City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 29, 1999

Ronald R. Bohannan, P.E.
Tierra West, LLC
4421 McLeod Rd. NE, Suite D
Albuquerque, New Mexico 87109

RE: Grading and Drainage Plan for Vista Manzano Subdivision (M10/D14), Submitted for Site Development Plan for Subdivision Approval, Preliminary Plat and Grading Permit Release, Engineer's Stamp Dated 7/27/99.

Dear Mr. Bohannan:

Based on the information provided, the above referenced plan for Vista Manzano Subdivision dated July 27, 1999 is approved for Preliminary Plat and Site Development Plan for Subdivision approval by the DRB.

The above referenced plan is also approved for Rough Grading. As you are aware, a top-soil disturbance permit is required for the grading on this site.

Prior to DRC approval, please provide more detail on Section C-C, the overflow spillway shown on Plan B of the grading plan. Is the spillway to be paved? What is the elevation of the water in this section? Is the proposed water surface lower than the adjacent private Lot?

The Grading and Drainage Certification is required prior to release of the Subdivision Improvements agreement (SIA) or financial guarantees for this subdivision. The certification must verify that all retaining walls are in place between the Lots.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Jeff Dorwart, Kaufman & Broad of NM, Inc.
File

DRAINAGE INFORMATION SHEET

D014

PROJECT TITLE: *VISTA MAZANO* **ZONE ATLAS/DRNG. FILE #:** *M10/D10*

DRB #: _____ **EPC #:** _____ **WORK ORDER #:** _____

LEGAL DESCRIPTION: *TRACT B,* T

CITY ADDRESS: *SAGE ROAD SW*

ENGINEERING FIRM: *TIERRA WEST, LLC* **CONTACT:** *RONALD R. BOHANNAN*

ADDRESS: *4421 McCleod Rd. NE Suite D, 87109* **PHONE:** *(505) 883-7592*

OWNER: *KAUFMAN & BROAD OF NM, INC* **CONTACT:** *JEFF DORWART*

ADDRESS: *4921 ALEXANDER BOULDEVARD NE* **PHONE:** _____

ARCHITECT: _____ **CONTACT:** _____

ADDRESS: _____ **PHONE:** _____

SURVEYOR: *Precision Surveys* **CONTACT:** *Larry Medrano*

ADDRESS: *2929 Coors Blvd NW Suite 309* **PHONE:** *(505)839-0569*

CONTRACTOR: _____ **CONTACT:** _____

ADDRESS: _____ **PHONE:** _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- X DRAINAGE PLAN
- _____ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- _____ EROSION CONTROL PLAN
- _____ ENGINEER'S CERTIFICATION
- _____ OTHER

PRE-DESIGN MEETING:

- X YES
- _____ NO
- _____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- _____ SKETCH PLAN APPROVAL
- X PRELIMINARY PLAT APPROVAL
- X S. DEV. PLAN FOR SUB'D. APPROVAL
- _____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- _____ SECTOR PLAN APPROVAL
- _____ FINAL PLAT APPROVAL
- _____ FOUNDATION PERMIT APPROVAL
- _____ BUILDING PERMIT APPROVAL
- _____ CERTIFICATE OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- _____ PAVING PERMIT APPROVAL
- _____ S. A. D. DRAINAGE REPORT
- _____ DRAINAGE REQUIREMENTS
- _____ *OTHER*

RECEIVED
JUN 25 1999
HYDROLOGY SECTION

DATE SUBMITTED: *06/25/99*

BY: *Ron Bohannan*

plan dated
6-25-99
revised -
replace w/
1-27 plans

1. Offsite basin?
* Street Calcs for Reseda Ave and OJO FELIZ (depth @ inlets?) 2x100yr
2. Sump inlets need overflow or Calcs = clarify overflow
3. * Storm drain thru dev. easement X-section
4. Storm drain layout w/ sizes energy dissipator out
→ Label sizes on plan
→ Street grades on plan (surge)
→ Retain walls on plan

Tierra West, LLC

July 27, 1999

Ms. Susan Calongne, P.E.
City of Albuquerque
Hydrology Division
P. O. Box 1293
Albuquerque, NM 87103

RE: Vista Manzano - M10-D14
Revised Grading Plan

Dear Ms. Calongne:

The purpose of this letter is to address your comments received July 22, 1999. The Grading Plan has been modified to incorporate those comments, and the following summary will explain how the plan was modified to include your remarks.

1. Required street capacity calculations are enclosed for Reseeda Avenue, Ojo Feliz Street and Latigo Avenue. The calculations show both Ojo Feliz Street and Latigo Avenue will require standard curb and gutter.

2. The drop inlet calculations were reviewed and verified to be correct. Since the inlets are in a sump condition and the provided capacity is less than two times the 100-year storm peak discharge rate, an overflow detail has been included for the inlet located at Reseeda Avenue and Ojo Feliz Street. Since the park is not to be graded, an emergency overflow for the inlets at Latigo Avenue and Arroyo Hondo Street is provided down Reseeda Avenue. During a clogging event, the storm water will rise to an elevation of 5025.94 and will spill down Reseeda Avenue.

3. The discharge from the site, via a 42" R.C.P., will not require an energy dissipater as previously shown. The plans have been revised to show an outlet structure instead.

4. Since the previously submitted plan was hard to read, due to the drainage basin lines, these lines have been removed on the plan sheet. The same basin delineations are shown within the body of the report.

5. The size of the storm drain lines are included on the Grading Plan. The body of the report includes the capacity calculations for the pipes.

6. The street grades on Sage Road and the Amole Channel are legible on the revised plans.

4421 McLeod Rd. NE, Suite D • Albuquerque, NM 87109 • (505) 883-7592
fax (505) 883-7034 • e-mail: twdms@aol

The plan has also been modified to accommodate a phased development. The entire site will be graded at one time, and the entire storm drain will be constructed. The remaining infrastructure will be split into phases. Since phase two will not have improved streets, a retention pond has been added at the phase line on Embarcadera Drive. A desiltation pond is added around the inlet located on Ojo Feliz Street and Reseeda Avenue. The site layout has been modified due to transportations comments and owners recommendation. A new street connection has been added to Sage Road and Questa Street has been modifed from a thru street to a cul de sac. The revised basin map is enclosed and the street capacities reflect the new layout.

Should you have any questions regarding these revisions, please do not hesitate to contact me.

Sincerely,

David Soule, P.E.

cc: Jeff Dorwart

Enclosures

JN 9900134

DS

990013:drainrevltr

Street Capacity Calculations

LATIGO AVENUE
28' F-F Street Section with 8" curb
Slope= 0.009

For water depths less than 0.125 feet

Y=	Water depth
Area =	8*Y^2
P=	SQRT(257*Y^2) + Y
n=	0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0008	0.170312	0.004697	0.000186	0.000372	0.232588	0.002326	0.409882	0.002655
0.02	0.0032	0.340624	0.009395	0.001181	0.002363	0.36921	0.007384	0.460078	0.006411
0.04	0.0128	0.681249	0.018789	0.007502	0.015004	0.586085	0.023443	0.51642	0.015403
0.06	0.0288	1.021873	0.028184	0.022118	0.044236	0.767989	0.046079	0.552524	0.02566
0.08	0.0512	1.362498	0.037578	0.047634	0.095268	0.930352	0.074428	0.579661	0.036817
0.1	0.08	1.703122	0.046973	0.086366	0.172732	1.079578	0.107958	0.601625	0.048687
0.12	0.1152	2.043746	0.056367	0.140441	0.280882	1.219106	0.146293	0.620187	0.06115
0.125	0.125	2.128902	0.058716	0.156592	0.313185	1.252739	0.156592	0.624421	0.064349

For water depths greater than 0.125 ft but less than 0.365 ft

Y1=	Y-0.125
A2=	A1 + 2*Y1 + 25*Y1^2
P2=	P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.135625	2.383952	0.056891	0.166364	0.332728	1.226646	0.159464	0.599542	0.062963
0.16	0.225625	3.914252	0.057642	0.279193	0.558385	1.237419	0.197987	0.545166	0.067027
0.2	0.415625	5.954652	0.069798	0.584283	1.168565	1.405793	0.281159	0.55396	0.085876
0.24	0.685625	7.995052	0.085756	1.105659	2.211319	1.61263	0.387031	0.580098	0.110578
0.28	1.035625	10.03545	0.103197	1.889459	3.778917	1.824462	0.510849	0.607614	0.13837
0.32	1.465625	12.07585	0.121368	2.979322	5.958643	2.032799	0.650496	0.633274	0.168226
0.36	1.975625	14.11625	0.139954	4.416237	8.832474	2.235362	0.80473	0.656551	0.199645
0.365	2.045	14.3713	0.142297	4.622205	9.244411	2.260247	0.82499	0.659298	0.203667

For water depths greater than 0.365 ft but less than 0.667 ft

Y2=	Y - 0.365
A3=	A2 + Y2*14
P3=	P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.115	14.3763	0.147117	4.887765	9.77553	2.311	0.85507	0.669532	0.211184
0.41	2.675	14.4163	0.185554	7.216526	14.43305	2.697767	1.106084	0.74248	0.271827
0.45	3.235	14.4563	0.223778	9.888038	19.77608	3.056581	1.375461	0.802974	0.333351
0.49	3.795	14.4963	0.261791	12.87872	25.75744	3.393601	1.662865	0.854348	0.395725
0.54	4.495	14.5463	0.309013	17.03749	34.07498	3.79032	2.046773	0.908973	0.474821
0.59	**5.195**	**14.5963**	**0.355912**	**21.63574**	**43.27149**	**4.164725**	**2.457187**	**0.955504**	**0.555086**
0.63	5.755	14.6363	0.3932	25.6141	51.2282	4.450756	2.803976	0.988179	0.620077
0.667	6.273	14.6733	0.427511	29.52102	59.04204	4.706045	3.138932	1.015466	0.680766

For water depths greater than 0.667 ft but less than 0.847 ft

Y3=	Y - 0.667
A4=	A3 + 14 * Y3 + 25 * Y3^2
P4=	P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.762225	16.32363	0.41426	31.16229	62.32457	4.608289	3.225802	0.97065	0.672653
0.72	7.085225	17.32383	0.408987	32.37312	64.74624	4.569103	3.289754	0.948936	0.671124
0.74	7.428225	18.32403	0.405382	33.74055	67.48111	4.542209	3.361235	0.930515	0.671723
0.76	7.791225	19.32423	0.403184	35.26137	70.52275	4.52578	3.439593	0.914869	0.674175
0.78	8.174225	20.32443	0.402187	36.93373	73.86746	4.518316	3.524286	0.901574	0.67825
0.8	8.577225	21.32463	0.402221	38.75682	77.51364	4.518573	3.614858	0.890284	0.683759
0.847	9.603	23.6751	0.405616	43.63565	87.2713	4.54396	3.848734	0.870091	0.701486

Street Capacity Calculations

OJO FELIZ STREET

28' F-F Street Section with 8" curb

Slope= 0.006

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0008	0.170312	0.004697	0.000152	0.000304	0.189907	0.001899	0.334668	0.001885
0.02	0.0032	0.340624	0.009395	0.000965	0.001929	0.301459	0.006029	0.375652	0.004591
0.04	0.0128	0.681249	0.018789	0.006125	0.012251	0.478536	0.019141	0.421655	0.011128
0.06	0.0288	1.021873	0.028184	0.018059	0.036119	0.62706	0.037624	0.451134	0.018635
0.08	0.0512	1.362498	0.037578	0.038893	0.077786	0.759629	0.06077	0.473292	0.026838
0.1	0.08	1.703122	0.046973	0.070518	0.141035	0.881472	0.088147	0.491225	0.035592
0.12	0.1152	2.043746	0.056367	0.11467	0.229339	0.995396	0.119448	0.506381	0.044809
0.125	0.125	2.128902	0.058716	0.127857	0.255714	1.022857	0.127857	0.509838	0.047178

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.135625	2.383952	0.056891	0.135836	0.271671	1.001552	0.130202	0.489524	0.046016
0.16	0.225625	3.914252	0.057642	0.22796	0.45592	1.010348	0.161656	0.445126	0.048626
0.2	0.415625	5.954652	0.069798	0.477065	0.95413	1.147825	0.229565	0.452306	0.062378
0.24	0.685625	7.995052	0.085756	0.902767	1.805534	1.316707	0.31601	0.473648	0.08061
0.28	1.035625	10.03545	0.103197	1.542737	3.085473	1.489667	0.417107	0.496115	0.101233
0.32	1.465625	12.07585	0.121368	2.432606	4.865212	1.659774	0.531128	0.517066	0.123469
0.36	1.975625	14.11625	0.139954	3.605843	7.211685	1.825165	0.65706	0.536072	0.146936
0.365	2.045	14.3713	0.142297	3.774015	7.54803	1.845484	0.673602	0.538314	0.149944

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.115	14.3763	0.147117	3.990843	7.981687	1.886924	0.698162	0.54667	0.155661
0.41	2.675	14.4163	0.185554	5.892269	11.78454	2.202717	0.903114	0.606232	0.201921
0.45	3.235	14.4563	0.223778	8.073549	16.1471	2.495688	1.123059	0.655626	0.249038
0.49	3.795	14.4963	0.261791	10.51543	21.03086	2.770864	1.357723	0.697572	0.296935
0.54	4.495	14.5463	0.309013	13.91105	27.8221	3.094783	1.671183	0.742173	0.357805
0.59	5.195	14.5963	0.355912	17.66551	35.33102	3.400483	2.006285	0.780165	0.419684
0.63	5.755	14.6363	0.3932	20.91383	41.82765	3.634027	2.289437	0.806845	0.469849
0.667	6.273	14.6733	0.427511	24.10381	48.20763	3.84247	2.562927	0.829124	0.516734

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

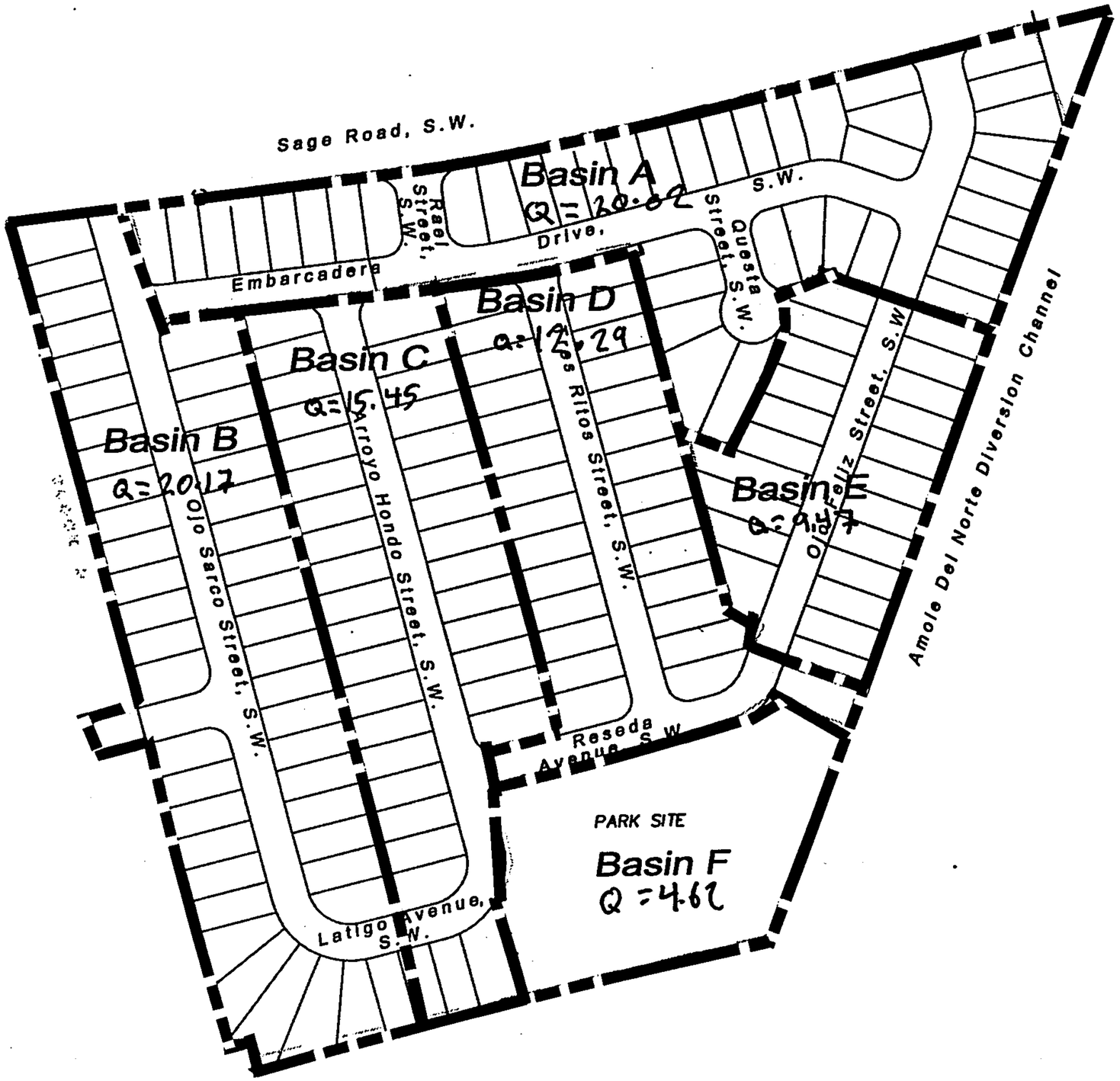
Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.762225	16.32363	0.41426	25.4439	50.8878	3.762652	2.633856	0.792533	0.509096
0.72	7.085225	17.32383	0.408987	26.43254	52.86509	3.730657	2.686073	0.774803	0.507186
0.74	7.428225	18.32403	0.405382	27.54905	55.09809	3.708698	2.744437	0.759762	0.506979
0.76	7.791225	19.32423	0.403184	28.79079	57.58158	3.695284	2.808416	0.746987	0.508251
0.78	**8.174225**	**20.32443**	**0.402187**	**30.15626**	**60.31253**	**3.689189**	**2.877568**	**0.736132**	**0.510818**
0.8	8.577225	21.32463	0.402221	31.64481	63.28962	3.689399	2.95152	0.726914	0.514525
0.847	9.603	23.6751	0.405616	35.62836	71.25672	3.710128	3.142478	0.710427	0.527033

EMERGENCY OVERFLOW CAPACITY

$$Q = 1.49/N)(A)(R_h)^{2/3}\ (S)^{1/2}$$

$$= 1.49/.030)(14)(14/14.12)^{2/3}\ (.015)^{1/2}$$

$$= 84.68\ CFS$$



PROPOSED BASIN MAP FOR

Vista Manzano Units 1 and 2

City of Albuquerque, Bernalillo County, New Mexico

July 1999

DRAINAGE REPORT
FOR

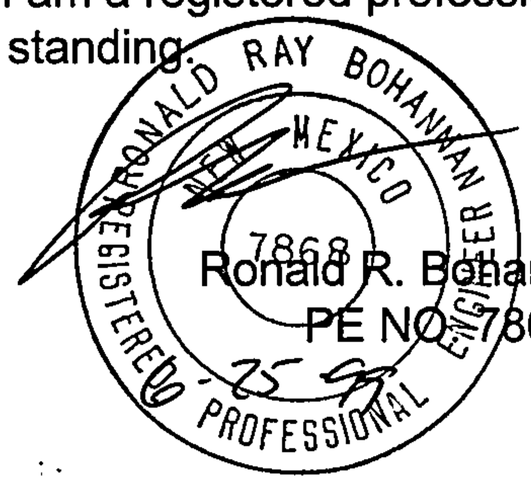
VISTA MANZANO

Prepared by:

Tierra West, LLC
4421 McLeod Rd., NE, Suite D
Albuquerque, New Mexico 87109

June, 1999

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the state of New Mexico in good standing.



Ronald R. Bohannan
PE NO. 7868

Job No 990013

M-10/D14

TABLE OF CONTENTS

Excutive Summary

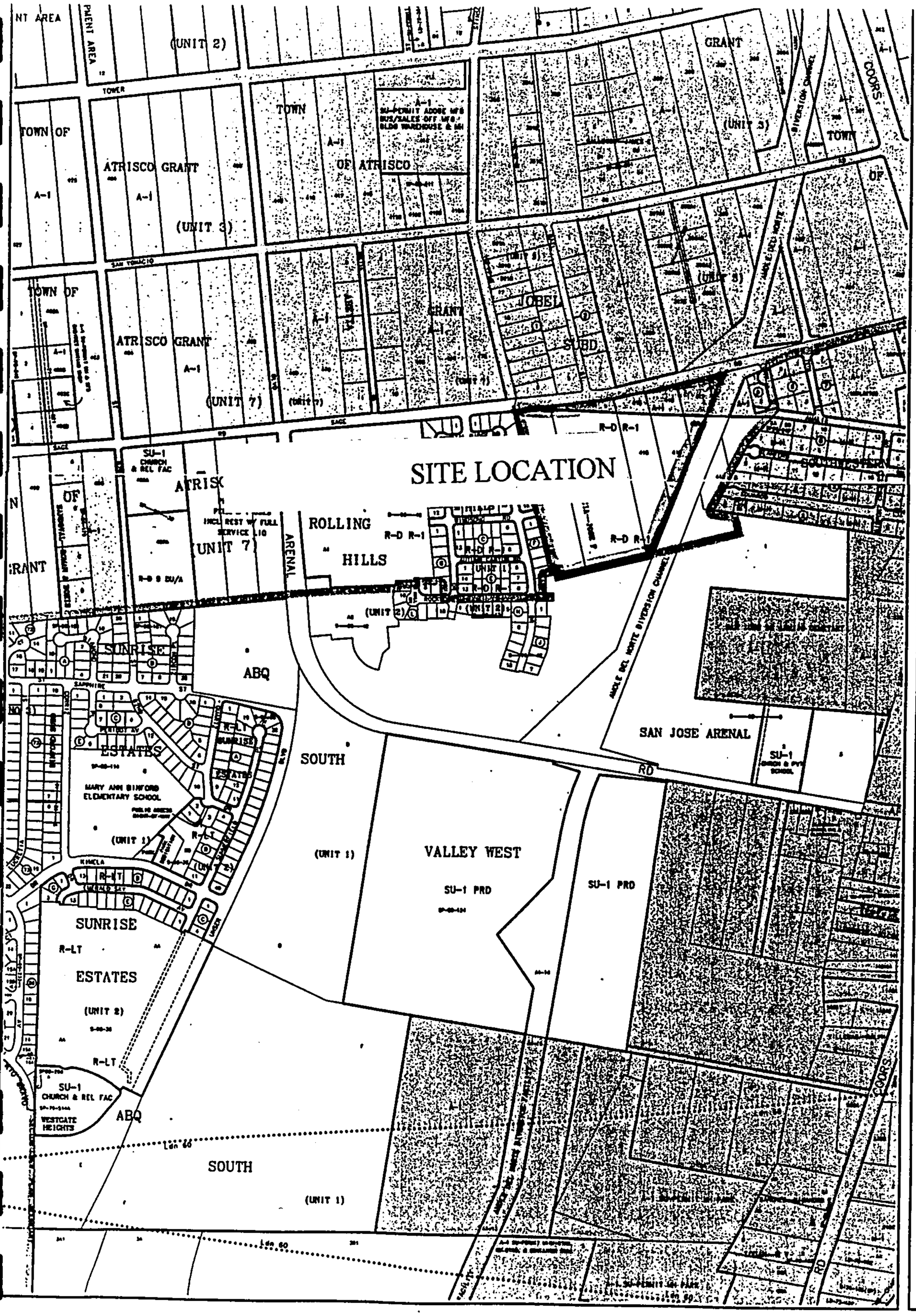
Vista Manzano is a 176 lot residential subdivision located in the southwest region of the City. Presently the site is undeveloped and is bounded to the west and south by subdivisions (Rolling Hills and Mountain View Estates), to the north by semi-developed residental homes and to the east by the Amole del Norte Diversion Channel. The site naturally slopes to this channel and discharges storm water into the channel via overland flow. The Drainage Analysis for Vista Manzano was performed in accordance with the City of Albuquerque's Development Process Manual (DPM), Volume 2, Design Criteria, specifically section 22.2, Hydrology, January 1993. We propose to grade the individual lots and have the storm water flow into the proposed streets into a series of inlets. These inlets will free discharge the storm water into the Amole del Norte Diversion Channel. This storm water management plan conforms with the approved Arenal/Unser Drainage Manage prepared by Isaacson & Arfman, P.A. During emergency conditions the storm water in the street will overflow into the City park located at the southeast corner of the Subdivision.

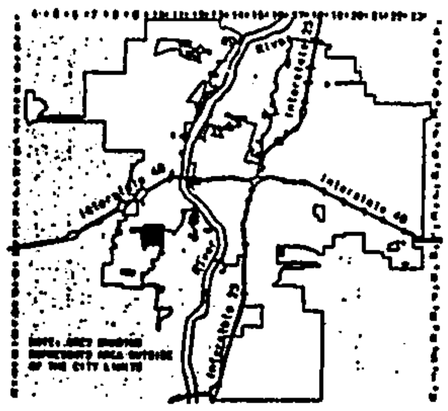
Location

Vista Manzano is a proposed single family subdivision zoned R-D, R-1. The site is located south of Sage Road NW and west of Coors Boulevard NW. The location is highlighted on the attached zone atlas page.

Legal Description

The legal description of the project is Tract B, Rolling Hills Subdivision, Unit 1, Tracts 413, 414, & Portions of Tracts 415, 416 and 417, Town of Atrisco Grant Unit 3, for a total of ± 24.7972 acres.





LEGAL DESCRIPTION

T10N

R3E

SEC 27

UNIFORM PROPERTY CODE

1-010-055

L-10-Z

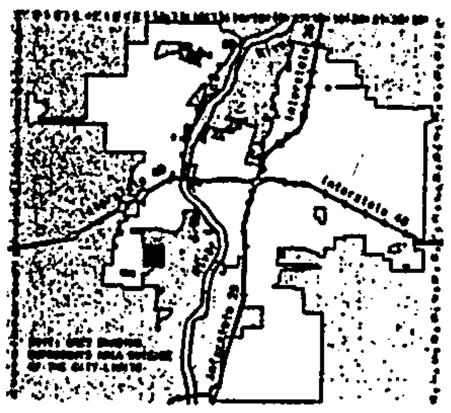
GRAPHIC SCALE IN FEET

250 0 500 1000

CITY OF Albuquerque

PLANNING DEPARTMENT

Map Amended through February 21, 1977



LEGAL DESCRIPTION

T10N

R3E

SEC 34

UNIFORM PROPERTY CODE

1-010-055

M-10-Z

Zoning and Surrounding Development

The site is zoned R-D, R-1. The land north of the site is zoned A-1 and is partially developed with residental homes. To the west and south are residential subdivisions, Rolling Hills and Mountain View Estates, and to the east boundary is the Amole del Norte Diversion Channel.

Purpose

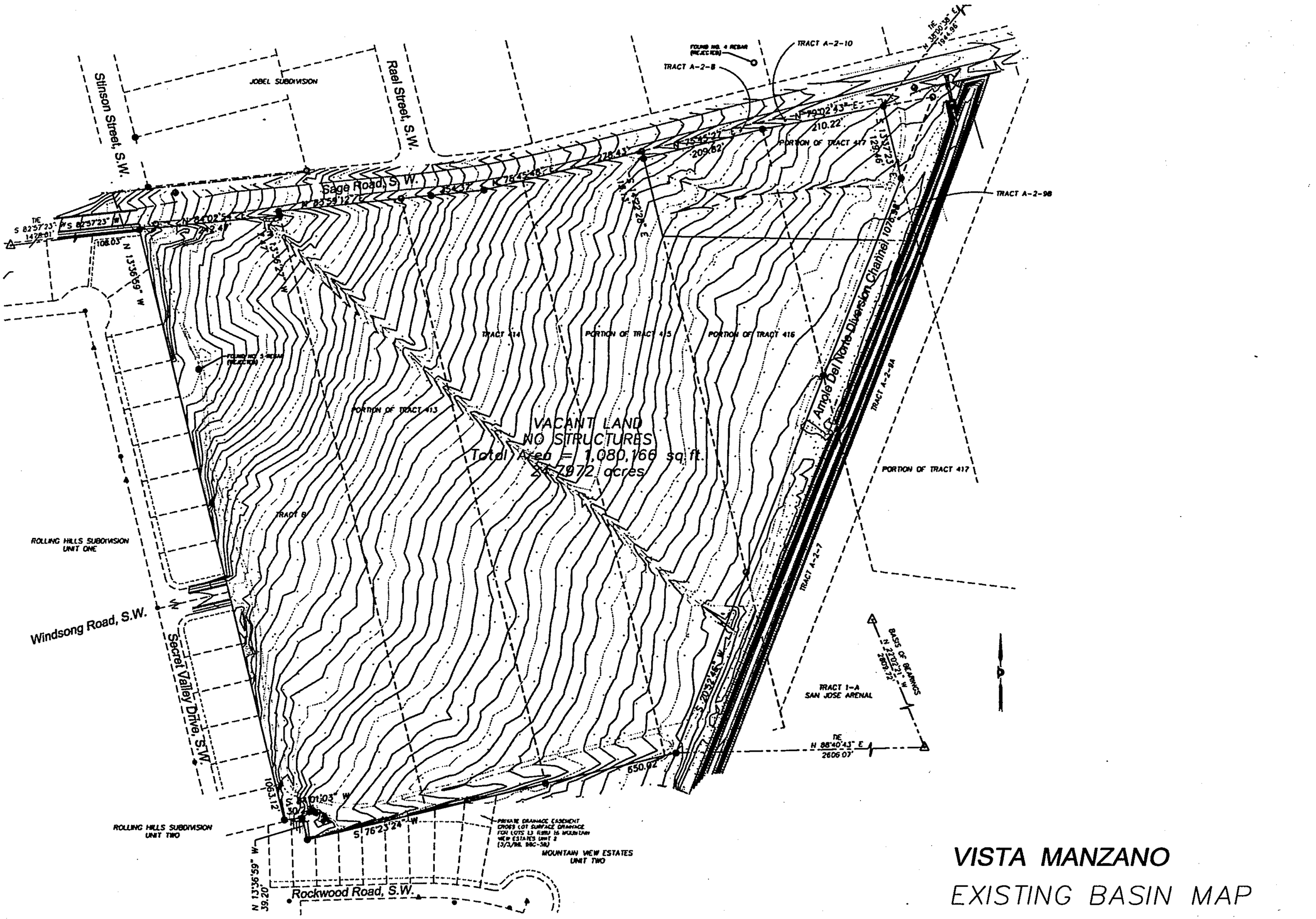
The purpose of this drainage report is to provide the drainage analysis and management plan for the proposed ± 24.797 acre single family residential subdivision. We are requesting approval for rough grading, Site Development Plan for Subdivision and Preliminary Plat.

Existing Drainage Conditions

Presently the site is undeveloped and is sparsely covered with desert shrubs and grasses. The site slopes from the northwest to the southeast at 4 to 5 percent. The stormwater sheet flows into the Amole del Norte Diversion and discharges 35.91 cfs. Offsite flows enter the site from Rolling Hills Subdivision Unit 1 and discharges ± 2.5 cfs onto the proposed site. We have included this offsite flow on the developed basin map under Basin B. According to the Arenal/Unser Drainage Management Plan (M10/D/10), by Isaacson & Arfman, P.A.(approved September 18, 1997) this site is allowed to free discharge 3.25 cfs/acre into the Amole Channel. They have designated this basin in their report as Basin 503 and as having 24 acres. Our site is ± 24.93 acres, including offsite flows from Rolling Hills and discharges 82.03 cfs.

allowed 81 cfs

According to the Tower/Sage Drainage Master Plan prepared by Andrews, Asbury and Roberts and approved by the City of Albuquerque, the developer of this site is to construct a 48" and 60" RCP storm drain pipe in Sage Road to accept future developments flows north of



VISTA MANZANO

EXISTING BASIN MAP

Sage Road.

Flood Plain and Soil Conditions

The site is not located in a flood plain as shown on Panel 337 of 825 of the National Flood Insurance Program Flood Insurance Rate Map published by F.E.M.A. for the County of Bernalillo, New Mexico, and incorporated areas, dated September 20, 1996. This site is in flood Hazard Zone area designated X, determined to be out of the 500 year flood plain.

The site contains two types of soil, Bluepoint (BKD) and Maduraz (MWA). For both Bluepoint (BKD) and Maduraz (Mwa) soils the runoff is slow and the hazard of water erosion is moderate or severe.

Proposed Conditions and On-Site Drainage Management Plan

The proposed drainage management plan is to collect the developed flows from the subdivision and into a proposed onsite storm drain system. The proposed onsite storm drain system discharges 78.58 cfs into the Amole del Norte Diversion Channel via a 42" RCP pipe.

The proposed site is divided into six onsite basins. (See Proposed Basin Map). Basin A contains 5.04 acres and discharge 17.32 cfs of developed storm water. Basin B contains 6.03 acres and discharges 20.17 cfs. Basin C contains 4.50 acres and discharges 15.45 cfs. Basin D contains 3.54 acres and discharges 12.29 cfs. Basin E contains 3.53 acres and discharges 12.22 cfs. Basin F contains 2.28 acres and discharges 4.62 cfs.

The storm water from the individual lots will discharge into the streets. The streets are to be mountable curb unless otherwise noted. Latigo Avenue will be standard curb and gutter. (See Street Capacity Calculations in the appendix.) The storm water channeled in the streets is collected in type “A” inlets.

106°45'

35°03'45"

JOIN

ZONE AH
(5076)

STINSON ST

SAN YGNACIO ROAD

ZONE A

ZONE X

RAEL STREET

Ponding Area 21

100-YEAR FLOOD
CONTAINED IN CHANNEL

ZONE AE
(EL. 5001)

COORS

ZONE X

D

4995

Arroyo A-B

ROAD

STINSON STREET

ZONE X

4985

ZONE AE

4980

76TH STREET

75TH STREET

AMALIA

SAGE

BERNALILLO COUNTY
CITY OF ALBUQUERQUE

BOULEVARD

4970

ROAD

BLANFORD

DRIVE

AMALI

ROAD

AIRPORT

EDUARDO

ROAD

EDUARDO PLACE

SITE LOCATION

ZONE AE
(EL 4951)

CITY OF ALBUQUERQUE
350002

COORS

ZONE X

CORPORATE LIMITS

ZONE AO
(DEPTH 1)

ARENAL

ROAD

Arenal

10000 Feet

N

5000 4000 3000 2000 1000 0

Scale 1:24000

5000

T. 9 N | T. 10 N.

1 480 000 FEET

(Joins sheet 29)

SITE LOCATION

TOWN OF ATRISCO GRANT

GRANT

ARENAL

COORS RD

MAIN CANAL

ARENAL DRAIN

CENTRAL AVE

Alamosa School

SANTA CLARA CEMETERY

BCC

PAC

MWA

BKD

Arenal

Rio Grande High School

66

45

448

SAGE ROAD

BASIN A

EMBARCADERA DRIVE SW

QUEST STREET SW

TRES RITOS STREET SW

OJO FELIZ STREET SW

BASIN B

BASIN C

BASIN D

BASIN E

OJO SARCO STREET SW

ARROYO HONDO STREET SW

RESEDA AVENUE SW

LATIGO AVENUE SW

BASIN F

Q = 17.32

Q = 12.17

Q = 12.29

Q = 4.62

Q = 15.15 CFS

Q = 20.17 CFS

29.49

41.78

35.63

A - 3.44 cfs/ac

B - 3.44 cfs/ac

C - 3.43 cfs/ac

D - 3.47 cfs/ac

E - 3.46 cfs/ac

F - 2.08 cfs/ac

PROPOSED BASIN MAP
VISTA MANZANO

Basins B and Basin C discharge 35.62 cfs into two type "A" inlets found in Latigo Street SW and basins A, D, E, and F discharge 46.40 cfs into three type "A" inlet found at Reseda Avenue SW. The inlets in Reseda are connected to a 42" RCP pipe which discharges to the Amole del Norte. The The 42" RCP pipe has a capacity of 84.40 cfs at a slope of 0.70%. A 50% clogging factor was used in the analysis of the inlet capacities. (See Drop Inlet Calculations and Pipe Capacity chart in the Appendix.)

Emergency Conditions

For emergency conditions the storm water will be carried in the streets and overflow into the City Park.

Summary

The proposed site contains ± 24.93 acres and free discharges 82.03 cfs of developed storm water runoff into the Amole del Norte Diversion Channel. This is in compliance with the to the Arenal/Unser Drainage Management Plan (M10/D/10), by Isaacson & Arfman, P.A. and approved September 18, 1997.

RUNOFF SUMMARY TABLE -DEVELOPED CONDITIONS

ONSITE BASINS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)	DEVELOPED Q100 (CFS)	DEVELOPED V100 (CF)
A	219542	5.04	.007875	15.08	22049
B	262667	6.03	.009422	20.05	30630
C	196020	4.50	.007031	15.71	24228
D	154202	3.54	.005531	10.95	18991
E	153766	3.53	.005517	12.22	18778
F	99317	2.28	.003563	4.57	5472

TIERRA WEST LLC
4421 McLeod Road NE, Suite D, Albuquerque, NM 87109 Phone (505) 883-7592 - Fax (505) 883-7034

RUNOFF CALCULATIONS

Date: June 24, 1999 Project: VISTA MANZANO Zone Atlas: L 10 & M10

This procedure is in accordance with the City of Albuquerque Development Process Manual, Volume 2, Section 22.2, "Hydrology", peak discharge rate for small watersheds less than forty acres in size.

Precipitation Zone from Figure A-1: 1
Land treatment descriptions are in Table A-4.

1. RUNOFF RATE COMPUTATION

Use Equation A-10: $Q_P = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
Values of Q_{pi} are from Table A-9, and are in CFS/acre. Area values are in acres.

EXISTING RATE OF RUNOFF (CFS)									
BASIN	Q_{PA}	A_A	Q_{PB}	A_B	Q_{PC}	A_C	Q_{PD}	A_D	
Basin 1	1.29	22.32	2.03	0.00	2.87	2.48	4.37	0.00	35.91
Total									35.91

DEVELOPED RATE OF RUNOFF (CFS)									
BASIN	Q_{PA}	A_A	Q_{PB}	A_B	Q_{PC}	A_C	Q_{PD}	A_D	Q
Basin A	1.29	0.00	2.03	2.03	2.87	0.00	4.37	3.02	17.32
Basin B	1.29	0.00	2.03	2.64	2.87	0.00	4.37	3.39	20.17
Basin C	1.29	0.00	2.03	1.80	2.87	0.00	4.37	2.70	15.45
Basin D	1.29	0.00	2.03	1.36	2.87	0.00	4.37	2.18	12.29
Basin E	1.29	0.00	2.03	1.39	2.87	0.00	4.37	2.14	12.17
Basin F	1.29	0.00	2.03	2.28	2.87	0.00	4.37	0.00	4.62
Total									82.03

2. RUNOFF VOLUME COMPUTATION

Use Equation A-5 to compute weighted excess precipitation:

Weighted E = "E" = $(E_A A_A + E_B A_B + E_C A_C + E_D A_D)/(A_A + A_B + A_C + A_D)$

$(A_A + A_B + A_C + A_D) = \sum A_i$

Use Equation A-6 to compute the volume:

V_{360} = "E" x $(A_A + A_B + A_C + A_D)$ x 3630 feet^3/acre·inch

Values of E_i are from Table A-8, and are in inches. Area values are in acres.

EXISTING VOLUME OF RUNOFF (CUBIC FEET)											
BASIN	E_A	A_A	E_B	A_B	E_C	A_C	E_D	A_D	$\sum A_i$	"E"	V_{360}
Basin 1	0.44	22.32	0.67	0.00	0.99	2.48	1.97	0.00	24.80	1.79	63197
Total											63,197

DEVELOPED VOLUME OF RUNOFF (CUBIC FEET)											
BASIN	E_A	A_A	E_B	A_B	E_C	A_C	E_D	A_D	$\sum A_i$	"E"	V_{360}
Basin A	0.44	0.00	0.67	2.03	0.99	0.00	1.97	3.02	5.04	1.79	26533
Basin B	0.44	0.00	0.67	2.64	0.99	0.00	1.97	3.39	6.03	1.79	30663
Basin C	0.44	0.00	0.67	1.80	0.99	0.00	1.97	2.70	4.50	1.79	23686
Basin D	0.44	0.00	0.67	1.36	0.99	0.00	1.97	2.18	3.54	1.79	18897
Basin E	0.44	0.00	0.67	1.39	0.99	0.00	1.97	2.14	3.53	1.79	18684
Basin F	0.44	0.00	0.67	2.28	0.99	0.00	1.97	0.00	2.28	1.79	5545
Total											124,008

STORM DROP INLET-EFFECTIVE AREA
Double 'A'

Area at the grate:

L = 88 ¾" - 2(6"$_{ends}$) - 6"$_{center\ piece}$ - 14(½ $_{middle\ bars}$)
= 63 ¾"
= 5.3125'

W = 25 ½" - 13(½"$_{middle\ bars}$)
= 19"
= 1.5833'

Area = 5.3125' x 1.5833'
= 8.41 ft^2

Effective Area = 8.41- 8.41 (0.5 $_{clogging\ factor}$)
= 4.21 ft^2 at the grate

Area at the throat:

L = 13.50"

H = 10 ¾" - 4 ½"
= 6 ¼"
= 0.5208'

Area = 13.50' x 0.5208'
= 7.03 ft^2 at the throat

Total Area:

Area = 4.21_{grate} + 7.03_{throat}
= 11.24 ft^2

DROP INLET CALCULATIONS

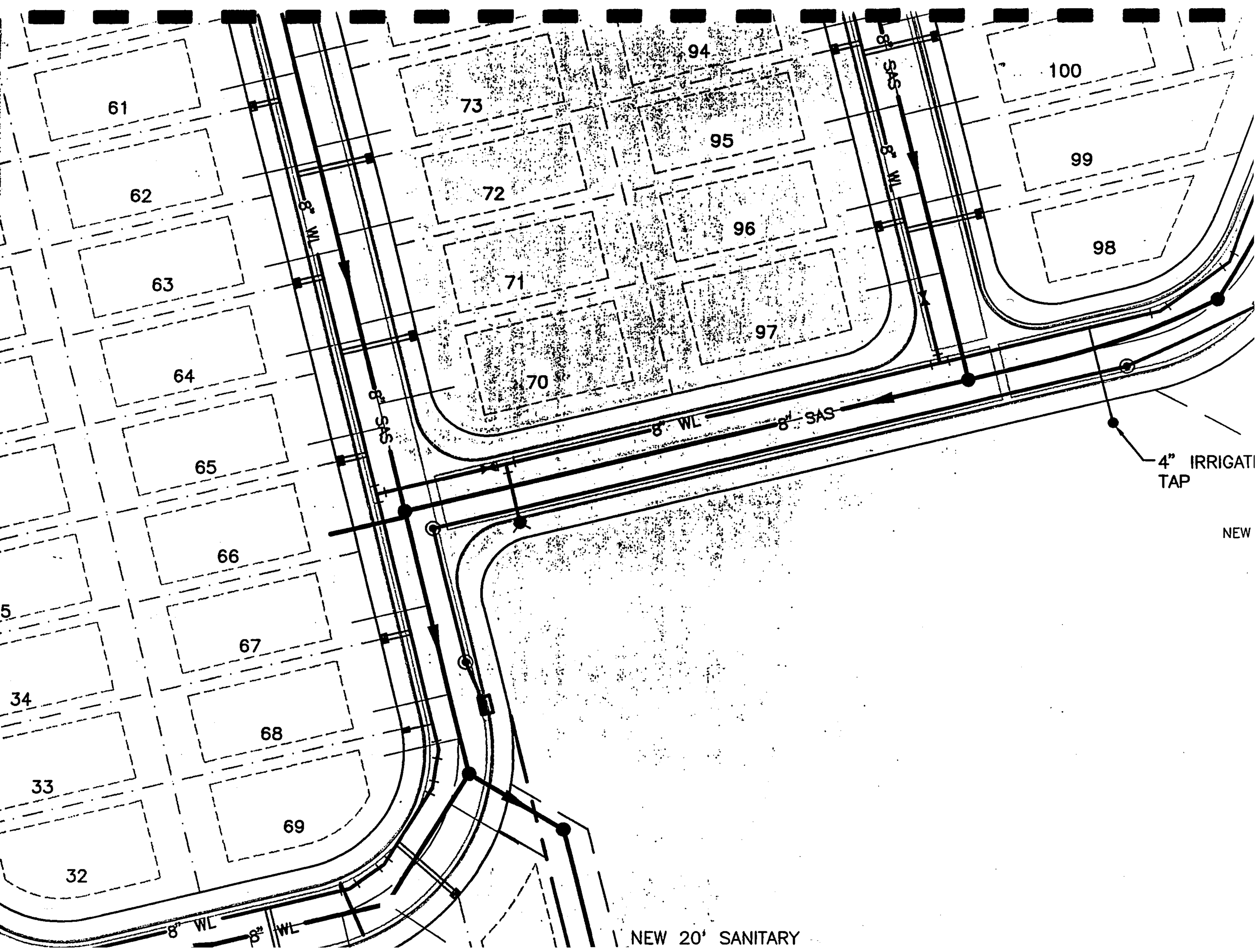
STREET	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
RESEDA	DOUBLE 'A'	11.24	35.62	0.4332	0.67
RESEDA/PARK	TRIPLE 'A'	16.86	46.4	0.3267	0.67

ORIFICE EQUATION

Q = CA sqrt(2gH)

C = 0.6

g = 32.2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99
100
8" WL
8" SAS
8" WL
8" SAS
8" WL
8" SAS
8" WL
8" WL
4" IRRIGATI
TAP
NEW
NEW 20' SANITARY

Pipe Capacity

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.013

STORM SEWER VISTA MANZANO

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
CB 1 TO MH1	30	2	4.91	0.625	58.16	35.62	7.26
MH1 to MH2	30	2	4.91	0.625	58.16	35.62	7.26
MH2 to MH3	30	2	4.91	0.625	58.16	35.62	7.26
MH3 to CB2	30	2	4.91	0.625	58.16	35.62	7.26
CB2 to AMOLE	42	0.7	9.62	0.875	84.40	82.03	8.53

FINDING STREET CAPACITY - 28 F-F CROSS-SECTION FOR 4" CURB

$Q = 1.49/n\ A\ R^{(2/3)}\ S^{1/2}$
n = 0.017
SLOPE = STREET SLOPE
$R^{2/3} = (A/P)^{2/3}$
D2 = HYDRAULIC DEPTH AFTER HYDRAULIC JUMP = $D1/2\ [SQRT\ (1 + 8Fr^2) - 1]$
$E = V^2 / 2g$

HALF STREET CALCULATIONS

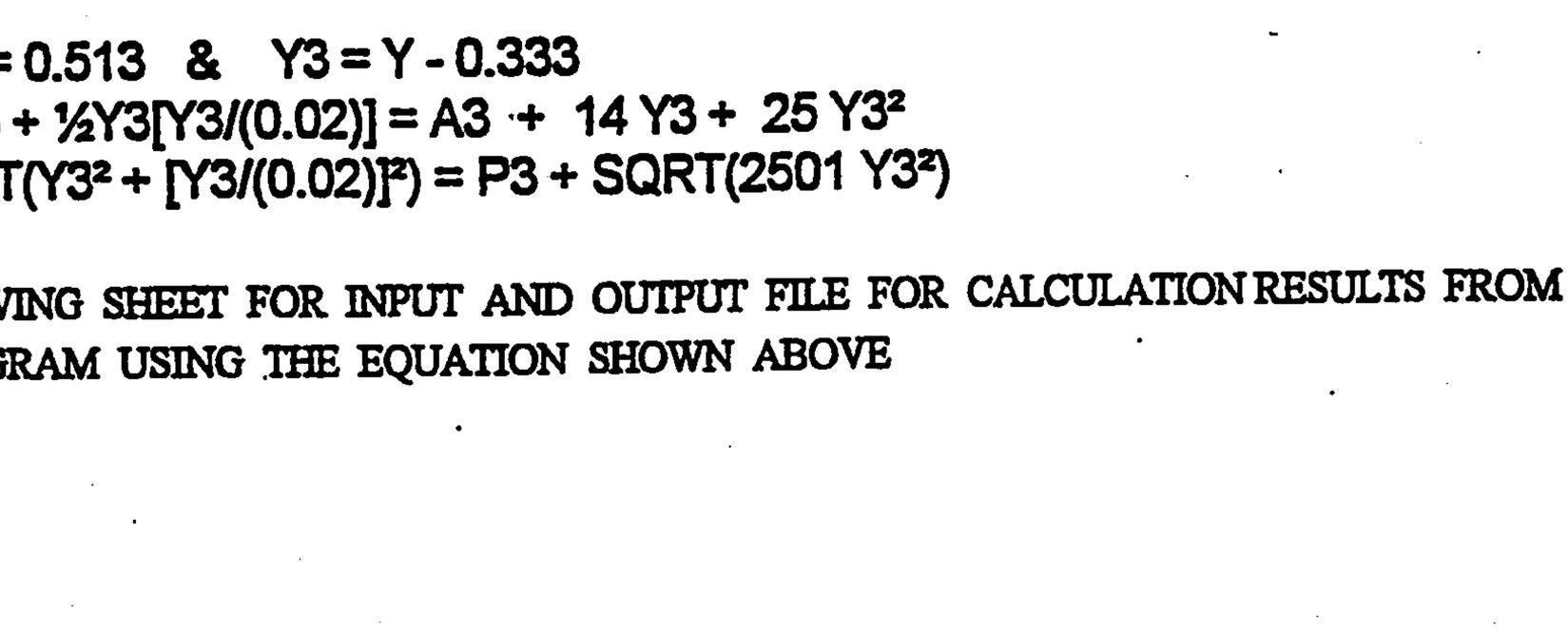
@ Y < = 0.0625
$A1 = \frac{1}{2}\ Y\ (Y/0.03125) = 16Y^2$
$P1 = SQRT[Y^2 + (Y/0.03125)^2] + Y = SQRT(1025\ Y^2) + Y$

@ 0.0625 < Y < = 0.3025 & Y1 = Y - 0.0625
$A2 = A1 + \frac{1}{2}Y1\ (Y1/0.02) + 2Y1 = A1 + 25Y1^2 + 2Y1$
$P2 = P1 + SQRT[Y1^2 + (Y1/0.02)^2] + Y1 = P1 + SQRT(2501\ Y^2) + Y1$

@ 0.3025 < Y < = 0.333 & Y2 = Y - 0.3025
A3 = A2 + 14Y2
P3 = P2 + Y2

@ 0.333 < Y < = 0.513 & Y3 = Y - 0.333
$A4 = A3 + 14Y3 + \frac{1}{2}Y3[Y3/(0.02)] = A3 + 14\ Y3 + 25\ Y3^2$
$P4 = P3 + SQRT(Y3^2 + [Y3/(0.02)]^2) = P3 + SQRT(2501\ Y3^2)$

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULATION RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHOWN ABOVE



28' F-F
4" CURB

NOT TO SCALE

FINDING STREET CAPACITY - 28 F-F CROSS-SECTION FOR 8" CURB

Q = 1.49/n A R^(2/3) S^½
n = 0.017
SLOPE = STREET SLOPE
R^2/3 = (A/P)^2/3
D2 = WATER DEPTH AFTER HYDRAULIC JUMP = D1/2 [SQRT (1 + 8Fr²) - 1]
E = V² / 2g

HALF STREET CALCULATIONS

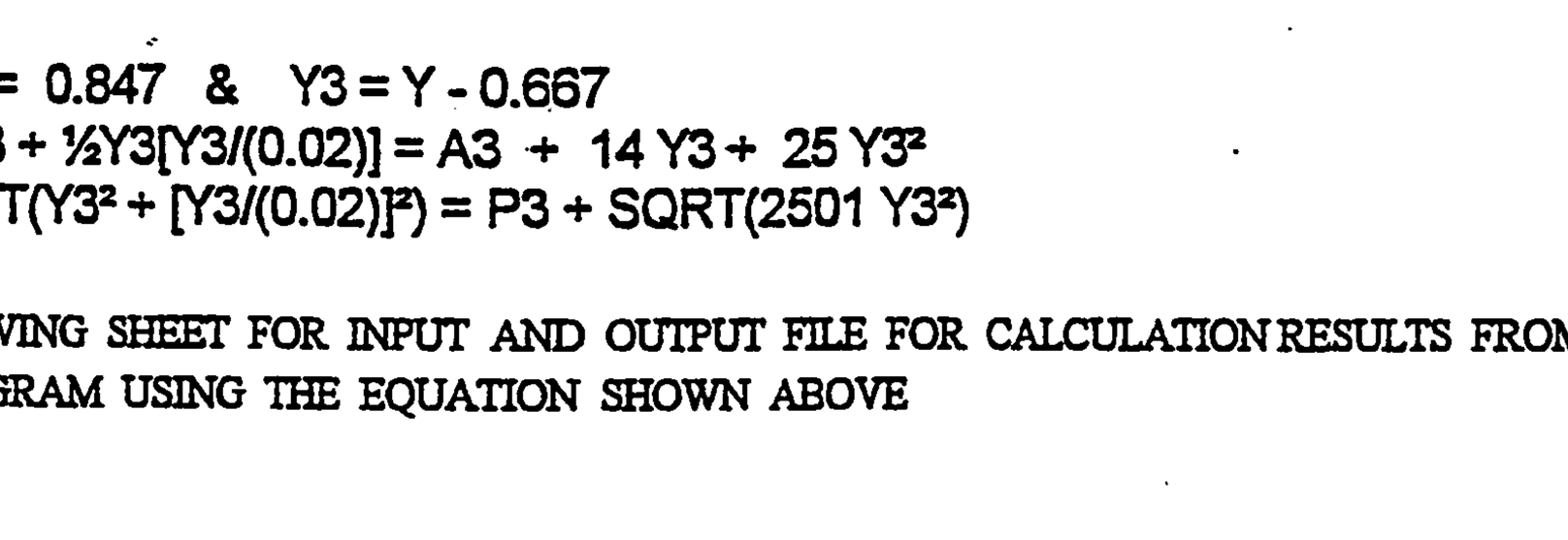
@Y < = 0.125
A1 = ½ Y (Y/0.0625) = 8Y²
P1 = SQRT[Y² + (Y/0.0625)²] + Y = SQRT(257 Y²) + Y

@ 0.125 < Y < = 0.365 & Y1 = Y - 0.125
A2 = A1 + ½Y1 (Y1/0.02) + 2Y1 = A1 + 25Y1² + 2Y1
P2 = P1 + SQRT[Y1² + (Y1/0.02)²] + Y1 = P1 + SQRT(2501 Y1²) + Y1

@ 0.365 < Y < = 0.667 & Y2 = Y - 0.365
A3 = A2 + 14Y2 + ~~½Y2[Y2/(0.02)]~~ = A2 + 14 Y2
P3 = P2 + ~~SQRT(Y2² + [Y2/(0.02)]²)~~ = P2 + Y2.

@ 0.667 < Y < = 0.847 & Y3 = Y - 0.667
A4 = A3 + 14Y3 + ½Y3[Y3/(0.02)] = A3 + 14 Y3 + 25 Y3²
P4 = P3 + SQRT(Y3² + [Y3/(0.02)]²) = P3 + SQRT(2501 Y3²)

SEE THE FOLLOWING SHEET FOR INPUT AND OUTPUT FILE FOR CALCULATION RESULTS FROM COMPUTER PROGRAM USING THE EQUATION SHOWN ABOVE



28' F-F
8" CURB

NOT TO SCALE

Street Capacity Calculations

EMBARCEDERA DRIVE

28' F-F Street Section with 4" curb

Slope= 0.006

For water depths less than 0.0625 feet

Y= Water depth
Area = 16*Y^2
P= SQRT(1025*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0016	0.335115	0.004774	0.000307	0.000614	0.191983	0.00192	0.338325	0.00192
0.015	0.0036	0.502673	0.007162	0.000906	0.001811	0.251569	0.003774	0.361979	0.003234
0.02	0.0064	0.670231	0.009549	0.00195	0.003901	0.304754	0.006095	0.379757	0.004676
0.025	0.01	0.837788	0.011936	0.003536	0.007073	0.353636	0.008841	0.394147	0.00622
0.03	0.0144	1.005346	0.014323	0.005751	0.011501	0.399341	0.01198	0.406308	0.007851
0.04	0.0256	1.340461	0.019098	0.012384	0.024769	0.483767	0.019351	0.426263	0.011328
0.05	0.04	1.675577	0.023872	0.022454	0.044909	0.561361	0.028068	0.442415	0.015046
0.0625	0.0625	2.094471	0.02984	0.040713	0.081425	0.651402	0.040713	0.459178	0.019973

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.0625	0.0625	2.094471	0.02984	0.040713	0.081425	0.651402	0.040713	0.459178	0.019973
0.1	0.207813	4.007346	0.051858	0.195671	0.391343	0.941576	0.094158	0.52472	0.03948
0.15	0.620313	6.557846	0.094591	0.871945	1.743889	1.405654	0.210848	0.639595	0.080028
0.18	0.987813	8.088146	0.122131	1.646406	3.292813	1.66672	0.30001	0.692306	0.107883
0.22	1.617813	10.12855	0.159728	3.224738	6.449476	1.99327	0.43852	0.748905	0.147665
0.26	2.407813	12.16895	0.197865	5.535812	11.07162	2.299104	0.597767	0.794592	0.189784
0.29	3.105313	13.69925	0.226678	7.816697	15.63339	2.517201	0.729988	0.823742	0.222637
0.3025	3.4225	14.33687	0.23872	8.917608	17.83522	2.605583	0.788189	0.834861	0.23661

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3025	3.4225	14.33687	0.23872	8.917608	17.83522	2.605583	0.788189	0.834861	0.23661
0.305	3.4575	14.33937	0.241119	9.069063	18.13813	2.623012	0.800019	0.836994	0.239412
0.31	3.5275	14.34437	0.245915	9.374963	18.74993	2.657679	0.82388	0.841189	0.245032
0.315	3.5975	14.34937	0.250708	9.684821	19.36964	2.692098	0.848011	0.845294	0.25067
0.32	3.6675	14.35437	0.255497	9.99861	19.99722	2.726274	0.872408	0.849311	0.256327
0.325	3.7375	14.35937	0.260283	10.3163	20.6326	2.760214	0.897069	0.853244	0.262001
0.33	3.8075	14.36437	0.265066	10.63786	21.27572	2.793923	0.921994	0.857096	0.267694
0.333	3.8495	14.36737	0.267934	10.83265	21.66529	2.81404	0.937075	0.85937	0.271117

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.333	3.8495	14.36737	0.267934	10.83265	21.66529	2.81404	0.937075	0.85937	0.271117
0.375	4.4816	16.46779	0.272143	12.74316	25.48632	2.84344	1.06629	0.818277	0.285231
0.4	4.899725	17.71804	0.276539	14.08168	28.16337	2.873974	1.14959	0.800802	0.295187
0.42	5.256725	18.71824	0.280834	15.26374	30.52748	2.903659	1.219537	0.789574	0.303853
0.45	5.829725	20.21854	0.288336	17.22764	34.45528	2.955137	1.329812	0.776325	0.317872
0.475	6.3416	21.46879	0.295387	19.0446	38.0892	3.003122	1.426483	0.767889	0.33038
0.513	7.1795	23.36917	0.307221	22.133	44.266	3.082805	1.581479	0.758507	0.350634

Street Capacity Calculations

OJO SARCO STREET

28' F-F Street Section with 4" curb

Slope= 0.0465

For water depths less than 0.0625 feet

Y= Water depth
Area = 16*Y^2
P= SQRT(1025*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0016	0.335115	0.004774	0.000855	0.00171	0.534458	0.005345	0.941858	0.009227
0.015	0.0036	0.502673	0.007162	0.002521	0.005042	0.700338	0.010505	1.007707	0.015154
0.02	0.0064	0.670231	0.009549	0.00543	0.01086	0.848399	0.016968	1.0572	0.02153
0.025	0.01	0.837788	0.011936	0.009845	0.01969	0.98448	0.024612	1.097258	0.028258
0.03	0.0144	1.005346	0.014323	0.016009	0.032017	1.111717	0.033352	1.131112	0.035279
0.04	0.0256	1.340461	0.019098	0.034477	0.068954	1.346749	0.05387	1.186667	0.050044
0.05	0.04	1.675577	0.023872	0.062511	0.125021	1.562764	0.078138	1.231631	0.065607
0.0625	0.0625	2.094471	0.02984	0.113339	0.226678	1.813427	0.113339	1.278298	0.085979

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.0625	0.0625	2.094471	0.02984	0.113339	0.226678	1.813427	0.113339	1.278298	0.085979
0.1	0.207813	4.007346	0.051858	0.544726	1.089452	2.621237	0.262124	1.460758	0.162547
0.15	0.620313	6.557846	0.094591	2.427391	4.854782	3.913175	0.586976	1.780556	0.310087
0.21	1.445313	9.618446	0.150265	7.700094	15.40019	5.327633	1.118803	2.048786	0.512452
0.22	1.617813	10.12855	0.159728	8.97729	17.95458	5.54903	1.220787	2.084864	0.547918
0.25	2.195313	11.65885	0.188296	13.59419	27.18837	6.19237	1.548092	2.182524	0.656698
0.275	2.745313	12.9341	0.212254	18.41303	36.82606	6.70708	1.844447	2.253924	0.749789
0.3025	3.4225	14.33687	0.23872	24.82557	49.65114	7.253636	2.194225	2.324155	0.854461

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3025	3.4225	14.33687	0.23872	24.82557	49.65114	7.253636	2.194225	2.324155	0.854461
0.305	3.4575	14.33937	0.241119	25.2472	50.49441	7.302156	2.227158	2.330093	0.864055
0.31	3.5275	14.34437	0.245915	26.09879	52.19758	7.398665	2.293586	2.341772	0.883282
0.315	3.5975	14.34937	0.250708	26.9614	53.9228	7.494483	2.360762	2.353198	0.902562
0.32	3.6675	14.35437	0.255497	27.83495	55.6699	7.589625	2.42868	2.364381	0.921893
0.325	3.7375	14.35937	0.260283	28.71936	57.43872	7.68411	2.497336	2.37533	0.941275
0.33	3.8075	14.36437	0.265066	29.61455	59.2291	7.777952	2.566724	2.386054	0.960707
0.333	3.8495	14.36737	0.267934	30.15681	60.31362	7.833955	2.608707	2.392385	0.97239

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.333	3.8495	14.36737	0.267934	30.15681	60.31362	7.833955	2.608707	2.392385	0.97239
0.375	4.4816	16.46779	0.272143	35.47545	70.95091	7.915801	2.968425	2.277987	1.035049
0.4	4.899725	17.71804	0.276539	39.20175	78.40349	8.000805	3.200322	2.229337	1.076864
0.42	5.256725	18.71824	0.280834	42.49245	84.9849	8.083446	3.395047	2.198082	1.112375
0.45	5.829725	20.21854	0.288336	47.95972	95.91943	8.226755	3.70204	2.161197	1.16866
0.475	6.3416	21.46879	0.295387	53.01792	106.0358	8.360339	3.971161	2.137712	1.218018
0.513	7.1795	23.36917	0.307221	61.61567	123.2313	8.582167	4.402652	2.111594	1.296768

Street Capacity Calculations

OJO SARCO

28' F-F Street Section with 8" curb

Slope= 0.0174

For water depths less than 0.125 feet

Y= Water depth
Area = 8*Y^2
P= SQRT(257*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0008	0.170312	0.004697	0.000259	0.000517	0.3234	0.003234	0.569918	0.004485
0.02	0.0032	0.340624	0.009395	0.001643	0.003286	0.513366	0.010267	0.639712	0.010673
0.04	0.0128	0.681249	0.018789	0.010431	0.020862	0.814918	0.032597	0.718052	0.025276
0.06	0.0288	1.021873	0.028184	0.030754	0.061508	1.067845	0.064071	0.768254	0.04176
0.08	0.0512	1.362498	0.037578	0.066232	0.132465	1.293602	0.103488	0.805986	0.059574
0.1	0.08	1.703122	0.046973	0.120087	0.240175	1.501092	0.150109	0.836526	0.078435
0.12	0.1152	2.043746	0.056367	0.195275	0.390551	1.695098	0.203412	0.862336	0.098166
0.125	0.125	2.128902	0.058716	0.217733	0.435466	1.741863	0.217733	0.868223	0.103219

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.135625	2.383952	0.056891	0.23132	0.462639	1.705582	0.221726	0.833629	0.101475
0.16	0.225625	3.914252	0.057642	0.388202	0.776403	1.720561	0.27529	0.758023	0.10926
0.2	0.415625	5.954652	0.069798	0.812412	1.624824	1.954676	0.390935	0.77025	0.139714
0.24	0.685625	7.995052	0.085756	1.537357	3.074714	2.242271	0.538145	0.806593	0.178912
0.28	1.035625	10.03545	0.103197	2.627186	5.254371	2.536812	0.710307	0.844853	0.222657
0.32	1.465625	12.07585	0.121368	4.142579	8.285157	2.826493	0.904478	0.880532	0.269405
0.36	1.975625	14.11625	0.139954	6.140529	12.28106	3.108145	1.118932	0.912898	0.31841
0.365	2.045	14.3713	0.142297	6.426916	12.85383	3.142746	1.147102	0.916716	0.324671

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.115	14.3763	0.147117	6.796161	13.59232	3.213315	1.188927	0.930946	0.336073
0.41	2.675	14.4163	0.185554	10.03417	20.06835	3.751093	1.537948	1.032376	0.42773
0.45	3.235	14.4563	0.223778	13.74876	27.49752	4.250003	1.912501	1.11649	0.520304
0.49	**3.795**	**14.4963**	**0.261791**	**17.90713**	**35.81426**	**4.718611**	**2.31212**	**1.187923**	**0.613874**
0.54	4.495	14.5463	0.309013	23.68967	47.37933	5.270226	2.845922	1.263876	0.732244
0.59	5.195	14.5963	0.355912	30.08328	60.16656	5.790814	3.416581	1.328574	0.852124
0.63	5.755	14.6363	0.3932	35.61496	71.22992	6.188525	3.898771	1.374007	0.949055
0.667	6.273	14.6733	0.427511	41.04731	82.09463	6.54349	4.364508	1.411948	1.039482

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.762225	16.32363	0.41426	43.3294	86.6588	6.407566	4.485296	1.349634	1.031153
0.72	7.085225	17.32383	0.408987	45.013	90.026	6.35308	4.574217	1.319441	1.030896
0.74	7.428225	18.32403	0.405382	46.91434	93.82867	6.315686	4.673607	1.293829	1.033658
0.76	7.791225	19.32423	0.403184	49.02895	98.0579	6.292842	4.78256	1.272073	1.039053
0.78	8.174225	20.32443	0.402187	51.35427	102.7085	6.282463	4.900321	1.253588	1.04676
0.8	8.577225	21.32463	0.402221	53.88917	107.7783	6.282821	5.026257	1.237889	1.056514
0.847	9.603	23.6751	0.405616	60.67291	121.3458	6.31812	5.351448	1.209813	1.086275

Street Capacity Calculations

ARROYO HONDO STREET

28' F-F Street Section with 4" curb

Slope= 0.0187

For water depths less than 0.0625 feet

Y= Water depth

Area = 16*Y^2

P= SQRT(1025*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0016	0.335115	0.004774	0.000542	0.001085	0.338928	0.003389	0.597283	0.004816
0.015	0.0036	0.502673	0.007162	0.001599	0.003198	0.444122	0.006662	0.639041	0.007993
0.02	0.0064	0.670231	0.009549	0.003443	0.006887	0.538015	0.01076	0.670427	0.011438
0.025	0.01	0.837788	0.011936	0.006243	0.012486	0.624311	0.015608	0.69583	0.015095
0.03	0.0144	1.005346	0.014323	0.010152	0.020304	0.704999	0.02115	0.717299	0.018928
0.04	0.0256	1.340461	0.019098	0.021864	0.043727	0.854046	0.034162	0.752529	0.027034
0.05	0.04	1.675577	0.023872	0.039641	0.079283	0.991032	0.049552	0.781043	0.035623
0.0625	0.0625	2.094471	0.02984	0.071874	0.143749	1.149991	0.071874	0.810637	0.046919

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.0625	0.0625	2.094471	0.02984	0.071874	0.143749	1.149991	0.071874	0.810637	0.046919
0.1	0.207813	4.007346	0.051858	0.34544	0.690879	1.662266	0.166227	0.926345	0.090222
0.15	0.620313	6.557846	0.094591	1.539338	3.078677	2.481553	0.372233	1.129146	0.175995
0.19	1.130313	8.598246	0.131458	3.493132	6.986264	3.090413	0.587178	1.249429	0.253905
0.244	2.072613	11.35279	0.182564	7.972954	15.94591	3.846814	0.938623	1.372392	0.367031
0.26	2.407813	12.16895	0.197865	9.772968	19.54594	4.058858	1.055303	1.402779	0.401926
0.29	3.105313	13.69925	0.226678	13.79966	27.59932	4.443888	1.288728	1.45424	0.468789
0.3025	3.4225	14.33687	0.23872	15.74322	31.48644	4.599918	1.391475	1.473871	0.497159

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3025	3.4225	14.33687	0.23872	15.74322	31.48644	4.599918	1.391475	1.473871	0.497159
0.305	3.4575	14.33937	0.241119	16.0106	32.0212	4.630687	1.41236	1.477636	0.502847
0.31	3.5275	14.34437	0.245915	16.55064	33.10128	4.691889	1.454486	1.485043	0.514249
0.315	3.5975	14.34937	0.250708	17.09766	34.19533	4.752652	1.497085	1.492288	0.525683
0.32	3.6675	14.35437	0.255497	17.65163	35.30326	4.812987	1.540156	1.49938	0.537151
0.325	3.7375	14.35937	0.260283	18.21248	36.42496	4.872904	1.583694	1.506324	0.54865
0.33	3.8075	14.36437	0.265066	18.78017	37.56034	4.932414	1.627697	1.513124	0.560181
0.333	3.8495	14.36737	0.267934	19.12404	38.24808	4.967929	1.65432	1.517139	0.567115

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.333	3.8495	14.36737	0.267934	19.12404	38.24808	4.967929	1.65432	1.517139	0.567115
0.375	4.4816	16.46779	0.272143	22.49688	44.99376	5.019832	1.882437	1.444593	0.601222
0.4	4.899725	17.71804	0.276539	24.85992	49.71984	5.073738	2.029495	1.413742	0.624362
0.42	5.256725	18.71824	0.280834	26.94673	53.89346	5.126145	2.152981	1.393921	0.644164
0.45	5.829725	20.21854	0.288336	30.41382	60.82763	5.217024	2.347661	1.37053	0.675754
0.475	6.3416	21.46879	0.295387	33.6215	67.24299	5.301737	2.518325	1.355637	0.703612
0.513	7.1795	23.36917	0.307221	39.07379	78.14757	5.44241	2.791957	1.339074	0.748278

Street Capacity Calculations

TRES RITOS STREET

28' F-F Street Section with 4" curb

Slope= 0.0343

For water depths less than 0.0625 feet

Y= Water depth

Area = 16*Y^2

P= SQRT(1025*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0016	0.335115	0.004774	0.000734	0.001469	0.459023	0.00459	0.808921	0.007485
0.015	0.0036	0.502673	0.007162	0.002165	0.004331	0.60149	0.009022	0.865475	0.012332
0.02	0.0064	0.670231	0.009549	0.004663	0.009327	0.728653	0.014573	0.907983	0.01756
0.025	0.01	0.837788	0.011936	0.008455	0.016911	0.845527	0.021138	0.942387	0.023086
0.03	0.0144	1.005346	0.014323	0.013749	0.027498	0.954805	0.028644	0.971463	0.02886
0.04	0.0256	1.340461	0.019098	0.029611	0.059221	1.156664	0.046267	1.019177	0.041024
0.05	0.04	1.675577	0.023872	0.053688	0.107375	1.34219	0.06711	1.057794	0.053865
0.0625	0.0625	2.094471	0.02984	0.097342	0.194684	1.557474	0.097342	1.097875	0.070697

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.0625	0.0625	2.094471	0.02984	0.097342	0.194684	1.557474	0.097342	1.097875	0.070697
0.1	0.207813	4.007346	0.051858	0.467841	0.935682	2.251266	0.225127	1.254582	0.134335
0.15	0.620313	6.557846	0.094591	2.084781	4.169561	3.360855	0.504128	1.529242	0.257958
0.2	1.282813	9.108346	0.140839	5.621634	11.24327	4.382273	0.876455	1.726857	0.398561
0.244	2.072613	11.35279	0.182564	10.79805	21.59611	5.209876	1.27121	1.85868	0.530871
0.26	2.407813	12.16895	0.197865	13.23588	26.47176	5.497055	1.429234	1.899833	0.580554
0.29	3.105313	13.69925	0.226678	18.68937	37.37874	6.018516	1.745369	1.969529	0.675659
0.3025	3.4225	14.33687	0.23872	21.3216	42.6432	6.229832	1.884524	1.996116	0.715979

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3025	3.4225	14.33687	0.23872	21.3216	42.6432	6.229832	1.884524	1.996116	0.715979
0.305	3.4575	14.33937	0.241119	21.68372	43.36745	6.271504	1.912809	2.001215	0.724062
0.31	3.5275	14.34437	0.245915	22.41512	44.83023	6.354391	1.969861	2.011246	0.740263
0.315	3.5975	14.34937	0.250708	23.15597	46.31195	6.436685	2.027556	2.021059	0.756508
0.32	3.6675	14.35437	0.255497	23.90623	47.81245	6.518399	2.085888	2.030664	0.772798
0.325	3.7375	14.35937	0.260283	24.66581	49.33162	6.599547	2.144853	2.040067	0.789131
0.33	3.8075	14.36437	0.265066	25.43465	50.8693	6.680144	2.204447	2.049278	0.805508
0.333	3.8495	14.36737	0.267934	25.90037	51.80074	6.728242	2.240505	2.054715	0.815354

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.333	3.8495	14.36737	0.267934	25.90037	51.80074	6.728242	2.240505	2.054715	0.815354
0.375	4.4816	16.46779	0.272143	30.46832	60.93664	6.798537	2.549451	1.956464	0.866877
0.4	4.899725	17.71804	0.276539	33.66867	67.33735	6.871543	2.748617	1.914681	0.901418
0.42	5.256725	18.71824	0.280834	36.49492	72.98983	6.942519	2.915858	1.887837	0.930813
0.45	5.829725	20.21854	0.288336	41.19051	82.38102	7.065601	3.179521	1.856158	0.977489
0.475	6.3416	21.46879	0.295387	45.53479	91.06957	7.180331	3.410657	1.835987	1.018487
0.513	7.1795	23.36917	0.307221	52.91901	105.838	7.37085	3.781246	1.813556	1.083989

Street Capacity Calculations

QUESTA STREET

28' F-F Street Section with 4" curb

Slope= 0.0343

For water depths less than 0.0625 feet

Y= Water depth
Area = 16*Y^2
P= SQRT(1025*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0016	0.335115	0.004774	0.000734	0.001469	0.459023	0.00459	0.808921	0.007485
0.015	0.0036	0.502673	0.007162	0.002165	0.004331	0.60149	0.009022	0.865475	0.012332
0.02	0.0064	0.670231	0.009549	0.004663	0.009327	0.728653	0.014573	0.907983	0.01756
0.025	0.01	0.837788	0.011936	0.008455	0.016911	0.845527	0.021138	0.942387	0.023086
0.03	0.0144	1.005346	0.014323	0.013749	0.027498	0.954805	0.028644	0.971463	0.02886
0.04	0.0256	1.340461	0.019098	0.029611	0.059221	1.156664	0.046267	1.019177	0.041024
0.05	0.04	1.675577	0.023872	0.053688	0.107375	1.34219	0.06711	1.057794	0.053865
0.0625	0.0625	2.094471	0.02984	0.097342	0.194684	1.557474	0.097342	1.097875	0.070697

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.0625	0.0625	2.094471	0.02984	0.097342	0.194684	1.557474	0.097342	1.097875	0.070697
0.1	0.207813	4.007346	0.051858	0.467841	0.935682	2.251266	0.225127	1.254582	0.134335
0.15	0.620313	6.557846	0.094591	2.084781	4.169561	3.360855	0.504128	1.529242	0.257958
0.2	1.282813	9.108346	0.140839	5.621634	11.24327	4.382273	0.876455	1.726857	0.398561
0.244	2.072613	11.35279	0.182564	10.79805	21.59611	5.209876	1.27121	1.85868	0.530871
0.26	2.407813	12.16895	0.197865	13.23588	26.47176	5.497055	1.429234	1.899833	0.580554
0.29	3.105313	13.69925	0.226678	18.68937	37.37874	6.018516	1.745369	1.969529	0.675659
0.3025	3.4225	14.33687	0.23872	21.3216	42.6432	6.229832	1.884524	1.996116	0.715979

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3025	3.4225	14.33687	0.23872	21.3216	42.6432	6.229832	1.884524	1.996116	0.715979
0.305	3.4575	14.33937	0.241119	21.68372	43.36745	6.271504	1.912809	2.001215	0.724062
0.31	3.5275	14.34437	0.245915	22.41512	44.83023	6.354391	1.969861	2.011246	0.740263
0.315	3.5975	14.34937	0.250708	23.15597	46.31195	6.436685	2.027556	2.021059	0.756508
0.32	3.6675	14.35437	0.255497	23.90623	47.81245	6.518399	2.085888	2.030664	0.772798
0.325	3.7375	14.35937	0.260283	24.66581	49.33162	6.599547	2.144853	2.040067	0.789131
0.33	3.8075	14.36437	0.265066	25.43465	50.8693	6.680144	2.204447	2.049278	0.805508
0.333	3.8495	14.36737	0.267934	25.90037	51.80074	6.728242	2.240505	2.054715	0.815354

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.333	3.8495	14.36737	0.267934	25.90037	51.80074	6.728242	2.240505	2.054715	0.815354
0.375	4.4816	16.46779	0.272143	30.46832	60.93664	6.798537	2.549451	1.956464	0.866877
0.4	4.899725	17.71804	0.276539	33.66867	67.33735	6.871543	2.748617	1.914681	0.901418
0.42	5.256725	18.71824	0.280834	36.49492	72.98983	6.942519	2.915858	1.887837	0.930813
0.45	5.829725	20.21854	0.288336	41.19051	82.38102	7.065601	3.179521	1.856158	0.977489
0.475	6.3416	21.46879	0.295387	45.53479	91.06957	7.180331	3.410657	1.835987	1.018487
0.513	7.1795	23.36917	0.307221	52.91901	105.838	7.37085	3.781246	1.813556	1.083989

ARENAL/UNSER
DRAINAGE MANAGEMENT PLAN

ALBUQUERQUE NEW MEXICO
JUNE 1997

Prepared by:
ISAACSON & ARFMAN, P.A.


(UNIT 3)
A-1
ABEYTA
GRANT
A-1
JOBEL
SUBD
(UNIT 7)
(UNIT 7)
SAGE ROAD
A-1
R-D R-1
ALB SO
503
GARCIA—JOSE
R-D R-1
501
UNSER BLVD
502
LONGFORD HOMES
AMOLE DEL NORTE DIVERSION CHANNEL
SAN
SAN JOSE ARENA
PT B
PT D
POND
ARENAL ROAD

HYDROGRAPH FOR BASIN 503
(SIDE FLOW 980' S. OF SAGE ROAD)

BASIN LENGTH, (FT)	=	1190
DIFFERENCE IN ELEVATION ACROSS BASIN	=	44
SLOPE OF BASIN, (FT/FT)	=	0.037
AREA OF BASIN, (ACRES)	=	24.0
AREA OF BASIN, (SQ MI)	=	0.03752
100-YR, 6-HR RAINFALL, (INCHES)	=	2.20
COMPOSITE CURVE NO.	=	77
DIRECT RUNOFF (INCHES)	=	.56
TIME OF CONCENTRATION (SCS UPLAND METHOD) (MIN)	=	8
TIME TO PEAK (MIN)	=	7
VOLUME OF RUNOFF (ACRE-FT) (from AHYMO run)	=	2.60
PEAK RUNOFF (CFS) (from AHYMO run)	=	78.03
RUNOFF PER ACRE (CFS/ACRE)	=	3.25

POINT	t/Tp (min/min)	t (min)	y (cfs/cfs)	Q (cfs)
1	.0	.0	.000	.00
2	.1	0.7	.030	2.34
3	.2	1.4	.100	7.80
4	.3	2.1	.190	14.82
5	.4	2.8	.310	24.18
6	.5	3.5	.470	36.66
7	.6	4.2	.660	51.48
8	.7	4.9	.820	63.96
9	.8	5.6	.930	72.54
10	.9	6.3	.990	77.22
11	1.0	7.0	1.000	78.03
12	1.1	7.7	.990	77.22
13	1.2	8.4	.930	72.54
14	1.3	9.1	.860	67.08
15	1.4	9.8	.780	60.84
16	1.5	10.5	.680	53.04
17	1.6	11.2	.560	43.68
18	1.7	11.9	.460	35.88
19	1.8	12.6	.390	30.42
20	1.9	13.3	.330	25.74
21	2.0	14.0	.280	21.84
22	2.2	15.4	.207	16.15
23	2.4	16.8	.147	11.47

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	501.10	5& 6	7	.06154	127.98	4.262	1.29859	1.500	3.250	
*S **BASIN 502 IS THE SOUTHERN PART OF THE LONGFORD SD										
COMPUTE NM HYD	502.00	-	8	.05788	121.79	4.080	1.32159	1.500	3.288	PER IMP= 44.00
*S **BASIN 503 IS CURRENTLY UNDEVELOPED, ASSUME FUTURE DEVELOPMENT WILL BE @										
*S **A DENSITY OF 4 DU/AC. THE DISCHARGE FROM THIS BASIN DRAINS TO THE AMOLE										
*S DEL NORTE CHANNEL AND DOES NOT AFFECT THE ARENAL/UNSER DRAINAGE MANAGEMENT										
*S SITE.										
COMPUTE NM HYD	503.00	-	9	.03752	78.03	2.599	1.29860	1.500	3.249	PER IMP= 42.00
*S**********										
*S **BASIN 504 IS CURRENTLY UNDEVELOPED, ASSUME FUTURE DEVELOPMENT WILL BE @										
*S **A DENSITY OF 9 DU/AC. THE DISCHARGE FROM THIS BASIN TRAVEL ALONG SAGE RD.										
*S AND ENTERS THE AMOLE DEL NORTE CHANNEL, DOES NOT AFFECT THE ARENAL/UNSER										
*S DRAINAGE MANAGEMENT SITE.										
COMPUTE NM HYD	504.00	-	10	.03667	92.58	3.349	1.71253	1.500	3.945	PER IMP= 78.00
*S **BASIN 505 IS FULLY DEVELOPED AND DRAINS SOUTH TO BLAKE RD..DISCHARGE FROM										
*S THIS BASIN DOES NOT AFFECT THE ARENAL/UNSER DRAINAGE MANAGEMENT SITE.										
COMPUTE NM HYD	505.00	-	11	.02618	43.10	1.407	1.00753	1.500	2.572	PER IMP= 29.00
FINISH										

```
*S **BASIN 502 IS THE SOUTHERN PART OF THE LONGFORD SD
COMPUTE NM HYD       ID=8 HYD NO=502.00 AREA=0.05788 SQ MI
                     PER A=0 PER B=28 PER C=28 PER D=44
                     TP=-0.1333 HR   MASS RAIN=-1

    K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   100.55    CFS   UNIT VOLUME =    .9993       B =   526.28      P60 = 1.8700
    AREA =      .025467 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330


    K =   .118429HR    TP =   .133300HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
    UNIT PEAK =   86.240    CFS   UNIT VOLUME =    1.000       B =   354.67      P60 = 1.8700
    AREA =      .032413 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

PRINT HYD            ID=8  CODE=1

                              OUTFLOW HYDROGRAPH RESERVOIR   502.00


    RUNOFF VOLUME =     1.32159 INCHES     =       4.0796 ACRE-FEET
    PEAK DISCHARGE RATE =     121.79 CFS  AT   1.500 HOURS   BASIN AREA =   .0579 SQ. MI.

*S **BASIN 503 IS CURRENTLY UNDEVELOPED, ASSUME FUTURE DEVELOPMENT WILL BE @
*S **A DENSITY OF 4 DU/AC. THE DISCHARGE FROM THIS BASIN DRAINS TO THE AMOLE
*S DEL NORTE CHANNEL AND DOES NOT AFFECT THE ARENAL/UNSER DRAINAGE MANAGEMENT
*S SITE.
COMPUTE NM HYD       ID=9 HYD NO=503.00 AREA=0.03752 SQ MI
                     PER A=0 PER B=29 PER C=29 PER D=42
                     TP=-0.1333 HR   MASS RAIN=-1

    K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   62.215    CFS   UNIT VOLUME =    .9992       B =   526.28      P60 = 1.8700
    AREA =      .015758 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330


    K =   .118429HR    TP =   .133300HR    K/TP RATIO =   .888442     SHAPE CONSTANT, N =  3.992480
    UNIT PEAK =   57.901    CFS   UNIT VOLUME =    1.000       B =   354.67      P60 = 1.8700
    AREA =      .021762 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

PRINT HYD            ID=9  CODE=1

                              OUTFLOW HYDROGRAPH RESERVOIR   503.00


    RUNOFF VOLUME =     1.29860 INCHES     =       2.5986 ACRE-FEET
    PEAK DISCHARGE RATE =      78.03 CFS  AT   1.500 HOURS   BASIN AREA =   .0375 SQ. MI.


*S**************************************************************************
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3.3.99 DRAINAGE FILE 440013

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
DEVELOPMENT SERVICE / HYDROLOGY SECTION

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO. M10 **DATE:** 2/3/99
PLANNING DIVISION NO'S: EPC: ZONING:RLT **DRB:**
SUBJECT: Sage Subdivision
STREET ADDRESS (IF KNOWN):
SUBDIVISION NAME: Tract B, 413, 415, 416, 417 Rolling Hills Subd.

APPROVAL REQUESTED: Preliminary Plat

ATTENDANCE: Fred J. Aguirre-City Hydrologist
Shahab/Shawn Biazar

FINDINGS:
An approved drainage report is required for preliminary plat approval. This report will need to follow the Master Drainage Study (M10/D10) for discharge The drainage report will need to establish the preliminary street design and storm drain requirements in Sage Rd. All dead end streets must have an overflow system. Connection to the Amole must fbe approved by Storm Drain Maintenance.

The developer will be responsible for street and storm drain improvements fronting the development.

THE UNDERSIGNED AGREES THAT THE ABOVE FINDINGS ARE SUMMARIZED ACCURATELY AND ARE SUBJECT TO CHANGE IF FURTHER INVESTIGATION REVEALS THAT THEY ARE NOT REASONABLE OR THAT THEY ARE BASED ON INACCURATE INFORMATION.

SIGNED: Fred J. Aguirre
TITLE : City Hydrologist

SIGNED:
TITLE :

NOTE PLEASE PROVIDE A COPY OF THIS RECAP WITH YOUR DRAINAGE SUBMITTAL.

I met w/ Fred Aguirre on this project 3.3.99
Chris

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP SHOP
600 SECOND ST. N.W.
ATTENTION: Randy
505-924-3900

Records Withdrawal Form

Project No. M10-D014 **Date:** 08-16-06

Project Title: Vista Manzano

a. File b. Mylars c. Redlines/Comments
d. Other Drainage

Requested by: Debbie Tuttle JMA **Phone No.:** 345420
Name and Company

Comments:

Anticipated Return Date: 08-16-06

I hereby accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development and Building Services Center on or before the indicted anticipated return date.

Delivery Picked Up By:

Name: Paul Naber **Organization:** ABQ Reprographics
Print

Signed: Paul Naber **Date:** 8-16-06

Office Use Only

Return Acknowledged:

Received By: _____ **Date:** _____
Print

City of Albuquerque

August 14, 2000

Ronald R. Bohannan, P.E.
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: Grading and Drainage Certification Plan for Phase I of the Vista Manzano Subdivision (M10/D14), Submitted for Release of Financial Guarantees, Engineer's Certification Stamp Dated 8/4/00.

Dear Mr. Bohannan:

Based on the information provided, the above referenced plan is adequate to satisfy the Grading and Drainage certification requirement per the Infrastructure List dated July 28, 1999 for the release of Financial Guarantees for Phase One of the Vista Manzano Subdivision.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Jeff Dorwart, Kaufman & Broad of NM, Inc.
Terri Martin, City Project No. 6207.81, DRB 99-169
File

SIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

e-mail: twdms@aol.com
1-800-245-3102

August 4, 2000

Mrs. Susan M. Calongne, P.E.
City/County Floodplain Administrator
Albuquerque Public Works Department
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Vista Monzano Subdivision, Phase One
Certification of Drainage and Release of Financial Guarantees
Tract 413, Lands of Jose Garcia, (M10/D14)

Dear Susan:

Enclosed please find one copy of the as-built Grading and Drainage Plan and information sheet for Phase One of the Vista Monzano Subdivision. Sundance Mechanical Inc. has completed the utility, paving, and curb and gutter required on the site. Aspen Landscaping has completed the site retaining walls. An "L" type retaining wall was added to the grading plan to facilitate construction of the retaining walls located next to the perimeter property lines. In addition, the retaining wall located along the west property line was moved 10' east at the request of the owner to prevent property damage to the existing residential lots located on the west side of the project. The plan certified was approved by the DRB. Outfall to the Amole del Norte Diversion Channel is in place. All work is in substantial compliance with the approved plans. As-built information was supplied by Aldrich Land Surveying. We are, therefore, requesting Final Certification of Drainage and Release of Financial Guarantees for Phase One of the project.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,

Ronald R. Bohannan, P. E.

Enclosure

cc: Jeff Dorwart

JN: 990013
RRB/rw

RECEIVED
AUG 04 2000
HYDROLOGY SECTION

990013:H2oFinal

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *Vista Monzano Subdivision* **ZONE ATLAS/DRNG. FILE #:** *M10/D14*

DRB #: *99-169* **EPC #:** **WORK ORDER #:** *6207.81*

7-28-99

LEGAL DESCRIPTION: *Tract 413, Lands of Jose Garcia*

CITY ADDRESS: *South of Sage Road between Hidden Valley Drive and Amole del Norte Diversion Channel*

ENGINEERING FIRM: *TIERRA WEST, LLC* **CONTACT:** *RONALD R. BOHANNAN*

ADDRESS: *8509 Jefferson NE, ABQ, NM 87113* **PHONE:** *(505) 858-3100*

OWNER: *Kaufman and Broad, NM* **CONTACT:** *Jeff Dorwart*

ADDRESS: *4921 Alexander Blvd, NE Ste B, 87109* **PHONE:** *(505) 342-5142*

ARCHITECT: *N/A* **CONTACT:**

ADDRESS: **PHONE:**

SURVEYOR: *Aldrich Land Surveying* **CONTACT:** *Tim Aldrich*

ADDRESS: *4109 Montgomery Blvd. NE 87109* **PHONE:** *(505) 884-1990*

CONTRACTOR: *Sundance Mechanical, Inc.* **CONTACT:** *Carlos Spiess*

ADDRESS: *4400 Alameda Suite E 87113* **PHONE:** *(505) 344-2694*

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

X OTHER (G & D As-builts)

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY PROVIDED

RECEIVED
AUG 04 2000
HYDROLOGY SECTION

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAN APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ S. DEV. PLAN FOR SUB'D. APPROVAL

____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

____ SECTOR PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ BUILDING PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ GRADING PERMIT APPROVAL

____ PAVING PERMIT APPROVAL

____ S. A. D. DRAINAGE REPORT

____ DRAINAGE REQUIREMENTS

X *OTHER (Release of Financial Guarantees)*

DATE SUBMITTED *August 4, 2000*

BY: *RONALD R. BOHANNAN*

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 18, 2001

Ronald R. Bohannan, P.E.
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: **VISTA MANZANO SUBDIVISION UNIT 2 (M-10/D14)**
Engineers Certification For Release of Financial Guaranty
Engineers Stamp dated 7/27/1999 Rev. 9/7/1999
Engineer's Certification dated 7/16/2001

Dear Mr. Bohannan:

Based upon the information provided in your submittal dated July 17, 2001, the above referenced plan is adequate to satisfy the Grading and Drainage Certification requirements for Release of Financial Guaranty for Unit 2.

If you have any questions, please call me at 924-3981.

Sincerely,

Teresa A. Martin
Hydrology Plan Checker
Public Works Department

BLB

C: Arlene Portillo, PWD – #620881
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *VISTA MANZANO SUBDIVISION UNIT 2* **ZONE ATLAS/DRNG. FILE #:** *M10/D14*

DRB #: *1000129* **EPC #:** _____ **WORK ORDER #:** *6208.81*

LEGAL DESCRIPTION: *Tracts 414,415,416 & 417, Unit Three, Town of Atrisco Grant*

CITY ADDRESS: *Sage Road SW and Amole Del Norte Diversion Channel*

ENGINEERING FIRM:	*TIERRA WEST, LLC*	**CONTACT:**	*RONALD R. BOHANNAN*
ADDRESS:	*8509 Jefferson NE, ABQ, NM 87113*	**PHONE:**	*(505) 858-3100*
OWNER:	*KB HOME NEW MEXICO, INC.*	**CONTACT:**	*JEFF DORWART*
ADDRESS:	*4921 Alexander Blvd.NE, Ste. B 87107*	**PHONE:**	*(505) 342-5142*
ARCHITECT:	*NA*	**CONTACT:**	
ADDRESS:		**PHONE:**	
SURVEYOR:	*ALDRICH LAND SURVEYING*	**CONTACT:**	*TIM ALDRICH*
ADDRESS:	*4109 Montgomery Blvd. NE 87109*	**PHONE:**	*(505) 884-1990*
CONTRACTOR:	*SUNDANCE MECHANICAL, INC.*	**CONTACT:**	*CARLOS SPIESS*
ADDRESS:	*4400 Alameda, Ste. E 87113*	**PHONE:**	*(505) 344-2694*

TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT

_____ DRAINAGE PLAN

_____ CONCEPTUAL GRADING & DRAINAGE PLAN

__X__ GRADING PLAN (AS-BUILT)

_____ EROSION CONTROL PLAN

__X__ ENGINEER'S CERTIFICATION

_____ OTHER

PRE-DESIGN MEETING:

_____ YES

_____ NO

_____ COPY PROVIDED

RECEIVED
JUL 17 2001
HYDROLOGY SECTION

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAN APPROVAL

_____ PRELIMINARY PLAT APPROVAL

_____ S. DEV. PLAN FOR SUB'D. APPROVAL

_____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

_____ SECTOR PLAN APPROVAL

_____ FINAL PLAT APPROVAL

_____ FOUNDATION PERMIT APPROVAL

_____ BUILDING PERMIT APPROVAL

_____ CERTIFICATE OF OCCUPANCY APPROVAL

_____ GRADING PERMIT APPROVAL

_____ PAVING PERMIT APPROVAL

_____ S. A. D. DRAINAGE REPORT

_____ DRAINAGE REQUIREMENTS

__X__ *OTHER (RELEASE OF SIA)*

DATE SUBMITTED: 7/16/01

BY: *RONALD R. BOHANNAN*

TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

e-mail: twdms@aol.com
1-800-245-3102

July 16, 2001

Mr. Bradley L. Bingham, P.E.
Sr. Engineer, City of Albuquerque, Hydrology
Albuquerque Public Works Department
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Vista Monzano Subdivision, Phase Two
Certification of Drainage and Release of Financial Guarantees
Tract 413, Lands of Jose Garcia, (M10/D14)

Dear Bradley:

Enclosed please find one copy of the as-built Grading and Drainage Plan and information sheet for Phase Two of the Vista Monzano Subdivision. Sundance Mechanical Inc. has completed the utility, paving, and curb and gutter required on the site. Aspen Landscaping has completed the site retaining walls. Outfall to the Amole del Norte Diversion Channel was constructed during Phase One of the project and is in place and functional. All work is in substantial compliance with the approved plans. As-built information was supplied by Aldrich Land Surveying. We are, therefore, requesting Final Certification of Drainage and Release of Financial Guarantees for the site.

Should you have any questions, please do not hesitate to contact our office.

Sincerely

Ronald R. Bohannan, P. E.

Enclosure

cc: Jeff Dorwart

JN: 990013
RRB/rw

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