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DETENTION CALCULATIONS
VOLUME 1

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PACE – LOT 4 PIDGEON PARK
O'FALLON, MISSOURI

SUBMITTED TO:

CITY OF O'FALLON
100 N. MAIN STREET
O'FALLON, MISSOURI 63366

PREPARED BY:

KUHLMANN *design* GROUP, INC.
66 PROGRESS PARKWAY
ST. LOUIS, MISSOURI 63043

(314) 434-8898

APRIL 16, 2010

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VOLUME 1

1. EXECUTIVE SUMMARY

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Executive Summary - Detention Report

Detention:

The project site has been designed to contain two separate detention structures. Due to the topography of the site approximately half of the site can be drained to an open detention dry pond near the southwest corner of the site. The other half of the site will drain to a below ground detention structure near the northwest corner of the site. The below ground structure will consist of 60 in diameter corrugated metal pipes totaling 568 feet in length (an additional 8' of pipe storage has been included for sediment storage). Both detention structures have been designed with a weir wall including a low flow outlet, an intermediate flow outlet and an overflow weir. The detention structure reports have been generated to include the 1, 2, 15, 25, and 100 year return events. Detention has been provided for only the 2, 15, 25, and 100 year events. Both detention basins outlet to the storm sewer system installed along Mexico Loop Road. The outlets are located above the hydraulic grade lines in that system.

Sediment Storage:

Two years of sediment storage has been provided in the detention basins.

	Tributary Area	Weighted C	Sediment Storage	Total Sediment Storage (2 Years)	Total Sediment Storage (2 Years)
	(acres)		(Cu ft./Ac) /yr	(Cu. Ft)	(Ac-Ft)
Detention 1 (Pond)	2.6	0.88	69	359	0.0082
Detention 2 (Vault)	3.4	0.93	69	469	0.0108

The below ground detention basin was increased by 8' of pipe to provide the additional 469 cu ft of sediment storage.

The 100 year elevation in the open detention basin is approximately 4.8 feet below the top of the bank. The required sediment storage of 359 cu ft would require 0.10' of depth in the bottom of the basin. This basin has adequate capacity for sediment storage.

Water Quality:

2. As a basis for determining water quality treatment volume, the following assumptions may be made:
   a. The water quality volume WQv for off-site areas is not required. The following equations are used to determine the storage volume, WQv (in acre/feet of storage):

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WQv = [(P)(Rv)(A)]/12

P = 1.14 inches of rainfall

Where: WQv = water quality volume (in acre-feet)

Rv = 0.05 + 0.009 (I) where I is percent impervious cover

A = area in acres

Detention 1

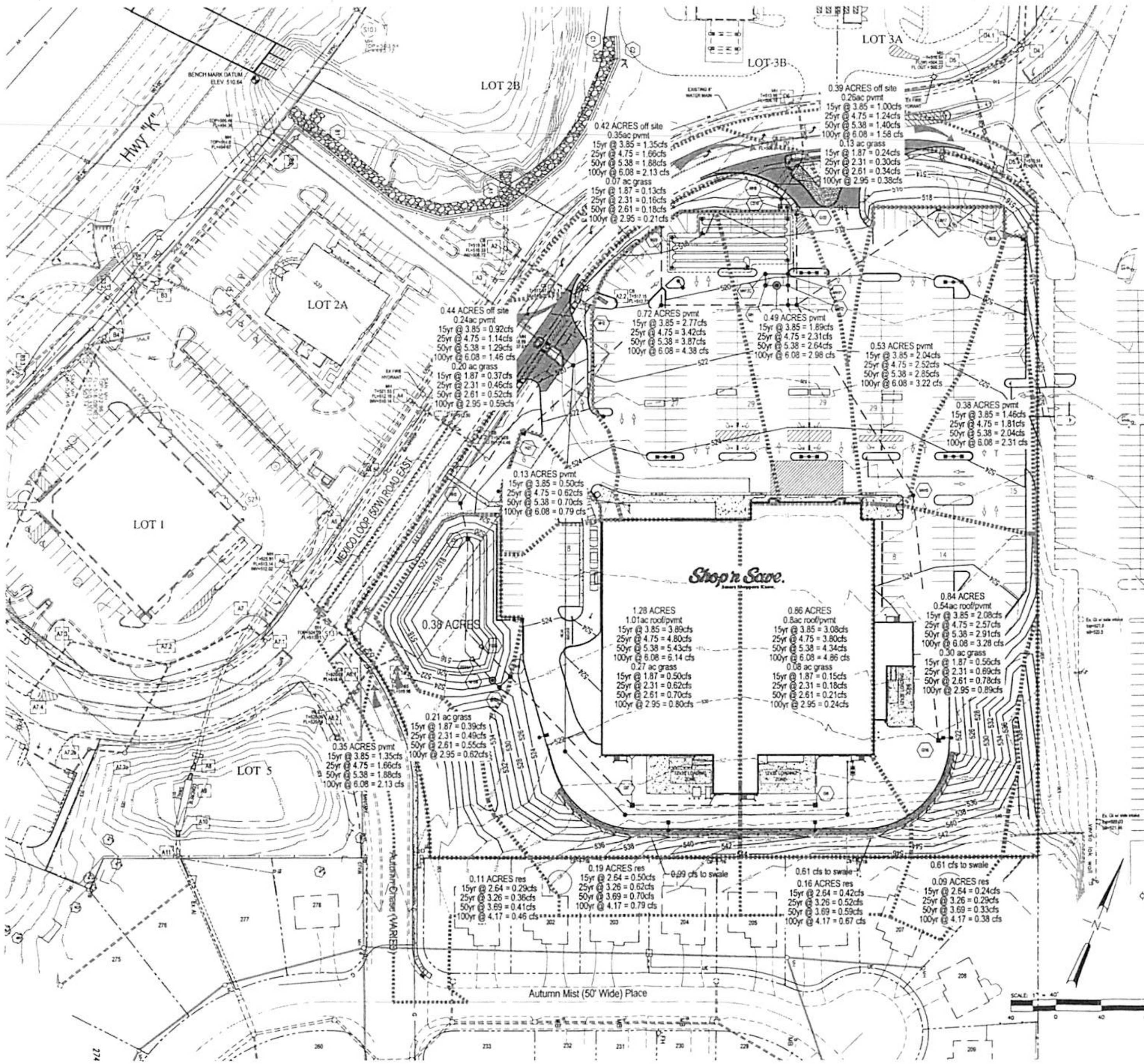
WQv = [(1.14)(0.05+.009 * 67)(2.66)]/12 = .165 acre-feet

Detention 2

WQv = [(1.14)(0.05+.009 * 83)(3.37)]/12 = 0.255 acre-feet

The water quality diversion structures were designed to divert all on the 1-year (1.14 inch) flow into the water quality units. The diversion structures have a weir wall that set to the elevation of the 1-year storm, so that all of the flow from that event is diverted to the water quality unit. For the greater storm events the diversion structures continue to divert additional water into the units, but the weir wall is overtopped allowing the flow to continue to the detention structure. The treated water is then returned through the detention structure. During larger storm events the water quality unit's treatment capacity will be exceeded, but they will continue to pass the excess water without washing out the already removed silt.

Return Event (year)	Q Pre-Developed (cfs)	Q Rear Pond Det 1 (cfs)	Q Front Vault Det 2 (cfs)	Q Off-Site (cfs)	Excess Detention (cfs)	Note
1	0.02	0.97	1.43	0.04	-2.42	Not Required
2	7.98	2.17	4.87	0.87	0.07	
15	13.28	2.68	9.29	1.28	0.03	
25	20.31	4.37	13.93	1.82	0.19	
100	31.52	7.44	20.72	2.65	0.71	



LOT 3A
LOT 3B
LOT 2B
LOT 2A
LOT 1
LOT 5
Hwy "K"
MEXICO LOOP (50'W) ROAD EAST
Autumn Chase (VARIES)
Autumn Mist (50' Wide) Place
BENCH MARK DATUM
ELEV 510.64
Shop 'n Save.
0.39 ACRES off site
0.26ac pvmt
15yr @ 3.85 = 1.00cfs
25yr @ 4.75 = 1.24cfs
50yr @ 5.38 = 1.40cfs
100yr @ 6.08 = 1.58 cfs
0.13 ac grass
15yr @ 1.87 = 0.24cfs
25yr @ 2.31 = 0.30cfs
50yr @ 2.61 = 0.34cfs
100yr @ 2.95 = 0.38cfs
0.42 ACRES off site
0.35ac pvmt
15yr @ 3.85 = 1.35cfs
25yr @ 4.75 = 1.66cfs
50yr @ 5.38 = 1.88cfs
100yr @ 6.08 = 2.13 cfs
0.07 ac grass
15yr @ 1.87 = 0.13cfs
25yr @ 2.31 = 0.16cfs
50yr @ 2.61 = 0.18cfs
100yr @ 2.95 = 0.21cfs
0.44 ACRES off site
0.24ac pvmt
15yr @ 3.85 = 0.92cfs
25yr @ 4.75 = 1.14cfs
50yr @ 5.38 = 1.29cfs
100yr @ 6.08 = 1.46 cfs
0.20 ac grass
15yr @ 1.87 = 0.37cfs
25yr @ 2.31 = 0.46cfs
50yr @ 2.61 = 0.52cfs
100yr @ 2.95 = 0.59cfs
0.72 ACRES pvmt
15yr @ 3.85 = 2.77cfs
25yr @ 4.75 = 3.42cfs
50yr @ 5.38 = 3.87cfs
100yr @ 6.08 = 4.38 cfs
0.49 ACRES pvmt
15yr @ 3.85 = 1.89cfs
25yr @ 4.75 = 2.31cfs
50yr @ 5.38 = 2.64cfs
100yr @ 6.08 = 2.98 cfs
0.53 ACRES pvmt
15yr @ 3.85 = 2.04cfs
25yr @ 4.75 = 2.52cfs
50yr @ 5.38 = 2.85cfs
100yr @ 6.08 = 3.22 cfs
0.38 ACRES pvmt
15yr @ 3.85 = 1.46cfs
25yr @ 4.75 = 1.81cfs
50yr @ 5.38 = 2.04cfs
100yr @ 6.08 = 2.31 cfs
0.13 ACRES pvmt
15yr @ 3.85 = 0.50cfs
25yr @ 4.75 = 0.62cfs
50yr @ 5.38 = 0.70cfs
100yr @ 6.08 = 0.79 cfs
1.28 ACRES
1.01ac roof/pvmt
15yr @ 3.85 = 3.89cfs
25yr @ 4.75 = 4.80cfs
50yr @ 5.38 = 5.43cfs
100yr @ 6.08 = 6.14 cfs
0.27 ac grass
15yr @ 1.87 = 0.50cfs
25yr @ 2.31 = 0.62cfs
50yr @ 2.61 = 0.70cfs
100yr @ 2.95 = 0.80cfs
0.86 ACRES
0.8ac roof/pvmt
15yr @ 3.85 = 3.08cfs
25yr @ 4.75 = 3.80cfs
50yr @ 5.38 = 4.34cfs
100yr @ 6.08 = 4.86 cfs
0.08 ac grass
15yr @ 1.87 = 0.15cfs
25yr @ 2.31 = 0.18cfs
50yr @ 2.61 = 0.21cfs
100yr @ 2.95 = 0.24cfs
0.84 ACRES
0.54ac roof/pvmt
15yr @ 3.85 = 2.08cfs
25yr @ 4.75 = 2.57cfs
50yr @ 5.38 = 2.91cfs
100yr @ 6.08 = 3.28 cfs
0.30 ac grass
15yr @ 1.87 = 0.56cfs
25yr @ 2.31 = 0.69cfs
50yr @ 2.61 = 0.78cfs
100yr @ 2.95 = 0.89cfs
0.38 ACRES
0.21 ac grass
15yr @ 1.87 = 0.39cfs
25yr @ 2.31 = 0.49cfs
50yr @ 2.61 = 0.55cfs
100yr @ 2.95 = 0.62cfs
0.35 ACRES pvmt
15yr @ 3.85 = 1.35cfs
25yr @ 4.75 = 1.66cfs
50yr @ 5.38 = 1.88cfs
100yr @ 6.08 = 2.13 cfs
0.11 ACRES res
15yr @ 2.64 = 0.29cfs
25yr @ 3.26 = 0.36cfs
50yr @ 3.69 = 0.41cfs
100yr @ 4.17 = 0.46 cfs
0.19 ACRES res
15yr @ 2.64 = 0.50cfs
25yr @ 3.26 = 0.62cfs
50yr @ 3.69 = 0.70cfs
100yr @ 4.17 = 0.79 cfs
0.99 cfs to swale
0.61 cfs to swale
0.16 ACRES res
15yr @ 2.64 = 0.42cfs
25yr @ 3.26 = 0.52cfs
50yr @ 3.69 = 0.59cfs
100yr @ 4.17 = 0.67 cfs
0.61 cfs to swale
0.09 ACRES res
15yr @ 2.64 = 0.24cfs
25yr @ 3.26 = 0.29cfs
50yr @ 3.69 = 0.33cfs
100yr @ 4.17 = 0.38 cfs
SCALE: 1" = 40'

PACE PROPERTIES
PIDGEON PARK WEST PLAT 2 - LOT 4
O'FALLON, MISSOURI

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DISCLAIMER OF RESPONSIBILITY

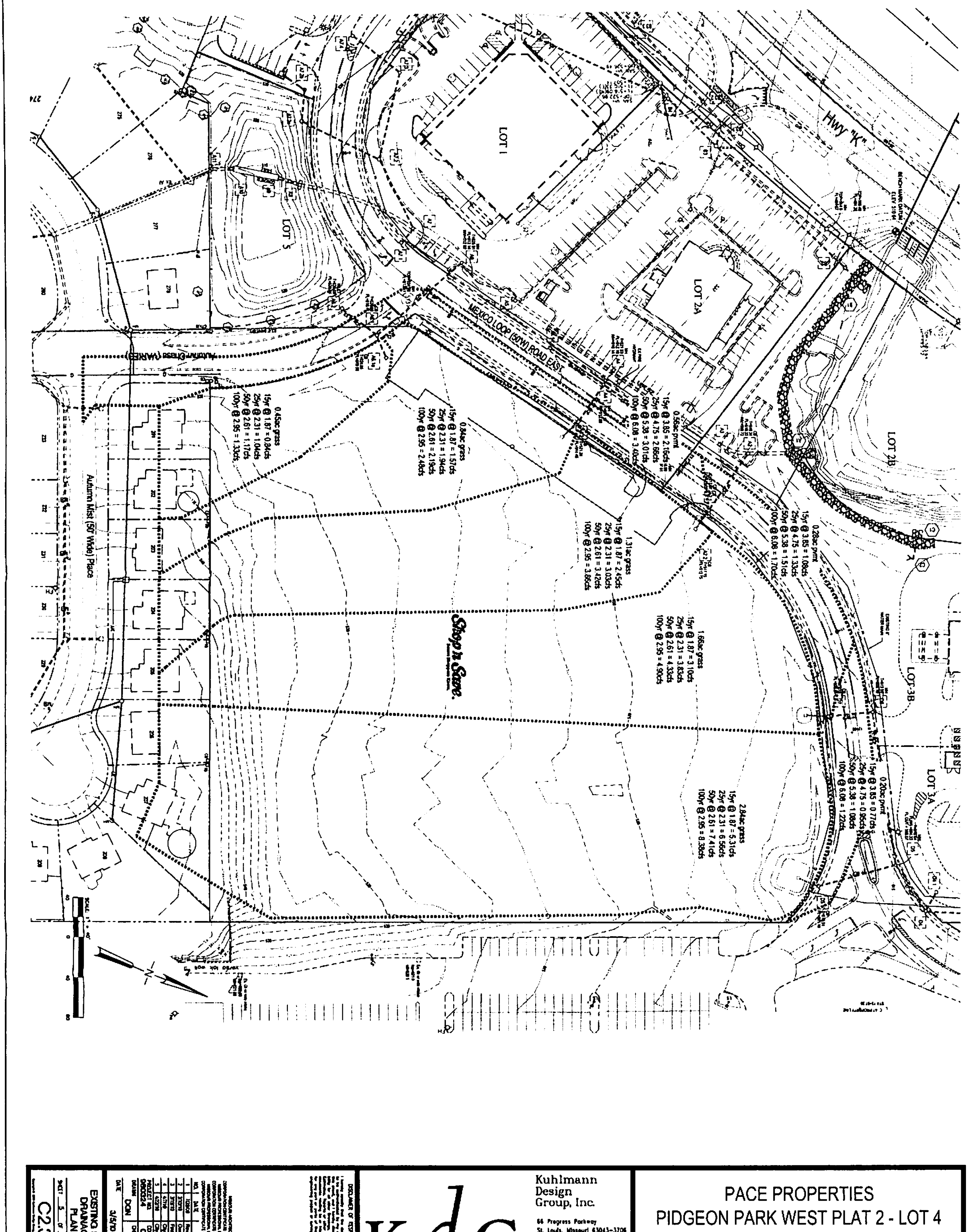
NO.	DATE	
1	7/28/09	Revised grading
2	3/3/10	Owner Review
3	3/19/10	Final Lease Docs
4	4/7/10	City Resubmittal
5	4/22/10	City Resubmittal

PROJECT NO.	CONTRACT NO.
980324	0013
DRAWN: DGN	CHECKED: CDF
DATE: 3/5/10	

PROPOSED SITE DRAINAGE PLAN

SHEET 4 OF 18

C2.2



EXISTING SITE DRAINAGE PLAN

C2.3

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