DRAINAGE REPORT
FOR
TRACT 24 AT VENTANA RANCH

MARCH 30, 2001

Prepared for:

LAS VENTANAS LIMITED PARTNERSHIP
#10 TRAMWAY LOOP NE
ALBUQUERQUE, NM 87122

Prepared by:

BOHANNAN HUSTON, INC.
COURTYARD I
7500 JEFFERSON STREET NE
ALBUQUERQUE, NM 87109

PREPARED BY:

Robert Lackey, E.I. — Date 3/30/2001

UNDER THE SUPERVISION OF:

Kevin Patton, P.E. — Date 3/30/01

KEVIN G. PATTON
NEW MEXICO
13685
REGISTERED PROFESSIONAL ENGINEER

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APPENDICES

EXHIBITS

I. PURPOSE

The purpose of this report is to present the drainage management plan for Tract 24 at Ventana Ranch and to obtain approval of the preliminary/final plat and grading plan by the Development Review Board (DRB). The proposed development of Tract 24 consists of 120 single family detached residential lots on approximately 20.72 acres.

This report will reference the following City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) approved studies prepared for the Ventana Ranch Subdivision development: 1) the *Las Ventanas Subdivision Drainage Master Plan*, dated April 1995 and 2) the *Final Addendum No. 4 For The Design Analysis Report For Ventana Ranch Subdivision Drainage Facilities*, dated July 2000.

The *Las Ventanas Subdivision Drainage Master Plan*, dated April 1995 (hereafter referred to as the LVSDMP), was prepared to summarize the findings of a hydrologic analysis of existing and developed drainage conditions for the proposed Las Ventanas Subdivision and formulates a drainage master plan for the development of the property. The report is intended to evaluate drainage in Las Ventanas Subdivision based on the Piedras Marcadas Hydrologic model prepared by Molzen-Corbin & Associates in 1993, to provide a conceptual plan for drainage in order to determine drainage facilities sizes and total costs. In addition, it provides drainage outfall alternatives for the Las Ventanas Subdivision.

The Final Addendum No. 4 For the Design Analysis Report For Ventana Ranch Subdivision Drainage Facilities, dated July 2000, was prepared to re-evaluate the hydrology and hydraulics for drainage outfall options for tracts in the north central portion of Ventana Ranch, a subdivision in the northwest Albuquerque. In addition, this report is to confirm that the proposed changes in the subdivision and the resulting changes in the hydrology do not change the storm drain hydraulics for the North Outfall or the West Branch Calabacillas Strom Drain diversion, as presented in Addendum No. 3. Addendum No. 3 was approved by the City of Albuquerque and by AMAFCA. Using the revised hydrology, the hydraulics for the North Outfall and the West Branch Calabacillas Strom Drain Diversion were checked to assure adequate capacity for the revised flow rates.

II. METHODOLOGIES

Please refer to the above referenced reports for the specific methodologies used in preparing those individual reports or plans.

Site conditions will be analyzed for a 10-year and 100-year, 6-hour storm event in accordance with the City of Albuquerque Drainage Ordinance and the Development Process Manual (DPM) Volume 2, Design Criteria, Section 22.2, Hydrology, for the City of Albuquerque, January 1993.

The site, as described in the 'Site Location and Characteristics' section below, is approximately 20.72 acres. Therefore, Part A of the DPM, Section 22.2, which provides a simplified procedure for projects with sub-basins smaller than 40 acres was used.

The existing approved drainage report referenced in the preparation of this plan is the "Las Ventanas Subdivision Drainage Master Plan" (LVSDMP) prepared by Bohannan Huston (originally dated April 1995 and updated October 1995). Additional information was provided in "The Final Addendum No. 4 For The Design Analysis Report for Ventana Ranch Subdivision Drainage Facilities" prepared by Bohannan Huston dated December 1997. This report identifies downstream drainage improvements and confirms that the storm drain hydraulics for the North Outfall or the West Branch Calabacillas Storm Drain Diversion Channel presented in Addendum 3, have not been changed. The developed flows from this tract will ultimately drain into the West Branch Calabacillas Storm Drain Diversion Channel.

III. SITE LOCATION AND CHARACTERISTICS

Ventana Ranch is a 940-acre development located west of Paradise Hills between Paseo del Norte and Irving Boulevards. Tract 24 is located in the north central quadrant of the Ventana Ranch Master Plan. Tract X-1-A-1-A-1 bound the proposed subdivision to the north (also known as Tract 29B-1), northeast (also known as Tract 29A-2) and the east (also known as Tract 29A-1), Bradford Hills Subdivision to the south, Terrazas Subdivision to the southwest, and Tract 23 to the northwest. The site will be accessible from Las Ventanas Road.

IV. EXISTING HYDRAULIC AND HYDROLOGIC CONDITIONS

In its existing condition, the site consists of undulating terrain with slopes from 5% to less than 1%. The proposed subdivision is located within existing Basin 503S, see Exhibit 3 for Existing Basin Map. Existing drainage patterns direct the runoff to the east. Basin 503S receives flow from Basin 502, which is directly west of Basin 503S. There are no recognized FEMA Floodplains within the proposed development.

V. PROPOSED HYDRAULIC AND HYDROLOGIC CONDITIONS

For additional assistance throughout this portion of the report, please refer to the Grading and Drainage Plan and the Proposed Conditions Basin Map enclosed in the Exhibit section of this report.

Discharge generated by Tract 24 will flow through the proposed internal streets to two major collection points; the low point at the cul-de-sac terminus in Terrazas Court and into a temporary detention pond at the end of Street I. This report conform to the approved Final Addendum No. 4 For the Design Analysis Report For Ventana Ranch Subdivision Drainage Facilities, dated July 2000. A copy of Addendum No. 4 is provided in the appendix of this report.

A. On-Site Basins

The proposed site is broken into five (5) major on-site basins. Three of the five major on-site basins, basins 3, 4, and 5, have each been divided into two (2) smaller sub-basins for analysis reasons. Major basins are described below. For sub-basin data, see Appendix A at the back of this report.

Runoff from Basins 1, 2 and 3 will drain to inlets at the low point at the end of the cul-de-sac in Terrazas Court.

Basin 1 (1.80ac, Q_{100}=5.9cfs) encompasses the entire length of Street M and consists of ten (10) lots, #1-4 and #30-35. The runoff from basin 1 will be directed from Street M into Terrazas Court and combined with Basin 3.

Basin 2 (1.99ac, Q_{100}=6.3cfs) encompasses the entire length of Street G and nine lots, #21-29. Runoff will flow into sub-basin 3-1 and be collected by the inlet at the end of the cul-de-sac. Runoff from basin 2 will be directed into Terrazas Court from Street M and combined with the runoff from basins 1 and 3.

Basin 3 encompasses the entire length of Terrazas Court and lots 36- 58. Basin 3 accepts runoff from basins 1 and 2 and has been divided into two sub-basins; 3-1 and 3-2 in order to properly analyze the roadway hydraulics.

Sub-Basin 3-1(1.89ac, Q_{100}=5.9cfs) is right of the centerline of Terrazas Street and includes the intersections of Street M (Basin 1), Street G (Basin 2) and nine (9) lots, #50 - 58.

Sub-Basin 3-2 (2.60ac, Q_{100}=8.5cfs) is left of the centerline of Terrazas Street and fourteen (14) lots, # 36-49. The combined flow from basin 1, basin 2, and basin 3 result in a net flow Q_{100}= 35.4cfs. Approximately 18.8 cfs of the net flow will be collected by two double grates type "A" inlets. The two inlets will be placed on either side of Terrazas (between lots 46 and 47 which are left of the centerline, and between lots 54 and 55 which are right of the centerline of Terrazas Court) upstream of the cul-de-sac. An additional Double Grate Type "A" inlet (with wing openings on each side of the grate) will be place at the low point at the end of the cul-de-sac to collect the residual flow (16.6 cfs) from the upstream inlets. The inlet located at the end of the cul-de-sac can accommodate 2 x 100

year 6 hour storm event with the public right-of-way. Please refer to Appendix C at the end of this report for a diagram of inlet placement on Terrazas Court.

Basin 4 consists of two sub-basins, 4-1 and 4-2. Sub-basin 4-1(4.45ac, Q_{100}=114.9cfs) is right of the centerline of Street F and twenty-nine (29) lots, # 5-17, and #105-120. All of the flow in this sub-basin will combine with the flow into Street I of sub-basin 5-1 at the intersection of Street I and Street F. Sub-basin 4-2(2.72ac, Q_{100}=8.7cfs) is left of the centerline of Street F and consists of fourteen (14) lots, #18 and #91-104. A small portion of the runoff within this sub-basin will combine with the runoff from basins 1 and 2 at the intersections of Street M and Street G. The remaining runoff will combine with sub-basin 5-1 at the intersection of Street F and Street I.

Basin 5 has also been divided into two sub-basins, 5-1 and 5-2. The centerline of Street I serve as the boundary between the two sub-basins. Sub-basin 5-1(1.99ac, Q_{100}=6.5cfs) is right of the centerline of Street I and consist of eleven (11) lots, #50-58. Additional runoff from basin 2 and sub-basin 4-2 will combine with the flow in sub-basin 5-1 at the intersection of Street G and Street I. Additional runoff will combine with the flow from Street F at the intersection of Street I and Street F. Sub-basin 5-2(3.28ac, Q_{100}=11.0cfs) is left of the centerline of Street I. The runoff from the twenty-two (22) lots present in this sub-basin will flow downstream where it will be combined with the runoff from Street F, discharging into a temporary detention pond located on the future Tract 29B-1 (off-site basin C) of Ventana Ranch.

B. Retention Pond and Storm Drain Analysis

1. Hydrology

The hydrology used in the analysis of the downstream storm drain is based on the hydrology contained in the LVSDMP. The 100-year peak discharge (fully developed) carried to the pond from basin 501 is 432cfs. The 2-yr developed condition bulked discharge to the pond is 119cfs. However, at this

time Basin 501 is undeveloped and the 100-year discharge is 135cfs and the 2-year discharge for undeveloped flow negligible.

These flows include a sediment-bulking factor applied to all clean water flows in order to account for the increase in runoff due to sediment in the flow. A bulking factor of 2.5% was used for both the 100-year and the 2-year flow. This was the value specified in the LVSDMP and is more conservative value the 2.0% bulking factor used in the WBCDMP (West Branch Calabacillas Drainage Master Plan).

2. Storm Drain Analysis

The storm drain, which passes through Terrazas street within Tract 24, is referred to as the 'West Branch Calabacillas Strom Drain Diversion' within Addendum 4 of the DAR for the Ventana Ranch Subdivision Drainage Facilities. Please refer Addendum 4 for a complete analysis and explanation for the existing storm drain.

An existing 84" sub-surface RCP storm drain provides service to Tract 24 beginning at the intersection of Las Ventanas Road and Terrazas and extends the entire length of Terrazas. This storm drain also receives flow from the following subdivisions: Terrazas, Bradford Hills, and Country Meadows. Two double grates Type "A", with curb wings openings on both sides of the inlet, will be installed, one on either side of Terrazas street upstream of the cul-de-sac, and will be connected to the existing 84" RCP storm drainpipe with the existing 18" RCP Drain pipe. Each inlet will collect 9.4 cfs of runoff during the 100-year storm leaving a residual flow of 16.6 cfs of runoff to be collected in the cul-de-sac portion of this street. One additional double grate type "A" inlet will be installed on the north side of the existing 84" RCP storm drain at the end of the cul-de-sac. This inlet will collect the remaining residual flow from Terrazas St. The collected flow of 16.6 cfs will discharge through a 24" RCP storm drainpipe that will be connected to a manhole

located on the future Tract 29A-1. The manhole is connected to an existing 24" off the 84" RCP storm drainpipe.

According to the Final Addendum No. 4, the estimated flow to be discharged from Tract 24 into the West Calabacillas Storm Diversion Channel is 32cfs. According to the modeled sub-basins mentioned above, 35.4 cfs will discharge into the existing 84" storm drain during a 100-year storm. According to Figure 2 of Addendum No. 4, Reach 5 and Reach 6 (Terrazas Street) will carry 445 cfs during a 100-year storm event. Reach 5 and reach 6 have a full pipe capacity of 500 cfs during a 100-year storm event. It can be seen that the discharge of 35.4 cfs from Tract 24 of Ventana Ranch into the West Calabacillas Storm Diversion Channel allows for an additional 19.6 cfs entering the diversion channel before full pipe capacity is achieved.

C. Off-Site Basin

Basin A (0.71ac, Q_{100}=3.10cfs) is the offsite basin adjacent to Tract 24 and shares boundaries with basins 1, 3, and 4. This basin consists of existing roadway and sidewalks creating nearly an impervious layer for runoff conditions, which will flow downstream on Las Ventanas Road. The runoff from this offsite basin will not contribute to onsite flow.

As mentioned previously in the Existing Conditions section, Basin 501 (175 acres) is directly west of the subdivision site. Basin 501 will discharge 432cfs when fully developed (existing, undeveloped flow is 135cfs) to the proposed detention pond, via an existing arroyo. See section B of this report for further information concerning the storm drain analysis.

VI. POND ANALYSIS - TEMPORARY RETENTION POND

The primary function of the pond is to collect runoff from off-site basins B, C, and D as well as onsite basins 4 and 5. The 5414 contours delineate the boundary for the retention pond. By developing the pond at the 5414 contours, a storage capacity of 11.2 acre-ft is available. The combined flow from off-site basins B, C, and D as well as the on-site basins 4 and 5, a net volume of 8.17 acre-ft (based on the 100-year, 10 day event) will discharge into the temporary retention pond. Since the net volume is less than the storage capacity of the pond, an outlet structure is not required.

VI. CONCLUSION

The LVSDMP governs the development of Tract 24 of the Ventana Ranch Subdivision. Increases in runoff, depth and velocity due to proposed development are within parameters anticipated within the previously approved Master Drainage Plan for this area. These flows can be safely conveyed by the improvements proposed in this drainage plan to existing drainage facilities, which have adequate capacity to accept such runoff. Erosion and dust control, consisting of erosion control berms, snow fencing and sedimentation basins, are proposed to prevent soil washing or blowing into paved streets, storm drains, and existing development areas. Therefore we believe this report supports the preliminary/final plat and grading plan submittals and should be approved as requested.

DRB Project No.: _____
DRC Project No.: _____
Prelim. Plat Approved: _____
Prelim. Plat Expires: _____

Date Submitted: 03/30/01

Figure 12

INFRASTRUCTURE LIST

EXHIBIT "A"
TO SUBDIVISION IMPROVEMENTS AGREEMENT
DEVELOPMENT REVIEW BOARD (D.R.B.) REQUIRED INFRASTRUCTURE LIST

VISTA DE ARENAL
(TRACT 24, VENTANA RANCH)

Following is a summary of PUBLIC/PRIVATE Infrastructure required to be constructed or financially guaranteed for the above development. This listing is not necessarily a complete listing. During the SIA process and/or in the review of the construction drawings, if the DRC Chair determines that appurtenant items and/or unforeseen items have not been included in the infrastructure listing, the DRC Chair may include those items in the listing and related financial guarantee. Likewise, if the DRC Chair determines that appurtenant or non-essential items can be deleted from the listing, those items may be deleted as well as the related portions of the financial guarantees. All such revisions require approval by the DRC Chair, the User Department and agent/owner. If such approvals are obtained, these revisions to the listing will be incorporated administratively. In addition, any unforeseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility will be required as a condition of project acceptance and close out by the City.

Size	Type Improvement	Location	From	To
PUBLIC ROADWAY IMPROVEMENTS (ON-SITE)				
22' F-F (IN) 24' F-F (OUT)	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES	SIROCCO PLACE	LAS VENTANAS ROAD	MISTRAL DRIVE
32' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	SIROCCO** PLACE	MISTRAL DRIVE	E. CUL-DE-SAC TERMINUS
32' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	MISTRAL DRIVE	SIROCCO PLACE	CANDELIA AVENUE
32' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	KHAMSIN DRIVE	SIROCCO PLACE	CANDELIA AVENUE
28' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	CANDELIA AVENUE	MISTRAL DRIVE	110 FT WEST OF MISTRAL DRIVE
32' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	CANDELIA AVENUE	MISTRAL DRIVE	VENDAVAL AVENUE
32' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	VENDAVAL AVENUE	KHAMSIN DRIVE	110 FT NORTH OF CANDELIA AVENUE

STREET LIGHTS AS PER THE COA DPM
*SIDEWALKS TO BE DEFERRED; **SIDEWALKS ARE WAIVED ON SIROCCO PLACE CUL-DE-SAC TERMINUS

PUBLIC WATER LINE IMPROVEMENTS (ON-SITE)

8" DIA (ZONE 4W)	WATER LINE W/ NEC. VALVES FH'S, MJ'S	SIROCCO PLACE	LAS VENTANAS ROAD	CUL-DE-SAC TERMINUS
8" DIA (ZONE 4W)	WATER LINE W/ NEC. VALVES FH'S, MJ'S	MISTRAL DRIVE	SIROCCO PLACE	CANDELIA AVENUE
8" DIA (ZONE 4W)	WATER LINE W/ NEC. VALVES FH'S, MJ'S	CANDELIA AVENUE	LOT 5	VENDAVAL AVENUE
8" DIA (ZONE 4W)	WATER LINE W/ NEC. VALVES FH'S, MJ'S	KHAMSIN DRIVE	CANDELIA AVENUE	SIROCCO PLACE
8" DIA (ZONE 4W)	WATER LINE W/ NEC. VALVES FH'S, MJ'S	VENDAVAL AVENUE	KHAMSIN DRIVE	5 FT NORTH OF LOT 80

Size	Type Improvement	Location	From	To
PUBLIC DRAINAGE IMPROVEMENTS (ON-SITE)				
18" DIA	RCP W/ NEC. INLETS AND CONNECTION TO EXIST. SD	SIROCCO PLACE	LOT 54/55 & LOT 46/47	EXIST. 84" SD IN SIROCCO PLACE
18" DIA	RCP W/ NEC. INLETS AT LOW POINT	SIROCCO PLACE	E. CUL-DE-SAC TERMINUS	EXISTING 84" STORM DRAIN
PUBLIC SANITARY SEWER IMPROVEMENTS (ON-SITE)				
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES*	SIROCCO PLACE	LOT 41	LAS VENTANAS ROAD
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES*	SIROCCO PLACE	E. CUL-DE-SAC TERMINUS	KHAMSIN DRIVE
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES	MISTRAL DRIVE	LOT 30	CANDELIA AVENUE
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES	CANDELIA AVENUE	LOT 5	VENDAVAL AVENUE
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES	KHAMSIN DRIVE	LOT 24	SIROCCO PLACE
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES	VENDAVAL AVENUE	KHAMSIN DRIVE	LOT 80
PUBLIC SANITARY SEWER IMPROVEMENTS (OFF-SITE)				
8" DIA	SANITARY SEWER W/ NEC. MH'S AND SERVICES	PUBLIC EASEMENT (TRACTS A & X-1-A-1-A-1)	VENDAVAL AVENUE	EXIST. SAS IN UNIVERSE BLVD

A TEMPORARY RETENTION POND W/ NECESSARY APPURTENANCES WILL BE CONSTRUCTED W/IN TRACT X-1-A-1-A-1 IN ACCORDANCE WITH THE APPROVED MASTER DRAINAGE PLAN ADDENDUM #4. THERE IS AN EXISTING TEMPORARY BLANKET DRAINAGE EASEMENT THAT HAS BEEN GRANTED OVER TRACT X-1-A-1-A-1 BY PRIOR PLATING ACTIONS. CERTIFICATION OF THE RETENTION POND WITHIN TRACT X-1-A-1-A-1 AND THE GRADING PLAN OF VISTA DE ARENAL (TRACT 24, VENTANA RANCH) IS REQUIRED PRIOR TO THE RELEASE OF FINANCIAL GUARANTY'S.

Prepared by:_____
Print Name: Kevin Patton, PE
Firm: Bohannan Huston

DEVELOPMENT REVIEW BOARD MEMBER APPROVALS

_____ NMUI Date

_____ Transportation Dev. Date

_____ Utilities Dev. Date

_____ Parks & G.S. Date

_____ City Engineer Date

_____ AMAFCA Date

_____ DRB Chair Date

DRC REVISIONS

REVISIONS	DATE	DRC CHAIR	USER DEPT	AGENT/OWNER

TRACT 24 @ VENTANA RANCH

BASIN I.D.	AREA (AC)	UNITS #	% LAND TREATMENT A	B	C	D	DISCHARGE (CFS) 10 YR	100YR
Historic Flow for Off-Site Basins and Tract 24								
B, C, D, Tract 24	78.08		80.0%	20.0%	0.0%	0.00%	27.5	110.8
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING)								
A	0.71		0.0%	2.0%	0.0%	98.00%	2.0	3.1
B	31.35		80.0%	20.0%	0.0%	0.00%	11.0	44.5
C-Undevelloped	12.42		80.0%	20.0%	0.0%	0.00%	4.4	17.6
C-Developed	12.42		0.0%	25.0%	25.0%	50.00%	24.9	42.3
D- Undeveloped	13.60		80.0%	20.0%	0.0%	0.00%	4.8	19.3
D-Developed	13.60		0.0%	25.0%	25.0%	50.00%	27.2	46.3
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)								
1	1.80	10	0.0%	46%	0.0%	54%	3.4	5.9
2	1.99	10	0.0%	50%	0.0%	50%	3.6	6.3
3-1	1.89	9	0.0%	52%	0.0%	48%	3.4	5.9
3-2	2.60	14	0.0%	48%	0.0%	52%	4.9	8.5
4-1	4.45	29	0.0%	43%	0.0%	57%	8.8	14.9
4-2	2.72	14	0.0%	49%	0.0%	51%	5.0	8.7
5-1	1.99	11	0.0%	47%	0.0%	53%	3.8	6.5
5-2	3.27	22	0.0%	43%	0.0%	57%	6.4	11.0
TOTAL	**20.71**	**119**					**39.2**	**67.8**

NOTES: 1) Impervious percentages were calculated from the DPM equation A-4, with the remaining percentages distributed to land treatment type B, due to the relatively flat terrain

N=UNITS/ACRES = 5.7
%D= 7*SQRT((N*N)+(5*N)) = 55.0 %

*Table A-4

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Candelia Ave.

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs)	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 4-1	1.75	2.00 (Crown)	14.9	STD	0.377	3.25	0.164	0.541	1.00	OK
Basin 4-2	1.75	2.00 (Crown)	8.7	STD	0.320	2.86	0.127	0.447	1.00	OK

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Khamsin Drive

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs)	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 2	0.70	2.00 (Crown)	6.3	STD	0.333	1.86	0.054	0.387	1.00	OK
	1.02	2.00 (Crown)	6.3	STD	0.315	2.15	0.072	0.387	1.00	OK
Analysis Pt. #3	0.70	2.00 (Crown)	15.1	STD	0.432	2.80	0.122	0.553	1.00	OK
	1.02	2.00 (Crown)	15.1	STD	0.410	3.18	0.157	0.567	1.00	OK

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Mistral Drive

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs)	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 1	1.32	2.00 (Crown)	5.9	STD	0.300	2.35	0.086	0.386	1.00	OK
	1.06	2.00 (Crown)	5.9	STD	0.308	2.16	0.072	0.381	1.00	OK
Analysis Pt. #1	1.32	2.00 (Crown)	14.6	STD	0.393	2.92	0.132	0.525	1.00	OK
	1.06	2.00 (Crown)	14.6	STD	0.405	2.71	0.114	0.519	1.00	OK

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Vendaval Ave.

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs) +	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 5-1	0.69	2.00 (Crown)	6.50	STD	0.440	2.46	0.094	0.535	0.87	OK
	1.04	2.00 (Crown)	6.50	STD	0.317	2.19	0.074	0.391	0.87	OK
	3.21	2.00 (Crown)	6.50	STD	0.267	3.34	0.174	0.441	0.87	OK
	1.54	2.00 (Crown)	6.50	STD	0.301	2.55	0.101	0.402	0.87	OK
	1.14	2.00 (Crown)	6.50	STD	0.313	2.27	0.080	0.393	0.87	OK
	0.60	2.00 (Crown)	6.50	STD	0.346	1.78	0.049	0.396	0.87	OK
Basin 5-2	0.69	2.00 (Crown)	11.00	STD	0.399	2.13	0.071	0.469	0.87	OK
	1.04	2.00 (Crown)	11.00	STD	0.372	2.49	0.096	0.468	0.87	OK
	3.21	2.00 (Crown)	11.00	STD	0.314	3.80	0.225	0.538	0.87	OK
	1.54	2.00 (Crown)	11.00	STD	0.352	2.89	0.130	0.481	0.87	OK
	1.14	2.00 (Crown)	11.00	STD	0.367	2.57	0.103	0.470	0.87	OK
	0.60	2.00 (Crown)	11.00	STD	0.405	2.04	0.065	0.470	0.87	OK
Analysis Pt. #4	0.69	2.00 (Crown)	23.90	STD	0.495	2.88	0.129	0.624	0.87	OK
	1.04	2.00 (Crown)	23.90	STD	0.465	3.26	0.165	0.630	0.87	OK
	3.21	2.00 (Crown)	23.90	STD	0.399	4.61	0.331	0.730	0.87	OK
	1.54	2.00 (Crown)	23.90	STD	0.440	3.67	0.209	0.648	0.87	OK
	1.14	2.00 (Crown)	23.90	STD	0.459	3.35	0.174	0.633	0.87	OK
	0.60	2.00 (Crown)	23.90	STD	0.507	2.76	0.119	0.625	0.87	OK
Analysis Pt. #7	1.14	2.00 (Crown)	23.70	STD	0.458	3.34	0.173	0.631	0.87	OK
	0.60	2.00 (Crown)	23.70	STD	0.505	2.75	0.118	0.623	0.87	OK
Analysis Pt. #8	0.60	2.00 (Crown)	41.1 *	STD	0.611	3.43	0.183	0.793	0.87	OK

Note: The (*) signifies the a revision to the original design flowrate for a 100-year storm. After performing the first two runs, the Energy Grade Line (EGL) exceeded the Right of Way (ROW) for this sub-division. The Contributing basin flows were reconsidered and it was determined that the original estimate was to high. The Calculations supporting this change have been attached following this page.

The (+) signifies that for all the basins and analysis points, the flow for the entire basin was used for each different grade. Since the right of way was not exceeded with the total flow at the end of the basin, the analysis was accepted. Had the flow at the end of the basin exceeded the right-of-way at any of the different grade changes throughout the basin, a second analysis would be made with the exact flow at that point in the basin.

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Candelia Ave.

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs)	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 4-1	1.75	2.00 (Crown)	14.9	STD	0.377	3.25	0.164	0.541	0.87	OK
Basin 4-2	1.75	2.00 (Crown)	8.7	STD	0.320	2.86	0.127	0.447	0.87	OK

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Khamsin Drive

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs) +	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 2	0.70	2.00 (Crown)	6.3	STD	0.333	1.86	0.054	0.387	0.87	OK
	1.02	2.00 (Crown)	6.3	STD	0.315	2.15	0.072	0.387	0.87	OK
Analysis Pt. #3	0.70	2.00 (Crown)	15.1	STD	0.432	2.80	0.122	0.553	0.87	OK
	1.02	2.00 (Crown)	15.1	STD	0.410	3.18	0.157	0.567	0.87	OK

Note: The (+) signifies that for all the basins and analysis points, the flow for the entire basin was used for each different grade. Since the right of way was not exceeded with the total flow at the end of the basin, the analysis was accepted. Had the flow at the end of the basin exceeded the right-of-way at any of the different grade changes throughout the basin, a second analysis would be made with the exact flow at that point in the basin.

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Mistral Drive

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs) +	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 1	1.32	2.00 (Crown)	5.9	STD	0.300	2.35	0.086	0.386	0.87	OK
	1.06	2.00 (Crown)	5.9	STD	0.308	2.16	0.072	0.381	0.87	OK
Analysis Pt. #1	1.32	2.00 (Crown)	14.6	STD	0.393	2.92	0.132	0.525	0.87	OK
	1.06	2.00 (Crown)	14.6	STD	0.405	2.71	0.114	0.519	0.87	OK

Note:

The (+) signifies that for all the basins and analysis points, the flow for the entire basin was used for each different grade. Since the right of way was not exceeded with the total flow at the end of the basin, the analysis was accepted. Had the flow at the end of the basin exceeded the right-of-way at any of the different grade changes throughout the basin, a second analysis would be made with the exact flow at that point in the basin.

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Sirocco Place

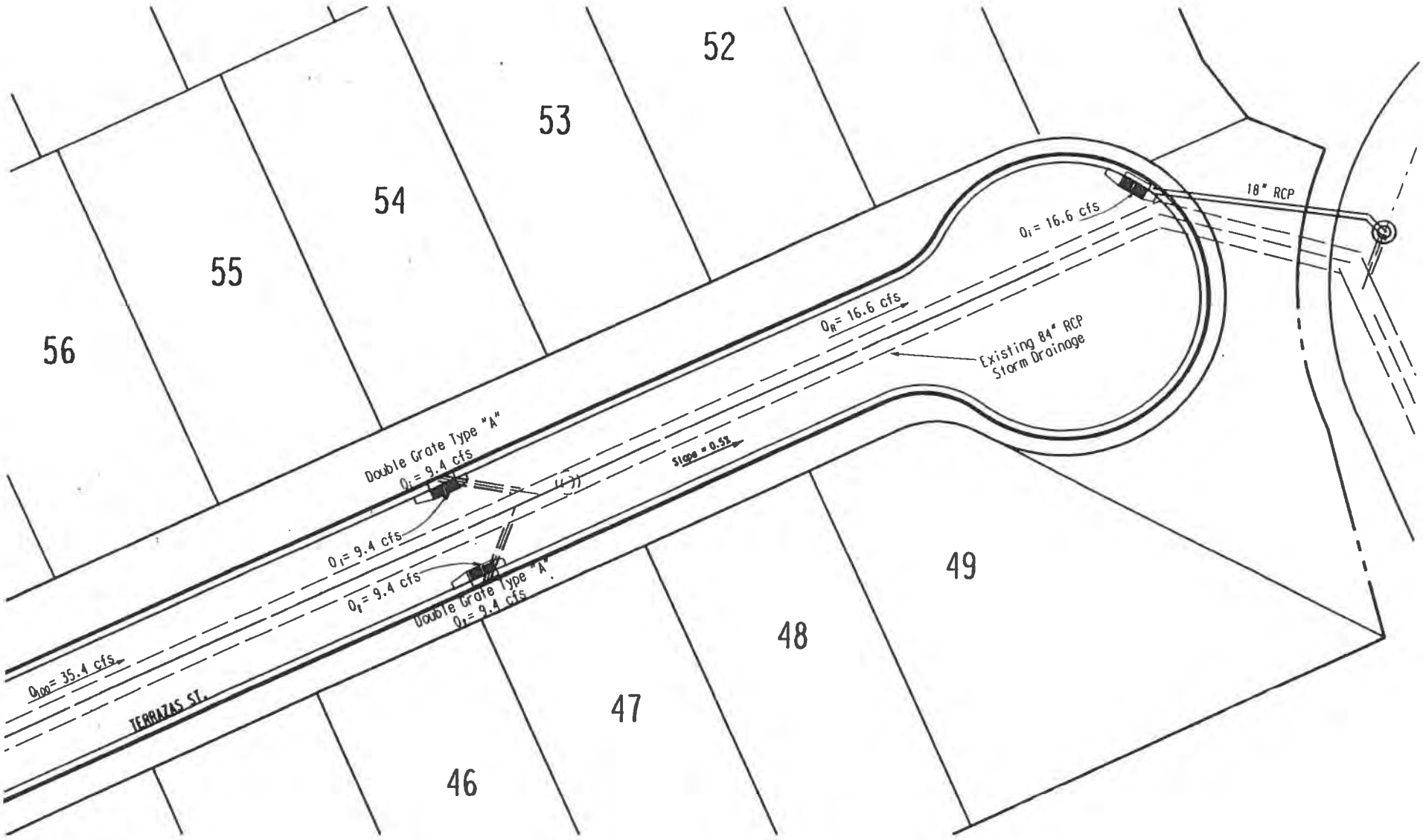
Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs)	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 3-1	0.50	2.00 (Crown)	5.90	STD	0.346	1.62	0.041	0.387	0.87	OK
Basin 3-2	0.50	2.00 (Crown)	8.50	STD	0.385	1.77	0.048	0.434	0.87	OK
Analysis Pt. #2	0.50	2.00 (Crown)	14.60	STD	0.457	2.02	0.064	0.521	0.87	OK
Analysis Pt. #5	0.50	2.00 (Crown)	15.10	STD	0.462	2.04	0.065	0.526	0.87	OK
Analysis Pt. #6	0.50	2.00 (Crown)	35.40	STD	0.598	2.66	0.110	0.708	0.87	OK

SUMMARY OF THE ROADWAY CAPACITY ANALYSIS FOR TRACT 24 AT VENTANA RANCH

Sirocco Place

Drainage Basins & Analysis Points	Roadway Grade (%)	Roadway Cross-Slope (%)	Q(100 YR) in Roadway (cfs)	Curb Type	Depth of Water in Roadway (ft)	Velocity of Storm Water in Roadway(ft/s)	$V^2/2*g$	EGL	ROW Elevation (ft)	Comments
Basin 3-1	0.50	2.00 (Crown)	5.90	STD	0.346	1.62	0.041	0.387	1.00	OK
Basin 3-2	0.50	2.00 (Crown)	8.50	STD	0.385	1.77	0.048	0.434	1.00	OK
Analysis Pt. #2	0.50	2.00 (Crown)	14.60	STD	0.457	2.02	0.064	0.521	1.00	OK
Analysis Pt. #5	0.50	2.00 (Crown)	15.10	STD	0.462	2.04	0.065	0.526	1.00	OK
Analysis Pt. #6	0.50	2.00 (Crown)	35.40	STD	0.598	2.66	0.110	0.708	1.00	OK

B-5/5


52
53
54
55
56
49
48
47
46
18" RCP
Q_i = 16.6 cfs
Q_p = 16.6 cfs
Existing 84" RCP
Storm Drainage
Double Grate Type "A"
Q_i = 9.4 cfs
Slope = 0.52
Q_i = 9.4 cfs
Q_i = 9.4 cfs
Double Grate Type "A"
Q_i = 9.4 cfs
Q_{100} = 35.4 cfs
TERRAZAS ST.

1-2

DEVELOPED CONDITIONS FOR INLETS IN
TRACT 24 AT VENTANA RANCH

INLET	CONDITION	TYPE	CONTRIBUTING BASIN AND RESIDUAL INLET	FLOW TO INLET 100-YR (CFS)	STREET DEPTH (FT)	GRATE CAPACITY (CFS)	RESIDUAL FLOW (CFS)
1	ON 0.50% GRADE	A' DOUBLE GRATE	BASINS 1, 2, 4-2				
2	ON 0.50% GRADE	A' DOUBLE GRATE	BASINS 1, 2, 4-3	35.4	0.6	9.4	16.6
3	INLET IN SUMP CONDITION; SEE NEXT PAGE FOR ANALYSIS						

DBL Grate at End of Cul-DE-Sac

ANALYSIS OF AN INLET IN A SUMP CONDITION - **Terrazas Street**

INLET TYPE: Double Grate Type "A" with curb opening wings on both sides on inlet.

WEIR: Q=C*L*H^1.5

Wing opening	Grate opeining	ORIFICE: Q=C*A*(2*G*H)**0.5 Grate opening	Wing opening
C= 3.0	C=3.0	C=0.6	C=0.6
L= 4.0 ft	L(double grate)=[2(2.67')+2(1.8')]=8.94 ft	A(double grate)=8.19 sf	A=2.0 sf
Q=3.0(4.0')H**1.5= 12.0H**1.5	Q=3.0(8.94)H^1.5=26.82*H^1.5	Q=4.194*(64.4*H)^0.5	Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR "A" OPENING	Q (CFS) WEIR DOUBLE GRATE	Q (CFS) ORIFICE DOUBLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at double "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.85	12.47	1.61	Weir controls on grate analysis
	0.20	0.20	1.07	2.40	17.64	4.55	
	0.30	0.30	1.97	4.41	21.60	8.35	
	0.40	0.40	3.04	6.78	24.94	12.86	
	0.47						Q(100 yr) = 16.6 cfs is provided at this depth
	0.50	0.50	4.24	9.48	27.88	17.97	
	0.60	0.60	5.58	12.46	30.55	23.62	
TOP OF CURB	0.70	0.70	7.03	15.71	32.99	29.76	
	0.75						Q(2x100 yr) = 33.2 cfs < ROW = .77 ft.
ROW LIMIT	0.80	0.80	8.59	19.19	35.27	36.36	
	0.90	0.90	10.25	22.90	37.41	43.39	
	1.00	1.00	12.00	26.82	39.43	50.82	

NOTE: The total runoff intercepted by the inlet at the low point in the road is:
Qr(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].
THE 100 YR STORM EVENT =16.6 CFS at the sump condition
THE 2 x 100 YR STORM EVENT =33.2 at the sump condition

C-4/4

Runoff Volume-Undeveloped Off-Site Basins

BASIN	AREA (ACRES)	% LAND TREATMENT* A	B	C	D	Zone 1 EXCESS PRECIPITATION - (IN) 6-HR*** A	B	C	D	V(100-YR 6-HR) V360 (ACRE-FT)	V(100-YR 24-HR) V1440 (ACRE-FT)	V(100-YR 10-DAY) V10 Day (ACRE-FT)
C (Tract 23)	12.42	80.00	20.00	0.00	0.00	0.44	0.67	0.99	1.97	0.50	0.50	0.50
D (Tract 29A)	13.60	80.00	20.00	0.00	0.00	0.44	0.67	0.99	1.97	0.55	0.55	0.55
B (Tract 29B)	31.35	80.00	20.00	0.00	0.00	0.44	0.67	0.99	1.97	1.27	1.27	1.27
4-1	4.45	0.00	43.00	0.00	57.00	0.44	0.67	0.99	1.97	0.52	0.62	0.83
4-2	2.72	0.00	49.00	0.00	51.00	0.44	0.67	0.99	1.97	0.30	0.36	0.47
5-1	1.99	0.00	47.00	0.00	53.00	0.44	0.67	0.99	1.97	0.23	0.27	0.35
5-2	3.27	0.00	43.00	0.00	57.00	0.44	0.67	0.99	1.97	0.38	0.46	0.61
										3.76	**4.02**	**4.60**

Runoff Volume-Developed Off-Site Basins

BASIN	AREA (ACRES)	% LAND TREATMENT* A	B	C	D	Zone 1 EXCESS PRECIPITATION - (IN) 6-HR*** A	B	C	D	V(100-YR 6-HR) V360 (ACRE-FT)	V(100-YR 24-HR) V1440 (ACRE-FT)	V(100-YR 10-DAY) V10 Day (ACRE-FT)
C (Tract 23)	12.42	0.00	25.00	25.00	50.00	0.44	0.67	0.99	1.97	1 45	1.69	2 21
D (Tract 29A)	13.60	0.00	25.00	25.00	50.00	0.44	0.67	0.99	1.97	1.59	1.85	2.42
B (Tract 29B)	31.35	80.00	20.00	0.00	0.00	0.44	0.67	0.99	1.97	1.27	1.27	1.27
4-1	4.45	0.00	43.00	0.00	57.00	0.44	0.67	0.99	1.97	0.52	0.62	0.83
4-2	2.72	0.00	49.00	0.00	51.00	0.44	0.67	0.99	1.97	0.30	0.36	0.47
5-1	1.99	0.00	47.00	0.00	53.00	0.44	0.67	0.99	1.97	0.23	0.27	0.35
5-2	3.27	0.00	43.00	0.00	57.00	0.44	0.67	0.99	1.97	0.38	0.46	0.61
										5.74	**6.50**	**8.17**

NOTES:

Obtained from Section 22.2, Hydrology of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, January, 1993

* Table A-4

** Table A-9

***Table A-8

From Table A-5 in the COA DPM SECTION 22.2

Percent Treeatment D - Impervious

No. of units 91

Acres 21.5

N = 4.23

% D = 43.76 use 48

1. TEMPORARY POND SIZE = 4.92 ACRES

- SIZE BASED ON 100 YR, 10 DAY RUNOFF VOLUME
- CALCULATED USING EQUATIONS FROM THE DPM
  - EQN. A-9: $V_{10\,DAYS} = V_{360} + A_D(P_{10\,DAYS} - P_{360})/12\ IN/FT$

$$V_{360} = \frac{EA}{12\ IN/FT}$$ (E: INCHES, A: ACRES)

$$E = \frac{0.44(\text{AREA A}) + 0.67(\text{AREA B}) + 0.99(\text{AREA C}) + 1.97(\text{AREA D})}{\text{TOTAL AREA}}$$

PER ZONE = 1

A_D = AREA THAT IS IMPERVIOUS

$P_{10\,DAYS} = 3.67"$

$P_{1440} = 2.66"$

$P_{360} = 2.20"$

OFF-SITE BASINS:

BASIN B (FUTURE TRACT 29B)

AREA = 31.35 ACRES

%A = 80%	%B = 20%	%C = 0	%D = 0
A = 25.08	A = 6.27	A = 0	A = 0

$$E = \frac{0.44(25.08) + 0.67(6.27) + 0.99(0) + 1.97(0)}{31.35}$$

$E = 0.4860$ INCHES

$V_{360} = 0.4860 \times 31.35\ AC/12\ IN/FT = 1.2687\ ACRE\text{-}FT$

$V_{1440} = 1.27 + 0\ (2.66 - 2.20)/12 = 1.27\ ACRE\text{-}FT$

$V_{10\,DAY} = 1.27 + 0\ (3.67 - 2.20)/12 = \boxed{1.27\ ACRE\text{-}FT}$

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SURVEYORS SOFTWARE DEVELOPERS

PROJECT NAME _____ SHEET _____ OF _____
PROJECT NO. _____ BY _____ DATE _____
SUBJECT _____ CH'D _____ DATE _____

• BASIN C (FUTURE TRACT 23)

AREA = 12.42 ACRES

%A = 0	%B = 25	%C 25	%D = 50
A = 0	A = 3.105 AC	A = 3.105 AC	A = 6.21 AC

$$E = \frac{0.44(0) + 0.67(3.105) + .99(3.105) + 1.97(6.21)}{12.42} = 1.40 \text{ INCHES}$$

$V_{3600} = 1.40 \times 12.42/12 = 1.449 = 1.45$ ACRE-FT

$V_{1440} = 1.45 + 6.21(2.646 - 2.20)/12 = 1.69$ ACRE-FT

$V_{10\ DAY} = 1.45 + 6.21(3.467 - 2.20)/12 =$ **2.21 ACRE-FT**

• BASIN D (FUTURE TRACT 29A)

AREA = 13.600 ACRES

%A = 0	%B = 25%	%C = 25%	%D = 50%
A = 0	A = 5.4	A = 3.4	A = 6.8

$$E = \frac{0.44(0) + 0.67(3.4) + 0.99(3.4) + 1.97(6.8)}{13.60}$$

$E = 1.40$ INCHES

$V_{3600} = 1.40$ IN $\times$ 13.60 AC/12 IN/FT = 1.59 ACRE-FT

$V_{1440} = 1.59 + 6.80(2.646 - 2.20)/12 = 1.85$ ACRE FT

$V_{10\ DAY} = 1.59 + 6.80(3.467 - 2.20)/12 =$ **2.42 ACRE-FT**

TOTAL OFFSITE VOLUME (10 DAY) = 9.77 ACRE-FT

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PROJECT NAME _____ SHEET _____ OF _____
PROJECT NO. _____ BY _____ DATE _____
SUBJECT _____ CH'D _____ DATE _____

CONTRIBUTING ON-SITE BASINS:

1. SUB-BASIN 4-1

AREA = 4.45 ACRES

% A = 0	% B = 43%	% C = 0	% D = 57
A = 0	A = 1.91 Ac	A = 0	A = 2.54 Ac

$$E = \frac{0.44(0) + 0.67(1.91) + 0.99(0) + 1.97(2.54)}{4.45} = 1.41 \text{ INCHES}$$

$V_{3600} = 1.41 \text{ IN} \times 4.45 \text{ Ac} / 12 \text{ IN/FT} = 0.52 \text{ ACRE-FT}$

$V_{1440} = 0.52 + 2.54(2.160 - 2.20)/12 = 0.462 \text{ ACRE-FT}$

$V_{10\ DAY} = 0.52 + 2.54(3.167 - 2.20)/12 = \boxed{0.8312 \text{ ACRE-FT}}$

2. SUB-BASIN 4-2

AREA = 2.72 ACRES

% A = 0	% B = 49	% C = 0	% D = 51
A = 0	A = 1.33 Ac	A = 0	A = 1.39 Ac

$$E = \frac{0.44(0) + 0.67(1.33) + 0.99(0) + 1.97(1.39)}{2.72} = 1.33 \text{ INCHES}$$

$V_{3600} = 1.33 \text{ IN} \times 2.72 \text{ Ac} / 12 \text{ IN/FT} = 0.30 \text{ Ac-FT}$

$V_{1440} = 0.30 + 1.39(2.660 - 2.20)/12 = 0.35 \text{ Ac-FT}$

$V_{10\ days} = 0.30 + 1.39(3.167 - 2.20)/12 = \boxed{0.47 \text{ Ac-FT}}$

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PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

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3. SUB-BASIN 5-1

AREA = 1.99 ACRES

%A = 0 → A = 0 | %B = 47 → A = 0.93 Ac | %C = 0 → A = 0 | %D = 53 → A = 1.05 Ac

$$E = \frac{0.44(0) + 0.107(0.93) + 0.99(0) + 1.97(1.05)}{1.99}$$

E = 1.3526 INCHES

$V_{3600} = 1.3526\,IN \times 1.99\,Ac \,/\, 12\,IN/FT = 0.22$ ACRE-FT

$V_{1440} = 0.22 + 1.05(2.66 - 2.20)/12 = 0.26$ ACRE-FT

$V_{10\text{-DAY}} = 0.22 + 1.05(3.67 - 2.20)/12 = \boxed{0.35}$ ACRE-FT

4. SUB-BASIN 5-2

AREA = 3.27 ACRES

%A = 0 → A = 0 | %B = 43 → A = 1.41 Ac | %C = 0 → A = 0 | %D = 57 → A = 1.86 Ac

$$E = \frac{0.44(0) + 0.107(1.41) + 0.99(0) + 1.97(1.86)}{3.27}$$

E = 1.41 INCHES

$V_{3600} = 1.41\,IN \times 3.27\,AC \,/\, 12\,IN/FT = 0.38$ ACRE-FT

$V_{1440} = 0.38 + 1.86(2.66 - 2.20)/12 = 0.45$ ACRE-FT

$V_{10\text{ day}} = 0.38 + 1.86(3.67 - 2.20)/12 = \boxed{0.60}$ ACRE-FT

TOTAL ON-SITE $V_{10\text{-day}} = 2.26$ ACRE-FT

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PROJECT NO. _____ BY _____ DATE _____
SUBJECT _____ CH'D _____ DATE _____

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- TOTAL 100yr 10 Day VOLUME TO BE STORED AT THE TEMPORARY DETENTION POND = 8.16 ACRE-FT
- TOTAL 100YR 24 HR VOLUME TO BE DETAINED AT TEMPORARY POND = 10.41 ACRE-FT
- TOTAL 100YR. 10 HR VOLUME TO BE RETAINED AT TEMPORARY POND = 5.73 ACRE-FT

PROJECT NAME _____ SHEET _____ OF _____
PROJECT NO. _____ BY _____ DATE _____
SUBJECT _____ CH'D _____ DATE _____

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D-6/6

STREET F (Candelaria Ave)

FLOWRATES (100 yR) : BASIN 4-1 = 14.9 cfs

BASIN 4-2 = 8.7 cfs

BASIN 4-1 = 14.9 cfs

SLOPE = 1.75% ⟶ WSEL = 0.3770' & V = 3.2536 fps

$EGL = \frac{V^2}{2g} + WSEL$

$= \frac{(3.2536\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3770\ ft$

EGL = 0.5414 ft < 1.0 = Raw okay

BASIN 4-2 = 8.7 cfs

SLOPE = 1.75% ⟶ INTERPOLATE ⟶ WSEL = 0.3202 & V = 2.855 fps

$EGL = \frac{V^2}{2g} + WSEL$

$= \frac{(2.855\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3202$

EGL = 0.4408 ft < 1.0 = Raw okay

* STREET F DOES NOT REQUIRE ANY INLETS

STREET F (CONTINUED) (Verdant Ave.

BASIN 5-2 = 11.0 cfs

- SLOPE = 1.54%, WSEL = 0.3519 ft, V = 2.8909 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.8909\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3519\ ft$

EGL = 0.4815 ft < 1.00 = Row + okay

- SLOPE = 1.14%, WSEL = 0.3070 ft, V = 2.5718 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.5718\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3690\ ft$

EGL = 0.4697 ft < 1.00 ft = Row okay

- SLOPE = 0.60%, WSEL = 0.4053 ft, V = 2.0392 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.0392\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4053\ ft$

EGL = 0.4099 ft < 1.00 ft = Row okay

Analysis Pt #4 = 23.9 cfs

- SLOPE = 0.69%, WSEL = 0.4952 ft, V = 2.8835 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.8835\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4952\ ft$

EGL = 0.6243 ft < 1.00 ft = Row okay

- SLOPE = 1.04%, WSEL = 0.4650 ft, V = 3.2580 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(3.2580\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4650\ ft$

EGL = 0.6298 ft < 1.00 ft = Row okay

- SLOPE = 3.21%, WSEL = 0.3994 ft, V = 4.6145 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(4.6145\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3994\ ft$

EGL = 0.7300 ft < 1.00 ft = Row okay

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PROJECT NAME VR TRACT 24 DRAINAGE REPORT SHEET 16 OF 11

PROJECT NO. 01 347 BY ROBERT LACEY DATE 3/18/01

SUBJECT STREET HYDRAULICS CH'D _____ DATE _____

ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

STREET I (CONTINUED) (Vandaveer Ave.

Analysis Pt #4 = 23.9 cfs

- SLOPE = 1.51%, WSEL = 0.4396 ft, V = 3.10693 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(3.10693\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4396\ ft$$

EGL = 0.10487 ft < 1.00 ft = Row okay

- SLOPE = 1.14%, WSEL = 0.4590 ft, V = 3.3482 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(3.3482\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4590\ ft$$

EGL = 0.10331 ft < 1.00 ft = Row okay

- SLOPE = 0.60%, WSEL = 0.5065 ft, V = 2.76029 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.76029\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.5065\ ft$$

EGL = 0.10250 ft < 1.00 ft = Row okay

Analysis Pt # 7 = 23.7 cfs

- SLOPE = 0.69%, WSEL = 0.4938 ft, V = 2.8729 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.8729\ ft/s)}{2(32.2\ ft/s^2)} + 0.4938\ ft$$

EGL = 0.10220 ft < 1.00 ft = Row okay

- SLOPE = 1.09%, WSEL = 0.41039 ft, V = 3.2479 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(3.2479\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.41039\ ft$$

EGL = 0.10277 < 1.00 = Row okay

- SLOPE = 3.21%, WSEL = 0.3982 ft, V = 4.60034 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(4.60034\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3982\ ft$$

EGL = 0.7273 ft < 1.00 = Row okay

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ENGINEERS PLANNERS PHOTOGRAMMETRISTS
SURVEYORS SOFTWARE DEVELOPERS

PROJECT NAME VR TRACT 31 DRAINAGE REPORT SHEET 7 OF 11
PROJECT NO. 01 347 BY ROBERT LARKEY DATE 3/8/01
SUBJECT STREET HY CALCS CH'D _____ DATE _____

BASIN 5-1:

Slope = 3.21%:

# of Lots = 13 Area = 1.76 Acres, $N = 13/1.76 = 7.3776$ Not Good

$N = 10.0$

$\%D = 7 \times \sqrt{(N \times N) + (5 \times N)}$

$= 7 \times \sqrt{(10 \times 10) * (5 \times 10)}$

$\%D = 56.8683$ $\%B = 21.56\%$, $\%C = 21.56\%$

Flow Rate (100 yr) = 10.2

WSEL = 0.3407 < Crown = .41, $V = 1.76$ ft/s

$EGL = \frac{V^2}{2g} + WSEL = \frac{(1.76\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3409$

EGL = 0.389 ft okay ✓

BASIN 5-2:

Slope = 3.21%

# of Lots = 12 Area = 1.99 Acres, $N = 12/1.99 = 6.02 > 6.0 +-$

$N = 6.0$

$\%D = 7 \times \sqrt{(N)^2 + (6 \times N)}$ Eq A-4 of DPM Ch. 22.2

$\%D = 56.8683$ $\%B = 21.56$ $\%C = 21.56$

Flow Rate (100yr) = 7.0 cfs

WSEL = 0.354 ft $V = 1.8160$ ft/s

$EGL = \frac{V^2}{2g} + WSEL = \frac{(1.8160\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.354$

EGL = 0.405' okay

NOTE:

THE ACTUAL AMOUNT OF FLOW FOR THE PORTION OF VERDANCE AVE HAVING A SLOPE OF 3.21%. IT WAS FOUND THAT THE WSEL = .4009' < RIGHT OF WAY & CROWN OF ROAD

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ENGINEERS PLANNERS PHOTOGRAMMETRISTS
SURVEYORS SOFTWARE DEVELOPERS

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

STREET I (CONTINUED) (Verdaville Ave)

ANALYSIS PT #8 = 42.9 cfs

- SLOPE = 1.14% , WSEL = 0.5530 ft , V = 4.2358 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(4.2358\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.5530\ ft$$

EGL = 0.8316 ft < 1.00 ft = Row okay

- SLOPE = 0.60% , WSEL = 0.6197 ft , V = 3.4843 fps

$$EGL = \frac{V^2}{2g} + WSEL = \frac{(3.4843\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.6197\ ft$$

EGL = 0.8082 ft < 1.00 = Row okay

NO INLETS ARE REQUIRED FOR STREET I

AFTER ADDITIONAL STUDY IT WAS DETERMINED THAT AT THE INTERSECTION OF STREETS G & I, STREET I HAS A HIGHER ELEVATION. THIS HIGH POINT AND THE VALLEY GUTTER WILL PREVENT THE RUNOFF FROM BASIN 2 FROM DISCHARGING INTO BASIN 5-1.

SINCE BASIN 2 WILL NOT BE A CONTRIBUTING BASIN TO THE FLOW IN BASIN 5, THE FLOW FOR ANALYSIS PT #8 WILL BE REDUCED FROM 47.5 cfs, AS ORIGINALLY THOUGHT, TO 4.2 cfs. THE CALCULATIONS ABOVE REFERENCED A VALUE OF 42.9 cfs, WHICH WAS FOUND TO BE APPROPRIATE FOR THIS STREET. SINCE 42.9 cfs > 47.5 cfs, STREET I IS okay.

~~THEREFORE, THE CONCLUSION REMAINS THAT STREET I DOES NOT REQUIRE~~ ANY INLETS.

STREET: TERRAZAS (Sirocco Place)

FLOW RATES (100yr) = BASIN 3-1 = 5.9 cfs Analysis Pt#5 = 15.1

BASIN 3-2 = 8.5 cfs Analysis Pt#6 = 35.4

Analysis Pt#2 = 14.6

BASIN 3-1

SLOPE = 0.50%, WSEL = 0.3458 ft, V = 1.6240 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(1.6240\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3458\ ft$

EGL = 0.38108 ft < 1.00 ft = Row okay

BASIN 3-2

SLOPE = 0.5%, WSEL = 0.3853 ft, V = 1.7671 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(1.7671\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.3853\ ft$

EGL = 0.43338 ft < 1.00 ft = Row okay

Analysis Pt #2 - 14.6 cfs

SLOPE = 0.5%, WSEL = 0.4573 ft, V = 2.0248 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.0248\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4573\ ft$

EGL = 0.5210 ft < 1.00 ft = Row okay

Analysis Pt #5 = 15.1 cfs:

SLOPE = 0.5%, WSEL = 0.4648 ft, V = 2.0464 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.0464\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.4648\ ft$

EGL = 0.5264 ft < 1.00 ft = Row okay

Analysis Pt #6 = 35.4 cfs

SLOPE = 0.5%, WSEL = 0.5979 ft, V = 2.6570 fps

$EGL = \frac{V^2}{2g} + WSEL = \frac{(2.6570\ ft/s)^2}{2(32.2\ ft/s^2)} + 0.5979\ ft = 0.7075\ ft$ < 1.00 ft = Row okay

- STREET TERRAZAS HAS A CUL-DE-SAC AND INLET WILL BE REQUIRED TO DRAIN THE RUNOFF!

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SURVEYORS SOFTWARE DEVELOPERS

PROJECT NAME VR TRACT 24 DRAINAGE REPORT SHEET 11 OF 11

PROJECT NO. 01 347 BY ROBERT LACKEY DATE 3/12/01

SUBJECT STREET HYDRAULICS CH'D DATE

ORIFICE EQUATION:

KNOWN ELEMENTS: $Q_{in} = 8.3$ cfs (Cul-de-sac)

$Q_{in} = 9.4$ cfs (INLET IN STREET)

$C_d = 0.602$ (Square edged Entrance) Use for both

$A = \frac{\pi D^2}{4}$ (Assume full Pipe flow)

$g = 32.2 \ ft/s^2$

$h = 10 ft$

ELEMENTS TO BE FOUND: DIAMETER OF PIPE

ORIFICE EQUATION: $Q = C_d A \sqrt{2gh} = C_d \frac{\pi D^2}{4} \sqrt{2gh}$

$$D^2 = \left[\frac{4Q}{\pi \cdot C_d \sqrt{2gh}} \right]^{1/2}$$

INLET IN STREET:

$$D = \left[\frac{4 (9.4 \ ft^3/s)}{\pi (0.602) \sqrt{2(32.2 \ ft/s^2)(10 ft)}} \right]^{1/2} \Rightarrow \text{DIA.} = .9910 ft = 12" RCP$$

PIPE CONNECTING INLETS IN THE CUL-DE-SAC

$$D = \left[\frac{4 (8.3 \ ft^3/s)}{\pi (0.602) \left[2 \times 32.2 \ ft/s^2 \times 10 ft \right]^{1/2}} \right]^{1/2} \Rightarrow \text{DIA.} = 0.9312 ft = 12"$$

DISCHARGE PIPE FOR BOTH INLETS AT CUL-DE-SAC TO 84" EXISTING

$Q = 16.6$ cfs

$$D = \left[\frac{4 (16.6 \ ft^3/s)}{\pi (0.602) \left[2 \times 32.2 \ ft/s^2 \times 10 ft \right]^{1/2}} \right]^{1/2} \Rightarrow \text{DIA} = 1.3169 ft$$

USE 18" pipe (1.5 ft)

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PROJECT NAME VR TRACT 24 DRAINAGE REPORT SHEET 1 OF)

PROJECT NO. 01 247 BY ROBERT LACKEY DATE 3-13-01

SUBJECT STORM DRAIN PIPE SIZING. CH'D _____ DATE _____

ENGINEERS PLANNERS PHOTOGRAMMETRISTS
SURVEYORS SOFTWARE DEVELOPERS

E-24½

IRVING BLVD.

EXISTING DRAINAGE BASIN
(TRACT X-1-A-1-A)
78.08 ACRES

TRACT Y-1-A-1

EXISTING 84" RCP
STORM DRAIN PIPE

CHURCH SITE

MULTI-FAMILY
RESIDENTIAL

SEDONA SUBD.

PARADISE
HILLS
SUBD.

RAINBOW BOULEVARD

UNIVERSE BLVD.

VENTANA RD.

LAS VENTANAS ROAD

WEST POINTE SUBD.
UNIT 2

TERRAZAS SUBD.

BRADFORD HILLS
SUBD.

COUNTRY MEADOWS
UNIT II

COUNTRY MEADOWS

PINON POINTE

LUZ EN LA VENTANA

LAS VENTANAS RD.

MESA VISTA SUBD.

LAS VENTANAS
DETENTION DAM

WEST POINTE SUBD.

VENTANA VILLAGE RD.

CANTABRIA SUBD.

VENTANA RANCH ROAD

UNIT 1

NORTHPOINTE SUBD.

PLEASANT HILLS SUBD.

BRIAR RIDGE SUBD.

NORTH BRANCH PIEDRAS MARCADAS CHANNEL

PARK

SOUTHPOINTE SUBD.

SONTERRA SUBD.

COUNTRY HILLS SUBD.
UNIT I

PARADISE BLVD.

VISTA CASITAS SUBD.

LAS CASITAS SUBD.

VENTANA POINTE

SOMMERSET SUBD.

TERESINA SUBD.

PASEO DEL NORTE

PASEO DEL NORTE

N

NOT TO SCALE

SUBDIVISION TO
BE DEVELOPED

ENGINEER'S SEAL

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

AS-BUILT INFORMATION

BENCH MARKS

ACS BRASS TABLET STAMPED "1-B9 1980"
GEOGRAPHIC POSITION (NAD 1927)
N.M. STATE PLANE COORDINATES
(CENTRAL ZONE) X=355,077.00
Y=1,529,056.93

CONTRACTOR

MARKED BY
DATE

INSPECTOR'S
ACCEPTANCE BY
DATE

FIELD
VERIFICATION BY
DATE

DRAWINGS
CORRECTED BY
DATE

NO.	DATE	REMARKS REVISIONS	BY

Bohannan Huston

Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109

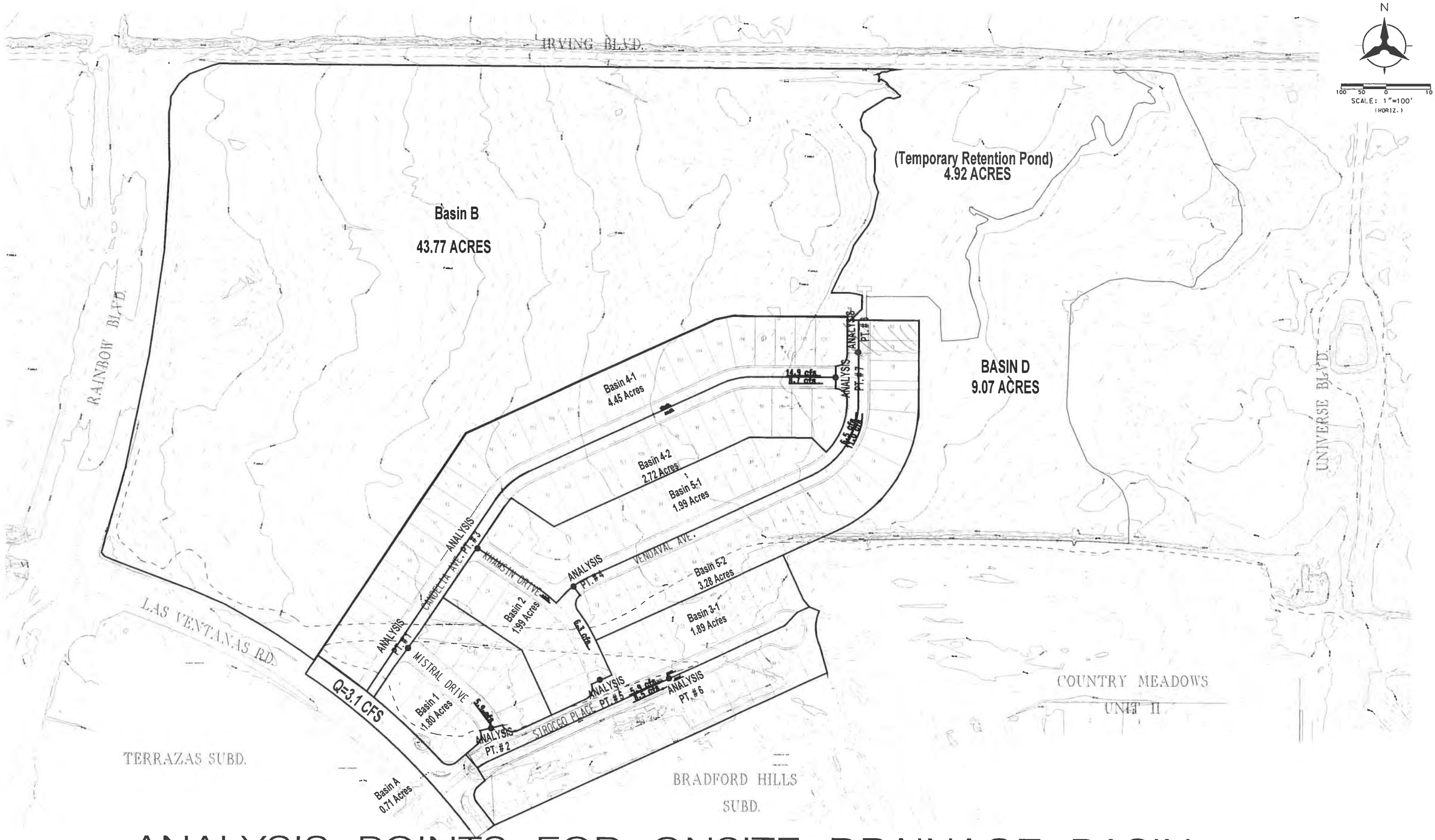
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GR

VISTA DE ARENAL AT VENTANA RANCH
EXISTING DRAINAGE

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR.

CITY PROJECT NO.	ZONE MAP NO.	SHEET
658681	B-9	



ANALYSIS POINTS FOR ONSITE DRAINAGE BASIN

VENTANA RANCH VISTA DE ARENAL (TRACT 24)

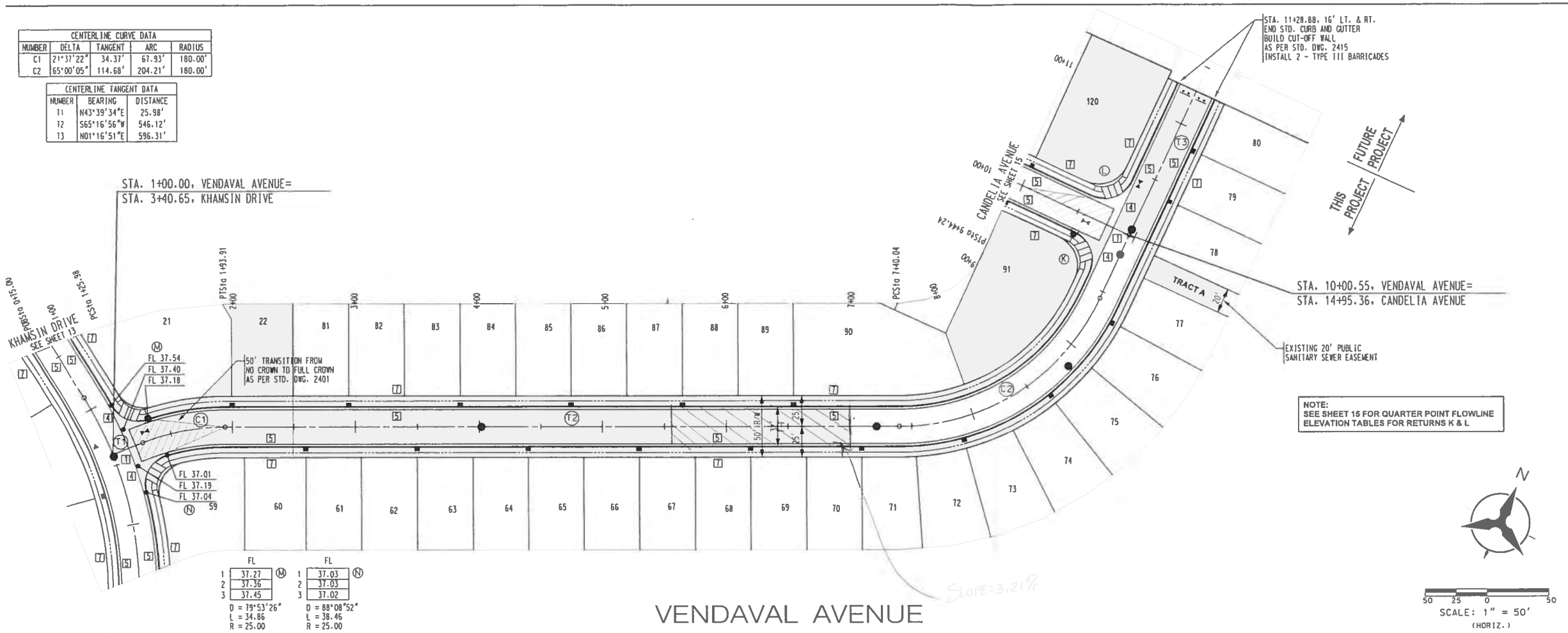
P:\01347\CDP\GENERAL\ 01347DP-ANALYSISPTS.DGN

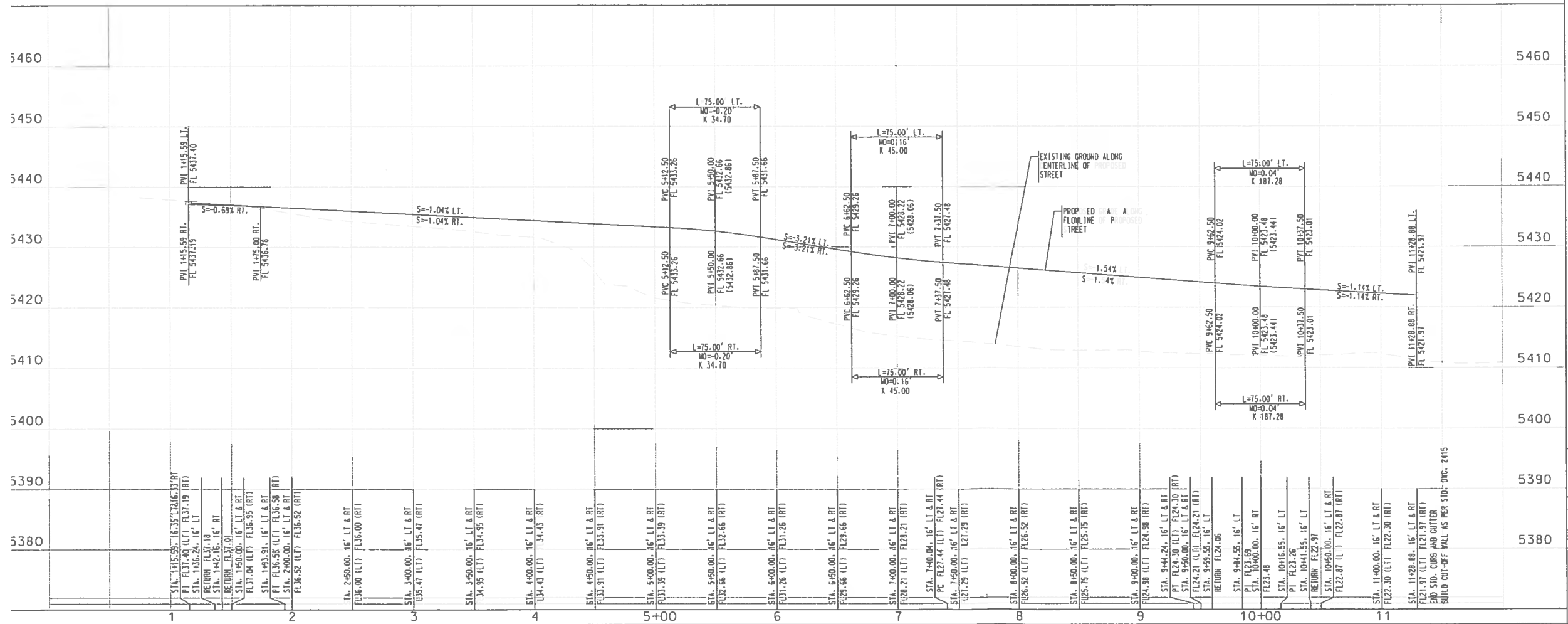
BHI JOB NO. 01347 2400

Bohannan ▲ Huston
Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 8
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

CENTERLINE CURVE DATA				
NUMBER	DELTA	TANGENT	ARC	RADIUS
C1	21°37'22"	34.37'	67.93'	180.00'
C2	65°00'05"	114.68'	204.21'	180.00'

CENTERLINE TANGENT DATA		
NUMBER	BEARING	DISTANCE
T1	N43°39'34"E	25.98'
T2	S65°16'56"W	546.12'
T3	N01°16'51"E	596.31'





NOTES

1. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF OF ANY DISCREPANCIES.
2. ALL CURB RETURN RADII SHALL BE 25' UNLESS OTHERWISE SPECIFIED.
3. ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
4. GRADE ELEVATIONS, WHERE NOTED, ARE ALONG FLOWLINE OF STANDARD CURB UNLESS OTHERWISE SPECIFIED.
5. CONTRACTOR IS TO INSTALL A 4" X 4" X 5' POST AND EMD AT THE END OF EACH SANITARY SEWER SERVICE.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
7. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
8. CONTRACTOR SHALL PROVIDE THE INSPECTORS, (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
9. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
10. ANY DAMAGE TO THE EXISTING FACILITIES (CURB & GUTTER), PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS' EXPENSE.
11. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2415 (SAWCUT ONLY).
12. WHEELCHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB & GUTTER.

KEYED GENERAL NOTES

1. INSTALL CONCRETE VALLEY GUTTER AS PER STD. DWG. 2420
2. INSTALL CONCRETE VALLEY GUTTER AS PER STD. DWG. 2421
3. INSTALL WHEELCHAIR RAMP AS PER STD. DWG. 2441, CASE I
4. INSTALL WHEELCHAIR RAMP AS PER MODIFIED STD. DWG. 2441, CASE II WITH ALTERNATE SECTION AA AND AS PER DETAIL SHEET 11
5. STD. CURB & GUTTER AS PER STD. DWG. 2415
6. MEDIAN CURB & GUTTER AS PER STD. DWG. 2415
7. FUTURE 4' SIDEWALK
8. BUILD 4' SIDEWALK
9. BUILD 10' ASPHALT TRAIL UNLESS OTHERWISE NOTED

AS-BUILT INFORMATION

CONTRACTOR
WORK STAKED BY
INSPECTOR'S ACCEPTANCE
FIELD VERIFICATION BY
MYLAR REVISED BY
CORRECTED BY
DATE

BENCH MARKS
ACS BRASS TABLET STAMPED "1-B9 1980"
GEOGRAPHIC POSITION (NAD 1927)
N.M. STATE PLANE COORDINATES
(CENTRAL ZONE) X=355,077.00
Y=1,529,056.93
GROUND-TO-GRID FACTOR = .99966334
DELTA ALPHA -00°16'47"

MICRO-FILM INFORMATION
RECORDED BY
DATE

FIELD NOTES

NO.	BY	DATE	REMARKS
			REVISIONS
			DESIGN

DESIGNED BY YOP
DATE 3/2001

ENGINEER'S SEAL

KEVIN G. PATTON
NEW MEXICO
13685
REGISTERED PROFESSIONAL ENGINEER

SURVEY INFORMATION

Bohannan ▲ Huston
Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROU

VISTA DE ARENAL SUBDIVISION AT VENTANA RAN
PAVING PLAN & PROFILE
VENDAVAL AVENUE

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR.	MO./DAY

CITY PROJECT NO.
ZONE MAP NO. B-9
SHEET 16 OF

I:\01347*CDP*PNP*01347PPNP05.DGN
BHI JOB NO. 01 347