DRAINAGE REPORT
FOR
TRACT D-4-L-2B
SEVEN-BAR RANCH

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INTRODUCTION AND SITE LOCATION

The proposed office complex at TractD-4-L-2B, Seven-Bar Ranch is located on Calle Cuervo between Ellison Drive and Corrales Road. The 1.19 acre property will be developed into an office complex with associated parking. This report specifically addresses the grading and drainage plan and analysis for Tract D-4-L-2B, Seven-Bar Ranch. This site is included in a drainage master plan completed by Bordenave Designs under the study A14/D4.

METHODOLOGY

The hydrologic and hydraulic criteria in Section 22 of the City of Albuquerque Development Process Manual (DPM), entitled "Drainage, Flood Control, and Erosion Control," was followed to perform the analyses given in this report. The design storm used for both the existing and developed conditions are the 100-year, 6-hour storm event for peak flow computations. This site is located in Precipitation Zone 1. A hydraulic analysis of the storm sewer collection system was performed to assist in the sizing of the infrastructure.

EXISTING DRAINAGE CONDITIONS

INTRODUCTION

The site drains to a depressed area at the north east corner of the property. An existing 36" RCP with end section is used to discharge the ponded area. This storm drain system eventually discharges to the Cabezon Channel. An existing 24" RCP storm drain is located along the north boundary of the property adjacent to Calle Cuervo. This 24" storm drain collects runoff from Tract D-4-L-2A directly west of the site and from properties west of Ellison. This 24" storm drain ties into the 36" storm drain at the northeast corner of the property. Runoff from Tract D-4-L-1, located south of the site, drains to a temporary pond which discharges to the depressed area on Tract D-4-L-2B.

The FEMA Flood Insurance Rate Map Number 35001C0109 F, effective date November 19, 2003, shown in Figure 1, indicates the presence of a Zone X flood hazard zone on the site. Zone X is an area in the 500-year flood or areas less than 1 foot deep 100-year flood.

OFF-SITE FLOWS

As mentioned previously, this site is included in a drainage master plan completed by Bordenave Designs under the study A14/D4. This drainage master plan limits the peak runoff from Tracts D-4-L-1, D-4-L-2A, and D-4-L-2B to a total of 16.64 CFS. Tracts D-4-L-1 and D-4-L-2A are developed. Tract D-4-L-1, which is developed as a storage unit complex, currently drains to a temporary pond at the north end of the site. The peak

runoff of 11.16 CFS discharges to the pond through a concrete rundown. This pond discharges 5 CFS to the depressed area in Tract D-4-L-2B via a 12" CMP culvert.

Runoff from Tract D-4-L-2A is collected in a Type D storm Inlet at the northeast corner of the site and is discharged into a 24" RCP storm drain that is located adjacent to Calle Cuervo and eventually ties into the 36" RCP storm drain in Tract D-4-L-2B. A total of 2.25 CFS is discharged into the 24" RCP storm drain from Tract D-4-L-2A.

ON-SITE FLOWS

For the existing conditions hydrologic analysis the site is considered land treatment type A. The peak flow from the site is 2.16 CFS.

Table 1 Existing Drainage Conditions

BASINS	Area (acres)	100yr-6hr Peak Flow (cfs)	100yr- 6hr Runoff Volume (acre-ft)	Land Treatment
OFFSITE				
Tract D-4-L-1	2.6779	11.16	0.41	8.6% B, 91.4% D
Tract D-4-L-2A	0.5510	2.25	0.08	7.6% B, 7.3% C, 85.1% D
ONSITE				
Tract D-4-L-2B	1.0645	2.16	0.06	100% A

DEVELOPED DRAINAGE CONDITIONS

DRAINAGE BASIN DELINEATION

The grading and drainage plan in the rear pocket shows that the site has just one drainage basin. As indicated before there are two offsite basins that drain through the site to an existing 36" RCP storm drain.

HYDROLOGIC ANALYSIS

To determine the peak flows of each basin a hydrologic analysis was performed in accordance to section 22.2 of the Development Process Manual (DPM). The 100-year 6-hour storm was the basis for determining peak flows to size the storm sewer inlets (see Appendix A). The 100-year 6-hour storm was also the basis for determining peak flows to calculate the size of the proposed storm sewer lines (see Appendix A). The property is located in Precipitation Zone 1, which has a 100-year 6-hour storm event of 2.20 inches.

The site was assigned land treatment values in accordance with Tables A-4 and A-5 of the DPM's section 22.2. Table 1 shows the Land Treatments and peak flows for each basin. See Appendix A for hydrologic calculations.

Table 2 Developed Drainage Conditions

BASINS	Area (acres)	100yr-6hr Peak Flow (cfs)	100yr-6hr Runoff Volume (acre-ft)	Land Treatment
OFFSITE				
Tract D-4-L-1	2.6779	11.16	0.41	8.6% B, 91.4% D
Tract D-4-L-2A	0.5510	2.25	0.08	7.6% B, 7.3% C, 85.1% D
ONSITE				
Tract D-4-L-2B	1.0645	4.24	0.15	10%B, 10%C, 80%D

DRAINAGE CONCEPT

Introduction

As mentioned previously, this site is included in a drainage master plan completed by Bordenave Designs under the study A14/D4. This drainage master plan limits the peak runoff from Tracts D-4-L-1, D-4-L-2A, and D-4-L-2B to a total of 16.64 CFS. Tracts D-4-L-1 and D-4-L-2A are developed. Under developed drainage conditions, the total peak runoff from all three tracts is 17.66 CFS. Therefore, a small portion of the peak runoff will be stored in a detention area (the volume required because the allowable discharge will be 1.02 CFS less than the peak runoff from Tract D-4-L-2B).

Tract D-4-L-1, which is developed as a storage unit complex, currently drains to a temporary pond at the ~~north~~ south end of the site. The peak runoff of 11.16 CFS discharges to the pond through a concrete rundown. This pond discharges 5 CFS to the depressed area in Tract D-4-L-2B via a 12" CMP culvert. With the development of Tract D-4-L-2B, the temporary drainage pond will be removed and the peak flows in the concrete rundown will be intercepted by a Type D storm inlet, which will discharge to an 18" RCP storm drain that will connect to the existing 36" RCP storm drain (see grading and drainage plan).

Runoff from Tract D-4-L-2A is collected in a Type D storm Inlet at the northeast corner of the site and is discharged into a 24" RCP storm drain that is located adjacent to Calle Cuervo and eventually ties into the 36" RCP storm drain in Tract D-4-L-2B. A total of 2.25 CFS is discharged into the 24" RCP storm drain from Tract D-4-L-2A.

Runoff from Tract D-4-L-2B will be collected by a Type D storm inlet in the northeast part of the parking area. The existing manhole in the 36" storm drain will be removed and disposed and the Type D storm inlet will be constructed in its location (see grading and drainage plan). The existing 24" RCP storm drain and the new 18" RCP storm drain will tie into the 36" RCP storm drain at the Type D storm inlet. Because the allowable discharge from Tract D-4-L-2B is 3.22 CFS and the peak runoff is 4.24 CFS, a portion of the parking area will be used for ponding a total of 939 cubic feet (see Appendix A). The maximum depth of the ponding area in the parking lot is 0.70 feet.

Storm Drain Hydraulic Analysis

A hydraulic analysis of the storm drain system was completed to size the storm drain that conveys the peak runoff from Tract D-4-L-1 to the existing 36" RCP storm drain. Based on the hydraulic grade analysis, an 18" RCP storm drain will adequately convey the peak flows collected in the Type D storm inlet.

100-YEAR HYDROLOGIC CALCULATIONS

BASIN #	AREA (acre)	LAND TREATMENT A (%)	B (%)	C (%)	D (%)	WEIGHTED E (in)	100-YEAR PRECIPITATION V (6-hr) (acre-ft)	V (6-hr) (cu-ft)	V(24-hr) (acre-ft)	V(24-hr) (cu-ft)	Q (cfs)
EXISTING CONDITIONS											
TRACT D-4-L-1	2.6779	0.00	8.60	0.00	91.40	1.86	0.41	18,063	0.51	22,150	11.16
TRACT D-4-L-2A	0.5510	0.00	7.60	7.30	85.10	1.80	0.08	3,600	0.10	4,383	2.25
TRACT D-4-L-2B	1.0645	0.00	100.00	0.00	0.00	0.67	0.06	2,589	0.06	2,589	2.16
TOTAL RUNOFF	4.2934						0.56	24252	0.67	29122	15.57
PROPOSED CONDITIONS											
TRACT D-4-L-1	2.6779	0.00	8.60	0.00	91.40	1.86	0.41	18,063	0.51	22,150	11.16
TRACT D-4-L-2A	0.5510	0.00	7.60	7.30	85.10	1.80	0.08	3,600	0.10	4,383	2.25
TRACT D-4-L-2B	1.0645	0.00	10.00	10.00	80.00	1.74	0.15	6,731	0.19	8,153	4.24
TOTAL RUNOFF	4.2934						0.65	28394	0.80	34686	17.66
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

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Zone 1

1. Land Types from previous reports

(A) Tract D-4-L-1 Cubby Hole Storage

Total Area = 2.6779 acres

Type B	= 0.2312 ac	8.6%
Type D	= 2.4467 ac	91.4%

(B) Tract D-4-L-2A

Total Area = 0.5510 acres

Type B	= 0.0416 ac	7.6%
Type C	= 0.0404 ac	7.3%
Type D	= 0.4690 ac	85.1%

2. Land Types Measured ~~on~~

Tract D-4-L-2~~B~~

Total Area = 1.0645

Type B	= 0.1060	10%
Type C	0.1060	10%
Type D	= 0.8524	80%

Determine Hydrograph for Tract D-4-L-2B

$t_B = (2,107 \times E \times A_T / Q_p) - (0.25 \times A_D / A_T)$

Weighted $E = 1.74$

$Q_p = 4.24$ CFS

$A_D = .80 \times 1.0645 = 0.852$ ac

$A_T = 1.0645$ ac

$t_b = [2,107(1.74)(1.0645/4.24)] - [0,25(0.852/1.0645)]$

$= 0.9204 - 0.20 = 0.72$ hrs $= 43.2$ min

$t_p = (0.7 * t_c) + [(1.6 - (A_D/A_T))/12]$

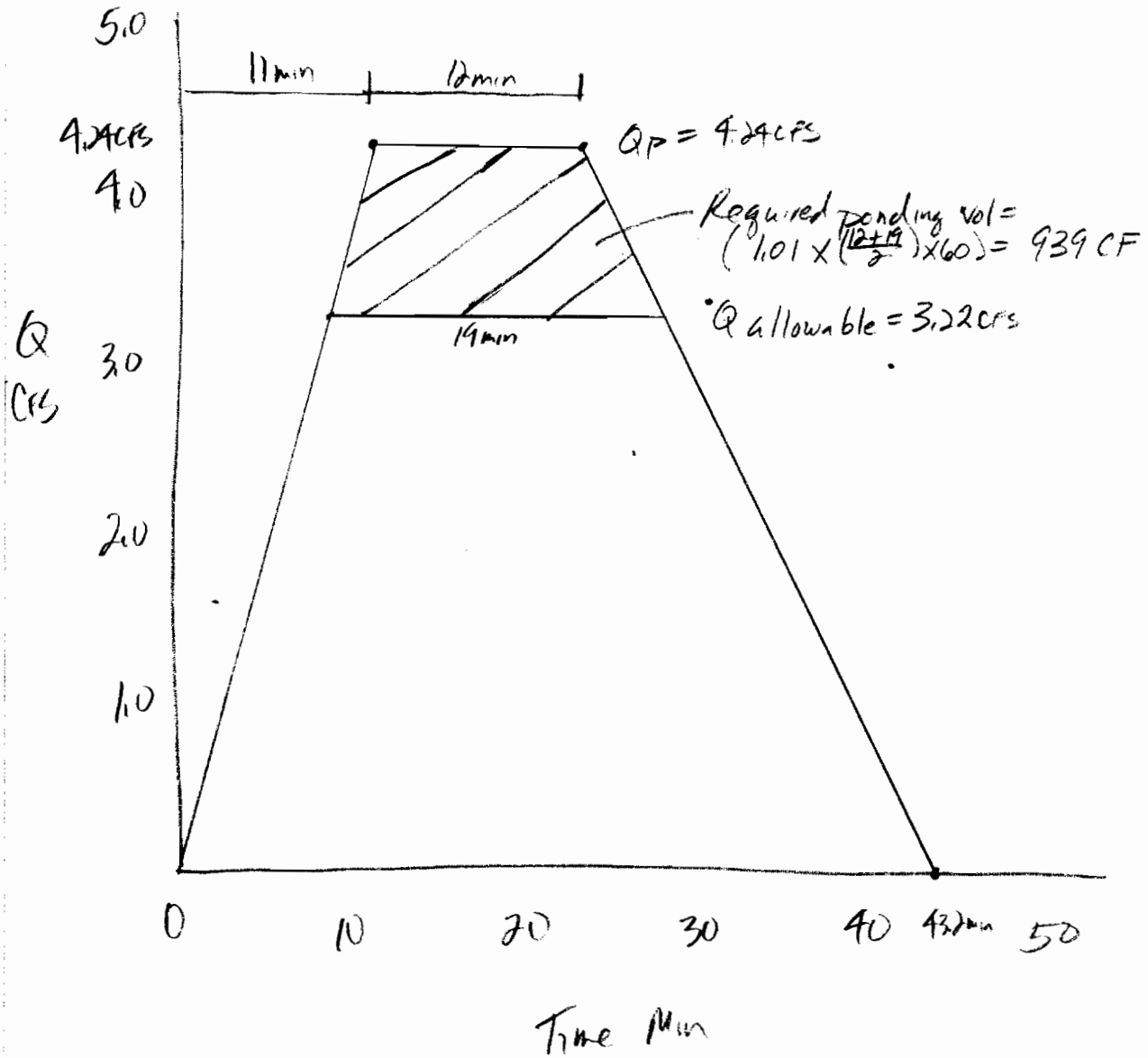
$t_c = 10$ min $= 0.1667$ hrs

$t_p = [0.7(0.1667)] + [(1.6 - (0.852/1.0645))/12]$

$= 0.1167 + 0.0666 = 0.1833$ hrs $= 11$ min

$0.25 \times A_D/A_T = 0.20$ hrs $= 12$ min

TRACT L-4-C-2B Ponding Volume Calculation



SUMMARY OF HYDRAULIC CALCULATIONS
CLOSED CONDUIT

BY: DBT
DATE: 6/21/2007
SHEET: 1 of 1

PROJECT: CALLE CUERVO SITE TRACT D-4-L-2B
100 year

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
										JUNCTION		LOSSES										
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	D	ANGLE	hf	hb	hj	hmh	ht	hmisc	SUM	E.G.	hv	H.G.	GROUND ELEV.
																					5014.06	
[redacted]	OUTLET												0.00				0.00	0.00	5014.40	0.34	5014.06	
		36	33	7.07	4.67	667.28	0.0024	100				0.24						0.24	5014.64	0.34	5014.30	
1	MH								90	24	90		0.09	0.41	0.00	0.00		0.50	5015.14	0.43	5014.71	5016.50
		24	16.5	3.14	5.25	226.29	0.0053	45				0.24						0.24	5015.38	0.43	5014.95	
2	MH								90				0.09	0.00	0.02	0.00		0.11	5015.49	0.43	5015.06	5016.85
		24	16.5	3.14	5.25	226.29	0.0053	550				2.92						2.92	5018.41	0.43	5017.98	
3	MH												0.00	0.00	0.02	0.00		0.02	5018.43	0.43	5018.00	5020.00
		24	16.5	3.14	5.25	226.29	0.0053	20				0.11						0.11	5018.54	0.43	5018.11	
																					5014.30	
JUNC 1	MH												0.00				0.00	0.00	5014.93	0.62	5014.30	
		18	11.2	1.77	6.34	105.07	0.0114	220				2.50						2.50	5017.43	0.62	5016.80	
	MH												0.00	0.00	0.03	0.00		0.03	5017.46	0.62	5016.84	5017.50
		18	11.2	1.77	6.34	105.07	0.0114	20				0.23						0.23	5017.69	0.62	5017.06	

REMARKS: Manning's n: 0.013