STORM WATER REPORT AND CALCULATIONS

Kiddie Academy – Dublin, OH (17-032)

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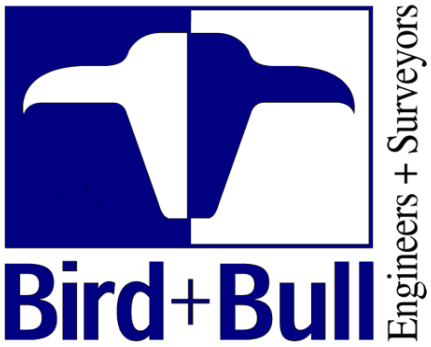


Written by: Andrew Gardner, P.E. (E-68659)

Table of Contents

Overview of the Project
Existing Conditions
Proposed Conditions

APPENDIX A-1 – TRIBUTARY BOUNDARY PLAN

APPENDIX A-2 – PONDPACK REPORT

APPENDIX A-3 – FEMA FIRMETTE MAP

APPENDIX A-4 – USDA SOILS REPORT

Storm Water Report and Calculations

Kiddie Academy – Dublin, OH (17-032)

OVERVIEW OF THE PROJECT

This project consists of the development of a new 10,000 s.f. daycare facility located on the Northwest corner of Avery Road and Tuswell Drive in Dublin, Ohio. The building will have associated parking and utilities along with a new curb cut on Tuswell Drive to access the site.

EXISTING CONDITIONS

The existing site consists of a 2.33 acre undeveloped parcel on the north side of Tuswell Drive. There is in existing retention pond on the western half of the site. The remainder of the site is undeveloped grass area. The site was platted as part of the Kendall Ridge Subdivision, and the retention pond was designed to provide storm water management for the overall development. The inlet and outlet pipes for the pond are submerged. Based on field survey information and record plans, it has been determined that the outlet for the existing pond is a submerged 42" pipe that connected to an existing 42" storm sewer flowing north from Kendall Ridge to outlets to the City of Dublin's dry detention basin to the north and ultimately to the Cosgray Ditch. The tributary area for the existing pond, including the site is approximately 8.36 acres based on the Kendall Ridge record plans.

To the east and southeast, the site slopes gently towards either Avery Road, (to the east), or Tuswell Drive, (to the south). The site is currently undeveloped with a retention basin occupying most of the western half of the parcel. The existing storm water management calculations for the pond were previously submitted and approved through the City of Dublin (Reference project Number 98-005-RES).

Per the Natural Resources Conservation Service of the United States Department of Agriculture, the site exhibits roughly 39% Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes, (primarily to the northeast of the site with an additional small section to the southwest along Tuswell Drive,) and 61% Kokomo silty clay loam, 0 to 2 percent slopes, (crossing the center of the site diagonally from the northeast corner to the southwest corner.) A USDA NRCS Soils Survey and report has been included within Appendix A-3.

The 24-hour storms for various frequencies are estimated, per the City of Dublin Stormwater Management Design Manual, to be:

1-Year:	2.20 inches
2-Year:	2.63 inches
5-Year:	3.24 inches
10 Year:	3.74 inches
25 Year:	4.44 inches
50 Year:	5.02 inches
100 Year:	5.63 inches

PROPOSED CONDITIONS

At the completion of construction, the site will house a new 10,000 s.f. daycare facility with associated parking and utility services. Playground areas will be constructed to the west of the proposed building and will be mulched semi-pervious surfaces. Per the current site plan, a total of 0.76 acres of impervious area will be added to the site as part of this project (see Appendix 1 for the on-site Tributary Boundary).

ALLOWABLE RELEASE RATE CALCULATION

The site is located in the Cosgray Watershed (City of Dublin Figure C-12, Subarea 1350) and the previously assumed allowable release rates are included below. Within the table, the increase in flow with the proposed improvements remains under the maximum allowable release rate for the overall development.

	RELEASE RATE (cfs)			
Storm Event	**Current**	**Daycare**	**Total**	**Allowable**
1	15.90	1.04	16.94	24.10
2	29.10	1.45	30.55	33.40
5	46.90	2.04	48.94	46.10
10	62.00	2.53	64.53	81.10
25	76.40	2.98	79.38	89.40
50	88.80	3.32	92.12	97.00
100	99.60	3.65	103.25	105.30

Pondpack V10 was used to calculate the post developed peak flows and to ensure the post developed flows meet the allowable release rates. The calculated peak flows from the site are summarized in the table below. Calculation printouts can be found in Appendix A-4.

Appendix A-1

TRIBUTARY BOUNDARY PLAN

EXISTING SYMBOLS LEGEND

Sign	SIGN
Sign	STREET SIGN
	AREA LIGHT
	YARD LIGHT
	LIGHT POLE
	LIGHT POLE W/SQR. BASE
	LIGHT POLE W/RND. BASE
	ELECTRIC GUY
E	ELECTRIC MARKER
E.T.	ELECTRIC TRANSFORMER
E.M.	ELECTRIC METER
E.D.	ELECTRIC DROP
E.P.B	ELECTRIC PULL BOX
E.P.	ELECTRIC PEDESTAL
E.O.	ELECTRIC OUTLET
T.C.	TELEPHONE CLOSURE
T.D.	TELEPHONE DROP
T.B.	TELEPHONE PULL BOX
T.P.	TELEPHONE PEDESTAL
	TELEPHONE POLE
	UTILITY POLE
P.B.	PULL BOX
Traffic P.B.	TRAFFIC PULL BOX
Traffic C.B.	TRAFFIC CONTROL BOX
	TRAFFIC SIGNAL
	TRAFFIC POLE
	TRAFFIC POLE W/ WALK
Spr.	SPRINKLER
W.V	WATER VALVE
F.H.	FIRE HYDRANT
W.M.	WATER METER
W.S.	WATER SERVICE
W.C. Valve	WATER CONTROL VALVE
I.C. Valve	IRRIGATION CONTROL VALVE
C.D.	CABLE TELEVISION DROP
C.P.	CABLE TELEVISION PEDESTAL
G.V.	GAS VALVE
G.S.	GAS SERVICE
G.M.	GAS METER
	GAS MARKER
C.O.	CLEAN OUT
Stm CB TC 708.43	CATCH BASIN W/TOP OF CASTING ELEV.
Stm. Inlet TC 707.28	CURB INLET W/TOP OF CASTING ELEV.
Stm. MH TC 708.43	STORM MANHOLE W/TOP OF CASTING ELEV.
San. MH TC 708.43	SANITARY MANHOLE W/TOP OF CASTING ELEV.
DS	DOWN SPOUT
RD	ROOF DRAIN
x708.53 G	EXISTING ELEV. @ GUTTER
x707.87	SPOT ELEV.
Bo	BOLLARD
WP	WOOD POST
MP	METAL POST
	MAIL BOX
	FLAGPOLE
g	EXISTING GAS LINE
w	EXISTING WATER LINE
uge	EXISTING UNDERGROUND ELECTRIC LINE
ohe	EXISTING OVERHEAD ELECTRIC LINE
ugt	EXISTING UNDERGROUND TELEPHONE LINE
oht	EXISTING OVERHEAD TELEPHONE LINE
ohcatv	EXISTING OVERHEAD CABLE TELEVISION LINE
ucatv	EXISTING UNDERGROUND CABLE TELEVISION LINE
710	EXISTING INDEX CONTOUR
709	EXISTING INTERMEDIATE CONTOUR
x x x x	EXISTING FENCE LINE

TREE LEGEND

TREE SYMBOLS DO NOT REPRESENT TRUNK SIZE OR DRIP LINES.

= DECIDUOUS TREE

= EVERGREEN TREE

= DEAD TREE

= SHRUB

= HEDGE

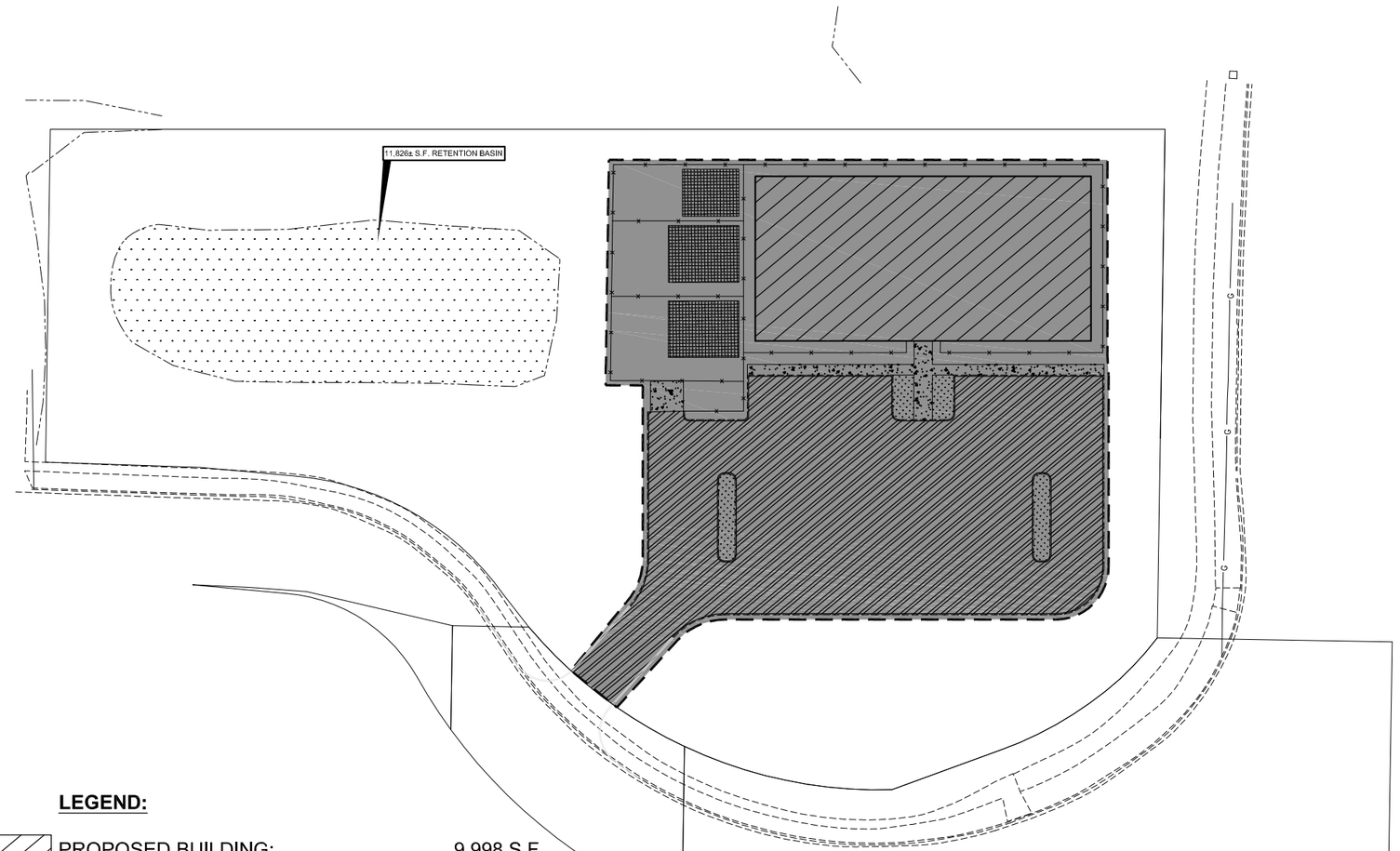
= STUMP

TWT = TWIN TRUNK

TRT = TRIPLE TRUNK

MUT = MULTI TRUNK

AL = ALDER
AP = APPLE
ASH = ASH
BE = BOXELDER
BF = BALSAM FIR
BH = BEECH
BI = BIRCH
BL = BLACK LOCUST
BLO = BLACK OAK
BM = BLACK MAPLE
BO = BUR OAK
BT = BUCKHORN
BW = BASSWOOD
BY = BUCKEYE
CA = CRABAPPLE
CD = CEDAR
CE = CHINESE ELM
CH = CHESTNUT
CHO = CHESTNUT OAK
CHY = CHERRY
CS = CHINESE SUMAE
CT = CATALPA
CW = COTTONWOOD
DW = DOGWOOD
ELM = ELM
FIR = FIR
GINK = GINKO
HAW = HAWTHORN
HB = HACKBERRY
HEM = HEMLOCK
HL = HONEY LOCUST
H = HICKORY
HY = HOLLY H
CH = HORSE CHESTNUT
J = JUNIPER
LO = LOCUST
M = MAPLE
MG = MAGNOLIA
MU = MULBERRY
NM = NORWAY MAPLE
OAK = OAK
OO = OSAGE ORANGE
ORN = ORNAMENTAL
PE = PEACH
PL = PLUM
PN = PINE
PO = PIN OAK
PP = POPLAR
PR = PEAR
PW = PUSSY WILLOW
QA = QUAKING ASPEN
RDB = REDBUD
RM = RED MAPLE
RO = RED OAK
SG = SWEETGUM
SH = SHAGBARK HICKORY
SIM = SILVER MAPLE
SM = SUGAR MAPLE
SO = SCARLET OAK
SP = SPRUCE
SS = SASSAFRAS
SU = SUMAC
SYC = SYCAMORE
TA = THORNAPPLE
TU = TULIP TREE
T = TREE
WAL = WALNUT
WL = WILLOW
WC = WILD CHERRY



LEGEND:

PROPOSED BUILDING:	9,998 S.F.
PROPOSED ASPHALT PAVEMENT:	19,473 S.F.
PROPOSED CONCRETE PAVEMENT:	1,095 S.F.
PROPOSED PLAY AREA*:	1,920 S.F.
EXISTING PAVEMENT (TO REMAIN):	519 S.F.
GREEN SPACE:	9,335 S.F.
— — — TOTAL "DISTURBED" AREA:	42,340 S.F.

IMPERVIOUS / PERVIOUS AREAS:

PHASE	IMPERVIOUS	PERVIOUS
EXISTING	519 S.F.	41,821 S.F.
PROPOSED	33,005 S.F.	9,335 S.F.

OHIO Utilities Protection SERVICE
Call Before You Dig
800-362-2764 or 8-1-1
www.oups.org

Bird+Bull Engineers & Surveyors
3500 Snouffer Rd., Ste.225
Columbus, Ohio 43235
Ph: (614) 761-1661
Fax: (614) 761-1328
WWW.BIRDBULL.COM

PROPOSED KIDDIE DAYCARE SITE
6055 AVERY ROAD, DUBLIN, OHIO

IMPERVIOUS / PERVIOUS AREA EXHIBIT

H: \Jobs \2017\032\CADD\DWG\Design\Exhibit\SWPPP Exhibit.dwg 04/03/2017

Appendix A-2

PONDPACK REPORT

Table of Contents

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 1.01

********** DESIGN STORMS SUMMARY **********

Dublin..... Design Storms 2.01

********** TC CALCULATIONS **********

DEVELOPED..... Tc Calcs 3.01

PROPOSED..... Tc Calcs 3.03

********** CN CALCULATIONS **********

DEVELOPED..... Runoff CN-Area 4.01

PROPOSED..... Runoff CN-Area 4.02

********** RUNOFF HYDROGRAPHS **********

DEVELOPED..... 1
Unit Hyd. Summary 5.01

DEVELOPED..... 2
Unit Hyd. Summary 5.02

DEVELOPED..... 5
Unit Hyd. Summary 5.03

Table of Contents (continued)

DEVELOPED..... 10
Unit Hyd. Summary 5.04

DEVELOPED..... 25
Unit Hyd. Summary 5.05

DEVELOPED..... 50
Unit Hyd. Summary 5.06

DEVELOPED..... 100
Unit Hyd. Summary 5.07

PROPOSED..... 1
Unit Hyd. Summary 5.08

PROPOSED..... 2
Unit Hyd. Summary 5.09

PROPOSED..... 5
Unit Hyd. Summary 5.10

PROPOSED..... 10
Unit Hyd. Summary 5.11

PROPOSED..... 25
Unit Hyd. Summary 5.12

PROPOSED..... 50
Unit Hyd. Summary 5.13

PROPOSED..... 100
Unit Hyd. Summary 5.14

********** POND VOLUMES **********

POND 10..... Vol: Elev-Volume 6.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 7.01

Table of Contents (continued)

Individual Outlet Curves 7.03
Composite Rating Curve 7.05

********** POND ROUTING **********

POND 10 OUT 1
Pond Routing Summary 8.01

POND 10 OUT 2
Pond Routing Summary 8.02

POND 10 OUT 5
Pond Routing Summary 8.03

POND 10 OUT 10
Pond Routing Summary 8.04

POND 10 OUT 25
Pond Routing Summary 8.05

POND 10 OUT 50
Pond Routing Summary 8.06

POND 10 OUT 100
Pond Routing Summary 8.07

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Dublin

Return Event	Total Depth in	Rainfall Type	RNF ID
1	2.2000	Synthetic Curve	TypeII 24hr
2	2.6300	Synthetic Curve	TypeII 24hr
5	3.2400	Synthetic Curve	TypeII 24hr
10	3.7400	Synthetic Curve	TypeII 24hr
25	4.4400	Synthetic Curve	TypeII 24hr
50	5.0200	Synthetic Curve	TypeII 24hr
100	5.6300	Synthetic Curve	TypeII 24hr

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 cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DEVELOPED	AREA	1	5278		12.0000	1.94		
DEVELOPED	AREA	2	6697		12.0000	2.43		
DEVELOPED	AREA	5	8747		12.0000	3.13		
DEVELOPED	AREA	10	10448		12.0000	3.70		
DEVELOPED	AREA	25	12849		12.0000	4.49		
DEVELOPED	AREA	50	14850		12.0000	5.14		
DEVELOPED	AREA	100	16963		12.0000	5.82		
EXISTING	AREA	1	1575		12.0500	.44		
EXISTING	AREA	2	2404		12.0500	.73		
EXISTING	AREA	5	3746		12.0500	1.21		
EXISTING	AREA	10	4958		12.0500	1.63		
EXISTING	AREA	25	6783		12.0500	2.25		
EXISTING	AREA	50	8381		12.0500	2.79		
EXISTING	AREA	100	10128		12.0500	3.38		

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 cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
*OUT 10	JCT	1	1575		12.0500	.44		
*OUT 10	JCT	2	2404		12.0500	.73		
*OUT 10	JCT	5	3746		12.0500	1.21		
*OUT 10	JCT	10	4958		12.0500	1.63		
*OUT 10	JCT	25	6783		12.0500	2.25		
*OUT 10	JCT	50	8381		12.0500	2.79		
*OUT 10	JCT	100	10128		12.0500	3.38		
*OUT 20	JCT	1	5278		12.0000	1.94		
*OUT 20	JCT	2	6697		12.0000	2.43		
*OUT 20	JCT	5	8747		12.0000	3.13		
*OUT 20	JCT	10	10448		12.0000	3.70		
*OUT 20	JCT	25	12849		12.0000	4.49		
*OUT 20	JCT	50	14850		12.0000	5.14		
*OUT 20	JCT	100	16963		12.0000	5.82		
*OUT 30	JCT	1	5264		12.1500	1.04		
*OUT 30	JCT	2	6684		12.1000	1.45		
*OUT 30	JCT	5	8734		12.1000	2.04		
*OUT 30	JCT	10	10435		12.1000	2.53		
*OUT 30	JCT	25	12836		12.1000	2.98		
*OUT 30	JCT	50	14837		12.1000	3.32		
*OUT 30	JCT	100	16951		12.1000	3.65		
POND 10 IN	POND	1	5278		12.0000	1.94		
POND 10 IN	POND	2	6697		12.0000	2.43		
POND 10 IN	POND	5	8747		12.0000	3.13		
POND 10 IN	POND	10	10448		12.0000	3.70		
POND 10 IN	POND	25	12849		12.0000	4.49		
POND 10 IN	POND	50	14850		12.0000	5.14		
POND 10 IN	POND	100	16963		12.0000	5.82		

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 cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
POND 10	OUT POND	1	5265		12.1500	1.04	921.59	13450
POND 10	OUT POND	2	6685		12.1000	1.45	921.71	13771
POND 10	OUT POND	5	8735		12.1000	2.04	921.86	14185
POND 10	OUT POND	10	10436		12.1000	2.53	921.97	14485
POND 10	OUT POND	25	12837		12.1000	2.98	922.13	14929
POND 10	OUT POND	50	14838		12.1000	3.32	922.27	15338
POND 10	OUT POND	100	16951		12.1000	3.65	922.43	15782
PROPOSED	AREA	1	5278		12.0000	1.94		
PROPOSED	AREA	2	6697		12.0000	2.43		
PROPOSED	AREA	5	8747		12.0000	3.13		
PROPOSED	AREA	10	10448		12.0000	3.70		
PROPOSED	AREA	25	12849		12.0000	4.49		
PROPOSED	AREA	50	14850		12.0000	5.14		
PROPOSED	AREA	100	16963		12.0000	5.82		

Title... Project Date: 3/30/2017
Project Engineer: BIRDBULL\hrose
Project Title: Watershed
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Dublin

Storm Tag Name = 1

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 1 yr
Total Rainfall Depth= 2.2000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 2.6300 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= 3.2400 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= 3.7400 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= 4.4400 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Title... Project Date: 3/30/2017
Project Engineer: BIRDBULL\hrose
Project Title: Watershed
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Dublin

Storm Tag Name = 50

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 50 yr
Total Rainfall Depth= 5.0200 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= 5.6300 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: User Defined

Segment #1 Time: .1670 hrs

==========
Total Tc: .1670 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: .1670 hrs

Total Tc: .1670 hrs

Tc Equations used...

==== User Defined ====

Tc = Value entered by user

Where: Tc = Time of concentration

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
	98	.760			98.00
	77	.210			77.00
COMPOSITE AREA & WEIGHTED CN --->		.970			93.45 (93)

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
	98	.760			98.00
	77	.210			77.00
COMPOSITE AREA & WEIGHTED CN --->		.970			93.45 (93)

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm
Duration = 24.0000 hrs Rain Depth = 2.2000 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 1
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 1.95 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 1.94 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

1.4990 in
5278 cu.ft

HYG Volume... 5278 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration = 24.0000 hrs Rain Depth = 2.6300 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 2
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 2.46 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 2.43 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

1.9021 in
6697 cu.ft

HYG Volume... 6697 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 3.2400 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 5
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 3.17 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 3.13 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

2.4842 in
8747 cu.ft

HYG Volume... 8747 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration = 24.0000 hrs Rain Depth = 3.7400 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 10
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 3.75 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 3.70 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

2.9672 in
10448 cu.ft

HYG Volume... 10448 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration = 24.0000 hrs Rain Depth = 4.4400 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 25
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 4.55 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 4.49 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

3.6491 in
12849 cu.ft

HYG Volume... 12849 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration = 24.0000 hrs Rain Depth = 5.0200 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 50
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 5.22 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 5.14 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

4.2175 in
14850 cu.ft

HYG Volume... 14850 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 5.6300 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - DEVELOPED 100
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 5.91 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 5.82 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

4.8177 in
16964 cu.ft

HYG Volume... 16963 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: DEVELOPED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm
Duration = 24.0000 hrs Rain Depth = 2.2000 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 1
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 1.95 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 1.94 cfs
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

1.4990 in
5278 cu.ft

HYG Volume... 5278 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration = 24.0000 hrs Rain Depth = 2.6300 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 2
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 2.46 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 2.43 cfs
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

1.9021 in
6697 cu.ft

HYG Volume... 6697 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 3.2400 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 5
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 3.17 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 3.13 cfs
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

2.4842 in
8747 cu.ft

HYG Volume... 8747 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration = 24.0000 hrs Rain Depth = 3.7400 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 10
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 3.75 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 3.70 cfs
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

2.9672 in
10448 cu.ft

HYG Volume... 10448 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration = 24.0000 hrs Rain Depth = 4.4400 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 25
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 4.55 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 4.49 cfs
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

3.6491 in
12849 cu.ft

HYG Volume... 12849 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration = 24.0000 hrs Rain Depth = 5.0200 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 50
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 5.22 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 5.14 cfs
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

4.2175 in
14850 cu.ft

HYG Volume... 14850 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 5.6300 in
Rain Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
HYG File - ID = work_pad.hyg - PROPOSED 100
Tc = .1670 hrs
Drainage Area = .970 acres Runoff CN= 93

==========
Computational Time Increment = .02227 hrs
Computed Peak Time = 11.9795 hrs
Computed Peak Flow = 5.91 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0000 hrs
Peak Flow, Interpolated Output = 5.82 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
==========

DRAINAGE AREA

ID:PROPOSED
CN = 93
Area = .970 acres
S = .7527 in
0.2S = .1505 in

Cumulative Runoff

4.8177 in
16964 cu.ft

HYG Volume... 16963 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .16700 hrs (ID: PROPOSED)
Computational Incr, Tm = .02227 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 6.58 cfs
Unit peak time Tp = .11133 hrs
Unit receding limb, Tr = .44533 hrs
Total unit time, Tb = .55667 hrs

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (cu.ft)
921.00	11831
922.00	14572
923.00	17376
924.00	20389
924.80	23697

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 921.00 ft
Increment = .20 ft
Max. Elev.= 924.80 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-Circular	O0	--->	TW	921.000	924.800

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = O0
Structure Type = Orifice-Circular

# of Openings = 1
Invert Elev. = 921.00 ft
Diameter = 1.0000 ft
Orifice Coeff. = .600

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

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev, ft	Device Q, cfs	Tail Water TW Elev, ft	Converge +/-ft	Notes / Computation Messages
921.00	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
921.20	.13	Free Outfall		CRIT.DEPTH CONTROL Vh= .051ft Dcr= .149ft CRIT.DEPTH Hev= .00ft
921.40	.50	Free Outfall		CRIT.DEPTH CONTROL Vh= .105ft Dcr= .294ft CRIT.DEPTH Hev= .00ft
921.60	1.07	Free Outfall		CRIT.DEPTH CONTROL Vh= .165ft Dcr= .435ft CRIT.DEPTH Hev= .00ft
921.80	1.78	Free Outfall		CRIT.DEPTH CONTROL Vh= .232ft Dcr= .568ft CRIT.DEPTH Hev= .00ft
922.00	2.67	Free Outfall		H =.50
922.20	3.16	Free Outfall		H =.70
922.40	3.59	Free Outfall		H =.90
922.60	3.96	Free Outfall		H =1.10
922.80	4.31	Free Outfall		H =1.30
923.00	4.63	Free Outfall		H =1.50
923.20	4.93	Free Outfall		H =1.70
923.40	5.21	Free Outfall		H =1.90
923.60	5.48	Free Outfall		H =2.10
923.80	5.73	Free Outfall		H =2.30
924.00	5.98	Free Outfall		H =2.50
924.20	6.21	Free Outfall		H =2.70

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = O0 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
924.40	6.44	Free Outfall		
	H =2.90			
924.60	6.66	Free Outfall		
	H =3.10			
924.80	6.87	Free Outfall		
	H =3.30			

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
921.00	.00	Free Outfall		None contributing
921.20	.13	Free Outfall		O0
921.40	.50	Free Outfall		O0
921.60	1.07	Free Outfall		O0
921.80	1.78	Free Outfall		O0
922.00	2.67	Free Outfall		O0
922.20	3.16	Free Outfall		O0
922.40	3.59	Free Outfall		O0
922.60	3.96	Free Outfall		O0
922.80	4.31	Free Outfall		O0
923.00	4.63	Free Outfall		O0
923.20	4.93	Free Outfall		O0
923.40	5.21	Free Outfall		O0
923.60	5.48	Free Outfall		O0
923.80	5.73	Free Outfall		O0
924.00	5.98	Free Outfall		O0
924.20	6.21	Free Outfall		O0
924.40	6.44	Free Outfall		O0
924.60	6.66	Free Outfall		O0
924.80	6.87	Free Outfall		O0

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 1
Outflow HYG file = work_pad.hyg - POND 10 OUT 1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	1.94 cfs	at	12.0000 hrs
Peak Outflow	=	1.04 cfs	at	12.1500 hrs
Peak Elevation	=	921.59 ft		
Peak Storage	=	13450 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	5278
- Infiltration	=	0
- HYG Vol OUT	=	5265
- Retained Vol	=	11843

Unrouted Vol = - cu.ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 2
Outflow HYG file = work_pad.hyg - POND 10 OUT 2

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	2.43 cfs	at	12.0000 hrs
Peak Outflow	=	1.45 cfs	at	12.1000 hrs
Peak Elevation	=	921.71 ft		
Peak Storage	=	13771 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	6697
- Infiltration	=	0
- HYG Vol OUT	=	6685
- Retained Vol	=	11843
Unrouted Vol	=	0 cu.ft (.001% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 5
Outflow HYG file = work_pad.hyg - POND 10 OUT 5

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	3.13 cfs	at	12.0000 hrs
Peak Outflow	=	2.04 cfs	at	12.1000 hrs
Peak Elevation	=	921.86 ft		
Peak Storage	=	14185 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	8747
- Infiltration	=	0
- HYG Vol OUT	=	8735
- Retained Vol	=	11843

Unrouted Vol = - cu.ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 10
Outflow HYG file = work_pad.hyg - POND 10 OUT 10

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	3.70 cfs	at	12.0000 hrs
Peak Outflow	=	2.53 cfs	at	12.1000 hrs
Peak Elevation	=	921.97 ft		
Peak Storage	=	14485 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	10448
- Infiltration	=	0
- HYG Vol OUT	=	10436
- Retained Vol	=	11843
Unrouted Vol	=	0 cu.ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 25
Outflow HYG file = work_pad.hyg - POND 10 OUT 25

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	4.49 cfs	at	12.0000 hrs
Peak Outflow	=	2.98 cfs	at	12.1000 hrs
Peak Elevation	=	922.13 ft		
Peak Storage	=	14929 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	12849
- Infiltration	=	0
- HYG Vol OUT	=	12837
- Retained Vol	=	11843
Unrouted Vol	= -	cu.ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 50
Outflow HYG file = work_pad.hyg - POND 10 OUT 50

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	5.14 cfs	at	12.0000 hrs
Peak Outflow	=	3.32 cfs	at	12.1000 hrs
Peak Elevation	=	922.27 ft		
Peak Storage	=	15338 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	14850
- Infiltration	=	0
- HYG Vol OUT	=	14838
- Retained Vol	=	11843
Unrouted Vol	=	0 cu.ft (.000% of Inflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\Jobs\2017\032\Engineering\Calculation\Stormwater\
Inflow HYG file = work_pad.hyg - POND 10 IN 100
Outflow HYG file = work_pad.hyg - POND 10 OUT 100

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	921.00 ft
Starting Volume	=	11831 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	.0500 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	5.82 cfs	at	12.0000 hrs
Peak Outflow	=	3.65 cfs	at	12.1000 hrs
Peak Elevation	=	922.43 ft		
Peak Storage	=	15782 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	11831
+ HYG Vol IN	=	16963
- Infiltration	=	0
- HYG Vol OUT	=	16951
- Retained Vol	=	11843
Unrouted Vol	=	0 cu.ft (.000% of Inflow Volume)

Index of Starting Page Numbers for ID Names

----- D -----
DEVELOPED... 3.01, 4.01, 5.01, 5.02,
5.03, 5.04, 5.05, 5.06, 5.07
Dublin... 2.01

----- O -----
Outlet 1... 7.01, 7.03, 7.05

----- P -----
POND 10... 6.01, 8.01, 8.02, 8.03,
8.04, 8.05, 8.06, 8.07
PROPOSED... 3.03, 4.02, 5.08, 5.09,
5.10, 5.11, 5.12, 5.13, 5.14

----- W -----
Watershed... 1.01

Appendix A-3

FEMA FIRMETTE MAP

d insurance is available in this community, contact your
ational Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1 " = 500 '

0 500 1000 FEET

PANEL 0133K

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

FRANKLIN COUNTY, OHIO

AND INCORPORATED AREAS

PANEL 133 OF 465

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLUMBUS, CITY OF	390170	0133	K
DUBLIN, CITY OF	390673	0133	K
FRANKLIN COUNTY	390167	0133	K
HILLIARD, CITY OF	390175	0133	K

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
39049C0133K

MAP REVISED
JUNE 17, 2008

Federal Emergency Management Agency

Appendix A-4

USDA SOILS REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Franklin County, Ohio

April 3, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Franklin County, Ohio.....13
CrA—Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes.....13
Ko—Kokomo silty clay loam, 0 to 2 percent slopes.....14
References.....17

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:881 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Franklin County, Ohio
Survey Area Data: Version 14, Sep 22, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 4, 2014—Aug 27, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Franklin County, Ohio (OH049)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CrA	Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes	1.1	40.2%
Ko	Kokomo silty clay loam, 0 to 2 percent slopes	1.6	59.8%
Totals for Area of Interest		**2.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Ohio

CrA—Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2thy7
Elevation: 520 to 1,550 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 145 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Crosby and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crosby

Setting

Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty material or loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 11 inches: silt loam
Bt1 - 11 to 14 inches: silt loam
2Bt2 - 14 to 28 inches: silty clay loam
2BCt - 28 to 36 inches: loam
2Cd - 36 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Kokomo, drained

Percent of map unit: 5 percent
Landform: Depressions, swales, water-lain moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Celina, eroded

Percent of map unit: 4 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Miamian, eroded

Percent of map unit: 1 percent
Landform: Ground moraines, recessionial moraines, water-lain moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Ko—Kokomo silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2rwj8
Elevation: 820 to 1,140 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Kokomo and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kokomo

Setting

Landform: Depressions on till plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy glaciofluvial deposits derived from sedimentary rock over loamy till derived from limestone and dolomite

Typical profile

Ap - 0 to 11 inches: silty clay loam
Btg - 11 to 41 inches: clay loam
Bt - 41 to 64 inches: clay loam
2C - 64 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 35 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Crosby

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Celina

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

References

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