THE KLEINGERS GROUP

CINCINNATI
COLUMBUS
DAYTON

6305 Centre Park Drive
West Chester, OH 45069
phone 513.779.7851
fax 513.779.7852
www.kleingers.com

Storm Sewer and Detention Report for Rinck Farm

Project # 160651.010

West Chester Township
Butler County, OH

Prepared: March 15, 2018
Revised: April 13, 2018
Revised: May 7, 2018
Revised: March 21, 2019
Revised: June 10, 2019

Designed by: Joe Haubert, P.E.
Reviewed by: Kevin Elliott, David Wright, P.E.

Table of Contents

Project Summary

This detention report is for Rinck Farm, located on the northwest corner of Union Center Blvd and Princeton Glendale Rd (also known as 747). The existing site is vacant and the proposed project will include a combination of 4 industrial buildings. The total size of the 4 proposed buildings are approximately 1,200,000 Square Feet. A large portion of the site is within the existing flood zone; this project will involve a significant amount of fill material within the floodplain. Compensatory storage is provided as per Butler County's requirements. This report has been updated to account for the splitting of "Future Building 3" into "Buildings 3 and 4". The split resulted in a 0.09 ac decrease in impervious area on site. Additionally, the off-site flow to the proposed pond now includes an impervious area accounting for the east/west road north of the site. Originally this road was intended to drain to the future detention on the northern Brate site, but now will drain south into the proposed pond. The outlet structure has not changed and the additional volume of the basin provides detention of the east/west roadway. The detention calculation account for this area.

Drainage Overview and Strategy

The proposed retention pond is designed to hold the critical year storm back to the 1 year pre-developed rate. Storms of less frequent occurrence than the critical storm are reduce flow rates by one storm event. The retention pond will also provide enough volume to maintain the existing floodplain storage.

The pre-developed and post-developed drainage maps can be found in Appendix A. Off-site drainage runs to the site from Brate Farm to the north. Future development of an east/west public road will route to and be detained in the proposed retention pond. Additionally, future development of Brate Farm, after properly detaining stormwater onsite, will discharge stormwater to the proposed retention pond. Analysis of Brate Farm's impact on the retention pond will occur with Brate Farm's stormwater detention report.

The critical storm for a specific development area is determined by calculating the total volume of runoff from a one-year frequency, 24 hour duration storm on the new development area before and after development. From the volumes calculated, the percentage increase in volume of the runoff due to the development is determined. Using this percentage, the 24-hour critical year storm is selected from the following table:

IF THE PERCENTAGE OF INCREASE IN VOLUME OF RUNOFF IS:		
Equal to or greater than	and less than	The critical storm for peak rate control will be
N/A	10	1 year
10	20	2 year
20	50	5 year
50	100	10 year
100	250	25 year
250	500	50 year
600	N/A	100 year

The volume and flows that were obtained for the pre-developed and post-developed 1-yr case is shown in the following tables:

PRE-DEVELOPMENT		
Storm Frequency (yr)	Hydrologic Volume (cf)	Hydrologic Runoff Rate (cfs)
1-yr	6.229	32.12

POST-DEVELOPMENT EAST		
Storm Frequency (yr)	Hydrologic Volume (cf)	Hydrologic Runoff Rate (cfs)
1-yr	5.064	81.32

POST-DEVELOPMENT WEST		
Storm Frequency (yr)	Hydrologic Volume (cf)	Hydrologic Runoff Rate (cfs)
1-yr	5.506*	88.41*

*values did not increase from Building 3 & 4 revisions

(10.570-6.229) / 6.229 = 0.697 = **70% Increase in Volume** therefore the Critical Year Storm is the 10-year frequency.

Water Quality

Water quality is being handled with a 10" stand pipe located inside the modified 2-5 outlet structure. See water quality calculations in Appendix E. Required water quality volume decreased slightly, but the same provided volume remains.

Overland Detention and Structure

To ensure an allowable release rate, a control structure was designed to regulate the post developed outflow. The controlling outlet structure consists of the following: a 10" stand pipe with tope elevation of 591.85 used for water quality, (3) 5'x1' windows at elevation 593.18, and a 36" outlet pipe.

The proposed structure and detention facility details can be found in Appendix D. The composite rating curve of the outlet structure information can be found in Appendix F.

Box Culvert Design

A single box culvert will connect both retention ponds to act as one for detention purposes. In the event of a flood, the box culvert will have the capacity to allow flow back and forth between the 2 retention ponds.

The USGS National Water Information System has stream gauges along Mill Creek measuring the steams height. Referencing gauge USGS 03255300 the height measurements available on their website date back to March 20, 2015. As shown in Appendix C, the highest increase in height occurred on 11/5/2017, where the creek's height increased 10.42 feet in 6.75 hours, a rate of approximately 1.5 ft/hr. This rate was used to estimate a flow rate through the box culvert.

Given the peak elevation of 594.40 for the 100-year storm event, 22.747 acre-ft of the ponds will be used for detention, leaving an additional 92.323 acre-ft for floodplain compensatory storage. The full height of the retention pond is 10.35 ft (591.85 NWE to 602.20). If the flood water heights rise at 1.5 ft/hr, then the ponds will fill in approximately 6.9 hours. Therefore, the max flow can be estimated by the volume of each pond divided by 6.9 hours

Retention Pond 1: 46.446 ac-ft (43560 ft/ac) / 6.90 hrs (3600 sec/hr) = 81.45 cfs

Retention Pond 2: 70.507 ac-ft (43560 ft/ac) / 6.90 hrs (3600 sec/hr) = 123.64 cfs (estimated peak through Box Culvert)

Conclusion

The detention volume was checked by using the Pondpack calculations included in Appendix F of this report. A list of the regulated release rates and storage elevations of the detention structure are shown below.

Storm Frequency (yr)	Pre-Developed On-Site Release Rate (cfs)	Allowable On-Site Release Rate (cfs)	Pre-Developed Off-Site Release Rate (cfs)	Allowable Release Rate + Off-Site Pass-Through (cfs)
1	32.12	32.12	8.94	41.06
2	42.72	32.12	12.44	44.56
5	62.38	32.12	19.08	51.20
10	76.99	32.12	24.12	56.24
25	94.92	76.99	30.42	107.41
50	110.10	94.92	35.85	130.77
100	122.34	110.10	40.27	150.37

Storm Frequency (yr)	Post East to Pond 2 Release Rate (cfs)	Pond 2 Elevation (ft)	Post West to Pond 1 Release Rate (cfs)	Pond 1 Elevation (ft)	Post-Developed Release Rate (cfs)
1	1.76	592.73	2.84	592.72	2.84
2	1.97	593.02	3.19	593.02	3.19
5	4.42	593.24	10.79	593.23	10.79
10	5.94	593.47	13.91	593.45	13.91
25	7.84	593.78	18.28	593.77	18.28
50	9.47	594.04	22.50	594.02	22.50
100	10.97	594.23	26.22	594.21	26.22

Based on the calculated findings, the total post-development release rates are below the allowable release rate. The post developed rates are much lower than the pre-developed conditions, this is due to the large detention size that was required for floodplain storage. The large detention surface area means there is minimal head on the outlet structure which leads to a very low release rate.

As part of this report, the floodplain volume must be maintained from the pre-developed to post-developed conditions.
Total Volume of Ponds @ 602.20 (Pond 1 and Pond 2): (46.446+70.507) = 116.953 Ac-ft
Volume of Ponds during 100-year storm event @ 594.38: (8.784+14.521) = 23.305 Ac-ft
Volume of Ponds remaining for floodplain storage: 116.953 – 23.305 = 93.648 Ac-ft
Existing Volume for floodplain = 80.650 Ac-ft
93.648 Ac-ft > 80.650 Ac-ft
The post-developed volume is sufficient to handle the detention and floodplain volumes.

APPENDIX A

Pre- & Post-Developed Drainage Map

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES

EXISTING FLOODPLAIN WITHIN SITE
PER FIRM 39017C0327F & 39017C0326F,
FLOODPLAIN ELEV WITHIN SITE: 602.20'
SITE VOLUME BELOW FLOODPLAIN ELEV: 80.650 AC-FT

THE KLEINGERS GROUP

CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE

www.kleingers.com

6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

RINCK FARM

UNION CENTRE BLVD
WEST CHESTER, OH 45069

SEAL:

NO.	DATE	DESCRIPTION

PROJECT NO:	**160651.010**
DATE:	**2019-03-19**

SCALE:

0 100 200 400

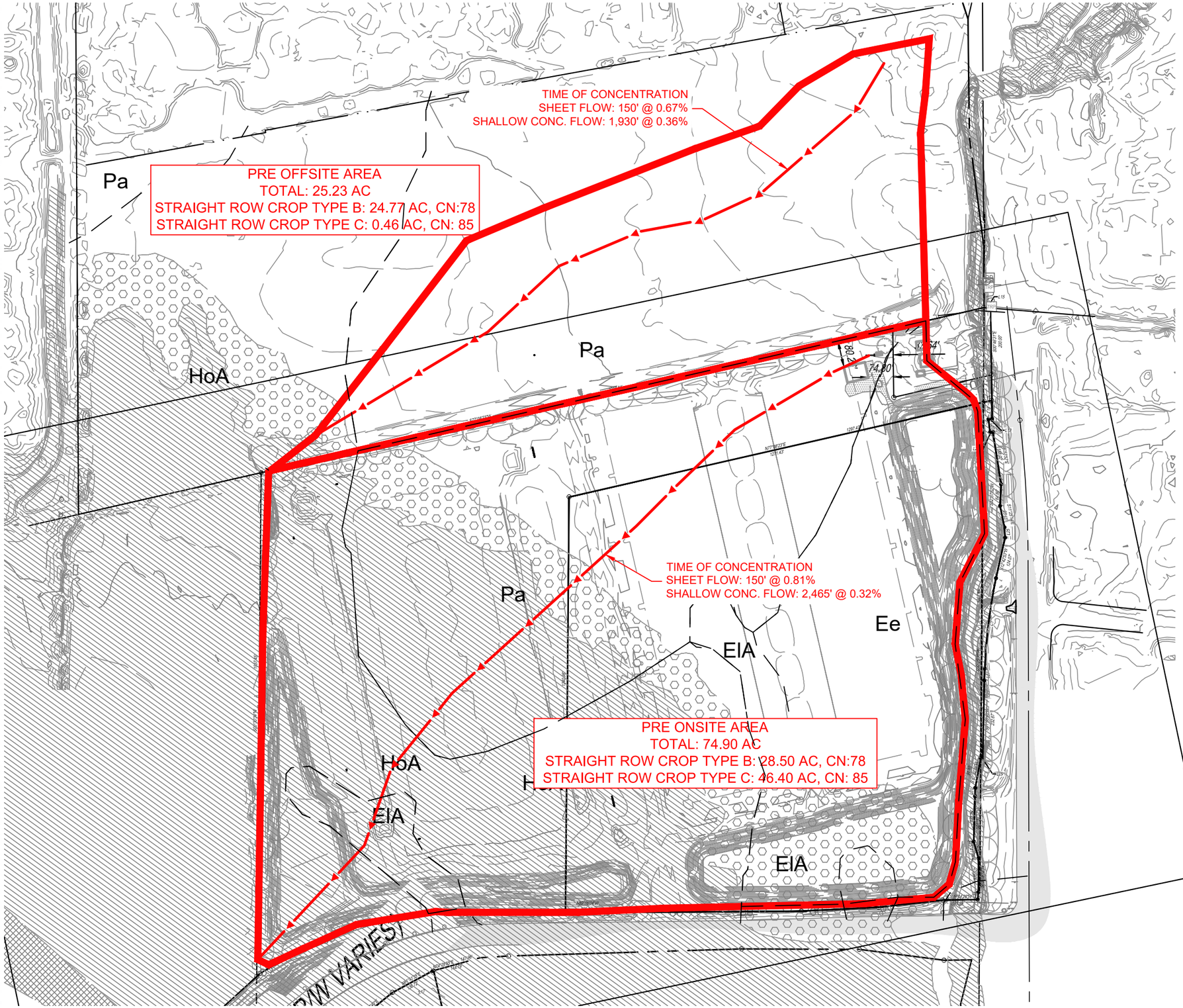
SHEET NAME:

EXISTING FLOODPLAIN

SHEET NO.

1 OF 3

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES



THE KLEINGERS GROUP

CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE

www.kleingers.com

6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

RINCK FARM
UNION CENTRE BLVD
WEST CHESTER, OH 45069

SEAL:

NO.	DATE	DESCRIPTION

PROJECT NO:	**160651.010**
DATE:	**2019-03-19**

SCALE:

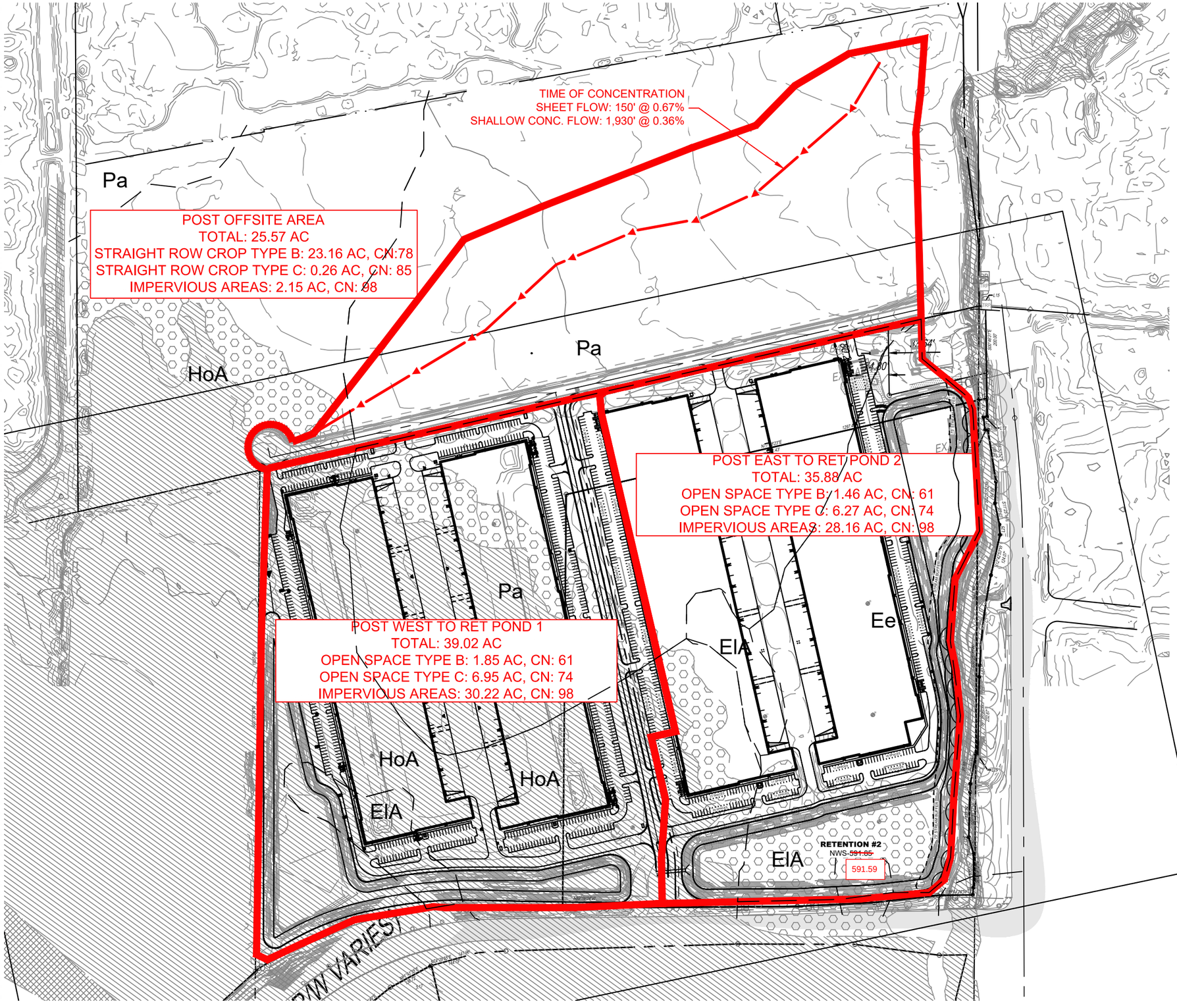
0 150 300 600

SHEET NAME:
PRE-DEVELOPED

SHEET NO.
2 OF 3

h:\2016\160651\DWG\010_Misc\160651CDET010.dwg, 3/21/2019 3:50:37 PM, jhaubert

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES



THE KLEINGERS GROUP

CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE

www.kleingers.com

6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

RINCK FARM
UNION CENTRE BLVD
WEST CHESTER, OH 45069

SEAL:

NO.	DATE	DESCRIPTION

PROJECT NO:	160651.010
DATE:	2019-03-19

SCALE:

0 150 300 600

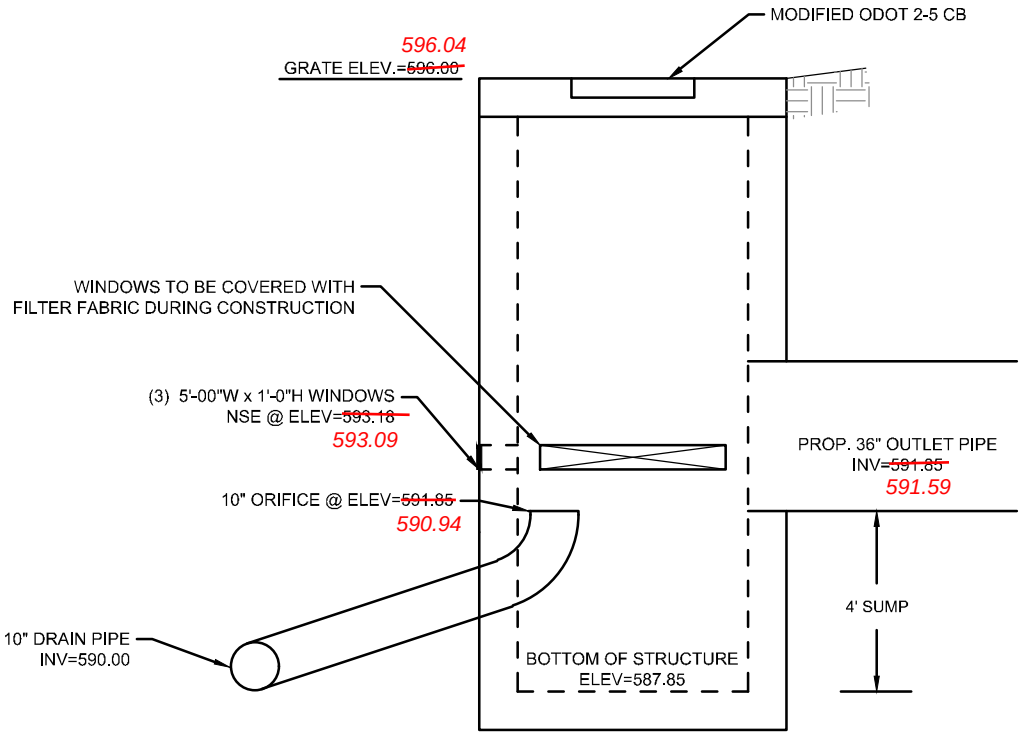
SHEET NAME:
POST-DEVELOPED

SHEET NO.
3 OF 3

h:\2016\160651\DWG\010_Misc\160651CDET010.dwg, 3/21/2019 3:50:38 PM, jhaubert

APPENDIX B

Detention Outlet Detail



DETENTION OUTFALL STRUCTURE

N.T.S.

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

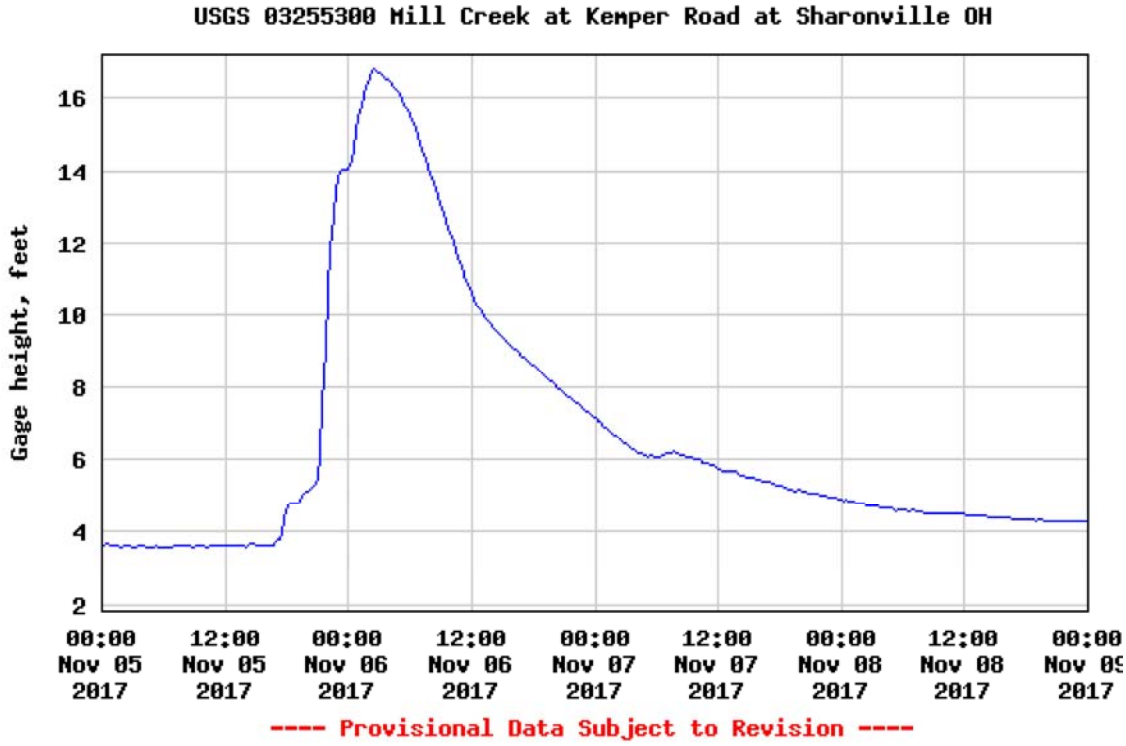
RINCK FARM
UNION CENTRE BLVD
WEST CHESTER, OH 45069

PROJECT NO:	**160651.002**
DATE:	**2018-02-22**
SCALE:	**NOT TO SCALE**
SHEET NO.	**STRUCTURES**

H:\2016\160651\DWG\002\Exhibit\2018-02-14 Pre-Post\160651CDET002.dwg, 5/8/2018 9:28:43 AM, jhaubert, 1:1

APPENDIX C

Mill Creek Gauge Data


USGS 03255300 Mill Creek at Kemper Road at Sharonville OH
Gage height, feet
16
14
12
10
8
6
4
2
00:00 Nov 05 2017
12:00 Nov 05 2017
00:00 Nov 06 2017
12:00 Nov 06 2017
00:00 Nov 07 2017
12:00 Nov 07 2017
00:00 Nov 08 2017
12:00 Nov 08 2017
00:00 Nov 09 2017
---- Provisional Data Subject to Revision ----

APPENDIX D

Box Culvert Detail

Culvert Report

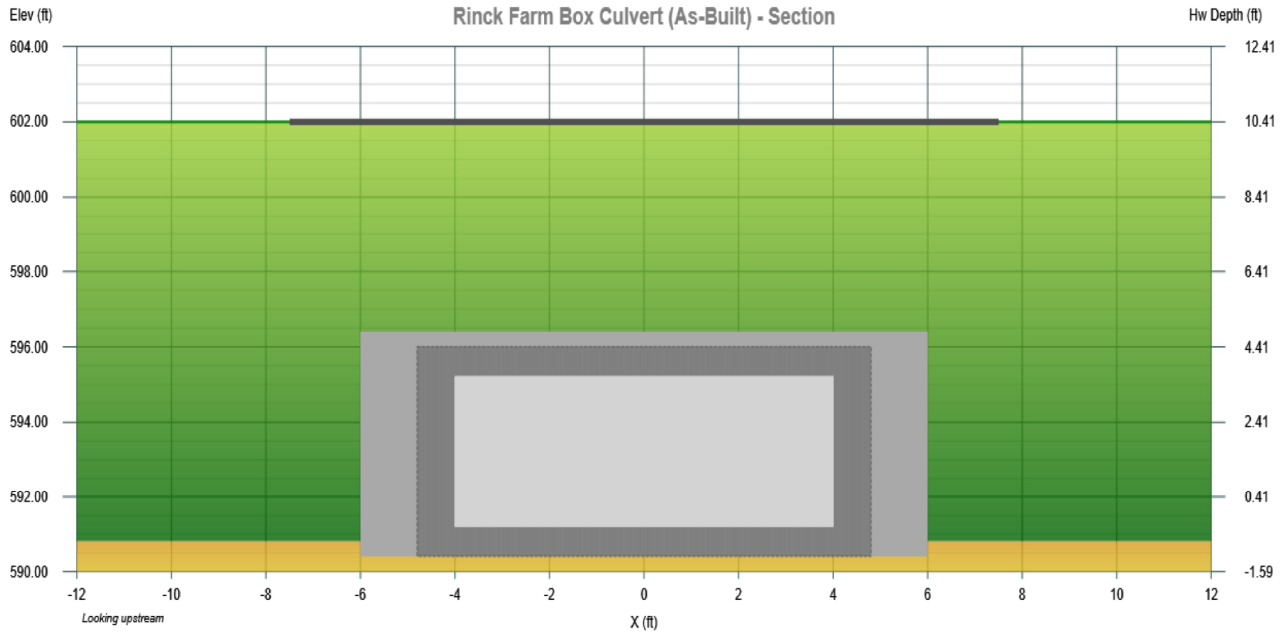
Project filename: 160651.010 Box Culvert Design.cst

Culvert Studio v 2.0.0.13

06-13-2019

Rinck Farm Box Culvert (As-Built) — Culvert 1

CULVERT		EMBANKMENT	
Shape	= Rectangular	Top Width	= 130.00 ft
Inlet Edge	= Square Edge/ Hdwall	Top Elevation	= 602.00 ft
Material	= Concrete	Crest Length	= 15.00 ft
Manning's n	= 0.013		
Rise	= 48 in	**DISCHARGE**	
Span	= 96 in	Method	= User-defined
Invert Elev. Down	= 591.21 ft		
Length	= 190 ft		
Slope	= 0.002 ft/ft		
Invert Elev. Up	= 591.59 ft		
No. Barrels	= 1	**TAILWATER**	
Plan Skew Angle	= 0 degrees	Tailwater Elevation	= 591.59 ft



APPENDIX E

Water Quality Calculations

PROJECT	Rinck Farm		
JOB #	160651.002	DESIGN	JMH
DATE	5/16/2018	CHECK	

WATER QUALITY VOLUME = INPUT FIELDS

Method 2

WQv= C * P * A / 12

C = 0.751495327
P = 0.9 IN
A = 74.9 ACRES *

WQv = 4.22 AC FT

RUNOFF COEFFICIENT
C = Rv = 0.05 + 0.9i
WHERE: i = IMPERVIOUS RATIO

IMPERVIOUS RATIO, i = IMPERVIOUS AREA / TOTAL AREA

IMPERVIOUS AREA =	58.38
TOTAL AREA =	74.9
i =	0.779439

P = Precipitation Depth of 0.90- inches

***AREA TO INCLUDE OFFSITE DRAINAGE**

THEREFORE, WQv =		4.22	AC FT
	OR,	183889.6	CF

BASIN STORAGE VOLUME

ELEV.	VOLUME
591.85	0.0000
593	3.6690

WQv ELEV: 593.17

Bottom of Detention: 591.85

*WQv ELEV= (WQv * ΔE/ΔV) + Bottom ELEV*

SIZE ORIFICE FOR DETENTION VOLUME DRAIN

***** DOUBLE CHECK UNITS *****

Q(avg) = WQv / Td Q(max) = 2 * Q(avg)

Td = 48 HOURS FOR DRY
24 HOURS FOR WET

Q(avg) = 2.1284 CFS

Q(max) = 4.2567 CFS

WHERE:

WQv = *WATER DETENTION VOLUME*
Q_{avg} = *AVERAGE FLOW RATE THROUGH THE ORIFICE*
Q_{max} = *MAXIMUM FLOW RATE THROUGH THE ORIFICE*
T_d = *WQv DRAIN TIME (24 TO 48 HOURS)*
C = 0.6 *ORIFICE COEFF.*
g = 32.2 *ft/ sec²*
H_{max} = *MAXIMUM HYDRAULIC HEAD (WQv ELEV - Bottom ELEV)*
A = *ORIFICE AREA (ft²) (Q=CA(2gh)^0.5)*
D = *ORIFICE DIAMETER (ft) (A=R^2 * π)*

A = Q(max) / C * (2 * g * H(max))^0.5

H(max) = 1.32 FT

A = 0.7685 SQ FT AREA OF REQUIRED ORIFICE

D = 11.87 IN **10" Circular**

APPENDIX F

Pondpack Version 10.1
Summary And Drainage Calculations

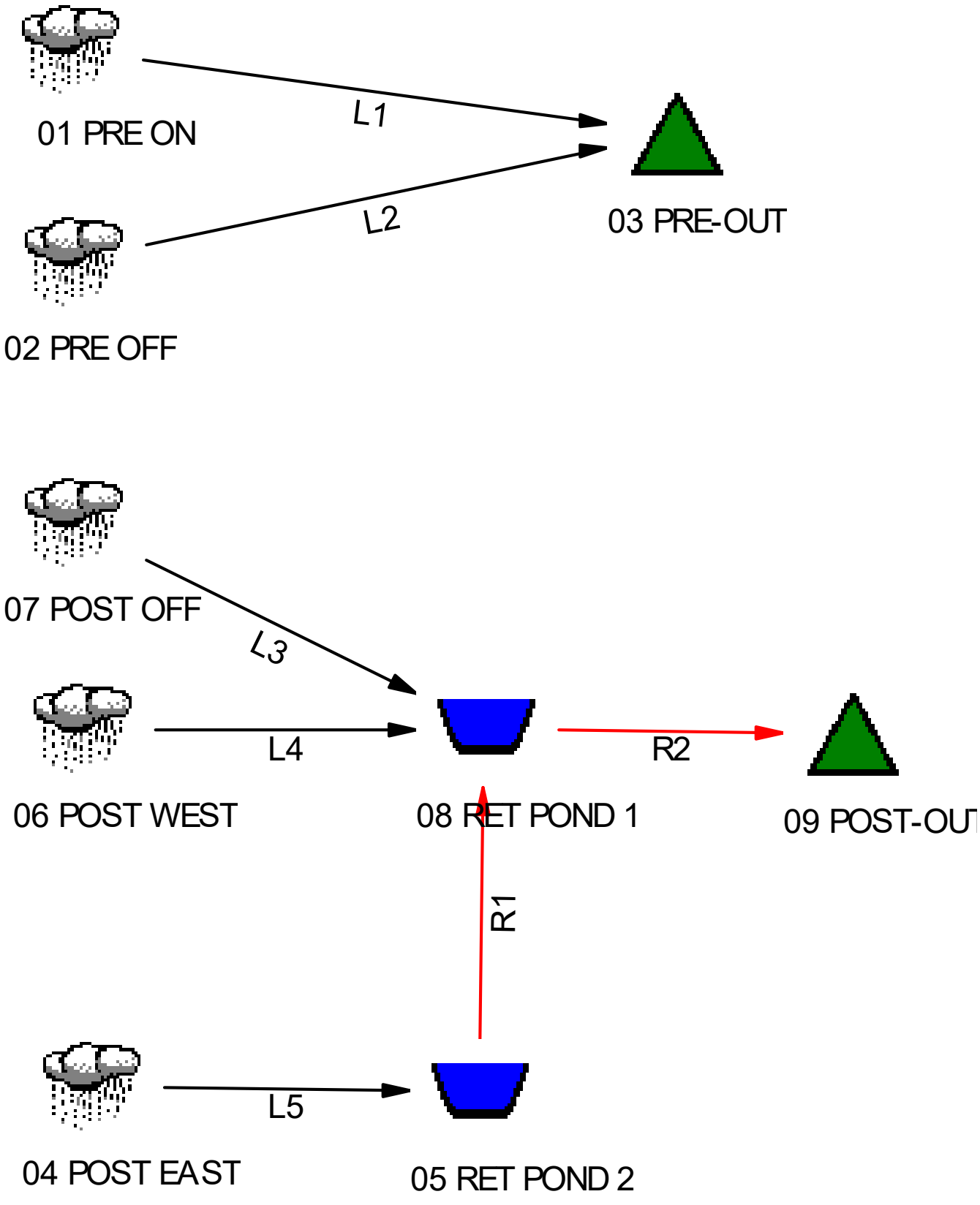

01 PRE ON
L1
02 PRE OFF
L2
03 PRE-OUT
07 POST OFF
L3
06 POST WEST
L4
08 RET POND 1
R2
09 POST-OUT
R1
04 POST EAST
L5
05 RET POND 2

Table of Contents

Table of Contents (continued)

MASTER DESIGN STORM SUMMARY

Network Storm Collection: BUTLER

Return Event	Total Depth in	Rainfall Type	RNF ID
1	2.5000	Synthetic Curve	TypeII 24hr
2	2.9000	Synthetic Curve	TypeII 24hr
5	3.6000	Synthetic Curve	TypeII 24hr
10	4.1000	Synthetic Curve	TypeII 24hr
25	4.7000	Synthetic Curve	TypeII 24hr
50	5.2000	Synthetic Curve	TypeII 24hr
100	5.6000	Synthetic Curve	TypeII 24hr

ICPM CALCULATION TOLERANCES

Target Convergence= .000 cfs +/-
Max. Iterations = 35 loops
ICPM Time Step = .0500 hrs
Output Time Step = .0500 hrs
ICPM Ending Time = 35.0000 hrs

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft

---

```
-------------------------------
ICPM CALCULATION TOLERANCES
-------------------------------
Target Convergence=     .000 cfs +/-
Max. Iterations   =       35 loops
ICPM   Time Step  =    .0500 hrs
Output Time Step  =    .0500 hrs
ICPM Ending Time  =  35.0000 hrs
-------------------------------
```

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
01 PRE ON	AREA	1	6.229		12.6500	32.12		
01 PRE ON	AREA	2	8.119		12.6500	42.72		
01 PRE ON	AREA	5	11.644		12.6500	62.38		
01 PRE ON	AREA	10	14.285		12.6500	76.99		
01 PRE ON	AREA	25	17.553		12.6500	94.92		
01 PRE ON	AREA	50	20.339		12.6500	110.10		
01 PRE ON	AREA	100	22.600		12.6500	122.34		
02 PRE OFF	AREA	1	1.656		12.6000	8.94		
02 PRE OFF	AREA	2	2.225		12.6000	12.44		
02 PRE OFF	AREA	5	3.309		12.6000	19.08		
02 PRE OFF	AREA	10	4.135		12.6000	24.12		
02 PRE OFF	AREA	25	5.170		12.5000	30.42		
02 PRE OFF	AREA	50	6.060		12.5000	35.85		
02 PRE OFF	AREA	100	6.786		12.5000	40.27		
*03 PRE-OUT	JCT	1	7.886		12.6500	41.06		
*03 PRE-OUT	JCT	2	10.343		12.6500	55.12		
*03 PRE-OUT	JCT	5	14.952		12.6500	81.32		
*03 PRE-OUT	JCT	10	18.420		12.6500	100.88		
*03 PRE-OUT	JCT	25	22.722		12.6500	124.96		
*03 PRE-OUT	JCT	50	26.398		12.6500	145.38		
*03 PRE-OUT	JCT	100	29.387		12.6500	161.87		

ICPM CALCULATION TOLERANCES

Target Convergence= .000 cfs +/-
Max. Iterations = 35 loops
ICPM Time Step = .0500 hrs
Output Time Step = .0500 hrs
ICPM Ending Time = 35.0000 hrs

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
04 POST EAST	AREA	1	5.064		12.0000	81.32		
04 POST EAST	AREA	2	6.182		12.0000	98.29		
04 POST EAST	AREA	5	8.173		12.0000	127.93		
04 POST EAST	AREA	10	9.613		12.0000	149.01		
04 POST EAST	AREA	25	11.355		12.0000	174.20		
04 POST EAST	AREA	50	12.815		12.0000	195.09		
04 POST EAST	AREA	100	13.987		12.0000	211.75		
05 RET POND 2	POND	1	5.064		12.0000	81.32		
05 RET POND 2	POND	2	6.182		12.0000	98.29		
05 RET POND 2	POND	5	8.173		12.0000	127.93		
05 RET POND 2	POND	10	9.613		12.0000	149.01		
05 RET POND 2	POND	25	11.355		12.0000	174.20		
05 RET POND 2	POND	50	12.815		12.0000	195.09		
05 RET POND 2	POND	100	13.987		12.0000	211.75		
05 RET POND 2OUT	POND	1	2.082	R	26.1500	1.76	592.73	6.061
05 RET POND 2OUT	POND	1	-1.592	R	12.4000	-15.05 (-Q)		
05 RET POND 2OUT	POND	2	2.297	R	25.9000	1.97	593.02	7.649
05 RET POND 2OUT	POND	2	-2.102	R	12.3000	-20.36 (-Q)		
05 RET POND 2OUT	POND	5	4.270	R	16.6000	4.42	593.24	8.892
05 RET POND 2OUT	POND	5	-2.540	R	12.2500	-30.59 (-Q)		
05 RET POND 2OUT	POND	10	5.825	R	17.4000	5.94	593.47	10.170
05 RET POND 2OUT	POND	10	-2.735	R	12.2000	-36.07 (-Q)		
05 RET POND 2OUT	POND	25	7.832	R	16.6500	7.84	593.78	11.933
05 RET POND 2OUT	POND	25	-3.195	R	12.2000	-43.76 (-Q)		
05 RET POND 2OUT	POND	50	9.485	R	16.8000	9.47	594.04	13.390
05 RET POND 2OUT	POND	50	-3.569	R	12.2000	-50.62 (-Q)		
05 RET POND 2OUT	POND	100	10.799	R	16.3000	10.97	594.23	14.521
05 RET POND 2OUT	POND	100	-3.833	R	12.2000	-56.07 (-Q)		

```
-------------------------------
ICPM CALCULATION TOLERANCES
-------------------------------
Target Convergence=     .000 cfs +/-
Max. Iterations   =       35 loops
ICPM   Time Step  =    .0500 hrs
Output Time Step  =    .0500 hrs
ICPM Ending Time  =  35.0000 hrs
-------------------------------
```

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
06 POST WEST	AREA	1	5.506		12.0000	88.41		
06 POST WEST	AREA	2	6.721		12.0000	106.86		
06 POST WEST	AREA	5	8.885		12.0000	139.09		
06 POST WEST	AREA	10	10.452		12.0000	162.01		
06 POST WEST	AREA	25	12.346		12.0000	189.39		
06 POST WEST	AREA	50	13.933		12.0000	212.10		
06 POST WEST	AREA	100	15.207		12.0000	230.22		
07 POST OFF	AREA	1	1.894		12.6000	10.53		
07 POST OFF	AREA	2	2.505		12.6000	14.28		
07 POST OFF	AREA	5	3.656		12.6000	21.31		
07 POST OFF	AREA	10	4.527		12.5000	26.61		
07 POST OFF	AREA	25	5.610		12.5000	33.22		
07 POST OFF	AREA	50	6.537		12.5000	38.85		
07 POST OFF	AREA	100	7.292		12.5000	43.41		
08 RET POND 1	POND	1	7.889	R	12.0000	84.99		
08 RET POND 1	POND	2	9.421	R	12.0000	102.61		
08 RET POND 1	POND	5	14.272	R	11.9500	132.84		
08 RET POND 1	POND	10	18.068	R	11.9500	154.40		
08 RET POND 1	POND	25	22.592	R	11.9500	180.90		
08 RET POND 1	POND	50	26.385	R	11.9500	201.66		
08 RET POND 1	POND	100	29.464	R	11.9500	219.09		

ICPM CALCULATION TOLERANCES

Target Convergence= .000 cfs +/-
Max. Iterations = 35 loops
ICPM Time Step = .0500 hrs
Output Time Step = .0500 hrs
ICPM Ending Time = 35.0000 hrs

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
08 RET POND 1OUT	POND	1	5.199	R	19.2500	2.84	592.72	3.599
08 RET POND 1OUT	POND	2	5.874	R	19.7500	3.19	593.02	4.555
08 RET POND 1OUT	POND	5	10.449	R	14.8000	10.79	593.23	5.294
08 RET POND 1OUT	POND	10	14.190	R	14.4000	13.91	593.45	6.079
08 RET POND 1OUT	POND	25	18.595	R	14.0000	18.28	593.77	7.169
08 RET POND 1OUT	POND	50	22.284	R	13.9000	22.50	594.02	8.071
08 RET POND 1OUT	POND	100	25.285	R	13.8000	26.22	594.21	8.784
*09 POST-OUT	JCT	1	5.199	R	19.2500	2.84		
*09 POST-OUT	JCT	2	5.874	R	19.7500	3.19		
*09 POST-OUT	JCT	5	10.449	R	14.8000	10.79		
*09 POST-OUT	JCT	10	14.190	R	14.4000	13.91		
*09 POST-OUT	JCT	25	18.595	R	14.0000	18.28		
*09 POST-OUT	JCT	50	22.284	R	13.9000	22.50		
*09 POST-OUT	JCT	100	25.285	R	13.8000	26.22		

Title... Project Date: 10/19/2016
Project Engineer: Mikez
Project Title: West Chester Distribution Center
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = BUTLER

Storm Tag Name = 1

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 1 yr
Total Rainfall Depth= 2.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 2.9000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 3.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 4.1000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 4.7000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Title... Project Date: 10/19/2016
Project Engineer: Mikez
Project Title: West Chester Distribution Center
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = BUTLER

Storm Tag Name = 50

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 50 yr
Total Rainfall Depth= 5.2000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 5.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet

Mannings n	.2400
Hydraulic Length	150.00 ft
2yr, 24hr P	2.9000 in
Slope	.008100 ft/ft

Avg.Velocity .08 ft/sec

Segment #1 Time: .4961 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	2465.00 ft
Slope	.003200 ft/ft

Unpaved

Avg.Velocity .91 ft/sec

Segment #2 Time: .7502 hrs

Total Tc: 1.2463 hrs

Tc Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet

Mannings n	.2400
Hydraulic Length	150.00 ft
2yr, 24hr P	2.9000 in
Slope	.006700 ft/ft

Avg.Velocity .08 ft/sec

Segment #1 Time: .5352 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	1930.00 ft
Slope	.003600 ft/ft

Unpaved

Avg.Velocity .97 ft/sec

Segment #2 Time: .5538 hrs

Total Tc: 1.0890 hrs

Tc Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: User Defined

Segment #1 Time: .1667 hrs

Total Tc: .1667 hrs

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: User Defined

Segment #1 Time: .1667 hrs

Total Tc: .1667 hrs

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet

Mannings n	.2400
Hydraulic Length	150.00 ft
2yr, 24hr P	2.9000 in
Slope	.006700 ft/ft
Avg.Velocity	.08 ft/sec

Segment #1 Time: .5352 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	1930.00 ft
Slope	.003600 ft/ft
Unpaved	
Avg.Velocity	.97 ft/sec

Segment #2 Time: .5538 hrs

Total Tc: 1.0890 hrs

Tc Equations used...

==== SCS TR-55 Sheet Flow ==

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ==============================

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Row crops - Straight row (SR), good	78	28.500			78.00
Row crops - Straight row (SR), good	85	46.400			85.00
COMPOSITE AREA & WEIGHTED CN --->		74.900			82.34 (82)

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Row crops - Straight row (SR), good	78	24.770			78.00
Row crops - Straight row (SR), good	85	.460			85.00
COMPOSITE AREA & WEIGHTED CN --->		25.230			78.13 (78)

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Open space (Lawns,parks etc.) - Goo	61	1.460			61.00
Open space (Lawns,parks etc.) - Goo	74	6.270			74.00
Impervious Areas - Paved parking lo	98	28.160			98.00
COMPOSITE AREA & WEIGHTED CN --->		35.890			92.30 (92)

RUNOFF CURVE NUMBER DATA
::

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Open space (Lawns,parks etc.) - Goo	61	1.850			61.00
Open space (Lawns,parks etc.) - Goo	74	6.950			74.00
Impervious Areas - Paved parking lo	98	30.220			98.00
COMPOSITE AREA & WEIGHTED CN --->		39.020			91.97 (92)

::

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Impervious Areas - Paved parking lo	98	2.150			98.00
Row crops - Straight row (SR), good	78	23.160			78.00
Row crops - Straight row (SR), good	85	.260			85.00
COMPOSITE AREA & WEIGHTED CN --->		25.570			79.75 (80)

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
591.59	-----	226100	0	.000	.000
592.00	-----	227893	680989	2.136	2.136
593.00	-----	241220	703575	5.384	7.520
594.00	-----	250906	738141	5.648	13.169
595.00	-----	263861	772069	5.908	19.077
596.00	-----	276879	811032	6.206	25.283
597.00	-----	289955	850176	6.506	31.789
598.00	-----	303090	889495	6.807	38.596
599.00	-----	316284	928991	7.109	45.705
600.00	-----	329539	968667	7.413	53.117
601.00	-----	342855	1008525	7.718	60.835
602.00	-----	356270	1048623	8.024	68.859
602.20	-----	361775	1077057	1.648	70.507

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
591.59	-----	132648	0	.000	.000
592.00	-----	134295	400411	1.256	1.256
593.00	-----	147448	422460	3.233	4.489
594.00	-----	157311	457059	3.498	7.987
595.00	-----	168828	489107	3.743	11.729
596.00	-----	180336	523651	4.007	15.736
597.00	-----	189816	555167	4.248	19.985
598.00	-----	203537	589910	4.514	24.499
599.00	-----	214989	627711	4.803	29.302
600.00	-----	226468	662111	5.067	34.369
601.00	-----	237990	696616	5.331	39.700
602.00	-----	249556	731250	5.596	45.295
602.20	-----	251670	751836	1.151	46.446

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 591.59 ft
Increment = .10 ft
Max. Elev.= 602.20 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Box	C0	<--->	TW	591.590	602.200

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = C0
Structure Type = Culvert-Box

No. Barrels	=	1
Barrel Height	=	4.00 ft
Barrel Width	=	8.00 ft
Upstream Invert	=	591.59 ft
Dnstream Invert	=	591.21 ft
Horiz. Length	=	190.00 ft
Barrel Length	=	190.00 ft
Barrel Slope	=	.00200 ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0150	
Ke	=	.2000	(forward entrance loss)
Kb	=	.004468	(per ft of full flow)
Kr	=	.2000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0018
Inlet Control M	=	2.0000
Inlet Control c	=	.02920
Inlet Control Y	=	.7400
T1 ratio (HW/D)	=	1.108
T2 ratio (HW/D)	=	1.206
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 596.02 ft ---> Flow = 224.00 cfs
At T2 Elev = 596.41 ft ---> Flow = 256.00 cfs

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 591.59 ft
Increment = .10 ft
Max. Elev.= 602.20 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Area	W1	--->	C0	593.090	602.200
Inlet Box	R1	--->	C0	596.040	602.200
Inlet Box	R0	--->	C0	591.590	602.200
Culvert-Circular	C0	--->	TW	591.590	602.200
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

Structure ID = W1
Structure Type = Orifice-Area

# of Openings	=	3
Invert Elev.	=	593.09 ft
Area	=	5.0000 sq.ft
Top of Orifice	=	594.18 ft
Datum Elev.	=	593.18 ft
Orifice Coeff.	=	.610

Structure ID = R1
Structure Type = Inlet Box

# of Openings	=	1
Invert Elev.	=	596.04 ft
Orifice Area	=	2.5000 sq.ft
Orifice Coeff.	=	.610
Weir Length	=	8.00 ft
Weir Coeff.	=	3.300
K, Reverse	=	1.000
Mannings n	=	.0000
Kev,Charged Riser	=	.000
Weir Submergence	=	No

OUTLET STRUCTURE INPUT DATA

Structure ID = R0
Structure Type = Inlet Box

# of Openings	=	1
Invert Elev.	=	591.59 ft
Orifice Area	=	.5454 sq.ft
Orifice Coeff.	=	.610
Weir Length	=	2.62 ft
Weir Coeff.	=	3.300
K, Reverse	=	1.000
Mannings n	=	.0000
Kev,Charged Riser	=	.000
Weir Submergence	=	No

OUTLET STRUCTURE INPUT DATA

Structure ID = C0
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = 3.0000 ft
Upstream Invert = 591.59 ft
Dnstream Invert = 589.97 ft
Horiz. Length = 519.74 ft
Barrel Length = 519.74 ft
Barrel Slope = .00312 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0150
Ke = .2000 (forward entrance loss)
Kb = .009623 (per ft of full flow)
Kr = .2000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...
Equation form = 1
Inlet Control K = .0018
Inlet Control M = 2.0000
Inlet Control c = .02920
Inlet Control Y = .7400
T1 ratio (HW/D) = 1.061
T2 ratio (HW/D) = 1.206
Slope Factor = -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 594.77 ft ---> Flow = 42.85 cfs
At T2 Elev = 595.21 ft ---> Flow = 48.97 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .00 cfs
Max. Q tolerance = .00 cfs

Full Pond Depth for WQ below NWE

File.... H:\2016\160651\Design\Storm Drainage\010\160651POND010.ppw

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
585.00	-----	159614	0	.000	.000
586.00	-----	168095	491509	3.761	3.761
587.00	-----	176690	517124	3.957	7.718
588.00	-----	185400	543082	4.156	11.874
589.00	-----	194271	569454	4.358	16.232
590.00	-----	203353	596384	4.564	20.795
591.00	-----	212640	623937	4.775	25.570
591.59	-----	226100	658007	2.971	28.541
592.00	-----	227893	680989	2.136	30.677
593.00	-----	241220	703575	5.384	36.061
594.00	-----	250906	738141	5.648	41.710
595.00	-----	263861	772069	5.908	47.618
596.00	-----	276879	811032	6.206	53.824
597.00	-----	289955	850176	6.506	60.330
598.00	-----	303090	889495	6.807	67.137
599.00	-----	316284	928991	7.109	74.245
600.00	-----	329539	968667	7.413	81.658
601.00	-----	342855	1008525	7.718	89.375
602.00	-----	356270	1048623	8.024	97.400
602.20	-----	361775	1077057	1.648	99.048

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Full Pond Depth for WQ below NWE

File.... H:\2016\160651\Design\Storm Drainage\010\160651POND010.ppw

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
585.00	-----	72972	0	.000	.000
586.00	-----	79034	227949	1.744	1.744
587.00	-----	85374	246551	1.887	3.631
588.00	-----	92039	266057	2.036	5.667
589.00	-----	100847	289228	2.213	7.880
590.00	-----	110283	316589	2.423	10.303
591.00	-----	119880	345144	2.641	12.944
591.85	-----	132648	378630	2.463	15.407
592.00	-----	134295	400411	.460	15.866
593.00	-----	147488	422519	3.233	19.100
594.00	-----	157311	457119	3.498	22.598
595.00	-----	168828	489107	3.743	26.340
596.00	-----	180336	523651	4.007	30.348
597.00	-----	189816	555167	4.248	34.596
598.00	-----	203537	589910	4.514	39.110
599.00	-----	214989	627711	4.803	43.913
600.00	-----	226468	662111	5.067	48.980
601.00	-----	237990	696616	5.331	54.311
602.00	-----	249556	731250	5.596	59.906
602.20	-----	251670	751836	1.151	61.057

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

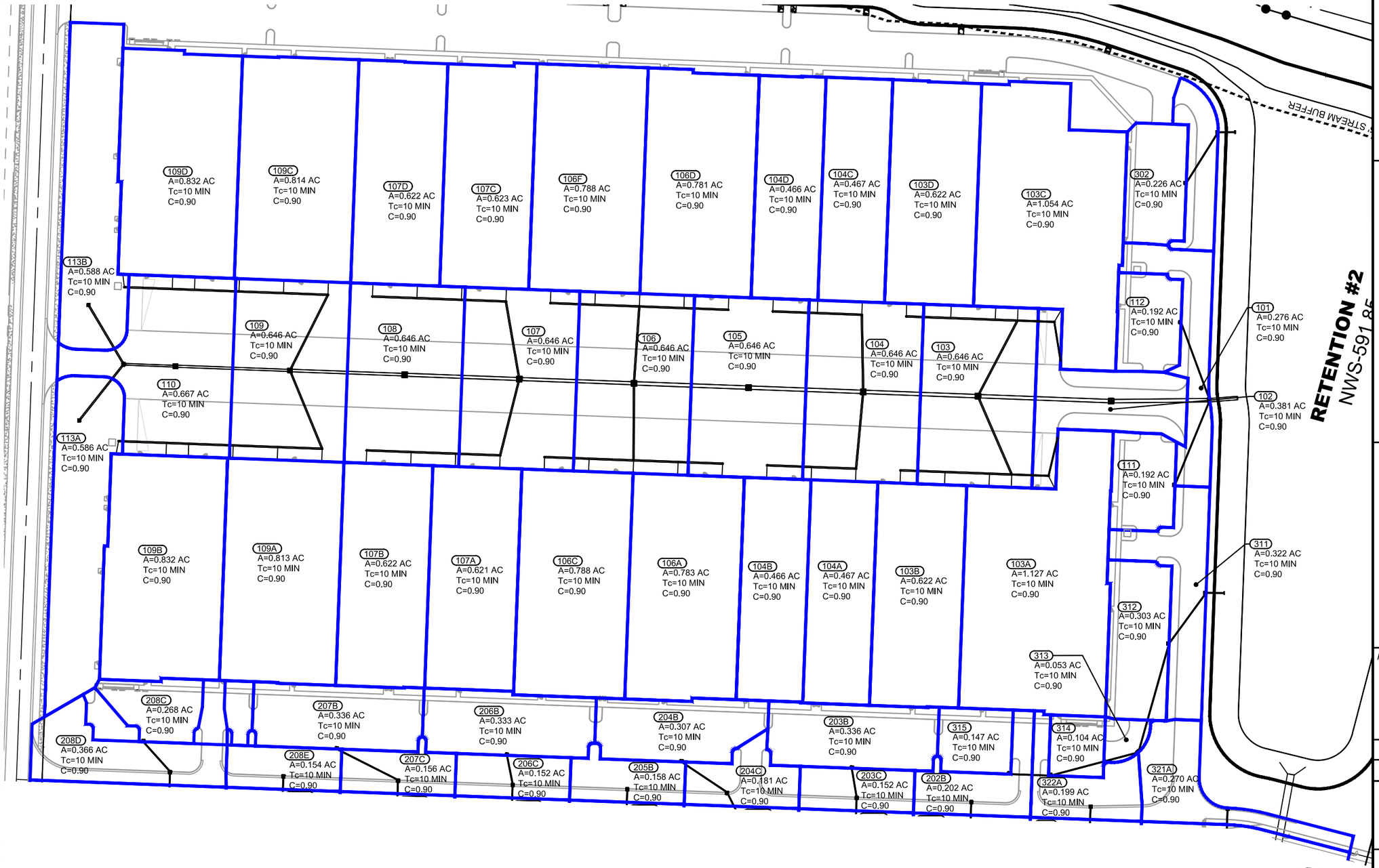
Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

APPENDIX G

Local Stormwater Map and Calculations

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES



THE KLEINGERS GROUP

CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE

www.kleingers.com

6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

RINCK FARM

UNION CENTRE BLVD
WEST CHESTER, OH 45069

SEAL:

NO.	DATE	DESCRIPTION

PROJECT NO: **160651.010**

DATE: **03-21-2019**

SCALE: 0 60 120 180

SHEET NAME:

LOCAL DRAINAGE MAP

SHEET NO.

1 OF 2

h:\2016\160651\DWG\010_Misc\160651STM010.dwg, 3/22/2019 8:29:03 AM, jhaubert

INSPIRED PEOPLE ▲ CREATIVE DESIGN ▲ TRANSFORMING COMMUNITIES

208B A=0.330 AC Tc=10 MIN C=0.90
208A A=0.152 AC Tc=10 MIN C=0.90
207A A=0.152 AC Tc=10 MIN C=0.90
206A A=0.152 AC Tc=10 MIN C=0.90
205A A=0.152 AC Tc=10 MIN C=0.90
204A A=0.152 AC Tc=10 MIN C=0.90
203A A=0.152 AC Tc=10 MIN C=0.90
202A A=0.140 AC Tc=10 MIN C=0.90
322 A=0.175 AC Tc=10 MIN C=0.90
413 A=0.058 AC Tc=10 MIN C=0.90
412 A=0.141 AC Tc=10 MIN C=0.90
411 A=0.209 AC Tc=10 MIN C=0.90
410 A=0.168 AC Tc=10 MIN C=0.90
409 A=0.334 AC Tc=10 MIN C=0.90
408 A=0.163 AC Tc=10 MIN C=0.90
407 A=0.146 AC Tc=10 MIN C=0.90
405 A=0.321 AC Tc=10 MIN C=0.90
404 A=0.170 AC Tc=10 MIN C=0.90
403 A=0.081 AC Tc=10 MIN C=0.90
402 A=0.050 AC Tc=10 MIN C=0.90
401 A=0.250 AC Tc=10 MIN C=0.90
201 A=0.387 AC Tc=10 MIN C=0.90
508B A=0.933 AC Tc=10 MIN C=0.90
414 A=0.213 AC Tc=10 MIN C=0.90
510B A=0.310 AC Tc=10 MIN C=0.90
507B A=0.630 AC Tc=10 MIN C=0.90
505B A=0.940 AC Tc=10 MIN C=0.90
504B A=0.311 AC Tc=10 MIN C=0.90
504A A=0.312 AC Tc=10 MIN C=0.90
504C A=0.311 AC Tc=10 MIN C=0.90
505A A=0.310 AC Tc=10 MIN C=0.90
503B A=0.662 AC Tc=10 MIN C=0.90
503A A=0.310 AC Tc=10 MIN C=0.90
503C A=0.310 AC Tc=10 MIN C=0.90
512 A=0.223 AC Tc=10 MIN C=0.90
510A A=0.320 AC Tc=10 MIN C=0.90
507C A=0.310 AC Tc=10 MIN C=0.90
510C A=0.238 AC Tc=10 MIN C=0.90
508A A=0.311 AC Tc=10 MIN C=0.90
507A A=0.310 AC Tc=10 MIN C=0.90
515 A=0.268 AC Tc=10 MIN C=0.90
511 A=0.254 AC Tc=10 MIN C=0.90
509 A=0.646 AC Tc=10 MIN C=0.90
508 A=0.646 AC Tc=10 MIN C=0.90
507 A=0.646 AC Tc=10 MIN C=0.90
506 A=0.646 AC Tc=10 MIN C=0.90
505 A=0.646 AC Tc=10 MIN C=0.90
504 A=0.646 AC Tc=10 MIN C=0.90
501 A=0.339 AC Tc=10 MIN C=0.90
510 A=0.863 AC Tc=10 MIN C=0.90
503 A=0.458 AC Tc=10 MIN C=0.90
502 A=0.183 AC Tc=10 MIN C=0.90
513 A=0.224 AC Tc=10 MIN C=0.90
508C A=0.310 AC Tc=10 MIN C=0.90
505C A=0.311 AC Tc=10 MIN C=0.90
516 A=0.296 AC Tc=10 MIN C=0.90
510E A=0.310 AC Tc=10 MIN C=0.90
507D A=0.315 AC Tc=10 MIN C=0.90
504D A=0.311 AC Tc=10 MIN C=0.90
510F A=0.238 AC Tc=10 MIN C=0.90
507F A=0.310 AC Tc=10 MIN C=0.90
504F A=0.311 AC Tc=10 MIN C=0.90
601 A=0.384 AC Tc=10 MIN C=0.90
514 A=0.229 AC Tc=10 MIN C=0.90
510D A=0.477 AC Tc=10 MIN C=0.90
508D A=0.934 AC Tc=10 MIN C=0.90
507E A=0.628 AC Tc=10 MIN C=0.90
505D A=0.936 AC Tc=10 MIN C=0.90
504E A=1.128 AC Tc=10 MIN C=0.90
602 A=0.217 AC Tc=10 MIN C=0.90

N #1
35

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

RINCK FARM
UNION CENTRE BLVD
WEST CHESTER, OH 45069

SEAL:

NO.	DATE	DESCRIPTION

PROJECT NO:	160651.010
DATE:	03-21-2019

SCALE:

0 60 120 180

SHEET NAME:
LOCAL DRAINAGE MAP

SHEET NO.
2 OF 2

h:\2016\160651\DWG\010_Misc\160651STM010.dwg, 3/22/2019 8:29:05 AM, jhaubert

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.7

Project Name: 002-100 STM

04-24-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Total Runoff (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
1	101-100	101	0.28	21.61	10.0	0.09	16.8	5.47	4.28	0.90	0.25	19.45	83.32	0.013	48	33.09	0.01	591.01	590.68	6.73	143.46	0.003	594.74	601.66	6.65	0.82	595.50	594.68	
2	102-101	102	0.38	20.95	10.0	0.31	16.5	5.47	4.33	0.90	0.34	18.86	81.57	0.013	48	113.28	0.0039	591.45	591.01	6.70	89.53	0.003	595.09	601.05	5.60	6.65	601.66	594.81	
3	103-102	103	0.65	20.57	10.0	0.43	16.0	5.47	4.38	0.90	0.58	18.52	81.17	0.013	48	157.26	0.0008	591.58	591.45	6.46	41.31	0.003	595.95	601.18	5.60	5.60	601.05	595.45	
4	104-103	104	0.65	16.50	10.0	0.44	15.6	5.47	4.45	0.90	0.58	14.85	66.04	0.013	48	134.18	0.0019	592.24	591.98	5.26	63.32	0.002	596.46	601.14	4.90	5.20	601.18	596.17	
5	105-104	105	0.65	13.99	10.0	0.50	15.1	5.47	4.52	0.90	0.58	12.59	56.91	0.013	48	131.67	0.0024	592.86	592.54	4.54	70.57	0.001	596.76	601.16	4.30	4.60	601.14	596.57	
6	106-105	106	0.65	13.34	10.0	0.52	14.6	5.47	4.60	0.90	0.58	12.01	55.24	0.013	48	136.32	0.0004	593.17	593.11	4.40	30.17	0.001	597.31	601.17	4.00	4.05	601.16	597.11	
7	107-106	107	0.65	9.56	10.0	0.53	14.0	5.47	4.68	0.90	0.58	8.60	40.30	0.013	42	133.83	0.0042	593.88	593.32	4.19	65.12	0.002	597.55	601.13	3.75	4.35	601.17	597.34	
8	107-108	108	0.65	6.42	10.0	0.77	13.3	5.47	4.81	0.90	0.58	5.78	27.83	0.013	42	133.81	0.0044	594.57	593.98	2.95	66.80	0.001	597.78	601.02	2.95	3.65	601.13	597.70	
9	109-108	109	0.65	5.78	10.0	0.61	12.7	5.47	4.92	0.90	0.58	5.20	25.59	0.013	36	134.11	0.0046	595.29	594.67	3.79	45.36	0.001	597.87	601.09	2.80	3.35	601.02	597.72	
10	110-109	110	0.67	1.84	10.0	1.26	11.4	5.47	5.16	0.90	0.60	1.66	8.55	0.013	30	133.62	0.0041	595.84	595.29	1.78	26.28	0.000	598.11	601.19	2.85	3.30	601.09	598.06	
11	113-110	113	0.00	1.17	0.0	0.56	10.8	0.00	5.28	0.00	0.00	1.06	5.58	0.013	24	60.58	0.0254	597.63	596.09	3.13	36.01	0.003	598.46	602.33	2.70	3.10	601.19	598.12	
12	113A-113	113A	0.59	0.59	10.0	0.85	10.0	5.47	5.47	0.90	0.53	0.53	2.88	0.013	18	83.04	0.0084	598.88	598.18	4.24	9.64	0.005	599.53	602.33	1.95	2.65	602.33	598.76	
13	113B-113	113B	0.59	0.59	10.0	0.82	10.0	5.47	5.47	0.90	0.53	0.53	2.89	0.013	18	80.90	0.0105	598.78	597.93	4.40	10.76	0.004	599.43	602.53	2.25	2.90	602.33	598.49	
14	112-101	112	0.19	0.19	10.0	1.33	10.0	5.47	5.47	0.90	0.17	0.17	0.95	0.013	12	95.99	0.0299	600.38	597.51	4.24	6.16	0.006	600.79	604.86	3.48	3.15	601.66	597.79	
15	111-101	111	0.19	0.19	10.0	1.48	10.0	5.47	5.47	0.90	0.17	0.17	0.94	0.013	12	106.41	0.025	600.22	597.56	4.08	5.63	0.006	600.63	604.92	3.70	3.10	601.66	597.85	
16	103C-103	103C	0.47	1.68	10.0	0.37	11.3	5.47	5.19	0.90	0.42	1.51	7.83	0.013	18	99.82	0.005	597.35	596.85	4.75	7.42	0.005	598.67	602.52	3.67	2.83	601.18	598.17	
17	103G-103C	103G	0.44	0.58	10.0	0.31	10.8	5.47	5.29	0.90	0.39	0.53	2.78	0.013	15	43.00	0.005	597.57	597.35	2.27	4.57	0.002	599.02	605.78	6.97	3.92	602.52	598.94	
18	103H-103G	103H	0.15	0.15	10.0	0.81	10.0	5.47	5.47	0.90	0.13	0.13	0.73	0.013	12	45.33	0.005	598.05	597.82	0.93	2.52	0.000	599.11	602.41	3.37	6.96	605.78	599.09	
19	103D-103C	103D	0.62	0.62	10.0	1.25	10.0	5.47	5.47	0.90	0.56	0.56	3.06	0.013	18	130.00	0.005	598.00	597.35	2.00	7.43	0.001	599.07	602.52	3.02	3.67	602.52	598.98	
20	103A-103	103A	0.47	1.75	10.0	0.35	11.3	5.47	5.19	0.90	0.42	1.57	8.18	0.013	18	99.82	0.005	597.35	596.85	4.63	7.42	0.006	598.96	602.52	3.67	2.83	601.18	598.35	
21	103E-103A	103E	0.51	0.66	10.0	0.27	10.8	5.47	5.29	0.90	0.46	0.60	3.15	0.013	15	43.00	0.005	597.57	597.35	2.57	4.57	0.002	599.29	605.77	6.96	3.92	602.52	599.19	
22	103F-103E	103F	0.15	0.15	10.0	0.81	10.0	5.47	5.47	0.90	0.13	0.13	0.73	0.013	12	45.33	0.005	597.80	597.57	0.93	2.52	0.000	599.40	602.41	3.61	7.20	605.77	599.38	
23	103B-103A	103B	0.62	0.62	10.0	1.25	10.0	5.47	5.47	0.90	0.56	0.56	3.06	0.013	18	130.00	0.005	598.00	597.35	1.78	7.43	0.001	599.34	602.52	3.02	3.67	602.52	599.24	
24	104C-104	104C	0.47	0.93	10.0	0.59	11.3	5.47	5.18	0.90	0.42	0.84	4.35	0.013	18	90.12	0.005	597.48	597.03	4.36	7.43	0.005	598.31	602.52	3.54	2.61	601.14	597.85	
25	104D-104C	104D	0.47	0.47	10.0	1.34	10.0	5.47	5.47	0.90	0.42	0.42	2.29	0.013	18	104.00	0.005	598.00	597.48	2.41	7.43	0.002	598.65	602.52	3.02	3.54	602.52	598.56	
26	104A-104	104A	0.47	0.93	10.0	0.60	11.3	5.47	5.18	0.90	0.42	0.84	4.35	0.013	18	90.12	0.005	597.48	597.03	4.36	7.43	0.005	598.31	602.52	3.54	2.61	601.14	597.85	
27	104B-104A	104B	0.47	0.47	10.0	1.34	10.0	5.47	5.47	0.90	0.42	0.42	2.29	0.013	18	104.00	0.005	598.00	597.48	2.41	7.43	0.002	598.65	602.52	3.02	3.54	602.52	598.56	
28	106E-106	106E	0.00	1.57	0.0	0.35	10.8	0.00	5.29	0.00	0.00	1.41	7.47	0.013	18	90.06	0.005	597.48	597.03	4.79	7.43	0.005	598.72	602.52	3.54	2.64	601.17	598.27	
29	106F-106E	106F	0.79	0.79	10.0	0.79	10.0	5.47	5.47	0.90	0.71	0.71	3.88	0.013	18	104.00	0.005	598.00	597.48	2.47	7.43	0.002	599.11	602.52	3.02	3.54	602.52	599.00	
30	106D-106E	106D	0.78	0.78	10.0	0.80	10.0	5.47	5.47	0.90	0.70	0.70	3.84	0.013	18	104.00	0.005	598.00	597.48	2.45	7.43	0.001	599.11	602.52	3.02	3.54	602.52	599.00	
31	106B-106	106B	0.00	1.57	0.0	0.35	10.8	0.00	5.29	0.00	0.00	1.41	7.48	0.013	18	90.06	0.005	597.48	597.03	4.79	7.43	0.005	598.72	602.52	3.54	2.64	601.17	598.27	
32	106C-106B	106C	0.79	0.79	10.0	0.79	10.0	5.47	5.47	0.90	0.71	0.71	3.88	0.013	18	104.00	0.005	598.00	597.48	2.47	7.43	0.002	599.12	602.52	3.02	3.54	602.52	599.00	
33	106a-106b	106A	0.78	0.78	10.0	0.79	10.0	5.47	5.47	0.90	0.70	0.70	3.85	0.013	18	104.00	0.005	598.00	597.48	2.46	7.43	0.001	599.12	602.52	3.02	3.54	602.52	599.00	
34	107C-107	107C	0.62	1.24	10.0	0.46	11.5	5.47	5.14	0.90	0.56	1.12	5.76	0.013	18	91.95	0.005	597.22	596.76	4.64	7.43	0.005	598.21	602.52	3.80	2.87	601.13	597.75	

Notes: IDF File = 160651.002.idf, Return Period = 10-yrs.

Project File: 002-100 STM.sws

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.7

Project Name: 002-100 STM

04-24-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Total Runoff (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
35	107D-107C	107D	0.62	0.62	10.0	1.50	10.0	5.47	5.47	0.90	0.56	0.56	3.06	0.013	18	156.00	0.005	598.00	597.22	2.79	7.43	0.002	598.72	602.52	3.02	3.80	602.52	598.49	
36	107A-107	107A	0.62	1.24	10.0	0.46	11.5	5.47	5.14	0.90	0.56	1.12	5.75	0.013	18	91.95	0.005	597.22	596.76	4.64	7.43	0.005	598.21	602.52	3.80	2.87	601.13	597.75	
37	107B-107A	107B	0.62	0.62	10.0	1.50	10.0	5.47	5.47	0.90	0.56	0.56	3.06	0.013	18	156.00	0.005	598.00	597.22	2.79	7.43	0.002	598.72	602.52	3.02	3.80	602.52	598.49	
38	109C-109	109C	0.81	1.65	10.0	0.38	11.7	5.47	5.10	0.90	0.73	1.48	7.55	0.013	18	98.94	0.005	595.98	595.49	4.27	7.42	0.005	598.34	602.52	5.04	4.10	601.09	597.83	
39	109D-109C	109D	0.83	0.83	10.0	1.73	10.0	5.47	5.47	0.90	0.75	0.75	4.10	0.013	18	240.33	0.005	597.18	595.98	2.32	7.43	0.002	598.90	605.75	7.07	5.04	602.52	598.54	
40	109A-109	109A	0.81	1.65	10.0	0.38	11.7	5.47	5.10	0.90	0.73	1.48	7.55	0.013	18	98.94	0.005	595.98	595.49	4.27	7.42	0.005	598.34	602.52	5.04	4.10	601.09	597.83	
41	109B-109A	109B	0.83	0.83	10.0	1.73	10.0	5.47	5.47	0.90	0.75	0.75	4.10	0.013	18	240.33	0.005	597.18	595.98	2.32	7.43	0.002	598.90	605.73	7.05	5.04	602.52	598.54	

Notes: IDF File = 160651.002.idf, Return Period = 10-yrs.

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.7

Project Name: 002-100 STM

04-24-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Total Runoff (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
1	310-311	311	0.32	0.93	10.0	0.07	13.5	5.47	4.77	0.90	0.29	0.84	3.99	0.013	12	21.53	-0.0005	597.18	597.19	5.08	n/a	0.013	598.46	602.48	4.30	0.31	598.50	598.19	
2	311-312	312	0.30	0.61	10.0	0.35	13.2	5.47	4.83	0.90	0.27	0.55	2.64	0.013	12	73.32	0.0093	597.86	597.18	3.36	3.43	0.005	599.09	603.96	5.10	4.30	602.48	598.69	
3	312-313	313	0.05	0.30	10.0	1.20	12.0	5.47	5.05	0.90	0.05	0.27	1.38	0.013	12	131.72	0.01	599.18	597.86	2.65	3.57	0.004	599.68	604.53	4.35	5.10	603.96	599.22	
4	313-314	314	0.10	0.25	10.0	1.15	10.8	5.47	5.28	0.90	0.09	0.23	1.20	0.013	12	107.25	0.0129	600.56	599.18	2.83	4.04	0.004	601.03	604.36	2.80	4.35	604.53	599.81	
5	314-315	315	0.15	0.15	10.0	0.82	10.0	5.47	5.47	0.90	0.13	0.13	0.72	0.013	12	45.43	0.0086	600.95	600.56	2.13	3.30	0.003	601.31	604.35	2.40	2.80	604.36	601.17	
6	370-371	371	1.83	6.06	10.0	0.42	14.0	5.47	4.70	0.90	1.64	5.45	25.61	0.013	30	125.74	0.0097	593.07	591.85	6.23	40.39	0.005	594.76	601.20	5.63	0.50	594.85	594.35	
7	371-372	372	1.52	4.23	10.0	0.40	13.6	5.47	4.76	0.90	1.37	3.80	18.13	0.013	24	134.00	0.01	594.91	593.57	7.13	22.62	0.008	596.42	601.20	4.29	5.63	601.20	595.08	
8	372-373	373	2.20	2.71	10.0	0.60	13.0	5.47	4.87	0.90	1.98	2.44	11.88	0.013	24	134.00	0.0096	596.20	594.91	4.85	22.19	0.004	597.42	601.20	3.00	4.29	601.20	596.99	
9	373-374	374	0.00	0.51	0.0	1.22	11.7	0.00	5.10	0.00	0.00	0.46	2.36	0.013	12	218.01	0.0097	599.31	597.20	4.56	3.50	0.008	599.96	604.55	4.24	3.00	601.20	597.80	
10	374-375	375	0.13	0.51	10.0	0.74	11.0	5.47	5.25	0.90	0.12	0.46	2.43	0.013	12	138.08	0.005	600.00	599.31	3.65	2.52	0.005	600.79	605.47	4.47	4.24	604.55	600.10	
11	375-376	376	0.38	0.38	10.0	1.00	10.0	5.47	5.47	0.90	0.34	0.34	1.87	0.013	12	142.75	0.005	600.72	600.00	3.03	2.52	0.004	601.35	605.58	3.86	4.47	605.47	600.91	
12	300-301	301	0.17	0.40	10.0	0.15	10.8	5.47	5.29	0.90	0.15	0.36	1.88	0.013	12	21.53	-0.006	598.67	598.80	2.40	n/a	0.003	599.86	603.32	3.65	0.39	600.19	599.80	
13	301-302	302	0.23	0.23	10.0	0.81	10.0	5.47	5.47	0.90	0.20	0.20	1.11	0.013	12	69.22	0.0117	599.68	598.87	2.34	3.85	0.003	600.13	604.14	3.46	3.45	603.32	599.92	
14	320-321	321	0.31	0.95	10.0	0.31	11.6	5.47	5.13	0.90	0.28	0.86	4.39	0.013	12	105.72	0.0199	596.24	594.14	6.51	5.02	0.014	597.12	601.99	4.75	1.05	596.19	594.88	
15	321-322	322	0.17	0.37	10.0	1.15	10.4	5.47	5.38	0.90	0.16	0.34	1.81	0.013	12	159.82	0.0094	597.84	596.34	3.11	3.45	0.005	598.41	602.04	3.20	4.65	601.99	597.60	
16	322-322A	322A	0.20	0.20	10.0	0.41	10.0	5.47	5.47	0.90	0.18	0.18	0.98	0.013	12	30.45	0.003	598.18	598.09	2.47	1.94	0.003	598.68	602.08	2.90	2.95	602.04	598.59	
17	321-321A	321A	0.27	0.27	10.0	0.37	10.0	5.47	5.47	0.90	0.24	0.24	1.33	0.013	12	37.63	0.0104	597.38	596.99	3.07	3.63	0.004	597.87	601.83	3.45	4.00	601.99	597.60	
18	340-341	341	0.52	0.65	10.0	0.09	12.1	5.47	5.02	0.90	0.47	0.59	2.95	0.013	12	22.15	0.0104	597.23	597.00	3.89	3.63	0.007	598.11	602.70	4.47	0.51	598.51	598.00	
19	341-342	342	0.13	0.13	10.0	2.12	10.0	5.47	5.47	0.90	0.12	0.12	0.66	0.013	12	106.33	0.01	598.29	597.23	1.79	3.55	0.003	598.63	603.30	4.01	4.47	602.70	598.35	
20	330-331	331	0.48	0.84	10.0	0.13	10.4	5.47	5.37	0.90	0.43	0.76	4.08	0.013	15	25.10	0.0104	596.26	596.00	3.52	6.57	0.004	597.31	602.70	5.19	0.69	597.94	597.25	
21	331-332	332	0.36	0.36	10.0	0.43	10.0	5.47	5.47	0.90	0.33	0.33	1.79	0.013	12	59.11	0.01	597.10	596.51	3.12	3.56	0.004	597.67	604.85	6.75	5.19	602.70	597.44	
22	350-351	351	1.60	1.60	10.0	0.25	10.0	5.47	5.47	0.90	1.44	1.44	7.87	0.013	18	65.72	0.01	596.70	596.04	5.13	10.50	0.007	597.77	601.20	3.00	0.50	598.05	597.54	
23	360-361	361	1.43	3.84	10.0	0.36	11.6	5.47	5.13	0.90	1.28	3.46	17.74	0.013	24	120.05	0.01	593.27	592.07	6.35	22.62	0.007	594.76	601.20	5.93	0.50	594.57	594.07	
24	361-362	362	1.83	2.41	10.0	0.61	11.0	5.47	5.26	0.90	1.64	2.17	11.42	0.013	24	134.00	0.01	594.61	593.27	4.73	22.62	0.004	595.81	601.20	4.59	5.93	601.20	595.33	
25	362-363	363	0.59	0.59	10.0	0.95	10.0	5.47	5.47	0.90	0.53	0.53	2.88	0.013	15	134.00	0.01	596.70	595.36	3.74	6.46	0.005	597.38	601.20	3.25	4.59	601.20	596.21	

Notes: IDF File = 160651.002.idf, Return Period = 10-yrs.

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc System (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Flow Rate (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
35	510D-510E	510E	0.310	0.310	10.0	1.59	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	77.58	0.01	598.94	598.16	2.08	11.38	0.002	599.39	603.01	2.57	3.35	603.01	599.29	
36	510-510A	510A	0.320	0.868	10.0	0.68	11.6	5.15	4.92	0.90	0.29	0.78	3.84	0.012	18	91.58	0.0075	598.16	597.47	4.16	9.85	0.004	598.91	603.01	3.35	2.73	601.70	598.28	
37	510A-510C	510C	0.238	0.238	10.0	1.56	10.0	5.15	5.15	0.90	0.21	0.21	1.10	0.012	18	58.36	0.01	598.74	598.16	1.70	11.38	0.001	599.19	606.34	6.10	3.35	603.01	599.19	
38	510D-510F	510F	0.238	0.238	10.0	1.57	10.0	5.15	5.15	0.90	0.21	0.21	1.10	0.012	18	58.76	0.01	598.75	598.16	1.34	11.38	0.001	599.29	606.34	6.09	3.35	603.01	599.30	
39	510A-510B	510B	0.310	0.310	10.0	1.06	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	52.00	0.01	598.68	598.16	2.04	11.38	0.002	599.16	603.01	2.83	3.35	603.01	599.18	
40	203A-406	EX 203A	0.152	0.641	10.0	0.34	10.5	5.15	5.08	0.90	0.14	0.58	2.93	0.012	18	33.59	0.0137	597.55	597.09	3.96	13.32	0.004	598.20	602.66	3.61	6.69	605.28	597.74	
41	203C-203A	EX 203C	0.152	0.489	10.0	0.19	10.3	5.15	5.11	0.90	0.14	0.44	2.25	0.013	12	32.01	0.0134	598.33	597.90	4.27	4.13	0.007	598.97	602.65	3.32	3.76	602.66	598.54	
42	203B-203C	EX 203B	0.336	0.336	10.0	0.29	10.0	5.15	5.15	0.90	0.30	0.30	1.56	0.013	12	34.35	0.0492	600.02	598.33	2.96	7.90	0.004	600.55	604.58	3.56	3.32	602.65	599.17	
43	600-601	601	0.384	0.601	10.0	0.11	10.5	5.15	5.07	0.90	0.35	0.54	2.74	0.013	12	22.15	0.0438	598.22	597.25	4.65	7.45	0.008	598.92	602.81	3.59	0.67	598.92	597.95	
44	601-602	602	0.217	0.217	10.0	0.51	10.0	5.15	5.15	0.90	0.20	0.20	1.01	0.013	12	38.80	0.0512	600.20	598.22	2.22	8.06	0.003	600.63	605.38	4.17	3.59	602.81	599.23	
45	208A-411	EX 208A	0.152	1.133	10.0	0.35	11.8	5.15	4.88	0.90	0.14	1.02	4.98	0.012	24	33.61	0.0034	596.72	596.61	1.61	14.29	0.000	598.59	602.71	3.99	7.31	605.91	598.58	
46	208B-208A	EX 208B	0.247	0.827	10.0	1.04	10.8	5.15	5.03	0.90	0.22	0.74	3.75	0.012	18	133.15	0.0047	597.80	597.17	2.83	7.83	0.002	598.68	602.71	3.41	4.04	602.71	598.56	
47	208D-208B	EX 208D	0.366	0.580	10.0	0.16	10.6	5.15	5.06	0.90	0.33	0.52	2.64	0.013	12	32.00	0.0097	598.21	597.90	4.27	3.50	0.007	598.90	602.67	3.46	3.81	602.71	598.69	
48	208C-208D	EX 208C	0.215	0.215	10.0	0.61	10.0	5.15	5.15	0.90	0.19	0.19	0.99	0.013	12	46.71	0.0501	600.55	598.21	2.21	7.97	0.003	600.97	605.13	3.58	3.46	602.67	599.20	
49	207A-410	EX 207A	0.152	0.698	10.0	0.31	10.8	5.15	5.04	0.90	0.14	0.63	3.17	0.012	18	33.58	0.0067	597.47	597.25	2.36	9.30	0.001	598.44	602.64	3.67	6.98	605.73	598.44	
50	207C-207A	EX 207C	0.156	0.546	10.0	0.17	10.6	5.15	5.06	0.90	0.14	0.49	2.49	0.013	12	32.02	0.0106	598.21	597.87	4.46	3.67	0.008	598.88	602.72	3.51	3.77	602.64	598.54	
51	207B-207C	EX 207B	0.390	0.390	10.0	0.58	10.0	5.15	5.15	0.90	0.35	0.35	1.81	0.013	12	80.50	0.034	600.95	598.21	3.19	6.57	0.005	601.52	604.61	2.66	3.51	602.72	599.09	
52	202A-404	EX 202A	0.140	0.342	10.0	0.28	10.4	5.15	5.08	0.90	0.13	0.31	1.56	0.013	12	33.57	0.0021	598.17	598.10	2.37	1.63	0.002	598.95	602.63	3.46	6.67	605.77	598.88	
53	202B-202A	EX 202B	0.202	0.202	10.0	0.45	10.0	5.15	5.15	0.90	0.18	0.18	0.93	0.013	12	32.00	0.0075	598.41	598.17	1.59	3.08	0.001	599.02	602.73	3.32	3.46	602.63	599.01	
54	507-507A	507A	0.310	1.251	10.0	0.55	11.1	5.15	4.99	0.90	0.28	1.13	5.62	0.012	18	105.43	0.0075	597.85	597.06	5.04	9.85	0.005	598.76	603.01	3.66	3.14	601.70	597.97	
55	507A-507B	507B	0.630	0.630	10.0	1.05	10.0	5.15	5.15	0.90	0.57	0.57	2.92	0.012	18	104.00	0.0075	598.63	597.85	2.91	9.85	0.002	599.28	603.01	2.88	3.66	603.01	599.10	
56	507A-507C	507C	0.310	0.310	10.0	1.06	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	52.00	0.0075	598.24	597.85	1.10	9.85	0.000	599.14	603.01	3.27	3.66	603.01	599.14	
57	206A-409	EX 206A	0.152	0.638	10.0	0.34	10.5	5.15	5.08	0.90	0.14	0.57	2.92	0.012	18	33.64	0.0072	597.37	597.13	2.67	9.65	0.002	598.15	602.58	3.71	6.61	605.24	598.17	
58	206C-206A	EX 206C	0.152	0.486	10.0	0.19	10.3	5.15	5.11	0.90	0.14	0.44	2.23	0.013	12	32.00	0.0069	598.09	597.87	4.13	2.95	0.007	598.74	602.60	3.51	3.71	602.58	598.52	
59	206B-206C	EX 206B	0.333	0.333	10.0	0.29	10.0	5.15	5.15	0.90	0.30	0.30	1.55	0.013	12	34.46	0.0528	599.91	598.09	2.94	8.18	0.004	600.44	604.52	3.61	3.51	602.60	598.93	
60	507-507D	507D	0.315	1.253	10.0	0.49	11.1	5.15	4.99	0.90	0.28	1.13	5.63	0.012	18	94.53	0.0075	597.77	597.06	5.05	9.87	0.005	598.68	603.01	3.74	3.14	601.70	597.97	
61	507D-507E	507E	0.628	0.628	10.0	1.05	10.0	5.15	5.15	0.90	0.56	0.56	2.91	0.012	18	104.00	0.0075	598.55	597.77	2.90	9.84	0.002	599.20	603.01	2.96	3.74	603.01	599.02	
62	507D-507F	507F	0.310	0.310	10.0	1.06	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	52.00	0.0075	598.16	597.77	1.10	9.85	0.000	599.06	603.01	3.35	3.74	603.01	599.06	
63	504-504D	504D	0.311	1.750	10.0	0.34	10.7	5.15	5.04	0.90	0.28	1.58	7.94	0.012	18	91.23	0.0075	596.84	596.15	5.85	9.86	0.007	597.91	603.01	4.67	4.05	601.70	597.23	
64	504D-504E	504E	1.128	1.128	10.0	0.67	10.0	5.15	5.15	0.90	1.01	1.01	5.23	0.012	18	119.62	0.0075	597.74	596.84	3.94	9.86	0.004	598.61	606.01	6.77	4.67	603.01	598.31	
65	504E-DS	Null Structure	0.000	0.000	0.0	0.38	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.012	18	46.18	0.0075	598.09	597.74	0.00	9.85	0.000	598.09	0.00	n/a	6.77	606.01	597.74	
66	205A-408	EX 205A	0.152	0.310	10.0	0.31	10.6	5.15	5.06	0.90	0.14	0.28	1.41	0.013	12	33.56	0.0051	597.88	597.71	3.33	2.55	0.005	598.41	602.69	3.81	7.15	605.86	598.24	
67	205B-205A	EX 205B	0.158	0.158	10.0	0.57	10.0	5.15	5.15	0.90	0.14	0.14	0.73	0.013	12	32.02	0.0075	598.22	597.98	2.22	3.08	0.003	598.59	602.58	3.36	3.71	602.69	598.54	
68	204A-406	406A	0.152	0.640	10.0	0.62	10.8	5.15	5.03	0.90	0.14	0.58	2.90	0.012	18	61.20	0.0033	597.09	596.89	3.59	6.53	0.003	597.79	602.04	3.45	7.63	606.02	597.59	

Notes: IDF File = Butler County Subdiv Reg IDF Curve.idf, Return Period = 10-yrs.

Project File: 010-STM.sws

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc System (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Flow Rate (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
69	204C-204A	EX 204C	0.181	0.488	10.0	0.21	10.6	5.15	5.06	0.90	0.16	0.44	2.22	0.013	12	35.34	0.0025	597.83	597.74	2.83	1.80	0.004	598.83	602.84	4.01	3.30	602.04	598.74	
70	204B-204C	EX 204B	0.307	0.307	10.0	0.59	10.0	5.15	5.15	0.90	0.28	0.28	1.42	0.013	12	64.48	0.0324	599.92	597.83	2.69	6.41	0.004	600.43	604.48	3.56	4.01	602.84	598.90	
71	208E-208A	EX 208E	0.154	0.154	10.0	0.59	10.0	5.15	5.15	0.90	0.14	0.14	0.71	0.013	12	32.00	0.0134	598.20	597.77	1.69	4.13	0.002	598.61	602.86	3.66	3.94	602.71	598.62	
72	505-505A	505A	0.310	1.251	10.0	0.49	11.0	5.15	5.00	0.90	0.28	1.13	5.63	0.012	18	92.78	0.0075	597.32	596.62	5.05	9.85	0.005	598.22	603.01	4.19	3.58	601.70	597.53	
73	505A-505B	505B	0.940	0.940	10.0	0.98	10.0	5.15	5.15	0.90	0.85	0.85	4.36	0.012	18	144.39	0.0075	598.40	597.32	3.77	9.85	0.003	599.20	603.01	3.11	4.19	603.01	598.48	
74	505-505C	505C	0.311	1.247	10.0	0.48	11.1	5.15	4.99	0.90	0.28	1.12	5.60	0.012	18	91.25	0.0075	597.31	596.62	5.04	9.87	0.005	598.21	603.01	4.20	3.58	601.70	597.53	
75	505C-505D	505D	0.936	0.936	10.0	1.06	10.0	5.15	5.15	0.90	0.84	0.84	4.34	0.012	18	156.00	0.0075	598.48	597.31	3.76	9.85	0.003	599.27	603.01	3.03	4.20	603.01	598.47	
76	501-516	516	0.296	0.296	10.0	1.36	10.0	5.15	5.15	0.90	0.27	0.27	1.37	0.013	12	142.59	0.0085	598.56	597.35	3.52	3.28	0.006	599.06	605.22	5.65	3.85	602.20	597.85	
77	504D-504F	504F	0.311	0.311	10.0	0.74	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	15	52.00	0.0075	597.48	597.09	1.30	6.06	0.000	598.44	603.01	4.28	4.67	603.01	598.43	
78	501-515	515	0.268	0.268	10.0	1.29	10.0	5.15	5.15	0.90	0.24	0.24	1.24	0.013	12	122.35	0.0091	598.21	597.10	3.40	3.39	0.006	598.68	605.16	5.95	4.10	602.20	597.57	
79	504-504A	504A	0.312	0.934	10.0	0.68	11.1	5.15	4.99	0.90	0.28	0.84	4.20	0.012	18	98.87	0.0075	596.84	596.10	4.17	9.85	0.004	597.62	603.01	4.67	4.10	601.70	596.99	
80	504A-504C	504C	0.311	0.311	10.0	1.06	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	52.00	0.0075	597.23	596.84	1.45	9.86	0.001	597.91	603.01	4.28	4.67	603.01	597.92	
81	504A-504B	504B	0.311	0.311	10.0	1.06	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	52.00	0.0075	597.23	596.84	1.45	9.86	0.001	597.91	603.01	4.28	4.67	603.01	597.92	
82	503-503A	503A	0.310	1.283	10.0	0.46	11.1	5.15	4.99	0.90	0.28	1.15	5.76	0.012	18	91.97	0.0075	596.37	595.68	4.85	9.85	0.005	597.29	603.01	5.14	4.52	601.70	596.68	
83	503A-503B	503B	0.662	0.662	10.0	0.41	10.0	5.15	5.15	0.90	0.60	0.60	3.07	0.012	18	43.01	0.0075	596.69	596.37	2.29	9.85	0.001	597.63	606.01	7.82	5.14	603.01	597.63	
84	503B-DS	Null Structure	0.000	0.000	0.0	0.38	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.012	18	46.13	0.0075	597.04	596.69	0.00	9.85	0.000	597.04	0.00	n/a	7.82	606.01	596.69	
85	503A-503C	503C	0.310	0.310	10.0	1.06	10.0	5.15	5.15	0.90	0.28	0.28	1.44	0.012	18	51.99	0.0075	596.76	596.37	1.07	9.85	0.000	597.68	603.01	4.75	5.14	603.01	597.68	

Notes: IDF File = Butler County Subdiv Reg IDF Curve.idf, Return Period = 10-yrs.

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.7

Project Name: 002-100 STM

04-24-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Total Runoff (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
1	101-100	101	0.28	21.61	10.0	0.08	16.0	6.14	4.93	0.90	0.25	19.45	95.98	0.013	48	33.09	0.01	591.01	590.68	7.73	143.46	0.004	594.77	601.66	6.65	0.82	595.50	594.68	
2	102-101	102	0.38	20.95	10.0	0.28	15.8	6.14	4.98	0.90	0.34	18.86	93.87	0.013	48	113.28	0.0039	591.45	591.01	7.58	89.53	0.004	595.27	601.05	5.60	6.65	601.66	594.86	
3	103-102	103	0.65	20.57	10.0	0.38	15.4	6.14	5.04	0.90	0.58	18.52	93.28	0.013	48	157.26	0.0008	591.58	591.45	7.42	41.31	0.004	596.11	601.18	5.60	5.60	601.05	595.45	
4	104-103	104	0.65	16.50	10.0	0.39	15.0	6.14	5.10	0.90	0.58	14.85	75.78	0.013	48	134.18	0.0019	592.24	591.98	6.03	63.32	0.003	596.78	601.14	4.90	5.20	601.18	596.40	
5	105-104	105	0.65	13.99	10.0	0.44	14.5	6.14	5.18	0.90	0.58	12.59	65.19	0.013	48	131.67	0.0024	592.86	592.54	5.19	70.57	0.002	597.20	601.16	4.30	4.60	601.14	596.93	
6	106-105	106	0.65	13.34	10.0	0.47	14.1	6.14	5.26	0.90	0.58	12.01	63.16	0.013	48	136.32	0.0004	593.17	593.11	5.03	30.17	0.002	597.49	601.17	4.00	4.05	601.16	597.22	
7	107-106	107	0.65	9.56	10.0	0.47	13.6	6.14	5.35	0.90	0.58	8.60	45.99	0.013	42	133.83	0.0042	593.88	593.32	4.78	65.12	0.002	597.80	601.13	3.75	4.35	601.17	597.52	
8	107-108	108	0.65	6.42	10.0	0.68	12.9	6.14	5.48	0.90	0.58	5.78	31.67	0.013	42	133.81	0.0044	594.57	593.98	3.29	66.80	0.001	598.12	601.02	2.95	3.65	601.13	597.99	
9	109-108	109	0.65	5.78	10.0	0.54	12.4	6.14	5.59	0.90	0.58	5.20	29.06	0.013	36	134.11	0.0046	595.29	594.67	4.11	45.36	0.002	598.28	601.09	2.80	3.35	601.02	598.03	
10	110-109	110	0.67	1.84	10.0	1.12	11.3	6.14	5.83	0.90	0.60	1.66	9.66	0.013	30	133.62	0.0041	595.84	595.29	1.97	26.28	0.001	598.55	601.19	2.85	3.30	601.09	598.48	
11	113-110	113	0.00	1.17	0.0	0.50	10.8	0.00	5.95	0.00	0.00	1.06	6.28	0.013	24	60.58	0.0254	597.63	596.09	3.33	36.01	0.003	598.51	602.33	2.70	3.10	601.19	598.55	
12	113A-113	113A	0.59	0.59	10.0	0.76	10.0	6.14	6.14	0.90	0.53	0.53	3.23	0.013	18	83.04	0.0084	598.88	598.18	4.40	9.64	0.005	599.57	602.33	1.95	2.65	602.33	598.80	
13	113B-113	113B	0.59	0.59	10.0	0.73	10.0	6.14	6.14	0.90	0.53	0.53	3.25	0.013	18	80.90	0.0105	598.78	597.93	4.55	10.76	0.004	599.47	602.53	2.25	2.90	602.33	598.52	
14	112-101	112	0.19	0.19	10.0	1.18	10.0	6.14	6.14	0.90	0.17	0.17	1.06	0.013	12	95.99	0.0299	600.38	597.51	4.40	6.16	0.006	600.82	604.86	3.48	3.15	601.66	597.80	
15	111-101	111	0.19	0.19	10.0	1.32	10.0	6.14	6.14	0.90	0.17	0.17	1.06	0.013	12	106.41	0.025	600.22	597.56	4.25	5.63	0.006	600.66	604.92	3.70	3.10	601.66	597.86	
16	103C-103	103C	0.47	1.68	10.0	0.33	11.1	6.14	5.86	0.90	0.42	1.51	8.84	0.013	18	99.82	0.005	597.35	596.85	5.00	7.42	0.007	599.06	602.52	3.67	2.83	601.18	598.35	
17	103G-103C	103G	0.44	0.58	10.0	0.28	10.7	6.14	5.96	0.90	0.39	0.53	3.13	0.013	15	43.00	0.005	597.57	597.35	2.55	4.57	0.002	599.45	605.78	6.97	3.92	602.52	599.35	
18	103H-103G	103H	0.15	0.15	10.0	0.72	10.0	6.14	6.14	0.90	0.13	0.13	0.82	0.013	12	45.33	0.005	598.05	597.82	1.05	2.52	0.001	599.56	602.41	3.37	6.96	605.78	599.53	
19	103D-103C	103D	0.62	0.62	10.0	1.12	10.0	6.14	6.14	0.90	0.56	0.56	3.43	0.013	18	130.00	0.005	598.00	597.35	1.94	7.43	0.001	599.50	602.52	3.02	3.67	602.52	599.39	
20	103A-103	103A	0.47	1.75	10.0	0.32	11.1	6.14	5.86	0.90	0.42	1.57	9.23	0.013	18	99.82	0.005	597.35	596.85	5.22	7.42	0.008	599.12	602.52	3.67	2.83	601.18	598.35	
21	103E-103A	103E	0.51	0.66	10.0	0.24	10.7	6.14	5.96	0.90	0.46	0.60	3.55	0.013	15	43.00	0.005	597.57	597.35	2.89	4.57	0.003	599.55	605.77	6.96	3.92	602.52	599.42	
22	103F-103E	103F	0.15	0.15	10.0	0.72	10.0	6.14	6.14	0.90	0.13	0.13	0.82	0.013	12	45.33	0.005	597.80	597.57	1.04	2.52	0.001	599.68	602.41	3.61	7.20	605.77	599.66	
23	103B-103A	103B	0.62	0.62	10.0	1.11	10.0	6.14	6.14	0.90	0.56	0.56	3.44	0.013	18	130.00	0.005	598.00	597.35	1.94	7.43	0.001	599.63	602.52	3.02	3.67	602.52	599.49	
24	104C-104	104C	0.47	0.93	10.0	0.53	11.2	6.14	5.85	0.90	0.42	0.84	4.91	0.013	18	90.12	0.005	597.48	597.03	4.49	7.43	0.005	598.37	602.52	3.54	2.61	601.14	597.92	
25	104D-104C	104D	0.47	0.47	10.0	1.19	10.0	6.14	6.14	0.90	0.42	0.42	2.57	0.013	18	104.00	0.005	598.00	597.48	2.41	7.43	0.002	598.72	602.52	3.02	3.54	602.52	598.64	
26	104A-104	104A	0.47	0.93	10.0	0.53	11.2	6.14	5.85	0.90	0.42	0.84	4.91	0.013	18	90.12	0.005	597.48	597.03	4.49	7.43	0.005	598.37	602.52	3.54	2.61	601.14	597.92	
27	104B-104A	104B	0.47	0.47	10.0	1.19	10.0	6.14	6.14	0.90	0.42	0.42	2.57	0.013	18	104.00	0.005	598.00	597.48	2.41	7.43	0.002	598.72	602.52	3.02	3.54	602.52	598.64	
28	106E-106	106E	0.00	1.57	0.0	0.32	10.7	0.00	5.96	0.00	0.00	1.41	8.41	0.013	18	90.06	0.005	597.48	597.03	4.76	7.43	0.006	599.11	602.52	3.54	2.64	601.17	598.53	
29	106F-106E	106F	0.79	0.79	10.0	0.70	10.0	6.14	6.14	0.90	0.71	0.71	4.35	0.013	18	104.00	0.005	598.00	597.48	2.46	7.43	0.002	599.50	602.52	3.02	3.54	602.52	599.37	
30	106D-106E	106D	0.78	0.78	10.0	0.71	10.0	6.14	6.14	0.90	0.70	0.70	4.31	0.013	18	104.00	0.005	598.00	597.48	2.44	7.43	0.002	599.50	602.52	3.02	3.54	602.52	599.37	
31	106B-106	106B	0.00	1.57	0.0	0.31	10.7	0.00	5.96	0.00	0.00	1.41	8.43	0.013	18	90.06	0.005	597.48	597.03	4.77	7.43	0.006	599.11	602.52	3.54	2.64	601.17	598.53	
32	106C-106B	106C	0.79	0.79	10.0	0.70	10.0	6.14	6.14	0.90	0.71	0.71	4.35	0.013	18	104.00	0.005	598.00	597.48	2.46	7.43	0.002	599.50	602.52	3.02	3.54	602.52	599.37	
33	106a-106b	106A	0.78	0.78	10.0	0.71	10.0	6.14	6.14	0.90	0.70	0.70	4.32	0.013	18	104.00	0.005	598.00	597.48	2.45	7.43	0.002	599.50	602.52	3.02	3.54	602.52	599.37	
34	107C-107	107C	0.62	1.24	10.0	0.41	11.3	6.14	5.81	0.90	0.56	1.12	6.51	0.013	18	91.95	0.005	597.22	596.76	4.56	7.43	0.005	598.31	602.52	3.80	2.87	601.13	597.94	

Notes: IDF File = 160651.002.idf, Return Period = 25-yrs.

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.7

Project Name: 002-100 STM

04-24-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Total Runoff (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
35	107D-107C	107D	0.62	0.62	10.0	1.34	10.0	6.14	6.14	0.90	0.56	0.56	3.43	0.013	18	156.00	0.005	598.00	597.22	2.80	7.43	0.002	598.80	602.52	3.02	3.80	602.52	598.60	
36	107A-107	107A	0.62	1.24	10.0	0.41	11.3	6.14	5.81	0.90	0.56	1.12	6.50	0.013	18	91.95	0.005	597.22	596.76	4.56	7.43	0.005	598.31	602.52	3.80	2.87	601.13	597.94	
37	107B-107A	107B	0.62	0.62	10.0	1.34	10.0	6.14	6.14	0.90	0.56	0.56	3.44	0.013	18	156.00	0.005	598.00	597.22	2.80	7.43	0.002	598.80	602.52	3.02	3.80	602.52	598.60	
38	109C-109	109C	0.81	1.65	10.0	0.34	11.5	6.14	5.77	0.90	0.73	1.48	8.54	0.013	18	98.94	0.005	595.98	595.49	4.83	7.42	0.007	598.83	602.52	5.04	4.10	601.09	598.18	
39	109D-109C	109D	0.83	0.83	10.0	1.54	10.0	6.14	6.14	0.90	0.75	0.75	4.60	0.013	18	240.33	0.005	597.18	595.98	2.60	7.43	0.002	599.55	605.75	7.07	5.04	602.52	599.09	
40	109A-109	109A	0.81	1.65	10.0	0.34	11.5	6.14	5.77	0.90	0.73	1.48	8.54	0.013	18	98.94	0.005	595.98	595.49	4.83	7.42	0.007	598.83	602.52	5.04	4.10	601.09	598.18	
41	109B-109A	109B	0.83	0.83	10.0	1.54	10.0	6.14	6.14	0.90	0.75	0.75	4.60	0.013	18	240.33	0.005	597.18	595.98	2.60	7.43	0.002	599.55	605.73	7.05	5.04	602.52	599.09	

Notes: IDF File = 160651.002.idf, Return Period = 25-yrs.

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.7

Project Name: 002-100 STM

04-24-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Total Runoff (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
1	310-311	311	0.32	0.93	10.0	0.06	13.1	6.14	5.43	0.90	0.29	0.84	4.54	0.013	12	21.53	-0.0005	597.18	597.19	5.79	n/a	0.016	598.54	602.48	4.30	0.31	598.50	598.19	
2	311-312	312	0.30	0.61	10.0	0.31	12.8	6.14	5.50	0.90	0.27	0.55	3.00	0.013	12	73.32	0.0093	597.86	597.18	3.82	3.43	0.007	599.36	603.96	5.10	4.30	602.48	598.83	
3	312-313	313	0.05	0.30	10.0	1.07	11.8	6.14	5.72	0.90	0.05	0.27	1.57	0.013	12	131.72	0.01	599.18	597.86	2.49	3.57	0.003	599.81	604.53	4.35	5.10	603.96	599.52	
4	313-314	314	0.10	0.25	10.0	1.02	10.7	6.14	5.95	0.90	0.09	0.23	1.35	0.013	12	107.25	0.0129	600.56	599.18	2.89	4.04	0.004	601.06	604.36	2.80	4.35	604.53	599.88	
5	314-315	315	0.15	0.15	10.0	0.73	10.0	6.14	6.14	0.90	0.13	0.13	0.81	0.013	12	45.43	0.0086	600.95	600.56	2.22	3.30	0.003	601.33	604.35	2.40	2.80	604.36	601.21	
6	370-371	371	1.83	6.06	10.0	0.37	13.5	6.14	5.36	0.90	1.64	5.45	29.22	0.013	30	125.74	0.0097	593.07	591.85	6.82	40.39	0.006	594.88	601.20	5.63	0.50	594.85	594.35	
7	371-372	372	1.52	4.23	10.0	0.35	13.2	6.14	5.43	0.90	1.37	3.80	20.65	0.013	24	134.00	0.01	594.91	593.57	7.81	22.62	0.009	596.52	601.20	4.29	5.63	601.20	595.10	
8	372-373	373	2.20	2.71	10.0	0.53	12.6	6.14	5.53	0.90	1.98	2.44	13.50	0.013	24	134.00	0.0096	596.20	594.91	5.25	22.19	0.005	597.51	601.20	3.00	4.29	601.20	597.14	
9	373-374	374	0.00	0.51	0.0	1.08	11.6	0.00	5.76	0.00	0.00	0.46	2.67	0.013	12	218.01	0.0097	599.31	597.20	4.74	3.50	0.008	600.00	604.55	4.24	3.00	601.20	597.86	
10	374-375	375	0.13	0.51	10.0	0.66	10.9	6.14	5.92	0.90	0.12	0.46	2.74	0.013	12	136.06	0.005	600.00	599.31	3.49	2.52	0.006	601.13	605.47	4.47	4.24	604.55	600.31	
11	375-376	376	0.38	0.38	10.0	0.89	10.0	6.14	6.14	0.90	0.34	0.34	2.10	0.013	12	142.75	0.005	600.72	600.00	2.70	2.52	0.003	601.66	605.58	3.86	4.47	605.47	601.20	
12	300-301	301	0.17	0.40	10.0	0.13	10.7	6.14	5.96	0.90	0.15	0.36	2.12	0.013	12	21.53	-0.006	598.67	598.80	2.70	n/a	0.004	599.88	603.32	3.65	0.39	600.19	599.80	
13	301-302	302	0.23	0.23	10.0	0.73	10.0	6.14	6.14	0.90	0.20	0.20	1.25	0.013	12	69.22	0.0117	599.68	598.87	2.50	3.85	0.004	600.15	604.14	3.46	3.45	603.32	599.95	
14	320-321	321	0.31	0.95	10.0	0.28	11.4	6.14	5.80	0.90	0.28	0.86	4.96	0.013	12	105.72	0.0199	596.24	594.14	6.32	5.02	0.019	597.24	601.99	4.75	1.05	596.19	595.14	
15	321-322	322	0.17	0.37	10.0	1.02	10.4	6.14	6.04	0.90	0.16	0.34	2.03	0.013	12	159.82	0.0094	597.84	596.34	3.33	3.45	0.005	598.45	602.04	3.20	4.65	601.99	597.76	
16	322-322A	322A	0.20	0.20	10.0	0.36	10.0	6.14	6.14	0.90	0.18	0.18	1.10	0.013	12	30.45	0.003	598.18	598.09	2.54	1.94	0.003	598.72	602.08	2.90	2.95	602.04	598.63	
17	321-321A	321A	0.27	0.27	10.0	0.33	10.0	6.14	6.14	0.90	0.24	0.24	1.49	0.013	12	37.63	0.0104	597.38	596.99	2.91	3.63	0.004	597.90	601.83	3.45	4.00	601.99	597.80	
18	340-341	341	0.52	0.65	10.0	0.08	11.9	6.14	5.69	0.90	0.47	0.59	3.34	0.013	12	22.15	0.0104	597.23	597.00	4.31	3.63	0.008	598.17	602.70	4.47	0.51	598.51	598.00	
19	341-342	342	0.13	0.13	10.0	1.89	10.0	6.14	6.14	0.90	0.12	0.12	0.74	0.013	12	106.33	0.01	598.29	597.23	1.88	3.55	0.003	598.65	603.30	4.01	4.47	602.70	598.45	
20	330-331	331	0.48	0.84	10.0	0.11	10.4	6.14	6.04	0.90	0.43	0.76	4.59	0.013	15	25.10	0.0104	596.26	596.00	3.92	6.57	0.005	597.33	602.70	5.19	0.69	597.94	597.25	
21	331-332	332	0.36	0.36	10.0	0.39	10.0	6.14	6.14	0.90	0.33	0.33	2.01	0.013	12	59.11	0.01	597.10	596.51	3.32	3.56	0.005	597.70	604.85	6.75	5.19	602.70	597.49	
22	350-351	351	1.60	1.60	10.0	0.22	10.0	6.14	6.14	0.90	1.44	1.44	8.84	0.013	18	65.72	0.01	596.70	596.04	5.51	10.50	0.007	597.86	601.20	3.00	0.50	598.05	597.54	
23	360-361	361	1.43	3.84	10.0	0.32	11.4	6.14	5.80	0.90	1.28	3.46	20.05	0.013	24	120.05	0.01	593.27	592.07	6.94	22.62	0.008	594.86	601.20	5.93	0.50	594.57	594.07	
24	361-362	362	1.83	2.41	10.0	0.55	10.8	6.14	5.93	0.90	1.64	2.17	12.87	0.013	24	134.00	0.01	594.61	593.27	5.11	22.62	0.005	595.88	601.20	4.59	5.93	601.20	595.47	
25	362-363	363	0.59	0.59	10.0	0.85	10.0	6.14	6.14	0.90	0.53	0.53	3.24	0.013	15	134.00	0.01	596.70	595.36	3.78	6.46	0.005	597.42	601.20	3.25	4.59	601.20	596.34	

Notes: IDF File = 160651.002.idf, Return Period = 25-yrs.

Project File: 002-300 STM.sws

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc System (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Flow Rate (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
1	EX200-EX201	EX 201	0.387	7.094	10.0	0.23	17.5	5.75	4.84	0.90	0.35	6.38	30.92	0.012	48	30.09	0.0047	590.97	590.83	2.47	106.13	0.000	594.84	601.92	6.95	0.92	595.75	594.83	
2	EX 201-401	401	0.250	6.707	10.0	0.20	17.3	5.75	4.86	0.90	0.23	6.04	29.36	0.012	30	64.47	0.0138	592.06	591.17	5.98	52.20	0.004	594.66	605.38	10.82	8.25	601.92	594.38	
3	401-402	402	0.050	6.457	10.0	0.35	16.9	5.75	4.90	0.90	0.05	5.81	28.47	0.012	30	111.38	0.0035	592.45	592.06	5.80	26.29	0.004	595.15	605.85	10.90	10.82	605.38	594.69	
4	402-403	403	0.081	6.407	10.0	0.27	16.7	5.75	4.93	0.90	0.07	5.77	28.42	0.012	30	87.94	0.0035	592.76	592.45	5.79	26.38	0.004	595.51	605.55	10.29	10.90	605.85	595.15	
5	403-404	404	0.170	6.326	10.0	0.29	16.4	5.75	4.96	0.90	0.15	5.69	28.23	0.012	30	92.31	0.0035	593.08	592.76	5.75	26.16	0.004	595.89	605.77	10.19	10.29	605.55	595.52	
6	404-405	405	0.321	5.814	10.0	0.44	15.9	5.75	5.01	0.90	0.29	5.23	26.20	0.012	30	134.04	0.0035	593.55	593.08	5.34	26.31	0.003	596.43	605.28	9.23	10.19	605.77	595.96	
7	405-406	406	0.000	4.852	0.0	0.54	15.4	0.00	5.07	0.00	0.00	4.37	22.12	0.012	30	138.81	0.005	594.25	593.55	4.51	31.55	0.002	596.90	606.02	9.27	9.23	605.28	596.56	
8	406-407 (1)	407	0.146	4.212	10.0	0.20	15.2	5.75	5.09	0.90	0.13	3.79	19.29	0.012	30	46.30	0.0052	594.49	594.25	3.93	31.99	0.002	597.07	605.94	8.95	9.27	606.02	596.98	
9	407-408	408	0.163	4.067	10.0	0.42	14.8	5.75	5.14	0.90	0.15	3.66	18.80	0.012	30	93.84	0.005	594.96	594.49	3.94	31.44	0.002	597.21	605.86	8.40	8.95	605.94	597.08	
10	408-409	409	0.334	3.593	10.0	0.43	14.4	5.75	5.19	0.90	0.30	3.23	16.77	0.012	24	133.99	0.0027	595.81	595.45	5.34	12.69	0.005	598.08	605.24	7.43	8.41	605.86	597.45	
11	409-410	410	0.168	2.621	10.0	0.57	13.8	5.75	5.25	0.90	0.15	2.36	12.39	0.012	24	134.01	0.0026	596.16	595.81	3.94	12.57	0.003	598.62	605.73	7.57	7.43	605.24	598.28	
12	410-411	411	0.209	1.755	10.0	0.83	13.0	5.75	5.35	0.90	0.19	1.58	8.46	0.012	24	134.01	0.0033	596.61	596.16	2.69	14.17	0.001	598.91	605.91	7.30	7.57	605.73	598.75	
13	411-412	412	0.141	0.412	10.0	1.03	11.9	5.75	5.49	0.90	0.13	0.37	2.04	0.013	12	162.16	0.0101	600.41	598.78	4.10	3.57	0.007	601.02	605.78	4.37	6.13	605.91	599.39	
14	412-413	413	0.058	0.272	10.0	0.67	11.3	5.75	5.57	0.90	0.05	0.24	1.36	0.013	12	70.65	0.0051	600.77	600.41	2.52	2.54	0.003	601.33	605.82	4.05	4.37	605.78	601.21	
15	413-414	414	0.213	0.213	10.0	1.26	10.0	5.75	5.75	0.90	0.19	0.19	1.10	0.013	12	105.97	0.005	601.30	600.77	2.69	2.52	0.004	601.75	605.30	3.00	4.05	605.82	601.40	
16	500-501	501	0.339	20.564	10.0	0.08	17.4	5.75	4.86	0.90	0.30	18.51	89.85	0.012	48	32.51	0.0035	591.96	591.85	9.09	92.08	0.004	595.05	602.20	6.24	0.92	596.76	594.65	
17	501-502	502	0.183	19.660	10.0	0.23	17.1	5.75	4.88	0.90	0.16	17.69	86.32	0.012	48	83.94	0.0035	592.75	592.46	8.28	91.49	0.003	595.84	601.84	5.09	5.74	602.20	595.55	
18	502-503	503	0.458	19.477	10.0	0.33	16.8	5.75	4.91	0.90	0.41	17.53	86.11	0.012	48	122.61	0.0035	593.18	592.75	8.31	92.47	0.003	596.25	601.70	4.52	5.09	601.84	595.83	
19	503-504	504	0.646	17.736	10.0	0.38	16.4	5.75	4.95	0.90	0.58	15.96	79.07	0.012	48	134.00	0.0035	593.65	593.18	7.20	92.15	0.003	596.82	601.70	4.05	4.52	601.70	596.56	
20	504-505	505	0.646	14.406	10.0	0.46	16.0	5.75	5.00	0.90	0.58	12.97	64.87	0.012	48	134.00	0.0035	594.12	593.65	5.75	92.15	0.002	597.34	601.70	3.58	4.05	601.70	597.20	
21	505-506	506	0.646	11.263	10.0	0.44	15.5	5.75	5.05	0.90	0.58	10.14	51.21	0.012	42	134.00	0.0035	594.59	594.12	5.60	64.56	0.002	597.64	601.70	3.61	4.08	601.70	597.43	
22	506-507	507	0.646	10.617	10.0	0.46	15.1	5.75	5.10	0.90	0.58	9.55	48.76	0.012	42	134.00	0.0035	595.06	594.59	5.65	64.56	0.002	597.87	601.70	3.14	3.61	601.70	597.70	
23	507-508	508	0.646	7.467	10.0	0.64	14.4	5.75	5.18	0.90	0.58	6.72	34.78	0.012	42	134.00	0.0035	595.53	595.06	4.09	64.54	0.001	598.25	601.70	2.67	3.14	601.70	598.18	
24	508-509	509	0.646	4.332	10.0	0.79	13.6	5.75	5.27	0.90	0.58	3.90	20.55	0.012	36	134.00	0.0035	596.00	595.53	3.12	42.81	0.001	598.47	601.70	2.70	3.17	601.70	598.41	
25	509-510	510	0.863	3.686	10.0	0.63	13.0	5.75	5.35	0.90	0.78	3.32	17.74	0.012	30	134.00	0.0035	596.47	596.00	3.82	26.31	0.001	598.59	601.70	2.73	3.20	601.70	598.44	
26	510-511	511	0.254	0.929	10.0	0.57	12.5	5.75	5.42	0.90	0.23	0.84	4.53	0.012	15	125.00	0.008	598.38	597.38	4.39	6.25	0.005	599.23	603.36	3.73	3.07	601.70	598.62	
27	511-513	513	0.224	0.453	10.0	0.96	11.5	5.75	5.54	0.90	0.20	0.41	2.26	0.013	12	167.00	0.01	600.29	598.63	3.74	3.56	0.006	600.93	605.30	4.01	3.74	603.36	599.47	
28	513-514	514	0.229	0.229	10.0	1.50	10.0	5.75	5.75	0.90	0.21	0.21	1.19	0.013	12	136.00	0.005	601.22	600.54	3.00	2.52	0.004	601.69	605.30	3.08	3.76	605.30	601.09	
29	511-512	512	0.223	0.223	10.0	1.89	10.0	5.75	5.75	0.90	0.20	0.20	1.15	0.013	12	167.00	0.01	600.54	598.88	2.65	3.56	0.004	601.00	605.30	3.75	3.49	603.36	599.57	
30	508-508A	508A	0.311	1.244	10.0	0.44	11.0	5.75	5.62	0.90	0.28	1.12	6.29	0.012	18	93.39	0.0075	598.23	597.53	5.28	9.85	0.006	599.19	603.01	3.28	2.67	601.70	598.49	
31	508A-508B	508B	0.933	0.933	10.0	0.95	10.0	5.75	5.75	0.90	0.84	0.84	4.83	0.012	18	156.00	0.0075	599.40	598.23	3.92	9.85	0.003	600.24	603.01	2.11	3.28	603.01	599.47	
32	508-508C	508C	0.310	1.244	10.0	0.43	11.0	5.75	5.62	0.90	0.28	1.12	6.29	0.012	18	90.01	0.0075	598.21	597.53	5.28	9.85	0.006	599.17	603.01	3.30	2.67	601.70	598.49	
33	508C-508D	508D	0.934	0.934	10.0	0.95	10.0	5.75	5.75	0.90	0.84	0.84	4.83	0.012	18	156.00	0.0075	599.37	598.20	3.92	9.85	0.003	600.21	603.01	2.14	3.31	603.01	599.45	
34	510-510D	510D	0.477	1.025	10.0	0.52	11.4	5.75	5.55	0.90	0.43	0.92	5.12	0.012	18	91.50	0.0075	598.16	597.47	4.16	9.86	0.004	599.02	603.01	3.35	2.73	601.70	598.64	

Notes: IDF File = Butler County Subdiv Reg IDF Curve.idf, Return Period = 25-yrs.

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc System (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Flow Rate (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
35	510D-510E	510E	0.310	0.310	10.0	1.42	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	77.58	0.01	598.94	598.16	2.14	11.38	0.002	599.42	603.01	2.57	3.35	603.01	599.37	
36	510-510A	510A	0.320	0.868	10.0	0.61	11.4	5.75	5.56	0.90	0.29	0.78	4.34	0.012	18	91.58	0.0075	598.16	597.47	3.67	9.85	0.003	598.96	603.01	3.35	2.73	601.70	598.71	
37	510A-510C	510C	0.238	0.238	10.0	1.40	10.0	5.75	5.75	0.90	0.21	0.21	1.23	0.012	18	58.36	0.01	598.74	598.16	1.60	11.38	0.001	599.25	606.34	6.10	3.35	603.01	599.27	
38	510D-510F	510F	0.238	0.238	10.0	1.41	10.0	5.75	5.75	0.90	0.21	0.21	1.23	0.012	18	58.76	0.01	598.75	598.16	1.28	11.38	0.000	599.37	606.34	6.09	3.35	603.01	599.38	
39	510A-510B	510B	0.310	0.310	10.0	0.95	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	52.00	0.01	598.68	598.16	1.94	11.38	0.001	599.23	603.01	2.83	3.35	603.01	599.26	
40	203A-406	EX 203A	0.152	0.641	10.0	0.30	10.4	5.75	5.69	0.90	0.14	0.58	3.28	0.012	18	33.59	0.0137	597.55	597.09	4.12	13.32	0.004	598.24	602.66	3.61	6.69	605.28	597.78	
41	203C-203A	EX 203C	0.152	0.489	10.0	0.17	10.3	5.75	5.71	0.90	0.14	0.44	2.51	0.013	12	32.01	0.0134	598.33	597.90	4.47	4.13	0.008	599.00	602.65	3.32	3.76	602.66	598.57	
42	203B-203C	EX 203B	0.336	0.336	10.0	0.26	10.0	5.75	5.75	0.90	0.30	0.30	1.74	0.013	12	34.35	0.0492	600.02	598.33	3.10	7.90	0.004	600.58	604.58	3.56	3.32	602.65	599.23	
43	600-601	601	0.384	0.601	10.0	0.09	10.5	5.75	5.69	0.90	0.35	0.54	3.07	0.013	12	22.15	0.0438	598.22	597.25	4.91	7.45	0.009	598.96	602.81	3.59	0.67	598.92	597.99	
44	601-602	602	0.217	0.217	10.0	0.45	10.0	5.75	5.75	0.90	0.20	0.20	1.12	0.013	12	38.80	0.0512	600.20	598.22	2.36	8.06	0.003	600.65	605.38	4.17	3.59	602.81	599.31	
45	208A-411	EX 208A	0.152	1.133	10.0	0.31	11.6	5.75	5.53	0.90	0.14	1.02	5.64	0.012	24	33.61	0.0034	596.72	596.61	1.79	14.29	0.001	598.99	602.71	3.99	7.31	605.91	598.97	
46	208B-208A	EX 208B	0.247	0.827	10.0	0.93	10.7	5.75	5.65	0.90	0.22	0.74	4.21	0.012	18	133.15	0.0047	597.80	597.17	2.47	7.83	0.001	599.11	602.71	3.41	4.04	602.71	598.95	
47	208D-208B	EX 208D	0.366	0.580	10.0	0.14	10.6	5.75	5.67	0.90	0.33	0.52	2.96	0.013	12	32.00	0.0097	598.21	597.90	3.77	3.50	0.007	599.21	602.67	3.46	3.81	602.71	598.99	
48	208C-208D	EX 208C	0.215	0.215	10.0	0.55	10.0	5.75	5.75	0.90	0.19	0.19	1.11	0.013	12	46.71	0.0501	600.55	598.21	2.34	7.97	0.003	601.00	605.13	3.58	3.46	602.67	599.40	
49	207A-410	EX 207A	0.152	0.698	10.0	0.28	10.7	5.75	5.65	0.90	0.14	0.63	3.55	0.012	18	33.58	0.0067	597.47	597.25	2.06	9.30	0.001	598.83	602.64	3.67	6.98	605.73	598.80	
50	207C-207A	EX 207C	0.156	0.546	10.0	0.15	10.5	5.75	5.68	0.90	0.14	0.49	2.79	0.013	12	32.02	0.0106	598.21	597.87	4.35	3.67	0.007	598.92	602.72	3.51	3.77	602.64	598.70	
51	207B-207C	EX 207B	0.390	0.390	10.0	0.52	10.0	5.75	5.75	0.90	0.35	0.35	2.02	0.013	12	80.50	0.034	600.95	598.21	3.36	6.57	0.005	601.55	604.61	2.66	3.51	602.72	599.15	
52	202A-404	EX 202A	0.140	0.342	10.0	0.25	10.4	5.75	5.69	0.90	0.13	0.31	1.75	0.013	12	33.57	0.0021	598.17	598.10	2.32	1.63	0.002	599.09	602.63	3.46	6.67	605.77	599.02	
53	202B-202A	EX 202B	0.202	0.202	10.0	0.40	10.0	5.75	5.75	0.90	0.18	0.18	1.04	0.013	12	32.00	0.0075	598.41	598.17	1.50	3.08	0.001	599.16	602.73	3.32	3.46	602.63	599.15	
54	507-507A	507A	0.310	1.251	10.0	0.49	11.0	5.75	5.62	0.90	0.28	1.13	6.32	0.012	18	105.43	0.0075	597.85	597.06	4.87	9.85	0.005	598.81	603.01	3.66	3.14	601.70	598.19	
55	507A-507B	507B	0.630	0.630	10.0	0.94	10.0	5.75	5.75	0.90	0.57	0.57	3.26	0.012	18	104.00	0.0075	598.63	597.85	3.04	9.85	0.003	599.32	603.01	2.88	3.66	603.01	599.19	
56	507A-507C	507C	0.310	0.310	10.0	0.95	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	52.00	0.0075	598.24	597.85	1.12	9.85	0.000	599.23	603.01	3.27	3.66	603.01	599.24	
57	206A-409	EX 206A	0.152	0.638	10.0	0.30	10.4	5.75	5.69	0.90	0.14	0.57	3.27	0.012	18	33.64	0.0072	597.37	597.13	2.17	9.65	0.001	598.46	602.58	3.71	6.61	605.24	598.46	
58	206C-206A	EX 206C	0.152	0.486	10.0	0.17	10.3	5.75	5.71	0.90	0.14	0.44	2.50	0.013	12	32.00	0.0069	598.09	597.87	4.22	2.95	0.007	598.80	602.60	3.51	3.71	602.58	598.58	
59	206B-206C	EX 206B	0.333	0.333	10.0	0.26	10.0	5.75	5.75	0.90	0.30	0.30	1.73	0.013	12	34.46	0.0528	599.91	598.09	3.08	8.18	0.004	600.47	604.52	3.61	3.51	602.60	598.99	
60	507-507D	507D	0.315	1.253	10.0	0.44	11.0	5.75	5.62	0.90	0.28	1.13	6.33	0.012	18	94.53	0.0075	597.77	597.06	4.88	9.87	0.005	598.74	603.01	3.74	3.14	601.70	598.19	
61	507D-507E	507E	0.628	0.628	10.0	0.94	10.0	5.75	5.75	0.90	0.56	0.56	3.25	0.012	18	104.00	0.0075	598.55	597.77	3.03	9.84	0.003	599.24	603.01	2.96	3.74	603.01	599.11	
62	507D-507F	507F	0.310	0.310	10.0	0.95	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	52.00	0.0075	598.16	597.77	1.12	9.85	0.000	599.16	603.01	3.35	3.74	603.01	599.16	
63	504-504D	504D	0.311	1.750	10.0	0.30	10.7	5.75	5.66	0.90	0.28	1.58	8.91	0.012	18	91.23	0.0075	596.84	596.15	6.18	9.86	0.007	597.98	603.01	4.67	4.05	601.70	597.29	
64	504D-504E	504E	1.128	1.128	10.0	0.60	10.0	5.75	5.75	0.90	1.01	1.01	5.84	0.012	18	119.62	0.0075	597.74	596.84	4.20	9.86	0.004	598.66	606.01	6.77	4.67	603.01	598.40	
65	504E-DS	Null Structure	0.000	0.000	0.0	0.38	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.012	18	46.18	0.0075	598.09	597.74	0.00	9.85	0.000	598.09	0.00	n/a	6.77	606.01	597.74	
66	205A-408	EX 205A	0.152	0.310	10.0	0.28	10.5	5.75	5.68	0.90	0.14	0.28	1.58	0.013	12	33.56	0.0051	597.88	597.71	3.42	2.55	0.005	598.45	602.69	3.81	7.15	605.86	598.28	
67	205B-205A	EX 205B	0.158	0.158	10.0	0.51	10.0	5.75	5.75	0.90	0.14	0.14	0.82	0.013	12	32.02	0.0075	598.22	597.98	2.28	3.08	0.003	598.61	602.58	3.36	3.71	602.69	598.59	
68	204A-406	406A	0.152	0.640	10.0	0.56	10.7	5.75	5.65	0.90	0.14	0.58	3.25	0.012	18	61.20	0.0033	597.09	596.89	3.69	6.53	0.003	597.84	602.04	3.45	7.63	606.02	597.64	

Notes: IDF File = Butler County Subdiv Reg IDF Curve.idf, Return Period = 25-yrs.

Project File: 010-STM.sws

STM Sewer Report

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Line No.	Line ID	Inlet ID	Drain Area (ac)	Total Area (ac)	Inlet Time (min)	Pipe Travel (min)	Tc System (min)	i Inlet (in/hr)	i Syst (in/hr)	Runoff Coeff (C)	Incr CxA	Total C x A	Flow Rate (cfs)	n-value Pipe	Line Size (in)	Line Length (ft)	Line Slope (ft/ft)	Invert Up (ft)	Invert Dn (ft)	Vel Ave (ft/s)	Capac. Full (cfs)	Sf Ave (ft/ft)	HGL Up (ft)	Grnd/Rim Elev Up (ft)	Cover Up (ft)	Cover Dn (ft)	Grnd/Rim Elev Dn (ft)	HGL Dn (ft)	
69	204C-204A	EX 204C	0.181	0.488	10.0	0.19	10.5	5.75	5.67	0.90	0.16	0.44	2.49	0.013	12	35.34	0.0025	597.83	597.74	3.17	1.80	0.005	598.91	602.84	4.01	3.30	602.04	598.74	
70	204B-204C	EX 204B	0.307	0.307	10.0	0.53	10.0	5.75	5.75	0.90	0.28	0.28	1.59	0.013	12	64.48	0.0324	599.92	597.83	2.87	6.41	0.004	600.45	604.48	3.56	4.01	602.84	599.01	
71	208E-208A	EX 208E	0.154	0.154	10.0	0.52	10.0	5.75	5.75	0.90	0.14	0.14	0.80	0.013	12	32.00	0.0134	598.20	597.77	1.08	4.13	0.000	599.04	602.86	3.66	3.94	602.71	599.03	
72	505-505A	505A	0.310	1.251	10.0	0.43	10.9	5.75	5.63	0.90	0.28	1.13	6.33	0.012	18	92.78	0.0075	597.32	596.62	5.10	9.85	0.005	598.28	603.01	4.19	3.58	601.70	597.65	
73	505A-505B	505B	0.940	0.940	10.0	0.87	10.0	5.75	5.75	0.90	0.85	0.85	4.87	0.012	18	144.39	0.0075	598.40	597.32	3.94	9.85	0.003	599.24	603.01	3.11	4.19	603.01	598.56	
74	505-505C	505C	0.311	1.247	10.0	0.43	10.9	5.75	5.62	0.90	0.28	1.12	6.30	0.012	18	91.25	0.0075	597.31	596.62	5.08	9.87	0.005	598.27	603.01	4.20	3.58	601.70	597.65	
75	505C-505D	505D	0.936	0.936	10.0	0.95	10.0	5.75	5.75	0.90	0.84	0.84	4.84	0.012	18	156.00	0.0075	598.48	597.31	3.93	9.85	0.003	599.32	603.01	3.03	4.20	603.01	598.55	
76	501-516	516	0.296	0.296	10.0	1.22	10.0	5.75	5.75	0.90	0.27	0.27	1.53	0.013	12	142.59	0.0085	598.56	597.35	3.67	3.28	0.006	599.09	605.22	5.65	3.85	602.20	597.88	
77	504D-504F	504F	0.311	0.311	10.0	0.66	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	15	52.00	0.0075	597.48	597.09	1.37	6.06	0.001	598.57	603.01	4.28	4.67	603.01	598.55	
78	501-515	515	0.268	0.268	10.0	1.15	10.0	5.75	5.75	0.90	0.24	0.24	1.39	0.013	12	122.35	0.0091	598.21	597.10	3.54	3.39	0.006	598.71	605.16	5.95	4.10	602.20	597.60	
79	504-504A	504A	0.312	0.934	10.0	0.61	11.0	5.75	5.62	0.90	0.28	0.84	4.72	0.012	18	98.87	0.0075	596.84	596.10	3.69	9.85	0.003	597.67	603.01	4.67	4.10	601.70	597.56	
80	504A-504C	504C	0.311	0.311	10.0	0.95	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	52.00	0.0075	597.23	596.84	1.45	9.86	0.000	597.99	603.01	4.28	4.67	603.01	597.99	
81	504A-504B	504B	0.311	0.311	10.0	0.95	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	52.00	0.0075	597.23	596.84	1.45	9.86	0.000	597.99	603.01	4.28	4.67	603.01	597.99	
82	503-503A	503A	0.310	1.283	10.0	0.41	11.0	5.75	5.62	0.90	0.28	1.15	6.48	0.012	18	91.97	0.0075	596.37	595.68	4.54	9.85	0.004	597.34	603.01	5.14	4.52	601.70	597.11	
83	503A-503B	503B	0.662	0.662	10.0	0.37	10.0	5.75	5.75	0.90	0.60	0.60	3.42	0.012	18	43.01	0.0075	596.69	596.37	2.34	9.85	0.001	597.73	606.01	7.82	5.14	603.01	597.72	
84	503B-DS	Null Structure	0.000	0.000	0.0	0.38	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.012	18	46.13	0.0075	597.04	596.69	0.00	9.85	0.000	597.04	0.00	n/a	7.82	606.01	596.69	
85	503A-503C	503C	0.310	0.310	10.0	0.95	10.0	5.75	5.75	0.90	0.28	0.28	1.61	0.012	18	51.99	0.0075	596.76	596.37	1.09	9.85	0.000	597.78	603.01	4.75	5.14	603.01	597.78	

Notes: IDF File = Butler County Subdiv Reg IDF Curve.idf, Return Period = 25-yrs.

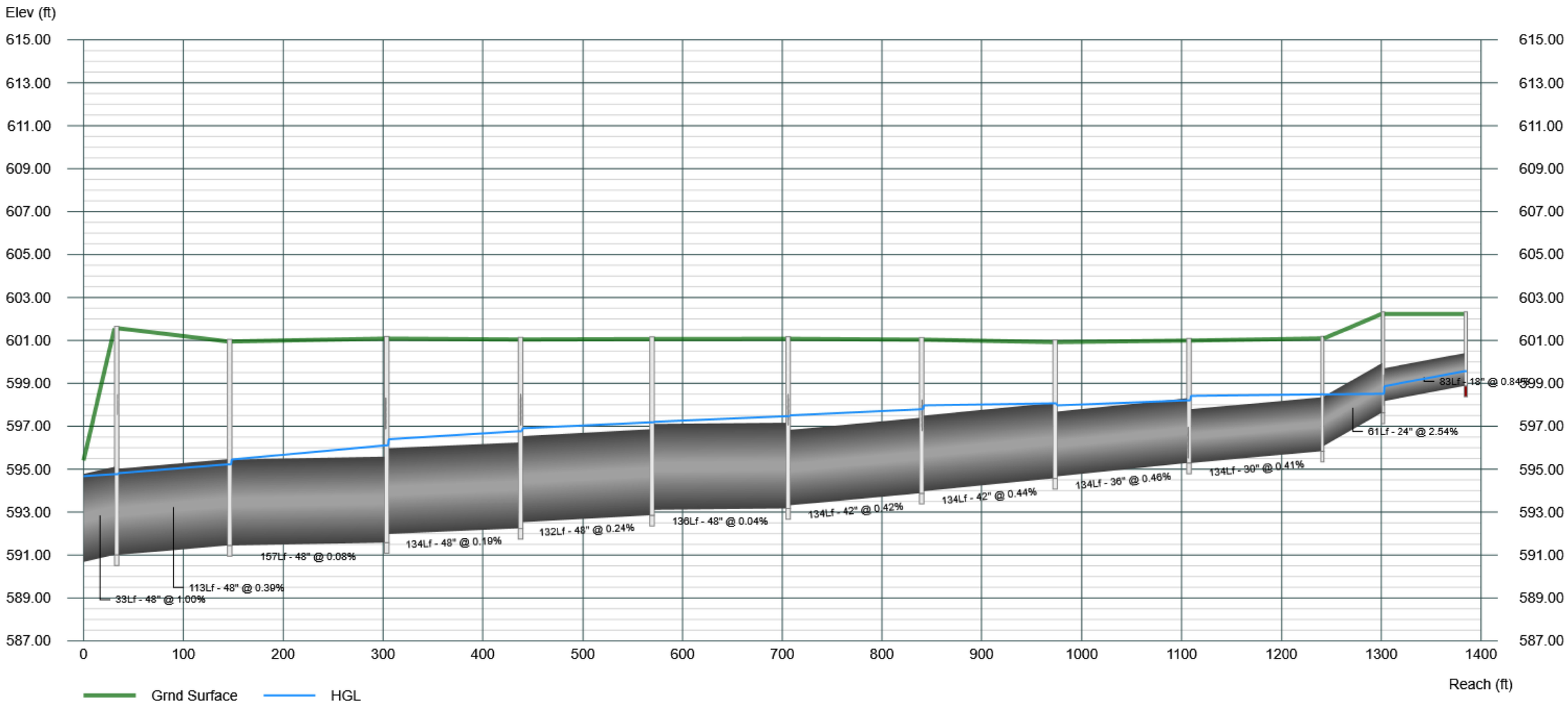
Profile View

Stormwater Studio 2019 v 3.0.0.12

Project Name: 002-100 STM

06-13-2019

Note: Note all pipes are included in profiles. But overall HGL along storm network is shown.



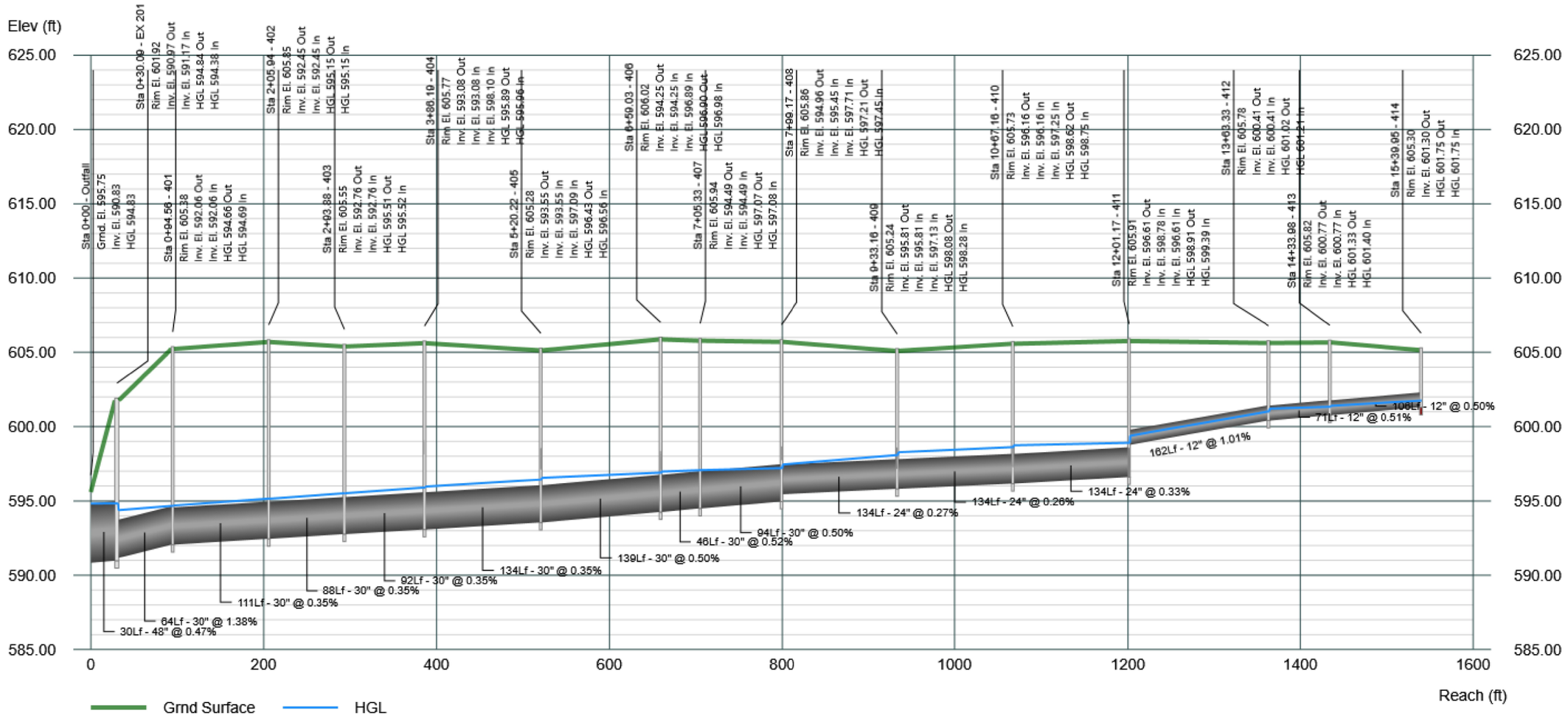
Profile View

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Note: Note all pipes are included in profiles. But overall HGL along storm network is shown.



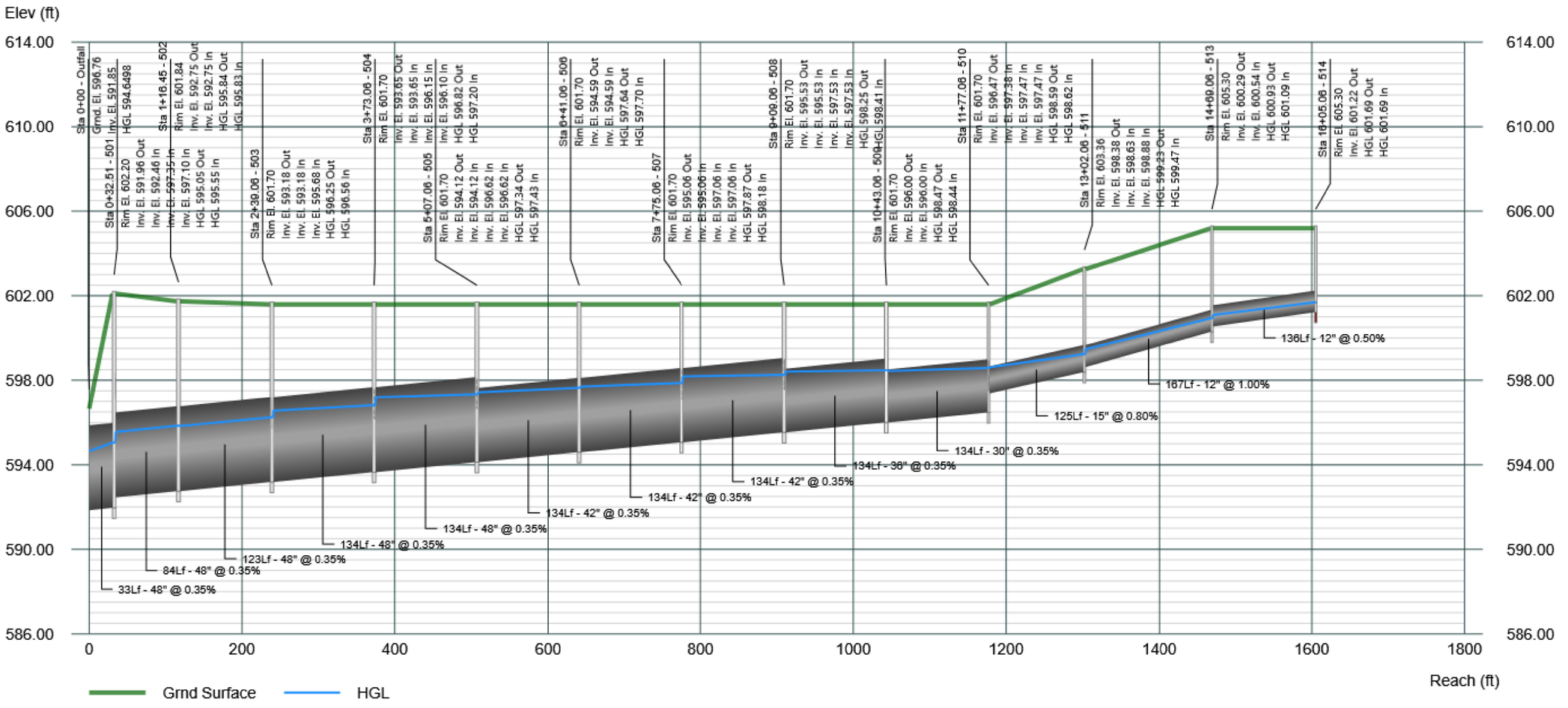
Profile View

Stormwater Studio 2019 v 3.0.0.12

Project Name: 010-STM

06-11-2019

Note: Note all pipes are included in profiles. But overall HGL along storm network is shown.



RINCK FARM
CONSTRUCTION DRAWINGS PLAN SET

AS BUILT

SECTION 4 & 10, TOWN 2, RANGE 2 B.T.M.
WEST CHESTER TOWNSHIP, BUTLER COUNTY, OHIO

studioNorth ARCHITECTURE
5015 NW Canal Street | Suite 200 | Riverside, MO 64150
816 | 888 | 7380
NP Studio North, LLC
Ohio Certificate of Authorization No. 00207236

GENERAL NOTES

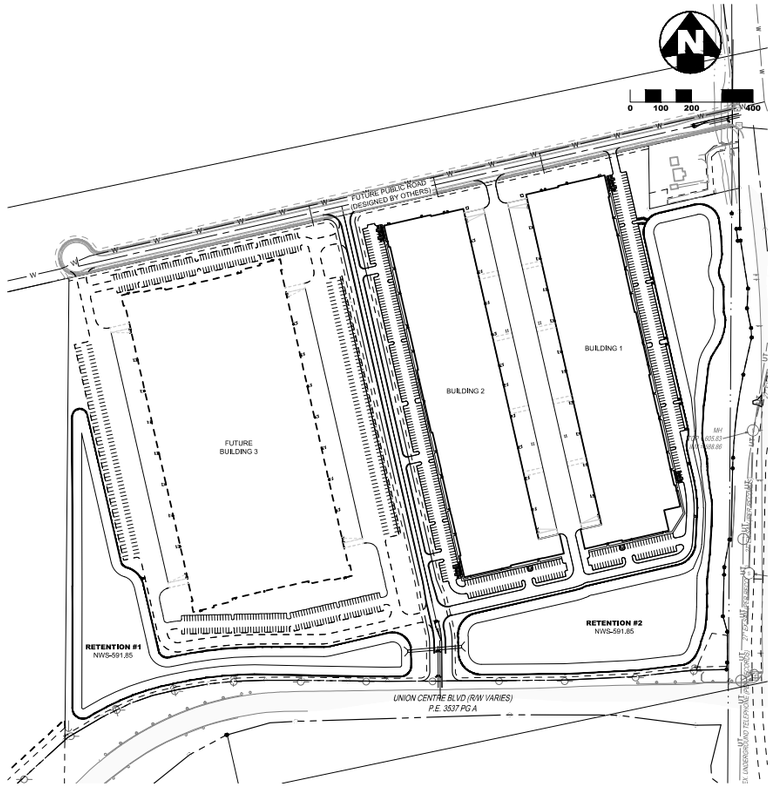
1. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH LOCAL, STATE, & FEDERAL REGULATIONS.
2. THE CONTRACTOR IS TO PERFORM ALL INSPECTIONS AS REQUIRED BY THE OHIO EPA FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND FURNISH OWNERS REPRESENTATIVE WITH WRITTEN REPORTS. OWNER WILL OBTAIN PERMITS.
3. **MAINTENANCE OF TRAFFIC** - WHEN CONSTRUCTION ACTIVITIES ALONG SEWARD ROAD REQUIRE TEMPORARY MAINTENANCE OF TRAFFIC, TEMPORARY TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH ODOT STANDARD DRAWING MT-95.61.
4. ITEM NUMBERS REFER TO THE OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS, AND ALL NEW CONSTRUCTION WORK SHALL BE DONE ACCORDING TO SAID SPECIFICATIONS AND IN ACCORDANCE WITH APPLICABLE STANDARDS OUTLINED IN THE "BUTLER COUNTY SUBDIVISION REGULATIONS." WHEN IN CONFLICT, THE BUTLER COUNTY REQUIREMENTS SHALL PREVAIL.
5. PROTECTION OF EXISTING TREES AND VEGETATION: PROTECT EXISTING TREES AND OTHER VEGETATION AGAINST UNNECESSARY CUTTING, BREAKING OR SKINNING OF ROOTS, SKINNING OR BRUISING OF BARK, SMOTHERING OF TREES BY STOCKPILING CONSTRUCTION MATERIALS OR EXCAVATED MATERIALS WITHIN DRIP LINE, EXCESS FOOT OR VEHICULAR TRAFFIC, OR PARKING OF VEHICLES WITHIN DRIP LINE. PROVIDE TEMPORARY GUARDS TO PROTECT TREES AND VEGETATION TO BE LEFT STANDING.
6. SUBGRADE EXCAVATION AND CONSTRUCTION TO BE PER GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. SUBGRADE PREPARATION SHALL BEGIN BY CLEARING & STRIPPING UNSUITABLE MATERIAL FROM SITE. THEN PLACE & COMPACT BACKFILL MATERIAL AT GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. ALL BACKFILL MATERIAL MUST BE ACCEPTABLE TO THE GEOTECHNICAL ENGINEER.
7. COMPACTED FILLS ARE TO BE MADE TO A MINIMUM OF THREE FEET ABOVE THE CROWN OF ANY PROPOSED SEWER PRIOR TO CUTTING OF TRENCHES FOR PLACEMENT OF SAID SEWERS, ALL FILLS SHALL BE CONTROLLED, COMPACTED, AND INSPECTED BY AN APPROVED TESTING LABORATORY OR AN INSPECTOR FROM THE APPROPRIATE GOVERNMENTAL AGENCY.
8. ADJUST ALL EXISTING CASTINGS AND CLEANOUTS WITHIN PROJECT AREA TO GRADE AS REQUIRED.
9. CONTRACTOR SHALL IMPLEMENT ALL SOIL AND EROSION CONTROL PRACTICES REQUIRED BY BUTLER COUNTY AND THE OHIO EPA.
10. ALL GROUND SURFACE AREAS THAT HAVE BEEN EXPOSED OR LEFT BARE AS A RESULT OF CONSTRUCTION AND ARE TO FINAL GRADE AND ARE TO REMAIN SO, SHALL BE SEEDED AS SOON AS PRACTICAL IN ACCORDANCE WITH SPECIFICATIONS. IF NO SPECIFICATIONS ARE SUPPLIED USE STATE OF OHIO SPECIFICATIONS ITEM 659.
11. ANY FIELD TILE CUT MUST BE TIED INTO THE STORM DRAINAGE SYSTEM.
12. THE CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION OR EARTH MOVING OPERATIONS,
13. ALL DIMENSIONS ARE TO THE OUTSIDE FACE OF BUILDING AND/OR EDGE OF PAVEMENT, UNLESS OTHERWISE NOTED,
14. FORTY-EIGHT HOURS BEFORE DIGGING IS TO COMMENCE, THE CONTRACTOR SHALL NOTIFY THE OHIO UTILITIES PROTECTION SERVICE, AND ALL OTHER AGENCIES WHICH MAY HAVE UNDERGROUND UTILITIES INVOLVING THIS PROJECT AND ARE NON-MEMBERS OF THE OHIO UTILITIES PROTECTION SERVICE.
15. EXISTING UNDERGROUND UTILITIES AND SERVICES ARE SHOWN IN THEIR APPROXIMATE LOCATIONS ACCORDING TO THE BEST INFORMATION AVAILABLE. THE LOCATIONS SHOWN ARE INTENDED ONLY AS A GUIDE AND CANNOT BE GUARANTEED ACCURATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR
    A. CONTACTING THE INDIVIDUAL UTILITY OWNERS TEN DAYS PRIOR TO CONSTRUCTION AND ADVISING THEM OF THE WORK TO TAKE PLACE.
    B. SOLICITING THEIR AID IN LOCATING AND PROTECTING ANY UTILITY WHICH MAY INTERFERE WITH CONSTRUCTION.
    C. EXCAVATING AND VERIFYING THE HORIZONTAL AND VERTICAL LOCATION OF EACH UTILITY.
    D. ALL DAMAGE TO ANY EXISTING UTILITY.

GRADING & EROSION CONTROL NOTES

1. THE NPDES PERMIT REQUIRES THAT ALL AREAS WHICH ARE AT OR NEAR FINAL GRADE, OR WHICH REMAIN DORMANT FOR MORE THAN 21 DAYS OR LONGER BE STABILIZED WITHIN 7 DAYS OF LAST ACTIVITY. VELOCITY DISSIPATION DEVICES SHOULD BE PLACED AT THE OUTFALL OF ALL DETENTION OR RETENTION STRUCTURES AND ALONG THE LENGTH OF ANY OUTFALL CHANNEL AS NECESSARY TO PROVIDE A NON-EROSIVE FLOW VELOCITY FROM THE STRUCTURE TO THE WATER COURSE.
2. THE NPDES PERMIT REQUIRES THAT SEDIMENT AND EROSION CONTROLS BE INSPECTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF 0.5" OR GREATER RAINFALL. A WRITTEN LOG SHOULD INDICATE THE DATE OF INSPECTION NAME OF INSPECTOR, WEATHER CONDITIONS, OBSERVATIONS, ACTIONS TAKEN TO CORRECT ANY PROBLEMS AND THE DATE ACTION WAS TAKEN.
3. SOLID, SANITARY AND TOXIC WASTE MUST BE DISPOSED OF IN A PROPER MANNER IN ACCORDANCE WITH STATE, LOCAL AND FEDERAL REGULATIONS.
4. TEMPORARY SEEDING TYPES-
    A. TALL FESCUE--SEED AT A RATE OF 50 lbs./ACRE (1 lb./100 SQ. FT.) AND MULCH WITH STRAW AT A RATE OF 2 TONS PER ACRE (80 lbs/1000 SQ. FT.). ESTABLISH BETWEEN MARCH 15 AND SEPTEMBER 30. COVER THE SEED 1/4-1/2 INCH BY RAKE OR SIMILAR TOOL. THIS IS THE MOST WIDELY USED AND BEST ADAPTED GRASS FOR STREAMBANK SEEDINGS. ITS HAS GOOD TOLERANCE TO WET SOILS AND FLOODING. IT IS ALSO WELL ADAPTED TO WELL DRAINED SOILS.
    B. REED CANARYGRASS (PHALARIS ARUNDINACAE) PLUS TALL FESCUE--SEED THE REED CANARYGRASS AT A RATE OF 15lbs./ACRE (1/3 lb./1000 SQ. FT.), PLUS 10 lbs./ACRE (1/4lb./1000 SQ. FT.) OF TALL FESCUE. MULCH WITH STRAW AT A RATE OF 2 TONS/ACRE (90 lbs./1000 SQ. FT.). THIS MIXTURE SHOULD ONLY BE SEEDED FROM MARCH 1 TO MAY 15, OR AUGUST 1 TO SEPTEMBER 30. COVER THE SEED 1/4-1/2 INCH BY RAKING OR SIMILAR TOOL. THIS MIXTURE IS ADAPTABLE TO SOILS THAT ARE VERY WET AS WELL AS WELL DRAINED SOIL CONDITIONS. REED CANARYGRASS CAN WITHSTAND EXTENDED PERIODS OF FLOODING. IT IS EXCELLENT FOR EROSION CONTROL. REED CANARYGRASS CAN ALSO BE ESTABLISHED BY SOD STRIPS, USING RHIZOMES, OR FRESHLY CUT CULMS. THE LOCAL CONSERVATION SERVICE OFFICE CAN PROVIDE THE SPECIFIC DETAILS REQUIRED TO USE ONE OF THE ALTERNATIVE ESTABLISHMENT METHODS.
5. FINAL SITE STABILIZATION IS CONSIDERED ACHIEVED ONCE ALL TEMPORARY EROSION AND SEDIMENT CONTROL PRACTICES ARE REMOVED AND DISPOSED OF AND ALL TRAPPED SEDIMENT HAS BEEN PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION.
6. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES WILL BE DISPOSED OF AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED. TRAPPED SEDIMENT AND OTHER DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES WILL BE PERMANENTLY STABILIZED TO PREVENT EROSION AND SEDIMENTATION.
7. ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL MEASURES WILL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
8. DANDY BAGS TO BE USED AT ALL STORM INLETS FOR EROSION CONTROL
9. TEMPORARILY GRADE LOW AREA TO DRAIN UNTIL FUTURE STORM IS CONSTRUCTED.

UTILITY NOTES

1. ROOF DRAINS, FOUNDATION DRAINS AND ALL OTHER CLEAR WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED.
2. THE CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION OR EARTH MOVING OPERATIONS.
3. ALL STORM STRUCTURES ARE ODOT TYPES UNLESS OTHERWISE INDICATED.
4. STORM SEWER PIPE LABELED "STM" SHALL BE ONE OF THE FOLLOWING: PVC SDR-35, PVC PROFILE PIPE PER ODOT ITEM 707.33, OR HIGH DENSITY POLYETHYLENE PER ODOT ITEM 707.33. STORM SEWER PIPE LABELED "RCP" SHALL BE REINFORCED CONCRETE PIPE, ODOT ITEM 706.02 CLASS IV. ALL STORM IS TO BE INSTALLED PER ODOT ITEM 603, TYPE A.
5. STEPS SHALL BE PROVIDED IN ALL CATCH BASINS AND MANHOLES OVER 4' DEEP.
6. CONTRACTOR SHALL SECURE ALL PERMITS AND FURNISH ALL DRAWINGS REQUIRED FOR UTILITY TAPS PRIOR TO STARTING CONSTRUCTION.
7. PROVIDE MANUFACTURERS RECOMMENDATION COVER OVER TOP OF STORM PIPE DURING CONSTRUCTION, UNTIL PAVING OPERATIONS BEGIN.
8. ITEM NUMBERS REFER TO THE OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS, AND ALL NEW CONSTRUCTION WORK SHALL BE DONE ACCORDING TO SAID SPECIFICATIONS AND IN ACCORDANCE WITH APPLICABLE STANDARDS OUTLINED IN THE "BUTLER COUNTY SUBDIVISION REGULATIONS." WHEN IN CONFLICT, THE BUTLER COUNTY REQUIREMENTS SHALL PREVAIL.
9. SITE UTILITY CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED VERTICAL SEPARATION BETWEEN UTILITIES BY VARYING DEPTH OF UNDERGROUND ELECTRIC, TELEPHONE, WATER AND GAS.
10. PRIVATE WATERLINE FROM PUBLIC MAIN TO METER PIT TO BE CLASS 55 D.I. PIPE WITH PE WRAP, ALL OTHER PRIVATE WATERLINE (AFTER METER PIT) TO BE AS NOTED ON THE UTILITY PLAN.
11. WATERLINE SHALL HAVE A MINIMUM OF 4.0' OF COVER.
12. A MINIMUM OF 1.5' OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN UTILITIES AT ALL TIMES.
13. STORM PIPE TO HAVE AN "N" VALUE OF 0.013 OR LESS.
14. FIRE HYDRANT ASSEMBLY INCLUDES FIRE HYDRANT AND 6" WATER VALVE.
15. PROVIDE UNDERGROUND FLUSH CERTIFICATES PER NFPA.
16. SANITARY SEWER SHALL BE 8" PVC-SDR 35 OR APPROVED EQUAL INSTALLED AT A MINIMUM GRADE OF 0.50% UNLESS OTHERWISE NOTED, SANITARY SEWER SHALL BE INSTALLED AT A MINIMUM DEPTH OF FOUR FEET (4') UNLESS OTHERWISE NOTED. A MINIMUM OF 18" CLEARANCE SHALL BE MAINTAINED AT ALL WATERLINE CROSSINGS. SANITARY SEWER JOINTS SHALL CONFORM TO ASTM D-321.
17. SANITARY LATERALS SHALL BE 8" PVC-SDR 21 OR APPROVED EQUAL INSTALLED AT A MINIMUM SLOPE OF 1/8" PER FOOT (1.04%) UNLESS OTHERWISE NOTED. A MINIMUM OF 18" CLEARANCE SHALL BE MAINTAINED AT ALL WATERLINE CROSSINGS. SANITARY SEWER JOINTS SHALL CONFORM TO ASTM D-321.



SHEET INDEX	
SHEET	TITLE
C000	COVER SHEET
C001	GENERAL DETAILS
C002	UTILITY DETAILS
C100	EXISTING AND DEMOLITION PLAN
C200	OVERALL LOCATION PLAN
C201	ENLARGED LOCATION PLAN
C202	ENLARGED LOCATION PLAN
C300	OVERALL UTILITY PLAN
C301	ENLARGED UTILITY PLAN
C302	ENLARGED UTILITY PLAN
C350	UTILITY PLAN AND PROFILES
C351	UTILITY PLAN AND PROFILES
C400	GRADING AND EROSION CONTROL PLAN
C401	ENLARGED GRADING AND EROSION CONTROL PLAN
C402	ENLARGED GRADING AND EROSION CONTROL PLAN
C410	HANDICAP RAMP GRADING DETAILS
C450	EROSION CONTROL DETAILS
C500	OVERALL PUBLIC ROAD PLAN
C501	ENLARGED PUBLIC ROAD PLAN
L100	LANDSCAPE PLAN

SITE DATA:

OWNER OF RECORD: NP RINCK FARM LLC
4825 NW 41ST STREET
SUITE 500
RIVERSIDE, MO 64150

DEVELOPER: NP RINCK FARM LLC
4825 NW 41ST STREET
SUITE 500
RIVERSIDE, MO 64150

ENGINEER/SURVEYOR: THE KLEINGERS GROUP
6305 CENTRE PARK DRIVE
WEST CHESTER, OH 45069

SITE INFORMATION

BOUNDARY: BASED ON BOUNDARY SURVEY BY THE KLEINGERS GROUP
TOPOGRAPHY: BASED ON TOPOGRAPHIC SURVEY BY THE KLEINGERS GROUP

ZONING: COMMUNITY BUSINESS DISTRICT (B-2), GENERAL INDUSTRIAL DISTRICT (M-2)

EXISTING USE: FARM LAND, UNDEVELOPED
PROPOSED USE: 2 WAREHOUSES (1 FUTURE WAREHOUSE)

UTILITY CONTACTS:

TELECOM
CINCINNATI BELL
221 E. 4TH ST., BLDG. 43
CINCINNATI, OH 45201
(513) 565-7043
CONTACT: MARK CONNER

TIME WARNER CABLE
11252 CORNELL PARK DR.
CINCINNATI, OH 45242
(513) 396-5493
CONTACT: JIM O'REILLY

WATER AND SEWER
BUTLER COUNT WATER AND SEWER
130 HIGH STREET
HAMILTON, OH 45011
(513) 887-3066
CONTACT: CONSTANCE KEPNER

GAS
DUKE ENERGY
139 E. FOURTH ST.,
ROOM 460A
CINCINNATI, OH 45202
(513) 287-1093
CONTACT: CHRIS COLYER

ELECTRIC
DUKE ENERGY
139 E. FOURTH ST.,
ROOM 460A
CINCINNATI, OH 45202
(513) 287-3852
CONTACT: CRAIG HUTCHISON

STORM
BUTLER COUNTY ENGINEER'S OFFICE
1921 FAIRGROVE AVENUE
(513) 785-4142
CONTACT: TERESA BARNES, PE, CPESC

TRAFFIC
BUTLER COUNTY ENGINEER'S OFFICE
1921 FAIRGROVE AVENUE
(513) 785-4109
CONTACT: MATT LOEFFLER, PE

THE KLEINGERS GROUP
CIVIL ENGINEERING | SURVEYING | LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

NorthPoint DEVELOPMENT

RINCK FARM
BUILDING 1 & BUILDING 2

8586 Trade Center Drive
West Chester, OH 45069

8556 Trade Center Drive
West Chester, OH 45069

Project No. 160651.002
Date: 04.02.18
Issued For: CD SUBMITTAL
Revisions:

No.	Date	Description
4	07.25.18	PERMIT REVISIONS
5	08.01.18	DESIGN CLARIFICATION
6	08.15.18	BCWS REVISIONS
7	09.11.18	ADDENDUM #1
8	10.10.18	ADDENDUM #2
9	10.30.18	ADDENDUM #3
10	11.21.18	ADDENDUM #4
11	12.19.18	FDC REVISIONS

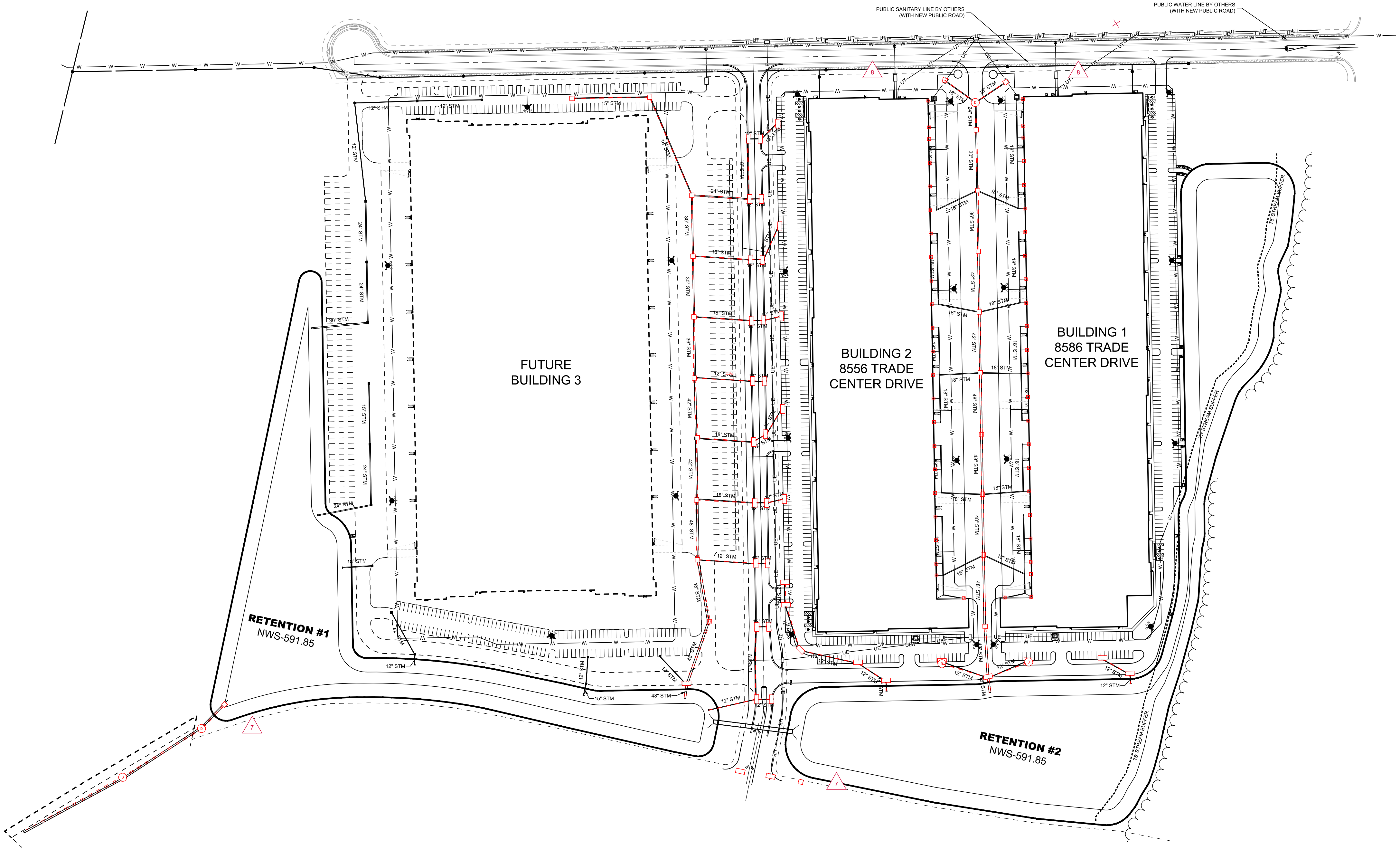
STATE OF OHIO
ADAM O. KORN
71267
REGISTERED PROFESSIONAL ENGINEER

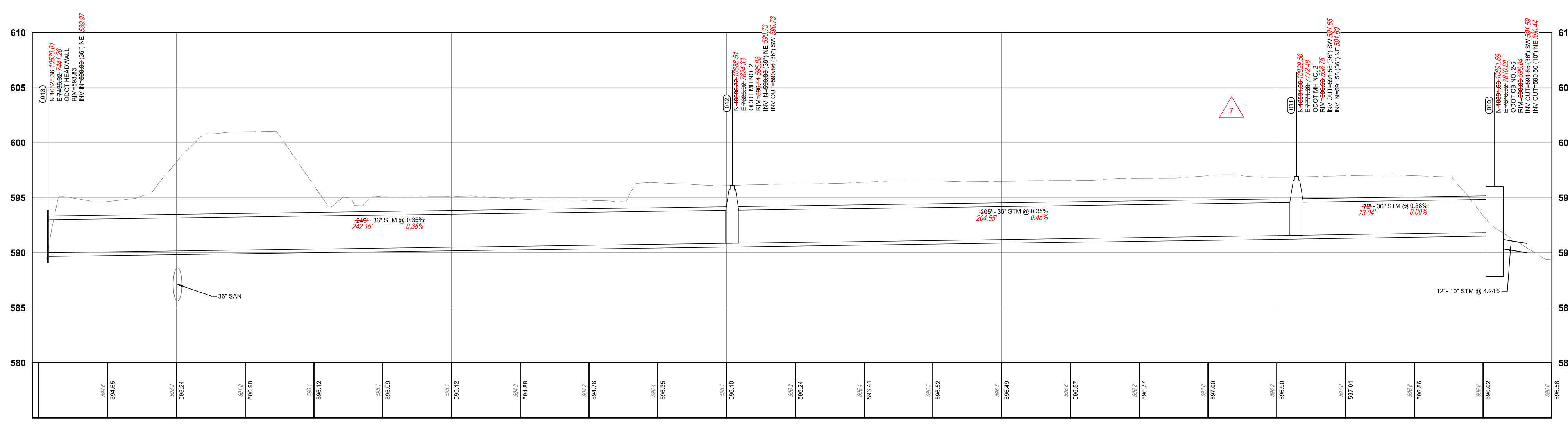
NOTE:
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE OHIO UTILITY PROTECTION SERVICE AT 1-800-362-2764 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

OHIO Utilities Protection Service
811 or 1-800-362-2764
Call Before You Dig

C000
COVER SHEET

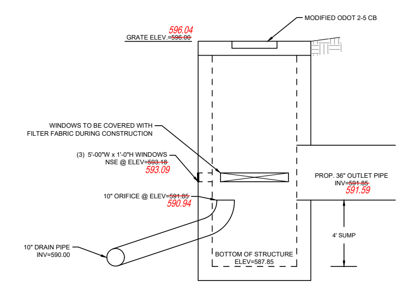
H:\2016\160651\DWG\01\160651HARD2 (AS BUILT COVER).dwg, 2/12/2019 2:04:36 PM, rburke





POND OUTLET TO MILL CREEK

(SHOWN FOR REFERENCE ONLY; THIS IS TO BE CONSTRUCTED AS PER THE SEPARATE SET OF APPROVED MASS GRADING PLAN)



DETENTION OUTFALL STRUCTURE (010)

N.T.S.

0 50 100 200

NOTE :
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE OHIO UTILITY PROTECTION SERVICE AT 1-800-362-2764 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

OHIO Utilities Protection SERVICE
811 or 1-800-362-2764 Call Before You Dig

studio North ARCHITECTURE
5015 NW Canal Street | Suite 200 | Riverside, MO 64150
816 | 888 | 7380
NP Studio North, LLC
Ohio Certificate of Authorization No. 00207236

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

NorthPoint DEVELOPMENT

RINCK FARM

BUILDING 1 & BUILDING 2

8586 Trade Center Drive
West Chester, OH 45069

8556 Trade Center Drive
West Chester, OH 45069

Project No. 160651.002
Date: 04.02.18
Issued For: CD SUBMITTAL
Revisions:

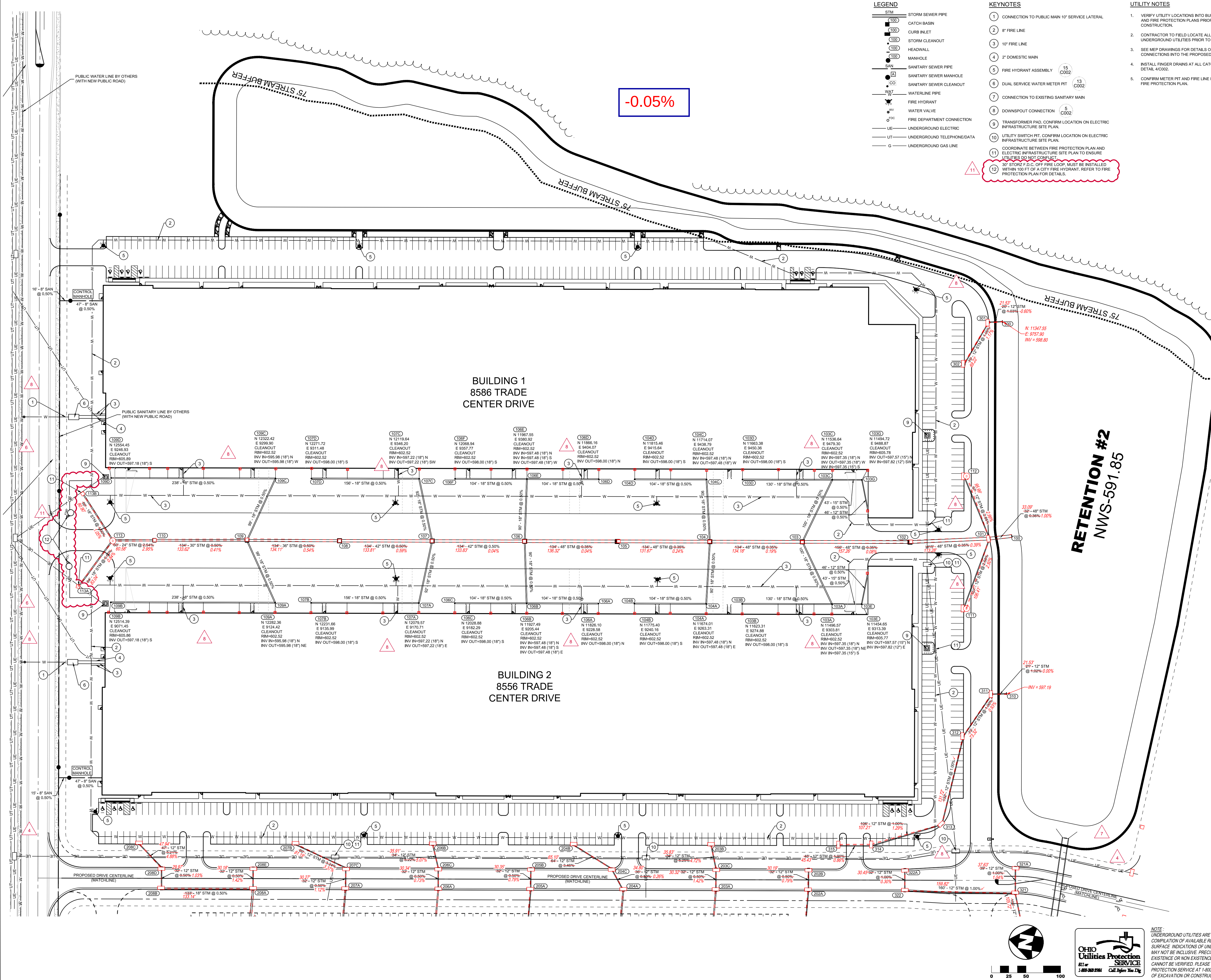
No.	Date	Description
4	07.25.18	PERMIT REVISIONS
5	08.01.18	DESIGN CLARIFICATION
6	08.15.18	BCWS REVISIONS
7	09.11.18	ADDENDUM #1
8	10.10.18	ADDENDUM #2
9	10.30.18	ADDENDUM #3
10	11.21.18	ADDENDUM #4
11	12.19.18	FDC REVISIONS

STATE OF OHIO
ADAM O. KORN
71267
REGISTERED PROFESSIONAL ENGINEER

C300

OVERALL UTILITY PLAN

H:\2016\160651\DWG\002\160651VAB002 (AS BUILT UTILITY PLANS).dwg, 3/21/2019 5:28:53 PM, nburke



LEGEND

Symbol	Description
STM	STORM SEWER PIPE
100	CATCH BASIN
100	CURB INLET
100	STORM CLEANOUT
100	HEADWALL
100	MANHOLE
SAN	SANITARY SEWER PIPE
A	SANITARY SEWER MANHOLE
CO	SANITARY SEWER CLEANOUT
WAT / W	WATERLINE PIPE
	FIRE HYDRANT
WV	WATER VALVE
FDC	FIRE DEPARTMENT CONNECTION
UE	UNDERGROUND ELECTRIC
UT	UNDERGROUND TELEPHONE/DATA
G	UNDERGROUND GAS LINE

KEYNOTES

1. CONNECTION TO PUBLIC MAIN 10" SERVICE LATERAL
2. 8" FIRE LINE
3. 10" FIRE LINE
4. 2" DOMESTIC MAIN
5. FIRE HYDRANT ASSEMBLY (15/C002)
6. DUAL SERVICE WATER METER PIT (13/C002)
7. CONNECTION TO EXISTING SANITARY MAIN
8. DOWNSPOUT CONNECTION (5/C002)
9. TRANSFORMER PAD. CONFIRM LOCATION ON ELECTRIC INFRASTRUCTURE SITE PLAN.
10. UTILITY SWITCH PIT. CONFIRM LOCATION ON ELECTRIC INFRASTRUCTURE SITE PLAN.
11. COORDINATE BETWEEN FIRE PROTECTION PLAN AND ELECTRIC INFRASTRUCTURE SITE PLAN TO ENSURE UTILITIES DO NOT CONFLICT.
12. 30° STORZ F.D.C. OFF FIRE LOOP, MUST BE INSTALLED WITHIN 100 FT OF A CITY FIRE HYDRANT, REFER TO FIRE PROTECTION PLAN FOR DETAILS.

UTILITY NOTES

1. VERIFY UTILITY LOCATIONS INTO BUILDING WITH MEP AND FIRE PROTECTION PLANS PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO FIELD LOCATE ALL NEARBY UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
3. SEE MEP DRAWINGS FOR DETAILS ON UTILITY CONNECTIONS INTO THE PROPOSED BUILDING.
4. INSTALL FINGER DRAINS AT ALL CATCH BASINS PER DETAIL 4/C002.
5. CONFIRM METER PIT AND FIRE LINE LOCATIONS WITH FIRE PROTECTION PLAN.

NOTE :
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE OHIO UTILITY PROTECTION SERVICE AT 1-800-362-2764 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

studio North ARCHITECTURE
5015 NW Canal Street | Suite 200 | Riverside, MO 64150
816 | 888 | 7380
NP Studio North, LLC
Ohio Certificate of Authorization No. 00207236

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

NorthPoint DEVELOPMENT

RINCK FARM

BUILDING 1 & BUILDING 2

8586 Trade Center Drive, West Chester, OH 45069
8556 Trade Center Drive, West Chester, OH 45069

Project No. 160651.002
Date: 04.02.18
Issued For: CD SUBMITTAL
Revisions:

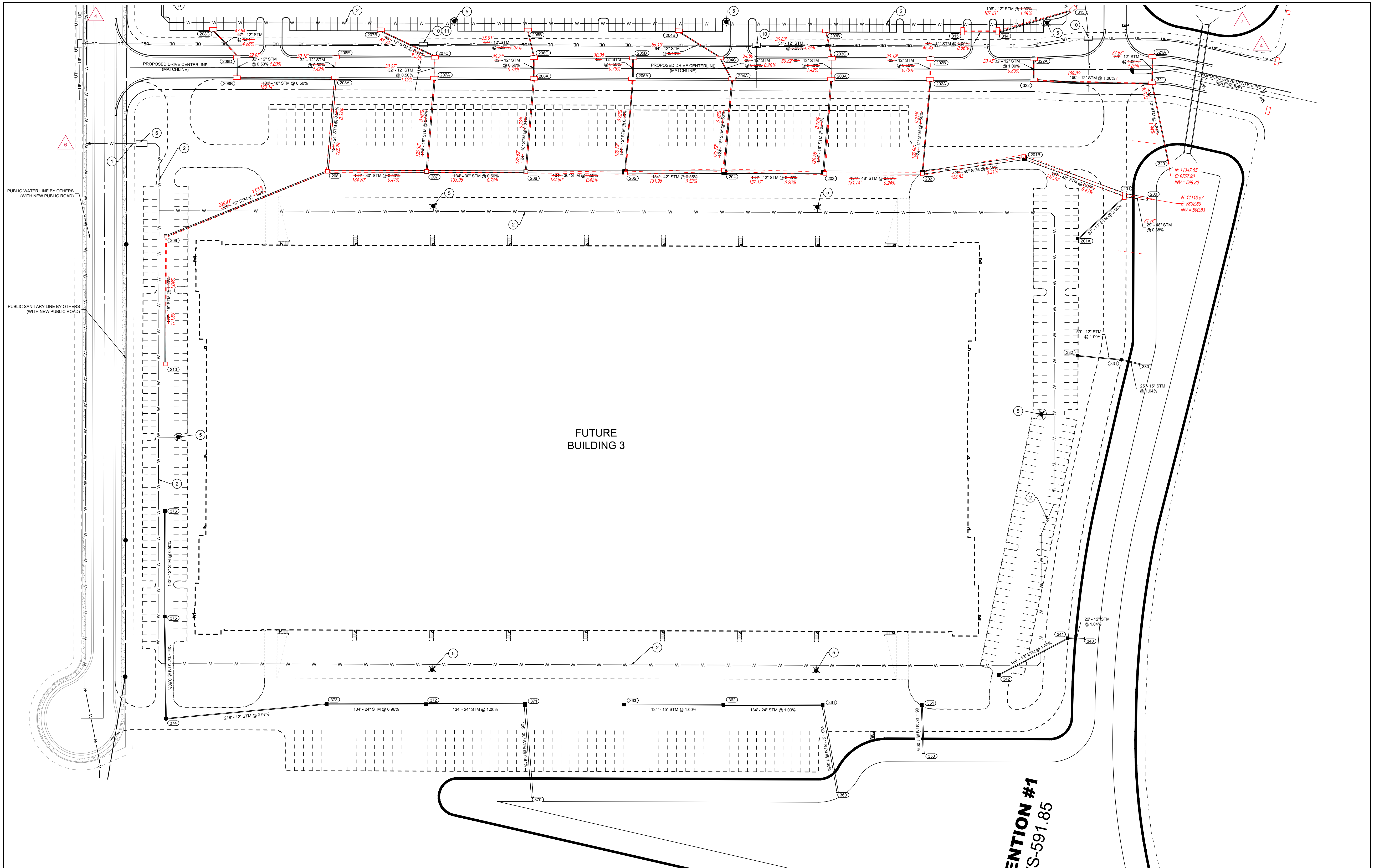
No.	Date	Description
4	07.25.18	PERMIT REVISIONS
5	08.01.18	DESIGN CLARIFICATION
6	08.15.18	BCWS REVISIONS
7	09.11.18	ADDENDUM #1
8	10.10.18	ADDENDUM #2
9	10.30.18	ADDENDUM #3
10	11.21.18	ADDENDUM #4
11	12.19.18	FDC REVISIONS

STATE OF OHIO ADAM O. KORN 71267 REGISTERED PROFESSIONAL ENGINEER

C301

ENLARGED UTILITY PLAN

H:\2016\160651\DWG\002\160651VAB002 (AS BUILT UTILITY PLANS).dwg, 3/21/2019 5:29:05 PM, nburke



LEGEND

- STM — STORM SEWER PIPE
- 100 — CATCH BASIN
- 100 — CURB INLET
- 100 — STORM CLEANOUT
- 100 — HEADWALL
- 100 — MANHOLE
- SAN — SANITARY SEWER PIPE
- A — SANITARY SEWER MANHOLE
- CO — SANITARY SEWER CLEANOUT
- WAT W — WATERLINE PIPE
- FIRE HYDRANT
- WV — WATER VALVE
- FDC — FIRE DEPARTMENT CONNECTION
- UE — UNDERGROUND ELECTRIC
- UT — UNDERGROUND TELEPHONE/DATA
- G — UNDERGROUND GAS LINE

KEYNOTES

1. CONNECTION TO PUBLIC MAIN 10" SERVICE LATERAL
2. 8" FIRE LINE
3. 10" FIRE LINE
4. 2" DOMESTIC MAIN
5. FIRE HYDRANT ASSEMBLY (15 / C002)
6. DUAL SERVICE WATER METER PIT (13 / C002)
7. CONNECTION TO EXISTING SANITARY MAIN
8. DOWNSPOUT CONNECTION (5 / C002)
9. TRANSFORMER PAD. CONFIRM LOCATION ON ELECTRIC INFRASTRUCTURE SITE PLAN.
10. UTILITY SWITCH PIT. CONFIRM LOCATION ON ELECTRIC INFRASTRUCTURE SITE PLAN.
11. COORDINATE BETWEEN FIRE PROTECTION PLAN AND ELECTRIC INFRASTRUCTURE SITE PLAN TO ENSURE UTILITIES DO NOT CONFLICT.
12. 30° STORZ F.D.C. OFF FIRE LOOP, MUST BE INSTALLED WITHIN 100 FT OF A CITY FIRE HYDRANT. REFER TO FIRE PROTECTION PLAN FOR DETAILS.

UTILITY NOTES

1. VERIFY UTILITY LOCATIONS INTO BUILDING WITH MEP AND FIRE PROTECTION PLANS PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO FIELD LOCATE ALL NEARBY UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
3. SEE MEP DRAWINGS FOR DETAILS ON UTILITY CONNECTIONS INTO THE PROPOSED BUILDING.
4. INSTALL FINGER DRAINS AT ALL CATCH BASINS PER DETAIL 4/C002.
5. CONFIRM METER PIT AND FIRE LINE LOCATIONS WITH FIRE PROTECTION PLAN.

NOTE :
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE OHIO UTILITY PROTECTION SERVICE AT 1-800-362-2764 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

studio North ARCHITECTURE
5015 NW Canal Street | Suite 200 | Riverside, MO 64150
816 | 888 | 7380
NP Studio North, LLC
Ohio Certificate of Authorization No. 00207236

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

NorthPoint DEVELOPMENT

RINCK FARM

BUILDING 1 & BUILDING 2

8586 Trade Center Drive
West Chester, OH 45069

8556 Trade Center Drive
West Chester, OH 45069

Project No. 160651.002
Date: 04.02.18
Issued For: CD SUBMITTAL
Revisions:

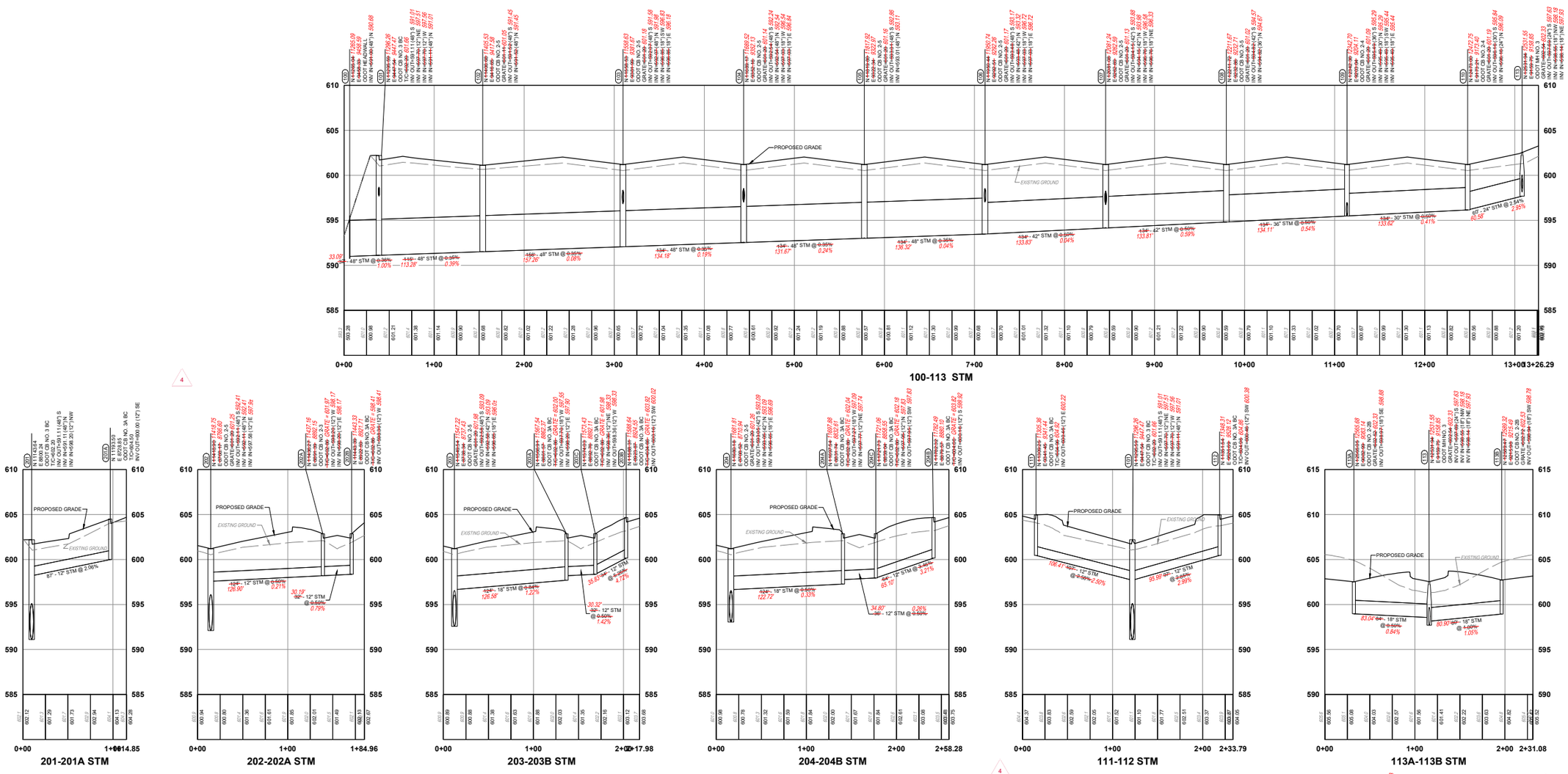
No.	Date	Description
4	07.25.18	PERMIT REVISIONS
5	08.01.18	DESIGN CLARIFICATION
6	08.15.18	BCWS REVISIONS
7	09.11.18	ADDENDUM #1
8	10.10.18	ADDENDUM #2
9	10.30.18	ADDENDUM #3
10	11.21.18	ADDENDUM #4
11	12.19.18	FDC REVISIONS

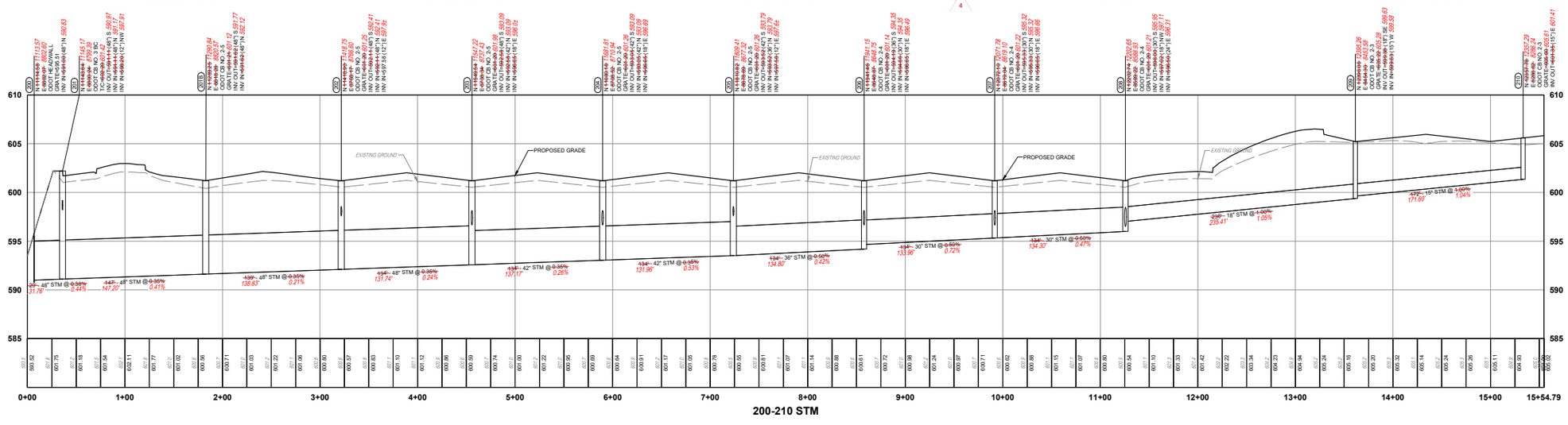
STATE OF OHIO
ADAM O. KORN
71267
REGISTERED PROFESSIONAL ENGINEER

C302

ENLARGED UTILITY PLAN

H:\2016\160651\DWG\002\160651VAB002 (AS BUILT UTILITY PLANS).dwg, 3/21/2019 5:29:15 PM, nburke





NOTE :
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE OHIO UTILITY PROTECTION SERVICE AT 1-800-362-2764 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

V 0 5 10 20
H 0 25 50 100

studio North ARCHITECTURE
5015 NW Canal Street | Suite 200 | Riverside, MO 64150
816 | 888 | 7380
NP Studio North, LLC
Ohio Certificate of Authorization No. 00207236

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

NorthPoint DEVELOPMENT

RINCK FARM
BUILDING 1 & BUILDING 2

8586 Trade Center Drive
West Chester, OH 45069

8556 Trade Center Drive
West Chester, OH 45069

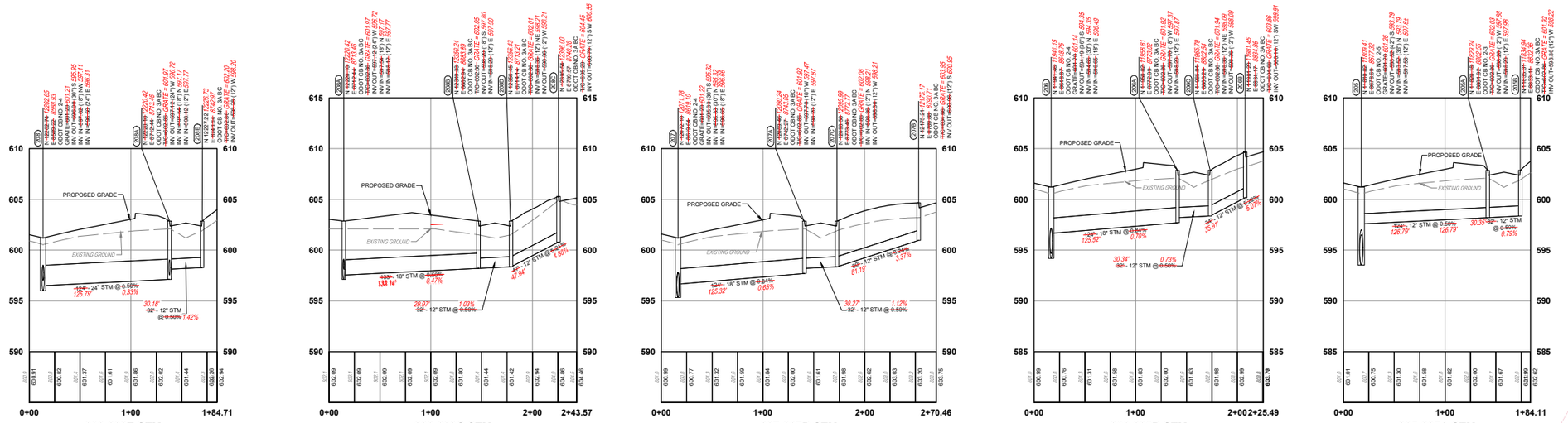
Project No.	160651.002
Date:	04.02.18
Issued For:	CD SUBMITTAL
Revisions:	

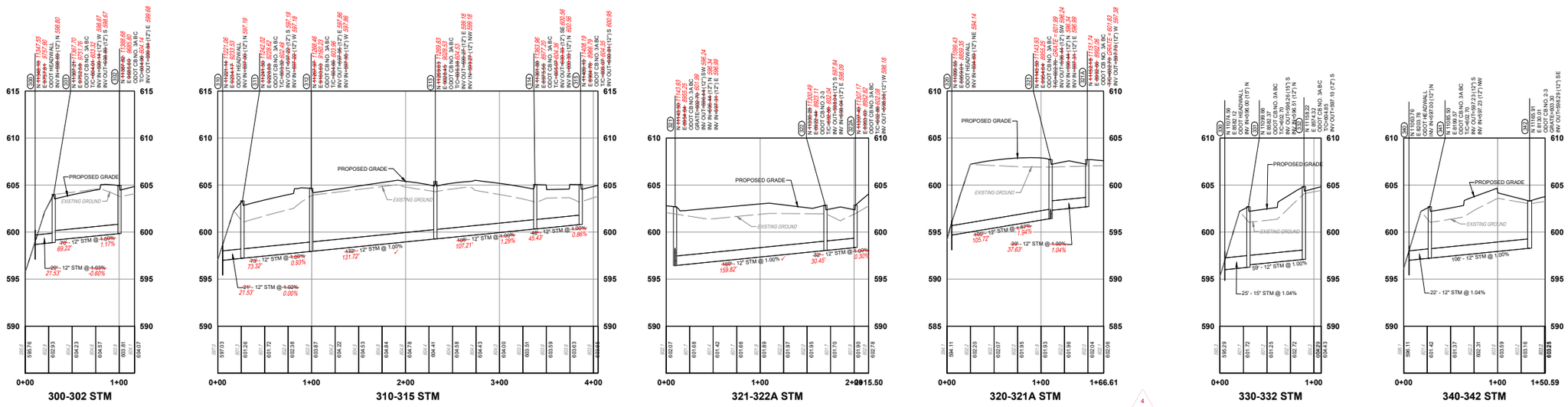
No.	Date	Description
4	07.25.18	PERMIT REVISIONS
5	08.01.18	DESIGN CLARIFICATION
6	08.15.18	BCWS REVISIONS
7	09.11.18	ADDENDUM #1
8	10.10.18	ADDENDUM #2
9	10.30.18	ADDENDUM #3
10	11.21.18	ADDENDUM #4
11	12.19.18	FDC REVISIONS

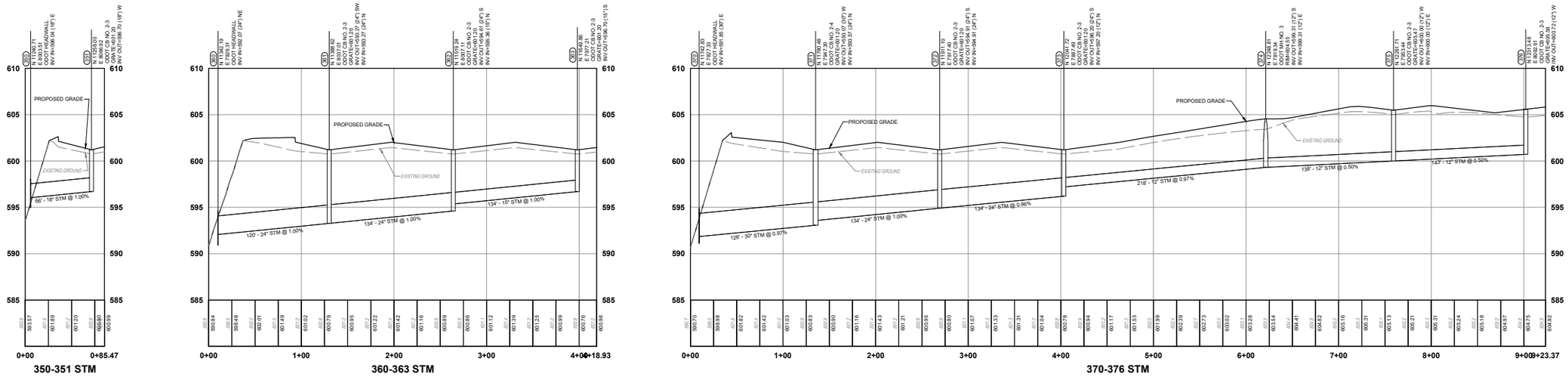
STATE OF OHIO
ADAM O. KORN
71267
REGISTERED
PROFESSIONAL ENGINEER

C350
UTILITY PLAN AND PROFILES

H:\2016\160651\DWG\001\160651V-A001 AS BUILT PLAN AND PROFILES.dwg, 3/22/2019 12:21:28 PM, rburke







studio North ARCHITECTURE
5015 NW Canal Street | Suite 200 | Riverside, MO 64150
816 | 888 | 7380
NP Studio North, LLC
Ohio Certificate of Authorization No. 00207236

THE KLEINGERS GROUP
CIVIL ENGINEERING
SURVEYING
LANDSCAPE ARCHITECTURE
www.kleingers.com
6305 Centre Park Dr.
West Chester, OH 45069
513.779.7851

NorthPoint DEVELOPMENT

RINCK FARM
BUILDING 1 & BUILDING 2

8586 Trade Center Drive
West Chester, OH 45069

8556 Trade Center Drive
West Chester, OH 45069

Project No. 160651.002
Date: 04.02.18
Issued For: CD SUBMITTAL
Revisions:

No.	Date	Description
4	07.25.18	PERMIT REVISIONS
5	08.01.18	DESIGN CLARIFICATION
6	08.15.18	BCWS REVISIONS
7	09.11.18	ADDENDUM #1
8	10.10.18	ADDENDUM #2
9	10.30.18	ADDENDUM #3
10	11.21.18	ADDENDUM #4
11	12.19.18	FDC REVISIONS

STATE OF OHIO
ADAM O. KORN
71267
REGISTERED
PROFESSIONAL ENGINEER

NOTE:
UNDERGROUND UTILITIES ARE PLOTTED FROM A COMPILATION OF AVAILABLE RECORD INFORMATION AND SURFACE INDICATIONS OF UNDERGROUND STRUCTURES AND MAY NOT BE INCLUSIVE. PRECISE LOCATIONS AND THE EXISTENCE OR NON EXISTENCE OF UNDERGROUND UTILITIES CANNOT BE VERIFIED. PLEASE NOTIFY THE OHIO UTILITY PROTECTION SERVICE AT 1-800-362-2764 BEFORE ANY PERIOD OF EXCAVATION OR CONSTRUCTION ACTIVITY.

OHIO Utilities Protection SERVICE

V 0 5 10 20
H 0 25 50 100

C351
UTILITY PLAN AND PROFILES

H:\2016\160651\CIVIL\02\160651XM002.DG BUILT PLAN AND PROFILES.dwg, 3/21/2019 12:21:04 PM, rfoulke

As-Built Pond Volumes

File.... H:\2016\160651\Design\Storm Drainage\160651DET002.ppw

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
591.85	-----	226100	0	.000	.000
592.00	-----	227893	680989	.782	.782
593.00	-----	~~240231~~ 241,220	702105	5.373	6.154
594.00	-----	~~253029~~ 250,906	~~739807~~ 738,142	~~5.661~~ 5.648	11.816
595.00	-----	~~265904~~ 263,861	~~778319~~ 772,070	~~5.956~~ 5.908	17.772
596.00	-----	~~278871~~ 276,879	~~817085~~ 811,031	~~6.253~~ 6.206	24.024
597.00	-----	~~291951~~ 289,955	~~856159~~ 850,175	~~6.552~~ 6.506	30.576
598.00	-----	~~305169~~ 303,090	~~895607~~ 889,495	~~6.853~~ 6.807	37.429
599.00	-----	~~318477~~ 316,284	~~935399~~ 928,991	~~7.158~~ 7.109	44.587
600.00	-----	~~331888~~ 329,539	~~975480~~ 968,667	~~7.465~~ 7.413	52.052
601.00	-----	~~345411~~ 342,855	~~1015882~~ 1,008,526	~~7.774~~ 7.718	59.826
602.00	-----	~~359036~~ 356,270	~~1056604~~ 1,048,624	~~8.085~~ 8.024	67.911
602.20	-----	361775	1081214	1.655	69.566

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (ac-ft)	Volume Sum (ac-ft)
591.85	-----	132648	0	.000	.000
592.00	-----	134295	400411	.460	.460
593.00	-----	~~145381~~ 147,488	419403	3.209	3.669
594.00	-----	~~156657~~ 157,311	~~452951~~ 457,119	~~3.466~~ 3.498	7.135
595.00	-----	~~168040~~ 168,828	~~486946~~ 489,107	~~3.726~~ 3.743	10.861
596.00	-----	~~179480~~ 180,336	~~521187~~ 523,651	~~3.988~~ 4.007	14.850
597.00	-----	~~190977~~ 189,816	~~555596~~ 555,167	~~4.252~~ 4.248	19.101
598.00	-----	~~202530~~ 203,537	~~590174~~ 589,910	~~4.516~~ 4.514	23.617
599.00	-----	~~214139~~ 214,989	~~624922~~ 627,711	~~4.782~~ 4.803	28.400
600.00	-----	~~225805~~ 226,468	~~659839~~ 662,111	~~5.049~~ 5.067	33.449
601.00	-----	~~237528~~ 237,990	~~694925~~ 696,616	~~5.318~~ 5.331	38.767
602.00	-----	~~249307~~ 249,556	~~730181~~ 731,250	~~5.588~~ 5.596	44.354
602.20	-----	251670	751462	1.150	45.504

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2