

**DRAINAGE REPORT
FOR
WESTERN SHADOWS UNIT 2**

SEPTEMBER 12, 2005

Prepared for:

**VENTANA WEST LLC
#10 TRAMWAY LOOP NE
ALBUQUERQUE, NM 87122-2000**

Prepared by:

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PREPARED BY:

Jerome Aigner 9.13.05
Jerome Aigner, E.I. Date

UNDER THE SUPERVISION OF:

Scott J. Steffen 9/13/05
Scott J. Steffen, P.E. Date

Bohannon Huston INC.

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I. INTRODUCTION

This drainage study establishes a drainage management plan for the proposed development of Western Shadows Unit 2 on Tract 14, Ventana Ranch West located at the southeast corner of Del Oeste Drive and Ventana Ridge Road in northwest Albuquerque. This subdivision is approximately 19.2 acres of residential (zoned R-LT) land to be subdivided into 83 single family residential lots. As the proposed residence complies with the proposed zoning of the property, no additional entitlement or zoning effort is required prior to building on the property.

This report outlines the hydrological methods used, and summarizes the existing and proposed drainage conditions necessary to support the planned 83-unit development. More specifically, this report is submitted in conjunction with the preliminary plat application. Therefore, preliminary plat and grading plan approval is requested. Prior to final plat and building permit approvals of this project, the City of Albuquerque (COA) must approve final grading plans and work order construction plans. Calculations and supporting data are presented in the appendices. Drainage basin maps, a grading plan, and a copy of the preliminary plat are included at the end of this report.

II. METHODOLOGY

Existing and proposed site hydrological conditions were analyzed for the 100-year, 6-hour storm in accordance with the revised Section 22.2, Hydrology, of the Development Process Manual (DPM) for the City of Albuquerque, dated January 1993. The Arid-lands Hydrologic Model (AHYMO) was utilized to determine peak flow rates for design of the storm drainage improvements within the project. The 100-year, 6-hour storm is used as the design event. The results are included in Appendix A. Street capacities were analyzed using Manning's equation, consistent with the revised DPM Section 22.2. All data and calculations supporting this study are located in Appendix B.

The following previously approved documents were used in the preparation of this report:

- 1) Ventana Ranch West Subdivision Drainage Management Plan, prepared by Bohannon Huston, Inc., dated October 10, 2003. This report allows for 61 cfs of developed runoff to discharge from the project site.
- 2) Work Order Construction Plans for Ventana Ranch West, Public Improvement District/Additional Backbone Roadway and Storm Drain Improvements, Phase 2, C.O.A. Prj. No. 617685, prepared by Bohannon Huston, Inc., Engineer's stamp dated September 7, 2004. This plan dictates a capacity of 69 cfs which can discharge from the project site into the storm drain within Ventana Ridge Road.

III. EXISTING CONDITIONS

A. Topography

This site is currently undeveloped land with grades ranging from approximately 1% to 6%. Review of soils information in the area indicates that the soils consist primarily of fine to medium grained silty sands with traces of clayey sands, silts and slightly silty to poorly graded sands. Vegetation is light consisting mostly of native grasses and shrubs.

B. Existing Drainage Patterns

The site generally drains from west to east as sheet flows. Future development in the area will not alter the natural drainage pattern of the area.

C. FEMA Floodplain

As designated on Panel 100 of 825 (Map number 35001C0100E) of the National Flood Insurance Program, Flood Insurance Rate Maps published by FEMA for Bernalillo County, New Mexico, map revised November 19, 2003, there is no existing flood hazard zone (zone AO) within the proposed development. See the FEMA Floodplain exhibit provided at the end of the report text.

IV. PROPOSED DEVELOPED CONDITIONS

Western Shadows Unit 2 subdivision is a proposed single-family residential development with 83 lots on 19.2 acres. Proposed street configurations are shown on the *Preliminary Plat*, **Exhibit 1**. The site will be accessible from Ventana Ridge Road NW.

A. Onsite Flows

The site was divided into seven onsite basins; 14A-F and DB-Park. Basin DB-Park, which is the future park site, drains into a proposed temporary retention pond to be built as part of Western Ridge Subdivision Unit 2. Basin 14C which is made up of Tuscarora Rd. also drains into Western Ridge Subdivision Unit 2. Basins 14A, 14B, 14D, 14E, and 14F discharge via surface flows to a sump area with proposed inlets within Yolanda Drive located within Basin 14D. Developed runoff is then conveyed by the proposed inlets into an existing 36" public storm drain in Ventana Ridge Road via a proposed storm drain within Yolanda Drive. A portion of the runoff generated by Basins 14A and 14B (approximately 14 cfs) is intercepted by proposed inlets located at the intersection of Jacob Avenue and Yolanda Drive and conveyed into the proposed storm drain within Yolanda Drive, with the bypass flows continuing to the sump area within Yolanda Drive mentioned above. Although an emergency overflow for the proposed sump area exists at the west end of Tuscarora Road, the proposed inlets within sump area within Yolanda Drive have been designed to accommodate twice the 100-year developed flowrate. A total of 61 cfs of developed runoff will discharge into the existing storm drain within Ventana Ridge Road, which is in conformance with the Ventana Ranch West Subdivision Drainage Management Plan as well as the storm drain capacity shown in the Work Order Construction Plans for Ventana Ranch West, Public Improvement District/Additional Backbone Roadway and Storm Drain Improvements, Phase 2.

The percent impervious land treatment for the proposed conditions is determined from Table A-5 of the DPM, Section 22.2. The land treatment values used in the AHYMO analysis are 20% treatment B, 20% treatment C, and 60% treatment D.

B. Offsite Flows

Existing Basin 501A as shown in the Ventana Ranch West Subdivision Drainage Management Plan is located directly west of the project site. This basin does not enter the project site due to an existing berm located just west of the project site. The berm grade was set as part of a master plan water line project that has been constructed in the future Del Oeste right-of-way. This berm directs undeveloped flows from Basin 501A toward the north where the runoff discharges into the West Branch of the Calabacillas Arroyo. The top of berm elevation is assumed to be the future road grade for Del Oeste Boulevard. The flow pattern for Basin 501A will not be altered as part of this project.

Offsite Basin 501B conveys minimal flow into Ventana Ridge Road. A small basin from the high point in Del Oeste Boulevard to the center-line of Ventana Ridge Road having a width equal to the east half of the right of way, produces 2.3 cfs that will flow into Ventana Ridge Road from the future Del Oeste Boulevard.

Please refer to Exhibits 5 and 6 for additional information on Del Oeste Boulevard and Basins 501A/501B.

V. CONCLUSION

This report provides a detailed study of the developed runoff and street capacities for the proposed Western Shadows Subdivision, Unit 2. Included is the preliminary plat, proposed conditions basin map, grading plan, infrastructure list, and all necessary hydrologic and hydraulic analyses. Erosion and dust control, consisting of erosion control berms, silt fencing and sedimentation basins, are proposed to prevent soil washing or blowing into paved streets, storm drains, and existing development areas. This drainage plan maintains the overall drainage pattern of the area and allows for the safe management of storm runoff in permanent as well as interim conditions, and is in conformance with the Ventana Ranch West Subdivision Drainage Management Plan.

TRACT14-EX.SUM

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -
 (MON/DAY/YR) =08/18/2005
 INPUT FILE = ex.txt
 AHYMO-S-9702c1BohanHu-AH

- VERSION: 1997.02c
 RUN DATE
 USER NO.=

CFS	PAGE = 1	HYDROGRAPH	FROM	TO	PEAK	RUNOFF	RUNOFF	TIME TO
PER	COMMAND	IDENTIFICATION	ID	ID	DISCHARGE	VOLUME	PEAK	PEAK
ACRE	NOTATION	NO.	NO.	(SQ MI)	(CFS)	(AC-FT)	(INCHES)	(HOURS)

*S VENTANA RANCH WEST TRACT 14 - EXISTING CONDITIONS

START

TIME= .00

RAINFALL TYPE= 1

RAIN6= 2.200

*S***Basin 14EX

COMPUTE NM HYD

1.317 PER IMP= .00

FINISH

25.26 .718 .44903 1.500

AHYMO.SUM

- VERSION: 1997.02c

RUN DATE

USER NO.=

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -

(MON/DAY/YR) =08/17/2005

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AHYMO-S-9702c\BohanHu-AH

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PER	HYDROGRAPH	ID	ID	(SQ MI)	DISCHARGE	VOLUME	PEAK
ACRE	COMMAND	IDENTIFICATION	NO.		(CFS)	(AC-FT)	(HOURS)
NOTATION							
*S VENTANA RANCH WEST TRACT 14 STREET FLOW							
START							
TIME= .00							
RAINFALL TYPE= 1							
RAIN6= 2.200							
*S***Basin 14A							
COMPUTE NM HYD							
3.612	PER IMP= 60.00	14A	- 1	.00788	18.20	.636	1.51376 1.500
*S***Basin 14B							
COMPUTE NM HYD							
3.615	PER IMP= 60.00	14B	- 3	.00361	8.35	.291	1.51376 1.500
*S***Basin 14C							
COMPUTE NM HYD							
4.147	PER IMP= 80.00	14C	- 5	.00033	.87	.031	1.77715 1.500
*S***Basin 14D							
COMPUTE NM HYD							
3.614	PER IMP= 60.00	14D	- 7	.00472	10.91	.381	1.51376 1.500
*S***Basin 14E							
COMPUTE NM HYD							
3.613	PER IMP= 60.00	14E	- 9	.00578	13.37	.467	1.51376 1.500
*S***Basin 14F							
COMPUTE NM HYD							
3.614	PER IMP= 60.00	14F	- 11	.00464	10.73	.375	1.51376 1.500
*S***Basin PARK							
COMPUTE NM HYD							
2.053	PER IMP= .00	PARK	- 13	.00302	3.96	.109	.67987 1.500
ADD HYD							
3.613		EF 9&11	14	.01042	24.10	.841	1.51370 1.500
ADD HYD							
3.613		AB 1&3	16	.01148	26.55	.927	1.51371 1.500
ADD HYD							
3.613		ABEF 14&16	17	.02191	50.66	1.768	1.51370 1.500
ADD HYD							
3.613		TOTAL 17&7	18	.02663	61.57	2.149	1.51370 1.500
FINISH							

A-56

Kate Drive

Kate Drive is a short 28' face-face street at a high point so no specific analysis was needed. **No inlets needed.**

Carly Drive

Carly Drive is a 28' face-face street with 1.4 cfs draining through it. The street slope is 1.1% and has a capacity of 37.8 cfs. **No inlets needed.**

Shelline Avenue

Shelline Avenue is a 28' face-face street with a cul-de-sac to its west end. At its critical point the street flow is approximately 5.5 cfs. The street slope is 2.8% and has a capacity of 30 cfs. This 5.5 cfs is conveyed into Yolanda Drive for a short section and ultimately to the low point. **No inlets needed.**

Jacob Avenue

Jacob Avenue is a 28' face-face street with two analysis points. The first point is as the intersection of Carly Drive and Jacob Avenue. At this point, the street flow is approximately 18.2 cfs. The street slope is 2.1% and has a capacity of 32.5 cfs. **No inlets needed at this point.**

The second analysis point is at the intersection of Yolanda Drive and Jacob Avenue. At this point the street flow is approximately 26.6 cfs. The street slope is 2.5% and has a capacity of 30.6 cfs. **2 Type A inlets will be used at this point.** According to the Grating Capacities graph, a type A inlet with 0.44' of head will accept approximately 7.2 cfs. One inlet will be installed on each side of the street which will reduce subsequent flow to 12.2 cfs.

Skylar Avenue

Skylar Avenue is a 28' face-face street with two analysis points. The first point is as the intersection of Carly Drive and Skylar Avenue. At this point, the street flow is approximately 13.4 cfs. The street slope is 1.9% and has a capacity of 32.9 cfs. **No inlets needed at this point.**

The second analysis point is at the intersection of Yolanda Drive and Jacob Avenue. At this point the street flow is approximately 24.2 cfs. The street slope is 3.2% and has a capacity of 28.6 cfs. **No inlets needed at this point.** However, the flow is redirected at this point into Yolanda Drive. A weir analysis was performed due to slight ponding and loss of momentum. A weir with 0.67' of depth and a 32' width (no street crown) can convey 52.9 cfs.

Yolanda Drive

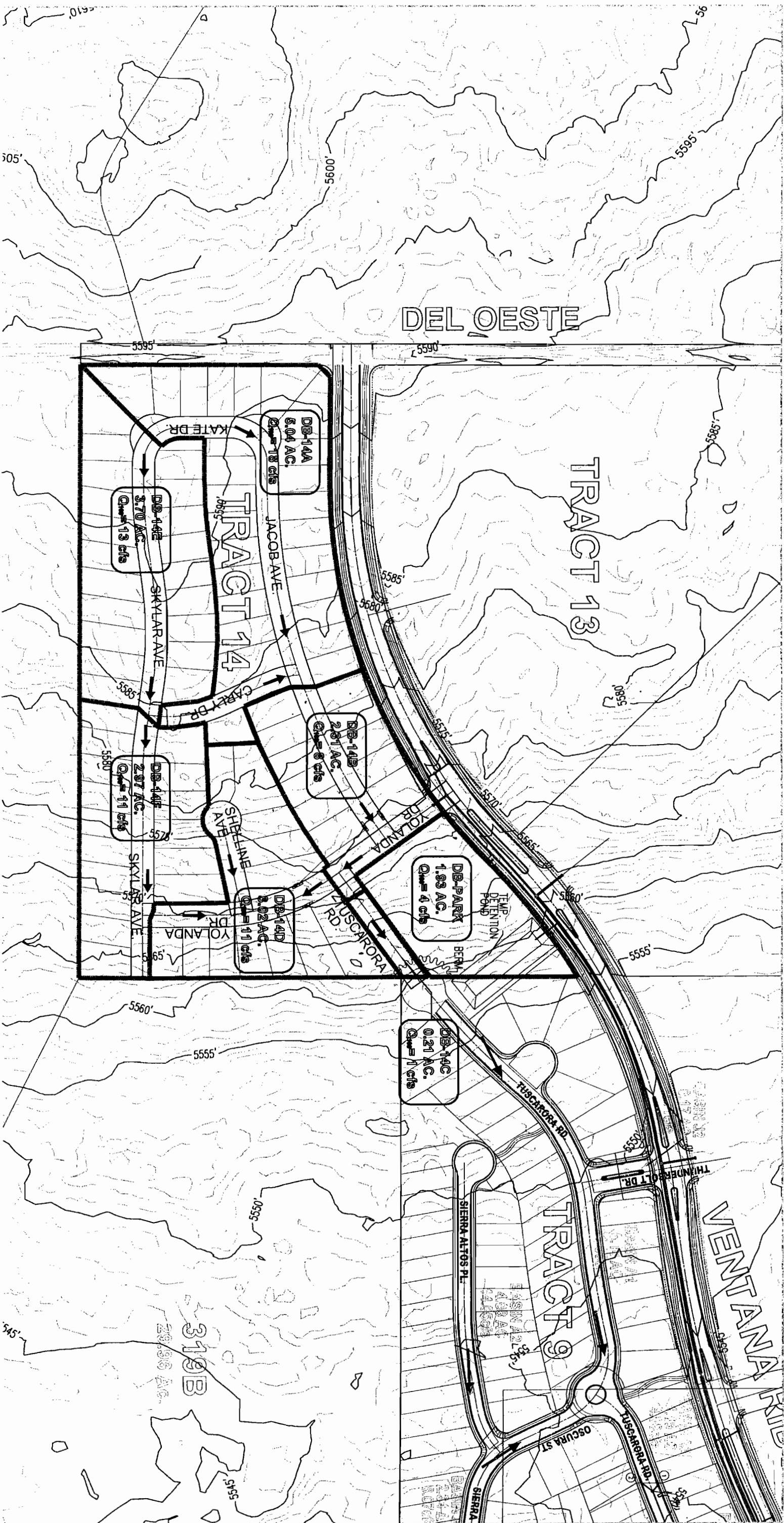
Yolanda Drive is a 32' face-face street that was analyzed at two separate points. The first point is at the intersection of Jacob Avenue and Yolanda Drive. At this point the street accepts 12.2 cfs from Jacob Avenue. This combines with 2 cfs from the northern section of Yolanda Dr. and travels toward the low point (sump condition). The street slope upstream of the low point is 3% and has a capacity of 31.8 cfs. So **no inlets are needed** before the low point.

To the south, Yolanda Drive accepts 24.2 cfs from Skylar Ave. The street slope is 0.9% and has a capacity of 44.6 cfs. **No inlets are needed** before the low point.

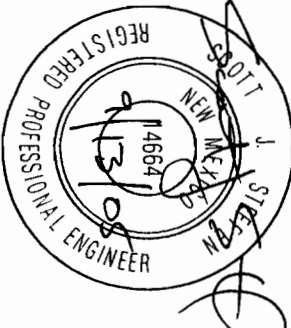
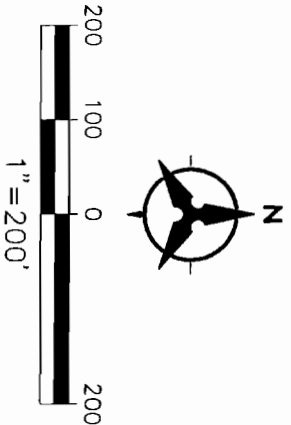
At the low point a sump condition occurs. According to the Grating Capacities graph, a double grate Type A inlet will accept 50 cfs. Incoming flows total approximately 47.8 cfs. **2 Type A Double Grate inlets will be used at this point.**

Tuscarora Drive

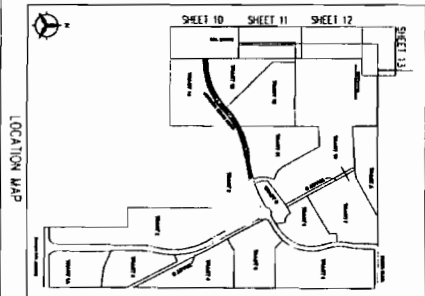
Tuscarora Drive is a short 28' face-face street that drains less than 1 cfs offsite. **No inlets needed.**



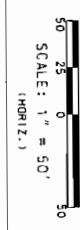
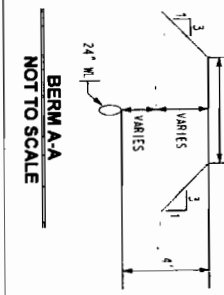
DEVELOPED CONDITIONS BASIN MAP
WESTERN SHADOWS UNIT 2
AUGUST, 2005



DEL OESTE 0+00.00 - 11+00.00



Tangent Table		
ID	BEARING	LENGTH
T1	N00°27.49'E	3456.19'
T2	S89°42.11'E	80.00'

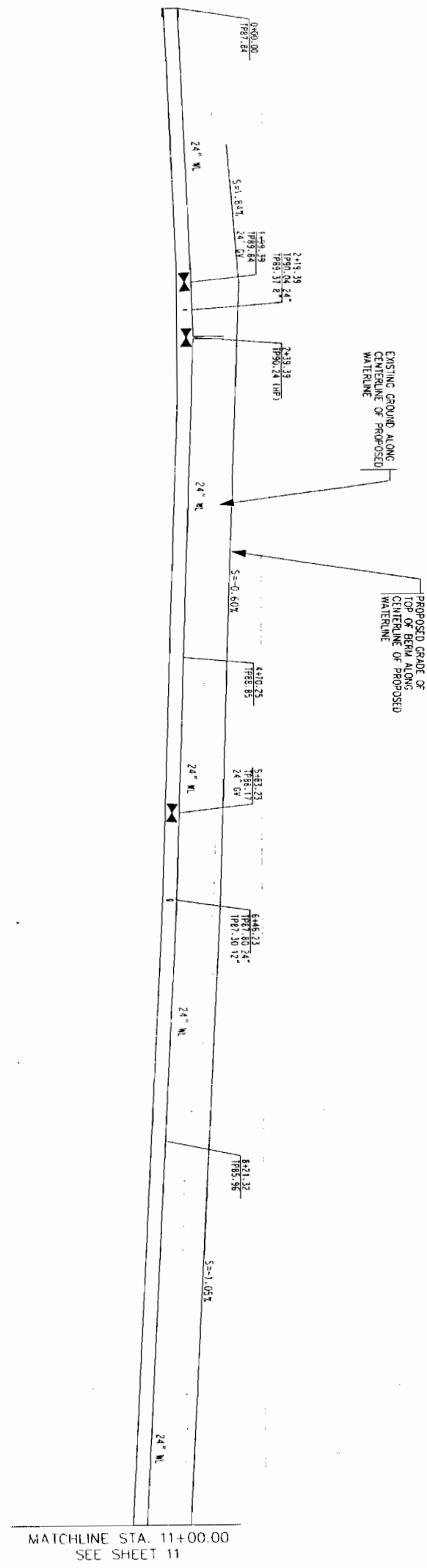


- NOTES:
1. ALL MECHANICAL JOINTS SHALL BE RESTRAINED AT THE FITTING.
 2. THE CONTRACTOR SHALL PROVIDE A MINIMUM PIPE LENGTH OF 20.0' FROM THE END OF THE PIPE TO THE FIRST RESTRAINED JOINT.
 3. THE CONTRACTOR SHALL RESTRAIN ALL PIPE JOINTS IN THE SPECIFIED DISTANCE LISTED IN THE TABLE ABOVE. (SEE NOTE 2 ABOVE).
 4. THE CONTRACTOR SHALL RESTRAIN ALL PIPE JOINTS FROM THE TEE ON THE MAIN TO THE FIRE HYDRANT FLANGE.
 5. RESTRAINED LENGTHS FOR REDUCERS ARE FOR THE LARGE SIZE.
 6. RESTRAINED LENGTHS FOR VERTICAL BRIDS ARE SHOWN IN PROFILE.

RESTRAINING JOINT TABLE			
MECHANICAL JOINTS	LENGTH OF RESTRAINED JOINTS		
GATE/AIR RELEASE VALVE	N/A	N/A	65
24" DIPTOP DIPK DIP 1/2 PVC	55	55	65
BUTTERFLY VALVE	N/A	N/A	65
CD	65	55	40
TE	-	14	18
REDUCER (24" x 20")	20	-	-
REDUCER (20" x 14")	N/A	28	-

1. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
2. CONTRACTOR IS TO INSTALL A 4" x 4" x 5' POST AND END AT THE END OF EACH SANITARY SEWER SERVICE.
3. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
4. CONTRACTOR SHALL PROVIDE THE INSPECTORS, (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
5. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
6. ANY DAMAGE TO THE EXISTING FACILITIES (CORG & UTILITY CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
7. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DMC 2415 (SMAJUT ONLY).
8. ALL EXCAVATION, TRENCHING AND SHORING ACTIVITIES MUST BE CARRIED-OUT IN ACCORDANCE WITH OSHA 29 CFR 1926.650 SUBPART P.
9. NO WORK SHALL BE UNDER TAKEN WITHIN EXISTING 50' GAS LINE EASEMENT WITHOUT FIRST CONTACTING PMA.
10. CONTRACTOR MUST MAINTAIN TWO-WAY TRAFFIC AT ALL TIMES DURING CONSTRUCTION. THE USE OF ANY UNAPPROVED ROAD BLOCKS OR ROAD CLOSURES WILL BE ALLOWED WITH PROPER BARRICADING.

ENGINEER'S SEAL		SURVEY INFORMATION		BENCH MARKS		AS-BUILT INFORMATION	
		FIELD NOTES		ACS BRASS TABLET STAMPED "2-B10 1980"		CONTRACTOR	
		NO.	DATE	GEOGRAPHIC POSITION (NAD 1927)		STAKED BY	DATE
				N.M. STATE PLANE COORDINATES		INSPECTOR'S	DATE
				(CENTRAL ZONE)		ACCEPTANCE BY	DATE
				X = 357,543.73 Y = 1,527,976.48		FIELD	DATE
				GROUND-TO-GRID FACTOR = 99966.354		VERIFICATION BY	DATE
				DELTA ALPHA = -00'16.30"		DRAWING	DATE
				NGVD 1929 ELEVATION = 5429.35		CORRECTED BY	DATE
						MICRO-FILM INFORMATION	
						RECORDED BY	DATE
						NO.	



5630
5620
5610
5600
5590
5580
5570
5560
5550

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CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP
BACKBONE WATER & SANITARY SEWER IMPROVEMENTS - PHASE 2
UTILITY PLAN & PROFILE
DEL OESTE 0+00.00 - 11+00.00

DESIGN: RENEW COMMITTEE
CHECKED: JGP
DATE: 3/2/2004

APPROVED BY: JGP
DATE: 3/2/2004

DESIGNED BY: JP/KGP
DATE: 3/2/2004

DRAWN BY: BS/ARR
DATE: 3/2/2004

CHECKED BY: KGP
DATE: 3/2/2004