City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 2, 2003

Larry D. Read, PE
Larry Read & Associates
4800-C Juan Tabo NE
Albuquerque, NM 87111

Re: 8-Acre Parcel @ 90th and Sunset Gardens Drainage Report
Engineer's Stamp dated 5-22-03, (L9/D32)

Dear Mr. Read,

Based upon the information provided in your submittal dated 5-22-03, the above referenced plan is approved for Site Development Plan for Subdivision and Preliminary Plat action by the DRB.

This project requires a National Pollutant Discharge Elimination System (NPDES) permit. Refer to the attachment that is provided with this letter for details. If you have any questions please feel free to call the Public Works Hydrology section at 768-3654 (Charles Caruso) or 768-3645 (Brian Wolfe).

If you have any questions, please contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: Chuck Caruso, CoA
file

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

L-9/D32

PROJECT TITLE: 8-acre Parcel & 90th St Sunset Gardens
DRB #: 1001178 EPC#: ZONE MAP/DRG. FILE #: D9
WORK ORDER#:

LEGAL DESCRIPTION: TRACT 23, BLOCK 15, ORIGINAL TOWNSITE OF WESTLAND
CITY ADDRESS: 90th & Sunset Gardens

ENGINEERING FIRM: Larry Read & Assoc.
ADDRESS: 4900 Juan Tabo NE, Suite C
CITY, STATE: ALB, NM
CONTACT: LARRY READ
PHONE: 237-5471
ZIP CODE: 87111

OWNER:
ADDRESS:
CITY, STATE:
CONTACT:
PHONE:
ZIP CODE:

ARCHITECT:
ADDRESS:
CITY, STATE:
CONTACT:
PHONE:
ZIP CODE:

SURVEYOR:
ADDRESS
CITY, STATE:
CONTACT:
PHONE:
ZIP CODE:

CONTRACTOR:
ADDRESS:
CITY, STATE:
CONTACT:
PHONE:
ZIP CODE:

CHECK TYPE OF SUBMITTAL:

- ___ DRAINAGE REPORT
- ___ DRAINAGE PLAN 1st SUBMITTAL, *REQUIRES TCL or equal*
- ___ DRAINAGE PLAN RESUBMITTAL
- X CONCEPTUAL GRADING & DRAINAGE PLAN
- ___ GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SIA / FINANCIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- X S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ___ YES
- X NO
- ___ COPY PROVIDED

RECEIVED
MAY 22 2003
HYDROLOGY SECTION

DATE SUBMITTED: MAY 21, 2003 BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

DRAINAGE REPORT

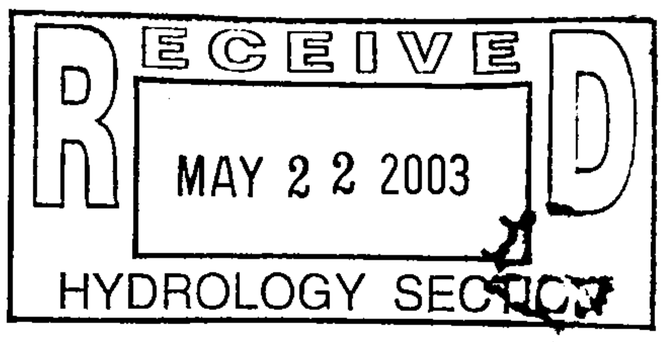
for

8-ACRE COMMERCIAL SUBDIVISION AT 90th & SUNSET GARDENS

ALBUQUERQUE, NEW MEXICO

May 16, 2003

Prepared by
Larry D. Read, P.E.
4800 Juan Tabo Blvd., N.E. Suite C
Albuquerque, New Mexico 87111
(505) 237-8421 Fax (505) 237-8422



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DRAINAGE REPORT

for

8-ACRE COMMERCIAL SUBDIVISION AT 90th & SUNSET GARDENS

ALBUQUERQUE, NEW MEXICO

May 16, 2003

LOCATION & DESCRIPTION

The proposed site, located at the northwest corner of 90th Street SW and Sunset Gardens Road SW **(Exhibit 1)**, includes 8 undeveloped acres. The developer is proposing to subdivide the parcel into three 2-acre lots and two 1-acre lots as shown on the Conceptual Grading Plan in the pocket at the end of this report. The subdivided lots will include a small office/warehouse space with associated paved parking. The balance of the site will be graded to provide an unpaved outdoor storage or laydown area.

A residential subdivision has been developed on the east side of 90th Street, directly east of this site. The land to the north and west of this site is old sporadic development consisting of industrial/commercial with interspersed residential. The existing offsite development land treatments are below the accepted maximums used for IP Zoning. Therefore, the runoff generated from these offsite basins can be expected to increase in the future.

FLOODPLAIN STATUS

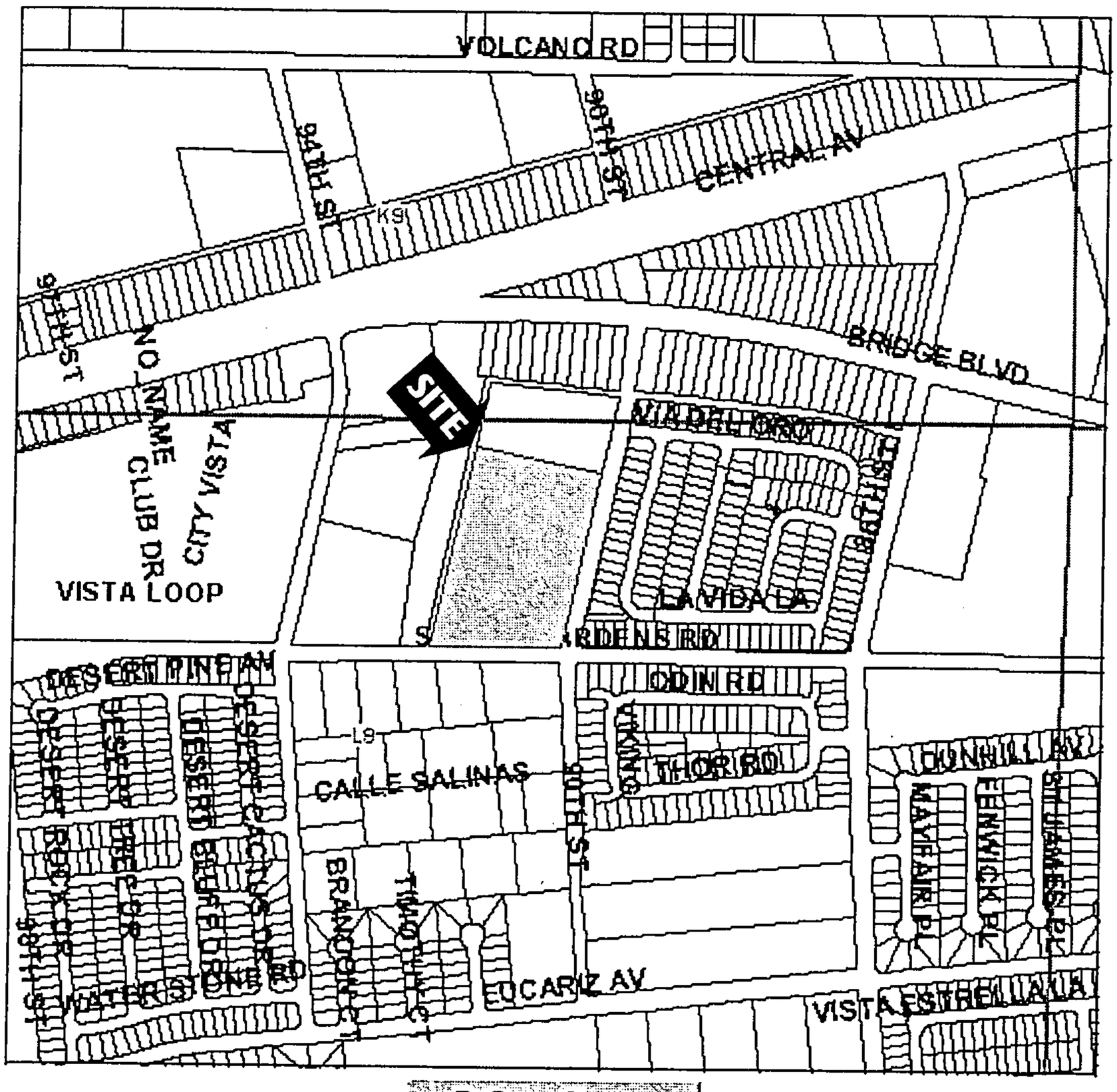
This project, as shown on FEMA's Flood Insurance Rate Map 35043C0328 D, dated September 20, 1996, is not in a designated floodplain. The nearest designated floodplain is on Bridge Boulevard several hundred feet north of the site as shown on **Exhibit 2**.

METHODOLOGY

The hydrology for this project was analyzed using the Quick Calculations of the June 1997 release of the City of Albuquerque Development Process Manual, Section 22.2. **Table 1** summarizes these calculations.

Activate By 'Clicking' on the Map

Zoom In | Id Address | Id ZM | Pan | Zoom Out



ReDraw Screen

1999 AIR PHOTO (Metro Area Coverage)

CITY

LAY

STREE
PARKS
CITY L
ZONE
NBR B
COMM
WATEI
SEWEF
STORM
ZONIN
LOT NU
ZIP CO
COUNC
FLOOD
PARCE
CONTF
SENAT
REPRE
COUNT
PARCE
CRIMI
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PROX

PRECIPITATION

The 100-yr 6-hour duration storm was used as the design storm for this analysis. For this design storm the calculations require the 6 and 24-hour along with the 10-day precipitation values. In addition Excess Precipitation and Peak Discharge values for Zone 1 have to be input from tables within of the City of Albuquerque Development Process Manual, Section 22.2.

EXISTING DRAINAGE

The existing site slopes toward the east at approximately 2.7% and has not been disturbed so it is well vegetated with desert grasses and weeds. The runoff from this parcel drains into 90th Street via sheet flow. Once in 90th Street, the flow splits at the existing high point shown on the grading plan and flows north to the existing alley on the north edge of the Valle Del Canto Unit II Subdivision. The flow entering 90th Street south of the high point flows south to the intersection with Sunset Gardens Road where it split again due to an existing north/south valley gutter on the east leg of the intersection. Per the calculations shown in **Appendix A** 0.69 cfs will continue south in the valley. Any flow in addition to 0.69 cfs will flow east on Sunset Gardens due to the slope (2.4%).

The site is impacted by runoff from several offsite drainage basins as shown on the Offsite Basin Map on the Grading Plan. Most of the offsite basins have some development existing but are not developed to the allowed density. The "Existing Conditions" portion of **Table 1** reflects the existing development in these basins instead of the traditional undeveloped condition. The runoff from Basins C and D sheet flow toward the east across this site. The majority of the runoff from Basins A and B are flowing in a more east northeast direction and only clip the corner of this site. Runoff from west of 94th Street has not been considered since construction of a storm drain in 94th is imminent.

INTERIM DEVELOPMENT CONDITION

Since Sunset Gardens Road and the existing storm drain in Sunset Gardens beginning just east of 86th Street have sufficient capacity for developed runoff from the onsite Basins I, J, and K and offsite Basins D and E, the Conceptual Grading Plan has indicated free discharge toward the intersection of 90th Street and Sunset Gardens. As discussed above, the flow will split at the east side of the intersection and 0.69 cfs will flow south in 90th Street (due to the valley gutter) while flows in excess of this amount will continue east in Sunset Gardens. The runoff from offsite Basin D will be intercepted in the proposed paved alley in the easement along the west side of this site. The proposed alley, to be constructed by this development, has a capacity of 48 cfs versus developed runoff from Basin D of 15 cfs. It will divert the runoff south into Sunset Gardens.

The alley on the north side of Villa Del Canto subdivision however does not have sufficient

capacity to handle developed runoff from onsite Basins G and H and offsite Basins A, B, and C as shown in the calculations in **Appendix A**. As an interim measure, the Conceptual Grading Plan has proposed temporary retention ponds in Basins G and H to hold all developed runoff from the respective basin during a 100-year, 10-day storm. These ponds will be removed from their respective site when a future storm drain is constructed in 90th Street from the entrance of the alley north to the existing storm drain in Bridge Boulevard. This storm drain should be constructed when offsite Basin A is developed. Likewise, this Conceptual Grading proposes to defer the construction of the paved alley west of Basins G and H until development in Basin A extends it north and east to 90th Street. As an interim measure, the Conceptual Grading and Drainage Plan proposes a temporary retention pond on the west side of onsite Basins G and H to hold the runoff from a 100-year, 10-day storm event in Offsite Basins B and C respectively. These ponds will be removed from the site when the alley is extended north and east to 90th Street.

FULLY DEVELOPED CONDITION

In the future when the storm drain discussed above is constructed in 90th Street, the runoff from onsite Basins G and H will free discharge to 90th Street and the onsite retention ponds in each basin will be regraded. Likewise when the alley west of this site is extended north and east to 90th Street, the retention ponds on the west side of Basins G and H will be regraded to drain east with the remainder of the onsite runoff. At this point, the paved alley section on the west side of Basins G and H will be constructed by this developer and the offsite runoff from Basins B and C will be diverted to 90th Street via the Alley section.

TABLE 1

100-YEAR HYDROLOGIC CALCULATIONS

BASIN #	AREA (acre)	LAND TREATMENT A (%)	B (%)	C (%)	D (%)	WEIGHTED E (in)	V (6-hr) (acre-ft)	V (6-hr) (cu-ft)	V(10 day) (acre-ft)	V(10 day) (cu-ft)	Q (cfs)
EXISTING CONDITIONS											
A	12.6600	48.00	0.00	28.00	24.00	0.96	1.01	44,173	1.39	60,386	31.29
B	2.3300	0.00	40.00	43.00	17.00	1.03	0.20	8,700	0.25	10,813	6.50
C	1.2200	0.00	10.00	78.00	12.00	1.08	0.11	4,763	0.13	5,545	3.62
RUNOFF TO EXISTING ALLEY											41.41
D	4.4900	0.00	16.00	67.00	17.00	1.11	0.41	18,017	0.51	22,090	13.43
E	3.8700	0.00	10.00	10.00	80.00	1.74	0.56	24,472	0.94	40,992	15.43
F	0.4400	0.00	10.00	10.00	80.00	1.74	0.06	2,782	0.11	4,661	1.75
G	2.0000	100.00	0.00	0.00	0.00	0.44	0.07	3,194	0.07	3,194	2.58
H	2.0000	100.00	0.00	0.00	0.00	0.44	0.07	3,194	0.07	3,194	2.58
I	2.0000	100.00	0.00	0.00	0.00	0.44	0.07	3,194	0.07	3,194	2.58
J	1.0000	100.00	0.00	0.00	0.00	0.44	0.04	1,597	0.04	1,597	1.29
K	1.0000	100.00	0.00	0.00	0.00	0.44	0.04	1,597	0.04	1,597	1.29
RUNOFF TO 90TH AND SUNSET GARDENS											40.93
TOTAL	**33.0100**						**2.58**	**112,490**	**3.54**	**154,070**	**82.33**
PROPOSED CONDITIONS											
A	12.6600	0.00	10.00	10.00	80.00	1.74	1.84	80,055	3.08	134,099	50.46
B	2.3300	0.00	10.00	10.00	80.00	1.74	0.34	14,734	0.57	24,680	9.29
C	1.2200	0.00	10.00	10.00	80.00	1.74	0.18	7,715	0.30	12,923	4.86
RUNOFF TO EXISTING ALLEY											64.61
D	4.4900	0.00	11.00	58.00	31.00	1.26	0.47	20,514	0.64	27,941	14.56
E	3.8700	0.00	10.00	10.00	80.00	1.74	0.56	24,472	0.94	40,992	15.43
F	0.4400	0.00	10.00	10.00	80.00	1.74	0.06	2,782	0.11	4,661	1.75
G	2.0000	0.00	10.00	54.00	36.00	1.31	0.22	9,516	0.31	13,358	6.65
H	2.0000	0.00	10.00	54.00	36.00	1.31	0.22	9,516	0.31	13,358	6.65
I	2.0000	0.00	10.00	54.00	36.00	1.31	0.22	9,516	0.31	13,358	6.65
J	1.0000	0.00	10.00	30.00	60.00	1.55	0.13	5,612	0.20	8,814	3.69
K	1.0000	0.00	10.00	30.00	60.00	1.55	0.13	5,612	0.20	8,814	3.69
RUNOFF TO 90TH AND SUNSET GARDENS											59.07
TOTAL	**33.0100**						**3.45**	**150,271**	**5.63**	**245,296**	**123.68**

EXCESS PRECIP.	0.44	0.67	0.99	1.97	E_i (in)
PEAK DISCHARGE	1.29	2.03	2.87	4.37	Q_{Pi} (cfs)

WEIGHTED E (in) = $(E_A)(\%A) + (E_B)(\%B) + (E_C)(\%C) + (E_D)(\%D)$

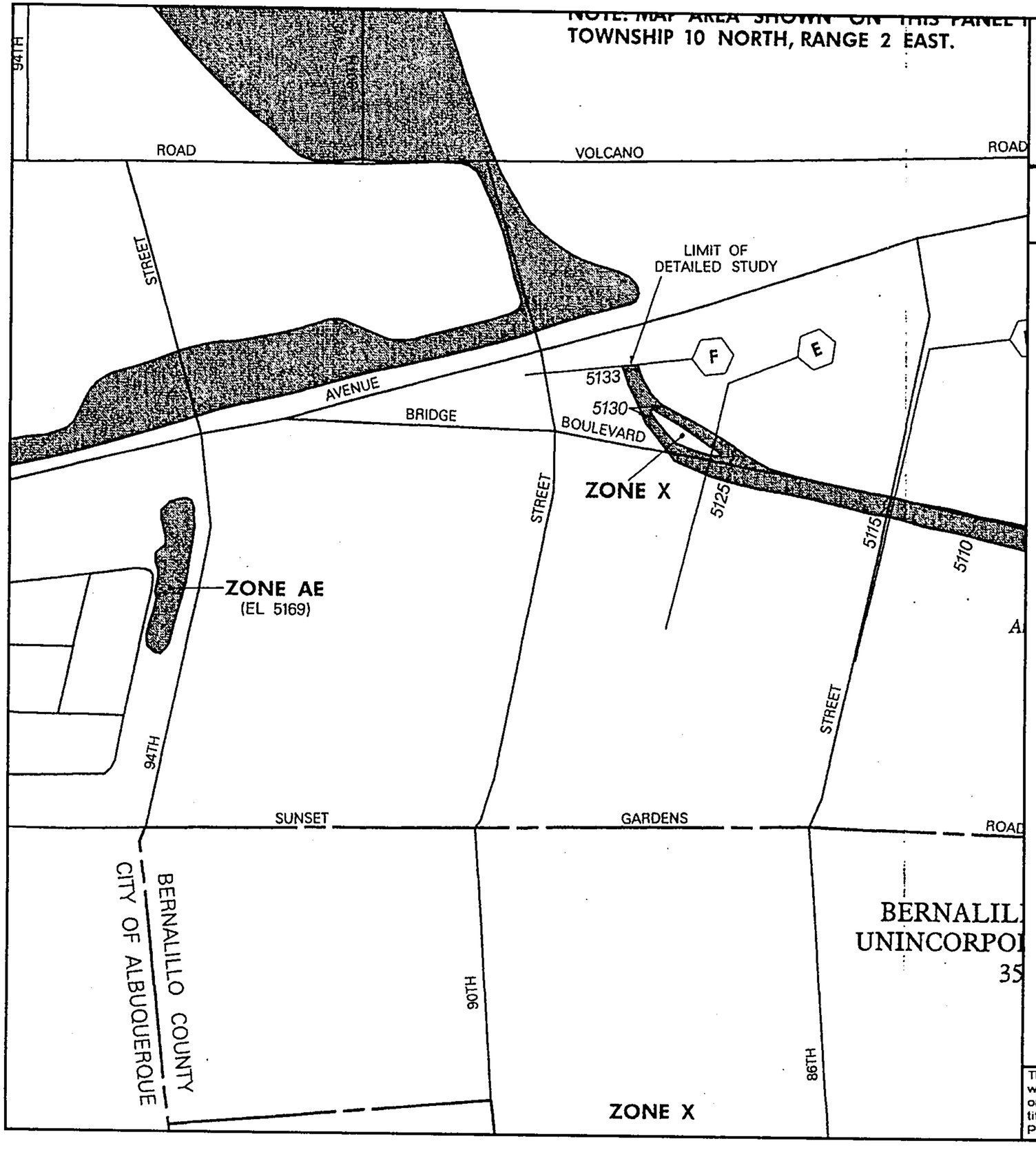
$V_{6\text{-HR}}$ (acre-ft) = (WEIGHTED E)(AREA)/12

V_{10DAY} (acre-ft) = $V_{6\text{-HR}} + (A_D)(P_{10DAY} - P_{6\text{-HR}})/12$

Q (cfs) = $(Q_{PA})(A_A) + (Q_{PB})(A_B) + (Q_{PC})(A_C) + (Q_{PD})(A_D)$

ZONE =	1
$P_{6\text{-HR}}$ (in.) =	2.20
$P_{24\text{-HR}}$ (in.) =	2.66
P_{10DAY} (in.) =	3.67

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED IN TOWNSHIP 10 NORTH, RANGE 2 EAST.



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 328 OF 825

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0328	D
BERNALILLO COUNTY, UNINCORPORATED AREAS	350001	0328	D

MAP NUMBER
35001C0328 D

EFFECTIVE DATE:
SEPTEMBER 20, 1996

Federal Emergency Management Agency

APPENDIX A

Miscellaneous Calculations

NEW ALLEY CAPACITY - SOUTH END
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	ALLEY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.005000	ft/ft
Water Surface Elevation	99.92	ft

Elevation range: 99.31 ft to 100.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	100.00	0.00	20.00	0.017
0.74	99.97			
0.76	99.31			
19.24	99.31			
19.26	99.97			
20.00	100.00			

Results		
Wtd. Mannings Coefficient	0.017	
Discharge	48.10	cfs
Flow Area	11.28	ft²
Wetted Perimeter	19.70	ft
Top Width	18.52	ft
Height	0.61	ft
Critical Depth	99.90	ft
Critical Slope	0.005430	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energy	100.20	ft
Froude Number	0.96	
Flow is subcritical.		

NEW ALLEY CAPACITY - NORTH END
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	ALLEY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.007700	ft/ft
Water Surface Elevation	99.92	ft

Elevation range: 99.31 ft to 100.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	100.00	0.00	20.00	0.017
0.74	99.97			
0.76	99.31			
19.24	99.31			
19.26	99.97			
20.00	100.00			

Results		
Wtd. Mannings Coefficient	0.017	
Discharge	59.69	cfs
Flow Area	11.28	ft²
Wetted Perimeter	19.70	ft
Top Width	18.52	ft
Height	0.61	ft
Critical Depth	100.01	ft
Critical Slope	0.005285	ft/ft
Velocity	5.29	ft/s
Velocity Head	0.43	ft
Specific Energy	100.35	ft
Froude Number	1.19	
Flow is supercritical.		

ALLEY CAPACITY - EG 0.2' ABOVE CURB
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	ALLEY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.019000	ft/ft
Water Surface Elevation	99.67	ft

Elevation range: 99.31 ft to 100.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	100.00	0.00	20.00	0.017
0.74	99.97			
0.76	99.31			
19.24	99.31			
19.26	99.97			
20.00	100.00			

Results		
Wtd. Mannings Coefficient	0.017	
Discharge	38.68	cfs
Flow Area	6.56	ft²
Wetted Perimeter	19.19	ft
Top Width	18.50	ft
Height	0.36	ft
Critical Depth	99.82	ft
Critical Slope	0.005639	ft/ft
Velocity	5.89	ft/s
Velocity Head	0.54	ft
Specific Energy	100.20	ft
Froude Number	1.74	
Flow is supercritical.		

VALLEY GUTTER CAPACITY AT 90TH & SUNSET
Worksheet for Triangular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	VALLEY GUTTER AT 90TH AND SUNSET GARDEN
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.012000	ft/ft
Depth	0.12	ft
Left Side Slope	16.670000	H : V
Right Side Slope	33.330000	H : V

Results		
Discharge	0.69	cfs
Flow Area	0.36	ft²
Wetted Perimeter	6.01	ft
Top Width	6.00	ft
Critical Depth	0.14	ft
Critical Slope	0.006034	ft/ft
Velocity	1.92	ft/s
Velocity Head	0.06	ft
Specific Energy	0.18	ft
Froude Number	1.38	
Flow is supercritical.		

SUNSET GARDENS CAPACITY
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	SUNSET GARDENS
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data				
Channel Slope	0.024000 ft/ft			
Water Surface Elevation	99.58 ft			
Elevation range: 99.14 ft to 100.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	100.00	0.00	60.00	0.017
9.99	99.80			
10.01	99.14			
30.00	99.54			
49.99	99.14			
50.01	99.80			
60.00	100.00			

Results		
Wtd. Mannings Coefficient	0.017	
Discharge	49.50	cfs
Flow Area	9.60	ft²
Wetted Perimeter	40.87	ft
Top Width	40.01	ft
Height	0.44	ft
Critical Depth	99.70	ft
Critical Slope	0.006124	ft/ft
Velocity	5.16	ft/s
Velocity Head	0.41	ft
Specific Energy	99.99	ft
Froude Number	1.86	
Flow is supercritical.		

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 1, 2003

Larry D. Read, PE
Larry Read & Associates
4800-C Juan Tabo NE
Albuquerque, NM 87111

Re: 8-Acre Parcel @ 90th and Sunset Gardens Grading and Drainage Plan
Engineer's Stamp dated 4-8-03, (L9/D32)

Dear Mr. Read,

Based upon the information provided in your submittal dated 4-7-03, the above referenced plan cannot be approved for Preliminary Plat until the following comments are addressed.

- What is the elevation at the grade break in 90th? What will be the design slopes of 90th? Please provide as-built information for the subdivision east of your project including the existing alley that will accept the north half of your site. The calculations provided (not stamped) show a depth of 0.28 feet. What is the capacity at 0.5 feet depth (height of existing curb)?

- Please provide the new alley elevations on your grading plan. If there is a grade break in the alley, where will the northerly flows go?

- The subdivisions east of your project built a valley gutter along 90th. Your low flows will enter the Valhalla Estates subdivision. Your report should mention this.

If you have any questions, please contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: file

L-9/D32

DRAINAGE INFORMATION SHEET
(REV. 11/01/2001)

PROJECT TITLE: 8 ACRE PROPERTY ZONE MAP/DRG. FILE #: L9
DRB #: _____ EPC #: _____ WORK ORDER#: _____

LEGAL DESCRIPTION: TRACT 23, BLOCK 11, ORIGINAL TOWNSITE OF WESTLAND
CITY ADDRESS: 90TH STREET & SUNSET GARDENS

ENGINEERING FIRM: Larry Read & Associates — CONTACT: Larry Read
ADDRESS: 4800 Juan Tabo NE, Suite C — PHONE: 237-8421
CITY, STATE: Albuquerque, NM — ZIP CODE: 87111

OWNER: Mule Barn Enterprises — CONTACT: Daniel Denton
ADDRESS: 2903 El Corto Dr. SW — PHONE: 220-3197
CITY, STATE: Albuquerque — ZIP CODE: 87105

ARCHITECT: — CONTACT: _____
ADDRESS: _____ — PHONE: _____
CITY, STATE: _____ — ZIP CODE: _____

SURVEYOR: — CONTACT: _____
ADDRESS: _____ — PHONE: _____
CITY, STATE: _____ — ZIP CODE: _____

CONTRACTOR: — CONTACT: _____
ADDRESS: _____ — PHONE: _____
CITY, STATE: _____ — ZIP CODE: _____

CHECK TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT
_____ DRAINAGE PLAN
XX CONCEPTUAL GRADING & DRAINAGE PLAN
_____ GRADING PLAN
_____ EROSION CONTROL PLAN
_____ ENGINEER'S CERTIFICATION (HYDROLOGY)
_____ CLOMR/LOMR
_____ TRAFFIC CIRCULATION LAYOUT (TCL)
_____ ENGINEER'S CERTIFICATION(TCL)
_____ ENGINEER'S CERTIFICATION (DRB APPR. SITE PLAN)
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CHECK TYPE OF APPROVAL SOUGHT:

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X PRELIMINARY PLAT APPROVAL
XX S. DEV. PLAN FOR SUB'D. APPROVAL
_____ S. DEV PLAN FOR BLDG. PERMIT APPROVAL
_____ SECTOR PLAN APPROVAL
_____ FINAL PLAT APPROVAL
_____ FOUNDATION PERMIT APPROVAL
_____ BUILDING PERMIT APPROVAL
_____ CERTIFICATE OF OCCUPANCY (PERM.)
_____ CERTIFICATE OF OCCUPANCY (TEMP.)
_____ GRADING PERMIT APPROVAL
_____ PAVING PERMIT APPROVAL
_____ WORK ORDER APPROVAL
_____ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

_____ YES
XX NO
_____ COPY PROVIDED

RECEIVED
APR 07 2003
HYDROLOGY SECTION

DATE SUBMITTED: April 7, 2003 BY: Larry Read

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five acres
2. **Drainage Plans:** Required for building permits, grading permits, paving permits, and site plans less than five (5)
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or

ALLEY CAPACITY
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	ALLEY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.019000	ft/ft
Water Surface Elevation	99.59	ft

Elevation range: 99.31 ft to 100.00 ft.

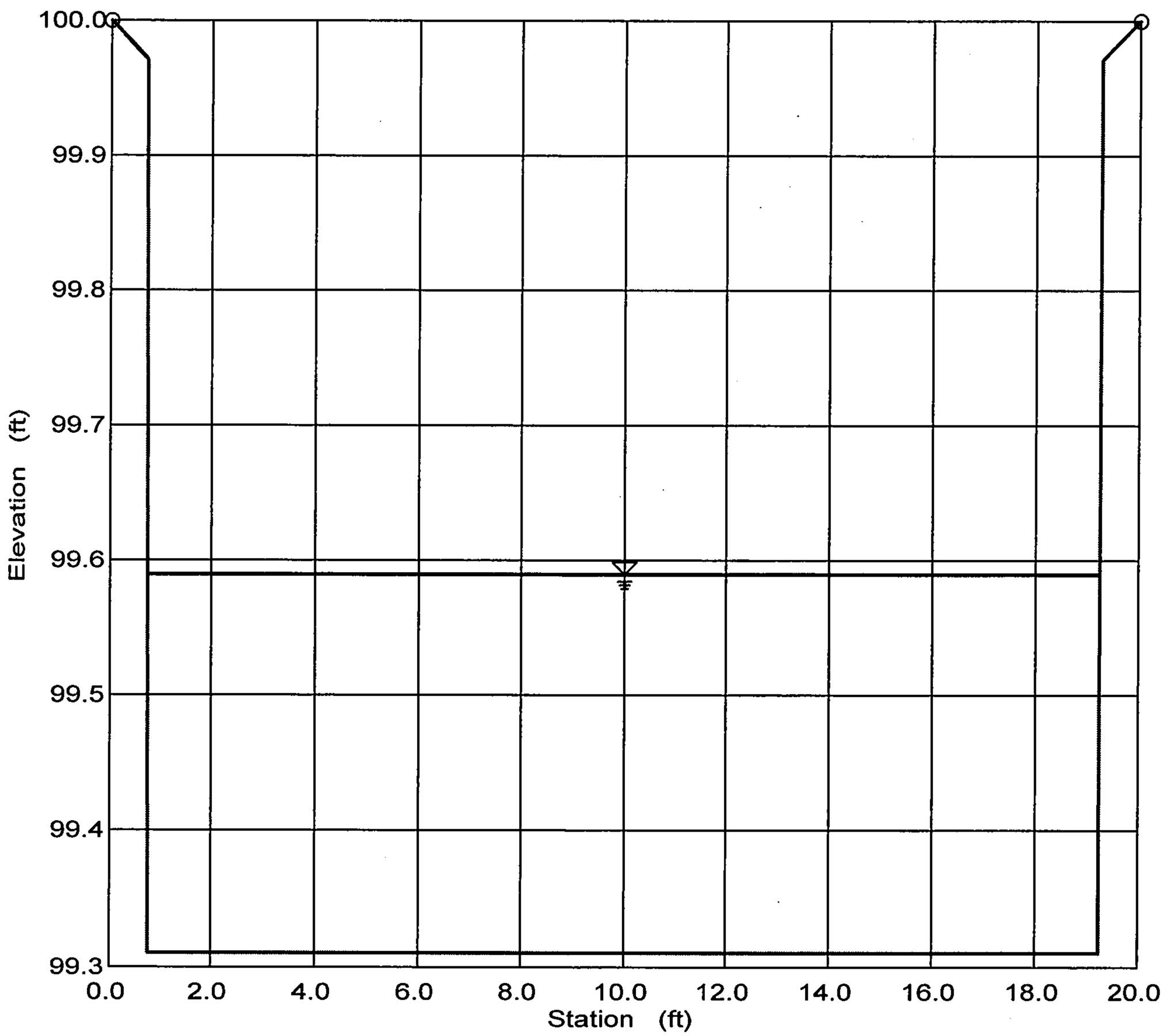
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	100.00	0.00	20.00	0.017
0.74	99.97			
0.76	99.31			
19.24	99.31			
19.26	99.97			
20.00	100.00			

Results		
Wtd. Mannings Coefficient	0.017	
Discharge	26.18	cfs
Flow Area	5.18	ft²
Wetted Perimeter	19.04	ft
Top Width	18.50	ft
Height	0.28	ft
Critical Depth	99.71	ft
Critical Slope	0.006054	ft/ft
Velocity	5.06	ft/s
Velocity Head	0.40	ft
Specific Energy	99.99	ft
Froude Number	1.69	
Flow is supercritical.		

ALLEY SECTION
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	ALLEY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.017	
Channel Slope	0.019000	ft/ft
Water Surface Elevation	99.59	ft
Discharge	26.18	cfs



SUNSET GARDENS
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	SUNSET GARDENS
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.024000	ft/ft
Water Surface Elevation	99.58	ft

Elevation range: 99.14 ft to 100.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	100.00	0.00	60.00	0.017
9.99	99.80			
10.01	99.14			
30.00	99.54			
49.99	99.14			
50.01	99.80			
60.00	100.00			

Results		
Wtd. Mannings Coefficient	0.017	
Discharge	49.50	cfs
Flow Area	9.60	ft²
Wetted Perimeter	40.87	ft
Top Width	40.01	ft
Height	0.44	ft
Critical Depth	99.70	ft
Critical Slope	0.006124	ft/ft
Velocity	5.16	ft/s
Velocity Head	0.41	ft
Specific Energy	99.99	ft
Froude Number	1.86	
Flow is supercritical.		

Cross Section
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\mule bar.fm2
Worksheet	SUNSET GARDENS
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.017	
Channel Slope	0.024000	ft/ft
Water Surface Elevation	99.58	ft
Discharge	49.50	cfs