Drainage Report Guidelines

Transportation Projects & Storm Water Projects <200 acres

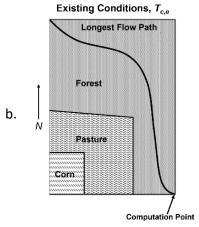
Please note this document serves as general guidance for meeting the criteria for a drainage report, and best practice is to refer to the most recent versions of the IDM and the UDC for more details. Supplemental information may be necessary to including in a drainage report depending on the scope and specifications of the development project.

Description

- a. Use of land (IDM 3.03 Level of Protection)
 - i. Identify appropriate Level of Protection
 - ii. Use Level of Protection criteria in post-development determination
- b. What is being developed
 - i. Acreage, location, nearby drainage
- c. Methodology
 - i. Method and rationale of drainage analysis, inventory of pertinent variables, coefficients, or formulas
 - ii. Clear explanation if any deviation from the Rational Method

Existing hydrologic analysis

- d. Land survey, topography, contours of land clearly shown to exhibit current drainage direction
- e. Pre-developed runoff determination (IDM 3.03 Hydrology)
 - i. Rainfall intensity
 - ii. Runoff coefficient (IDM 3.03 Table 3.1: Runoff Coefficient (C))
 - iii. Drainage area calculation
 - iv. Drainage area map
 - v. Time of concentration
 - 1. Graphical
 - a. Visual exit pathway of most remote (largest Tc) location in drainage area

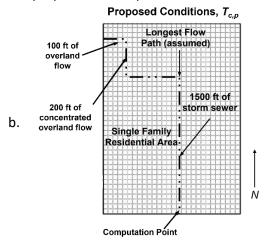


2. Analytical (ex. NRCS)

Proposed hydrologic analysis

- f. Proposed layout of development with functioning hydraulics (IDM 3.04: Hydraulics)
- g. Post-developed runoff determination
 - i. Rainfall intensity
 - ii. Runoff coefficient (IDM 3.03 Table 3.1: Runoff Coefficient (C))
 - iii. Drainage area calculation
 - iv. Drainage area map
 - v. Time of concentration
 - 1. Graphical

a. Visual exit pathway of most remote (largest Tc) location in drainage area with proposed developments



2. Analytical (ex. NRCS)

Hydraulic Analysis

h. Clear display of calculations and resulting hydraulic grade lines for both minor and major storm events listed in *IDM 3.03 Level of Protection*

LINE	STATION			LENGTH	BOX CULVERT		PIPE		MANNING'S	FLOW	HGL ELEV		INVERT ELEV		FINISHED GRADE		
I			FLOW 'Q'		HEIGHT	WIDTH	DIA.	SLOPE		VELOCITY	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	PONDING>0.0'
XPSWMM LINK	DOWNSTREAM	UPSTREAM	(cfs)	(ft)	(ft)	(ft)	(in)	SEOI E	n n	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	1 ONDINGS 0.0
A18	MH A17	MH A18	26.64	126	N/A	N/A	36	0.09%	0.012	3.72	15.00	15.20	6.56	6.67	15.46	13.32	TRUE
A17	MH_A16	MH A17	26.69	122	N/A	N/A	36	0.09%	0.012	3.73	14.80	15.00	6.45	6.56	14.85	15.46	FALSE
A16	MH A15	MH A16	74.75	163	N/A	N/A	48	0.09%	0.012	5.91	14.50	14.80	6.31	6.45	15.15	14.85	FALSE
A15	MH A14	MH A15	74.65	144	N/A	N/A	48	0.09%	0.012	5.90	14.10	14.50	6.18	6.31	14.38	15.15	FALSE
A14	MH A13	MH A14	125.18	330	N/A	N/A	60	0.09%	0.012	6.35	13.50	14.10	5.88	6.18	14.14	14.38	FALSE
A13	MH A12	MH A13	162.33	172	N/A	N/A	60	0.09%	0.012	8.24	13.00	13.50	5.72	5.88	14.62	14.14	FALSE
E12	MH E11	MH A12	171.53	130	N/A	N/A	66	0.09%	0.012	7.20	12.70	13.00	5.11	5.22	13.65	14.62	FALSE
E11	MH E10	MH E11	177.27	332	N/A	N/A	66	0.08%	0.012	7.44	12.00	12.70	4.85	5.11	13.37	13.65	FALSE
E10	MH E9	MH E10	189.87	354	N/A	N/A	66	0.06%	0.012	7.94	11.10	12.00	4.63	4.85	13.22	13.37	FALSE
E9	MH_E8	MH_E9	200.68	257	N/A	N/A	66	0.07%	0.012	8.08	10.40	11.10	4.45	4.63	13.40	13.22	FALSE
E8	MH E7	MH E8	199.81	101	N/A	N/A	66	0.07%	0.012	8,24	10.10	10.40	4.38	4.45	13.00	13.40	FALSE
E7	JB E6	MH_E7	209.15	91	N/A	N/A	66	0.07%	0.012	8.80	9.80	10.10	4.31	4.38	13.01	13.00	FALSE
E6	JB ES	JB E6	272.74	65	5	8	N/A	2.20%	0.013	6.06	9.70	9.80	4.27	4.31	12.80	13.01	FALSE
E5	JB E4	JB_E5	264.74	174	5	8	N/A	0.05%	0.013	6.62	9.40	9.70	4.18	4.27	12.65	12.80	FALSE
E4	JB_E3	JB_E4	273.63	244	5	8	N/A	0.05%	0.013	6.86	8.90	9.40	4.06	4.18	12.56	12.65	FALSE
E3	JB_E2	JB_E3	280.21	275	5	8	N/A	0.05%	0.013	7.31	8.20	8.90	3.34	4.06	13.51	12.56	FALSE
E_OUTFALL	OUTFALL_1	JB_E1	287.16	55	5	10	N/A	0.02%	0.013	6.87	6.90	8.20	3.91	3.93	9.81	12.49	FALSE
D31	MH_D30	MH_D31	49.98	327	N/A	N/A	42	0.11%	0.012	5.18	13.20	13.90	7.91	8.27	14.32	14.75	FALSE
D30	MH_D29	MH_D30	64.47	54	N/A	N/A	48	0.11%	0.012	5.12	13.10	13.20	7.85	7.91	14.33	14.32	FALSE
D29	MH_D28	MH_D29	64.47	130	N/A	N/A	48	0.11%	0.012	5.12	12.90	12.22	7.70	7.85	14.32	14.33	FALSE
D28	MH_D27	MH_D28	67.53	98	N/A	N/A	48	0.11%	0.012	5.36	12.70	12.90	7.60	7.70	14.70	14.32	FALSE
D27	MH_D26	MH_D27	67.54	151	N/A	N/A	48	0.11%	0.012	5.37	12.40	12.70	7.43	7.60	14.16	14.70	FALSE
D26	MH_D25	MH_D26	73.13	470	N/A	N/A	48	0.11%	0.012	5.78	11.50	12.40	6.91	7.43	13.57	14.16	FALSE
D25	MH_D24	MH_D25	80.38	430	N/A	N/A	54	0.07%	0.012	4.83	10.90	11.50	5.94	6.24	13.16	13.57	FALSE
D24	MH_D23	MH_D24	87.35	365	N/A	N/A	54	0.07%	0.012	5.27	10.30	10.90	5.70	5.94	12.86	13.16	FALSE
D23	MH_D22	MH_D23	92.00	108	N/A	N/A	54	0.07%	0.012	5.69	10.10	10.30	5.60	5.68	13.00	12.86	FALSE
D22	MH_D21	MH_D22	92.02	58	N/A	N/A	54	0.07%	0.012	5.77	10.00	10.10	5.56	5.60	12.89	13.00	FALSE
D21	MH_D20	MH_D21	99.00	190	N/A	N/A	54	0.07%	0.012	6.26	9.60	10.00	5.43	5.56	12.66	12.89	FALSE
D20	MH_D19	MH_D20	103.55	182	N/A	N/A	54	0.07%	0.012	6.77	9.20	9.60	5.31	5.43	12.54	12.66	FALSE
D_OUTFALL	OUTFALL_2	MH_D19	103.58	55	N/A	N/A	54	0.05%	0.012	6.25	8.40	9.20	3.91	3.94	9.14	12.54	FALSE
C35	MH_C34	MH_C35	8.64	217	N/A	N/A	24	0.11%	0.012	2.72	11.70	11.90	6.16	6.30	12.91	12.85	FALSE
C34	MH_C33	MH_C34	22.54	258	N/A	N/A	30	0.11%	0.012	4.56	11.00	11.70	5.83	6.16	12.89	12.91	FALSE
C33	MH_C32	MH_C33	42.03	270	N/A	N/A	36	0.11%	0.012	5.92	10.10	11.00	5.54	5.83	12.89	12.89	FALSE
C32	MH_E6	MH_C32	63.59	260	N/A	N/A	48	0.11%	0.012	4.90	9.80	10.10	5.25	5.50	13.01	12.89	FALSE
B38	MH_D31	MH_B38	29.70	353	N/A	N/A	36	0.11%	0.012	4.18	13.90	14.50	8.27	8.66	14.75	15.32	FALSE
B37	MH_B38	MH_B37	11.71	353	N/A	N/A	24	0.11%	0.012	3.68	14.50	15.30	8.66	9.05	15.32	15.35	FALSE
B36	MH_A12	MH_B36	10.16	55	N/A	N/A	24	0.11%	0.012	3.67	13.00	13.00	6.65	6.71	14.62	14.46	FALSE

LINE	STATION			LENGTH	TH BOX CULVERT		PIPE		MANNING'S	FLOW	HGL ELEV		INVERT ELEV		FINISHED GRADE		1
			FLOW 'Q'		HEIGHT	WIDTH	DIA.	SLOPE		VELOCITY	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	PONDING>0.0
XPSWMM LINK	DOWNSTREAM	UPSTREAM	(cfs)	(ft)	(ft)	(ft)	(in)	SECIL	n	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	1 ONDING-0.0
A18	MH A17	MH A18	-56.08	126	N/A	N/A	36	0.09%	0.012	-7.86	14.09	13.32	6.56	6.67	15.46	13.32	FALSE
A17	MH A16	MH A17	-56.08	122	N/A	N/A	36	0.09%	0.012	-7.85	14.82	14.09	6.45	6.56	14.85	15.46	FALSE
A16	MH A15	MH A16	65.09	163	N/A	N/A	48	0.09%	0.012	5.16	14.76	14.82	6.31	6.45	15.15	14.85	FALSE
A15	MH A14	MH A15	64.78	144	N/A	N/A	48	0.09%	0.012	5.13	14.73	14.76	6.18	6.31	14.38	15.15	FALSE
A14	MH A13	MH A14	112.57	330	N/A	N/A	60	0.09%	0.012	5.72	14.52	14.73	5.88	6.18	14.14	14.38	TRUE
A13	MH A12	MH A13	147.74	172	N/A	N/A	60	0.09%	0.012	7.50	14.21	14.52	5.72	5.88	14.62	14.14	TRUE
E12	MH E11	MH_A12	157,47	130	N/A	N/A	66	0.09%	0.012	6,62	14.02	14.21	5.11	5.22	13.65	14.62	FALSE
E11	MH E10	MH E11	163.74	332	N/A	N/A	66	0.08%	0.012	6.87	13.66	14.02	4.85	5.11	13.37	13.65	TRUE
E10	MH E9	MH E10	178.40	354	N/A	N/A	66	0.06%	0.012	7.45	12.98	13.66	4.63	4.85	13.22	13.37	TRUE
E9	MH_E8	MH_E9	193.62	257	N/A	N/A	66	0.07%	0.012	8.13	12.26	12.98	4.45	4.63	13.40	13.22	FALSE
E8	MH_E7	MH_E8	193.61	101	N/A	N/A	66	0.07%	0.012	8.13	11.66	12.26	4.38	4.45	13.00	13.40	FALSE
E7	JB_E6	MH_E7	209.58	91	N/A	N/A	66	0.07%	0.012	8.80	11.37	11.66	4.31	4.38	13.01	13.00	FALSE
E6	JB E5	JB E6	291.70	65	5	8	N/A	2.20%	0.013	6.47	11.26	11.37	4.27	4.31	12.80	13.01	FALSE
E5	JB_E4	JB_E5	326.91	174	5	8	N/A	0.05%	0.013	8.16	10.76	11.26	4.18	4.27	12.65	12.80	FALSE
E4	JB_E3	JB_E4	342.82	244	5	8	N/A	0.05%	0.013	8.56	9.99	10.76	4.06	4.18	12.56	12.65	FALSE
E3	JB_E2	JB_E3	356.30	275	5	8	N/A	0.05%	0.013	8.90	9.09	9.99	3.34	4.06	13.51	12.56	FALSE
E_OUTFALL	OUTFALL_1	JB_E1	368.97	55	5	10	N/A	0.02%	0.013	-7.86	7.40	9.09	3.91	3.93	9.81	12.49	FALSE
D31	MH_D30	MH_D31	56.84	327	N/A	N/A	42	0.11%	0.012	5.88	14.76	15.17	7.91	8.27	14.32	14.75	TRUE
D30	MH_D29	MH_D30	79.46	54	N/A	N/A	48	0.11%	0.012	6.30	14.70	14.76	7.85	7.91	14.33	14.32	TRUE
D29	MH_D28	MH_D29	81.23	130	N/A	N/A	48	0.11%	0.012	6.44	14.48	14.70	7.70	7.85	14.32	14.33	TRUE
D28	MH_D27	MH_D28	83.51	98	N/A	N/A	48	0.11%	0.012	6.63	14.27	14.48	7.60	7.70	14.70	14.32	TRUE
D27	MH_D26	MH_D27	82.92	151	N/A	N/A	48	0.11%	0.012	6.58	13.96	14.27	7.43	7.60	14.16	14.70	FALSE
D26	MH_D25	MH_D26	85.94	470	N/A	N/A	48	0.11%	0.012	6.82	12.78	13.96	6.91	7.43	13.57	14.16	FALSE
D25	MH_D24	MH_D25	95.33	430	N/A	N/A	54	0.07%	0.012	5.98	12.00	12.78	5.94	6.24	13.16	13.57	FALSE
D24	MH_D23	MH_D24	107.59	365	N/A	N/A	54	0.07%	0.012	6.72	11.05	12.00	5.70	5.94	12.86	13.16	FALSE
D23	MH_D22	MH_D23	117.73	108	N/A	N/A	54	0.07%	0.012	7.09	10.76	11.05	5.60	5.68	13.00	12.86	FALSE
D22	MH_D21	MH_D22	117.45	58	N/A	N/A	54	0.07%	0.012	7.05	10.60	10.76	5.56	5.60	12.89	13.00	FALSE
D21	MH_D20	MH_D21	130.10	190	N/A	N/A	54	0.07%	0.012	7.86	9.91	10.60	5.43	5.56	12.66	12.89	FALSE
D20	MH_D19	MH_D20	137.75	182	N/A	N/A	54	0.07%	0.012	8.77	9.08	9.91	5.31	5.43	12.54	12.66	FALSE
D_OUTFALL	OUTFALL_2	MH_D19	137.75	55	N/A	N/A	54	0.05%	0.012	8.44	7.36	9.08	3.91	3.94	9.14	12.54	FALSE
C35	MH_C34	MH_C35	-10.32	217	N/A	N/A	24	0.11%	0.012	-3.24	13.25	12.87	6.16	6.30	12.91	12.85	TRUE
C34	MH_C33	MH_C34	25.71	258	N/A	N/A	30	0.11%	0.012	5.19	13.08	13.25	5.83	6.16	12.89	12.91	TRUE
C33	MH_C32	MH_C33	49.35	270	N/A	N/A	36	0.11%	0.012	6.94	12.96	13.08	5.54	5.83	12.89	12.89	TRUE
C32	MH_E6	MH_C32	82.15	260	N/A	N/A	48	0.11%	0.012	6.51	12.06	12.96	5.25	5.50	13.01	12.89	TRUE
B38	MH_D31	MH_B38	33.98	353	N/A	N/A	36	0.11%	0.012	4.79	15.17	15.36	8.27	8.66	14.75	15.32	TRUE
B37	MH_B38	MH_B37	19.06	353	N/A	N/A	24	0.11%	0.012	5.99	15.36	15.66	8.66	9.05	15.32	15.35	TRUE
B36	MH_A12	MH_B36	31.51	55	N/A	N/A	24	0.11%	0.012	9.85	14.21	14.72	6.65	6.71	14.62	14.46	TRUE

i.

j.

Determination of Impact

- k. Proposed and existing comparison of flow and runoff rates (IDM 3.05b: Pre-Developed Peak Runoff)
- I. Mitigation efforts described if necessary (IDM 3.05a: No Adverse Impacts Downstream; a)