DRAINAGE REPORT

For

OAKLAND NORTH SUBDIVISION
Albuquerque, New Mexico

Prepared by

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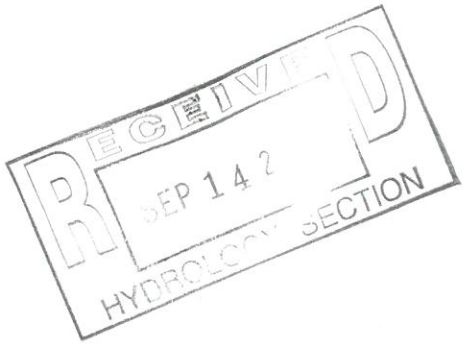

PURPOSE

The purpose of this report is to provide the Drainage Management Plan for the development of the Oakland North Subdivision. This plan will be utilized for the development of the subject property as an 8-lot single family residential subdivision. This plan was prepared in accordance with the City of Albuquerque's Development Process Manual. This report will demonstrate that the proposed improvements do not adversely affect the surrounding properties, nor the upstream or downstream facilities.

INTRODUCTION

The subject of this report, as shown on the Exhibit A, is a 3-acre parcel of land located on the north side of Oakland Boulevard between Barstow Boulevard and Ventura Boulevard. The site is located in the Far Northeast area of Albuquerque. The legal description of this site is Lots 28, 29, 30 of Block 2, Tract 3, Unit 3 North Albuquerque Acres. As shown on FIRM map 35001C141F, a portion of the site lies within flood zone X, with a portion of Lot 28 and 29 lying within flood zone AO (2'). The site is currently undeveloped.

The site is located within basin 111.1 as described in the North Albuquerque Acres Master Drainage Plan (NAAMDP) and as shown on Appendix C. The north east corner of the subject property is crossed by the La Cueva Arroyo, which is a major unimproved floodway. The site currently drains from the east to the west, discharging directly into the La Cueva Arroyo located within the adjacent lot 3. The La Cueva Arroyo becomes channelized approximately 600' downstream. The development of this site must be in conformance to the governing North Albuquerque Acres Master Drainage Plan.

EXISTING CONDITIONS

The site is currently undeveloped. The site is covered with native grasses; there are signs of minor impact from human activities. The site slopes from east to west at a typical 4% slope. Minor flows enter the site from the eastern boundary. The southwest quadrant of this project lies within the La Cueva Arroyo. As described within the NAAMDP and shown on in Appendix C, the fully developed flows for this reach of the La Cueva Arroyo are predicted to be 3094 cfs. As shown in Appendix A, the site currently discharges 5.80 cfs directly to the La Cueva arroyo. This flow is conveyed within the floodway which is channelized approximately 600' downstream at Barstow Boulevard. This concrete 'Nor Este' channel was designed for ultimate conditions of the upstream basin, which includes this site.

PROPOSED CONDITIONS

This site is located within the boundaries of the North Albuquerque Acres Master Drainage Plan (NAAMDP). The development of this site will be in conformance to this Plan. As shown in the NAAMDP, this site is located within Basin 111.1. As shown in Appendix C, this site is allowed to free discharge based upon the land treatments listed in Table A-1. Based upon the developed conditions assumptions this site is allowed to discharge 8.97 cfs.

The development of this site shall include the construction of a single Cul-de-sac and 8 individual single-family residential lots. The lots will be graded to free discharge to North Oakland Court which will drain to the west where the flows are captured by a single-grated type-A inlet. This inlet will discharge to the La Cueva Channel that is currently under design. As shown in appendix B, the inlet, storm drain and Cul-de-sac were designed to accommodate the entire flow. As shown in Appendix A, the site is predicted to discharge 8.98 cfs. The area of the project located within the FEMA floodplain will need to be reclaimed and a Letter of Map Revision will be required once the channel is constructed. The proposed improvements for the proposed channel

are being designed by this office but are not within the scope of this report. The proposed channel dimension and flow line elevations adjacent to the site were taken from the channel plans proposed by this office. The proposed channel improvements will be bonded and a CLOMR/LOMR will be required for the development of this site.

SUMMARY AND RECOMMENDATIONS

This site is an undeveloped portion of land located directly adjacent to and partially within the La Cueva Arroyo. The development of this project will consist of 8 single family residential lots. This site is located within the boundaries of the North Albuquerque Acres Master Drainage Plan. The proposed discharge resulting from this development is 8.97 cfs. The allowable discharge for fully developed onsite conditions is 8.97 cfs. The developed flows will be conveyed to the La Cueva Arroyo via an underground conduit. The ultimate channel section for the adjacent La Cueva Arroyo will be financially guaranteed. A Conditional Letter of Map Revision must be approved prior to grading of the parcel and prior to work within the floodplain.

The proposed site development does not adversely affect the upstream or downstream facilities. The site was designed in conformance to City of Albuquerque Drainage Policy. Therefore, we request approval of the site-grading plan. Since public improvements will be constructed a work order and Subdivision Improvement Agreement will be required. Since this site encompasses more than 1 acre, a NPDES permit will be required prior to any construction activity.

Weighted E Method

Existing Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
onsite	115830.00	2.659	80%	2.1272727	10%	0.266	5%	0.13295	5%	0.133	0.803	0.178	5.80

Proposed Developed Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year, 6-hr.			10-day
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Volume (ac-ft)
Upstream A	23400.00	0.537	20%	0.107438	20%	0.107	34%	0.18264	26%	0.140	1.368	0.061	1.81	0.080
Proposed	115830.00	2.659	20%	0.5318182	27%	0.718	23%	0.61159	30%	0.798	1.385	0.307	8.98	0.413
Allowable	115830.00	2.659	20%	0.5318182	20%	0.532	34%	0.90409	26%	0.691	1.368	0.303	8.97	0.395

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Where for 100-year, 6-hour storm

Ea= 0.66 Qa= 1.87

Eb= 0.92 Qb= 2.6

Ec= 1.29 Qc= 3.45

Ed= 2.36 Qd= 5.02

Street Capacity Calculations

Unnamed street

26' F-F Street Section with 4" curb

Slope= 0.05

For water depths less than 0.0625 feet

=	Water depth
rea =	16*Y^2
P=	SQRT(1025*Y^2) + Y
n=	0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.0016	0.33	0.00	0.00	0.00	0.56	0.01	0.99	0.00982
0.02	0.0064	0.66	0.01	0.01	0.01	0.89	0.02	1.11	0.02287
0.025	0.01	0.83	0.01	0.01	0.02	1.03	0.03	1.15	0.03001
0.035	0.0196	1.16	0.02	0.03	0.05	1.29	0.05	1.22	0.04516
0.045	0.0324	1.49	0.02	0.05	0.10	1.53	0.07	1.27	0.06124
0.052	0.043264	1.72	0.03	0.07	0.15	1.68	0.09	1.30	0.07296
0.06	0.0576	1.98	0.03	0.11	0.21	1.85	0.11	1.33	0.08675
0.0625	0.0625	2.06	0.03	0.12	0.24	1.90	0.12	1.34	0.09114

or water depths greater than 0.0625 ft but less than 0.3025 ft

Y1=	Y-0.0625
A2=	A1 + 2*Y1 + 25*Y1^2
'2=	P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.063506	2.09	0.03	0.12	0.24	1.90	0.12	1.34	0.09169
0.1	0.172656	3.98	0.04	0.42	0.83	2.41	0.24	1.35	0.14676
0.13	0.311406	5.51	0.06	0.90	1.79	2.88	0.37	1.41	0.2018
0.16	0.495156	7.04	0.07	1.65	3.30	3.33	0.53	1.47	0.2616
0.2	0.810156	9.08	0.09	3.16	6.32	3.90	0.78	1.54	0.34642
0.207	0.873506	9.43	0.09	3.49	6.99	4.00	0.83	1.55	0.36175
0.2612	**1.446942**	**12.20**	**0.12**	**6.83**	**13.65**	**4.72**	**1.23**	**1.63**	**0.48443**
0.3025	1.9825	14.31	0.14	10.38	20.75	5.23	1.58	1.68	0.58199

or water depths greater than 0.3025 ft but less than 0.333 ft

Y2=	Y - 0.3025
^3=	A2 + Y2*14
3=	P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.303	1.9895	14.31	0.14	10.44	20.88	5.25	1.59	1.68	0.58401
0.3039	2.0021	14.31	0.14	10.55	21.10	5.27	1.60	1.68	0.58764
0.3062	2.0343	14.31	0.14	10.83	21.66	5.32	1.63	1.70	0.59693
0.31	2.0875	14.31	0.15	11.31	22.61	5.42	1.68	1.71	0.61229
0.3125	2.1225	14.32	0.15	11.62	23.24	5.48	1.71	1.73	0.6224
0.32	2.2275	14.32	0.16	12.59	25.18	5.65	1.81	1.76	0.65279
0.3317	2.3913	14.34	0.17	14.16	28.33	5.92	1.96	1.81	0.70034
0.333	2.4095	14.34	0.17	14.34	28.69	5.95	1.98	1.82	0.70564

or water depths greater than 0.333 ft but less than 0.513 ft

Y3=	Y - 0.333
4=	A3 + 13 * Y3 + 25 * Y3^2
4=	P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.335	2.4356	14.44	0.17	14.54	29.07	5.97	2.00	1.82	0.7095
0.3601	2.78016	15.69	0.18	17.14	34.28	6.17	2.22	1.81	0.75948
0.38	3.075725	16.69	0.18	19.47	38.94	6.33	2.41	1.81	0.80094
0.38946	3.223173	17.16	0.19	20.66	41.33	6.41	2.50	1.81	0.82116
0.4603	4.469532	20.70	0.22	31.44	62.88	7.03	3.24	1.83	0.98129
0.504	5.363525	22.89	0.23	39.85	79.69	7.43	3.74	1.84	1.08641
0.513	5.5595	23.34	0.24	41.76	83.52	7.51	3.85	1.85	1.10856

TABLE A-2

LA CUEVA ARROYO SUB-BASIN CHARACTERISTICS

Basin ID	Hydrologic Condition	Basin Area (mi^2)	Land Treatment (%)				TP (hrs)
			A	B	C	D	
100	Existing	1.2140	0	0	100	0	.475
	Future	1.2140	0	0	100	0	.475
101	Existing	.6070	0	0	100	0	.267
	Future	.6070	0	0	100	0	.267
102	Existing	.8750	20	40	40	0	.320
	Future	.8750	20	40	40	0	.320
102.1	Existing	.0930	82	0	18	0	.133
	Future	.0930	80	0	20	0	.133
106	Existing	.0436	78	0	5	17	.133
	Future	.0436	22	23	38	17	.133
106.1	Existing	.1116	75	0	15	10	.14
	Future	.1116	22	23	38	17	.14
107.1	Existing	.1808	92	0	3	5	.14
	Future	.1808	22	23	38	17	.14
107.2	Existing	.1720	86	0	5	9	.18
	Future	.1720	22	23	38	17	.18
108	Existing	.2055	80	0	10	10	.16
	Future	.2055	22	23	38	17	.16
109	Existing	.1006	80	0	10	10	.133
	Future	.1006	22	23	38	17	.133
110	Existing	.1634	80	0	10	10	.19
	Future	.1634	22	23	38	17	.19
111	Existing	.0674	90	0	5	5	.14
	Future	.0533	16	26	33	25	.14
111.1*	Existing	.1194	80	0	10	10	.133
	Future	.0969	20	20	34	26	.133
111.3*	Future	.0420	0	34	16	50	.133
111.4*	Future	.0141	22	23	38	17	.133
112.1*	Existing	.0894	0	34	16	50	.140
	Future	.0894	0	34	16	50	.140
112.2*	Existing	.0826	11	29	15	45	.140
	Future	.0826	0	34	16	50	.140

*Modified for COA NAA MDP 9/97