PINNACLE ENGINEERING GROUP
Plan | Design | Deliver
www.pinnacle-engr.com

STORM SEWER COMPUTATIONS
FOR
YORKVILLE SUBDIVISION

SHEET 1 OF 1
DESIGN BY: AEK
PROJECT NUMBER: 1335.00
DATE: 2/26/2021

DESIGN DATA

County: Racine | **Design Storm:** 10 yr | **Storm Duration:** 10 min | **DESIGN INTENSITY (I):** 5.04 in/hr | Intensity calculated using SEWRPC IDF equations.

STRUCTURE DATA			DRAINAGE AREA AND FLOW DATA (Flow is determined by Rational Method Q = CIA)				PIPE DATA				PIPE CAPACITY INFORMATION (Pipe capacity is determined by Manning's Equation $Q = 1.486/n\ AR^{2/3} S^{1/2}$)					ELEVATIONS		
Notes	Upstream Structure	Downstream Structure	Individual Acres A	Individual Coefficient C	Individual Flow Q (cfs)	Cumulative Flow (cfs)	Length (ft)	Diameter (in)	Slope (%)	Manning Coefficient	Required Drop (ft)	Actual Drop (ft)	Percent Full (%)	Actual Velocity (fps)	Max. Capacity (cfs)	Rim/Toc Up	Invert Up	Invert Down
	CULVERT 1		16.40	0.23	19.01	19.01	108.00	24	0.65	0.013	0.76	0.70	92%	6.59	19.62	725.00	722.20	721.50
	CULVERT 2		12.60	0.21	13.34	13.34	82.00	24	0.80	0.013	0.28	0.66	62%	6.88	21.77	726.70	722.16	721.50
	CULVERT 3		0.80	0.46	1.85	1.85	45.00	12	0.60	0.013	0.12	0.27	63%	3.77	2.97	726.70	723.47	723.20
	CULVERT 4		8.80	0.24	10.64	10.64	50.00	24	0.50	0.013	0.11	0.25	62%	5.45	17.21	725.70	722.65	722.40
	AREA TO BYPASS SWALE		13.00	0.20	13.10	13.10	1.00	24	0.50	0.013	0.00	0.01	73%	5.68	17.21			

CULVERT DESIGN SUMMARY

All 4 culverts are design to handle the 10-year storm even under no surcharge conditions.

Culvert 1 will overtop the new roadway and continue west under larger events.

Culvert 2 needs to be designed to handle the 100-year storm without over toping the backslope of the ditch where it would flow undetained and not tributary to the pond. As shown on the 100-year flow sheet, the culvert is design to handle the 100-year without surcharge.

Culvert 3 needs to be designed to handle the 100-year storm without over topping the backslope of the ditch and having off site water come into the middle pond. As shown on the 100-year flow sheet, the culvert is designed to handle the 100-year event without surcharge and will not over top into the roadside ditch.

Culvert 4 will overtop the new roadway and continue west under larger events. Note that it will also handle the 100-year event.

The bypass swale is designed to carry the 100-year event

PINNACLE ENGINEERING GROUP
Plan | Design | Deliver
www.pinnacle-engr.com

STORM SEWER COMPUTATIONS
FOR
YORKVILLE SUBDIVISION

SHEET 1 OF 1
DESIGN BY: AEK
PROJECT NUMBER: 1335.00
DATE: 2/26/2021

100-YEAR FLOWS

DESIGN DATA

County: Racine | **Design Storm:** 100 yr | **Storm Duration:** 10 min | **DESIGN INTENSITY (I):** 7.65 in/hr | Intensity calculated using SEWRPC IDF equations.

STRUCTURE DATA			DRAINAGE AREA AND FLOW DATA (Flow is determined by Rational Method Q = CIA)				PIPE DATA				PIPE CAPACITY INFORMATION (Pipe capacity is determined by Manning's Equation $Q = 1.486/n\ AR^{2/3} S^{1/2}$)					ELEVATIONS		
Notes	Upstream Structure	Downstream Structure	Individual Acres A	Individual Coefficient C	Individual Flow Q (cfs)	Cumulative Flow (cfs)	Length (ft)	Diameter (in)	Slope (%)	Manning Coefficient	Required Drop (ft)	Actual Drop (ft)	Percent Full (%)	Actual Velocity (fps)	Max. Capacity (cfs)	Rim/Toc Up	Invert Up	Invert Down
	CULVERT 1		16.40	0.23	28.86	28.86	108.00	24	0.65	0.013	1.76	0.70	Surcharge	---	19.62	725.00	722.20	721.50
	CULVERT 2		12.60	0.21	20.24	20.24	82.00	24	0.80	0.013	0.66	0.66	88%	7.34	21.77	726.70	722.16	721.50
	CULVERT 3		0.80	0.46	2.82	2.82	45.00	12	0.60	0.013	0.28	0.27	90%	4.00	2.97	726.70	723.47	723.20
	CULVERT 4		8.80	0.24	16.16	16.16	50.00	24	0.50	0.013	0.26	0.25	89%	5.80	17.21	725.70	722.65	722.40
	AREA TO BYPASS SWALE		13.00	0.20	19.89	19.89												

100-YEAR FLOW FOR SWALE ANALYSIS

CULVERT 2, 3 AND 4 WILL PASS THE 100-YEAR

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Jan 13 2021

Trapezoidal

Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 735.00
Slope (%)	= 0.70
N-Value	= 0.025

Calculations

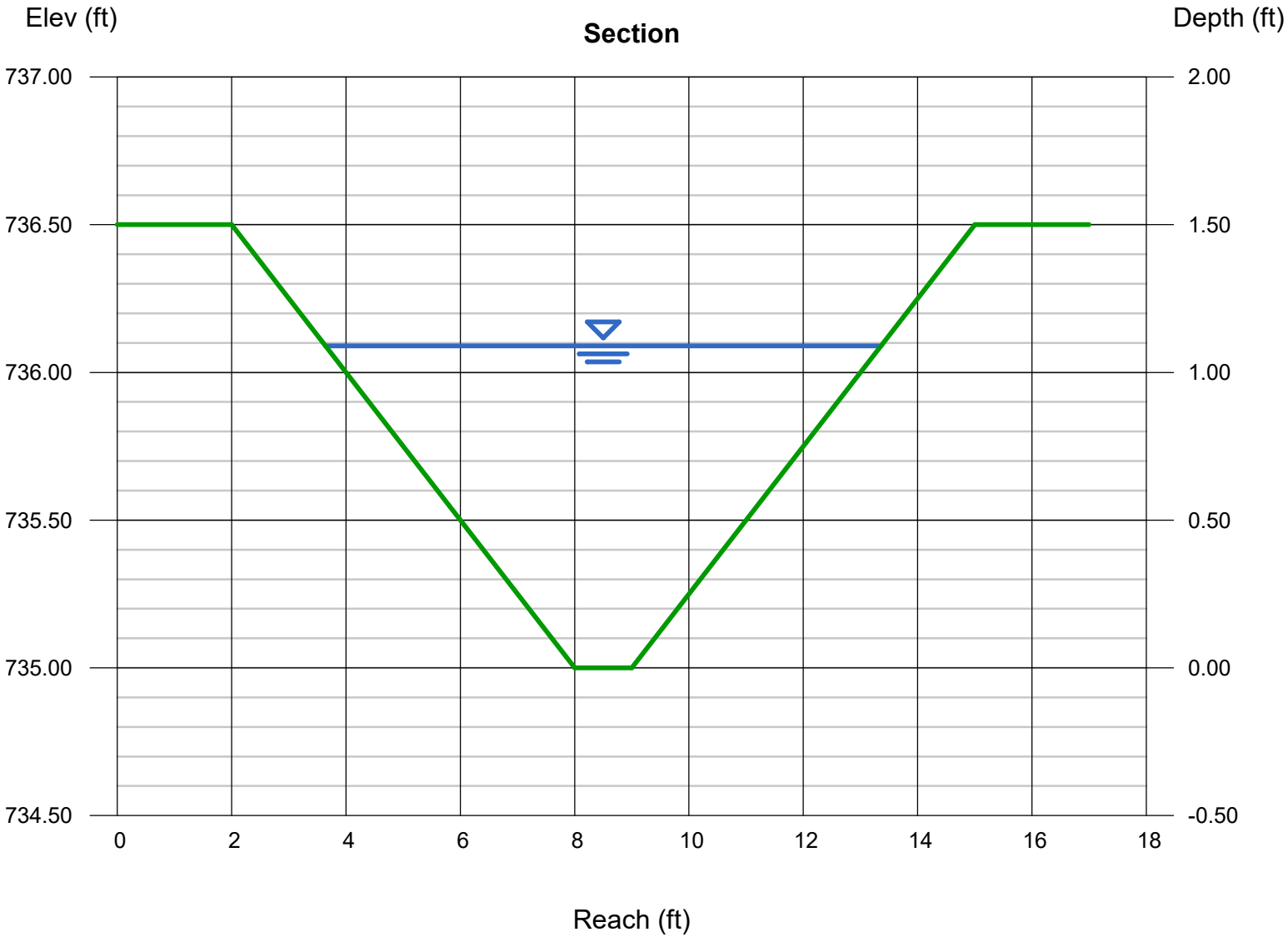
Compute by:	Known Q
Known Q (cfs)	= 19.90

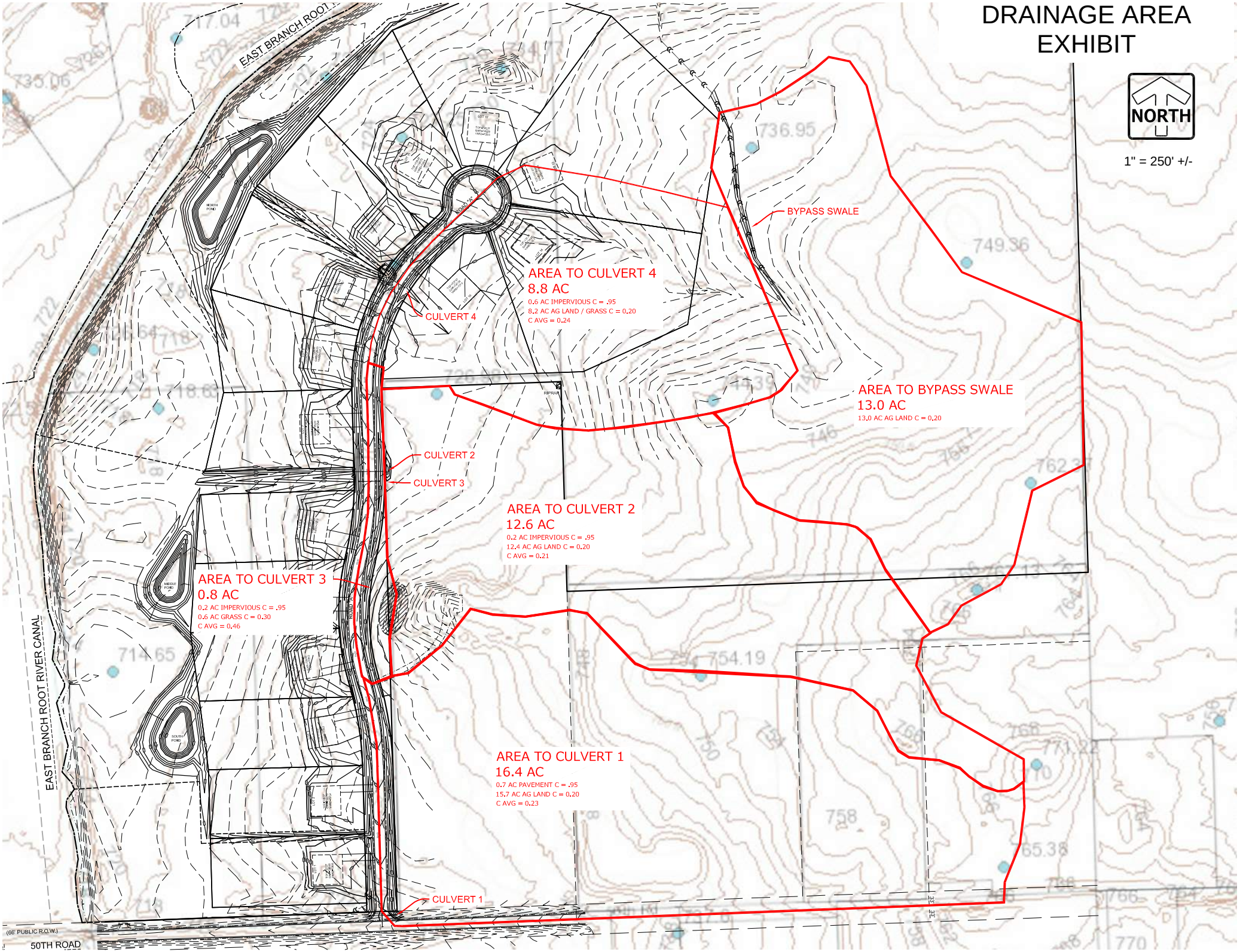
FROM 100-YEAR SPREADSHEET

Highlighted

Depth (ft)	= 1.09
Q (cfs)	= 19.90
Area (sqft)	= 5.84
Velocity (ft/s)	= 3.41
Wetted Perim (ft)	= 9.99
Crit Depth, Yc (ft)	= 0.98
Top Width (ft)	= 9.72
EGL (ft)	= 1.27

AN 18" DEEP SWALE / BERM WITH MIN 1' BOTTOM WIDTH WILL CONVEY THE 100-YEAR EVENT




DRAINAGE AREA EXHIBIT
NORTH
1" = 250' +/-
EAST BRANCH ROOT
BYPASS SWALE
AREA TO CULVERT 4
8.8 AC
0.6 AC IMPERVIOUS C = .95
8.2 AC AG LAND / GRASS C = 0.20
C AVG = 0.24
CULVERT 4
AREA TO BYPASS SWALE
13.0 AC
13.0 AC AG LAND C = 0.20
CULVERT 2
CULVERT 3
AREA TO CULVERT 2
12.6 AC
0.2 AC IMPERVIOUS C = .95
12.4 AC AG LAND C = 0.20
C AVG = 0.21
AREA TO CULVERT 3
0.8 AC
0.2 AC IMPERVIOUS C = .95
0.6 AC GRASS C = 0.30
C AVG = 0.46
EAST BRANCH ROOT RIVER CANAL
AREA TO CULVERT 1
16.4 AC
0.7 AC PAVEMENT C = .95
15.7 AC AG LAND C = 0.20
C AVG = 0.23
CULVERT 1
(66' PUBLIC R.O.W.)
50TH ROAD