

DRAINAGE REPORT

for

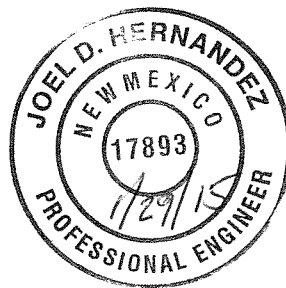
Heritage Marketplace Southeast Corner Unser and Ladera Albuquerque, New Mexico

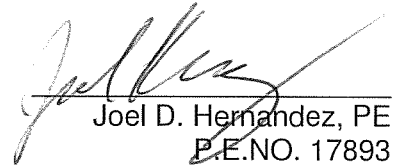
Prepared by:

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5571 Midway Park Place NE
Albuquerque, New Mexico 87109

January 2015

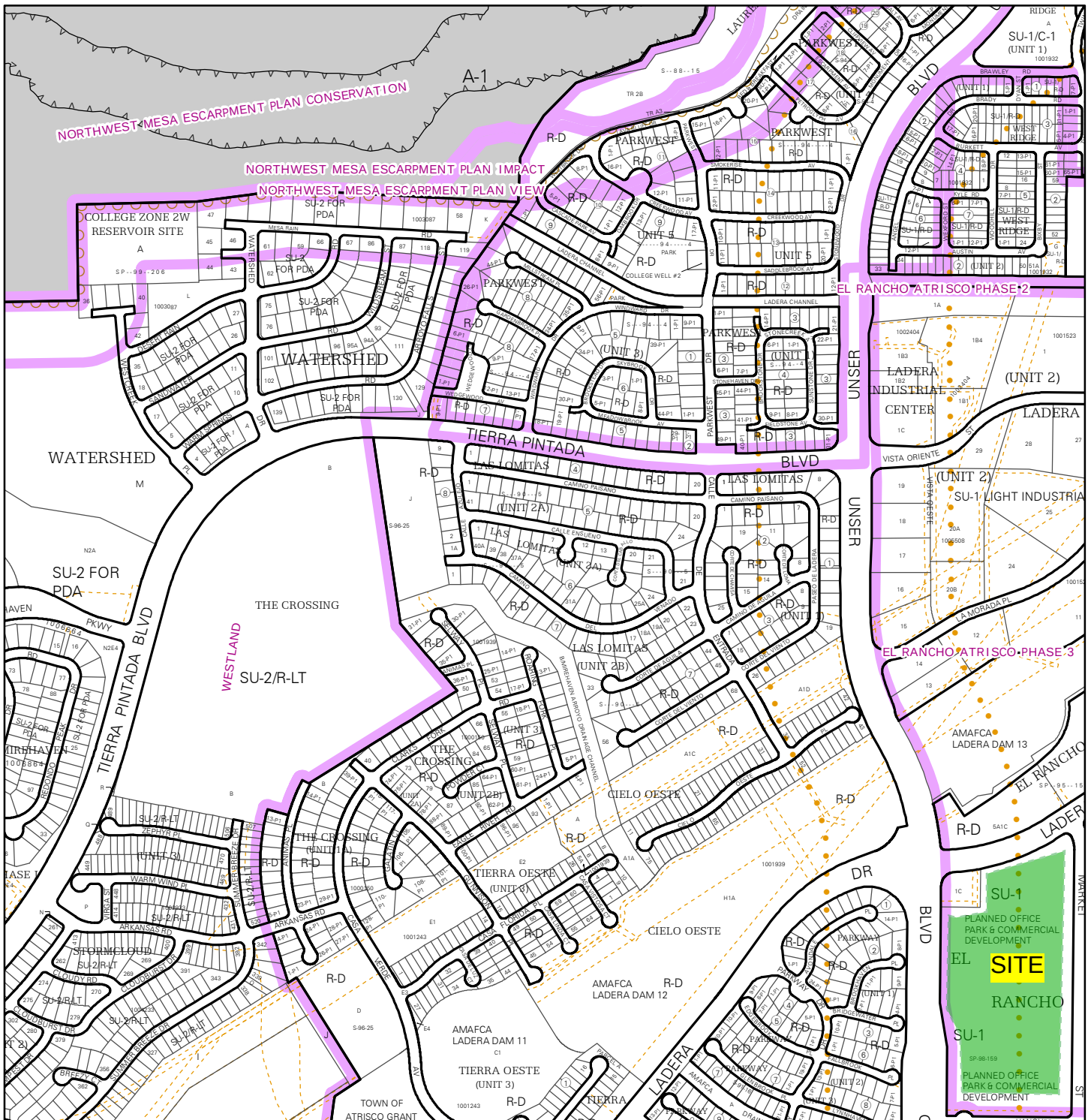
I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.



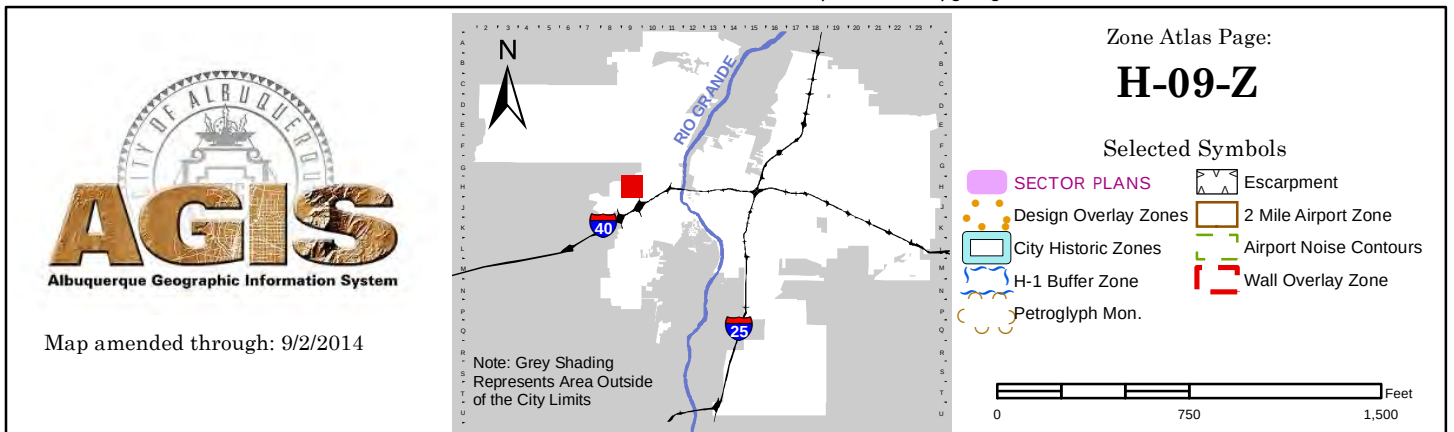

Joel D. Hernandez, PE
P.E.NO. 17893

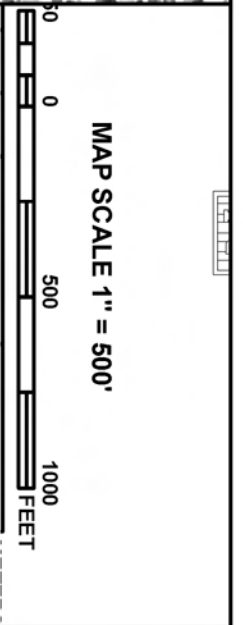
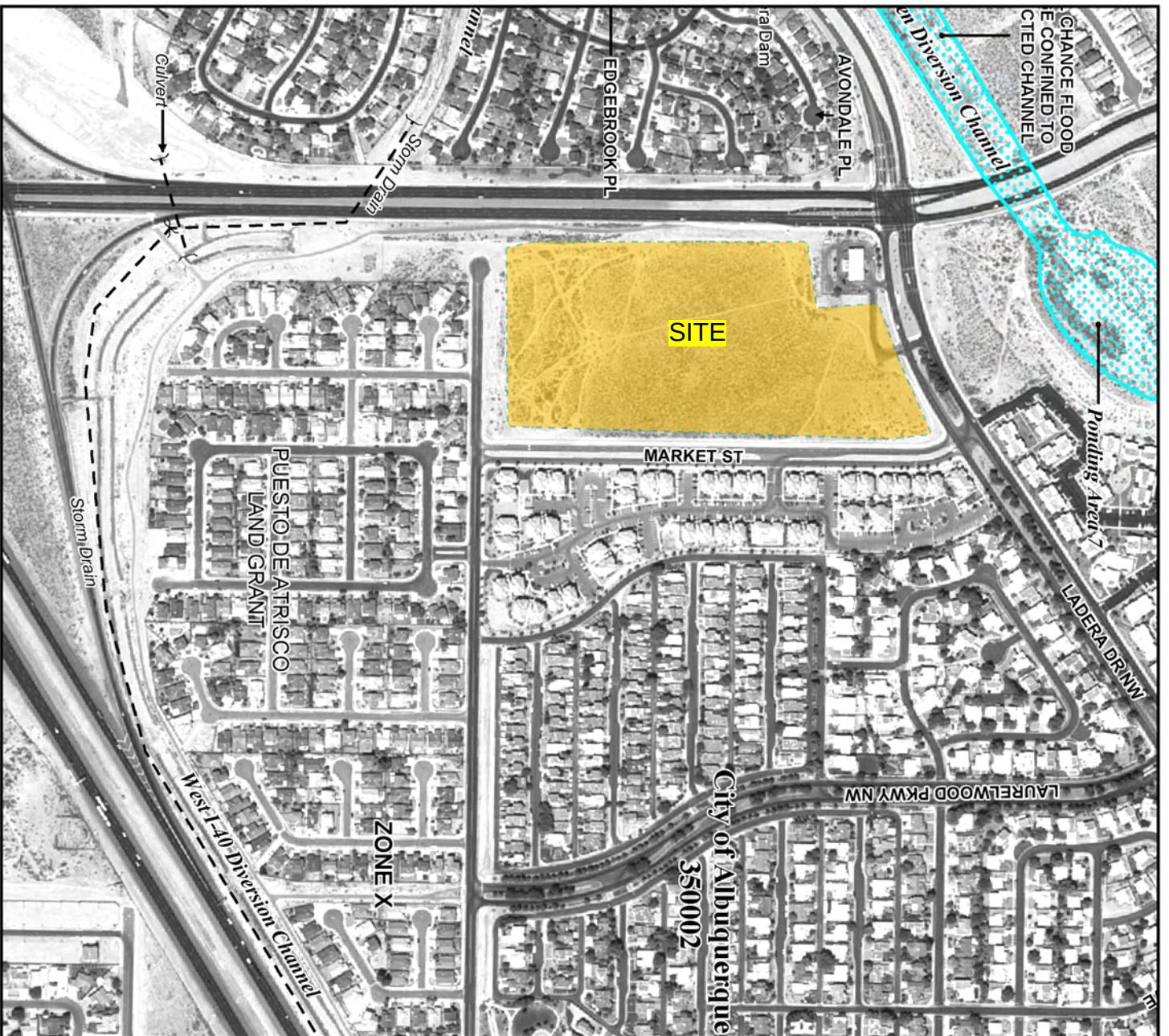
Job No 2014038

EXHIBIT A - VICINITY MAP



For more current information and details visit: <http://www.cabq.gov/gis>





NFIP	
PANEL 0326H	
FIRM FLOOD INSURANCE RATE MAP BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS PANEL 326 OF 825 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)	
CONTAINS: COMMUNITY NUMBER PANEL SUFFIX ALBUQUERQUE CITY OF 350002 0326 H BERNALILLO COUNTY 350001 0326 H UNINCORPORATED AREAS	
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.	
MAP NUMBER 35001C0326H MAP REVISED AUGUST 16, 2012 Federal Emergency Management Agency	

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

EXHIBIT B

PURPOSE

The purpose of this report is to demonstrate the proposed grading and drainage scheme is consistent with the Conceptual Drainage Plan for Heritage Plaza (Issacson Report) prepared by Isaacson & Arfman, P.A., dated June 1985, and to determine the required pond volumes and storm drain sizing necessary to connect to existing infrastructure. The Issacson Report is included in Appendix B of this report.

FLOOD PLAIN

The site is not within a floodplain as shown on FIRM Map 35001c0326H. See Exhibit B for location of site.

EXISTING CONDITIONS

The property over which the shopping center project will be constructed is currently undeveloped, with the exception of the existing Valero service station at the southeast corner of Unser Boulevard and Ladera Drive. An existing 42 inch RCP storm drain pipe anticipated to accept runoff from the site runs within a drainage easement along the north side of Hanover Road which borders the southerly portion of the site. There are no offsite basins draining onto the site other than the existing Valero service station.

The Issacson Report concludes Basins 3,5, and 6 of said report are to have restricted runoff rates not to exceed those of the 10-year event.

PROPOSED CONDITIONS

The northerly/upstream basins (Basin A1-A5, inclusive) coincide with the Issacson Report Basins 3,5, and 6 and are therefore configured to be routed through two interconnected detention ponds so as not to exceed the 10-year event. The southerly basins (Basins B1-B4, inclu-

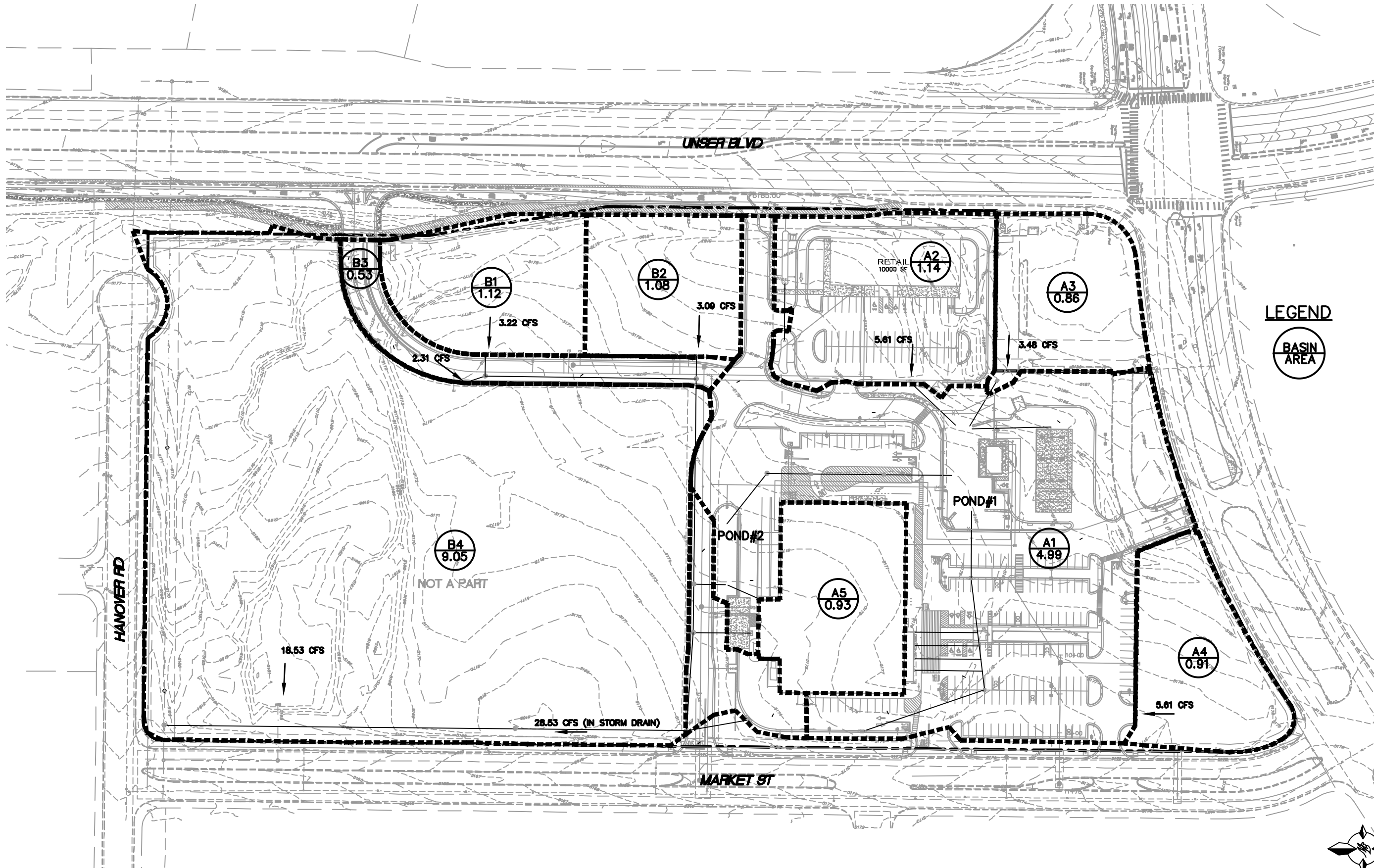
sive) are anticipated to incorporate detention basins within the individual pads at the time they develop. A hydrologic analysis was run using AHYMO to demonstrate the proposed pond volumes are adequate to restrict the flow to the 10-year event (24.66 cfs). A hydraulic analysis to size the major pipe network was run using Flowmaster. A section of 24-inch and 30-inch RCP will be required to convey flows through the future residential parcel to the existing 42-inch RCP. Calculations are included in Appendix A of this report.

STORMWATER CONTROL MEASURES

Stormwater Control Measures are incorporated in the design to the extent practicable and will provide management of the 90th Percentile Storm. The primary design measure is the retention/detention pond which will serve to retain the 90th Percentile Storm which was quantified per the Drainage Ordinance requirement of 0.44 inches and reduced by 0.1 inch to account for the initial impervious abstraction as listed in Table A-6 of Section 22 of the DPM. Detailed pond volume design tabulations are included in Appendix A.

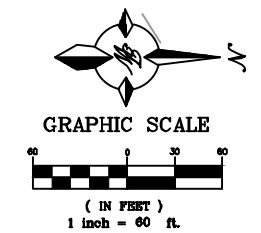
SUMMARY

Following a detailed analysis of existing and proposed drainage conditions guided by DPM Section 22 – Weighted E Method, storm water discharge resulting from the 100-year, 6-hr storm event indicates that the proposed redevelopment and corresponding grading and drainage design will accommodate the proposed development, and correspondingly not increase run-off volumes or alter historic discharge locations. It is therefore recommended that this plan be approved for Site Development Plan for Building Permit and Site Development Plan for Subdivision based upon these findings.



LEGEND

BASIN AREA



**BASIN MAP
DRAINAGE PLAN**

DPM Weighted E Method

Heritage Plaza - Precipitation Zone 1- Proposed Basins

(Routed Through Grocery Store Ponds)

Northerly Developed Basins (Routed Through Grocery Store Ponds)																										
Basin Descriptions													100-Year, 6-Hr						10-Year, 6-Hr				2-Year, 6-Hr			
Basin	Area (sf)	Area (acres)	Area (sq miles)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A1 Store	217,349	4.990	0.00780	0%	0	0%	0.000	29%	1.427732	71%	3.562	1.690	0.703	19.66	1.011	0.420	12.42	0.548	0.228	6.69	1.011	0.420	12.42	0.548	0.228	6.69
A2 Pad C	61,332	1.408	0.00220	0%	0	0%	0.000	26%	0.362718	74%	1.045	1.718	0.202	5.61	1.034	0.121	3.56	0.565	0.066	1.94	1.034	0.121	3.56	0.565	0.066	1.94
A3 Valero	37,460	0.860	0.00134	0%	0	0%	0.000	22%	0.187052	78%	0.673	1.757	0.126	3.48	1.066	0.076	2.22	0.589	0.042	1.23	1.066	0.076	2.22	0.589	0.042	1.23
A4 Pad E	39,708	0.912	0.00142	0%	0	0%	0.000	20%	0.182277	80%	0.729	1.774	0.135	3.71	1.080	0.096	2.38	0.600	0.046	1.32	1.080	0.096	2.38	0.600	0.046	1.32
A5 Roof*	40,601	0.932	0.00146	0%	0	0%	0.000	0%	0	100%	0.932	1.970	0.153	4.07	1.240	0.096	2.69	0.720	0.056	1.58	1.240	0.096	2.69	0.720	0.056	1.58
A6 Drive*	19,719	0.453	0.00071	0%	0	0%	0.000	17%	0.076957	83%	0.376	1.803	0.068	1.86	1.104	0.042	1.20				1.104	0.042	1.20			
Total	396,450	9.101	0.01422																							

*Notes: Basin not routed through ponds.

SOUTHERLY Developed Basins

Basin Descriptions																						
Basin	Area (sf)	Area (acres)	Area (sq miles)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year, 6-Hr			10-Year, 6-Hr			2-Year, 6-Hr				
				%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs		
B1 Pad A	48,870	1.122	0.00175	0%	0	0%	0.000	100%	1.121901	0%	0.000	0.990	0.093	3.22	0.440	0.041	1.67	0.120	0.011	0.53		
B2 Pad B	46,933	1.077	0.00168	0%	0	0%	0.000	100%	1.077433	0%	0.000	0.990	0.089	3.09	0.440	0.040	1.61	0.120	0.011	0.51		
B3 Drive	23,035	0.529	0.00083	0%	0	0%	0.000	0%	0	100%	0.529	1.970	0.087	2.31	1.240	0.055	1.53	0.720	0.032	0.89		
B4 Res	394,392	9.054	0.01415	0%	0	98%	8.873	2%	0.18108	0%	0.000	0.676	0.510	18.53	0.224	0.169	7.01					
Total	513,230	11.782	0.01841										0.779	27.15		0.305	11.82		0.054	1.93		

Equations:

$$\text{Weighted E} = E_a \cdot A_a + E_b \cdot A_b + E_c \cdot A_c + E_d \cdot A_d / (\text{Total Area})$$

$$\text{Volume} = \text{Weighted D} \cdot \text{Total Area}$$

$$\text{Flow} = Q_a \cdot A_a + Q_b \cdot A_b + Q_c \cdot A_c + Q_d \cdot A_d$$

First Flush and Pond Volume Calculations

POND 1 VOLUME CALCULATIONS

ELEVATION (ft)	AREA (sf)	VOLUME (cf)	CUMULATIVE VOLUME (cf)
5170	2213	0	0
5171	3173	2693	2693
5172	4197	3685	6378
5173	5295	4746	11124
5174	6410	5852.5	16977
5175	7568	6989	23966
			23966
			23966
			23966

POND 2 VOLUME CALCULATIONS

ELEVATION (ft)	AREA (sf)	VOLUME (cf)	CUMULATIVE VOLUME (cf)
5170	0	0	0
5171	399	199.5	199.5
5172	933	666	865.5
5173	1539	1236	2101.5
5174	2217	1878	3979.5
5175	2967	2592	6571.5
			6571.5

TOTAL POND VOLUME

30537

ACTUAL ELEV.	DEPTH (FT)	VOLUME (CF)	Q (CFS)	VOLUME (AC-FT)
70	0	0	0.0000	
71.00	0.00	2893	0.0000	0.06640266
72.00	0.00	7244	0.0000	0.16628788
73.00	1.00	13226	3.3237	0.3036157
74.00	2.00	20956	13.7041	0.48108356
75.00	3.00	30537	19.0934	0.70103306

Orifice Equation

$$Q = CA \sqrt{2gH}$$

C = 0.6

Diameter (in) = 22.5

Area (ft²) = 2.761

g = 32.2

H (Ft) = Depth of water above center of orifice

Q (CFS) = Flow

FIRST FLUSH CALCULATIONS

Total Retention Vol Provided= **7244** cubic feet (ELEV 5170 TO 5172)

Volume Required = $A_d * (0.44\text{in}-0.1\text{in})$

$A_d=4.49$ acres = 195758 SQ FT

Vol Req'd: 5546 cubic feet < Vol Provided, Therefore **OK**

Worksheet for 30" RCP Capacity Check

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Diameter	2.50	ft
Discharge	28.53	ft³/s

Results

Normal Depth	1.85	ft
Flow Area	3.90	ft²
Wetted Perimeter	5.18	ft
Hydraulic Radius	0.75	ft
Top Width	2.19	ft
Critical Depth	1.82	ft
Percent Full	74.0	%
Critical Slope	0.00624	ft/ft
Velocity	7.32	ft/s
Velocity Head	0.83	ft
Specific Energy	2.68	ft
Froude Number	0.97	
Maximum Discharge	34.18	ft³/s
Discharge Full	31.77	ft³/s
Slope Full	0.00484	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	74.03	%
Downstream Velocity	Infinity	ft/s

Worksheet for 24" RCP Capacity Check

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01710	ft/ft
Diameter	2.00	ft
Discharge	28.93	ft ³ /s

Results

Normal Depth	1.60	ft
Flow Area	2.70	ft ²
Wetted Perimeter	4.43	ft
Hydraulic Radius	0.61	ft
Top Width	1.60	ft
Critical Depth	1.85	ft
Percent Full	80.0	%
Critical Slope	0.01418	ft/ft
Velocity	10.73	ft/s
Velocity Head	1.79	ft
Specific Energy	3.39	ft
Froude Number	1.46	
Maximum Discharge	31.82	ft ³ /s
Discharge Full	29.58	ft ³ /s
Slope Full	0.01636	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	80.04	%
Downstream Velocity	Infinity	ft/s

Worksheet for 24" RCP at 1.29%

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01290	ft/ft
Diameter	2.00	ft
Discharge	24.74	ft ³ /s

Results

Normal Depth	1.58	ft
Flow Area	2.66	ft ²
Wetted Perimeter	4.37	ft
Hydraulic Radius	0.61	ft
Top Width	1.63	ft
Critical Depth	1.76	ft
Percent Full	78.8	%
Critical Slope	0.01080	ft/ft
Velocity	9.31	ft/s
Velocity Head	1.35	ft
Specific Energy	2.92	ft
Froude Number	1.29	
Maximum Discharge	27.64	ft ³ /s
Discharge Full	25.69	ft ³ /s
Slope Full	0.01196	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	78.82	%
Downstream Velocity	Infinity	ft/s

Worksheet for 18" RCP 0.4% Capacity Check

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00400	ft/ft
Diameter	1.50	ft
Discharge	5.53	ft ³ /s

Results

Normal Depth	1.05	ft
Flow Area	1.31	ft ²
Wetted Perimeter	2.96	ft
Hydraulic Radius	0.44	ft
Top Width	1.38	ft
Critical Depth	0.91	ft
Percent Full	69.7	%
Critical Slope	0.00600	ft/ft
Velocity	4.21	ft/s
Velocity Head	0.27	ft
Specific Energy	1.32	ft
Froude Number	0.76	
Maximum Discharge	7.15	ft ³ /s
Discharge Full	6.64	ft ³ /s
Slope Full	0.00277	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	69.68	%
Downstream Velocity	Infinity	ft/s

Worksheet for 18" RCP 0.6% Capacity Check

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Diameter	1.50	ft
Discharge	8.62	ft ³ /s

Results

Normal Depth	1.33	ft
Flow Area	1.66	ft ²
Wetted Perimeter	3.69	ft
Hydraulic Radius	0.45	ft
Top Width	0.95	ft
Critical Depth	1.14	ft
Percent Full	88.8	%
Critical Slope	0.00791	ft/ft
Velocity	5.20	ft/s
Velocity Head	0.42	ft
Specific Energy	1.75	ft
Froude Number	0.69	
Maximum Discharge	8.75	ft ³ /s
Discharge Full	8.14	ft ³ /s
Slope Full	0.00673	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	88.83	%
Downstream Velocity	Infinity	ft/s

```

Heritage.01.15 North Basins
*****
* Heritage Plaza, ALBUQUERQUE, NM *
*****
* 100-YEAR, 24-HR STORM (UNDER PROPOSED CONDITIONS) w/ routing *
*****
*
START                TIME=0.0
*
*
RAINFALL              TYPE=2 RAIN QUARTER=0.0 IN
                      RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                      RAIN DAY=2.66 IN DT=0.05 HR
*DEVELOPED CONDITIONS
*
*BASIN A1
*
COMPUTE NM HYD        ID=1 HYD NO=100.1 AREA=0.00780 SQ MI
                      PER A=0.00 PER B=0.00 PER C=28.0 PER D=72.00
                      TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD             ID=1 CODE=1
*
*
*BASIN A2
*
COMPUTE NM HYD        ID=2 HYD NO=100.2 AREA=0.00220 SQ MI
                      PER A=0.00 PER B=0.00 PER C=26.0 PER D=74.00
                      TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD             ID=2 CODE=1
*
*
*BASIN A3
*
COMPUTE NM HYD        ID=3 HYD NO=100.3 AREA=0.00134 SQ MI
                      PER A=0.00 PER B=0.00 PER C=22.0 PER D=78.00
                      TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD             ID=3 CODE=1
*
*
*BASIN A4
*
COMPUTE NM HYD        ID=4 HYD NO=100.4 AREA=0.00142 SQ MI
                      PER A=0.00 PER B=0.00 PER C=20.0 PER D=80.00
                      TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD             ID=4 CODE=1
*
*
*BASIN A5 - ROOF
*
COMPUTE NM HYD        ID=5 HYD NO=100.5 AREA=0.00146 SQ MI
                      PER A=0.00 PER B=0.00 PER C=0.0 PER D=100.00
                      TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD             ID=5 CODE=1
*
*
*BASIN A6 - DRIVE
*
COMPUTE NM HYD        ID=6 HYD NO=100.6 AREA=0.00071 SQ MI
                      PER A=0.00 PER B=0.00 PER C=17.0 PER D=83.00
                      TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD             ID=6 CODE=1
*
*
ADD HYD               ID=50 HYD NO=100.21 ID=1 ID=2
ADD HYD               ID=50 HYD NO=100.21 ID=50 ID=3
ADD HYD               ID=50 HYD NO=100.21 ID=50 ID=4
*

```

```

Heritage.01.15 North Basins
PRINT HYD          ID=50 CODE=1
*
*
*ROUTE BASIN 1,2,3 & 4 THROUGH DETENTION PONDS
ROUTE RESERVOIR    ID=55 HYD NO=200.1 INFLOW ID=50 CODE=24
                   OUTFLOW (CFS) STORAGE(AC-FT) ELEVATION(FT)
                   0.0          0.0          70.00
                   0.010        0.0664        71.00
                   0.0100       0.1662        72.00
                   3.3237       0.3036        73.00
                   13.704       0.4810        74.00
                   19.093       0.7010        75.00
*
PRINT HYD          ID=55 CODE=1
*
*
ADD HYD            ID=56 HYD NO=100.22 ID=55 ID=5
PRINT HYD          ID=56 CODE=1
*
*
ADD HYD            ID=57 HYD NO=100.23 ID=56 ID=6
PRINT HYD          ID=57 CODE=1
*
*
FINISH

```

AHYMO

01a AHYMO PROGRAM (AHYMO-S4) - Version: S4.01a - Rel:
 RUN DATE (MON/DAY/YR) = 01/29/2015
 START TIME (HR:MIN:SEC) = 10:52:52 USER NO.=
 TierraWest-SiteA99368577
 INPUT FILE = C:\Users\Joel\Desktop\Heritage.01.15 North
 Basins.txt

* Heritage Plaza, ALBUQUERQUE, NM *

* 100-YEAR, 24-HR STORM (UNDER PROPOSED CONDITIONS) w/ routing *

*

START TIME=0.0

*

*

RAINFALL TYPE=2 RAIN QUARTER=0.0 IN

RAIN ONE=1.87 IN RAIN SIX=2.20 IN

RAIN DAY=2.66 IN DT=0.05 HR

24-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR
 CONVECTIVE AREAS (NM & AZ) - D1
 DT = 0.050000 HOURS END TIME = 24.000002 HOURS

0.0000	0.0022	0.0045	0.0069	0.0096	0.0123	0.0154
0.0197	0.0264	0.0336	0.0412	0.0494	0.0578	0.0664
0.0753	0.0844	0.0946	0.1052	0.1168	0.1387	0.1657
0.2020	0.2430	0.2937	0.3614	0.4375	0.5689	0.7733
1.1234	1.3695	1.5635	1.6610	1.7465	1.8079	1.8568
1.8994	1.9306	1.9592	1.9828	1.9979	2.0087	2.0183
2.0273	2.0352	2.0426	2.0499	2.0568	2.0625	2.0659
2.0692	2.0724	2.0754	2.0784	2.0813	2.0842	2.0870
2.0896	2.0923	2.0949	2.0974	2.0999	2.1023	2.1046
2.1069	2.1092	2.1115	2.1136	2.1158	2.1179	2.1199
2.1220	2.1240	2.1260	2.1280	2.1299	2.1318	2.1337
2.1356	2.1374	2.1392	2.1411	2.1428	2.1446	2.1463
2.1481	2.1498	2.1514	2.1531	2.1548	2.1564	2.1580
2.1596	2.1612	2.1628	2.1643	2.1658	2.1674	2.1689
2.1704	2.1718	2.1733	2.1747	2.1762	2.1776	2.1790
2.1804	2.1818	2.1832	2.1845	2.1859	2.1872	2.1885
2.1899	2.1912	2.1925	2.1937	2.1950	2.1963	2.1975
2.1988	2.2000	2.2013	2.2026	2.2038	2.2051	2.2064
2.2077	2.2089	2.2102	2.2115	2.2128	2.2141	2.2153
2.2166	2.2179	2.2192	2.2204	2.2217	2.2230	2.2243
2.2256	2.2268	2.2281	2.2294	2.2307	2.2319	2.2332
2.2345	2.2358	2.2371	2.2383	2.2396	2.2409	2.2422
2.2434	2.2447	2.2460	2.2473	2.2486	2.2498	2.2511
2.2524	2.2537	2.2549	2.2562	2.2575	2.2588	2.2601
2.2613	2.2626	2.2639	2.2652	2.2664	2.2677	2.2690
2.2703	2.2716	2.2728	2.2741	2.2754	2.2767	2.2779
2.2792	2.2805	2.2818	2.2831	2.2843	2.2856	2.2869
2.2882	2.2894	2.2907	2.2920	2.2933	2.2946	2.2958
2.2971	2.2984	2.2997	2.3009	2.3022	2.3035	2.3048

AHYMO							
2.3061	2.3073	2.3086	2.3099	2.3112	2.3124	2.3137	
2.3150	2.3163	2.3176	2.3188	2.3201	2.3214	2.3227	
2.3239	2.3252	2.3265	2.3278	2.3291	2.3303	2.3316	
2.3329	2.3342	2.3354	2.3367	2.3380	2.3393	2.3406	
2.3418	2.3431	2.3444	2.3457	2.3469	2.3482	2.3495	
2.3508	2.3521	2.3533	2.3546	2.3559	2.3572	2.3584	
2.3597	2.3610	2.3623	2.3636	2.3648	2.3661	2.3674	
2.3687	2.3699	2.3712	2.3725	2.3738	2.3750	2.3763	
2.3776	2.3789	2.3802	2.3814	2.3827	2.3840	2.3853	
2.3865	2.3878	2.3891	2.3904	2.3917	2.3929	2.3942	
2.3955	2.3968	2.3980	2.3993	2.4006	2.4019	2.4032	
2.4044	2.4057	2.4070	2.4083	2.4095	2.4108	2.4121	
2.4134	2.4147	2.4159	2.4172	2.4185	2.4198	2.4210	
2.4223	2.4236	2.4249	2.4262	2.4274	2.4287	2.4300	
2.4313	2.4325	2.4338	2.4351	2.4364	2.4377	2.4389	
2.4402	2.4415	2.4428	2.4440	2.4453	2.4466	2.4479	
2.4492	2.4504	2.4517	2.4530	2.4543	2.4555	2.4568	
2.4581	2.4594	2.4607	2.4619	2.4632	2.4645	2.4658	
2.4670	2.4683	2.4696	2.4709	2.4722	2.4734	2.4747	
2.4760	2.4773	2.4785	2.4798	2.4811	2.4824	2.4837	
2.4849	2.4862	2.4875	2.4888	2.4900	2.4913	2.4926	
2.4939	2.4952	2.4964	2.4977	2.4990	2.5003	2.5015	
2.5028	2.5041	2.5054	2.5067	2.5079	2.5092	2.5105	
2.5118	2.5130	2.5143	2.5156	2.5169	2.5182	2.5194	
2.5207	2.5220	2.5233	2.5245	2.5258	2.5271	2.5284	
2.5297	2.5309	2.5322	2.5335	2.5348	2.5360	2.5373	
2.5386	2.5399	2.5412	2.5424	2.5437	2.5450	2.5463	
2.5475	2.5488	2.5501	2.5514	2.5527	2.5539	2.5552	
2.5565	2.5578	2.5590	2.5603	2.5616	2.5629	2.5642	
2.5654	2.5667	2.5680	2.5693	2.5705	2.5718	2.5731	
2.5744	2.5757	2.5769	2.5782	2.5795	2.5808	2.5820	
2.5833	2.5846	2.5859	2.5872	2.5884	2.5897	2.5910	
2.5923	2.5935	2.5948	2.5961	2.5974	2.5987	2.5999	
2.6012	2.6025	2.6038	2.6050	2.6063	2.6076	2.6089	
2.6102	2.6114	2.6127	2.6140	2.6153	2.6165	2.6178	
2.6191	2.6204	2.6217	2.6229	2.6242	2.6255	2.6268	
2.6280	2.6293	2.6306	2.6319	2.6332	2.6344	2.6357	
2.6370	2.6383	2.6395	2.6408	2.6421	2.6434	2.6447	
2.6459	2.6472	2.6485	2.6498	2.6510	2.6523	2.6536	
2.6549	2.6562	2.6574	2.6587	2.6600			

*DEVELOPED CONDITIONS

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*BASIN A1

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COMPUTE NM HYD ID=1 HYD NO=100.1 AREA=0.00780 SQ MI

PER A=0.00 PER B=0.00 PER C=28.0 PER D=72.00

TP=-0.1333 HR MASS RAINFALL=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000
 SHAPE CONSTANT, N = 7.106428
 UNIT PEAK = 22.172 CFS UNIT VOLUME = 0.9986 B =
 526.28 P60 = 1.8700
 AREA = 0.005616 SQ MI IA = 0.10000 INCHES INF = 0.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

K = 0.105867HR TP = 0.133300HR K/TP RATIO = 0.794199
 SHAPE CONSTANT, N = 4.514592
 UNIT PEAK = 6.3592 CFS UNIT VOLUME = 0.9999 B =
 388.14 P60 = 1.8700
 AREA = 0.002184 SQ MI IA = 0.35000 INCHES INF = 0.83000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 100.10

RUNOFF VOLUME = 2.04333 INCHES = 0.8500 ACRE-Feet
 PEAK DISCHARGE RATE = 20.48 CFS AT 1.500 HOURS BASIN AREA =
 0.0078 SQ. MI.

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*BASIN A2

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COMPUTE NM HYD ID=2 HYD NO=100.2 AREA=0.00220 SQ MI

PER A=0.00 PER B=0.00 PER C=26.0 PER D=74.00

TP=-0.1333 HR MASS RAINFALL=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000
 SHAPE CONSTANT, N = 7.106428
 UNIT PEAK = 6.4274 CFS UNIT VOLUME = 0.9975 B =
 526.28 P60 = 1.8700
 AREA = 0.001628 SQ MI IA = 0.10000 INCHES INF = 0.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

K = 0.105867HR TP = 0.133300HR K/TP RATIO = 0.794199
 SHAPE CONSTANT, N = 4.514592
 UNIT PEAK = 1.6655 CFS UNIT VOLUME = 0.9941 B =
 388.14 P60 = 1.8700
 AREA = 0.000572 SQ MI IA = 0.35000 INCHES INF = 0.83000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 100.20

RUNOFF VOLUME = 2.06992 INCHES = 0.2429 ACRE-Feet
 PEAK DISCHARGE RATE = 5.83 CFS AT 1.500 HOURS BASIN AREA =
 0.0022 SQ. MI.

AHYMO

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*BASIN A3

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COMPUTE NM HYD ID=3 HYD NO=100.3 AREA=0.00134 SQ MI
PER A=0.00 PER B=0.00 PER C=22.0 PER D=78.00
TP=-0.1333 HR MASS RAINFALL=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000
SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 4.1265 CFS UNIT VOLUME = 0.9966 B =
526.28 P60 = 1.8700
AREA = 0.001045 SQ MI IA = 0.10000 INCHES INF = 0.04000
INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

K = 0.105867HR TP = 0.133300HR K/TP RATIO = 0.794199
SHAPE CONSTANT, N = 4.514592
UNIT PEAK = 0.85838 CFS UNIT VOLUME = 0.9874 B =
388.14 P60 = 1.8700
AREA = 0.000295 SQ MI IA = 0.35000 INCHES INF = 0.83000
INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 100.30

RUNOFF VOLUME = 2.12311 INCHES = 0.1517 ACRE-FEET
PEAK DISCHARGE RATE = 3.60 CFS AT 1.500 HOURS BASIN AREA =
0.0013 SQ. MI.

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*BASIN A4

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COMPUTE NM HYD ID=4 HYD NO=100.4 AREA=0.00142 SQ MI
PER A=0.00 PER B=0.00 PER C=20.0 PER D=80.00
TP=-0.1333 HR MASS RAINFALL=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000
SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 4.4850 CFS UNIT VOLUME = 0.9966 B =
526.28 P60 = 1.8700

AREA = 0.001136 SQ MI AHYMO
INCHES PER HOUR IA = 0.10000 INCHES INF = 0.04000
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

K = 0.105867HR TP = 0.133300HR K/TP RATIO = 0.794199
SHAPE CONSTANT, N = 4.514592
UNIT PEAK = 0.82693 CFS UNIT VOLUME = 0.9874 B =
388.14 P60 = 1.8700
AREA = 0.000284 SQ MI IA = 0.35000 INCHES INF = 0.83000
INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 100.40

RUNOFF VOLUME = 2.14971 INCHES = 0.1628 ACRE-Feet
PEAK DISCHARGE RATE = 3.84 CFS AT 1.500 HOURS BASIN AREA =
0.0014 SQ. MI.

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*BASIN A5 - ROOF

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COMPUTE NM HYD ID=5 HYD NO=100.5 AREA=0.00146 SQ MI
PER A=0.00 PER B=0.00 PER C=0.0 PER D=100.00
TP=-0.1333 HR MASS RAINFALL=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000
SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 5.7642 CFS UNIT VOLUME = 0.9971 B =
526.28 P60 = 1.8700
AREA = 0.001460 SQ MI IA = 0.10000 INCHES INF = 0.04000
INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

PRINT HYD ID=5 CODE=1

PARTIAL HYDROGRAPH 100.50

RUNOFF VOLUME = 2.41566 INCHES = 0.1881 ACRE-Feet
PEAK DISCHARGE RATE = 4.19 CFS AT 1.500 HOURS BASIN AREA =
0.0015 SQ. MI.

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AHYMO

*BASIN A6 - DRIVE

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COMPUTE NM HYD ID=6 HYD NO=100.6 AREA=0.00071 SQ MI
 PER A=0.00 PER B=0.00 PER C=17.0 PER D=83.00
 TP=-0.1333 HR MASS RAINFALL=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000
 SHAPE CONSTANT, N = 7.106428
 UNIT PEAK = 2.3266 CFS UNIT VOLUME = 0.9941 B =
 526.28 P60 = 1.8700
 AREA = 0.000589 SQ MI IA = 0.10000 INCHES INF = 0.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

K = 0.105867HR TP = 0.133300HR K/TP RATIO = 0.794199
 SHAPE CONSTANT, N = 4.514592
 UNIT PEAK = 0.35145 CFS UNIT VOLUME = 0.9649 B =
 388.14 P60 = 1.8700
 AREA = 0.000121 SQ MI IA = 0.35000 INCHES INF = 0.83000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

PRINT HYD ID=6 CODE=1

PARTIAL HYDROGRAPH 100.60

RUNOFF VOLUME = 2.18960 INCHES = 0.0829 ACRE-FEET
 PEAK DISCHARGE RATE = 1.95 CFS AT 1.500 HOURS BASIN AREA =
 0.0007 SQ. MI.

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ADD HYD ID=50 HYD NO=100.21 ID=1 ID=2
 ADD HYD ID=50 HYD NO=100.21 ID=50 ID=3
 ADD HYD ID=50 HYD NO=100.21 ID=50 ID=4

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PRINT HYD ID=50 CODE=1

PARTIAL HYDROGRAPH 100.21

RUNOFF VOLUME = 2.06804 INCHES = 1.4074 ACRE-FEET
 PEAK DISCHARGE RATE = 33.75 CFS AT 1.500 HOURS BASIN AREA =
 0.0128 SQ. MI.

AHYMO

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*ROUTE BASIN 1,2,3 & 4 THROUGH DETENTION PONDS

ROUTE RESERVOIR ID=55 HYD NO=200.1 INFLOW ID=50 CODE=24

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

0.0	0.0	70.00
0.010	0.0664	71.00
0.0100	0.1662	72.00
3.3237	0.3036	73.00
13.704	0.4810	74.00
19.093	0.7010	75.00

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TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
0.00	0.00	70.00	0.000	0.00
1.20	4.26	70.73	0.049	0.01
2.40	1.08	72.97	0.300	3.24
3.60	0.05	72.12	0.183	0.40
4.80	0.08	72.03	0.170	0.10
6.00	0.15	72.03	0.171	0.12
7.20	0.16	72.04	0.172	0.15
8.40	0.16	72.04	0.172	0.16
9.60	0.15	72.04	0.172	0.16
10.80	0.16	72.04	0.172	0.16
12.00	0.16	72.04	0.172	0.16
13.20	0.15	72.04	0.172	0.16
14.40	0.16	72.04	0.172	0.16
15.60	0.15	72.04	0.172	0.16
16.80	0.15	72.04	0.172	0.16
18.00	0.16	72.04	0.172	0.16
19.20	0.15	72.04	0.172	0.16
20.40	0.15	72.04	0.172	0.16
21.60	0.16	72.04	0.172	0.16
22.80	0.15	72.04	0.172	0.16
24.00	0.15	72.04	0.172	0.16
25.20	0.00	72.00	0.167	0.02
26.40	0.00	72.00	0.166	0.01
27.60	0.00	72.00	0.166	0.01
28.80	0.00	72.00	0.166	0.01
30.00	0.00	72.00	0.166	0.01
31.20	0.00	72.00	0.166	0.01
32.40	0.00	72.00	0.166	0.01
33.60	0.00	72.00	0.166	0.01
34.80	0.00	72.00	0.166	0.01
36.00	0.00	72.00	0.166	0.01
37.20	0.00	72.00	0.166	0.01
38.40	0.00	72.00	0.166	0.01
39.60	0.00	72.00	0.166	0.01
40.80	0.00	72.00	0.166	0.01
42.00	0.00	72.00	0.166	0.01
43.20	0.00	72.00	0.166	0.01

			AHYMO	
44.40	0.00	72.00	0.166	0.01
45.60	0.00	72.00	0.166	0.01
46.80	0.00	72.00	0.166	0.01
48.00	0.00	72.00	0.166	0.01
49.20	0.00	72.00	0.166	0.01
50.40	0.00	72.00	0.166	0.01
51.60	0.00	72.00	0.166	0.01
52.80	0.00	72.00	0.166	0.01
54.00	0.00	72.00	0.166	0.01
55.20	0.00	72.00	0.166	0.01
56.40	0.00	72.00	0.166	0.01
57.60	0.00	72.00	0.166	0.01
58.80	0.00	72.00	0.166	0.01
60.00	0.00	72.00	0.166	0.01
61.20	0.00	72.00	0.166	0.01
62.40	0.00	72.00	0.166	0.01
63.60	0.00	72.00	0.166	0.01
64.80	0.00	72.00	0.166	0.01
66.00	0.00	72.00	0.166	0.01
TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
67.20	0.00	72.00	0.166	0.01
68.40	0.00	72.00	0.166	0.01
69.60	0.00	72.00	0.166	0.01
70.80	0.00	72.00	0.166	0.01
72.00	0.00	72.00	0.166	0.01
73.20	0.00	72.00	0.166	0.01
74.40	0.00	72.00	0.166	0.01
75.60	0.00	72.00	0.166	0.01
76.80	0.00	72.00	0.166	0.01
78.00	0.00	72.00	0.166	0.01
79.20	0.00	72.00	0.166	0.01
80.40	0.00	72.00	0.166	0.01
81.60	0.00	72.00	0.166	0.01
82.80	0.00	72.00	0.166	0.01
84.00	0.00	72.00	0.166	0.01
85.20	0.00	72.00	0.166	0.01
86.40	0.00	72.00	0.166	0.01
87.60	0.00	72.00	0.166	0.01
88.80	0.00	72.00	0.166	0.01
90.00	0.00	72.00	0.166	0.01
91.20	0.00	72.00	0.166	0.01
92.40	0.00	72.00	0.166	0.01
93.60	0.00	72.00	0.166	0.01
94.80	0.00	72.00	0.166	0.01
96.00	0.00	72.00	0.166	0.01
97.20	0.00	72.00	0.166	0.01
98.40	0.00	72.00	0.166	0.01
99.60	0.00	72.00	0.166	0.01
100.80	0.00	72.00	0.166	0.01
102.00	0.00	72.00	0.166	0.01
103.20	0.00	72.00	0.166	0.01
104.40	0.00	72.00	0.166	0.01
105.60	0.00	72.00	0.166	0.01
106.80	0.00	72.00	0.166	0.01
108.00	0.00	72.00	0.166	0.01
109.20	0.00	72.00	0.166	0.01
110.40	0.00	72.00	0.166	0.01
111.60	0.00	72.00	0.166	0.01
112.80	0.00	72.00	0.166	0.01
114.00	0.00	72.00	0.166	0.01
115.20	0.00	72.00	0.166	0.01
116.40	0.00	72.00	0.166	0.01
117.60	0.00	72.00	0.166	0.01

			AHYMO	
118.80	0.00	72.00	0.166	0.01
120.00	0.00	72.00	0.166	0.01
121.20	0.00	72.00	0.166	0.01
122.40	0.00	72.00	0.166	0.01
123.60	0.00	72.00	0.166	0.01
124.80	0.00	72.00	0.166	0.01
126.00	0.00	72.00	0.166	0.01
127.20	0.00	72.00	0.166	0.01
128.40	0.00	72.00	0.166	0.01
129.60	0.00	72.00	0.166	0.01
130.80	0.00	72.00	0.166	0.01
132.00	0.00	72.00	0.166	0.01
133.20	0.00	72.00	0.166	0.01

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
134.40	0.00	72.00	0.166	0.01
135.60	0.00	72.00	0.166	0.01
136.80	0.00	72.00	0.166	0.01
138.00	0.00	72.00	0.166	0.01
139.20	0.00	72.00	0.166	0.01
140.40	0.00	72.00	0.166	0.01
141.60	0.00	72.00	0.166	0.01
142.80	0.00	72.00	0.166	0.01
144.00	0.00	72.00	0.166	0.01
145.20	0.00	72.00	0.166	0.01
146.40	0.00	71.00	0.066	0.01
147.60	0.00	70.98	0.065	0.01
148.80	0.00	70.97	0.064	0.01
150.00	0.00	70.96	0.063	0.01
151.20	0.00	70.94	0.063	0.01
152.40	0.00	70.93	0.062	0.01
153.60	0.00	70.91	0.061	0.01
154.80	0.00	70.90	0.060	0.01
156.00	0.00	70.89	0.059	0.01
157.20	0.00	70.87	0.058	0.01
158.40	0.00	70.86	0.057	0.01
159.60	0.00	70.85	0.056	0.01
160.80	0.00	70.84	0.055	0.01
162.00	0.00	70.82	0.055	0.01
163.20	0.00	70.81	0.054	0.01
164.40	0.00	70.80	0.053	0.01
165.60	0.00	70.79	0.052	0.01
166.80	0.00	70.78	0.051	0.01
168.00	0.00	70.76	0.051	0.01
169.20	0.00	70.75	0.050	0.01
170.40	0.00	70.74	0.049	0.01
171.60	0.00	70.73	0.048	0.01
172.80	0.00	70.72	0.048	0.01
174.00	0.00	70.71	0.047	0.01
175.20	0.00	70.70	0.046	0.01
176.40	0.00	70.69	0.046	0.01
177.60	0.00	70.68	0.045	0.01
178.80	0.00	70.67	0.044	0.01
180.00	0.00	70.66	0.044	0.01
181.20	0.00	70.65	0.043	0.01
182.40	0.00	70.64	0.042	0.01
183.60	0.00	70.63	0.042	0.01
184.80	0.00	70.62	0.041	0.01
186.00	0.00	70.61	0.041	0.01
187.20	0.00	70.60	0.040	0.01
188.40	0.00	70.59	0.039	0.01
189.60	0.00	70.58	0.039	0.01
190.80	0.00	70.57	0.038	0.01
192.00	0.00	70.57	0.038	0.01

AHYMO				
193.20	0.00	70.56	0.037	0.01
194.40	0.00	70.55	0.037	0.01
195.60	0.00	70.54	0.036	0.01
196.80	0.00	70.53	0.035	0.01
198.00	0.00	70.53	0.035	0.01
199.20	0.00	70.52	0.034	0.01

PEAK DISCHARGE = 16.124 CFS - PEAK OCCURS AT HOUR 1.70
 MAXIMUM WATER SURFACE ELEVATION = 74.449 <75.0, therefore OK
 MAXIMUM STORAGE = 0.5798 AC-FT INCREMENTAL TIME= 0.050000HRS

*

PRINT HYD ID=55 CODE=1

PARTIAL HYDROGRAPH 200.10

RUNOFF VOLUME = 2.01798 INCHES = 1.3733 ACRE-Feet
 PEAK DISCHARGE RATE = 16.12 CFS AT 1.700 HOURS BASIN AREA = 0.0128 SQ. MI.

*

*

ADD HYD ID=56 HYD NO=100.22 ID=55 ID=5

PRINT HYD ID=56 CODE=1

PARTIAL HYDROGRAPH 100.22

RUNOFF VOLUME = 2.05879 INCHES = 1.5614 ACRE-Feet
 PEAK DISCHARGE RATE = 18.42 CFS AT 1.650 HOURS BASIN AREA = 0.0142 SQ. MI.

*

*

ADD HYD ID=57 HYD NO=100.23 ID=56 ID=6

PRINT HYD ID=57 CODE=1

PARTIAL HYDROGRAPH 100.23

RUNOFF VOLUME = 2.06499 INCHES = 1.6443 ACRE-Feet
 PEAK DISCHARGE RATE = 19.91 CFS AT 1.600 HOURS BASIN AREA = 0.0149 SQ. MI.

*

*

FINISH

AHYMO

NORMAL PROGRAM FINISH

END TIME (HR:MIN:SEC) = 10:52:52

APPENDIX B- REFERENCE REPORT
DRAINAGE INFORMATION SHEET

PROJECT TITLE: HERITAGE PLAZA S/D ZONE ATLAS/DRNG. FILE #: H-9-0-1B

LEGAL DESCRIPTION: TR. 1, EL RANCHO ATRISCO, PHASE III

CITY ADDRESS: DNA

ENGINEERING FIRM: ISAACSON & ARFMAN CONTACT: FRED ARFMAN

ADDRESS: 128 MONROE ST. PHONE: 268-8828

OWNER: WESTLAND DEV. CO. CONTACT: RON BOHANNAN

ADDRESS: 401 N. COORS PHONE: 831-9600

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: RON FORSTBAUER CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: DNA CONTACT: _____

ADDRESS: _____ PHONE: _____

PRE-DESIGN MEETING:

☒ YES
☒ NO
☒ PREVIOUSLY
COPY OF CONFERENCE RECAP
SHEET PROVIDED

DRB NO. 85-196

EPC NO. _____

PROJECT NO. _____

TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT

_____ DRAINAGE PLAN

☒ REVISED
CONCEPTUAL GRADING & DRAIN. PLAN

_____ GRADING PLAN

_____ EROSION CONTROL PLAN

_____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAT APPROVAL

_____ PRELIMINARY PLAT APPROVAL

_____ SITE DEVELOPMENT PLAN APPROVAL

☒ FINAL PLAT APPROVAL

_____ BUILDING PERMIT APPROVAL

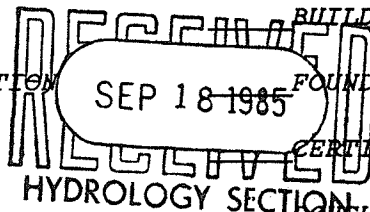
_____ FOUNDATION PERMIT APPROVAL

_____ CERTIFICATE OF OCCUPANCY APPROVAL

_____ ROUGH GRADING PERMIT APPROVAL

DATE SUBMITTED: 9-18-85 _____ GRADING/PAVING PERMIT APPROVAL

BY: Fred C. Arfman OTHER _____ (SPECIFY)





City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

October 18, 1985

Mr. Fred Arfman
Isaacson & Arfman, PA
128 Monroe Street NE
Albuquerque, NM 87108

REF: CONCEPTUAL DRAINAGE PLAN FOR TRACT 1 EL RANCHO ATRISCO PHASE III
(H9-D1B) RECEIVED SEPTEMBER 18, 1985

Dear Mr. Arfman:

I have reviewed the above referenced submittal and it is in compliance with the comments that you previously received regarding this development. Consequently, the above referenced plan, dated 9/16/85 is approved in concept whereby, allowing Site Development Plan sign-off and the granting of Preliminary Plat approval by DRB. For Preliminary Plat approval the DRB will also need to approve the required infrastructure listing.

Prior to any further approvals or sign-offs, i.e. final plat, building permits or work order plans, a comprehensive detailed Drainage Report will be required for review and approval.

Should you have any questions or comments, please call this office at 766-7644.

Cordially,

for Billy J. Goolsby, PE
Civil Engineer/Hydrology

BJG:mrk

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

CONCEPTUAL DRAINAGE PLANHERITAGE PLAZA

THE STUDY SITE IS BOUNDED BY UNSER BLVD., HANOVER RD., HERITAGE BLVD. AND LADERA DR. CONTAINING APPROXIMATELY 23.34 ACRES. THE SITE IS PRESENTLY UNDEVELOPED AND SLOPES FROM NORTHWEST TO SOUTHEAST WITH AN AVERAGE SLOPE OF 2 PERCENT. FLOWS FROM THE SITE DISCHARGE TO HANOVER RD. AND HERITAGE BLVD. (PRESENTLY UNDER DESIGN BY ISAACSON & ARFMAN CONSULTING ENGINEERING ASSOCIATES).

OFF-SITE FLOWS HAVE NO IMPACT ON THE PROPOSED SITE DUE TO EXISTING ELEVATIONS.

THE PROPOSED DEVELOPMENT IS BEING PLANNED CONCURRENT WITH HERITAGE BLVD. AND HANOVER RD. IMPROVEMENTS. THE EXISTING STORM DRAIN IN HANOVER RD. HAS BEEN DESIGNED FOR THE INJECTION OF 50 CFS OF STORM RUNOFF FROM THE SITE AS SHOWN ON THE PLAN. THIS INFORMATION IS PROVIDED IN SAD #212. A NEW STORM DRAIN WILL BE EXTENDED NORTH ALONG HERITAGE BLVD. TO INTERCEPT THE REMAINING SITE FLOWS. ALL SITE FLOWS ARE THEN TRANSPORTED TO AN EXISTING DETENTION POND LOCATED SOUTHEAST OF THE LAURELWOOD DEVELOPMENT. CAPACITIES OF ALL DOWNSTREAM FACILITIES ARE BEING INVESTIGATED BY ISAACSON & ARFMAN, CONSULTING ENGINEERING ASSOCIATES. PONDING WILL BE PROVIDED IN BASINS THREE, FIVE, AND SIX AS REQUIRED TO MATCH DOWNSTREAM CAPACITIES, HOWEVER, IT IS NOT NOW ANTICIPATED THAT PONDING WILL BE REQUIRED.

CALCULATIONS:

SOIL SERIES: PAC, BCC: HYDROLOGIC SOIL GROUP = B

AREA = 23.34 ACRES

L = 1550 FT.

S = $(85-50)/1550 = 0.0226$

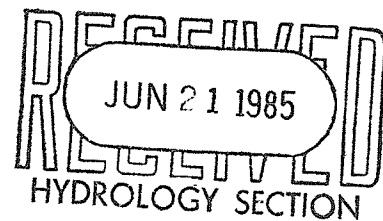
$T_c = 0.0078(1550)^{.77} / (.0226)^{.385} = 9.60 \text{ MIN.}$

USE $T_c = 10 \text{ MIN.}$

I = 2.2 IN./HR. PLATE 22.2 D-2

RAINFALL = 2.2 IN. PLATE 22.2 D-1

i = $(2.2)(2.2) = 4.84 \text{ IN./HR.}$



EXISTING ON-SITE CONDITIONS:

PERCENT IMPERVIOUS = 0%

C = 0.34 PLATE 22.2 C-1

 $Q(100) = (0.34)(4.84)(23.34) = 38.41 \text{ CFS}$ $Q(10) = (0.657)(38.41) = 25.23 \text{ CFS}$

CN = 70 PLATE 22.2 C-2

DIRECT RUNOFF = 0.35 IN. PLATE 22.2 C-4

 $V(100) = (0.35)(23.34)(43560)/12 = 29653 \text{ CU. FT.}$ $V(10) = (0.657)(29653) = 19482 \text{ CU. FT.}$ PROPOSED ON-SITE CONDITIONS:

PERCENT IMPERVIOUS = 83%

C = 0.79 PLATE 22.2 C-1

 $Q(100) = (0.79)(4.84)(23.34) = 89.24 \text{ CFS}$ $Q(10) = (0.657)(89.24) = 58.63 \text{ CFS}$

CN = 92 PLATE 22.2 C-2

DIRECT RUNOFF = 1.4 IN. PLATE 22.2 C-4

 $V(100) = (1.4)(23.34)(43560)/12 = 118614 \text{ CU. FT.}$ $V(10) = (0.657)(118614) = 77929 \text{ CU. FT.}$ CAPACITY OF HANOVER ROAD:

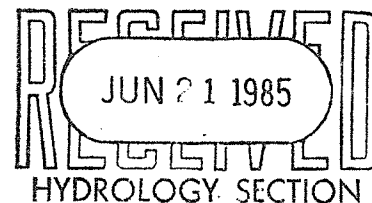
40' STREET

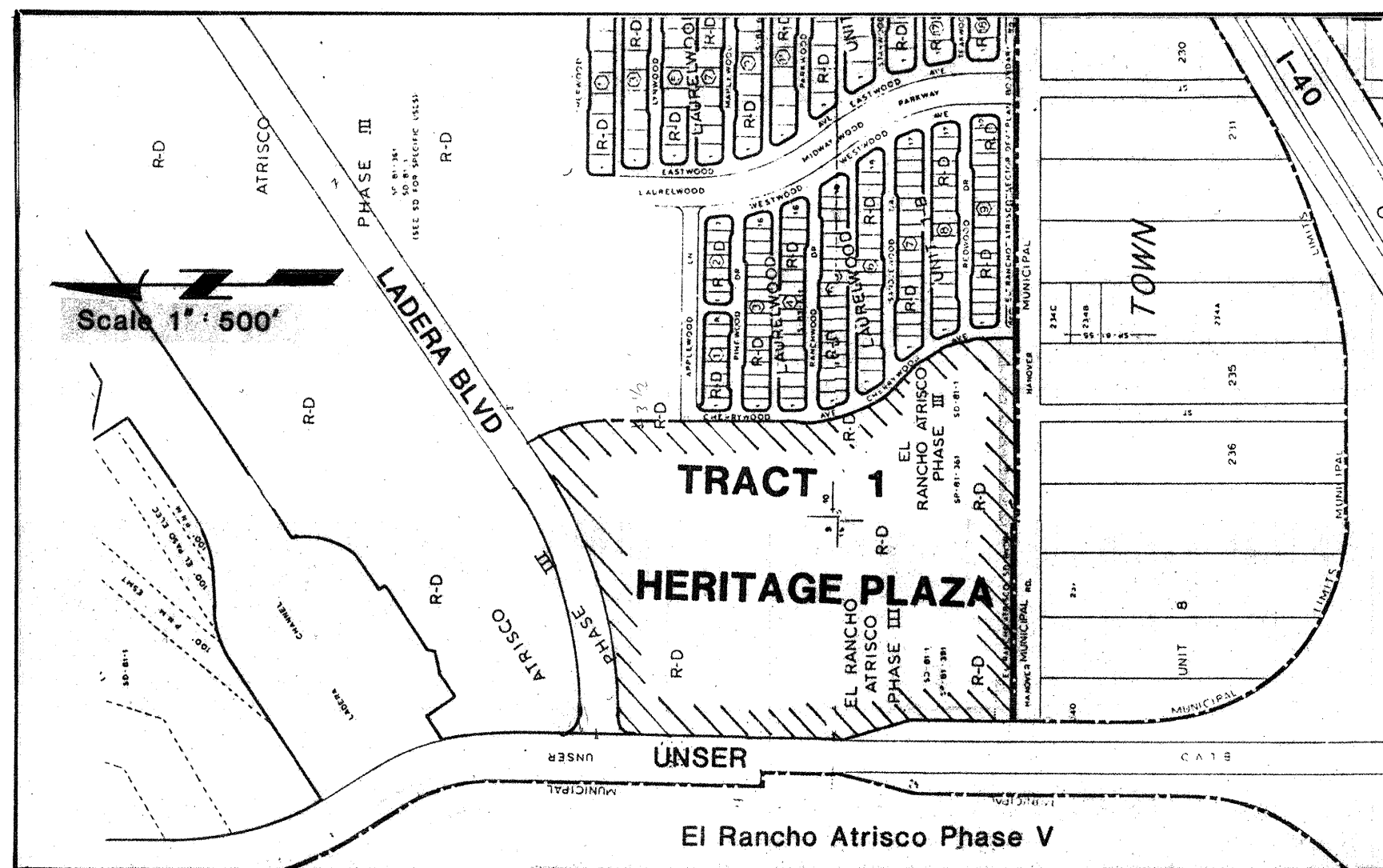
S = 0.025

 $Q(100) = (90)(2) = 180 \text{ CFS}$ $Q(10) = (22)(2) = 44 \text{ CFS}$ CAPACITY OF HERITAGE BLVD.:

70' STREET

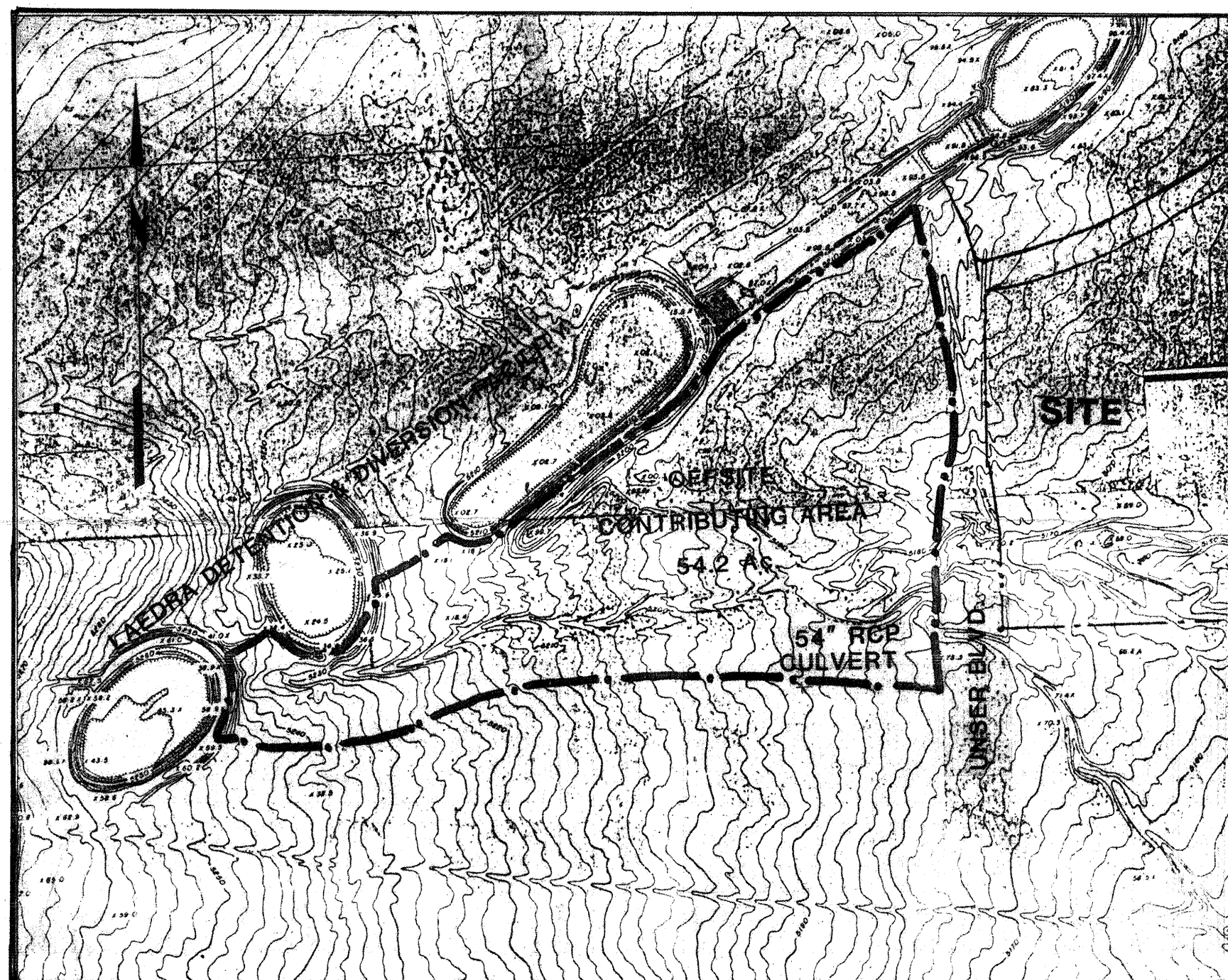
S = 0.015

 $Q(100) = (93)(2) = 186 \text{ CFS}$ $Q(10) = (16.5)(2) = 33 \text{ CFS}$ 

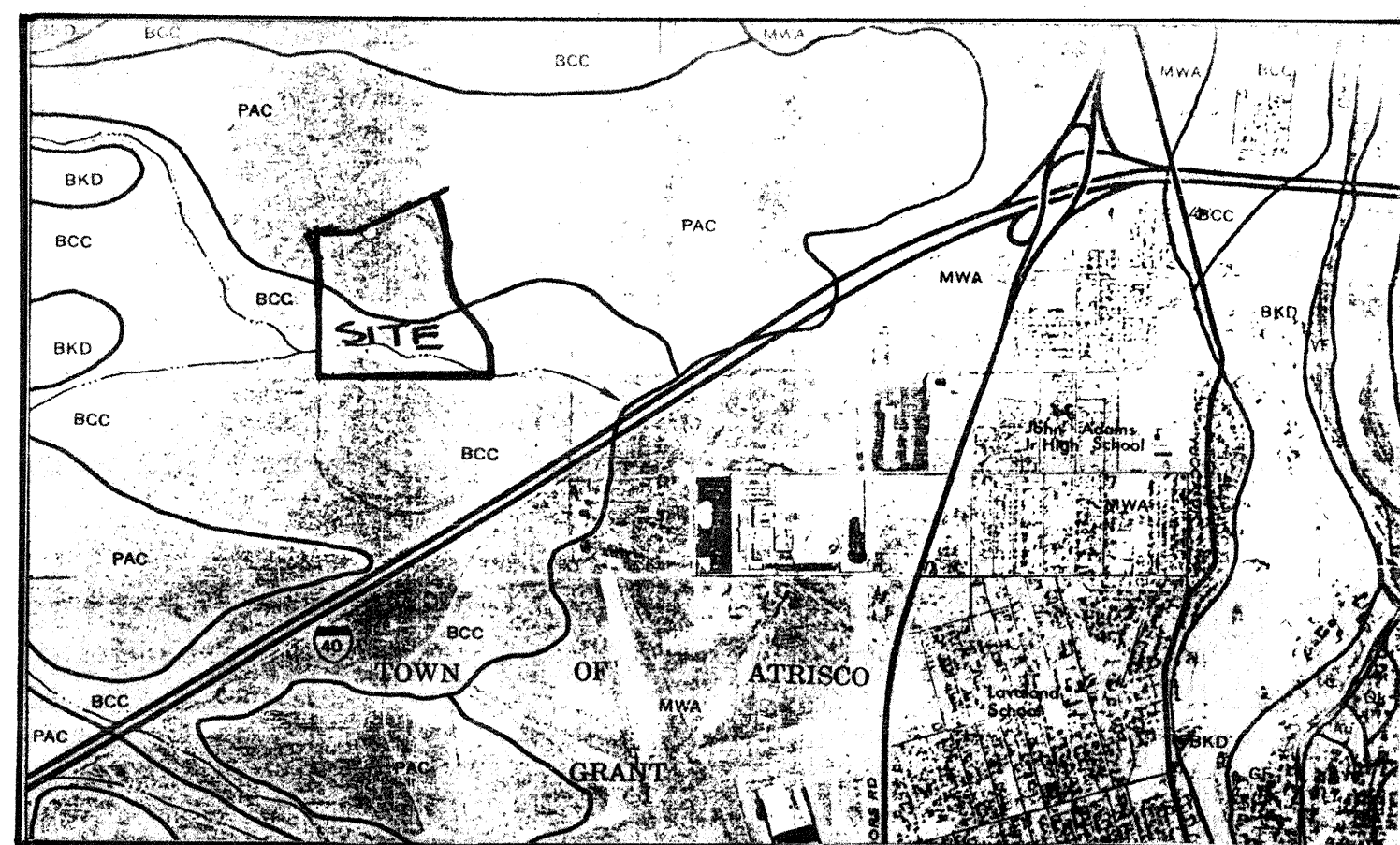


VICINITY MAP

MAP NOS. H-9, H-10, J-9, J-10



SURROUNDING & CONTRIBUTING AREAS



SOILS MAP

LEGAL DESCRIPTION

TRACT 1 OF EL RANCHO ATRISCO, PHASE III AS FOUND IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO IN BOOK C-19, PAGE 143-1 AND RECORDED ON MAY 17, 1982 AND CONTAINING 35.9707 ACRES.

FLOOD HAZARD

THIS SITE IS NOT AFFECTED BY ANY EXISTING FLOOD PLAINS OR FLOODWAY AS DEFINED ON PLATE 26 AND 27 OF THE CITY ACCEPTED FLOOD HAZARD MAPS PREPARED BY FEMA IN OCTOBER OF 1983.

SOILS

SUBJECT SITE CONSIST OF A PAJARITO SERIES (PAC) SOIL ON THE NORTH HALF AND A BLUEPOINT SERIES (BCC) SOIL IN THE SOUTHERLY HALF. THE PAJARITO IS IN THE HYDROLOGICAL SOIL GROUP "A" WHILE THIS BLUEPOINT IS IN GROUP "B".

OFFSITE DRAINAGE

AREA = 54.2 ACRES
L = 2600'
S = 0.02541/1
Tc = 21 MIN
I = (1.45) (2.2) = 3.19
'C'(UND) = 0.37
'C'(DEV) = 0.70

UNDEVELOPED
 $Q_{100} = (0.37) (3.19) (54.2) = 64$ CFS
COMPARES WITH 61 CFS FROM SAD 212 STUDY
 $Q_{10} = (0.657) (64) = 42$ CFS

DEVELOPED (Tc = 30 MIN.)
 $Q_{100} = (0.70) (2.68) (54.2) = 102$ CFS - DISCHARGE IS CONTROLLED BY THE ENTRANCE TO THE 54" CULVERT AND THE REDUCTION TO A 36" RCP TO THE EAST OF UNSER. THE SAD 212 PLAN CALLED FOR 80 CFS ACCEPTANCE ON THE EAST R.O.W. OF UNSER BOULEVARD.
 $Q_{10} = (102) (0.657) = 67$ CFS

ALL OTHER OFFSITE FLOWS ARE DEFLECTED BY EITHER UNSER OR LADERA BOULEVARDS.

EXISTING CONDITIONS

NORTH - LADERA BOULEVARD IMPROVED AS A FOUR LANE DIVIDE ROAD WITHIN A 106' RIGHT-OF-WAY. NO STORM WATER FLOWS FROM LADERA BOULEVARD ENTER ONTO THE SITE.

EAST - LAURELWOOD SUBDIVISION BORDERS ON THE ENTIRE EASTERLY BOUNDARY. THE SOUTHEASTERLY PORTION (SOUTH OF APPLEWOOD) HAS IMPROVED PUBLIC STREETS, UTILITIES AND STORM DRAINS. THIS OFFSITE AREA IS DOWN GRADE FROM THE SUBJECT SITE, THEREFORE IT DOES NOT CONTRIBUTE STORM WATERS TO TRACT 1 B OR 1 C.

SOUTHBOUND LANE FLOW CHARACTERISTICS
UNCONTROLLED DISCHARGE FROM
CONTRIBUTING AREAS

10 YR. EVENT ANALYSIS		1/2 ST. FLOW CARRYING CHARACTERISTICS						STORM DRAIN		
PT.	STREET GRADE	Q(CFS)	V(FPS)	D(FT)	QD=0.5'	QD=0.67'	DIA.	SLOPE %	Q(CFS)	
1	1.0 %	1.6	1.9	0.27	13.5	36	N/A	N/A	N/A	
2	1.6 %	32	4.6	0.58	17.0	36	"	"	"	
3	"	41	5.2	0.65	"	"	"	"	"	
4	"	19	4.0	0.52	"	"	24"	1.7	29.6	
5	"	3	2.6	0.29	"	"	30"	1.24	45.6	
6	"	0	0	0	"	"	42"	1.24	45.6	
ALL FLOWS ACCEPTED BY 42" DIA. STORM DRAIN										
100 YEAR EVENT		1/2 ST. FLOW CARRYING CHARACTERISTICS						STORM DRAIN		
PT.	STREET GRADE	Q(CFS)	V(FPS)	D(FT)	QD=0.5'	QD=0.67'	DIA.	SLOPE %	Q(CFS)	
1	1.0 %	2.4	2.4	0.36			N/A	N/A	N/A	
2	1.6 %	47.4	5.5	0.68			"	"	"	
3	"	61	5.7	0.75			"	"	"	
4	"	39	5.1	0.64			24"	2.14	33.1	
5	"	19	3.8	0.49			36"	0.63	53.0	
6	"	0	0	0			42"	1.24	45.6	
ALL FLOWS (79 CFS) ACCEPTED BY 42" DIA. STORM DRAIN										

EXISTING CONDITIONS (CONTINUED)

EAST - LOCATED IN CHERRYWOOD LANE, WHICH BORDERS THE SITE, IS A BATTERY OF FOUR CATCH BASINS WHICH TIE INTO THE AREA'S MAJOR STORM DRAIN. THESE CATCH BASINS WOULD ACCEPT THE UNDEVELOPED FLOWS FROM THE WESTERLY AREAS DUE TO THEIR PROXIMITY TO THE PRIMARY STORM WATER ROUTE THROUGH THE SUBJECT SITE. AFTER THE DEVELOPMENT OF TRACT 1, THESE BASINS SHALL STILL BE USEFUL BY ACCEPTING THOSE STORM WATERS GENERATED BY A PORTION OF BOTH TRACTS 1B & 1C.

SOUTH - HANOVER ROAD BORDERS ALONG THE SOUTH PROPERTY LINE. THIS ROAD IS NOT ANNEXED INTO THE CITY AND DOES NOT CONTRIBUTE STORM WATER TO THE SUBJECT SITE. ADJACENT AND OFFSITE 25 FEET FROM THE PROPOSED NORTHERLY RIGHT-OF-WAY LINE OF HANOVER ROAD IS A CITY STORM DRAIN CENTERED WITHIN A 30' EASEMENT. THIS STORM DRAIN WAS CONSTRUCTED UNDER S.A.D. 212 AND CONVEYS STORM WATERS FROM THOSE AREAS WEST OF UNSER BOULEVARD TO THE PUBLIC PARK AND DETENTION POND AT THE NORTHWEST QUADRANT OF 72ND STREET AND HANOVER ROAD. THE STORM DRAIN SIZES, MANHOLE LOCATIONS AND DESIGNED FLOW RATES ARE ALL SHOWN ON THE SITE EXHIBIT (SHEET 2 OF 2). THIS STORM DRAIN WAS DESIGNED TO PROVIDE THE STORM WATER RELIEF FOR THE ENTIRE DEVELOPED TRACT AND SHALL BE USED TO ITS FULL POTENTIAL IN HANDLING THE DEVELOPED STORM WATERS.

WEST - UNSER BOULEVARD DEFLECTS ALL OFFSITE STORM WATERS WHICH HISTORICALLY CONTRIBUTED TO THE SITE. THESE FLOWS ARE DIRECTED TO THE 54" DIA. R.C.P. CULVERT WHICH ALIGNS WITH THE PUBLIC STORM DRAIN PARALLELING THE NORTH R.O.W. LINE OF HANOVER RD. UNSER BLVD'S STORM WATERS DO NOT ENTER ONTO THE SUBJECT SITE.

PROPOSED CONDITIONS

THE SECTOR DEVELOPMENT PLAN FOR EL RANCHO ATRISCO, PHASE III HAS THE FOLLOWING LAND USE DESIGNATIONS FOR THE THREE TRACTS:

TRACT 1A-OFFICE/COMMERCIAL MIX TRACT 1B - MULTI-FAMILY
TRACT 1C - MULTI-FAMILY

TRACT 1A HAS BEEN MASTERPLANNED AND SUBMITTED TO THE CITY (EPC). THE POINTS OF RELEASE OF STORM WATER HAVE BEEN IDENTIFIED ON THE SITE'S EXHIBIT ALONG WITH THEIR CORRESPONDING DISCHARGE RATES. THESE FLOWS MUST BE CONVEYED BY HERITAGE BLVD. AND COLLECTED BY CATCH BASINS WHERE THEY WOULD BE ALLOWED TO ENTER INTO THE PREVIOUSLY MENTIONED STORM DRAIN.

A MAJORITY OF THE STORM WATER RUNOFF FROM TRACTS 1B AND 1C CANNOT BE RELEASED INTO HERITAGE BLVD. THEY MUST DISCHARGE TO THE EAST AND ENTER ONTO CHERRYWOOD LANE AT A RELEASE RATE COMPATIBLE WITH THE EXISTING AND PROPOSED IMPROVEMENTS. HERITAGE BLVD. SHALL BE CONSTRUCTED AS A MINOR ARTERIAL (86' R.O.W. AND A 66 FOOT FACE TO FACE DIMENSIONING). A PUBLIC STORM DRAIN SHALL BE CONSTRUCTED WITHIN ITS RIGHT-OF-WAY TO COLLECT ALL SURFACE FLOWS. THE FOLLOWING TABLE IS PROVIDED TO SHOW THE STORM WATER CONVEYANCE CHARACTERISTICS OF HERITAGE BLVD. AND ITS RELATED STORM DRAIN. ALL FLOW RATES AND POINTS OF ACCEPTANCE ARE FROM THE CONCEPTUAL DRAINAGE PLAN PREPARED BY CHAVEZ-GREIVES & ASSOCIATES AS PART OF THE EPC SUBMITTAL PACKAGE OF MAY 30, 1985. THE ADDITION OF A CONTROLLED DISCHARGE RATE FOR BASINS NO. 5&6 HAS BEEN INCORPORATED TO BRING THE TOTAL FLOW RATE FOR THE SITE INTO AN ACCEPTABLE AND WORKING RANGE SUCH THAT THE PLANNED CARRYING CAPACITY OF THE 42" DIA. STORM DRAIN IS NOT OVERTAXED.

NOTES

- ALL STREET CAPACITY VALUES WERE DERIVED FROM THE DPM, PLATE 22.3 D-3.
- CATCH BASIN CAPACITIES WERE DERIVED FROM THE DPM, PLATE 22.3 D-5 & D-7.
- STORM DRAIN DIAMETERS WERE DERIVED FROM THE DPM, PLATE 22.3 B-5, "FACTORS FOR CLOSED CONDUITS FLOWING FULL.

10 YR. EVENT ANALYSIS		1/2 ST. FLOW CARRYING CHARACTERISTICS						STORM DRAIN		
PT.	STREET GRADE	Q(CFS)	V(FPS)	D(FT)	QMAX @ 0.5'	QD=0.67'	DIA.	SLOPE %	Q(CFS)	
1	1.0 %	1.6	1.9	0.27	13.5	36	N/A	N/A	N/A	
2	1.6 %	21.6	4.1	0.52	17.0	46	"	"	"	
3	"	31	3.8	0.60	"	"	"	"	"	
4	"	12	3.5	0.42	"	"	24"	1.0	29.1	
5	"	12	3.5	0.42	"	"	24"	1.4	29.1	
6	"	0	0	0	"	"	MAIN STORM DRAIN LINE			
100 YEAR EVENT		1/2 ST. FLOW CARRYING CHARACTERISTICS						STORM DRAIN		
PT.	STREET GRADE	Q(CFS)	V(FPS)	D(FT)	QMAX @ 0.5'	QD=0.67'	DIA.	SLOPE %	Q(CFS)	
1	1.0 %	2.4	2.4	0.36			N/A	N/A	N/A	
2	1.6 %	24.4	4.3	0.55			"	"	"	
3	"	38.4	5.0	0.63			"	"	"	
4	"	17.0	3.9	0.51			24"	2.54	36.0	
5	"	19	3.8	0.49			36"	0.63	53.0	
6	"	0	0	0			MAIN STORM DRAIN LINE			

61 CFS INJECTED INTO 42" STORM DRAIN AT JUNCTION MH

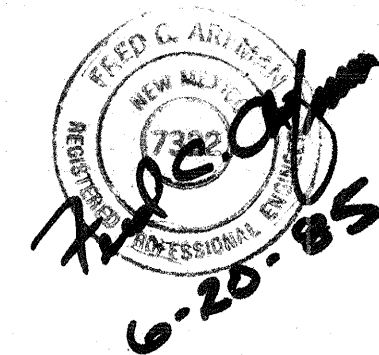
CONCEPTUAL DRAINAGE PLAN

FOR

TRACT 1, EL RANCHO ATRISCO, PHASE III

LANDS OF

WESTLAND DEVELOPMENT CO., INC.

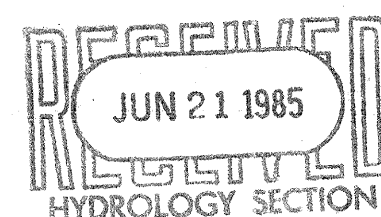


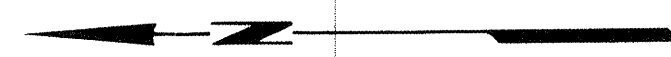
Isaacson & Arfman, P.A.
CONSULTING ENGINEERING ASSOCIATES
Albuquerque, New Mexico

EL RANCHO ATRISCO, PHASE III

CONCEPTUAL DRAINAGE PLAN

Sheet
1
of
2





SCALE: 1" = 60'

LAURELWOOD SUBDIVISION
(UNDEVELOPED)

LAURELWOOD SUBDIVISION
(DEVELOPED PUBLIC IMPROVEMENTS)

$\Delta = 33^\circ 53' 33''$
 $R = 542.51'$
 $L = 320.91'$

TRACT 1B
SU FOR MULTI-FAMILY
BASIN NO. 7
2.66 AC.

TRACT 1C
SU FOR MULTI-FAMILY

BASIN NO. 8
5.76 AC.

BASIN NO. 2
2.1 AC.

TRACT 1A
1.3 AC.

BASIN NO. 6
8.04 AC.

BASIN NO. 4
4.0 AC.

BASIN NO. 5
3.4 AC.

BASIN NO. 3
3.5 AC.

BASIN NO. 1
1.7 AC.

LEGEND

- FLOW DIRECTIONAL ARROW
- CONSTRUCTION WORK NOT PART OF THIS PLAN
- ANALYSIS POINT NO.
- FINISH FLOOR ELEVATION
- EXISTING IMPROVEMENTS
- EXISTING CONTOURS
- DRAINAGE BASIN BOUNDARY

$\Delta = 87^\circ 13' 04''$
 $R = 25.00'$
 $L = 38.06'$

UNSER BLVD.

Date
G-85
Designed
FEA
Checked
PTP

Isaacson & Arfman, P.A.
CONSULTING ENGINEERING ASSOCIATES
New Mexico
Albuquerque, NM

EL RANCHO ATRISCO PHASE III
TRACT 1

CONCEPTUAL DRAINAGE PLAN
(FOR INFORMATION ONLY)

Sheet
11
HYDROLOGY SECTION