CITY OF ALBUQUERQUE

September 12, 2006

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

Re: Residential at 98th and Sage Grading and Drainage Plan
Engineer's Stamp dated 9-12-06 (M9/D25A)

Dear Mr. Bohannan,

Based upon the information provided in your submittal received 9-12-06, the above referenced plan is approved for Preliminary Plat action by the DRB. Once that board approves the Grading Plan, please submit a mylar copy for my signature in order to obtain a Rough Grading Permit.

If you have any questions, you can contact me at 924-3695.

Sincerely,

Curtis A. Cherne, E.I.
Engineering Associate, Planning Dept.
Development and Building Services

C: file
Brad Bingham

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: Sage Ranch Subdivision
ZONE MAP/DRG. FILE #: M-9-D25 4
DRB #: 1003991 EPC #:
WORK ORDER #:

LEGAL DESCRIPTION: Tract A-1-C Town of Atrisco Grant Unit 7
CITY ADDRESS:

ENGINEERING FIRM:	Tierra West, LLC	CONTACT:	Ron Bohannan
ADDRESS:	8509 Jefferson NE	PHONE:	(505) 858-3100
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87113
OWNER:	Frontera Development	CONTACT:	Jay Schneider
ADDRESS:	6263 North Scottsdale Road #160	PHONE:	480315-9600
CITY, STATE:	Scottsdale	ZIP CODE:	85250
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Precision Surveys	CONTACT:	Larry Medrano
ADDRESS:	4900 Alameda Boulevard NE, Suite A	PHONE:	505-856-5700
CITY, STATE:	ABQ, NM	ZIP CODE:	87113
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	

CHECK TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- ____ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- X 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
- X 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 (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ SO-19

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ____ YES
- x NO
- ____ COPY PROVIDED

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HYDROLOGY SECTION

DATE SUBMITTED: 8/12/2006 BY: Sarah Abeyta

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

5571 Midway Park Place NE
Albuquerque, NM 87109

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

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

September 12, 2006

Mr. Curtis A. Cherne
Planning Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RE: Sage Ranch Drainage Report Revisions
Response to Comments (M9-D25A)

Dear Mr. Cherne:

Per your correspondence dated July 25, 2006, regarding the above referenced property, please find the following responses addressing the comments listed in your letter.

1) Provide a discussion of offsite flows and quantify if present.
There are not offsite flows entering the site. A statement regarding the offsite drainage has been added to the revised Drainage Report.

2) Show the drainage easement and the existing storm drain pipe.
The proposed 20' Drainage easement has been labeled on the revised Grading and Drainage Plan. There is no new storm drain proposed for the residential subdivision. The existing storm drain pipe on the commercial property is shown on the revised grading and drainage plan.

3) The AHYMO analysis should include all basins (basin 11 was omitted) and should be combined at the end in order to determine what the peak flow at the existing rundown in Jenny Court is.
The AHYMO analysis has been updated and now includes Basin 11. The combined peak flow for both the Residential and Commercial Properties at the existing rundown in Jenny Court is 14.10 cfs, which is less than the allowable required 18.4 cfs as required in the Sun Sage Hills Subdivision (M9-D14).

4) The original report stated different volume and peak discharge values for the Marketplace tract. The report also does not match the AHYMO output file. Which is correct?
The revised report for Sage Ranch reflects the correct volumes and discharge values. The AHYMO file was updated and now reflects the correct basin information to match the basins as they are numbered in the revised report.

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5) Why are the backyards of lots 1, 2, and 3 designed to drain into the Marketplace tract?
The backyards will not drain into the commercial tract. There is a limited amount of drainage that will fall between the existing 6' screen wall and the new proposed retaining wall. The existing screen wall prevents drainage from entering the commercial site.

If you have any questions or need additional information regarding this matter, please do not hesitate to contact me (505) 858-3100.

Sincerely,

Sarah Abeyta

Sarah Abeyta

JN: 26015
SA/cla

2006: 26015 Curtis A. Cherne Drain Response ltr 091206.doc

DRAINAGE REPORT
FOR

Sage Ranch Subdivision

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HYDROLOGY SECTION

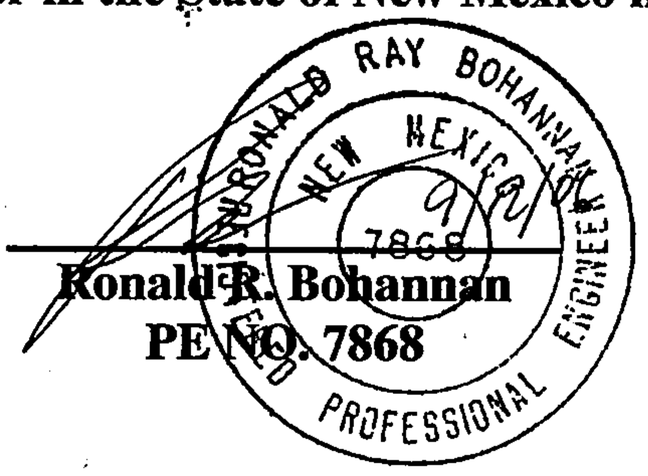
Prepared by:

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

Prepared for:
FRONTERA DEVELOPMENT, INC.
6263 North Scottsdale Road, Suite 160
Scottsdale, AZ 85250

Revised
September 2006

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 26015

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MAP POCKET

Grading and Drainage Plan

Section I

Report

Purpose

The purpose of this report is to modify the previously approved master drainage management plan for Sage Marketplace (M9-D25). The previously approved plan was for a total of a 13.77 acre site; the Neighborhood Market (4.51 acres) which is currently under construction, Lot 2 (0.54 acres), Lot 3 (1.12 acres), Lot 4 (3.84 acres) which are future planned commercial developments and Lot 5 (3.76), which is a residential development. At this time the 3.76 acre residential property is being developed and this report is being submitted for those improvements. The 3.76 acre parcel will consist of 26 lots residential lots.

Location

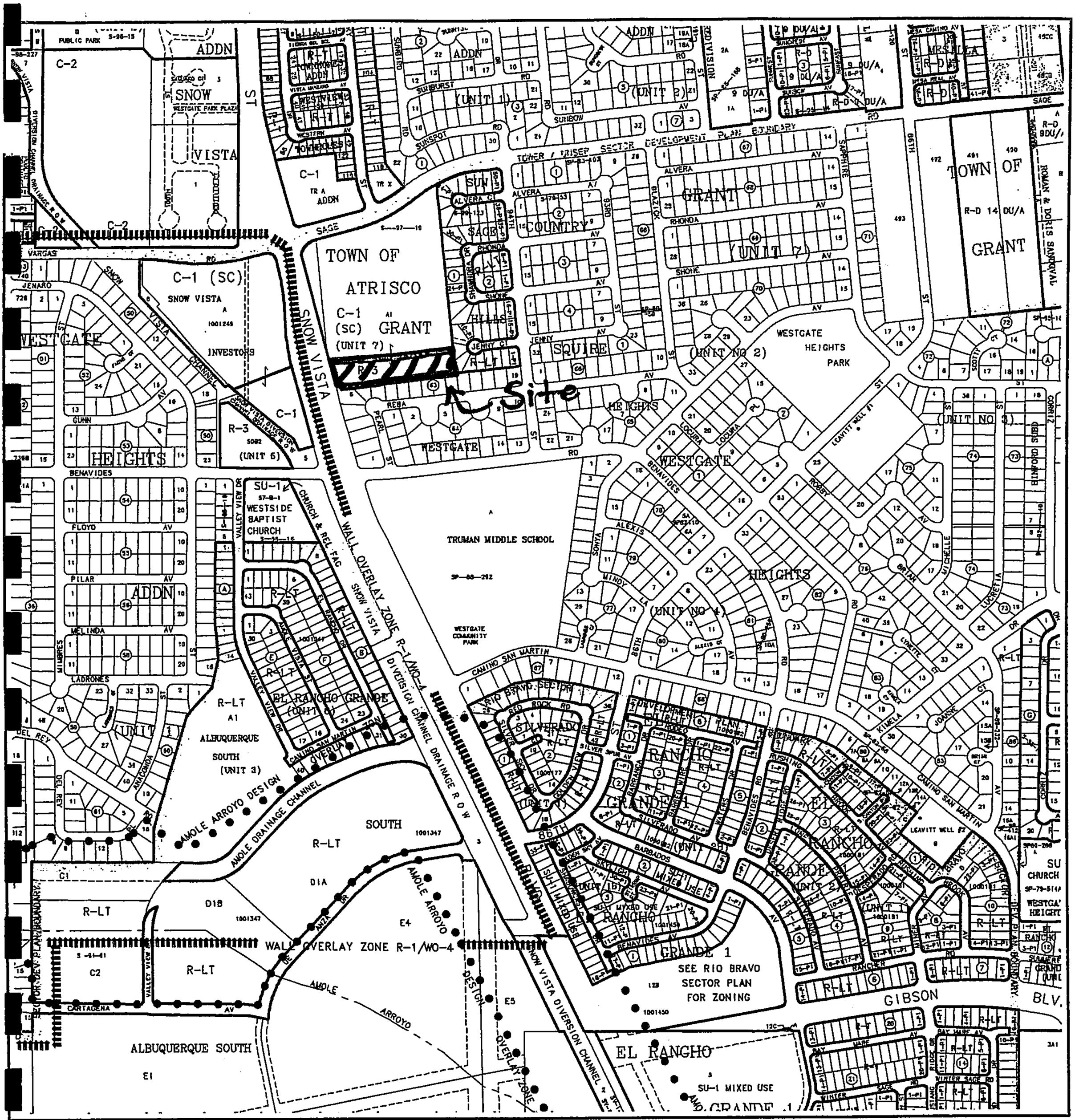
The site is located on the west side of Albuquerque, more specifically east of Snow Vista Boulevard S.W. and south of the new commercial development, Sage Marketplace. The site is 3.76 acres and will consist of 26 residential lots. The site is shown on the following Zone Atlas Page M-9-Z.

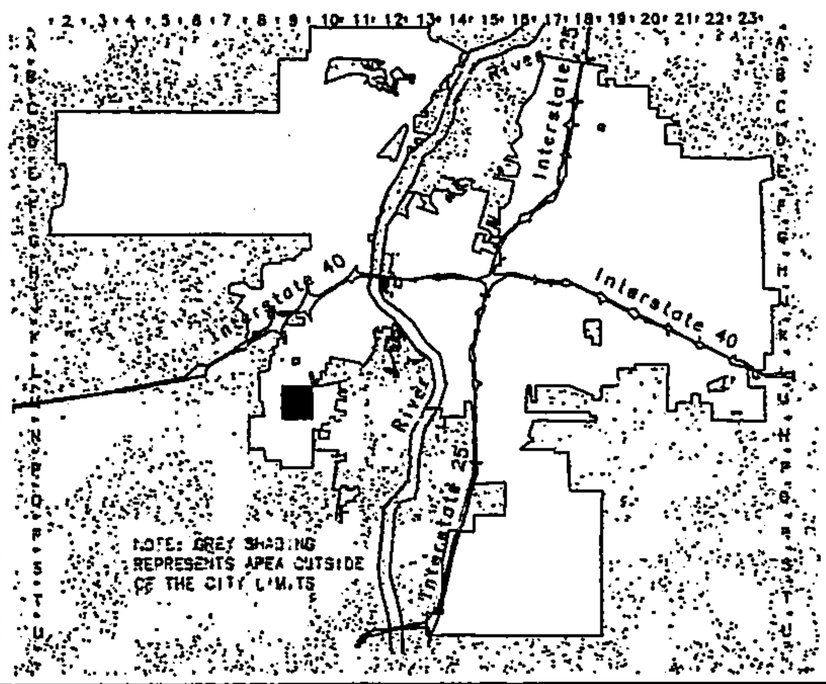
Existing Drainage Conditions

The 3.76 acre site is currently undeveloped and being used as a staging area for the contractor working on the commercial development to the north. The site currently drains from west to east to a temporary detention pond. From this temporary pond the water is discharged at a controlled rate through an existing 20' drainage easement to the existing Sun Sage Hills Subdivision via an existing storm drain pipe. There are no offsite flows entering the site.

Flood Plain

The site is located on Firm Map 35001C0336E. The map indicates that the site does not lie within a 100-year flood plain.





CITY OF
Albuquerque

Albuquerque Geographic Information System
PLANNING DEPARTMENT

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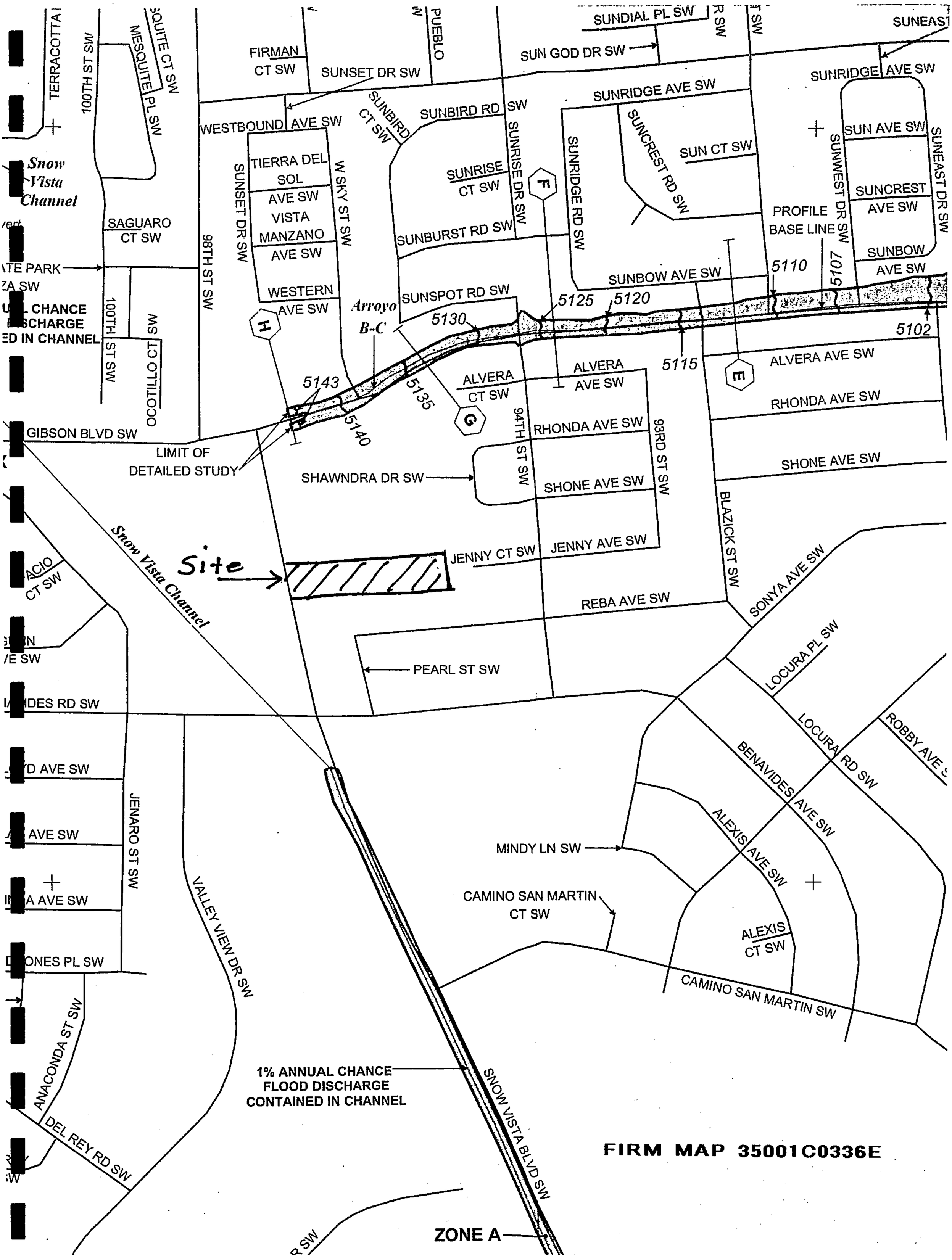
GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

M-9-Z

Map Amended through July 09, 2003


TERRACOTTA
100TH ST SW
MESQUITE PL SW
SQUITE CT SW
FIRMAN CT SW
PUEBLO
SUNSET DR SW
SUNDIAL PL SW
SUN GOD DR SW
SUNEAST
SUNRIDGE AVE SW
SUNRIDGE AVE SW
WESTBOUND AVE SW
SUNBIRD CT SW
SUNBIRD RD SW
SUNRISE DR SW
SUNRISE CT SW
SUNRIDGE RD SW
SUNCREST RD SW
SUN CT SW
SUN AVE SW
SUNWEST DR SW
SUNEAST DR SW
SUNCREST AVE SW
PROFILE BASE LINE
SUNBOW AVE SW
SUNBURST RD SW
TIERRA DEL SOL AVE SW
VISTA MANZANO AVE SW
WESTERN AVE SW
W SKY ST SW
SUNSET DR SW
SAGUARO CT SW
98TH ST SW
100TH ST SW
OCOTILLO CT SW
SUNSPOT RD SW
Arroyo B-C
5110
5107
5102
5125
5120
5130
5115
5143
5135
5140
ALVERA CT SW
ALVERA AVE SW
RHONDA AVE SW
94TH ST SW
93RD ST SW
SHONE AVE SW
SHAWNDRA DR SW
GIBSON BLVD SW
LIMIT OF DETAILED STUDY
Snow Vista Channel
Site
JENNY CT SW
JENNY AVE SW
BLAZICK ST SW
REBA AVE SW
SONYA AVE SW
PEARL ST SW
LOCURA PL SW
LOCURA RD SW
ROBBY AVE
BENAVIDES AVE SW
ALEXIS AVE SW
ALEXIS CT SW
MINDY LN SW
CAMINO SAN MARTIN CT SW
CAMINO SAN MARTIN SW
JENARO ST SW
VALLEY VIEW DR SW
ANACONDA ST SW
DEL REY RD SW
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
SNOW VISTA BLVD SW
ZONE A
FIRM MAP 35001C0336E

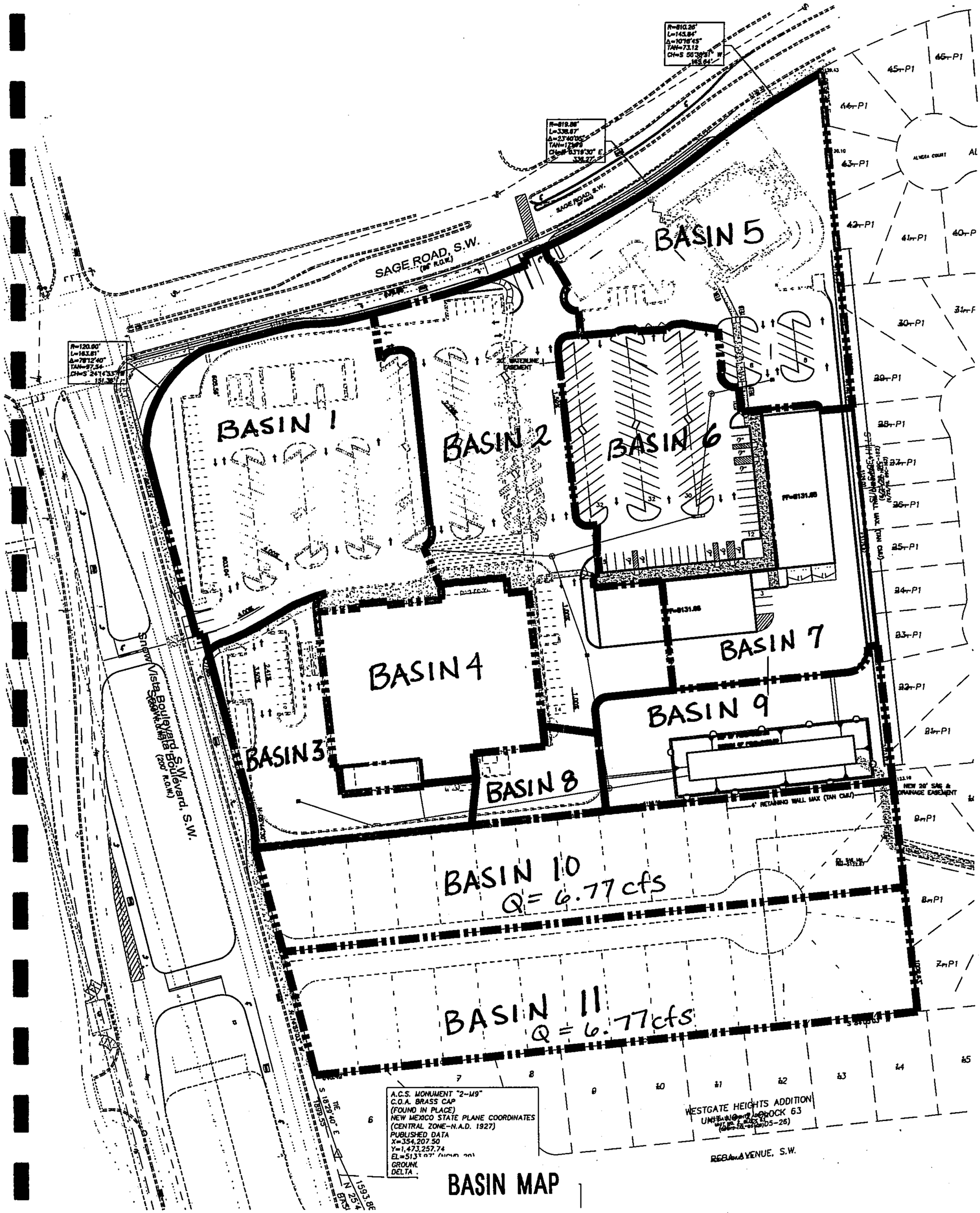
Proposed Drainage Management Plan

The entire site will be graded and all of the surface improvements will be built out in their entirety. The enclosed grading plan (in the map pocket) shows the grades for the entire project.

This site was previously analyzed in the approved Drainage Report for Sage Marketplace (M9-D25). The site previously analyzed consisted of 13.77 acres; 10.01 commercial and 3.76 residential. The site was divided into 11 developed basins as shown on the following page. The residential property was divided into Basins 10 and 11. The commercial portion of the site drains to a detention pond which was constructed with the Neighborhood Market building via a series of drop inlets and storm drain. The discharge from the commercial portion of the site is restricted in order to allow for the residential piece to free discharge to Jenny Court.

According to the drainage report for the existing Sun Sage Hills subdivision (M9-D14), located east of the site, the amount of runoff that can be discharged from the total 13.77 acre site is 18.4 cfs. An orifice structure was constructed in the new pond built with the Neighborhood Market, in order to restrict the amount of runoff generated by the commercial site. Using land treatment types 20% type B, 20% type C and 60% type D, the runoff generated by the developed residential property is 13.54 cfs. According to the AHYMO data, provided in the Appendix, the discharge from the commercial and residential properties is 14.10 cfs which is under the required 18.4 cfs.

The discharge from the subdivision will flow via 4" curb and gutter on Sage Ranch Court to a new 12' concrete channel which will be built on the east end of the site at the end of the cul-de-sac. The channel necks down to 11' in one area and does have


SAGE ROAD, S.W.
(80' R.O.W.)
BASIN 1
BASIN 2
BASIN 3
BASIN 4
BASIN 5
BASIN 6
BASIN 7
BASIN 8
BASIN 9
BASIN 10
Q= 6.77 cfs
BASIN 11
Q= 6.77 cfs
Snow Vista Boulevard, S.W.
(200' R.O.W.)
ALVERA COURT
WESTGATE HEIGHTS ADDITION
UNIT 1
BLOCK 63
(D5-26)
RIO BRAVO AVENUE, S.W.
A.C.S. MONUMENT "2-M9"
C.O.A. BRASS CAP
(FOUND IN PLACE)
NEW MEXICO STATE PLANE COORDINATES
(CENTRAL ZONE-N.A.D. 1927)
PUBLISHED DATA
X=354,207.50
Y=1,473,257.74
20' WATERLINE EASEMENT
NEW 20' SAN. & DRAINAGE EASEMENT
4' RETAINING WALL MAX (TAN CMU)

BASIN MAP

capacity for the 13.54 cfs. A 12' channel will be constructed in order to allow maintenance to an existing sanitary sewer manhole within the new 20' drainage/sanitary sewer easement. From the new concrete channel, this flow plus the runoff being discharge from the pond on the commercial property will drain to Jenny Court. From Jenny Court the runoff discharges to Saphire Street at Corriz Drive. At this point the runoff is intercepted by a series of seven Type 'C' inlets and a 40' wide traverse drop inlet.

Calculations

The weighted E method from the "City of Albuquerque Development Process Manual Volume 11 – Design Criteria, 1997 Revision" was used to calculate the runoff and volume for the site.

Summary

According to the previously approved, Sage Marketplace Drainage Report, the flow from both the commercial and residential sites is restricted to 18.4 cfs. The discharge from the commercial site is restricted by an orifice plate in the new pond which was previously constructed on the commercial site. The discharge from the residential property, 13.54 cfs, is allowed to free discharge to Jenny Court via a 12' concrete channel to be built with the residential property. The water will flow via a 4" curb and gutter in Sage Ranch Court to the new 12' concrete channel. The total discharge from the commercial and residential sites is 14.10 cfs which is less than the allowed 18.4 cfs.

From Jenny Court the runoff discharges to Saphire Street at Corriz Drive. At this point the runoff is intercepted by a series of seven Type 'C' and a 40' wide traverse drop inlet.

Section II

Runoff Calculations

Weighted E Method

Developed Basins

											100-Year			10-Year		
Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
			%	(acres)	%	(acres)	%	(acres)	%	(acres)						
1	81839.28	1.88	0%	0	20%	0.38	0%	0.00	80%	1.50	1.710	0.268	7.33	1.036	0.162	4.63
2	73888.48	1.70	0%	0	20%	0.34	0%	0.00	80%	1.36	1.710	0.242	6.62	1.036	0.146	4.18
3	32004.94	0.73	0%	0	20%	0.15	0%	0.00	80%	0.59	1.710	0.105	2.87	1.036	0.063	1.81
4	42214.75	0.97	0%	0	0%	0.00	0%	0.00	100%	0.97	1.970	0.159	4.24	1.240	0.100	2.80
5	63636.64	1.46	0%	0	20%	0.29	0%	0.00	80%	1.17	1.710	0.208	5.70	1.036	0.126	3.60
6	51886.99	1.19	0%	0	20%	0.24	0%	0.00	80%	0.95	1.710	0.170	4.65	1.036	0.103	2.94
7	42034.1	0.96	0%	0	20%	0.19	0%	0.00	80%	0.77	1.710	0.138	3.77	1.036	0.083	2.38
8	11249.06	0.26	0%	0	20%	0.05	0%	0.00	80%	0.21	1.710	0.037	1.01	1.036	0.022	0.64
9	37,128	0.85	0%	0	20%	0.17	0%	0.00	80%	0.68	1.710	0.121	3.33	1.036	0.074	2.10
10	**81,893**	**1.88**	**0%**	**0**	**20%**	**0.38**	**20%**	**0.38**	**60%**	**1.13**	**1.514**	**0.237**	**6.77**	**0.876**	**0.137**	**4.11**
11	**81,893**	**1.88**	**0%**	**0**	**20%**	**0.38**	**20%**	**0.38**	**60%**	**1.13**	**1.514**	**0.237**	**6.77**	**0.876**	**0.137**	**4.11**
TOTAL	599,669	13.77										1.684	53.04		1.018	29.17

Equations:

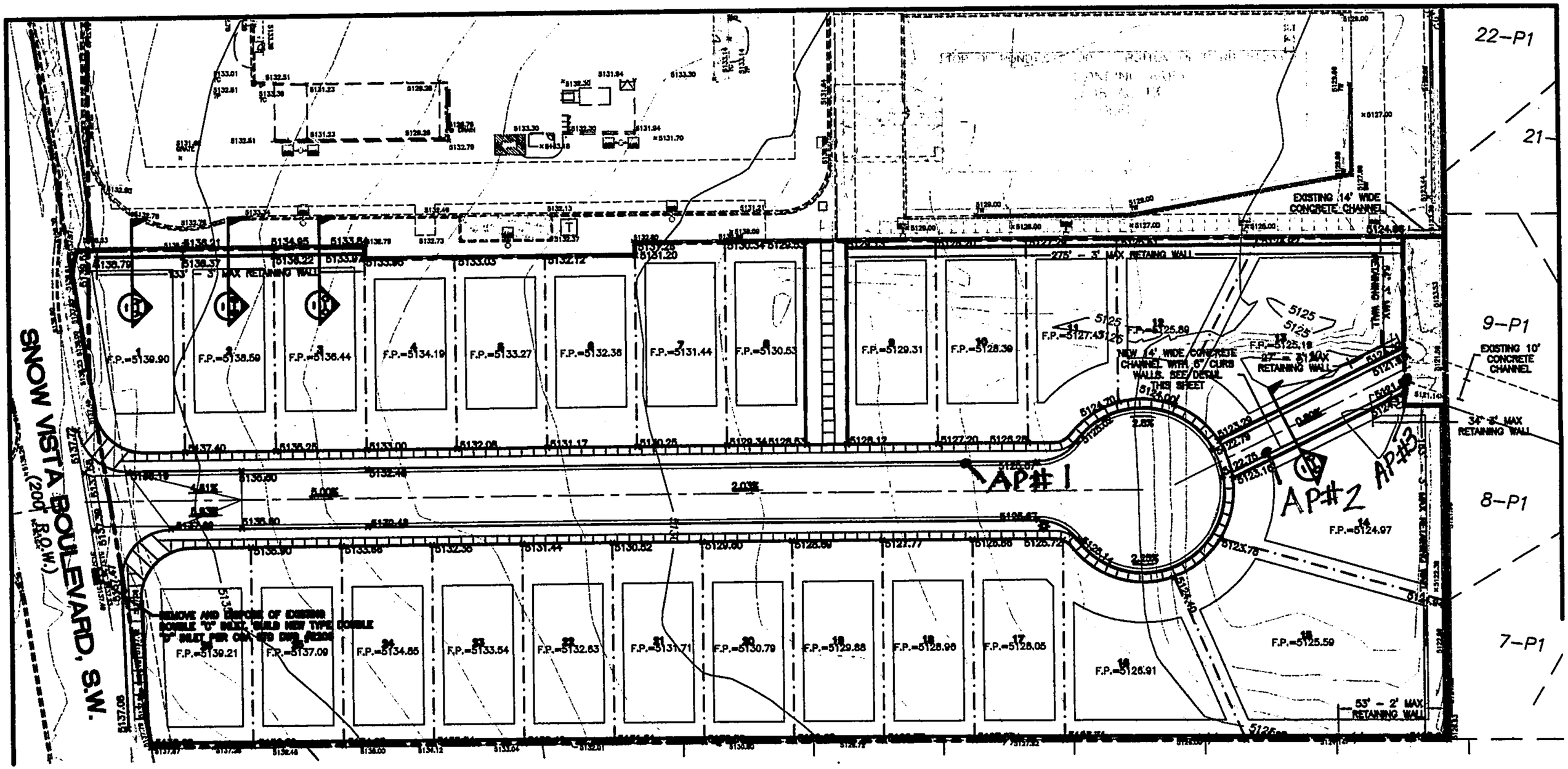
Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

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



ANALYSIS POINT MAP

28' F-F Street Section with 4" curb

Slope= 0.028

AP #1

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	0.33	0.00	0.00	0.00	0.42	0.00	0.74	0.006575
0.02	0.0064	0.66	0.01	0.00	0.01	0.66	0.01	0.83	0.01548
0.025	0.01	0.83	0.01	0.01	0.02	0.77	0.02	0.86	0.020373
0.035	0.0196	1.16	0.02	0.02	0.04	0.97	0.03	0.91	0.030803
0.045	0.0324	1.49	0.02	0.04	0.07	1.14	0.05	0.95	0.041917
0.052	0.043264	1.72	0.03	0.05	0.11	1.26	0.07	0.97	0.050034
0.06	0.0576	1.98	0.03	0.08	0.16	1.38	0.08	1.00	0.059604
0.0625	0.0625	2.06	0.03	0.09	0.18	1.42	0.09	1.00	0.062654

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)
0.063	0.063506	2.09	0.03	0.09	0.18	1.42	0.09	1.00	0.063027
0.1	0.172656	3.98	0.04	0.31	0.62	1.81	0.18	1.01	0.100931
0.13	0.311406	5.51	0.06	0.67	1.34	2.15	0.28	1.05	0.139261
0.16	0.495156	7.04	0.07	1.23	2.47	2.49	0.40	1.10	0.181082
0.2	0.810156	9.08	0.09	2.37	4.73	2.92	0.58	1.15	0.240591
0.207	0.873506	9.43	0.09	2.61	5.23	2.99	0.62	1.16	0.251363
0.2612	1.446942	12.20	0.12	5.11	10.22	3.53	0.92	1.22	0.337727
0.289	**1.798056**	**13.62**	**0.13**	**6.82**	**13.64**	**3.79**	**1.10**	**1.24**	**0.383799**
0.3025	1.9825	14.31	0.14	7.77	15.53	3.92	1.18	1.26	0.406553

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)
0.303	1.9895	14.31	0.14	7.81	15.62	3.93	1.19	1.26	0.408002
0.3039	2.0021	14.31	0.14	7.89	15.79	3.94	1.20	1.26	0.410612
0.3062	2.0343	14.31	0.14	8.11	16.21	3.98	1.22	1.27	0.417284
0.31	2.0875	14.31	0.15	8.46	16.92	4.05	1.26	1.28	0.42832
0.3125	2.1225	14.32	0.15	8.70	17.39	4.10	1.28	1.29	0.435588
0.32	2.2275	14.32	0.16	9.42	18.84	4.23	1.35	1.32	0.457429
0.3317	2.3913	14.34	0.17	10.60	21.20	4.43	1.47	1.36	0.491619
0.333	2.4095	14.34	0.17	10.73	21.47	4.45	1.48	1.36	0.495426

For water depths greater than 0.333 ft but less than 0.523 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)
0.335	2.4376	14.44	0.17	10.89	21.78	4.47	1.50	1.36	0.498465
0.3601	2.80726	15.69	0.18	13.04	26.07	4.64	1.67	1.36	0.537438
0.38	3.122725	16.69	0.19	14.94	29.89	4.79	1.82	1.37	0.569347
0.4196	3.809389	18.67	0.20	19.31	38.63	5.07	2.13	1.38	0.635133
0.4603	4.596832	20.70	0.22	24.65	49.31	5.36	2.47	1.39	0.705468
0.504	5.534525	22.89	0.24	31.42	62.84	5.68	2.86	1.41	0.783587
0.513	5.7395	23.34	0.25	32.95	65.91	5.74	2.95	1.41	0.799974
0.523	5.972	23.84	0.25	34.71	69.43	5.81	3.04	1.42	0.818294

Channel Capacity

AP #3

	Top Width (ft)	Bottom Width (ft)	Depth (ft)	Area (ft^2)	WP (ft)	R	Slope (%)	Q Provided (cfs)	Q Required (cfs)	Velocity (ft/s)
Channel	11	11	0.5	5.50	12.00	0.4583	0.8	33.52	16.08	2.92

Manning's Equation:

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

A = Area

R = D/4

S = Slope

n = 0.013

Section III

AHYMO Data

VOLUME CALCULATIONS

POND 1

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D + 0.5 * C * D^2
C = (At - Ab) / Dt

Ab =	9,976.79
At =	19,645.28
Dt =	6.00
C =	1611.42

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
5123	0	0	0.0000
5124.00	1.00	0.2290	0.3392
5125.25	2.25	0.5442	0.5344
5126.50	3.50	0.9172	0.6753
5127.75	4.75	1.3480	0.7915
5129.00	6.00	1.8366	0.8928

Orifice Equation
Q = CA SQRT(2gH)

C =	0.6	
Diameter (in)	3.75	Size of Orifice in existing pond on ~~residential property~~ commercial property
Area (ft^2)=	0.077	
g =	32.2	
H (Ft) =	Depth of water above center of orifice	
Q (CFS)=	Flow	

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02d RUN DATE (MON/DAY/YR) =08/23/2006

INPUT FILE = Z:\2006\26015\Reports\DRAINA~1\INPUTR~1.TXT USER NO.= AHYMO-S-9702d1TierraW-AH

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	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.350
COMPUTE NM HYD	100.20	-	1	.00290	7.34	.282	1.82491	1.500	3.955	PER IMP= 80.00
COMPUTE NM HYD	100.30	-	2	.00265	6.71	.258	1.82491	1.500	3.955	PER IMP= 80.00
COMPUTE NM HYD	100.40	-	3	.00114	2.90	.111	1.82491	1.500	3.969	PER IMP= 80.00
COMPUTE NM HYD	100.50	-	4	.00150	4.22	.168	2.10071	1.500	4.396	PER IMP= 100.00
COMPUTE NM HYD	100.50	-	5	.00228	5.77	.222	1.82491	1.500	3.956	PER IMP= 80.00
COMPUTE NM HYD	100.50	-	6	.00186	4.71	.181	1.82491	1.500	3.960	PER IMP= 80.00
COMPUTE NM HYD	100.50	-	7	.00150	3.80	.146	1.82491	1.500	3.962	PER IMP= 80.00
COMPUTE NM HYD	100.50	-	8	.00040	1.03	.039	1.82491	1.500	4.013	PER IMP= 80.00
COMPUTE NM HYD	100.50	-	9	.00130	3.30	.127	1.82491	1.500	3.965	PER IMP= 80.00
COMPUTE NM HYD	100.50	-	11	.00290	6.81	.249	1.60840	1.500	3.670	PER IMP= 60.00
COMPUTE NM HYD	100.50	-	12	.00290	6.81	.249	1.60840	1.500	3.670	PER IMP= 60.00
ADD HYD	301.00	1& 2	15	.00555	14.05	.540	1.82482	1.500	3.955	
ADD HYD	302.00	5& 6	16	.00414	10.49	.403	1.82478	1.500	3.958	
ADD HYD	303.00	15&16	17	.00969	24.54	.943	1.82480	1.500	3.956	
ADD HYD	304.00	3& 4	18	.00264	7.12	.279	1.98141	1.500	4.212	
ADD HYD	305.00	17&18	19	.01233	31.65	1.222	1.85833	1.500	4.011	
ADD HYD	306.00	7& 8	20	.00190	4.83	.185	1.82462	1.500	3.973	
ADD HYD	307.00	20& 9	21	.00320	8.13	.311	1.82466	1.500	3.970	
ADD HYD	306.00	19&21	22	.01553	39.78	1.533	1.85139	1.500	4.002	
ROUTE RESERVOIR	202.00	22	13	.01553	.79	1.032	1.24611	2.766	.079	AC-FT= 1.339
ADD HYD	401.00	11&12	14	.00580	13.62	.498	1.60830	1.500	3.670	
ADD HYD	402.00	14&13	23	.02133	14.10	1.530	1.34460	1.500	1.033	
FINISH										

```
**************************************************************
*                                                            *
*                    SAGE RANCH DRAINAGE ANALYSIS            *
*                        98TH & SAGE(26015)                  *
*            PROPOSED CONDITIONS (100-YEAR, 6-HR STORM)      *
*                                                            *
**************************************************************
*
START                TIME=0.0 HR
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.35 IN
                     RAIN DAY=2.66 IN DT=0.03333 HR

*
* BASIN 1
*
COMPUTE NM HYD       ID=1 HYD NO=100.2 AREA=0.0029 SQ MI
                     PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1

*
*BASIN 2
*
COMPUTE NM HYD       ID=2 HYD NO=100.3 AREA=0.00265 SQ MI
                     PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=2 CODE=1

*
*BASIN 3
*
COMPUTE NM HYD       ID=3 HYD NO=100.4 AREA=0.00114 SQ MI
                     PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=3 CODE=1

*
*BASIN 4
*
COMPUTE NM HYD       ID=4 HYD NO=100.5 AREA=0.0015 SQ MI
                     PER A=0 PER B=0 PER C=0 PER D=100.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=4 CODE=1

*
*BASIN 5
*
COMPUTE NM HYD       ID=5 HYD NO=100.5 AREA=0.00228 SQ MI
                     PER A=0 PER B=20.00 PER C=0 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=5 CODE=1

*

*BASIN 6
*
COMPUTE NM HYD       ID=6 HYD NO=100.5 AREA=0.00186 SQ MI
                     PER A=0 PER B=20.00 PER C=0 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=6 CODE=1

*

*BASIN 7
```

```
*
COMPUTE NM HYD       ID=7 HYD NO=100.5 AREA=0.0015 SQ MI
                     PER A=0 PER B=20.00 PER C=0 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=7 CODE=1

*

*BASIN 8
*
COMPUTE NM HYD       ID=8 HYD NO=100.5 AREA=0.0004 SQ MI
                     PER A=0 PER B=20.00 PER C=0 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=8 CODE=1

*

*BASIN 9
*
COMPUTE NM HYD       ID=9 HYD NO=100.5 AREA=0.0013 SQ MI
                     PER A=0 PER B=20.00 PER C=0 PER D=80.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=9 CODE=1

*

*BASIN 10
*
COMPUTE NM HYD       ID=11 HYD NO=100.5 AREA=0.0029 SQ MI
                     PER A=0 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=11 CODE=1

*

*BASIN 11
*
COMPUTE NM HYD       ID=12 HYD NO=100.5 AREA=0.0029 SQ MI
                     PER A=0 PER B=20.00 PER C=20.00 PER D=60.00
                     TP=0.133 HR MASS RAINFALL=-1
PRINT HYD            ID=12 CODE=1

*

*ADD BASINS 1 THRU 9
*
ADD HYD            ID=15 HYD NO=301.00 ID=1  ID=2
ADD HYD            ID=16 HYD NO=302.00 ID=5 ID=6
ADD HYD            ID=17 HYD NO=303.00 ID=15 ID=16
ADD HYD            ID=18 HYD NO=304.00 ID=3 ID=4
ADD HYD            ID=19 HYD NO=305.00 ID=17 ID=18
ADD HYD            ID=20 HYD NO=306.00 ID=7 ID=8
ADD HYD            ID=21 HYD NO=307.00 ID=20 ID=9
ADD HYD            ID=22 HYD NO=306.00 ID=19 ID=21


PRINT HYD                ID=22 CODE=1
*

* POND 1
*
ROUTE RESERVOIR     ID=13 HYD NO=202.00 INFLOW ID=22 CODE=24
                    OUTFLOW(CFS)      STORAGE(AC-FT)  ELEVATION(FT)
                        0.0000            0.0000         5123.00
                        0.3392            0.2290         5124.00
```

```
                                INPUT Revised 08-22-06 tp 0.133.txt
                          0.5344          0.5442          5125.25
                          0.6753          0.9172          5126.50
                          0.7915          1.3480          5127.75
                          0.8928          1.8366          5129.00

PRINT HYD            ID=13 CODE=1
*

*ADD BASINS 1 THRU 11
*
ADD HYD            ID=14 HYD NO=401.00 ID=11  ID=12
ADD HYD            ID=23 HYD NO=402.00 ID=14 ID=13


PRINT HYD                  ID=23 CODE=1
*

FINISH
```

```
    AHYMO PROGRAM (AHYMO_97) -                              - Version:  1997.02d
          RUN DATE (MON/DAY/YR) = 08/23/2006
          START TIME (HR:MIN:SEC) = 09:54:03     USER NO.= AHYMO-S-9702d1TierraW-AH
          INPUT FILE = Z:\2006\26015\Reports\DRAINA~1\INPUTR~1.TXT


**************************************************************
*                                                            *
*                    SAGE RANCH DRAINAGE ANALYSIS            *
*                        98TH & SAGE(26015)                  *
*              PROPOSED CONDITIONS (100-YEAR, 6-HR STORM)    *
*                                                            *
**************************************************************
*
START                  TIME=0.0 HR
RAINFALL               TYPE=1 RAIN QUARTER=0.0 IN
                       RAIN ONE=1.87 IN RAIN SIX=2.35 IN
                       RAIN DAY=2.66 IN DT=0.03333 HR

                       COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT
1.40 HR.

                       DT =     .033330 HOURS        END TIME =     5.999400 HOURS
                          .0000   .0034   .0068   .0103   .0139   .0176   .0213
                          .0252   .0291   .0331   .0372   .0414   .0457   .0502
                          .0547   .0594   .0643   .0693   .0744   .0797   .0852
                          .0909   .0968   .1029   .1092   .1159   .1228   .1301
                          .1377   .1457   .1542   .1594   .1649   .1708   .1835
                          .2118   .2555   .3182   .4038   .5163   .6598   .8384
                        1.0565  1.2588  1.3434  1.4147  1.4782  1.5359  1.5890
                        1.6384  1.6845  1.7277  1.7684  1.8068  1.8430  1.8774
                        1.9099  1.9407  1.9699  1.9977  2.0241  2.0309  2.0374
                        2.0435  2.0494  2.0551  2.0606  2.0659  2.0710  2.0759
                        2.0808  2.0855  2.0900  2.0945  2.0988  2.1031  2.1072
                        2.1112  2.1152  2.1191  2.1229  2.1266  2.1303  2.1339
                        2.1375  2.1409  2.1443  2.1477  2.1510  2.1543  2.1575
                        2.1607  2.1638  2.1669  2.1699  2.1729  2.1759  2.1788
                        2.1817  2.1845  2.1873  2.1901  2.1928  2.1956  2.1982
                        2.2009  2.2035  2.2061  2.2087  2.2112  2.2138  2.2162
                        2.2187  2.2212  2.2236  2.2260  2.2284  2.2307  2.2331
                        2.2354  2.2377  2.2400  2.2422  2.2445  2.2467  2.2489
                        2.2511  2.2532  2.2554  2.2575  2.2596  2.2617  2.2638
                        2.2659  2.2679  2.2700  2.2720  2.2740  2.2760  2.2780
                        2.2800  2.2819  2.2839  2.2858  2.2877  2.2896  2.2915
                        2.2934  2.2953  2.2972  2.2990  2.3008  2.3027  2.3045
                        2.3063  2.3081  2.3099  2.3117  2.3134  2.3152  2.3169
                        2.3187  2.3204  2.3221  2.3238  2.3255  2.3272  2.3289
                        2.3305  2.3322  2.3339  2.3355  2.3371  2.3388  2.3404
                        2.3420  2.3436  2.3452  2.3468  2.3484  2.3500

      *
      * BASIN 1
      *
      COMPUTE NM HYD       ID=1 HYD NO=100.2 AREA=0.0029 SQ MI
                           PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                           TP=0.133 HR MASS RAINFALL=-1

            K =    .072485HR     TP =    .133000HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N
=  7.106420
            UNIT PEAK =    9.1801     CFS    UNIT VOLUME =     .9981        B =    526.28       P60 =
1.8700
            AREA =       .002320 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER
HOUR
            RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330
```

```
          K =    .130697HR     TP =    .133000HR     K/TP RATIO =    .982685      SHAPE CONSTANT, N
=  3.593454
          UNIT PEAK =    1.4264     CFS    UNIT VOLUME =     .9904        B =    327.09       P60 =
1.8700
          AREA =       .000580 SQ MI     IA =     .50000 INCHES     INF =    1.25000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=1 CODE=1

                                        PARTIAL HYDROGRAPH    100.20


          RUNOFF VOLUME =      1.82491 INCHES      =          .2823 ACRE-FEET
          PEAK DISCHARGE RATE =        7.34 CFS  AT    1.500 HOURS    BASIN AREA =    .0029 SQ.
MI.


     *
     *BASIN 2
     *
     COMPUTE NM HYD       ID=2 HYD NO=100.3 AREA=0.00265 SQ MI
                          PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                          TP=0.133 HR MASS RAINFALL=-1

          K =    .072485HR     TP =    .133000HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N
=  7.106420
          UNIT PEAK =    8.3888     CFS    UNIT VOLUME =     .9981        B =    526.28       P60 =
1.8700
          AREA =       .002120 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


          K =    .130697HR     TP =    .133000HR     K/TP RATIO =    .982685      SHAPE CONSTANT, N
=  3.593454
          UNIT PEAK =    1.3034     CFS    UNIT VOLUME =     .9895        B =    327.09       P60 =
1.8700
          AREA =       .000530 SQ MI     IA =     .50000 INCHES     INF =    1.25000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=2 CODE=1

                                        PARTIAL HYDROGRAPH    100.30


          RUNOFF VOLUME =      1.82491 INCHES      =          .2579 ACRE-FEET
          PEAK DISCHARGE RATE =        6.71 CFS  AT    1.500 HOURS    BASIN AREA =    .0027 SQ.
MI.


     *
     *BASIN 3
     *
     COMPUTE NM HYD       ID=3 HYD NO=100.4 AREA=0.00114 SQ MI
                          PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                          TP=0.133 HR MASS RAINFALL=-1
```

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 3.6087 CFS UNIT VOLUME = .9962 B = 526.28 P60 = 1.8700
AREA = .000912 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .130697HR TP = .133000HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = .56072 CFS UNIT VOLUME = .9749 B = 327.09 P60 = 1.8700
AREA = .000228 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

```
PRINT HYD           ID=3 CODE=1
```

PARTIAL HYDROGRAPH 100.40

RUNOFF VOLUME = 1.82491 INCHES = .1110 ACRE-FEET
PEAK DISCHARGE RATE = 2.90 CFS AT 1.500 HOURS BASIN AREA = .0011 SQ. MI.

```
*
*BASIN 4
*
COMPUTE NM HYD      ID=4 HYD NO=100.5 AREA=0.0015 SQ MI
                    PER A=0 PER B=0 PER C=0 PER D=100.00
                    TP=0.133 HR MASS RAINFALL=-1
```

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 5.9354 CFS UNIT VOLUME = .9974 B = 526.28 P60 = 1.8700
AREA = .001500 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

```
PRINT HYD           ID=4 CODE=1
```

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 2.10071 INCHES = .1681 ACRE-FEET
PEAK DISCHARGE RATE = 4.22 CFS AT 1.500 HOURS BASIN AREA = .0015 SQ. MI.

```
*
*BASIN 5
*
COMPUTE NM HYD      ID=5 HYD NO=100.5 AREA=0.00228 SQ MI
                    PER A=0 PER B=20.00 PER C=0 PER D=80.00
                    TP=0.133 HR MASS RAINFALL=-1
```

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420

UNIT PEAK = 7.2175 CFS UNIT VOLUME = .9979 B = 526.28 P60 = 1.8700
AREA = .001824 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .130697HR TP = .133000HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = 1.1214 CFS UNIT VOLUME = .9885 B = 327.09 P60 = 1.8700
AREA = .000456 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=5 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 1.82491 INCHES = .2219 ACRE-FEET
PEAK DISCHARGE RATE = 5.77 CFS AT 1.500 HOURS BASIN AREA = .0023 SQ. MI.

*

*BASIN 6
*
COMPUTE NM HYD ID=6 HYD NO=100.5 AREA=0.00186 SQ MI
PER A=0 PER B=20.00 PER C=0 PER D=80.00
TP=0.133 HR MASS RAINFALL=-1

K = .072485HR TP = .133000HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 5.8880 CFS UNIT VOLUME = .9974 B = 526.28 P60 = 1.8700
AREA = .001488 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .130697HR TP = .133000HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = .91486 CFS UNIT VOLUME = .9851 B = 327.09 P60 = 1.8700
AREA = .000372 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=6 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 1.82491 INCHES = .1810 ACRE-FEET
PEAK DISCHARGE RATE = 4.71 CFS AT 1.500 HOURS BASIN AREA = .0019 SQ. MI.

*

```
     *BASIN 7
     *
     COMPUTE NM HYD       ID=7 HYD NO=100.5 AREA=0.0015 SQ MI
                          PER A=0 PER B=20.00 PER C=0 PER D=80.00
                          TP=0.133 HR MASS RAINFALL=-1

          K =    .072485HR     TP =    .133000HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N
=  7.106420
          UNIT PEAK =    4.7484     CFS    UNIT VOLUME =     .9970        B =    526.28       P60 =
1.8700
          AREA =       .001200 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


          K =    .130697HR     TP =    .133000HR     K/TP RATIO =    .982685      SHAPE CONSTANT, N
=  3.593454
          UNIT PEAK =    .73779     CFS    UNIT VOLUME =     .9822        B =    327.09       P60 =
1.8700
          AREA =       .000300 SQ MI     IA =     .50000 INCHES     INF =    1.25000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=7 CODE=1

                                        PARTIAL HYDROGRAPH    100.50


          RUNOFF VOLUME =      1.82491 INCHES      =         .1460 ACRE-FEET
          PEAK DISCHARGE RATE =        3.80 CFS  AT    1.500 HOURS    BASIN AREA =    .0015 SQ.
MI.



     *

     *BASIN 8
     *
     COMPUTE NM HYD       ID=8 HYD NO=100.5 AREA=0.0004 SQ MI
                          PER A=0 PER B=20.00 PER C=0 PER D=80.00
                          TP=0.133 HR MASS RAINFALL=-1

          K =    .072485HR     TP =    .133000HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N
=  7.106420
          UNIT PEAK =    1.2662     CFS    UNIT VOLUME =     .9898        B =    526.28       P60 =
1.8700
          AREA =       .000320 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


          K =    .130697HR     TP =    .133000HR     K/TP RATIO =    .982685      SHAPE CONSTANT, N
=  3.593454
          UNIT PEAK =    .19674     CFS    UNIT VOLUME =     .9299        B =    327.09       P60 =
1.8700
          AREA =       .000080 SQ MI     IA =     .50000 INCHES     INF =    1.25000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=8 CODE=1

                                        PARTIAL HYDROGRAPH    100.50
```

```
          RUNOFF VOLUME =     1.82491 INCHES     =         .0389 ACRE-FEET
          PEAK DISCHARGE RATE =       1.03 CFS  AT   1.500 HOURS   BASIN AREA =    .0004 SQ.
MI.



     *
     *BASIN 9
     *
     COMPUTE NM HYD       ID=9 HYD NO=100.5 AREA=0.0013 SQ MI
                          PER A=0 PER B=20.00 PER C=0 PER D=80.00
                          TP=0.133 HR MASS RAINFALL=-1

          K =    .072485HR    TP =    .133000HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N
=  7.106420
          UNIT PEAK =    4.1152    CFS   UNIT VOLUME =     .9966       B =    526.28       P60 =
1.8700
          AREA =       .001040 SQ MI    IA =     .10000 INCHES    INF =     .04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


          K =    .130697HR    TP =    .133000HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N
=  3.593454
          UNIT PEAK =    .63942    CFS   UNIT VOLUME =     .9789       B =    327.09       P60 =
1.8700
          AREA =       .000260 SQ MI    IA =     .50000 INCHES    INF =    1.25000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=9 CODE=1

                                        PARTIAL HYDROGRAPH   100.50


          RUNOFF VOLUME =     1.82491 INCHES     =         .1265 ACRE-FEET
          PEAK DISCHARGE RATE =       3.30 CFS  AT   1.500 HOURS   BASIN AREA =    .0013 SQ.
MI.



     *
     *BASIN 10
     *
     COMPUTE NM HYD       ID=11 HYD NO=100.5 AREA=0.0029 SQ MI
                          PER A=0 PER B=20.00 PER C=20.00 PER D=60.00
                          TP=0.133 HR MASS RAINFALL=-1

          K =    .072485HR    TP =    .133000HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N
=  7.106420
          UNIT PEAK =    6.8851    CFS   UNIT VOLUME =     .9977       B =    526.28       P60 =
1.8700
          AREA =       .001740 SQ MI    IA =     .10000 INCHES    INF =     .04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


          K =    .118163HR    TP =    .133000HR    K/TP RATIO =    .888442     SHAPE CONSTANT, N
=  3.992480
          UNIT PEAK =    3.0933    CFS   UNIT VOLUME =     .9963       B =    354.67       P60 =
```

```
1.8700
          AREA =       .001160 SQ MI     IA =     .42500 INCHES     INF =    1.04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=11 CODE=1

                                        PARTIAL HYDROGRAPH    100.50


          RUNOFF VOLUME =      1.60840 INCHES      =          .2488 ACRE-FEET
          PEAK DISCHARGE RATE =       6.81 CFS  AT    1.500 HOURS    BASIN AREA =    .0029 SQ.
MI.


     *
     *BASIN 11
     *
     COMPUTE NM HYD       ID=12 HYD NO=100.5 AREA=0.0029 SQ MI
                          PER A=0 PER B=20.00 PER C=20.00 PER D=60.00
                          TP=0.133 HR MASS RAINFALL=-1

          K =    .072485HR     TP =    .133000HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N
=  7.106420
          UNIT PEAK =    6.8851     CFS    UNIT VOLUME =     .9977         B =    526.28       P60 =
1.8700
          AREA =       .001740 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


          K =    .118163HR     TP =    .133000HR     K/TP RATIO =    .888442      SHAPE CONSTANT, N
=  3.992480
          UNIT PEAK =    3.0933     CFS    UNIT VOLUME =     .9963         B =    354.67       P60 =
1.8700
          AREA =       .001160 SQ MI     IA =     .42500 INCHES     INF =    1.04000 INCHES PER
HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

     PRINT HYD            ID=12 CODE=1

                                        PARTIAL HYDROGRAPH    100.50


          RUNOFF VOLUME =      1.60840 INCHES      =          .2488 ACRE-FEET
          PEAK DISCHARGE RATE =       6.81 CFS  AT    1.500 HOURS    BASIN AREA =    .0029 SQ.
MI.


     *

     *ADD BASINS 1 THRU 9
     *
     ADD HYD                         ID=15 HYD NO=301.00 ID=1  ID=2
     ADD HYD                         ID=16 HYD NO=302.00 ID=5 ID=6
     ADD HYD                         ID=17 HYD NO=303.00 ID=15 ID=16
     ADD HYD                         ID=18 HYD NO=304.00 ID=3 ID=4
     ADD HYD                         ID=19 HYD NO=305.00 ID=17 ID=18
     ADD HYD                         ID=20 HYD NO=306.00 ID=7 ID=8
     ADD HYD                         ID=21 HYD NO=307.00 ID=20 ID=9
```

```
ADD HYD                          ID=22 HYD NO=306.00 ID=19 ID=21

PRINT HYD                        ID=22 CODE=1

                                          HYDROGRAPH FROM AREA   306.00

     RUNOFF VOLUME =     1.85139 INCHES     =       1.5334 ACRE-FEET
     PEAK DISCHARGE RATE =      39.78 CFS  AT   1.500 HOURS   BASIN AREA =    .0155 SQ.
MI.


     *
     * POND 1
     *
     ROUTE RESERVOIR      ID=13 HYD NO=202.00 INFLOW ID=22 CODE=24
                    OUTFLOW(CFS)      STORAGE(AC-FT)   ELEVATION(FT)
                       0.0000            0.0000          5123.00
                       0.3392            0.2290          5124.00
                       0.5344            0.5442          5125.25
                       0.6753            0.9172          5126.50
                       0.7915            1.3480          5127.75
                       0.8928            1.8366          5129.00

* * * * * * * * * * * * * * * * * * * *

  TIME       INFLOW     ELEV       VOLUME     OUTFLOW
  (HRS)      (CFS)      (FEET)     (AC-FT)    (CFS)

    .00         .00   5123.00        .000        .00
    .80         .04   5123.00        .000        .00
   1.60       27.50   5125.88        .731        .61
   2.40        1.78   5127.69       1.328        .79
   3.20         .47   5127.70       1.332        .79
   4.00         .36   5127.63       1.307        .78
   4.80         .34   5127.55       1.278        .77
   5.60         .36   5127.47       1.250        .77
   6.40         .03   5127.37       1.218        .76
   7.20         .00   5127.23       1.168        .74
   8.00         .00   5127.09       1.120        .73
   8.80         .00   5126.95       1.072        .72
   9.60         .00   5126.81       1.025        .70
  10.40         .00   5126.68        .979        .69
  11.20         .00   5126.55        .933        .68
  12.00         .00   5126.41        .889        .66
  12.80         .00   5126.26        .846        .65
  13.60         .00   5126.12        .803        .63
  14.40         .00   5125.98        .762        .62
  15.20         .00   5125.85        .722        .60
  16.00         .00   5125.71        .682        .59
  16.80         .00   5125.58        .644        .57
  17.60         .00   5125.46        .607        .56
  18.40         .00   5125.34        .570        .54
  19.20         .00   5125.21        .535        .53
 PEAK DISCHARGE =          .789 CFS - PEAK OCCURS AT HOUR    2.77
 MAXIMUM WATER SURFACE ELEVATION =     5127.725
 MAXIMUM STORAGE =        1.3394 AC-FT      INCREMENTAL TIME=     .033330HRS

PRINT HYD            ID=13 CODE=1

                                   PARTIAL HYDROGRAPH   202.00
```

6.81
6.61
.19
1441 cfs

```
          RUNOFF VOLUME =     1.24611 INCHES     =       1.0321 ACRE-FEET
          PEAK DISCHARGE RATE =        .79 CFS  AT   2.766 HOURS   BASIN AREA =    .0155 SQ.
MI.


      *
      *ADD BASINS 1 THRU 11
      *
      ADD HYD                       ID=14 HYD NO=401.00 ID=11  ID=12
      ADD HYD                       ID=23 HYD NO=402.00 ID=14 ID=13


      PRINT HYD                     ID=23 CODE=1

                                                HYDROGRAPH FROM AREA   402.00

          RUNOFF VOLUME =     1.34460 INCHES     =       1.5296 ACRE-FEET
          PEAK DISCHARGE RATE =      14.10 CFS  AT   1.500 HOURS   BASIN AREA =    .0213 SQ.
MI.


      *


      FINISH

          NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 09:54:03
```

CITY OF ALBUQUERQUE

July 25, 2006

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

Re: Residential at 98th and Sage Grading and Drainage Plan
Engineer's Stamp dated 7-7-06 (M9/D25A)

Dear Mr. Bohannan,

Based upon the information provided in your submittal received 7-11-06, the above referenced plan cannot be approved for Preliminary Plat action and Final Plat action by the DRB and Grading Permit until the following comments are addressed.

- Provide a discussion of offsite flows and quantify if present.
- Show the drainage easement and the existing storm drain pipe.
- The AHYMO analysis should include all basins (basin 11 was omitted) and should be combined at the end in order to determine what the peak flow at the existing rundown in Jenny Court is.
- The original report stated different volume and peak discharge values for the Marketplace tract. The report also does not match the AHYMO output file. Which is correct?
- Why are the backyards of lots 1, 2, and 3 designed to drain into the Marketplace tract?

Brad Bingham and I would like to meet with you to discuss these comments. Please call to set up a meeting. My number is 924-3695.

Sincerely,

Curtis A. Cherne, E.I.
Engineering Associate, Planning Dept.
Development and Building Services

BSB

C: file
Brad Bingham

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: Sage Ranch Subdivision
ZONE MAP/DRG. FILE #: M-9-D25A
DRB #: 1003991 EPC #:
WORK ORDER #:

LEGAL DESCRIPTION: Tract A-1-C Town of Atrisco Grant Unit 7
CITY ADDRESS:

ENGINEERING FIRM:	Tierra West, LLC	CONTACT:	Ron Bohannan
ADDRESS:	8509 Jefferson NE	PHONE:	(505) 858-3100
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87113
OWNER:	Frontera Development	CONTACT:	Jay Schneider
ADDRESS:	6263 North Scottsdale Road #160	PHONE:	480315-9600
CITY, STATE:	Scottsdale	ZIP CODE:	85250
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Precision Surveys	CONTACT:	Larry Medrano
ADDRESS:	4900 Alameda Boulevard NE, Suite A	PHONE:	505-856-5700
CITY, STATE:	ABQ, 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

BP fee paid

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SIA / FINANACIAL GUARANTEE RELEASE
- X 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.)
- X GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- ____ SO-19

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ____ YES
- x NO
- ____ COPY PROVIDED

RECEIVED
JUL 11 2006
HYDROLOGY SECTION

DATE SUBMITTED: 7/10/2006 BY: Sarah Abeyta

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.

(505) 858-3100

8509 Jefferson NE, Albuquerque, NM 87113

LETTER OF TRANSMITTAL

DATE: 7/11/2006	JOB NO: 26015
ATTENTION: Bradley Bingham	
RE: Sage Ranch Subdivision	

TO Mr. Bradley Bingham, PE
City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, NM 87103

PHONE: (505) 924-3986

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

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATED	NO.	DESCRIPTION
1			Copy of the Drainage Report

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ **FOR SIGNATURE(S)**

☐ For your use ☐ Approved as noted ☐ _____

☒ As requested ☐ Returned for corrections

☐ For review and comments ☐ _____

☐ FOR BIDS DUE _____ 20 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

RECEIVED
JUL 11 2006
HYDROLOGY SECTION

COPY TO _____

RECEIVED BY Sandy Handley Date: 07/11/06 SIGNED Cynthia Abeyta for Sarah Abeyta

FAX (505) 858-1118 If enclosures are not as noted, kindly notify us at once Email: twllc@tierrawestllc.com

DRAINAGE REPORT
FOR

Sage Ranch Subdivision

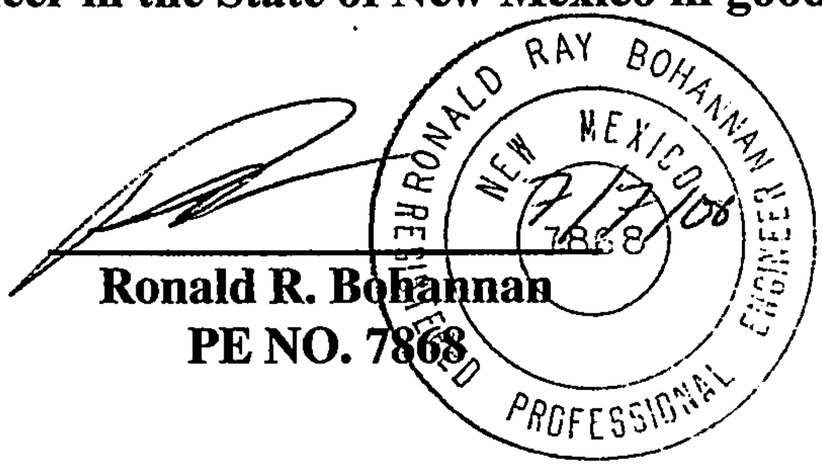
Prepared by:

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

Prepared for:
FRONTERA DEVELOPMENT, INC.
6263 North Scottsdale Road, Suite 160
Scottsdale, AZ 85250

July 2006

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 26015

RECEIVED
JUL 11 2006
HYDROLOGY SECTION

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MAP POCKET
Grading and Drainage Plan

Section I

Report

Purpose

The purpose of this report is to modify the previously approved master drainage management plan for Sage Marketplace (M9-D25). The previously approved plan was for a total of a 13.77 acre site; the Neighborhood Market (4.51 acres) which is currently under construction, Lots 2 (0.54 acres), Lot 3 (1.12 acres), Lot 4 (3.84 acres) which are future planned commercial developments and Lot 5 (3.76), which is a residential development. At this time the 3.76 acre residential property is being developed and this report is being submitted those improvements. The 3.76 acre parcel will consist of 26 lots residential lots.

Location

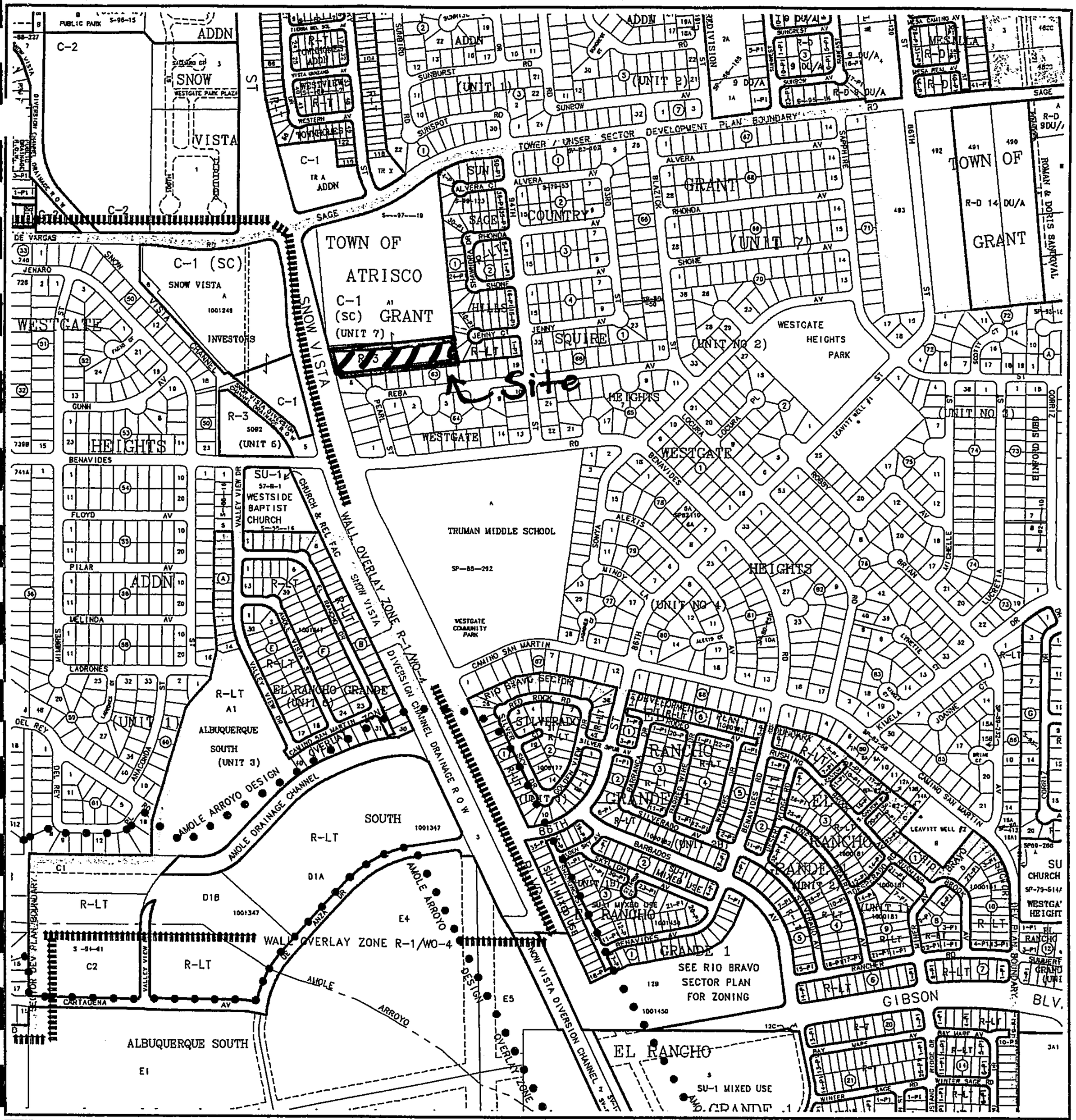
The site is located on the west side of Albuquerque, more specifically east of Snow Vista Boulevard S.W. and south of the new commercial development, Sage Marketplace. The site is 3.76 acres and will consist of 26 residential lots. The site is shown on the following Zone Atlas Page M-9-Z.

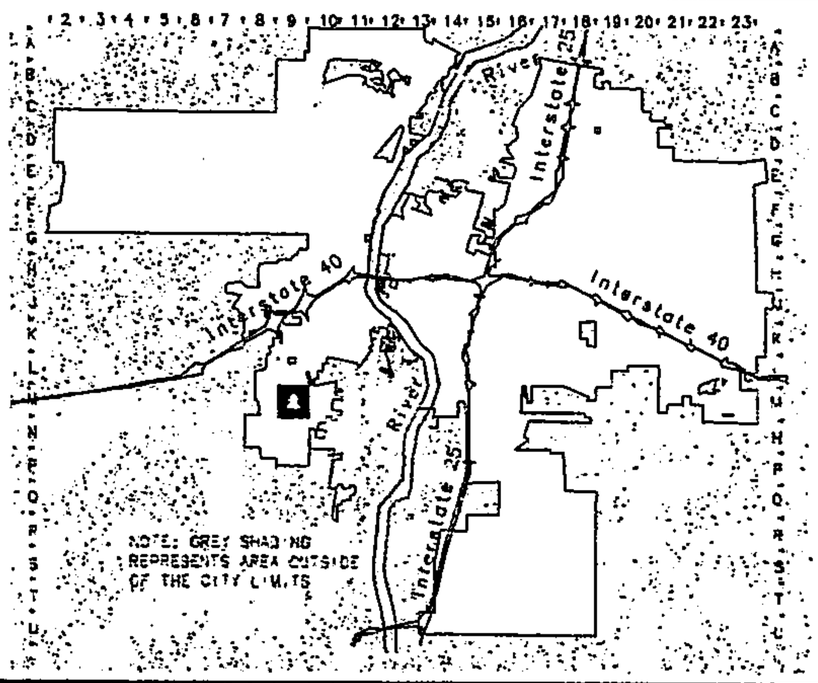
Existing Drainage Conditions

The 3.76 acre site is currently undeveloped and being used as a staging area for the contractor working on the commercial development to the north. The site currently drains from west to east to a temporary detention pond. From this temporary pond the water is discharged at a controlled rate through an existing 20' drainage easement to the existing Sun Sage Hills Subdivision via an existing storm drain pipe.

Flood Plain

The site is located on Firm Map 35001C0336E. The map indicates that the site does not lie within a 100-year flood plain.





CITY OF
Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

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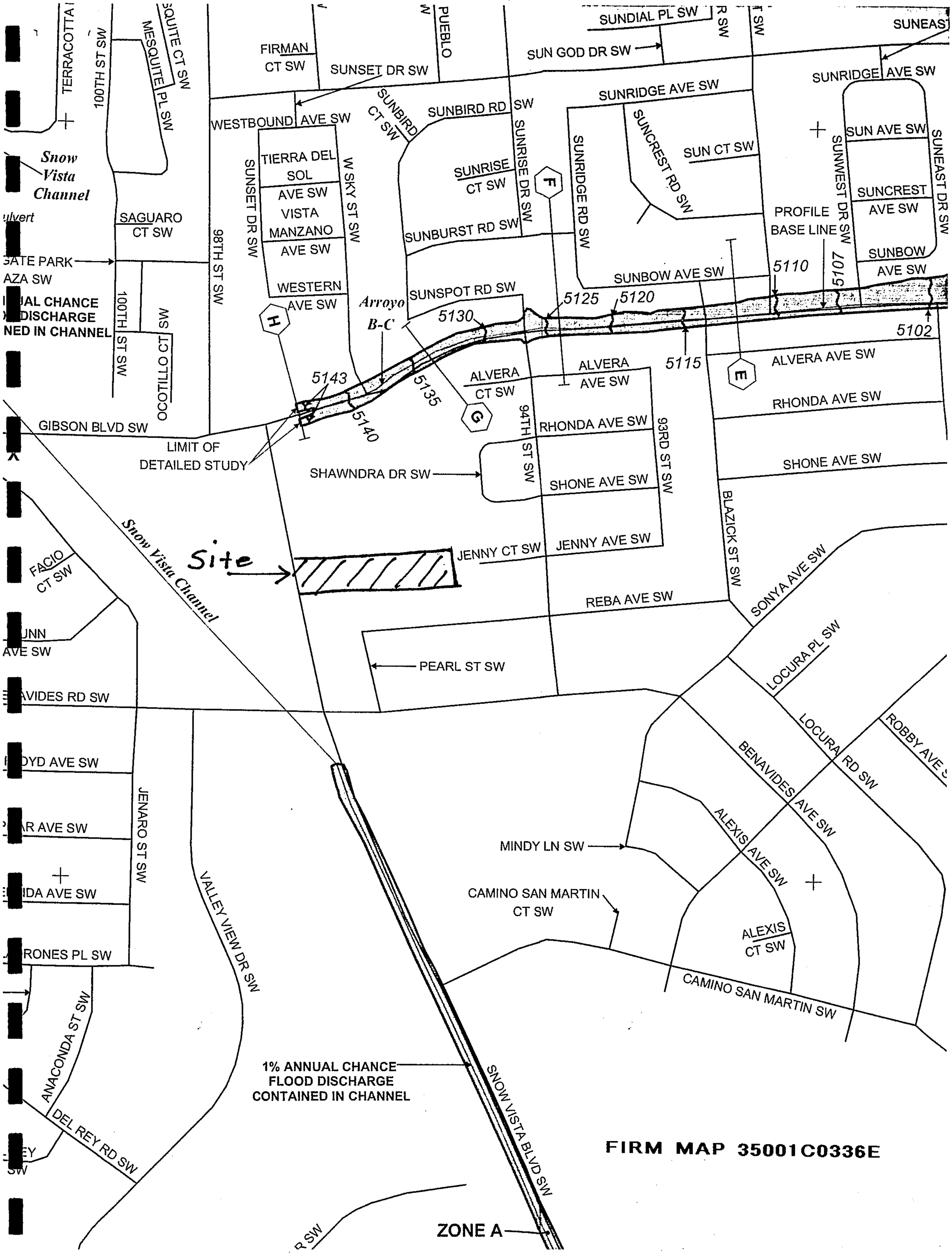
GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

M-9-Z

Map Amended through July 09, 2003


TERRACOTTA
100TH ST SW
MESQUITE CT SW
MESQUITE PL SW
FIRMAN CT SW
PUEBLO
SUNSET DR SW
SUNDIAL PL SW
SUN GOD DR SW
SUNEAST
SUNRIDGE AVE SW
WESTBOUND AVE SW
SUNBIRD CT SW
SUNBIRD RD SW
SUNRISE DR SW
SUNRISE CT SW
SUNRIDGE RD SW
SUNCREST RD SW
SUN CT SW
SUN AVE SW
SUNWEST DR SW
SUNEAST DR SW
SUNCREST AVE SW
SUNBOW AVE SW
PROFILE BASE LINE
5110
5107
5102
Snow Vista Channel
SAGUARO CT SW
98TH ST SW
TIERRA DEL SOL AVE SW
VISTA MANZANO AVE SW
WESTERN AVE SW
W SKY ST SW
SUNSET DR SW
SUNBURST RD SW
SUNSPOT RD SW
5130
5125
5120
5115
Arroyo B-C
5143
5140
5135
ALVERA CT SW
ALVERA AVE SW
RHONDA AVE SW
94TH ST SW
93RD ST SW
SHONE AVE SW
SHAWNDRA DR SW
GIBSON BLVD SW
LIMIT OF DETAILED STUDY
JENNY CT SW
JENNY AVE SW
Site
BLAZICK ST SW
SONYA AVE SW
REBA AVE SW
PEARL ST SW
LOCURA PL SW
LOCURA RD SW
ROBBY AVE
BENAVIDES AVE SW
ALEXIS AVE SW
ALEXIS CT SW
MINDY LN SW
CAMINO SAN MARTIN CT SW
CAMINO SAN MARTIN SW
FACIO CT SW
VALLEY VIEW DR SW
JENARO ST SW
ANACONDA ST SW
DEL REY RD SW
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
SNOW VISTA BLVD SW
ZONE A
FIRM MAP 35001C0336E

July 25, 2006

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

Re: Residential at 98th and Sage Grading and Drainage Plan

Engineer's Stamp dated 7-7-06 (M9/D25A)

Dear Mr. Bohannan,

Based upon the information provided in your submittal received 7-11-06, the above referenced plan cannot be approved for Preliminary Plat action and Final Plat action by the DRB and Grading Permit until the following comments are addressed.

- Provide a discussion of offsite flows and quantify if present.
- Show the drainage easement and the existing storm drain pipe. Add a build note if the existing storm drain pipe is to be removed.
- The 3.75" orifice plate installed on the outfall of the pond (Walmart) restricts the flow out of the pond to a maximum of 0.9661 cfs as stated in the Drainage Report dated September 2005. Therefore, the amount of runoff leaving the commercial site is 0.9661 cfs and the existing orifice plate does not need to be modified.

If you have any questions, you can contact me at 924-3695.

Sincerely,

Curtis A. Cherne, E.I.
Engineering Associate, Planning Dept.
Development and Building Services

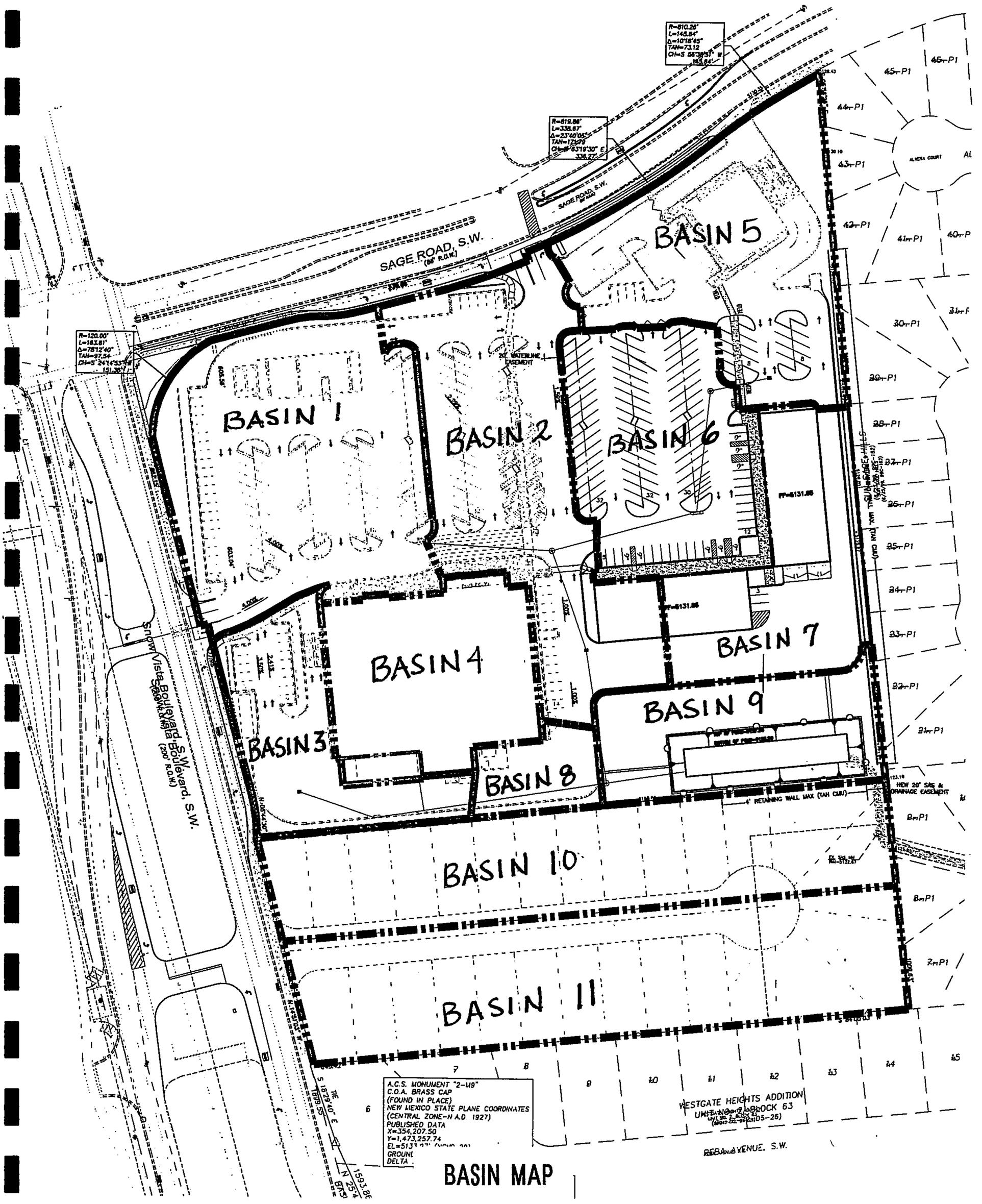
C: file

Proposed Drainage Management Plan

The entire site will be graded and all of the surface improvements will be built out in their entirety. The enclosed grading plan (in the map pocket) shows the grades for the entire project.

This site was previously analyzed in the approved Drainage Report for Sage Marketplace (M9-D25). The site previously analyzed consisted of 13.77 acres; 10.01 commercial and 3.76 residential. The site was divided into 11 developed basins as shown on the following page. The residential property was divided into Basins 10 and 11. The commercial portion of the site drains to a detention pond which was constructed with the Neighborhood Market building via a series of drop inlets. The discharge from the commercial portion of the site is restricted in order to allow for the residential piece to free discharge to Jenny Court.

According to the drainage report for the existing Sun Sage Hills subdivision (M9-D14), located east of the site, the amount of runoff that can be discharged from the total 13.77 acre site is 18.4 cfs in a 24 hour period. An orifice structure was constructed in the new pond built with the Neighborhood Market, which restricts the runoff leaving the commercial site to discharge 7.20 cfs. Using land treatment types 20% type B, 20% type C and 60% type D, the runoff generated by the developed residential property is 13.54 cfs. This 7.20 cfs, generated by the commercial development, added to the 13.54 cfs, generated by the residential property, will exceed the allowable 18.4 cfs. The size of the orifice, controlling the discharge rate from the commercial pond, will need to be modified to 3" in order to further restrict the amount of runoff from the commercial site to 4.24 cfs in a 24 hour period. This 4.24 cfs together with the 13.54 cfs free discharge from the


SAGE ROAD, S.W.
(66' R.O.W.)
SAGE ROAD, S.W.
SNOW VISTA BOULEVARD, S.W.
(200' R.O.W.)
BASIN 1
BASIN 2
BASIN 3
BASIN 4
BASIN 5
BASIN 6
BASIN 7
BASIN 8
BASIN 9
BASIN 10
BASIN 11
R=810.26'
L=145.84'
Δ=10°18'45"
TAN=73.12
CH=S 58°38'51" W
145.64'
R=812.86'
L=338.87'
Δ=23°40'05"
TAN=121.79
CH=S 83°19'30" E
336.27'
R=120.00'
L=183.81'
Δ=78°12'40"
TAN=97.54
CH=S 24°14'33" W
166.38'
20' WATERLINE EASEMENT
4' RETAINING WALL MAX (TAN CMU)
NEW 20' SAN. & DRAINAGE EASEMENT
ALVERA COURT
FF=6131.85
A.C.S. MONUMENT "2-M9"
C.O.A. BRASS CAP
(FOUND IN PLACE)
NEW MEXICO STATE PLANE COORDINATES
(CENTRAL ZONE-N A.D. 1927)
PUBLISHED DATA
X=354,207.50
Y=1,473,257.74
WESTGATE HEIGHTS ADDITION
UNIT 2 BLOCK 63
(D5-26)
REGAL AVENUE, S.W.

BASIN MAP

residential development totals 17.78 cfs; meeting the requirements of the restricted amount of 18.4 cfs in a 24 hour period.

The runoff discharged from the residential site will be conveyed to a 14' concrete channel via 4" mountable curb. From the concrete rundown the water will be discharged to Jenny Court. From Jenny Court the runoff discharges to Saphire Street at Corriz Drive. At this point the runoff is intercepted by a series of seven Type 'C' inlets and a 40' wide traverse drop inlet.

Calculations

The weighted E method from the "City of Albuquerque Development Process Manual Volume 11 – Design Criteria, 1997 Revision" was used to calculate the runoff and volume for the site.

Summary

According to the Sage Marketplace Drainage Report the flow from both the commercial and residential sites have to be restricted to a total of 18.4 cfs in a 24 hour period. The discharge from the commercial site will be further restricted by changing the size of the existing orifice in the newly constructed pond. The discharge from the residential property, 13.54 cfs, is allowed to free discharge to Jenny Court via a 14' concrete channel to be built with the residential property. The water will flow via a 4" mountable curb to the new 14' concrete channel. The total discharge from the site will be 17.78 cfs which is less than the allowed 18.4 cfs. From Jenny Court the runoff

discharges to Saphire Street at Corriz Drive. At this point the runoff is intercepted by a series of seven Type 'C' and a 40' wide traverse drop inlet.

Section II

Runoff Calculations

Weighted E Method

Developed 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	81839.28	1.88	0%	0	20%	0.38	0%	0.00	80%	1.50	1.710	0.268	7.33	1.036	0.162	4.63
2	73888.48	1.70	0%	0	20%	0.34	0%	0.00	80%	1.36	1.710	0.242	6.62	1.036	0.146	4.18
3	32004.94	0.73	0%	0	20%	0.15	0%	0.00	80%	0.59	1.710	0.105	2.87	1.036	0.063	1.81
4	42214.75	0.97	0%	0	0%	0.00	0%	0.00	100%	0.97	1.970	0.159	4.24	1.240	0.100	2.80
5	63636.64	1.46	0%	0	20%	0.29	0%	0.00	80%	1.17	1.710	0.208	5.70	1.036	0.126	3.60
6	51886.99	1.19	0%	0	20%	0.24	0%	0.00	80%	0.95	1.710	0.170	4.65	1.036	0.103	2.94
7	42034.1	0.96	0%	0	20%	0.19	0%	0.00	80%	0.77	1.710	0.138	3.77	1.036	0.083	2.38
8	11249.06	0.26	0%	0	20%	0.05	0%	0.00	80%	0.21	1.710	0.037	1.01	1.036	0.022	0.64
9	37,128	0.85	0%	0	20%	0.17	0%	0.00	80%	0.68	1.710	0.121	3.33	1.036	0.074	2.10
10	**81,893**	**1.88**	**0%**	**0**	**20%**	**0.38**	**20%**	**0.38**	**60%**	**1.13**	**1.514**	**0.237**	**6.77**	**0.876**	**0.137**	**4.11**
11	**81,893**	**1.88**	**0%**	**0**	**20%**	**0.38**	**20%**	**0.38**	**60%**	**1.13**	**1.514**	**0.237**	**6.77**	**0.876**	**0.137**	**4.11**
TOTAL	599,669	13.77										1.684	53.04		1.018	29.17

1.89 ac

Equations:

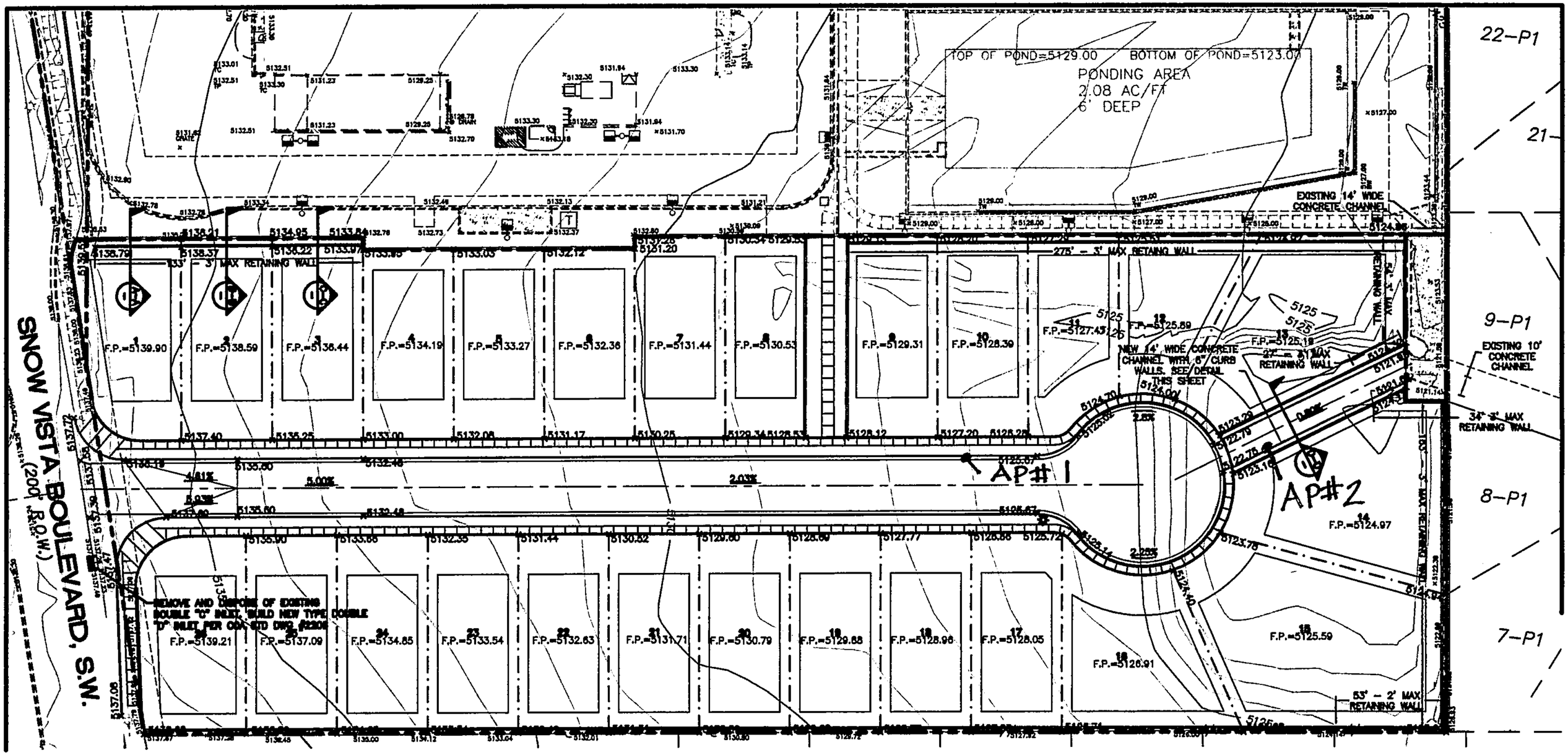
Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

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



ANALYSIS POINT MAP

28' F-F Street Section with 4" curb

Slope= 0.028

AP #1

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	0.33	0.00	0.00	0.00	0.42	0.00	0.74	0.006575
0.02	0.0064	0.66	0.01	0.00	0.01	0.66	0.01	0.83	0.01548
0.025	0.01	0.83	0.01	0.01	0.02	0.77	0.02	0.86	0.020373
0.035	0.0196	1.16	0.02	0.02	0.04	0.97	0.03	0.91	0.030803
0.045	0.0324	1.49	0.02	0.04	0.07	1.14	0.05	0.95	0.041917
0.052	0.043264	1.72	0.03	0.05	0.11	1.26	0.07	0.97	0.050034
0.06	0.0576	1.98	0.03	0.08	0.16	1.38	0.08	1.00	0.059604
0.0625	0.0625	2.06	0.03	0.09	0.18	1.42	0.09	1.00	0.062654

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)
0.063	0.063506	2.09	0.03	0.09	0.18	1.42	0.09	1.00	0.063027
0.1	0.172656	3.98	0.04	0.31	0.62	1.81	0.18	1.01	0.100931
0.13	0.311406	5.51	0.06	0.67	1.34	2.15	0.28	1.05	0.139261
0.16	0.495156	7.04	0.07	1.23	2.47	2.49	0.40	1.10	0.181082
0.2	0.810156	9.08	0.09	2.37	4.73	2.92	0.58	1.15	0.240591
0.207	0.873506	9.43	0.09	2.61	5.23	2.99	0.62	1.16	0.251363
0.2612	1.446942	12.20	0.12	5.11	10.22	3.53	0.92	1.22	0.337727
0.289	**1.798056**	**13.62**	**0.13**	**6.82**	**13.64**	**3.79**	**1.10**	**1.24**	**0.383799**
0.3025	1.9825	14.31	0.14	7.77	15.53	3.92	1.18	1.26	0.406553

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)
0.303	1.9895	14.31	0.14	7.81	15.62	3.93	1.19	1.26	0.408002
0.3039	2.0021	14.31	0.14	7.89	15.79	3.94	1.20	1.26	0.410612
0.3062	2.0343	14.31	0.14	8.11	16.21	3.98	1.22	1.27	0.417284
0.31	2.0875	14.31	0.15	8.46	16.92	4.05	1.26	1.28	0.42832
0.3125	2.1225	14.32	0.15	8.70	17.39	4.10	1.28	1.29	0.435588
0.32	2.2275	14.32	0.16	9.42	18.84	4.23	1.35	1.32	0.457429
0.3317	2.3913	14.34	0.17	10.60	21.20	4.43	1.47	1.36	0.491619
0.333	2.4095	14.34	0.17	10.73	21.47	4.45	1.48	1.36	0.495426

For water depths greater than 0.333 ft but less than 0.523 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)
0.335	2.4376	14.44	0.17	10.89	21.78	4.47	1.50	1.36	0.498465
0.3601	2.80726	15.69	0.18	13.04	26.07	4.64	1.67	1.36	0.537438
0.38	3.122725	16.69	0.19	14.94	29.89	4.79	1.82	1.37	0.569347
0.4196	3.809389	18.67	0.20	19.31	38.63	5.07	2.13	1.38	0.635133
0.4603	4.596832	20.70	0.22	24.65	49.31	5.36	2.47	1.39	0.705468
0.504	5.534525	22.89	0.24	31.42	62.84	5.68	2.86	1.41	0.783587
0.513	5.7395	23.34	0.25	32.95	65.91	5.74	2.95	1.41	0.799974
0.523	5.972	23.84	0.25	34.71	69.43	5.81	3.04	1.42	0.818294

Concrete Rundown Capacity

Weir Equation:

$$Q = CLH^{3/2}$$

Q= Flow
C = 2.95
L= Length of weir
H = Height of Weir

AP# 2

L = 14'
H = .5'

Q Provided = 2.95*14* .5^3/2 = 14.60 cfs

Q Required 13.54 cfs < 14.60 cfs
Use 14' wide concrete channel section

$r = A/P$
$= \frac{7'}{15} = 0.47$

channel

$Q = \frac{1.486}{n} A r^{2/3} \cdot S^{1/2}$

$= \frac{1.486}{.013} (14' \times .5')(0.47)^{.667} \cdot .008^{.5}$

$= 43.3$ cfs

Section III

AHYMO Data

VOLUME CALCULATIONS

POND 1

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D + 0.5 * C * D²
C = (At - Ab) / Dt

Ab	=	9,976.79
At	=	19,645.28
Dt	=	6.00
C	=	1611.42

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
5123	0	0	0.0000
5124.00	1.00	0.2290	0.2211
5125.25	2.25	0.5442	0.3445
5126.50	3.50	0.9172	0.4342
5127.75	4.75	1.3480	0.5083
5129.00	6.00	1.8366	0.5729

Orifice Equation
Q = CA SQRT(2gH)

C =	0.6
Diameter (in)	3
Area (ft^2)=	0.049
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

4.24 cfs

$Q = C_D \sqrt{2gh}$

$4.24 = 0.6(.049)\sqrt{64.4h}$

$\frac{4.24}{.6(.049)} = \sqrt{64.4h}$

$144.21 = (\sqrt{h})^2 (8.025)^2$

$h =$

$\sqrt{64.4h} = \sqrt{64.4} \cdot \sqrt{h}$

$\sqrt{11.6} = \sqrt{4} \cdot \sqrt{4}$

$4 \neq 2.2$

3.5" dia r = .156 ft
A = .0191 ft²
Q = .89 cfs h = 5.8

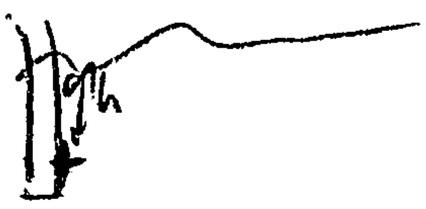
what h did table below use

$Q = .6(.049) = \sqrt{64.4h}$

$19.38 = 8.025 \cdot \sqrt{h}$

$\sqrt{h} = 2.414$

$h = 5.84'$



$h = 5' 6.5" = 5.625'$

out!

$Q = .6(.049)\sqrt{64.4 \cdot 5.625}$

Q = .56 cfs

flow to drain
avg flow 0.4 cfs

1.8366 ac ft
= 80,002 ft³

$\frac{80002 \text{ ft}^3}{.4 \text{ ft}^3} \mid \frac{\text{sec}}{}$

$= 200,006 \text{ sec} \mid \frac{\text{hr}}{3600 \text{ sec}}$

= 55 hr

```
**************************************************************
*                                                            *
*                SAGE MARKETPLACE DRAINAGE ANALYSIS          *
*                      98TH & SAGE(25020)                    *
*           PROPOSED CONDITIONS (100-YEAR, 6-HR STORM)       *
*                                                            *
**************************************************************
*
START                   TIME=0.0 HR
RAINFALL                TYPE=1 RAIN QUARTER=0.0 IN
                        RAIN ONE=1.87 IN RAIN SIX=2.35 IN
                        RAIN DAY=2.66 IN DT=0.03333 HR

*
* BASIN 1
*
COMPUTE NM HYD          ID=1 HYD NO=100.2 AREA=0.0022 SQ MI
                        PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1

*
*BASIN 2
*
COMPUTE NM HYD          ID=2 HYD NO=100.3 AREA=0.0015 SQ MI
                        PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=2 CODE=1

*
*BASIN 3
*
COMPUTE NM HYD          ID=3 HYD NO=100.4 AREA=0.0018 SQ MI
                        PER A=0 PER B=20.00 PER C=0.00 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=3 CODE=1

*
*BASIN 4
*
COMPUTE NM HYD          ID=4 HYD NO=100.5 AREA=0.0004 SQ MI
                        PER A=0 PER B=20.00 PER C=0 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=4 CODE=1

*
*BASIN 5
*
COMPUTE NM HYD          ID=5 HYD NO=100.5 AREA=0.0026 SQ MI
                        PER A=0 PER B=20.00 PER C=0 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=5 CODE=1

*

*BASIN 6
*
COMPUTE NM HYD          ID=6 HYD NO=100.5 AREA=0.0015 SQ MI
                        PER A=0 PER B=0 PER C=0 PER D=100.00
```

```
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=6 CODE=1

*

*BASIN 7
*
COMPUTE NM HYD          ID=7 HYD NO=100.5 AREA=0.0014 SQ MI
                        PER A=0 PER B=20.00 PER C=0 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=7 CODE=1

*

*BASIN 8
*
COMPUTE NM HYD          ID=8 HYD NO=100.5 AREA=0.0029 SQ MI
                        PER A=0 PER B=20.00 PER C=0 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=8 CODE=1

*

*BASIN 9
*
COMPUTE NM HYD          ID=9 HYD NO=100.5 AREA=0.0013 SQ MI
                        PER A=0 PER B=20.00 PER C=0 PER D=80.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=9 CODE=1

*

*BASIN 10
*
COMPUTE NM HYD          ID=11 HYD NO=100.5 AREA=0.0029 SQ MI
                        PER A=0 PER B=20.00 PER C=20.00 PER D=60.00
                        TP=0 HR MASS RAINFALL=-1
PRINT HYD               ID=11 CODE=1

*


*ADD BASINS 1 THRU 9
*
ADD HYD                 ID=15 HYD NO=301.00 ID=1  ID=3
ADD HYD                 ID=16 HYD NO=302.00 ID=15 ID=2
ADD HYD                 ID=17 HYD NO=303.00 ID=5  ID=8
ADD HYD                 ID=18 HYD NO=304.00 ID=17 ID=16
ADD HYD                 ID=19 HYD NO=305.00 ID=7  ID=6
ADD HYD                 ID=20 HYD NO=306.00 ID=19 ID=4
ADD HYD                 ID=21 HYD NO=307.00 ID=18 ID=20
ADD HYD                 ID=22 HYD NO=306.00 ID=21 ID=9


PRINT HYD                       ID=22 CODE=1
*

* POND 1
*
```

where is basin 11?

```
ROUTE RESERVOIR      ID=13 HYD NO=202.00 INFLOW ID=22 CODE=24
                     OUTFLOW(CFS)      STORAGE(AC-FT)   ELEVATION(FT)
                          0.0000            0.0000          5123.00
                          0.2211            0.2290          5124.00
                          0.3445            0.5442          5125.25
                          0.4342            0.9172          5126.50
                          0.5083            1.1380          5127.75
                          0.5729            1.8366          5129.00

PRINT HYD            ID=13 CODE=1
*


FINISH
```

no pond. should be 2.08 ac-ft

```
          AHYMO PROGRAM (AHYMO_97) -                              - Version:  1997.02d
               RUN DATE (MON/DAY/YR) = 05/03/2006
               START TIME (HR:MIN:SEC) = 09:59:22     USER NO.=
AHYMO-S-9702d1TierraW-AH
               INPUT FILE = Z:\2005\25020\Reports\25020I~3.TXT

     ***************************************************************
     *                                                             *
     *                  SAGE MARKETPLACE DRAINAGE ANALYSIS         *
     *                                                             *
     *                        98TH & SAGE(23134)                   *
     *                                                             *
     *          PROPOSED CONDITIONS (100-YEAR, 6-HR STORM)         *
     *                                                             *
     ***************************************************************
     *

     START                TIME=0.0 HR

     RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN

                          RAIN ONE=1.87 IN RAIN SIX=2.35 IN

                          RAIN DAY=2.66 IN DT=0.03333 HR


                    COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 -
PEAK AT 1.40 HR.
                    DT =     .033330 HOURS        END TIME =     5.999400 HOURS
                       .0000   .0034   .0068   .0103   .0139   .0176   .0213
                       .0252   .0291   .0331   .0372   .0414   .0457   .0502
                       .0547   .0594   .0643   .0693   .0744   .0797   .0852
                       .0909   .0968   .1029   .1092   .1159   .1228   .1301
                       .1377   .1457   .1542   .1594   .1649   .1708   .1835
                       .2118   .2555   .3182   .4038   .5163   .6598   .8384
                     1.0565  1.2588  1.3434  1.4147  1.4782  1.5359  1.5890
                     1.6384  1.6845  1.7277  1.7684  1.8068  1.8430  1.8774
                     1.9099  1.9407  1.9699  1.9977  2.0241  2.0309  2.0374
                     2.0435  2.0494  2.0551  2.0606  2.0659  2.0710  2.0759
                     2.0808  2.0855  2.0900  2.0945  2.0988  2.1031  2.1072
                     2.1112  2.1152  2.1191  2.1229  2.1266  2.1303  2.1339
                     2.1375  2.1409  2.1443  2.1477  2.1510  2.1543  2.1575
                     2.1607  2.1638  2.1669  2.1699  2.1729  2.1759  2.1788
                     2.1817  2.1845  2.1873  2.1901  2.1928  2.1956  2.1982
                     2.2009  2.2035  2.2061  2.2087  2.2112  2.2138  2.2162
                     2.2187  2.2212  2.2236  2.2260  2.2284  2.2307  2.2331
                     2.2354  2.2377  2.2400  2.2422  2.2445  2.2467  2.2489
                     2.2511  2.2532  2.2554  2.2575  2.2596  2.2617  2.2638
                     2.2659  2.2679  2.2700  2.2720  2.2740  2.2760  2.2780
                     2.2800  2.2819  2.2839  2.2858  2.2877  2.2896  2.2915
```

2.2934 2.2953 2.2972 2.2990 2.3008 2.3027 2.3045
2.3063 2.3081 2.3099 2.3117 2.3134 2.3152 2.3169
2.3187 2.3204 2.3221 2.3238 2.3255 2.3272 2.3289
2.3305 2.3322 2.3339 2.3355 2.3371 2.3388 2.3404
2.3420 2.3436 2.3452 2.3468 2.3484 2.3500

*

* BASIN 1

*

COMPUTE NM HYD ID=1 HYD NO=100.2 AREA=0.0022 SQ MI

PER A=0 PER B=20.00 PER C=0.00 PER D=80.00

TP=0 HR MASS RAINFALL=-1

*****Warning*****A value for the Time to Peak was not previously computed; use Tp=0.133333 hrs.

TIME TO PEAK (hrs)= .1333

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 6.9469 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700
AREA = .001760 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .131024HR TP = .133333HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = 1.0794 CFS UNIT VOLUME = .9873 B = 327.09 P60 = 1.8700
AREA = .000440 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 100.20

RUNOFF VOLUME = 1.82491 INCHES = .2141 ACRE-FEET
PEAK DISCHARGE RATE = 5.56 CFS AT 1.500 HOURS BASIN AREA = .0022 SQ. MI.

*

*BASIN 2

```
      *

      COMPUTE NM HYD       ID=2 HYD NO=100.3 AREA=0.0015 SQ MI

                           PER A=0 PER B=20.00 PER C=0.00 PER D=80.00

                           TP=0 HR MASS RAINFALL=-1

           TIME TO PEAK (hrs)=    .1333
           *****Warning*****This Tp value was used for a previously computed
hydrograph.
                                 A new Tp value should be computed.


           K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE
CONSTANT, N =  7.106420
           UNIT PEAK =    4.7365     CFS    UNIT VOLUME =     .9969        B =    526.28
  P60 = 1.8700
           AREA =       .001200 SQ MI     IA =     .10000 INCHES     INF =     .04000
INCHES PER HOUR
           RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330


           K =    .131024HR     TP =    .133333HR     K/TP RATIO =    .982685      SHAPE
CONSTANT, N =  3.593454
           UNIT PEAK =    .73595     CFS    UNIT VOLUME =     .9821        B =    327.09
  P60 = 1.8700
           AREA =       .000300 SQ MI     IA =     .50000 INCHES     INF =    1.25000
INCHES PER HOUR
           RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330

        PRINT HYD            ID=2 CODE=1


                                              PARTIAL HYDROGRAPH    100.30

           RUNOFF VOLUME =      1.82491 INCHES      =          .1460 ACRE-FEET
           PEAK DISCHARGE RATE =        3.80 CFS  AT    1.500 HOURS    BASIN AREA =
.0015 SQ. MI.


      *

      *BASIN 3

      *

      COMPUTE NM HYD       ID=3 HYD NO=100.4 AREA=0.0018 SQ MI

                           PER A=0 PER B=20.00 PER C=0.00 PER D=80.00

                           TP=0 HR MASS RAINFALL=-1
```

TIME TO PEAK (hrs)= .1333
*****Warning*****This Tp value was used for a previously computed hydrograph.
A new Tp value should be computed.

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 5.6838 CFS UNIT VOLUME = .9973 B = 526.28 P60 = 1.8700
AREA = .001440 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .131024HR TP = .133333HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = .88314 CFS UNIT VOLUME = .9849 B = 327.09 P60 = 1.8700
AREA = .000360 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 100.40

RUNOFF VOLUME = 1.82491 INCHES = .1752 ACRE-FEET
PEAK DISCHARGE RATE = 4.56 CFS AT 1.500 HOURS BASIN AREA = .0018 SQ. MI.

*

*BASIN 4

*

COMPUTE NM HYD ID=4 HYD NO=100.5 AREA=0.0004 SQ MI

PER A=0 PER B=20.00 PER C=0 PER D=80.00

TP=0 HR MASS RAINFALL=-1

TIME TO PEAK (hrs)= .1333
*****Warning*****This Tp value was used for a previously computed hydrograph.
A new Tp value should be computed.

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE

```
CONSTANT, N =  7.106420
          UNIT PEAK =   1.2631    CFS   UNIT VOLUME =    .9897        B =   526.28
  P60 = 1.8700
          AREA =      .000320 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330


          K =   .131024HR    TP =   .133333HR    K/TP RATIO =   .982685     SHAPE
CONSTANT, N =  3.593454
          UNIT PEAK =   .19625    CFS   UNIT VOLUME =    .9295        B =   327.09
  P60 = 1.8700
          AREA =      .000080 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330

     PRINT HYD            ID=4 CODE=1

                                        PARTIAL HYDROGRAPH   100.50

          RUNOFF VOLUME =     1.82491 INCHES      =         .0389 ACRE-FEET
          PEAK DISCHARGE RATE =       1.03 CFS  AT   1.500 HOURS   BASIN AREA =
.0004 SQ. MI.



     *

     *BASIN 5

     *

     COMPUTE NM HYD       ID=5 HYD NO=100.5 AREA=0.0026 SQ MI

                          PER A=0 PER B=20.00 PER C=0 PER D=80.00

                          TP=0 HR MASS RAINFALL=-1

          TIME TO PEAK (hrs)=   .1333
          *****Warning*****This Tp value was used for a previously computed
hydrograph.
                              A new Tp value should be computed.


          K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE
CONSTANT, N =  7.106420
          UNIT PEAK =   8.2099    CFS   UNIT VOLUME =    .9980        B =   526.28
  P60 = 1.8700
          AREA =      .002080 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330
```

K = .131024HR TP = .133333HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = 1.2756 CFS UNIT VOLUME = .9894 B = 327.09 P60 = 1.8700
AREA = .000520 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=5 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 1.82491 INCHES = .2531 ACRE-FEET
PEAK DISCHARGE RATE = 6.57 CFS AT 1.500 HOURS BASIN AREA = .0026 SQ. MI.

*

*BASIN 6

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COMPUTE NM HYD ID=6 HYD NO=100.5 AREA=0.0015 SQ MI

PER A=0 PER B=0 PER C=0 PER D=100.00

TP=0 HR MASS RAINFALL=-1

TIME TO PEAK (hrs)= .1333
*****Warning*****This Tp value was used for a previously computed hydrograph.
A new Tp value should be computed.

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 5.9206 CFS UNIT VOLUME = .9976 B = 526.28 P60 = 1.8700
AREA = .001500 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=6 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 2.10071 INCHES = .1681 ACRE-FEET
PEAK DISCHARGE RATE = 4.21 CFS AT 1.500 HOURS BASIN AREA = .0015 SQ. MI.

*

*BASIN 7

*

COMPUTE NM HYD ID=7 HYD NO=100.5 AREA=0.0014 SQ MI

PER A=0 PER B=20.00 PER C=0 PER D=80.00

TP=0 HR MASS RAINFALL=-1

TIME TO PEAK (hrs)= .1333
*****Warning*****This Tp value was used for a previously computed hydrograph.
A new Tp value should be computed.

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 4.4207 CFS UNIT VOLUME = .9969 B = 526.28 P60 = 1.8700
AREA = .001120 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .131024HR TP = .133333HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = .68689 CFS UNIT VOLUME = .9805 B = 327.09 P60 = 1.8700
AREA = .000280 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=7 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 1.82491 INCHES = .1363 ACRE-FEET
PEAK DISCHARGE RATE = 3.55 CFS AT 1.500 HOURS BASIN AREA = .0014 SQ. MI.

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*
*BASIN 8
*
COMPUTE NM HYD       ID=8 HYD NO=100.5 AREA=0.0029 SQ MI
                     PER A=0 PER B=20.00 PER C=0 PER D=80.00
                     TP=0 HR MASS RAINFALL=-1
     TIME TO PEAK (hrs)=    .1333
     *****Warning*****This Tp value was used for a previously computed
hydrograph.
                          A new Tp value should be computed.

          K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE
CONSTANT, N =  7.106420
          UNIT PEAK =    9.1572    CFS   UNIT VOLUME =     .9980        B =    526.28
  P60 = 1.8700
          AREA =       .002320 SQ MI    IA =     .10000 INCHES    INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330


          K =    .131024HR    TP =    .133333HR    K/TP RATIO =    .982685     SHAPE
CONSTANT, N =  3.593454
          UNIT PEAK =    1.4228    CFS   UNIT VOLUME =     .9911        B =    327.09
  P60 = 1.8700
          AREA =       .000580 SQ MI    IA =     .50000 INCHES    INF =    1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330

     PRINT HYD            ID=8 CODE=1

                          PARTIAL HYDROGRAPH    100.50

          RUNOFF VOLUME =      1.82491 INCHES      =          .2823 ACRE-FEET
          PEAK DISCHARGE RATE =        7.33 CFS  AT    1.500 HOURS    BASIN AREA =
.0029 SQ. MI.

*
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*BASIN 9

*

COMPUTE NM HYD ID=9 HYD NO=100.5 AREA=0.0013 SQ MI

PER A=0 PER B=20.00 PER C=0 PER D=80.00

TP=0 HR MASS RAINFALL=-1

TIME TO PEAK (hrs)= .1333
*****Warning*****This Tp value was used for a previously computed hydrograph.
A new Tp value should be computed.

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 4.1050 CFS UNIT VOLUME = .9965 B = 526.28
P60 = 1.8700
AREA = .001040 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .131024HR TP = .133333HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593454
UNIT PEAK = .63782 CFS UNIT VOLUME = .9787 B = 327.09
P60 = 1.8700
AREA = .000260 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=9 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 1.82491 INCHES = .1265 ACRE-FEET
PEAK DISCHARGE RATE = 3.30 CFS AT 1.500 HOURS BASIN AREA = .0013 SQ. MI.

*

*BASIN 10

*

COMPUTE NM HYD ID=11 HYD NO=100.5 AREA=0.0029 SQ MI

PER A=0 PER B=20.00 PER C=20.00 PER D=60.00

TP=0 HR MASS RAINFALL=-1

TIME TO PEAK (hrs)= .1333
*****Warning*****This Tp value was used for a previously computed hydrograph.
A new Tp value should be computed.

K = .072666HR TP = .133333HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 6.8679 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700
AREA = .001740 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .118459HR TP = .133333HR K/TP RATIO = .888442 SHAPE CONSTANT, N = 3.992480
UNIT PEAK = 3.0856 CFS UNIT VOLUME = .9962 B = 354.67 P60 = 1.8700
AREA = .001160 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=11 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 1.60840 INCHES = .2488 ACRE-FEET
PEAK DISCHARGE RATE = 6.80 CFS AT 1.500 HOURS BASIN AREA = .0029 SQ. MI.

3.740 ac ± (.001562S) = .0585 mi²

1.89 ac ± .00295 SQ mi

*

*ADD BASINS 1 THRU 9

*

ADD HYD ID=15 HYD NO=301.00 ID=1 ID=3

ADD HYD ID=16 HYD NO=302.00 ID=15 ID=2

ADD HYD ID=17 HYD NO=303.00 ID=5 ID=8

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ADD HYD          ID=18 HYD NO=304.00 ID=17 ID=16

ADD HYD          ID=19 HYD NO=305.00 ID=7 ID=6

ADD HYD          ID=20 HYD NO=306.00 ID=19 ID=4

ADD HYD          ID=21 HYD NO=307.00 ID=18 ID=20

ADD HYD          ID=22 HYD NO=306.00 ID=21 ID=9


PRINT HYD        ID=22 CODE=1

                 HYDROGRAPH FROM AREA   306.00

      RUNOFF VOLUME =     1.85128 INCHES      =       1.5403 ACRE-FEET
      PEAK DISCHARGE RATE =      39.91 CFS  AT   1.500 HOURS   BASIN AREA =
.0156 SQ. MI.

    *

    * POND 1

    *

    ROUTE RESERVOIR     ID=13 HYD NO=202.00 INFLOW ID=22 CODE=24

                        OUTFLOW(CFS)      STORAGE(AC-FT)   ELEVATION(FT)

                            0.0000            0.0000          5123.00

                            0.2211            0.2290          5124.00

                            0.3445            0.5442          5125.25

                            0.4342            0.9172          5126.50

                            0.5083            1.1380          5127.75

                            0.5729            1.8366          5129.00

* * * * * * * * * * * * * * * * * *

  TIME        INFLOW      ELEV       VOLUME      OUTFLOW
  (HRS)       (CFS)       (FEET)     (AC-FT)     (CFS)

   .00          .00     5123.00         .000         .00
```

.80	.04	5123.00	.000	.00
1.60	27.67	5125.90	.737	.39
2.40	1.80	5128.13	1.353	.53
3.20	.47	5128.17	1.375	.53
4.00	.36	5128.16	1.367	.53
4.80	.34	5128.14	1.354	.53
5.60	.36	5128.12	1.343	.53
6.40	.03	5128.09	1.326	.53
7.20	.00	5128.02	1.291	.52
8.00	.00	5127.96	1.257	.52
8.80	.00	5127.90	1.223	.52
9.60	.00	5127.84	1.189	.51
10.40	.00	5127.78	1.155	.51
11.20	.00	5127.66	1.121	.50
12.00	.00	5127.47	1.089	.49
12.80	.00	5127.29	1.056	.48
13.60	.00	5127.11	1.025	.47
14.40	.00	5126.94	.994	.46
15.20	.00	5126.77	.964	.45
16.00	.00	5126.60	.935	.44
16.80	.00	5126.46	.906	.43
17.60	.00	5126.37	.878	.42
18.40	.00	5126.27	.850	.42
19.20	.00	5126.18	.822	.41

PEAK DISCHARGE = .530 CFS - PEAK OCCURS AT HOUR 3.07
MAXIMUM WATER SURFACE ELEVATION = 5128.175
MAXIMUM STORAGE = 1.3756 AC-FT INCREMENTAL TIME= .033330HRS

PRINT HYD ID=13 CODE=1

PARTIAL HYDROGRAPH 202.00

RUNOFF VOLUME = .89467 INCHES = .7444 ACRE-FEET
PEAK DISCHARGE RATE = .53 CFS AT 3.066 HOURS BASIN AREA = .0156 SQ. MI.

.53

*

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 09:59:22