LETTER OF TRANSMITTAL

Community Sciences Corporation
P. O. Box 1328
CORRALES, NEW MEXICO 87048

(505) 897-0000

TO *Middle Rio Grande Conservancy District*
1930 2nd SW, P.O. Box 581
Albuquerque, NM 87103

DATE	JOB NO.
January 4, 1980	*47-2-0003*

ATTENTION *Mr. Subas Shaw, District Engineer*

RE: *Casita Vista Subdivision - Drainage*

RECEIVED
JAN 9 1980
CITY ENGINEER

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			*Plan for draining rear yard ponds per our previous discussions*

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS *Please review at your earliest convenience and advise us regarding acceptability.*

COPY TO *Dick Heller, City Engineer* ✓
Grover Jones

SIGNED: *Kent M. Watson*

If enclosures are not as noted, kindly notify us at once.

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

November 3, 1978

Mr. Fred Arfman
Chambers, Campbell, Isaacson,
Chaplin, Inc.
3500 Indian School Road N.E.
Albuquerque, New Mexico 87106

Dear Mr. Arfman:

I have reviewed the drainage report for Casita Vista Townhouses Phase II and I am in agreement with the concept. The drainage report is, therefore, hereby approved.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gw

cc: Dwayne Sheppard, Acting City Engineer
Richard Leonard, AMAFCA
Drainage Report File

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

December 31, 1979

Middle Rio Grande Conservancy District
Mr. Subhas K. Shah
Post Office Box 581
1930 Second St. S.W.
Albuquerque, New Mexico 87103

K11-D7

RE: CASITA VISTA SUBDIVISION

Dear Mr. Shah:

On behalf of the City of Albuquerque I would like to thank you personally and the Middle Rio Grande Conservancy for the cooperation extended to Mr. Kent Whitman of Community Sciences Corporation and the City of Albuquerque in allowing the minor discharge of water into your canal.

This is the best solution in the interest of both the City, the Developer and M.R.G.C.D. and your cooperation is much appreciated.

Very truly yours,

Richard S. Heller
City Engineer

RSH/tsl

cc: Kent Whitman, Community Sciences, Corp.
Bruno Conegliano, Asst. City Engineer-Hydrology

MIDDLE RIO GRANDE CONSERVANCY DISTRICT
POST OFFICE BOX 581
1930 SECOND ST., S.W. PHONE 243-6796
ALBUQUERQUE, NEW MEXICO 87103

December 26, 1979

RECEIVED
DEC 28 1979
CITY ENGINEER

Mr. Kent M. Whitman
Community Sciences Corporation
P.O. Box 1328
Corrales, NM 87048

Re: Casita Vista Subdivision drainage plan

Dear Kent:

I have received your formal request for drainage plan approval on the above referenced project.

As we discussed, the District policy calls for no acceptance of any surface runoff into the District facilities, provided it threatens the damage to the District property and facilities. The Arenal Main Canal in the vicinity of your project is concrete lined and uncontrolled runoff would cause damage to the concrete lining.

The District would approve your project provided the following conditions are met:

1) The outlet drain pipes should be connected into one main drain pipe.

2) Only one drain inlet will be permitted from your property to drain into Arenal Main Canal.

3) The 4" drain pipe should drain directly into the canal. No sheet flow into District banks will be permitted.

4) Adequate cover should be provided over the drain pipe to avoid any damage due to District vehicles.

5) The developer or the City will be responsible for proper maintenance of the drainage system.

6) It is expected that the runoff received into the system will be free from contamination, grease, silt, etc.

7) A license is required from the District for a drain inlet. Please furnish final plans with these modifications.

If you have any further questions, please do not hesitate to contact us.

Sincerely,

Subhas K. Shah
District Engineer

SKS:cj

cc: Mr. R. S. Nanninga, General Manager
Mr. Richard Heller, City Engineer
City of Albuquerque ✓

community sciences corporation

P.O. Box 1328
Corrales, New Mexico 87048
(505) 897-0000

December 19, 1979

K-11-07

Mr. Subes Shaw
District Engineer
Middle Rio Grande Conservancy District
P.O. Box 581
Albuquerque, NM 87103

Re: Casita Vista Subdivision, Drainage Plan

Dear Mr. Shaw:

Pursuant to our meeting of December 18, we are hereby formally requesting your cooperation in solving the drainage problems associated with the above referenced project. A plot plan is enclosed for your convenience.

As we discussed, this property is situated adjacent to the Arenal Drain, and the easterly boundary of the parcel borders a 15 foot high, 45° embankment which lies primarily on District property. We have proposed a drainage plan for the Casita Vista project which would incorporate individual rear yard lot ponds adjacent to the embankment. Since these ponds will undoubtedly increase potential of embankment saturation, we feel it will be to the benefit of all parties involved to provide some method of positive drainage for these ponds to minimize the threat of embankment failure.

To accomplish this objective we propose to furnish each pond with a small outlet drain which would empty the pond at a controlled rate. The discharge from these drains would be collected into two 4" diameter PVC pipes (one draining to the NE corner of the parcel and one to the SE corner). Flows would be released at the toe of the embankment onto a small rip rap pad and would sheet from the pad into the Arenal Drain. Peak discharge from the two pipes combined would be limited to 1 cfs for the "pond full" condition.

I would like to emphasize again that this plan represents no significant change in drainage pattern from what is occuring at the present since the site drains naturally from West to East. By this letter we are seeking M.R.G.C.D. approval to proceed with the proposed plan.

SURVEYING
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LAND PLANNING

In addition, Dick Heller, the City Engineer, feels that the City has a strong enough interest in protecting the future home owners in this area that he has countersigned the letter below.

Please respond to this request at your earliest convenience. Your cooperation is appreciated.

Sincerely yours,

Kent M. Whitman, P.E.

Richard Heller, P.E.
City Engineer, City of Albuquerque

cc: Grover Jones, Mission Construction

Enclosure

KMW/lds

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

December 10, 1979

K11-D7

Mr. Kent Whitman
Community Science Corp.
P.O. Box 1328
Corrales, New Mexico 87048

Reference: Casita Vista Development

Dear Mr. Whitman:

I have reviewed the drainage report for the referenced development, and I cannot concur with the proposal submitted.

A field investigation has revealed that the soil in place is mostly loose alluvial sand with much greater permeability than that exhibited by the soils of the east alluvial fans where a C value of 0.4 is usually adopted. I believe that the existing conditions do not warrant the use of a runoff coefficient C greater than 0.15-0-2.

I also object to the proposal of raising the land by importing fill material and conveying the developed runoff to 52nd Street. The minimal nature of the storm drainage facilities in the valley makes it imparative that no additional discharge be conveyed to already overload facilities, or preempt some of their capacity. My Assistant, Fred Aguirre, has reviewed the computation submitted and found them inadequate (see attachment). I concur with his disagreement, particularly with the use of a runoff coefficient of 0.65 for southwestern landscaping which is normally underlaid by polyethilene film; a value of 0.9 should instead be used.

I further find the drainage report inadequate in terms of the attention paid to the vertical bank, 10 to 15 ft. high, adjacent to the Arenal Canal: Will the ponding areas on top of the slope cause bank failures? A soil engineer report will be required to verify the stability of the slope with the design proposal submitted. Given the circumstances of the site, 100% retention is required. As you may be aware, the development plan shown on the drainage report is at variance with the plan submitted to the Planning Department, and a new action by the E.P.C., will be required. I am forwarding a copy of the plan to Mr. Don Peterson, for his review and follow up.

MUNICIPAL DEVELOPMENT DEPARTMENT
Richard S. Heller, P.E., City Engineer ENGINEERING DIVISION Telephone (505) 766-7467

If you have any questions, please don't hesitate to contact my office.

Very truly yours,

Bruno Conegliano
Assistant City Engineer/Hydrology

BC/lc
xc: Richard Leonard, AMAFCA
Richard Heller, City Engineer
Fred Aguirre, Civil Engineer
Drainage File
reading

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

May 9, 1978

Fred C. Arfman
Chambers, Campbell, Isaacson & Chaplin, Inc.
3500 Indian School Rd.,NE
Albuquerque, New Mexico 87106

RE: Casita Vista Townhouses

Dear Mr. Arfman:

The drainage report for Casita Vista Townhouses has been reviewed and is hereby approved.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gm

cc; V.M. Kimmick
Jim Smith
Drainage file

Assuming the Breakdown for the Average Lot is Correct

ITEM	C	AREA/LOT	NO. OF LOTS		TOTAL AREA
Driveway	.9	220	10		2200
Patio	.9	150	10		1500
Building	.9	1000	10		10000
Paving	.9	370	10		3700
Southwest Landscaping	.9	2513	10		15130
				Subtotal	42530
Lawn	.4	800	10		8000
				Total	50530
				Equivalent	1.16 Acres

Undeveloped Conditions

$50,530 \times 2.2/12 \times .4 = 3706 \text{ ft.}^3$

Developed Conditions

$42,530 \times 2.2/12 \times .9 = 7017 \text{ ft.}^3$
$8000 \times 2.2/12 \times .4 = 586 \text{ ft.}^3$
7604 ft.^3

If required ponding is the difference between the dev. and undev. the required ponding is $7604 - 3706 = 3898 \text{ ft.}^3$ per lot $3898 \text{ ft.}^3/10 = 390 \text{ ft.}^3$ and not 264 ft.^3

(1) I cannot agree with some of the areas designated for the different items on page five of the report. See my calculated areas on page five.

(2) I don't agree with the "C" factor designated for Southwest Landscaping.

(3) The item designated as paving (street) does not agree with the area I calculated for the for the cul-df-sac. (In report) 370 s.f. X 10 lots = 3700 s.f. total (my calculations) 5800 s.f. total. See grading plan.

*(4) Since an average pond requirement is designated for each lot, I would like to see a balance for each lot between the drainage area and pond. These areas should be outlined and the pond volumes calculated (and shown).

*(5) Since U.B.C. (Uniform Bldg. Code) is concerned with the close proximity of my pond to be structure, we should get their approval.

* Item (4) has been a critical problem regarding final inspection in the field. Drainage areas designated on the conceptual plan does not usually balance with the pond it is draining to.

(7) How about positive drainage?

(8) Ponds adjacent to the canal should be designed against any failures.

(9) Recommend an erosion sedimentation protection plan for this particular development. Our waterways should be protected from any increase in suspended solids and sediment depositing in the canal.

(10) According to the FHBM dated 12-4-79, this area is not in a flood hazard zone.

BRUNO

MY COMMENTS — FRED AGUIRRE

ASSUMING THE BREAKDOWN FOR THE AVERAGE LOT IS CORRECT.

ITEM	C	AREA/LOT	NO OF LOTS	TOTAL AREA
DRIVEWAY	.9	220	10	2200
PATIO	.9	150	10	1500
BUILDING	.9	1000	10	10000
PAVING	.9	370	10	3700
SOUTHWEST LANDSCAPING	.9	2513	10	25130
			SUBTOTAL	42,530
LAWN	.4	800	10	8000
			TOTAL	50,530
			EQUIVALENT	1.16 ACRES

UNDEVELOPED CONDITIONS

$50,530 \times 2.3/12 \times .4 = 3706\ ft^3$

DEVELOPED CONDITIONS

$42,530 \times 2.3/12 \times .9 = 7017\ ft^3$

$8000 \times 2.2/12 \times .4 = 586\ ft^3$

$7604\ ft^3$

IF REQUIRED PONDING IS THE DIFFERENCE BETWEEN THE DEV. AND UNDEV.

THE REQUIRED PONDING IS $7604 - 3706 = 3898\ ft^3$

PER LOT $3898\ ft^3 / 10 = 390\ ft^3$ AND NOT $264\ ft^3$

① I CAN NOT AGREE WITH SOME OF THE AREAS DESIGNATED FOR THE DIFFERENT ITEMS ON PAGE FIVE OF THE REPORT. SEE MY CALCULATED AREAS ON PAGE FIVE

② I DON'T AGREE WITH THE "C" FACTOR DESIGNATED FOR SOUTHWEST LANDSCAPING.

③ THE ITEM DESIGNATED AS PAVING (STREET) DOES NOT AGREE WITH THE AREA I CALCULATED FOR THE Cul-de-Sac.
(IN REPORT) 370 sf. x 10 LOTS = 3700 S.f TOTAL
(MY CALCULATIONS) 5800 sf TOTAL. SEE GRADING PLAN

★ ④ SINCE AN AVERAGE POND REQUIREMENT IS DESIGNATED FOR EACH LOT, I WOULD LIKE TO SEE A BALANCE FOR EACH LOT BETWEEN THE DRAINAGE AREA AND POND. THESE AREAS SHOULD BE OUTLINED AND THE POND VOLUMES CALCUATED (AND SHOWN)

⑤ SINCE U.B.C (UNIFORM BLDG. CODE) IS CONCERNED WITH THE CLOSE PROXIMITY OF THE POND TO THE STRUCTURE, WE SHOULD GET THEIR APPROVAL.

⑥ IS THIS AREA CONSIDERED THE VALLEY?

★ ITEM ④ HAS BEEN A CRITICAL PROBLEM REGARDING FINAL INSPECTION IN THE FIELD. DRAINAGE AREAS DESIGNATED ON THE CONCEPTUAL PLAN DOES NOT USUALLY BALANCE WITH THE POND IT IS DRAINING TO.

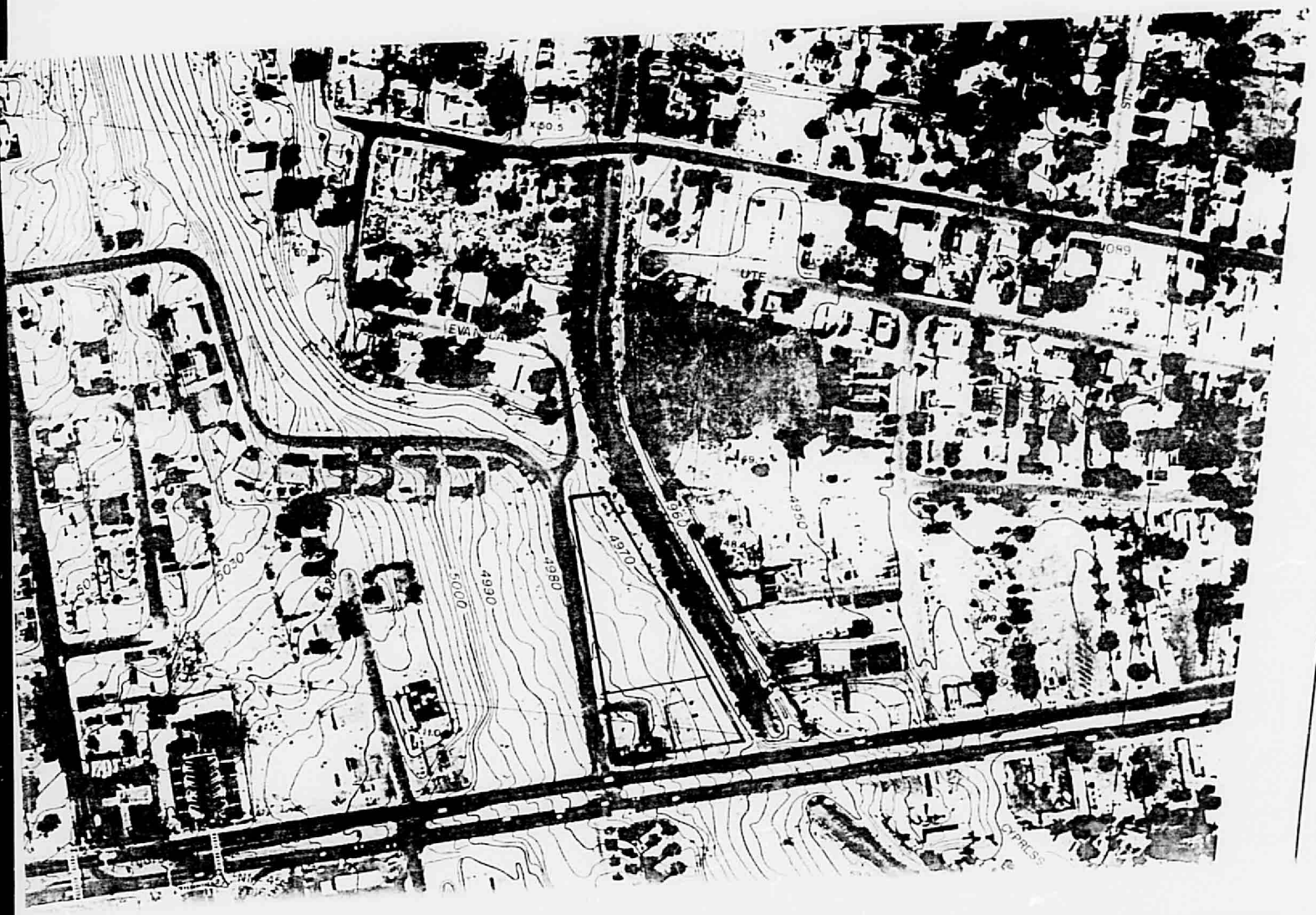
(7) How about positive drainage?

(8) Ponds adjacent to the canal should be designed against any failures.

(9) Recommend an erosion sedimentation protection plan for this particular development. Our waterways should be protected from any increase in suspended solids and sediment depositing in the canal.

(10) According to the FHBM dated 12-4-79, this area is not in a flood hazard zone,

GLENDALE GARDENS
GLENDALE RD
NO. 2
53rd ST
51st ST
EVANSDALE RD
EVANSDALE ADD'N
AVALON
MEZCAL DR.
YUCCA
KIMBELL INC.
LD. 73-462
CASITA VISTA CT.
TR C-1
Atrisco Grant
53rd ST
52nd ST
AVENUE
ARENAL
GLENDALE
GLENDALE GARDENS
SUB'D OF RD.
UTE
UTE ADD'N
RD.
MERSMAN ADD'N
LOMBARDY RD.
LOMBARDY CT
SP-76-394
WEST BUSINESS
50th ST
49th ST
NW
ALBUQUERQUE ADDITION
WEST
ZIMMERMAN
OWENS
CYPRESS



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VERTICAL
CONTOUR IN

CASITA VISTA

UNIT TWO

DRAINAGE MANAGEMENT PLAN

PREPARED FOR: MUNDO SOL CORPORATION
ALBUQUERQUE, NEW MEXICO

PREPARED BY: COMMUNITY SCIENCES CORPORATION
ALBUQUERQUE, NEW MEXICO

NOVEMBER 1979

Kent M. Whitman

KENT M. WHITMAN

SURVEYING
ENGINEERING
LAND PLANNING

TABLE OF CONTENTS

CASITA VISTA - UNIT TWO

DRAINAGE MENAGEMENT PLAN

A) PURPOSE AND SCOPE

Mundo Sol Corporation is currently planning to develop a 1.16 acre tract within the Town of Atrisco Grant, Bernalillo County New Mexico.

The purpose of this report is to present a drainage management plan for the proposed development (Casita Vista, Unit Two) which is acceptable to the City of Albuquerque and to the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).

B) SITE LOCATION AND TOPOGRAPHY

The proposed development, Casita Vista - Unit Two, is located in northwest Albuquerque. The 1.16 acre tract is situated between 52nd street N.W. and the Arenal Canal, approximately 150' northerly from Central Avenue. See Plate 1, Location Map, Page Three.

The site slopes northeasterly toward the Arenal Canal at an approximate gradient of 3% percent. Soils overlying the site consist of sands with small amounts of silt; generally loose to medium dense in the upper 4 to 6 feet.

C) DESIGN CRITERIA

1) ENGINEERING PARAMETERS

For calculation of required storage volumes a composite C of 0.69 has been computed for developed areas, and a C of 0.40 was used for undeveloped areas.

All volume calculations have been based on 100 year-6 hour rainfall of 2.2" (0.18') per AMAFCA requirements.

Rate of runoff calculations have been based on the frequency -intensity - duration relationship for a 100 year storm as presented by Gordon Herkenhoff and Associates in their 1963 Master Plan of Drainage for the City of Albuquerque This relationship is expressed by the following equation: $I = 189 / (Tc+25)$.

2) FLOOD CONTROL REGULATIONS

The drainage plan presented in this report has been designed to comply with the 1972 AMAFCA Resolution in regard to rate and volume of runoff leaving the site. That Resolution has been interpreted to say that the rate and volume of runoff allowed to leave the site after development shall be no greater than the rate and volume running off prior to development.

D) COMPUTATIONAL PROCEDURES

Appendix A contains samples of the various types of hydraulic calculations performed.

E) OFF-SITE DRAINAGE

Plate 2, OFF-SITE DRAINAGE MAP shows the existing topography for the proposed development tract. The natural drainage flow is from West to East. Flow from the West is intercepted by 52nd street N.W. before reaching the tract. Flows South of the tract are West-to-East but have the potential to flow toward the southerly boundary of the tract. To prevent drainage from flowing onto the development site from the South, a 6" high P.C.C. curb will be constructed along the South Boundary.

F) ON-SITE DRAINAGE

As shown on the Drainage Management Plan, Plate 3, on-site drainage is conveyed to on-site lot ponds except for the front yard areas of lots 1 - 3 and 5 - 10. For lots 4 and 10 the side yard, or yard area adjacent to 52nd street N.W., is utilized as a ponding area and does not drain to 52nd street N.W.

The tract was analyzed for ponding requirement only because the rate of runoff to 52nd street was determined to be insignificant. (See Appendix A - Calculations, No. 4).

1) COMPOSITE C

Total Area = 1.16 Acres

No of Lots = 10

Average Area of Lot = 1.16/10 = 0.116 Acres

= 5053 S.F.

ITEM	AREA	AVG AREA CALCULATED BY ME/LOT	C
Driveway	220 S.F.	267	0.95
Patio	150		0.95
Building	1000	1050	0.95
Paving(street)	370 S.F.	580	0.95
Lawn	800 S.F.		0.25
Southwest Landscape	2,513		0.65 ?

COMPOSITE C = $\frac{1{,}740 \times 0.95 + 800 \times 0.25 + 2{,}513 \times 0.65}{5053}$

= 0.69

2) POND VOLUME (AVERAGE PER LOT)

R(100 yr.- 6 hr.) = 2.2" = 0.18'

C natural = 0.40

C dev = 0.69

VOLUME = (0.69 - 0.40) (0.18) (5053)

= 264 C.F.

3) POND - VOLUME

Length: Top = 30'

Bottom = 25.5'

Width: Top = 15

Bottom = 10.5

Depth: = 0.75'

VOLUME = $\frac{(30 \times 15) + (25.5 \times 10.5)}{2}$ (0.75) = 269C.F.

CALCULATION

4) RATE OF RUNOFF

The front 20' of lots 1-3, and 5-10 are proposed to be graded to drain to 52nd street N.W.

The contributing area is approximately:

20 x 325/ 43,560 = 0.15 Acres

$Q = C\ I\ A$

$C = 0.45$

$I = 5.4$ in/hr for $T_c <$ 10min.

$A = 0.15$ Acre

$Q = 0.4$ cfs.

CONCLUSION: Runoff to street is virtually insignificant.

5) OFF-SITE AREA RATE OF RUNOFF (SOUTH BOUNDARY)

Q required = 0.8 acre x 5.4 in/hr x 0.90

= 3.9 cfs.

Side Slopes @ 0 left & 50 : 1 right

Bottom Width : 0

Depth : 0.5'

Width : 0

N : .025

S : .03 (min.)

Q = 25 cfs. O.K. > 3.9 cfs.

A

DRAINAGE STUDY

CASITA VISTA TOWNHOUSES

PHASE II

PREPARED BY:

CHAMBERS, CAMPBELL, ISAACSON, CHAPLIN, INC.

3500 Indian School Road N.E.

Albuquerque, New Mexico 87106

October 1978

A

DRAINAGE STUDY

CASITA VISTA TOWNHOUSES

PHASE II

PREPARED BY:

CHAMBERS, CAMPBELL, ISAACSON, CHAPLIN, INC.

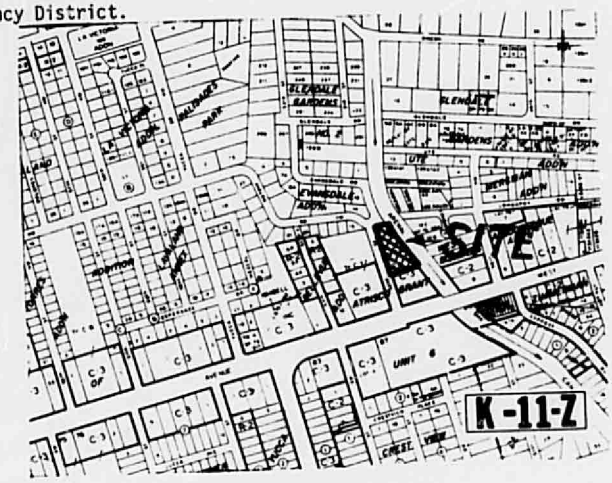
3500 Indian School Road N.E.

Albuquerque, New Mexico 87106

October 1978

PURPOSE

The purpose of this report is threefold - to determine the drainage characteristics of the subject property in its undeveloped condition analyze the internal flows in its developed state with recommendations for compliance to the Albuquerque Metropolitan Arroyo Flood Control Authority's (A.M.A.F.C.A.) requirements, and make recommendations for positive drainage control to safeguard the subdivision and abide to the requirements set by the Middle Rio Grande Conservancy District.



LOCATION MAP

INTRODUCTION

Casita Vista Townhouses Phase II is located on Albuquerque's west side, north of Central Ave. and on the east side of 52nd Street. The site is bordered by the Arenal Canal to the east. Special considerations must be made in order to handle the runoff that historically sheet flows into the canal's right-of-way. The overall site comprises 1.18 acres of loose to very loose sand. There is

an approximate 4% negative slope from 52nd Street to the site's eastern side, where it then drops off substantially to the Arenal Canal.

In the following pages design data will be presented to verify that the runoff will not enter into the Arenal Canal's right-of-way in the form of concentrated flows. In fact, the site shall retain 150% of required storm runoff by means of area ponds. Furthermore, conclusions will be reached as regards tc site's ponding and runoff control.

DRAINAGE CONDITIONS

The undeveloped and developed drainage characteristics are shown on the following pages and on the Drainage Site Plan. Shown are the ponding areas, direction of flow, individual drainage basins, and area to sheet flow to the east.

SITE DATA

Area = 1.18 ac
"C" = 0.30; Developed "C" = 0.60
D = 2.2" = .183'

I. UNDEVELOPED CHARACTERISTICS

Q = CIA
= (0.30)(5.4)(1.18)
= 1.9 use 2 cfs
V = (0.30)(.183)(1.18)(43560)
= 2827 cu. ft.

II. DEVELOPED CHARACTERISTICS (uncontrolled)

Q = CIA , where C = 0.60
= (0.60)(5.4)(1.18) =
= 3.82 use 4 cfs
V = (0.60)(.183)(1.18)(43560)
= 5654 cu. ft.

III. PONDING REQUIREMENTS

$V_D - V_{UND} = V_{POND}$

(5654 - 2827) = 2827 cu. ft. must be ponded.

TABLE I

Drainage Area	Area (sq.ft.)	"C"	D(ft.)	Runoff Volume	Pond Surf. Area (sq.ft.)	Depth of Pond (ft)
A	3240	.55	.18$\bar{3}$	327 cu. ft.	492	0.8
B	2828	.60	.18$\bar{3}$	311	392	0.9
C	2964	.60	.183	326	516	0.75
D	1520	.60	.18$\bar{3}$	167	296	0.70
E	3732	.52	.18$\bar{3}$	356	740	0.6
F	4620	.45	.18$\bar{3}$	440	572	0.9
G	4456	.45	.18$\bar{3}$	368	496	0.9
H	4368	.48	.18$\bar{3}$	384	920	0.5
I	3460	.52	.18$\bar{3}$	330	884	0.4
J	5340	.90	.18$\bar{3}$	881	520	4.0

Total Runoff Retained on site = 3890 ct. ft.

Ponding requirement is satisfied. All runoff in form of overland sheet flow.

RECOMMENDATIONS

1. Protions of lots 1, 2, 3, and 7 be allowed to have its storm water runoff flow off the site toward the east.
2. All lots to pond individual runoff except those portions at lots 7, 8, 9, and 10. This area is the common drive that provides access to the four. Runoff is to be directed to the east where it shall pond on the northern end of lot #7. This access drive and pond are maintained by the owners of the 4 lots mentioned.
3. Individual lot ponding depth should not exceed 1'-0". All pond limits shall be at least 15' away from the dwelling unit's foundation.

SUMMARY

This townhouse development is required to pond more than it's required volume because of the fact that concentrated flows are not allowed to enter into the Arenal Canal's right-of-way. This is a policy established by the Middle Rio Grande Conservancy District and no formal variation of this policy could be attained. This site accepts no offsite flows and reduced the predevelopment runoff by 50%.

In conclusion, the development of this site should have a beneficial effect on the drainage characteristics of the area.

A DRAINAGE STUDY

FOR

CASITA VISTA TOWNHOUSES

Prepared for:

Pronto Enterprises

APRIL 1978

Chambers, Campbell, Isaacson, Chaplin, inc.
architects engineers planners 3500 indian school road ne albuquerque new mexico 87106 505 266-5521

1. PRE-DEVELOPMENT RUNOFF:

Q = CIA, where C = 0.40, I = 5.4"/hr., A = 1.43 ac.
Q = (0.40)(5.4)(1.43)
= 3.1 use 3 cfs

V = CD(1/12)A, where D = 2.2"
= (0.40)(2.2)(1/12)(62291)
= 4568 cu. ft.

2. OFF-SITE RUNOFF:

Flows from the west will enter the site at the northwest and southwest corners as shown in the following maximum conditions.

Q = CIA, where C = 0.30, I = 5.4, A = 7500 s.f.
= (0.30)(5.4)(.17)
= .3 cfs

V = CDA (1/12), where A = 7500 s.f., D = 2.2"
= (0.30)(2.2)(7500)(1/12)
= 413 cu. ft.

3. POST-DEVELOPMENT RUNOFF:

A. Area subject to backyard ponding.
Total area = 12,688 sq. ft.

Impervious 0.90 $(\frac{1820}{12688})$ = .16

Landscaped 0.25 $(\frac{10.868}{12688})$ = .21

Composite "C" for ponding areas = .37

V = CD(1/12)A
= (0.37)(2.2)(1/12)(12,688)
= 861 cu. ft.
This volume is divided into two ponds. The northeast pond will require a ponding capacity of 423 cu. ft.; while the capacity of the southeast pond will be 438 cu. ft.

B. Area of site subject to runoff
(Total area) - (ponding area) = (area to runoff)
62291 - 12688 = 49,603 sq. ft.

Composite "C" Factor:

roofs, streets, walks, etc. = 0.90 x $\frac{28133}{49603}$ = .51

landscaped areas = 0.20 x $\frac{11420}{49603}$ = .05

non-landscaped areas = 0.40 x $\frac{2200}{49603}$ = .01

turf stone driveways = 0.50 x $\frac{6040}{49603}$ = .06

interior grass contained areas = $0.10 \times \frac{1760}{49603} = \underline{.00}$

Composite "C" Factor = .63

Q = CIA
= (0.63)(5.4)(1.14)
= 3.9 cfs

V = CD(1/12)A
= (0.63)(2.2)(1/12)(49603)
= 5,729 cu. ft.

These values exceed the pre-development figures, therefore, additional ponding shall be required.

Consider roof top retention on structures #3 through 10, plus total run-off retention of parking structures #6 and #7 by means of dry wells.

Total roof area = 7056 sq. ft.

V = (2.2)(1/12)(7056)
= 1,294 cu. ft.

C. Adjusted Post-Development Runoff

Qa = CaIAa, where C = 0.58, Aa = .98 ac.
= (0.58)(5.4)(.98)
= 3 cfs

V = CaD(1/12)Aa
= (0.58)(2.2)(1/12)(42547)
= 4,524 cu. ft.

4. SUMMARY:

Casita Vista Townhouse drainage requirements are satisfied due to the retention of 2155 cu. ft. by means of roof-top and backyard ponding.

	Q	V	Area contributing to runoff	Volume Ponded
Pre-Dev.	3 cfs	4568 cu. ft.	62291 sq. ft.	-0-
(1)Post-Dev.	4 cfs	5729 cu. ft.	49603 sq. ft.	861 cu. ft.
(2)Post-Dev. (adjusted)	3 cfs	4524 cu. ft.	42547 sq. ft.	2155 cu. ft.