HYDROLOGY H11/D15 1 of 2 4 PLANS

H 11/D15

4 PLANS

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

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

June 27, 1984

Mr. Frank Lovelady
7408 Morrow Road NE
Albuquerque, NM 87108

REF: REVISED DRAINAGE REPORT FOR ADOBE MESA SUBDIVISION (H11-D15)
RECEIVED MAY 25, 1984

Dear Frank:

The above referenced submittal, dated May 25, 1984, is approved.

If I can be of further assistance, please contact me at 766-7644.

Sincerely yours,

Billy J. Goolsby

Billy J. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

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

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

March 22, 1984

Mr. Frank Lovelady
7408 Morrow Road NE
Albuquerque, NM 87108

REF: DRAINAGE REPORT FOR ADOBE MESA SUBDIVISION (H11-D15) RECEIVED MARCH 5, 1984

Dear Frank:

I have reviewed the above referenced submittal and forward the following comments:

1. At this time I could only give conceptual approval with regard to the plan. The pl· · itself does not have sufficient detail for building permit purposes. To receive building permit approval the plan will have to be an inclusion in the construction set for the contractor to build by. This plan does not have any grading on it nor does it have any pad elevations.

2. With regard to off-site flows, are there any plans approved for grading of Tract F to direct flows to Kevin Ct.? This site has to accept any existing off-site flows unless the off-site areas are being developed at the same time and there are plans on file.

3. Will there be any retaining walls required for this site to be graded?

4. The plan should also have a legend as per the DPM.

If there is a grading plan for this development, then it should be submitted for review and approval prior to any permit issuance.

Should you have any questions or comments, please contact me at 766-7644.

Sincerely yours,

Billy J. Goolsby

Billy J. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. H-11 DATE: 2/27/84

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: Adobe Mesa

ATTENDANCE: WHO	REPRESENTING
Frank Lovelady	
Billy Goolsby	

FINDINGS: ① Drainage Report per DPM required
② Area not located in or contributing to a Flood Hazard area. As shown on Panel 21 of the FIRM.
③ Discharge based on downstream capacity. Storm sewer system located in Cascada Place.

Please provide copy of recap w/ submittal

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

SIGNED: Billy G. Goolsby SIGNED: Frank D. Lovelady

TITLE: CE/Hydrologist TITLE: _____

DATE: 2/27/84 DATE: 2/27/84

WILLIAM MATOTAN & ASSOCIATES • ENGINEERS

230 Truman Street, N.E. Albuquerque, New Mexico 87108 Phone (505) 265-8467

November 1, 1976

RECEIVED
NOV 0 2 1976
CITY ENGINEERS

Mr. Kleston Laws
Assistant City Engineer-Hydrology
P. O. Box 1293
Albuquerque, New Mexico 87103

Subject: Vista Magnifica Subdivision
Drainage Report

Dear Mr. Laws:

Transmitted herewith are two (2) copies of the drainage report for the Vista Magnifica Subdivision as requested. Please note that the addendum to the report is included in the report.

In addition find enclosed with the report a layout of the final recommended drainage system including a schematic layout of the storm sewer system.

Very truly yours,

WILLIAM MATOTAN & ASSOCIATES, INC.

John A. Andrews

John A. Andrews, P. E.
Vice-President

JAA/bjs

cc: Robert M. Dixon
Attorney at Law

September 16, 1976

H11-015

Mr. John Andrews
William Matotan & Assoc.
230 Truman Street N.E.
Albuquerque, New Mexico 87108

RE: VISTA MAGNIFICA

Dear Mr. Andrews:

The subject plat has been signed, but we do not have sufficient copies of the drainage report for our files and AMAFCA. Please send two copies with seal and signature.

Very truly yours,

Kleston H. Laws
Assistant City Engineer@Hydrology

KHL/fs

Sept 16, 1976

John ~~Ed~~ Andrews
William Matotan and Associates
230 Truman Street NE
Albq. N M 87108

Re: Vista Magnifica

Dear Mr Andrew:

The subject plat has been signed, but we do not have sufficient copies of the drainage report for our files and AMAFCA. Please send two copies with seal and signature.

VTY

Kluston H Lewis

get copy for John

WILLIAM MATOTAN & ASSOCIATES • ENGINEERS

230 Truman Street, N.E. Albuquerque, New Mexico 87108 Phone (505) 265-8467

July 26, 1976

Mr. K. H. Laws,
Assistant City Engineer, Hydrology
City of Albuquerque
P O Box 1293
Albuquerque, New Mexico 87103

Re: Vista Magnifica - Drainage Report

Dear Mr. Laws:

Attached is a copy of the addendum to the above mentioned drainage report. These revisions reflect those pertinent items discussed by phone July 16, 1976.

You will notice that these revisions reflect usage of the Intensity-Duration-Frequency curves developed for the West Mesa, as opposed to the Intensity-Duration-Frequency curves developed by Herkenhoff for the general Albuquerque area. The intensities from the West Mesa curves run from 10% - 20% below the Herkenhoff values. For your information, I have included a second set of pages 2-6 of the drainage report which reflect the flows generated using the Herkenhoff curves for your information only.

I hope that these revisions will meet with your acceptance. If there are any further questions and/or comments, please advise.

Very truly yours,

WILLIAM MATOTAN & ASSOCIATES, INC.

Dan Morehead

Dan Morehead

DM:ys
Encl:
cc: Robert M. Dixon,
Attorney at Law
201-12th N.W.
Albuquerque, N.M.

STORM DRAINAGE REPORT

ADOBE MESA SUBDIVISION

(TRACT "D" VISTA MAGNIFICA)

H11-D15

March 5, 1984

(Revised May 25, 1984)

Prepared By

Frank D. Lovelady, P.E.

RECEIVED
MAY 25 1984
HYDROLOGY SECTION

INFORMATION SHEET

PROJECT TITLE ADOBE MESA SUBDIVISION TYPE OF SUBMITTAL DRAINAGE REPORT

ZONE ATLAS PAGE NO. H - 11 CITY ADDRESS Cliffside Drive

LEGAL DESCRIPTION Tract lettered "D' of the corrected Plat VISTA MAGNIFICA

ENGINEERING FIRM _____ CONTACT Frank D. Lovelady

ADDRESS 7408 Morrow Road NE PHONE 883-7973

OWNER Vista Magnifica CONTACT Bob Dixon

ADDRESS 501 Tijeras Ave., NW Suite 101 87102 PHONE 345-7535

ARCHITECT _____ CONTACT _____

ADDRESS _____ PHONE _____

SURVEYOR Southwest Surveying Co. Inc. CONTACT Carl Harrington

ADDRESS 215 Marble NW PHONE 247-4444

CONTRACTOR Adobe Masters CONTACT Hap Crawford

ADDRESS _____ PHONE 822-3321

PRE-DESIGN MEETING:

XX YES
__ NO
XX COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

__ SKETCH PLAT APPROVAL
__ PRELIMINARY PLAT APPROVAL
__ SITE DEVELOPMENT PLAN APPROVAL
XX FINAL PLAT APPROVAL
XX BUILDING PERMIT APPROVAL
__ CERTIFICATE OF OCCUPANCY APPROVAL
__ ROUGH GRADING PERMIT APPROVAL
__ GRADING/PAVING PERMIT APPROVAL
__ OTHER _____ (SPECIFY)

DATE SUBMITTED: May 25, 1984

BY: Frank D. Lovelady
Frank D. Lovelady

7408 Morrow Road NE
Albuquerque,
New Mexico 87110

May 25, 1984

Billy J. Goolsby, PE
City/County Flood Plain Admin.
Design Hydrology Section
123 Central NW
Albuquerque, NM 87102

REF: DRAINAGE REPORT FOR ADOBE MESA SUBDIVISION (H11-D15)

Dear Billy:

In response to your letter of March 22, 1984, the following revisions have been made.

1. Grading has been shown as well as pad elevations.

2. There are no known plans to develop Tract F. Off-site drainage from Area 1 will be accepted.

3. A retaining wall will be required for developing lots 18, 19, 20, and 21.

4. A legend has been added.

Your approval of this submittal is requested.

Sincerely,

Frank D. Lovelady, PE

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

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

March 22, 1984

Mr. Frank Lovelady
7408 Morrow Road NE
Albuquerque, NM 87108

REF: DRAINAGE REPORT FOR ADOBE MESA SUBDIVISION (H11-D15) RECEIVED MARCH 5, 1984

Dear Frank:

I have reviewed the above referenced submittal and forward the following comments:

1. At this time I could only give conceptual approval with regard to the plan. The plan itself does not have sufficient detail for building permit purposes. To receive building permit approval the plan will have to be an inclusion in the construction set for the contractor to build by. This plan does not have any grading on it nor does it have any pad elevations.

2. With regard to off-site flows, are there any plans approved for grading of Tract F to direct flows to Kevin Ct.? This site has to accept any existing off-site flows unless the off-site areas are being developed at the same time and there are plans on file.

3. Will there be any retaining walls required for this site to be graded?

4. The plan should also have a legend as per the DPM.

If there is a grading plan for this development, then it should be submitted for review and approval prior to any permit issuance.

Should you have any questions or comments, please contact me at 766-7644.

Sincerely yours,

Billy J. Goolsby

Billy J. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. H-11 DATE: 2/27/84

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: Adobe Mesa

WHO	REPRESENTING
ATTENDANCE: Frank Lovelady	
Billy Goolsby	

FINDINGS: ① Drainage Report per DPM required
② Area no located in or contributing to a Flood Hazard area. As shown on Panel 21 of the FIRM.
③ Discharge based on downstream capacity. Storm sewer system located in Cascada Place.

Please provide copy of recap w/ submittal

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

SIGNED: Billy G. Goolsby SIGNED: Frank D. Lovelady

TITLE: CE/Hydrology TITLE: _____

DATE: 2/27/84 DATE: 2/27/84

STORM DRAINAGE REPORT

FOR

ADOBE MESA SUBDIVISION

(TRACT "D" VISTA MAGNIFICA)

I. PURPOSE:

The purpose of this report is to present a comprehensive analysis of drainage control constraints on the proposed development and to present a plan for handling the storm runoff in a manner consistent with current storm drainage policy of the City of Albuquerque.

II. SCOPE:

The scope of this report includes determining off-site and on-site flow rates and volumes, presenting a design for on-site storage with controlled discharge and generally satisfying the listed storm drainage requirements.

III. LOCATION AND USE:

The proposed development is located in Zone Atlas Grid H-11. The subdivision is south of Interstate Highway 40 and east of Atrisco Drive, NW. The intended use is residential townhouses. Zoning is SU-1.

IV. EXISTING CONDITIONS:

A. General Description.

The subdivision is located on gently sloping land fronting on Cliffside Drive and Cascade Place NW. The subdivision is shown in Figure 1. The streets are paved. The subdivision and off-site areas to the west slope generally from west to east.

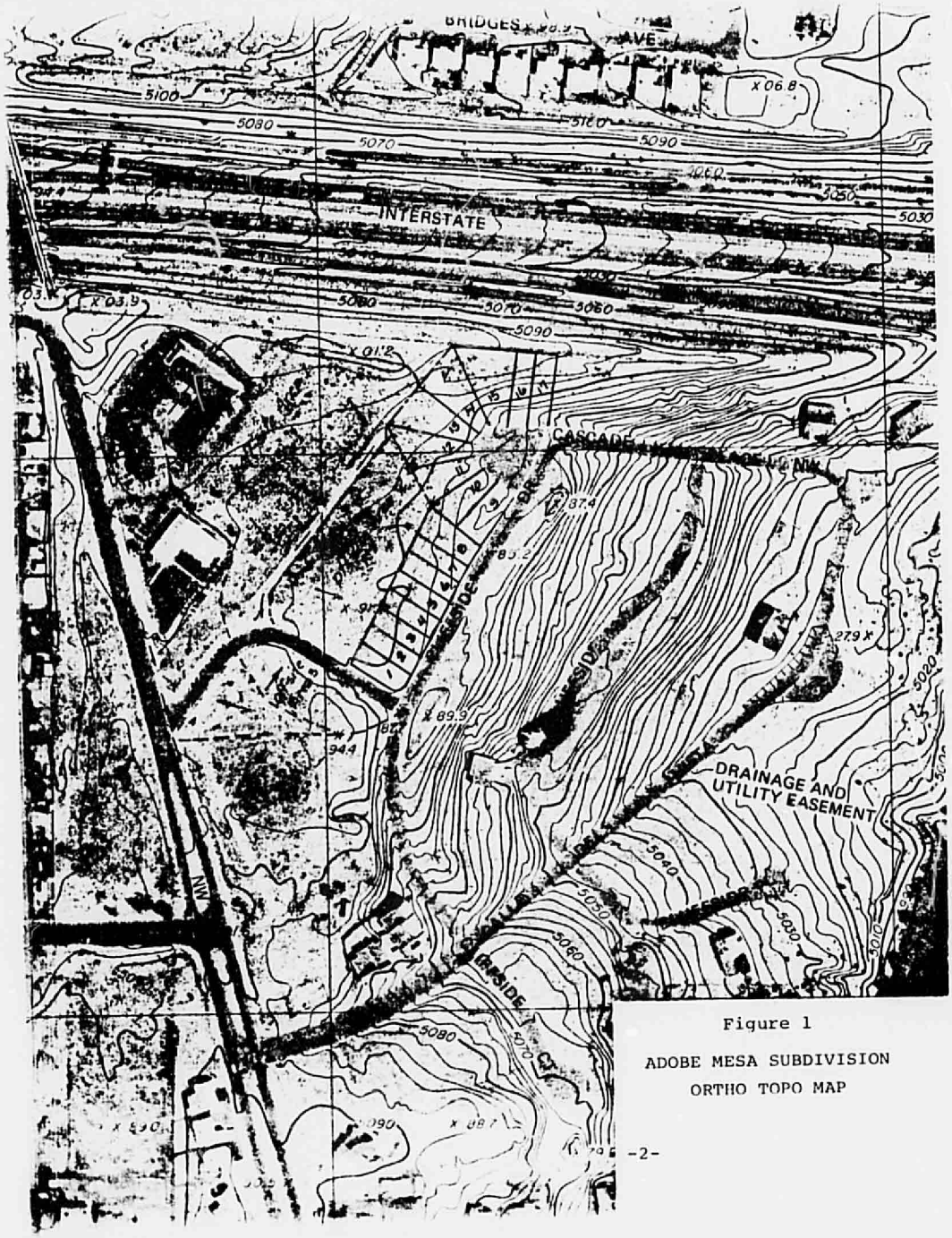


Figure 1

ADOBE MESA SUBDIVISION

ORTHO TOPO MAP

B. Soil type.

The soil type is Bluepoint, (BCC,BKD), Hydrologic Soil Group A. The Bernalillo County Soil Map is shown in Figure 2.

C. Floodway Map.

The floodway map is shown in Figure 3. The Subdivision is not located in a flood zone.

D. Storm Sewer.

There is an existing storm sewer system serving the proposed subdivision although the first catch basin is approximately 300 feet downstream from the eastern edge of the subdivision. The storm sewer system is shown in Figure 4.

V. OFF-SITE DRAINAGE AREAS:

A. Area 1.

This area is west of the strip of land designated on the Zone Atlas Page H-11 as Tract F, which is apparently the only access for lots 1 through 8 of Palisades Addition. Tract F will have to be graded to drain to Kevin Court. Tract F will intercept all drainage from Off-site Area 1. Off-site Area 1 contains approximately 3.04 acres. Area 1 drainage is accepted as sheet flow.

B. Off-site Area 2.

This is Tract E of Vista Magnifica. As Tract E is Developed, drainage will have to be retained on-site because the natural slope is toward the NE corner of Tract E (also common to 10 and 11, Adobe Mesa Subdivision). The only other apparent option is to provide a drainage easement centered on the lot line between lots 10 and 11 which would permit future construction of a controlled outlet pipe from Tract E to the "eye-brow" on Cliffside Drive. Off-site Area 2 contains approximately 1.30 acres. Area 2 drainage is accepted as sheet flow.

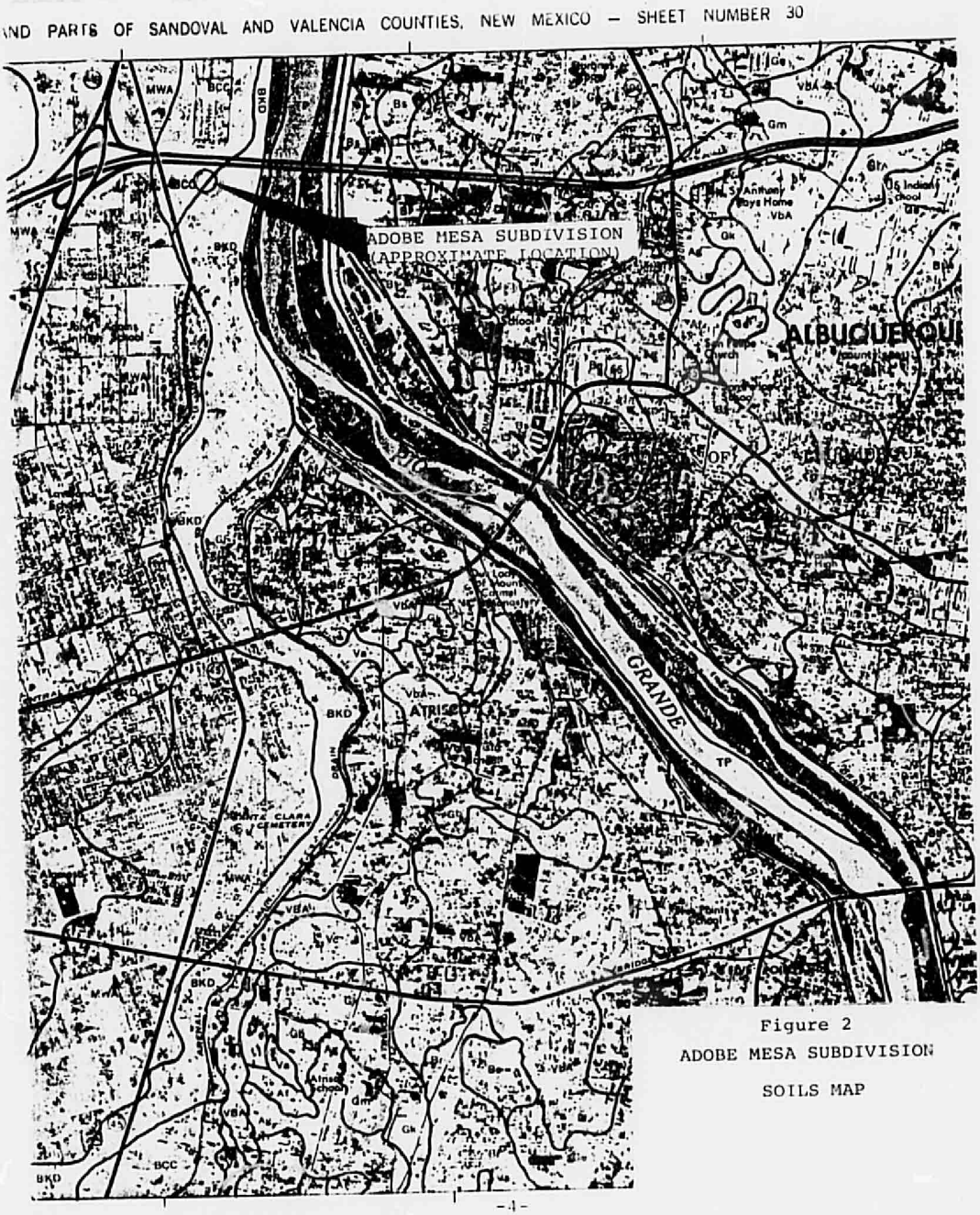


Figure 2

ADOBE MESA SUBDIVISION

SOILS MAP

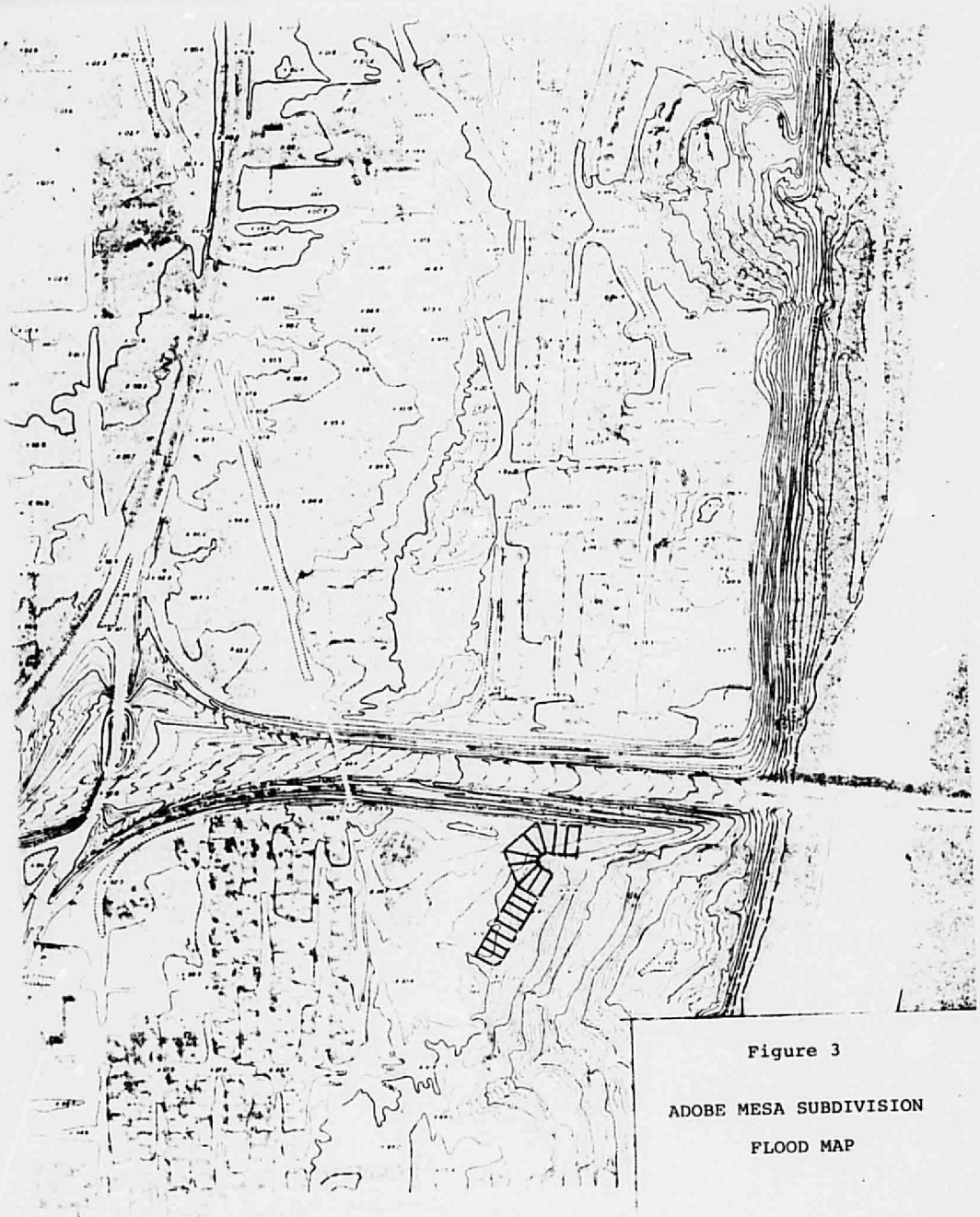


Figure 3

ADOBE MESA SUBDIVISION

FLOOD MAP

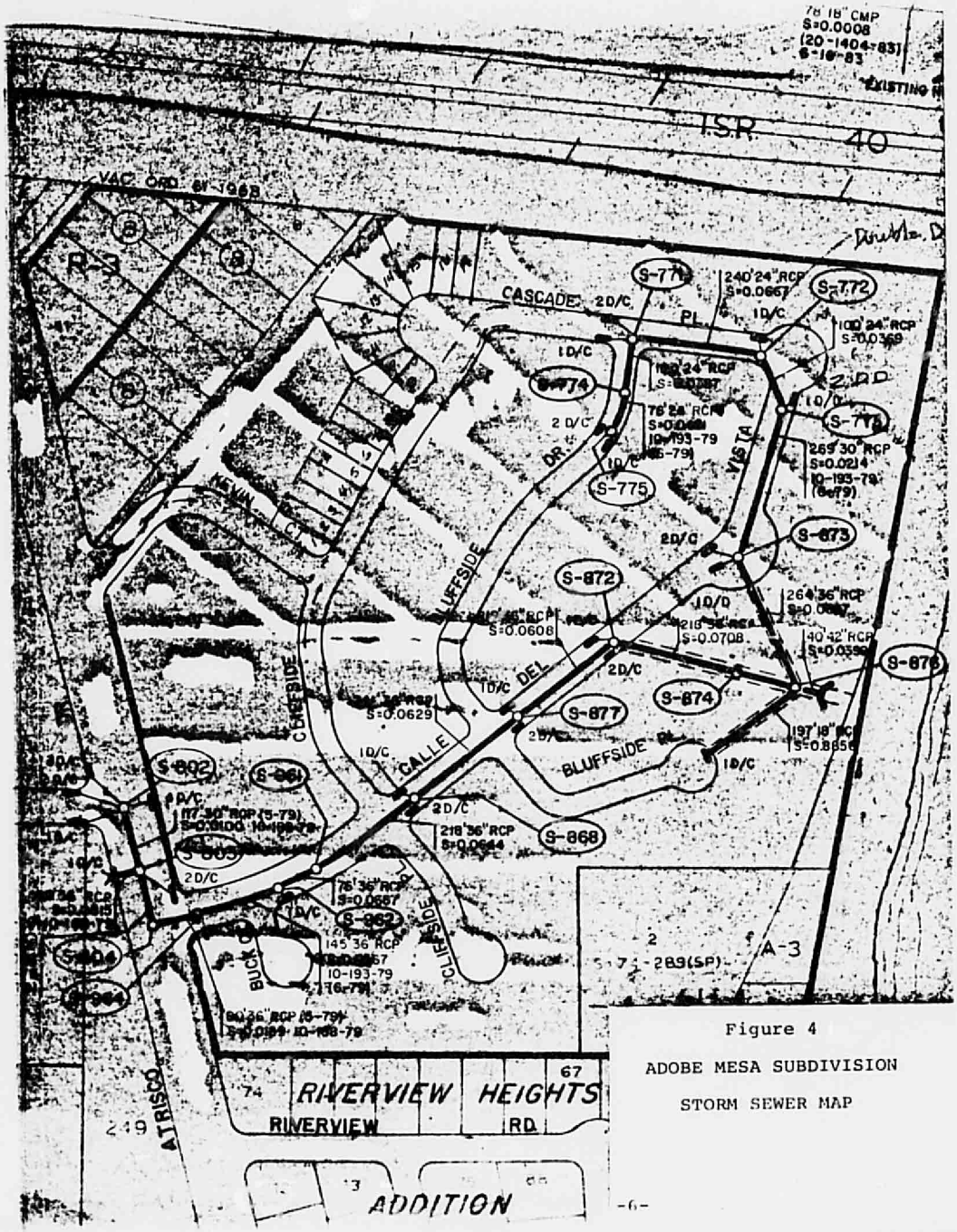


Figure 4

ADOBE MESA SUBDIVISION

STORM SEWER MAP

C. Off-site Area 3.

This area contains approximately 0.54 acres. The area is discussed only because it drains to the same catch basin as the subdivision.

D. Off-site Area 4.

This area consists of the paved streets contributing to the catch basin mentioned above. The area is 1170 feet of 42' wide street plus the "eye-brow", a total of approximately 1.34 acres of totally paved area.

VI. ON-SITE DRAINAGE AREAS:

The Subdivision itself contains 2.0558 acres. Drainage is from rear of lot to fromt of lot.

VII. PEAK RUNOFF:

A. Time of Concentration.

Due to the small size of the individual drainage areas, the minimum time of concentration of 10 minutes is used. If gutter flow time is neglected and the time of concentration is computed based on the distance from the catch basin to the most remote point, the Time of concentration is;

$$T_c = 0.0078\ (900^{0.77}/o.04^{0.385})$$

$$= 5.07 \text{ minutes (less than 10 minutes)}$$

B. Intensity.

From Plate 22.2 D-1, the 6-hour, 100-year rainfall is 2.2 inches. The intensity therefore is;

$$I = (2.2)(6.84)10^{-0.51} = 4.65 \text{ in/hr}$$

C. Runoff Coefficient.

For all areas other than the streets, it is assumed that the developed condition will be 50 per cent impermeable. Plate 22.2 C-1 shows that for Hydrologic Soils

D. Peak Discharge.

The peak rate of discharge form off-site Areas 1 through 4 and the subdivision is shown in Table 1.

TABLE 1

AREA DESIGNATION	AREA (Acres)	INTENSITY (I)	"C"	Q(cfs)
Off-site 1	3.04	4.65	0.42	5.94
Off-site 2	1.30	4.65	0.42	2.54
Off-site 3	0.54	4.65	0.42	1.05
Off-site 4	1.34	4.65	0.90	5.61
Subdivision	2.06	4.65	0.42	4.02
		Total Discharge		19.16

Practically all of the above discharge stays on the west side of Cliffside Drive.

VIII. GUTTER FLOW:

A. Cliffside Drive.

The slope of the street is 87.7 - 85.2/330 = 0.0076 ft/ft. From Plate 22.3 D-1, assuming all of the flow is on the west side of the street, for a flow of 19.2 cfs and the given slope, the depth of flow is about 0.58 feet and the velocity is 3.6 ft/sec.

B. Cascade Place NW.

The average slope of the street is approximately 0.11 ft/ft. Plate 22.3 D-1 shows a depth of flow of 0.54 feet and a velocity of just under 4 ft/sec.

IX. CATCH BASIN CAPACITY:

As the flow turns east on Cascade Street, it is assumed that all flow will be on the north side of the street. There are two catch basins, a double C catch basin near the intersection of Bluffside Drive and a Double D catch basin near the intersection of Calle Del Vista. It is assumed that local

flow coming from property on the north side of Cascade Place will enter the catch basins and be gone by the time the peak flow from Table 1 arrives. From Plate 22.3 D-6, the grating capacity for a depth of flow above normal gutter grade of 0.54 feet and a slope of 0.09 is approximately 14 cfs.Since the street grade is 0.11 the capacity might be somewhat less. Nevertheless, since there are two double catch basins, the combined capacity will be in excess of 19.2 cfs.

X. PREVIOUS DRAINAGE REPORT:

A previous drainage report was prepared by William Matotan and Associates in 1976. Page 5 of that report is reproduced in Appendix A. The times of concentration are shown to be much greater than the minimum 10 minutes. Therefore, flow from Table 1 will be discharged well in advance of the peak discharge for the overall storm sewer system.

XI. CONCLUSIONS:

1. The Adobe Mesa Subdivision is a phase of a previous subdivision which has an approved drainage report and a storm sewer system designed for full development. Therefore, runoff from this subdivision will easily be accomodated by gutter flow and the storm sewer system.
2. Off-site Area 2 is the only off-site area directly affecting the subdivision. This area could be developed with on-site ponding. Grading the site to Kevin Court is another possible option. The third and least desireable option is a drainage easement between lots 10 and 11 of Adobe Mesa Subdivision.

XII. RECOMMENDATIONS:

1. It is recommended that development be done in such a way that each lot will retain as much runoff as

possible by normal lot development, landscaping and means other than ponding.

2. It is Recommended that this report be accepted and approved.

Respectfully Submitted:

Frank D. Lovelady, P.E.

The weighted "C" was calculated based on the percentage of each type of surface area to the total drainage area. In applying these factors it was assumed that there would be no backyard ponding due to the steep slopes of the area.

Again, the rational formula was used to compute the accumulated flow at the selected points. Below is a tabulation of the results:

TABULATION OF RESULTS - DEVELOPED CONDITIONS

Sub-Area	Elev. Diff. Feet	Length of Sub-Area	T_c Min.	I in/hr.	C	Area Acres	Accumlated Q C.F.S.
I D	10	260	29.80	3.45	0.48	29.68	49.15
I C	14	200	30.14	3.40	0.50	34.41	58.51
I A	34	500	30.95	3.38	0.54	40.66	74.21
I B	26	348	10.00	5.40	0.77	1.93	8.00
*Total Flow @ Easement	64	390	31.85	3.32	0.55	42.63	77.84
II C	17	1230	15.00	4.73	0.54	13.29	33.90
II B	24	220	15.30	4.70	0.58	16.80	45.80
II A	32	310	15.80	4.63	0.62	20.20	58.00
**Total Flow @ Easement	12	170	16.00	4.61	0.62	21.50	61.45
***III A	20	200	10.00	5.40	0.75	1.20	4.86
***III B	34	195	10.00	5.40	0.75	0.80	3.24
***III C	28	165	10.00	5.40	0.75	0.50	2.03
***III D	16	160	10.00	5.40	0.75	0.60	2.43

* Sub-areas I_A thru I_D include offsite areas A and A_1

** Sub-areas II_A thru II_C include offsite area B

*** Sub-areas III_A thru III_D do not contribute to flow accumulating on streets or easements.

VII. Summary of Results

A. Existing Conditions

Storm runoff from areas "A" and "A_1" (see Appendix Sheet II) ultimately converges at the existing 48" RCP culvert on Atrisco Road located south of Iliff Road at the southern entrance to Vista Magnifica. This flow is then coupled with the drainage of Sub-basin 3 that produces a runoff flow of 66.4 C.F.S.

ADDENDUM

to

Drainage Report for Vista Magnifica
a subdivision of the
City of Albuquerque

July 26, 1976

Attached to this addendum to the Drainage Report are:

1. The following revisions made to the computations done for the original report.

   I. Recalculation of Runoff Coefficient "C" for the presently developed areas.
   II. Addition of 3 acres not included in original report.
   III. Use of the West Mesa Rainfall-Intensity curves.

2. Substitute pages 2-6 which summarize the revisions made, including changing the rainfall intensity to conform to Rainfall-Intensity curves developed for the West Mesa.

The following recommendation should be added to those previously made on page 7 of the report, in light of comments received from the City Engineer's office:

"6. If removal of the culvert under Atrisco Road is not allowed by the City Engineer, a storm sewer system should and can be designed to accommodate those flows anticipated at the South entrance to Vista Magnifica."

For simplicity, the Appendices have not been revised to reflect the above changes. It is assumed that those who review this report and addendum will make the necessary adjustments where applicable.

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Vista Magnifica Drainage Report Addendum to Report By D. Morehead Chk'd _____ Date July, 1976	Sheet ____ of ____ Job No. 532

I RECALCULATION OF RUNOFF COEFFICIENT "C"

for maximum runoff conditions in suburban areas.

total Ave. lot size for ½ block = (60)(100) x 17 = 102,000 sq ft
total pavement area for ½ block = (33.25)(1100) = 36,575 sq ft

Σ = 138,575 sq ft.

total Ave. roof area = 1475 sq ft x 17 = 25,075 sq ft
total Ave. back yard (walled) - 2200 sq ft x 17 = 37,400 sq ft.
total Ave. sidewalk driveway, etc. = 660 sq ft x 17 = 11,200 sq ft.
total Ave front ~~lawn~~ yard improv. = 1666 sq ft x 17 = 28,220 sq ft.

SURFACE	% of TOTAL	RUNOFF "C"	WEIGTED "C"
Pavement	26.4%	0.875	0.23
Roof	18.1%	0.825	0.15
Backyard	27.0%	0.150	0.04
Driveway, etc.	8.1%	0.875	0.07
Front yard	20.4%	0.250	0.05
	100%		0.54

THEREFORE:

all runoff calculation ~~and~~ for Areas "A", "A.", & B,

Change C = 0.45 to C = 0.54

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Vista Magnifica Drainage Report Sheet ___ of ___ Addendum to Report Job No. 532 By D. Morehead Chk'd ___ Date July, 1976

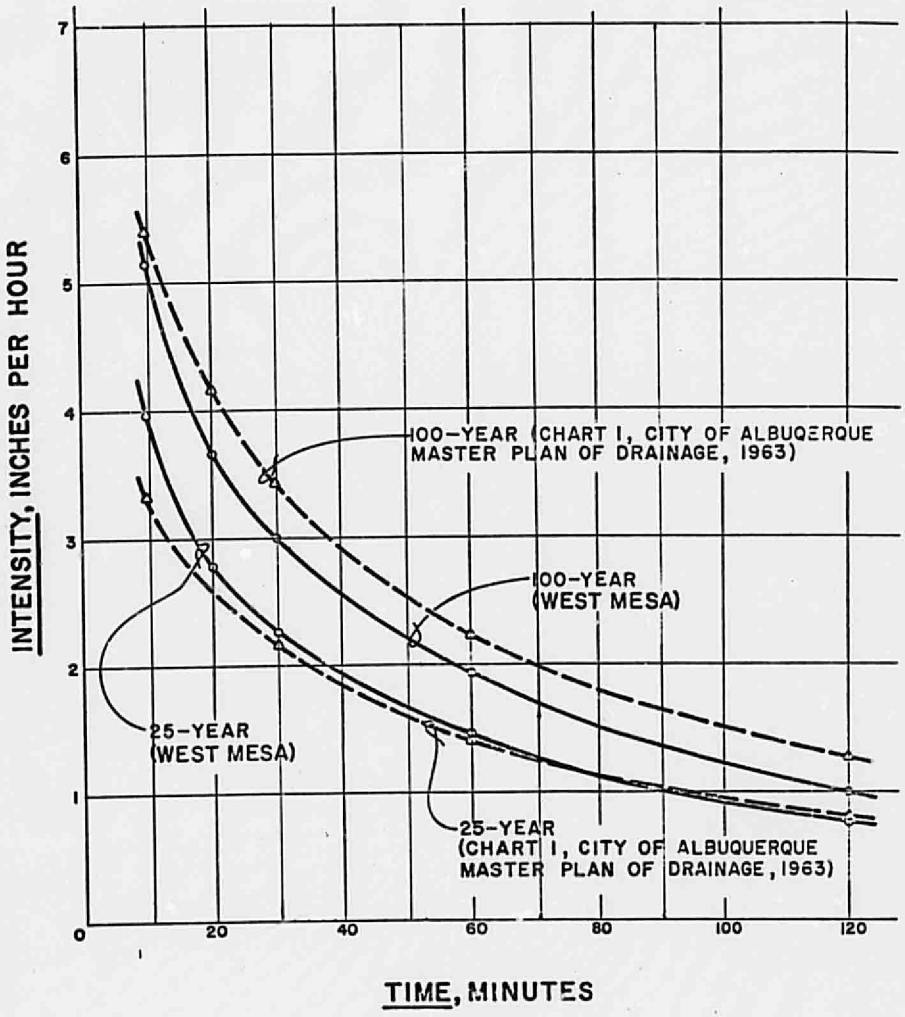
II Addition of 3 Acres not previously included in Area A (southern portion of Tr. 250 & 251 ~~Apor~~ Airport Unit)

THERE FORE:

Total runoff area in area "A" = 19.5 Acres not 16.5 Acres.

III. Use of Intensity-Duration-Frequency curves (developed for the West Mesa Area from Weather Bureau Isopluvials, 1967 & extrapolation for on hour rainfall values) -- Figure III-8, "Drainage Management Plan, Western Metropolitan Area, City of Albuquerque" - W.I. Matoten & Assoc., 1975 -- Appendix

These curves were developed specifically for the West Mesa area to more closely approximate the rainfall anticipated in the area. By use of these curves, as opposed to the curves developed by Herkenhoff & Assoc., it is believed that a more realistic flow (Q) was calculated.



INTENSITY-DURATION-FREQUENCY CURVES

WEST MESA, ALBUQUERQUE

(SOURCE: WEATHER BUREAU ISOPLUVIALS, 1967 AND EXTRAPOLATION FOR ONE HOUR RAINFALL VALUES)

FIGURE III-8

Computations done using Rainfall-Intensity Curves developed by Herkenhoff.

FOR INFORMATION ONLY 7/26/76

Q = Runoff in C.F.S.

A = Contributing area in acres

I = Intensity in inches/hour for duration equal to the time of accumulation measured in minutes

C = Runoff coefficient

IV. Contributory Areas Outside the Subdivision - (See Appendix Sheet II for location and Appendix Sheet IA for summary of computations)

Drainage areas contributing runoff to Vista Magnifica Subdivision include the area immediately west of Atrisco Road in the Swin-Mar and Hermosura Additions, and portions of Tracts 249, 250 and 251, Airport Unit, Town of the Atrisco Grant.

Area "A" (~~16.5~~ 19.5 acres), which is the northernmost part of the watershed contributing to the existing culvert under Atrisco Road, has a predicted intensity of 3.49 in/hr. for the 100-year storm. The time of concentration (Tc) was found to be 29 minutes, which is the time it takes for floodwater to flow from the most remote point of a watershed to its outlet. A runoff coefficient of ~~0.45~~ 0.54 for maximum runoff conditions in suburban areas was used, ~~which is in conformance with "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963" by Gordon Herkenhoff and Assoc. and determined as applicable for the study area~~. Peak discharge from Area "A" was calculated to be ~~26~~ 37 C.F.S.

Area "A_1", which includes the Hermosura Addition and a portion of TR 249, Airport Unit, Town of Atrisco Grant, has an estimated intensity of 5.1 in/hr with a time of concentration of 12 minutes. The runoff coefficient is assumed the same at ~~0.45~~ 0.54.

FOR INFORMATION ONLY 7/22/76

Peak runoff from this portion was calculated to be ~~21~~ 25 C.F.S.

The total peak flow at the culvert form areas "A" and "A_1", during a 100-year storm is ~~40~~ 54 C.F.S., which is not a direct addition of the two contributing components. Differential time of concentrations result in lower accumulated peak flows.

Area "B" (7.2 acres) discharges onto Vista Grande Road. The time of concentration was found to be less than 10 minutes; therefore, a maximum intensity of 5.40 in/hr. for a 100-year storm was utilized. The runoff coefficient is ~~0.45~~ 0.54 in accordance with development of the area. Peak discharge of storm water onto Vista Magnifica from Area "B" is calculated to be ~~17.4~~ 21 C.F.S.

V. <u>Existing Conditions</u> - (See Appendix Sheet II for location and Appendix Sheet IB for summary of computations)

Studies consisted of analyzing Vista Magnifica in the undeveloped form, considering internal flows originating within the boundary coupled with the established flows from adjacent areas to the west, mentioned previously. There are four major sub-basins within the subject area that contribute primarily to historical ephemeral streams or swales; the largest of which is in sub-basin #3. The final outlet of the sub-basins is over the escarpment and into the Rio Grande. The arroyo in sub-basin 3 is deeply incised, especially at its outfall to the river.

Flows in a 100-year situation were calculated using the Rational Method, Q = CIA. Below is a tabulation of results for the four existing sub-basins.

For Information Only
7/26/76

TABULATION OF RESULTS - EXISTING CONDITIONS

Sub-Basin No.	Elev. Diff. Feet	Length of Sub-Basin ft	Tc Min.	I In/Hr.	C	Area Acres	Q C.F.S.
1	36	550	3* (10↑ min.)	5.4	0.75	1.2	4.8
2	85	785	3* (10↑ min.)	5.4	0.75	3.7	15.2
3 Incl. Areas A & A_1	-	-	34	3.2	0.57 ~~0.49~~	45.2 ~~42.2~~	82.7 ~~66.4~~**
4 Incl. Area B	-	-	12	5.1	0.65 ~~0.61~~	22.1	73.4 ~~68.9~~**
					Total		~~155.3~~ 176.1

*All time of concentrations less than 10 minutes were assumed to have a maximum of 5.4 inches per hour.

**Lagged with flows from Areas "A", "A_1", and "B" using total time of concentrations.

VI. Developed Conditions - (See Appendix Sheet III for location and Appendix Sheets ID for summary of computations.)

Studies consisted of analyzing the subdivision in its developed form. Again, internal flows were coupled with flows from the drainage areas to the west. The subdivision was divided into two major contributing areas based primarily on topography. The two major areas were then broken up into sub-areas with regard to lot runoff and street flow. These were then lagged together for accumulated peak discharge. Non-contributory sub-areas within the subdivision were also noted.

Under developed conditions, the existing 48" RCP under Atrisco is assumed to be abandoned or removed and all the flow accumulated at this point will be carried by the street. As discussed before, the flow at this point is ~~40.2~~ 54 C.F.S. for a 100-year storm situation.

To determine flows from the developed subdivision, a weighted runoff coefficient "C", was determined using the following standard coefficients for various surfaces.

Surface	Runoff Coefficient, "C"
roof	0.825
pavement	0.875
lawns	0.150
yard improvements, other than lawns	0.25
existing terrain	0.75

For Information Only 7/20/76

The weighted "C" was calculated based on the percentage of each type of surface area to the total drainage area. In applying these factors it was assumed that there would be no backyard ponding due to the steep slopes of the area.

Again, the rational formula was used to compute the accumulated flow at the selected points. Below is a tabulation of the results:

TABULATION OF RESULTS - DEVELOPED CONDITIONS

Sub-Area	Elev. Diff. Feet	Length of Sub-Area	T_c Min.	I in/hr.	C	Area Acres	Accumlated Q C.F.S.
I D	10	260	29.80	3.45	0.55 ~~0.48~~	32.1 ~~29.68~~	~~49.15~~ 62.0
I C	14	200	30.14	3.40	0.56 ~~0.50~~	27.41 ~~34.41~~	~~58.51~~ 71.8
I A	34	500	30.95	3.38	0.57 ~~0.54~~	43.7 ~~40.66~~	~~74.21~~ 87.1
I B	26	348	10.00	5.40	0.77	1.93	8.00
*Total Flow @ Easement	64	390	31.85	3.32	0.60 ~~0.55~~	45.6 ~~42.63~~	~~77.84~~ 90.8
II C	17	1230	15.00	4.73	0.61 ~~0.54~~	13.29	~~33.90~~ 38.4
II B	24	220	15.30	4.70	0.66 ~~0.59~~	16.80	~~45.80~~ 49.2
II A	32	310	15.80	4.63	0.65 ~~0.62~~	20.20	~~58.00~~ 60.8
**Total Flow @ Easement	12	170	16.00	4.61	0.65 ~~0.62~~	21.50	57.3 ~~61.45~~ 64.4
***III A	20	200	10.00	5.40	0.75	1.20	4.86
***III B	34	195	10.00	5.40	0.75	0.80	3.24
***III C	28	165	10.00	5.40	0.75	0.50	2.03
***III D	16	160	10.00	5.40	0.75	0.60	2.43

* Sub-areas I_A thru I_D include offsite areas A and A_1

** Sub-areas II_A thru II_C include offsite area B

*** Sub-areas III_A thru III_D do not contribute to flow accumulating on streets or easements.

VII. Summary of Results

A. Existing Conditions

Storm runoff from areas "A" and "A_1" (see Appendix Sheet II) ultimately converges at the existing 48" RCP culvert on Atrisco Road located south of Iliff Road at the southern entrance to Vista Magnifica. This flow is then coupled with the drainage of Sub-basin 3 that produces a runoff flow of ~~66.4~~ 82.7 C.F.S.

For Information Only 7/26/76

during a 100-year frequency storm. This is the major point of concentrated flow in the subdivision. Area "B" contributes to flows accumulated on Vista Grande Road at the northern entrance to Vista Magnifica. Runoff from this area is added to runoff from Sub-basin 4 to produce a flow of ~~68.9~~ 73.4 C.F.S. This flow is not as concentrated as that in the arroyo to the south (Sub-basin 3), but it is of prime interest in development of Vista Magnifica. Flows from Sub-basins 1 and 2 are ~~15.2~~ 4.8 C.F.S. and ~~4.2~~ 15.2 C.F.S. respectively, for a 100-year storm. These flows in existing condition sheet flow across the land into the Rio Grande and have no point of concentration within the subdivision.

B. Developed Conditions

As in the existing conditions, the flows from Areas "A", "A_1" and "B" will converge on Vista Magnifica at the points mentioned above. Under developed conditions though, the flow from "A" and "A_1" was assumed to accumulate on Atrisco Road at the southern entrance of Vista Magnifica, not at the outlet of the existing 48" RCP culvert. Again, the flows from "A" and "A_1" were added to developed ~~sub-area~~ area I (which includes portions of Sub-basins 1 and 2) to determine the increase in runoff for Sub-basin 3 under developed conditions for a 100-year frequency storm. This flow is ~~77.8~~ 90.8 C.F.S., an increase of ~~11.4~~ 8.1 C.F.S. Then flows expected for area "B" were added to drainage calculated from developed ~~sub-area~~ area II and compared with the flows determined for Sub-basin 4. This flow actually decreased under developed conditions from ~~68.9~~ 73.4 C.F.S. to ~~61.4~~ 64.4 C.F.S., due primarily to both vertical and horizontal street alignment. In addition to

Q = Runoff in C.F.S.

A = Contributing area in acres

I = Intensity in inches/hour for duration equal to the time of accumulation measured in minutes

C = Runoff coefficient

IV. Contributory Areas Outside the Subdivision - (See Appendix Sheet II for location and Appendix Sheet IA for summary of computations)

Drainage areas contributing runoff to Vista Magnifica Subdivision include the area immediately west of Atrisco Road in the Swin-Mar and Hermosura Additions, and portions of Tracts 249, 250 and 251, Airport Unit, Town of the Atrisco Grant.

Area "A" (19.5 acres), which is the northernmost part of the watershed contributing to the existing culvert under Atrisco Road, has a predicted intensity of 3.0 in./hr. for the 100-year storm. The time of concentration (Tc) was found to be 29 minutes, which is the time it takes for floodwater to flow from the most remote point of a watershed to its outlet. A runoff coefficient of 0.54 for maximum runoff conditions in suburban areas was used. Peak discharge from Area "A" was calculated to be 32 C.F.S.

Area "A_1", which includes the Hermosura Addition and a portion of TR 249, Airport Unit, Town of Atrisco Grant, has an estimated intensity of 4.8 in/hr with a time of concentration of 12 minutes. The runoff coefficient is assumed the same at 0.54.

revised 7/26/76

Peak runoff from this portion was calculated to be 24 C.F.S.

The total peak flow at the culvert form areas "A" and "A_1", during a 100-year storm is 47 C.F.S., which is not a direct addition of the two contributing components. Differential time of concentrations result in lower accumulated peak flows.

Area "B" (7.2 acres) discharges onto Vista Grande Road. The time of concentration was found to be less than 10 minutes; therefore, a maximum intensity of 5.2 in./hr. for a 100-year storm was utilized. The runoff coefficient is 0.54 in accordance with development of the area. Peak discharge of storm water onto Vista Magnifica from Area "B" is calculated to be 21 C.F.S.

V. Existing Conditions - (See Appendix Sheet II for location and Appendix Sheet IB for summary of computations)

Studies consisted of analyzing Vista Magnifica in the undeveloped form, considering internal flows originating within the boundary coupled with the established flows from adjacent areas to the west, mentioned previously. There are four major sub-basins within the subject area that contribute primarily to historical ephemeral streams or swales; the largest of which is in sub-basin #3. The final outlet of the sub-basins is over the escarpment and into the Rio Grande. The arroyo in sub-basin 3 is deeply incised, especially at its outfall to the river.

Flows in a 100-year situation were calculated using the Rational Method, Q = CIA. Below is a tabulation of results for the four existing sub-basins.

TABULATION OF RESULTS - EXISTING CONDITIONS

Sub-Basin No.	Elev. Diff. Feet	Length of Sub-Basin ft	Tc Min.	I In/Hr.	C	Area Acres	Q C.F.S.
1	36	550	3*	5.2	0.75	1.2	4.7
2	85	785	3*	5.2	0.75	3.7	14.6
3 Incl. Areas A & A_1	-	-	34	2.8	0.57	45.2	72.1
4 Incl. Area B	-	-	12	4.8	0.65	22.1	68.9**
						Total	160.3

*All time of concentrations less than 10 minutes were assumed to have a maximum of 5.2 inches per hour.

**Lagged with flows from Areas "A", "A_1", and "B" using total time of concentrations.

VI. Developed Conditions - (See Appendix Sheet III for location and Appendix Sheets ID for summary of computations.)

Studies consisted of analyzing the subdivision in its developed form. Again, internal flows were coupled with flows from the drainage areas to the west. The subdivision was divided into two major contributing areas based primarily on topography. The two major areas were then broken up into sub-areas with regard to lot runoff and street flow. These were then lagged together for accumulated peak discharge. Non-contributory sub-areas within the subdivision were also noted.

Under developed conditions, the existing 48" RCP under Atrisco is assumed to be abandoned or removed and all the flow accumulated at this point will be carried by the street. As discussed before, the flow at this point is 47 C.F.S. for a 100-year storm situation.

To determine flows from the developed subdivision, a weighted runoff coefficient "C", was determined using the following standard coefficients for various surfaces.

Surface	Runoff Coefficient, "C"
roof	0.825
pavement	0.875
lawns	0.150
yard improvements, other than lawns	0.25
existing terrain	0.75

revised 7/26/76

The weighted "C" was calculated based on the percentage of each type of surface area to the total drainage area. In applying these factors it was assumed that there would be no backyard ponding due to the steep slopes of the area.

Again, the rational formula was used to compute the accumulated flow at the selected points. Below is a tabulation of the results:

TABULATION OF RESULTS - DEVELOPED CONDITIONS

Sub-Area	Elev. Diff. Feet	Length of Sub-Area	T_c Min.	I in/hr.	C	Area Acres	Accumulated Q C.F.S.
I D	10	260	29.80	3.1	0.55	32.7	55.8
I C	14	200	30.14	3.0	0.56	37.4	62.8
I A	34	500	30.95	3.0	0.59	43.7	77.3
I B	26	348	10.00	5.2	0.77	1.93	7.6
*Total Flow @ Easement	64	390	31.85	2.9	0.60	45.6	79.3
II C	17	1230	15.00	4.4	0.61	13.29	35.7
II B	24	220	15.30	4.3	0.62	16.80	44.8
II A	32	310	15.80	4.1	0.65	20.20	53.8
**Total Flow @ Easement	12	170	16.00	4.1	0.65	21.50	57.3
***III A	20	200	10.00	5.2	0.75	1.20	4.7
***III B	34	195	10.00	5.2	0.75	0.80	3.1
***III C	28	165	10.00	5.2	0.75	0.50	2.0
***III D	16	160	10.00	5.2	0.75	0.60	2.3

* Sub-areas I_A thru I_D include offsite areas A and A_1

** Sub-areas II_A thru II_C include offsite area B

*** Sub-areas III_A thru III_D do not contribute to flow accumulating on streets or easements.

VII. Summary of Results

A. Existing Conditions

Storm runoff from areas "A" and "A_1" (see Appendix Sheet II) ultimately converges at the existing 48" RCP culvert on Atrisco Road located south of Iliff Road at the southern entrance to Vista Magnifica. This flow is then coupled with the drainage of Sub-basin 3 that produces a runoff flow of 72.1 C.F.S.

during a 100-year frequency storm. This is the major point of concentrated flow in the subdivision. Area "B" contributes to flows accumulated on Vista Grande Road at the northern entrance to Vista Magnifica. Runoff from this area is added to runoff from Sub-basin 4 to produce a flow of 68.9 C.F.S. This flow is not as concentrated as that in the arroyo to the south (Sub-basin 3), but it is of prime interest in development of Vista Magnifica. Flows from Sub-basins 1 and 2 are 4.7 C.F.S. and 14.6 C.F.S. respectively, for a 100-year storm. These flows in existing condition sheet flow across the land into the Rio Grande and have no point of concentration within the subdivision.

B. Developed Conditions

As in the existing conditions, the flows from Areas "A", "A_1" and "B" will converge on Vista Magnifica at the points mentioned above. Under developed conditions though, the flow from "A" and "A_1" was assumed to accumulate on Atrisco Road at the southern entrance of Vista Magnifica, not at the outlet of the existing 48" RCP culvert. Again, the flows from "A" and "A_1" were added to developed area I (which includes portions of Sub-basins 1 and 2) to determine the increase in runoff for Sub-basin 3 under developed conditions for a 100-year frequency storm. This flow is 79.3 C.F.S., an increase of 7.2 C.F.S. Then flows expected for area "B" were added to drainage calculated from developed area II and compared with the flows determined for Sub-basin 4. This flow actually decreased under developed conditions from 68.9 C.F.S. to 57.3 C.F.S., due primarily to both vertical and horizontal street alignment. In addition to

received
16 July 1976

DRAINAGE REPORT

for

VISTA MAGNIFICA

A SUBDIVISION OF THE CITY OF ALBUQUERQUE

JULY 1976

WILLIAM MATOTAN & ASSOC., INC.
ENGINEERS
ALBUQUERQUE, NEW MEXICO

DRAINAGE REPORT

for

VISTA MAGNIFICA

a subdivision of the

City of Albuquerque

Prepared by:
William Matotan & Assoc., Inc.
230 Truman, N.E.
Albuquerque, New Mexico 87108
Phone 265-8467

seal & signature

INDEX

		Page
I	Purpose	1
II	Introduction	1
III	Design Criteria	1
IV	Contributory Areas Outside the Subdivision	2
V	Existing Conditions	3
VI	Developed Conditions	4
VII	Summary	5
VIII	Conclusions and Recommendations	7
IX	Bibliography	8

APPENDIX

I Calculations

A. Contributing Flow into Area - - - - - - - - - - - 6 sheets

B. Runoff - Existing Conditions - - - - - - - - - - 4 sheets

C. Runoff - Developed Conditions - - - - - - - - - 13 sheets

D. Channel and/or culvert designs - - - - - - - - 3 sheets

II Location Map of Existing Drainage Areas

III Location map of Drainage Areas with Vista Magnifica under developed conditions

I. Purpose

The purpose of this drainage study is to determine the amount of runoff expected in the subject area during a 100-year storm under existing and developed conditions. Also included in this report are recommendations for compliance with the City Engineer's and AMAFCA's requirements for positive subdivision drainage control.

II. Introduction

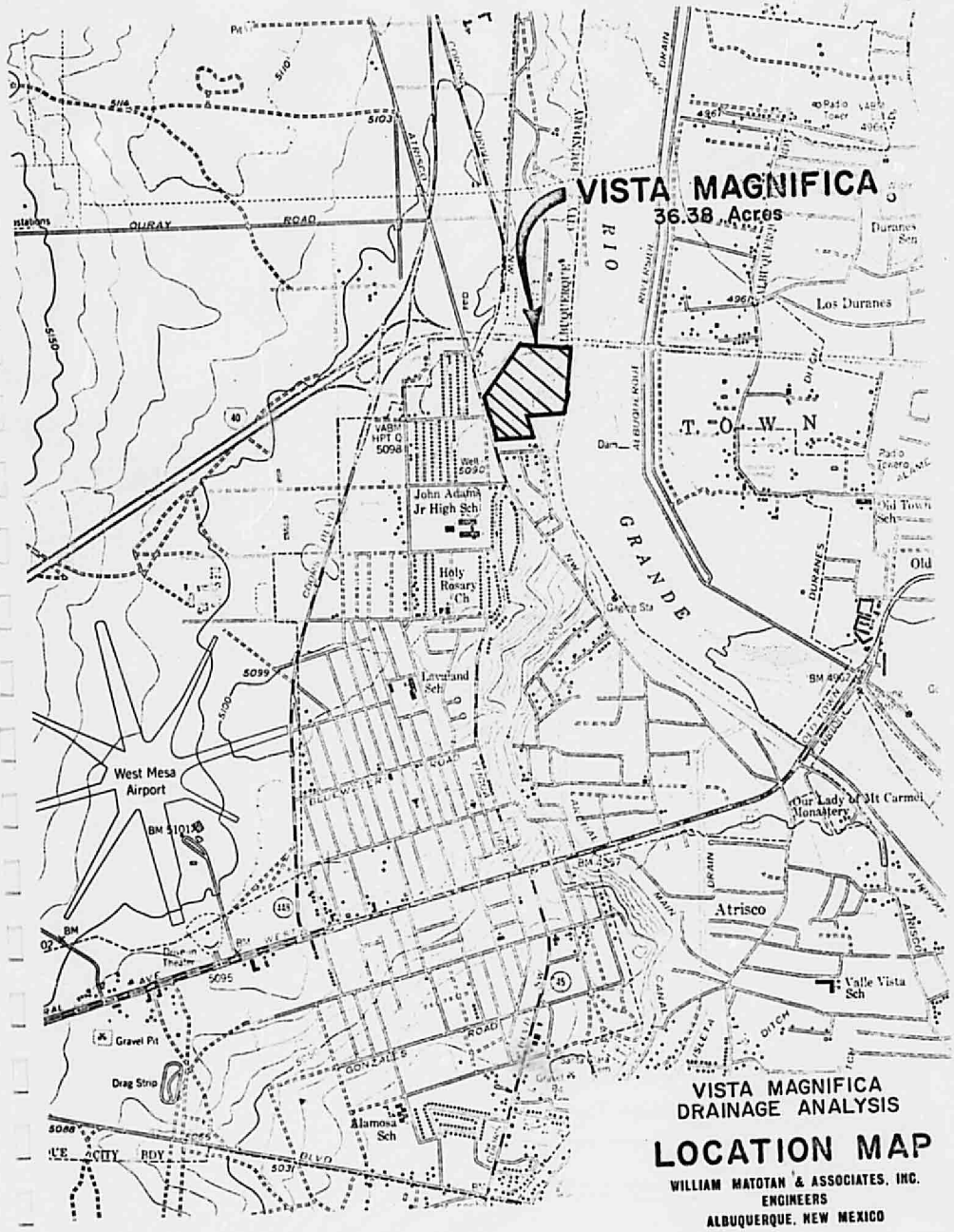
Vista Magnifica Subdivision at present, is zoned SU-1 and located in the northwest part of Albuquerque on the west bank of the Rio Grande. The subject area is bounded on the north by Interstate 40; on the west by Atrisco Road; and to the south lies the Riverview Heights Addition. (See location map)

The subdivision is a sandy, dissected terrace environment which slopes to the east at an average of 7% to 8%. Rainfall in the area collects primarily in arroyos, although there is some sheet flow at transitions from steep to shallower slopes. Runoff ultimately drains into the river or infiltrates.

Under developed conditions, backyard ponding would be difficult with such high slopes and small lots. Drainage easements are required in the eastern portion of the subdivision to provide for drainage of the subdivision.

III. Design Criteria

All flows were calculated using the Rational Formula, Q = CIA, where:


VISTA MAGNIFICA
36.38 Acres
QURAY ROAD
RIO GRANDE
T. O. W. N
Los Duranes
John Adams Jr High Sch
Holy Rosary Ch
Laveland Sch
West Mesa Airport
Atrisco
Our Lady of Mt Carmel Monastery
Valle Vista Sch
Alamosa Sch
Gravel Pit
Drag Strip
Old Town Sch
Durangos Sch
Dam
Gretta Sta
Patio Tower
BM 5101
BM 5097
BM 5095
BM 4960
5099
5098
5090
5088
5087
5103
5104
5100
5105
40
45
VISTA MAGNIFICA
DRAINAGE ANALYSIS
LOCATION MAP
WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
ALBUQUERQUE, NEW MEXICO

Q = Runoff in C.F.S.

A = Contributing area in acres

I = Intensity in inches/hour for duration equal to the time of accumulation measured in minutes

C = Runoff coefficient

IV. Contributory Areas Outside the Subdivision - (See Appendix Sheet II for location and Appendix Sheet IA for summary of computations)

Drainage areas contributing runoff to Vista Magnifica Subdivision include the area immediately west of Atrisco Road in the Swin-Mar and Hermosura Additions, and portions of Tracts 249, 250 and 251, Airport Unit, Town of the Atrisco Grant.

Area "A" (16.5 acres), which is the northernmost part of the watershed contributing to the existing culvert under Atrisco Road, has a predicted intensity of 3.49 in/hr. for the 100-year storm. The time of concentration (Tc) was found to be 29 minutes, which is the time it takes for floodwater to flow from the most remote point of a watershed to its outlet. A runoff coefficient of 0.45 for maximum runoff conditions in suburban areas was used, which is in conformance with "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963" by Gordon Herkenhoff and Assoc. and determined as applicable for the study area. Peak discharge from Area "A" was calculated to be 26 C.F.S.

Area "A_1", which includes the Hermosura Addition and a portion of TR 249, Airport Unit, Town of Atrisco Grant, has an estimated intensity of 5.1 in/hr with a time of concentration of 12 minutes. The runoff coefficient is assumed the same at 0.45.

Peak runoff from this portion was calculated to be 21 C.F.S.

The total peak flow at the culvert form areas "A" and "A_1", during a 100-year storm is 40 C.F.S., which is not a direct addition of the two contributing components. Differential time of concentrations result in lower accumulated peak flows.

Area "B" (7.2 acres) discharges onto Vista Grande Road. The time of concentration was found to be less than 10 minutes; therefore, a maximum intensity of 5.40 in/hr. for a 100-year storm was utilized. The runoff coefficient is 0.45 in accordance with development of the area. Peak discharge of storm water onto Vista Magnifica from Area "B" is calculated to be 17.4 C.F.S.

V. Existing Conditions - (See Appendix Sheet II for location and Appendix Sheet IB for summary of computations

Studies consisted of analyzing Vista Magnifica in the undeveloped form, considering internal flows originating within the boundary coupled with the established flows from adjacent areas to the west, mentioned previously. There are four major sub-basins within the subject area that contribute primarily to historical ephemeral streams or swales; the largest of which is in sub-basin #3. The final outlet of the sub-basins is over the escarpment and into the Rio Grande. The arroyo in sub-basin 3 is deeply incised, especially at its outfall to the river.

Flows in a 100-year situation were calculated using the Rational Method, Q = CIA. Below is a tabulation of results for the four existing sub-basins.

TABULATION OF RESULTS - EXISTING CONDITIONS

Sub-Basin No.	Elev. Diff. Feet	Length of Sub-Basin ft	Tc Min.	I In/Hr.	C	Area Acres	Q C.F.S.
1	36	550	3*	5.4	0.75	1.2	4.8
2	85	785	3*	5.4	0.75	3.7	15.2
3 Incl. Areas A & A_1	-	-	34	3.2	0.49	42.2	66.4**
4 Incl. Area B	-	-	12	5.1	0.61	22.1	68.9**
					Total		155.3

10 min.

*All time of concentrations less than 10 minutes were assumed to have a maximum of 5.4 inches per hour.

**Lagged with flows from Areas "A", "A_1", and "B" using total time of concentrations.

VI. Developed Conditions - (See Appendix Sheet III for location and Appendix Sheets ID for summary of computations.)

Studies consisted of analyzing the subdivision in its developed form. Again, internal flows were coupled with flows from the drainage areas to the west. The subdivision was divided into two major contributing areas based primarily on topography. The two major areas were then broken up into sub-areas with regard to lot runoff and street flow. These were then lagged together for accumulated peak discharge. Non-contributory sub-areas within the subdivision were also noted.

SAD 188

Under developed conditions, the existing 48" RCP under Atrisco is assumed to be abandoned or removed and all the flow accumulated at this point will be carried by the street. As discussed before, the flow at this point is 40.2 C.F.S. for a 100-year storm situation. 12

To determine flows from the developed subdivision, a weighted runoff coefficient "C", was determined using the following standard coefficients for various surfaces.

Surface	Runoff Coefficient, "C"
roof	0.825
pavement	0.875
lawns	0.150
yard improvements, other than lawns	0.25
existing terrain	0.75

The weighted "C" was calculated based on the percentage of each type of surface area to the total drainage area. In applying these factors it was assumed that there would be no backyard ponding due to the steep slopes of the area.

Again, the rational formula was used to compute the accumulated flow at the selected points. Below is a tabulation of the results:

TABULATION OF RESULTS - DEVELOPED CONDITIONS

Sub-Area	Elev. Diff. Feet	Length of Sub-Area	T_c Min.	I in/hr.	C	Area Acres	Accumlated Q C.F.S.
I D	10	260	29.80	3.45	0.48	29.68	49.15
I C	14	200	30.14	3.40	0.50	34.41	58.51
I A	34	500	30.95	3.38	0.54	40.66	74.21
I B	26	348	10.00	5.40	0.77	1.93	8.00
*Total Flow @ Easement	64	390	31.85	3.32	0.55	42.63	77.84
II C	17	1230	15.00	4.73	0.54	13.29	33.90
II B	24	220	15.30	4.70	0.58	16.80	45.80
II A	32	310	15.80	4.63	0.62	20.20	58.00
**Total Flow @ Easement	12	170	16.00	4.61	0.62	21.50	61.45
***III A	20	200	10.00	5.40	0.75	1.20	4.86
***III B	34	195	10.00	5.40	0.75	0.80	3.24
***III C	[illegible]	165	10.00	5.40	0.75	0.50	2.03
***III D	16	160	10.00	5.40	0.75	0.60	2.43

* Sub-areas I_A thru I_D include offsite areas A and A_1

** Sub-areas II_A thru II_C include offsite area B

*** Sub-areas III_A thru III_D do not contribute to flow accumulating on streets or easements.

VII. Summary of Results

A. Existing Conditions

Storm runoff from areas "A" and "A_1" (see Appendix Sheet II) ultimately converges at the existing 48" RCP culvert on Atrisco Road located south of Iliff Road at the southern entrance to Vista Magnifica. This flow is then coupled with the drainage of Sub-basin 3 that produces a runoff flow of 66.4 C.F.S.

during a 100-year frequency storm. This is the major point of concentrated flow in the subdivision. Area "B" contributes to flows accumulated on Vista Grande Road at the northern entrance to Vista Magnifica. Runoff from this area is added to runoff from Sub-basin 4 to produce a flow of 68.9 C.F.S. This flow is not as concentrated as that in the arroyo to the south (Sub-basin 3), but it is of prime interest in development of Vista Magnifica. Flows from Sub-basins 1 and 2 are 15.2 C.F.S. and 4.2 C.F.S. respectively, for a 100-year storm. These flows in existing condition sheet flow across the land into the Rio Grande and have no point of concentration within the subdivision.

B. Developed Conditions

As in the existing conditions, the flows from Areas "A", "A_1" and "B" will converge on Vista Magnifica at the points mentioned above. Under developed conditions though, the flow from "A" and "A_1" was assumed to accumulate on Atrisco Road at the southern entrance of Vista Magnifica, not at the outlet of the existing 48" RCP culvert. Again, the flows from "A" and "A_1" were added to developed sub-area I (which includes portions of Sub-basins 1 and 2) to determine the increase in runoff for Sub-basin 3 under developed conditions for a 100-year frequency storm. This flow is 77.8 C.F.S., an increase of 11.4 C.F.S. Then flows expected for area "B" were added to drainage calculated from developed sub-area II and compared with the flows determined for Sub-basin 4. This flow actually decreased under developed conditions from 68.9 C.F.S. to 61.4 C.F.S., due primarily to both vertical and horizontal street alignment. In addition to

SAD 188

the flows from these two primary drainage areas, which control the actual design of the drainage facilities that will need to be constructed to accommodate flows, there were portions of Sub-basins 1, 2 and 4 which were assumed to sheet flow directly into the Rio Grande. These are designated as Sub-areas III_A, III_B, and III_C on Appendix Sheet III.

VIII. Conclusions and Recommendations

1. Since no structures, storm sewers, etc. exist downstream from Vista Magnifica, the increased runoff due to development for the 100-year storm is acceptable, and will not be in opposition to AMAFCA Resolution 1972-2.

2. Location and alignment of the proposed streets in the subdivision are sufficient to accommodate a 100-year storm flow using the City standard 32' (face of curb to face of curb) street section. (see Appendix sheets I_C for computations) give depth & velocity.

3. Location and alignment of the proposed drainage easements as outlined on Appendix sheet III are sufficient to accommodate 100-year storm flows. Appendix sheets I_D demonstrate the adequacy of a lined channel and/or culvert for the flows anticipated.

4. In design of the two major drainage facilities (outlets for drainage areas I and II), provisions will need to be made to reduce the anticipated velocity to a subcritical velocity in order to minimize and control erosion at the outfall of the structure

5. Design of Atrisco Road in Special Assessment District 188 will require revisions in order to transition the flows from Areas "A" and "A_1" to the south entrance of Vista Magnifica. The existing 48" RCP culvert should be removed and all flows carried by the street section.

over bank!

IX. Bibliography

Butler, Stanley, Engineering Hydrology, New Jersey: Prentice-Hall, Inc., 1959

Daugherty and Franzini, Fluid Mechanics with Engineering Applications, New York: McGraw-Hill Book Co., 1965.

Herkenhoff, Gordon & Assoc., "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963," Albuquerque, New Mexico: Gordon Herkenhoff & Assoc., Consulting Engineers.

King and Brater, Handbook of Hydraulics, New York: McGraw-Hill Book Co., 1963.

Leverton-Denny Engineers, Inc., "Coors Boulevard, M-4053(1), Drainage Report--Amended," Albuquerque, New Mexico: Leverton-Denny Consulting Engineers, 1975.

Matotan, William I. & Associates, Inc., "Drainage Management Plan Western Metropolitan Area," Albuquerque, New Mexico: W. I. Matotan & Associates, Consulting Engineers, 1975.

New Mexico State Highway Dept., "Instructional Manual," Santa Fe, New Mexico: N.M.S.H.D., 1968.

Nomograph prepared by P. Z. Kerpich, "Time of concentration (Tc) of rainfall on small drainage areas," Civil Engineering, Vol. 10, No. 6, June 1940, p. 362.

APPENDIX

Area "A" - Contributing Flows From The West

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Vista Hermosa Drainage Study Sheet 1 of 6 Inflow into Vista Hermosa Job No. 522 By D. Vinsland Chk'd JCM Date 9/1/86

I.A.

Area "A" 100 Year Storm

West ½ block of Block (6), Sun-Mar Addition

Area = 3.69 Ac.

Calc. for Runoff Coefficient, c.

c = 0.45 (According to Herbenhoff, "Master Plan of Drainage..."; maximum runoff for Suburban Area.)

Tc Calculations

10 min. - runoff from roof to Street

L = 1070'
Δh = 5.35'
S = 0.005
V = 1.44 FPS based on existing slope of street.

$t = \frac{1070}{1.44} = 743.06$ sec. $\frac{743.06}{60} = 12.4$ min

Tc = 10 + 12.4 = 22.4 min.

$I_{100} = \frac{189}{Tc+25} = \frac{189}{22.4+25} = 3.99$ in/hr.

Q_{100} (0.45)(3.99)(3.69) = 6.62 CFS @ 55th & Ilift

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Vista Hermosa Drainage Opt. Sheet 5 of 6 Tolbert into Vista Hermosa Job No. [illegible] By D. Micklewood Chk'd JCM Date 9/4/85

I-A.

Area "A" Cont.

Rest of Area "A" to inlet at Alameda Road

Area = 12.81 Acres Total Contributing Area = 16.5 Ac.

Calc. for Runoff Coefficient, C.

C = 0.45 (According to Herkenhoff, "Master Plan of Drainage ...")

Tc Calculations

$L = 1020'$
$\Delta h = 7.6'$
$S = 0.0075$
$V = 2.5$ FPS based on slope & 6.63 CFS inflow

$t = \frac{1020}{2.5} = 408.00$ sec $\frac{408}{60} = 6.80$ min.

$T_c = 22.4 + 6.8 = 29.2$ min.

$I_{100} = \frac{189}{T_c + 25} = \frac{189}{29.2 + 25} = 3.49$ in/hr.

Q_{100} $(0.45)(3.49)(16.5) = 25.9$ CFS Total runoff from Area "A"

Area "A1" - Contributing Flows From the West

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project [illegible] Sheet 3 of 6 Inflows into Hola Distrib. Job No. [illegible] By D. Pinchard Chk'd [illegible] Date [illegible]

1A

Area "A1" 100 Year Storm

Hermosura Add. & N½ of Tr. 2W2, N.E. Unit T.R.G.

Area = 7.5 Ac. (Hermosura Add.)

Calc. for Runoff Coefficient, C.

C = 0.45 (According to Herkenhoff, "Master Plan of Drainage...")

Tc Calculations

Tc = 10 min (due to size of Area)

$I_{100} = \frac{183}{Tc + 25} = \frac{183}{10 + 25} = 5.4$ in/hr (Max. Condition)

$Q_{100} = (0.45)(5.4)(7.5) = 18.23$ CFS from Hermosura Add.

IA.

Area "A1" Cont.

Rest of Contributing Area

Area = 9.1 Ac. Acrum

Calc. for runoff Coefficient, C

C = 0.45 (According to Herkenhoff, "Master Plan of Drainage...", Maximum Q for developed residential Areas)

Tc Calculations

$L = 320'$
$\Delta h = 5'$
$S = 0.016$
$V = 2.66$ FPS based on slope & 18.23 CFS inflow

$t = \frac{320}{2.66} = 120.44$ sec. $\frac{120.44}{60} = 2.04$ min.

$Tc = 2.04 + 10$ min $= 12.04$ min

$I_{100} = \frac{169}{Tc + 25} = \frac{169}{12.04 + 25} = 5.1$ in/hr.

$Q_{100} = (0.45)(5.1)(9.1) = 20.9$ CFS Total runoff from Area "A1"

Area "A" + Area "A1" - Contributing Flows From West

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Vista Diversion Drainage Det Sheet 5 of 6 Inflow into Vista Diversion Job No. [illegible] By D. Marchand Chk'd [illegible] Date [illegible]

I.D.

Area "A" + Area "A1" — 100 Year Storm

Area = 16.5 + 9.1 = 25.6 Ac. what about 7.5

Calc. for Runoff Coefficients

C = 0.45 (According to Hofkenhoff, "Master Plan of Drainage ...")

Tc Calculations

Tc = 29.2 min. (Max. time to to reach point of convergence - see calcs. of Area "A".)

$I_{100} = \frac{169}{Tc + 25} = \frac{169}{29.2 + 25} = 3.49$ in/hr.

$Q_{100} = (0.45)(3.49)(25.6) = 40.2$ cfs Total Flow Areas "A" + "A1" @ culvert on Atrisco

calc for culvert capacity?

Area "B" - Contributing Flows From The West

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project [illegible] Sheet 6 of 6 [illegible] Job No. [illegible] By JGM Chk'd JGM Date 9/9/96

100 Year Storm

Area "B"

Flow accumulated @ Vista Grande Road & Atrisco Road from small adjacent Areas

Area = 7.16 Acres

Calc. for Runoff Coefficient, C

C = 0.45 (According to Harkenhoff, "Master Plan of Drainage ...")

Tc Calculations

Ave Slope on Atrisco Road = 0.0114

Tc = 10 min. - due to size of Area "B"

$I_{100} = \frac{129}{Tc + 25} = \frac{129}{10+25} = 3.40$ in/hr.

$Q_{100} = (0.45)(3.40)(7.16) = 10.40$ CFS Total for Area "B" @ Vista Grande and Atrisco

Existing Condition - Subbasin #1

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project [illegible] Sheet 1 of 4
[illegible] Existing Conditions Job No. [illegible]
By [illegible] Chk'd [illegible] Date [illegible]

Subbasin #1 — 100 year storm

Area = 1.10 Acres (Mostly sheet flow)

C = 0.95 (Taken from the "Instructional Design Manual" for New Mexico State Highway Commission, Santa Fe, New Mexico, 1968.

Tc Calculations

L = 360'
Δh = 36'
S = 0.065

Tc = 10 min. (According to Herkenhoff, "Master Plan of Drainage...")

$I_{100} = \frac{187}{Tc + 25} = \frac{187}{10 + 25} = 5.4$ inches

$Q_{100} = (0.95)(5.4)(1.10) = 4.62$ cfs.

HYDROLOGY H11/D15 2 of 2 4 PLANS

Existing Condition - Subbasin #2

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project [illegible] Sheet 2 of [illegible] Runoff Existing Conditions Job No. [illegible] By [illegible] Chk'd [illegible] Date [illegible]

Subbasin #2 — 100 year storm

Area = 2.75 Ac.

C = 0.75 (Same as Subbasin #1)

Tc Calculations

L = 785'
Δh = 65'
S = 0.108

Tc = 10 min. (Same as subbasin #1)

$I_{100} = \frac{169}{Tc+25} = \frac{169}{10+25} = 6.4$ in/hr.

Q_{100}: (0.75)(6.4)(2.75) = 15.10 cfs.

Existing Condition - Subbasin #3

I.B.

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Lake Mountain Dam Rpt. Sheet 2 of 4 Pinoth Existing Condition Job No. 622 By JCM Chk'd Vaw Date 9-6-76

Subbasin #3 — 100 Year Storm

Area = 16.6 Ac. — Total Contributing Area = 40.2 Ac (inc. Areas "A" & "A1")

Calc. for Runoff Coefficient, C

$$\text{Weighted } C = \frac{20.2}{33.84}(0.45) + \frac{13.64}{33.84}(0.75) = \underline{0.60}$$

(A" & A1")

Tc Calculations

L = 1370'
Δh = 106'
S = 0.077
V = 4.92 fps based on 40.2 cfs inflow from developments to the west & existing channel configuration

$$t = \frac{1370}{4.92} = 278.46 \text{ sec} \quad \frac{278.46}{60} = 4.64 \text{ min.}$$

Tc = 29.2 (Areas "A" & "A1") + 4.64 = 33.84 min.

$$I_{100} = \frac{159}{Tc + 25} = \frac{159}{33.84 + 25} = \underline{3.21 \text{ in/hr.}}$$

$$Q_{100} = (0.60)(3.21)(40.2) = \underline{\underline{66.28 \text{ CFS}}}$$

Existing Condition - Subbasin #4

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Lake Worth Drain. Sub. Sheet 4 of 4 Runoff Existing Condition Job No. 5.3.2 By JCV Chk'd Dan Date 7-8-96

I.B.

Subbasin #4 — 100 Year Storm

Area = 14.9 Acres — Total Contributing Area = 22.10 Ac (inc. Area "B")

Calc. for Runoff Coefficient, C

$$\text{Weighted } C = \frac{10.0}{22.10}(0.45) + \frac{12.1}{22.1}(0.75) = 0.61$$

Tc Calculations

$L = 2435'$
$\Delta h = 93'$
$S = 0.038$

Tc = 10 min. (Area "B") + 2.0 min = 12.0 min

$$I_{100} = \frac{169}{Tc+25} = \frac{169}{10+25} = 5.11 \text{ in/hr.}$$

$$Q_{100} = (0.61)(5.11)(22.10) = 68.9 \text{ CFS}$$

Developed Condition - Area I

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project [illegible] Sheet 1 of 13 I.C
Runoff Developed Condition Job No. [illegible]
By [illegible] Chk'd [illegible] Date [illegible]

Street Design - Area I — 100 year storm

Subarea In

Area = 4.08 Ac. Total contributing Area = 29.68 Ac.

Calc. for runoff coefficient, c
Townhouse & Apartment development

Type of Surface	% of Total	stand. C	Weighted C
roof	25%	0.825	0.21
paving	40%	0.875	0.35
Lawns	10%	0.150	0.02
yard improve. other than lawn	25%	0.250	0.06
	100%		0.64

Inflow into Subdivision 25.6 Ac w/ c = 0.45 ("A" & "A")

Weighted c for contributory Area In

$$\text{Weighted } c = \frac{4.08}{29.68}(0.64) + \frac{25.6}{29.68}(0.45) = 0.48$$

Tc Calculations

$L = 260'$
$\Delta h = 10'$
$S = 0.0385$
$V = 4.6$ fps - calculated from 40.2 CFS inflow

$$t = \frac{260}{4.6} = 34.2 \text{ sec.} \quad \frac{34.2}{60} = 0.6 \text{ min}$$

$Tc = 29.2$ (Areas "A" & "A") $+ 0.6 = 29.8$ min

$$I_{100} = \frac{189}{Tc + 25} = \frac{189}{29.8 + 25} = 3.45 \text{ in/hr}$$

$$Q_{100} = (0.48)(3.45)(29.68) = 49.15 \text{ CFS}$$ - Accum. Peak @ In

— Flow is within capacity of typical 32' street Office Sec

Subarea IC

Area = 4.43 Ac. Total contributing Area = 34.41 Ac.

Calc. for runoff Coefficient C

Use same distribution of development as in Subarea ID (0.64)

Weighted C for contributary Area IC

$$\text{Weighted } C = \frac{8.81}{34.41}(0.64) + \frac{25.6}{34.41}(0.45) = 0.50$$

Tc Calculations

$L = 500'$
$\Delta h = 14'$
$S = 0.0700$
$V = 9.8$ FPS calculated from 49.15 CFS inflow

$$t = \frac{200}{9.8} = 20.41 \text{ Sec.} \quad \frac{20.41}{60} = 0.34 \text{ min.}$$

$Tc = 29.8$ (Accum. time) $+ 0.34 = 30.14$ min.

$$I_{100} = \frac{189}{Tc + 25} = \frac{189}{30.14 + 25} = 3.43 \text{ in/hr.}$$

$Q_{100} = (0.50)(3.43)(34.41) = 58.5$ CFS - Accum. Peak @ IC

-flow is within capacity of typical 30' street with this slope

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project: Vista Mesa Drainage Det. Sheet 3 of 13
Project: Proposed Developed Condition Job No.
By: [illegible] Chk'd: [illegible] Date: [illegible]

Subarea IA

Area = 6.25 Ac. Total contributing Area = 40.66 Ac.

Calc. for runoff Coefficient, C
Residential Lot development

Type of Surface	% of Total	Strick. C	Weighted C
roof	20%	0.825	0.165
paving	30%	0.875	0.262
lawns	5%	0.150	0.008
Yard improve. for area	45%	0.750	0.337

Weighted C for contributory Area IA

$$\text{Weighted } C = \frac{6.25}{40.66}(0.11) + \frac{8.81}{40.66}(0.64) + \frac{25.6}{40.66}(0.45) = \underline{0.54}$$

Tc Calculations

$L = 500'$
$\Delta h = 34'$
$S = 6.8\%$
$V = 10.3$ FPS calculated from 58.5 CFS inflow

$$t = \frac{500}{10.3} = 48.54 \text{ sec} \quad \frac{48.54}{60} = 0.81 \text{ min.}$$

$Tc = 30.14 + 0.81 = 30.95$ min

$$I_{100} = \frac{189}{Tc + 25} = \frac{189}{30.95 + 25} = \underline{3.38 \text{ in/hr.}}$$

$$Q_{100} = (0.54)(3.38)(40.66) = \underline{\underline{74.21 \text{ CFS}}} - \text{Accum. Peak @ IA}$$

-flow is within capacity of 30' street at this slope-

$Y_{30} = 1.55$
$D = .5$

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project Vista Hermosa Development Sheet 4 of 13
Subject: Detailed Computation Job No. [illegible]
By [illegible] Chk'd [illegible] Date [illegible]

Subarea IB

Area = 1.93 Area contributes to drainage easement

Calc. for runoff coefficient, c

Use same distribution of development as in Subarea IA (0.77)

Tc Calculations

Due to size of subarea, Tc has been set @ 10 minutes

$I_{100} = \frac{189}{Tc + 25} = \frac{189}{10+25} =$ 5.4 in/hr

$q_{100} = (0.77)(5.4)(1.93) =$ 8.00 CFS = Discharge from IB

- flow within capacity of typical 30' street with this slope -

- design drainage structure for this flow to keep flow from out of sight for 30' drainage easement -

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Vista Monterey Drainage Rpt. Sheet 5 of 13 Runoff Developed Conditions Job No. 892 By D. Moreland Chk'd Dwm Date 7/9/96

Subarea I - Total Accumulated Area Contributing To Drainage Easement (ee)

Area = 1.97 Ac. Total Contributing Area = 42.63 Ac

Calc. for runoff coefficient, c

Use same distribution of development as in previous areas.

$$\text{Weighted } c = \frac{8.22}{42.63}(0.77) + \frac{8.21}{42.63}(0.64) + \frac{25.6}{42.63}(0.40) = 0.55$$

Tc Calculations

$l = 390'$
$\Delta h = 64'$
$S = 0.164$
$V = 7$ FPS based on previous runoff

$$t = \frac{390}{7} = 55.71 \text{ sec} \quad \frac{55.71}{60} = 0.9 \text{ min.}$$

$$Tc = 30.95 + 0.9 = 31.85 \text{ min.}$$

$$I_{100} = \frac{189}{Tc + 25} = \frac{189}{31.85 + 25} = 3.32 \text{ in/hr}$$

$$Q_{100} = (0.55)(3.32)(42.63) = 77.84 \text{ cfs}$$ Total Runoff Peak Flow for Area I

- Design channel for easement to accommodate this flow.

Developed Condition - Area II

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project Nob Hill Mixed Use Subd. Sheet 6 of 13 Runoff Developed Condition Job No. 0-22 By D. Vinchcard Chk'd DAW Date 9/20/85

Street Design - Area II — 100 Year Storm

Subarea IIC

Area = 6.13 Ac. — Total contributing Area = 13.29 Ac.

Calc. for runoff coefficient C

Use same distribution of development as in Subarea IB (0.64)

Weighted C for contributory Area IC

$$\text{Weighted } C = \frac{6.13}{13.29}(0.64) + \frac{7.16}{13.29}(0.45) = 0.54$$

Inflow into Subdivision 7.6 Ac. - 17.4 CFS (Area "B")

Tc Calculations

$L = 1230'$
$\Delta h = 17'$
$S = 0.014$
$V = 4.1$ FPS - calculated from 17.4 CFS inflow

$$t = \frac{1230}{4.1} = 300 \text{ sec.} \quad \frac{300}{60} = 5 \text{ min.}$$

$Tc =$ 10 min (Area "B") + 5 = 15 min

$$I_{100} = \frac{189}{Tc + 25} = \frac{189}{15 + 25} = 4.73 \text{ in/hr.}$$

$$Q_{100} = (0.54)(4.73)(13.29) = 33.9 \text{ CFS}$$ - Accum. Peak @ IIC

- flow within capacity of typical 32' street within this stretch

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project: Water Management Planning Dist. Sheet 7 of 13
Runoff Disposal Facilities Job No. [illegible]
By: D. Wrathem Chk'd: [illegible] Date: 7/[illegible]

Subarea IIB

Area = 3.51 Ac. Total contributing Area = 16.8 Ac.

Calc. for runoff Coefficient, C

Use same distribution of development as in Subarea IA (0.77)

Weighted C for contributory Area IIB

$$\text{weighted } C = \frac{3.51}{16.8}(0.77) + \frac{6.13}{16.8}(0.64) + \frac{7.14}{16.8}(0.45) = 0.65$$

Tc Calculations

L = 220'
Δh = 24'
S = 0.109
V = 11.4 fps calculated from 22.9 CFS inflow

$$t = \frac{220}{11.4} = 19.30 \text{ sec} \quad \frac{19.30}{60} = 0.32 \text{ min.}$$

Tc = 15 (accum. time) + 0.32 = 15.32 min.

$$I_{100} = \frac{189}{Tc + 25} = \frac{189}{15.32 + 25} = 4.69 \text{ in/hr}$$

$$Q_{100} = (0.65)(4.69)(16.8) = 45.8 \text{ CFS}$$ accum. Peak @ IIB

- Flow within capacity of typical 32' street @ this slope

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project Vista Magnifica Drainage Plan Sheet 8 of 12
Runoff Development Condition Job No. 220
By D. Matotan Chk'd [illegible] Date 7/1/80

Subarea IIA

Area = 3.59 Ac. Total contributing Area = 20.2 Ac.

Calc. for runoff Coefficient, C

Use same distribution of development as in Subarea IA (0.77)

Weighted C for contributary Area IIA

$$\text{weighted } C = \frac{6.9}{20.2}(0.77) + \frac{6.18}{20.2}(0.64) + \frac{7.14}{20.2}(0.45) = 0.62$$

Tc Calculations

$l = 310'$
$\Delta h = 22'$
$S = 0.103$
$V = 10.77$ FPS calculated from 45.5 cfs inflow

$$t = \frac{310}{10.77} = 28.26 \text{ sec.} \quad \frac{28.26}{60} = 0.47 \text{ min.}$$

$Tc = 15.3$ (Accum. time) + 0.47 = 15.8 min.

$$I_{100} = \frac{187}{Tc + 25} = \frac{187}{15.8 + 25} = 4.63 \text{ in/hr}$$

$$Q_{100} = (0.62)(4.63)(20.2) = 58.00 \text{ cfs}$$ Accum. flow @ IIA

- flow within capacity of 32' street @ this slope

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project Vista Mandica Drainage Plan Sheet 2 of 13
Bernalillo County, New Mexico Job No. [illegible]
By D. Macaulay Chk'd [illegible] Date [illegible]

Subarea II - Total Accumulated Area Contributing to Pedestrian Vista Coverage Excess

Area = 1.28 Ac. Total Contributing Area = 21.5 Ac.

Calc. for runoff Coefficient, c

Use same distribution of development as in subareas IIA & IIC

Weighted c = $\frac{8.15}{21.5}(0.77) + \frac{6.18}{21.5}(0.61) + \frac{7.14}{21.5}(0.45) = 0.62$

Tc Calculations

L = 170'
Δh = 12'
S = 0.071
V = 15.6 FPS calculated from 56.00 cfs inflow

$t = \frac{170}{15.6} = 10.90$ sec $\frac{10.90}{60} = 0.20$ min.

Tc = 15.8 + 0.2 = 16.0 min.

$I_{100} = \frac{180}{Tc + 25} = \frac{180}{16+25} = 4.41$ in/hr.

$Q_{100} = (0.62)(4.41)(21.5) = 59.15$ cfs Total Accum. Peak Flow for Area II

Pipe within capacity of 30" sheet pile steps

Developed Condition - Non-contributory Flow

WILLIAM MATOTAN & ASSOCIATES, INC. ENGINEERS 230 Truman Street, N.E. - Albuquerque, N.M. 87108 Telephone 265-8467	Project [illegible] Sheet 10 of 12 Except Developed Condition Job No. [illegible] By [illegible] Chk'd [illegible] Date [illegible]

Subareas not contributing to street flow

100 year storm

Subarea IIA

Area = 1.2 Ac.

C = 0.75 (Taken from Herkenhoff, "Master Plan of Drainage ...")

Tc Calculations

L = 200'
Δh = 20'
S = 0.100

Tc = 1.15 min (Taken from nomograph by Kirpich, "Civil Engineering", Vol. 10, No. 6)

Use 10 min.

$I_{100} = \frac{189}{Tc + 20} = \frac{189}{10 + 20} = 6.3$ in/hr.

$Q_{100} = (0.75)(6.3)(1.2) = 4.86$ cfs

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Subarea III B

Area = 0.60 Ac.

C = 0.15 (same as Subarea III A)

Tc Calculations

Tc = 10 min. (same as Subarea III B)

$I_{10} = \frac{189}{Tc + 25} = \frac{189}{10 + 25} = 5.4$ in/hr.

$Q_{10} = (0.75)(5.4)(0.6) = 2.24$ CFS

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Subarea IIIC

Area = 0.5 Ac.

C = 0.75 (same as subarea IIIA)

Tc Calculations

Tc = 10 min. (same as Subarea IIA)

$I_{110} = \frac{189}{Tc + 25} = \frac{189}{10 + 25} = 5.4$ in/hr

$Q_{110} = (0.75)(5.4)(0.5) = 2.03$ CFS

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. – Albuquerque, N.M. 87108
Telephone 265-8467

Subarea III D

Area = 0.6 Ac

C = 0.75 (same as subarea III A)

Tc Calculations

Tc = 10 min. (same as subarea III A)

$I_{100} = \frac{160}{Tc+25} = \frac{160}{10+25} = 4.4$ in./hr.

$Q_{100} = (0.75)(4.4)(0.6) = 2.42$ CFS

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

Project Vista Hermosa Drainage Ext. Sheet 1 of 3 I.D.
Channel & Culvert Design Job No. 229
By L. Matotan Chk'd Mat Date 7/ /

Southern Most drainage easement - from Southeast cul de sac to 25' drainage easement — Culvert design

Q necessary = 5 cfs

L = 235'
Δh = 25'
S = 0.1067 ft/ft

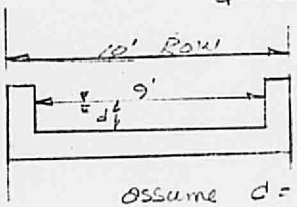
try 18" RCP.

by use of: Nomograph for Computing Required Size of Circular Pipe Flowing full

velocities are excessive at natural S

by use of a deep drop inlet & drop man hole maintain an effective S = 0.7 ft/ft

V = 16 fps
Q = 26 cfs. ⇐ adequate



Channel design

assume d = 0.5'

$V = \frac{1.486}{0.015}(0.45)^{2/3}(0.11)^{1/2}$

$= 19.29$ fps. $N_f = \frac{19.29}{\sqrt{32.2(\frac{0.5}{4.5})}} = 24$ — supercritical

$Q = (19.29)(4.5) = 86.5$ cfs. ⇐

Typical rectangular section shown will be adequate with <u>some method energy dissipation.</u>

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N.E. - Albuquerque, N.M. 87108
Telephone 265-8467

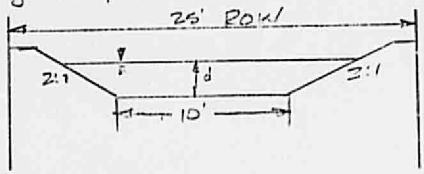
Project [illegible] Sheet 2 of 3 I.D.
[illegible] Job No. [illegible]
By [illegible] Chk'd [illegible] Date [illegible]

25' Drainage Easement

Q necessary = 77.5 CFS

L = 590'
Δh = 44'
S = 0.113 %

try trapezoidal section as below, concrete lined



assume d = 0.5'

$$V = \frac{1.486}{0.015}(0.45)^{2/3}(0.113)^{1/2} = 19.51 \text{ fps}$$

$$Q = (0.5)(19.51) = 107.33 \text{ CFS}$$

Froude No. = 2.3 > 1 super critical

Section will be adequate for flows anticipated,
Energy dissipation will be required.

WILLIAM MATOTAN & ASSOCIATES, INC.
ENGINEERS
230 Truman Street, N. E. - Albuquerque, N. M. 87108
Telephone 265-8467

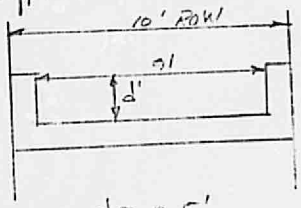
Project [illegible] Sheet [illegible] of [illegible] I.D.
Job No. [illegible]
By: [illegible] Chk'd [illegible] Date [illegible]

Northernmost drainage easement

$Q_{necessary} = 61.4$ CFS

$L = 170'$
$\Delta h = 11'$
$S = 0.065$ ft/ft

try typical rectangular as below, Concrete lined.



assume $d = 0.5'$

$$V = \frac{1.486}{0.015}(0.45)^{2/3}(0.065)^{1/2}$$

$V = 14.79$ fps

$$N_F = \frac{14.79}{\sqrt{(32.2)\left(\frac{9}{12}\right)}} = 1.8 < 1$$

super critical

$Q = (14.79)(4.5) = 66.6$ CFS

SECTION WILL BE ADEQUATE FOR FLOW ANTICIPATED, ENERGY DISSIPATION WILL BE REQUIRED.

WILLIAM MATOTAN & ASSOCIATES - ENGINEERS
ALBUQUERQUE, NEW MEXICO