PLANS/PLATS ON FILE

FILE DESC: D-19 / D017

PLANS/PLATS 4

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

December 16, 1983

Mr. Steve Schroll
Tom Mann & Associates, Inc.
811 Dallas NE
Albuquerque, New Mexico 87110

RE: DRAINAGE REPORT FOR ACADEMY NORTH SUBDIVISION (D19-D17)
RECEIVED DECEMBER 2, 1983

Dear Steve:

I have reviewed the above referenced plan and have the following comments:

1. I am confused with your street flow computations. Apparently only the 10 year flows were used for analysis and this is sufficient but, I don't know where the value came from for Section C-C. The runoff associated with this section is from Sub-Basin 3, yet, the value used for analysis is 10.1 cfs. and the computations indicate a 10 year flow of 4.2 cfs. Please clarify for me.

2. You will need to supply all your computations for the pipe capacity analysis. I cannot get the same values you indicate. Also, I suggest that this system be analyzed by computing the hydraulic grade. The pipes may or may not have the capacities indicated however, the water has to get into the pipe first and working under a full flow condition. To get the 16.8 cfs. as indicated into the 18" pipe the water will have to pond at a depth of 3 feet above the top of the pipe under inlet control. How will this affect the flow into the catch-basin? I would also like to see some more information on how the capacities of the inlets were determined so that I can verify what you used for imput gives the correct results.

3. The plan indicates channel stabilization to be installed. What are the limits? Will the entire length of the channel be lined with riprap? Also, has AMAFA given approval for what is proposed since it is their channel?

Please contact me if you should have any questions or comments concerning these request.

Yours truly,

Billy J. Goolsby P.E.

Billy Goolsby
CE/Hydrology

BG/ca

811 DALLAS, N.E. • ALBUQUERQUE • NEW MEXICO • 87110 • 505-265-5611

Tom Mann Associates, Inc.
Engineers

D19-D17

30971
December 27, 1983

Mr. Billy Goolsby
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Academy North Subdivision - Drainage Report

Dear Mr. Goolsby:

Transmitted herewith are two copies of the corrected Drainage Report for the Academy North Subdivision. If you have any questions or comments, please do not hesitate to call.

Sincerely,

TOM MANN & ASSOCIATES, INC.

Steven K. Schroll
Project Engineer

SKS:ra
Encls.

RECEIVED
DEC 27 1983
ENGINEERING

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE January 10, 1984 REF. NO._____

TO: Tom Mann & Associates, agent for Roger H. Smith

FROM: City Engineer/AMAFCA Designee

SUBJECT: S-84-4

No objection to preliminary plat approval.

Dedication of a drainage right-of-way for the adjacent arroyo required.

Change the AMAFCA R/W designation to drainage R/W.

Subdivision Improvements Agreement appropriate for the required public infrastructures on and off-site, for final plat sign-off.

FJA/tsl

FILE W/ REPORT

MARTY VALDEZ QUESTION TO THE CAPATABILITY OF THIS DEVELOPMENT WITH THE UPSTREAM IMPROVEMENTS

DEFERRED TO 1/24/84

D19-D17

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

January 12, 1984

Mr. Steve Schroll
Tom Mann & Associates, Inc.
811 Dallas NE
Albuquerque, New Mexico 87110

RE: GRADING & DRAINAGE REPORT FOR ACADEMY NORTH SUBDIVISION
(D19-D17) RECEIVED DECEMBER 27, 1984

Dear Steve:

I am writing this letter to inform you that I am in the process of reviewing the above referenced plan. It is taking some time to generate the additional calculations, elevations, pipe profile and ponding areas associated with the storm sewer system in order to verify the final results you have provided.

I will try to accomplish this as quickly as possible and get you a response. If this information can be submitted to me, it would help to expedite the review.

Yours truly,

Billy J. Goolsby P.E.

Billy Goolsby
City/County Flood Ordinance
Administrator

BG/ca

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

30971
January 25, 1984

Mr. Billy Goolsby, P.E.
Engineering/Hydrology Division
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Academy North Subdivision

Dear Billy:

Transmitted herewith for review is the revised drainage report for the above mentioned project.

If you have any questions or comments, please do not hesitate to call.

Sincerely,

TOM MANN & ASSOCIATES, INC.

Steven K. Schroll
Project Engineer

SKS:kl
Encs.

RECEIVED
JAN 25 1984
HYDROLOGY SECTION

RECEIVED
JAN 25 1984
HYDROLOGY SECTION

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

RECEIVED
JAN 26 1984
CITY ENGINEER

D-19 D-17

30971
January 26, 1984

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

Re: Academy North Subdivision - Financial Guarantee

Dear Fred:

Transmitted herewith is a copy of the agreement for Academy North Subdivision. It has been reviewed once and I feel that everything is in order. I would like to process it as quickly as possible. I have attached a copy of the Irrevocable Letter of Credit. As you will note it has a 60 day time period and we are working with the bank to remove that time stipulation.

Please let me know if you have any other possible comments about this agreement, and I will submit the new one to you as soon as possible. As I stated, we are anxious to begin work so please give me any comments so that we may clean this up as soon as possible.

Thank you,

TOM MANN & ASSOCIATES, INC.

Thomas T. Mann, Jr. P.E.
President

TTM:kl

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

February 2, 1984

Mr. Steve Schroll
Tom Mann & Associates, Inc.
811 Dallas NE
Albuquerque, New Mexico 87110

RE: REVISED GRADING AND DRAINAGE REPORT FOR ACADEMY NORTH SUBDIVISICN (D19-D17) RECEIVED JANUARY 25, 1984

Dear Steve:

The above referenced plan is in compliance with my previous comments and is hereby approved.

This new submittal does not have a revision date on the plan. Therefore the construction set will have to be checked thoroughly to see that it matches this approved plan exactly.

Please supply me with documentation as to AMAFCA's concurrence with respect to the proposed work in the channel.

Financial securities will also be required for the infrastructure improvements prior to final sign-off.

Should you have any questions or comments, please contact me.

Sincerely yours,

Billy J. Goolsby

Billy Goolsby
City/County Flood Ordinance
Administrator

BG/ca

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

D-19 —
D-17

30971
March 14, 1984

Kevin Peterman
Rio Grande Title Company
6400 Indian School Road N.E.
Albuquerque, NM 87110

Re: Academy North Subdivision

Dear Kevin:

I am continuing to receive pressure from the City of Albuquerque to resolve the right-of-way problem on the south side of the Academy North Subdivision. It is the 100-foot strip that I have talked to you about which seems to be in limbo as to who owns it. The City and AMAFCA are requesting that I obtain the dedication on it to them in order to allow us to proceed with our subdivision.

Please let me know the status of that piece of land as soon as possible.

Thank you,

TOM MANN & ASSOCIATES, INC.

Thomas T. Mann, Jr., P.E.
President

TTM:ra
cc: Fred Aguirre ✓

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

30972
August 7, 1984

Billy Goolsby
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Academy North Subdivision D-19 D-17

Dear Billy:

At our metting of August 7, 1984, we discussed the problem with lots 20-30 of the subject project. You indicated that 1) since the grading and drainage plan for the site was not followed in setting house pad elevations, it will be necessary for Tom Mann & Associates to certify these lots. We will perform this service. 2) You had no particular problem with our proposed plan to swale the driveways. The alley can be paved. 3) The grading of these lots will be critical. It would be wise to have a surveyor blue-top the drives and lots. 4) The City may request additional certifications depending on the field conditions encountered when the City inspects the site.

If this information is incorrect, please notify me as soon as possible.

Sincerely,

TOM MANN & ASSOCIATES, INC.

Steven K Schroll
Project Engineer

SKS:ra
xc: Roger Smith
Paul Woods
Steve Smith
Rick Roybal

RECEIVED
AUG 09 1984
HYDROLOGY SECTION

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

3097
August 17, 1984

Mr. Fred Aguirre
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Academy North Subdivision

Dear Fred:

In accordance with your request, we have obtained a quitclaim deed to the 100-foot strip of land adjacent to the Academy North Subdivision that you requested for channel right-of-way.

Transmitted herewith is the filed original of the quitclaim deed deeding the land to the City of Albuquerque. In addition, I have attached the correspondence that led to the owner quitclaiming the land to the City.

This should relieve the concerns expressed by AMAFCA on the land ownership of the channel. I therefore request that you sign our revised subdivision plat so that it may be filed.

If you have any questions or comments, please do not hesitate to call.

Thank you,

TOM MANN & ASSOCIATES, INC.

Thomas T. Mann, Jr., P.E.
President

TTM:ra

SF-3 SHORT FORM QUITCLAIM DEED—New Mexico Statutory Form—Rev. 6/75

AUG 9 1984

84 60642

916

QUITCLAIM DEED

Associated Investment Company of El Paso, Texas

for consideration paid, quitclaim

to City of Albuquerque, New Mexico

whose address is P.O. Box 1293, Albuquerque, New Mexico 87103

the following described real estate in Bernalillo County, New Mexico:

A certain tract of land located within the Corporate Limits of the City of Albuquerque comprising a portion of Tract C of Heritage Hills as shown on the plat filed in the Office of the County Clerk of Bernalillo County, New Mexico, on February 25, 1977 (D7-124), and being more particularly described as follows:

Beginning at the southwest corner of Tract C, thence N 00°08'19" E a distance of 100 feet; thence S 89°36'36" E a distance of 344.93 feet; thence S 12°27'07" W a distance of 102.26 feet; thence N 89°36'36" W a distance of 323.12 feet to the point of beginning and containing 0.7668 acres more or less.

WITNESS its hand and seal this 7th day of August, 19 84

ASSOCIATED INVESTMENT COMPANY OF EL PASO, TEXAS

(Seal) (Seal)

(Seal) (Seal)

ACKNOWLEDGMENT FOR NATURAL PERSONS

STATE OF

COUNTY OF } ss.

The foregoing instrument was acknowledged before me this day of, 19,

by (Name or Names of Person or Persons Acknowledging)

My commission expires:
(Seal)

Notary Public

FOR RECORDER'S USE ONLY

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD
1984 AUG 10 PM 2:14
BK 218 PG 916
DOLORES C. WALLER
RECORDER

THE VALLEY CO. ALBUQUERQUE, N. M.

ACKNOWLEDGMENT FOR CORPORATION

STATE OF TEXAS

COUNTY OF EL PASO } ss.

The foregoing instrument was acknowledged before me this 7th

August, 19 84,

by Paul R. Gardner,

(Name of Officer)

Vice President of Associated Investment Company of

(Title of Officer) (Name of Corporation Acknowledging)

El Paso, Texas

Texas corporation, on behalf of said

(State of Incorporation)

corporation.

My commission expires:

KATHY GASWAY, Notary Public
For the State of Texas
My Commission Expires Sept. 22, 1984

Kathy Gasway
Notary Public

DRAINAGE REPORT for the ACADEMY NORTH SUBDIVISION

RECEIVED
JAN 25 1984
HYDROLOGY SECTION

Tom Mann Associates, Inc.
811 DALLAS, N.E. • ALBUQUERQUE • NEW MEXICO • 87110
ENGINEERS

JOB NO. 3-0971

INFORMATION SHEET

PROJECT TITLE Academy North Subdivision TYPE OF SUBMITTAL Drainage Report

ZONE ATLAS PAGE NO. D-19, 20 CITY ADDRESS N/A

LEGAL DESCRIPTION Tracts "A-A" and "C", Unit 6, Loma Del Norte, and Tract "C", Unit 2, Heritage Hills

ENGINEERING FIRM Tom Mann & Associates CONTACT Steve Schroll

ADDRESS 811 Dallas N.E. PHONE 265-5611

OWNER Roger Smith, Inc. CONTACT Roger Smith

ADDRESS 126 General Chenault N.E. PHONE 294-1525

ARCHITECT Don Krueger CONTACT Don Krueger

ADDRESS 126 General Chenault N.E. PHONE 293-7888

SURVEYOR Unavailable CONTACT

ADDRESS PHONE

CONTRACTOR Unavailable CONTACT

ADDRESS PHONE

DATE SUBMITTED

BY Steve Schroll

RECEIVED
JAN 25 1984
HYDROLOGY SECTION

DRAINAGE REPORT

FOR

ACADEMY NORTH SUBDIVISION

November, 1983

Prepared For: Roger Smith, Inc.
126 General Chenault N.E.
Albuquerque, New Mexico 87123

Prepared By: Tom Mann & Associates, Inc.
811 Dallas N.E.
Albuquerque, New Mexico 87110
(505) 265-5611

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
THOMAS T. MANN
3762
AND LAND SURVEYOR

12/2/83
1/29/84

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PURPOSE AND SCOPE

The purpose of this drainage report is to establish the criteria for controlling runoff resulting from development in a manner consistent with the City of Albuquerque Drainage Ordinance and Development Process Manual.

This report analyzes the runoff resulting from a 100-year frequency, 6-hour duration storm under existing and developed conditions.

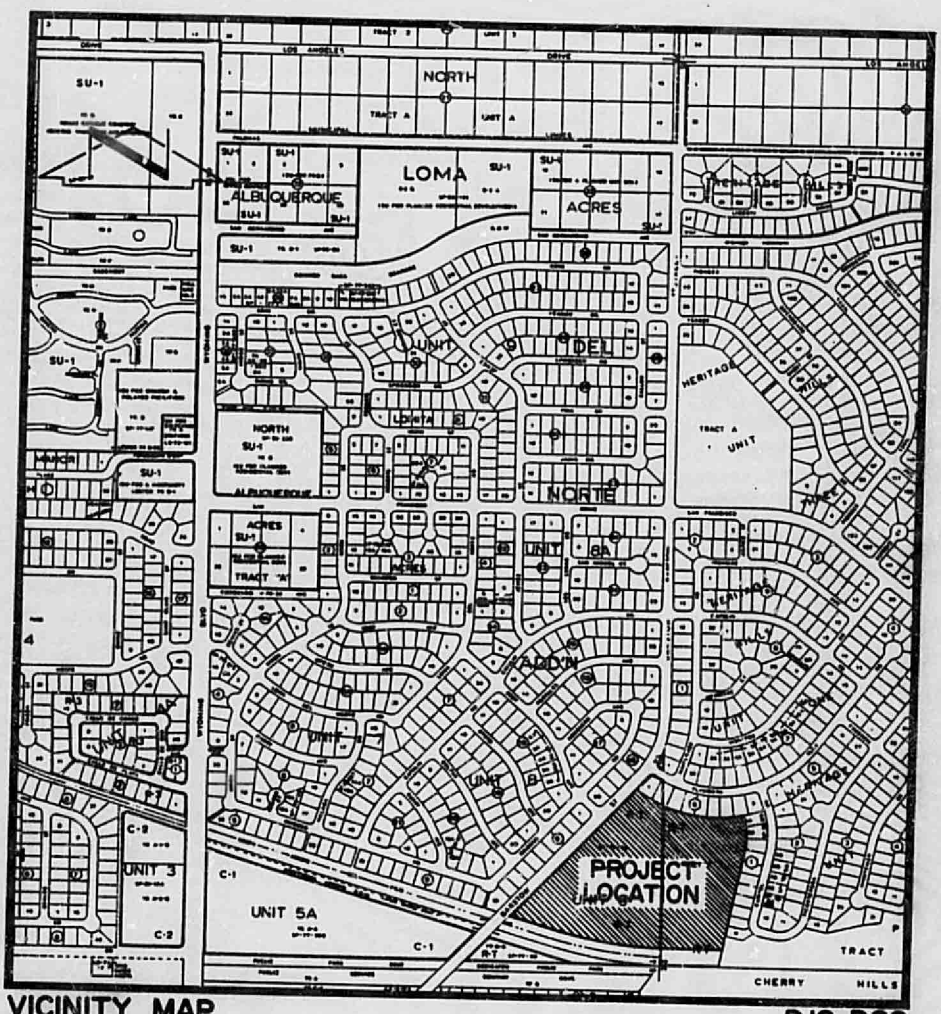
The scope of the plan is to ensure that the proposed development will be protected from storm runoff and will not increase the flooding potential of adjacent properties.

Location and Description

Academy North is located in the northeast quadrant of the City of Albuquerque, adjacent to the Heritage Hills Subdivision on the North and East, Barstow Road and the Lomita Acres Subdivision to the West, and the North Arroyo Del Pino channel and Cherry Hills Subdivision to the South. The site is located within Sections 19 and 20, Township 11 North, Range 4 East. Figure 1, the Vicinity Map, depicts the location of the site.

The parcel is zoned R-T for Residential Townhouse development. The parcel contains approximately 18.6 acres and will be developed as a 143-unit townhouse complex with all units to be built on individually owned lots. Presently the site is undeveloped.

According to the National Flood Insurance Program Flood Boundary Maps, Plate 10, the site does not lie within a Flood Hazard Zone. The 100-year flood is confined to the North Arroyo Del Pino Channel.



VICINITY MAP
SCALE 1" = 800'

D19, D20

FIGURE 1

DESIGN CRITERIA

The analysis of storm runoff for the site is based upon the Rational Method, as outlined in the City of Albuquerque's "Development Process Manual, Volume II." This approach determines the peak discharge and associated volume of runoff for the specified design storm (100-year frequency, 6-hour duration) falling on the study area. Street capacities and channel capacities are determined by the Manning equation. Pipe capacities are determined by the Manning Equation, with losses calculated as per the Development Process Manual, Volume II.

EXISTING DRAINAGE CONDITIONS

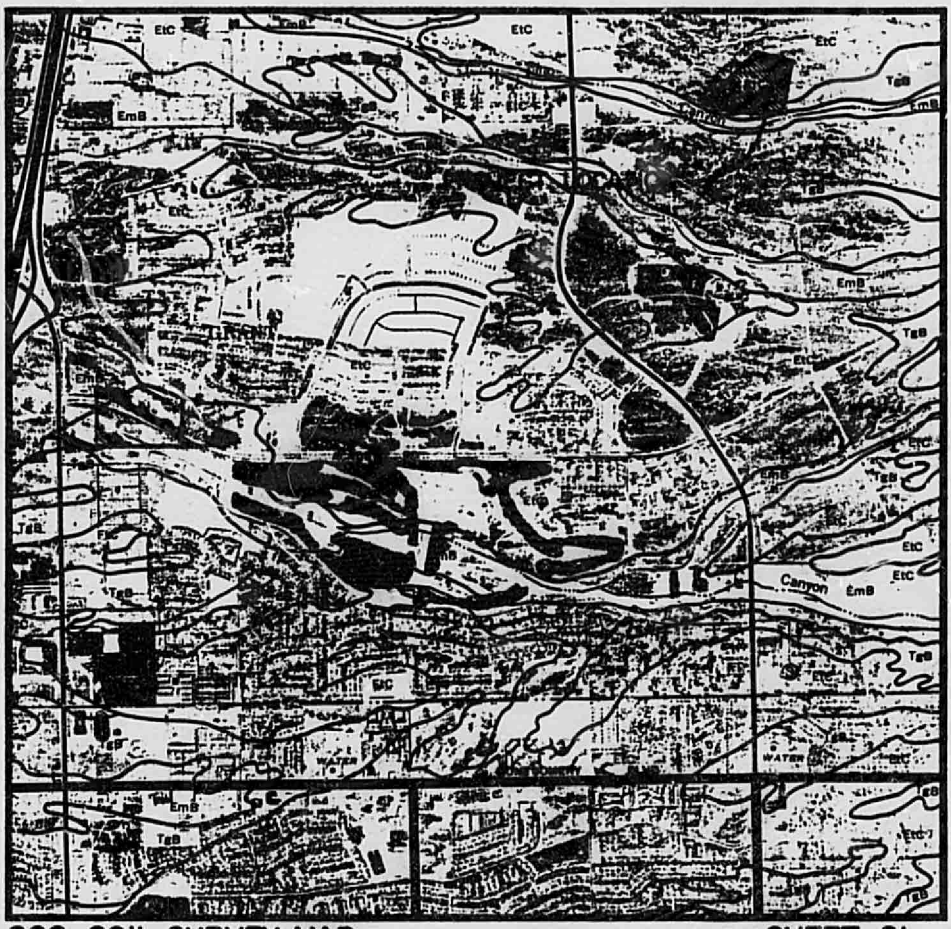
The site is bounded on the north and east by residential housing, on the west by Barstow Road N.E., and on the south by the North Arroyo Del Pino Channel. The site slopes from northeast to southwest at approximately four percent (4%).

The residential development to the north and east, Heritage Hills Subdivision, has been developed in such a manner that all runoff is contained, or is discharged into the North Arroyo Del Pino Channel, San Francisco Road, or Barstow Road. (See approved Drainage Reports for Heritage Hills, Unit 1, dated January, 1977, and Heritage Hills, Units 2, 3, and 4, dated March, 1977). From these reports, and from field visits, it can be concluded that no offsite flows enter the site from the adjacent development.

The North Arroyo Del Pino Channel, lying to the south of the site, is presently an unlined channel with some vegetation and levees forming sedimentation basins approximately 100' apart to the east of Barstow Road. There is presently no crossing structure at Barstow Road. The capacity of the chanel in the existing state is estimated to be 1725 cfs at a depth of 3 feet. (See Appendix C). The estimated flow in the existing state within this channel during the 100-year, 6-hour storm is estimated to be 1026 cfs at a depth of 2.3 feet.

As indicated by Figure 2, the soil on the site has been classified by the Soil Conservation Service as EtC (Embudo Tijeras Complex) and TgB (Tijeras). Both soils have been classified as type B soil, which indicates medium runoff potential and moderate potential of water erosion.

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



SCS SOIL SURVEY MAP

SCALE 1" = 2000'

SHEET 21

FIGURE 2

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

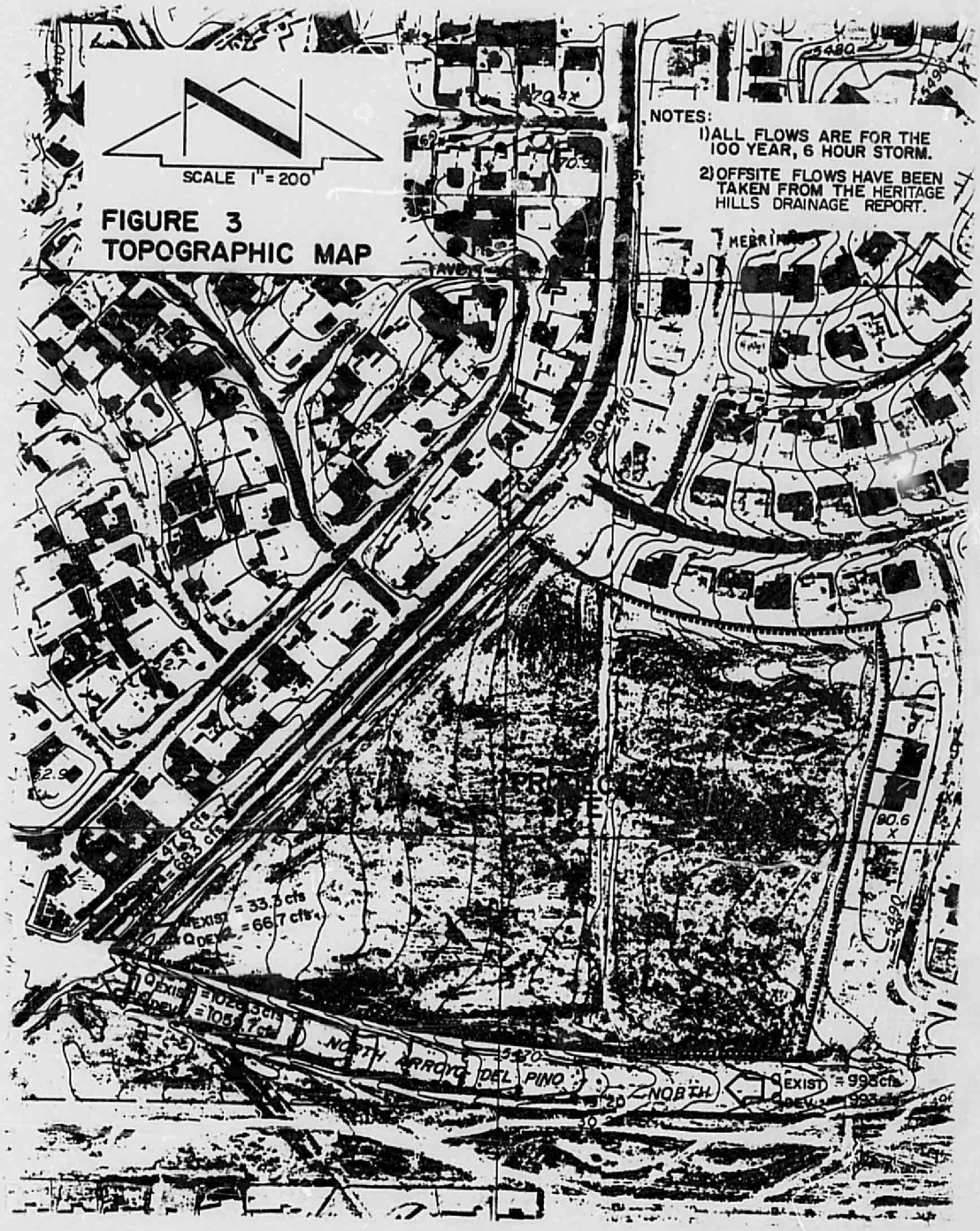


FIGURE 3
TOPOGRAPHIC MAP

PROPOSED DRAINAGE CONDITIONS

The proposed Drainage Plan, Figure 4, is included at the back of this report. The plan shows 1) existing contours at 2'-0" intervals, 2) proposed spot elevations and contours at 2'-0" intervals, 3) proposed drainage conditions, 4) location of proposed retaining walls, and 5) limit and character of proposed improvements.

For the purpose of analyzing street and inlet capacities, the site has been broken down into three drainage sub-basins. (See Figure 5). Basins 1 and 2 will outlet into the proposed storm drain system at the southwest corner of the site. Basin 3 discharges directly into the channel through Emily Street. For basin runoff calculations, see Appendix B. For street capacities and storm sewer capacities, see Appendices C and D, respectively.

The proposed storm drain system was designed to carry the 10-year storm. For storms of greater magnitude, the excess runoff will enter Barstow Street through Della Road. The runoff will then enter the channel at the dip section in Barstow Road. The additional flows in Barstow Road (20.7 cfs for the 100-year storm) can be adequately conveyed into the channel, since Barstow Road has a capacity of 145.7 cfs and existing flows of 47.6 cfs (as per Heritage Hills Report). It is anticipated that future improvements to Barstow Road and the channel will include drop inlets in Barstow to convey runoff to the channel.

CONCLUSIONS AND RECOMMENDATIONS

1. The North Arroyo Del Pino Channel has sufficient capacity to adequately convey the developed runoff from the site.

2. The individual lots shall be graded by the developer to provide positive drainage away from the pad in all directions.

3. Lots 1-19 and 31-51 require backyard ponding of runoff occurring only in backyards. (Rooftops will drain toward the street).

4. Pad elevations of houses adjacent to the channel have been set a minimum of 3.5 feet above the bottom of the channel. (Lots 1, 51-73).

5. Channel stabilization shall be provided as shown on Figure 5.

6. The proposed improvements will not contribute to the flooding potential of adjacent sites.

APPENDIX A

RUNOFF CALCULATION - EXISTING CONDITION

ACADEMY NORTH SUBDIVISION HYDROLOGY - EXISTING STATE

(Rational Method)

Site:

Area = 809,350 sf = 18.58

% impervious = 0

C = 0.34 (DPM Plate 22.2 C-1)

$Q_{100} = CiA$

$i = 6.84\ P_6 T_c^{-0.51} = 5.28$ in/hr

Where $P_6 = 2.5$ in (DPM Plate 22.1 D-1)

$T_c = 0.0078L^{0.77}S^{-0.385} = 10$ minutes (minimum)

$Q_{100} = 0.34(5.28)18.58 = 33.3$ cfs

$V_{100} = CP_6A = 57{,}330$ cf

APPENDIX B

RUNOFF CALCULATION - DEVELOPED CONDITION

ACADEMY NORTH HYDROLOGY - DEVELOPED STATE

Sub-Basin 1:

Area of basin = 8.2 Ac

% impervious = 69 (see following page)

C = 0.68 (DPM Plate 22.2 C-1)

Q_{100} = CiA (Rational Equation)

Where $i = 6.84\ P_6 T_c^{-0.51} = 5.28$ in/hr

P_6 = 2.5 in/hr (DPM Plate 22.1 D-1)

T_c = 10 minutes (minimum)

Q_{100} = 29.4 cfs

Q_{10} = 19.3 cfs

Sub-Basin 2:

Area of basin = 8.6 Ac

% impervious = 69

C = 0.68

i = 5.28 in/hr

T_c = 10 minutes (minimum)

Q_{100} = 30.9 cfs

Q_{10} = 20.3 cfs

Sub-Basin 3:

Area of basin = 1.8 Ac

% impervious = 69

C = 0.68

i = 5.28 in/hr

T_c = 10 minutes (minimum)

Q_{100} = 6.5 cfs

Q_{10} = 4.2 cfs

ACADEMY NORTH HYDROLOGY - DEVELOPED STATE (CONTINUED)

Site:

A = 18.6 Ac

% impervious = 69

C = 0.68

i = 5.28 in/hr

T_c = 10 minutes

Q_{100} = 66.7 cfs

APPENDIX C

STREET AND CHANNEL CAPACITIES

For analysis, three critical street sections have been chosen as per Figure 4. The calculations below determine the depth of flow in the streets and channel based on the Manning Equation.

10 Year Flow	100 Year Flow	Capacity
Section A-A		
$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$		
Q = 19.3 cfs	Q = 29.4 cfs	Q = 143.4 cfs
S = 0.0262 ft/ft	S = 0.0262	S = 0.0262
n = 0.017	n = 0.017	n = 0.017
A = 5.63 sf	A = 6.38 sf	A = 16.32 sf
R = 0.17 ft	R = 0.19 ft	R = 0.49 ft
depth = 0.31 ft = 3.72 in	d = 0.36 ft = 4.32 in	d = 0.67 ft = 8 in
Section B-B		
A = 4.24 sf	A = 5.37 sf	A = 13.20 sf
R = 0.17 ft	R = 0.22 ft	R = 0.52 ft
S = 0.0330 ft/ft	S = 0.0330 ft/ft	S = 0.0330 ft/ft
Q = 20.3 cfs	Q = 30.9 cfs	Q = 135.7 cfs
d = 0.30 ft = 3.56 in	d = 0.34 ft = 4.08 in	d = 0.67 ft = 8 in
Section C-C		
A = 1.28 sf	A = 1.91 sf	A = 1.91 sf
R = 0.08 ft	R = 0.10 ft	R = 0.10 ft
S = 0.0325 ft/ft	S = 0.0325 ft/ft	S = 0.0325 ft/ft
Q = 4.2 cfs	Q = 6.5 cfs	Q = 6.5 cfs
d = 0.16 ft = 1.88 in	d = 0.20 ft = 2.34 in	d = 0.20 ft = 2.34 in
Channel Capacity		
(See Figure 4 for typical cross-section).		
d = 1.85 ft	d = 2.34 ft	d = 3.0 ft
A = 60.1 sf	A = 80.35 sf	A = 115.5 sf
R = 1.49 ft	R = 1.81 ft	R = 2.20 ft
S = 0.032 ft/ft	S = 0.032 ft/ft	S = 0.032 ft/ft
n = 0.030	n = 0.030	n = 0.030
Q = 695 cfs	Q = 1060 cfs	Q = 1725 cfs
V = 11.6 fps	V = 13.2 fps	V = 14.9 fps

APPENDIX D

PIPE CAPACITIES

The tables on the following pages give the results of the pipe capacities computations, based on the Manning Equation, and hydraulic grade line computations as per the Design Process Manual, Volume II. These computations demonstrate that the strom drain system will adequately convey the 10-year storm into the channel. Inlet capacities are taken from DPM Plates 22.3 D-5 and 22.3 D-7.

The following notations were used:

- D = Diameter of pipe, in
- Q = Design flow, cfs
- A = Area of pipe opening, sf
- V = Q/A = velocity, fps
- K = Pipe coefficient based on Mannings "n" factor of 0.013, dimensionless
- S_f = Average friction slope, ft/ft
- L = Length of pipe, ft
- Δ = Change in angle at bend or junction, degrees
- H_f = Head loss due to friction, ft
- H_B = Head loss due to bend, ft
- H_j = Head loss due to junction, ft
- H_{mh} = Head loss due to manhole, ft
- H_T = Head loss due to transition, ft
- H_{misc} = Miscellaneous head losses, ft
- ΣH_L = Total head loss, ft
- E.G. = Elevation of energy grade line, ft, using local datum
- h_v = Velocity head, ft
- H.G. = Elevation of hydraulic grade line, ft, using local datum

Pages 23 and 24 give the input values and results for the hydraulic computations.

TOM MANN ASSOCIATES INC.
ALBUQUERQUE, N.M.

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT

BY: SKS
DATE: 12/21/83
SHEET: 1 OF 2

PROJECT: Academy North
LINE: Emily St.

STATION	STRUCT.	INV.	D	Q	A	V	K	S_F	L	Δ	LOSSES H_F	H_B	H_J	H_{MH}	H_T	H_{MISC}	ΣH_L	E.G.	hv	H.G.
10+00	outlet	45.00																		
			2.5	39.6	4.91	8.07	410	0.0093	30		0.28						0.28	48.51	1.01	47.50
10+30	bend									45°		0.15					0.15	48.79	1.01	47.78
			2.5	39.6	4.91	8.07	410	0.0093	85		0.79						0.79	48.94	1.01	47.93
11+15	MH	45.49								65°		0.22		0.05			0.27	49.73	1.01	48.72
			2.5	39.6	4.91	8.07	410	0.0093	170		1.58						1.58	50.00	1.01	48.99
12+85	MH	46.20								80°			0.94	0.05			0.99	51.58	1.01	50.57
			2.0	19.3	3.14	6.14	226	0.0043	40		0.29						0.29	52.58	0.59	51.99
13+25	JCT									45°			0.16				0.16	52.87	0.59	52.28
			2.0	14.8	3.14	4.71	226	0.0043	9		0.04						0.04	53.02	0.34	52.68
13+34	JCT									45°			0.09				0.09	53.06	0.34	52.72
			2.0	10.3	3.14	3.28	226	0.0021	16		0.03						0.03	53.15	0.17	52.98
13+50	MH	47.17								45°		0.02	0.07	0.01			0.10	53.18	0.17	53.02
			1.50	5.15	1.77	2.91	105	0.0024	21		0.05						0.05	53.29	0.13	53.15
																		53.34	0.13	53.20

REMARKS: grade elev = 53.62
HGL = 53.20
Δ = 0.42'

TOM MANN ASSOCIATES INC.
ALBUQUERQUE, N.M.

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT

PROJECT: Academy North LINE: Della Rd.

BY: SKS
DATE: 12/21/83
SHEET: 2 OF 2

STATION	STRUCT.	INV.	D	Q	A	V	K	S_F	L	Δ	LOSSES H_F	H_B	H_J	H_{MH}	H_T	H_{MISC}	ΣH_L	E.G.	hv	H.G.
10+00	MH	46.2																52.64	0.65	51.99
			2.0	20.3	3.14	6.46	226	0.0081	25		0.20						0.20	52.84	0.65	52.19
10125	JCT									45°			0.17				0.17	53.01	0.59	52.43
			2.0	19.15	3.14	6.10	226	0.0072	10		0.07						0.07	53.08	0.58	52.51
10135	JCT									45°			0.15				0.15	53.24	0.51	52.73
			2.0	18.0	3.14	5.73	226	0.0063	18		0.11						0.11	53.35	0.51	52.84
10153	JCT									45°			0.13				0.13	53.48	0.29	53.20
			2.0	13.5	3.14	4.30	226	0.0036	17		0.06						0.06	53.54	0.29	53.26
10170	JCT									45°			0.08				0.08	53.62	0.13	53.49
			2.0	9.0	3.14	2.86	226	0.0016	6		0.01						0.01	53.63	0.13	53.50
10176	MH									45°		0.02	0.07	0.01			0.10	53.73	0.10	53.63
			1.5	4.5	1.77	2.54	105	0.0018	20		0.04						0.04	53.77	0.10	53.67

REMARKS: grade elev = 55.84
inv elev = 53.67
Δ = 2.17'

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

EMIT: STLEET

N=0.01

STATION=1,000.00

EG=48.51
HV=1.01
HG=47.50

PIPE SIZE=30.00
Q=39.60
AREA=4.91
VEL=8.07
K=410.17
SF=0.00932
L=30.00
PIPE BEND=0.00
HF=0.28
HB=0.00
SUM HL=0.28

EG=48.79
HV=1.01
HG=47.78

STATION=1,030.00

PNT BEND=45.00
HB=0.15
HJ=0.00
HX=0.00
SUM HL=0.15

EG=48.94
HV=1.01
HG=47.93

PIPE SIZE=30.00
Q=39.60
AREA=4.91
VEL=8.07
K=410.17
SF=0.00932
L=85.00
PIPE BEND=0.00
HF=0.79
HB=0.00
SUM HL=0.79

EG=49.73
HV=1.01
HG=48.72

STATION=1,115.

PNT BEND=65.00
HB=0.22
HJ=0.00
HX=0.00
HMH=0.05
SUM HL=0.27

EG=50.00
HV=1.01
HG=48.99

PIPE SIZE=30.00
Q=39.60
AREA=4.91
VEL=8.07
K=410.17
SF=0.00932
L=170.00
PIPE BEND=0.00
HF=1.58
HB=0.00
SUM HL=1.58

EG=51.58
HV=1.01
HG=50.57

STATION=1,285.00

PNT BEND=0.00
SIDE PIPE=24.00
PIPE ANGLE=80.00

HB=0.00
HJ=0.94
HX=0.00
HMH=0.05
SUM HL=0.99

EG=52.58
HV=0.59
HG=51.99

PIPE SIZE=24.00
Q=19.30
AREA=3.14
VEL=6.14
K=226.22
SF=0.00728
L=40.00
PIPE BEND=0.00
HF=0.29
HB=0.00
SUM HL=0.29

EG=52.87
HV=0.59
HG=52.28

STATION=1,325.00

PNT BEND=0.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.00
HJ=0.16
HX=0.00
SUM HL=0.16

EG=53.02
HV=0.34
HG=52.68

PIPE SIZE=24.00
Q=14.80
AREA=3.14
VEL=4.71
K=226.22
SF=0.00428
L=9.00
PIPE BEND=0.00
HF=0.04
HB=0.00
SUM HL=0.04

EG=53.06
HV=0.34
HG=52.72

STATION=1,334.00

PNT BEND=0.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.00
HJ=0.09
HX=0.00
SUM HL=0.09

EG=53.15
HV=0.17
HG=52.98

PIPE SIZE=24.00
Q=10.30
AREA=3.14
VEL=3.28
K=226.22
SF=0.00207
L=16.00
PIPE BEND=0.00
HF=0.03
HB=0.00
SUM HL=0.03

EG=53.18
HV=0.17
HG=53.02

STATION=1,350.00

PNT BEND=45.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.02
HJ=0.07
HX=0.00
HMH=0.01
SUM HL=0.10

EG=53.29
HV=0.13
HG=53.15

PIPE SIZE=18.00
Q=5.15
AREA=1.77
VEL=2.91
K=105.04
SF=0.00240
L=21.00
PIPE BEND=0.00
HF=0.05
HB=0.00
SUM HL=0.05

EG=53.34
HV=0.13
HG=53.20

STATION=1,371.00

DELLA ROAD

H=0.013

STATION=1,000.00

EG=52.64
HV=0.65
HG=51.99

PIPE SIZE=24.00
Q=20.30
AREA=3.14
VEL=6.46
K=226.22
SF=0.00885
L=25.00
PIPE BEND=0.00
HF=0.20
HB=0.00
SUM HL=0.20

EG=52.84
HV=0.65
HG=52.19

STATION=1,025.00

PNT BEND=0.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.00
HJ=0.17
HX=0.00
SUM HL=0.17

EG=53.01
HV=0.58
HG=52.43

PIPE SIZE=24.00
Q=19.15
AREA=3.14
VEL=6.10
K=226.22
SF=0.00717
L=10.00
PIPE BEND=0.00
HF=0.07
HB=0.00
SUM HL=0.07

EG=53.08
HV=0.58
HG=52.51

STATION=1,035.00

PNT BEND=0.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.00
HJ=0.15
HX=0.00
SUM HL=0.15

EG=53.24
HV=0.51
HG=52.73

PIPE SIZE=24.00
Q=18.00
AREA=3.14
VEL=5.73
K=226.22
SF=0.00633
L=18.00
PIPE BEND=0.00
HF=0.11
HB=0.00
SUM HL=0.11

EG=53.35
HV=0.51
HG=52.84

STATION=1,053.00

PNT BEND=0.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.00
HJ=0.13
HX=0.00
SUM HL=0.13

EG=53.48
HV=0.29
HG=53.20

PIPE SIZE=24.00
Q=13.50
AREA=3.14
VEL=4.30
K=226.22
SF=0.00356
L=17.00
PIPE BEND=0.00
HF=0.06
HB=0.00
SUM HL=0.06

EG=53.54
HV=0.29
HG=53.26

STATION=1,070.00

PNT BEND=0.00
SIDE PIPE=18.00
PIPE ANGLE=45.00

HB=0.00
HJ=0.08
HX=0.00
SUM HL=0.08

EG=53.62
HV=0.13
HG=53.49

PIPE SIZE=24.00
Q=9.00
AREA=3.14
VEL=2.86
K=226.22
SF=0.00158
L=6.00
PIPE BEND=0.00
HF=0.01
HB=0.00
SUM HL=0.01

EG=53.63
HV=0.13
HG=53.50

pipe size = 18
Q = 4.50
A = 1.77
Vel = 2.54
K = 105
SF = 0.00184
L = 20'
pipe bend = 0.0
HF = 0.04
HB = 0
Sum HL = 0.04

EG = 53.77
HV = 0.10
HG = 53.67

Sta 1076
pnt. bend = 45
side pipe = 18
pipe angle = 45

HB = 0.02
HJ = 0.07
HV = 0
HMH = 0.01
SUM HL = 0.10
EG = 53.73
HV = 0.10
HGL = 53.63

30972
Academy North
8/1/84
Alley 'C'

Typical Lot:

Rational Method:

$Q = C \cdot A$

(contributing) $A_{Total} = 15 \times 12 + 20 \times 20 + 20 \times 36 + 19 \times 20$
$= 1680 \text{ sf} = 0.04 \text{ Ac}$

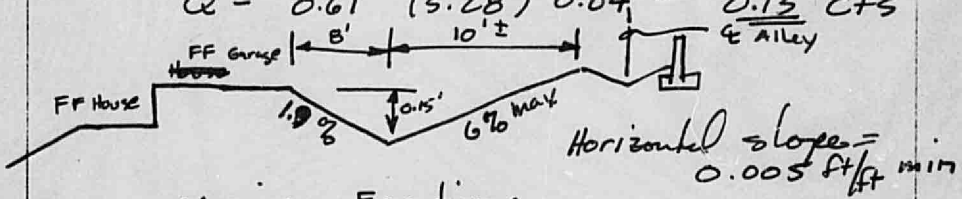
$\% \text{ imp} = \frac{15 \times 12 + 20 \times 20 + 19 \times 20}{1680} = 57$

$C = 0.61$ (DPM)

$i = 6.84 \, P_6 \, t_c^{-0.51} = 5.28 \text{ in/hr}$

$P_6 = 2.5''$

$Q = 0.61 \, (5.28) \, 0.04 = \underline{0.13} \text{ cfs}$



Manning Equation:

$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$A = 0.15 \times 8 \times 1/2 + 0.15 \times 2.5 \times 1/2 = 0.787 \text{ sf}$

$R = A/P = 0.787 / 10.5 = 0.075$

$n = 0.017$ manning factor

$Q = \underline{0.87} \text{ cfs}$

Factor of Safety:

$F.S. = \frac{0.87}{0.13} = \underline{6.7}$

PLAN/PLATS

ON

FILE