

**Home Depot West Wichita Drainage Report**

**Introduction:**

The purpose of this drainage report was to determine if stormwater detention would be required on the proposed Home Depot site in west Wichita, KS. The report was performed according to standard City of Wichita procedures for calculating stormwater runoff for a 100-year storm.

**Site Information:**

The site is located in the Carriage House Plaza 2nd Addition, north of west Kellogg (U.S. 54) and east of Tyler Road in west Wichita. The property includes approximately 24 acres, which is currently undeveloped. Storm and sanitary sewer lines have been constructed through this property. The storm sewer includes a 10'x7' reinforced concrete box (RCB) which runs north to south through the middle of the property. This box carries drainage from this site and from land to the north. This 10'x7' RCB is the main focus of this report.

**Drainage Basin:**

The drainage area for the 10'x7' RCB includes approximately 186 acres. Land uses for this area include 144 acres of single family housing, 16.5 acres of light commercial development, and 25.5 acres of undeveloped land.

**Existing Conditions:**

The volume of runoff for existing conditions was calculated based on the rational method for a point at the southeast corner of the drainage area. The flow at this point for a 100-year storm is 438 cfs. The capacity of the 10'x7' RCB at this point is 411 cfs. Therefore, the runoff has exceeded the box capacity for a 100-year storm with the current conditions.

**Detention:**

According to City of Wichita policies, stormwater detention will be required with any future development on this site. Detention is required if the existing stormwater sewer is not large enough to handle runoff from the site under fully developed conditions. As discussed above, the existing 10'x7' RCB is not large enough to handle runoff under existing conditions, not to mention developed conditions.

Since the entire 186 acre drainage area north of the site drains into the 10'x7' RCB, the ability of this system to function properly depends on the adequacy of the RCB. Therefore, instead of focusing on only the 24-acre site, the detention calculations were based on the 186 acre drainage area.

Runoff calculations were based on a 60 minute time of concentration, which is the time of concentration for the entire drainage area. The runoff generated using the rational method for the 24 acres in an undeveloped state is 57 cfs. Runoff generated by the same 24 acres in developed state will be 73 cfs.

Runoff from the buildings and parking areas to the north of the buildings is calculated at 33 cfs. This is based on 10 acres, with a time of concentration of 60 minutes. Based on preliminary calculations, a detention pond covering approximately 20,000 sq. ft. with a depth of 4 ft. would be adequate for detaining 33 cfs. This pond could be located in the northeast corner, as shown in site plan C1-e. The pond shown is very close to 20,000 sq. ft. The detention pond will drain through an 18" pipe running from the pond to the 10'x7' RCB. At the time of peak runoff, the flow through this pipe will be 15 cfs. (Calculations are shown in Appendix 1)

By draining 33 cfs into the pond, and only allowing 15 cfs into the 10'x7' RCB at the time of peak runoff, 18 cfs is detained. This is greater than the 15 cfs increase caused by development of this 24 acre site. The remaining runoff from the site would be allowed to drain to the south side of the property and enter the 10'x7' RCB through a stormwater sewer system without detention.

**Conclusion:**

The 10'x7' RCB is not adequate for the 100-year storm under current conditions. Therefore, any future development in this drainage basin will require stormwater detention according to City of Wichita policies. Subject to the City's approval, a detention pond of approximately 20,000 sq. ft., 4 ft. deep in the northeast corner of the property should be adequate. This report is a preliminary analysis of the drainage for the 24 acre site. A design of an on-site stormwater sewer system and detention pond will need to be performed as part of the site development package.

**Appendix 1:  
DETENTION POND DESIGN  
18" OUTFALL PIPE**

TIME MIN.	TOTAL RUNOFF CU. FT.	PREV. DISCHARGE CU. FT.	POND VOLUME CU. FT.	DEPTH FT.	INCR. DISCHARGE CU. FT.	TOTAL DISCHARGE CU. FT.	STORAGE CU. FT.	INTENSITY IN/HR.	WSEL	FLOW CFS
1	3979.8	0	3979.8	0.2	12	12	3967.8	7.37	134.2	0.2
2	7959.6	12	7947.6	0.4	24	24	7923.6	7.37	134.362	0.6
3	11939.4	36	11903.4	0.6	36	36	11879.4	7.37	134.524	1.0
4	15919.2	126	15793.2	0.8	152	278	15641.2	7.37	134.7821	2.5
5	19899.0	276	19623.0	1.0	243.6	521.6	19377.4	7.37	134.969	4.05
6	23878.8	621.6	23257.2	1.19	300	821.6	23057.2	7.37	135.1529	6.0
7	27858.6	621.6	27037.0	1.39	348	1170.0	26689.0	7.37	135.3345	8.0
8	31838.4	1189.5	30648.9	1.53	451.755	1621.755	30217.05	7.37	135.5109	10.0
9	35818.2	1621.355	34196.85	1.71	500.0045	2121.3595	33996.81	7.37	135.6848	12.0
10	39798.0	2121.359	37675.49	1.84	543.4982	2664.858	37131.14	7.37	135.8567	14.0
11	43777.8	2664.858	41112.94	2.056	593.1939	3248.052	40629.75	7.37	136.0265	16.0
12	47757.6	3248.052	44509.55	2.225	618.3638	3866.416	43869.58	7.37	136.1945	18.0
13	51737.4	3866.416	47853.13	2.39	654.5099	4520.925	47121.08	7.37	136.3608	20.0
14	55717.2	4520.925	51194.88	2.56	696.6076	5207.532	50508.27	7.37	136.5254	22.0
15	59697.0	5207.532	54488.07	2.724	717.1632	5924.696	53707.91	7.37	136.6885	24.0
16	63676.8	5924.696	57783.18	2.89	731.7384	6676.434	56877.37	7.18	136.7899	26.0
17	67656.6	6676.434	61029.75	3.08	744.2051	7420.733	60027.02	7.00	136.8429	28.0
18	71636.4	7420.733	64229.02	3.25	757.7327	8160.465	63243.33	6.84	136.9152	30.0
19	75616.2	8160.465	67429.55	3.419	768.7759	8929.241	66507.56	6.68	136.9604	32.0
20	79596.0	8929.241	70629.31	3.58	778.0293	9708.27	69817.33	6.53	137.0003	34.0
21	83575.8	9708.27	73829.08	3.738	788.6629	10496.93	73173.67	6.39	137.0383	36.0
22	87555.6	10496.93	77028.85	3.894	798.8276	11294.77	76574.03	6.26	137.0757	38.0
23	91535.4	11294.77	80228.62	4.049	808.5699	12101.47	80044.13	6.13	137.1071	40.0
24	95515.2	12101.47	83428.39	4.205	813.3368	12913.81	83574.79	6.01	137.2488	42.0
25	99495.0	12913.81	86628.16	4.361	820.8849	13734.69	88105.31	5.90	137.2956	44.0
26	103474.8	13734.69	89827.93	4.517	827.5704	14582.06	92735.84	5.79	137.3355	46.0
27	107454.6	14582.06	93027.70	4.673	833.9555	15396.03	97366.37	5.69	137.3782	48.0
28	111434.4	15396.03	96227.47	4.829	839.6206	16235.65	102001.89	5.59	137.4143	50.0
29	115414.2	16235.65	99427.24	4.985	844.3817	17100.01	106893.59	5.49	137.4447	52.0
30	119394.0	17100.01	102627.01	5.141	849.4541	17929.46	112050.54	5.40	137.4775	54.0
31	123373.8	17929.46	105826.78	5.297	853.6121	18744.48	117485.52	5.32	137.5136	56.0
32	127353.6	18744.48	109026.55	5.453	857.2165	19641.69	123220.51	5.22	137.5258	58.0
33	131333.4	19641.69	112226.32	5.609	861.2769	20522.97	129255.50	5.14	137.5548	60.0
34	135313.2	20522.97	115426.09	5.765	865.0227	21388.99	135590.51	5.07	137.5858	62.0
35	139293.0	21388.99	118625.86	5.921	870.1397	22239.13	142280.87	5.00	137.613	64.0
36	143272.8	22239.13	121825.63	6.077	874.6452	23112.78	149326.42	4.93	137.6363	66.0
37	147252.6	23112.78	125025.40	6.233	878.5452	23999.32	156726.46	4.86	137.6557	68.0
38	151232.4	23999.32	128225.17	6.389	878.8562	24888.18	164482.02	4.79	137.6711	70.0
39	155212.2	24888.18	131424.94	6.545	882.1412	25750.32	172683.48	4.73	137.6832	72.0
40	159192.0	25750.32	134624.71	6.701	883.322	26633.64	181222.06	4.66	137.7011	74.0
41	163171.8	26633.64	137824.48	6.857	885.5854	27519.21	190124.79	4.60	137.7152	76.0
42	167151.6	27519.21	141024.25	7.013	887.3113	28400.52	199400.88	4.54	137.728	78.0

98022 Home Depot West Time of Conc. 3-17-98 DK

Assume SW' Overland Flow @ 0.5% slope: V = 0.20 ft/sec

500 ft = 2500 sec

120 ft = 600 sec

From Detent @ Windchuck + Handlog:

Length	Rise	Slope (%)	Velocity	Time (Sec)
282	24"	0.27	2.72	104
103	24"	0.24	2.8	37
475	30"	0.15	2.68	186
492	30"	0.23	2.20	154
554	30"	0.24	3.04	14
470	36"	0.13	2.72	172
598	36"	0.26	3.84	156
74	54"	0.26	5.04	15

TOTAL = 838 sec.

1971' 10'x7' RCB @ 0.10% V = 5.9 ft/sec

1971' = 334 sec

5.9 ft/sec

Total sec: 2500 + 838 + 334 = 3672 = 1.02 HRS



