DRAINAGE REPORT

for
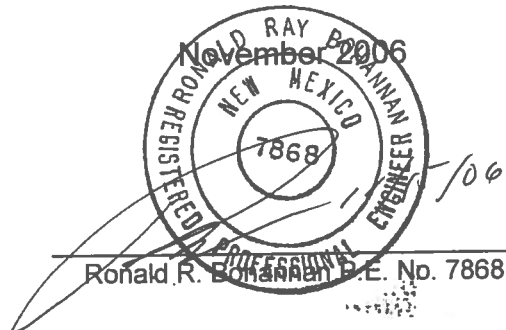

Venture Commerce Center
Northeast Corner of Eagle Ranch/Westside Drive
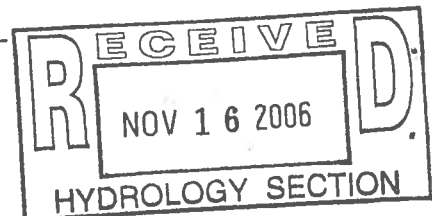# Albuquerque, New Mexico

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Location

The site is located at the northeast corner of Westside Drive and Eagle Ranch Road. The site contains approximately 7.5 acres and is currently undeveloped (see attached Zone Atlas Map B-13). The property will be subdivided into two lots, with only the northerly 5 acres being developed at this time. The purpose of this report is to provide the drainage analysis and management plan for the project.

Existing Drainage Conditions

The site is currently undeveloped. No offsite runoff enters the site. The Calabacillas Arroyo is located to the north of the site and cuts off flows from that direction. Eagle Ranch Road and Westside Drive are located west and south of the site and prevent any offsite drainage from entering the site from those directions. The property to the east is developed as a car dealership and no water leaves the site.

FIRM Map

The site is located on FIRM Map 35001C0108E as shown on the attached excerpt. The map shows that the site does not lie within any 100-year flood plains. The Calabacillas Arroyo is located north of the site. The project is far enough to the west from the Arroyo to be outside the floodplain and prudent line limits.

Due to recent erosion problems in the Calabacillas Arroyo, AMAFCA is working with their consultant for a design for slope stabilization. This project will either enter into a funding agreement with AMAFCA for a portion of the cost of the proposed improvements, or construct improvements adjacent to the site. At this time, AMAFCA's design is not complete, and no decisions can be made.

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On-Site Drainage Management Plan

      The proposed drainage management plan is to collect the developed flows into two new on-site storm drain systems that outfall to the existing 60" storm drain on the east side of the site. The site is divided into eight (8) basins. Basins 1, 4, and 8 will drain to a new storm drain on the south side of the site. Basin 8 consists of the currently undeveloped tract to the south and has a developed flow of 8.56 cfs. This basin currently drains northeast towards the new project and an interim detention pond will capture the undeveloped flows until the basin is developed. A new 18" storm drain stub and catch basin will capture the undeveloped flows and convey them to the new south storm drain system. The 18" storm drain has capacity for the developed flow of 8.56 cfs from this site. The new southern storm drain system will drain a total of 17.16 cfs to the existing 60" storm drain. A new storm drain was constructed in Eagle Ranch Road as part of an SAD and the existing 60" is intended to act as an overflow for the new Eagle Ranch storm sewer. There is ample capacity in the older storm drain to convey the flows from this site and the flows from the upstream Kia Dealership.

      Basins 2, 3, 5, and 6 will drain a total flow of 10.29 to the second new storm drain system located on the north side of the site. This new storm drain also outfalls to the existing 60" storm drain on the east side of the property. Basin 7 consists of the landscape area located north of the parking lot adjacent to the Calabacillas Arroyo. This basin has an undeveloped flow of 1.06 cfs and will continue the current drainage pattern of sheet flowing into the Calabacillas Arroyo. Water quality inlets are located at the end of both new storm drains before any flows from the site enter the existing 60" storm drain.

      In the case of an emergency or storm greater than the 100-year event, the site will overflow out the entrances or to the Calabacillas Arroyo before any water enters the buildings.

Calculations

The Weighted E method from the "City of Albuquerque Development Process Manual Volume 11 – Design Criteria, 1997 Revision" was used to calculate the runoff and volume for the site.

Summary

The site generates a total developed flow of 28.51 cfs. Two new on-site storm drain systems will drain 27.45 cfs to the existing 60" storm drain located on the east side of the site. Basin 7 will continue the current drainage pattern and discharge 1.06 cfs directly to the Calabacillas Arroyo. Basin 8 is undeveloped at this time, but the new storm drain system has been designed to accept the future developed flow of 8.56 cfs.

Weighted E Method

On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	100-Year Weighted E (ac-ft)	100-Year Volume (ac-ft)	100-Year Flow cfs	10-Year Weighted E (ac-ft)	10-Year Volume (ac-ft)	10-Year Flow cfs
1	19,121	0.44	0%	0	15%	0.07	0%	0.00	85%	0.37	1.775	0.065	1.76	1.087	0.040	1.13
2	12,508	0.29	0%	0	15%	0.04	0%	0.00	85%	0.24	1.775	0.042	1.15	1.087	0.026	0.74
3	10,276	0.24	0%	0	15%	0.04	0%	0.00	85%	0.20	1.775	0.035	0.95	1.087	0.021	0.61
4	74,154	1.70	0%	0	15%	0.26	0%	0.00	85%	1.45	1.775	0.252	6.84	1.087	0.154	4.38
5	77,564	1.78	0%	0	15%	0.27	0%	0.00	85%	1.51	1.775	0.263	7.16	1.087	0.161	4.58
6	11,164	0.26	0%	0	15%	0.04	0%	0.00	85%	0.22	1.775	0.038	1.03	1.087	0.023	0.66
7	22,709	0.52	0%	0	100%	0.52	0%	0.00	0%	0.00	0.670	0.029	1.06	0.220	0.010	0.40
8	92,773	2.13	0%	0	15%	0.32	0%	0.00	85%	1.81	1.775	0.315	8.56	1.087	0.193	5.47
Total	320,270	7.35	0%	0	0%	0.00	0%	0.00	85%	5.81		1.040	28.51		0.628	17.96

Excess Precipitation, E (inches)

Zone 1	100-Year	10-Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)

Zone 1	100-Year	10-Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

Equations:

Weighted E = $E_a*A_a + E_b*A_b + E_c*A_c + E_d*A_d$ / (Total Area)

Volume = Weighted D * Total Area

Flow = $Q_a * A_a + Q_b * A_b + Q_c * A_c + Q_d * A_d$

Pipe Capacity

Pipe	D (in)	Slope (%)	Area (ft^2)	R	Q Provided (cfs)	Q Required (cfs)	Velocity (ft/s)
1	12	1	0.79	0.250	3.57	1.76	2.24
2	18	1	1.77	0.375	10.53	8.56	4.84
3	18	1	1.77	0.375	10.53	10.32	5.84
4	18	3.5	1.77	0.375	19.70	17.16	9.71
5	12	1	0.79	0.250	3.57	1.15	1.46
6	12	1	0.79	0.250	3.57	0.95	1.21
7	12	1	0.79	0.250	3.57	2.10	2.67
8	12	1	0.79	0.250	3.57	3.13	3.99
9	12	1	0.79	0.250	3.57	3.13	3.99
10	18	1	1.77	0.375	10.53	10.29	5.82

Manning's Equation:

$$Q = 1.49/n * A * R^{2/3} * S^{1/2}$$

$A =$ Area
$R =$ D/4
$S =$ Slope
$n =$ 0.013

Update

STORM DRAIN INLET
EFFECTIVE AREA ASSUMING A 50% CLOGGING FACTOR

SINGLE 'D':

Area at the grate:

L $\quad$ = 38.375" - 7 (1/2" middle bars)
$\quad\quad$ = 34.875"
$\quad\quad$ = 2.906'

W $\quad$ = 25.5" - 13 (1/2 middle bars)
$\quad\quad$ = 19"
$\quad\quad$ = 1.583'

Area $\quad$ = 1.583' x 2.906'
$\quad\quad\quad$ = 4.601 ft^2

Effective Area $\quad\quad$ = 4.601 - 0.5 (4.601)
$\quad\quad\quad\quad\quad\quad$ = 2.30 ft^2

Effective Area = 2.30 ft^2

DROP INLET CALCULATIONS

Basin	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
1	Single 'D'	2.30	1.76	0.0253	0.5
2	Single 'D'	2.30	1.15	0.0108	0.5
3	Single 'D'	2.30	0.95	0.0074	0.5
4	Single 'D'	2.30	1.03	0.0087	0.5
5	Single 'D'	2.30	6.84	0.3815	0.5
6	Single 'D'	2.30	7.16	0.4180	0.5

ORIFICE EQUATION

$Q = CA \ sqrt(2gH)$

$C = $ 0.6

$g = $ 32.2

Emergency Overflow

<u>Weir Equation:</u>

$$Q = CLH^{3/2}$$

Q = Flow
C = 2.95
L = Length of weir
H = Height of Weir

Westside Entrance

$$Q = 2.95 * 30 * 0.5^{3/2}$$

Q = 31.29 cfs

Eagle Ranch Entrance

$$Q = 2.95 * 36 * 0.50^{3/2}$$

Q = 37.55 cfs