CITY OF ALBUQUERQUE

August 22, 2007

Vicky Warwick
P.O. Box 362
Ruidoso, NM 88355
505-937-6777

Re: Drainage at 10812 Malaguena Lane NE

Dear Ms. Warwick,

This letter is issued in response to a complaint about recent changes made to your lot (10812 Malaguena Ln. NE) that adversely affect the overall drainage plan for this area. Per the approved grading and drainage plan for the Academy Ridge East Subdivision Phase 1, "rear lot discharges will be collected in a swale type ditch and transmitted from lot to lot through holes built into the block walls between lots. Every sixth lot (counting downstream) will provide a 5 foot private drainage easement and a swale to convey the collected flow to the street." The grading plan for this site designates your lot as a lot that must convey the collected flow to the street. Your changes have blocked this conveyance and have caused flooding problems for your neighbors upstream, possibly making you liable for any damages.

In the spirit of cooperation, I ask that you take the appropriate measures necessary to restore the original drainage flow and alleviate the upstream flooding issues. Please contact me at your earliest convenience at 924-3981 to discuss possible remediation methods or if you have any questions. If you are not the property owner, please contact me.

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

Sincerely,

Kristal D. Metro, P.E., CFM
Senior Engineer, Planning Dept.
Development and Building Services

C: Arlene Jacobs, 6221 Academy Ridge Ct. NE, Albuquerque, NM 87111
File
CC: Resident, 10812 Malaguena Ln. NE, Albuquerque, NM 87111

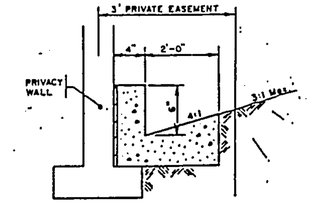
8/29/07 Rec'd call from Vicky Warwick
When purchased home 7 yrs ago, hole was not in wall
-neighbor punched hole in wall (early summer '07)
w/ sledgehammer, caused flooding in their yard
Hoping for some design advice

ZONE ATLAS E-21

APPROVED FOR DRAINAGE

6/29/88
DATE

Roy L. Hoss Jr. Hydrology
SIGNATURE TITLE



REAR YARD ALTERNATE PRIVATE DRAINAGE RUNDOWN DETAIL

3 NOT TO SCALE

SCALE 1"= 50

THE MEADOWS

PROPOSED GRADES SEVILLE APARTMENTS

ACADEMY ROAD

MALAGUENA

LANE

STREET

ACADEMY RIDGE COURT

CARRUTHERS

Wall 'A'

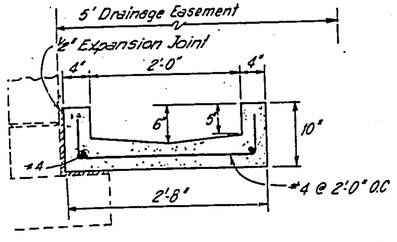
Wall 'B'

MATCH LINE SEE SHEET 10

MATCH LINE SEE SHEET 10

ACADEMY RIDGE ROAD

ACADEMY PLACE UNIT 5



DRAINAGE RUNDOWN DETAIL

To Be Built by Others

NO SCALE

4 Contractor's grading operations shall not disturb this area until the proposed storm drainage improvements at Malaguena Lane are in place and functioning.

RECORD DRAWINGS
Date 12/85

12-31-85

ENGINEER'S SEAL

E-22

AS-BUILT INFORMATION
CONTRACTOR KLC Inc. DATE 2/
WORK INSPECTED BY KLC Inc. DATE 2/
INSPECTOR'S ACCEPTANCE BY Paul Longacre DATE 2/
FIELD VERIFICATION BY Bill Lassle DATE 2/
DRAWINGS REVISED BY Bill Lassle DATE 2/
MICRO-FILM INFORMATIO

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

BENCH MARKS
ACS Brass Cap "6-E22" Elev 5934.53
Location: 1.2 miles East of the Intersection of Academy Road N.E. & Eubank Blvd. N.E.
Station is then 375 South on the South Rail of the Bear Canyon Tributary

NO.	DATE	REMARKS	BY
1	6/23/08	ADDED REAR YARD RUNDOWN DETAIL	KLD
2	9/9/85	ADDED SHT. 19 & REMAINING WORK	KLD
3	7/23/85	ADDED CURB & GUTTER	KLD

REVISIONS
DESIGN

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: ACADEMY RIDGE EAST PHASE I GRADING PLAN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER
City Engineer		6/21/85	Liquid Waste	NA
A C E - Design		6/17/85	Traffic	NA
~~D C E~~ - Hydrology		5/27/85	Water	NA

DRAWING NO. 2289 | MAP NO. E-21 | SHEET 11 | 0

PRINTING 44 13C 63174

E21/D29

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 19, 1990

CERTIFICATE OF COMPLETION AND ACCEPTANCE

Ms. Lynn Johnson
Centex Homes
10701 Montgomery Blvd. N.E.
Albuquerque, NM 87111

RE: PROJECT NO. 3977, ACADEMY RIDGE EAST III, (MAP NO. E-22)

Dear Ms. Johnson:

This is to certify that the City of Albuquerque accepts Project No. 3977 as being completed according to approved plans and construction specifications. The City of Albuquerque will accept for continuous maintenance all public infrastructure improvements constructed as part of Project No. 3977.

The project is described as follows:

- Removed and re-built catch basin, Type "A", to accommodate driveway on Malaguena Lane east of Academy Ridge Dr.
- The contractor's correction period begins the date of this letter and will be effective for a period of one (1) year.

Sincerely,

Brian L. Speicher, P.E.
Chief Construction Engineer
Design/Construction Division
Engineering Group
Public Works Department

BLS:kt

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR KEN SCHULTZ

CHIEF ADMINISTRATIVE OFFICER GENE ROMO

DEPUTY CAO PUBLIC SERVICES FRANK MARTINEZ

DEPUTY CAO PLANNING/DEVELOPMENT BILL MUELLER

February 5, 1988

Kerry Davis, P.E.
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: AMENDMENT TO ACADEMY RIDGE EAST, UNIT III DRAINAGE PLAN
RECEIVED JANUARY 6, 1988 FOR RUNDOWN REVISION APPROVAL
(E-21/D29) (W.O. NO. 3001)

Dear Mr. Davis:

The proposed amendment to combine the rear yard flows from Lots 19-32 with those of lots 6-1 and outfall to Malaguena Lane is approved. Provide this office with a revised Grading Plan with an engineer's stamp and revision date. The construction set for City Project 3001 must also be updated.

If you have any questions, call me at 768-2650.

Cordially,

Roger A. Green, PE

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

RAG/bsj

xc: Richard Mallett

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

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

October 7, 1986

Kerry Davis
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: REVISED CONSTRUCTION PLANS FOR CITY WORK ORDER PROJECT NO. 2767 (E-21/D29) RECEIVED OCTOBER 2, 1986

Dear Kerry:

The above referenced plans with the revision date of September, 1986, are approved.

Please attach a copy of these approved plans to the construction sets for sign-off and for the contractors use.

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

Cordially,

Billy J. Goolsby

Billy J. Goolsby, P.E.
C.E./Hydrology Section

BJG/bsj

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

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

September 17, 1986

Kerry Davis
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: REVISED DRAINAGE & CONSTRUCTION PLANS FOR ACADEMY RIDGE EAST, UNIT III (E-21/D29) RECEIVED SEPTEMBER 12, 1986

Dear Kerry:

The above referenced plans, dated September 9, 1986, are approved for inclusion in the Work Order set for sign-off at D.R.C.

Please see that these plans are included in the package prior to DRC signature session.

If I can be of further assistance, please call.

Cordially,

Billy J. Goolsby

Billy J. Goolsby, P.E.
C.E./Hydrology Section

BJG/bsj

— As per Builder's house designs, approx. 20% of roof area discharges to rear of yard.

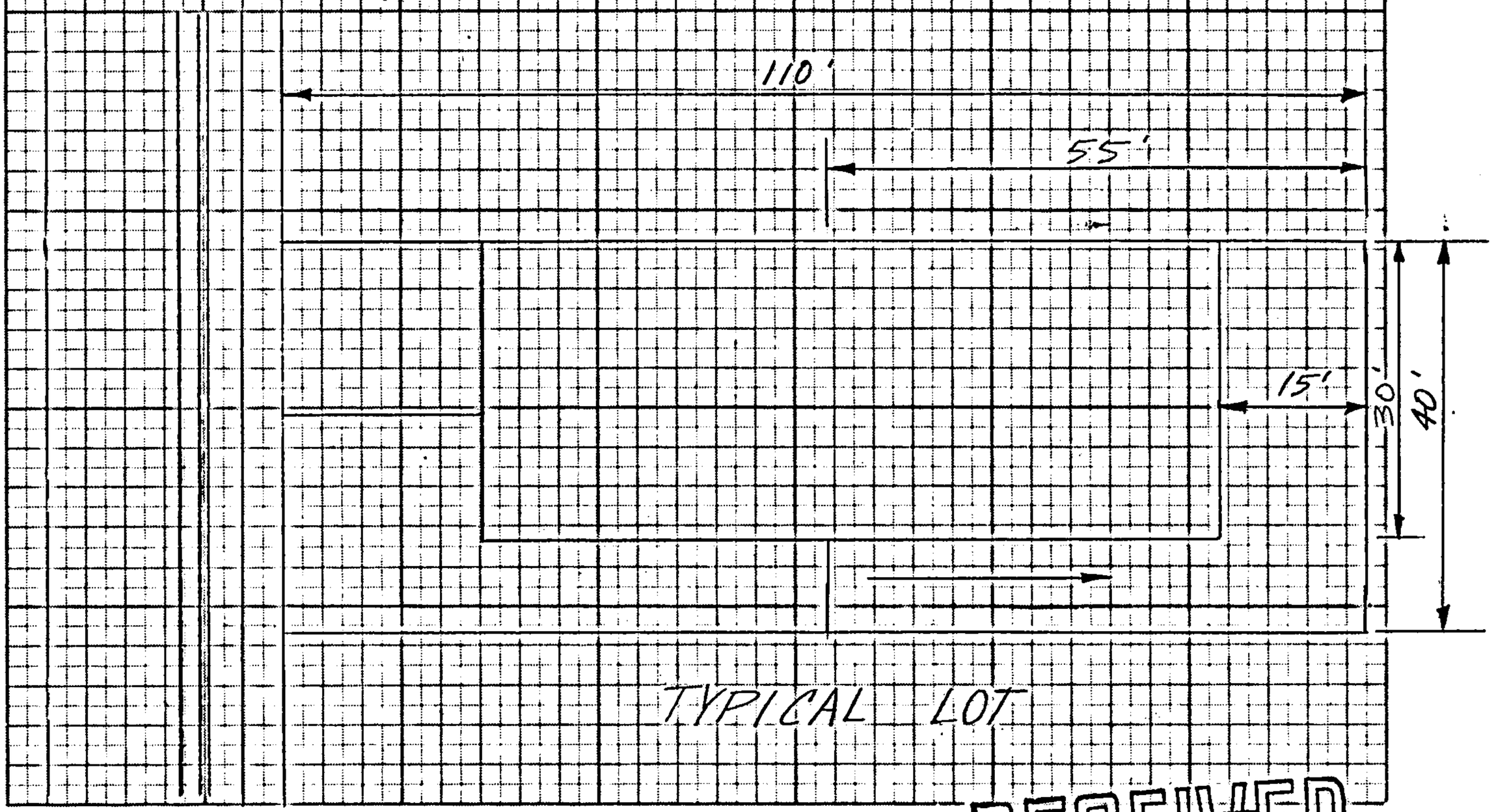
— Assume that 1/2 of side yard discharges to rear of yard.

Rear Yard Area (40' x 15') = 600 SF
(40' x 10') = 400 SF
1000 SF @ 0.25 (C)

Roof Area (30' x 15') = 450 SF @ 0.90 (C)

Total Area = 1450 SF.

Composite "C" Factor $\frac{(1000)(0.25) + (450)(0.90)}{1450} = 0.45$



BOHANNAN HUSTON INC.

PROJECT NAME Academy Ridge East SHEET OF
PROJECT NO. Phase I BY DLP DATE 6/23/88
SUBJECT CH'D DATE

10 LOT Total Area = $\frac{10(1450)}{43,560} = 0.33$ Ac

$I = (6\text{hr. rain})\ 6.84\ t_c^{-0.51}$

$I = (2.5)(6.84)(10)^{-0.51}$

$I = 5.28$"

$Q = CIA$

$Q = (0.45)(5.28)(0.33)$

$Q = 0.78$ cfs.

PROJECT NAME Academy Ridge East Phase I SHEET 2 OF

PROJECT NO. BY DATE

SUBJECT CH'D DATE

BOHANNAN HUSTON INC.

ACADEMY RIDGE FOURTH

MH - STA 1+75.00 CARRUTHERS ST.

HG = 5763.81 24" SD. Q = 28 CFS

INV. = 5762.05

TYPE 'C' INLET 'V' DEPTH STA 10+88.94

d = 24"

Q = 14 CFS

A = 3.14 FT²

V = 4.5 FPS

$V_{MIN} = 1.33 + 1.2\frac{V^2}{2g} + d$

$= 1.33 + 1.2(0.31) + 2.0 = 3.71'$

ACTUAL DEPTH

TC = 73.80
INV. = 69.63
4.17' ✓

TYPE 'A' INLET 'V' DEPTH STA 11+50.69

d = 18"

Q = 8 CFS

A = 1.77 FT²

V = 4.5 FPS

$V_{MIN} = 1.33 + 1.2\frac{V^2}{2g} + d$

$= 1.33 + 1.2(0.31) + 1.5 = 3.20$

TC = 74.59
INV 70.79
3.81' ✓

PROJECT NAME ACADEMY RIDGE EAST UNIT II SHEET ____ OF ____
PROJECT NO. 53543 BY ____ DATE ____
SUBJECT INLET DESIGN CH'D ____ DATE ____

BEAR TRIBUTARY
FOR CONTINUATION SEE
SHT. 17.

Existing 60' drainage R/W

ACADEMY RIDGE RD.
FOR CONTINUATION SEE
SHT. 16

P.C. STA. 2+45.00

P.I. STA. 3
Δ = 16° 24
R = 797.36
L = 228.43
T = 115.00

TC FL
73.90 ~~73.88~~ ~~73.22~~ 73.26
73.72 ~~73.73~~ ~~73.06~~ 73.05
73.49 ~~73.57~~ ~~72.90~~ 72.86

TC FL
73.95 ~~73.92~~ ~~73.2~~
74.07 ~~73.99~~ ~~73.~~
74.07 ~~73.4~~

M

ETAIL SHT. 18

2. 0+00
orm Drain

Sta. 0+00
Carruthers Street

29

TC ~~74.07~~ 74.02
72.92
FL ~~72.88~~
73.40
TC ~~73.41~~

8" PVC

SAS

W

8"PVC, DIP

24.2'

24.4'

MH 6

6" PVC, DIP or AC

SD 54" RCP

W 6"

SD

54"

46°

62.5' E

TC ~~73.41~~ 73.39
72.98
FL ~~72.88~~
TC ~~73.11~~ 73.80

32' F-F
50' R/W

TC
73.82 ~~73.84~~
74.36 ~~73.84~~
73.80 ~~73.84~~

STA. 0+20.00 CARRUTHERS ST =
STA. 39+76.20 DRAINAGE & ACCESS RIGHT-OF-WAY

TC .50 FL .87
73.~~49~~ 72.~~82~~
73.~~56.46~~ 72.~~89~~.98
73.~~64~~ ~~72.97~~
.70 73.09

Build Concrete Cutoff Wall
as per C.O.A. Std. P-8-3
Place 2 Type III Barricades
at end of pavement

Sta. 10+35
Sta 2+05.
Install
1-8" x 8"
1-8" x 6"
2-8" Gate
60 LF 8"
1-8" Cap
Blocking
1-6" Cap

Sta. 0+00 10' Lt Carruthers Street
Remove
1-6" Cap & Blocking
Install
205 LF 6" PVC, DIP or AC
1-6" Gate Valve W/Type "A" Box & Lid
1-6" 90° Bend
2-6" 45° Bends
Blocking

STA. 1+95 CARRUTHERS STREET =
STA. 10+45.94 ACADEMY RIDGE ROAD

Sta. 1+95 Carruthers St.
Install
50 LF 8" PVC
1-8" Plug
S = 0.02 Ft
Inv. @ plug = 66.~~00~~ .14

73.39 Rt.
73.65 Rt.
73.67 Rt.
73.86 Rt.

Sta. 1+95 Carruthers St. =
Sta. 10+45.94, Academy
Ridge Road

ts Lt, ~~Rt~~
~~Rt~~ TC = ~~5772.96~~ 73.01 Lt, 73.04 Rt.
8.71 Lt.
Rt Connect to

ACADEMY RIDGE RD.
8" PVC or PVC
S 88°53'35" E
8" PVC, DIP or AC
SAS
W
W
6" PVC, DIP or AC
CARRUTHERS
8" PVC, DIP or AC
W
STREET
8" PVC or VCP
SAS
N 01°06'25" E
RIM = 73.13
54" RCP
1+50
SD
2+00
48" RCP
2+50
TA 0+77.10
IM = 72.49
ILET
TC = 73.60
S 24°49'21" E
N 22°38' E
35.01'
24.01'
2+00
Sta ~~11+85.00~~, 25' Rt. Carruthers St.
Build 6' Dia Type 'E' M.H.
inv. (W) = 5762.66
(NE) = ~~5762.81~~ 5763.13
(SE) = ~~57.63.52~~ 5766.65
Rim = ~~5773.69~~ 5773.22
Install 24"
39 ~~24~~ LF ~~18"~~ RCP Rt. ~~S=0.249~~ S=0.068 INV. = 69.36
21 ~~35~~ LF 18" RCP Lt. ~~S=0.0110~~ INV. = 63.65
Place Sandbags at End of
Pipes to plug

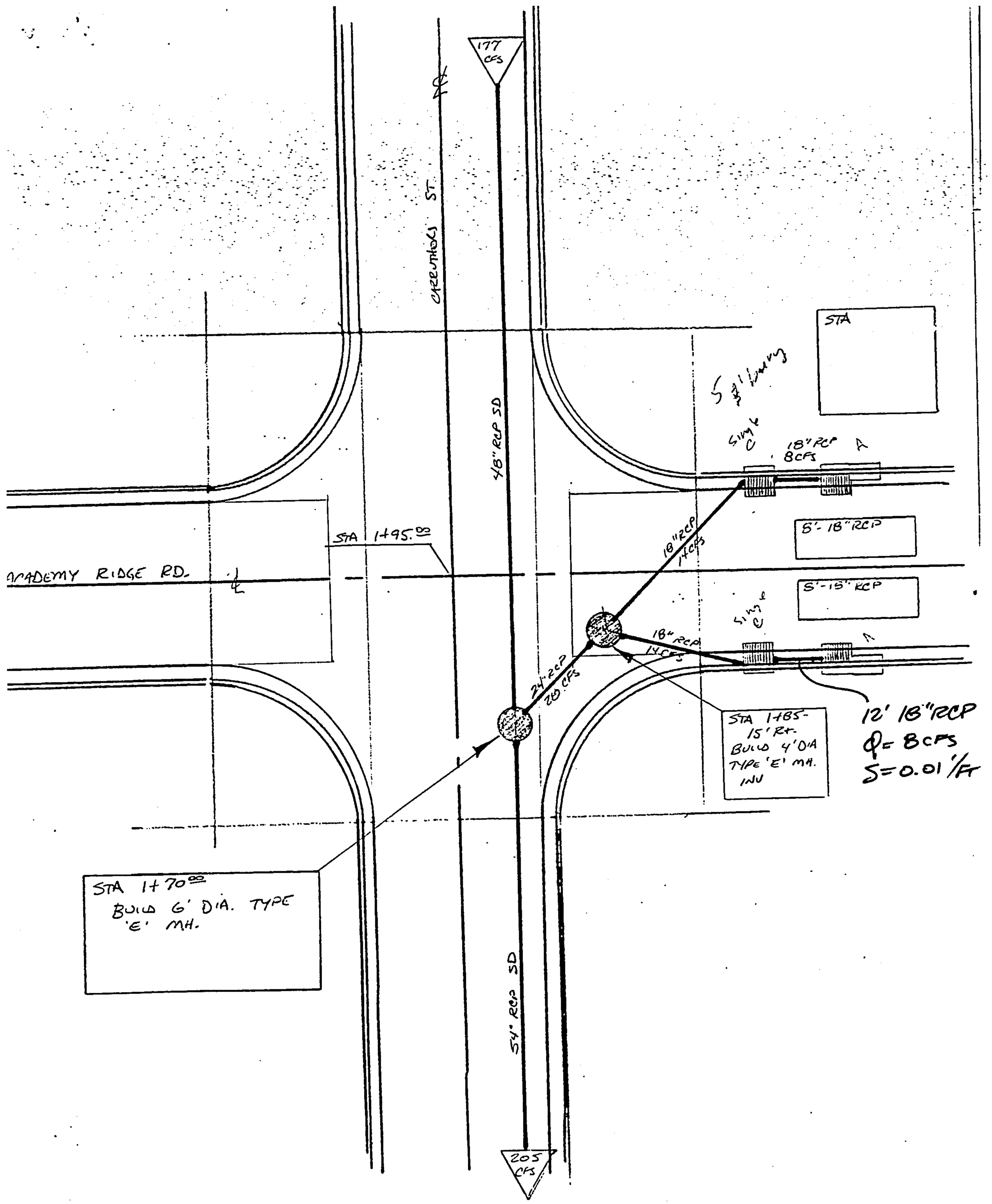
SCALE 1"=20'

98.83
~~38.83~~ Carruthers Street =
re1.75 Malaguena Lane

MALAGUENA LANE
8" PVC, DIP or AC
W

SCALE: 1" = 20'

ACAD. RIDGE
UNIT I
PROJECT 2289


177 CFS
GREENWICH ST
48" RCP SD
STA
5 SIMILAR
C
18" RCP
8 CFS
A
5'-18" RCP
18" RCP
14 CFS
5'-15" RCP
SIMILAR
C
A
18" RCP
14 CFS
24" RCP
20 CFS
STA 1+95.00
ACADEMY RIDGE RD.
STA 1+85-
15' RT.
BUILD 4' DIA
TYPE 'E' MH.
INV
12' 18" RCP
Q= 8 CFS
S= 0.01 '/FT
STA 1+70.00
BUILD 6' DIA. TYPE
'E' MH.
54" RCP SD
205
CFS

INTERSECTION- CARRUTHERS ST. & ACADEMY RIDGE ROAD.

PEAK FLOW IN MAINLINE

$Q = 177$ CFS

PEAK FLOW BASIN A-6 PLUS ROUTED FLOW FROM A-4

$Q = 40$ CFS

ACADEMY RIDGE ROAD EAST:

$\frac{1}{2}Q = 20$ CFS

$S = 4.0\%$

$D = 0.45'$ [DPM 22.3-D-1]

→ INSTALL 2=TYPE 'A' INLETS - 1 EACH SIDE

$Q_{REMOVED} = 8$ CFS PER INLET [DPM 22.3-D-5]

$Q_{REMAINING} = 40$ CFS $- 16$ CFS $= 24$ CFS

$\frac{1}{2}Q = 12$ CFS

$S = 4.0\%$

$D = 0.38'$

→ INSTALL 2-TYPE 'C' INLETS - 1 EACH SIDE

$Q_{REMOVED} = 6$ CFS PER INLET

TOTAL INPUT TO CARRUTHERS LATERAL =

16 CFS + 12 CFS = 28 CFS

TOTAL FLOW IN CARRUTHERS LATERAL =

177 CFS + 28 CFS = 205 CFS

→ INSTALL VALLEY GUTTER TO ALLOW REMAINING FLOW TO CROSS ACADEMY RIDGE ROAD AND FLOW SOUTH ON CARRUTHERS ROAD.

TOTAL FLOW ON CARRUTHERS ROAD =

14 CFS + 12 CFS = 26 CFS

$\frac{1}{2}Q = 13$ CFS

PROJECT NAME ACADEMY RIDGE EAST SHEET ____ OF ____

PROJECT NO. 71442 BY KLD DATE 7/18/24

SUBJECT CARRUTHERS LATERAL CHK'D ____ DATE ____

BEAR TRIBUTA
SEE SHEET 59
S.A.D NO. 205

Existing 60' drainage R/W

ACADEMY RI

P.C. STA. 2+

1"=115.00

Sta. 0+00
Storm Drain

Sta. 0+00
Carruthers Street

N88°53'35"W

SD

54" RCP

N46°06'25"E
119 LF

W

N01°06'25"E

54" RCP

SD

W

SAS

10'

SD

Install
21.21 L.F. 24" R.C.P
S = .04
Inv. @ Plug = 62.66

Storm Drain ℄ =
Bear Tributary
54.69)

Install E.M.D
Inv. 55.58

Install E.M.D

SAD-205
PROJECT 1721

CULVERT RATING TABLE

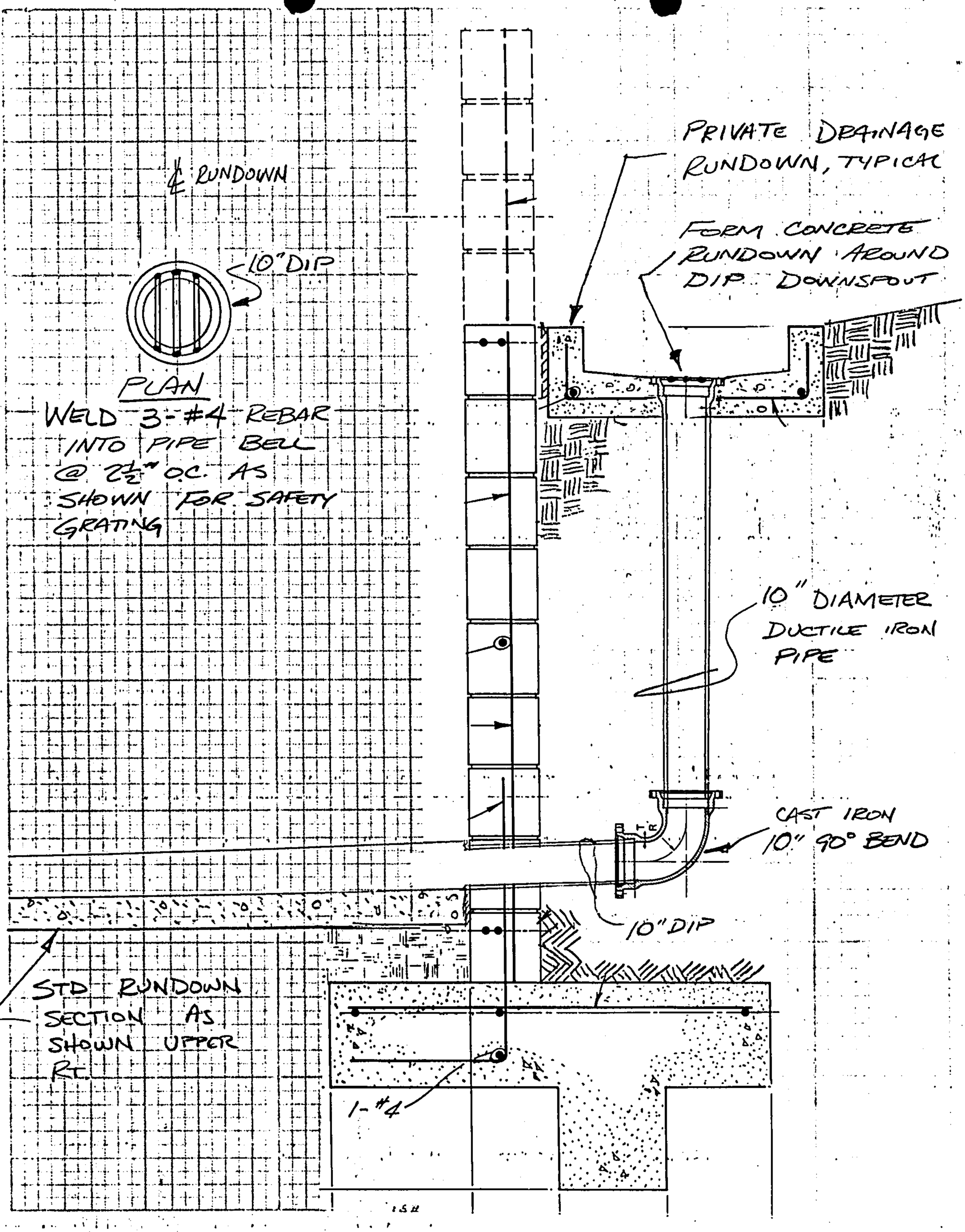
12. INCH DIAMETER PIPE

FLOW DEPTH INCHES	FLOW AREA SQ. FT.	DISCHARGE CFS	VELOCITY FPS.
1.00000	0.03862	0.06315	1.63519
2.00000	0.10733	0.27351	2.54856
3.00000	0.19359	0.63427	3.27631
4.00000	0.29241	1.13759	3.89045
5.00000	0.40056	1.77084	4.42093
6.00000	0.51564	2.51621	4.88369
7.00000	0.63505	3.36144	5.29822
8.00000	0.75583	4.28017	5.66049
9.00000	0.88357	5.25216	5.94424
10.00000	1.00831	6.25317	6.20161
11.00000	1.13150	7.25682	6.41346
12.00000	1.25151	8.23415	6.57938
13.00000	1.36659	9.15277	6.69755
14.00000	1.47474	9.97533	6.76413
15.00000	1.57355	10.65611	6.77201
16.00000	1.65981	11.13264	6.70715
17.00000	1.72852	11.29617	6.53516
18.00000	1.76715	10.50433	5.94424

CULVERT RATING TABLE

24. INCH DIAMETER PIPE

FLOW DEPTH INCHES	FLOW AREA SQ. FT.	DISCHARGE CFS	VELOCITY FPS.
1.00000	0.04479	0.14713	3.28501
2.00000	0.12504	0.64328	5.14454
3.00000	0.22665	1.50675	6.64777
4.00000	0.34416	2.73195	7.93793
5.00000	0.47417	4.30302	9.07492
6.00000	0.61418	6.19769	10.09094
7.00000	0.76224	8.38907	11.00574
8.00000	0.91669	10.84657	11.83234
9.00000	1.07605	13.53649	12.57975
10.00000	1.23901	16.42230	13.25436
11.00000	1.40432	19.46485	13.86068
12.00000	1.57079	22.62236	14.40186
13.00000	1.73727	25.85039	14.87990
14.00000	1.90258	29.10153	15.29584
15.00000	2.06554	32.32512	15.64974
16.00000	2.22490	35.46652	15.94071
17.00000	2.37935	38.46613	16.16669
18.00000	2.52741	41.25769	16.32412
19.00000	2.66742	43.76541	16.40737
20.00000	2.79743	45.89854	16.40741
21.00000	2.91494	47.54010	16.30914
22.00000	3.01655	48.51834	16.08406
23.00000	3.09680	48.50477	15.66266
24.00000	3.14159	45.24477	14.40186



PROJECT NAME ACADEMY RIDGE EAST SHEET 1 OF 1

PROJECT NO. 61820 BY K. DAVIS DATE

SUBJECT DOWNSPOUT DETAIL CH'D DATE

MALAGUENA

LANE

ACADEMY RIDGE COURT

CARRUTHERS

Wall 'A'

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

16 42 43

1 2 3 4

0+00

Only

PROJECT: Academy Ridge East

SUMMARY OF HYDRAULIC CALCULATIONS

BY: KLS
DATE: 24 Feb '86
SHEET 1 OF 1

STATION	STRUC	CONDUIT Q	n	PIPE	L	S	S_f	OPEN CHANNEL FLOW PIPE HYDRAULICS Q/full	q/full	d/D-full	d_n	V full	V/V full	V	LOSSES H_f	H_x	PRESSURE CONDUIT LOSSES A	V	H_f	H_b	H_j	H_{min}	H_x	E_{hl}	ELEVATIONS E.G.	hv	H.G.	soffitt	d_n	invert
0+00	WYE																												
																									26^{21}	1.30	24^{91}		2^{01}	22^{90}
		45	0.013	36"	34^{99}	0.010	0.00455	67	0^{67}	0^{67}	2.01	9^{44}	0^{97}	9.16	0^{34}										26^{55}	1.30	25^{25}	.71	2.01	23^{24}
$0+34^{99}$	45° Bend																								26^{55}	1.30	25^{25}		2.01	23^{24}
		45	0.013	36"	168^{20}	0.010	0.00455	67	0^{67}	0^{67}	2.01	9^{44}	0^{97}	9.16	1^{68}	0^{09}										28^{32}	1.30	27^{02}		2.01	25^{01}
$2+02^{69}$	MH																								28^{02}	1.55	26^{47}		1.46	25^{01}
		25	0.013	24"	295^{37}	0.020	0.01221	32	0^{78}	0^{73}	1.46	10^{19}	0^{98}	9.99	5^{91}										33^{93}	1.55	32^{38}		1.46	30^{92}
$4+98^{06}$	MH																								33^{93}	1.55	32^{38}		1.46	30^{92}
		25	0.013	24"	23^{41}	0.020	0.01221	32	0^{78}	0^{73}	1.46	10^{19}	0^{98}	9.99	0^{47}										35^{40}	1.55	32^{85}		1.46	31^{39}
$5+21^{47}$	MH																												

For inlet design only - SD is existing

INTERSECTION- CARRUTHERS ST. & ACADEMY RIDGE ROAD.

PEAK FLOW IN MAINLINE

$Q = 177$ CFS

PEAK FLOW BASIN A-6 PLUS ROUTED FLOW FROM A-4

$Q = 40$ CFS

ACADEMY RIDGE ROAD EAST:

$\frac{1}{2}Q = 20$ CFS

$S = 4.0\%$

$D = 0.45'$ [DPM 22.3-D-1]

→ INSTALL 2-TYPE 'A' INLETS - 1 EACH SIDE

$Q_{REMOVED} = 8$ CFS PER INLET [DPM 22.3-D-5]

$Q_{REMAINING} = 40$ CFS - 16 CFS = 24 CFS

$\frac{1}{2}Q = 12$ CFS

$S = 4.0\%$

$D = 0.38'$

→ INSTALL 2-TYPE 'C' INLETS - 1 EACH SIDE

$Q_{REMOVED} = 6$ CFS PER INLET

TOTAL INPUT TO CARRUTHERS LATERAL =

16 CFS + 12 CFS = 28 CFS

TOTAL FLOW IN CARRUTHERS LATERAL =

177 CFS + 28 CFS = 205 CFS

→ INSTALL VALLEY GUTTER TO ALLOW REMAINING FLOW TO CROSS ACADEMY RIDGE ROAD AND FLOW SOUTH ON CARRUTHERS ROAD.

TOTAL FLOW ON CARRUTHERS ROAD =

14 CFS + 12 CFS = 26 CFS

$\frac{1}{2}Q = 13$ CFS

BOHANNAN HUSTON INC.

PROJECT NAME ACADEMY RIDGE EAST SHEET ____ OF ____

PROJECT NO. 41442 BY KLD DATE 7/18/84

SUBJECT CARRUTHERS LATERAL CH'D ____ DATE ____

SUMP CONDITION ON CARRUTHERS ROAD @ STA 7440.59

TC = 12.98

CHECK REQUIRED HEAD FOR DISCHARGE = 13 CFS PER INLET

$Q = CA\sqrt{2gH}$ (C FACTOR FOR CONDUIT = 0.6)

(A FOR 18" PIPE = 1.77 S.F.)

$13\ CFS = (0.6)(1.77)\sqrt{2(32.2)H}$

$13 = 1.06\sqrt{64.4H}$

$12.26 = \sqrt{64.4H}$

$150.33 = 64.4H$

$2.33' = H$ REQUIRED

→ INSTALL 2-TYPE A INLETS @ STA 7440.5

TOTAL INPUT TO CARRUTHERS LATERAL = 26 CFS

TOTAL FLOW IN CARRUTHERS LATERAL @ BEAR TRIB

205 CFS + 26 CFS = 231 CFS

PROJECT NAME ACADEMY RIDGE EAST SHEET ____ OF ____

PROJECT NO. 41442 BY KJS DATE 7/18/04

SUBJECT CARRUTHERS LATERAL DESIGN CH'D ____ DATE ____

FROM ACADEMY RD

150 CFS

STA 5+98.83

MARAGUENA

18" RCP 13.5 CFS

16" RCP 13.5 CFS

24" RCP 27 CFS

STA 5+73.83 15' RT.
BUILD 6' DIA
TYPE 'C' M.H.

177 CFS

TO ACADEMY RIDGE RD

FROM NAVAGUNA

177 CFS

CREEMORE ST

48" RCP SD

STA

5 @ 1' Inlets

SIMP C

18" RCP A
8 CFS

8'-18" RCP

18" RCP
14 CFS

8'-18" RCP

SIMP C

18" RCP
14 CFS

A

24" RCP
20 CFS

STA 1+95.00

ACADEMY RIDGE RD.

STA 1+85-
15' Rt.
BUILD 4' DIA
TYPE 'E' MH.
INV

STA 1+70.00
BUILD 6' DIA. TYPE
'E' MH.

54" RCP SD

205 CFS

UNDEVELOPED FLOWS FROM EAST OF CARRUTHERS.

LAST INLET M.H. ON BEAR TRKS @ STA. Y/B+50 - NEAR NORTHEAST CORNER OF ACADEMY PLACE UNIT 5.

$i = (2.6)(6.84)(10\ min)^{-.51} = 5.50$

BASIN	D.A.	C FACTOR	i	Q UNDEVELOPED
A-1	7.1	0.34	5.5	13.3
A-3	5.1			9.5
A-5	9.4			17.6
A-6	8.3			15.5
A-9	2.3			4.3
TOTAL	32.2			60.2 cfs

BUILD 1- TYPE DOUBLE 'D' INLET @ ALLEY INTERSECTION EAST OF CARRUTHERS

ASSUME FLOW DEPTH = 0.5'

$Q_{REMOVED} = 10$ CFS

BUILD 2- TYPE 'A' INLETS ON CARRUTHERS AT SAG SUMP CONDITION

$Q_{REMAINING} = 60\ cfs - 10 = 50$ CFS OR 25 CFS PER INLET.

WITH 18" CONNECTOR PIPES:

$Q = CA\sqrt{2gh}$

$25 = (0.6)(1.77)\sqrt{64.4h}$

$23.54 = \sqrt{64.4h}$

$554.15 = 64.4h$

$8.6' = h$

$-0.2'$

$8.4'$ = MINIMUM DEPTH OF INLET BELOW TOP OF CURB.

TC = 5772.96

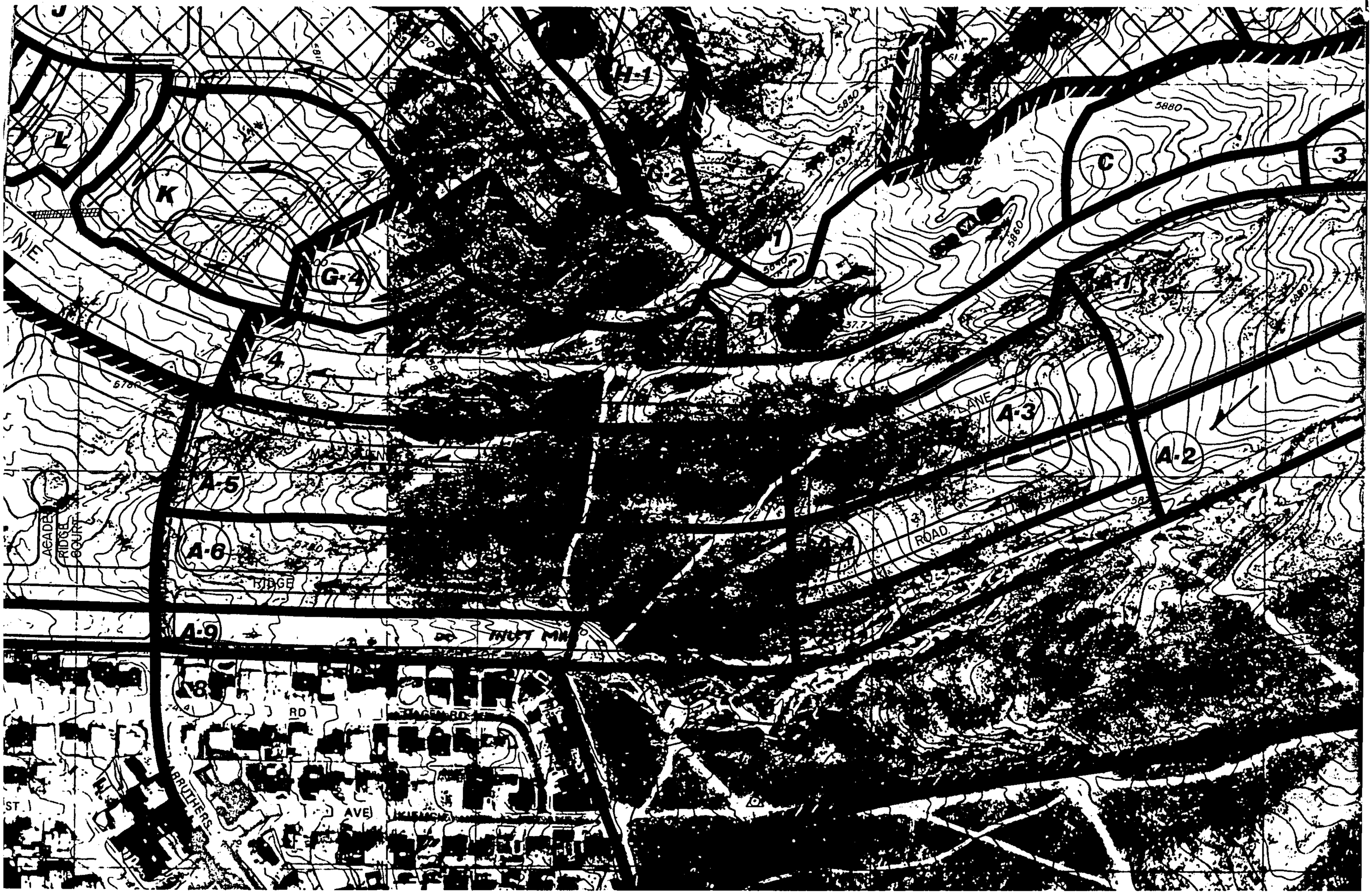
INVERT = 5764.00

DEPTH PROVIDED = 8.96'

PROJECT NAME ACADEMY RIDGE EAST SHEET ____ OF ____

PROJECT NO. 4/1443 BY KID DATE ____

SUBJECT UNDEVELOPED FLOW ANALYSIS CH'D ____ DATE ____



UNDEVELOPED DRAINAGE AREA - BASINS A-1, A-3, A-5, A-6, & A PORTION OF A-9

95 LF 6" PVC, DIP or AC
6" Gate Valve w/Type "A" Box & Lid
6" 90° Bend
6" 45° Bends
Blocking

Sta. 1+95 Carruthers St.
Install
50 LF 8" PVC
1-8" Plug
S = 0.02 ft/ft
Inv. @ plug = 66.00

CAR

Sta 0+00 S.D. ℄ =
Sta 39.36 & Bear.
Tributary Storm Sewer
Existing 66"x54" Wye
Sta. 0+35.82
Existing 54"x18" Wye
Sta. 0+38.45
Existing 54"x18" Wye

80' VC
MO = * 0.18

Remove Concrete Cut - 0.1'±
Wall Match Existing Pavement
VPC 0+00.00
TC 73.31
VPI 0+40
(72.81) TC 72.99
IDENTICAL MANHOLE
VPT 0+80
TC 73.02

E.R. 1+54.00 Lt. & Rt.
TC 73.41
P.I. 1+79.00 Lt. & Rt.
TC 73.54
P.I. 2+11.00 Lt. & Rt.
TC 73.71
E.R. 2+36.00 Lt. & Rt.
TC 73.84

S = 0.0125

Existing
Top
S = 0

CI

6" PVC, DIP or AC
8" PVC, DIP or AC
S

103.67' - 54" RCP
S = 0.02411

400.92' - 48" R

Sta 0+56.33
Build Type 'A' Inlets Lt. & Rt.
Inv. = 57.64.00 Lt. & Rt. MUST DO
TC = 57.72.96
Connect 18" RCP Outfall
Pipes to Existing Wyes
Sta 0+72.59 S.D. =
Sta 0+66.33 ℄ Existing
Storm Sewer Equation

Sta 1+95 ℄ Carruthers St. =
Build 4' Dia Type 'E' MH
W = 9.44
N = 65.02
E = 65.04
Z = 73.28

DRAINAGE REPORT
FOR
ACADEMY RIDGE EAST

July 1984

PREPARED FOR:

AMERIWEST CORPORATION
P.O. BOX 25625
ALBUQUERQUE, NM 87125

PREPARED BY:

BOHANNAN–HUSTON INC.
4125 CARLISLE NE
ALBUQUERQUE, NM 87107

Job No. 4 144 1

PURPOSE

The purpose of this report is to outline the drainage management plan for a 60.1 acre tract referred to as Academy Ridge East, owned by AmeriWest Corporation. The Development Process Manual (DPM) will be utilized to establish the plan.

SITE LOCATION AND DESCRIPTION

Academy Ridge East is located south of Academy Road NE, about one-half mile east of Eubank Blvd. Figure 1 identifies the project location. The development falls within the Academy/Tramway/Eubank Sector Development Plan area. The property combines portions of two tracts within the Sector Development Plan, both zoned R-D. One tract is zoned for single family residential (6 DU/acre maximum) and the other is zoned for mixed residential (15 DU/acre maximum). The entire subdivision will have no more than 6 DU/acre and will be developed for patio homes. Figure 2 shows the tracts as they appear in the Sector Development Plan.

PREVIOUS REPORTS

Two major drainage studies are currently existing that provide hydrological analyses of the property and additional information that will prove useful. These are the ***Academy/Tramway/Eubank Sector Development Plan Master Conveyance Study*** and the ***Drainage Report for the Bear Arroyo Tributary*** prepared for SAD 205.

The Master Conveyance Study recommended constructing an open concrete channel in the Bear Tributary Arroyo with structures at street crossings. This plan was abandoned in favor of a closed conduit to be constructed in SAD 205.

The Master Conveyance Study also recommended constructing special design inlets in Academy Road with a closed conduit to deliver collected flows to the Bear Tributary Channel, along the proposed alignment of Carruthers St. This pipeline will be referred to as the Carruthers lateral. ,

The design of the inlets in Academy included flows from north of Academy only. This area is shown as a portion of Basin C5 on Figure 3. Because of this, Academy Ridge must be designed to discharge no flows to Academy Road.

The ***Drainage Report for the Bear Arroyo Tributary*** was prepared to analyze runoff generated east of Tramway. That report recommends constructing diversion structures to divert Bear Tributary runoff into the Pino Arroyo, as shown in Figure 4.

These diversions are to be constructed prior to SAD 205. AMAFCA Resolution 1984-5 decrees that no development may occur within the 100-year flood plain until the diversion structures are in place and functioning.

Another analysis of the Bear Tributary Watershed was performed for SAD 205 of those basins west of Tramway. This analysis is included in Appendix 1. Information from that analysis was culled for use in the hydrology utilized in this report.

HYDROLOGIC ANALYSIS

A modified version of the computerized watershed model "HYMO" was used to compute the flow rates generated within the Bear Tributary basins. The rainfall used for this analysis was the one-hour, 100-year storm equal to 2.3". This storm was used in the previous report done for SAD 205. (p. A1-3) "The one-hour storm was used because flooding problems in this area usually result from very intense, short duration thunderstorms. Six-hour storms would add to the volume of runoff, but would not add to the peak flow rates". (p. A1-4).

All hydrologic computations and the HYMO printout are included in Appendix 2. The runoff generated within each of the basins calculated by HYMO was checked using the rational method and reasonable correlations were obtained. The basin layout for the Bear Tributary Watershed is shown on Plate 1.

A routing scheme was developed to approximate the actual drainage configuration under developed conditions, assuming no runoff retention in any basin. The schematic diagrams for basin configuration and the HYMO analysis are presented on page A2-4 and A2-5 of Appendix 2.

DRAINAGE MANAGEMENT PLAN

The scheme for managing storm water runoff in Academy Ridge will assume that the Bear Tributary pipeline will be in place, as well as the other items to be constructed as parts of SAD 205. These items include the diversions to the Pino Arroyo at Tramway, and Academy Road, complete with inlets to collect flows generated north of Academy, along with a portion of the Carruthers lateral.

Bear Tributary Pipeline

The original hydraulic analysis of the Bear Tributary pipeline is included in Appendix 3, along with reduced plans for the SAD 205 construction of the pipeline.

The original hydraulic analysis provided for flow inputs distributed along the length of the pipe. The Academy Ridge development will concentrate the majority of these inputs in three laterals: the Carruthers lateral, the Malaguena lateral and a lateral in Academy Ridge Drive. See Figure 5 for an overview of the drainage facilities to be constructed in Academy Ridge East.

The design of the Bear Tributary pipeline provided specially designed inlet manholes to deliver flow to the pipe. The Academy Ridge development will include a paved public alleyway centered over the pipe. If possible, the inlet manholes would remain in place and functioning, and small swales would deliver flow from the adjacent blocks to the inlets. If this is not possible, type 'D' inlets would be built to accept flow from the alley and connectors would deliver that flow to the manholes.

A flow schematic for the Bear Tributary pipeline showing actual inputs and mainstream flows after the Academy Ridge development is in place is shown on page A3- of Appendix 3. This compares favorably with the original design flows shown above it.

Carruthers Lateral

This pipeline has been designed for SAD 205 to convey flows from Tract J of the Tanoan Properties (see Figure 1), now Country Club Estates. Originally, a ponding area was designed to collect flows from a tract of land north of Academy (Basin D, Figure 3 and a closed basin shown on Plate 1 of the Appendix). This ponding area has been eliminated and a diversion will be constructed to convey flows from this basin to the Tanoan Country Club, and the Pino Arroyo Watershed. That construction will be a part of the County Club Estates development. } clock

Page A4-1 of Appendix 4 shows the plan and profile for the portion of the Carruthers lateral to be built under SAD 205. The Academy Ridge development will include removing the bend where the pipe dumps into an existing arroyo, extending it to the Bear Tributary pipeline, and constructing a junction box at their confluence. The specially designed inlets in Academy Road will remain in place after Academy Ridge East is developed. Academy Ridge East will utilize the Carruthers lateral to remove some of the flow generated internally. Batteries of inlets will be installed in Malaguena Lane and Academy Ridge Road to accomplish this. Figure 5 provides an overview of the drainage facilities to be constructed in Academy Ridge.

The original hydraulic analysis of Tract J and the original design of the Carruthers lateral called for a 66" pipe to convey flows from Academy Road. The drainage report for Country Club Estates included a hydrologic analysis that reduces the discharge from Tract J from 118 cfs to 45 cfs. Hydrologic analysis of basins north of Academy Road indicates a peak flow discharge into Carruthers Road of approximately 160 cfs.

Preliminary design computations for the storm drain laterals are shown on page A4-2 of Appendix 4. These computations utilize pressure flow procedures presented in the DPM. The hydraulic grade line elevations at the Bear Tributary pipeline were taken from the hydraulic computations in Appendix 2. Since the Academy Ridge development reduces the actual flow in the Bear Tributary, these elevations are conservative. The preliminary design calculates friction head loss only, but sufficient elevation differences are provided to allow for head losses from junctions, manholes, etc. The preliminary design for the Carruthers lateral indicates that a 48" pipe will be required to convey discharge from Academy Road. Therefore, the SAD 205 construction drawings should be changed to downsize the Carruthers lateral pipeline.

In addition, to provide the most efficient use of space for platting within Academy Ridge East, the intersection of Carruthers and Academy occurs approximately 40' west of the location proposed by the SAD 205 construction drawings. It is, therefore, imperative that SAD 205 be changed to allow for a new size and configuration of the Carruthers lateral. ?

Off-Site Flows

Academy Road will divert any flow attempting to enter the development from the north. Therefore, the only off-site flows to be addressed are sheet flows from the tract of land immediately to the east held in trust for the Albuquerque Boys Academy, flows from the tracts southeast owned by AmeriWest Corporation, and flow entering through the Bear Tributary collection channel.

An east-west ridge enters Academy Ridge East from the Academy lands approximately 200' north of the southeast corner of the development. Sheet flow across the ?

Academy lands will be collected and diverted in an open earthen channel to the north and south. The flow diverted south will be collected by the Bear Tributary Collection Channel, a small open channel that delivers flow to the pipeline. The flow directed to the north will enter a rundown that will deliver it to Malaguena Lane. Inlets will be provided in Malaguena Lane at Academy Ridge Drive to convey the flow to the Academy Ridge lateral. The diversion berm will be a temporary facility that will be in place until the Academy lands are developed. At that time, adequate grading of the site could provide runoff concentration at the northwest and southwest corners of the tract without a diversion facility.

Flow from the southeast will be collected by the paved alleyway and delivered to the Bear Tributary pipeline. Some off-site grading may be required to accomplish this without ponding. Additional flow from the tract to the southeast would be conveyed to the Bear Tributary pipeline in a future storm drain lateral.

On-Site Grading

Due to the desire of the developer to allow the location of the individual dwelling pads to remain flexible, the grading plan will not provide flat pad areas. Rather, a small ridge line will be graded across the rear of the future pad envelopes, in a diagonal grading scheme shown on Plate 2. Rear lot discharges will be collected in a swale type ditch and transmitted from lot to lot through holes built into the block walls between lots. Every sixth lot (counting downstream) will provide a 5' private drainage easement and a swale to convey the collected flow to the street. The future configuration of such a scheme is presented on sheet A4-3.

PHASING PLAN

The proposed Academy Ridge development will be constructed in three phases from west to east as shown in the three figures in Appendix 5. The existing topography will allow natural arroyos to transmit undeveloped flows to stubbed streets with minimal grading off-site to each phase. The manhole inlets and collection channel on the Bear Tributary will remain in place and functioning until a development phase is constructed. At that time, the public alleyway will be paved and type 'D' inlets will replace the manhole inlets as required. In addition, storm drain laterals will be constructed as follows: the Malaguena and Carruthers laterals in Phase I and the Academy Ridge lateral in Phase II.

EROSION CONTROL

An erosion control plan will be submitted during the construction plans review process prior to obtaining grading permits. The plan will address measures required to minimize erosion in those areas graded but remaining undeveloped during implementation of the phasing plan.

SUMMARY AND CONCLUSIONS

Academy Ridge East is proposed as a townhome development with densities not to exceed 6 DU/acre. It occurs within the Bear Arroyo Tributary Watershed, bordered by Academy Road on the north and the Bear Tributary pipeline on the south. This report assumed that the diversions to the Pino Arroyo from the Bear Tributary Arroyo at Tramway would be in place as well as the improvements included in SAD 205. Among these improvements are pavement on Academy Road and the Bear Tributary pipeline.

Hydrologic analysis of the ultimate development led to the following conclusions:

- The pipeline in Academy Road, identified as the Carruthers lateral, included in the SAD 205 improvements should be redesigned to downsize the pipe and alter the geometry to relocate the outlet in the revised intersection of Carruthers Road and Academy.

- Concentrating the inputs into the Bear Tributary pipeline into three storm drain laterals will not adversely affect the hydraulics of the original design of the pipeline, done for SAD 205.

- Some off-site grading will be required for the ultimate development to collect and divert sheet flow from the tract immediately east of the development and to prevent ponding in the tract southeast of the development.

- On-site grading will provide for lot-to-lot conveyance of backyard discharge and conveyance of six-lot collected flows to the internal streets, where those flows will be intercepted by the storm drain laterals.

- The existing topography will allow phasing of the development with minimal grading off-site to each implemented phase.

Tom Mann Associates, Inc.
Engineers
811 DALLAS, N.E. • ALBUQUERQUE • NEW MEXICO • 87110 • 505-265-5611

10078
May 26, 1983

BEAR TRIBUTARY FLOW ANALYSIS

100 year, 1 hour discharges in CFS:

Crossing	No. Diversion	Diversion 1-Mile East Of Tramway	Diversion At Tramway
Tramway	1220	700	0
Lowell	1250	800	170
Eubank	1410	1280	830

BEAR TRIBUTARY FLOW ANALYSIS
AT TRAMWAY BOULEVARD AND EUBANK BOULEVARD

INTRODUCTION

The purpose of this study was to determine 100-year flow rates along the Bear Arroyo Tributary at Tramway and Eubank, assuming different runoff conditions upstream of Tramway.

The first part of this analysis was to develop a rainfall-runoff model that matched the accepted flow rates developed by Leonard Rice. The second part of the analysis was to then evaluate the downstream effects of a diversion east of Tramway that reduced flow in the Bear Tributary to 700 cfs or less at Tramway.

PROCEDURES

The rainfall-runoff model HYMO was used for this analysis. The model uses the SCS curve number approach to develop runoff and also has routing capabilities. Drainage areas downstream of Tramway were defined by T. Mann Engineers. Upstream of Tramway the drainage areas were defined by Bohannan—Huston, Inc. within a study entitled "Drainage Evaluation of Albuquerque Academy Land East of Tramway," February, 1982. Curve numbers were based on standard SCS criteria assuming fully developed conditions with no on-site reduction of flow. Times of concentration for the sub-basins were based on average velocities for street flows taken from the Kent Whitman report.

The rainfall used for this analysis was the one hour, 100-year rainfall equal to 2.3 inches (K. Whitman). The rainfall distribution was based on the 10% probability, first quartile storm, typical of intense southwestern thunderstorms, from F.A. Huff, "Time Distribution of Rainfall in Heavy Storms," Water Resources Research, 3, No. 4, 1967.

A1-3

The one hour storm was used because flooding problems in this area usually result from very intense, short duration thunderstorms. Six hour storms would add to the volume of runoff but would not add to the peak flow rate.

STUDY RESULTS

A schematic of the sub-basin characteristics and flow rates is shown on Figure 1. The hydrographs for the flows, at Tramway and Eubank, with and without the diversion are shown on Figure 2. A review of the attached computer runs indicates that without the diversion, the peak flow rate at Eubank is mostly dependent on the large flow from east of Tramway because the peak flows from intervening drainage basins west of Tramway occur earlier. With the diversion in place, the intervening sub-basins contribute more directly to the peak flow rate at Eubank.

The Leonard Rice peak flow rates for Bear Tributary at Tramway and Eubank are 1,206 cfs and 1,400 cfs respectively. Discharges generated by the rainfall-runoff model for those same locations, without an upstream diversion, yielded 1,220 cfs and 1,410 cfs. With the diversion in place (approximately one mile east of Tramway) flows at Tramway and Eubank were estimated to be 700 cfs and 1,280 cfs respectively.

There is only a small difference in peak flow at Eubank with and without the diversion. Again, this analysis was based on many assumptions and on fully developed conditions without on-site detention.

Additional information developed in this study are the expected flows at Lowell. The peak flow rate along Academy at Lowell is 80 cfs. The peak channel flow at Lowell is 760 cfs with the diversion and 1,240 cfs without the diversion. Total routed flow at Lowell (Academy flow and channel flow) is 800 cfs and 1,250 cfs with and without the upstream diversion.

One last computer run was made to determine the peak flow rate at Eubank assuming total diversion at Tramway. Assuming no flow at Tramway, total flow at Lowell (Academy and channel flow) would be 170 cfs and peak flow at Eubank would be 830 cfs.

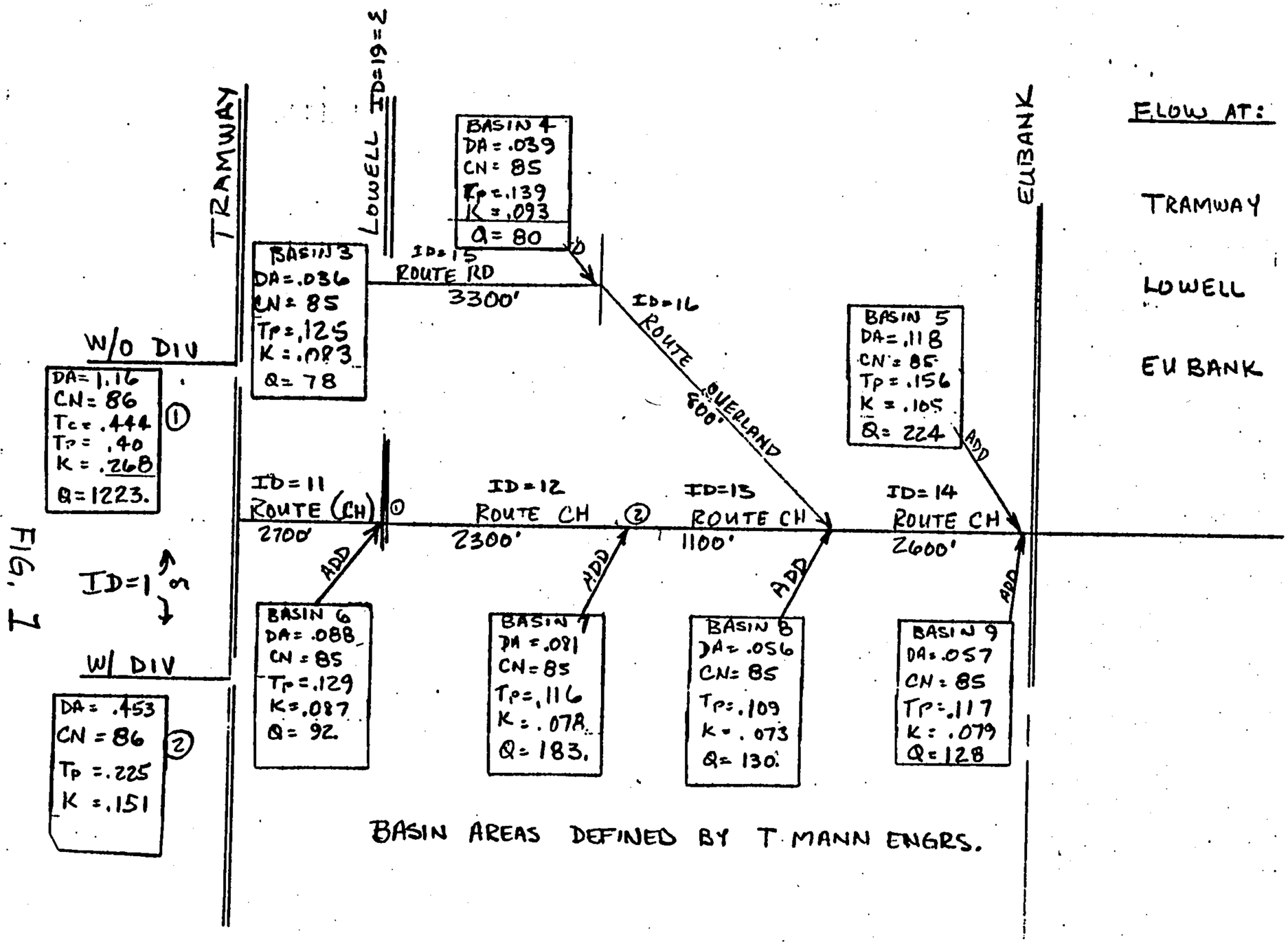
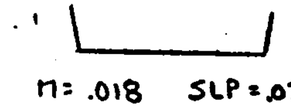


FIG. 1

FLOW AT:	WITHOUT DIVERSION (CFS)	WITH DIVERSION 1MI EAST OF TRAMWAY (CFS)	WITH DIVERSION AT TRAMWAY (CFS)
TRAMWAY	1220	700.	-0-
LOWELL	1250.	800.	170.
EU BANK	1410.	1280.	830

BASIN AREAS DEFINED BY T. MANN ENGRS.

OVERLAND SECTION



STA.	ELEV
0	2
2	0
62	0
64	2

ROAD SECTION

STA.	ELEV
0	.67
.1	0.0
30	.47
60	0.0
60.1	.67

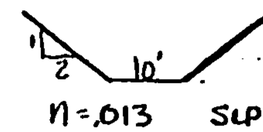
MIN	
0	.0
2	.33
4	.79
6	1.21
8	1.53

RAINFALL .0333HR: 2MIN

10	1.78	20	2.16
12	1.94	22	2.19
14	2.02	24	2.22
16	2.09	26	2.25
18	2.13	28	2.28
		30	2.30

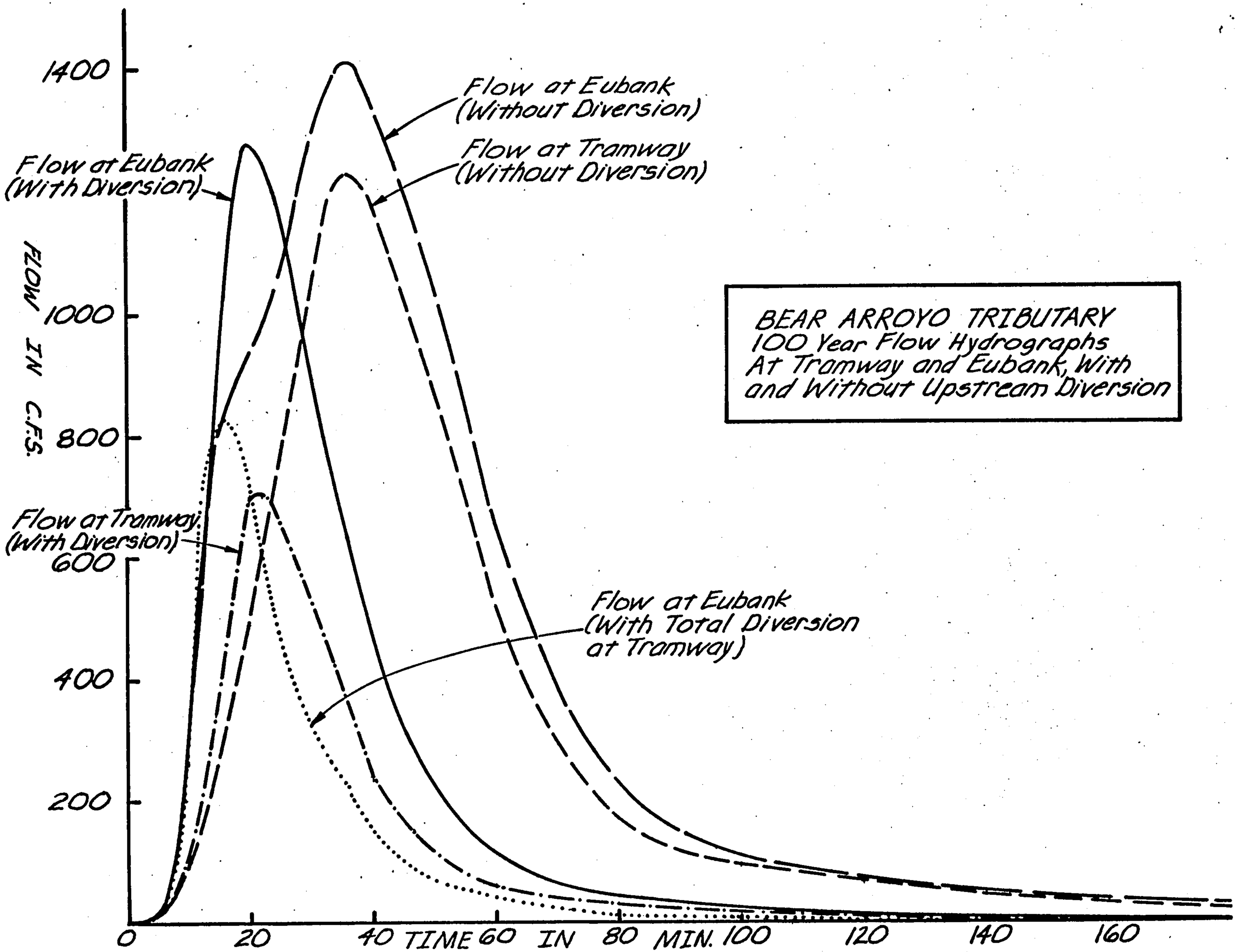
1 HR = 2.3"
1ST QUARTILE
10% PROBABILITY

CHANNEL SECTION



STA.	ELEV
0	5
10	0
20	0
30	5

A1-5



BEAR ARROYO TRIBUTARY
100 Year Flow Hydrographs
At Tramway and Eubank, With
and Without Upstream Diversion

FIG 2

A1-6

BOHANNAN HUSTON INC.

PROJECT NAME ACADEMY RIDGE EAST

PROJECT NO. 41441

SUBJECT DRAINAGE BASIN SUMMARY

SHEET A2-1 OF

BY KVS DATE 5/84

CH'D DATE

BASIN	LAND USE / DENSITY (SEE FIGURE 2, SHT. ___)	AVG % IMPERV.	D.A. (ACRES)	CN	C FACTOR	Q_{10} (CFS)	Q_{100} (2) (CFS)
A-1	MIXED RES. (12 DU./AC)	75%	7.12	85	0.72	30.2	29.5
A-2	" " "	75%	4.18	85	0.72	19.0	17.3
*A-3	SINGLE FAM. RES. (6 D.U./AC)	70% (3)	5.12	82	0.70	22.9	20.6
*A-4	" " " "	70%	4.28	82	0.70	19.1	17.2
A-5	" " " "	70%	9.43	82	0.70	41.0	38.0
A-6	" " " "	70%	8.32	82	0.70	36.2	33.5
A-7	" " " "	70%	15.06	82	0.70	70.2	60.6
*A-8	" " " "	70%	2.89	82	0.70	13.3	11.6
A-9	" " " "	70%	4.47	82	0.70	19.4	180
A-10	" " " "	70%	5.27	82	0.70	23.9	21.2
7	PARK, SCHOOL, RES (6 DU/AC)	60%	25.11	80	0.60	90.9	86.6
8	SINGLE FAM RES (4 DU/AC)	38%	35.8	80	0.50	119.1	103.0

* LAND USE IS ACTUAL, CHANGED FROM SECTOR DEVELOPMENT PLAN

(2) BASED ON A RAINFALL INTENSITY OF (2.3")(2.5) = 5.75" (DPM CHART D-2)

(3) SEE FIGURE

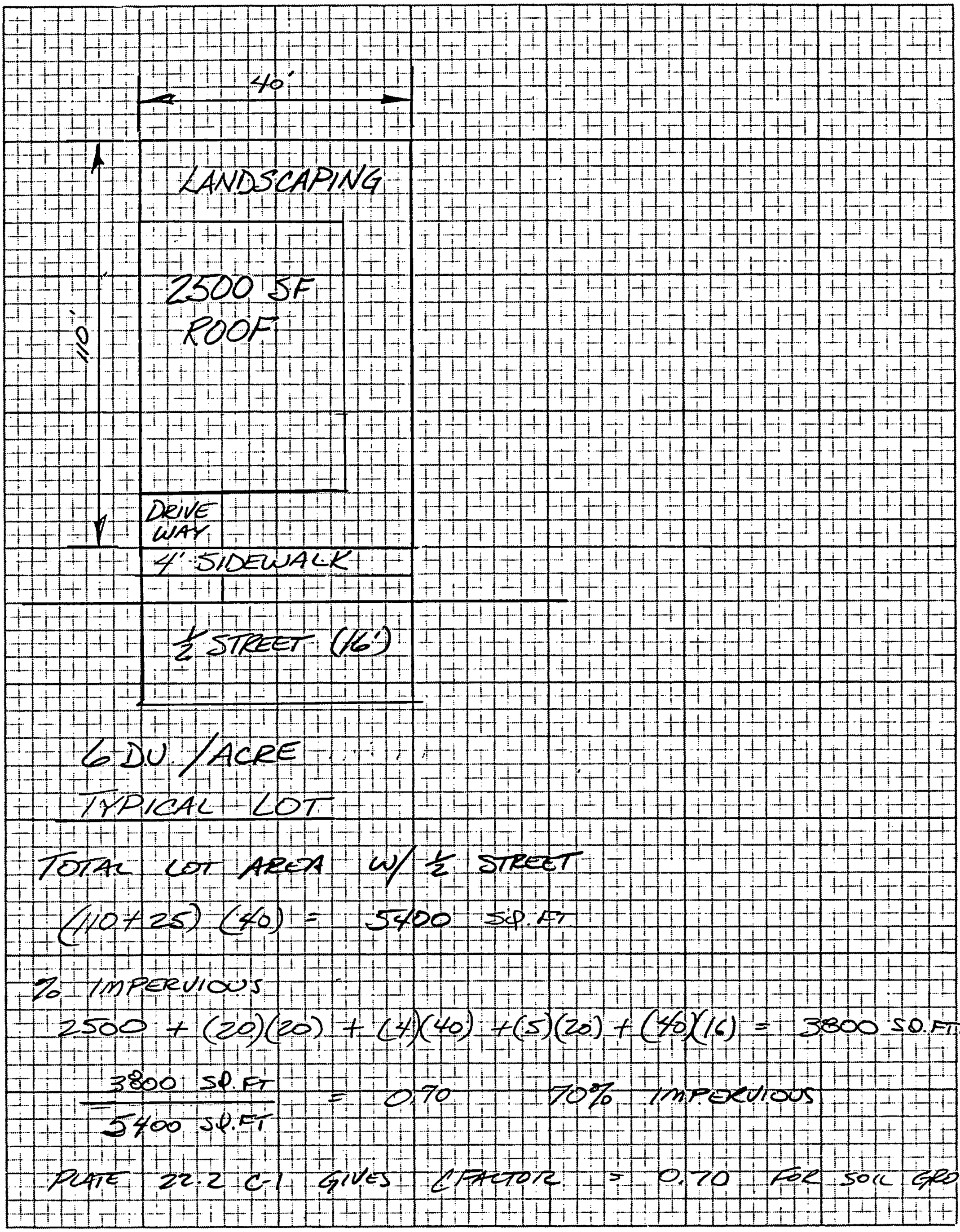
BOHANNAN HUSTON INC.

PROJECT NAME ACADEMY RIDGE EAST SHEET A2-2 OF

PROJECT NO. 41441 BY KLS DATE 5/84

SUBJECT DRAINAGE BASIN DATA CH'D DATE

BASIN	HYD. NO.	LENGTH (FT.)	SLOPE (FT/FT)	AREA (SQ mi.)	TC (HOURS)	TP (HOURS)	K (HOURS)	CN
A-1	121	400	0.100	0.0111	0.0316	0.0212	0.0127	85
A-2	122	380	0.079	0.0065	0.0335	0.0223	0.0134	85
A-3	123	450	0.075	0.0080	0.0389	0.0259	0.0156	82
A-4	124	470	0.083	0.0067	0.0387	0.0258	0.0155	82
A-5	125	750	0.067	0.0147	0.0602	0.0401	0.0241	82
A-6	126	800	0.074	0.0130	0.0609	0.0406	0.0244	82
A-7	127	600	0.067	0.0235	0.0507	0.0338	0.0203	82
A-8	128	500	0.080	0.0045	0.0412	0.0274	0.0165	82
A-9	129	800	0.070	0.0070	0.0622	0.0415	0.0249	82
A-10	130	700	0.079	0.0082	0.0536	0.0357	0.0214	82
7	107	1050	0.011	0.0392	0.0763	0.0509	0.0305	80
8	108	900	0.029	0.0559	0.0957	0.0638	0.0383	80



6 D.U. / ACRE

TYPICAL LOT

TOTAL LOT AREA W/ ½ STREET

(110+25) (40) = 5400 SQ. FT

% IMPERVIOUS

2500 + (20)(20) + (4)(40) + (5)(20) + (40)(16) = 3800 SQ. FT.

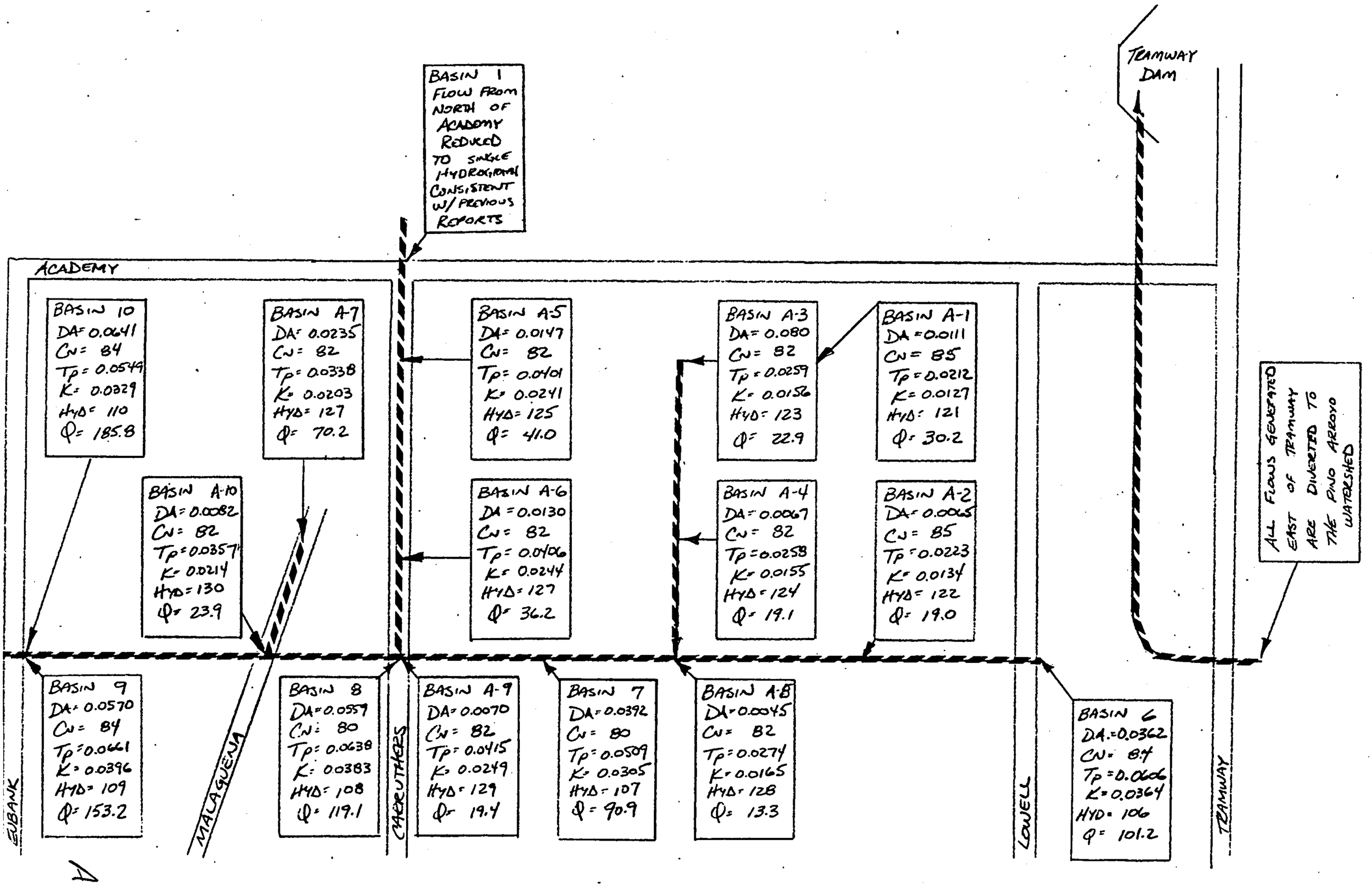
$\frac{3800 \text{ SQ. FT}}{5400 \text{ SQ. FT}} = 0.70$ 70% IMPERVIOUS

PLATE 22.2 C-1 GIVES C FACTOR = 0.70 FOR SOIL GROUP B

PROJECT NAME _____ SHEET A2-3 OF _____

PROJECT NO. _____ BY _____ DATE _____

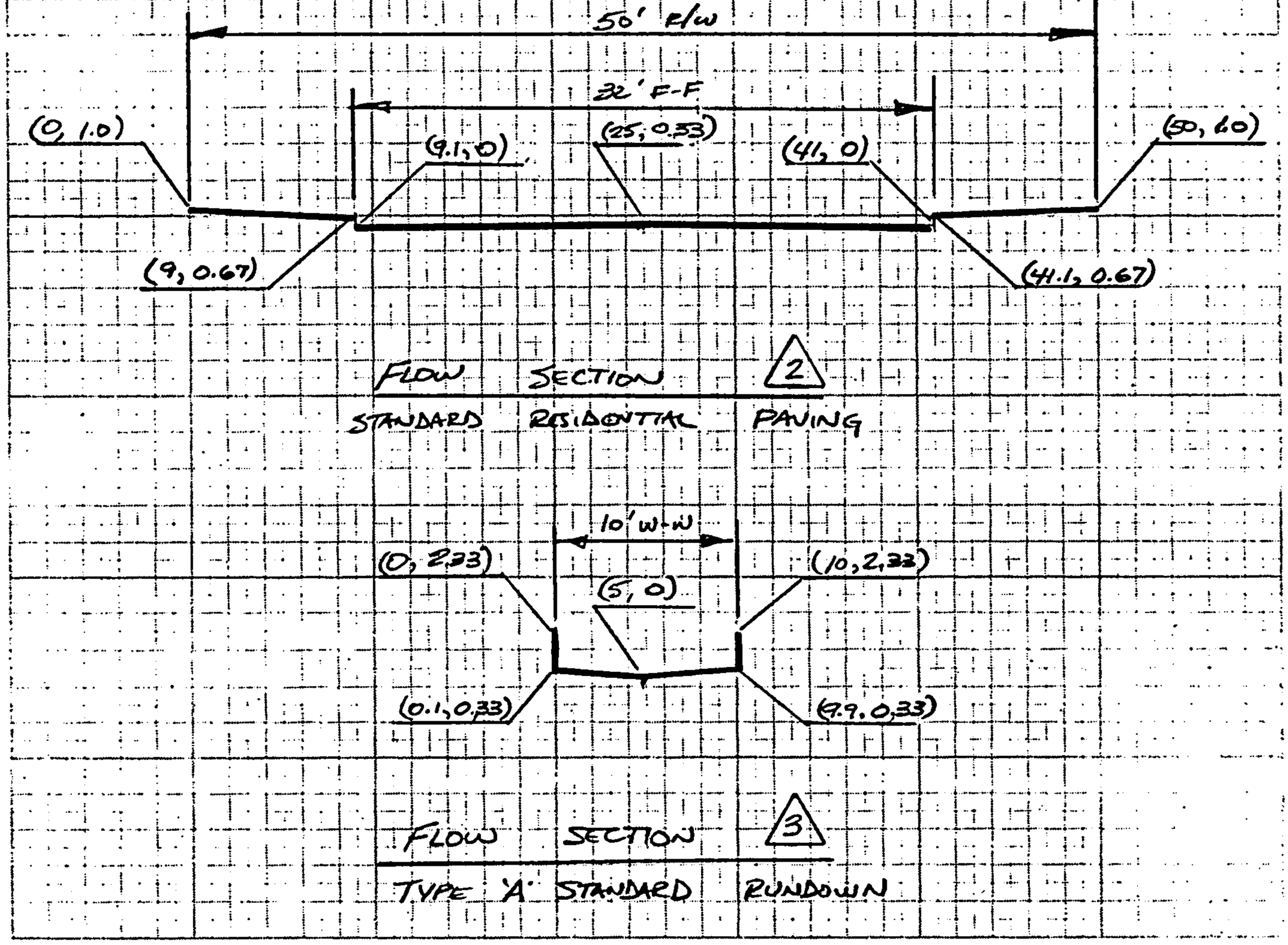
SUBJECT _____ CH'D _____ DATE _____



A2-4

BEAR TRIBUTARY WATERSHED DRAINAGE BASIN SCHEMATIC

STORM DRAIN



PROJECT NAME ACADEMY RIDGE EAST SHEET A2-6 OF _____

PROJECT NO. 41441 BY KLD DATE 5/84

SUBJECT HYMO FLOW SECTIONS CH'D _____ DATE _____

ANALYSIS POINT

BASIN ID

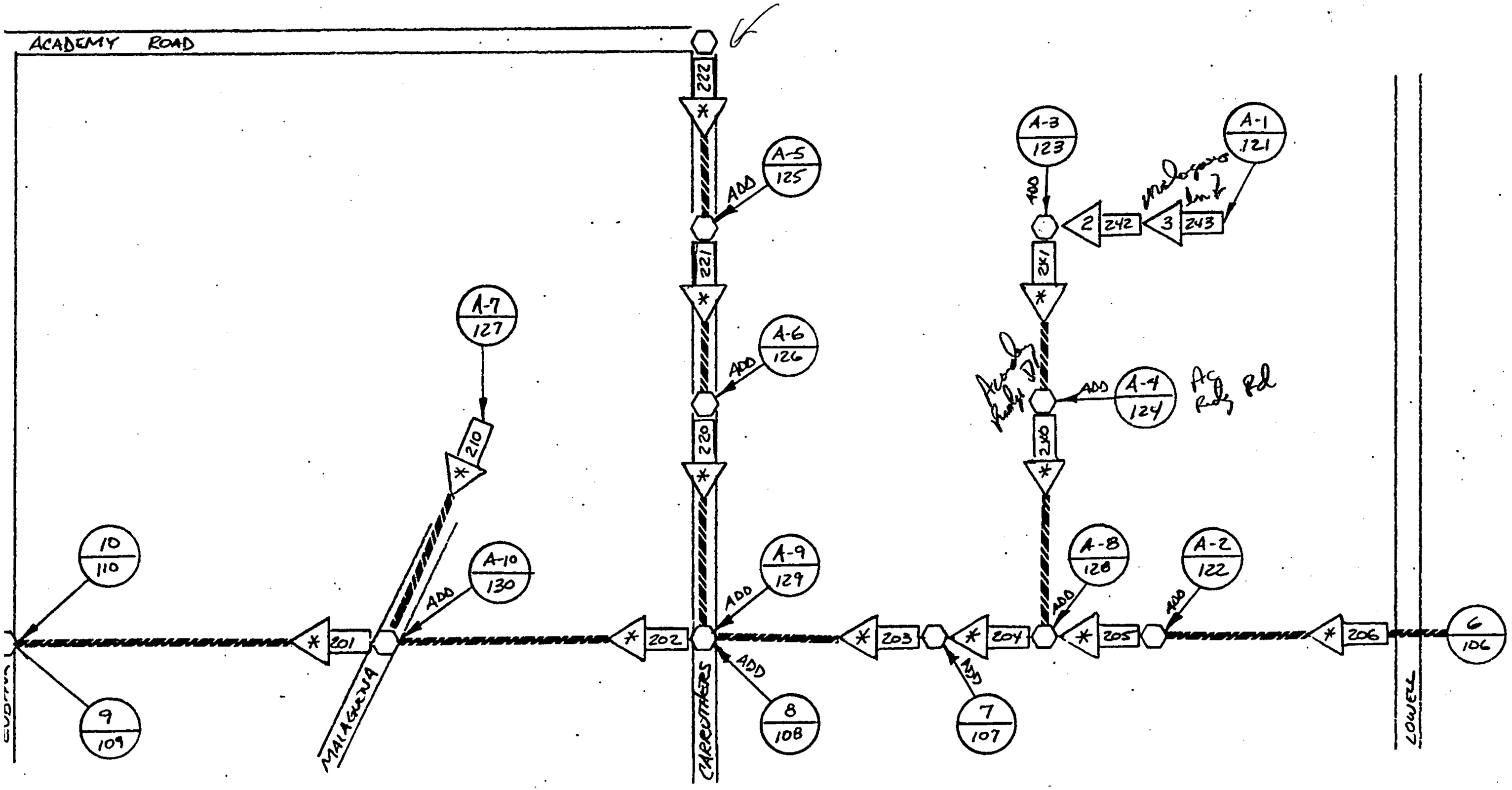
BASIN SYMBOL

HYD. NO.

FLOW SECTION

ROUTING SYMBOL

ROUTED HYD. NO.



BEAR ARROYO TRIBUTARY HYMO ANALYSIS SCHEMATIC

A2-5

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}}$$ [DPM SECTION 22.2.B.1]

$T_p = (\frac{2}{3}) T_c$

$K = 0.6\ T_p$

C_N DETERMINATION:

ALL SOILS IN SOIL GROUP B

CURVE NUMBER DETERMINATION

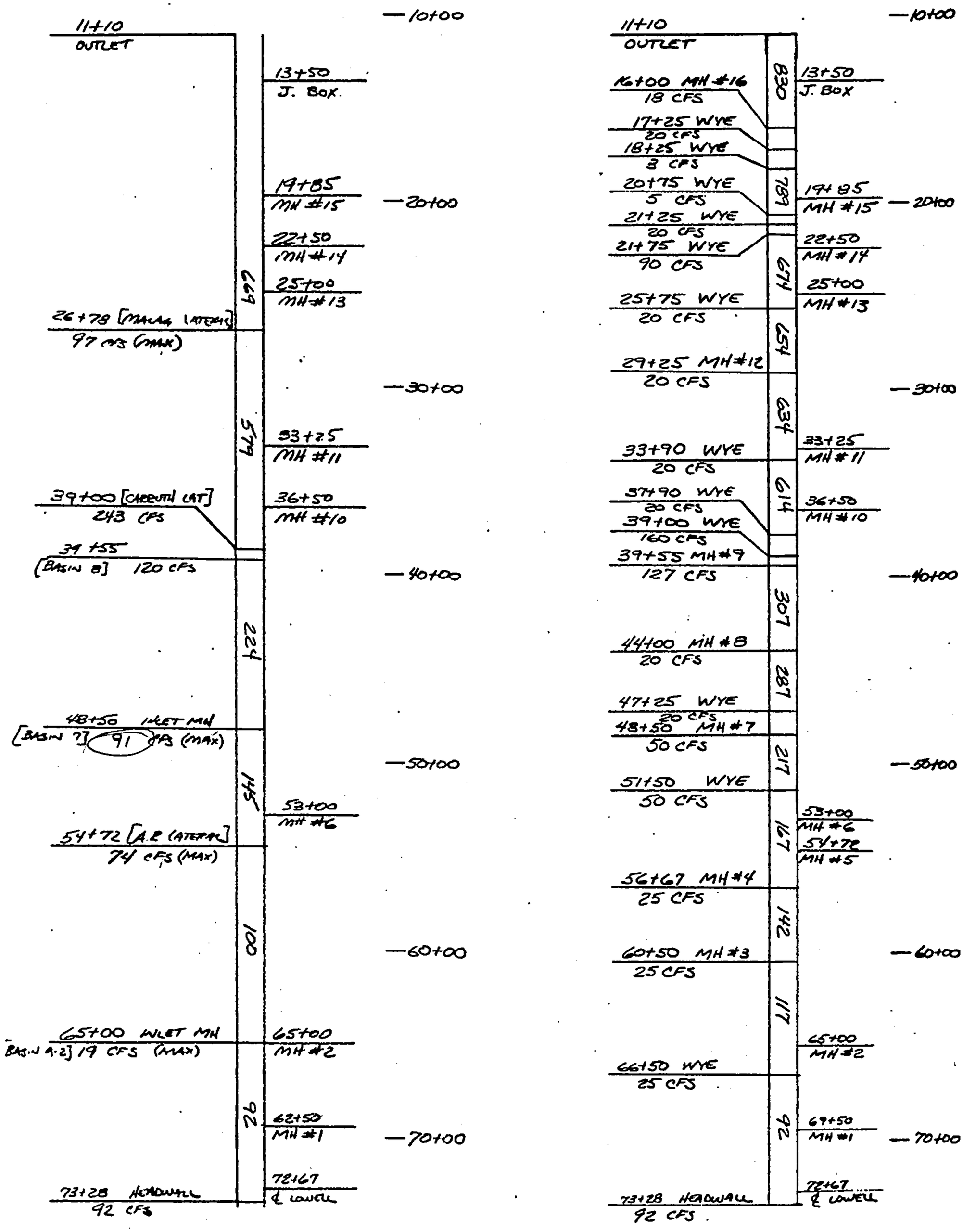
LAND USE DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
Cultivated land[1]: without conservation treatment	72	81	88	91
: with conservation treatment	62	71	78	81
: poor condition	68	79	86	89
Pasture or range land: fair condition	54	70	80	85
: good condition	39	61	74	80
Meadow: good condition	30	58	71	78
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83
good cover[2]	25	55	70	77
Open Spaces, lawns, parks, golf courses, cemeteries, etc.				
good condition: grass cover on 75% or more of the area	39	61	74	80
fair condition: grass cover on 50% to 75% of the area	49	69	79	84
Commercial and business areas (85% impervious)	89	92	94	95
Industrial districts (72% impervious)	81	88	91	93
Residential [3]				
Average lot size / Average % impervious[4]				
1/8 acre or less / 65	77	85	90	92
1/4 acre / 38	61	75	83	87
1/3 acre / 30	57	72	81	86
1/2 acre / 25	54	70	80	85
1 acre / 20	51	68	79	84
Paved parking lots, roofs, driveways, etc.[5]	98	98	98	98
Streets and roads:				
paved with curbs and storm sewers[5]	98	98	98	98
gravel	76	85	89	91
dirt	72	82	87	89

PROJECT NAME ACADEMY RIDGE EAST SHEET A2-7 OF

PROJECT NO. 41441 BY DATE

SUBJECT FORMULAE FOR HYMO CH'D DATE

A3-1



BEAR TRIBUTARY PIPELINE FLOW SCHEMATIC

PROJECT: BEAR TRIB 10079
SAD 205

SUMMARY OF HYDRAULIC CALCULATIONS

BY: SC
DATE: 12/1/83
SHEET: 1 OF 4

STATION	STRUC.	CONDUIT Q	n	PIPE	L	S	S_F	OPEN CHANNEL FLOW: PIPE HYDRAULICS Q_{FULL}	Q/Q_{FULL}	d/D_{FULL}	d_n	V_{FULL}	V/V_{FULL}	V	LOSSES H_F	H_X	PRESSURE CONDUIT: PIPE HYDRAULICS A	V	LOSSES H_F	H_B	H_J	H_{MH}	H_X	ΣH_L	ELEVATIONS E.G.	h_V	H.G.	SOFFIT	d_n	INVERT
11+10	OORET																								85^{11}	14.92	70^{19}	71^{54}	3^{48}	66^{71}
		830	0.011	58x91	240'	0.0296	0.02753	866	0.93	0.72	3.48	30.1	1.03	31.00	7.10										92^{21}	14.92	77^{29}	78^{64}	3^{48}	73^{81}
13+50	J. BOX														0.01	0.33														
																									94^{24}	15.21	79^{03}	79^{81}	5.22	73^{81}
		830	0.011	72"	250'	0.0296	0.02751	861	0.96	0.87	5.22	30.4	1.0^{3}	31.3	7.40										01^{64}	15.21	86^{43}	87^{21}	5.22	81^{21}
16+00	MH														0.19															
																									01^{83}	15.21	86.62	87^{32}	5.10	81^{22}
		812	0.011	72"	125	0.0296	0.02633	861	0.94	0.85	5.10	30.4	1.03	31.3	3.70										05^{53}	15.21	90^{32}	91^{22}	5.10	85^{22}
17+25	WYE																													
																									05^{53}	15.21	90^{32}	91^{22}	5.10	85^{22}
		792	0.011	72"	100	0.0296	0.02505	861	0.92	0.85	5.10	30.4	1.03	31.3	2.96										08^{49}	15.21	93^{28}	94^{18}	5.10	88^{18}
18+25	WYE																													
																									08^{49}	15.21	93^{28}	94^{18}	5.10	88^{18}
		789	0.011	72"	160	0.0296	0.02486	861	0.92	0.85	5.10	30.4	1.03	31.3	4.74										13^{23}	15.21	98^{02}	98^{92}	5.10	92^{92}
19+85	MH														0.14															
																									13^{37}	13.33	00^{04}	00^{67}	5.28	94^{76}
		789	0.011	72"	90	0.0260	0.02486	807	0.98	0.88	5.28	28.5	1.03	29.3	2.34										15^{71}	13.33	02^{38}	03^{01}	5.28	97^{10}
20+75	WYE																													
																									15^{71}	13.33	02^{38}	03^{01}	5.28	91^{10}
		784	0.011	72"	50	0.0260	0.02455	807	0.97	0.93	5.28	28.5	1.03	29.3	1.30										17^{01}	13.33	03^{68}	04^{31}	5.28	98^{40}
21+25	WYE																													
																									16^{95}	13.33	03^{62}	04^{31}	5.22	98^{40}

A3-2

PROJECT: BEAR TRIB – SAD 205

SUMMARY OF HYDRAULIC CALCULATIONS

BY: _____

DATE: _____

STATION	STRUC.	CONDUIT Q	n	PIPE	L	S	S_F	OPEN CHANNEL FLOW: PIPE HYDRAULICS Q_{FULL}	Q/Q_{FULL}	d/D_{FULL}	d_n	V_{FULL}	V/V_{FULL}	V	LOSSES H_F	H_X	PRESSURE CONDUIT: PIPE HYDRAULICS A	V	LOSSES H_F	H_B	H_J	H_{MH}	H_X	ΣH_L	ELEVATIONS E.G.	h_v	H.G.	SOFFIT	d_n	INVERT
		764	0011	72"	50	0 0260	0 02331	807	095	87	522	28.5	1.03	29.3	1.30										18.25	13.33	04.92	05.72	5.22	99.70
21+75	WYE																												
		674	0 011	72"	75	0 0260	0.0184	807	0.84	0.78	4.68	28.5	1.0	28.5	1.95										16.99	12.61	04.38		4.68	99.20
																									18.94	12.61	06.33	07.65	4.68	01.65
22+50	MH														0.25														
																									20.15	12.50	07.65	07.65	5.5	02.15
		674	0 011	66"	250	0.0280	0.02867										23.76	28.37	7.21					7.21	27.36	12.50	14.86	14.65	5.5	09.15
25+00	MH																					0.62		0.62						
																									27.98	12.50	15.48	14.65	5.5	09.15
		674	0.011	66"	75	0.02438	0.02887										23.76	28.37	2.16					2.16	30.14	12.50	17.64	16.48	5.5	10.77
25+75	WYE																				0.93			0.93						
																									31.91	11.77	19.30	16.48	5.5	10.97
		654	0.011	66"	350	0.02438	0.02718										23.76	21.53	9.50					9.50	40.57	11.77	28.80	25.21	5.50	23.30
29+25	MH																				1.01	0.59		1.60						
																									42.17	1.24	27.93		4.62	23.31
		634	0011	66"	400	0.0310	0.02554	695	091	0.84	4.62	29.4	1.03	30.3	12.40										54.57	14.24	40.33		4.62	35.71
33+25	MH																													
																									54.57	14.24	40.33		4.62	35.71
		634	0.011	66"	65	0.0310	0.02554	695	091	0.84	4.62	29.4	1.03	30.3	2.02										56.59	14.24	42.35		4.62	37.73
33+90	WYE																													
																									56.26	13.96	42.30		4.57	37.73
		614	0.011	66"	260	0.0310	0.2396	688	088	0.82	4.57	29.4	1.02	30.0	8.06										64.32	13.96	50.36		4.57	45.79
36+50	MH																													
																									64.32	13.96	50.36		4.57	45.79

PROJECT: BOAR TRIB – SAD 205

SUMMARY OF HYDRAULIC CALCULATIONS

BY: _____

DATE: _____

SHEET: 3 OF 4

STATION	STRUC.	CONDUIT Q	n	PIPE	L	S	S_F	OPEN CHANNEL FLOW – PIPE HYDRAULICS Q_{FULL}	Q/Q_{FULL}	d/D_{FULL}	d_n	V_{FULL}	V/V_{FULL}	V	LOSSES H_F	H_X	PRESSURE CONDUIT – PIPE HYDRAULICS A	V	LOSSES H_F	H_B	H_J	H_{MH}	H_X	ΣH_L	ELEVATIONS E.G.	h_v	H.G.	SOFFIT	d_n	INVERT
		614	0011	66"	140	0.0310	0.02396	698	0.88	0.83	4.51	29.4	1.02	30.0	4.34										68^{66}	13^{96}	54^{70}		4^{57}	50^{13}
37+90	WYE																												
																									67^{84}	13^{42}	54^{42}		4^{29}	50^{13}
39+0	WYE	594																											
		594																							72^{96}	13^{42}	59^{54}		4^{29}	55^{25}
39+55	J.BOX	494	0011	66"	165	0.0310	0.02242	698	0.85	0.78	4.29	29.4	1.00	29.4	5.12	0.22									73^{19}	11^{23}	61^{96}		3^{02}	55^{94}
		307	0.013	54"	445	0.0400	0.01744	465	0.66	0.67	3.02	27.2	0.92	26.9	17.80										90^{09}	11^{23}	79^{76}		3^{02}	76^{74}
44+00	MH															0.31									91^{30}	8^{10}	83^{20}			
		287	0.013	48"	325	0.04811	0.03994										12.57	22.84	2.57					12.97	04^{27}	8^{10}	96^{17}			–
47+25	WYE																				1.08			1.08						
																									05^{35}	7^{01}	98^{34}			92^{57}
		267	0.013	48"	125	0.04811	0.03455										12.57	21.25	4.32					4.32	09^{67}	7^{01}	102^{66}			98^{66}
48+50	MH																				0.94	0.35		1.29						
																									10^{96}	4^{63}	06^{33}			
		217	0.013	48"	300	0.03344	0.02282										12.57	17.27	6.84					6.84	17^{80}	4^{63}	13^{17}			09^{17}
51+50	WYE																				0.62			0.62						
																									18^{42}	2^{74}	15^{68}			
		167	0.013	48"	150	0.02324	0.01352										12.57	13.29	2.03					2.03	20^{45}	2^{74}	17^{71}		4.0	13^{71}
53+00	MH																					5.2								14^{21}
																									22^{80}	6^{32}	16^{48}		2.77	13^{71}

4S-4

PROJECT: BEAR TRIB – SAD 205

SUMMARY OF HYDRAULIC CALCULATIONS

BY: _____

DATE: _____

SHEET: 4 OF 4

STATION	STRUC.	CONDUIT Q	n	PIPE	L	S	S_F	OPEN CHANNEL FLOW – PIPE HYDRAULICS Q_{FULL}	Q/Q_{FULL}	d/D_{FULL}	dn	V_{FULL}	V/V_{FULL}	V	LOSSES H_F	H_X	PRESSURE CONDUIT – PIPE HYDRAULICS A	V	LOSSES H_F	H_B	H_J	H_{MH}	H_X	ΣH_L	ELEVATIONS E.G.	h_V	H.G.	SOFFIT	dn	INVERT
		167	0.013	42"	172	0.03650	0.02756	194	0.86	0.79	2.77	20.2	1.00	20.2	6.4										29.78	6.32	22.88		2.77	20.11
54+72	MH																												
																								29.20	6.32	22.88		2.77	20.11
		167	0.013	42"	195	0.03720	0.02756	194	0.86	0.79	2.77	20.2	1.00	20.2	7.25										36.45	6.32	30.13	30.36	2.77	27.36
56+67	MH																												
																								36.45	6.27	30.18		3.00	27.68
		142	0.013	36"	383	0.04359	0.0454										7.07	20.09	17.36					17.36	53.81	6.27	47.54		3.0	44.54
60+50	MH																				1.38	0.31		1.69					
																									55.50	4.25	51.25		3.0	
		117	0.013	36"	450	0.03902	0.03086										7.07	16.55	13.85					13.85	69.35	4.25	65.10		3.0	60.10
65+00	MH																					0.21		0.21					
																									69.56	4.25	65.31		3.0	
		117	0.013	36"	150	0.02182	0.03086										7.07	16.55	4.62					4.62	74.18	4.25	69.93		3.0	65.37
66+50	WYE																				0.93								
																									75.11	2.63	72.48		3.0	
		92	0.013	36"	300	0.02182	0.01708										7.07	13.02	5.71					5.71	80.82	2.63	78.19		3.0	75.19
69+50	MH																												
																									91.32	3.88	77.44		3.1	74.34
		92	0.013	36"	378		0.01708	128	0.72	0.70	2.10	18.2	0.87	15.8	14.08										95.38	3.88	91.50			87.70
73+28	INLET															1.37													

A3-4

A3-7

DRAWING NO. 1721 | SHEET 57 OF 87 | MAP NO.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Hydrology		
A.C.E. - Operations			Transp.		
A.C.E. - Maintenance			Water		

TITLE: BEAR CANYON TRIBUTARY STORM DRAIN PLAN & PROFILE
STA 13+27.36 TO STA 20+00

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

NO.	DATE	REMARKS	BY

ENGINEER'S SEAL

SURVEY INFORMATION

NO.	DATE	FIELD NOTES	BY

BENCH MARKS

A "D" CUT ON TOP OF THE CONCRETE CURB LOCATED ON THE NW CURB RETURN AT THE INTERSECTION OF CARRUTHERS RD. AND EUBANK CTL IN THE NORTHEAST QUADRANT OF THE INTERSECTION. (NAD 83 (93) - F22)
ELEVATION = 5161.80

AS BUILT INFORMATION

NO.	DESCRIPTION	BY	DATE

MISCELLANEOUS NOTES

1. All RCP shall be A.S.T.M. Class III.
2. All trench fill shall be compacted to a minimum of 95% of ASTM D698 (modified) A.S.T.M. D1557.

BEAR TRIBUTARY STORM DRAIN

HORIZONTAL SCALE 1"=50'
VERTICAL SCALE 1"=5'

STORM DRAIN INV. ELEV:

MATCH LINE STA 20+00 FOR CONTINUATION SEE SHEET 58

DUNITE SPILLWAY DETAIL

EUBANK BLVD. N.E.

MATCH LINE STA 20+00 FOR CONTINUATION SEE SHEET 57

MATCH LINE STA 32+00 FOR CONTINUATION SEE SHEET 59

CONSTRUCT 6' HIGH CHAINLINK FENCE AS PER CITY OF ALBUQUERQUE STD DWG S-440

CONSTRUCT 10' CHAINLINK GATE

CENTERLINE OF PIPE

EASEMENT LINE

EXIST CHAINLINK FENCE

EXIST STEEL CBGM

INSTALL AIR RELEASE VALVE

INSTALL 14" WATERLINE SEE PROFILE THIS SHEET

14" CAP & CONC BLOCKING

PROPOSED 60' ROW

GRADE TO SLOPE @ 8:1 MAX

SLOPE 1:1 LINE PAVEMENT CONCRETE 12" THICK (SLOPE PAVING)

S88°53'36"E 1153.41'

N88°53'36"W 1192.58'

S88°53'36"E 596.43'

N88°53'36"W 537.46'

STA 22+00.00 MH # 16 TYPE 'C' MH

STA 23+00.00 MH # 15 TYPE 'A' MH

STA 32+00.00 MH # 14 TYPE 'A' MH

ACADEMY PLACE SUBDIVISION UNIT NO. 5
FILED OCT 17, 1974, VOL D-6, FOLIO 91

MALAGUEÑA LANE

LOTS: 9A, 9, 10, 11, 12, 13, 14, 15, 1, 2, 3

EXIST 14" DIP WATERLINE

INSTALL 14"DIP WATERLINE

INSTALL AIR RELEASE VALVE FOR 20"-16" REDUCER CONC. BLK. & CAP

BEAR TRIBUTARY STORM DRAIN

14" WATERLINE PROFILE

2600 LF 72" RCP CLASS III @ S= 0.0050

912.00 LF 60" RCP CLASS III @ S=0.0050

497.00 LF 60" RCP CLASS III @ S=0.0050

2700 LF 66" RCP CLASS III @ S=0.0050

5' DIA. MH.

EXIST. GROUND PROFILE @ CENTERLINE OF PIPE

TRENCHED BRIDGE

66" RCP STORM DRAIN

44" RCP STORM DRAIN

STA 22+00.00 INVERT=5703.74

STA 22+24.02 INV IN=5708.33

STA 23+00.00 INV OUT=5708.33

STA 23+36.02 INV IN=5708.73

STA 29+00.00 INV OUT=5708.73

STA 29+21.00 INV IN=5711.42

STA 29+29.00 INV IN=5711.942

STORM DRAIN INV. ELEV.

5750 5740 5730 5720 5710 5700

20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00

GENERAL NOTES

1. All RCP shall be A.S.T.M. Class III.
2. All trench fill shall be compacted to a minimum density of 95% of optimum (modified) A.S.T.M. D1557.

SURVEY INFORMATION
FIELD NOTES
BY DATE

BENCH MARKS
A "C" CUT ON TOP OF THE CONCRETE CURB LOCATED ON THE NW CURB RETURN AT THE INTERSECTION OF CARRUTHERS RD. AND DONAHOO CT IN THE NORTHEAST QUADRANT OF THE INTERSECTION. (ALB. B.M. 19 - F22)
ELEVATION = 5787.30

AS BUILT INFORMATION
CONTRACTOR
FIELD VERIFICATION BY
DATE
AS BUILTS BY
DATE
FIELD VERIFICATION BY
DATE
CONSTRUCTION BY
DATE
MICRO-FILM INFORMATION
MICROFILMED BY
DATE

ENGINEER'S SEAL
REGISTERED PROFESSIONAL ENGINEER THOMAS L. BARR JR. 5712 NEW MEXICO U.S.A.

NO DATE REMARKS BY

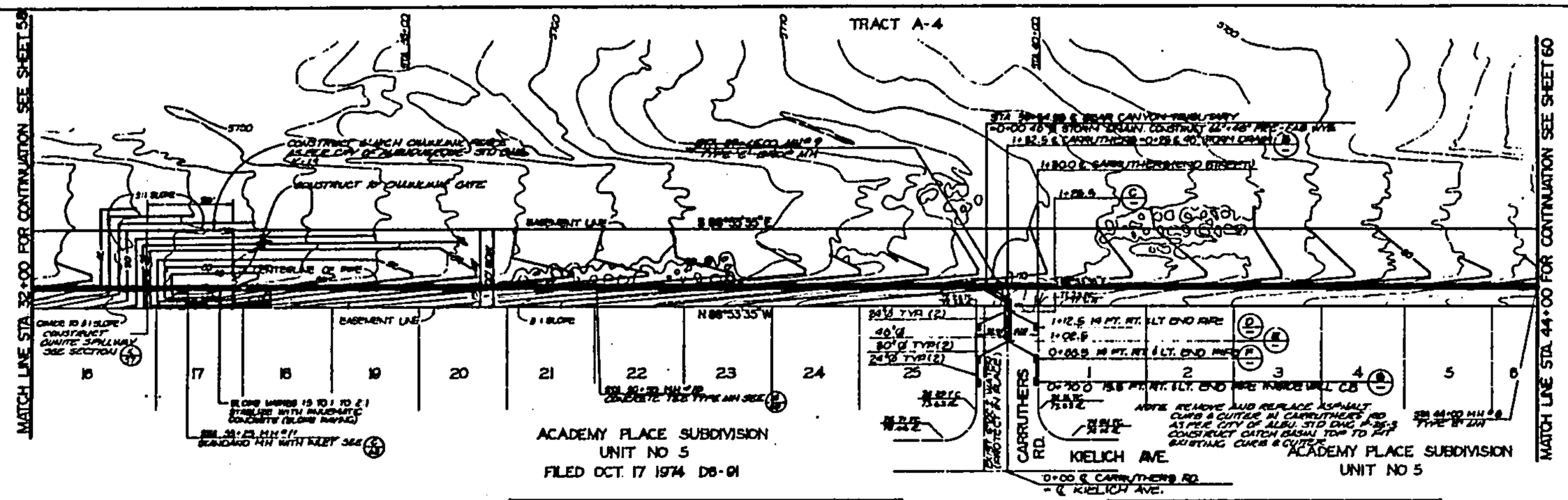
CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: BEAR CANYON TRIBUTARY
STORM DRAIN PLAN & PROFILE
STA 20+00 TO STA 32+00

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
ACE - Design			Traffic		
ACE - Hydrology			Water		

DRAWING NO 1721 MAP NO. SHEET 58 OF 87

A3-8



CATCH BASIN DATA						
	STA.	TYPE	"V"	PIPE INV ELEV IN	PIPE INV ELEV OUT	NOTES
Ⓓ	1+12.5	DOUBLE 'C'	8.5'		64.90	STD DWG K5-2 TYP (2)
Ⓕ	0+88.9	DOUBLE 'C'	8.5'	65.10	64.90	STD DWG K5-2 TYP (2)
Ⓖ	0+71.5	TYPE 'B'	5.0'		66.80	STD DWG K-8-2 TYP (2)

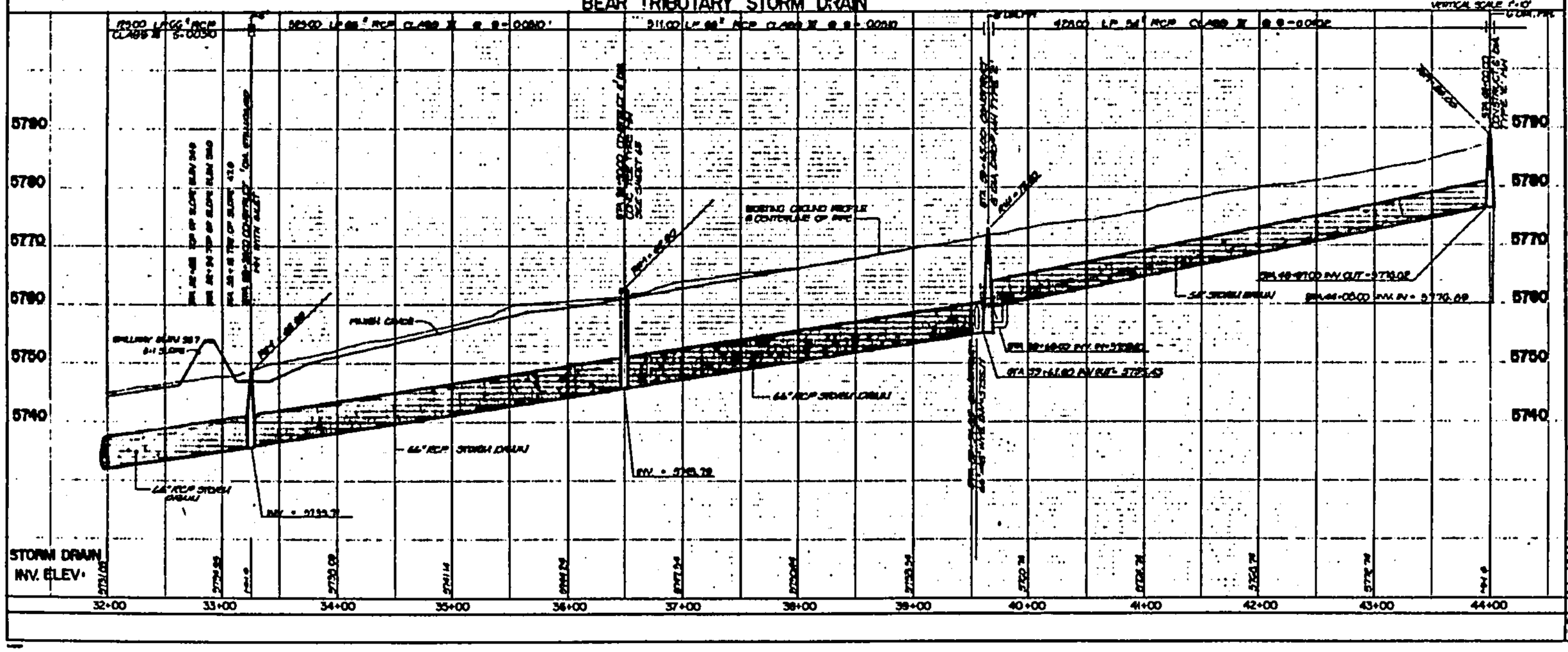
1. STA REFERENCED ℄ CB TO ℄ CARRUTHERS
2. CURB & GUTTER TRANSITION PER STD DWG K-7.
3. C.B. FRAME & GRATING PER STD DWG. K-6 & K-8

PRECAST PIPE STRUCTURES				
	STA.	DESCRIPTION	INVELEV	NOTES
Ⓑ	1+32.5	4'Ø-60° EL	69.72	
Ⓒ	1+86.9	DOUBLE 45° WYE 48"X 24"X 24"	69.90	
Ⓔ	1+02.5	DOUBLE 45° WYE 48"X 30"X 30"	64.70	PLUG END

1 STA. REFERS TO ℄ CARRUTHERS AVE.
2. INVERT ELEVATIONS @ INTERSECTION OF PIPE ℄'s

BEAR TRIBUTARY STORM DRAIN

HORIZONTAL SCALE 1"=50'
VERTICAL SCALE 1"=10'



SPECIAL NOTES

1. all RCP shall be A.S.T.M. Class III
2. all trench fill shall be compacted to a minimum density of 95% of optimum (modified) A.S.T.M. D1557.

BENCH MARKS — AS BUILT INFORMATION

A "D" CUT ON TOP OF THE CONCRETE CURB LOCATED ON THE NNE CURB RETURN AT THE INTERSECTION OF CARRUTHERS RD. AND CONAMOD CT. IN THE NORTHEAST QUADRANT OF THE INTERSECTION. (ALB. BM. # 13 - P22)

ELEVATION = 5797.30

SURVEY INFORMATION — FIELD NOTES — NO | BY | DATE

ENGINEER'S SEAL

REMARKS — NO | DATE | BY

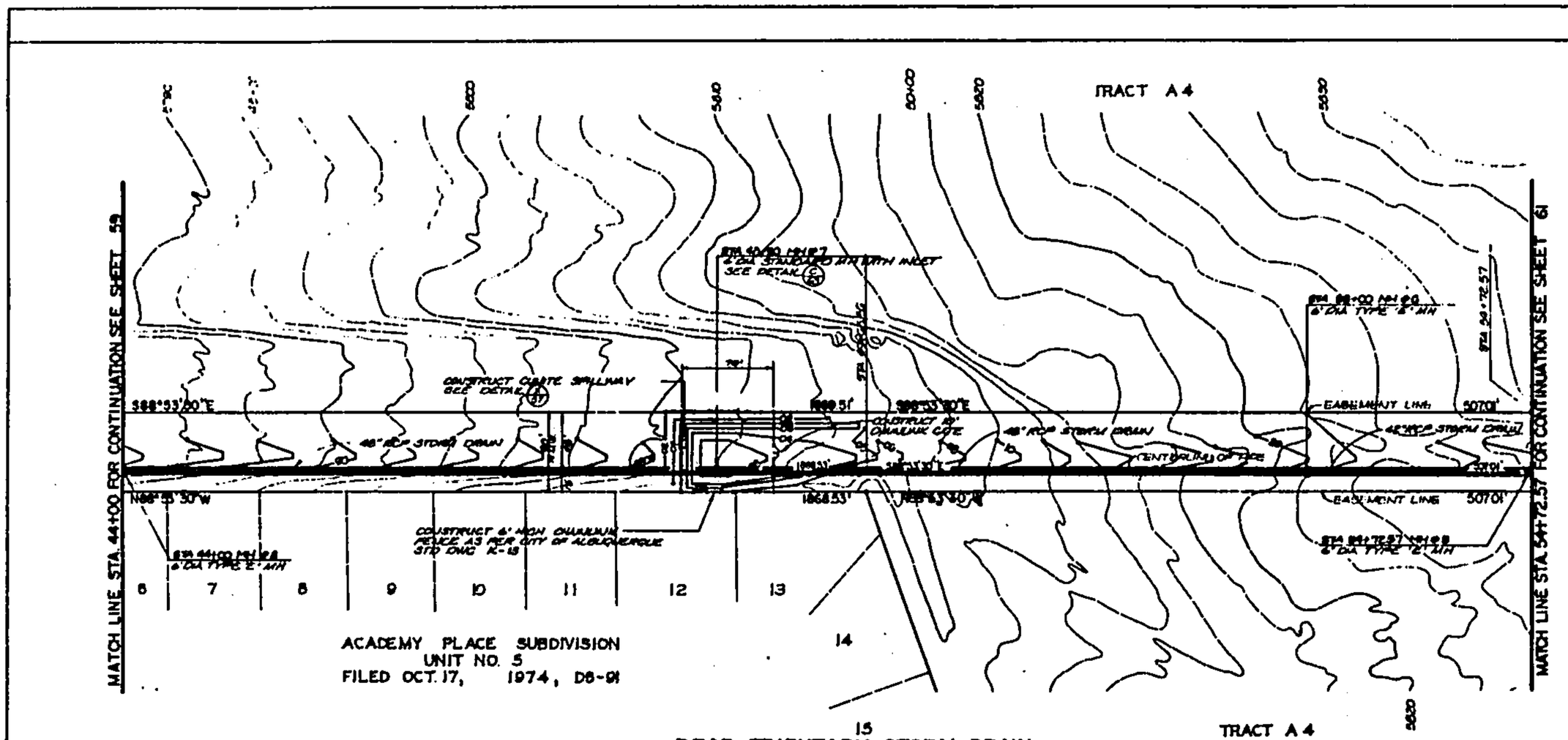
CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: BEAR CANYON TRIBUTARY
STORM DRAIN PLAN & PROFILE
STA 32+00 TO STA 44+00

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E. - Design			Traffic		
A.C.E. - Hydrology			Water		

DRAWING NO 1721 | MAP NO. | SHEET 59 OF 87

A3-9



GENERAL NOTES

1. All RCP shall be A.S.T.M. Class III.
2. All trench fill shall be compacted to a minimum density of 95% of optimum (modified) A.S.T.M. D1557.

AS BUILT INFORMATION

BENCH MARKS

A "D" CUT ON TOP OF THE CONCRETE CURB LOCATED ON THE NINE CURB RETURN AT THE INTERSECTION OF CARUTHERS RD. AND CONANICUT CT. IN THE NORTHEAST QUADRANT OF THE INTERSECTION. I.A.L.S. #14, 19-1723

ELEVATION = 5767.30

SURVEY INFORMATION

FIELD NOTES

ENGINEER'S SEAL

REMARKS

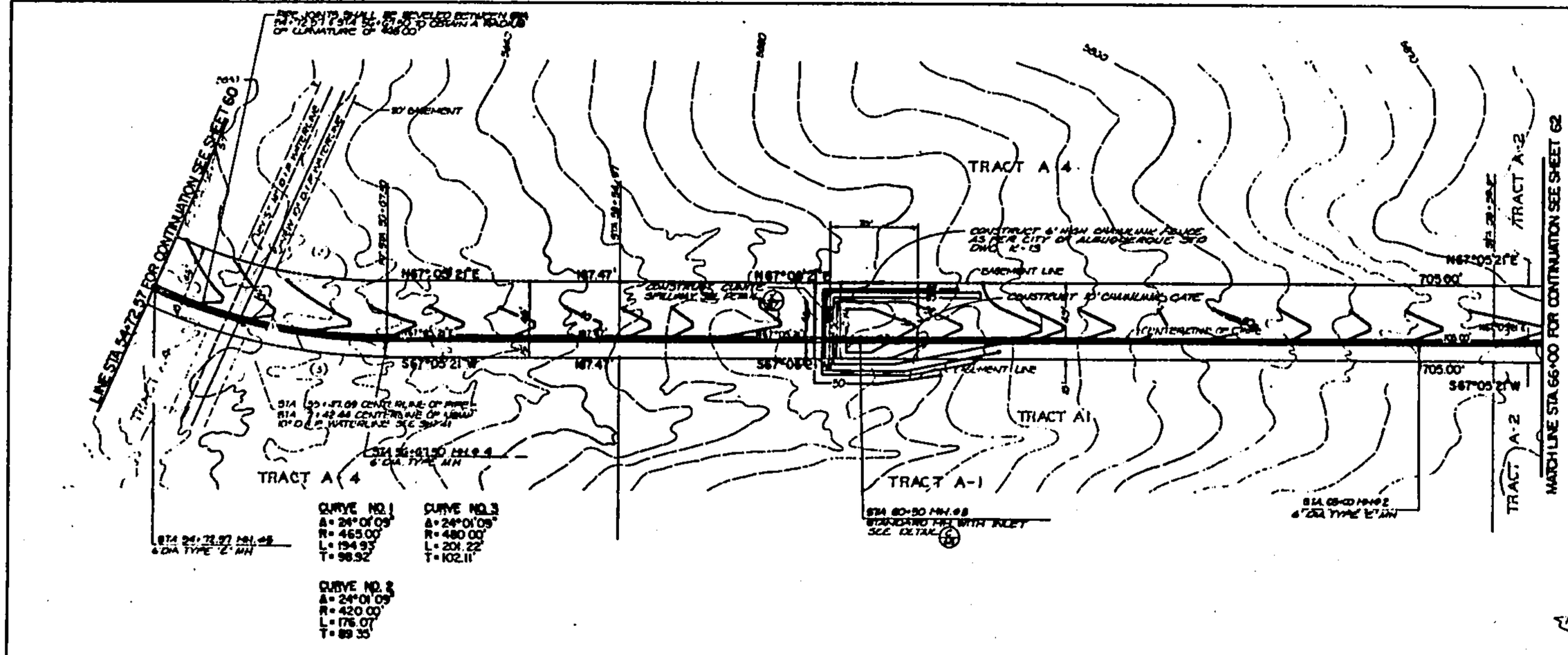
CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: BEAR CANYON TRIBUTARY
STORM DRAIN PLAN & PROFILE
STA 44+00 TO STA 54+73

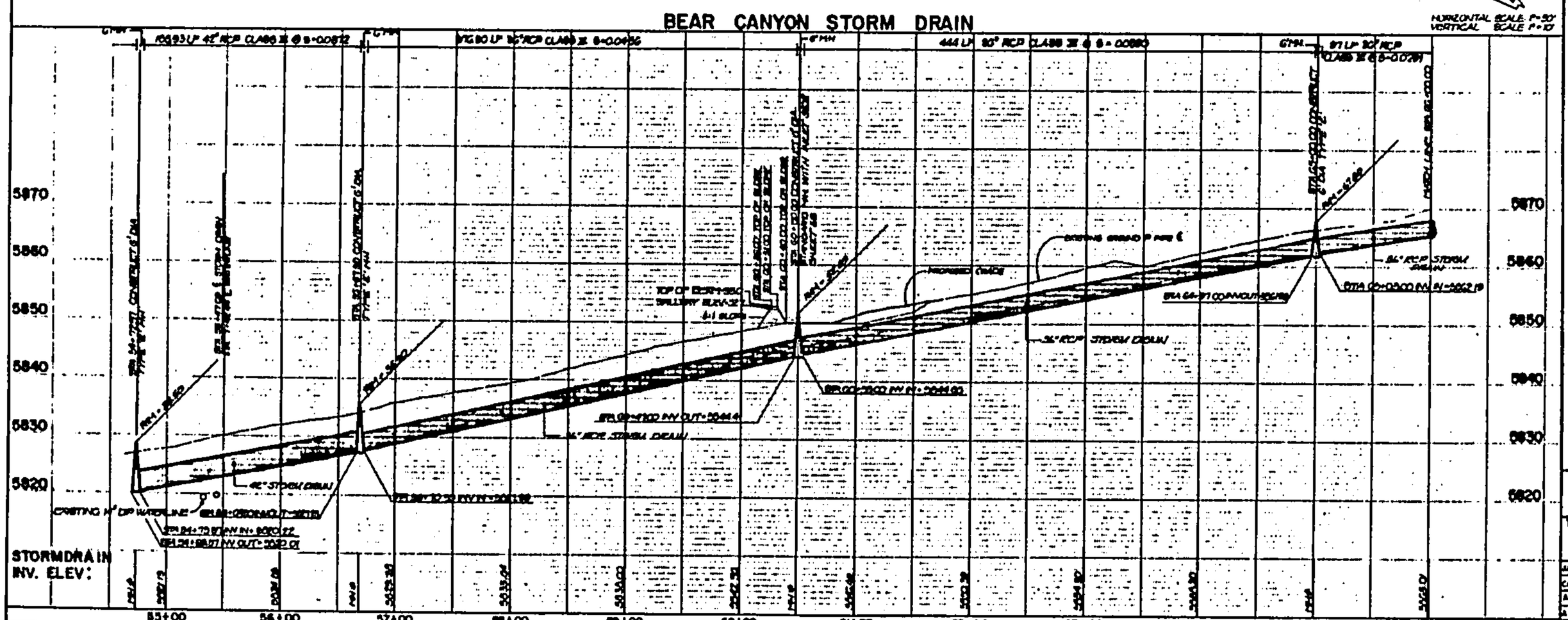
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E.-Design			Traffic		
A.C.E.-Hydrology			Water		

DRAWING NO. 1721 MAP NO. SHEET 60 OF 87

A3-10



BEAR CANYON STORM DRAIN



GENERAL NOTES

1. All RCP shall be A.S.T.M. Class III.
2. All trench fill shall be compacted to a minimum density of 95% of optimum (modified) A.S.T.M. D1557.

SURVEY INFORMATION — AS BUILT INFORMATION

FIELD NOTES — BENCH MARK: A "T" CUT ON TOP OF THE CONCRETE CURB LOCATED ON THE NW/E CURB RETURN AT THE INTERSECTION OF CARRUTHERS RD. AND DONA-ANA CT. IN THE NORTHEAST QUADRANT OF THE INTERSECTION (ALB. B.M. 13-#22) ELEVATION = 5701.80

MICRO-FILM INFORMATION

ENGINEER'S SEAL

REMARKS

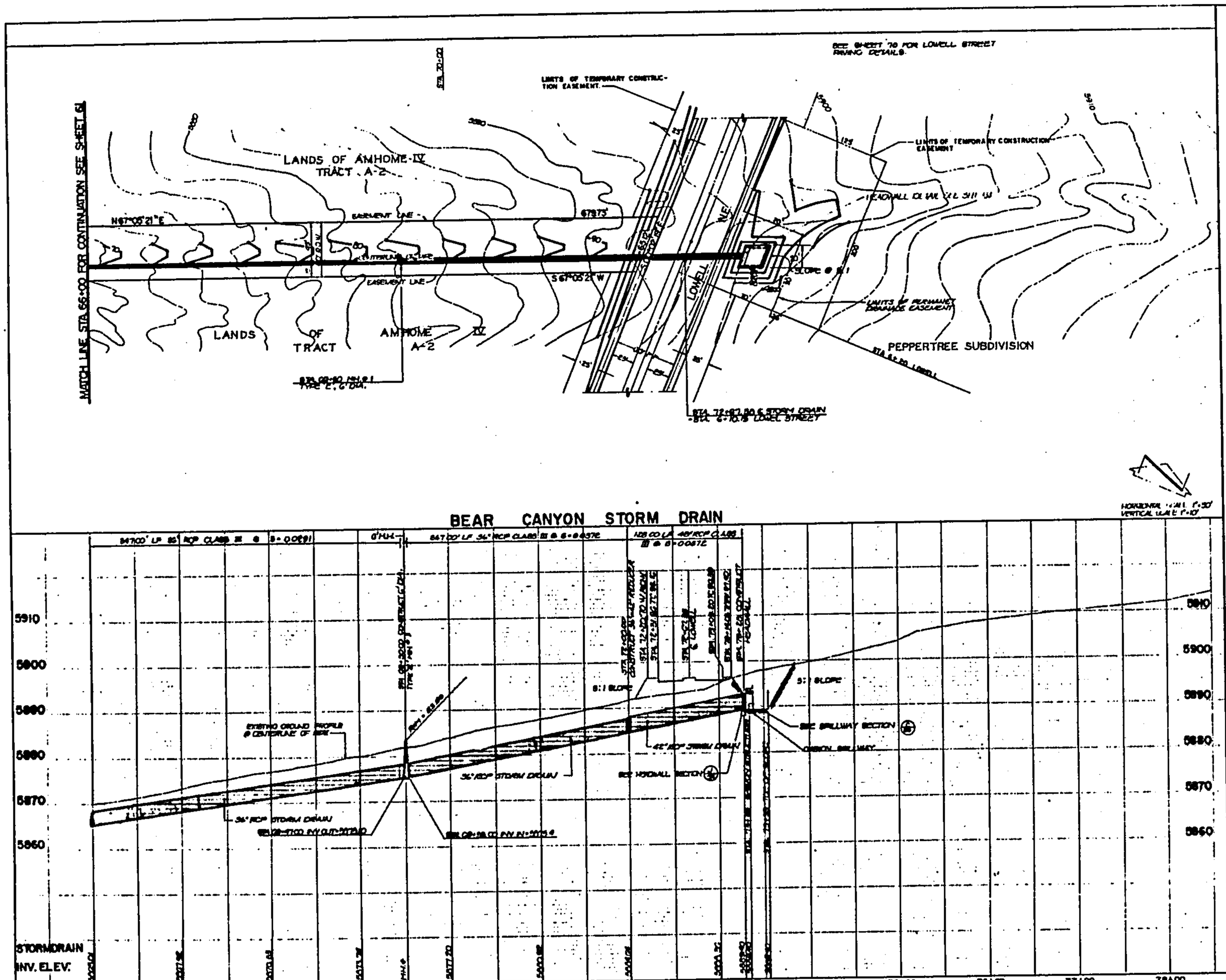
CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: BEAR CANYON TRIBUTARY
STORM DRAIN PLAN & PROFILE
STA 54+73 TO STA 66+10

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E.-Design			Traffic		
A.C.E.-Hydrology			Water		

DRAWING NO 1721 | MAP NO. | SHEET 61 OF 87

A3-11



GENERAL NOTES

1. All RCP shall be A.S.T.M. Class III.
2. All trench fill shall be compacted to a minimum density of 95% of optimum (modified) A.S.T.M. D1557.

AS BUILT INFORMATION

BENCH MARKS

A. CUT ON TOP OF THE CONCRETE CURB LOCATED ON THE NNE CURB RETURN AT THE INTERSECTION OF CARRUTHERS RD. AND DONALDSON CT. IN THE NORTH-EAST QUADRANT OF THE INTERSECTION (ALB. B.M. 13-F22)
ELEVATION = 5781.30

SURVEY INFORMATION

FIELD NOTES BY DATE

NO

ENGINEER'S SEAL

REGISTERED PROFESSIONAL ENGINEER THOMAS E. MASSIE 6776 NEW MEXICO

NO DATE BY REMARKS

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: BEAR CANYON TRIBUTARY
STORM DRAIN PLAN & PROFILE
STA 66+00 TO STA 78+00

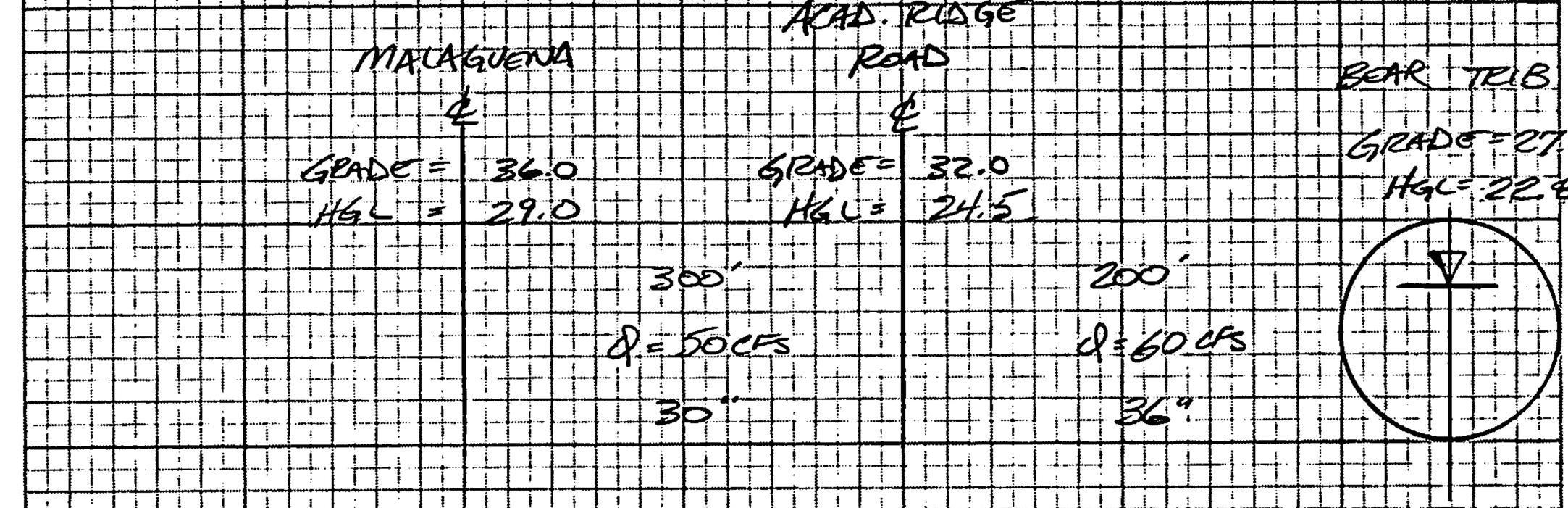
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E. - Design			Traffic		
A.C.E. - Hydrology			Water		

DRAWING NO 1721 | MAP NO | SHEET 62 OF 87

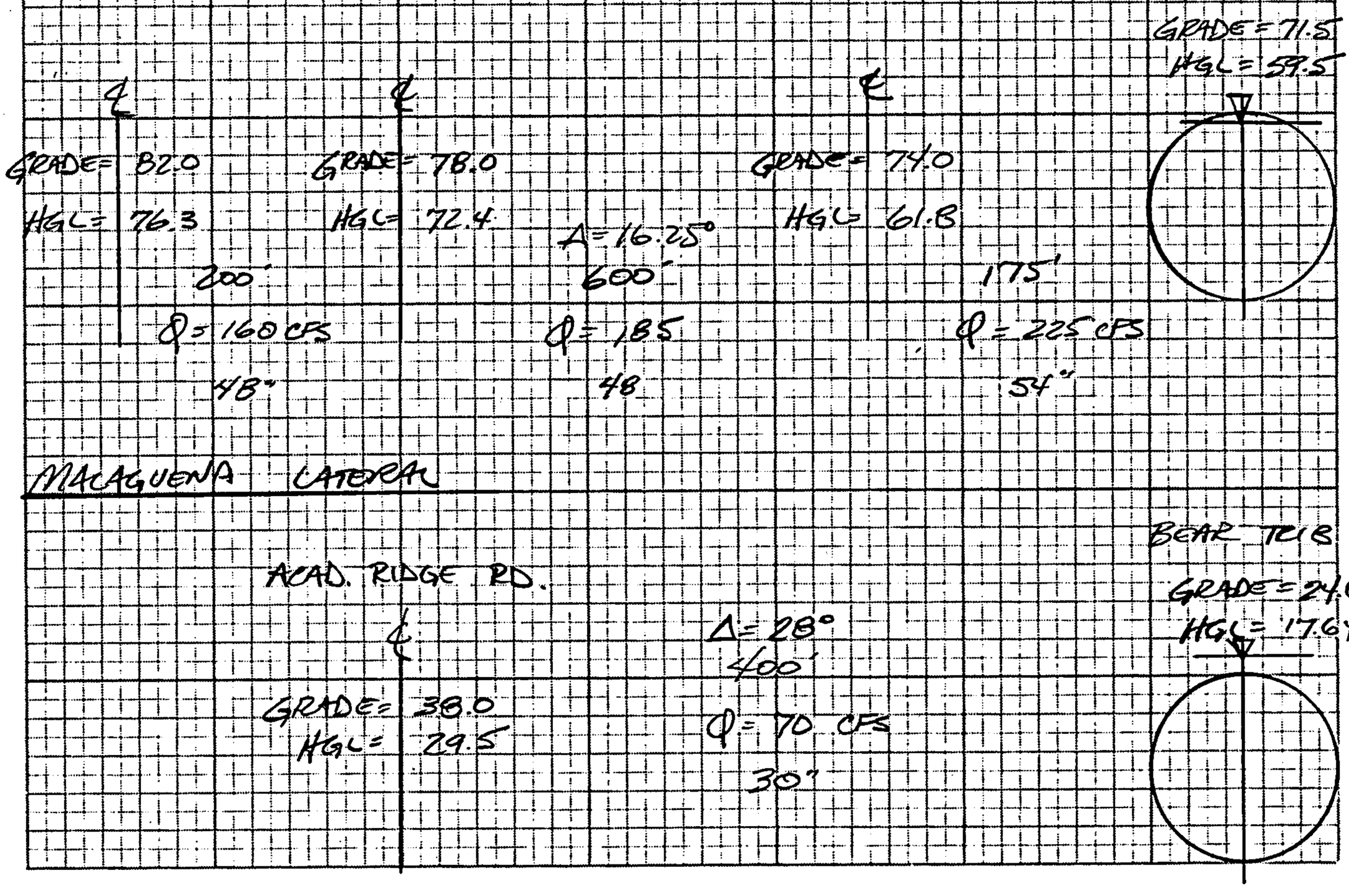
A3-12

ACADEMY RIDGE LATERAL -

HYDRAULIC GRADE LINE ELEVATIONS AT THE BEAR TRIB PIPELINE WERE CULLED FROM THE PIPELINE ANALYSIS PERFORMED FOR SAD-205, AND REPRESENT THE WORST POSSIBLE CASE.



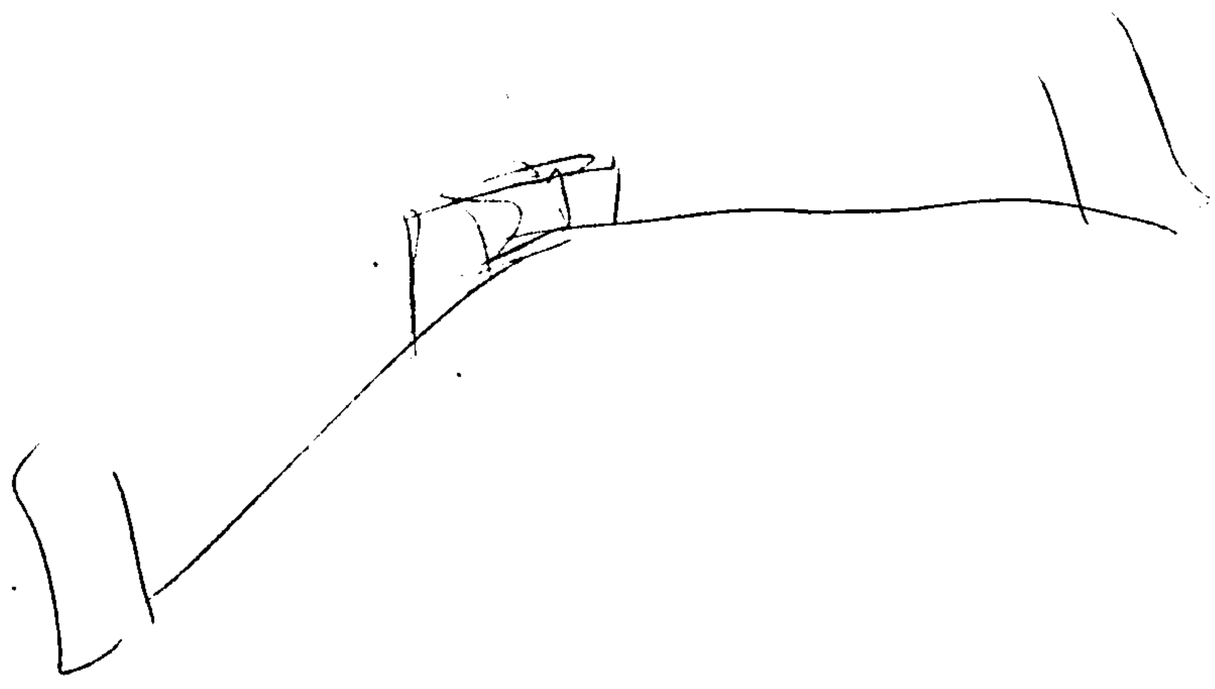
CARRUTHERS LATERAL

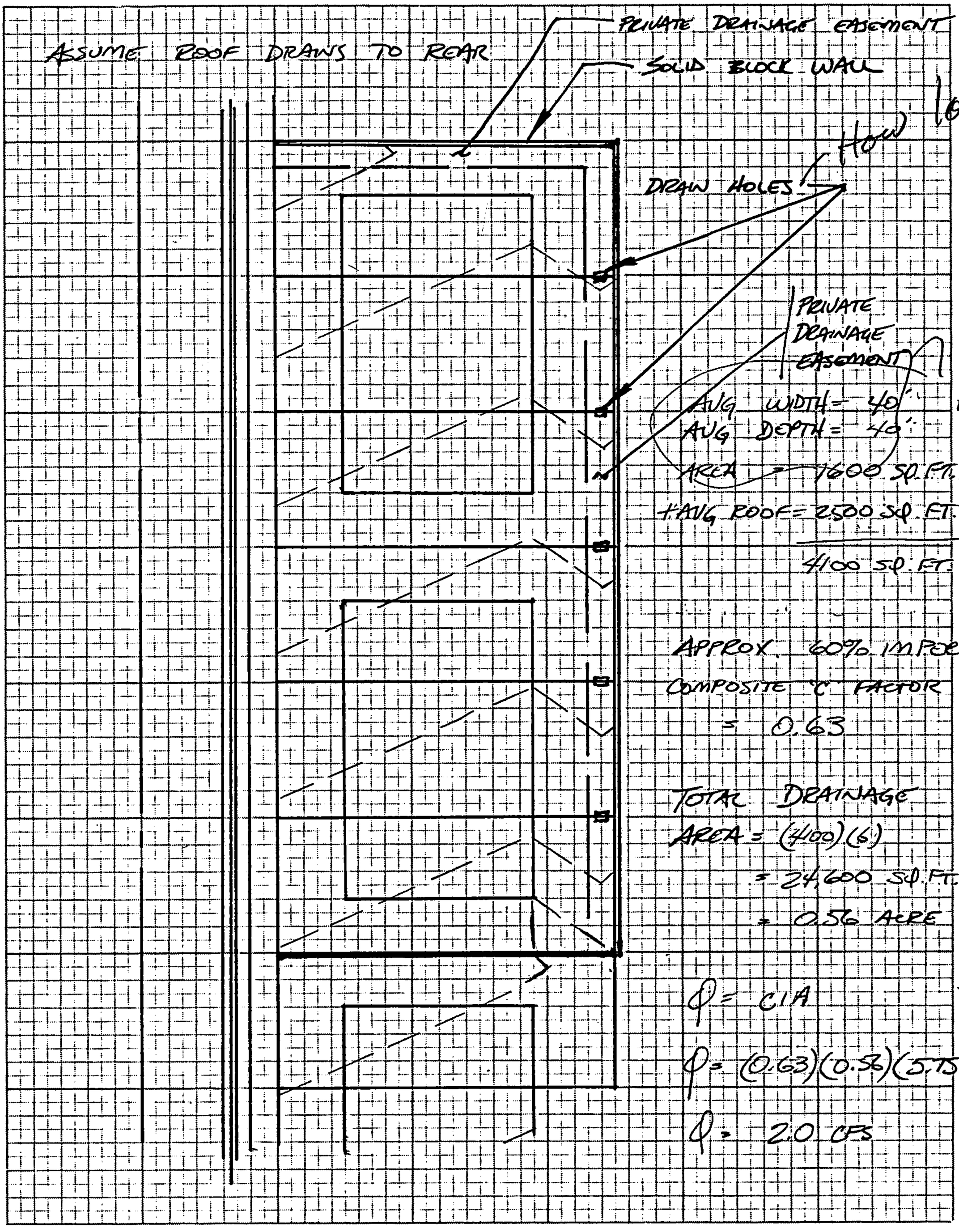


MALAGUENA LATERAL

BOHANNAN HUSTON INC.

PROJECT NAME ACADEMY RIDGE EAST SHEET ____ OF A4-2
PROJECT NO. 4141 BY KJD DATE 6/85
SUBJECT STM. DRAIN LATERALS - PREL. DES. CH'D ____ DATE ____





PROJECT NAME ACADEMY RIDGE EAST SHEET _____ OF A4-3

PROJECT NO. 41441 BY KLD DATE 7/10/84

SUBJECT TYPICAL GRADING SCHEME CH'D _____ DATE _____

INTERSECTION - MALAGUENA LANE AND ACADEMY RIDGE ROAD

PEAK FLOW BASIN A-7

Q_P = 70.2 CFS

ALLOW FLOWS TO DRAIN SOUTH IN ACADEMY ROAD

INTERSECTION - MALAGUENA LANE AND BEAR TRIB.

COMBINED PEAK FLOWS BASIN A-7 AND BASIN A-10

Q_P = 97.2 CFS

→ PLACE 1-TYPE D INLET IN ALLEY GUTTER @ BEAR TRIB.

FLOW DEPTH IN ALLEY = 0.5' (SEE RATING CURVE)

$Q_{REMOVED}$ = 8 CFS (FROM DPM PLATE 22.3 D-6)

$Q_{REMAINING}$ = 24 CFS - 8 = 16 CFS WILL OUTFALL TO MALAGUENA.

SUMP CONDITION @ MALAGUENA AND THE BEAR TRIB

→ PLACE TWO DOUBLE C INLETS AT STA 0+70 MALAGUENA (SAG)

ASSUME INLET CONTROLS ON CONNECTOR PIPES

WITH 6' OF HEAD AVAILABLE

AVAILABLE CONDUIT DISCHARGE = $Q = CA\sqrt{2gh}$

TRY 24" CONNECTOR PIPES

$Q_{REMOVED} = (0.6)(3.14)\sqrt{2(32.2)(6)}$ = 37 CFS EACH SIDE

TOTAL $Q_{REMOVED}$ = 74 CFS

REMAINING FLOW UPSTREAM = 97.2 - 8 = 74 = 15.2 CFS

→ PLACE 2-TYPE A INLETS ON MALAGUENA UPSTREAM.

$Q_{ORIGINAL}$ = 70.2 CFS ½ STREET FLOW = 35 CFS S = 3.8%

DEPTH OF FLOW = 0.55' (TABLE 22.3 D-1)

$Q_{REMOVED}$ = 10 CFS EACH SIDE

TOTAL FLOW = 97.2 CFS

- 20 CFS REMOVED BY TYPE A INLETS - MALAGUENA
- 8 CFS REMOVED BY TYPE D INLET - BEAR TRIB

70 CFS TO BE REMOVED BY DOUBLE C INLETS.

BOHANNAN HUSTON INC.

PROJECT NAME ACADEMY RIDGE EAST SHEET ____ OF ____

PROJECT NO. 41443 BY KLD DATE 1/7/85

SUBJECT MALAGUENA CATCH DESIGN CH'D ____ DATE ____

SET DEPTH OF DOUBLE C INLETS TO REMOVE 70 CFS

$Q = CA\sqrt{2gh}$

$35 = (0.6)(3.14)\sqrt{64.4h}$

$18.58 = \sqrt{64.4h}$

$5.36 = h$ = REQUIRED HEAD

-0.2

5.16' BELOW TOP OF CURB

DETERMINE MINIMUM DEPTH FOR TYPE 'A' INLETS

$d = 18"$

$Q = 10$ CFS

$A = 1.77$ FT^2

$V = 5.65$ FPS

$V_{MIN} = 1.33 + 1.2\frac{V^2}{2g} + d$

$= 1.33 + 1.2(0.5) + 1.5 = 3.42'$

DETERMINE MINIMUM DEPTH FOR TYPE 'D' INLET

$d = 18"$

$Q = 8$ CFS

$A = 1.77$ FT^2

$V = 4.52$ FPS

$V_{MIN} = 1.33 + 1.2\frac{V^2}{2g} + d$

$1.33 + 1.2(0.32) + 1.5 = 3.21'$

BOHANNAN HUSTON INC.

PROJECT NAME ACADEMY RIDGE EAST SHEET____ OF____

PROJECT NO.____ BY____ DATE____

SUBJECT____ CH'D____ DATE____

SUMMARY OF HYDRAULIC CALCULATIONS

FULL CLOSED CONDUIT DESIGN

Calc. by KD
Chk. by
Project: ACADEMY RIDGE EAST - MANZUONA CATCH
Lines:
Freq.: 100 Yr.

Proj. No. 4.443
Date 1/20/05
Sheet 1 of 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
STRUCTURE	STATION	S.D. TYPE SIZE	Q	A	V	K	S_f	L	Δ	LOSSES							E.G.	h_v	H.G.	
										H_F	H_B	H_J	H_T	H_{MH}	H_{MISC}	ΣH_L				
1 WYE		66" MAIN	64/69																	A
	0+00	48"	90	12.57	7.16	1436.43	0.00393	18.00		0.07						0.07	5720.84	0.80	5720.04	1A*
2	0+18	24"	35									0.11				0.11	20.91	0.80	20.11	2A
3 WYE	0+18	48"	55	12.57	4.38	1436.43	0.00147	18.00		0.03						0.03	21.01	0.30	20.72	3A
4	0+36	24"	35														21.04	0.30	20.74	4A
5 WYE	0+36	48"																		5A
6																				6A
7																				7A
8																				8A
9																				9A
10																				10A
11																				11A
12																				12A
13																				13A
14																				14A
15																				15A
16																				16A
17																				17A
18																				18A
19																				19A
20																				20A

NOTES:

*1A ASSUME HGL @ SOFFIT OF MAIN

HEAD REQUIRED FOR ORIFICE CONTROLLED OUTLET

WITHIN DOUBLE 'C' INLETS = 5.16'

TOP OF CURB = 26.18

CENTER OF PIPE = 21.00

∴ HGL IS LOW ENOUGH @ 20.72 & 20.74 TO DRIVE THE 24" CONNECTOR PIPES.

S=0.0423 Lft. Rt.

S=0.0452 Lft. Lt.

7+75 V.P.C.
T.C. 23.76 (Lt.)
24.00 (Rt.)

8+50 Academy Place Unit 5
V.P.I. (27.16), 26.12 (Lt.), 26.18 (Rt.)
8+72.40 Begin Curb Lt.
T.C. 26.43
8+87.70 B.K. = 0+00 A.H.
26.54 (Rt.) 26.53 (Lt.)
0+15.03 Begin Curb Rt.
T.C. 26.55

0+28.96 Rt.
Elev. @ back of
Drivepad 26.68

0+55.95 Rt.
Elev. @ back of
Drivepad 26.43

Sta. 0+70
Build Type Double 'C' Inlets Lt. & Rt.
T.C. = 26.18
Inv. = 20.00

Sta. 1+12
Build Type 'A' Inlets Lt. & Rt.
T.C. = 26.59
Inv. = 22.50

M.O. = -0.98 (Rt.), -1.04 (Lt.)

1+50 V.C.

0+37.30 V.P.T.
T.C. 26.41 Lt. & Rt.

V.P.C. 0+50
T.C. 26.28

1+00 V.P.I.
(25.78)
T.C. 26.39

V.P.T. 1+50
T.C. 27.71

M.O. = +0.91

1+00 V.C.

0+00

0+17.70 ℄ Malaguena
26+75.20 S.O. ℄
Inv. = 13.83

0+35.77
Tie to Exist. 4' Dia. M.H.
Inv. N = 11.50
W = 11.30
Adjust Rim To
Elev. 26.07

0+62.10
Exist. 14" Cap
Top W.L. = 16.5

0+85.26, 10' Rt.
Build 6' Dia. Type "E" M.H.
Inv. = 17.87 (S)
18.56 (NE)
18.38 (NW)

48" RCP S=0.0445

403.2

S=0.0100 Lft. Rt.

8"

1

2

WESTERN TECHNOLOGIES INC.

8305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488

Centex Homes
10701 Montgomery Blvd., NE
Suite 6
Albuquerque, New Mexico

April 19, 1989

Attention: Mr. Richard Mallett, V.P.

Re: Evaluation of Drainage
Academy Ridge East Phase I
Albuquerque, New Mexico

Job No. 3229J024

Our geotechnical engineering report for the Academy East Phase I drainage investigation is attached. The work was performed in accordance with our proposal of March 30, 1989, accepted by your signed agreement of April 3, 1989.

Soils at the site generally consisted of fine to coarse-grained silty sand overlying poorly-graded sand with low to moderate load bearing capabilities. Subsurface soil conditions identified during the field investigation were found to be unusually moist in areas where surface water has accumulated due primarily to collection of irrigation water. We are recommending locating four intercepters to dewater the problem areas.

We are prepared to review your plans and specifications for consistency with the recommendations, and to provide the construction observation and testing recommended.

Sincerely,

WESTERN TECHNOLOGIES, INC.
Geotechnical Engineering Services

By: Charles M. Miller, P.E.

CHARLES M. MILLER NEW MEXICO 6018 REGISTERED PROFESSIONAL ENGINEER

Reviewed by: Lyle M. Tweet, P.E.

Copies: Addressee (3)

Geotechnical Engineering
Evaluation of Drainage
Academy Ridge East Phase I
Academy Ridge Road and Malaguena Lane
Albuquerque, New Mexico

INTRODUCTION

This report contains the results of our geotechnical engineering evaluation for the drainage problem located between Academy Ridge Road and Malaguena Lane in Albuquerque, New Mexico. The purpose of these services is to evaluate subsurface soil and groundwater conditions, and criteria for surface and subsurface drainage adjacent to the buildings.

PROPOSED EXISTING CONSTRUCTION

We understand the proposed and existing structures will be one/two-story slab-on-grade houses using wood construction. Shallow footings are planned or have been constructed for these houses. Ground floor level for the existing and proposed structures is at or slightly above existing site grade.

SITE CONDITIONS

At the time of our exploration, the site was occupied by homes on lots 42, 43, 46, 47, and 50. Lots 44, 45, 48, and 49 were vacant. For additional information see site plan. The ground surface was terraced and the vacant lots were free of vegetation. Site drainage was to the west, although shallow depressions existed. Other site features include a back lot drain channel extending from the back of lot 42 west to its outlets west of lot 47 and west of lot 50, both of which drain into Academy Ridge Road. The drain channel is joined along its length in two locations by tributary drain channels which drain areas to the north of the aforementioned lots.

In addition, a sump pump is located in the back of lot 46 and a gravel sump is connected to the house on lot 47.

SCOPE OF SERVICES

Our scope of service was to determine the primary causes of surface and/or subsurface drainage problems for the Academy Ridge Phase I project. The problems consisted of ponded water. To accomplish the primary goal, interviews with City personnel, home owners, subcontractors, and home builders were completed. In addition, observation of the site was continued over a two week period as well as reviewing previous reports and investigations by others.

A total of five borings were drilled to depths of approximately 15 to 20 feet and 11 test pits were excavated to depths of approximately 3 to 4 feet at the approximate locations shown on the site plan. During exploration, subsoils were visually examined and sampled at selected intervals. Moisture-density tests were performed on selected soil samples.

Western Technologies Inc. performed the services described in this report to develop engineering information for the purposes defined in the "Introduction." We did not intend to uncover nor identify any contaminated subsurface materials that may contain hazardous or flammable substances. Identification of such substances requires specialized exploration techniques and analyses which were beyond the scope of this investigation.

INTERPRETATION OF SUBSURFACE CONDITIONS

Exploration: As presented on Logs of Borings, subsoils vary with depth and are fairly uniform across the site. The backhoe test pits were generally found to be moist to slightly-moist silty sand and fill depths ranged from 1 to 4 feet. The native silty sands were noted as being lightly cemented at the fill/native soil

interface. In the borings, fill material was noted as ranging from 3 to 8 feet deep and consisted of moist to slightly-moist silty sand. Below the native silty sands, dry to slightly-moist poorly-graded sands were encountered to the full depth of exploration In areas where water has ponded on the surface and later evaporated, calcium carbonates were encountered. A groundwater table was not encountered in any boring at the time of exploration.

Testing: Laboratory test results verify field findings in that site silty sands are slightly-moist to moist and the underlying poorly-graded sands are slightly-moist to dry. For further information on specific tests see the attached data.

CONCLUSIONS AND RECOMMENDATIONS

General: Based on previous history, observations of the area, soil borings and test pits, our conclusions are as follows:

1) The primary cause of excessive water is caused by irrigation by homeowners. The soil is being excessively wetted causing water migration in the upper struture of soil.

Secondary isolated drainage problems:

2) Excessive irrigation water requires an improvement of the drainage in selected lots. (See attached drawings.)

3) Inadequate sloping next to and away from houses causes water to accumulate next to house foundations and walls;

4) Runoff is not being channeled to the back lot drains or rundowns efficiently because the adjacent ground surface in some yards is below the lip of the concrete drains.

5) Impedance of surface flow by landscaping, sidewalks, retaining walls, etc.,causes runoff to accumulate.

Recommendations: To control the excessive irrigation, area homeowners must be made aware of the problem and educated as to the adverse effects over-watering can cause. Also, positive

drainage should be provided on future lots to drain surface water away from structures. To help runoff water reach the rundowns or back lot drains, concrete interceptors or some modification of the existing drains could be implemented. Each lot must be specifically designed which will require a study of each specific/ isolated conditions which are causing problems.

CLOSURE

Based on this investigation, our findings in the field, and reports of others, it is our conclusion that the drainage problem in the area is caused by excessive irrigation. Correction of the problem will depend primarily on the cooperation of homeowners in controlling the use of irrigation water.

If you have any questions or if we can help you further, please feel free to contact us.

Job No. 3229J024

BORING LOG NOTES

The number shown in "LOG OF BORING NO." refers to the approximate location of the same number indicated on the "Site Plan" as positioned in the field by measurements from property lines and/or existing features.

"TYPE/SIZE BORING" refers to the exploratory equipment used in the boring wherein HSA = hollow-stem auger.

"N" in "Blows/Foot" refers to the number of blows of a 140-pound weight, dropped 30 inches, required to advance a two-inch-outside-diameter split-barrel sampler a distance of 1 foot, Standard Penetration Test (ASTM D1586). Refusal to penetration is considered more than 100 blows per foot.

"R" in "Blows/Foot" refers to the number of blows of a 140-pound weight, dropped 30 inches, required to advance a 2.42-inch-inside-diameter ring sampler a distance of 1 foot. Refusal to penetration is considered more than 50 blows per foot.

"Sample Type" refers to the form of sample recovery wherein N = Split-barrel sample, and R = Ring sample.

"Dry Density, pcf" refers to the laboratory-determined dry density in pounds per cubic foot.

"Moisture Content, %" refers to the laboratory-determined moisture content in percent (ASTM D2216).

"Unified Class" refers to the soil type as defined by "Method of Soil Classification". The soils were visually classified in the field and, where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate test.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans or as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and soil characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

In general, terms and symbols on the boring logs conform with "Standard Definitions of Terms and Symbols Relating to Soil and Rock Mechanics" (ASTM D653).

LOG OF BORING

Test Boring No. 1

Project: Centex Homes - Academy Ridge Rd.-Drainage Job No. 3229J024

Type/Size Boring: HSA 6 5/8" Rig Type: CME-75 Date: 04-03-89

Groundwater Conditions: No Groundwater Encountered

Depth (ft)	Blows/ Foot	ST	DD (pcf)	MC (%)	Description
					Fill
	32	N			SILTY SAND; fine to coarse grained, dense, trace of gravel, moist, brown, (SM)
					Black Organic Layer, 3-5' strong sewage odor
5					
	14	N			SILTY SAND; fine to coarse grained, dense, trace of gravel, moist, brwown, (SM)
10					
	7	N			SILTY SAND; coarse grained, loose, trace of gravel, dry, brown, (SP)
15					
	19	N			
					STOPPED AT 16.5 FEET
20					
25					

LOG OF BORING

Test Boring No. 2

Project: Centex Homes - Academy Ridge Rd.-Drainage Job No. 3229J024

Type/Size Boring: HSA 6 5/8" Rig Type: CME-75 Date: 04-03-89

Groundwater Conditions: No Groundwater Encountered

Depth (ft)	Blows/ Foot	ST	DD (pcf)	MC (%)	Description
					FILL
	15	N			SILTY SAND; fine to coarse grained, medium dense, moist to slightly moist, brown, (SM)
5					
	24	N			
10					SAND; fine to coarse grained, medium dense, trace of gravel, slightly moist to dry, brown, (SP)
	16	N			
15					
	6	N			
					STOPPED AT 16.5 FEET
20					
25					

LOG OF BORING

Test Boring No. 3

Project: Centex Homes - Academy Ridge Rd.-Drainage Job No. 3229J024

Type/Size Boring: HSA 6 5/8" Rig Type: CME-75 Date: 04-03-89

Groundwater Conditions: No Groundwater Encountered

Depth (ft)	Blows/ Foot	ST	DD (pcf)	MC (%)	Description
					FILL
	22	N	124		SILTY SAND; fine to coarse grained, dense, light cementation, moist, brown, (SM)
5					
	33	N	126		
10					
	30	N	122		SILTY SAND; fine to coarse grained, medium dense, trace of gravel, light cementation, low plasticity, moist, brown, (SM)
15					
	10	N			SAND; coarse grained, medium dense, trace of gravel, moist, brown, (SP)
20					
	16	N			
					STOPPED AT 21.5 FEET
25					

LOG OF BORING

Test Boring No. 4

Project: Centex Homes - Academy Ridge Rd.-Drainage Job No. 3229J024

Type/Size Boring: HSA 6 5/8" Rig Type: CME-75 Date: 04-03-89

Groundwater Conditions: No Groundwater Encountered

Depth (ft)	Blows/ Foot	ST	DD (pcf)	MC (%)	Description
					FILL
	12	N	124		SILTY SAND; fine grained, medium dense, trace of gravel, slightly moist, brown, (SM)
5					
	24	N			
					SAND; coarse grained, medium dense, trace of gravel, slightly moist, brown, (SP)
10					
	10	N			
15					
	7	N			
					STOPPED AT 16.5 FEET
20					
25					
30					

LOG OF BORING

Test Boring No. 5

Project: Centex Homes - Academy Ridge Rd.-Drainage Job No. 3229J024

Type/Size Boring: HSA 6 5/8" Rig Type: CME-75 Date: 04-03-89

Groundwater Conditions: No Groundwater Encountered

Depth (ft)	Blows/ Foot	ST	DD (pcf)	MC (%)	Description
					FILL
	21	N			SILTY SAND; fine to medium grained, medium dense, trace of coarse grained and gravel, slightly moist, brown, (SM)
5					
	19	N	133		
10					
	6	N			SILTY SAND; fine to medium grained, medium dense, trace of coarse grained and gravel, slightly moist, brown, (SM)
15					
	8	N			
					SAND; fine to coarse grained, loose to medium dense, moist, brown, (SP)
20					CLAYEY SILTY SAND; medium dense, low plas-
	10	N			ticity, light cementation, moist, brown, (SC-SM)
					STOPPED AT 21.5 FEET
25					

SITE PLAN

ACADEMY RIDGE DRAINAGE

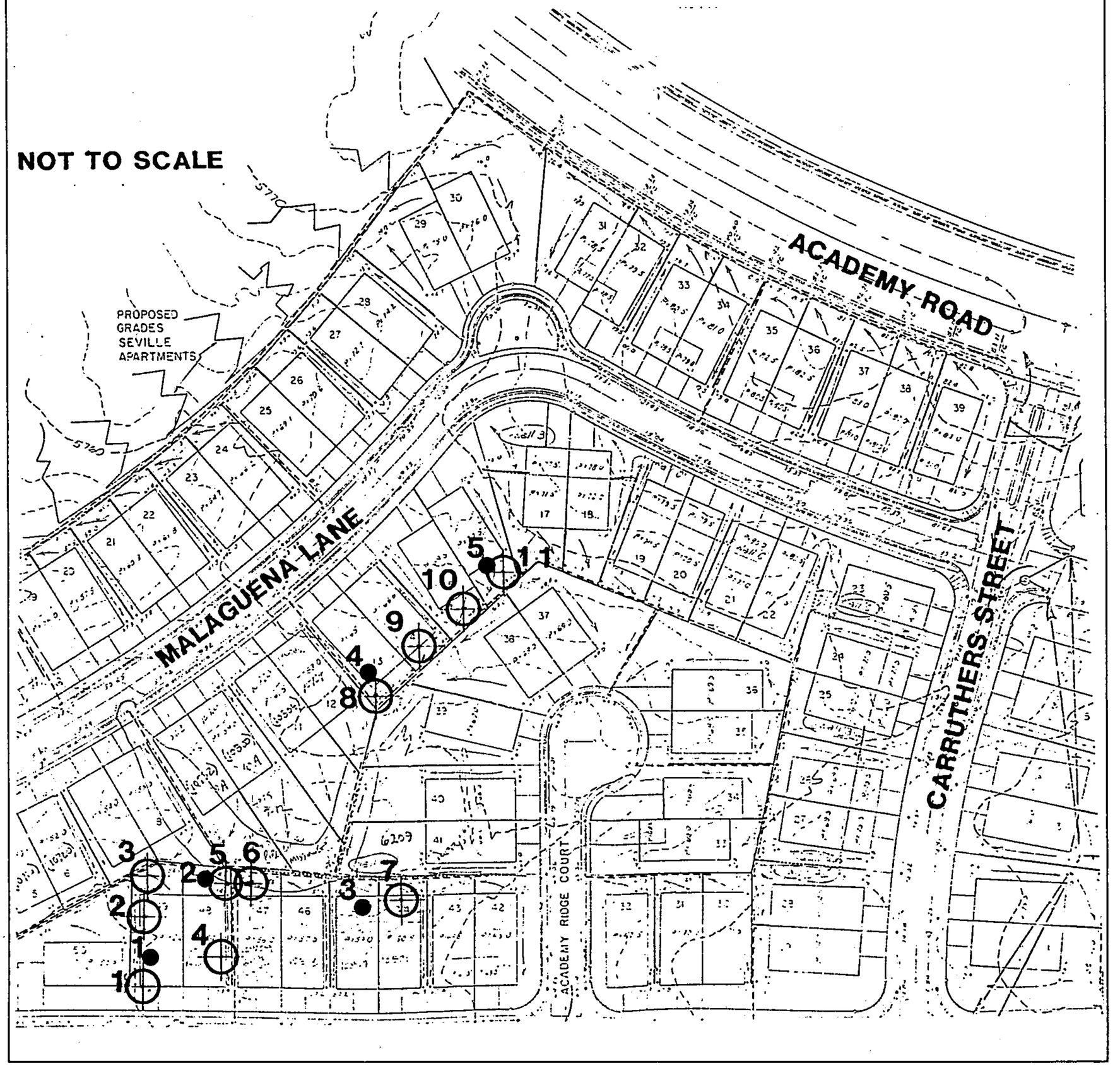
JOB NUMBER 3229J024

Prepared By Jeffery Firebaugh Date 4-4-89 Checked By Charlie Miller Date 4-4-89

BORING ●

TEST PIT ⊕

NOT TO SCALE



LOGS OF TEST PITS

Test Pit No.	Total Depth (feet)	Soil Type	Moisture	Fill Thickness (feet)
1	4	SM	SL. MOIST	2
2	4	SM	SL. MOIST	2
3	4	SM	SL. MOIST	3
4	4	SM	DRY	1
5	4	SM	MOIST	4
6	4	SM	MOIST	3
7	4	SM	DRY	1
8	4	SM	SL. MOIST	4
9	4	SM	SL. MOIST	2.5
10	4	SM	SL. MOIST	3
11	4	SM	SL. MOIST	4

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 11, 1988

Kerry Davis, P.E.
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: REVISED GRADING & DRAINAGE PLAN FOR ACADEMY RIDGE EAST, UNIT III
RECEIVED MAY 6, 1988 FOR APPROVAL (E-21/D29)

Dear Mr. Davis:

The above referenced submittal, Sheet 9 of 13, revised May 3, 1988, is approved.

If you have any further questions, call me at 768-2650.

Cordially,

Roger A. Green, PE

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

RAG/bsj

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 29, 1988

Kerry Davis, P.E.
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: DRAINAGE RUNDOWN MODIFICATION FOR ACADEMY RIDGE EAST, UNIT I
RECEIVED JUNE 24, 1988 FOR BUILDING PERMIT APPROVALS (E-21/D29)
(CITY PROJECT NO. 2289)

Dear Mr. Davis:

The above referenced submittal revised June 23, 1988, is approved. The V-bottom drainage channels may be used where the minimum slope is 0.5%.

If you have any further questions, call me at 768-2650.

Cordially,

Roger A. Green, PE

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

xc: Rick Duran, Drainage Inspector
Lynn Johnson, Centex Homes

RAG/bsj