



Townes at Carlton Pointe
Rolesville, NC
Wake County

Storm Drainage
Calculations

June 19, 2019
Revised: September 16, 2019

Prepared for:

Carlton Group of NC, LLC
5856 Faringdon Place
Raleigh, NC 27609



Townes at Carlton Pointe

Table of Contents

Site Description

Storm Drain Analysis

Attachments:

Storm Drain Schedule

Marchskip Way and Jamescroft Way (HGL and Gutter Spread)- Line A

Excelsor Ct (HGL and Gutter Spread) – Line B

Vineyard Ct (HGL and Gutter Spread)

EX3 – Storm Drainage Areas



caaENGINEERS, Inc.
NC License number C-2151

1233 Heritage Links Drive, Wake Forest, NC 27587

919.625.6755

Townes at Carlton Pointe

Project Address: 4521, 4522, 4541, & 4542 Vineyard Pine Lane
Rolesville, NC

Pins: 1758455319, 1758457329, 1758455033, 1758457035

Latitude: N 35°54' 23.06"

Longitude: W 78°28' 40.29"

Developer: Carlton Group of NC, LLC
5856 Faringdon Place
Raleigh, NC 27609

Telephone: (914) 403-7848

Site Description

The project consists of four parcels, approximately 1.4 acres each for a total of project site of 5.8 acres located on Vineyard Pine Lane in Rolesville, NC. The parcels are vacant and the property is zoned R & PUD. The site is in the Neuse River Basin and the Town of Rolesville and subjected to those rules regarding nutrient management and post stormwater runoff. The parcel is not located within a flood zone as noted per FEMA map 3720174700J, Dated May 2, 2006.

Storm Drain Analysis:

Analysis for the pipe system is the Q10 for the HGL review and Q10 for gutter spread per city of Raleigh standards. Areas within the proposed right of way along the proposed streets were evaluated.



caaENGINEERS, Inc.
NC License number C-2151

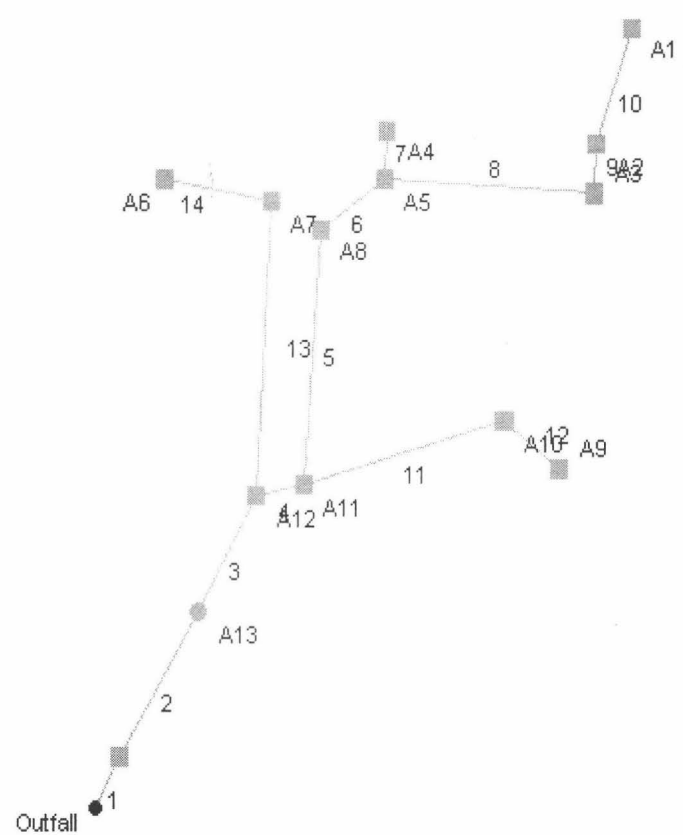
1233 Heritage Links Drive, Wake Forest, NC 27587

919.625.6755

STORM DRAINAGE STRUCTURE SCHEDULE

STRUCTURE DATA								PIPE DATA					REMARKS
Structure Number	Structure Type	Rim/TOC Elevation	Invert In North	Invert In East	Invert In South	Invert In West	Invert Out	To	Pipe Length Out	Pipe Slope	Design Diameter	Pipe Material	
#		elev	elev	elev	elev	elev	elev		ft	%	in		
A1	NCDOT 840.14	377.50					374.55	A2	56.0	1.00%	18	RCP	
A2	NCDOT 840.02	380.50	374.20				374.00	A3	22.0	1.00%	18	RCP	
A3	NCDOT 840.02	380.50	373.77				371.80	A5	105.0	1.00%	18	RCP	
A4	NCDOT 840.02	378.10					373.00	A5	22.0	1.05%	15	RCP	
A5	NCDOT 840.02	378.10	372.77	370.74			370.54	A8	39.0	1.03%	24	RCP	
A6	NCDOT 840.14	375.50					372.99	A7	54.0	0.50%	18	RCP	
A7	NCDOT 840.02	377.20				372.72	372.52	A12	132.0	4.18%	18	RCP	
A8	NCDOT 840.02	377.10	370.14				369.94	A11	115.0	4.30%	24	RCP	
A9	NCDOT 840.02	375.50					369.55	A10	35.0	1.00%	15	RCP	
A10	NCDOT 840.14	375.00		369.20			369.00	A11	104.0	2.88%	18	RCP	
A11	NCDOT 840.02	375.20	365.00	366.00			364.23	A12	24.0	0.50%	24	RCP	
A12	NCDOT 840.02	375.10	367.00	364.11			363.91	A13	60.0	0.50%	24	RCP	
A13	NCDOT 840.31	373.00	363.61				363.41	A14	76.0	0.50%	24	RCP	
A14	NCDOT 840.14	369.80	363.03				362.83	A15	26.0	0.50%	24	RCP	
A15	FES						362.70	BMP			24	RCP	CLASS 1Rip Rap Apron L=12', W= 6' - 14', T=2.25'
B1	YARD INLET	373.81					369.13	B2	37.0	1.00%	15	RCP	
B2	NCDOT 840.02	372.86		368.56			368.36	B4	119.0	1.14%	18	RCP	
B3	NCDOT 840.14	373.50					368.86	B4	104.0	1.78%	15	RCP	
B4	NCDOT 840.02	370.30	367.00	367.00			366.80	B5	23.0	1.00%	18	RCP	
B5	NCDOT 840.02	370.30		366.57	366.57		366.37	B6	69.0	3.14%	24	RCP	
B6	NCDOT 840.14	369.50		364.20			364.00	B7	39.0	6.44%	24	RCP	
B7	FES						363.00	BMP		2.50%	24	RCP	CLASS 1Rip Rap Apron L=12', W= 6' - 14', T=2.25'
B8	NCDOT 840.02	371.80		368.38			368.18	B5	89.0	1.80%	15	RCP	
B9	NCDOT 840.02	371.75					368.60	B8	22.0	1.00%	15	RCP	
C1	NCDOT 840.14	377.80			370.80		370.60	**	60.0	1.00%	42	RCP	**Tie into existing 42" pipe
C2	NCDOT 840.14	377.80					372.10		130.0	1.00%	24		
D1	RISER	364.50					361.00	D2	61.0	0.50%	18	RCP	
D2	FES						360.00						CLASS 1Rip Rap Apron L=12', W= 4.5' - 13.5', T=2.25'
EX1	EXISITNG CURB INLET	373.72					368.97	EX2					
EX2	EXISITNG CURB INLET	373.33					368.33	EX3					
EX3	EXISITNG CURB INLET	372.81					367.64	EX4					Adjust rim as needed per proposed grading
EX4	EXISITNG CURB INLET	372.88					367.22	EX5					Adjust rim as needed per proposed grading
EX5	EXISITNG CURB INLET	374.47					364.30	EX6					
EX6	EXISTNG JUNCTION BOX	368.69					362.36	OUTFALL			42"	RCP	

Hydraflow Plan View



TOWNES AT CLARKTON POINTE
HGL
LINE A
Q₁₀ HGL & GUTTER SPREAD

Storm Sewer Summary Report

Page 1

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	A14-A15	15.08	24 c	26.0	362.70	362.83	0.500	364.70	364.81	0.18	End 1 2 3 4 5 6 6 8 9 4 11 3
2	A13- A14	14.10	24 c	76.0	363.03	363.41	0.500	364.99	365.22	0.05	
3	A12-A13	14.20	24 c	60.0	363.61	363.91	0.500	365.27	365.47	0.50	
4	A11-A12	10.46	24 c	24.0	364.11	364.23	0.500	365.97	366.00	0.25	
5	A8-A11	8.00	24 c	115.0	365.00	369.94	4.296	366.25	370.94	0.44	
6	A5-A8	7.21	24 c	39.0	370.14	370.54	1.026	371.38	371.49	0.41	
7	A4-A5	1.17	15 c	22.0	372.77	373.00	1.046	373.13	373.44	0.15	
8	A3-A5	5.70	18 c	105.0	370.74	371.80	1.010	371.90	372.71	0.60	
9	A2-A3	4.37	18 c	22.0	373.77	374.00	1.046	374.44	374.82	0.21	
10	A1-A2	3.37	18 c	56.0	374.20	375.00	1.429	375.03	375.70	0.27	
11	A10-A11	2.06	18 c	104.0	366.00	369.00	2.885	366.34	369.55	0.24	
12	A9-A10	0.91	15 c	35.0	369.20	369.55	1.000	369.79	369.93	0.13	
13	A7-A12	2.89	18 c	132.0	367.00	372.52	4.182	367.37	373.17	0.36	
Project File: jonesville rd line A REVISED.stm						Number of lines: 13			Run Date: 09-16-2019		
NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.											

Storm Sewer Inventory Report

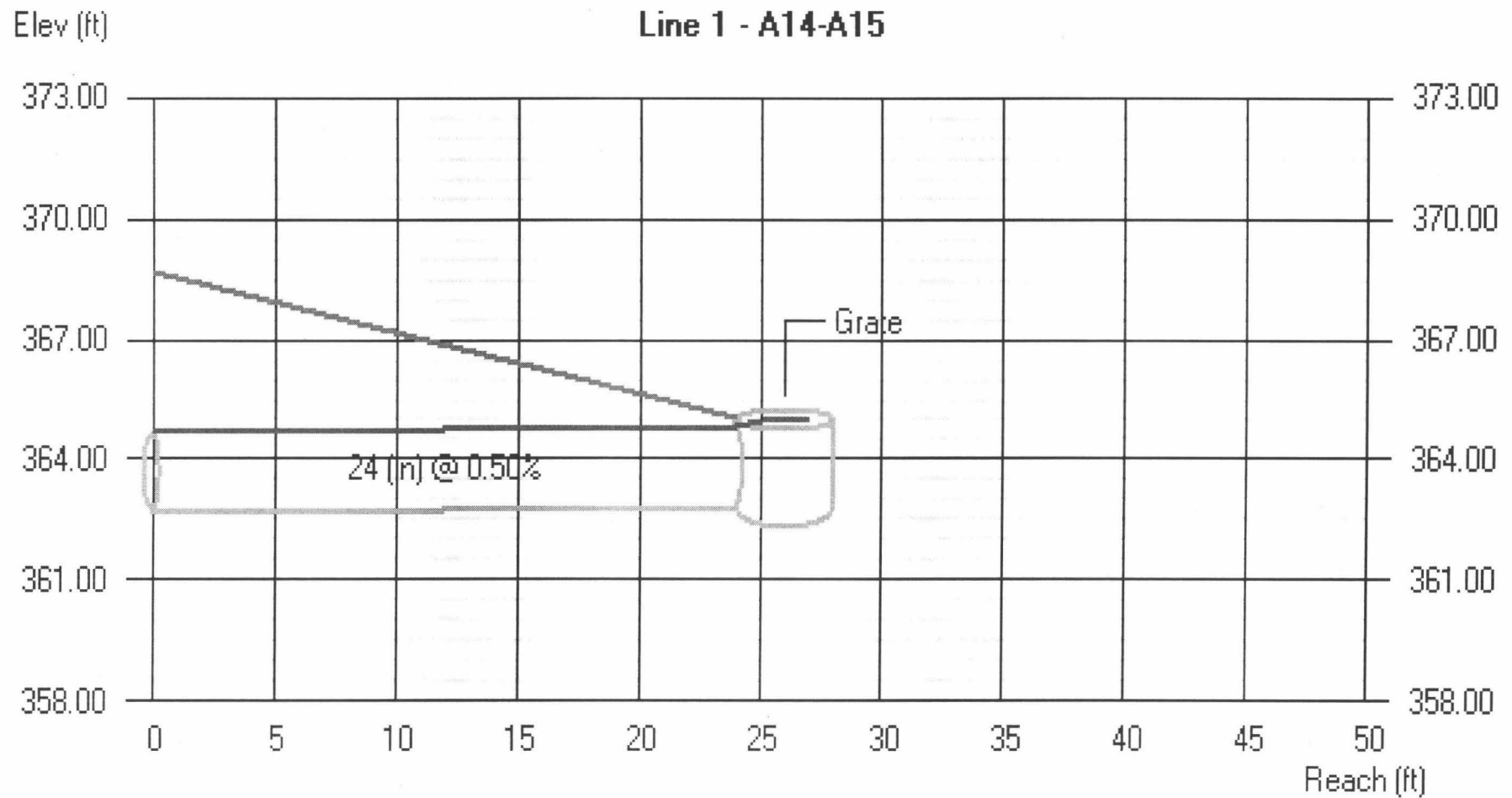
Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	26.0	-62.1	Grate	0.00	0.23	0.80	5.0	362.70	0.50	362.83	24	Cir	0.013	0.50	365.00	A14-A15
2	1	76.0	2.5	MH	0.00	0.00	0.80	5.0	363.03	0.50	363.41	24	Cir	0.013	0.15	373.00	A13- A14
3	2	60.0	-1.6	Comb	0.00	0.21	0.80	5.0	363.61	0.50	363.91	24	Cir	0.013	1.10	375.10	A12-A13
4	3	24.0	50.0	Comb	0.00	0.17	0.80	5.0	364.11	0.50	364.23	24	Cir	0.013	1.25	375.20	A11-A12
5	4	115.0	-75.0	Comb	0.00	0.15	0.90	5.0	365.00	4.30	369.94	24	Cir	0.013	1.10	377.20	A8-A11
6	5	39.0	50.9	Comb	0.00	0.10	0.90	5.0	370.14	1.03	370.54	24	Cir	0.013	1.10	378.10	A5-A8
7	6	22.0	-50.6	Comb	0.00	0.18	0.90	5.0	372.77	1.05	373.00	15	Cir	0.013	1.00	378.10	A4-A5
8	6	105.0	38.8	Comb	0.00	0.23	0.90	5.0	370.74	1.01	371.80	18	Cir	0.013	1.50	380.50	A3-A5
9	8	22.0	-91.0	Comb	0.00	0.18	0.90	5.0	373.77	1.05	374.00	18	Cir	0.013	0.70	380.50	A2-A3
10	9	56.0	15.4	DrGr	0.00	1.68	0.30	7.0	374.20	1.43	375.00	18	Cir	0.013	1.00	379.00	A1-A2
11	4	104.0	-5.0	DrGr	0.00	0.21	0.80	5.0	366.00	2.88	369.00	18	Cir	0.013	1.25	375.00	A10-A11
12	11	35.0	54.0	Comb	0.00	0.14	0.90	5.0	369.20	1.00	369.55	15	Cir	0.013	1.00	375.50	A9-A10
13	3	132.0	-25.9	Curb	0.00	0.20	0.90	5.0	367.00	4.18	372.52	18	Cir	0.013	1.50	377.20	A7-A12
Project File: jonesville rd line A REVISED.stm												Number of lines: 13			Date: 09-16-2019		

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	26.0	0.23	4.57	0.80	0.18	2.49	5.0	9.8	6.1	15.08	15.99	4.81	24	0.50	362.83	362.70	364.81	364.70	365.00	0.00	A14-A15
2	1	76.0	0.00	4.34	0.80	0.00	2.31	5.0	9.6	6.1	14.10	15.99	4.61	24	0.50	363.41	363.03	365.22	364.99	373.00	365.00	A13- A14
3	2	60.0	0.21	4.34	0.80	0.17	2.31	5.0	9.3	6.2	14.20	15.99	5.25	24	0.50	363.91	363.61	365.47	365.27	375.10	373.00	A12-A13
4	3	24.0	0.17	3.04	0.80	0.14	1.69	5.0	9.2	6.2	10.46	15.99	3.49	24	0.50	364.23	364.11	366.00	365.97	375.20	375.10	A11-A12
5	4	115.0	0.15	2.52	0.90	0.14	1.26	5.0	8.5	6.3	8.00	46.88	4.48	24	4.30	369.94	365.00	370.94	366.25	377.20	375.20	A8-A11
6	5	39.0	0.10	2.37	0.90	0.09	1.13	5.0	8.2	6.4	7.21	22.91	4.20	24	1.03	370.54	370.14	371.49	371.38	378.10	377.20	A5-A8
7	6	22.0	0.18	0.18	0.90	0.16	0.16	5.0	5.0	7.2	1.17	6.60	3.55	15	1.05	373.00	372.77	373.44	373.13	378.10	378.10	A4-A5
8	6	105.0	0.23	2.09	0.90	0.21	0.87	5.0	7.6	6.5	5.70	10.55	4.48	18	1.01	371.80	370.74	372.71	371.90	380.50	378.10	A3-A5
9	8	22.0	0.18	1.86	0.90	0.16	0.67	5.0	7.5	6.6	4.37	10.74	5.09	18	1.05	374.00	373.77	374.82	374.44	380.50	380.50	A2-A3
10	9	56.0	1.68	1.68	0.30	0.50	0.50	7.0	7.0	6.7	3.37	12.55	3.75	18	1.43	375.00	374.20	375.70	375.03	379.00	380.50	A1-A2
11	4	104.0	0.21	0.35	0.80	0.17	0.29	5.0	5.8	7.0	2.06	17.84	5.12	18	2.88	369.00	366.00	369.55	366.34	375.00	375.20	A10-A11
12	11	35.0	0.14	0.14	0.90	0.13	0.13	5.0	5.0	7.2	0.91	6.46	2.23	15	1.00	369.55	369.20	369.93	369.79	375.50	375.00	A9-A10
13	3	132.0	0.20	1.09	0.90	0.18	0.45	5.0	7.9	6.5	2.89	21.47	6.19	18	4.18	372.52	367.00	373.17	367.37	377.20	375.10	A7-A12
Project File: jonesville rd line A REVISED.stm																Number of lines: 13				Run Date: 09-16-2019		
NOTES: Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period = 10 Yrs.																						

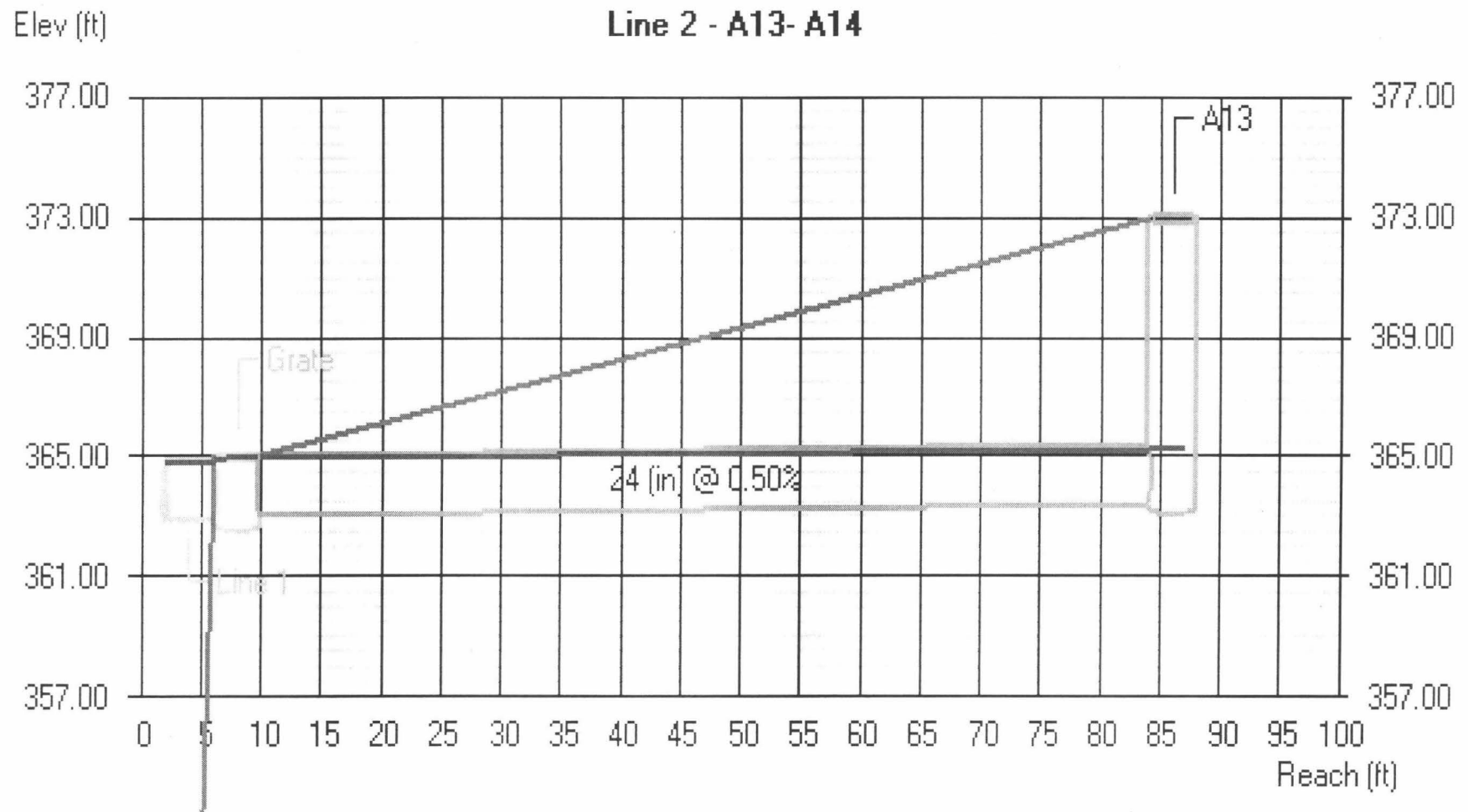
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



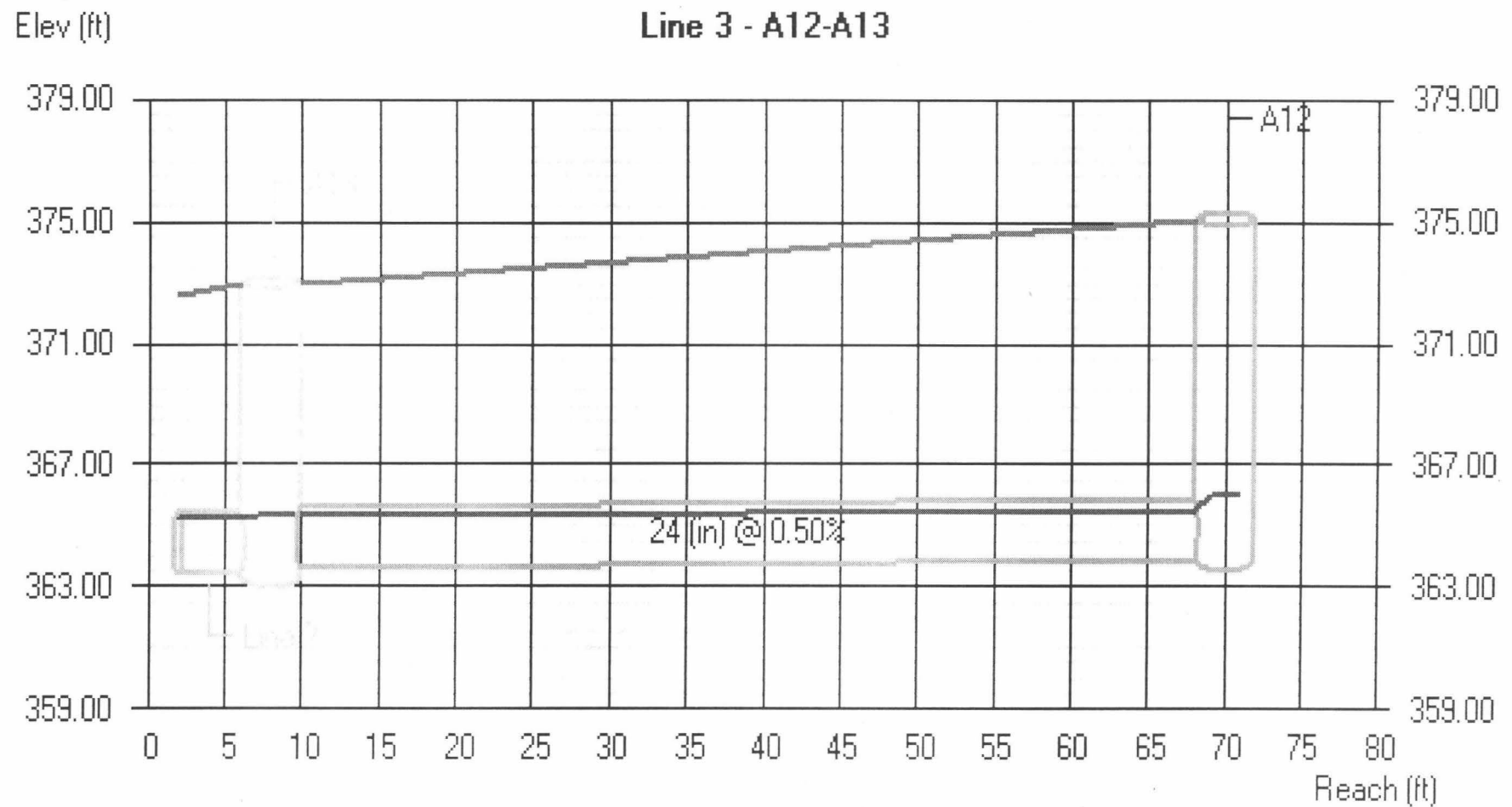
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



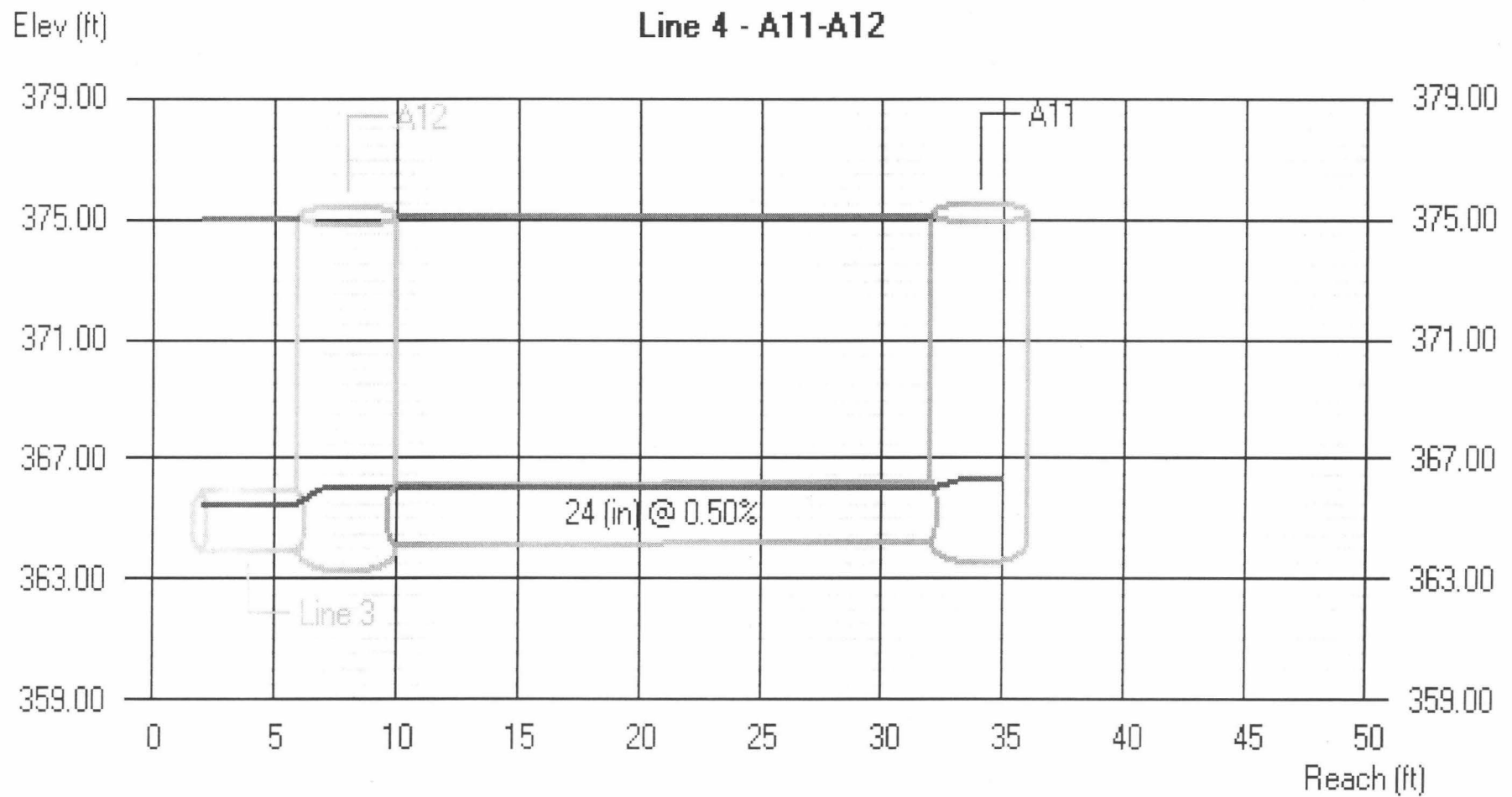
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



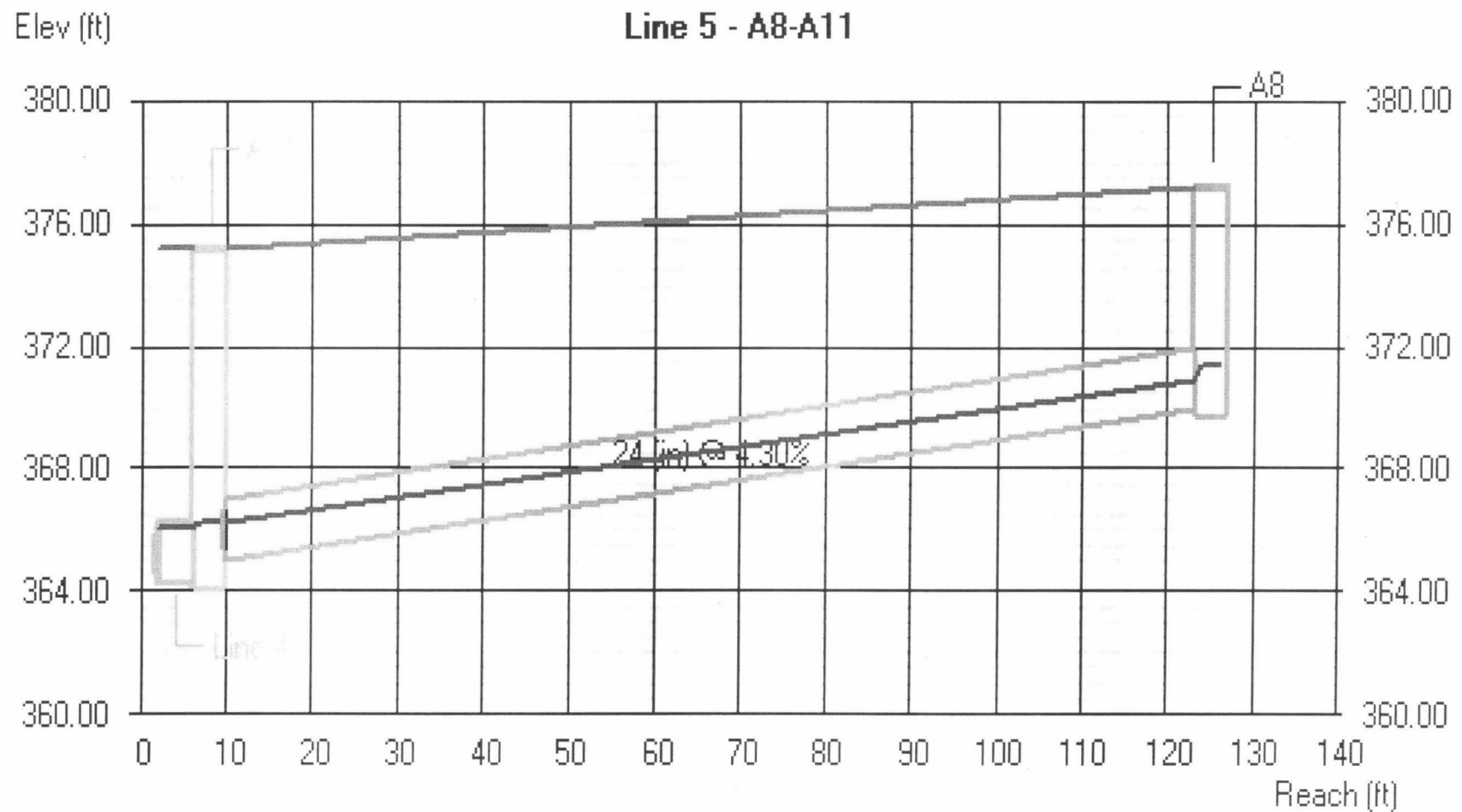
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



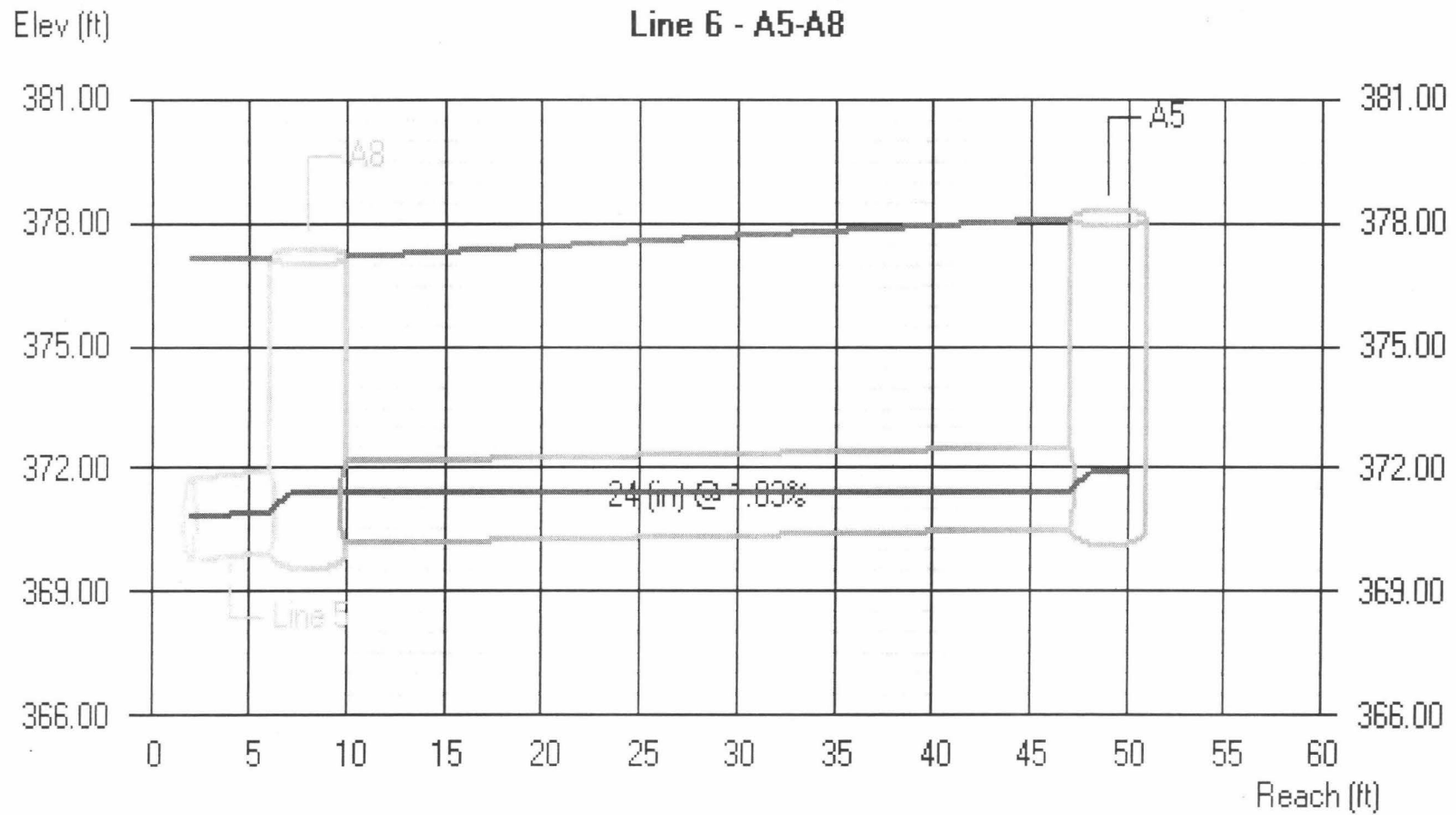
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



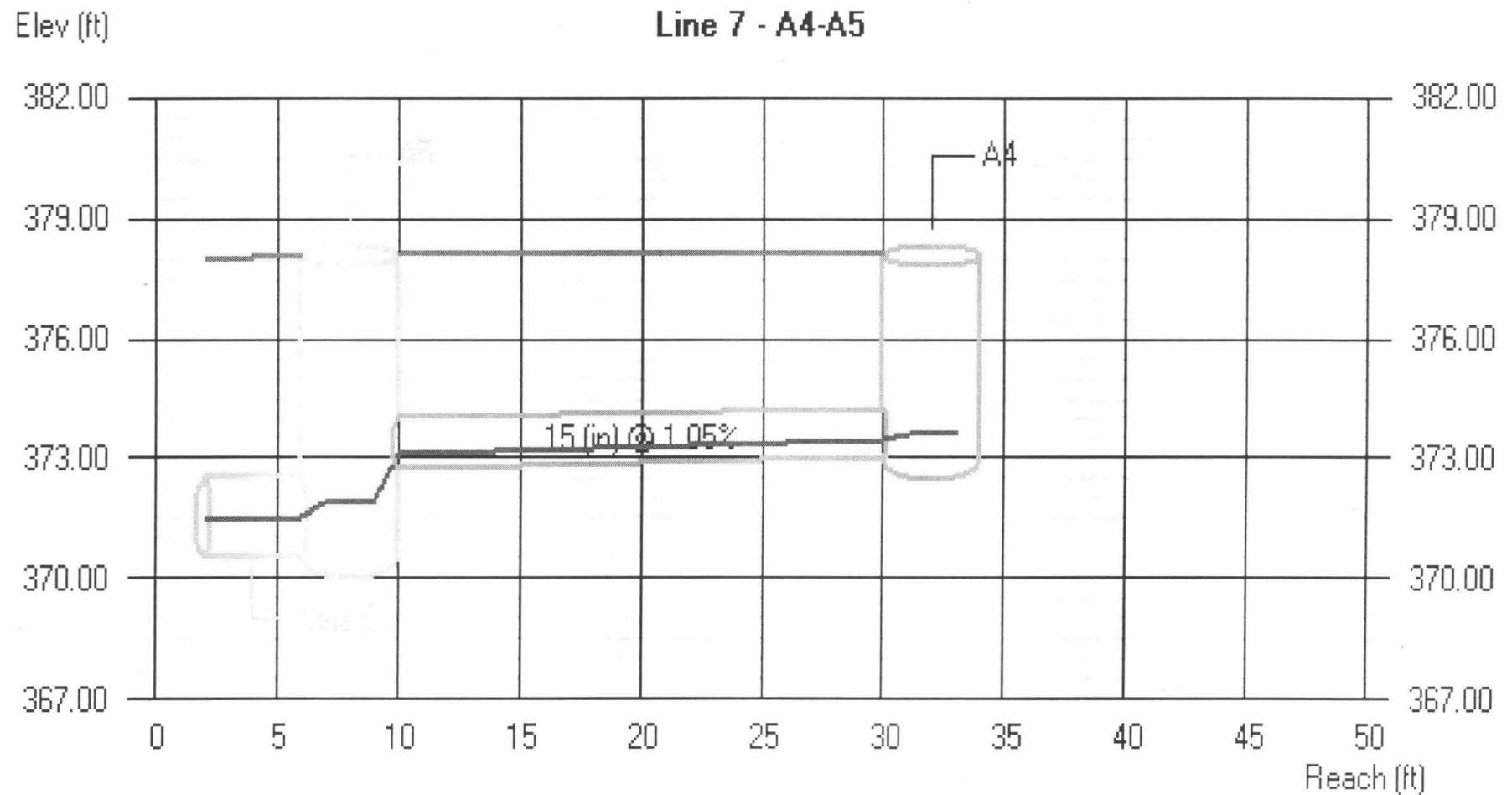
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



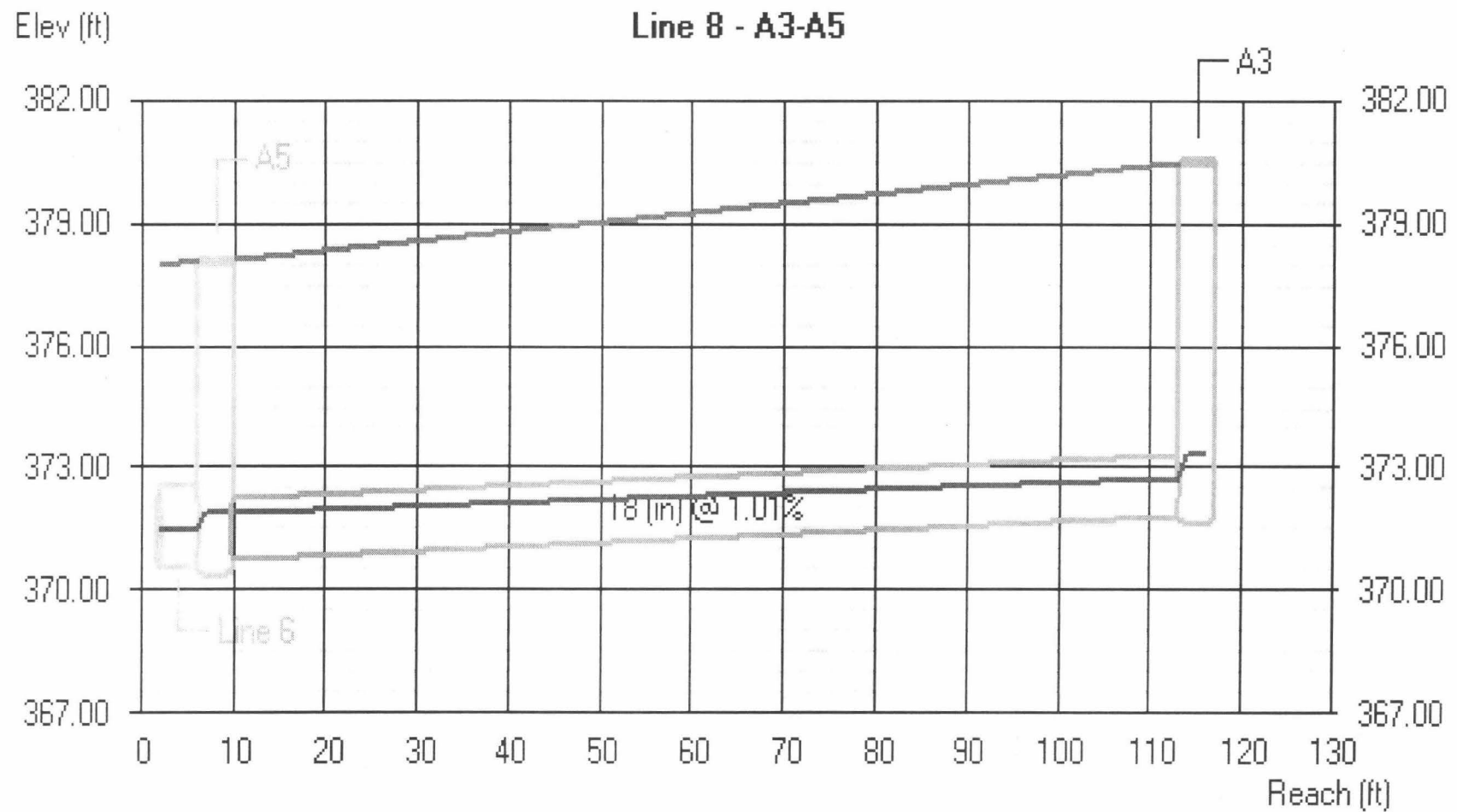
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



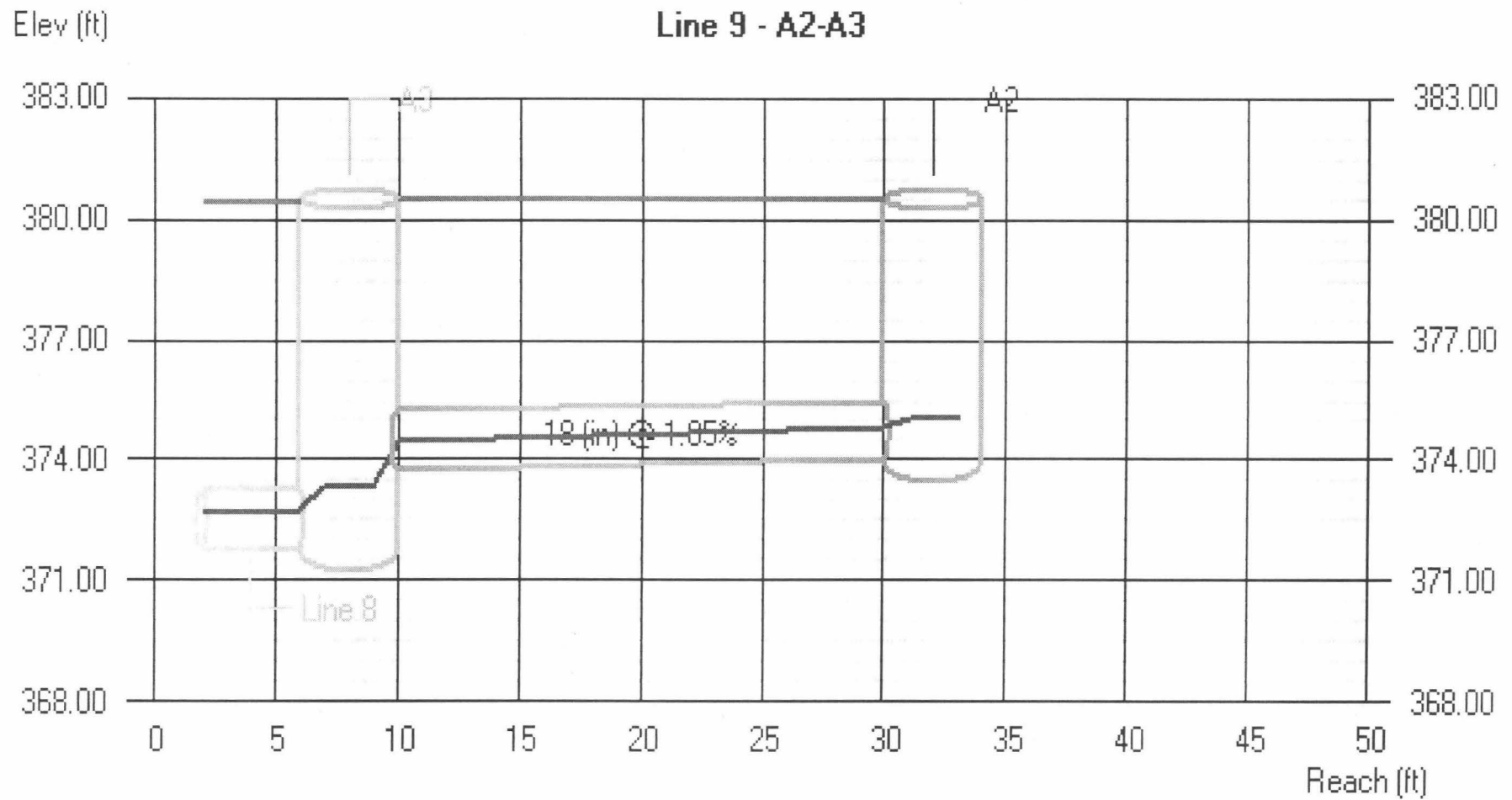
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



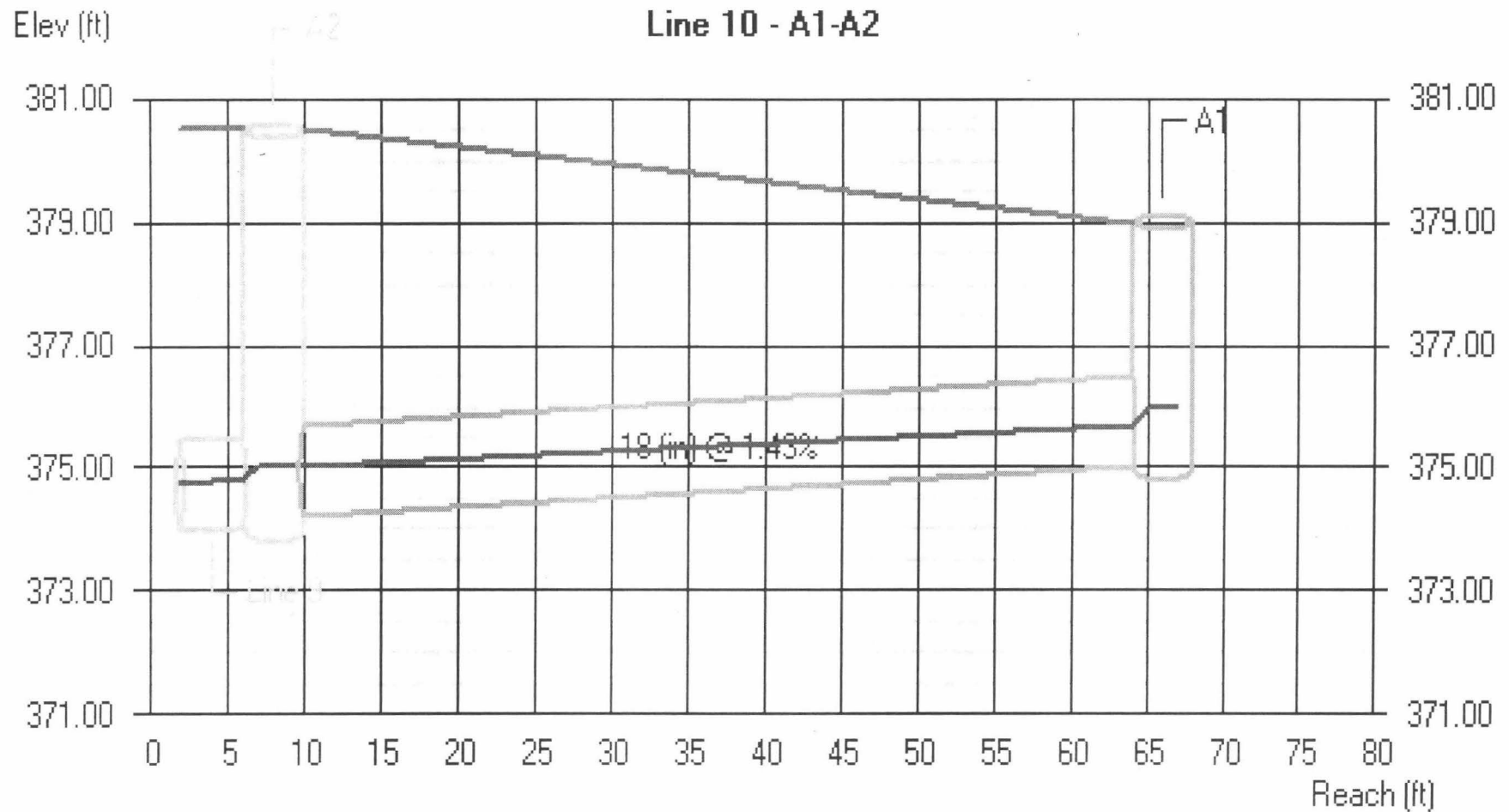
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



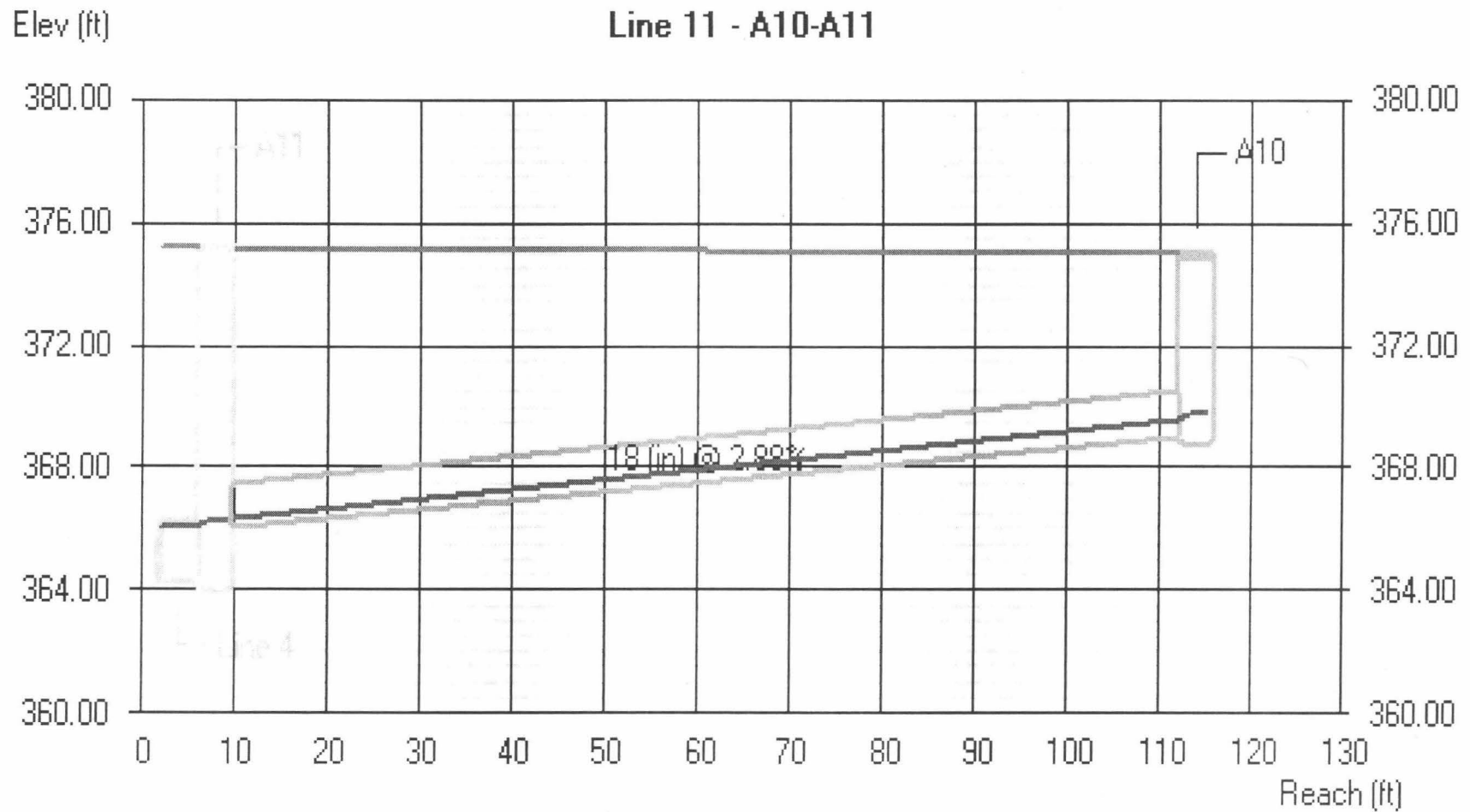
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



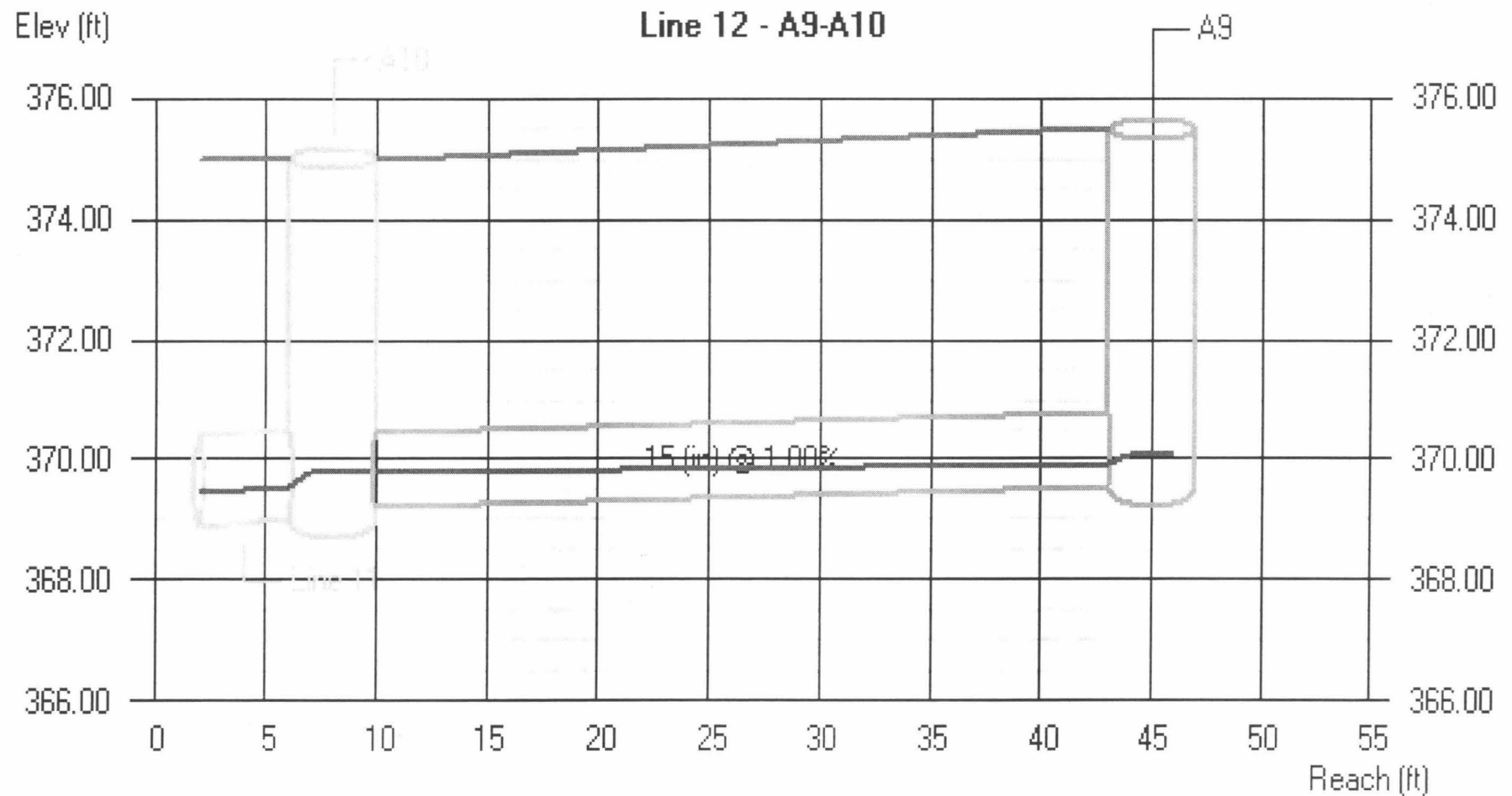
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



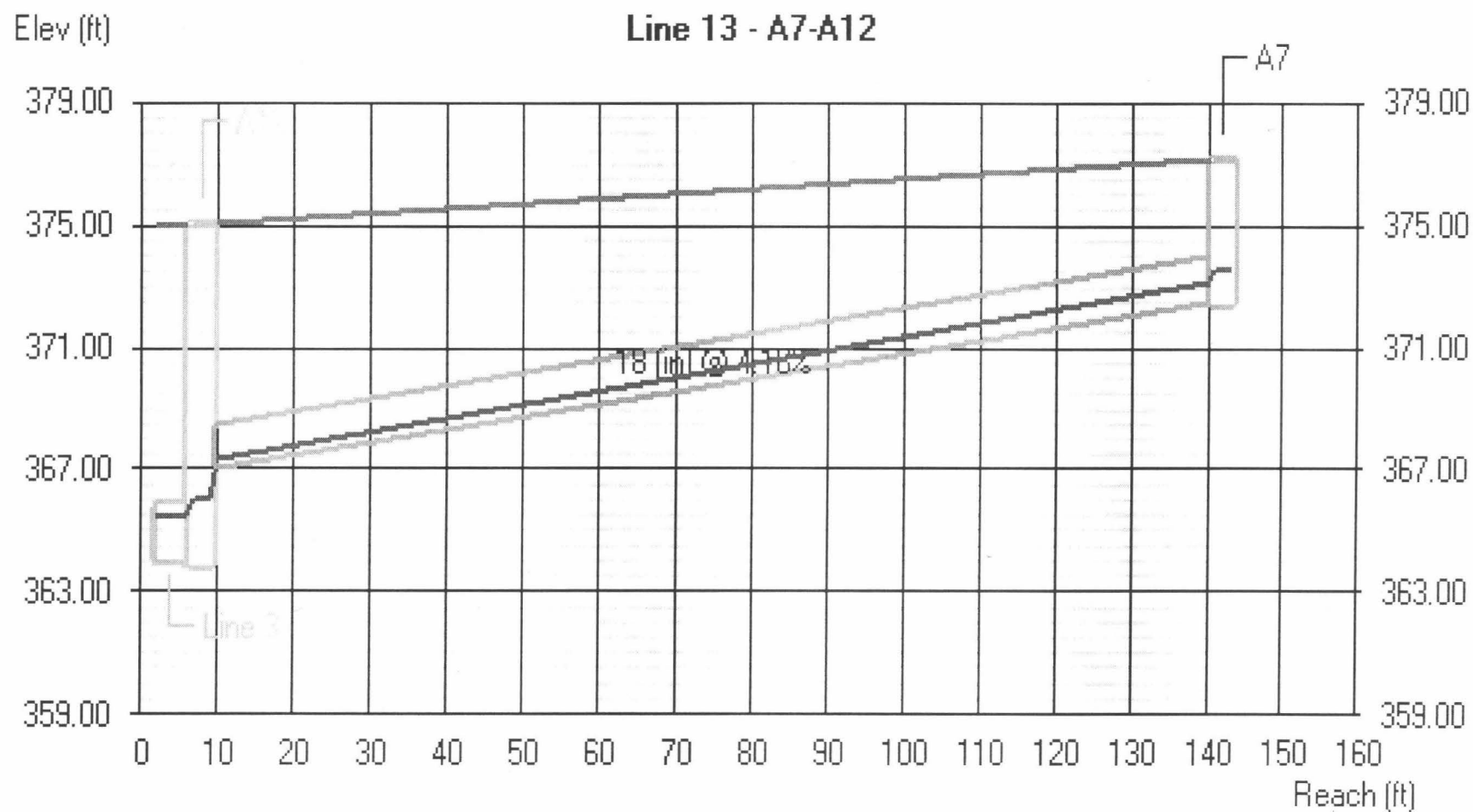
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



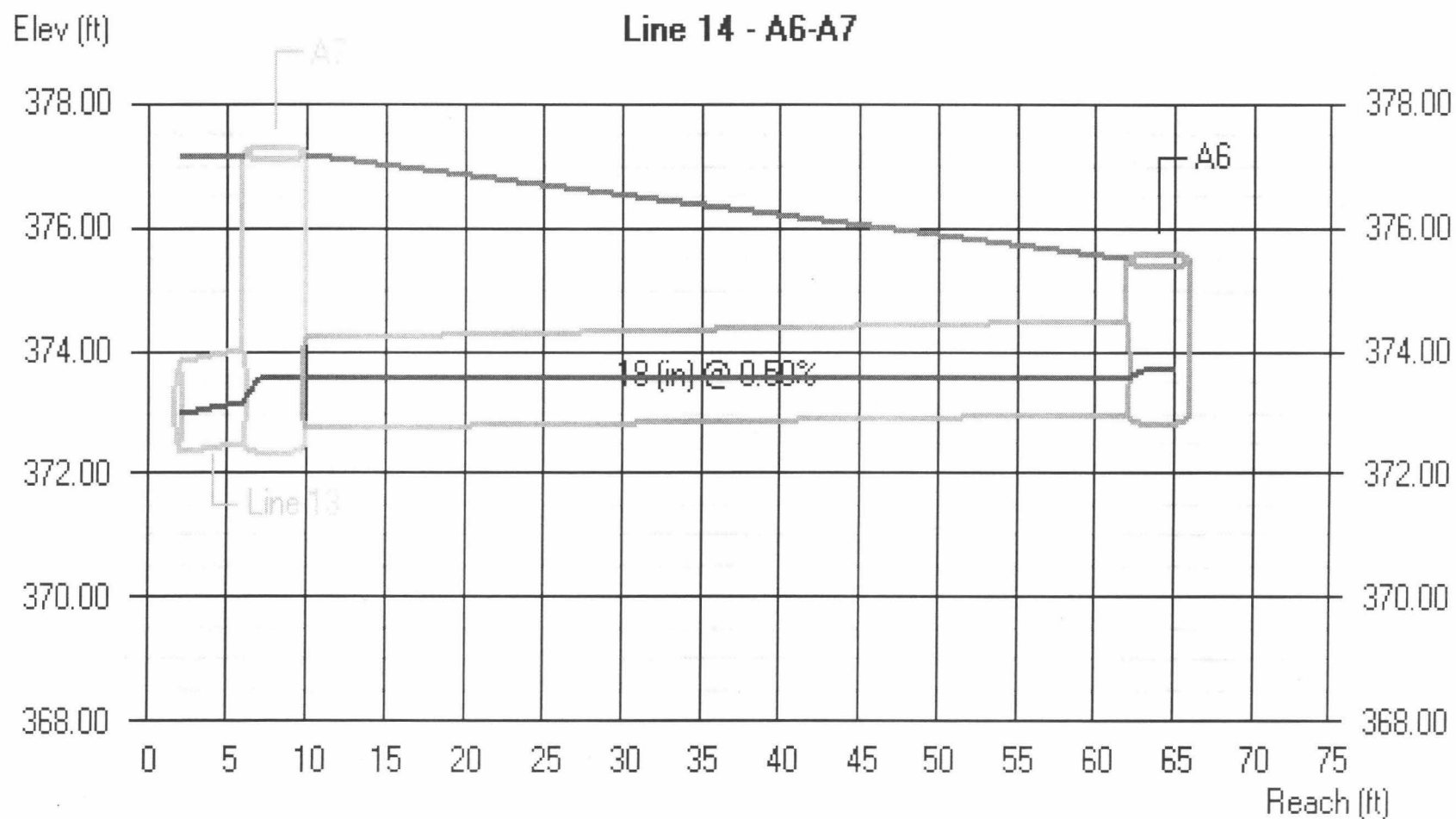
Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



Storm Sewer Profile

Proj. file: jonesville rd line A REVISED.stm



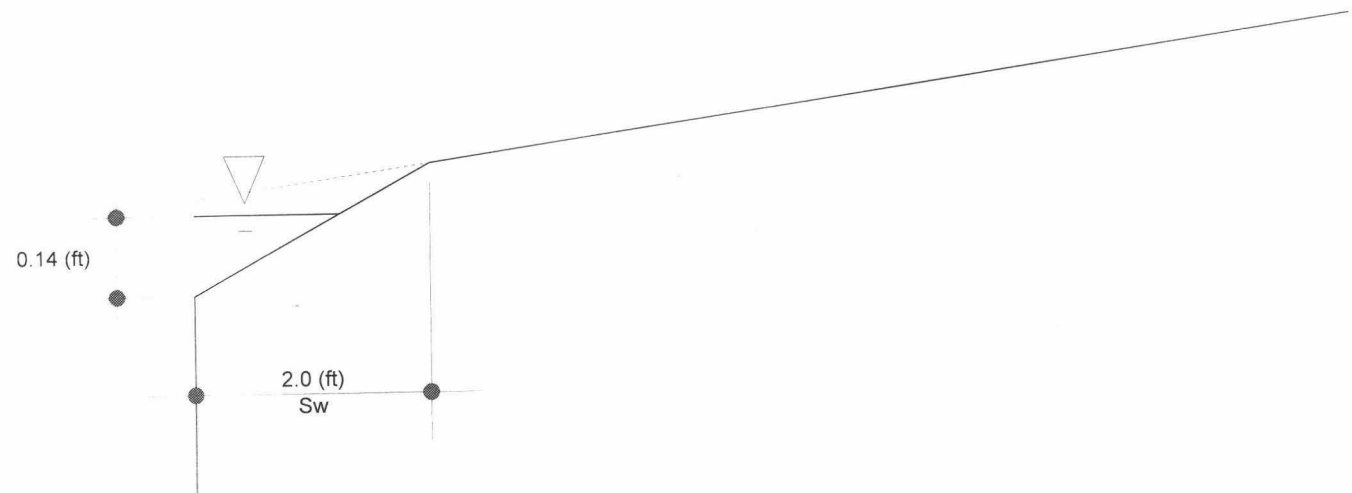
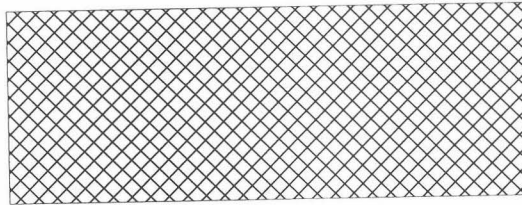
Inlet Section (Line 3 - Combination Inlet)

Inlet Flows

Q Catchment = 1.21 (cfs)
Q Carryover = 0.00
Q Total = 1.21
Q Captured = 1.21
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.24 (ft)



Inlet Section

A12

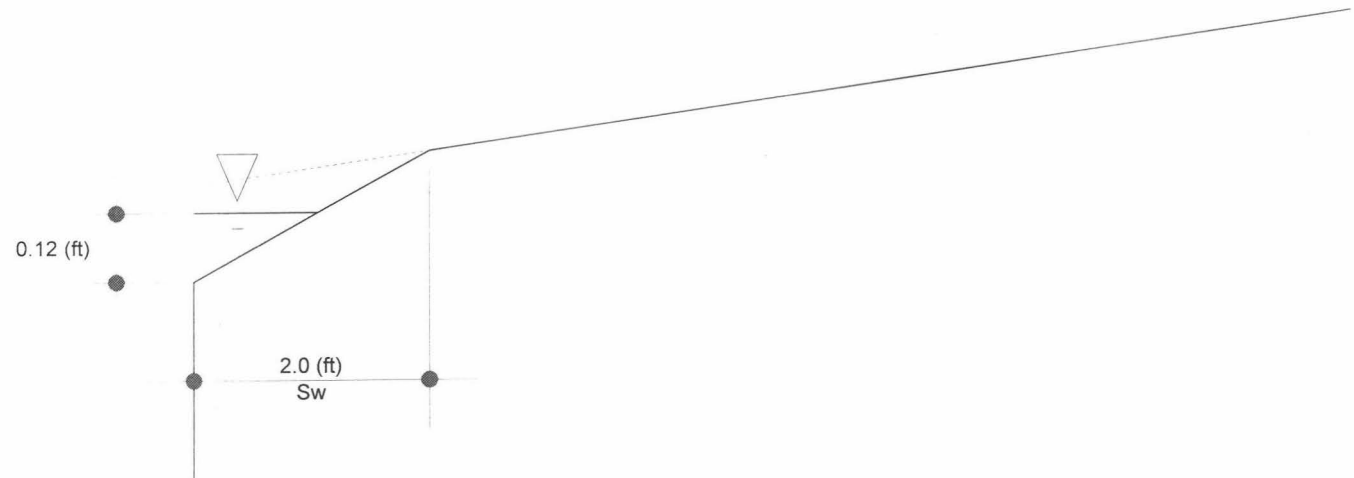
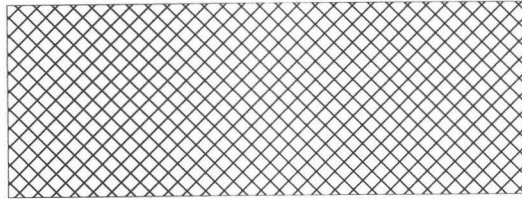
Inlet Section (Line 4 - Combination Inlet)

Inlet Flows

Q Catchment = 0.98 (cfs)
Q Carryover = 0.00
Q Total = 0.98
Q Captured = 0.98
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.06 (ft)



Inlet Section

A11

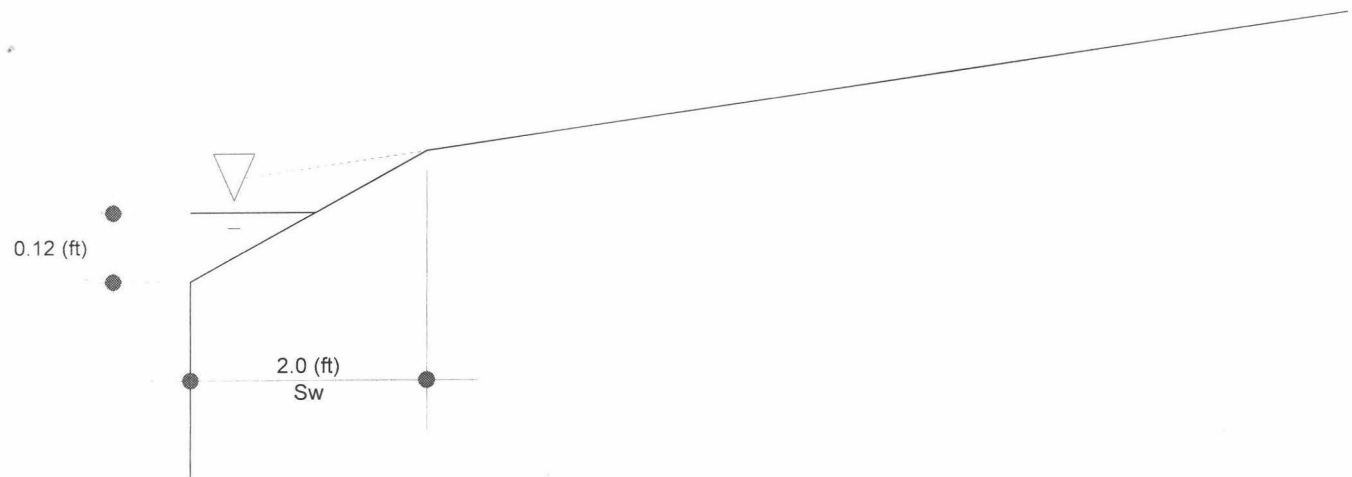
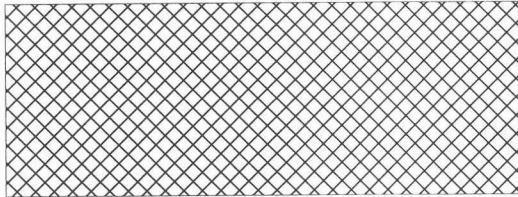
Inlet Section (Line 5 - Combination Inlet)

Inlet Flows

Q Catchment = 0.97 (cfs)
Q Carryover = 0.00
Q Total = 0.97
Q Captured = 0.97
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.06 (ft)



Inlet Section

A8

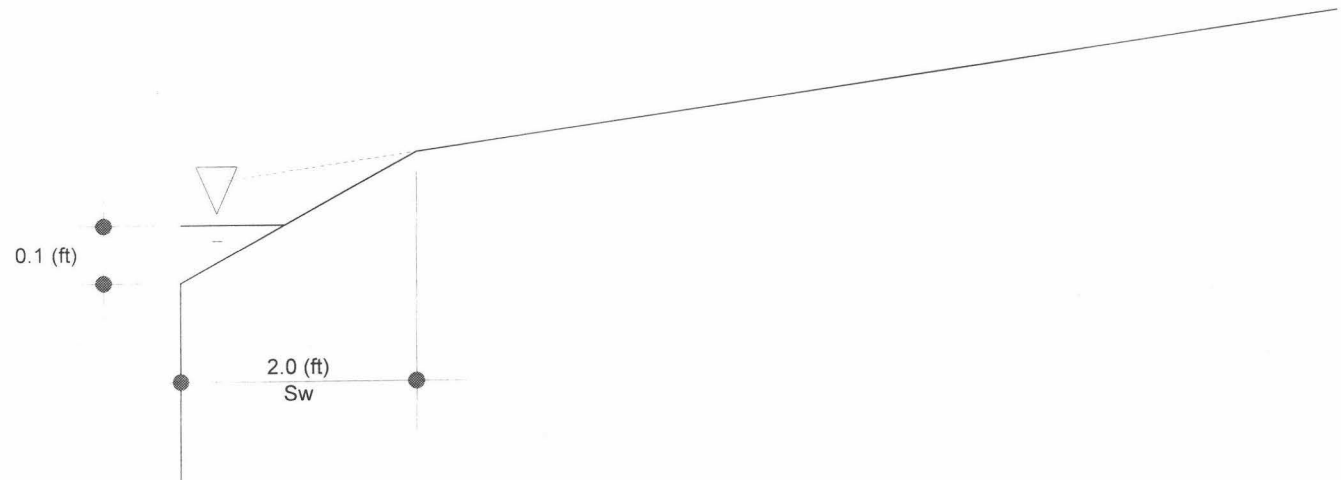
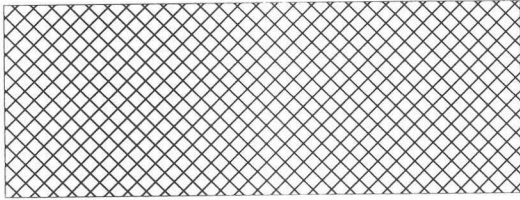
Inlet Section (Line 6 - Combination Inlet)

Inlet Flows

Q Catchment = 0.65 (cfs)
Q Carryover = 0.00
Q Total = 0.65
Q Captured = 0.65
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 0.88 (ft)



Inlet Section

A5

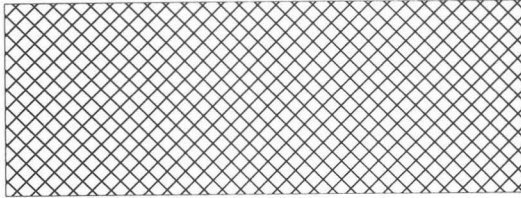
Inlet Section (Line 7 - Combination Inlet)

Inlet Flows

Q Catchment = 1.17 (cfs)
Q Carryover = 0.00
Q Total = 1.17
Q Captured = 1.17
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.24 (ft)



Inlet Section

A4

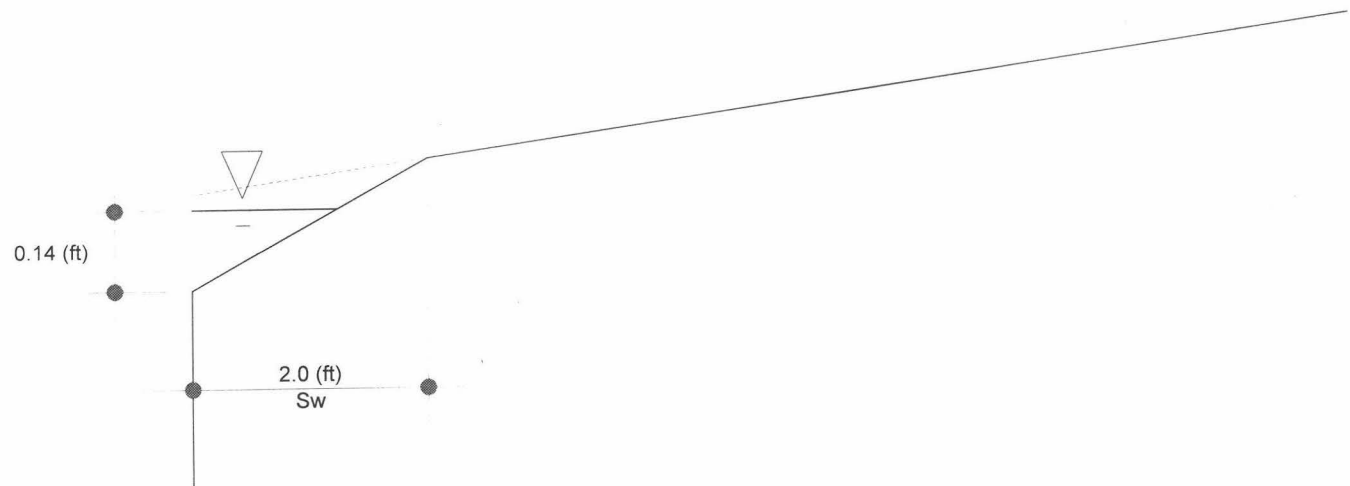
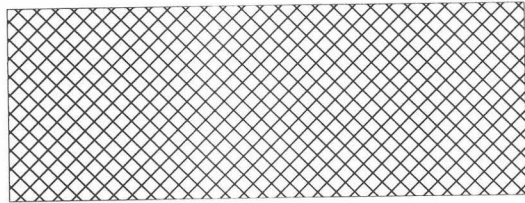
Inlet Section (Line 7 - Combination Inlet)

Inlet Flows

Q Catchment = 1.17 (cfs)
Q Carryover = 0.00
Q Total = 1.17
Q Captured = 1.17
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.24 (ft)



Inlet Section

A4

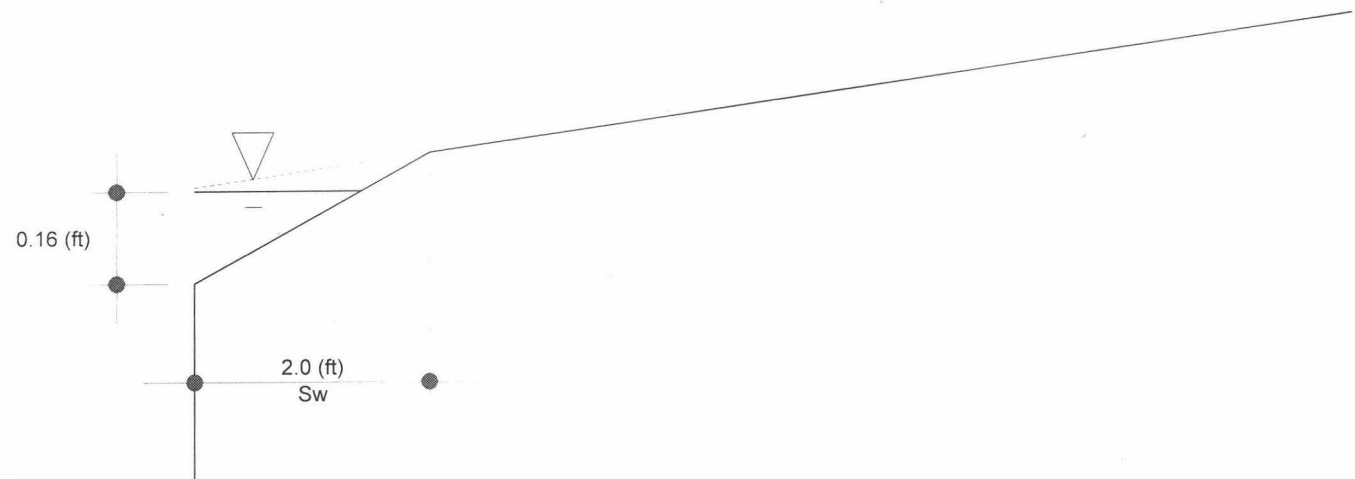
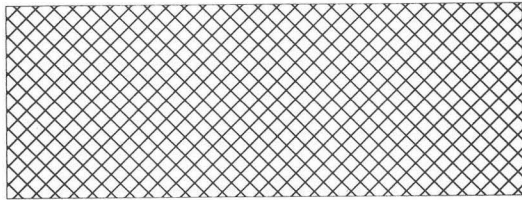
Inlet Section (Line 8 - Combination Inlet)

Inlet Flows

Q Catchment = 1.49 (cfs)
Q Carryover = 0.00
Q Total = 1.49
Q Captured = 1.49
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.41 (ft)



Inlet Section

A3

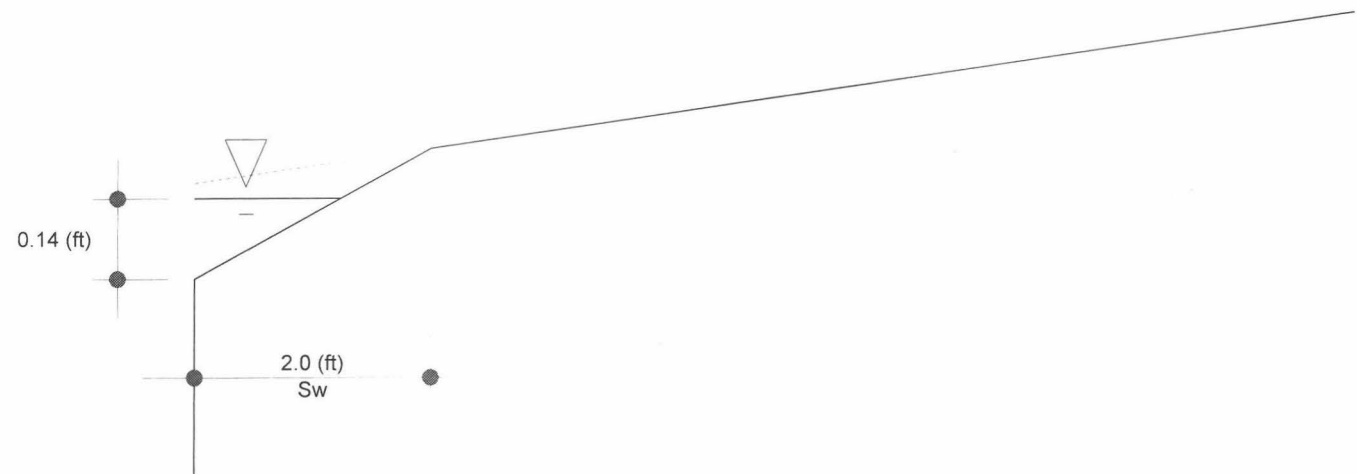
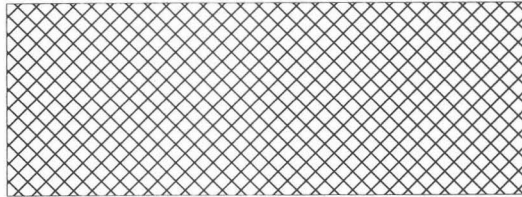
Inlet Section (Line 9 - Combination Inlet)

Inlet Flows

Q Catchment = 1.17 (cfs)
Q Carryover = 0.00
Q Total = 1.17
Q Captured = 1.17
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.24 (ft)



Inlet Section

A2

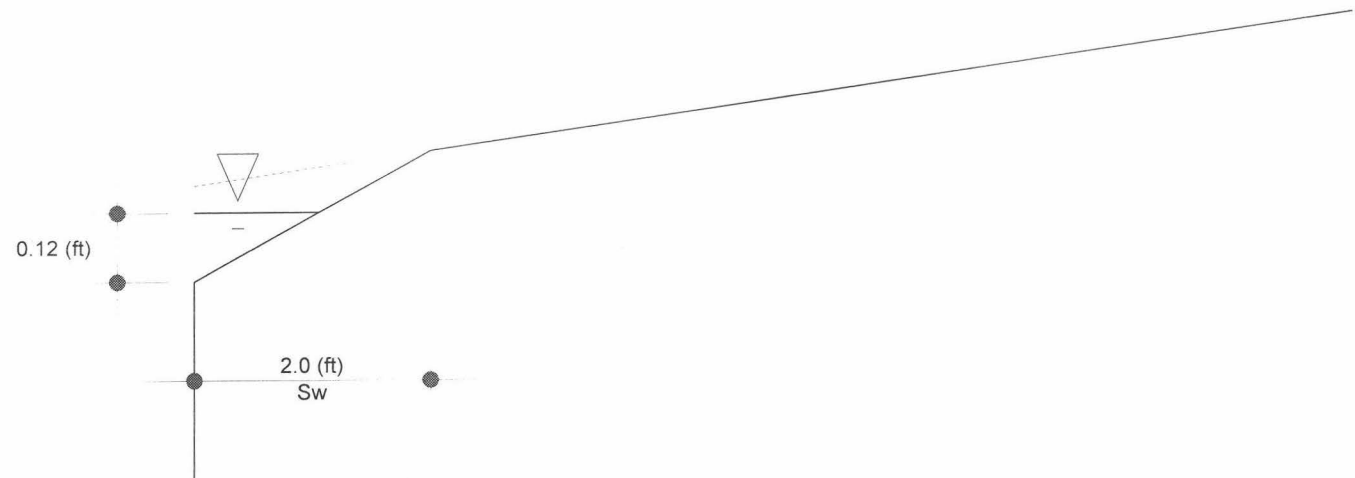
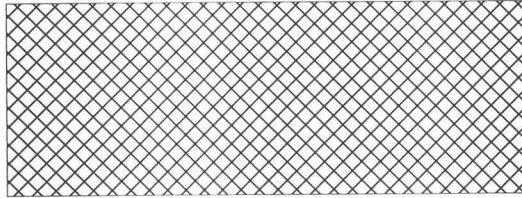
Inlet Section (Line 12 - Combination Inlet)

Inlet Flows

Q Catchment = 0.91 (cfs)
Q Carryover = 0.00
Q Total = 0.91
Q Captured = 0.91
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.06 (ft)



Inlet Section

A9

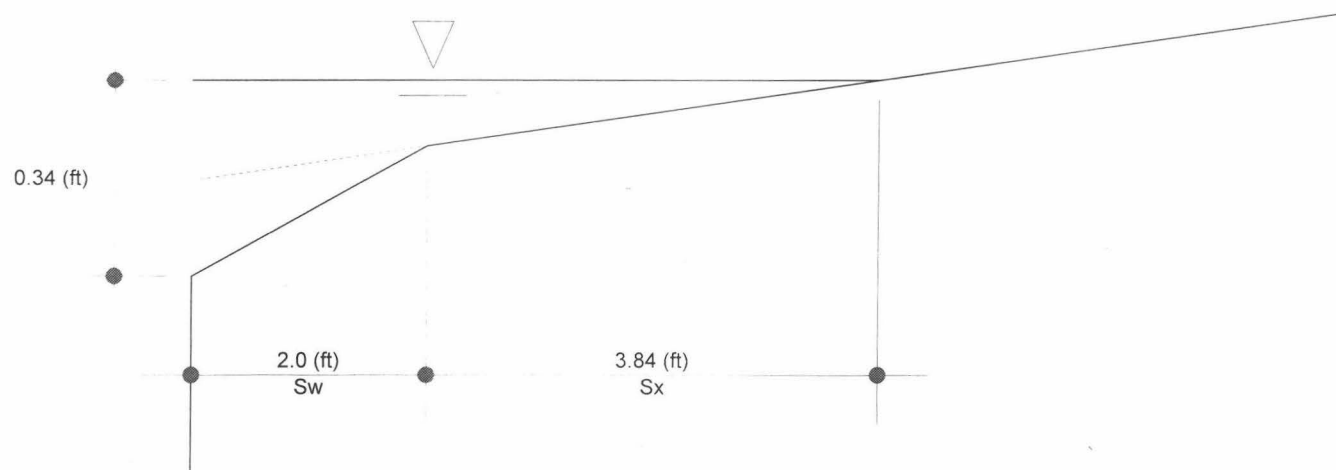
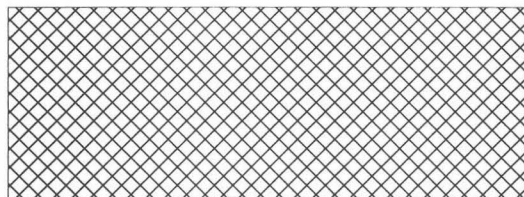
Inlet Section (Line 13 - Curb Inlet)

Inlet Flows

Q Catchment = 1.30 (cfs)
Q Carryover = 0.00
Q Total = 1.30
Q Captured = 1.30
Q Bypassed = 0.00

Gutter

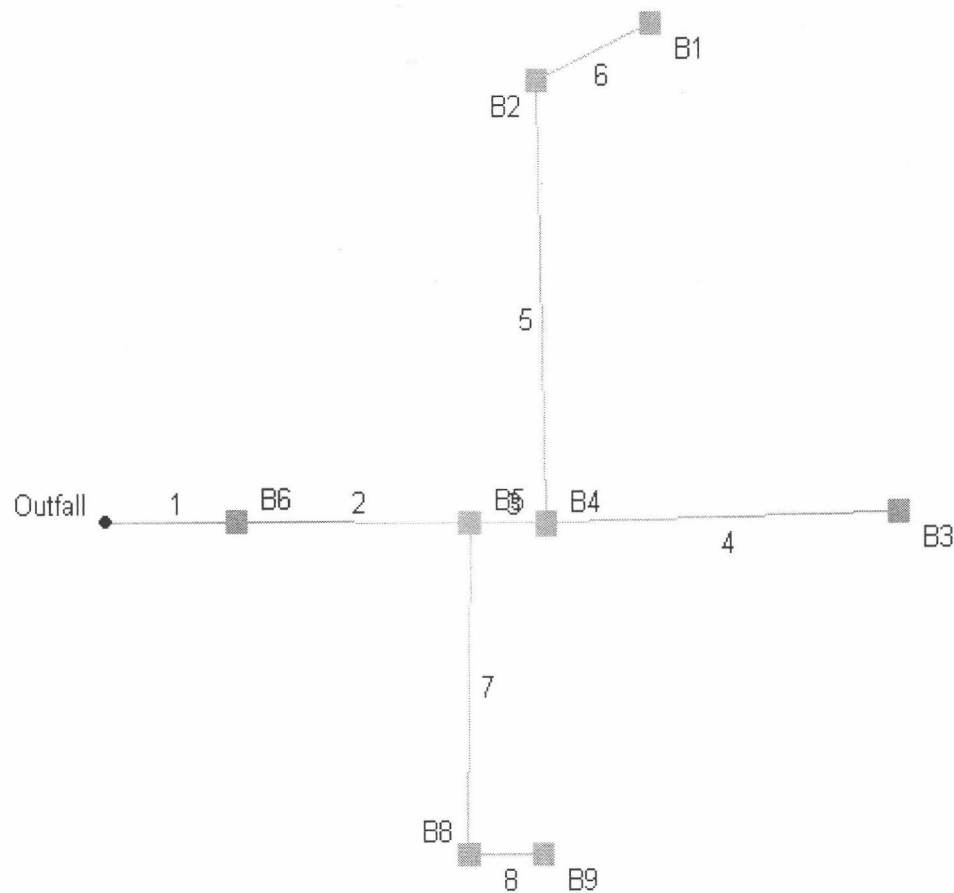
Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 5.84 (ft)



Inlet Section

A7

Hydraflow Plan View



TOWNES AT CARLTON POINTE
HGL LINE B
Q₁₀ 3' HGL
Q₁₀ GUTTER SPREAD

Storm Sewer Summary Report

Page 1

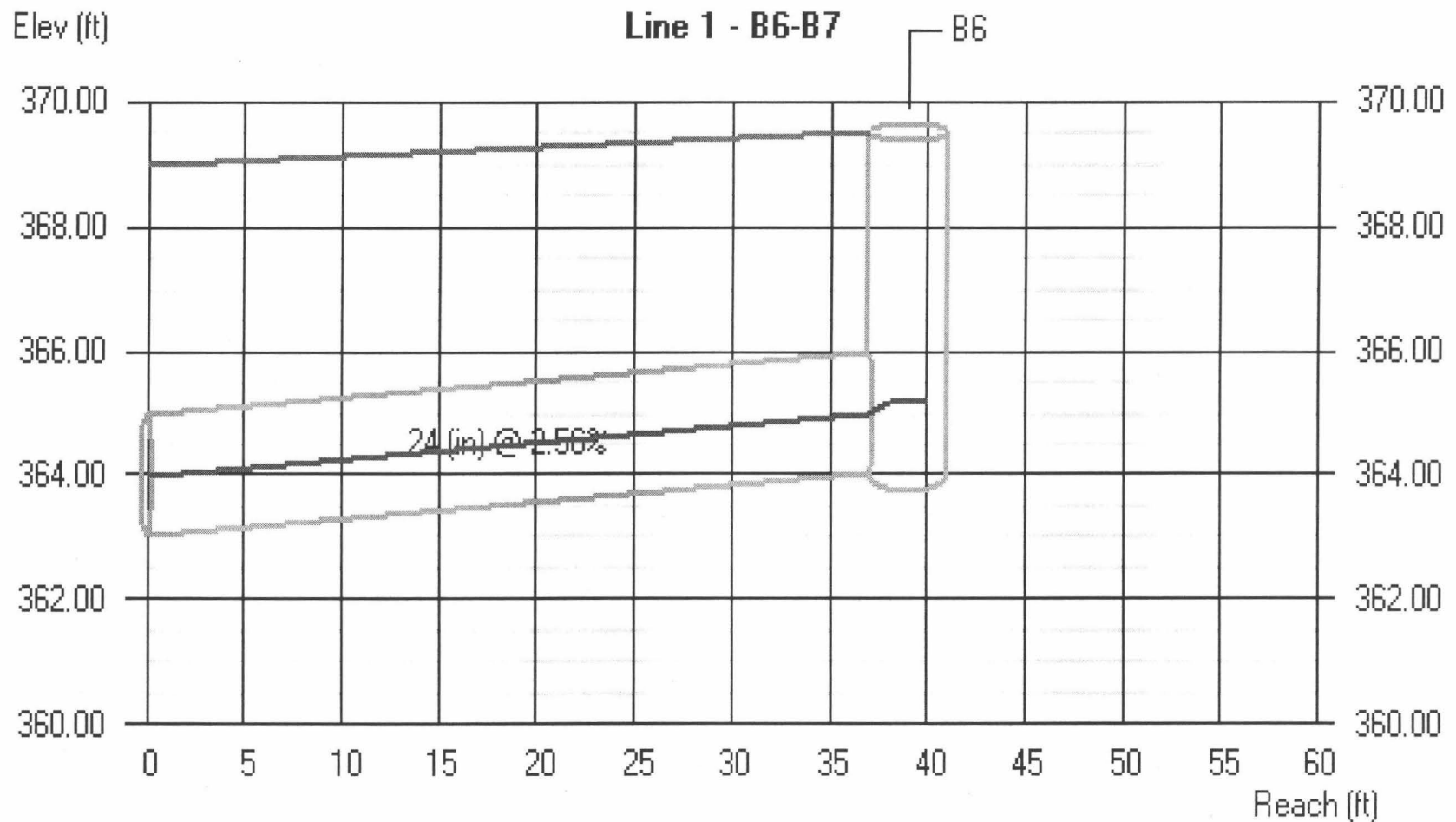
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	B6-B7	7.32	24 c	39.0	363.00	364.00	2.564	363.96	364.96	0.19	End 1 2 3 3 5 2 7
2	B5-B6	7.03	24 c	69.0	364.20	366.37	3.145	365.15	367.31	0.55	
3	B4-B5	4.16	18 c	23.0	366.57	366.80	1.000	367.86	367.85	0.23	
4	B3-B4	1.50	18 c	104.0	367.76	368.86	1.058	368.14	369.33	0.16	
5	B2- B4	1.97	18 c	119.0	367.76	368.36	0.504	368.29	368.90	0.23	
6	B1 - B2	1.23	15 c	37.0	368.56	369.13	1.541	369.13	369.57	0.15	
7	B8 - B5	2.37	15 c	89.0	367.33	368.18	0.955	367.86	368.80	0.36	
8	B9 - B8	1.43	15 c	22.0	368.38	368.60	1.000	369.16	369.12	0.13	
Project File: Joneville Road B stm.stm						Number of lines: 8			Run Date: 06-19-2019		
NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.											

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	39.0	0.08	1.30	0.80	0.06	1.14	5.0	8.0	6.4	7.32	36.22	4.92	24	2.56	364.00	363.00	364.96	363.96	369.50	0.00	B6-B7
2	1	69.0	0.12	1.22	0.90	0.11	1.07	5.0	7.5	6.6	7.03	40.11	4.83	24	3.14	366.37	364.20	367.31	365.15	370.50	369.50	B5-B6
3	2	23.0	0.16	0.73	0.90	0.14	0.63	5.0	7.4	6.6	4.16	10.50	2.86	18	1.00	366.80	366.57	367.85	367.86	370.50	370.50	B4-B5
4	3	104.0	0.26	0.26	0.80	0.21	0.21	5.0	5.0	7.2	1.50	10.80	3.73	18	1.06	368.86	367.76	369.33	368.14	373.50	370.50	B3-B4
5	3	119.0	0.12	0.31	0.90	0.11	0.28	5.0	5.6	7.0	1.97	7.46	3.49	18	0.50	368.36	367.76	368.90	368.29	373.47	370.50	B2- B4
6	5	37.0	0.19	0.19	0.90	0.17	0.17	5.0	5.0	7.2	1.23	8.01	2.71	15	1.54	369.13	368.56	369.57	369.13	373.81	373.47	B1 - B2
7	2	89.0	0.15	0.37	0.90	0.14	0.33	5.0	5.3	7.1	2.37	6.31	4.34	15	0.96	368.18	367.33	368.80	367.86	372.80	370.50	B8 - B5
8	7	22.0	0.22	0.22	0.90	0.20	0.20	5.0	5.0	7.2	1.43	6.46	2.35	15	1.00	368.60	368.38	369.12	369.16	372.70	372.80	B9 - B8
Project File: Joneville Road B stm.stm																Number of lines: 8				Run Date: 06-19-2019		
NOTES: Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period = 10 Yrs.																						

Storm Sewer Profile

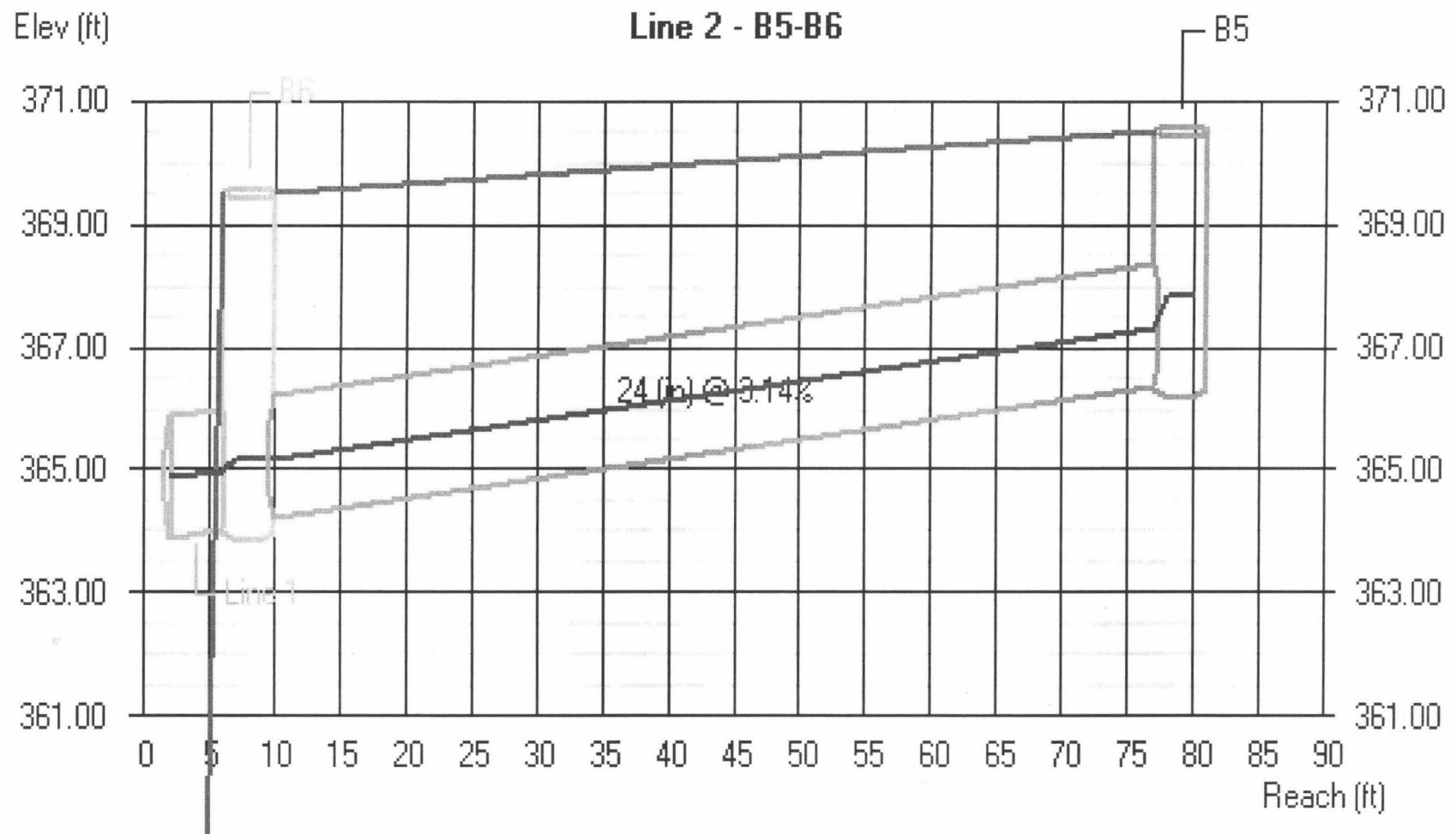
Proj. file: Joneville Road B stm.stm



Q10

Storm Sewer Profile

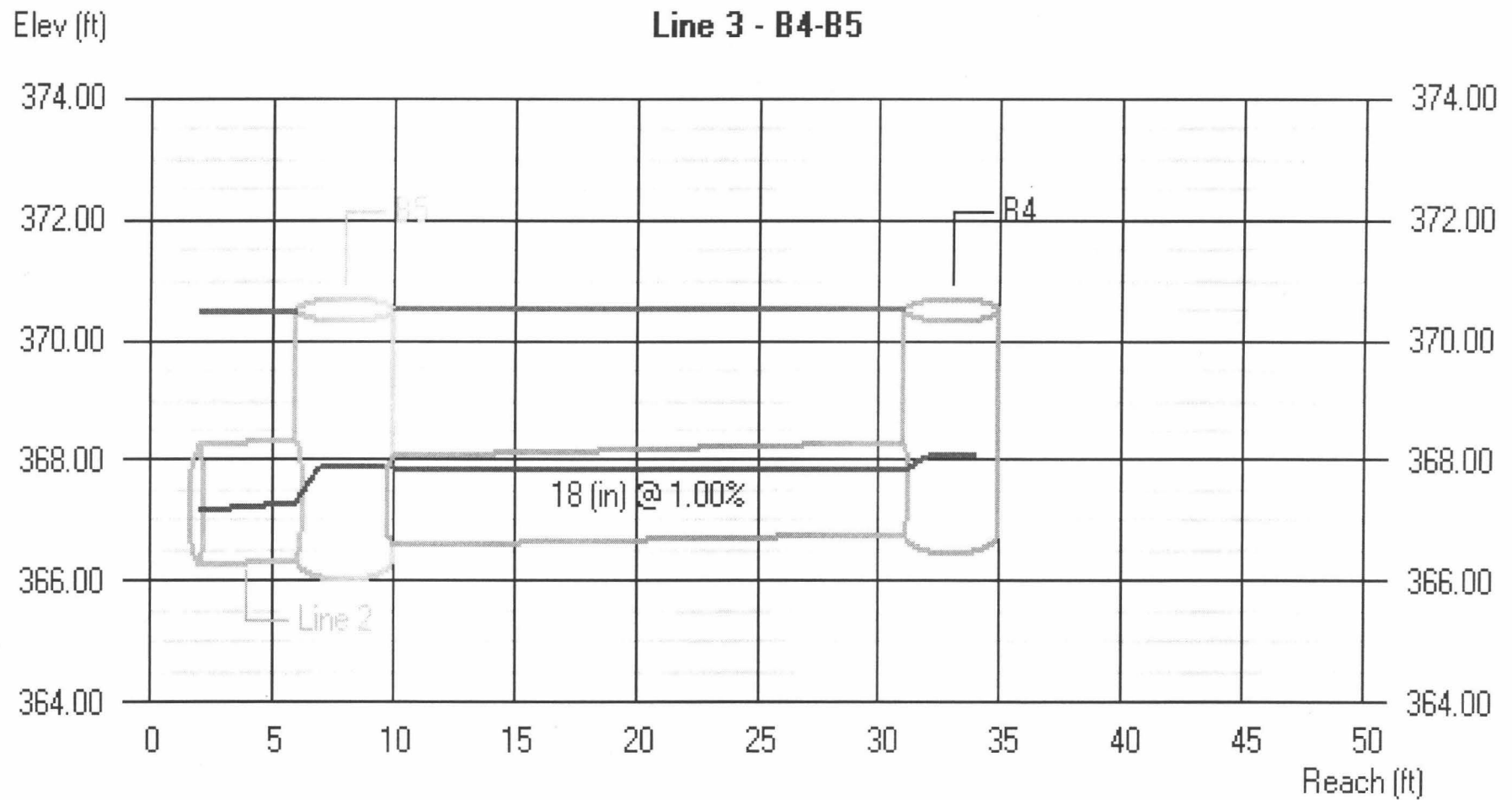
Proj. file: Joneville Road B stm.stm



Q10

Storm Sewer Profile

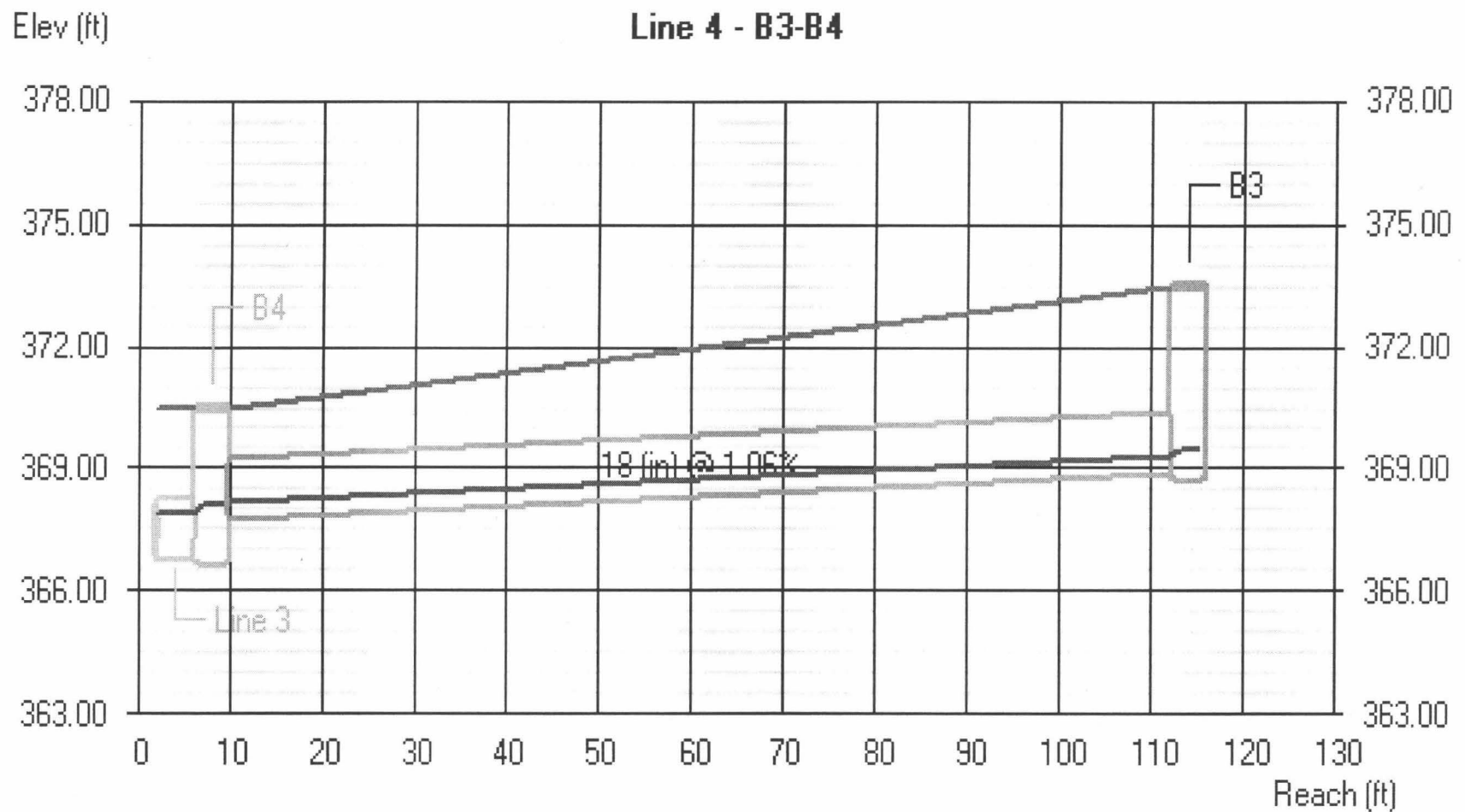
Proj. file: Joneville Road B stm.stm



Q10

Storm Sewer Profile

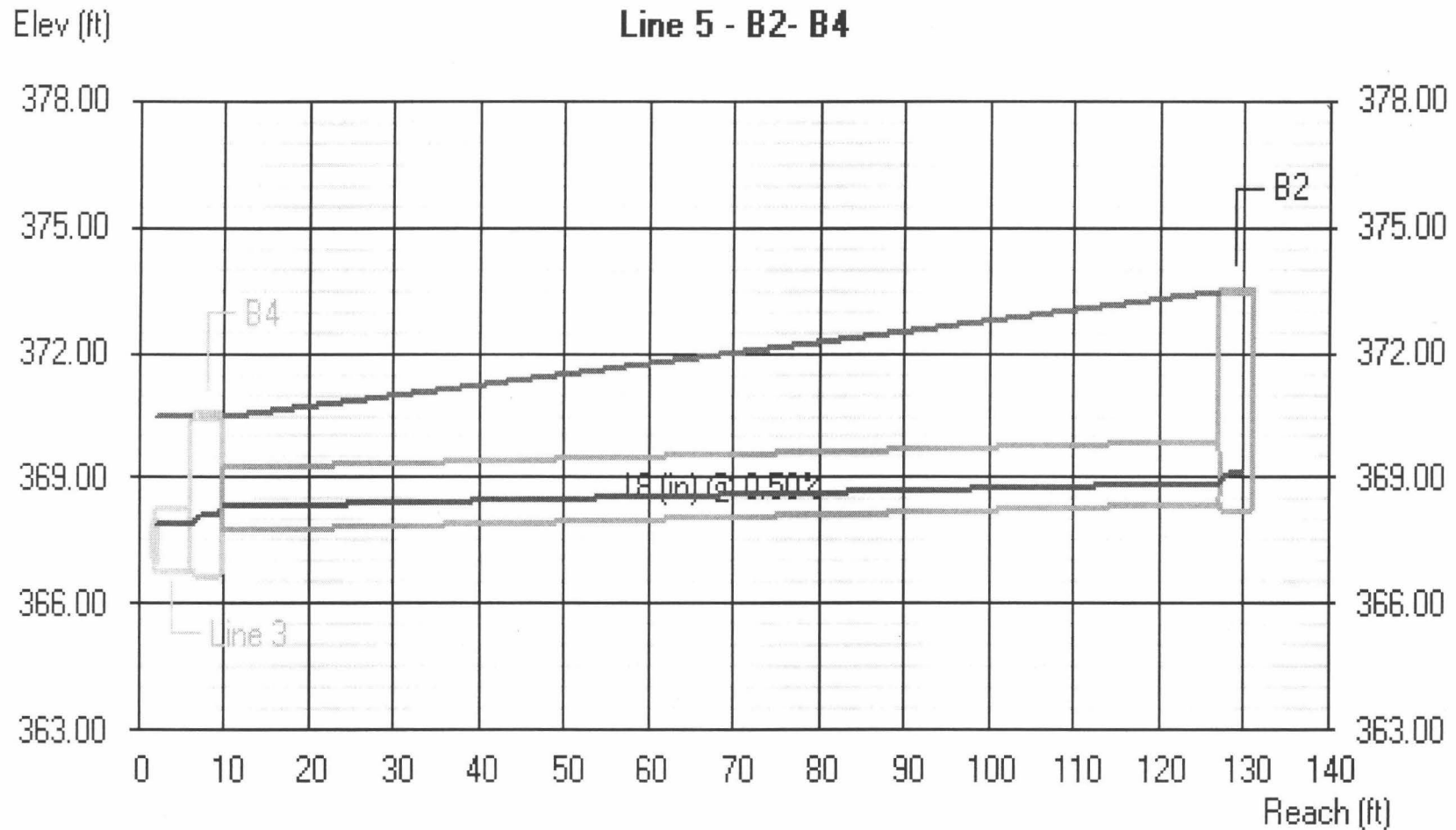
Proj. file: Joneville Road B stm.stm



Q.10

Storm Sewer Profile

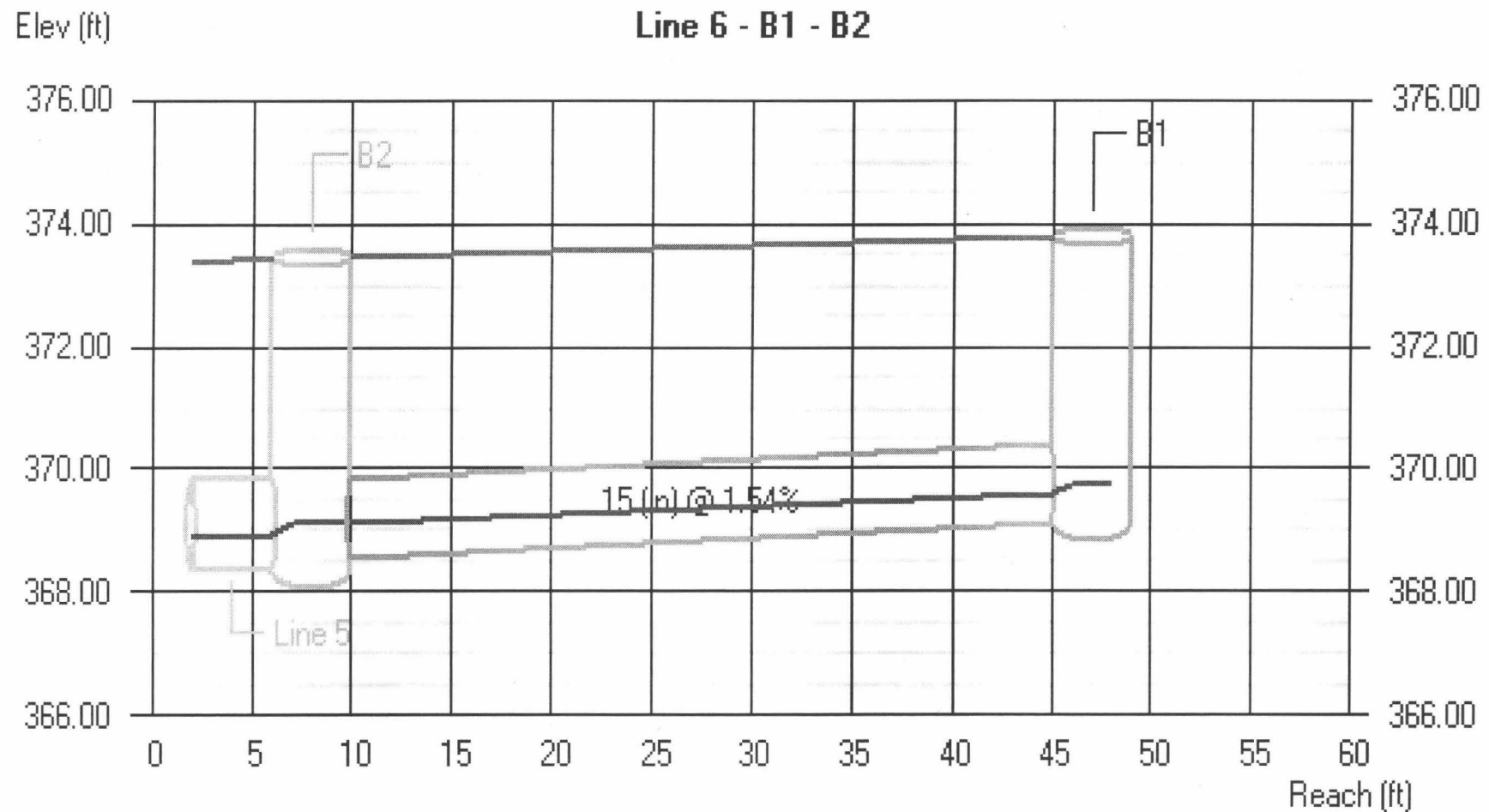
Proj. file: Joneville Road B stm.stm



Q10

Storm Sewer Profile

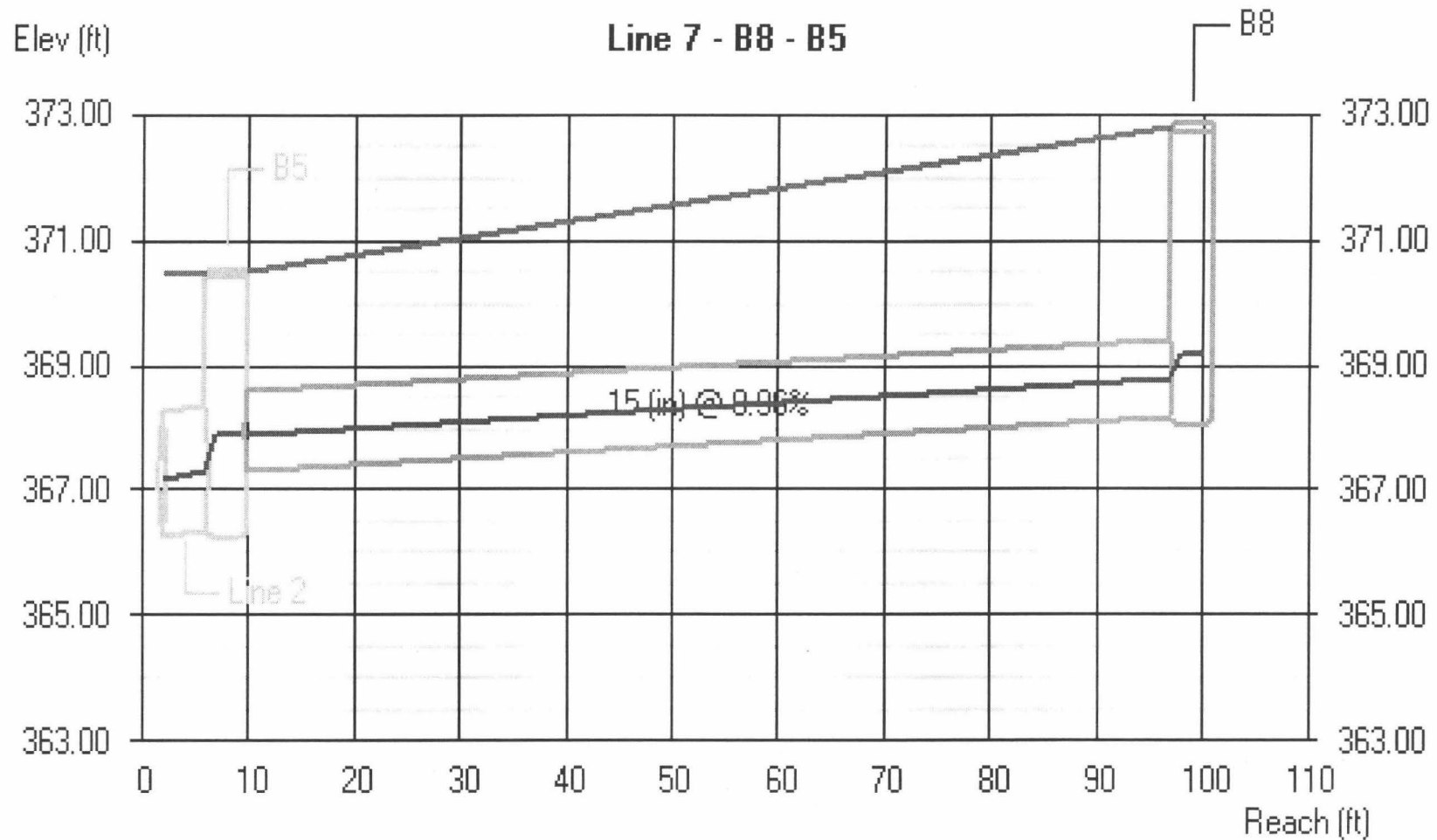
Proj. file: Joneville Road B stm.stm



Q10

Storm Sewer Profile

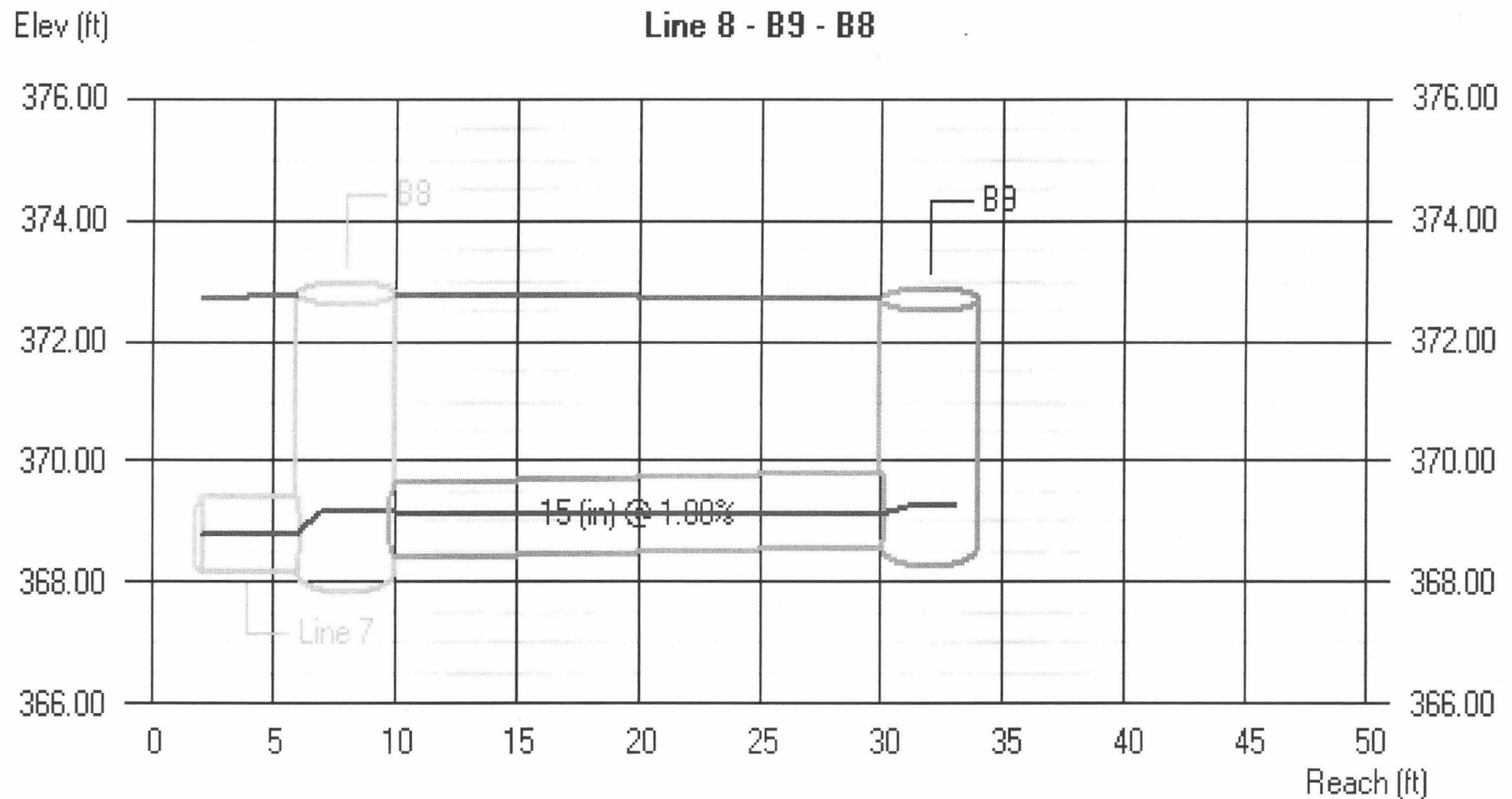
Proj. file: Joneville Road B stm.stm



P10

Storm Sewer Profile

Proj. file: Joneville Road B stm.stm



QID

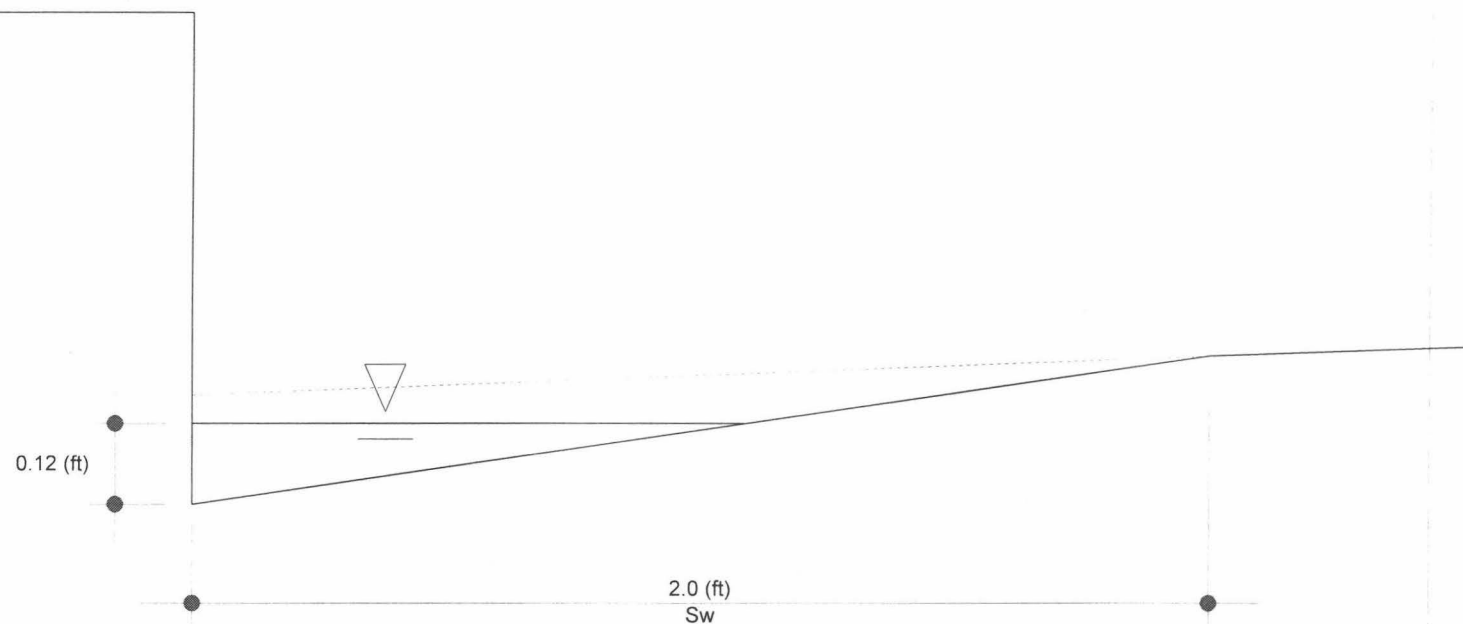
Inlet Section (Line 3 - Grate Inlet)

Inlet Flows

Q Catchment = 1.04 (cfs)
Q Carryover = 0.00
Q Total = 1.04
Q Captured = 1.04
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.09 (ft)



Inlet Section

B4

Q10

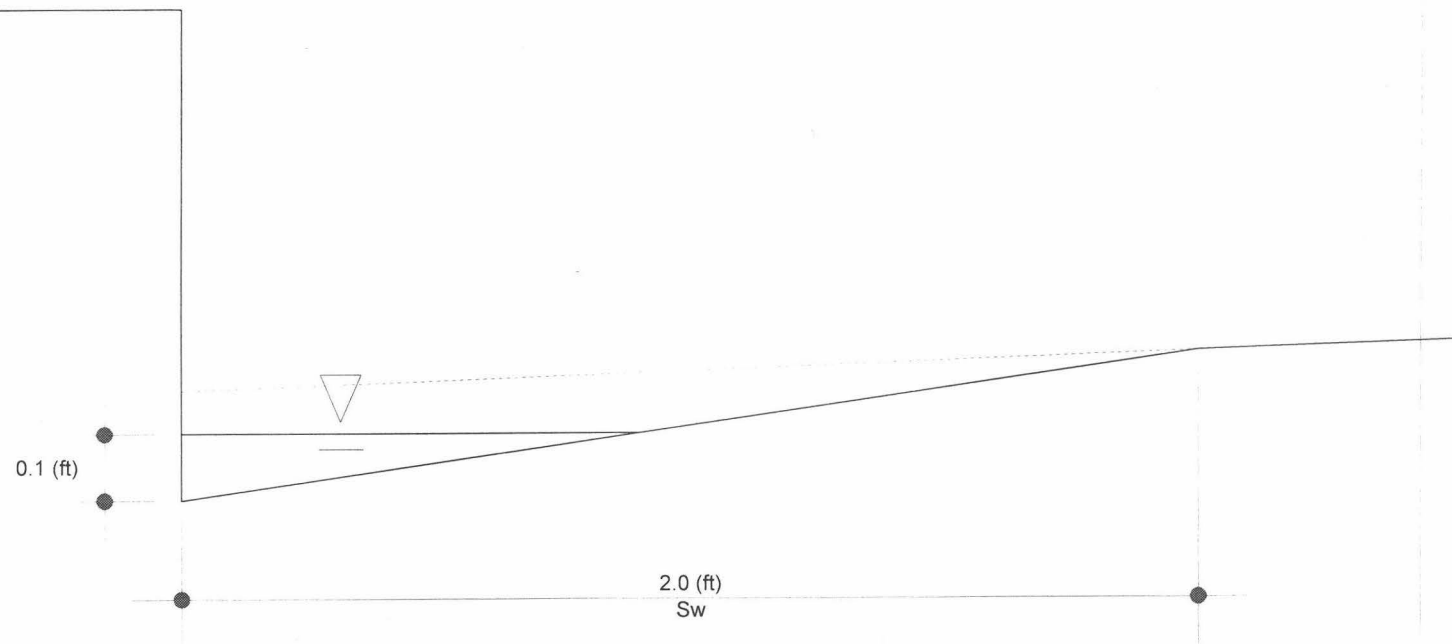
Inlet Section (Line 5 - Grate Inlet)

Inlet Flows

Q Catchment = 0.78 (cfs)
Q Carryover = 0.00
Q Total = 0.78
Q Captured = 0.78
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 0.90 (ft)



Inlet Section

B2

Q10

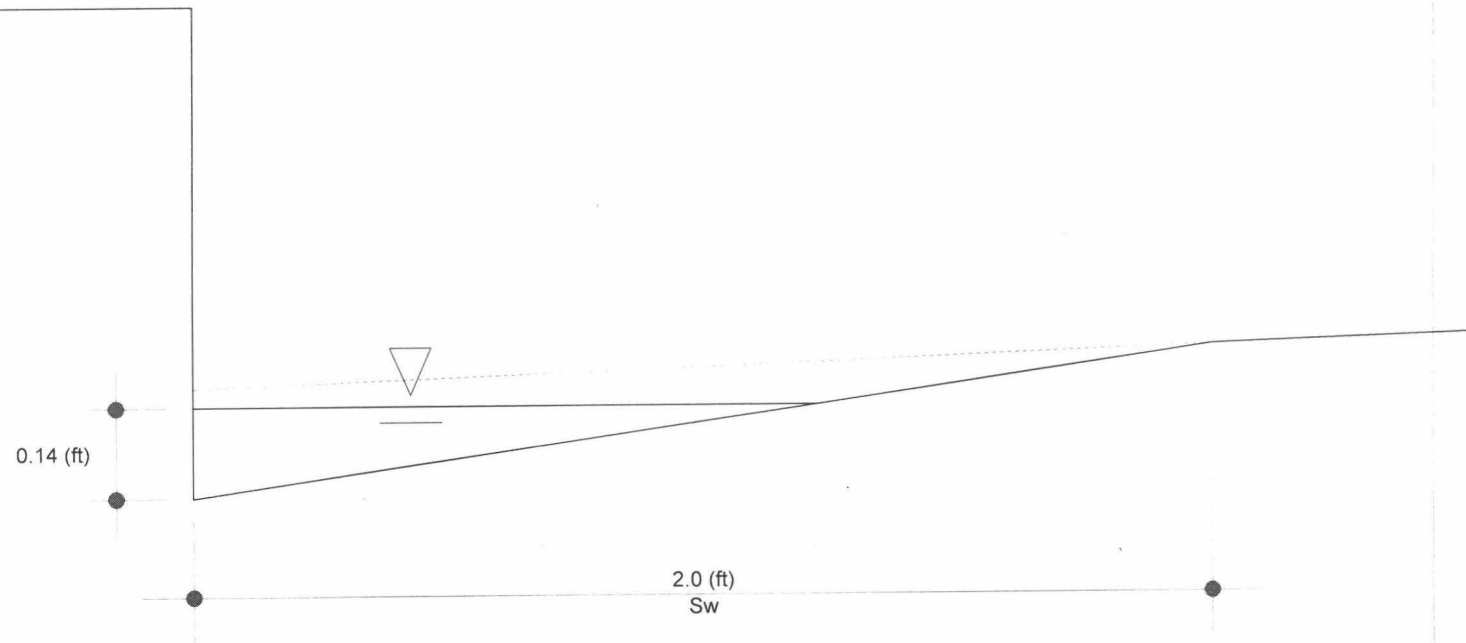
Inlet Section (Line 6 - Grate Inlet)

Inlet Flows

Q Catchment = 1.23 (cfs)
Q Carryover = 0.00
Q Total = 1.23
Q Captured = 1.23
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.22 (ft)



Inlet Section

B1

Q10

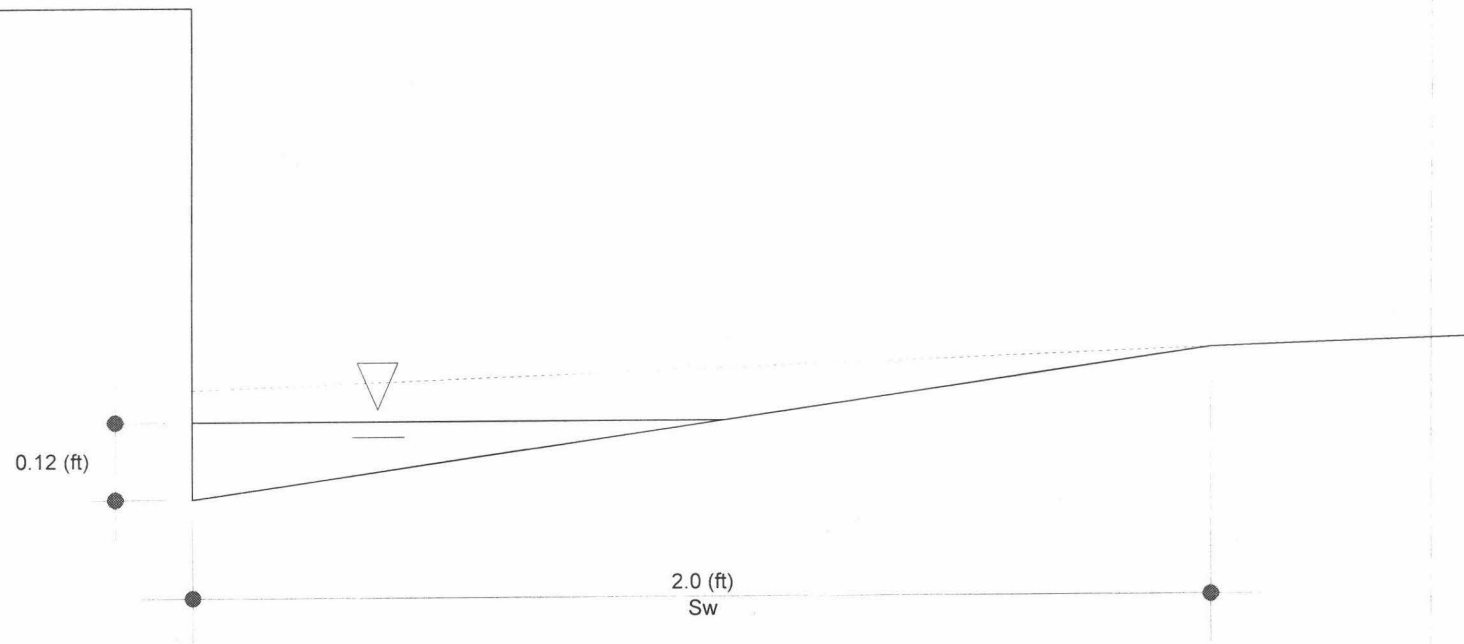
Inlet Section (Line 7 - Grate Inlet)

Inlet Flows

Q Catchment = 0.97 (cfs)
Q Carryover = 0.00
Q Total = 0.97
Q Captured = 0.97
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.04 (ft)



Inlet Section

B8

Q10

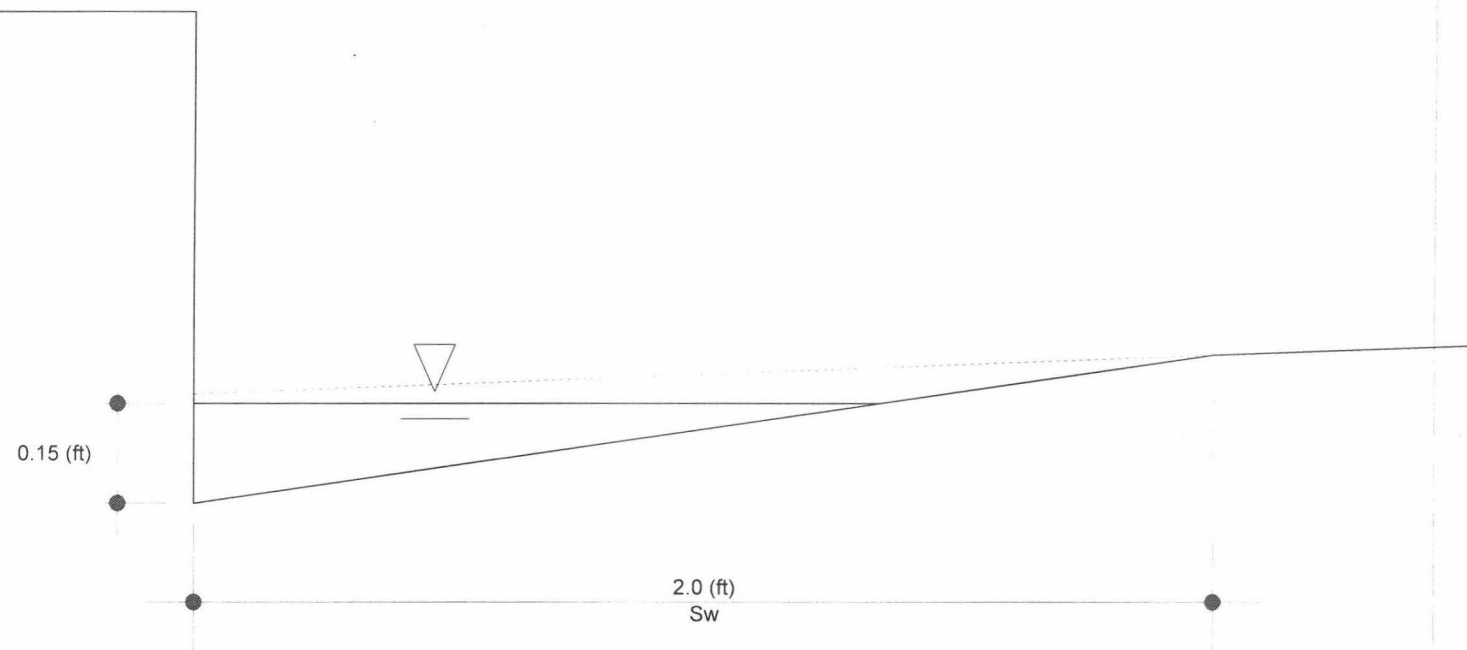
Inlet Section (Line 8 - Grate Inlet)

Inlet Flows

Q Catchment = 1.43 (cfs)
Q Carryover = 0.00
Q Total = 1.43
Q Captured = 1.43
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 1.34 (ft)

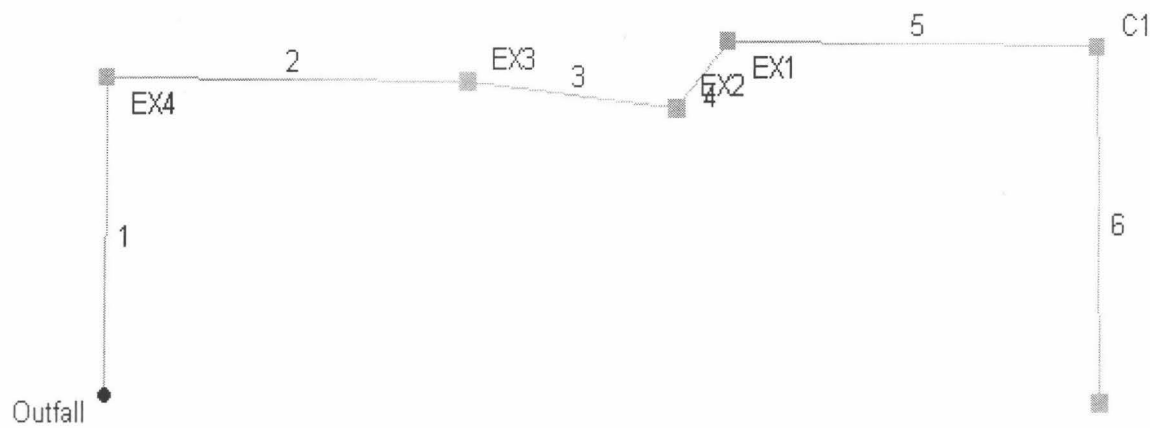


Inlet Section

B9

Q10

Hydraflow Plan View



TOWNES AT CARLTON POINTE
VINEYARD LANE
GIS HAS 1/2 GUTTER SPREAD

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	116.0	-89.8	Curb	0.00	0.20	0.90	5.0	362.36	4.19	367.22	42	Cir	0.013	1.50	374.47	EX4-EX5
2	1	146.0	90.5	Curb	0.00	0.20	0.90	5.0	367.22	0.29	367.64	42	Cir	0.013	0.50	372.81	EX3-EX4
3	2	85.0	5.9	Curb	0.00	0.20	0.90	5.0	367.64	0.81	368.33	42	Cir	0.013	1.25	373.33	EX2-EX3
4	3	32.0	-56.2	Curb	0.00	0.20	0.90	5.0	368.33	2.00	368.97	42	Cir	0.013	1.10	373.72	EX1-EX2
5	4	149.0	50.4	DrGrt	0.00	1.00	0.60	5.0	368.97	1.09	370.60	42	Cir	0.013	1.50	377.80	C1-EX1
6	5	130.0	88.4	DrGrt	0.00	1.00	0.60	5.0	370.80	1.00	372.10	24	Cir	0.013	1.00	377.80	C1-C2
Project File: jonesville rd EXIST line.stm												Number of lines: 6				Date: 09-16-2019	

Storm Sewer Summary Report

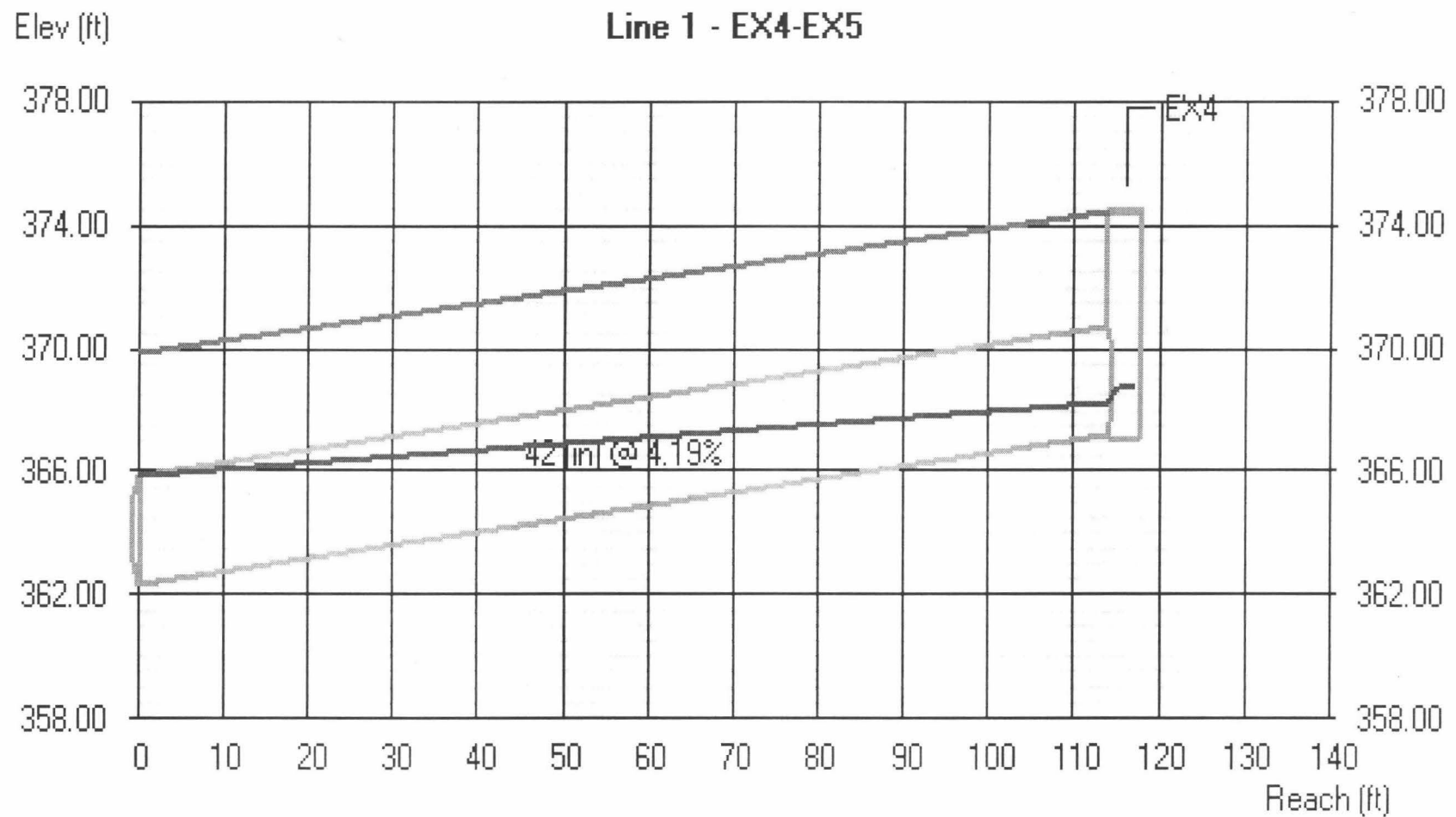
Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	EX4-EX5	10.45	42 c	116.0	362.36	367.22	4.190	365.86	368.21	0.51	End 1 2 3 4 5
2	EX3-EX4	10.07	42 c	146.0	367.22	367.64	0.288	368.72	368.80	0.10	
3	EX2-EX3	9.41	42 c	85.0	367.64	368.33	0.812	368.90	369.27	0.40	
4	EX1-EX2	8.48	42 c	32.0	368.33	368.97	2.000	369.67	369.86	0.33	
5	C1-EX1	8.15	42 c	149.0	368.97	370.60	1.094	370.19	371.47	0.44	
6	C1-C2	4.33	24 c	130.0	370.80	372.10	1.000	371.91	372.84	0.26	
Project File: jonesville rd EXIST line.stm						Number of lines: 6			Run Date: 09-16-2019		
NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.											

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	116.0	0.20	2.80	0.90	0.18	1.92	5.0	13.3	5.4	10.45	205.9	2.88	42	4.19	367.22	362.36	368.21	365.86	374.47	0.00	EX4-EX5
2	1	146.0	0.20	2.60	0.90	0.18	1.74	5.0	11.3	5.8	10.07	53.96	3.09	42	0.29	367.64	367.22	368.80	368.72	372.81	374.47	EX3-EX4
3	2	85.0	0.20	2.40	0.90	0.18	1.56	5.0	10.0	6.0	9.41	90.64	3.77	42	0.81	368.33	367.64	369.27	368.90	373.33	372.81	EX2-EX3
4	3	32.0	0.20	2.20	0.90	0.18	1.38	5.0	9.4	6.1	8.48	142.3	3.45	42	2.00	368.97	368.33	369.86	369.67	373.72	373.33	EX1-EX2
5	4	149.0	1.00	2.00	0.60	0.60	1.20	5.0	6.6	6.8	8.15	105.2	3.53	42	1.09	370.60	368.97	371.47	370.19	377.80	373.72	C1-EX1
6	5	130.0	1.00	1.00	0.60	0.60	0.60	5.0	5.0	7.2	4.33	22.62	3.27	24	1.00	372.10	370.80	372.84	371.91	377.80	377.80	C1-C2
Project File: jonesville rd EXIST line.stm																Number of lines: 6			Run Date: 09-16-2019			
NOTES: Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period = 10 Yrs.																						

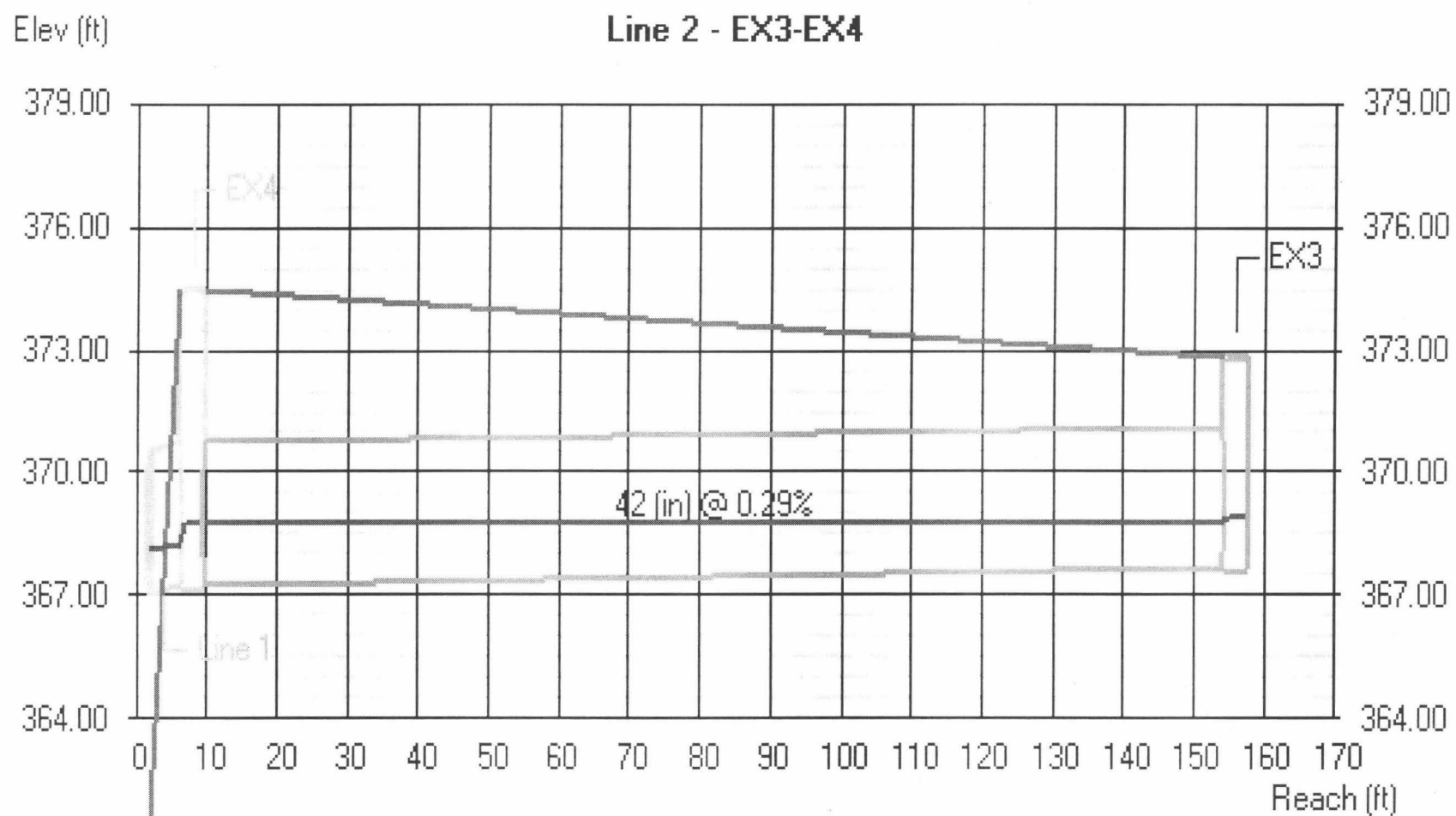
Storm Sewer Profile

Proj. file: jonesville rd EXIST line.stm



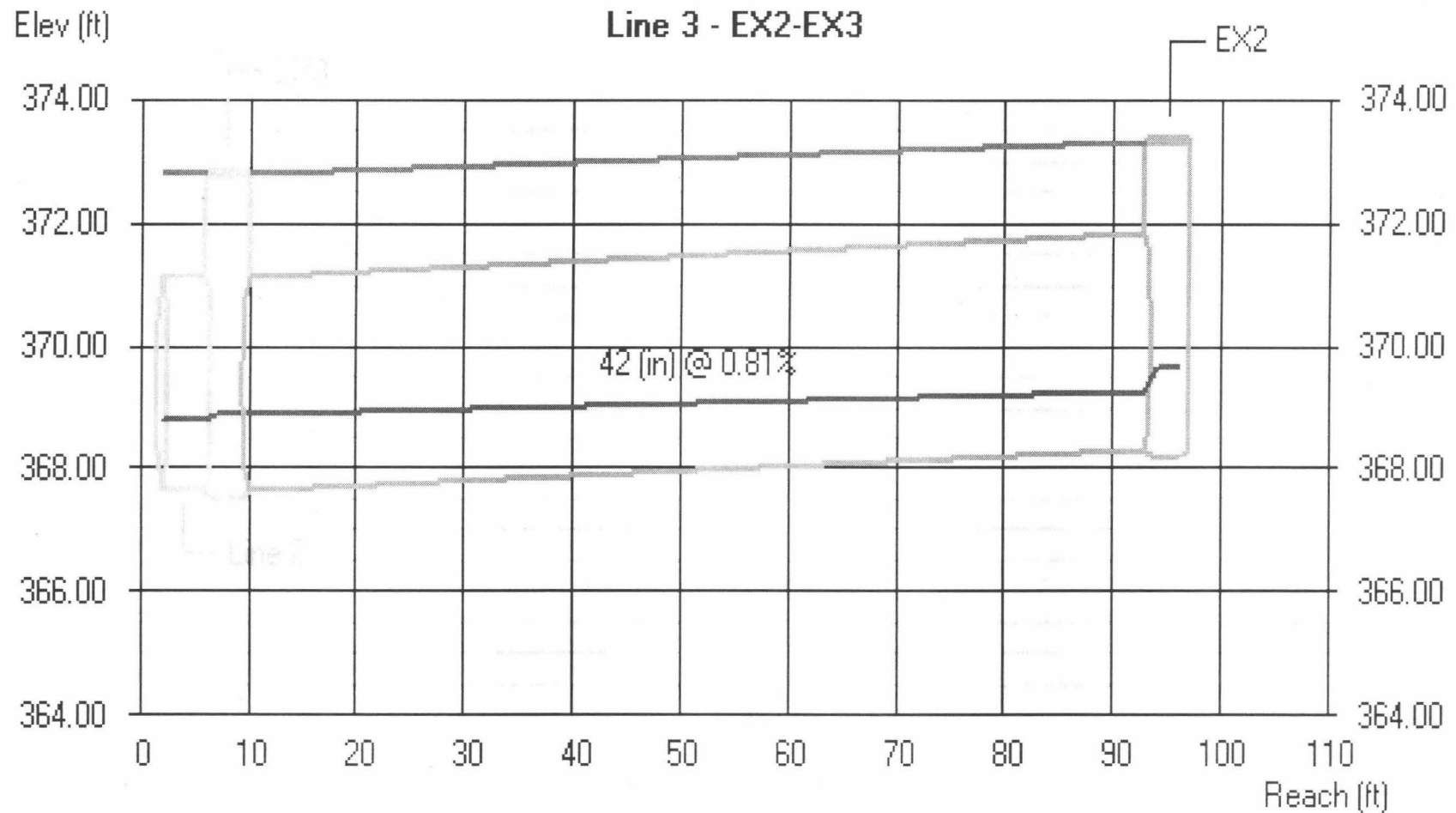
Storm Sewer Profile

Proj. file: jonesville rd EXIST line.stm



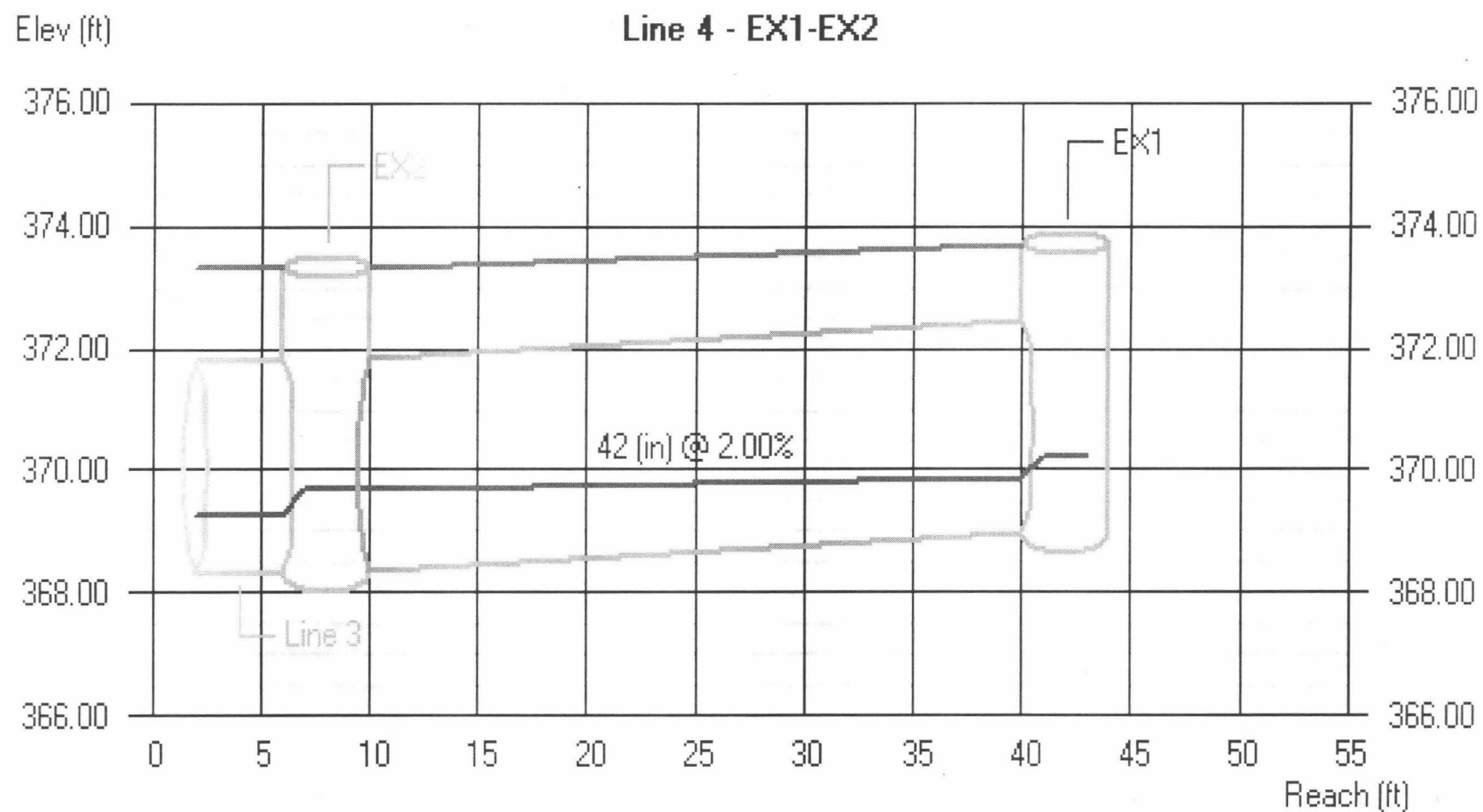
Storm Sewer Profile

Proj. file: jonesville rd EXIST line.stm



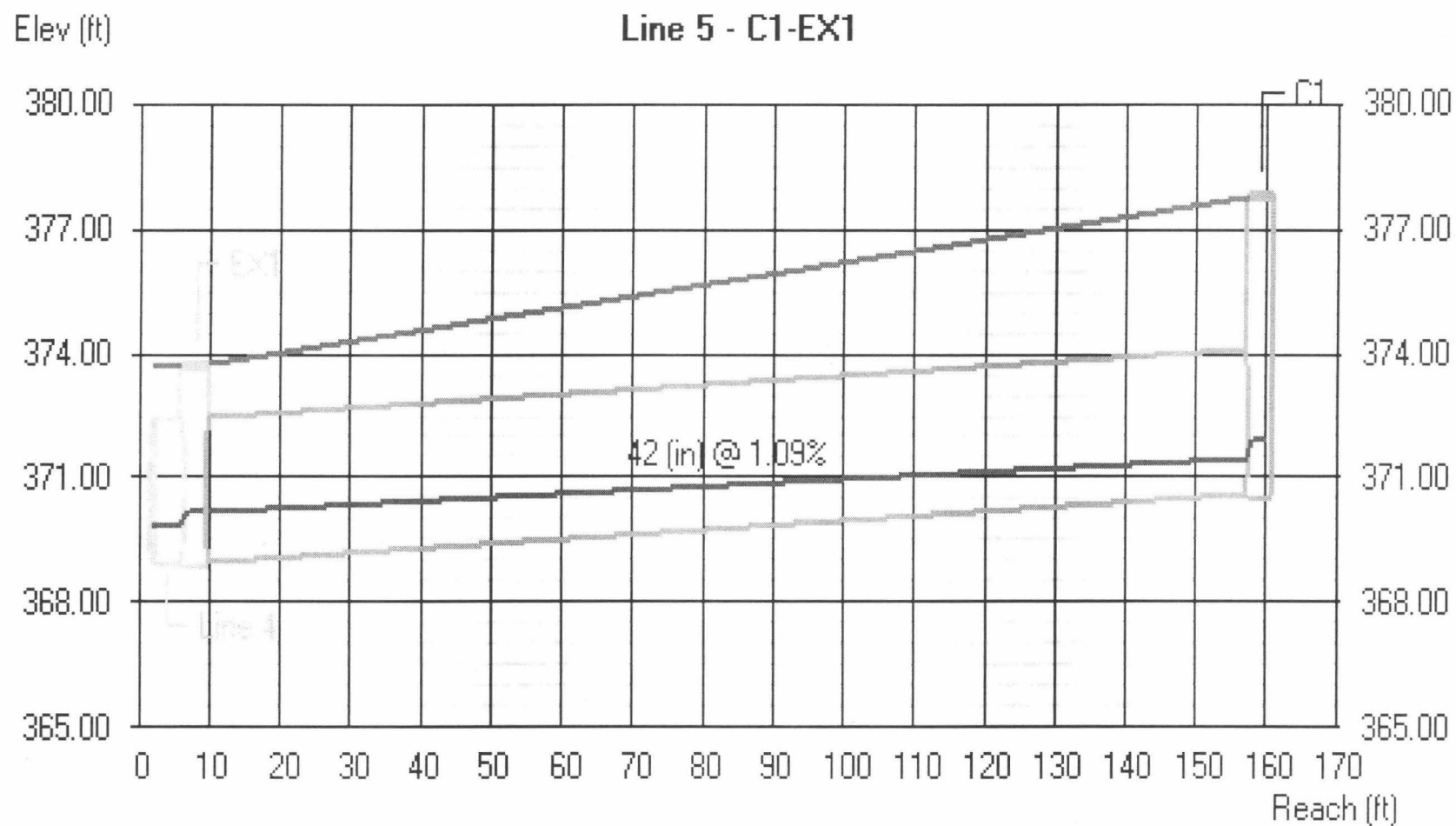
Storm Sewer Profile

Proj. file: jonesville rd EXIST line.stm



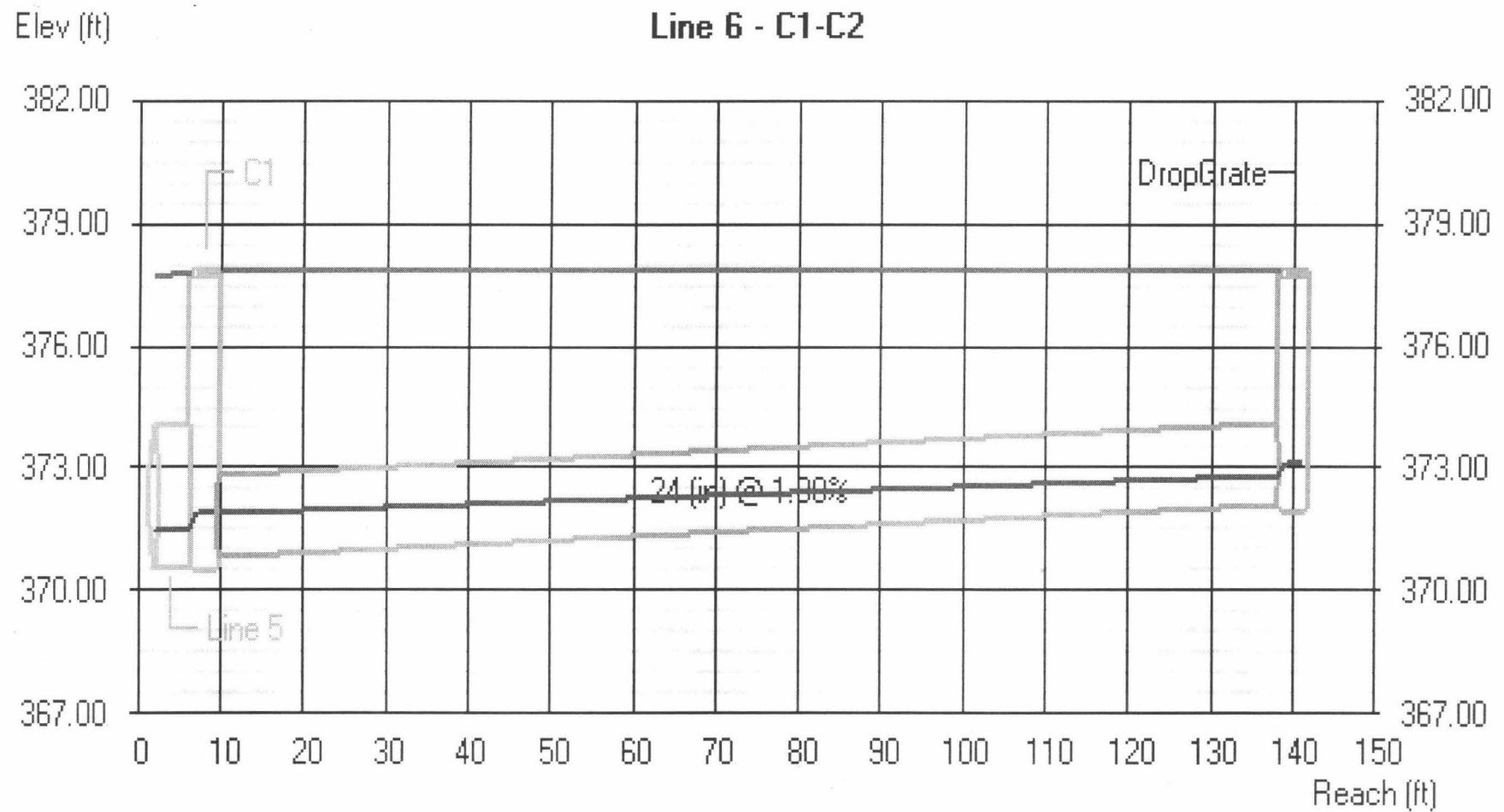
Storm Sewer Profile

Proj. file: jonesville rd EXIST line.stm



Storm Sewer Profile

Proj. file: jonesville rd EXIST line.stm



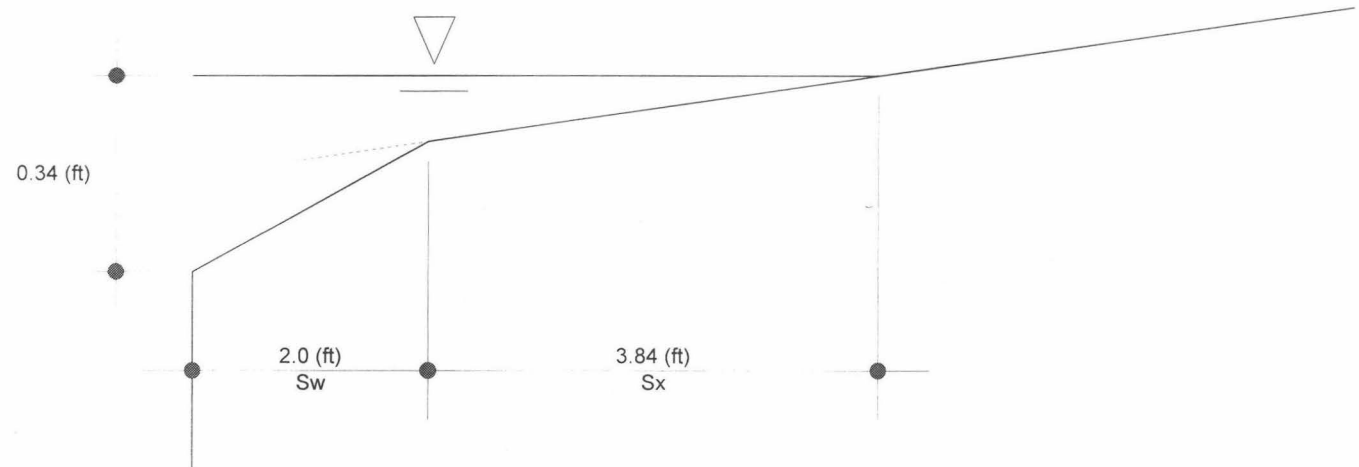
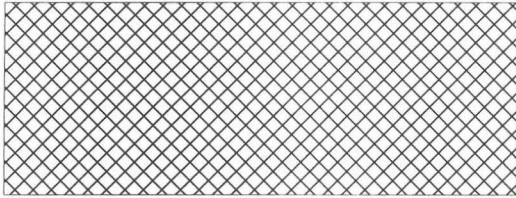
Inlet Section (Line 1 - Curb Inlet)

Inlet Flows

Q Catchment = 1.30 (cfs)
Q Carryover = 0.00
Q Total = 1.30
Q Captured = 1.30
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 5.84 (ft)



Inlet Section

EX4

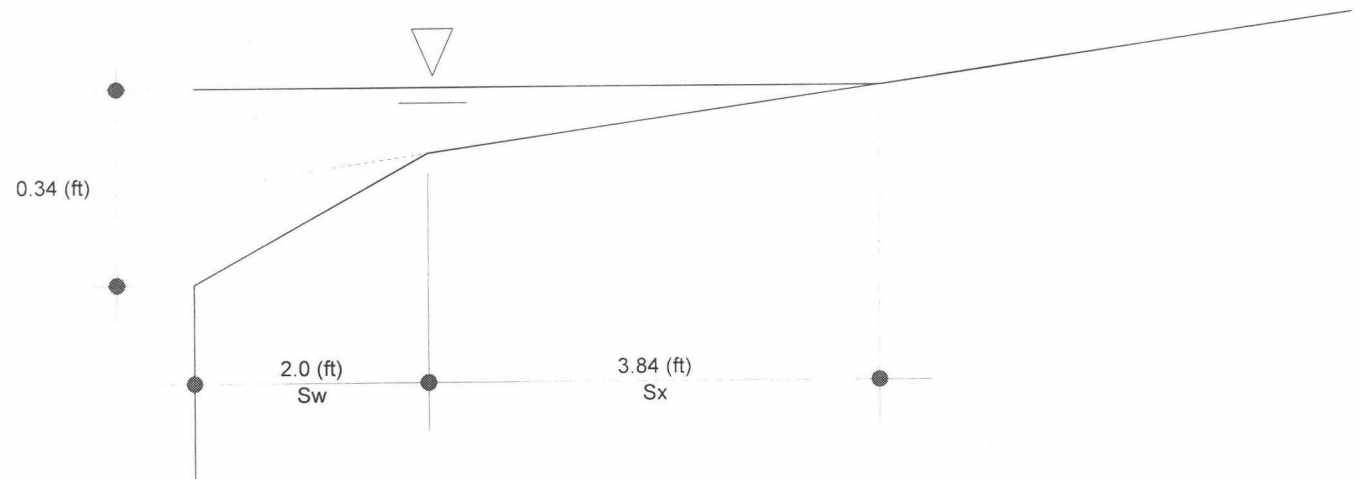
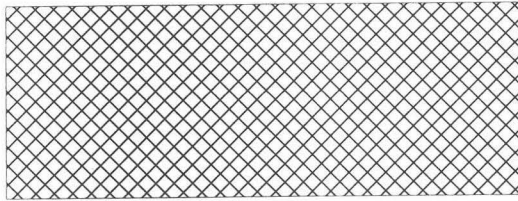
Inlet Section (Line 2 - Curb Inlet)

Inlet Flows

Q Catchment = 1.30 (cfs)
Q Carryover = 0.00
Q Total = 1.30
Q Captured = 1.30
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 5.84 (ft)



Inlet Section

EX3

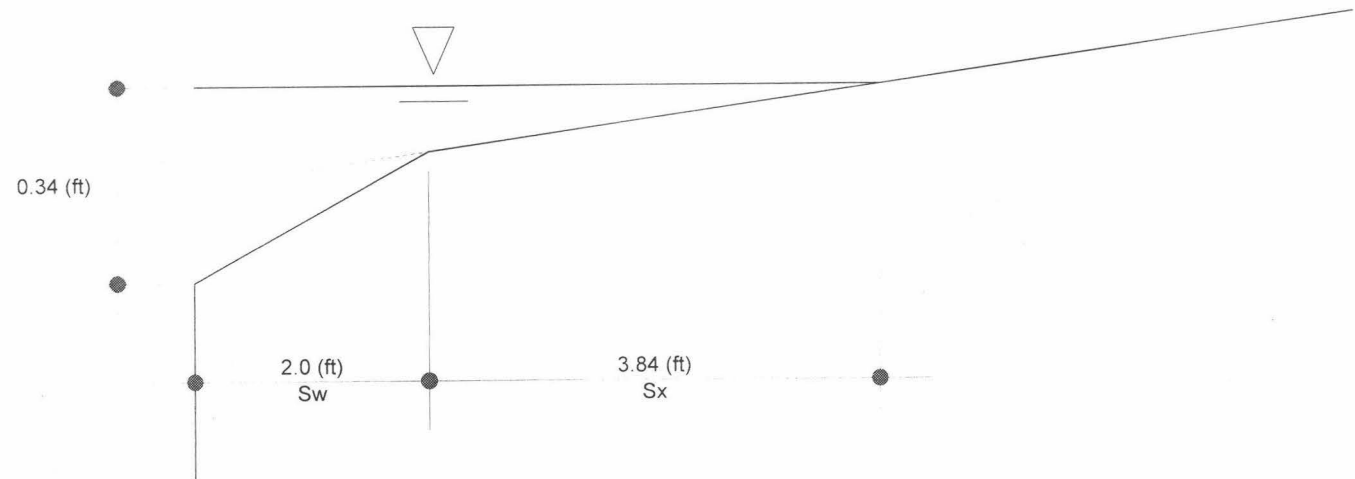
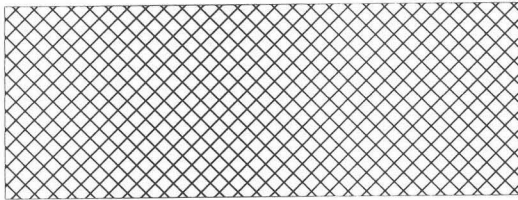
Inlet Section (Line 3 - Curb Inlet)

Inlet Flows

Q Catchment = 1.30 (cfs)
Q Carryover = 0.00
Q Total = 1.30
Q Captured = 1.30
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 5.84 (ft)



Inlet Section

EX2

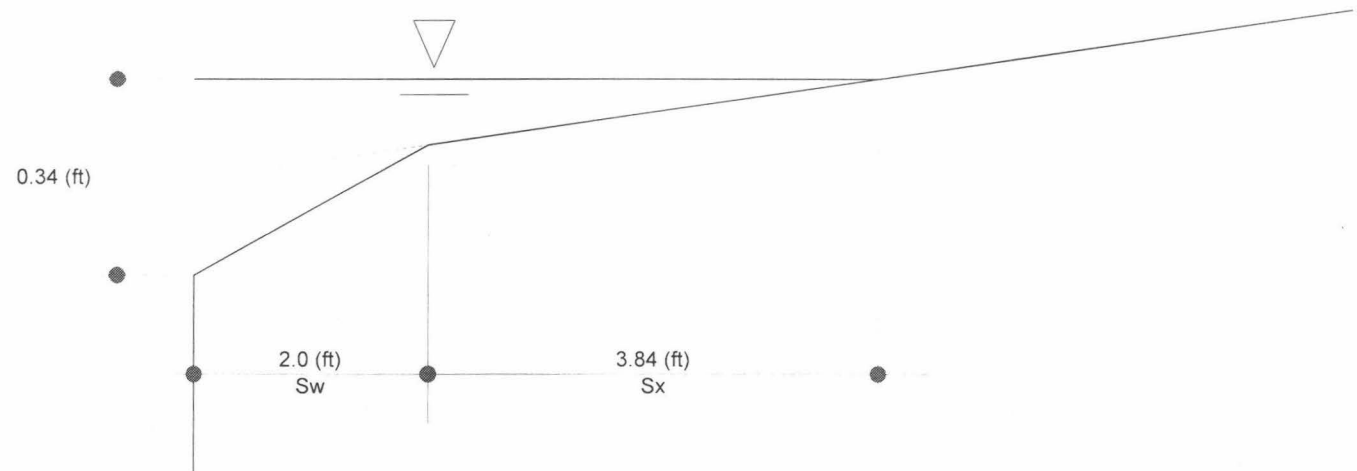
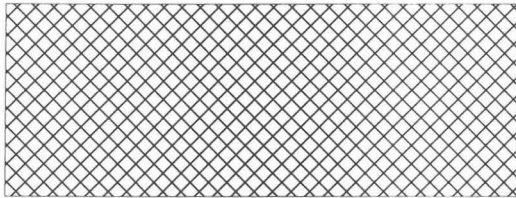
Inlet Section (Line 4 - Curb Inlet)

Inlet Flows

Q Catchment = 1.30 (cfs)
Q Carryover = 0.00
Q Total = 1.30
Q Captured = 1.30
Q Bypassed = 0.00

Gutter

Gutter Width = 2.00 (ft)
Gutter Slope = Sag
Cross Slope, Sw = 0.100 (ft/ft)
Cross Slope, Sx = 0.030 (ft/ft)
Loc. Depression = 2.00 (in)
Spread width, T = 5.84 (ft)



Inlet Section

EX1



caaENGINEERS, Inc.
McIntyre, Gettle, Crowley
PROFESSIONAL ENGINEERS
1233 Heritage Lake Drive, Wake Forest, North Carolina 27587
4928 Windy Hill Drive, Raleigh, North Carolina 27609
(919) 255-5155
© caaENGINEERS, Inc. All Rights Reserved

NO.	DATE	REVISION / DESCRIPTION
1	2/24/20	Comment
2	2/24/20	Comment
3	2/24/20	Comment
4	2/24/20	Comment
5	2/24/20	Comment
6	2/24/20	Comment
7	2/24/20	Comment
8	2/24/20	Comment
9	2/24/20	Comment
10	2/24/20	Comment
11	2/24/20	Comment
12	2/24/20	Comment
13	2/24/20	Comment
14	2/24/20	Comment
15	2/24/20	Comment
16	2/24/20	Comment
17	2/24/20	Comment
18	2/24/20	Comment
19	2/24/20	Comment
20	2/24/20	Comment
21	2/24/20	Comment
22	2/24/20	Comment
23	2/24/20	Comment
24	2/24/20	Comment
25	2/24/20	Comment
26	2/24/20	Comment
27	2/24/20	Comment
28	2/24/20	Comment
29	2/24/20	Comment
30	2/24/20	Comment
31	2/24/20	Comment
32	2/24/20	Comment
33	2/24/20	Comment
34	2/24/20	Comment
35	2/24/20	Comment
36	2/24/20	Comment
37	2/24/20	Comment
38	2/24/20	Comment
39	2/24/20	Comment
40	2/24/20	Comment
41	2/24/20	Comment
42	2/24/20	Comment
43	2/24/20	Comment
44	2/24/20	Comment
45	2/24/20	Comment
46	2/24/20	Comment
47	2/24/20	Comment
48	2/24/20	Comment
49	2/24/20	Comment
50	2/24/20	Comment
51	2/24/20	Comment
52	2/24/20	Comment
53	2/24/20	Comment
54	2/24/20	Comment
55	2/24/20	Comment
56	2/24/20	Comment
57	2/24/20	Comment
58	2/24/20	Comment
59	2/24/20	Comment
60	2/24/20	Comment
61	2/24/20	Comment
62	2/24/20	Comment
63	2/24/20	Comment
64	2/24/20	Comment
65	2/24/20	Comment
66	2/24/20	Comment
67	2/24/20	Comment
68	2/24/20	Comment
69	2/24/20	Comment
70	2/24/20	Comment
71	2/24/20	Comment
72	2/24/20	Comment
73	2/24/20	Comment
74	2/24/20	Comment
75	2/24/20	Comment
76	2/24/20	Comment
77	2/24/20	Comment
78	2/24/20	Comment
79	2/24/20	Comment
80	2/24/20	Comment
81	2/24/20	Comment
82	2/24/20	Comment
83	2/24/20	Comment
84	2/24/20	Comment
85	2/24/20	Comment
86	2/24/20	Comment
87	2/24/20	Comment
88	2/24/20	Comment
89	2/24/20	Comment
90	2/24/20	Comment
91	2/24/20	Comment
92	2/24/20	Comment
93	2/24/20	Comment
94	2/24/20	Comment
95	2/24/20	Comment
96	2/24/20	Comment
97	2/24/20	Comment
98	2/24/20	Comment
99	2/24/20	Comment
100	2/24/20	Comment

Drainage Map - HGI Areas
The Townes at Carlton Point
The Carlton Group of NC, LLC
Rolesville, Wake County, North Carolina

Job No. 5501
Dwg No. EX3

Drainage Area Outline

Drainage Area Outline

OFFSITE DRAINAGE
2.41 ACRES

OFFSITE DRAINAGE
2.02 ACRES

* ASSUME .2 ACRE
DRAINAGE TO EXIST.
STRUCTURES ON
VINEYARD CT.

