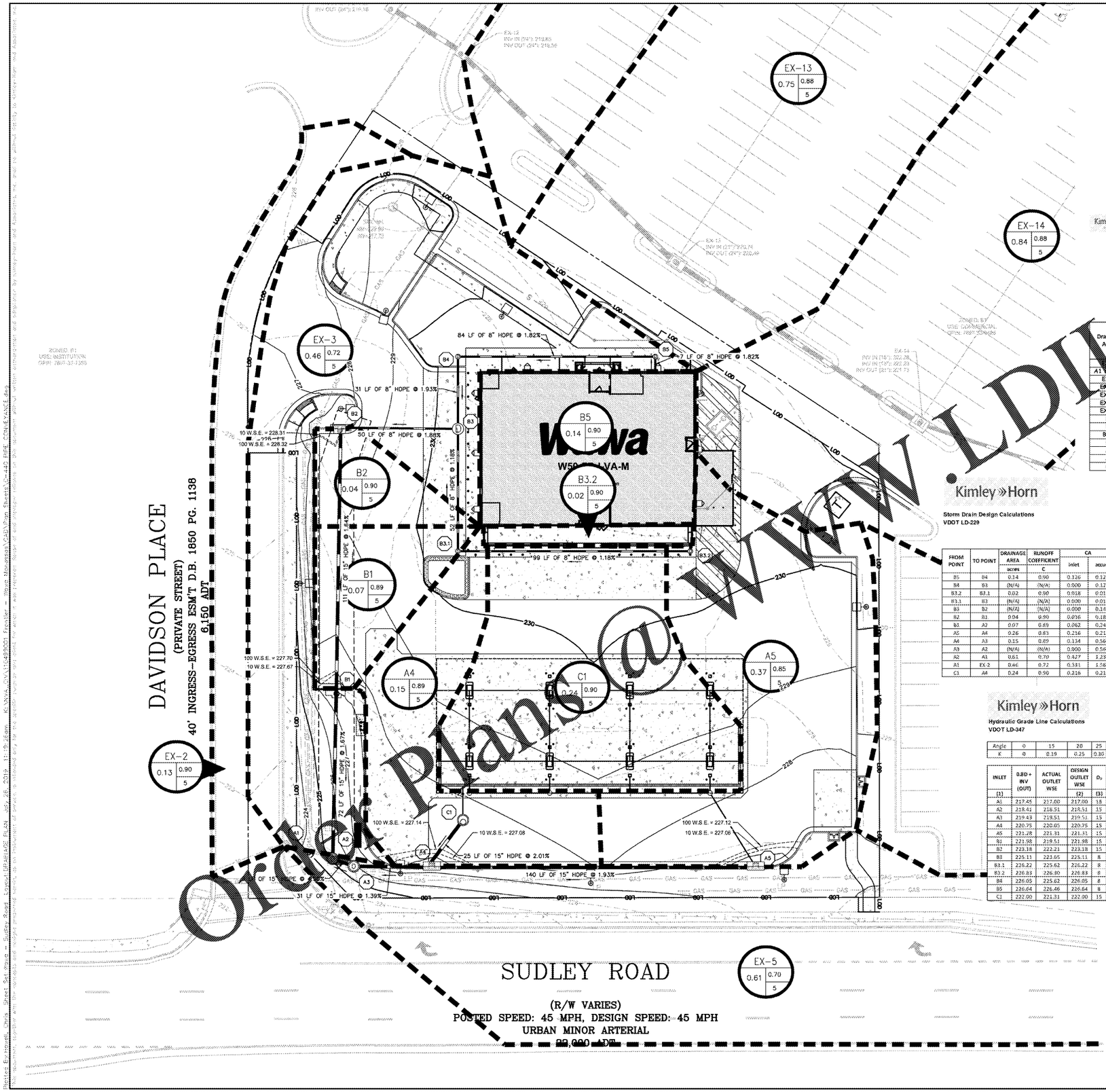

Order Plans at WWW.LDILine.com

LEGEND

- PROPERTY LINE/LEGAL ROW
- LOD — LIMITS OF DISTURBANCE (1.46 AC)
- DRAINAGE DIVIDE

A: DRAINAGE AREA NAME
B: AREA (ACRES)
C: RATIONAL COEFFICIENT
D: TIME OF CONCENTRATION

Kimley»Horn

Inlet Drainage Area Calculations for Rational Method

Post Development

Project: Wawa Sudley Road Date: 09/07/18 Initials: CMH

Runoff Coefficients

Land Cover	Range	Use
General Impervious	0.75 - 0.95	0.90
Lawns	0.05 - 0.35	0.30
-	-	
-	-	
-	-	

Drainage Area	General Impervious		Lawns		-		-		-		Total Area	Runoff Coefficient
	Runoff Coefficient 0.90		Runoff Coefficient 0.30		Runoff Coefficient		Runoff Coefficient		Runoff Coefficient			
	Area (sf)	Area (ac)	Area (sf)	Area (ac)	Area (sf)	Area (ac)	Area (sf)	Area (ac)	Area (sf)	Area (ac)	A	C
A2	6,725	0.15									0.15	0.90
A1 + A3	13,935	0.32	6,200	0.14							0.46	0.72
E1	17,850	0.41	8,805	0.20							0.61	0.70
EX-12	{from Lowe's Plan Set}										0.37	0.85
EX-13	31,670	0.73	860	0.02							0.75	0.88
EX-14	34,950	0.80	1,200	0.03							0.83	0.88
EX-15	{from Lowe's Plan Set}										0.85	0.85
B1	2,905	0.07	65	0.00							0.07	0.89
B2	1,830	0.04									0.04	0.90
B3.2	780	0.02									0.02	0.90
B5	5,960	0.14									0.14	0.90
A4	6,439	0.15	95	0.00							0.15	0.89
A5	9,986	0.23	1,340	0.03							0.26	0.83
C1	10,454	0.24									0.24	0.90

Project: Wawa - Sudley Road
Project #: 110499001
Date: 9/7/2018
Locality: Prince William County
10 -year storm
Manning n = 0.010 for HDPE
0.013 for RCP

Kimley»Horn

Storm Drain Design Calculations
VDOT LD-229

FROM POINT	TO POINT	DRAINAGE AREA (acres)	RUNOFF COEFFICIENT C	CA inlet	CA accum	INLET TIME accum (min)	RAINFALL I (in/hr)	RUNOFF Q (cfs)	INVERT ELEVATIONS upper end (ft)	INVERT ELEVATIONS lower end (ft)	LENGTH (ft)	SLOPE (%)	SIZE (in)	PIPE CAPACITY (cfs)	Q / Q₀ (%)	VELOCITY (fps)	FLOW TIME incr (min)	FLOW TIME accum (min)	REMARKS
B5	B4	0.14	0.90	0.126	0.126	5.00	6.41	0.81	227.63	226.11	84	1.80%	8	2.12	38%	5.67	0.25	5.00	
B4	B3	(N/A)	(N/A)	0.000	0.126	0.00	6.35	0.81	226.11	225.52	33	1.80%	8	2.12	37%	5.78	0.09	5.25	
B3.2	B3.1	0.02	0.90	0.018	0.018	5.00	6.41	0.12	227.46	226.30	99	1.20%	8	1.71	7%	2.80	0.59	5.00	
B3.1	B3	(N/A)	(N/A)	0.000	0.018	0.00	6.27	0.11	226.30	225.69	52	1.20%	8	1.71	6%	2.78	0.31	5.59	
B3	B2	(N/A)	(N/A)	0.000	0.144	0.00	6.19	0.90	225.52	224.58	50	1.90%	8	2.15	42%	5.90	0.14	5.90	
B2	B1	0.04	0.90	0.036	0.180	5.00	6.15	1.12	224.00	222.18	111	1.60%	15	10.75	10%	5.67	0.33	6.04	
B1	A2	0.07	0.89	0.062	0.242	5.00	6.07	1.48	222.18	220.98	72	1.70%	15	10.86	14%	6.20	0.19	6.37	
A5	A4	0.26	0.83	0.216	0.216	5.00	6.41	1.39	223.00	220.28	146	1.90%	15	11.68	12%	6.41	0.36	5.00	
A4	A3	0.15	0.89	0.134	0.565	5.00	6.32	3.60	220.18	219.75	31	1.40%	15	9.91	36%	7.44	0.07	5.37	
A3	A2	(N/A)	(N/A)	0.000	0.565	0.00	6.30	3.59	219.89	218.43	9	1.90%	15	10.58	19%	11.71	0.01	5.44	
A2	A1	0.61	0.70	0.427	1.235	5.00	5.03	7.50	218.43	217.41	21	4.90%	15	14.29	52%	11.79	0.03	6.56	
A1	EX-2	0.46	0.72	0.331	1.566	5.00	6.02	9.50	217.16	216.25	36	2.60%	18	16.87	56%	9.83	0.06	6.59	
C1	A6	0.24	0.90	0.216	0.216	5.00	6.41	1.40	223.50	223.00	43	2.00%	15	11.92	12%	6.50	0.06	5.00	

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Hydraulic Grade Line Calculations
VDOT LD-347

Project: Wawa - Sudley Road
Project #: 110499001
Date: 9/7/2018
Locality: Prince William County
10 -year storm

Angle	0	15	20	25	30	40	50	60	70	80	90
K	0	0.19	0.25	0.30	0.35	0.43	0.50	0.56	0.61	0.66	0.70

INLET	0.8D + INV (OUT)	ACTUAL OUTLET WSE	DESIGN OUTLET WSE	D_o	Q_o	L_o	S_{fo}	H_f	JUNCTION LOSS V_o	H_o	Q_i	V_i	$Q_i V_i$	$\frac{V_i^2}{2g}$	H_i	Angle	H_θ	H_L	Surface Runoff Factor?	1.3 H_L	IS-17	0.5 H_L	FINAL H	INLET WSE	F/L ELEV
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		(13)	(14)	(15)	(16)						(18)	(19)	(20)	(21)
A1	217.45	217.00	217.00	18	9.50	36	0.0048	0.17	9.83	0.98	7.50	11.79	88.43	2.16	0.76	40	0.83	2.06	YES	2.68	YES	1.34	1.51	218.51	223.09
A2	218.41	218.31	218.51	15	7.50	21	0.0080	0.17	11.79	0.54	3.59	11.71	42.04	2.13	0.75	0	0.00	1.28	YES	1.67	YES	0.84	1.00	219.51	225.30
A3	219.43	219.51	219.51	15	3.59	9	0.0018	0.02	11.71	0.13	3.60	7.34	26.78	0.85	0.30	20	0.21	1.05	NO	1.05	YES	0.52	0.54	220.05	225.84
A4	220.75	220.05	220.75	15	3.60	31	0.0018	0.06	7.44	0.21	1.40	6.50	9.10	0.66	0.23	90	0.33	0.77	YES	1.00	YES	0.50	0.56	221.31	226.82
A5	221.28	221.31	221.31	15	1.39	140	0.0003	0.04	6.41	0.16	0.00	0.00	0.00	0.00	0.00	0	0.00	0.16	YES	0.21	YES	0.10	0.14	221.45	226.75
B1	221.98	219.51	221.98	15	1.48	72	0.0003	0.02	6.20	0.15	1.12	5.67	6.35	0.50	0.17	0	0.00	0.67	YES	0.42	YES	0.21	0.23	222.21	227.55
B2	223.18	222.21	223.18	15	1.12	111	0.0002	0.02	5.67	0.12	0.90	5.90	5.31	0.54	0.19	90	0.38	0.69	YES	0.90	YES	0.45	0.47	223.65	228.24
B3	225.11	223.65	225.11	8	0.90	50	0.0033	0.16	5.90	0.14	0.81	5.78	4.68	0.52	0.16	50	0.26	0.68	NO	0.68	YES	0.34	0.50	225.62	230.38
B3.1	226.22	225.62	226.22	8	0.11	52	0.0000	0.00	2.78	0.03	0.12	2.80	0.34	0.12	0.04	90	0.09	0.16	NO	0.16	YES	0.08	0.08	226.30	230.38
B3.2	226.83	226.30	226.83	8	0.12	99	0.0001	0.01	2.80	0.03	0.00	0.00	0.00	0.00	0.00	0	0.00	0.03	YES	0.04	YES	0.02	0.03	226.86	230.44
B4	226.05	225.62	226.05	8	0.81	33	0.0027	0.08	5.78	0.13	0.81	5.67	4.59	0.50	0.17	90	0.38	0.65	NO	0.65	YES	0.33	0.41	226.46	230.44
B5	226.04	226.46	226.64	8	0.81	84	0.0027	0.22	5.67	0.12	0.00	0.00	0.00	0.00	0.00	0	0.00	0.12	YES	0.16	YES	0.08	0.30	226.95	230.56
C1	222.00	221.31	222.00	15	1.40	43	0.0003	0.01	6.50	0.16	0.00	0.00	0.00	0.00	0.00	0	0.00	0.16	YES	0.21	YES	0.11	0.12	222.12	227.66

Inlet Ponding Calculation Chart (Per VDOT Requirements)

$Q_i = (C_w)^* L^* (d^{*1.5})$, where C_w = 3.0, and 50% inlet blockage was assumed

Intesity Value = 6.41 for 10-year storm and 8.64 for 100-year storm per PWC DCSM

Inlet Number	Inlet Length (ft)	Design Inlet Length (ft)	Drainage Area (Ac.)	C-Value	10-yr Discharge (cfs)	100-yr Discharge (cfs)	10-yr ponding depth (ft)	100-yr ponding depth (ft)
B1	6	3	0.07	0.89	0.39	0.52	0.12	0.15
B2	4	2	0.02	0.90	0.10	0.14	0.07	0.08
A4	8	4	0.28	0.90	1.59	2.15	0.26	0.32
A5	8	4	0.37	0.85	2.04	2.74	0.31	0.37

GRAPHIC SCALE IN FEET
0 10 20 40

NORTH

No.	REVISIONS	DATE	BY
1	PWC COMMENTS – 1ST ROUND	09/10/2018	CAH
2	PWC COMMENTS – 2ND ROUND	11/02/2018	CAH
3	PWC COMMENTS – SIGNATURE SET	02/06/2019	CAH
4	UTILITY REVISIONS	07/25/2019	CMH

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COMMONWEALTH OF VIRGINIA
ROSS STEVENS
Lic. No. 047498
02/06/2019
PROFESSIONAL ENGINEER

KHA PROJECT 110499001
DATE 02/06/2019
SCALE AS SHOWN
DESIGNED BY CMH
DRAWN BY CAH
CHECKED BY RSS

STORMWATER CONVEYANCE CALCULATIONS

WAWA - SUDLEY ROAD

PREPARED FOR
FRONTIER DEVELOPMENT VA
PRINCE WILLIAM COUNTY

Sheet 27 of 40

SHEET NUMBER
C-440