City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 10, 2003

Ron Bohannan
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: Grading and Drainage Report for West Bluff (H11-D49A) Dated April 1, 2003

Dear Mr. Bohannan:

The above referenced plan received April 2, 2003 is approved for Work Order by Hydrology at DRC.

This site requires a National Pollution Discharge Elimination System (NPDES) permit. Refer to the attachment that is provided with this letter for details. If you have any questions please feel free to call the Public works Hydrology section at 768-3654 (Charles Caruso) or 768-3645 (Brian Wolf).

If you have any questions please contact me at 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

C: Charles Caruso, Hydrology Public Works

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: West Bluff Townhomes
ZONE MAP/DRG. FILE #: H-11/D49A
DRB #: *1001004/1001005* EPC #:
WORK ORDER #: *665181*

LEGAL DESCRIPTION: Lots 1 through 9 of the West Bluff Center Subdivision
CITY ADDRESS: Alamogordo Dr. between Ouray Rd. and Ian Ave.

ENGINEERING FIRM:	Tierra West, LLC	CONTACT:	RONALD R. BOHANNAN OR SARA LAVY
ADDRESS:	8509 Jefferson NE	PHONE:	(505) 858-3100
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87113
OWNER:	West Bluff Center LLC	CONTACT:	Paul Silverman
ADDRESS:	4408 Canyon Court NE	PHONE:	(505) 294-8625
CITY, STATE:		ZIP CODE:	
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Precision Surveys	CONTACT:	Larry Medrano
ADDRESS:	8414 Jefferson NE	PHONE:	856-5700
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87113
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	

CHECK TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- ___ DRAINAGE PLAN RESUBMITTAL
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SIA / FINANACIAL GUARANTEE RELEASE
- ___ 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
- X BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ___ YES
- X NO
- ___ COPY PROVIDED

RECEIVED
APR 02 2003
HYDROLOGY SECTION

DATE SUBMITTED: 4/2/2003 BY: Jonathan Niski

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of sumbittal may be required based on the following:

1. **Conceptual Grading and Drainage Plans**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

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

twllc@tierrawestllc.com
1-800-245-3102

April 2, 2003

Carlos Montoya, PE
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

RE: Re-submittal of West Bluff Town Homes Grading Plan

Dear Mr. Montoya:

Attached please find an updated Drainage Report and Grading and Drainage Plan for the West Bluff Townhomes. The site was originally approved on May 4, 2001 and I attached a copy of the approval letter. It has been over a year since that approval and we are requesting an updated approval. No changes have been made to the Grading and Drainage Plan or Drainage Report.

Should you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Sara Lavy

Sara Lavy, P.E.

Enclosure

cc: Paul Silverman

JN: 200087
scl

200087: 20087 carlos Montoya ltr.doc

JN2000?/

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 4, 2001

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

RE: WEST BLUFF TOWNHOUSES (H11-D49A). Resubmittal OF GRADING AND DRAINAGE PLAN FOR PRELIMINARY PLAT AND FINAL PLAT, AND FOR GRADING PERMIT APPROVALS. ENGINEER'S STAMP DATED APRIL 11, 2001. ORIGINAL STAMPED MARCH 7, 2001.

Dear Mr.Bohannan:

Based on the information provided on your April 18, 2001 resubmittal, the above referenced project is approved for Preliminary and Final Plats and for Grading Permit.

When submitting for Building Permit, please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Prior to Certificate of Occupancy approval, an Engineer's Certification per the DPM will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Terri Martin
File

RECEIVED
APR 02 2003
HYDROLOGY SECTION

DRAINAGE REPORT

for

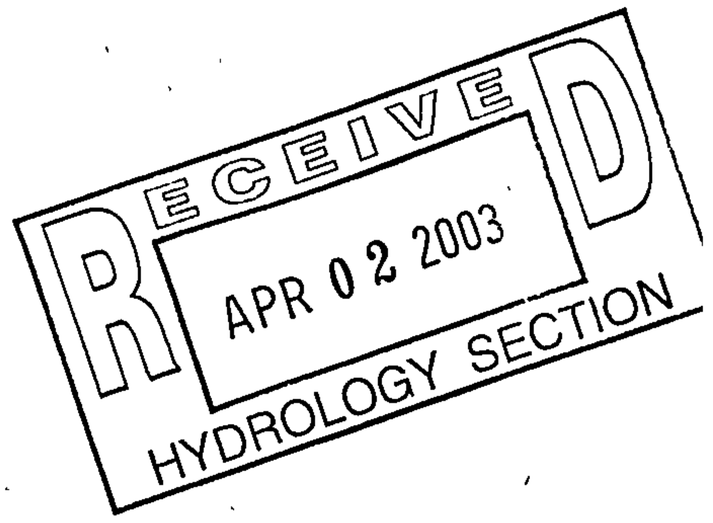
West Bluff Town Homes

Prepared by

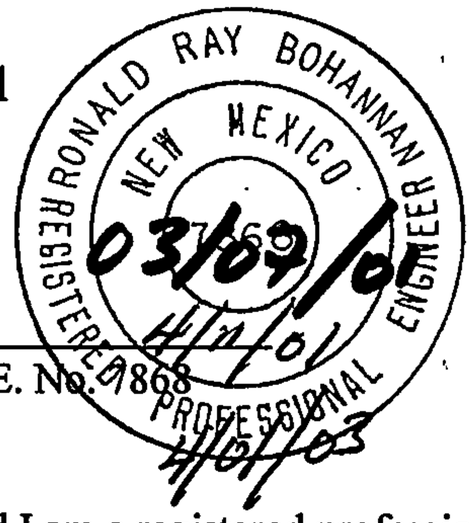
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

West Bluff Center, LLC
4408 Canyon Court NE
Albuquerque, New Mexico 87111-3010



March 2001



Ronald R. Bohannan P.E. No. 9868

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.

TABLE OF CONTENTS

Location

West Bluff Town Homes is a proposed nine unit town home subdivision. It is located on Alamogordo Drive NW between Ouray Road and Ian Avenue. The site is shown on the attached Zone Atlas Map H-11 and contains approximately 0.5354 acres. The legal description of the property is Lots 1 through 9 of the West Bluff Center Subdivision. The purpose of this report is to provide the drainage analysis and management plan for the subdivision.

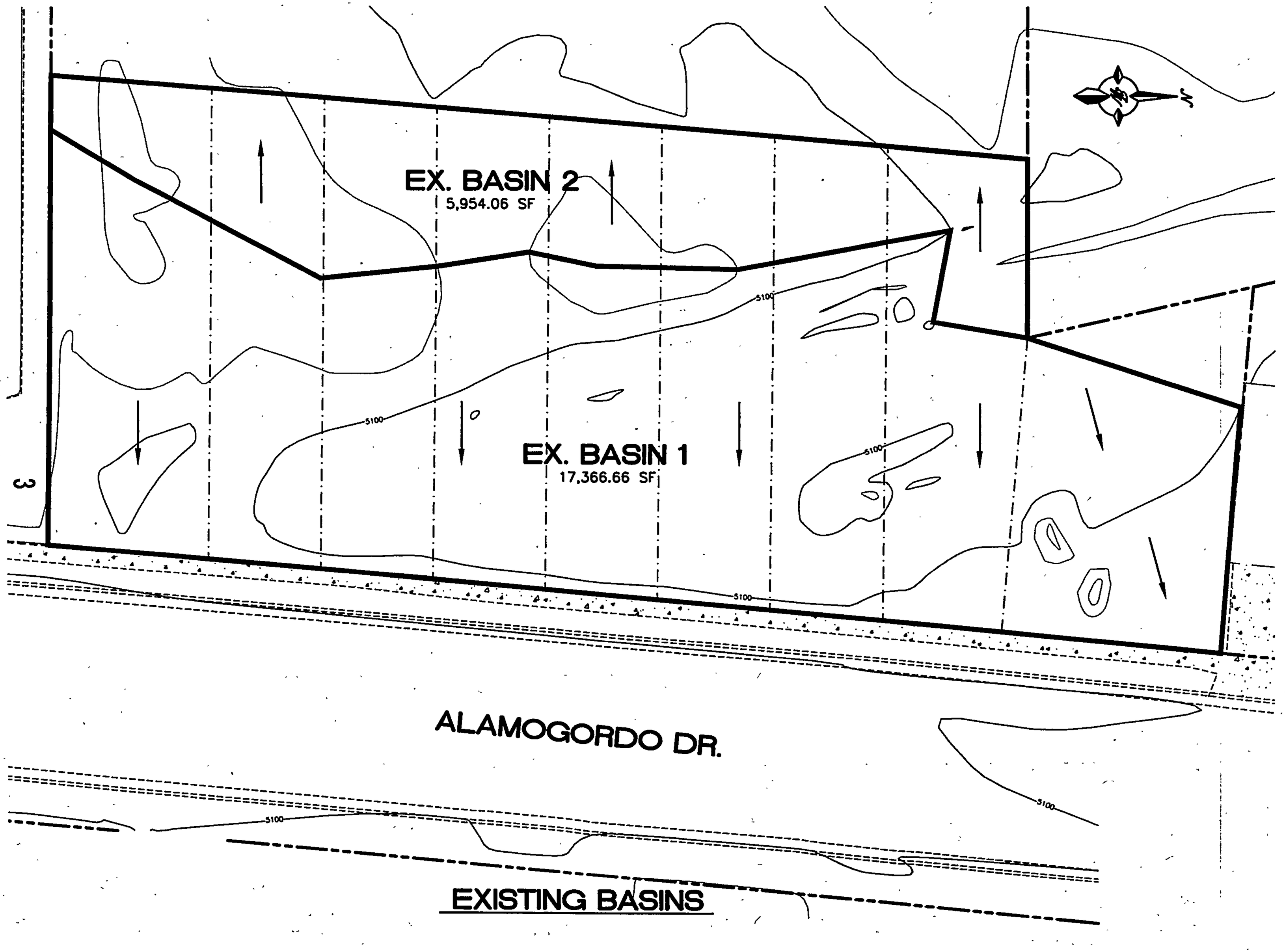
Existing Drainage Conditions

The site is currently undeveloped. As shown on the attached exhibit, there are two existing basins on the site. Basin 1 sheet flows east with an undeveloped discharge rate of 0.83 cfs towards Alamogordo Drive. Based on the drainage report filed for the Western Estates Subdivision in H11-D54, see attached appendix, the West Bluff Town Homes site falls within Basin A and has been accounted for in the downstream analysis. The flows from Alamogordo Drive NW drain to an existing channel built under City Project #5509.81 at Bridges Avenue. The channel, with a capacity for 70.50 cfs, then flows into the West Bluff Outfall. Basin 2 sheet flows west with an undeveloped discharge rate of 0.28 cfs to an undeveloped tract of land. There are existing buildings to the north and south of the site but no off-site flows enter our site from either location.

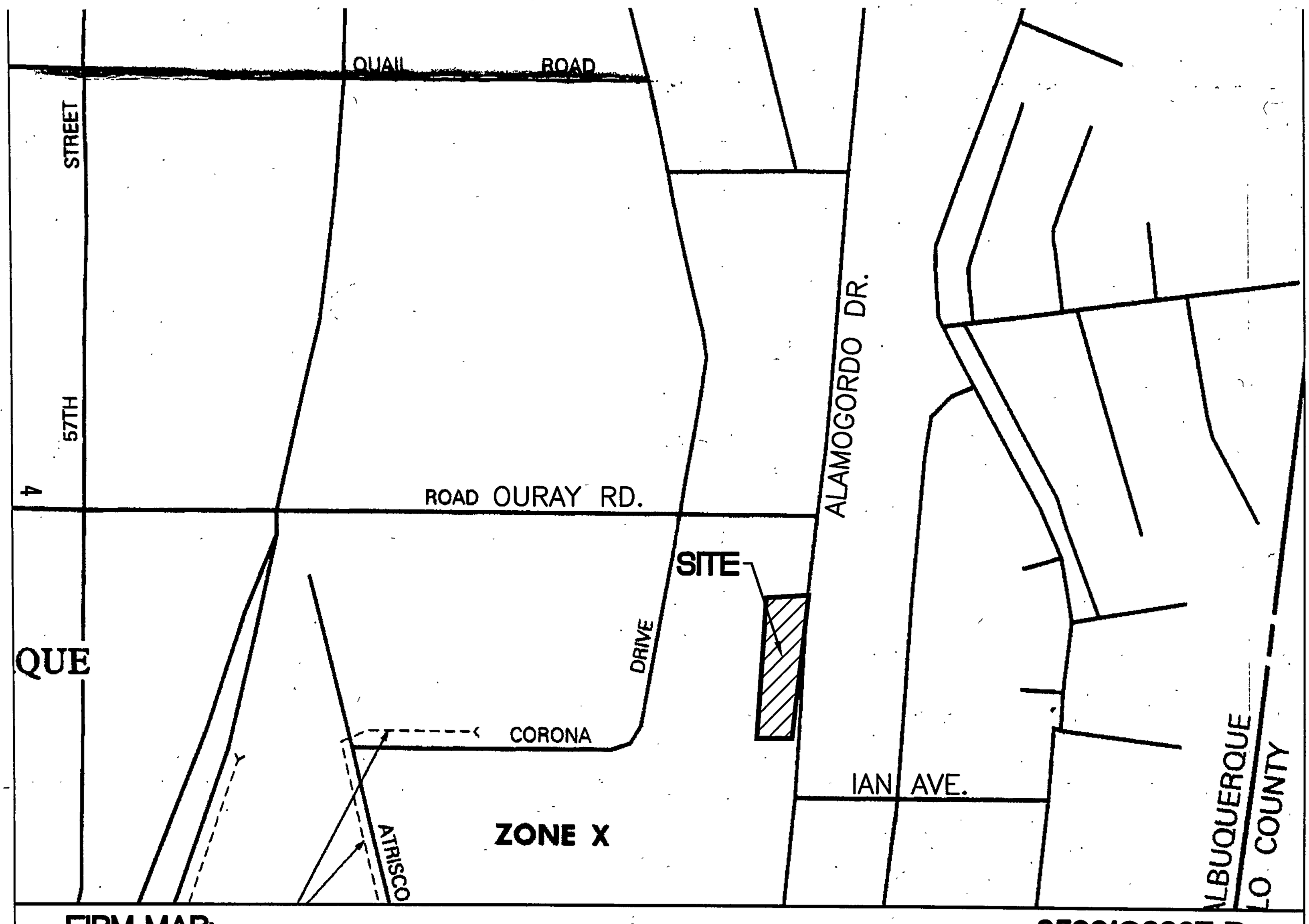
FIRM Map and Soil Conditions

The site is located on FIRM Map 35001C0327 D as shown on the attached excerpt. The map shows that the site does not lie in a flood zone.

The site contains one soil from the Soil Conservation Service Soil Survey of Bernalillo County. It is a Bluepoint loamy fine sand which has slow runoff and a severe hazard of soil blowing. The surface layer of the soil ranges from sand to clay.



EXISTING BASINS



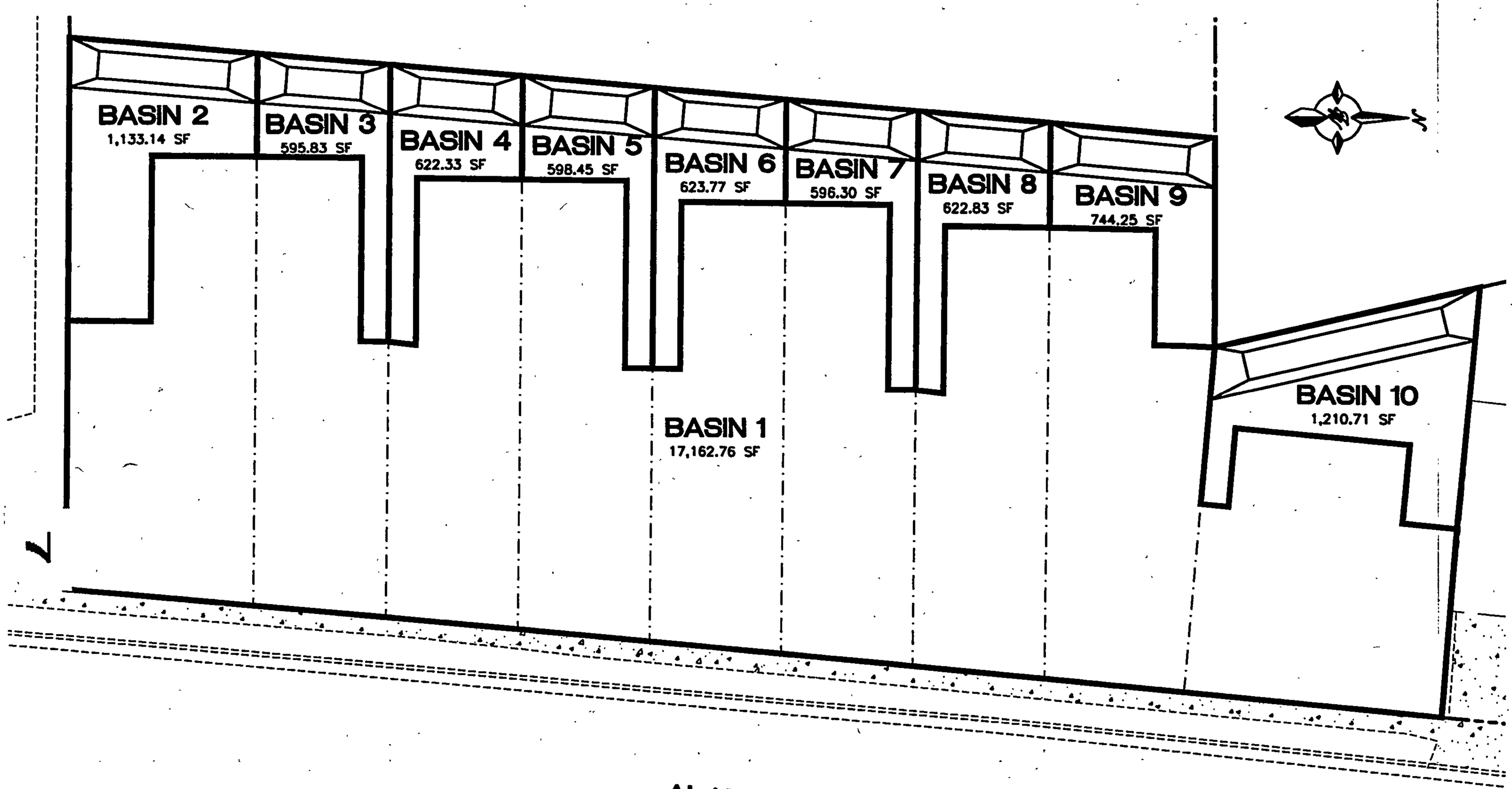
FIRM MAP: **35001C0327 D**

On-Site Drainage Management Plan

Most of the site will drain to Alamogordo Drive with each lot containing a rear yard pond. The roofs for each unit will drain to the front of the pad, which is included in Basin 1. The rear yard ponds are required due to the flatness of the site and the design of the town homes. This solution conforms to an approved Grading and Drainage Report filed by Brasher & Lorenz, Inc. for Pal Estates (H11-D49) on June 7, 1995, which allows for free discharge from the site. Based on the drainage report for the Western Estates Subdivision in H11-D54, Alamogordo Drive NW has the capacity for the free discharge from the site.

As shown on the attached Developed Basins Exhibit, there are 10 proposed basins on the site, which account for each of the rear yard ponds. The developed flow from Basin 1, which includes the front yard of each lot and the roofs of the town homes, will free discharge into Alamorgordo Drive at a rate of 1.54 cfs. Basins 2 through 10 are located in the rear of each lot and include only the flow that falls in the rear yard. All rear yard ponds were designed for the 10-day, 100-year volume. As mentioned previously, all roof drainage will be designed to flow to the front of the building by either a pitched roof or by rain gutters. We have included a Pond Summary Table at the end of the report that includes the following information: Basin 2 has a required 10-day, 100-year volume requirement of 0.001452 ac-ft. The pond for this basin has a capacity for 0.001611 ac-ft. Basins 3 through 8 have a required 10-day, 100-year volume requirement of 0.000800 ac-ft. each. The ponds for these basins have a capacity for 0.00818 ac-ft. each. Basin 9 has a required 10-day, 100-year volume requirement of 0.000954 ac-ft. The pond for this basin has a capacity for 0.001044 ac-ft. Basin 10 has a required 10-day, 100-year volume requirement of 0.001552 ac-ft. The pond for this basin had a capacity for 0.001778 ac-ft. If at some time in the future the ponds become filled with debris, the resulting 0.32 cfs will free discharge into Alamogordo Drive NW.

In the event of an emergency or a storm greater than a 100-year event Basins 2 through 10 will sheet flow into to Basin 1 and these flows will continue to free discharge into Alamogordo Drive.



ALAMOGORDO DR.

DEVELOPED BASINS

Weighted E Method

Undeveloped On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
1	17,367	0.40	50%	0.20	0%	0.00	50%	0.1993457	0%	0.00	0.715	0.024	0.83	0.260	0.009	0.34
2	5,954	0.14	50%	0.07	0%	0.00	50%	0.0683425	0%	0.00	0.715	0.008	0.28	0.260	0.003	0.12
Total	23,321	0.54										0.032	1.11		0.012	0.46

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)		
Zone 1	100-Year	10 - Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

Weighted E Method

Developed On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	100-Year, 6-Hr Weighted E	100-Year, 6-Hr Volume (ac-ft)	100-Year, 6-Hr Flow cfs	10-Year, 6-Hr Weighted E	10-Year, 6-Hr Volume (ac-ft)	10-Year, 6-Hr Flow cfs	2-Year, 6-Hr Weighted E	2-Year, 6-Hr Volume (ac-ft)	2-Year, 6-Hr Flow cfs	100-Year, 10-Day Weighted E	100-Year, 10-Day Volume (ac-ft)	100-Year, 10-Day Flow cfs
1	17,163	0.39	0%	0	20%	0.08	0%	0	80%	0.32	1.710	0.056	1.54	1.036	0.034	0.97	0.578	0.019	0.54	1.710	0.094759	1.54
2	1,133	0.03	0%	0	100%	0.03	0%	0	0%	0.00	0.670	0.001	0.05	0.220	0.000	0.02	0.010	0.000	0.00	0.670	0.001452	0.05
3	596	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000764	0.03
4	622	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000797	0.03
5	598	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000766	0.03
6	624	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000800	0.03
7	596	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000764	0.03
8	623	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000799	0.03
9	744	0.02	0%	0	100%	0.02	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000954	0.03
10	1,211	0.03	0%	0	100%	0.03	0%	0	0%	0.00	0.670	0.002	0.06	0.220	0.001	0.02	0.010	0.000	0.00	0.670	0.001552	0.06

POND SUMMARY

	BASIN 2	BASINS 3-8	BASIN 9	BASIN 10
Area of Pond Top (SF)	306.85	216.60	265.96	437.51
Area of Pond Bottom (SF)	118.47	68.33	97.70	182.25
Depth of Pond (FT)	0.33	0.25	0.25	0.25
Volume (CF)	70.18	35.62	45.46	77.47
Volume (AC-FT)	0.001611	0.000818	0.001044	0.001778
Volume Required (CF)	63.25	34.85	41.56	67.61
Volume Required (AC-FT)	0.001452	0.000800	0.000954	0.001552
Volume Provided (CF)	70.18	35.62	45.46	77.47
Volume Provided (AC-FT)	**0.001611**	**0.000818**	**0.001044**	**0.001778**

VOLUME OF POND

V=(At + Ab)/2 * D

At = Area of Top

Ab= Area of Bottom

D = Depth

DOWNSTREAM ANALYSIS

The Western Estates Subdivision is an infill project located adjacent to a developed residential area. The 1.9 acre site represents approximately 9% of a 20.4 acre basin that drains to the West Bluff Outfall System (the Outfall). Developed runoff from the project site will discharge into Alamagordo Drive. Alamagordo Drive conveys developed runoff from the local residential properties, together with runoff from the project site to the West bluff Outfall. Developed runoff enters the Outfall from a paved public channel (see pages 5 & 6) and 24 inch storm drain. The storm drain makes a direct connection to the Outfall system as it parallels I-40, just west of the Rio Grande River. The Outfall consists of an underground box conduit with a concrete channel located on the surface which conveys surface flow from the I-40 right-of-way.

As shown by the street capacity calculations, under existing conditions Alamagordo carries 45.5 cfs which results in a street depth of 0.68 feet. The proposed development will increase the flowrate to 50.4 cfs with a street depth of 0.71 feet. Development of this property results in a 4% increase in street depth. Street flows are anticipated to exceed curb height by 0.04 feet, but will remain within the public right-of-way. The street slope of 0.2% results in a velocity of 2.5 fps. The development of the project site will increase the flow rate approximately 4.9 cfs, or 7% over existing conditions.

Flow depths in the outfall channel are 0.98 feet under existing conditions and 1.02 under developed conditions. The existing channel cross-section provides a 6-inch channel invert and 6 inch concrete curbs, for a total channel depth of 1.0 foot. Sufficient horizontal and vertical depths are present outside the channel edges to convey flows which over top the channel curbs. The inlet to the Outfall system consists of a 24 inch RCP storm drain which makes direct connection to the underground conduit. As shown by the attached nomograph (see page 8), the 24 inch storm drain has a capacity of approximately 22 cfs, leaving the remaining runoff (48.5 cfs) to exit over the headwall and enter the Outfall channel along I-40. This condition is present under existing conditions.

Portions of the downstream improvements are to be reconstructed with this project in order to improve downstream capacity. Meetings with City of Albuquerque Hydrology staff have resulted in a policy for this project where certain improvements will be provided with the construction of Western Estates, with the remaining improvements to be provided by future developments. The following schedule is proposed which will provide reconstruction of the downstream channel:

Western Estates Subdivision will provide the Following:

1. Reconstruct the channel inlet at the intersection of Alamagordo and Bridges to improve channel inlet hydraulics and provide capacity for predicted developed flows.

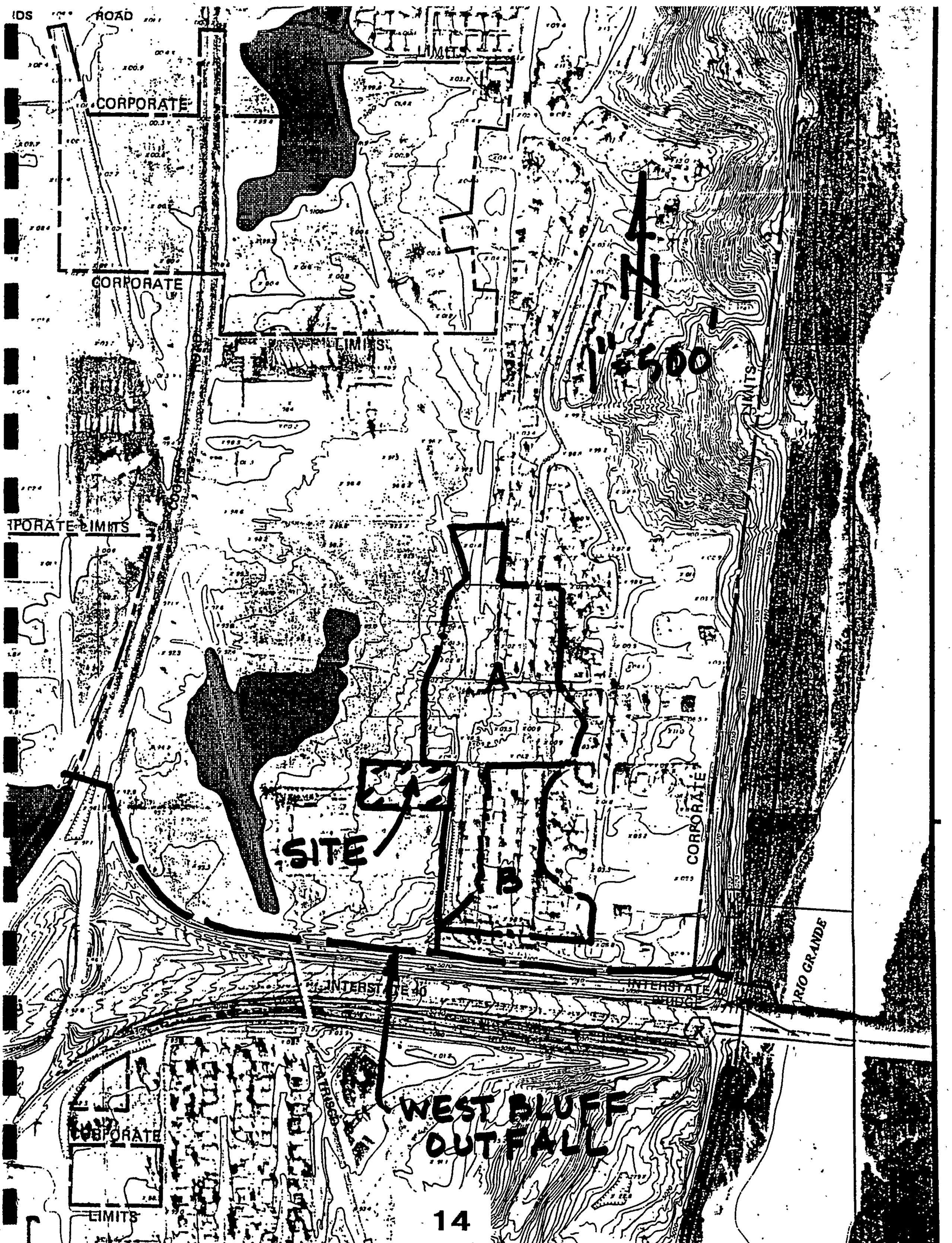
2. Reconstruct the inlet to the West Bluff Outfall at the channel terminus to provide capacity for predicted developed flows.

Future developments will provide the following:

1. Reconstruct the existing channel section between the reconstructed channel inlet and the channel outfall to provide additional sidewall height, per DPM criteria.

Western Estates Subdivision will provide downstream improvements as outlined above. Complete details and calculations are provided to demonstrate system capacities.

			HYDROLOGY - HYMO					
Precipitation Zone 1						P360 = 2.20 inches		
BASIN	AREA	Aa	Ab	Ac	Ad	E	Q100	VOL100
	acres	acres	acres	acres	acres	inches	cfs	af
EXISTING CONDITION:								
SITE	1.93	1.93				0.44	2.5	0.0708
A	12.60	0.00	3.15	3.15	6.30	1.40	43.0	1.4700
B	5.90	0.00	1.48	1.48	2.94	1.40	20.1	0.6883
DEVELOPED CONDITION:								
SITE	1.93	0.00	0.29	0.24	1.40	1.65	7.4	0.2654
A	12.60	0.00	3.15	3.15	6.30	1.40	43.0	1.4700
B	5.90	0.00	1.48	1.48	2.94	1.40	20.1	0.6883


ROAD
CORPORATE
CORPORATE
LIMITS
LIMITS
1"=500'
RPORATE LIMITS
COURT
SITE
A
B
CORPORATE
RIO GRANDE
INTERSTATE 10
INTERSTATE 10
BRIDGE
WEST BLUFF
OUTFALL
CORPORATE
LIMITS

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 2, 2001

Ron Bohannan, PE
Tierra West, LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: West Bluff Townhomes, Revised Grading Plan
Engineer's Stamp dated 5-26-01 (H11/D49A)

Dear Mr. Bohannan,

Based upon the information provided in your submittal dated 6-8-01, the above referenced Plan is approved for Final Plat action by the DRB.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

H-11/D49A

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *West Bluff Townhomes* **ZONE ATLAS/DRNG. FILE #:** *H-11 / D49 A*

DRB #: *1001004 / 1001005* **EPC #:** **WORK ORDER #:**

LEGAL DESCRIPTION: *Lots 1 through 9 of the West Bluff Center Subdivision*

CITY ADDRESS: *Alamogordo Dr. between Ouray Rd. and Ian Ave.*

ENGINEERING FIRM: *TIERRA WEST, LLC* **CONTACT:** *Ronald R. Bohannan or Sara Lavy*

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

OWNER: *West Bluff Center LLC* **CONTACT:** *Paul Silverman*

ADDRESS: *4408 Canyon Court NE* **PHONE:** *(505) 294-8625*

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

PRE-DESIGN MEETING:

- ___ YES
- X NO
- ___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SKETCH PLAN APPROVAL
- X PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- X 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 08 2001
HYDROLOGY SECTION

DATE SUBMITTED: *06/07/01*

BY: *Jonathan Niski*

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

June 6, 2001

Bradley L. Bingham, PE
City of Albuquerque
Sr. Engineer, Hydrology
P. O. Box 1293
Albuquerque, NM 87103

H11/D49A

RE: Re-submittal of West Bluff Town Homes Grading Plan

Dear Bradley:

Attached you will find a new Grading and Drainage Plan for the West Bluff Townhomes. You approved the drainage report on April 4, 2001 with the engineer's stamp date of 3-12-01. We request approval for the drainage of this site with the new Grading and Drainage Plan described below.

We added a CMU block wall around the site and wall details that were not originally shown on the Grading and Drainage Plan. This addition does not affect the site's drainage and the drainage report was not changed. Please file this Grading and Drainage plan with that report so the latest drawing is on file.

Should you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Ronald R. Bohannan, P.E.

Enclosure

cc: Paul Silverman

JN: 200087
RRB/jdn

RECEIVED
JUN 08 2001
HYDROLOGY

200087:20087Brad060401.wpd

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 4, 2001

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

RE: WEST BLUFF TOWNHOUSES (H11-D49A). Resubmittal OF GRADING AND DRAINAGE PLAN FOR PRELIMINARY PLAT AND FINAL PLAT, AND FOR GRADING PERMIT APPROVALS. ENGINEER'S STAMP DATED APRIL 11, 2001. ORIGINAL STAMPED MARCH 7, 2001.

Dear Mr.Bohannan:

Based on the information provided on your April 18, 2001 resubmittal, the above referenced project is approved for Preliminary and Final Plats and for Grading Permit.

When submitting for Building Permit, please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Prior to Certificate of Occupancy approval, an Engineer's Certification per the DPM will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Terri Martin
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *West Bluff Townhomes* **ZONE ATLAS/DRNG. FILE #:** *H-11 / D49 A*

DRB #: *1001004 / 1001005* **EPC #:** **WORK ORDER #:**

LEGAL DESCRIPTION: *Lots 1 through 9 of the West Bluff Center Subdivision*

CITY ADDRESS: *Alamogordo Dr. between Ouray Rd. and Ian Ave.*

ENGINEERING FIRM: *TIERRA WEST, LLC* **CONTACT:** *Ronald R. Bohannan or Sara Lavy*

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

OWNER: *West Bluff Center LLC* **CONTACT:** *Paul Silverman*

ADDRESS: *4408 Canyon Court NE* **PHONE:** *(505) 294-8625*

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

PRE-DESIGN MEETING:

- ___ YES
- X NO
- ___ COPY PROVIDED

RECEIVED
APR 18 2001
HYDROLOGY SECTION

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SKETCH PLAN APPROVAL
- X PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- X 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*

DATE SUBMITTED: *04/11/01*

BY: *Jonathan Niski*

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

April 17, 2001

Bradley L. Bingham, PE
City of Albuquerque
Sr. Engineer, Hydrology
P. O. Box 1293
Albuquerque, NM 87103

RE: Re-submittal of West Bluff Town Homes Drainage Report H11/D49A

Dear Bradley:

I have addressed the comments you made on the West Bluff Town Homes Subdivision as follows:

1. Backyard ponds are allowable but you cannot get credit for them in the total amount that will drain to the street. It is possible that these ponds could get filled in the future. Therefore, all 10 developed basins must be added together to discuss the capacity of Alamogordo.
   A sentence was added in the On-Site Drainage Management Plan section stating that if the ponds become filled with debris the resulting 0.32 cfs will free discharge into Alamogordo Drive and was restated in the Summary on page six.

2. Please describe where the system your project drains to and what capacity is available.
   We added a note in the Existing Drainage Conditions on page two stating that the flows drain to a channel at Alamogordo Drive and Bridges Avenue. The channel was designed for 70.50 cfs and the analysis included this site in the calculations. The site has capcity to serve the lots and we have included this statement on page eleven.

Should you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Ronald R. Bohannan, P.E.

Enclosures

Cc: Paul Silverman

JN: 200087
RRB/jdn

200087brad.wpd

DRAINAGE REPORT

for

West Bluff Town Homes

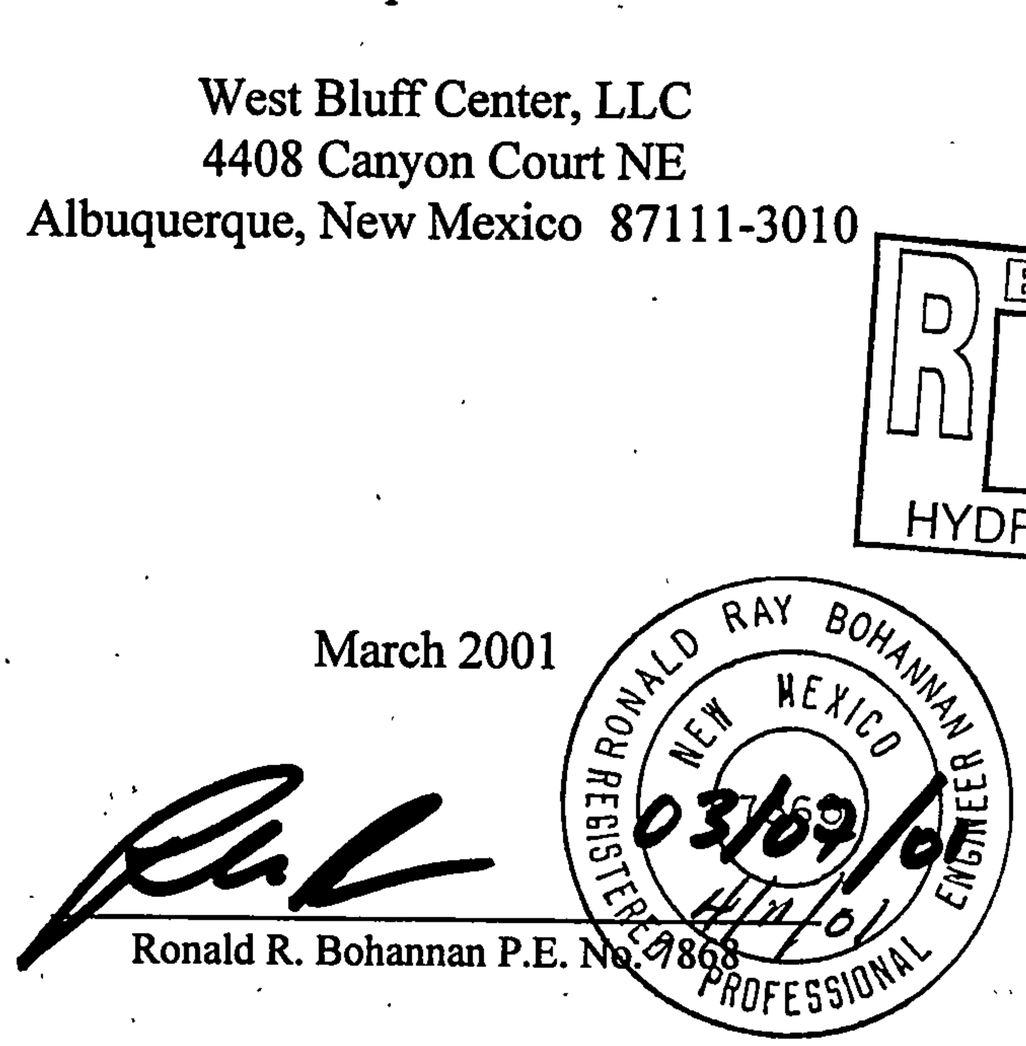
Prepared by

Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

West Bluff Center, LLC
4408 Canyon Court NE
Albuquerque, New Mexico 87111-3010

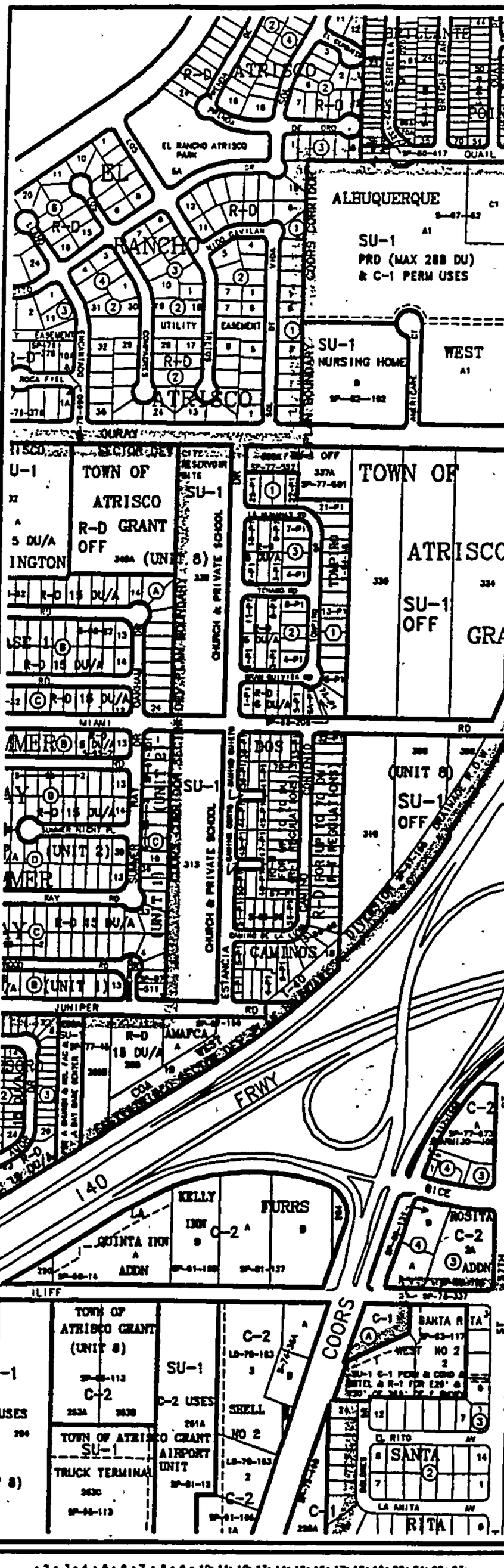
March 2001



Ronald R. Bohannan P.E. No. 9868

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.

TABLE OF CONTENTS



CITY OF
Albuquerque

A lbuquerque G eographic I nformation S ystem

PLANNING DEPARTMENT

GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

H-11-Z

Map Amended through July 28, 2000

Location

West Bluff Town Homes is a proposed nine unit town home subdivision. It is located on Alamogordo Drive NW between Ouray Road and Ian Avenue. The site is shown on the attached Zone Atlas Map H-11 and contains approximately 0.5354 acres. The legal description of the property is Lots 1 through 9 of the West Bluff Center Subdivision. The purpose of this report is to provide the drainage analysis and management plan for the subdivision.

Existing Drainage Conditions

The site is currently undeveloped. As shown on the attached exhibit, there are two existing basins on the site. Basin 1 sheet flows east with an undeveloped discharge rate of 0.83 cfs towards Alamogordo Drive. Based on the drainage report filed for the Western Estates Subdivision in H11-D54, see attached appendix, the West Bluff Town Homes site falls within Basin A and has been accounted for in the downstream analysis. The flows from Alamogordo Drive NW drain to an existing channel built under City Project #5509.81 at Bridges Avenue. The channel, with a capacity for 70.50 cfs, then flows into the West Bluff Outfall. Basin 2 sheet flows west with an undeveloped discharge rate of 0.28 cfs to an undeveloped tract of land. There are existing buildings to the north and south of the site but no off-site flows enter our site from either location.

FIRM Map and Soil Conditions

The site is located on FIRM Map 35001C0327 D as shown on the attached excerpt. The map shows that the site does not lie in a flood zone.

The site contains one soil from the Soil Conservation Service Soil Survey of Bernalillo County. It is a Bluepoint loamy fine sand which has slow runoff and a severe hazard of soil blowing. The surface layer of the soil ranges from sand to clay.

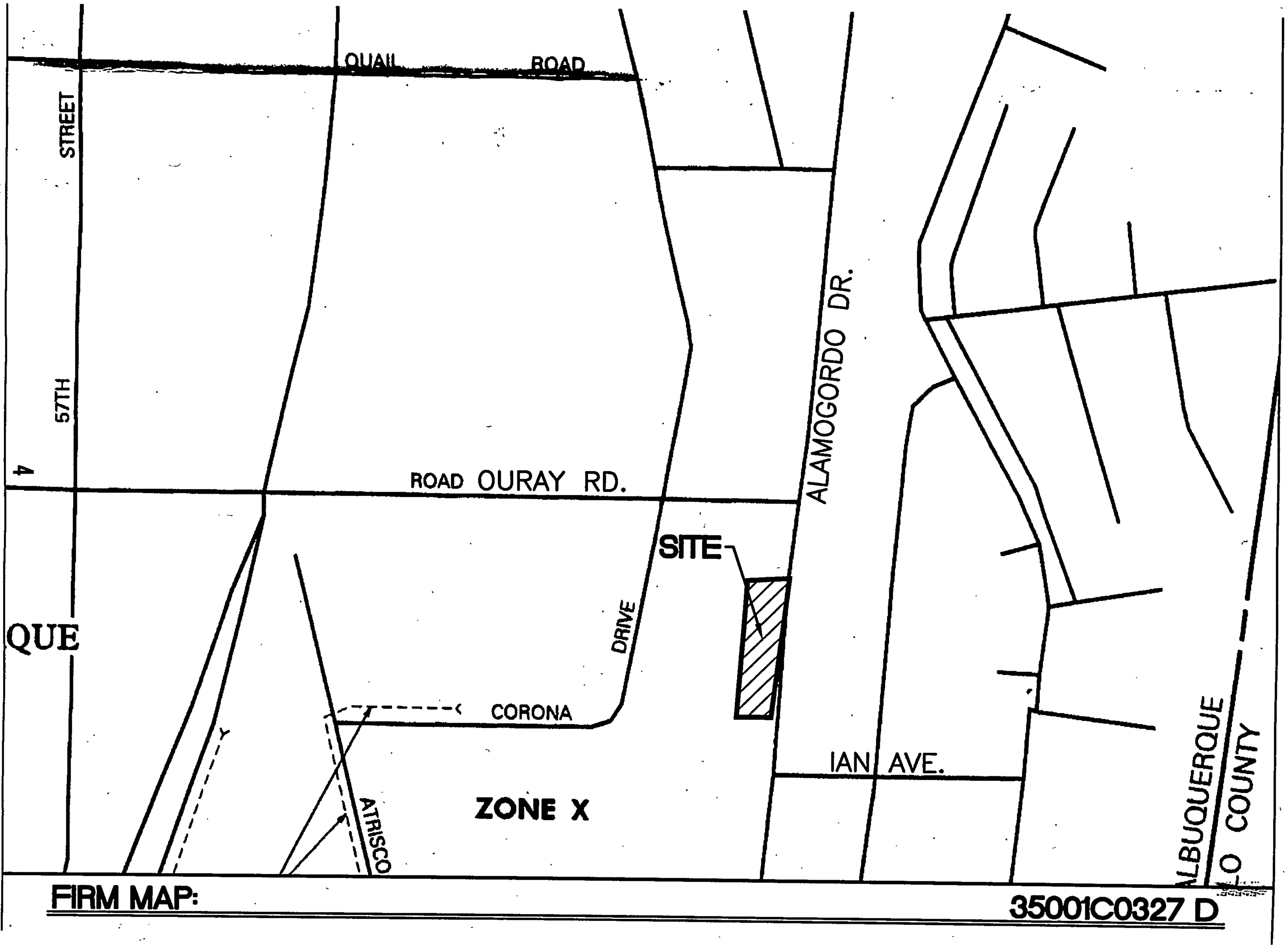
EX. BASIN 2
5,954.06 SF

EX. BASIN 1
17,366.66 SF

5100

ALAMOGORDO DR.

EXISTING BASINS



FIRM MAP: 35001C0327 D

On-Site Drainage Management Plan

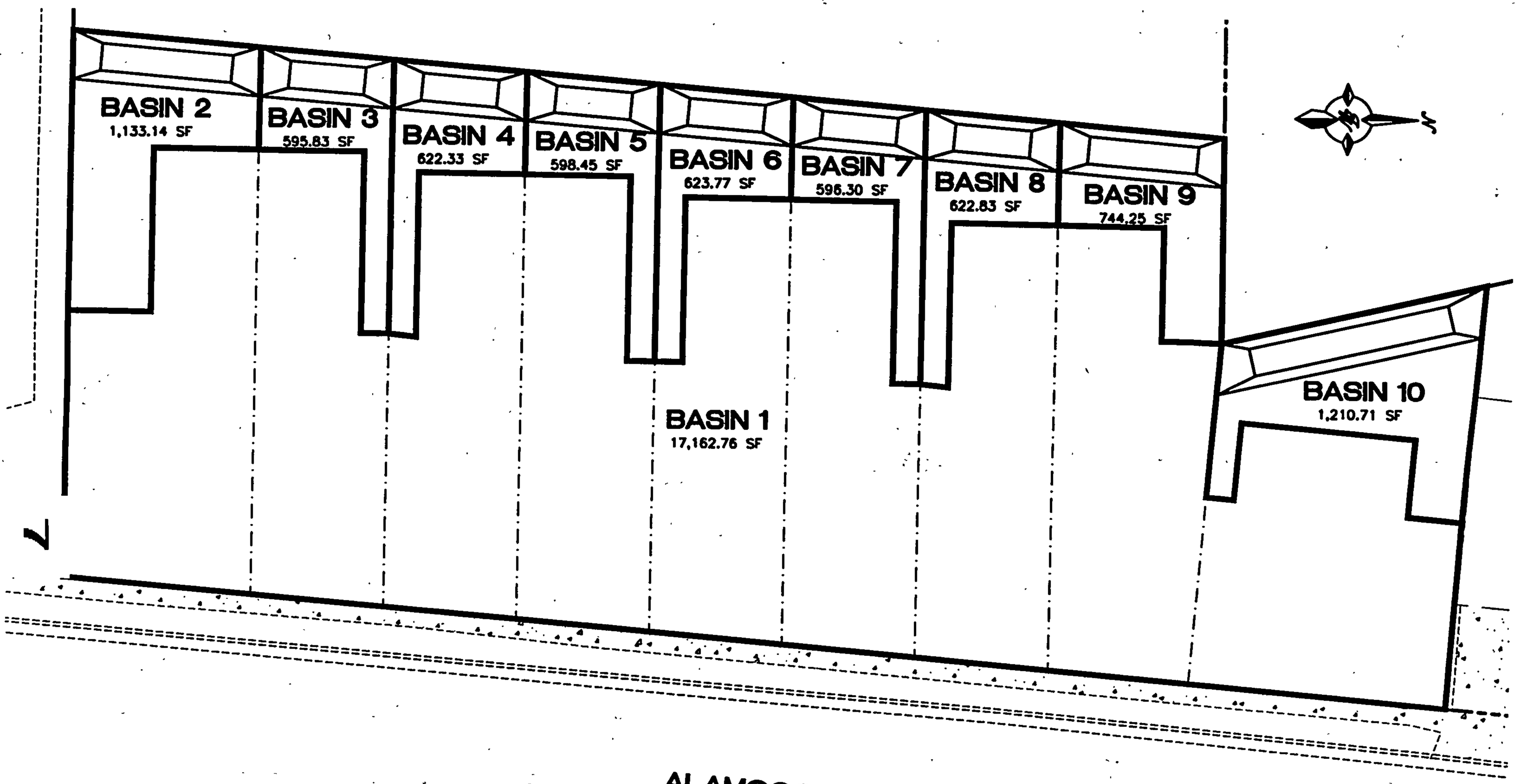
Most of the site will drain to Alamogordo Drive with each lot containing a rear yard pond. The roofs for each unit will drain to the front of the pad, which is included in Basin 1. The rear yard ponds are required due to the flatness of the site and the design of the town homes. This solution conforms to an approved Grading and Drainage Report filed by Brasher & Lorenz, Inc. for Pal Estates (H11-D49) on June 7, 1995, which allows for free discharge from the site. Based on the drainage report for the Western Estates Subdivision in H11-D54, Alamogordo Drive NW has the capacity for the free discharge from the site.

As shown on the attached Developed Basins Exhibit, there are 10 proposed basins on the site, which account for each of the rear yard ponds. The developed flow from Basin 1, which includes the front yard of each lot and the roofs of the town homes, will free discharge into Alamorgordo Drive at a rate of 1.54 cfs. Basins 2 through 10 are located in the rear of each lot and include only the flow that falls in the rear yard. All rear yard ponds were designed for the 10-day, 100-year volume. As mentioned previously, all roof drainage will be designed to flow to the front of the building by either a pitched roof or by rain gutters. We have included a Pond Summary Table at the end of the report that includes the following information: Basin 2 has a required 10-day, 100-year volume requirement of 0.001452 ac-ft. The pond for this basin has a capacity for 0.001611 ac-ft. Basins 3 through 8 have a required 10-day, 100-year volume requirement of 0.000800 ac-ft. each. The ponds for these basins have a capacity for 0.00818 ac-ft. each. Basin 9 has a required 10-day, 100-year volume requirement of 0.000954 ac-ft. The pond for this basin has a capacity for 0.001044 ac-ft. Basin 10 has a required 10-day, 100-year volume requirement of 0.001552 ac-ft. The pond for this basin had a capacity for 0.001778 ac-ft. If at some time in the future the ponds become filled with debris, the resulting 0.32 cfs will free discharge into Alamogordo Drive NW.

In the event of an emergency or a storm greater than a 100-year event Basins 2 through 10 will sheet flow into to Basin 1 and these flows will continue to free discharge into Alamogordo Drive.

Summary

Basin 1 will discharge a total of 1.54 cfs into Alamogordo Drive while Basins 2 through 10 will have the flows contained in rear yard ponds. If needed, Basins 2 through 10 will overflow into Basin 1 by sheet flowing through the side yards. The flows, 1.86 cfs total, will continue to free discharge into Alamogordo Drive.



DEVELOPED BASINS

Weighted E Method

Undeveloped On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
1	17,367	0.40	50%	0.20	0%	0.00	50%	0.1993457	0%	0.00	0.715	0.024	0.83	0.260	0.009	0.34
2	5,954	0.14	50%	0.07	0%	0.00	50%	0.0683425	0%	0.00	0.715	0.008	0.28	0.260	0.003	0.12
Total	23,321	0.54										0.032	1.11		0.012	0.46

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (Inches)		
Zone 1	100-Year	10 - Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

Weighted E Method

Developed On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year, 6-Hr			10-Year, 6-Hr			2-Year, 6-Hr			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E	Volume (ac-ft)	Flow cfs	Weighted E	Volume (ac-ft)	Flow cfs	Weighted E	Volume (ac-ft)	Flow cfs	Weighted E	Volume (ac-ft)	Flow cfs
1	17,163	0.39	0%	0	20%	0.08	0%	0	80%	0.32	1.710	0.056	1.54	1.036	0.034	0.97	0.578	0.019	0.54	1.710	0.094759	1.54
2	1,133	0.03	0%	0	100%	0.03	0%	0	0%	0.00	0.670	0.001	0.05	0.220	0.000	0.02	0.010	0.000	0.00	0.670	0.001452	0.05
3	596	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000764	0.03
4	622	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000797	0.03
5	598	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000766	0.03
6	624	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000800	0.03
7	596	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000764	0.03
8	623	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000799	0.03
9	744	0.02	0%	0	100%	0.02	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000954	0.03
10	1,211	0.03	0%	0	100%	0.03	0%	0	0%	0.00	0.670	0.002	0.06	0.220	0.001	0.02	0.010	0.000	0.00	0.670	0.001552	0.06

POND SUMMARY

	BASIN 2	BASINS 3-8	BASIN 9	BASIN 10
Area of Pond Top (SF)	306.85	216.60	265.96	437.51
Area of Pond Bottom (SF)	118.47	68.33	97.70	182.25
Depth of Pond (FT)	0.33	0.25	0.25	0.25
Volume (CF)	70.18	35.62	45.46	77.47
Volume (AC-FT)	0.001611	0.000818	0.001044	0.001778
Volume Required (CF)	63.25	34.85	41.56	67.61
Volume Required (AC-FT)	0.001452	0.000800	0.000954	0.001552
Volume Provided (CF)	70.18	35.62	45.46	77.47
Volume Provided (AC-FT)	**0.001611**	**0.000818**	**0.001044**	**0.001778**

VOLUME OF POND

V=(At + Ab)/2 * D

At = Area of Top

Ab= Area of Bottom

D = Depth

DOWNSTREAM ANALYSIS

The Western Estates Subdivision is an infill project located adjacent to a developed residential area. The 1.9 acre site represents approximately 9% of a 20.4 acre basin that drains to the West Bluff Outfall System (the Outfall). Developed runoff from the project site will discharge into Alamagordo Drive. Alamagordo Drive conveys developed runoff from the local residential properties, together with runoff from the project site to the West bluff Outfall. Developed runoff enters the Outfall from a paved public channel (see pages 5 & 6) and 24 inch storm drain. The storm drain makes a direct connection to the Outfall system as it parallels I-40, just west of the Rio Grande River. The Outfall consists of an underground box conduit with a concrete channel located on the surface which conveys surface flow from the I-40 right-of-way.

As shown by the street capacity calculations, under existing conditions Alamagordo carries 45.5 cfs which results in a street depth of 0.68 feet. The proposed development will increase the flowrate to 50.4 cfs with a street depth of 0.71 feet. Development of this property results in a 4% increase in street depth. Street flows are anticipated to exceed curb height by 0.04 feet, but will remain within the public right-of-way. The street slope of 0.2% results in a velocity of 2.5 fps. The development of the project site will increase the flow rate approximately 4.9 cfs, or 7% over existing conditions.

Flow depths in the outfall channel are 0.98 feet under existing conditions and 1.02 under developed conditions. The existing channel cross-section provides a 6-inch channel invert and 6 inch concrete curbs, for a total channel depth of 1.0 foot. Sufficient horizontal and vertical depths are present outside the channel edges to convey flows which over top the channel curbs. The inlet to the Outfall system consists of a 24 inch RCP storm drain which makes direct connection to the underground conduit. As shown by the attached nomograph (see page 8), the 24 inch storm drain has a capacity of approximately 22 cfs, leaving the remaining runoff (48.5 cfs) to exit over the headwall and enter the Outfall channel along I-40. This condition is present under existing conditions.

Portions of the downstream improvements are to be reconstructed with this project in order to improve downstream capacity. Meetings with City of Albuquerque Hydrology staff have resulted in a policy for this project where certain improvements will be provided with the construction of Western Estates, with the remaining improvements to be provided by future developments. The following schedule is proposed which will provide reconstruction of the downstream channel:

Western Estates Subdivision will provide the Following:

1. Reconstruct the channel inlet at the intersection of Alamagordo and Bridges to improve channel inlet hydraulics and provide capacity for predicted developed flows.

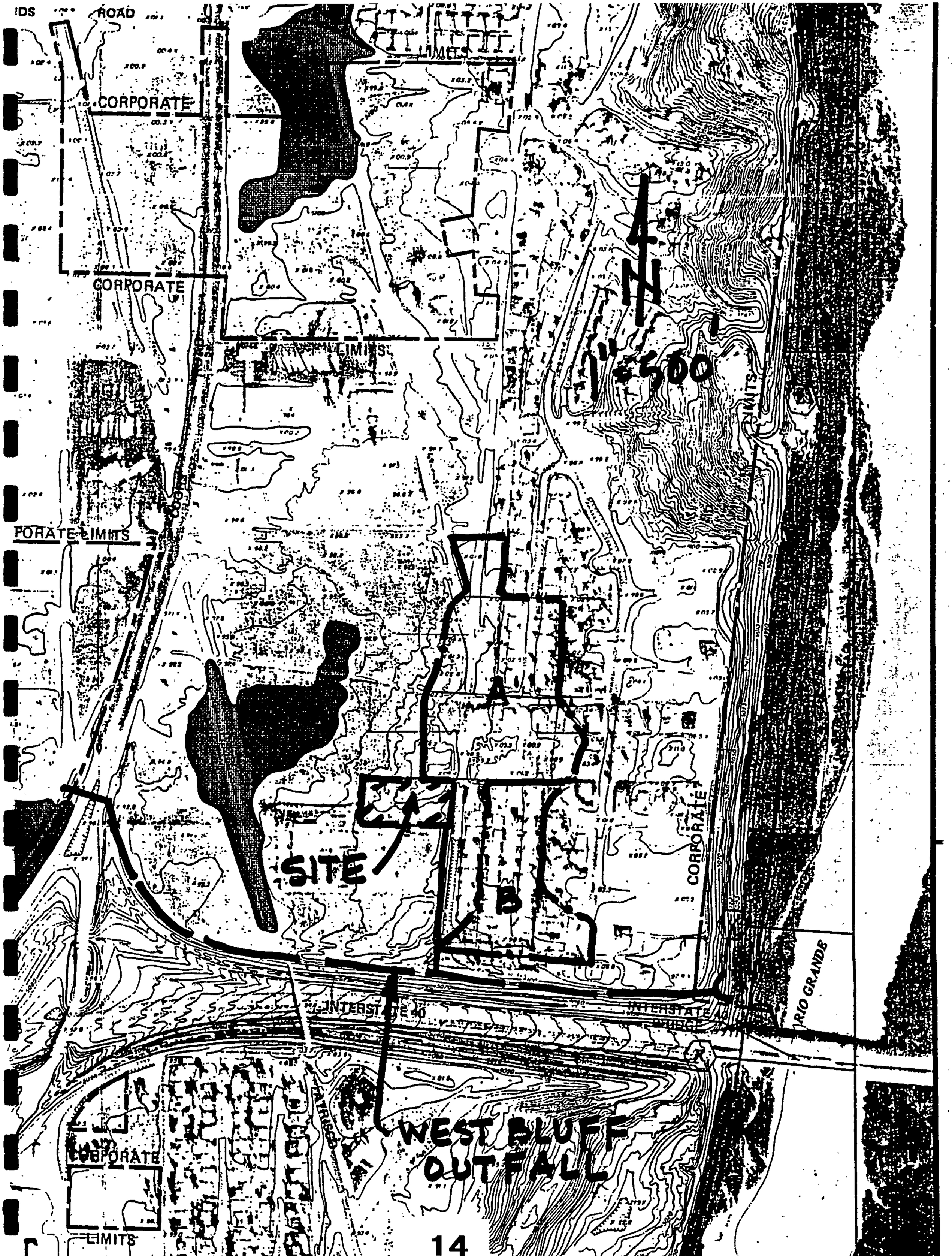
2. Reconstruct the inlet to the West Bluff Outfall at the channel terminus to provide capacity for predicted developed flows.

Future developments will provide the following:

1. Reconstruct the existing channel section between the reconstructed channel inlet and the channel outfall to provide additional sidewall height, per DPM criteria.

Western Estates Subdivision will provide downstream improvements as outlined above. Complete details and calculations are provided to demonstrate system capacities.

			HYDROLOGY - HYMO					
Precipitation Zone 1						P360 = 2.20 inches		
BASIN	AREA	Aa	Ab	Ac	Ad	E	Q100	VOL100
	acres	acres	acres	acres	acres	inches	cfs	af
EXISTING CONDITION:								
SITE	1.93	1.93				0.44	2.5	0.0708
A	12.60	0.00	3.15	3.15	6.30	1.40	43.0	1.4700
B	5.90	0.00	1.48	1.48	2.94	1.40	20.1	0.6883
DEVELOPED CONDITION:								
SITE	1.93	0.00	0.29	0.24	1.40	1.65	7.4	0.2654
A	12.60	0.00	3.15	3.15	6.30	1.40	43.0	1.4700
B	5.90	0.00	1.48	1.48	2.94	1.40	20.1	0.6883


ROAD
CORPORATE
CORPORATE
LIMITS
LIMITS
PORATE LIMITS
1"=500'
SITE
A
B
INTERSTATE 40
INTERSTATE 40
RIO GRANDE
CORPORATE
CORPORATE
LIMITS
WEST BLUFF
OUTFALL

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

April 4, 2001

Ron Bohannan, PE
Tierra West, LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: West Bluff Townhomes, Drainage Report
Engineer's Stamp dated 3-7-01 (H11/D49A)

Dear Mr. Bohannan,

Based upon the information provided in your submittal dated 3-12-01, the above referenced site is approved for Preliminary Plat action by the DRB. Prior to Final Plat, please address the following comments.

- Backyard ponds are allowable but you cannot get credit for them in the total amount that will drain to the street. It is possible that these ponds could get filled in the future. Therefore, all 10 developed basins must be added together to discuss the capacity of Alamogordo.

- Please describe where the system your project drains to and what capacity is available.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

DRAINAGE INFORMATION SHEET

PROJECT TITLE: *West Bluff Townhomes* **ZONE ATLAS/DRNG. FILE #:** *H-11 / D49A*

DRB #: *1001004 / 1001005* **EPC #:** **WORK ORDER #:**

LEGAL DESCRIPTION: *Lots 1 through 9 of the West Bluff Center Subdivision*

CITY ADDRESS: *Alamogordo Dr. between Ouray Rd. and Ian Ave.*

ENGINEERING FIRM: *TIERRA WEST, LLC* **CONTACT:** *Ronald R. Bohannan or Sara Lavy*

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

OWNER: *West Bluff Center LLC* **CONTACT:** *Paul Silverman*

ADDRESS: *4408 Canyon Court NE* **PHONE:** *(505) 294-8625*

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

PRE-DESIGN MEETING:

- ____ YES
- X NO
- ____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SKETCH PLAN APPROVAL
- X PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- X 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
MAR 12 2001
HYDROLOGY SECTION

DATE SUBMITTED: *03/08/01*

BY: *Jonathan Niski*

DRAINAGE REPORT

for

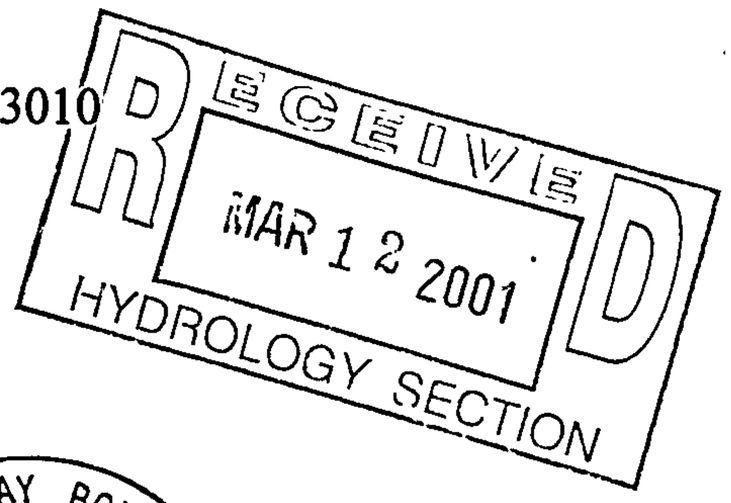
West Bluff Town Homes

Prepared by

Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

West Bluff Center, LLC
4408 Canyon Court NE
Albuquerque, New Mexico 87111-3010

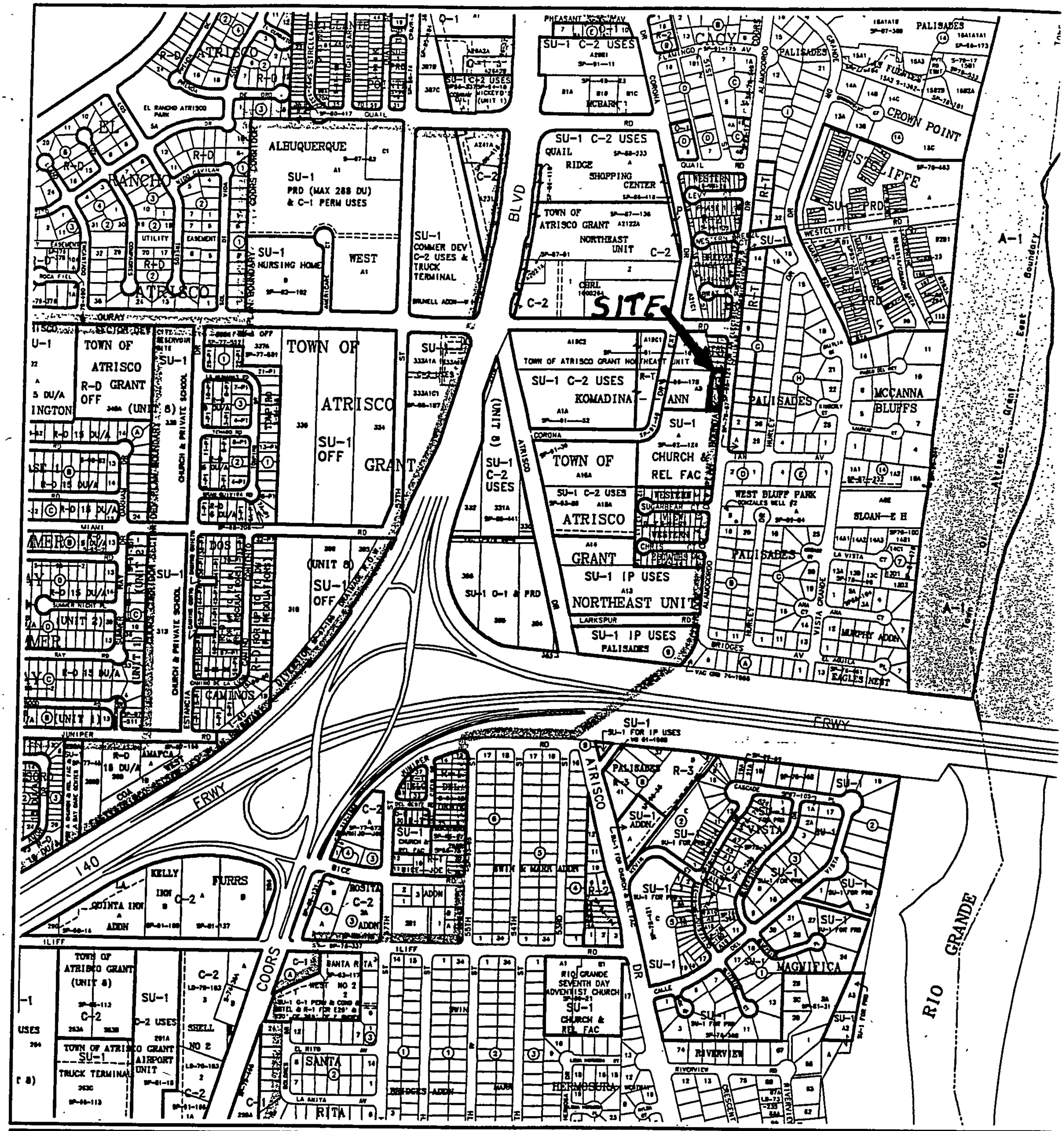


March 2001

Ronald R. Bohannan P.E. No. 9868

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.

TABLE OF CONTENTS



CITY OF Albuquerque

A lbuquerque G eographic I nformation S ystem

PLANNING DEPARTMENT

GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

H-11-Z

Map Amended through July 28, 2000

Location

West Bluff Town Homes is a proposed nine unit townhome subdivision. It is located on Alamogordo Drive NW between Ouray Road and Ian Avenue. The site is shown on the attached Zone Atlas Map H-11 and contains approximately 0.5354 acres. The legal description of the property is Lots 1 through 9 of the West Bluff Center Subdivision. The purpose of this report is to provide the drainage analysis and management plan for the subdivision.

Existing Drainage Conditions

The site is currently undeveloped. As shown on the attached exhibit, there are two existing basins on the site. Basin 1 sheet flows east with an undeveloped discharge rate of 0.83 cfs towards Alamogordo Drive Basin 2 sheet flows west with an undeveloped discharge rate of 0.28 cfs to an undeveloped tract of land. There are existing buildings to the north and south of the site but no off-site flows enter our site from either location.

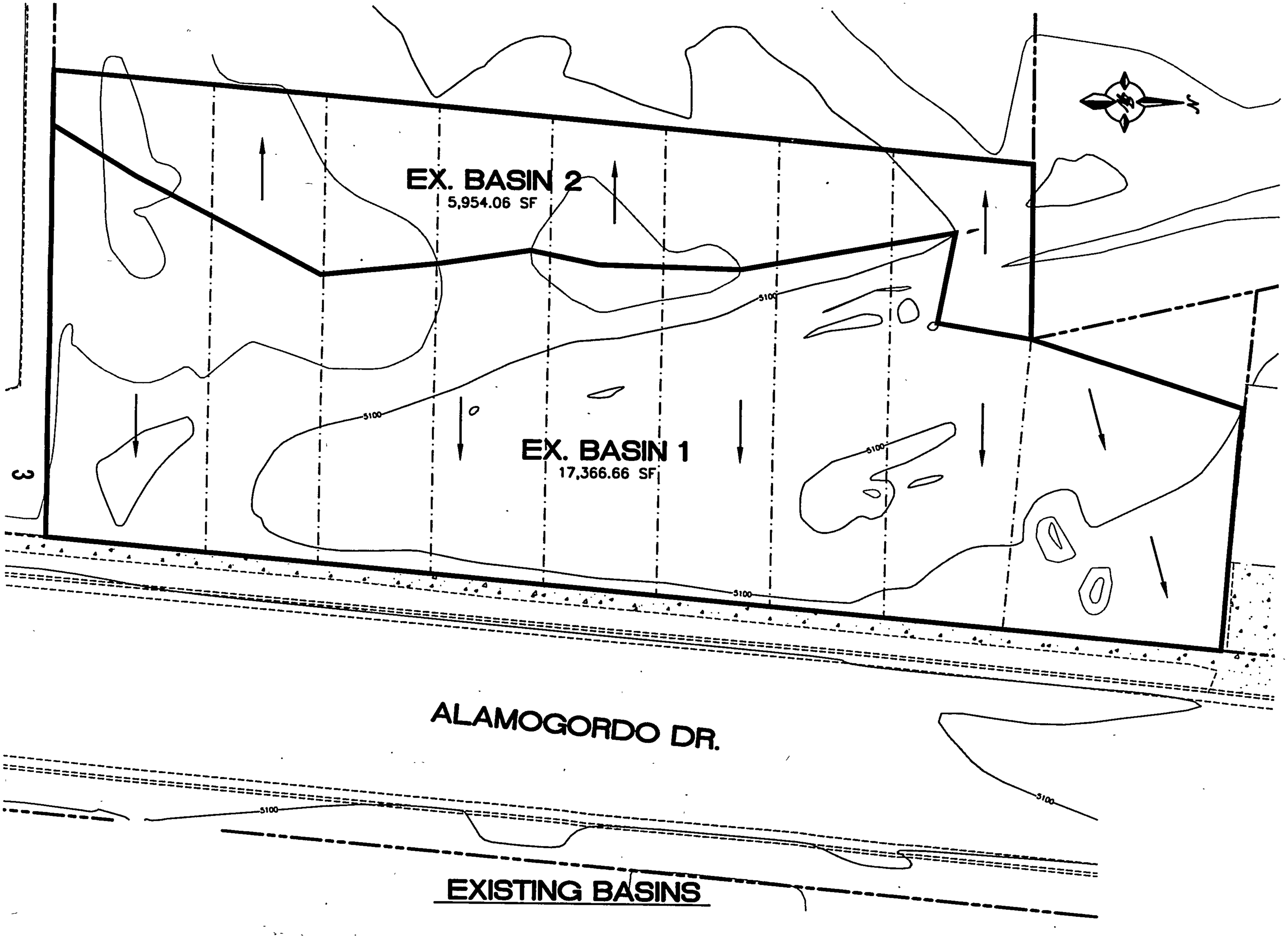
FIRM Map and Soil Conditions

The site is located on FIRM Map 35001C0327 D as shown on the attached excerpt. The map shows that the site does not lie in a flood zone.

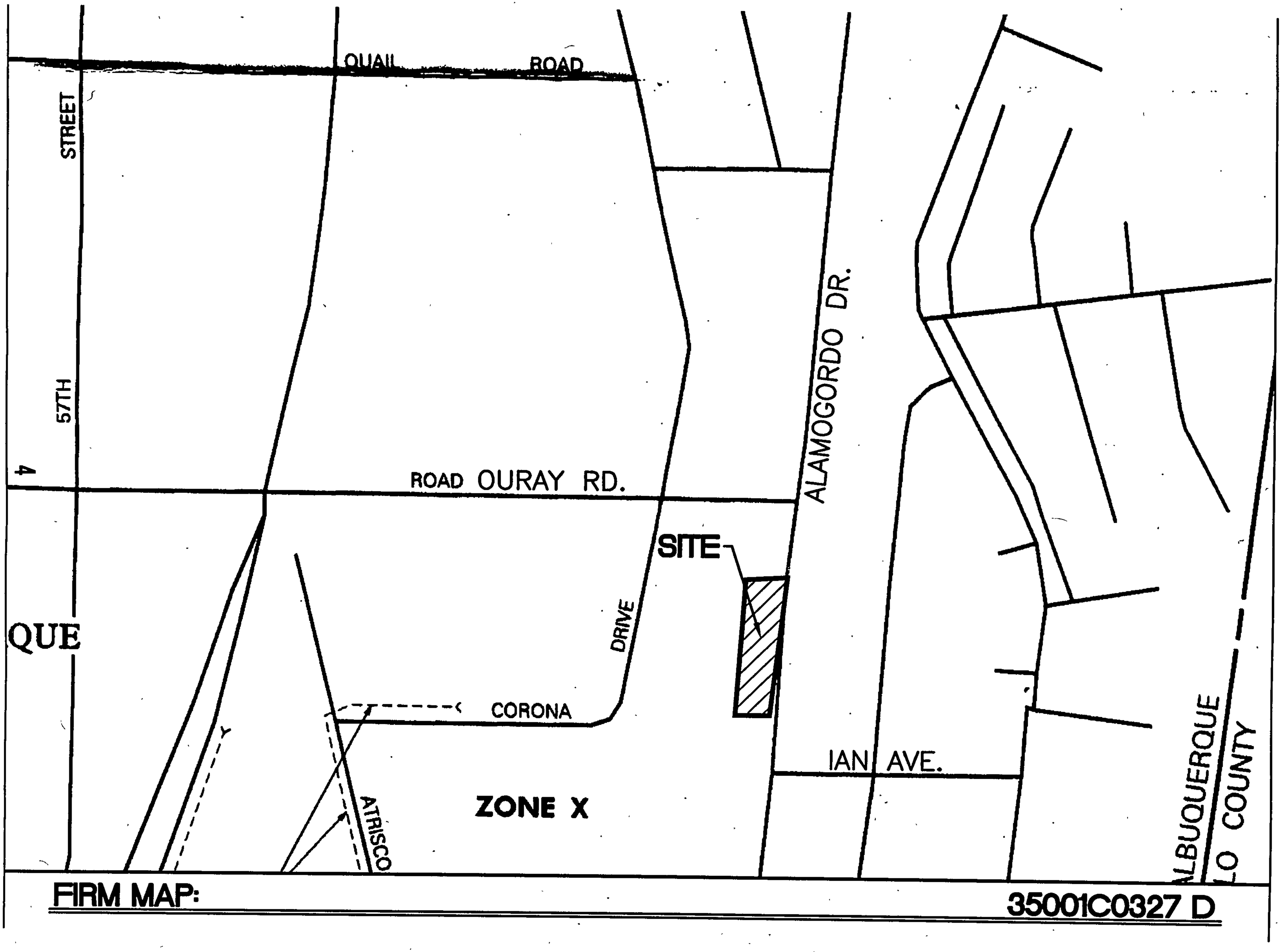
The site contains one soil from the Soil Conservation Service Soil Survey of Bernalillo County. It is a Bluepoint loamy fine sand which has slow runoff and a severe hazard of soil blowing. The surface layer of the soil ranges from sand to clay.

On-Site Drainage Management Plan

Most of the site will drain to Alamogordo Drive with each lot containing a rear yard pond. The roofs for each unit will drain to the front of the pad, which is included in Basin 1. The rear yard ponds are required due to the flatness of the site and the design of the town homes. This solution conforms to an approved Grading and Drainage Report filed by Brasher & Lorenz, Inc.



EXISTING BASINS



FIRM MAP: 35001C0327 D

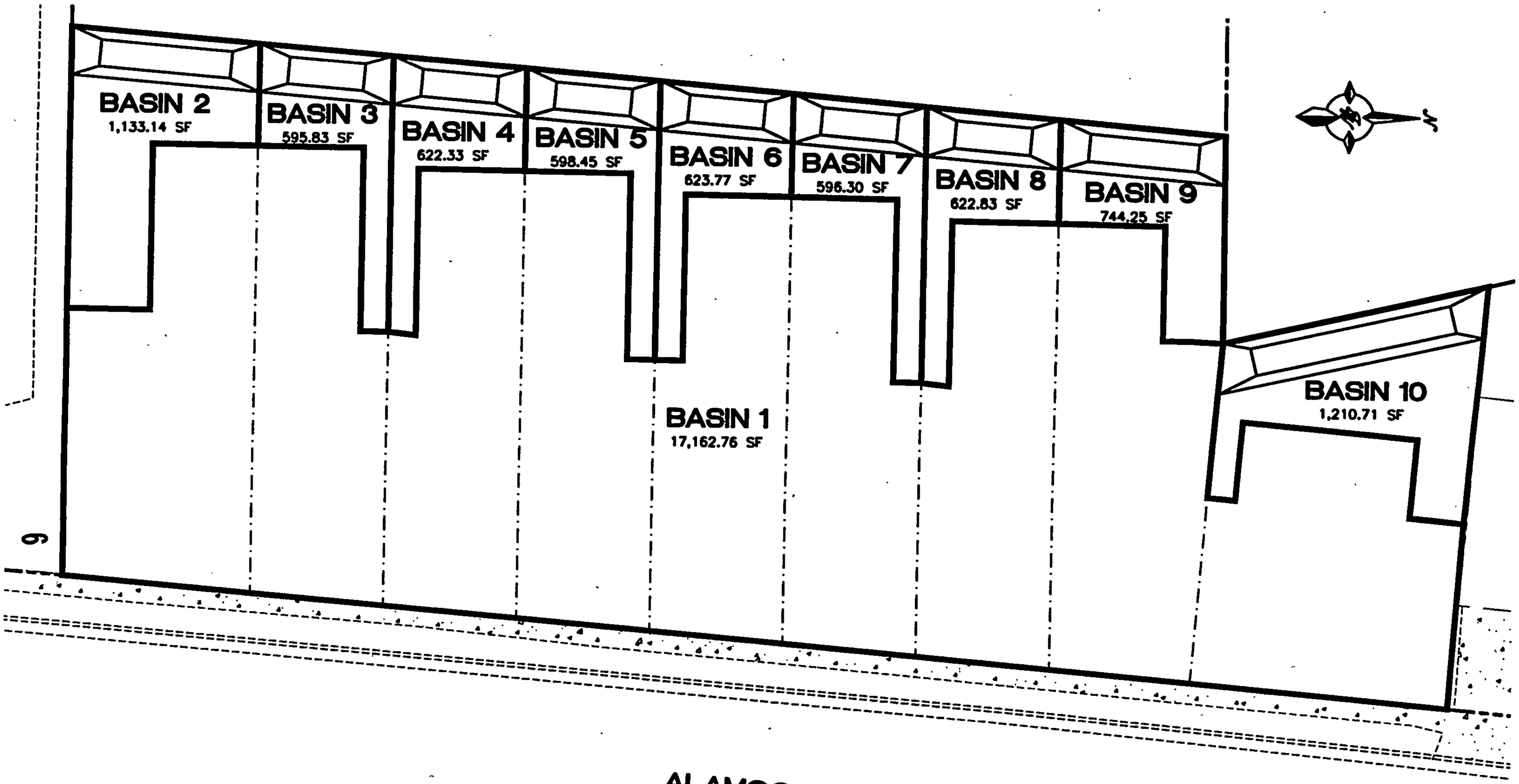
for Pal Estates (H11-D49) on June 7, 1995, which allows for free discharge from the site.

As shown on the attached Developed Basins Exhibit, there are 10 proposed basins on the site, which account for each of the rear yard ponds. The developed flow from Basin 1, which includes the front yard of each lot and the roofs of the town homes, will free discharge into Alamorgordo Drive at a rate of 1.54 cfs. Basins 2 through 10 are located in the rear of each lot and include only the flow that falls in the rear yard. All rear yard ponds were designed for the 10-day, 100-year volume. As mentioned previously, all roof drainage will be designed to flow to the front of the building by either a pitched roof or by rain gutters. We have included a Pond Summary Table at the end of the report that includes the following information: Basin 2 has a required 10-day, 100-year volume requirement of 0.001452 ac-ft. The pond for this basin has a capacity for 0.001611 ac-ft. Basins 3 through 8 have a required 10-day, 100-year volume requirement of 0.000800 ac-ft. each. The ponds for these basins have a capacity for 0.00818 ac-ft. each. Basin 9 has a required 10-day, 100-year volume requirement of 0.000954 ac-ft. The pond for this basin has a capacity for 0.001044 ac-ft. Basin 10 has a required 10-day, 100-year volume requirement of 0.001552 ac-ft. The pond for this basin had a capacity for 0.001778 ac-ft.

In the event of an emergency or a storm greater than a 100-year event Basins 2 through 10 will sheet flow into to Basin 1 and these flows will continue to free discharge into Alamogordo Drive.

Summary

Basin 1 will discharge a total of 1.54 cfs into Alamogordo Drive while Basins 2 through 10 will have the flows contained in rear yard ponds. If needed, Basins 2 through 10 will overflow into Basin 1 by sheet flowing through the side yards. The flows will continue to free discharge into Alamogordo Drive.



DEVELOPED BASINS

Weighted E Method

Undeveloped On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
1	17,367	0.40	50%	0.20	0%	0.00	50%	0.1993457	0%	0.00	0.715	0.024	0.83	0.260	0.009	0.34
2	5,954	0.14	50%	0.07	0%	0.00	50%	0.0683425	0%	0.00	0.715	0.008	0.28	0.260	0.003	0.12
Total	23,321	0.54										0.032	1.11		0.012	0.46

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)		
Zone 1	100-Year	10 - Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

Weighted E Method

Developed On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year, 6-Hr			10-Year, 6-Hr			2-Year, 6-Hr			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E	Volume (ac-ft)	Flow cfs	Weighted E	Volume (ac-ft)	Flow cfs	Weighted E	Volume (ac-ft)	Flow cfs	Weighted E	Volume (ac-ft)	Flow cfs
1	17,163	0.39	0%	0	20%	0.08	0%	0	80%	0.32	1.710	0.056	1.54	1.036	0.034	0.97	0.578	0.019	0.54	1.710	0.094759	1.54
2	1,133	0.03	0%	0	100%	0.03	0%	0	0%	0.00	0.670	0.001	0.05	0.220	0.000	0.02	0.010	0.000	0.00	0.670	0.001452	0.05
3	596	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000764	0.03
4	622	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000797	0.03
5	598	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000766	0.03
6	624	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000800	0.03
7	596	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000764	0.03
8	623	0.01	0%	0	100%	0.01	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000799	0.03
9	744	0.02	0%	0	100%	0.02	0%	0	0%	0.00	0.670	0.001	0.03	0.220	0.000	0.01	0.010	0.000	0.00	0.670	0.000954	0.03
10	1,211	0.03	0%	0	100%	0.03	0%	0	0%	0.00	0.670	0.002	0.06	0.220	0.001	0.02	0.010	0.000	0.00	0.670	0.001552	0.06

POND SUMMARY

	BASIN 2	BASINS 3-8	BASIN 9	BASIN 10
Area of Pond Top (SF)	306.85	216.60	265.96	437.51
Area of Pond Bottom (SF)	118.47	68.33	97.70	182.25
Depth of Pond (FT)	0.33	0.25	0.25	0.25
Volume (CF)	70.18	35.62	45.46	77.47
Volume (AC-FT)	0.001611	0.000818	0.001044	0.001778
Volume Required (CF)	63.25	34.85	41.56	67.61
Volume Required (AC-FT)	0.001452	0.000800	0.000954	0.001552
Volume Provided (CF)	70.18	35.62	45.46	77.47
Volume Provided (AC-FT)	**0.001611**	**0.000818**	**0.001044**	**0.001778**

VOLUME OF POND

V=(At + Ab)/2 * D

At = Area of Top

Ab= Area of Bottom

D = Depth