DRAINAGE REPORT

for

SEVILLE SUBDIVISION
UNIT 7
Albuquerque, New Mexico

September 2003

I, David S. Harrison, do hereby certify that this report was prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico.

David S. Harrison, P.E.
NM No. 14704

9-03-03
Date

Table of Contents

List of Exhibits

Exhibit A:	Vicinity Map
Exhibit B:	Zone Atlas Sheet A-10 with site
Exhibit C:	FEMA Flood map with site
Exhibit D:	Roll Curb Location Map

List of Plates
(Located in Pockets)

Plate 1:	Existing Conditions
Plate 2A:	Developed Conditions (Undeveloped Offsite)
Plate 2B:	Developed Conditions (Developed Offsite)
Plate 3:	Grading plan
Plate 4:	Erosion Control Plan

List of Appendices

Appendix A:	AHYMO Input and Output for Existing Conditions
Appendix B:	AHYMO Input and Output for Developed Conditions
Appendix C:	Street Capacity Analysis

Introduction

Wilson & Company prepared this drainage report under contract to Curb West, Inc. The document provides a basis for the design of storm water conveyance systems within Seville Unit 7. The first objective of this report is to analyze the hydrologic characteristics associated with the existing and developed conditions. The second is to present the proposed storm drain design used to mitigate the storm runoff generated by Seville Unit 7.

Seville Unit 7 is located in Northwest Albuquerque and is part of the overall Seville Subdivision. Unit 7 currently drains in a Northeasterly direction with grades ranging from 2% to 12%. Flows generated by Unit 7 discharge into the main branch of the Calabacillas Arroyo. The Calabacillas Arroyo discharges to the Swinburne Dam. Unit 7 is presently undeveloped and covered with typical West Mesa desert vegetation.

Developed flows from Unit 7 will pass into an existing storm drain within Rio Segura Blvd. The Rio Segura storm drain discharges into the main branch of the Calabacillas Arroyo, at a point located at the drop structure, which discharges directly to the Swinburne Detention Facility. This facility has been designed to provide detention for all upstream lands assuming a fully developed condition.

Project Description

The proposed development is located within the city limits of Albuquerque, New Mexico. Seville Subdivision Unit 7 is a development within the Seville Subdivision. Seville Subdivision is bounded on the south by Irving Blvd., on the east and north by the main branch of the Calabacillas Arroyo, and on the west by Universe Blvd. Seville is immediately west of the confluence of the west branch and the main stem of the Calabacillas Arroyo. Unit 7 is located on the northern portion of the subdivision. Unit 7 is bounded on the west by vacant land, the south by Rio Segura Blvd., on the east by Kayenta Blvd., and the north by vacant land. See Exhibit A, Vicinity Map.

The current legal description of the proposed Unit 7 development is "Tract 1-B-1-F-1, Seville, as the same is shown and designated on the plat entitled "Bulk land plat of tracts 1-B-1-C-1 thru 1-B-1-G-1, Seville (being a replat of tracts 1-B-1-C thru 1-B-1-G, Seville) within the town of Alameda grant in projected section 3, township 11 north, range 2 east, New Mexico principal meridian, City of Albuquerque, Bernalillo county, New Mexico." Together with: "Tract B-2-B, Seville, as the same is shown and designated on the plat entitled "bulk land plat of Tracts 1-A-1, 1-A-2, 1-B-1-A thru 1-B-1-H, 1-B-2-A, B-2-A and B-2-B, Seville (being a replat of tracts 1-A, 1-B-1, 1-B-2, Seville and tract B-2, Paradise Heights) within the town of Alameda Grant in projected section 3, township 11 north, range 2 east, New Mexico principal meridian, City of Albuquerque, Bernalillo County, New Mexico."

Exhibit C contains the September 20, 1996 FEMA Flood Insurance Rate Maps for the area which includes the proposed subdivision layout. The FEMA floodplain does not encroach on the subdivision in any location. Unit 7 will discharge into the main branch of the Calabacillas Arroyo, which is identified as a floodplain.

The site is located on Zone Atlas Sheet A-10-Z. See Exhibit B for site location on this Zone Atlas Sheet. Seville Subdivision Unit 7 is currently zoned R-LT.

Project Background and Documents

Seville Subdivision currently includes Units 1, 2, 3, 4, 5 and 6. The infrastructure within Unit 4 is in place and homes are currently under construction. Unit 5 and Unit 6 infrastructure is currently being constructed. Drainage design was approved for Units 1 & 2 in a report titled "Drainage Report for Seville Subdivision" (Easterling & Associates, Inc., June 2000). Drainage design approval for Units 3 & 4 was also obtained thru subsequent drainage reports performed by Wilson & Company dated April and February 2002, respectively. Approval was also obtained for Units 5 & 6 with the drainage report performed by Wilson & Company dated January 2003.

The TVI west campus has completed construction. The campus is located north of the West Branch along the west side of Universe Blvd. TVI has constructed the west half of Universe Blvd. The drainage from the west, which has historically entered Seville Subdivision across the Universe Blvd. right of way, will be diverted to the West Branch at Universe Blvd.

Existing Conditions

(Refer to Plate 1 – Existing Conditions)
The existing conditions hydrology used a bulking factor of 7%. The draft copy of the "Calabacillas Arroyo Prudent Line Study and Related Work Development of a Prudent Line for the West Branch" prepared by Mussetter Engineering, Inc., bulks the flow in the West Branch of the Calabacillas at an average of 7.75%. The bulking factor of 7.75% for the West Branch of the Calabacillas includes a bed load and a wash load. The existing conditions hydrology is bulked for a wash load, since it is not flowing in a defined channel. The bulking factor of 7% is a conservative wash load-bulking factor.

The existing site of Unit 7 typically slopes Norteasterly at grades of 2 to 12%. It is presently undeveloped and covered with typical west mesa desert vegetation. Historically, the site discharges via sheet flows and minor channelization into the Main Branch of the Calabacillas Arroyo. The main branch of the Calabacillas Arroyo discharges directly to the Swinburne detention facility. Upstream from the detention facility within the Calabacillas Arroyo, a drop structure has been constructed. The Rio Segura storm drain outfall was constructed in conjunction with Unit 1 and discharges to said drop structure. The following table details the existing basins and the associated runoff.

Basin	Description	Area, acres	Q_{100YR}, cfs	V_{100YR}, acft
EX-1	Undeveloped	71.47	72.99	2.93
EX-2	Undeveloped	47.42	42.98	0.91
EX-3	Seville Units 5 & 6	32.41	121.91	4.24
EX-4	Seville Unit 4	16.95	63.24	2.21

Developed Conditions (U7)

(Refer to Plate 2 – Developed Conditions)

The developed site encompassed by Unit 7 site will consist of 81 lots of single-family housing. A portion of the eastern half of Kayenta Blvd. will be constructed with this development.

Under developed conditions, Unit 7 will discharge as it has historically. Flows will be conveyed via the Rio Segura storm drain and discharged into the main branch of the Calabacillas Arroyo. The peak flows generated by the developed on-site basins within Unit 7 is 55.25 cfs.

The hydrologic analysis for the developed condition was completed using the Arid Lands Hydrologic Model (AHYMO) Version 1997.02. (See Appendices A & B for input and output data). Methodology outlined in Section 22.2 of the City of Albuquerque Development Process Manual (DPM) was also incorporated into this analysis. Street flows have been evaluated using Flow Master by Haested Methods. The street flow analysis was used to determine where roll type curb could be used within the subdivision. Inlets are located to prevent exceeding the street flow capacities per the DPM. See Appendix C and Exhibit D for street capacity analysis. See Appendix D for storm drain design output.

Offsite basins, Basins T-1, T-2, and T-3, were analyzed to determine the undeveloped flows generated upstream of the proposed subdivision. Basin T-1 will be routed through Unit 7 and incorporated into the street flow. Basin T-2 will drain to Rio Segura and basin T-3 will discharge as it historically has, to the north of Unit 7. A desilting basin will be constructed on the western side of unit 7 & 6 at the end of Rio Segura. The desilting basin will have a volume of 0.95 ACFT. The desilting basing will discharge into the storm drain in Rio Segura, per the Unit 5 & Unit 6 drainage report, the Rio Segura storm drain system is sized to accommodate these flows.

The following table details the developed onsite basins (D) as well as the undeveloped offsite basins (T) and the associated runoff. See Plate 2B

Basin	Area, acres	Q_{100YR}, cfs	V_{100YR}, acft
D-1	1.74	6.42	0.22
D-2	1.46	5.38	0.19
D-3	1.07	3.97	0.14
D-4	1.41	5.20	0.18
D-5	4.04	14.90	0.52
D-6	2.15	7.95	0.28
D-7	2.27	8.39	0.29
D-8	0.80	1.31	0.05
T-1	2.95	10.87	0.37
T-2	1.78	6.57	0.22

The following table details the developed offsite basins (T) and the associated runoff. See Plate 2A.

Basin	Area, acres	Q_{100YR}, cfs	V_{100YR}, acft
T-1	1.27	4.69	0.16
T-2	1.12	4.14	0.14
T-3	1.50	5.54	0.19

Grading Plan

The Grading Plans for the Seville Unit 7 is attached as Plate 4. These sheets illustrate the overall grading concept for the subdivision as well as the proposed storm drain.

Conclusion

The analysis indicates that the proposed system is adequate to handle the storm runoff generated by the site. Wilson & Company recommends that the proposed storm drain system undergo regular maintenance activities. This should include removing debris from grate inlets, as well as removing sediment buildup within the pipe system. The Future area contributing flows to the Unit 7 storm drainage system should be analyzed in greater detail at the time of development to ensure that the runoff is within the constraints of this design. The downstream condition of the West and Main Branches of the Calabacillas basin has been designed to accommodate developed discharge of the entire basin. Therefore, we are proposing no detention of runoff with this development.

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =06/26/2003

INPUT FILE = exist.txt USER NO.=
AHYMO-C-9803c01UNMLIB-AH

CFS PAGE = 1

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)	PER ACRE NOTATION
START TIME= .00									
RAINFALL TYPE= 1									
RAIN6= 1.467									
SEDIMENT BULK									
PK BF = 1.07									
COMPUTE NM HYD	1.10	-	1	.11167	14.10	.595	.09997	1.600	.197 PER IMP= .00
SEDIMENT BULK									
PK BF = 1.07									
COMPUTE NM HYD	1.20	-	2	.07409	8.38	.395	.09997	1.633	.177 PER IMP= .00
ROUTE	1.40	1	4	.11167	8.49	.595	.09997	1.767	.119
ADD HYD	301.00	2& 4	5	.18576	15.70	.990	.09997	1.700	.132
FINISH									

AHYMO.SUM

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =06/26/2003

INPUT FILE = exist.txt USER NO.=

AHYMO-C-9803c01UNMLIB-AH

CFS PAGE = 1

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)	PER ACRE NOTATION
START TIME= .00 RAINFALL TYPE= 1 RAIN6= 2.200 SEDIMENT BULK PK BF = 1.07									
COMPUTE NM HYD	1.10	-	1	.11167	72.99	2.925	.49106	1.600	1.021 PER IMP= .00
SEDIMENT BULK PK BF = 1.07									
COMPUTE NM HYD	1.20	-	2	.07409	42.98	1.940	.49106	1.633	.906 PER IMP= .00
ROUTE	1.40	1	4	.11167	56.89	2.925	.49107	1.700	.796
ADD HYD	301.00	2& 4	5	.18576	97.03	4.865	.49106	1.667	.816
FINISH									

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - AHYMO.SUM - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =06/13/2003

INPUT FILE = dev-on.txt

AHYMO-C-9803c01UNMLIB-AH USER NO.=

COMMAND NOTATION	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
START TIME= .00									
RAINFALL TYPE= 1 RAIN6= 1.467									
COMPUTE NM HYD PER IMP= 60.00	3.10	-	1	.00272	3.91	.129	.88974	1.500	2.252
COMPUTE NM HYD PER IMP= 60.00	3.20	-	2	.00228	3.28	.108	.88974	1.500	2.252
COMPUTE NM HYD PER IMP= 60.00	3.30	-	3	.00168	2.42	.080	.88974	1.500	2.255
COMPUTE NM HYD PER IMP= 60.00	3.40	-	4	.00220	3.17	.104	.88974	1.500	2.253
COMPUTE NM HYD PER IMP= 60.00	3.50	-	5	.00631	9.08	.299	.88974	1.500	2.248
COMPUTE NM HYD PER IMP= 60.00	3.60	-	6	.00336	4.84	.160	.88974	1.500	2.251
COMPUTE NM HYD PER IMP= 60.00	3.70	-	7	.00355	5.11	.169	.88974	1.500	2.250
COMPUTE NM HYD PER IMP= 60.00	3.80	-	8	.00055	.80	.026	.88974	1.500	2.272
FINISH									

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - AHYMO.SUM - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =06/13/2003
INPUT FILE = dev-on.txt USER NO.=
AHYMO-C-9803c01UNMLIB-AH

CFS PER ACRE	COMMAND NOTATION	HYDROGRAPH IDENTIFICATION NO.	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)
	START TIME= .00								
	RAINFALL TYPE= 1								
	RAIN6= 2.200								
3.695	COMPUTE NM HYD PER IMP= 60.00	3.10	-	1	.00272	6.42	.223	1.53936	1.500
3.697	COMPUTE NM HYD PER IMP= 60.00	3.20	-	2	.00228	5.38	.187	1.53936	1.500
3.701	COMPUTE NM HYD PER IMP= 60.00	3.30	-	3	.00168	3.97	.138	1.53936	1.500
3.697	COMPUTE NM HYD PER IMP= 60.00	3.40	-	4	.00220	5.20	.180	1.53936	1.500
3.690	COMPUTE NM HYD PER IMP= 60.00	3.50	-	5	.00631	14.90	.518	1.53936	1.500
3.694	COMPUTE NM HYD PER IMP= 60.00	3.60	-	6	.00336	7.95	.276	1.53936	1.500
3.693	COMPUTE NM HYD PER IMP= 60.00	3.70	-	7	.00355	8.39	.292	1.53936	1.500
3.731	COMPUTE NM HYD PER IMP= 60.00	3.80	-	8	.00055	1.31	.045	1.53936	1.500
	FINISH								

AHYMO.SUM

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =06/23/2003

INPUT FILE = fut-off.txt USER NO.=

AHYMO-C-9803c01UNMLIB-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)	PER ACRE	NOTATION
START TIME= .00										
RAINFALL TYPE= 1										
RAIN6= 2.200										
COMPUTE NM HYD	1.10	-	1	.00198	1.73	.049	.45893	1.533	1.366	PER IMP= .00
COMPUTE NM HYD	1.20	-	2	.00175	1.53	.043	.45893	1.533	1.367	PER IMP= .00
COMPUTE NM HYD	1.30	-	3	.00234	2.05	.057	.45893	1.533	1.365	PER IMP= .00
FINISH										

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =08/27/2003

INPUT FILE = fut-dev.txt USER NO.=

AHYMO-C-9803c01UNMLIB-AH

COMMAND NOTATION	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
START TIME= .00									
RAINFALL TYPE= 1 RAIN6= 1.460									
COMPUTE NM HYD PER IMP= 60.00	1.10	-	1	.00198	2.85	.094	.88471	1.500	2.246
COMPUTE NM HYD PER IMP= 60.00	1.20	-	2	.00175	2.52	.083	.88471	1.500	2.247
COMPUTE NM HYD PER IMP= 60.00	1.30	-	3	.00234	3.37	.111	.88471	1.500	2.245
FINISH									

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =08/27/2003

INPUT FILE = fut-dev.txt USER NO.=
AHYMO-C-9803c01UNMLIB-AH

COMMAND NOTATION	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
START TIME= .00									
RAINFALL TYPE= 1 RAIN6= 2.200									
COMPUTE NM HYD PER IMP= 60.00	1.10	-	1	.00198	4.69	.163	1.53936	1.500	3.694
COMPUTE NM HYD PER IMP= 60.00	1.20	-	2	.00175	4.14	.144	1.53936	1.500	3.695
COMPUTE NM HYD PER IMP= 60.00	1.30	-	3	.00234	5.54	.192	1.53936	1.500	3.691
FINISH									

28f-f s=0.68% (AP 1)
Worksheet for Irregular Channel

Project Description	
Worksheet	28f-f s=0.68% (AP 1)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.006800	ft/ft
Discharge	6.42	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	99.47	ft
Elevation Range	99.13 to 100.00	
Flow Area	3.4	ft²
Wetted Perimeter	26.13	ft
Top Width	25.61	ft
Actual Depth	0.34	ft
Critical Elevation	99.46	ft
Critical Slope	0.008567	ft/ft
Velocity	1.87	ft/s
Velocity Head	0.05	ft
Specific Energy	99.53	ft
Froude Number	0.90	
Flow Type	Subcritical	

Calculation Messages:
Flow is divided.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+48	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	100.00
0+10	99.80
0+10	99.13
0+12	99.26
0+24	99.50
0+36	99.26

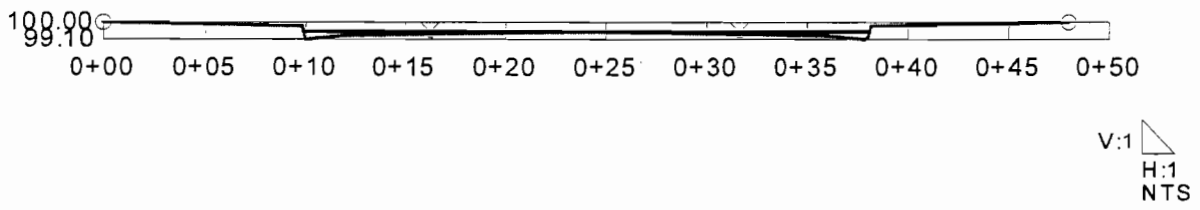
28f-f s=0.68% (AP 1)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+38	99.13
0+38	99.80
0+48	100.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	28f-f s=0.68% (AP 1)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.006800	ft/ft
Water Surface Elevation	99.47	ft
Elevation Range	99.13 to 100.00	
Discharge	6.42	cfs



28f-f s=1.60% (AP 2)
Worksheet for Irregular Channel

Project Description	
Worksheet	28f-f s=1.60% (AP 2)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.016000	ft/ft
Discharge	11.80	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	99.49	ft
Elevation Range	99.13 to 100.00	
Flow Area	3.9	ft²
Wetted Perimeter	28.08	ft
Top Width	27.52	ft
Actual Depth	0.36	ft
Critical Elevation	99.53	ft
Critical Slope	0.007735	ft/ft
Velocity	2.99	ft/s
Velocity Head	0.14	ft
Specific Energy	99.63	ft
Froude Number	1.39	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+48	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	100.00
0+10	99.80
0+10	99.13
0+12	99.26
0+24	99.50
0+36	99.26

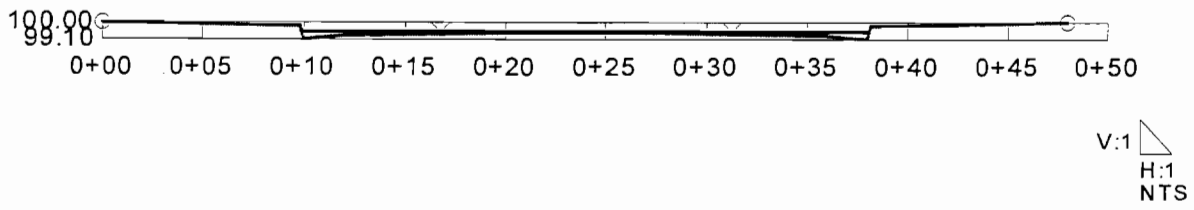
28f-f s=1.60% (AP 2)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+38	99.13
0+38	99.80
0+48	100.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	28f-f s=1.60% (AP 2)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.016000	ft/ft
Water Surface Elevation	99.49	ft
Elevation Range	99.13 to 100.00	
Discharge	11.80	cfs



 © Haestad Methods, Inc. **Wilson & Co.**
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

28f-f s=0.61% (AP 3)
Worksheet for Irregular Channel

Project Description	
Worksheet	28f-f s=0.61% (AP 3)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.006100	ft/ft
Discharge	10.99	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	99.53	ft
Elevation Range	99.13 to 100.00	
Flow Area	5.1	ft²
Wetted Perimeter	28.86	ft
Top Width	28.24	ft
Actual Depth	0.40	ft
Critical Elevation	99.52	ft
Critical Slope	0.007854	ft/ft
Velocity	2.15	ft/s
Velocity Head	0.07	ft
Specific Energy	99.61	ft
Froude Number	0.89	
Flow Type	Subcritical	

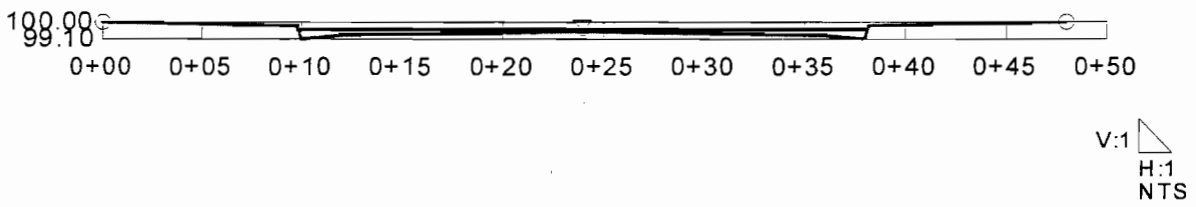
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+48	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	100.00
0+10	99.80
0+10	99.13
0+12	99.26
0+24	99.50
0+36	99.26
0+38	99.13
0+38	99.80
0+48	100.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	28f-f s=0.61% (AP 3)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.006100	ft/ft
Water Surface Elevation	99.53	ft
Elevation Range	99.13 to 100.00	
Discharge	10.99	cfs



28f-f s=0.61% (AP 4)
Worksheet for Irregular Channel

Project Description	
Worksheet	28f-f s=0.61% (AP 4)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.006100	ft/ft
Discharge	19.38	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	99.61	ft
Elevation Range	99.13 to 100.00	
Flow Area	7.2	ft²
Wetted Perimeter	29.01	ft
Top Width	28.29	ft
Actual Depth	0.48	ft
Critical Elevation	99.60	ft
Critical Slope	0.006962	ft/ft
Velocity	2.69	ft/s
Velocity Head	0.11	ft
Specific Energy	99.72	ft
Froude Number	0.94	
Flow Type	Subcritical	

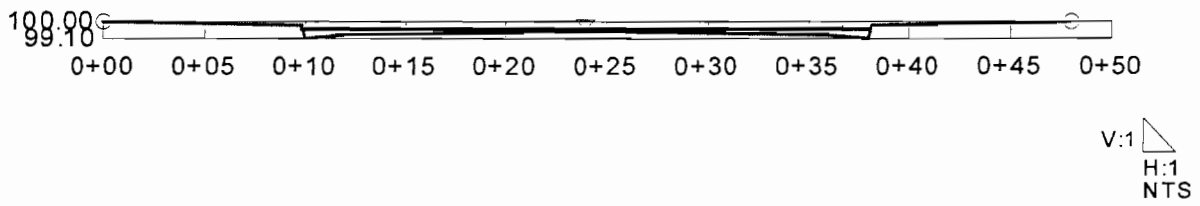
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+48	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	100.00
0+10	99.80
0+10	99.13
0+12	99.26
0+24	99.50
0+36	99.26
0+38	99.13
0+38	99.80
0+48	100.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	28f-f s=0.61% (AP 4)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.006100	ft/ft
Water Surface Elevation	99.61	ft
Elevation Range	99.13 to 100.00	
Discharge	19.38	cfs



28f-f s=0.65% (AP 5)
Worksheet for Irregular Channel

Project Description	
Worksheet	28f-f s=0.65% (AP 5)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.006500	ft/ft
Discharge	14.90	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	99.57	ft
Elevation Range	99.13 to 100.00	
Flow Area	6.0	ft²
Wetted Perimeter	28.92	ft
Top Width	28.26	ft
Actual Depth	0.44	ft
Critical Elevation	99.56	ft
Critical Slope	0.007360	ft/ft
Velocity	2.47	ft/s
Velocity Head	0.10	ft
Specific Energy	99.66	ft
Froude Number	0.95	
Flow Type	Subcritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+48	0.017

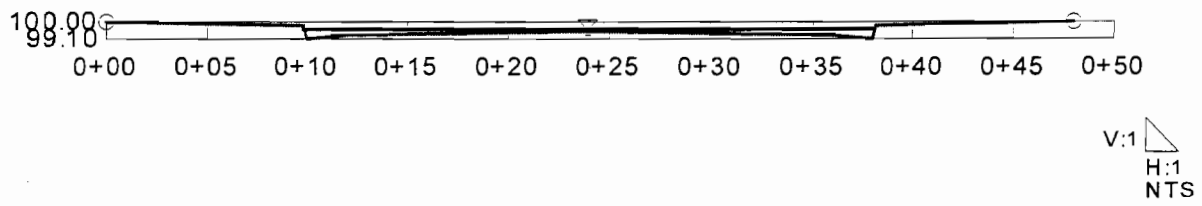
Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	100.00
0+10	99.80
0+10	99.13
0+12	99.26
0+24	99.50
0+36	99.26
0+38	99.13
0+38	99.80
0+48	100.00

© Haestad Methods, Inc.
Wilson & Co.
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	28f-f s=0.65% (AP 5)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.006500	ft/ft
Water Surface Elevation	99.57	ft
Elevation Range	99.13 to 100.00	
Discharge	14.90	cfs



28f-f s=2.02% (AP 6)
Worksheet for Irregular Channel

Project Description	
Worksheet	28f-f s=2.02% (AP 6)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.020200	ft/ft
Discharge	20.97	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.017	
Water Surface Elevation	99.54	ft
Elevation Range	99.13 to 100.00	
Flow Area	5.3	ft²
Wetted Perimeter	28.87	ft
Top Width	28.24	ft
Actual Depth	0.41	ft
Critical Elevation	99.61	ft
Critical Slope	0.006848	ft/ft
Velocity	3.99	ft/s
Velocity Head	0.25	ft
Specific Energy	99.79	ft
Froude Number	1.63	
Flow Type	Supercritical	

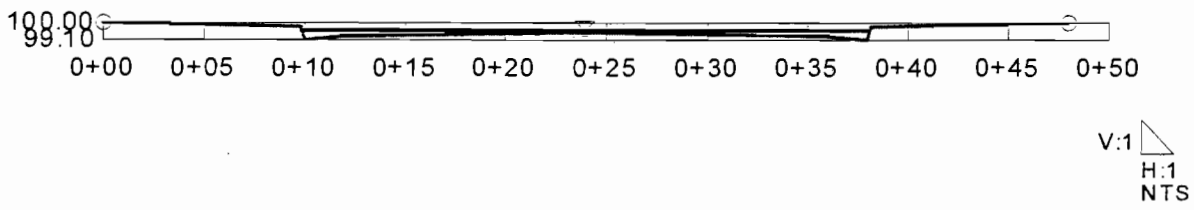
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+48	0.017

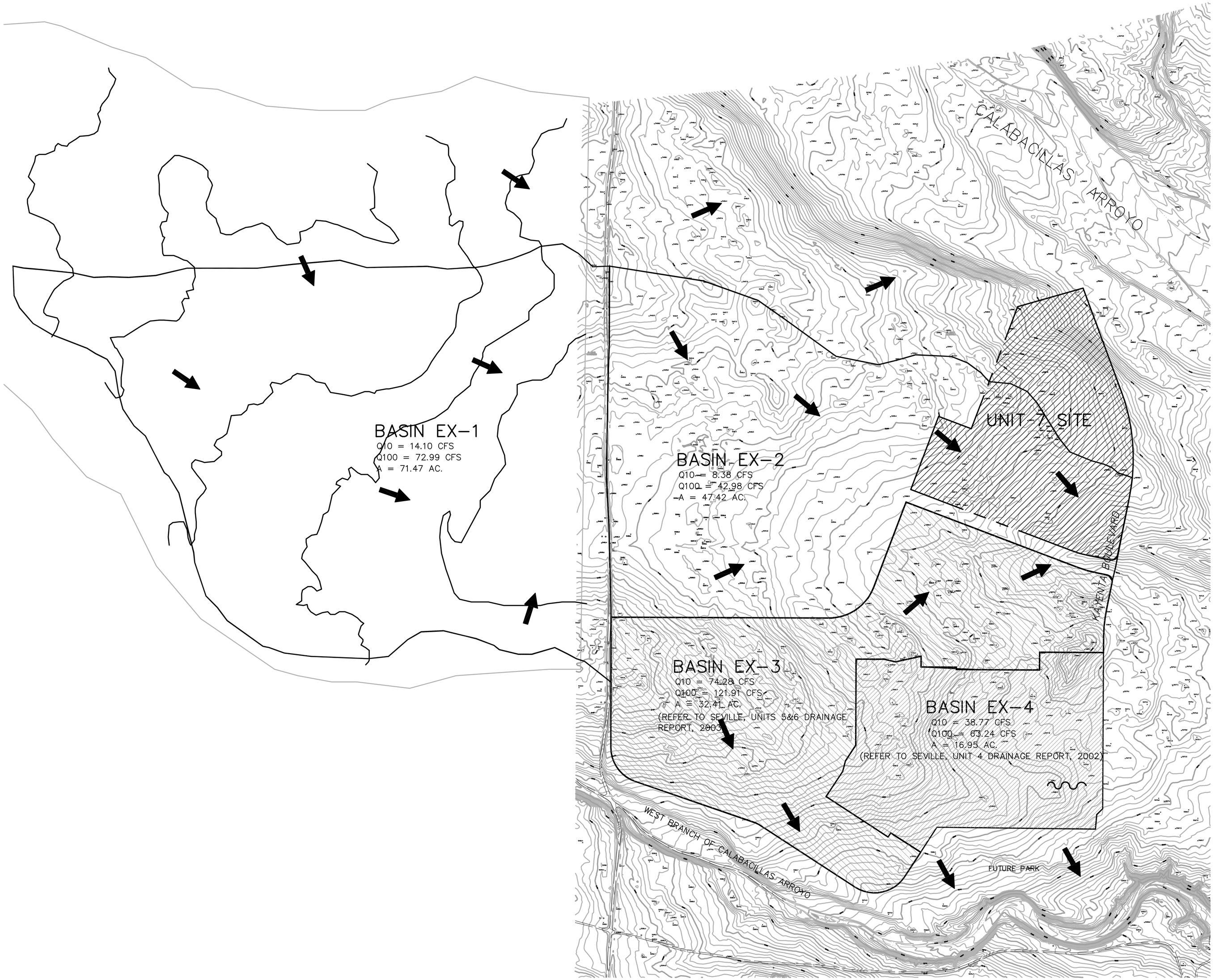
Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	100.00
0+10	99.80
0+10	99.13
0+12	99.26
0+24	99.50
0+36	99.26
0+38	99.13
0+38	99.80
0+48	100.00

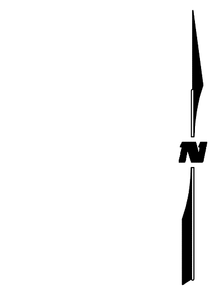
Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	28f-f s=2.02% (AP 6)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.017	
Slope	0.020200	ft/ft
Water Surface Elevation	99.54	ft
Elevation Range	99.13 to 100.00	
Discharge	20.97	cfs







200 0 100 200 400

SCALE: 1 INCH = 200 FT.

LEGEND

- DRAINAGE FLOW ARROW
- BASIN BOUNDARY
- HIGH POINT IN EXISTING ROADWAY

HYDROLOGIC DATA – EXISTING

BASIN	DESCRIPTION	AREA (acres)	LAND TREATMENT PERCENTAGES BY TYPE				YIELD (cfs/ac)	Q_{100} (cfs)	V_{100-6} (ac-ft)
			A	B	C	D			
EX-1	UNDEVELOPED	71.47	95	0	5	0	1.02	72.99	2.93
EX-2	UNDEVELOPED	47.42	95	0	5	0	0.92	42.98	0.91
EX-3	SEVILLE UNIT 5 & 6	32.41	0	10	30	60	3.76	121.91	4.24
EX-4	SEVILLE UNIT 4	16.95	0	10	30	60	3.73	63.24	2.21

WILSON & COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 898-8021

SEVILLE SUBDIVISION UNIT 7

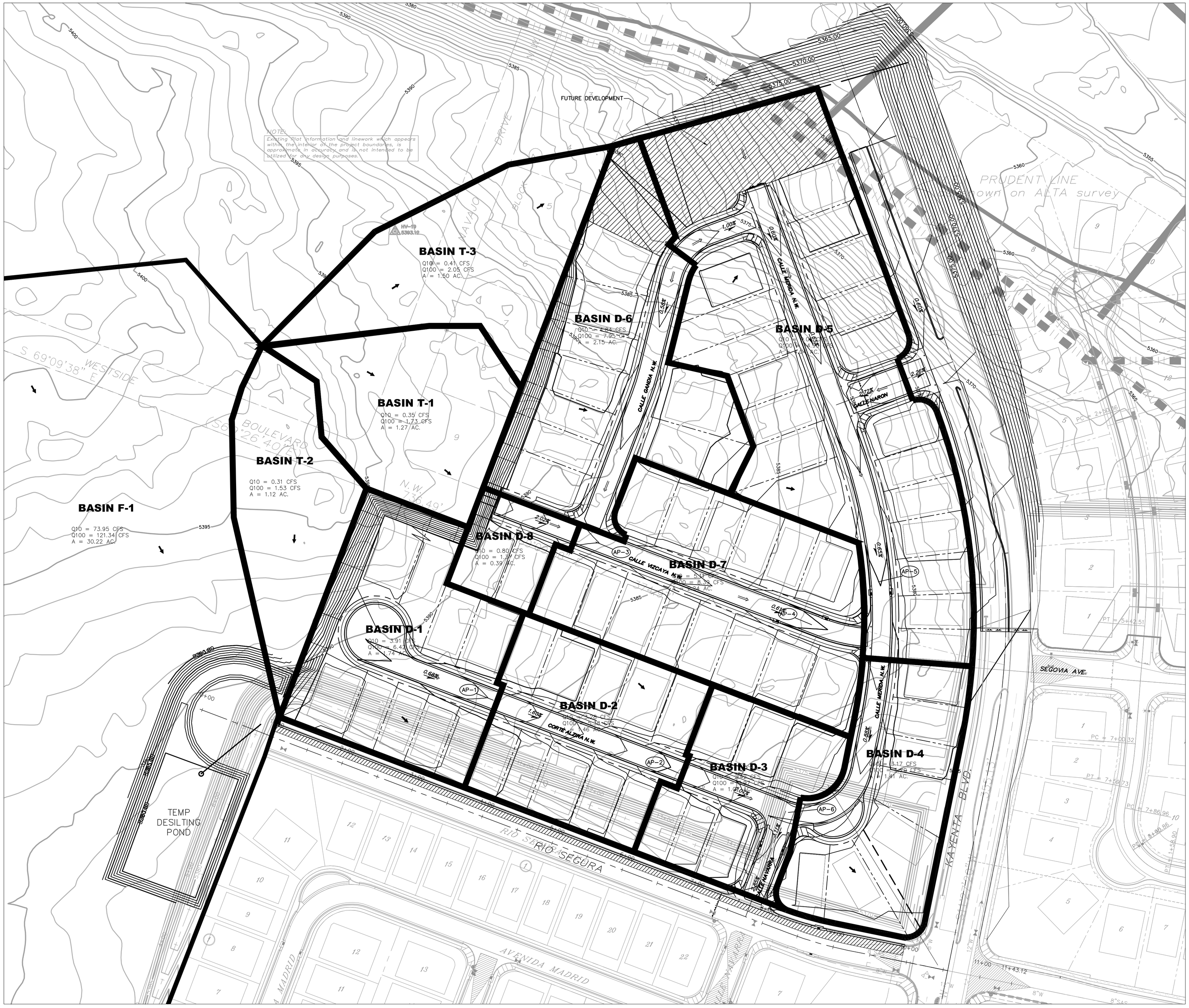
BASIN BOUNDARY MAP EXISTING CONDITIONS

REVISIONS	NO.	DATE	REMARKS	BY

DESIGN	JRW	WCEA NO. X2218030	DATE JULY 2003
DRAWN	JRW	PROJECT NO. N/A	SHEET NO. 1 OF 1
CHECK	DSA		

T:\PROJECTS\X2218009\WP\DRAINAGE\EXIST DRAINAGE.DWG\11-19-02\JRW

PLATE 1



N

60 0 30 60 120

SCALE: 1 INCH = 60 FT.

LEGEND

- DRAINAGE FLOW ARROW
- FUTURE FLOW ARROW
- HIGH POINT
- (AP-9) HYDRAULIC ANALYSIS POINT

HYDROLOGIC DATA – UNDEVELOPED

BASIN	AREA (acres)	LAND TREATMENT PERCENTAGES BY TYPE A	B	C	D	YIELD (cfs/ac)	Q_{100} (cfs)	V_{100-24} (ac-ft)
T-1	1.27	95	0	5	0	1.36	1.73	0.05
T-2	1.12	95	0	5	0	1.37	1.53	0.04
T-3	1.50	95	0	5	0	1.37	2.05	0.06

STREET HYDRAULIC DATA

AP	@ INLET (#)	SLOPE (%)	Q_{100} (cfs)	$Q_{INT.}$ (cfs)	$Q_{BYP.}$ (cfs)	D_{100} (ft)	V_{100} (ft/sec)	D*V	Y_2 (ft)
AP-1	–	0.68	6.42	–	–	0.34	1.87	0.64	0.38
AP-2	–	1.60	11.80	–	–	0.36	2.99	1.07	0.47
AP-3	–	0.61	10.99	–	–	0.40	2.15	0.86	0.46
AP-4	1A & 1B	0.61	19.38	19.38	0.00	0.48	2.69	1.29	0.57
AP-5	2A & 2B	0.65	14.90	14.90	0.00	0.44	2.47	1.09	0.52
AP-6	3A & 3B	2.02	20.97	20.97	0.00	0.41	3.99	1.64	0.61

$$Y_2 = \left[\frac{V^2}{2g}\right] \times 0.8 + D_{100}$$

WILSON & COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 898-8021

SEVILLE SUBDIVISION UNIT 7

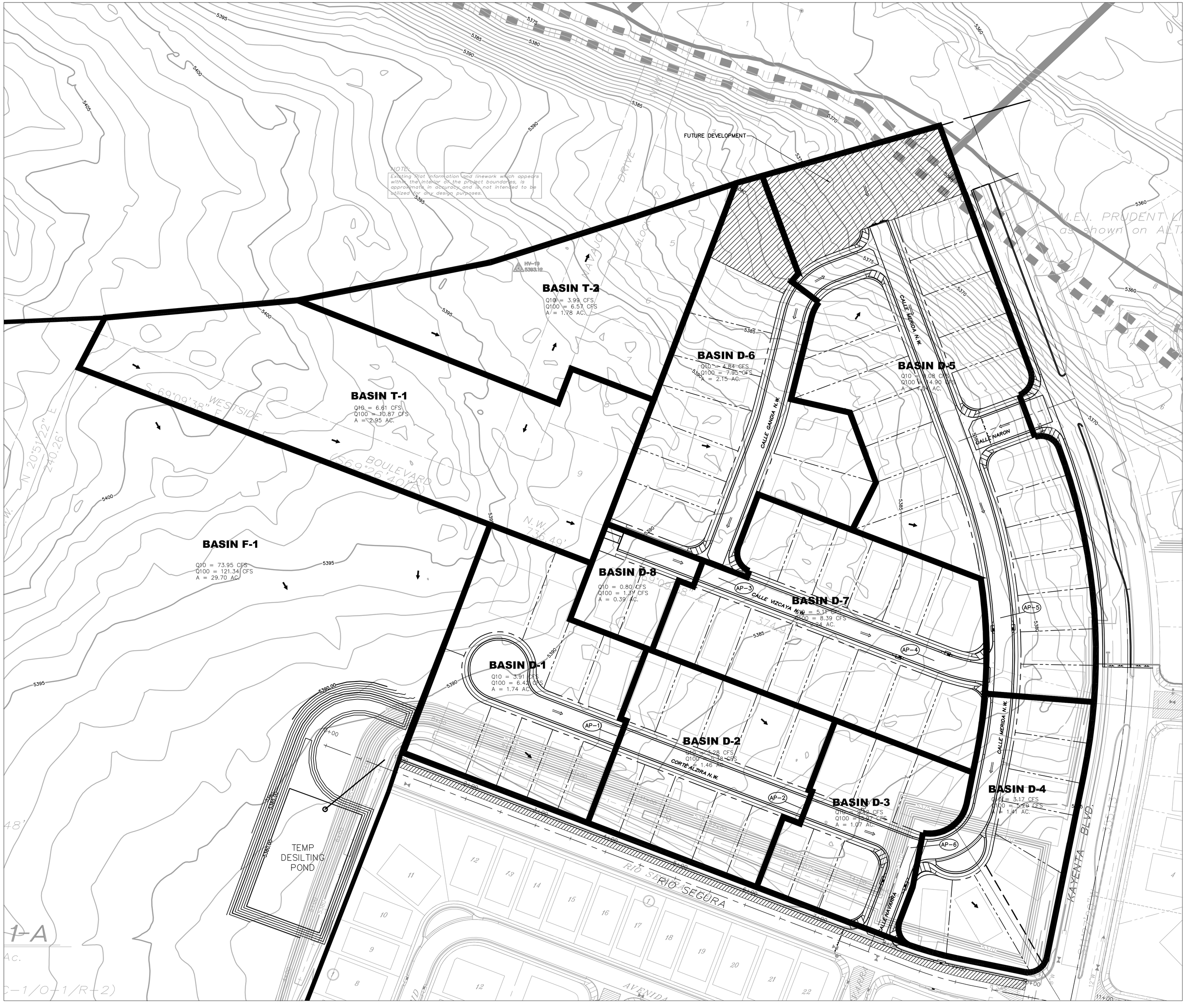
BASIN BOUNDARY MAP DEVELOPED CONDITIONS

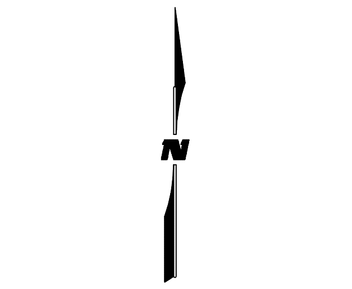
REVISIONS NO.	DATE	REMARKS	BY

DESIGN JRW	WCEA NO. X2218030	DATE JULY 2003	
DRAWN JRW	PROJECT NO. N/A	SHEET NO. 1 OF 1	
CHECK DSA			

PLATE 2A

T:\PROJECTS\X2218030\M\DRAINAGE\DRAINAGE BASINS0C.DWG\ 06-11-03





LEGEND

- DRAINAGE FLOW ARROW
- FUTURE FLOW ARROW
- HIGH POINT
- (AP-9) HYDRAULIC ANALYSIS POINT

HYDROLOGIC DATA – DEVELOPED

BASIN	AREA (acres)	LAND TREATMENT PERCENTAGES BY TYPE				YIELD (cfs/ac)	Q_{100} (cfs)	V_{100-24} (ac-ft)
		A	B	C	D			
D-1	1.74	0	10	30	60	3.69	6.42	0.22
D-2	1.46	0	10	30	60	3.68	5.38	0.19
D-3	1.07	0	10	30	60	3.71	3.97	0.14
D-4	1.41	0	10	30	60	3.69	5.20	0.18
D-5	4.04	0	10	30	60	3.69	14.90	0.52
D-6	2.15	0	10	30	60	3.69	7.95	0.28
D-7	2.24	0	10	30	60	3.69	8.39	0.29
D-8	0.39	0	10	30	60	3.36	1.31	0.05
T-1	2.95	0	10	30	60	3.69	10.87	0.37
T-2	1.78	0	10	30	60	3.69	6.57	0.22

STREET HYDRAULIC DATA

AP	⊕ INLET (#)	SLOPE (%)	Q_{100} (cfs)	Q_{INT} (cfs)	Q_{BYP} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	D*V	Y_2 (ft)
AP-1	–	0.68	6.42	–	–	0.34	1.87	0.64	0.38
AP-2	–	1.60	11.80	–	–	0.36	2.99	1.07	0.47
AP-3	–	0.61	10.99	–	–	0.40	2.15	0.86	0.46
AP-4	1A & 1B	0.61	28.52	28.52	0.00	0.54	3.14	1.69	0.69
AP-5	2A & 2B	0.65	14.90	14.90	0.00	0.44	2.47	1.09	0.52
AP-6	3A & 3B	2.02	20.97	20.97	0.00	0.41	3.99	1.64	0.61

$$Y_2 = \left[\frac{V^2}{2g}\right] \times 0.8 + D_{100}$$

WILSON & COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 898-8021

SEVILLE SUBDIVISION UNIT 7

BASIN BOUNDARY MAP DEVELOPED CONDITIONS

REVISIONS	NO.	DATE	REMARKS	BY

DESIGN	JRW	WCEA NO. X2218030	DATE JULY 2003
DRAWN	JRW	PROJECT NO. N/A	SHEET NO. 1 OF 1
CHECK	DSA		

T:\PROJECTS\X2218030\WORKING\DRAINAGE\DRAINAGE BASINSDC.DWG\06-11-03

PLATE 2B