

E YOUNG STREET CONNECTOR

E YOUNG STREET
(S.R. 1003)
Rolesville, NC, 27571

DRAINAGE AND EROSION CONTROL CALCULATIONS

PREPARED FOR:

LENNAR CORPORATION
1100 Perimeter Park Drive, Suite 112
Morrisville, NC 27596

PREPARED BY:

BGE, INC.
5440 Wade Park Boulevard, Suite 102
Raleigh, NC 27607



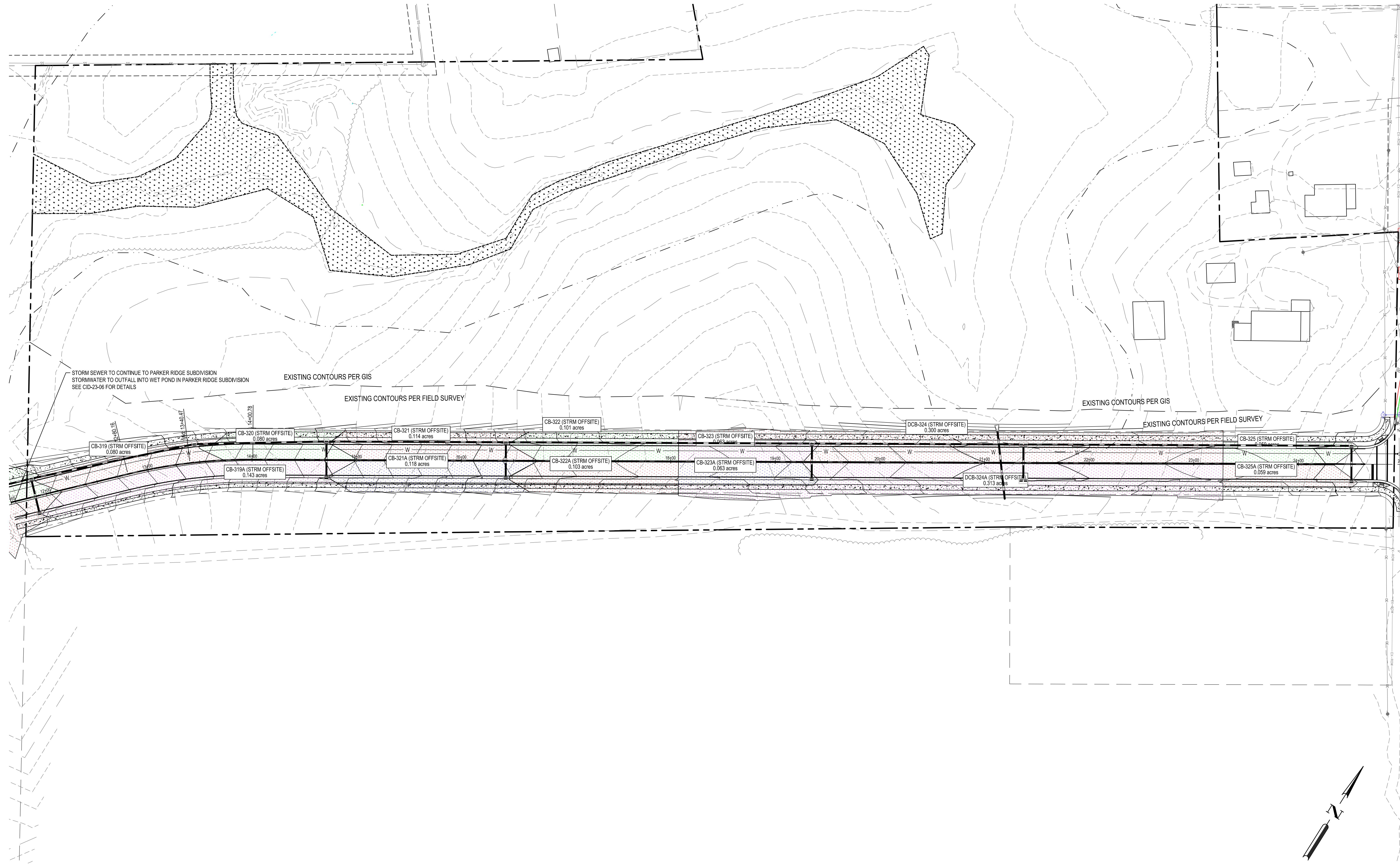
Initial Submittal: 07/03/2023
Second Submittal: 10/04/2023



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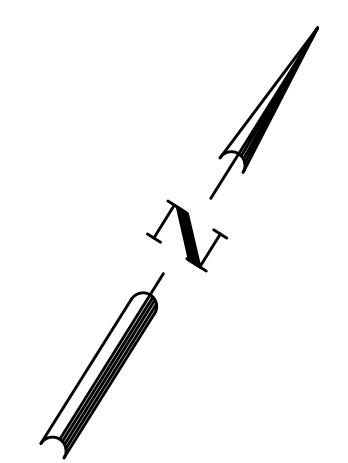
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ATTACHMENT 1: DRAINAGE AREA MAP



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YOUNG STREET CONNECTOR DRAINAGE AREAS



10 YR STORM

10-YR ANALYSIS

CATCHMENTS - Time: 0.00 hours

Outflow Element	Scaled Area (acres)	Flow (Total Out) (cfs)	Time of Concentration (hours)	Runoff Coefficient (Rational)
CB-325 (STRM OFFSITE)	0.059	0.41	0.083	0.950
CB-323 (STRM OFFSITE)	0.063	0.43	0.083	0.950
CB-323A (STRM OFFSITE)	0.063	0.43	0.083	0.950
CB-322 (STRM OFFSITE)	0.101	0.70	0.083	0.950
CB-321 (STRM OFFSITE)	0.114	0.78	0.083	0.950
CB-319 (STRM OFFSITE)	0.080	0.55	0.083	0.950
CB-319A (STRM OFFSITE)	0.143	0.98	0.083	0.950
CB-320 (STRM OFFSITE)	0.080	0.55	0.083	0.950
CB-321A (STRM OFFSITE)	0.118	0.81	0.083	0.950
CB-325A (STRM OFFSITE)	0.059	0.41	0.083	0.950
DCB-324A (STRM OFFSITE)	0.313	2.15	0.083	0.950
DCB-324 (STRM OFFSITE)	0.300	2.06	0.083	0.950
CB-322A (STRM OFFSITE)	0.103	0.71	0.083	0.950

10-YR ANALYSIS

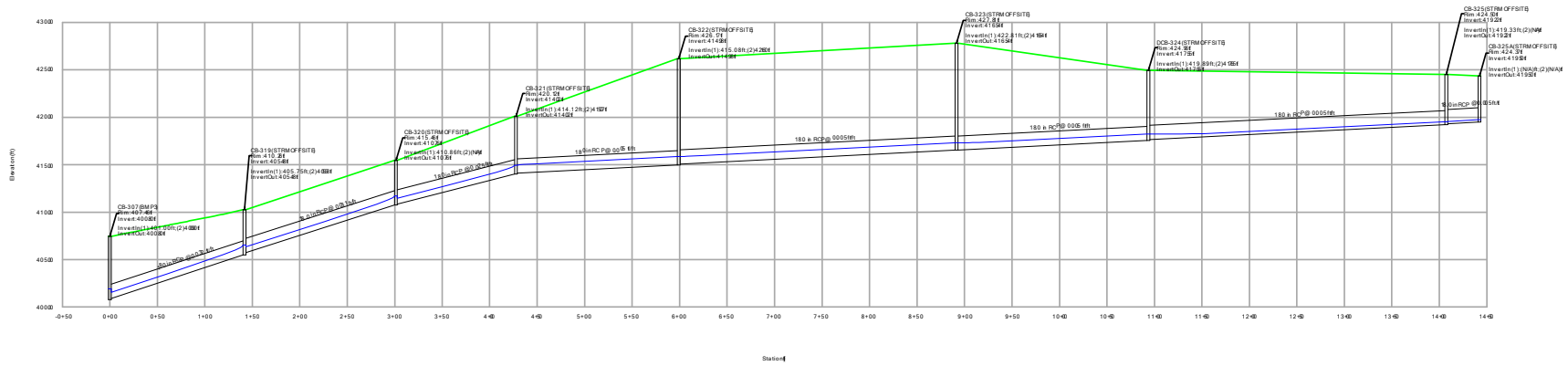
Inlets - Time: 0.00 hours

Label	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Flow (Total Out) (cfs)	Capture Efficiency (Calculated) (%)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Grate Length (ft)	Velocity (In) (ft/s)	Velocity (Out) (ft/s)
CB-323A (STRM OFFSITE)	0.41	0.02	0.41	95.3	423.23	423.23	3.0	2.26	2.26
CB-323 (STRM OFFSITE)	0.41	0.02	3.97	95.3	417.32	417.32	3.0	3.62	4.27
DCB-324A (STRM OFFSITE)	1.47	0.70	1.47	67.9	420.52	420.52	3.0	3.25	3.25
DCB-324 (STRM OFFSITE)	1.43	0.65	3.37	68.6	418.26	418.26	3.0	1.16	4.10
CB-325 (STRM OFFSITE)	0.39	0.02	0.77	96.0	419.55	419.55	3.0	2.27	2.72
CB-325A (STRM OFFSITE)	0.39	0.02	0.39	96.0	419.73	419.73	3.0	2.22	2.22
CB-321 (STRM OFFSITE)	0.73	0.13	5.86	85.0	414.96	414.96	3.0	4.70	5.06
CB-319 (STRM OFFSITE)	0.57	0.06	7.38	90.2	406.53	406.53	3.0	9.50	5.57
CB-319A (STRM OFFSITE)	0.90	0.22	0.90	80.2	406.53	406.53	3.0	0.97	0.97

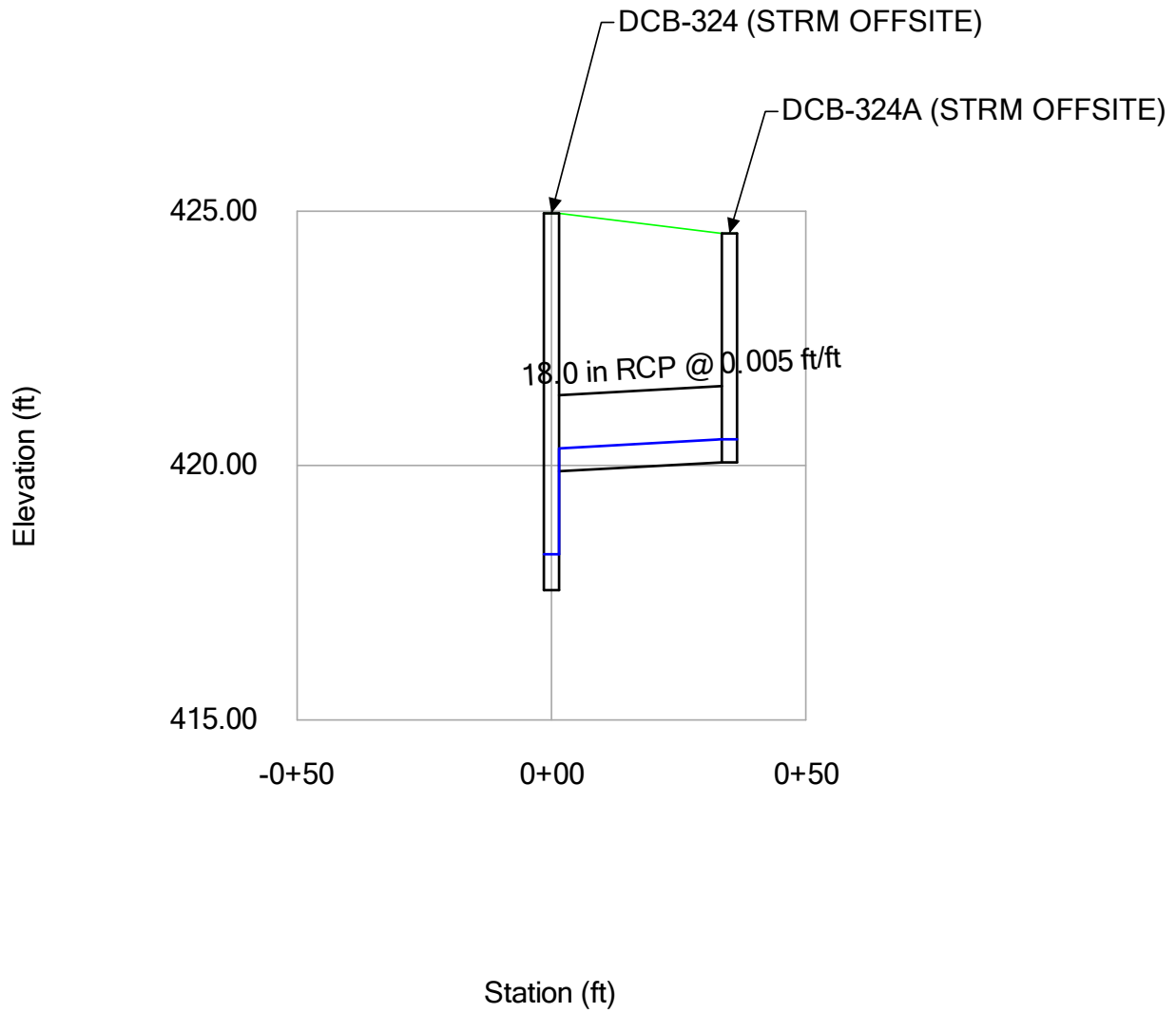
10-YR ANALYSIS
Conduit Results - Time: 0.00 hours

Label	Diameter (in)	Slope (Calculated) (ft/ft)	Velocity (In) (ft/s)	Velocity (Out) (ft/s)	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CB-323 TO CB-323A (STRM OFFSITE)	18.0	0.005	2.26	2.30	0.41	7.43	423.23	423.05
CB-323 TO DCB-324 (STRM OFFSITE)	18.0	0.005	4.10	3.62	3.37	7.43	418.26	417.32
CB-322 TO CB-323 (STRM OFFSITE)	18.0	0.005	4.27	4.27	3.97	7.43	417.32	415.86
CB-322 TO CB-322A (STRM OFFSITE)	18.0	0.005	2.56	2.57	0.63	7.43	422.07	421.89
CB-321 TO CB-322 (STRM OFFSITE)	18.0	0.005	4.47	4.70	4.80	7.43	415.86	414.97
DCB-324 TO DCB-324A (STRM OFFSITE)	18.0	0.005	3.25	3.27	1.47	7.43	420.52	420.34
DCB-324 TO CB-325 (STRM OFFSITE)	18.0	0.005	2.72	1.16	0.77	7.43	419.55	418.26
CB-325 TO CB-325A (STRM OFFSITE)	18.0	0.005	2.22	2.27	0.39	7.43	419.73	419.56
CB-320 TO CB-321 (STRM OFFSITE)	18.0	0.025	5.06	8.58	5.86	16.61	414.96	411.48
CB-321 TO CB-321A (STRM OFFSITE)	18.0	0.005	2.70	2.70	0.75	7.43	415.56	415.39
CB-319 TO CB-320 (STRM OFFSITE)	18.0	0.031	5.20	9.50	6.27	18.62	411.73	406.35
CB-319 TO CB-319A (STRM OFFSITE)	18.0	0.005	0.97	0.76	0.90	7.43	406.53	406.53

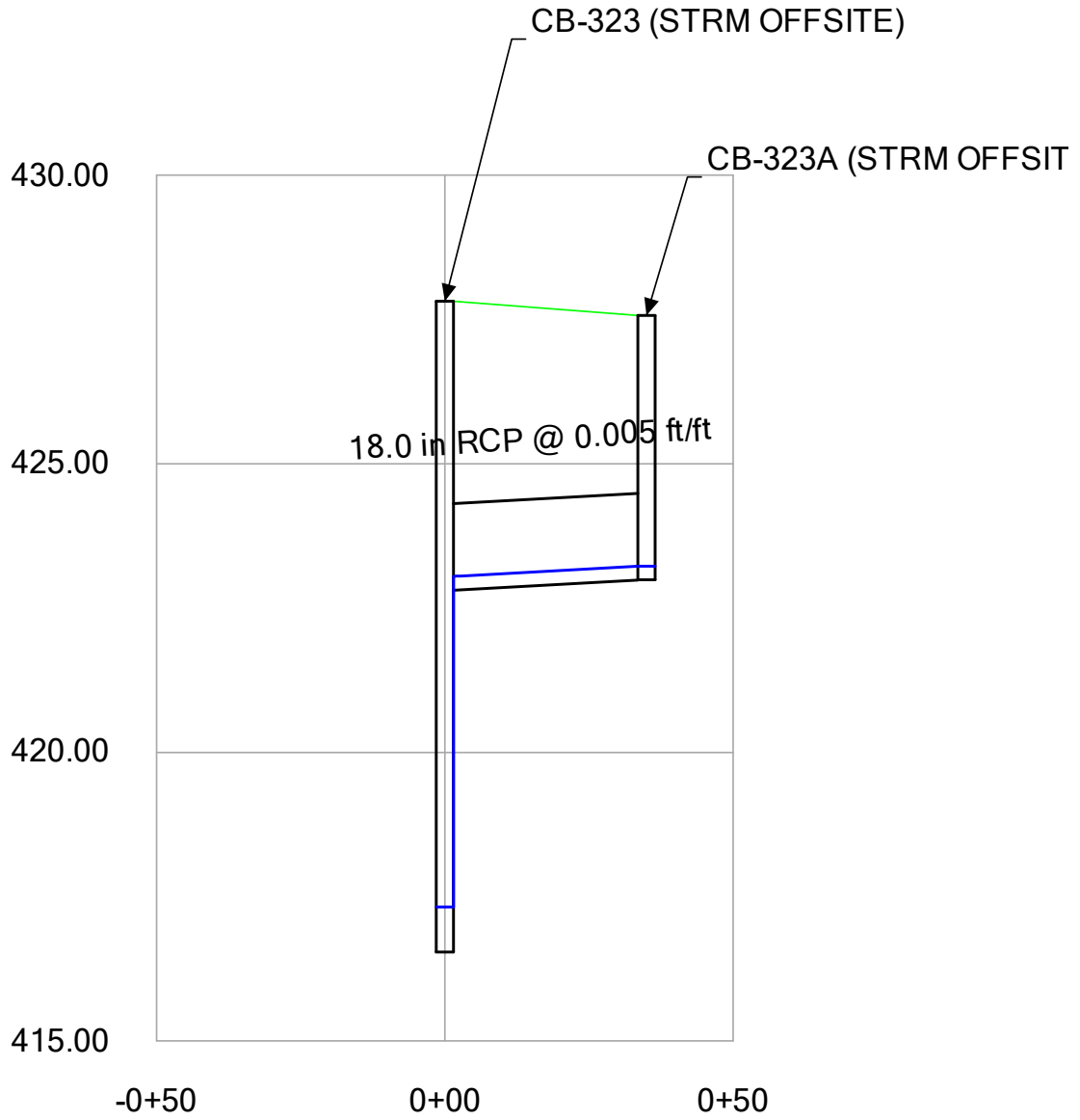
10-YR ANALYSIS



10-YR ANALYSIS

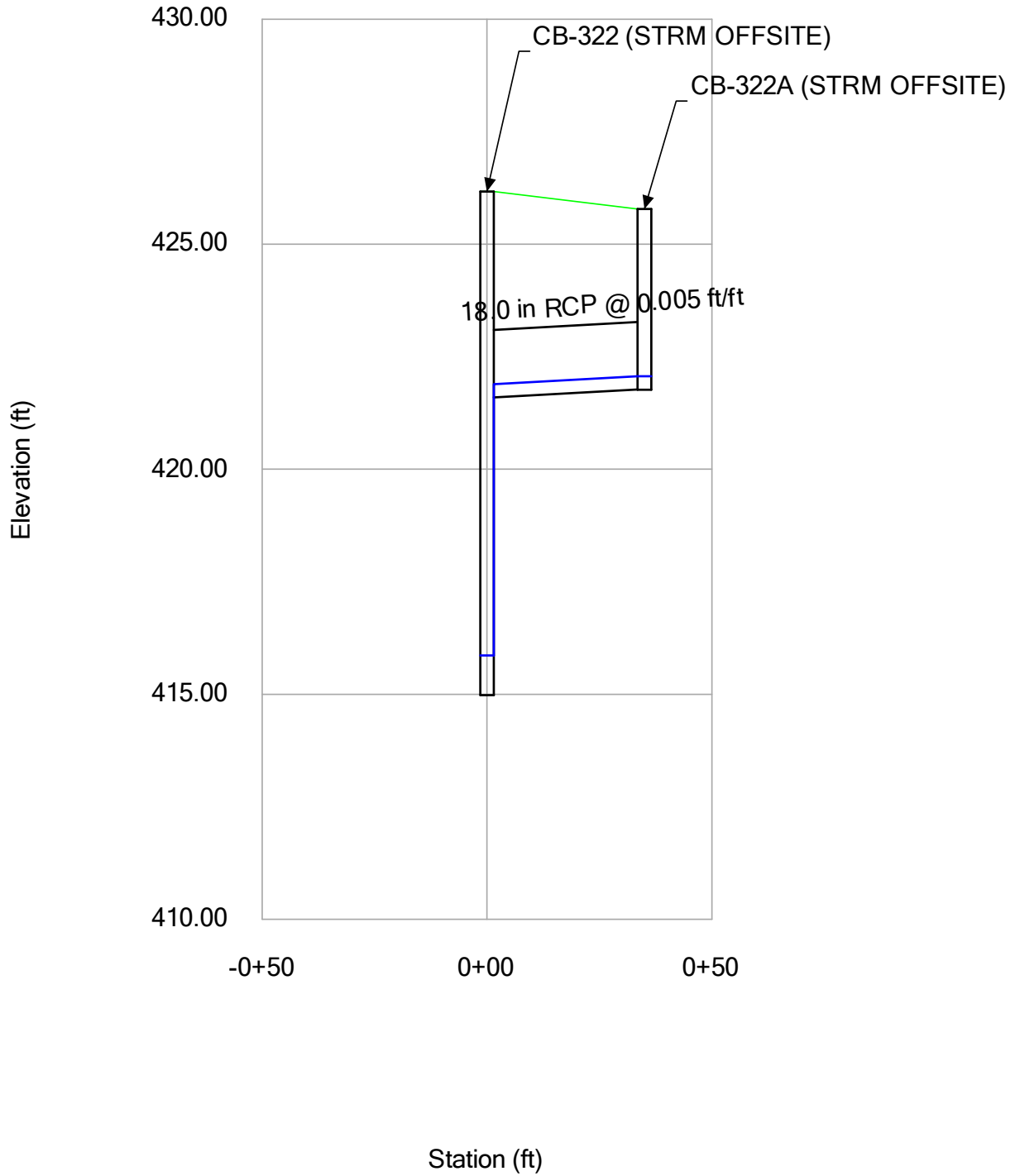


10-YR ANALYSIS

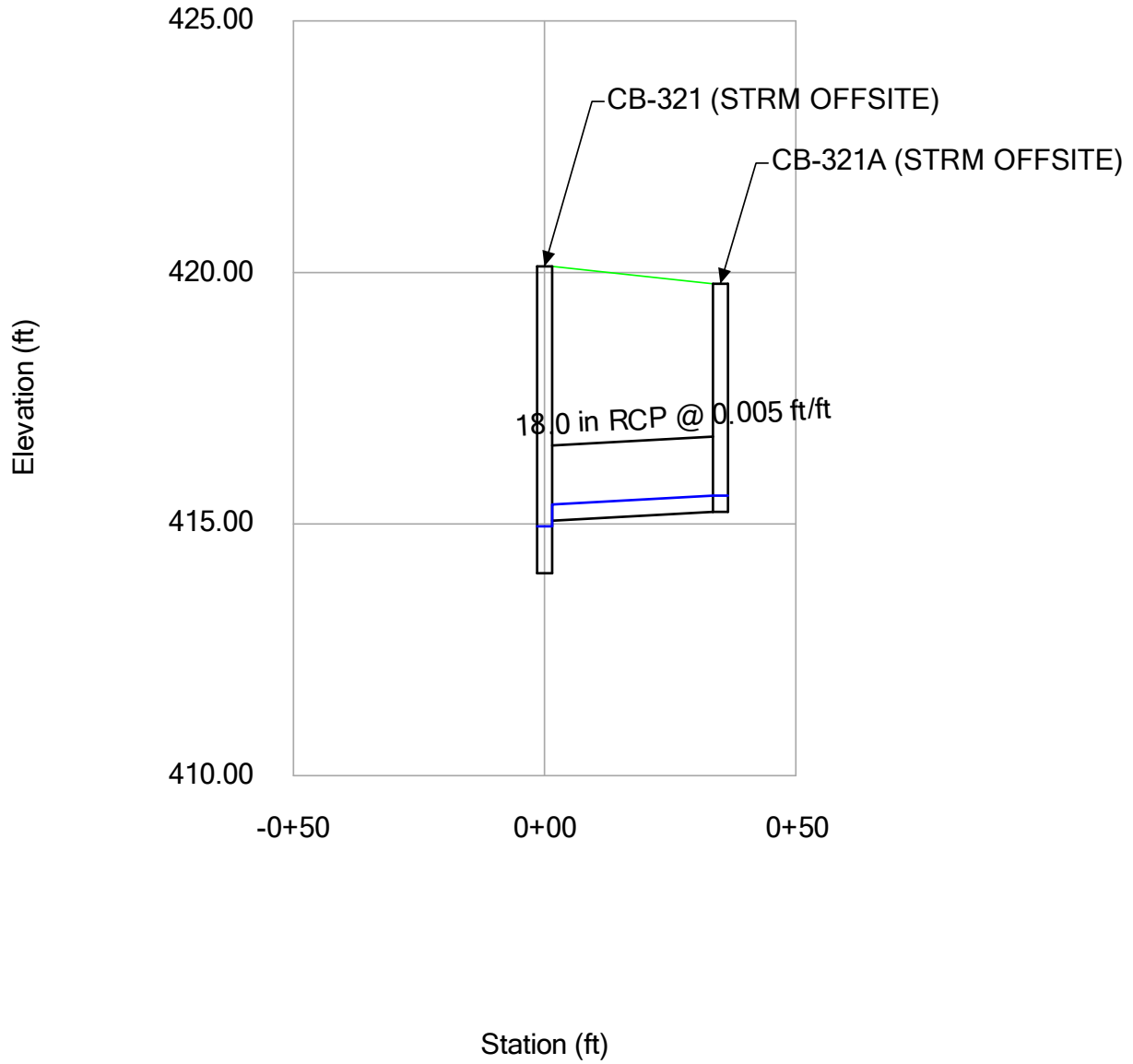


Station (ft)

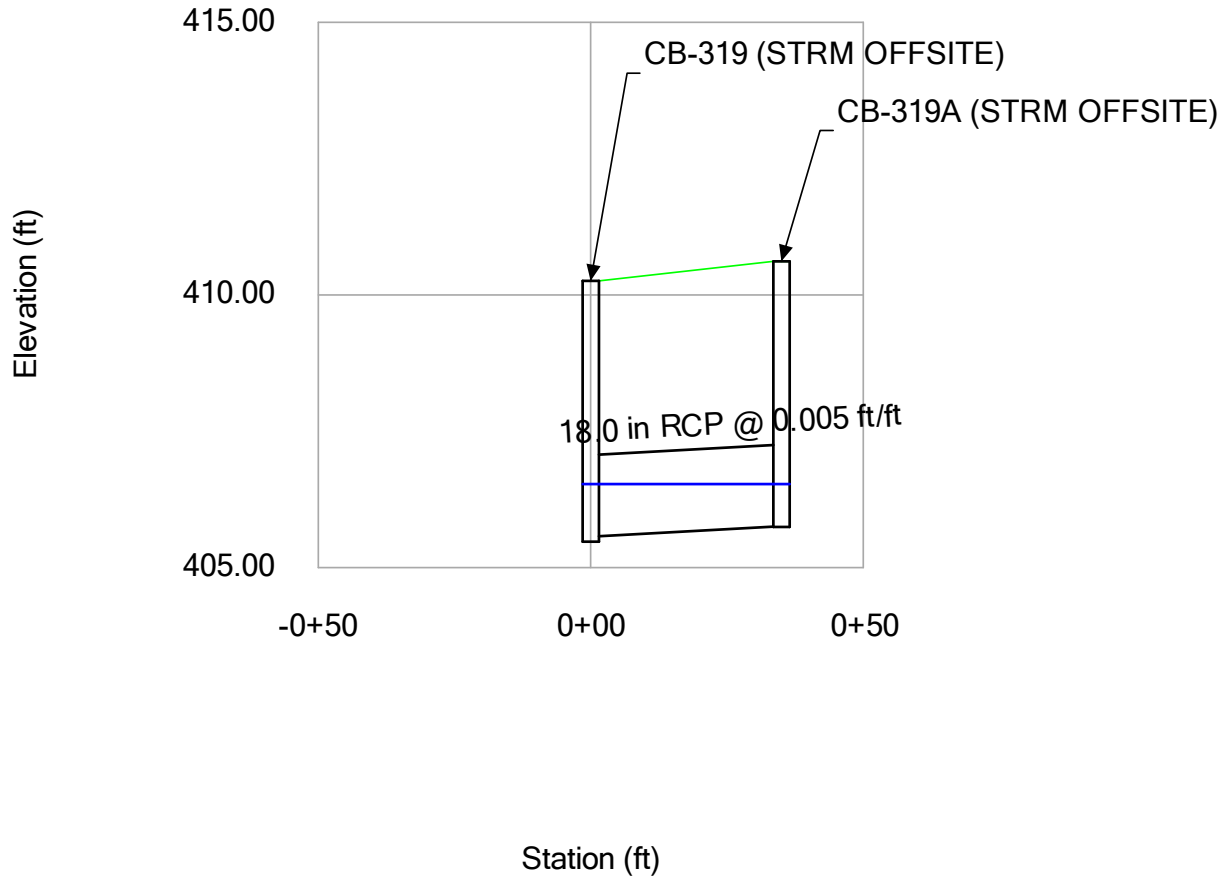
10-YR ANALYSIS



10-YR ANALYSIS



10-YR ANALYSIS



25 YR STORM

25-YR ANALYSIS

CATCHMENTS - Time: 0.00 hours

Outflow Element	Scaled Area (acres)	Flow (Total Out) (cfs)	Time of Concentration (hours)	Runoff Coefficient (Rational)
CB-325 (STRM OFFSITE)	0.059	0.45	0.083	0.950
CB-323 (STRM OFFSITE)	0.063	0.48	0.083	0.950
CB-323A (STRM OFFSITE)	0.063	0.48	0.083	0.950
CB-322 (STRM OFFSITE)	0.101	0.77	0.083	0.950
CB-321 (STRM OFFSITE)	0.114	0.87	0.083	0.950
CB-319 (STRM OFFSITE)	0.080	0.61	0.083	0.950
CB-319A (STRM OFFSITE)	0.143	1.09	0.083	0.950
CB-320 (STRM OFFSITE)	0.080	0.61	0.083	0.950
CB-321A (STRM OFFSITE)	0.118	0.90	0.083	0.950
CB-325A (STRM OFFSITE)	0.059	0.45	0.083	0.950
DCB-324A (STRM OFFSITE)	0.313	2.39	0.083	0.950
DCB-324 (STRM OFFSITE)	0.300	2.29	0.083	0.950
CB-322A (STRM OFFSITE)	0.103	0.79	0.083	0.950

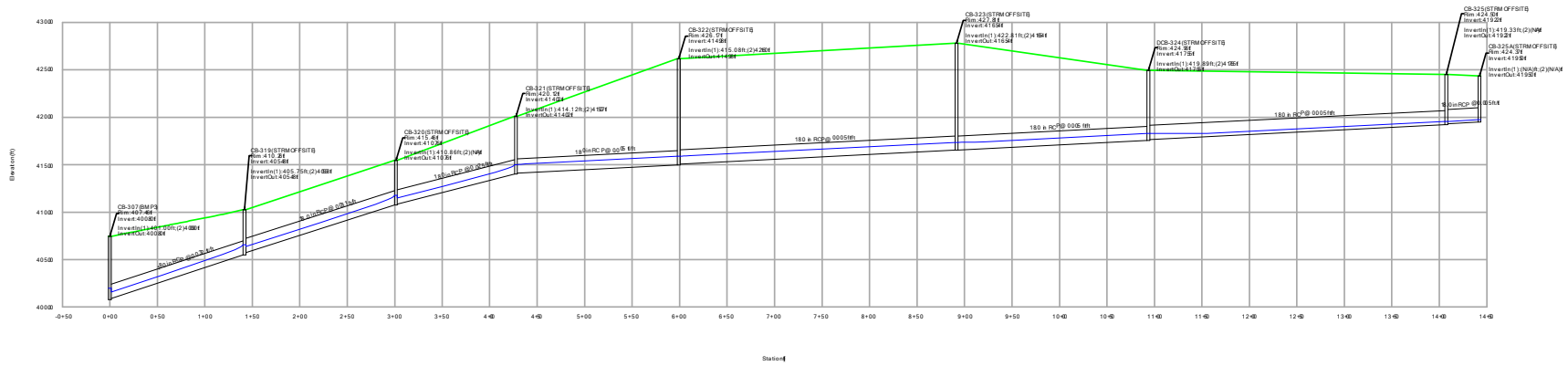
25-YR ANALYSIS
Inlets - Time: 0.00 hours

Label	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Flow (Total Out) (cfs)	Capture Efficiency (Calculated) (%)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Grate Length (ft)	Velocity (In) (ft/s)	Velocity (Out) (ft/s)
CB-323A (STRM OFFSITE)	0.45	0.03	0.45	94.0	423.24	423.24	3.0	2.32	2.32
CB-323 (STRM OFFSITE)	0.45	0.03	4.32	94.0	417.36	417.36	3.0	3.69	4.36
DCB-324A (STRM OFFSITE)	1.59	0.83	1.59	65.9	420.53	420.53	3.0	3.32	3.32
DCB-324 (STRM OFFSITE)	1.55	0.77	3.65	66.6	418.29	418.29	3.0	1.18	4.19
CB-325 (STRM OFFSITE)	0.43	0.02	0.85	94.8	419.56	419.56	3.0	2.32	2.79
CB-325A (STRM OFFSITE)	0.43	0.02	0.43	94.8	419.74	419.74	3.0	2.28	2.28
CB-321 (STRM OFFSITE)	0.81	0.17	6.39	82.9	415.00	415.00	3.0	4.85	5.24
CB-319 (STRM OFFSITE)	0.63	0.09	8.07	88.1	406.58	406.58	3.0	9.74	5.81
CB-319A (STRM OFFSITE)	0.99	0.28	0.99	77.9	406.58	406.58	3.0	0.98	0.98

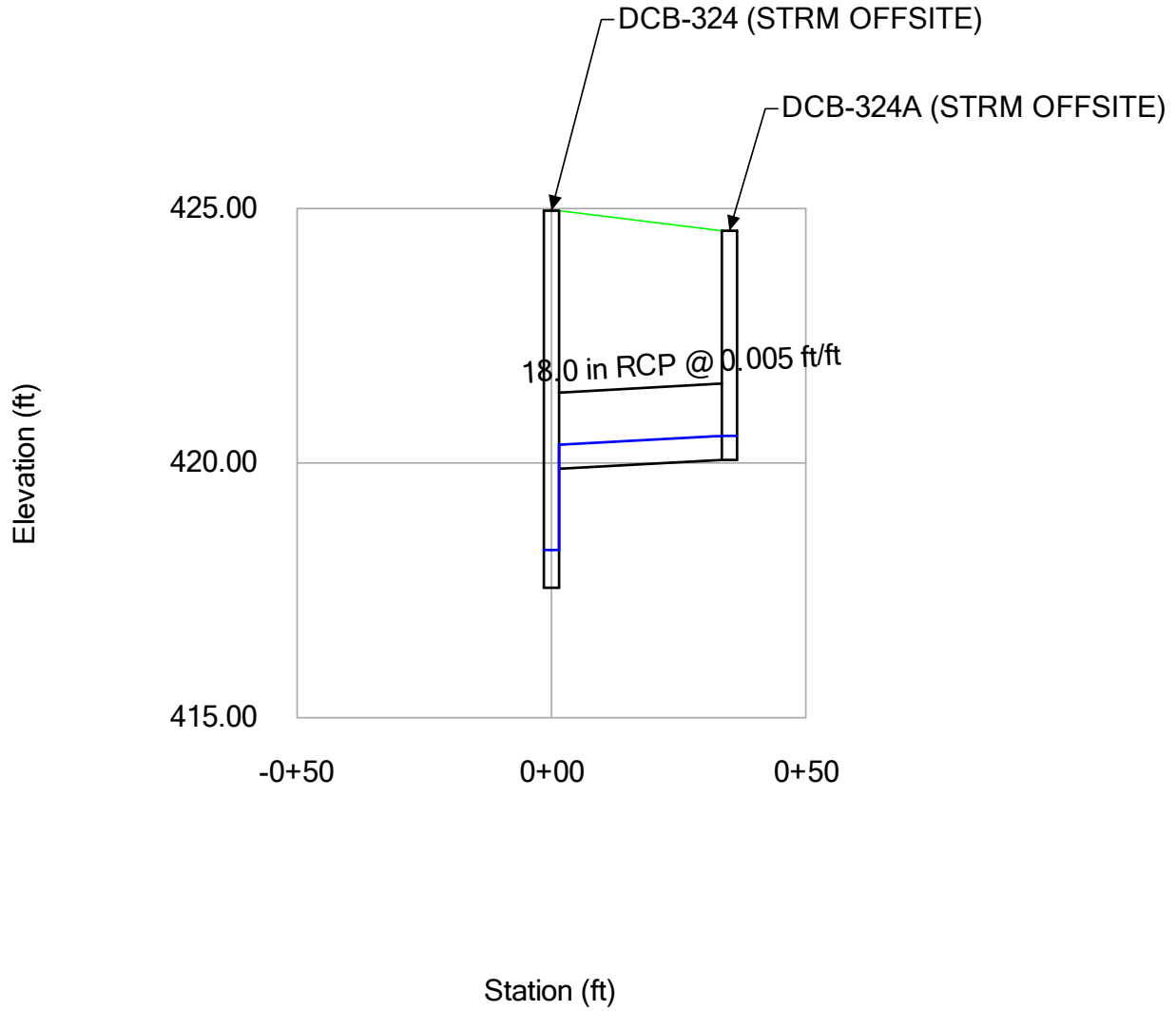
25-YR ANALYSIS
Conduit Results - Time: 0.00 hours

Label	Diameter (in)	Slope (Calculated) (ft/ft)	Velocity (In) (ft/s)	Velocity (Out) (ft/s)	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CB-323 TO CB-323A (STRM OFFSITE)	18.0	0.005	2.32	2.35	0.45	7.43	423.24	423.06
CB-323 TO DCB-324 (STRM OFFSITE)	18.0	0.005	4.19	3.69	3.65	7.43	418.29	417.36
CB-322 TO CB-323 (STRM OFFSITE)	18.0	0.005	4.36	4.29	4.32	7.43	417.36	415.91
CB-322 TO CB-322A (STRM OFFSITE)	18.0	0.005	2.62	2.62	0.68	7.43	422.08	421.90
CB-321 TO CB-322 (STRM OFFSITE)	18.0	0.005	4.55	4.85	5.23	7.43	415.91	415.00
DCB-324 TO DCB-324A (STRM OFFSITE)	18.0	0.005	3.32	3.35	1.59	7.43	420.53	420.36
DCB-324 TO CB-325 (STRM OFFSITE)	18.0	0.005	2.79	1.18	0.85	7.43	419.56	418.29
CB-325 TO CB-325A (STRM OFFSITE)	18.0	0.005	2.28	2.32	0.43	7.43	419.74	419.57
CB-320 TO CB-321 (STRM OFFSITE)	18.0	0.025	5.24	8.78	6.39	16.61	415.00	411.51
CB-321 TO CB-321A (STRM OFFSITE)	18.0	0.005	2.77	2.77	0.83	7.43	415.58	415.40
CB-319 TO CB-320 (STRM OFFSITE)	18.0	0.031	5.39	9.74	6.85	18.62	411.77	406.38
CB-319 TO CB-319A (STRM OFFSITE)	18.0	0.005	0.98	0.79	0.99	7.43	406.58	406.58

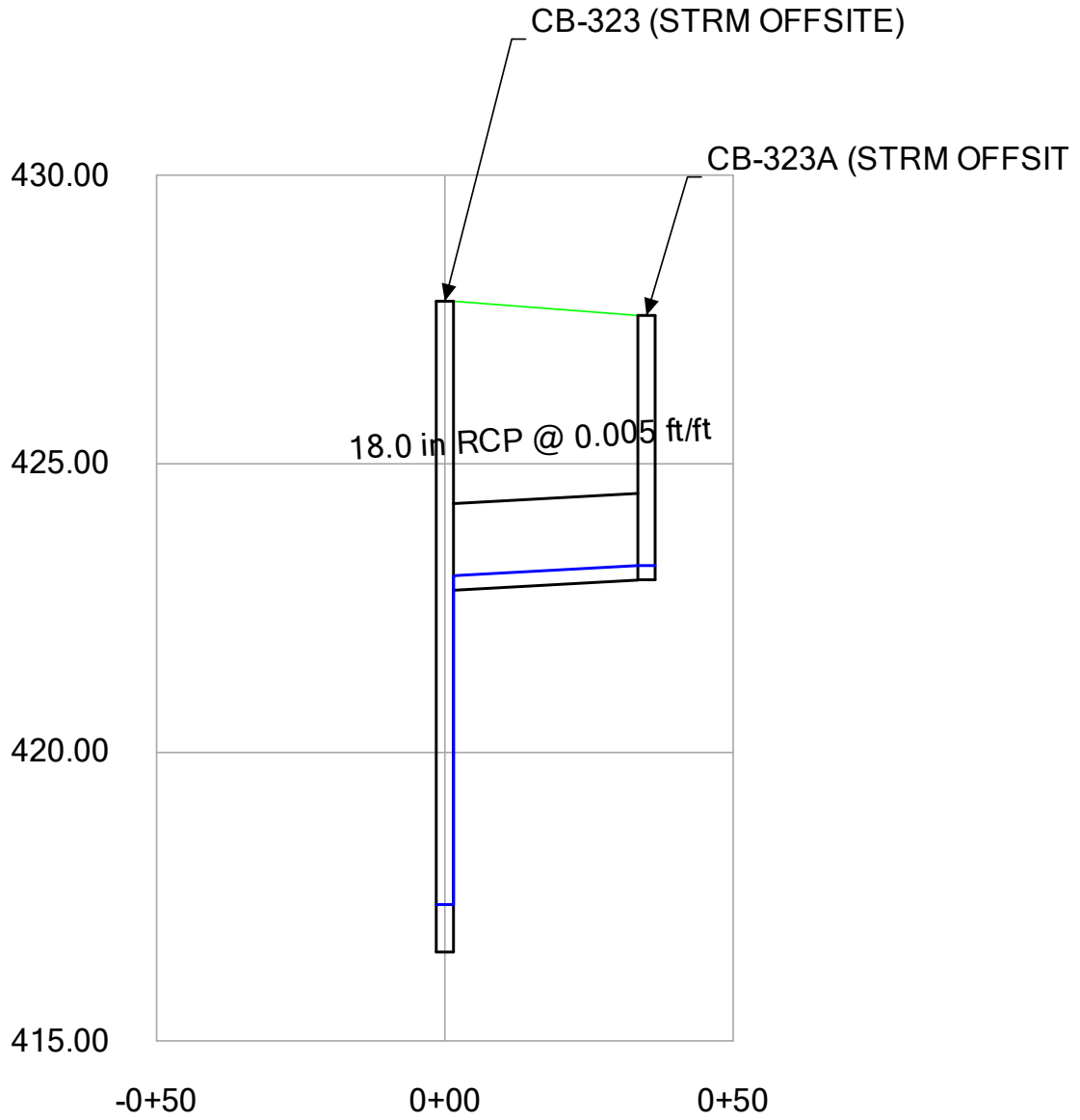
25-YR ANALYSIS



25-YR ANALYSIS

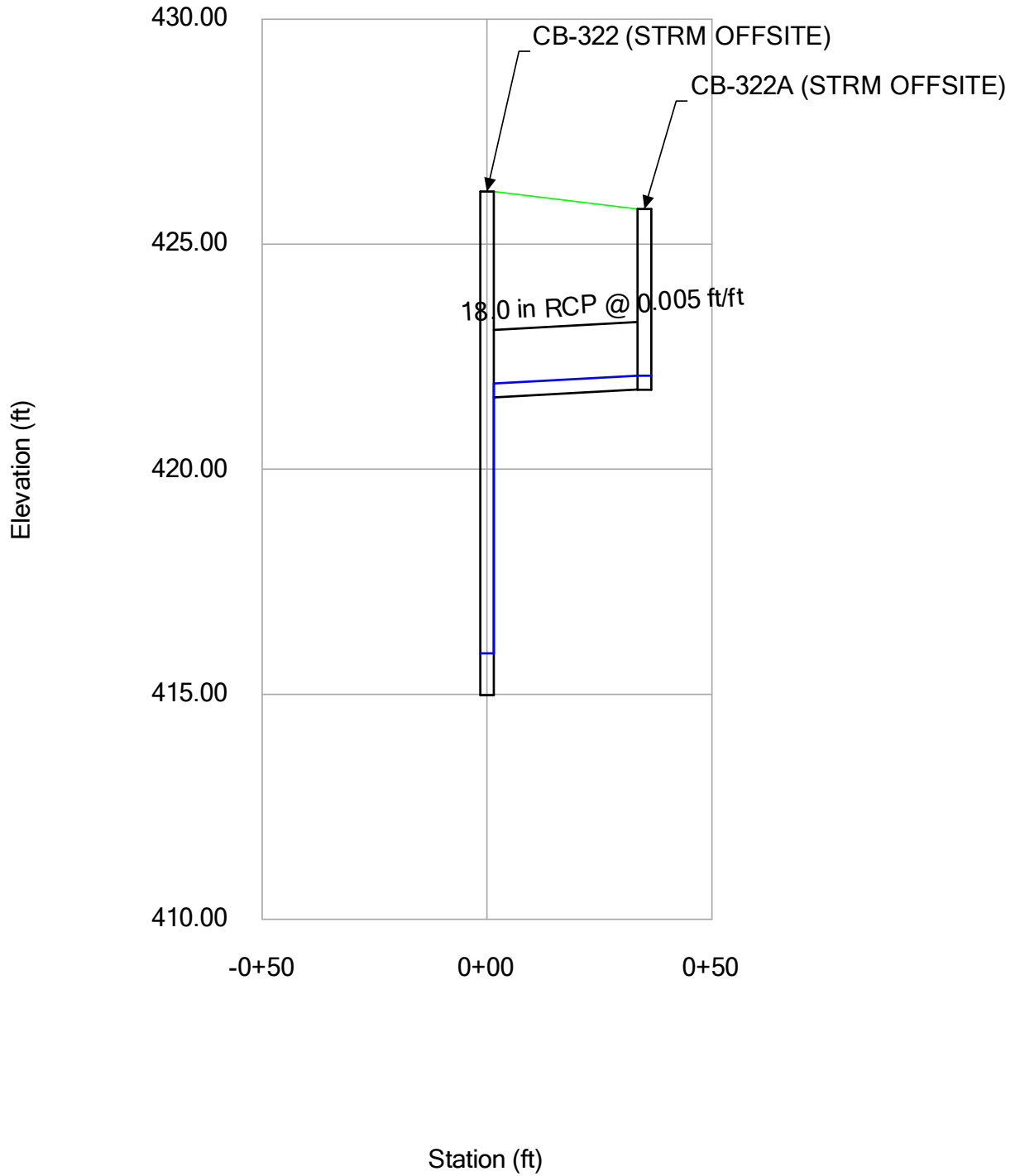


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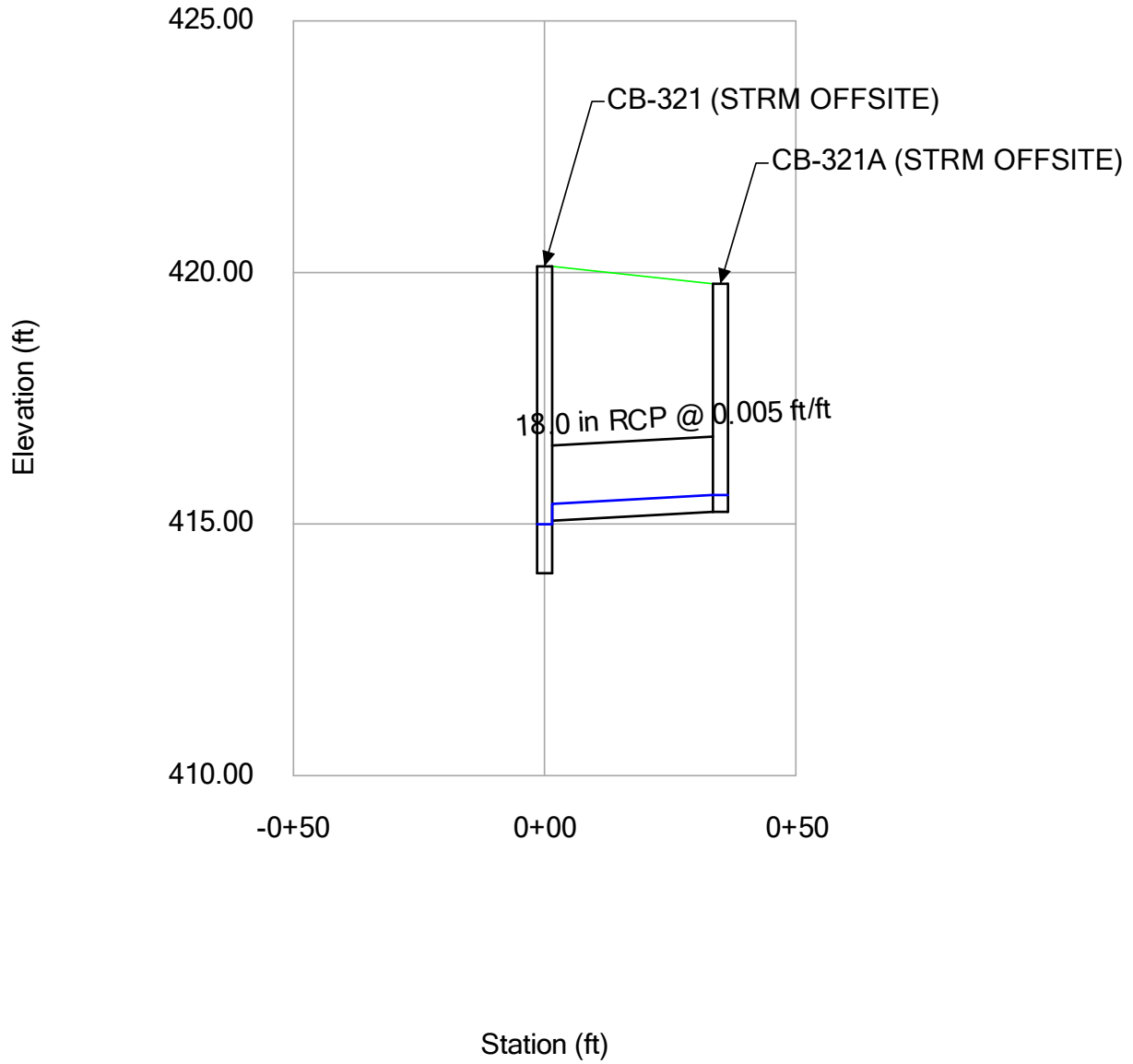


Station (ft)

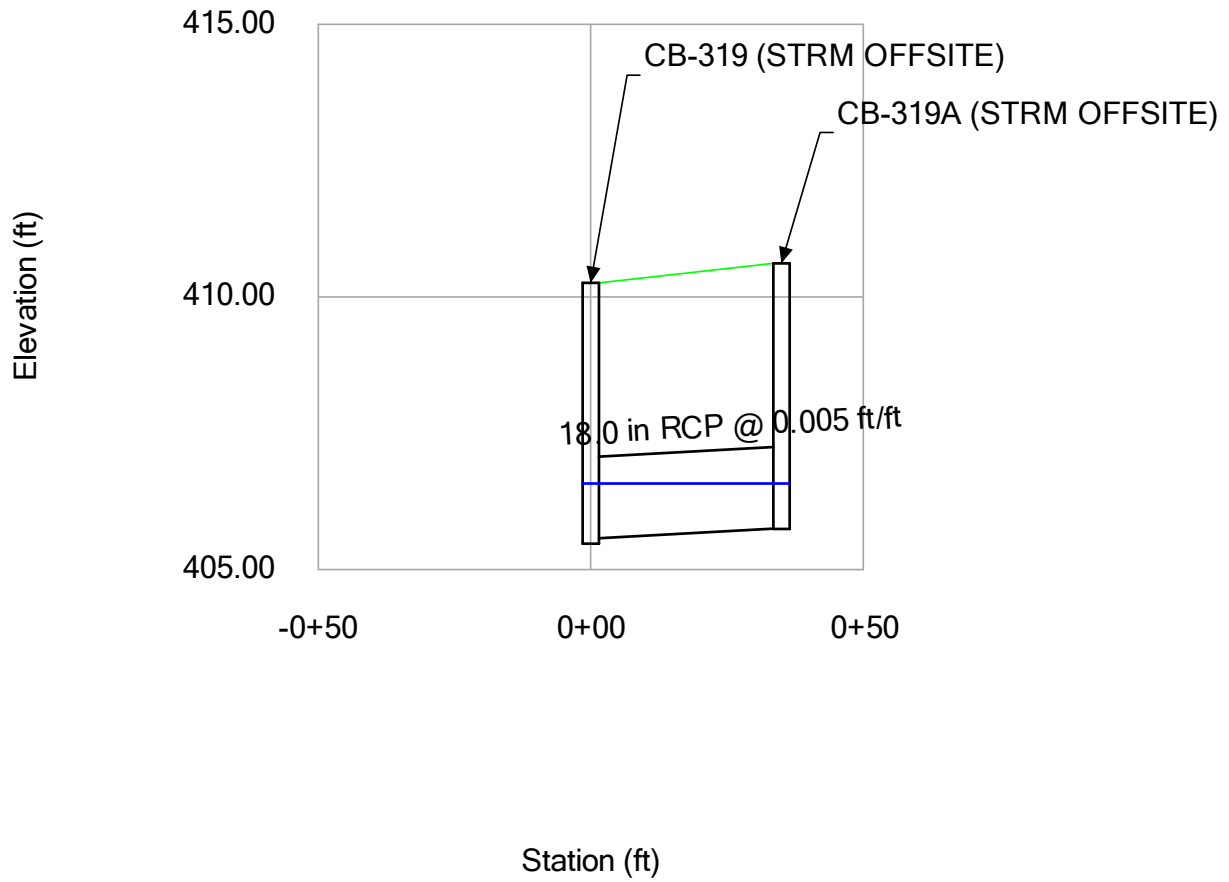
25-YR ANALYSIS



25-YR ANALYSIS



25-YR ANALYSIS



INLET SPREAD

INLET SPRAD - 2-YR

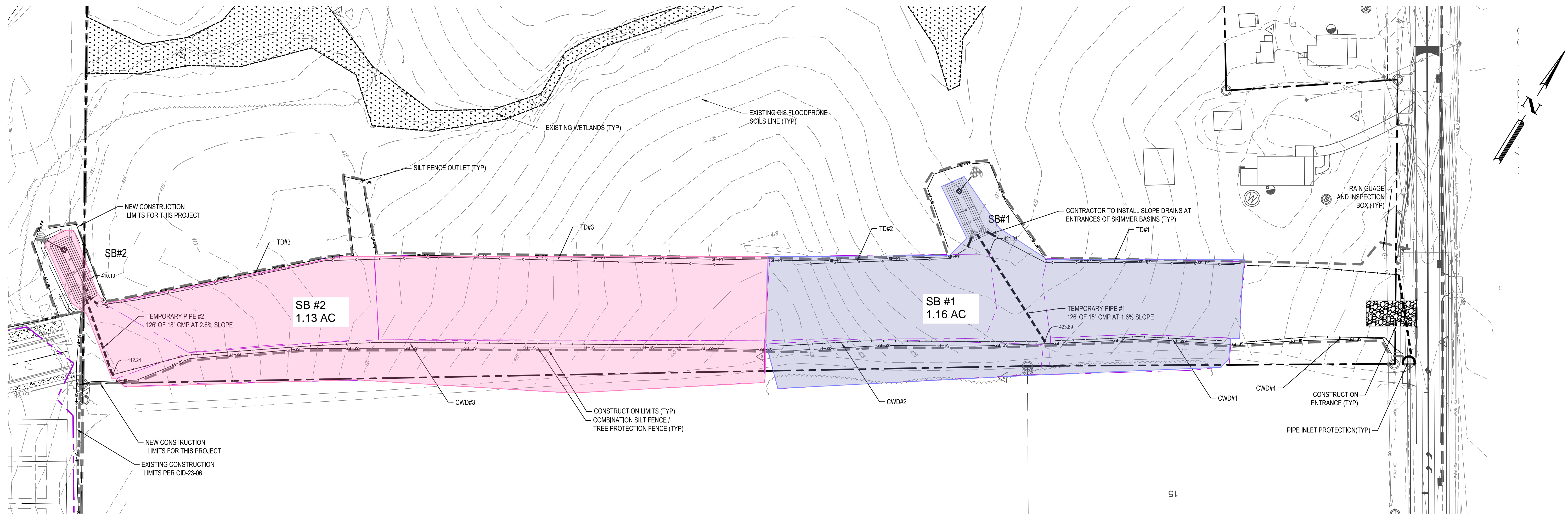
Inlet Spread - Time: 0.00 hours

Label	Inlet Drainage Area (acres)	Intercepted CA (acres)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Flow (Total Out) (cfs)	Spread / Top Width (ft)	Depth (Gutter) (in)
DCB-324A (STRM OFFSITE)	0.313	0.217	1.23	0.46	1.23	6.7	2.1
DCB-324 (STRM OFFSITE)	0.300	0.210	1.19	0.43	2.76	6.6	2.1
CB-319A (STRM OFFSITE)	0.143	0.127	0.72	0.12	0.72	4.9	1.7
CB-321A (STRM OFFSITE)	0.118	0.106	0.60	0.07	0.60	4.4	1.5
CB-321 (STRM OFFSITE)	0.114	0.103	0.59	0.07	4.71	4.3	1.5
CB-322A (STRM OFFSITE)	0.103	0.090	0.51	0.04	0.51	4.0	1.4
CB-322 (STRM OFFSITE)	0.101	0.089	0.50	0.04	3.88	4.0	1.4
CB-320 (STRM OFFSITE)	0.080	0.083	0.47	0.03	5.04	3.8	1.4
CB-319 (STRM OFFSITE)	0.080	0.078	0.44	0.03	5.90	3.6	1.4
CB-323A (STRM OFFSITE)	0.063	0.058	0.33	0.01	0.33	3.0	1.2
CB-323 (STRM OFFSITE)	0.063	0.058	0.33	0.01	3.23	3.0	1.2
CB-325 (STRM OFFSITE)	0.059	0.055	0.31	0.01	0.62	2.9	1.2
CB-325A (STRM OFFSITE)	0.059	0.055	0.31	0.01	0.31	2.9	1.2

4" PER HOUR

Inlet Spread - Time: 0.00 hours

Label	Inlet Drainage Area (acres)	Intercepted CA (acres)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Flow (Total Out) (cfs)	Spread / Top Width (ft)	Depth (Gutter) (in)
CB-1003A	0.064	0.059	0.24	0.00	0.24	1.7	1.2
CB-1003	0.064	0.059	0.24	0.00	0.47	1.7	1.2
CB-1002	0.102	0.094	0.38	0.00	0.76	2.2	1.5
CB-1002A	0.104	0.095	0.38	0.00	0.38	2.2	1.5
DCB-1004A	0.320	0.294	1.19	0.00	1.19	5.1	3.2
DCB-1004	0.305	0.281	1.13	0.00	3.40	4.9	3.1
CB-1005A	0.082	0.075	0.30	0.00	0.30	1.9	1.4
CB-1005	0.082	0.075	0.30	0.00	0.60	1.9	1.4
CB-1001	0.117	0.107	0.43	0.00	1.63	2.5	1.6
CB-1001A	0.117	0.107	0.43	0.00	0.43	2.5	1.6



SKIMMER BASIN SUMMARY																	
BASIN NUMBER	DRAINAGE AREA (AC)	DENUDED AREA (AC)	RUNOFF COEFFICIENT	SYSTEM INTENSITY (IN/HR)	10-YEAR PEAK FLOW (CFS)	BASIN DIMENSIONS			TOP OF DAM EL. (FT)	WEIR LENGTH (FT)	AREA REQUIRED (SF)	AREA PROVIDED (SF)	VOLUME REQUIRED (CF)	VOLUME PROVIDED (CF)	SKIMMER SIZE (IN)	SKIMMER ORIFICE DIA. (IN)	DEWATERING TIME (DAYS)
						DEPTH (FT)	LENGTH (FT)	WIDTH (FT)									
SB #1	1.16	1.16	0.50	7.25	4.21	3.0	66	22	278	6	1,367	1,452	2,088	2,916	4	0.75	2.78
SB #2	1.13	1.13	0.50	7.25	4.10	3.0	66	22	290	6	1,331	1,452	2,034	2,916	4	0.75	2.71

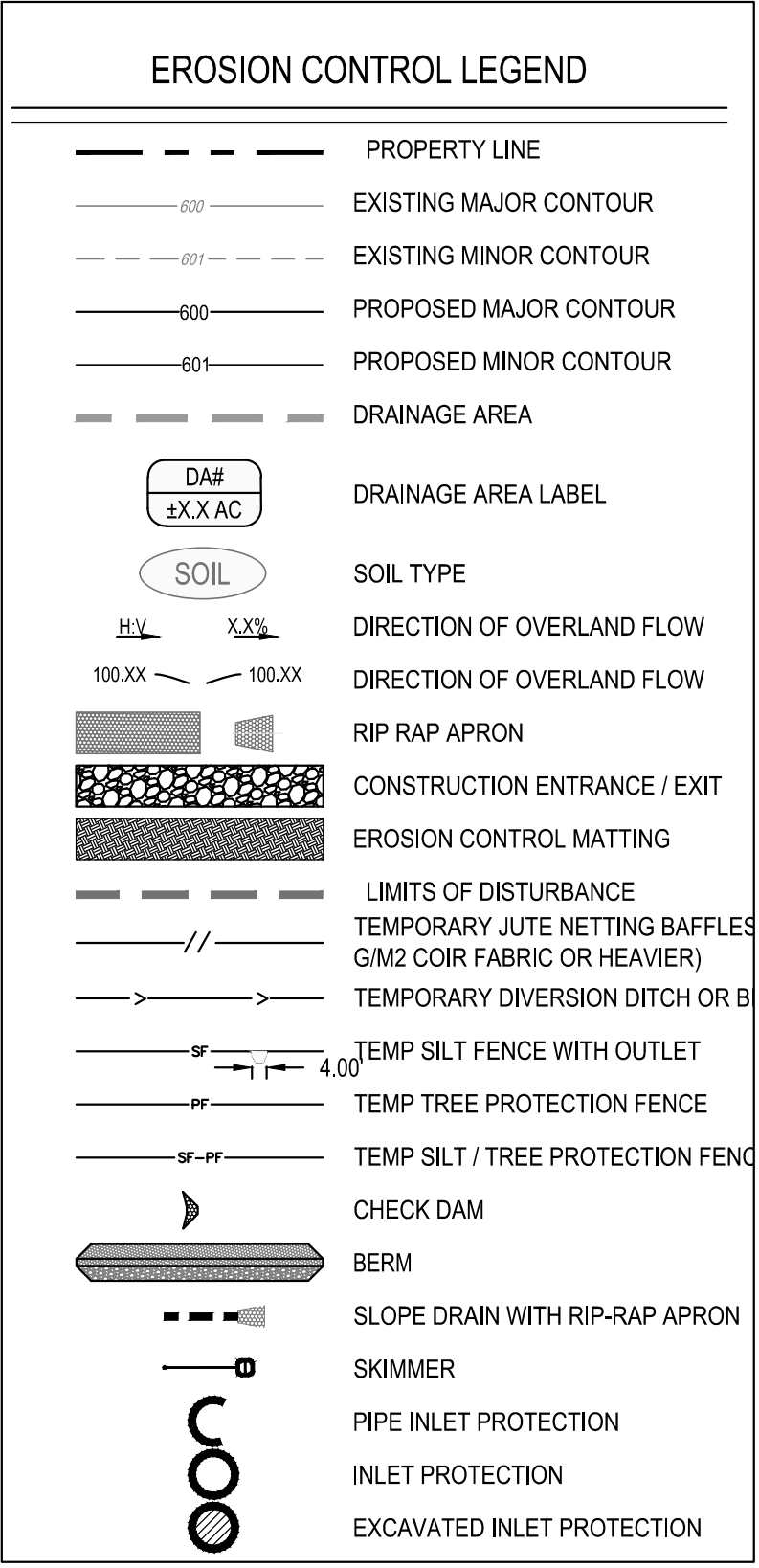
Temporary Diversion Ditch, Pipe Sizing & Lining Calculations

Rainfall Intensity $I_{10-yr} = 7.25$ in/hr

Swale ID	Rational C	Drainage Area (ac)	Q_{10-yr} (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lbs/ft ²)	Calculated Velocity (ft/s)	Bottom Width (ft)	# of Check Dams	Type of Liner	Slope Drain Type and Size (in)
TD1	0.50	0.34	1.24	2.49%	0.23	0.004	2.19	2	2	GRASS	CMP - 12"
TD2	0.50	0.43	1.55	3.65%	0.23	0.01	2.69	4	3	GRASS	CMP - 12"
TD3	0.50	1.13	4.11	2.72%	0.44	0.01	3.25	2	8	GRASS	CMP - 12"
CWD 1	0.50	0.15	0.53	4.41%	0.31	0.01	2.78	0	3	GRASS	N/A
CWD 2	0.50	0.25	0.89	3.13%	0.40	0.01	2.77	0	4	GRASS	N/A
CWD 3	0.50	0.60	2.19	4.00%	0.53	0.01	3.82	0	4	GRASS	N/A
PIPE 1	0.50	1.16	4.21	1.59%	0.98	0.01	6.81	4	1	N/A	CMP - 15"
PIPE 2	0.50	1.74	6.31	2.56%	0.92	0.01	5.83	4	1	N/A	CMP - 18"

NOTES:
 All ditches are to be trapezoidal in shape: 2:1 sideslopes, and height of 1.0'
 Calculated Depth and Calculated Velocity Based on Flowmaster Output
 NAG S150: North American Green S150 or approved equal

ABBREVIATIONS
 TD = TEMPORARY DIVERSION
 CWD = CLEAN WATER DIVERSION
 SB = SKIMMER BASIN



NARRATIVE

PROJECT INCLUDES APPROXIMATELY 1,520 LINEAR FEET OF 36" BACK TO BACK STREET SECTION TO CONNECT STREET H TO YOUNG STREET AND STORM DRAINAGE IN ROLESVILLE, NC. THERE IS A FUTURE DEVELOPMENT (BY OTHERS) ON THIS PROPERTY THAT WILL REQUIRE STORMWATER CONTROL MEASURES AND WILL TREAT THE NEW IMPERVIOUS INCLUDING THIS PROJECT'S IMPERVIOUS AREAS.

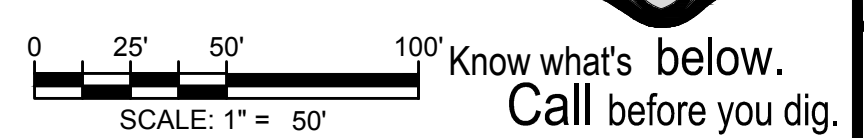
CONSTRUCTION SEQUENCE - PHASE 1

- SCHEDULE A PRECONSTRUCTION CONFERENCE WITH THE ENVIRONMENTAL CONSULTANT. OBTAIN A LAND DISTURBING PERMIT.
- INSTALL GRAVEL CONSTRUCTION PAD, BYPASS PIPES AND CLEAN WATER DIVERSIONS TO BYPASS PIPES. INSTALL TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS OR OTHER MEASURES AS SHOWN ON THE APPROVED PLAN. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. SEED TEMPORARY DIVERSIONS, AND BASINS IMMEDIATELY AFTER CONSTRUCTION.
- CALL ENVIRONMENTAL CONSULTANT FOR AN ONSITE INSPECTION BY THE ENVIRONMENTAL CONSULTANT TO OBTAIN A CERTIFICATE OF COMPLIANCE.

CONSTRUCTION SEQUENCE - PHASE 2

- BEGIN CLEARING AND GRUBBING. MAINTAIN DEVICES AS NEEDED. ROUGH GRADE SITE.
- INSTALL STORM SEWER, IF SHOWN, AND PROTECT INLETS WITH BLOCK AND GRAVEL INLET CONTROLS, SEDIMENT TRAPS OR OTHER APPROVED MEASURES AS SHOWN ON THE PLAN. BEGIN CONSTRUCTION, BUILDING, ETC.
- STABILIZE SITE AS AREAS ARE BROUGHT UP TO FINISH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC. SEED AND MULCH DENUDED AREAS PER GROUND STABILIZATION TIME FRAMES.
- WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE STABILIZED COMPLETELY, CALL ENVIRONMENTAL CONSULTANT FOR AN INSPECTION.
- IF SITE IS APPROVED, REMOVE TEMPORARY DIVERSIONS, SILT FENCE, SEDIMENT BASINS, ETC., AND SEED OUT OR STABILIZE ANY RESULTING BARE AREAS. ALL REMAINING PERMANENT EROSION CONTROL DEVICES, SUCH AS VELOCITY DISSIPATORS, SHOULD NOW BE INSTALLED.
- WHEN VEGETATION HAS BECOME ESTABLISHED, CALL FOR A FINAL SITE INSPECTION BY THE ENVIRONMENTAL CONSULTANT. OBTAIN A CERTIFICATE OF COMPLETION.

DISTURBED AREA: 3.05 AC



DESIGNED BY: DF/JWM	DATE	DESCRIPTION
DRAWN BY: JWM	REV	
REVIEWED BY: DF		
 5440 WADE PARK BLVD, SUITE 102 RALEIGH NC 27607 WWW.BCEINC.COM NC LICENSE #C-4387 ©2023		
LENNAR CORPORATION 1100 PERIMETER PARK DRIVE, SUITE 112 MORRISVILLE / NORTH CAROLINA / 27560		
YOUNG STREET CONNECTION 408 E YOUNG STREET ROLESVILLE / NORTH CAROLINA / 27571		
EROSION CONTROL PHASE 1		
NOT FOR CONSTRUCTION FILE NUMBER: 8430-03 DATE: 07/03/2023 C5-0		

G:\NCA\Projects\Lenmar\8430-03 - Lenmar - School Street - Rolesville\03 - DWG\PlanSheets\Cif-Site\RS-0 - EROS-RD.dwg Layout: 7/3/2023 4:02:47 PM

EROSION CONTROL DA MAP

SKIMMER BASIN CALCULATIONS

PROJECT: Parker Ridge - Young Street Connector

PROJ. NO: TBD

DATE: July 3, 2023

DESIGNED BY: DF

SKIMMER BASIN SUMMARY																	
BASIN NUMBER	DRAINAGE AREA (AC)	DENUDED AREA (AC)	RUNOFF COEFFICIENT	SYSTEM INTENSITY (IN/HR)	10-YEAR PEAK FLOW (CFS)	BASIN DIMENSIONS			TOP OF DAM EL. (FT)	WEIR LENGTH (FT)	AREA REQUIRED (SF)	AREA PROVIDED (SF)	VOLUME REQUIRED (CF)	VOLUME PROVIDED (CF)	SKIMMER SIZE (IN)	SKIMMER ORIFICE DIA. (IN)	DEWATERING TIME (DAYS)
						DEPTH (FT)	LENGTH (FT)	WIDTH (FT)									
SB #1	1.16	1.16	0.50	7.25	4.21	3.0	66	22	278	6	1,367	1,452	2,088	2,916	4	0.75	2.78
SB #2	1.13	1.13	0.50	7.25	4.10	3.0	66	22	290	6	1,331	1,452	2,034	2,916	4	0.75	2.71

NOTES:

1. One foot of free board is provided for all basins.
2. System Intensity calculated for Tc=5 min.
3. Orifice sizes calculated for a 2-day drawdown per reference of "Determining Orifice Size for the Faircloth Skimmer, Feb. 2001".

Skimmer Basin #1

1.16	Drainage Area (Acres)	
1.16	Disturbed Area (Acres)	
0.50	C	
7.25	I	in/hr
4.21	Peak Flow from 10-year Storm (cfs)	
2088	Required Volume ft ³	
1367	Required Surface Area ft ²	
26.1	Suggested Width ft	
52.3	Suggested Length ft	
22	Trial Top Width at Spillway Invert ft	
66	Trial Top Length at Spillway Invert ft	
2	Trial Side Slope Ratio Z:1	
3	Trial Depth ft	(2 to 3.5 feet above grade)
10	Bottom Width ft	
54	Bottom Length ft	
540	Bottom Area ft ²	
2916	Actual Volume ft ³	Okay
1452	Actual Surface Area ft ²	Okay
6	Trial Weir Length ft	
0.5	Trial Depth of Flow ft	
6.4	Spillway Capacity cfs	Okay
Faircloth		
4	Skimmer Size (inches)	
0.333	Head on Skimmer (feet)	
0.75	Orifice Size (1/4 inch increments)	
2.78	Dewatering Time (days)	
	Suggest about 3 days	

Skimmer Basin #2

1.13	Drainage Area (Acres)	
1.13	Disturbed Area (Acres)	
0.50	C	
7.25	I	in/hr
4.10	Peak Flow from 10-year Storm (cfs)	
2034	Required Volume ft ³	
1331	Required Surface Area ft ²	
25.8	Suggested Width ft	
51.6	Suggested Length ft	
22	Trial Top Width at Spillway Invert ft	
66	Trial Top Length at Spillway Invert ft	
2	Trial Side Slope Ratio Z:1	
3	Trial Depth ft	(2 to 3.5 feet above grade)
10	Bottom Width ft	
54	Bottom Length ft	
540	Bottom Area ft ²	
2916	Actual Volume ft ³	Okay
1452	Actual Surface Area ft ²	Okay
6	Trial Weir Length ft	
0.5	Trial Depth of Flow ft	
6.4	Spillway Capacity cfs	Okay
Faircloth		
4	Skimmer Size (inches)	
0.333	Head on Skimmer (feet)	
0.75	Orifice Size (1/4 inch increments)	
2.71	Dewatering Time (days)	
	Suggest about 3 days	

TEMPORARY DIVERSIONS

TEMPORARY DIVERSION, CLEANWATER DIVERSION, AND PIPE SUMMARY

Rainfall Intensity $I_{10\text{-yr}} = 7.25$ in/hr

Swale ID	Rational C	Drainage Area (ac)	$Q_{10\text{-yr}}$ (cfs)	Slope (%)	Calculated Depth (ft)	Calculated Shear Stress (lbs/ft ²)	Calculated Velocity (ft/s)	Bottom Width (ft)	# of Check Dams	Type of Liner	Slope Drain Type and Size (in)
TD1	0.50	0.34	1.24	2.49%	0.23	0.004	2.19	2	2	GRASS	CMP - 12"
TD2	0.50	0.43	1.55	3.65%	0.23	0.01	2.69	4	3	GRASS	CMP - 12"
TD3	0.50	1.13	4.11	2.72%	0.44	0.01	3.25	2	8	GRASS	CMP - 12"
CWD 1	0.50	0.15	0.53	4.41%	0.31	0.01	2.78	0	3	GRASS	N/A
CWD 2	0.50	0.25	0.89	3.13%	0.40	0.01	2.77	0	4	GRASS	N/A
CWD 3	0.50	0.60	2.19	4.00%	0.53	0.01	3.82	0	4	GRASS	N/A
PIPE 1	0.50	1.16	4.21	1.59%	0.98	0.01	6.81	N/A	N/A	N/A	CMP - 15"
PIPE 2	0.50	1.74	6.31	2.56%	0.92	0.01	5.83	N/A	N/A	N/A	CMP - 18"

NOTES:

All ditches are to be trapezoidal in shape: 2:1 sideslopes, and height of 1.0'

Calculated Depth and Calculated Velocity Based on Flowmaster Output

NAG S150: North American Green S150 or approved equal

Worksheet for TD1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.035
Channel Slope	0.025 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	2.00 ft
Discharge	1.24 cfs
Results	
Normal Depth	2.8 in
Flow Area	0.6 ft ²
Wetted Perimeter	3.0 ft
Hydraulic Radius	2.2 in
Top Width	2.92 ft
Critical Depth	2.5 in
Critical Slope	0.033 ft/ft
Velocity	2.19 ft/s
Velocity Head	0.07 ft
Specific Energy	0.30 ft
Froude Number	0.877
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	2.8 in
Critical Depth	2.5 in
Channel Slope	0.025 ft/ft
Critical Slope	0.033 ft/ft

Worksheet for TD2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.035
Channel Slope	0.037 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	2.00 ft
Discharge	1.55 cfs

Results	
Normal Depth	2.8 in
Flow Area	0.6 ft ²
Wetted Perimeter	3.0 ft
Hydraulic Radius	2.3 in
Top Width	2.93 ft
Critical Depth	2.9 in
Critical Slope	0.032 ft/ft
Velocity	2.69 ft/s
Velocity Head	0.11 ft
Specific Energy	0.35 ft
Froude Number	1.071
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.8 in
Critical Depth	2.9 in
Channel Slope	0.037 ft/ft
Critical Slope	0.032 ft/ft

Worksheet for TD3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.035
Channel Slope	0.027 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	2.00 ft
Discharge	4.11 cfs

Results	
Normal Depth	5.3 in
Flow Area	1.3 ft ²
Wetted Perimeter	4.0 ft
Hydraulic Radius	3.8 in
Top Width	3.76 ft
Critical Depth	5.2 in
Critical Slope	0.028 ft/ft
Velocity	3.25 ft/s
Velocity Head	0.16 ft
Specific Energy	0.60 ft
Froude Number	0.989
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.3 in
Critical Depth	5.2 in
Channel Slope	0.027 ft/ft
Critical Slope	0.028 ft/ft

Worksheet for CWD 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.044 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Discharge	0.53 cfs

Results	
Normal Depth	3.7 in
Flow Area	0.2 ft ²
Wetted Perimeter	1.4 ft
Hydraulic Radius	1.7 in
Top Width	1.24 ft
Critical Depth	4.0 in
Critical Slope	0.028 ft/ft
Velocity	2.78 ft/s
Velocity Head	0.12 ft
Specific Energy	0.43 ft
Froude Number	1.247
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.7 in
Critical Depth	4.0 in
Channel Slope	0.044 ft/ft
Critical Slope	0.028 ft/ft

Worksheet for CWD 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.030
Channel Slope	0.031 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Discharge	0.89 cfs
Results	
Normal Depth	4.8 in
Flow Area	0.3 ft ²
Wetted Perimeter	1.8 ft
Hydraulic Radius	2.1 in
Top Width	1.60 ft
Critical Depth	5.0 in
Critical Slope	0.026 ft/ft
Velocity	2.77 ft/s
Velocity Head	0.12 ft
Specific Energy	0.52 ft
Froude Number	1.092
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.8 in
Critical Depth	5.0 in
Channel Slope	0.031 ft/ft
Critical Slope	0.026 ft/ft

Worksheet for CWD 3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.030
Channel Slope	0.040 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Discharge	2.19 cfs
Results	
Normal Depth	6.4 in
Flow Area	0.6 ft ²
Wetted Perimeter	2.4 ft
Hydraulic Radius	2.9 in
Top Width	2.14 ft
Critical Depth	7.1 in
Critical Slope	0.023 ft/ft
Velocity	3.82 ft/s
Velocity Head	0.23 ft
Specific Energy	0.76 ft
Froude Number	1.302
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.4 in
Critical Depth	7.1 in
Channel Slope	0.040 ft/ft
Critical Slope	0.023 ft/ft

Worksheet for Circular Pipe - 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.024
Channel Slope	0.016 ft/ft
Diameter	15.0 in
Discharge	4.21 cfs
Results	
Normal Depth	11.7 in
Flow Area	1.0 ft ²
Wetted Perimeter	2.7 ft
Hydraulic Radius	4.6 in
Top Width	1.03 ft
Critical Depth	10.0 in
Percent Full	78.1 %
Critical Slope	0.024 ft/ft
Velocity	4.09 ft/s
Velocity Head	0.26 ft
Specific Energy	1.24 ft
Froude Number	0.723
Maximum Discharge	4.75 cfs
Discharge Full	4.41 cfs
Slope Full	0.014 ft/ft
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	11.7 in
Critical Depth	10.0 in
Channel Slope	0.016 ft/ft
Critical Slope	0.024 ft/ft

Worksheet for Circular Pipe - 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.024
Channel Slope	0.026 ft/ft
Diameter	18.0 in
Discharge	6.31 cfs
Results	
Normal Depth	11.0 in
Flow Area	1.1 ft ²
Wetted Perimeter	2.7 ft
Hydraulic Radius	5.0 in
Top Width	1.46 ft
Critical Depth	11.7 in
Percent Full	60.9 %
Critical Slope	0.022 ft/ft
Velocity	5.60 ft/s
Velocity Head	0.49 ft
Specific Energy	1.40 ft
Froude Number	1.124
Maximum Discharge	9.87 cfs
Discharge Full	9.17 cfs
Slope Full	0.012 ft/ft
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	60.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.0 in
Critical Depth	11.7 in
Channel Slope	0.026 ft/ft
Critical Slope	0.022 ft/ft