FINAL STORMWATER MANAGEMENT

ANALYSIS AND REPORT

FOR

77TH STREET PROJECT

NAPERVILLE, ILLINOIS

APPROVED

CITY OF NAPERVILLE
Address: 77th Street Project
Last Revision Date: 3/6/2020
Approval Date: 3/27/2020

REVISED MARCH 6, 2020
REVISED FEBRUARY 5, 2020
DECEMBER 16, 2019

782.029

PROFESSIONAL ENGINEER'S CERTIFICATION

STATE OF ILLINOIS }
SS.
COUNTY OF DUPAGE }

I, MICHAEL A. MAY, A LICENSED PROFESSIONAL ENGINEER OF ILLINOIS, HEREBY CERTIFY THAT THIS TECHNICAL SUBMISSION WAS PREPARED ON BEHALF OF OAK CREEK CAPITAL PARTNERS, LLC BY CEMCON, LTD. UNDER MY PERSONAL DIRECTION.

DATED THIS 6 DAY OF March, AD, 2020

Michael May, P.E.

ILLINOIS LICENSED PROFESSIONAL ENGINEER NO. 062-059494

MY LICENSE EXPIRES ON NOVEMBER 30, 2021

PROFESSIONAL DESIGN FIRM LICENSE NO. 184-002937, EXPIRATION DATE IS APRIL 30, 2021

NOTE: UNLESS THIS DOCUMENT BEARS THE ORIGINAL SIGNATURE AND IMPRESSED SEAL OF THE DESIGN PROFESSIONAL ENGINEER, IT IS NOT A VALID TECHNICAL SUBMISSION.

PREPARED FOR:

OAK CREEK CAPITAL PARTNERS, LLC
P.O. BOX 5726
NAPERVILLE, IL 60567

847-514-9144

PREPARED BY:

CEMCON, LTD.
2280 WHITE OAK CIRCLE
SUITE 100
AURORA, IL 60504

630-862-2100

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TABLE OF CONTENTS

FINAL STORMWATER MANAGEMENT
ANALYSIS AND REPORT
FOR
77TH STREET PROJECT
NAPERVILLE, ILLINOIS

EXHIBITS

EXHIBIT A SITE LOCATION MAP

EXHIBIT B USDA NRCS SOILS MAP

EXHIBIT C FEMA FLOOD INSURANCE RATE MAPS

EXHIBIT D NATIONAL WETLAND INVENTORY MAP

EXHIBIT E PERMITS

EXHIBIT F "WITHOUT PROJECT" EXISTING CONDITION HYDROLOGY

- EXISTING CONDITIONS WATERSHED EXHIBIT
- PONDPACK INPUT AND OUTPUT FILES
- PONDPACK SUPPORTING DOCUMENTATION

EXHIBIT G "WITH PROJECT" PROPOSED CONDITION HYDROLOGY

- PROPOSED CONDITIONS WATERSHED EXHIBIT
- PONDPACK INPUT AND OUTPUT FILES
- PONDPACK SUPPORTING DOCUMENTATION

EXHIBIT H CATCHMENT EXHIBIT

EXHIBIT I STORM SEWER SUPPORTING CALCULATIONS

EXHIBIT J ELECTRONIC COPIES OF THE PONDPACK MODELS

FINAL STORMWATER MANAGEMENT
ANALYSIS AND REPORT
FOR
77TH STREET PROJECT
NAPERVILLE, ILLINOIS

1.0 PROJECT DESCRIPTION

The 77TH Street Project proposed by Oak Creek Capital Partners, LLC. is a 3.4± acre site that consists of 10 single family homes and reconstruction of an offsite stormwater management facility. The site is situated north of 77th Street and east of Wehrli Road (see Tab 1A). Site infrastructure improvements (see Final Site Development Plans) will include the construction of sanitary sewers, watermains, stormwater drainage and conveyance facilities, and regrading/expansion of an existing stormwater management facility which will be vegetatively stabilized for stormwater discharge control.

The purpose of this Stormwater Management Analysis and Report is to summarize the hydrologic and hydraulic analyses performed for Existing and Proposed Conditions and to demonstrate that, when constructed, the development will comply with City, County, State, and Federal laws and regulations and provide a significant drainage improvement and regional benefit for the watershed.

2.0 FLOODPLAIN AND WETLANDS ASSESSMENT

During the project-planning phase, the subject site was evaluated for the presence of regulatory floodplains/floodways, buffer, and wetland habitat. This evaluation consisted of a detailed review of available topographic, wetland, and FEMA Maps. Following is an account of the sources referenced and procedures employed in conducting the assessment for the project.

A. FLOODPLAIN EVALUATION

According to the FEMA Flood Insurance Rate Map (FIRM) panel 17043C0808H (Exhibit C) there is no floodplain located within the limits of this site.

B. WETLAND ASSESSMENT

According to the DuPage County Wetland GIS database, there are no wetlands within the development limits. Refer to Exhibit D for a copy of the current DuPage County wetland map from their GIS database.

3.0 EXISTING "WITHOUT-PROJECT" CONDITION

A. WATERSHED DESCRIPTION

The existing 3.4 ac. site is a vacant lot heavily wooded. The site is tributary to the west branch of the DuPage river watersheds. In the existing conditions the site drains to the Southeast to 77th Street. The existing basin directly to the east of the site was modeled in the existing pondpack model for the proposed conditions where the site will drain to the modified basin. Additionally all the tributary area to this basin, including the Lizzadro Estates Subdivision, Shiva Estates Subdivision and the parcel directly north of Shiva Estates was modeled in the existing conditions. Storage was added for both the depression located on the parcel north of Shiva Estates and storage in the road way / structures in the Shiva Estates Subdivision to accurately establish the flow that is tributary to the Wehrli Road storm sewer and what flows overland to the existing Lizzadro Estates Subdivision Basin. Refer to Exhibit F for the Existing Conditions Watershed Exhibit.

A detailed hydrologic analysis of the existing conditions of the site and the upstream tributary area has been prepared using the Pondpack hydrologic analysis software. Refer to Exhibit F for the complete calculations and supporting documentation.

B. METHODS

In accordance with the current DuPage County Countywide Stormwater & Floodplain Ordinance (Ordinance), proposed site development which contains more than 25,000 sq-ft. of new impervious area requires stormwater management to protect downstream properties. The

Ordinance requires that the proposed development attenuate flows to 0.1 cfs/ac. of development area.

To develop rainfall vs. runoff relationships for the development, the Soil Conservation Service (SCS) method was utilized with the PondPack V8i software and employed the following methodology and procedures in determining the respective hydrologic and hydraulic parameters.

- **Runoff Curve Numbers –** The TR-55 Tables 2-2a *(urban areas)* and 2-2c *(agr. Lands)*, "DuPage County Soil Survey", and watershed land use data were utilized to calculate runoff curve numbers *(CN)* for input to the Pond Pack Model. A CN = 98 was used for all impervious surfaces, a CN = 74 (type C soils) was used for all landscaped pervious Surfaces, a CN = 70 (type C soils) was used for all woods and a CN = 83 was used for all residential ¼ Acre. The existing conditions CN documentation for the watershed is provided in Exhibit F. The proposed conditions CN documentation is located in Exhibit G.

- **Time of Concentration (lag time) -** The time of concentration (T_c) calculations of each sub-basin were performed for the flow path representing the travel time from the hydraulically most distant point of the watershed utilizing Worksheet 3 from the TR-55 Hydrology Manual. The Time of Concentration documentation for the existing and proposed conditions is provided in Exhibit F and Exhibit G respectively.

- **Precipitation Data/Rainfall Distribution -** Bulletin 70 northeast rainfall values with Huff rainfall distributions were selected in accordance with Appendix E criteria and the "Technical Guidance" to the Ordinance. Storage volumes were evaluated based on the 100-year frequency 24-hour duration event measuring 7.58 inches of precipitation and the Huff 3rd quartile rainfall distribution. Furthermore to account for the new updated Bulletin 70 based on the 100-year frequency 24-hour duration event measuring 8.57 inches. The additional 1” was applied to the site only and the additional calculated storage was provided in the proposed basin.

- **Stage vs. Storage and Stage vs. Discharge Relationships -** Stage vs. storage relationships for the SMF were measured in AutoCAD at regular intervals corresponding to the level of potential inundation, and the volume was calculated by the method of average area times the incremental interval. Stage vs. discharge relationships were

computed in PondPack inlet/outlet control equations with all possible headwater and tailwater combinations. Supporting documentation is provided in Exhibit G.

C. HYDROLOGIC ANALYSIS

As stated previously, PondPack was used to model the hydrology of the watersheds within the limits of the development and upstream offsite areas using the previously stated methodologies. Pondpack was used based on its capability to model multiple stage restrictors. For both the existing and proposed conditions a schematic can be found under Exhibit F and G under Pondpack input and output files. This schematic shows how each of the subareas and basin are interconnected and each outlet is labeled. Furthermore, along with the schematic the Pondpack input files includes: unit hydrograph information for each subarea, outlet input data that gives the information for each basin outlet, and elevation volume tables for each basin that was modeled. Refer to the proposed conditions section for a summary of existing peak flows and a comparison with the proposed conditions peak flows.

4.0 PROPOSED "WITH-PROJECT" CONDITION

A. DESCRIPTION

In accordance with the City of Naperville and DuPage County Stormwater Management Ordinance, any proposed site development which would affect the discharge of stormwater requires stormwater management to protect downstream properties. In general, stormwater management facilities (SMF) are configured to restrict site rainfall-runoff to 0.1 cfs/ac. for the 100-year 24-hour storm of developed area. In addition, adequate stormwater conveyance systems are required to by-pass the expected runoff from any off-site areas.

The 77th street project will include expansion/modification of the existing Lizzadro Estates Subdivision Basin (refer to Exhibit G for the Proposed Conditions Watershed Exhibit). With the expansion of the existing basin the existing restrictor will be modified to include an orifice sized at 4.8" and an internal weir wall set at 728.0. Additionally to convey the 100-year storm events an 8" orifice plate will be bolted over the existing down stream 12" RCP. The 77th street project, along with the Lizzadro Estates Subdivision, will require a total of 3.59 ac./ft of storage and 3.87 ac./ft of storage with the additional 1" over the site. The modified onsite basin will provide 3.92 ac./ft of storage.

B. HYDROLOGIC ANALYSIS

As previously stated, the site runoff for the development has been documented to be in strict conformance with the Ordinance. Table 1 below demonstrates that peak flows for all 100-year events have been reduced below existing and that the required release rate has been met for all 100-year events as well. The ordinance also requires that the proposed development maintains or reduces 2-year 24-hour peak flows. The 2-year 24-hour existing onsite flow from the site is 1.27 cfs. The 2-year 24-hour proposed onsite flow from the site is 0.79 cfs. The site therefore provides the required attenuation during the 2-year 24-hour event. The proposed project reduces flows in all 100-year events as demonstrated in Table 1 below. The allowable release rate will include the 3.39 onsite acres along with the 7.63 acres the Lizzadro Basin was designed for.

Table 1

Release Rate Analysis (100-Year Storm)

Event	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	18 Hr	24 Hr
Onsite Allowable Release (cfs)	1.10	1.10	1.10	1.10	1.10	1.10	1.10
By-Pass Flow (cfs)	12.15	11.36	9.05	6.54	4.60	3.87	3.14
Total Allowable Release (cfs)	13.25	12.46	10.15	7.64	5.70	4.97	4.24
Proposed Release (cfs)	3.43	3.82	3.89	3.94	4.07	4.08	4.08
Existing Release (cfs)	6.22	7.40	8.90	7.38	9.11	9.42	8.17

Notes: Onsite Allowable Release = 0.10 cfs/ac. * 11.02 ac. = 1.10 cfs

By-Pass Flow = Sub Area 013 in Model, 011 Outflow and 012 Overflow in Model

Total Allowable Release = Onsite Allowable Release + By-Pass Flow

Proposed Release = Flow from SWMF 01 + Undetained flow from Sub Area 002

Existing Release = Total flow draining to downstream areas of site as follows:

Area draining from site to 77th Street – O-2 in Model

Area draining south from Lizzadro Estates Basin – O-1 in Model

Furthermore to account for the new Rainfall of 8.57" for Bulletin 70 the total site was multiplied by the 1" increase. Table 2 below shows the site required storage plus the additional 1" over the proposed site.

Table 2

Required Storage Analysis (100-Year Storm)

Event	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	18 Hr	24 Hr
SWMF No. 1	728.94	729.91	730.10	730.23	730.62	730.65	730.63
Required Storage (ac.ft.)	2.21	2.96	3.11	3.22	3.57	3.59	3.58
Additional 1" Oversite (ac.ft.)	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Total Required Storage (ac.ft.)	2.49	3.24	3.39	3.50	3.85	3.87	3.86

Notes: Proposed SWMF No. 1 = Proposed HWL in basin

Required Storage = Storage required with 7.58" Rainfall

Additional 1" Oversite = Storage required with 8.57 Rainfall

(additional 1" multiplied by site area)

(1"/12") * 3.4 ac. = 0.28 ac.ft.

Total Required Storage = Required Storage + Additional 1" Oversite

5.0 SOIL EROSION AND SEDIMENTATION CONTROL PLAN

Soil erosion and sediment control measures will be proposed to protect downstream properties and the Special Management Areas from adverse effects of soil erosion and sedimentation. The proposed erosion and sediment control features will include:

- Storm sewer inlets protected with sediment trapping/filter control devices during.
- Silt fencing installed along the site perimeter and a double row of silt fence along wetland, buffer and floodplain areas.
- Construction entrance(s) will be implemented to minimize the impact to adjacent roadways.

Disturbed areas permanently seeded and protected from soil erosion after final grading is accomplished.

6.0 STORMWATER CONVEYANCE SYSTEM

The Stormwater Conveyance Systems have been designed in accordance with the City and County standards and general engineering practice. The storm sewer systems have been designed to convey the 10-year critical duration storm event via gravity flow. Furthermore, because 100-year overflow routes with 1.5' of maximum ponding could not be provided along the

south property line, the storm sewer has been designed to convey the 100-year storm event under pressure flow with keeping the hydraulic grade line below the rims. Design of the storm sewer systems was performed using StormCAD modeling program utilizing gravity design methodology and the overland flood routes were designed using the broad crested weir equation at all high points. Refer to Exhibits H & I for the storm sewer catchment area exhibit and calculations.

7.0 STORMWATER SYSTEMS MAINTENANCE PLAN

The Applicant shall be responsible for the periodic monitoring and maintenance of all stormwater management and stormwater conveyance facilities until such time of final acceptance of the improvements at which time the home owners association will assume maintenance and monitoring. The system includes, but are not limited to, (a) storm sewers, storm drains, inlets, manholes, catch basins and appurtenances, (b) swales and overland drainageways, (c) all containment berms and all stormwater storage facilities, (d) all landscaping and vegetative cover around and within stormwater conveyance and stormwater storage facilities, and (e) all permanent erosion and sedimentation control devices. The Applicant/HOA shall undertake appropriate measures to monitor and maintain such facilities in accordance with the policies and procedures established under the Ordinance as amended from time-to-time, and/or the programs and procedures set forth by the owner as part of the routine maintenance program. The programs for monitoring and maintaining the stormwater management and/or water conveyance facilities/systems imposed under this plan shall include the following components and procedures:

A. Storm sewers, storm drains and other drainage appurtenances, including manholes and inlets, shall be kept clear of sediment and debris, retained at the elevations, lines and grades intended, and maintained in an operable condition capable of conveying storm water runoff.

B. Swales and overland drainage ways shall be maintained to the line and grade established on the Site Development Plan documents to convey stormwater runoff in a free and unobstructed manner. Landscape planting, earthen fill, or other obstructions that impede the flow of stormwater shall be removed, the area regraded, and a vegetative cover shall be reestablished to deter erosion.

C. The proper function of the stormwater management system is dependent upon maintaining both the structural integrity and the minimum elevation of the containment berms, and it is also essential that the volume of potential storage available within the stormwater management facility be preserved. Substantial regrading, placement of earthen fill, or other earthwork operations that would change the elevation, impair the structural integrity, or diminish the volume contained within the basin shall be prohibited. Containment berms shall be maintained at the minimum elevations noted on the Site Development Plan documents and in good structural condition.

D. A vegetative cover around and within the stormwater management facility is essential for the prevention of soil erosion and the deposition of sediments within the basin. The periodic replanting and replacement of vegetation shall be required, when necessary, to maintain the vegetative cover.

E. Temporary sediment traps, siltation fences, or ditch checks, as well as those permanent facilities including catch basins and inlets shall be periodically cleaned of sediment and debris and/or replaced and restored to operable conditions.

8.0 SUMMARY

Oak Creek Capital proposes to develop a 3.4± ac. parcel of land located north of 77th Street and east of Wehrli Road in the City of Naperville. The development will consist of 10 single family homes. Stormwater storage/management is required to control runoff from the site per the City/County Ordinance. A hydrologic analysis was performed utilizing Pondpack to verify compliance with the City/County Ordinance. The stormwater management and conveyance systems proposed meet or exceed the requirements of the City of Naperville and DuPage County. Additionally, as demonstrated by the PondPack model results, the proposed development will reduce flows downstream and provide a net watershed benefit. The development therefore will provide a watershed benefit to an area.

EXHIBIT A

LOCATION MAP

77TH STREET PROJECT

T38N, R10E, SEC. 28

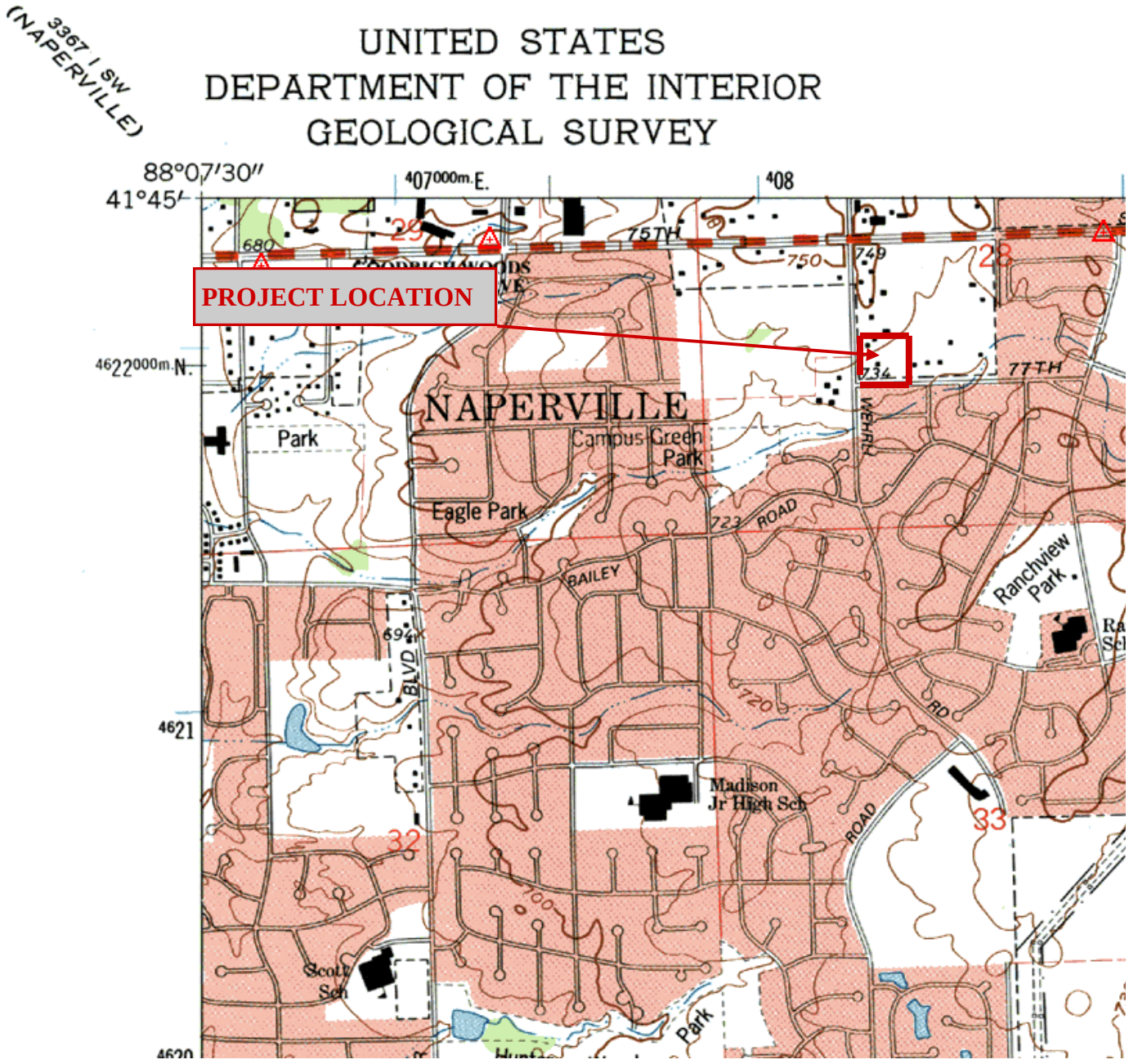
ROMEOVILLE QUADRANGLE

CEMCON, Ltd.	PROJECT / CLIENT: OAK CREEK CAPITAL PARTNERS, LLC. P.O. BOX 716 ST.CHARLES, IL 60174 (847)-514-9144	DRAWN BY:	ARF	6/10/19
		CHECKED BY:		
		APPROVED:		
		SCALE: N.T.S.		

77TH STREET PROJECT

T38N, R10E, SEC. 28

ROMEOVILLE QUADRANGLE



CEMCON, Ltd.	PROJECT / CLIENT: OAK CREEK CAPITAL PARTNERS, LLC. P.O. BOX 716 ST.CHARLES, IL 60174 (847)-514-9144	DRAWN BY:	ARF	6/10/19
		CHECKED BY:		
		APPROVED:		
		SCALE: N.T.S.		

EXHIBIT B

USDA NRCS SOILS MAP

Map Scale: 1:1,760 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N 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 1:12,000.

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: DuPage County, Illinois
Survey Area Data: Version 14, Sep 12, 2018

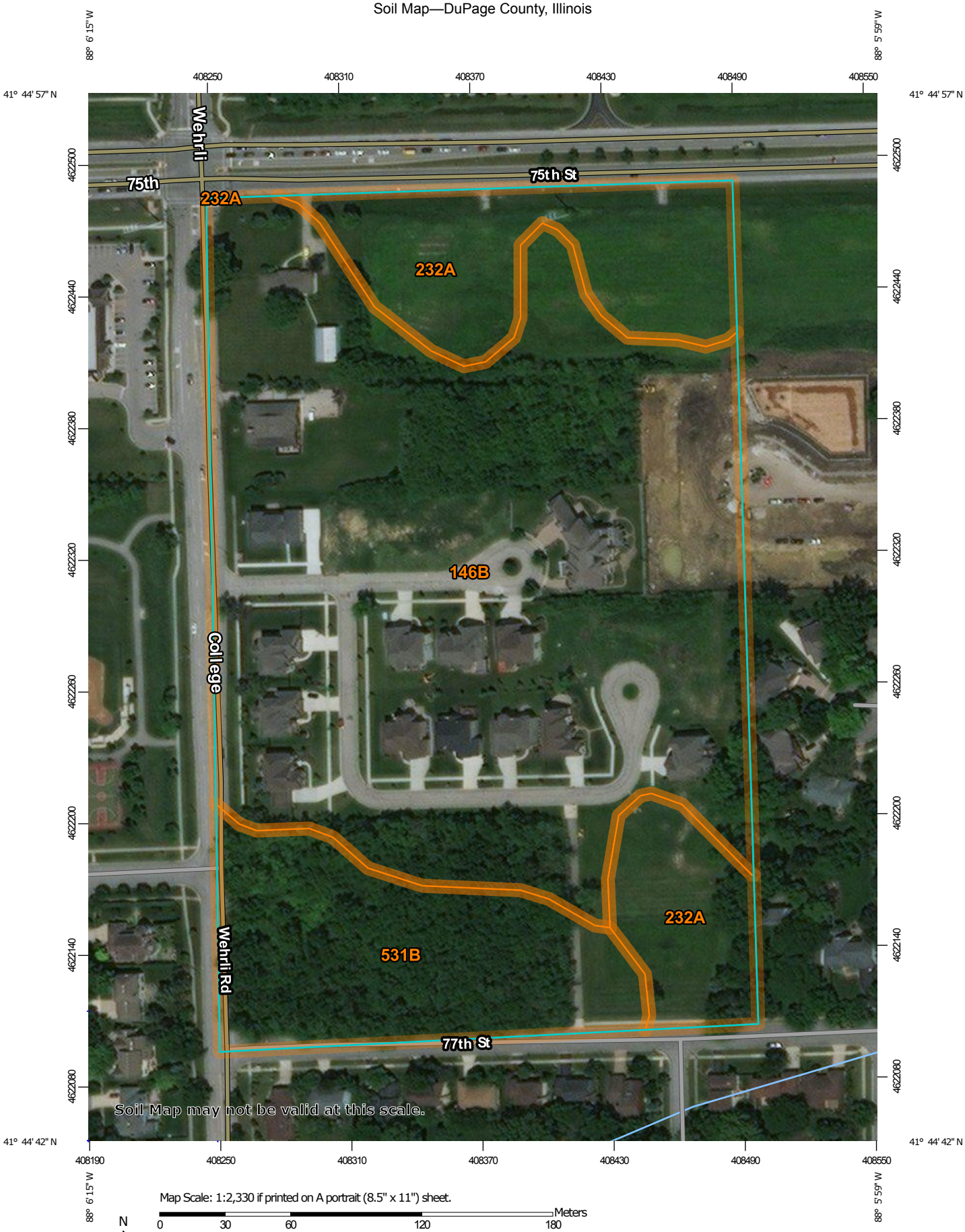
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 10, 2016—Oct 8, 2016

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
146B	Elliott silt loam, 2 to 4 percent slopes	7.4	61.6%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	1.4	11.3%
531B	Markham silt loam, 2 to 4 percent slopes	3.3	27.1%
Totals for Area of Interest		**12.0**	**100.0%**



Map Scale: 1:2,330 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

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- Soil Map Unit Lines
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Special Point Features

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

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

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Soil Survey Area: DuPage County, Illinois
Survey Area Data: Version 14, Sep 12, 2018

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

Date(s) aerial images were photographed: Feb 10, 2016—Oct 8, 2016

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Map Unit Legend

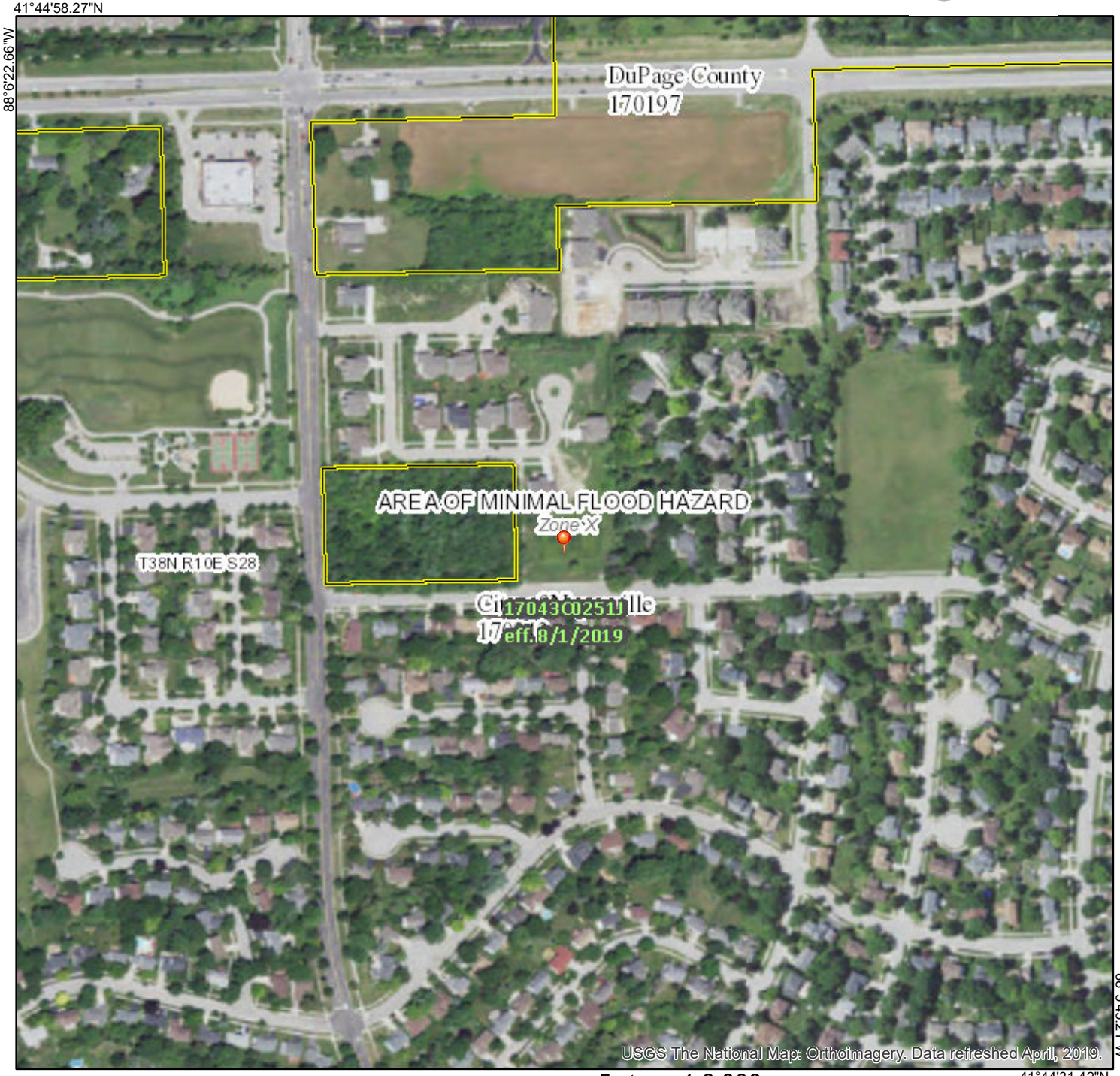
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
146B	Elliott silt loam, 2 to 4 percent slopes	15.6	66.8%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	4.1	17.7%
531B	Markham silt loam, 2 to 4 percent slopes	3.6	15.5%
Totals for Area of Interest		**23.4**	**100.0%**

EXHIBIT C

FEMA FLOOD INSURANCE RATE MAPS

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

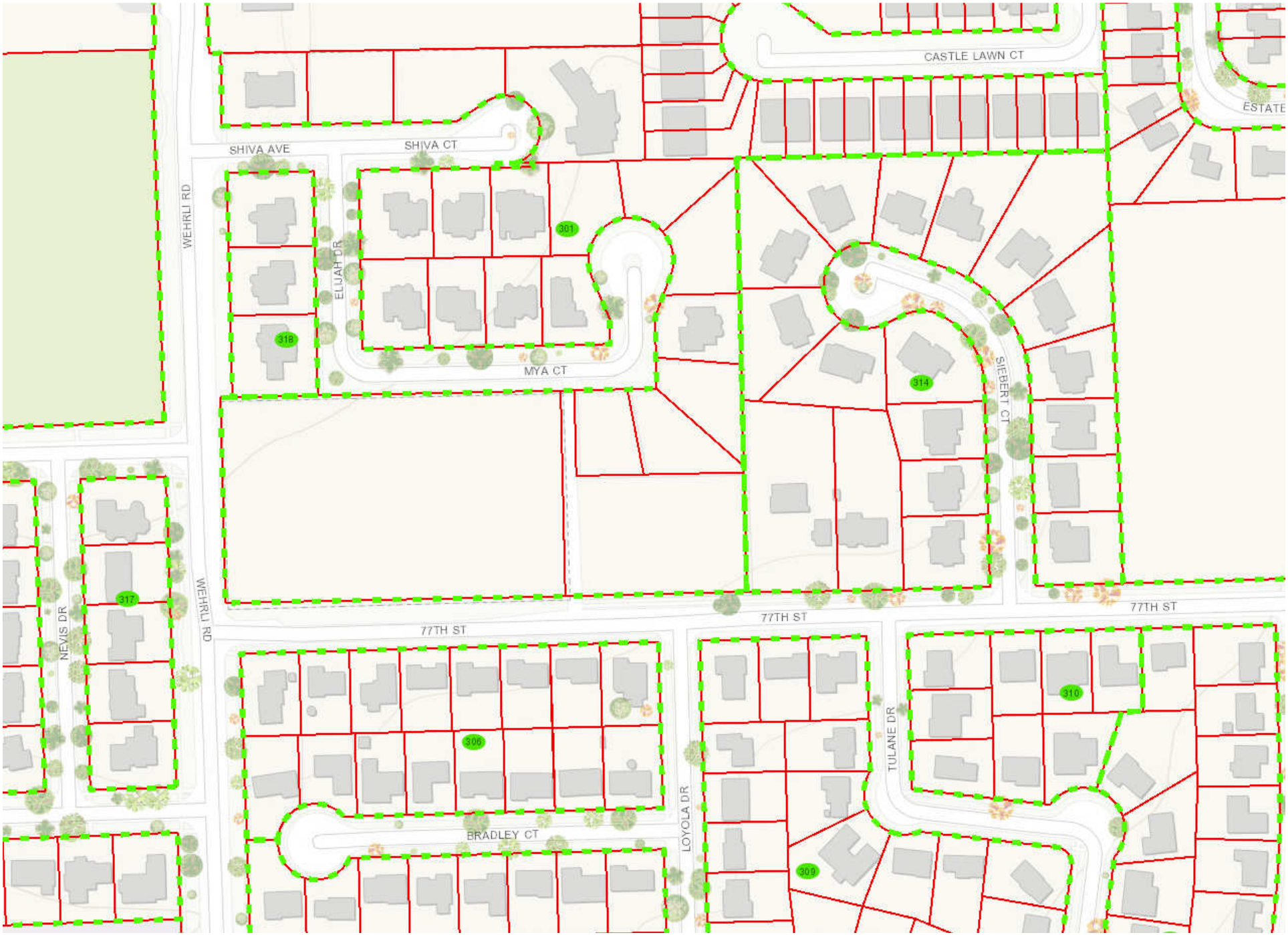
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

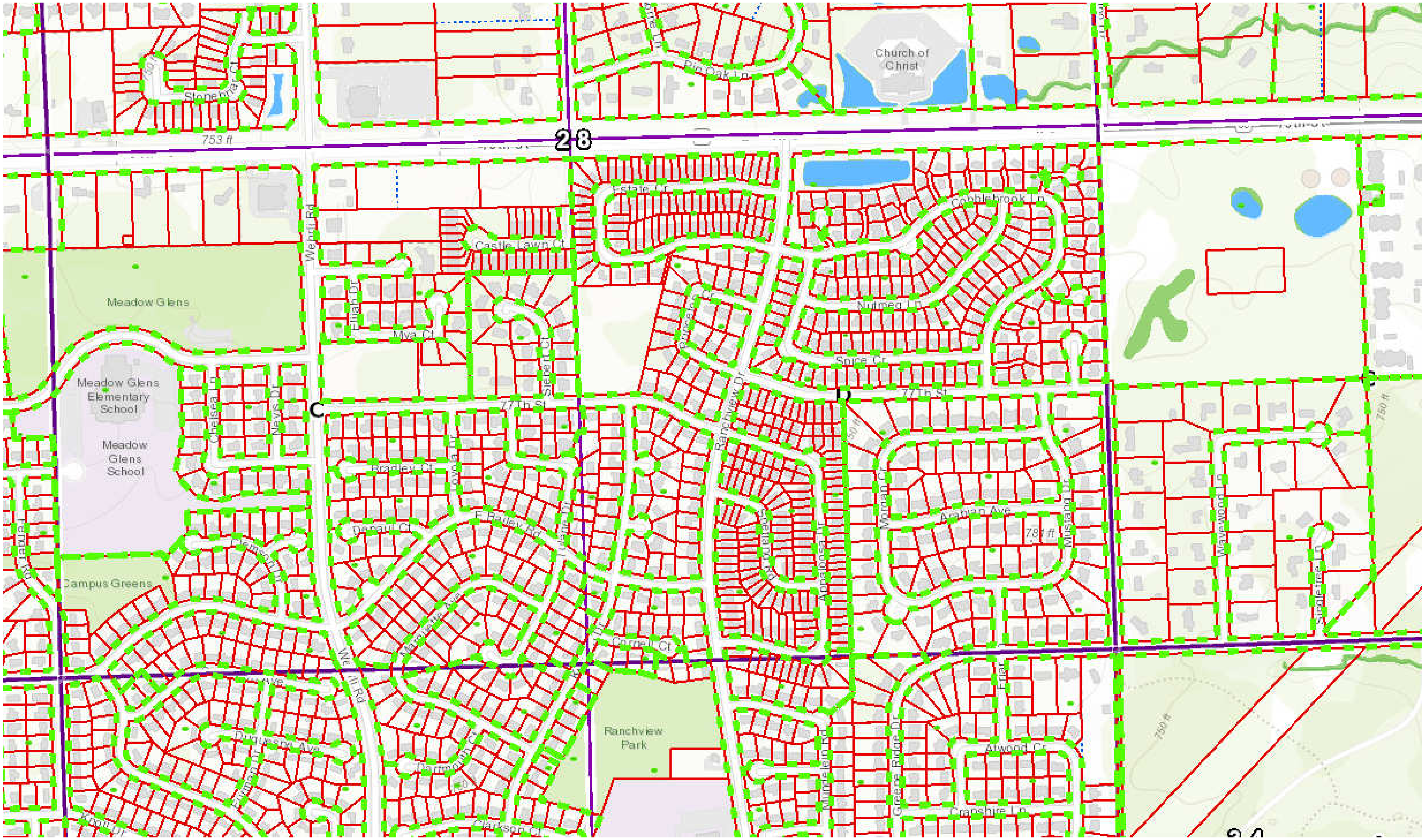
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/12/2019 at 2:40:02 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

EXHIBIT D

NATIONAL WETLAND INVENTORY MAP


CASTLE LAWN CT
ESTATE
SHIVA AVE
SHIVA CT
WEHRLI RD
ELIJAH DR
301
318
MYA CT
314
SIEBERT CT
77TH ST
77TH ST
77TH ST
NEVIS DR
317
WEHRLI RD
306
BRADLEY CT
LOYOLA DR
TULANE DR
310
309



753 ft
28
Church of Christ
Stonebriar Ct
Pin Oak Ln
Estate Cir
Cobblebrook Ln
Castle Lawn Ct
Weber Rd
Meadow Glens
Nutmeg Ln
Elijah Dr
Mya Ct
Siebert Ct
Spice Cir
Meadow Glens Elementary School
Meadow Glens School
C
77Th St
D
Ranchview Dr
Chelsea Ln
Bradley Ct
Denali Ct
Arabian Ave
Mustang Ln
781 ft
Appaloosa Ln
Campus Greens
Ranchview Park
Duquesne Ave
Dartmouth Ct
Atwood Ct
Cranshire Ln
Clarkson Ct
750 ft

EXHIBIT E

PERMITS

EcoCAT
Ecological Compliance Assessment Tool

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Applicant: Oak Creek Capital Partners, LLC
Contact: John Luczynski
Address: P.O. Box 716
St. Charles, IL 60174

IDNR Project Number: 1911754
Date: 06/11/2019
Alternate Number: 782.029

Project: 77th Street Project
Address: north of 77th Street and east of Wehrli Road, Naperville

Description: The 77TH Street Project proposed by Oak Creek Capitol Partners, LLC. is a 3.4± acre site that consists of 10 single family homes and reconstruction of an offsite stormwater management facility. Site infrastructure improvements will include the construction of sanitary sewers, watermains, stormwater drainage and conveyance facilities, and regarding/expansion of an existing stormwater management facility which will be vegetatively stabilized for stormwater discharge control.

Natural Resource Review Results

Consultation for Endangered Species Protection and Natural Areas Preservation (Part 1075)

The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

Consultation is terminated. This consultation is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary. Termination does not imply IDNR's authorization or endorsement.

Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: DuPage

Township, Range, Section:
38N, 10E, 28

IL Department of Natural Resources Contact
Brian Willard
217-785-5500
Division of Ecosystems & Environment

Government Jurisdiction
IL Environmental Protection Agency
Allen Keller
1021 North Grand Avenue
Springfield, Illinois 62794 -9276

Disclaimer

The Illinois Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of natural resources in Illinois. This review reflects the information existing in the Database at the time of this inquiry, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, compliance with applicable statutes and regulations is required.

Terms of Use

By using this website, you acknowledge that you have read and agree to these terms. These terms may be revised by IDNR as necessary. If you continue to use the EcoCAT application after we post changes to these terms, it will mean that you accept such changes. If at any time you do not accept the Terms of Use, you may not continue to use the website.

1. The IDNR EcoCAT website was developed so that units of local government, state agencies and the public could request information or begin natural resource consultations on-line for the Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act, and Illinois Interagency Wetland Policy Act. EcoCAT uses databases, Geographic Information System mapping, and a set of programmed decision rules to determine if proposed actions are in the vicinity of protected natural resources. By indicating your agreement to the Terms of Use for this application, you warrant that you will not use this web site for any other purpose.

2. Unauthorized attempts to upload, download, or change information on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act.

3. IDNR reserves the right to enhance, modify, alter, or suspend the website at any time without notice, or to terminate or restrict access.

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Unauthorized use, tampering with or modification of this system, including supporting hardware or software, may subject the violator to criminal and civil penalties. In the event of unauthorized intrusion, all relevant information regarding possible violation of law may be provided to law enforcement officials.

Privacy

EcoCAT generates a public record subject to disclosure under the Freedom of Information Act. Otherwise, IDNR uses the information submitted to EcoCAT solely for internal tracking purposes.

782.029 A-2

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of **Natural Resources**

JB Pritzker, Governor
Colleen Callahan, Director

www.dnr.illinois.gov

Mailing address: State Historic Preservation Office, 1 Old State Capitol Plaza, Springfield, IL 62701

DuPage County
Naperville
NE of 77th Street & Wehrli Road, Section:28-Township:38N-Range:10E
CEMCON-782.029, IEPA
New construction, ten single family homes

PLEASE REFER TO: SHPO LOG #005061819

RECEIVED
JUL 08 2019
BY:.....

July 3, 2019

Anthony R. Falkowski
CEMCON, Ltd.
2280 White Oak Circle, Suite 100
Aurora, IL 60502-9675

Dear Mr. Falkowski:

The Illinois State Historic Preservation Office is required by the Illinois State Agency Historic Resources Preservation Act (20 ILCS 3420, as amended, 17 IAC 4180) to review all state funded, permitted or licensed undertakings for their effect on cultural resources. Pursuant to this, we have received information regarding the referenced project for our comment.

Our staff has reviewed the specifications under the state law and assessed the impact of the project as submitted by your office. We have determined, based on the available information, that no significant historic, architectural or archaeological resources are located within the proposed project area.

According to the information you have provided concerning your proposed project, apparently there is no federal involvement in your project. However, please note that the state law is less restrictive than the federal cultural resource laws concerning archaeology. If your project will use federal loans or grants, need federal agency permits, use federal property, or involve assistance from a federal agency, then your project must be reviewed under the National Historic Preservation Act of 1966, as amended. Please notify us immediately if such is the case.

This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the IL Human Skeletal Remains Protection Act (20 ILCS 3440).

Please retain this letter in your files as evidence of compliance with the Illinois State Agency Historic Resources Preservation Act.

If further assistance is needed please contact Jeff Kruchten, Chief Archaeologist at 217/785-1279 or Jeffery.kruchten@illinois.gov.

Sincerely,

Robert F. Appleman
Deputy State Historic
Preservation Officer

EXHIBIT F

“WITHOUT PROJECT” EXISTING CONDITION HYDROLOGY

EXISTING CONDITIONS

WATERSHED EXHIBIT

EXISTING WATERSHED EXHIBIT

FOR

77TH STREET PROJECT

50 25 0 50

SCALE: 1 INCH = 50 FEET

SUBAREA 012
AREA = 3.42 Ac.
CN = 80.8
Tc = 0.25 Hrs.

SUBAREA 011
AREA = 1.61 Ac.
CN = 83.0
Tc = 0.25 Hrs.

SUBAREA 013
AREA = 1.43 Ac.
CN = 83.6
Tc = 0.25 Hrs.

SUBAREA 010
AREA = 7.63 Ac.
CN = 84.6
Tc = 0.31 Hrs.

SUBAREA 001
AREA = 3.39 Ac.
CN = 70.0
Tc = 0.26 Hrs.

LEGEND

WATERSHED BOUNDARY

PREPARED FOR DEVELOPER/OWNER:

OAK CREEK CAPITAL PARTNERS, LLC
P.O. BOX 5726
NAPERVILLE, IL 60567
(847) 514-9144

PREPARED BY:

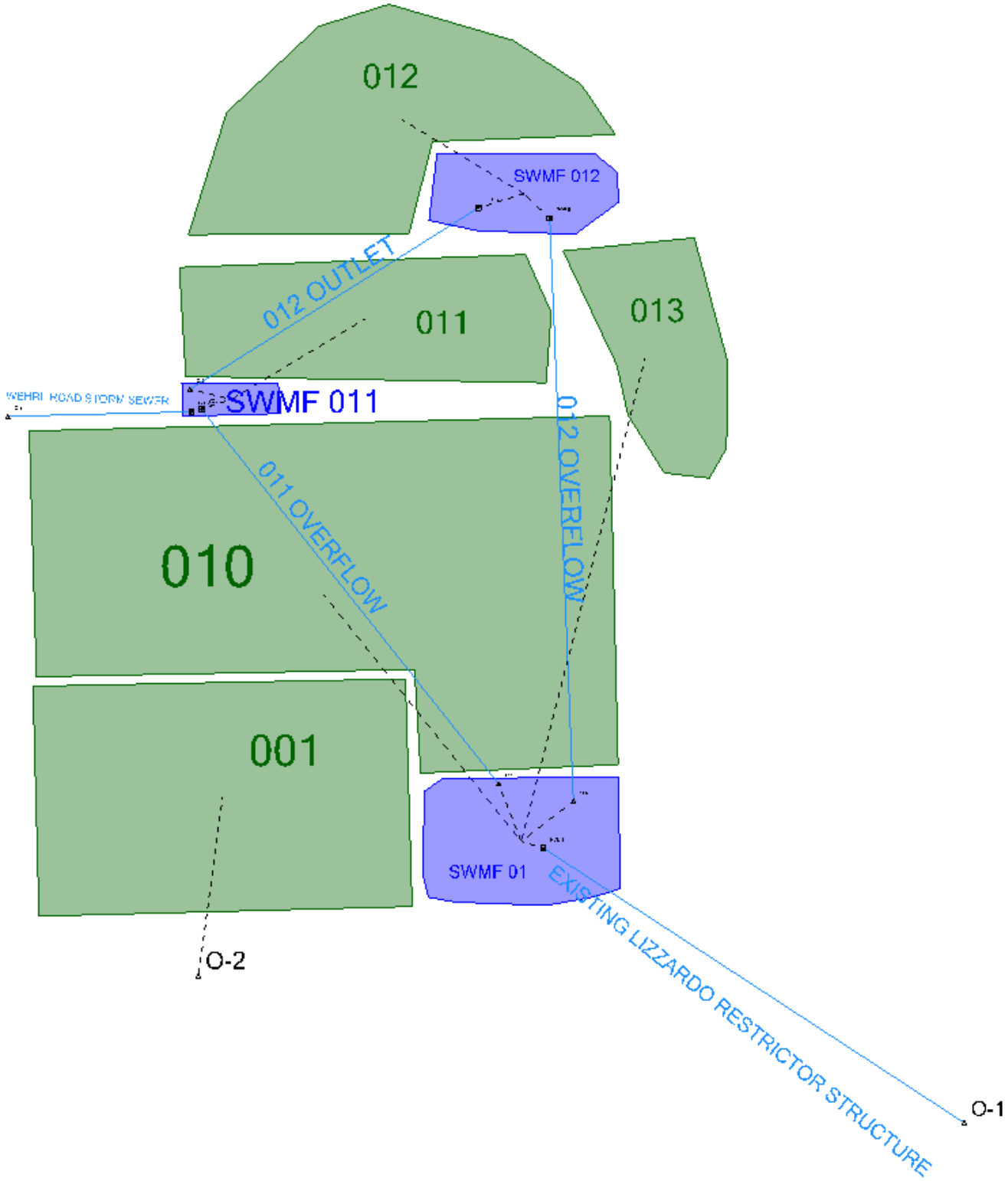
CEMCON, Ltd.
Consulting Engineers, Land Surveyors & Planners
2280 White Oak Circle, Suite 100
Aurora, Illinois 60502-9675
PH: 630.862.2100 FAX: 630.862.2199
E-Mail: cadd@cemcon.com Website: www.cemcon.com

DISC NO.: 782029 FILE NAME: FINAL WATSHED
DRAWN BY: JGC FLD. BK. / PG. NO.: ---
COMPLETION DATE: 12-16-19 JOB NO.: 782.029
XREF: TOPO PROJECT MANAGER: MAM/ARF

PLOT FILE CREATED: 12/13/2019 BY: JEFF CEBULA DRAWING PATH: P:\782029\DWG\ENG\DRAWINGS\EXHIBITS\FINAL WATSHED.DWG

PONDPACK INPUT

AND OUTPUT FILES



EXISTING CONDITIONS POND PACK MODEL SCHEMATIC

Scenario Calculation Summary

Scenario Summary	
ID	34
Label	2yr-24hr
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	2yr-24hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	2	Rainfall Type	Time-Depth Curve
Total Depth	3.0 in	Storm Event	24Hr

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.010 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	2yr-24hr	2	None	0.205	15.650	0.44	(N/A)	(N/A)
010	2yr-24hr	2	None	1.003	15.600	1.87	(N/A)	(N/A)
011	2yr-24hr	2	None	0.197	15.600	0.38	(N/A)	(N/A)
012	2yr-24hr	2	None	0.376	15.600	0.74	(N/A)	(N/A)
013	2yr-24hr	2	None	0.180	15.600	0.34	(N/A)	(N/A)
O-1	2yr-24hr	2	None	0.808	18.350	0.83	(N/A)	(N/A)
O-2	2yr-24hr	2	None	0.205	15.650	0.44	(N/A)	(N/A)
O-3	2yr-24hr	2	None	0.568	15.650	0.88	(N/A)	(N/A)
SWMF 01 (IN)	2yr-24hr	2	None	1.183	15.600	2.21	(N/A)	(N/A)
SWMF 01 (OUT)	2yr-24hr	2	None	0.808	18.350	0.83	727.13	0.484
SWMF 011 (IN)	2yr-24hr	2	None	0.538	15.650	0.80	(N/A)	(N/A)
SWMF 011 (OUT)	2yr-24hr	2	None	0.538	15.650	0.80	742.57	0.001

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 012 (IN)	2yr-24hr	2	None	0.376	15.600	0.74	(N/A)	(N/A)
SWMF 012 (OUT)	2yr-24hr	2	None	0.341	17.100	0.50	742.94	0.095

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
011 OVERFLOW	Pond Outlet	Upstream	0.538	15.650	0.80	SWMF 011	Pond Inflow
011 OVERFLOW	Pond Outlet	Outflow	0.538	15.650	0.80	SWMF 011	Pond Outflow
011 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
011 OVERFLOW	Pond Outlet	Downstream	1.183	15.600	2.21	SWMF 01	
012 OUTLET	Pond Outlet	Upstream	0.376	15.600	0.74	SWMF 012	Pond Inflow
012 OUTLET	Pond Outlet	Outflow	0.341	17.100	0.50	SWMF 012	Pond Outflow
012 OUTLET	Pond Outlet	Link	0.341	17.100	0.50		
012 OUTLET	Pond Outlet	Downstream	0.538	15.650	0.80	SWMF 011	
012 OVERFLOW	Pond Outlet	Upstream	0.376	15.600	0.74	SWMF 012	Pond Inflow
012 OVERFLOW	Pond Outlet	Outflow	0.341	17.100	0.50	SWMF 012	Pond Outflow
012 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
012 OVERFLOW	Pond Outlet	Downstream	1.183	15.600	2.21	SWMF 01	
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Upstream	1.183	15.600	2.21	SWMF 01	Pond Inflow
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Outflow	0.808	18.350	0.83	SWMF 01	Pond Outflow
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Link	0.808	18.350	0.83		
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Downstream	0.808	18.350	0.83	O-1	

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
WEHRL ROAD STORM SEWER	Pond Outlet	Upstream	0.538	15.650	0.80	SWMF 011	Pond Inflow
WEHRL ROAD STORM SEWER	Pond Outlet	Outflow	0.538	15.650	0.80	SWMF 011	Pond Outflow
WEHRL ROAD STORM SEWER	Pond Outlet	Link	0.568	15.650	0.88		
WEHRL ROAD STORM SEWER	Pond Outlet	Downstream	0.568	15.650	0.88	O-3	

Messages

Message Id	69
Scenario	2yr-24hr
Element Type	Pond
Element Id	45
Label	SWMF 011
Time	(N/A)
Message	The pond has a diversion with both interconnected and level pool outlet structures. It is recommended that you use either all interconnected or all level pool outlet structures with a diversion from a pond.
Source	Warning
Message Id	71
Scenario	2yr-24hr
Element Type	Pond
Element Id	45
Label	SWMF 011
Time	(N/A)
Message	The pond SWMF 011 has a mixed diversion using both a level pool and interconnected pond route. This configuration may lead to a loop in the system. PondPack does not support loops. Please review your network topology for any possible loops.
Source	Warning
Message Id	15
Scenario	2yr-24hr
Element Type	Composite Outlet Structure
Element Id	63
Label	012 OUTLET
Time	(N/A)
Message	Kr (reverse flow entrance loss coefficient) was not specified. Kr was set to same value as Ke= 0.200 .
Source	Warning

Scenario Calculation Summary

Scenario Summary	
ID	22
Label	100yr-24HR
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	100yr-24hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	7.6 in	Storm Event	24Hr

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.010 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100yr-24HR	100	None	1.147	15.600	2.10	(N/A)	(N/A)
010	100yr-24HR	100	None	3.635	15.550	5.85	(N/A)	(N/A)
011	100yr-24HR	100	None	0.743	15.600	1.22	(N/A)	(N/A)
012	100yr-24HR	100	None	1.507	15.600	2.52	(N/A)	(N/A)
013	100yr-24HR	100	None	0.669	15.600	1.09	(N/A)	(N/A)
O-1	100yr-24HR	100	None	2.601	16.850	6.07	(N/A)	(N/A)
O-2	100yr-24HR	100	None	1.147	15.600	2.10	(N/A)	(N/A)
O-3	100yr-24HR	100	None	1.497	15.600	1.66	(N/A)	(N/A)
SWMF 01 (IN)	100yr-24HR	100	None	5.018	15.600	8.99	(N/A)	(N/A)
SWMF 01 (OUT)	100yr-24HR	100	None	2.601	16.850	6.07	730.98	2.535
SWMF 011 (IN)	100yr-24HR	100	None	1.431	15.600	1.67	(N/A)	(N/A)
SWMF 011 (OUT)	100yr-24HR	100	None	1.430	15.600	1.67	742.89	0.001

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 012 (IN)	100yr-24HR	100	None	1.507	15.600	2.52	(N/A)	(N/A)
SWMF 012 (OUT)	100yr-24HR	100	None	1.402	15.650	2.51	743.10	0.137

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
011 OVERFLOW	Pond Outlet	Upstream	1.431	15.600	1.67	SWMF 011	Pond Inflow
011 OVERFLOW	Pond Outlet	Outflow	1.430	15.600	1.67	SWMF 011	Pond Outflow
011 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
011 OVERFLOW	Pond Outlet	Downstream	5.018	15.600	8.99	SWMF 01	
012 OUTLET	Pond Outlet	Upstream	1.507	15.600	2.52	SWMF 012	Pond Inflow
012 OUTLET	Pond Outlet	Outflow	1.402	15.650	2.51	SWMF 012	Pond Outflow
012 OUTLET	Pond Outlet	Link	0.687	21.950	0.55		
012 OUTLET	Pond Outlet	Downstream	1.431	15.600	1.67	SWMF 011	
012 OVERFLOW	Pond Outlet	Upstream	1.507	15.600	2.52	SWMF 012	Pond Inflow
012 OVERFLOW	Pond Outlet	Outflow	1.402	15.650	2.51	SWMF 012	Pond Outflow
012 OVERFLOW	Pond Outlet	Link	0.714	15.600	2.05		
012 OVERFLOW	Pond Outlet	Downstream	5.018	15.600	8.99	SWMF 01	
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Upstream	5.018	15.600	8.99	SWMF 01	Pond Inflow
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Outflow	2.601	16.850	6.07	SWMF 01	Pond Outflow
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Link	2.601	16.850	6.07		
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Downstream	2.601	16.850	6.07	O-1	

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
WEHRL ROAD STORM SEWER	Pond Outlet	Upstream	1.431	15.600	1.67	SWMF 011	Pond Inflow
WEHRL ROAD STORM SEWER	Pond Outlet	Outflow	1.430	15.600	1.67	SWMF 011	Pond Outflow
WEHRL ROAD STORM SEWER	Pond Outlet	Link	1.497	15.600	1.66		
WEHRL ROAD STORM SEWER	Pond Outlet	Downstream	1.497	15.600	1.66	O-3	

Messages

Message Id	69
Scenario	2yr-24hr
Element Type	Pond
Element Id	45
Label	SWMF 011
Time	(N/A)
Message	The pond has a diversion with both interconnected and level pool outlet structures. It is recommended that you use either all interconnected or all level pool outlet structures with a diversion from a pond.
Source	Warning
Message Id	71
Scenario	2yr-24hr
Element Type	Pond
Element Id	45
Label	SWMF 011
Time	(N/A)
Message	The pond SWMF 011 has a mixed diversion using both a level pool and interconnected pond route. This configuration may lead to a loop in the system. PondPack does not support loops. Please review your network topology for any possible loops.
Source	Warning
Message Id	15
Scenario	2yr-24hr
Element Type	Composite Outlet Structure
Element Id	63
Label	012 OUTLET
Time	(N/A)
Message	Kr (reverse flow entrance loss coefficient) was not specified. Kr was set to same value as Ke= 0.200 .
Source	Warning

Scenario Calculation Summary

Scenario Summary	
ID	28
Label	100yr-18hr
Notes	
Active Topology	<I> Base Active Topology
Hydrology	<I> Base Hydrology
Rainfall Runoff	100yr-18hr
Physical	<I> Base Physical
Initial Condition	<I> Base Initial Condition
Boundary Condition	<I> Base Boundary Condition
Infiltration and Inflow	<I> Base Infiltration and Inflow
Output	<I> Base Output
User Data Extensions	<I> Base User Data Extensions
PondPack Engine Calculation Options	<I> Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	7.0 in	Storm Event	18Hr

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.010 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100yr-18hr	100	None	1.015	11.700	2.47	(N/A)	(N/A)
010	100yr-18hr	100	None	3.293	11.700	7.08	(N/A)	(N/A)
011	100yr-18hr	100	None	0.671	11.700	1.47	(N/A)	(N/A)
012	100yr-18hr	100	None	1.355	11.700	3.03	(N/A)	(N/A)
013	100yr-18hr	100	None	0.604	11.700	1.31	(N/A)	(N/A)
O-1	100yr-18hr	100	None	2.833	12.750	6.95	(N/A)	(N/A)
O-2	100yr-18hr	100	None	1.015	11.700	2.47	(N/A)	(N/A)
O-3	100yr-18hr	100	None	1.330	11.700	1.85	(N/A)	(N/A)
SWMF 01 (IN)	100yr-18hr	100	None	4.630	11.700	10.95	(N/A)	(N/A)
SWMF 01 (OUT)	100yr-18hr	100	None	2.833	12.750	6.95	731.00	2.549
SWMF 011 (IN)	100yr-18hr	100	None	1.286	11.700	1.91	(N/A)	(N/A)
SWMF 011 (OUT)	100yr-18hr	100	None	1.286	11.700	1.91	742.98	0.001

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 012 (IN)	100yr-18hr	100	None	1.355	11.700	3.03	(N/A)	(N/A)
SWMF 012 (OUT)	100yr-18hr	100	None	1.348	11.750	3.01	743.12	0.144

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
011 OVERFLOW	Pond Outlet	Upstream	1.286	11.700	1.91	SWMF 011	Pond Inflow
011 OVERFLOW	Pond Outlet	Outflow	1.286	11.700	1.91	SWMF 011	Pond Outflow
011 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
011 OVERFLOW	Pond Outlet	Downstream	4.630	11.700	10.95	SWMF 01	
012 OUTLET	Pond Outlet	Upstream	1.355	11.700	3.03	SWMF 012	Pond Inflow
012 OUTLET	Pond Outlet	Outflow	1.348	11.750	3.01	SWMF 012	Pond Outflow
012 OUTLET	Pond Outlet	Link	0.615	18.300	0.59		
012 OUTLET	Pond Outlet	Downstream	1.286	11.700	1.91	SWMF 011	
012 OVERFLOW	Pond Outlet	Upstream	1.355	11.700	3.03	SWMF 012	Pond Inflow
012 OVERFLOW	Pond Outlet	Outflow	1.348	11.750	3.01	SWMF 012	Pond Outflow
012 OVERFLOW	Pond Outlet	Link	0.733	11.750	2.56		
012 OVERFLOW	Pond Outlet	Downstream	4.630	11.700	10.95	SWMF 01	
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Upstream	4.630	11.700	10.95	SWMF 01	Pond Inflow
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Outflow	2.833	12.750	6.95	SWMF 01	Pond Outflow
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Link	2.833	12.750	6.95		
EXISTING LIZZARDO RESTRICTOR STRUCTURE	Pond Outlet	Downstream	2.833	12.750	6.95	O-1	

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
WEHRL ROAD STORM SEWER	Pond Outlet	Upstream	1.286	11.700	1.91	SWMF 011	Pond Inflow
WEHRL ROAD STORM SEWER	Pond Outlet	Outflow	1.286	11.700	1.91	SWMF 011	Pond Outflow
WEHRL ROAD STORM SEWER	Pond Outlet	Link	1.330	11.700	1.85		
WEHRL ROAD STORM SEWER	Pond Outlet	Downstream	1.330	11.700	1.85	O-3	

Messages

Message Id	69
Scenario	2yr-24hr
Element Type	Pond
Element Id	45
Label	SWMF 011
Time	(N/A)
Message	The pond has a diversion with both interconnected and level pool outlet structures. It is recommended that you use either all interconnected or all level pool outlet structures with a diversion from a pond.
Source	Warning
Message Id	71
Scenario	2yr-24hr
Element Type	Pond
Element Id	45
Label	SWMF 011
Time	(N/A)
Message	The pond SWMF 011 has a mixed diversion using both a level pool and interconnected pond route. This configuration may lead to a loop in the system. PondPack does not support loops. Please review your network topology for any possible loops.
Source	Warning
Message Id	15
Scenario	2yr-24hr
Element Type	Composite Outlet Structure
Element Id	63
Label	012 OUTLET
Time	(N/A)
Message	Kr (reverse flow entrance loss coefficient) was not specified. Kr was set to same value as Ke= 0.200 .
Source	Warning

Table of Contents

Time-Depth Curve: 24Hr	
Label	24Hr
Start Time	0.000 hours
Increment	1.200 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 1.200 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.2	0.5	0.7	0.9
6.000	1.1	1.4	1.7	2.1	2.4
12.000	2.9	3.4	4.3	5.3	6.0
18.000	6.4	6.8	7.0	7.2	7.4
24.000	7.6	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	24Hr
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.350 hours
Area (User Defined)	3.390 acres

Computational Time Increment	0.047 hours
Time to Peak (Computed)	15.587 hours
Flow (Peak, Computed)	2.10 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	2.10 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	3.390 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.1 in
Runoff Volume (Pervious)	1.160 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.147 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.350 hours
Computational Time Increment	0.047 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.97 ft³/s
Unit peak time, Tp	0.233 hours

Subsection: Unit Hydrograph Summary
Label: 001

Return Event: 100 years
Storm Event: 24Hr

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.933 hours
Total unit time, Tb	1.167 hours

Storm Event	24Hr
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.310 hours
Area (User Defined)	7.630 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	15.583 hours
Flow (Peak, Computed)	5.86 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.550 hours
Flow (Peak Interpolated Output)	5.85 ft³/s

Drainage Area	
SCS CN (Composite)	84.600
Area (User Defined)	7.630 acres
Maximum Retention (Pervious)	1.8 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.8 in
Runoff Volume (Pervious)	3.664 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.635 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.310 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	27.89 ft³/s
Unit peak time, Tp	0.207 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.827 hours
Total unit time, Tb	1.033 hours

Storm Event	24Hr
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	1.610 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	15.600 hours
Flow (Peak, Computed)	1.22 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	1.22 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	1.610 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.6 in
Runoff Volume (Pervious)	0.748 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.743 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.30 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Storm Event	24Hr
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	3.420 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	15.600 hours
Flow (Peak, Computed)	2.52 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	2.52 ft³/s

Drainage Area	
SCS CN (Composite)	80.800
Area (User Defined)	3.420 acres
Maximum Retention (Pervious)	2.4 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.3 in
Runoff Volume (Pervious)	1.517 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.507 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.50 ft³/s
Unit peak time, Tp	0.167 hours

Subsection: Unit Hydrograph Summary
Label: 012

Return Event: 100 years
Storm Event: 24Hr

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Storm Event	24Hr
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	1.430 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	15.600 hours
Flow (Peak, Computed)	1.09 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	1.09 ft³/s

Drainage Area	
SCS CN (Composite)	83.600
Area (User Defined)	1.430 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.6 in
Runoff Volume (Pervious)	0.673 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.669 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.48 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
725.00	0.000
726.00	0.127
727.00	0.433
728.00	0.837
729.00	1.322
730.00	1.892
731.00	2.550
732.00	3.308

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
742.00	0.000
743.00	0.001
744.00	0.002
744.50	0.048
745.00	0.090

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
742.50	0.000
743.00	0.108
744.00	0.405

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	745.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward + Reverse	TW	744.50	745.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	744.50 ft
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	744.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	12" RCP STORM SEWER	Forward	TW	742.50	744.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 12" RCP STORM SEWER Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	12.0 in
Length	175.00 ft
Length (Computed Barrel)	175.00 ft
Slope (Computed)	0.002 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.031
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.094
T2 ratio (HW/D)	1.196
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	743.59 ft	T1 Flow	2.75 ft³/s
T2 Elevation	743.70 ft	T2 Flow	3.14 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	744.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward + Reverse	TW	743.00	744.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	743.00 ft
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	725.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	732.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	EXISTING 10" Culvert - 1	Forward	TW	731.30	732.00
Orifice-Circular	Orifice - 1	Forward	TW	725.00	731.30
Rectangular Weir	Weir - 1	Forward	TW	730.80	732.00
Rectangular Weir	STRUCTURE WEIR	Forward	TW	730.95	731.30
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: EXISTING 10" Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	10.0 in
Length	72.00 ft
Length (Computed Barrel)	72.01 ft
Slope (Computed)	0.017 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.040
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.087
T2 ratio (HW/D)	1.189
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	725.36 ft	T1 Flow	1.74 ft³/s
T2 Elevation	725.44 ft	T2 Flow	1.99 ft³/s

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	730.80 ft
Weir Length	20.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: STRUCTURE WEIR Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	730.95 ft
Weir Length	6.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	725.00 ft
Orifice Diameter	4.8 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	745.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	10" RCP STORM SEWER	Forward	TW	742.00	745.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 10" RCP STORM SEWER Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	10.0 in
Length	175.00 ft
Length (Computed Barrel)	175.03 ft
Slope (Computed)	0.017 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.040
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.087
T2 ratio (HW/D)	1.189
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	742.91 ft	T1 Flow	1.74 ft³/s
T2 Elevation	742.99 ft	T2 Flow	1.99 ft³/s

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	725.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.010	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	16.850	730.98	2.535

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	15.600	2.52	0.000	0.00
Pond Outflow...	15.650	2.51	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	1.507	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	1.402	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	5.018 ac-ft
Volume (Total Out ICPM)	2.601 ac-ft
Volume (Ending)	2.416 ac-ft
Elevation (Ending)	730.80 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	742.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.010	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	15.600	742.89	0.001

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	15.600	2.52	0.000	0.00
Pond Outflow...	15.650	2.51	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	1.507	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	1.402	Forward

Mass Balance (ac-ft)		
Volume (Initial ICPM)	0.000	ac-ft
Volume (Total In ICPM)	1.431	ac-ft
Volume (Total Out ICPM)	1.430	ac-ft
Volume (Ending)	0.001	ac-ft
Elevation (Ending)	742.57	ft
Difference	0.000	ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0	%

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	742.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.010	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	15.600	743.10	0.137

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	15.600	2.52	0.000	0.00
Pond Outflow...	15.650	2.51	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	1.507	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	1.402	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	1.507 ac-ft
Volume (Total Out ICPM)	1.402 ac-ft
Volume (Ending)	0.105 ac-ft
Elevation (Ending)	742.99 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Index

PONDPACK SUPPORTING DOCUMENTATION

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 5/30/2019
Location Subarea 001 Checked Date

Circle one: Present (Developed)

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Woods	70			3.39	237.3
1/ Use only one CN source per line.			Totals =		3.39	237.300

CN (weighted) = Total Product / Total Area = 237.300 / 3.390 = 70.000

Use CN = 70.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 5/30/2019
Location Subarea 010 Checked Date

Circle one: Present (Developed)

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Open Space	74			0.16	11.84
C	Impervious	98			0.89	87.22
C	Residential 1/4 Acre	83			6.58	546.14
1/ Use only one CN source per line.			Totals =		7.63	645.200

CN (weighted) = Total Product / Total Area = 645.200 / 7.630 = 84.561

Use CN = 84.6

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 8/13/2019
Location Subarea 011 Checked Date

Circle one: Present Developed

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Residential 1/4 Acre	83			1.61	133.63
1/ Use only one CN source per line.			Totals =		1.61	133.630

CN (weighted) = Total Product / Total Area = 133.630 / 1.610 = 83.000

Use CN = 83.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 8/13/2019
Location Subarea 012 Checked Date

Circle one: Present Developed

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Open Space	74			0.83	61.42
C	Impervious	98			0.20	19.63
C	Row Crop	88			1.40	122.81
C	Woods	73			0.99	72.27
1/ Use only one CN source per line.			Totals =		3.42	276.131

CN (weighted) = Total Product / Total Area = 276.131 / 3.416 = 80.837

Use CN = 80.8

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 8/13/2019
Location Subarea 013 Checked Date

Circle one: Present Developed

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Residential Townhomes	90			0.70	63.00
C	Residential 1/4 Acre	83			0.32	26.56
C	Woods	73			0.41	29.93
1/ Use only one CN source per line.			Totals =		1.43	119.490

CN (weighted) = Total Product / Total Area = 119.490 / 1.430 = 83.559

Use CN = 83.6

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Project	782.029	By	ARF	Date	1/19/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 001

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Woods			
2. Manning's roughness coeff., n (Table 3-1)			0.4			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.04			
5. Land slope, s		ft/ft	0.03			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.312	+	=	0.312

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			314			
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\, V}$		hr	0.038	+	=	0.038

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\, V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.350
	min	21

Project	782.029	By	ARF	Date	1/19/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 0010

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.04			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.244	+	=	0.244

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			560			
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\, V}$		hr	0.068	+	=	0.068

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\, V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		0.312
	ASSUMED	min	19

Project	782.029	By	ARF	Date	8/13/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 011

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft				
4. Two-yr 24-hr rainfall, P_2		in	3.04			
5. Land slope, s		ft/ft				
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr		+	=	

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L						
9. Watercourse slope, s						
10. Average velocity, V (figure 3-1)						
11. $T_t = \frac{L}{3600\,V}$		hr		+	=	

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw compute r		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\,V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)		hr	0.250
	ASSUMED	min	15

Project	782.029	By	ARF	Date	8/13/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 012

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft				
4. Two-yr 24-hr rainfall, P_2		in	3.04			
5. Land slope, s		ft/ft				
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr		+		=

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L						
9. Watercourse slope, s						
10. Average velocity, V (figure 3-1)						
11. $T_t = \frac{L}{3600\,V}$		hr		+		=

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw compute r		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\,V}$		hr		+		=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)		hr	0.250
	ASSUMED	min	15

Project	782.029	By	ARF	Date	8/13/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 013

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)

		Segment ID				
1.	Surface Description (Table 3-1)		Grass			
2.	Manning's roughness coeff., n (Table 3-1)		0.24			
3.	Flow length, L (total L ≤ 300 ft)	ft				
4.	Two-yr 24-hr rainfall, P_2	in	3.04			
5.	Land slope, s	ft/ft				
6.	$Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$	hr		+		=

Shallow Concentrated Flow

		Segment ID				
7.	Surface description (paved or unpaved)		unpaved			
8.	Flow length, L					
9.	Watercourse slope, s					
10.	Average velocity, V (figure 3-1)					
11.	$T_t = \frac{L}{3600\, V}$	hr		+		=

Channel Flow

		Segment ID				
12.	Cross sectional flow area, a	ft^2				
13.	Wetted perimeter, pw	ft				
14.	Hydraulic radius, r= a/pw compute r	ft				
15.	Channel Slope, s	ft/ft				
16.	Manning's roughness coeff., n					
17.	$V = 1.49\, r^{2/3}\, s^{1/2} / n$	ft/s	3			
18.	Flow length, L	ft				
19.	$T_t = \frac{L}{3600\, V}$	hr		+		=

20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr		0.250
		ASSUMED	min	15

Job #: 782.029
Project: 77th and Wehrli road concept

Date: August 30, 2018
Revised:
By: ARF

001 STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
725.0	260	0.006	0.000	**0.000**
726.0	10780	0.247	0.127	**0.127**
727.0	15900	0.365	0.306	**0.433**
728.0	19300	0.443	0.404	**0.837**
729.0	22970	0.527	0.485	**1.322**
730.0	26680	0.612	0.570	**1.892**
731.0	30600	0.702	0.657	**2.550**
732.0	35450	0.814	0.758	**3.308**

Job #: 782.029
Project: 77th and Wehrli road concept

Date: August 13, 2019
Revised:
By: ARF

011 STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC.-Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
742.0	50	0.001	0.000	**0.000**
743.0	50	0.001	0.001	**0.001**
744.0	50	0.001	0.001	**0.002**
744.5	7950	0.183	0.046	**0.048**

Job #: 782.029
Project: 77th and Wehrli road concept

Date: August 13, 2019
Revised:
By: ARF

012 STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
742.5	8060	0.185	0.000	**0.000**
743.0	10760	0.247	0.108	**0.108**
744.0	15120	0.347	0.297	**0.405**

EXHIBIT G

“WITH PROJECT” PROPOSED CONDITION HYDROLOGY

PROPOSED CONDITIONS

WATERSHED EXHIBIT

PROPOSED WATERSHED EXHIBIT
FOR
77TH STREET PROJECT

50 25 0 50
SCALE: 1 INCH = 50 FEET

SUBAREA 012
AREA = 3.42 Ac.
CN = 80.8
Tc = 0.25 Hrs.

SUBAREA 011
AREA = 1.61 Ac.
CN = 83.0
Tc = 0.25 Hrs.

SUBAREA 013
AREA = 1.43 Ac.
CN = 83.6
Tc = 0.25 Hrs.

SUBAREA 010
AREA = 7.63 Ac.
CN = 84.6
Tc = 0.31 Hrs.

SUBAREA 001
AREA = 3.33 Ac.
CN = 85.0
Tc = 0.27 Hrs.

SUBAREA 002
AREA = 0.06 Ac.
CN = 83.0
Tc = 0.19 Hrs.

LEGEND

WATERSHED BOUNDARY

PREPARED FOR DEVELOPER/OWNER:

OAK CREEK CAPITAL PARTNERS, LLC
P.O. BOX 5726
NAPERVILLE, IL 60567
(847) 514-9144

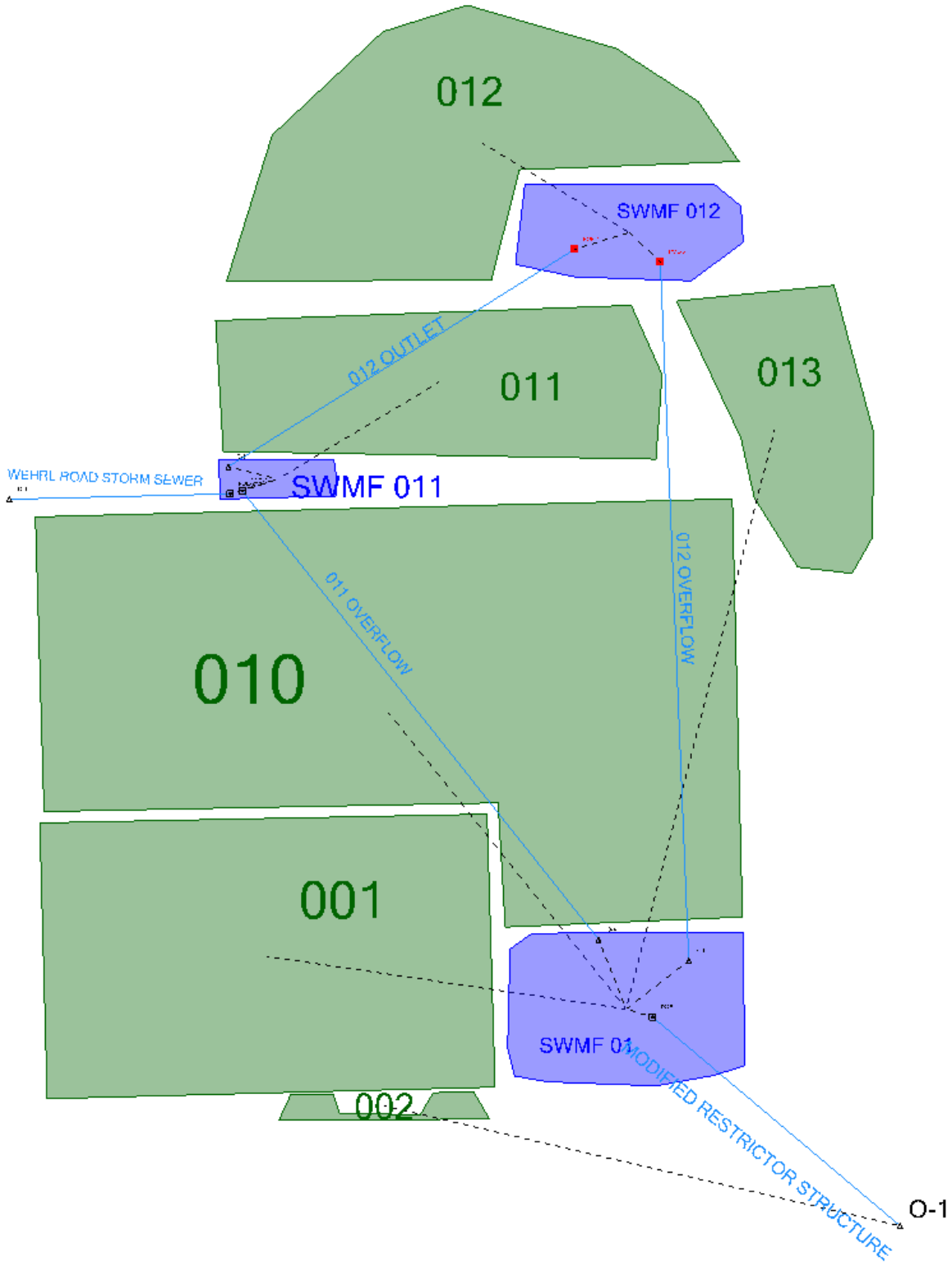
PREPARED BY:
CEMCON, Ltd.
Consulting Engineers, Land Surveyors & Planners
2280 White Oak Circle, Suite 100
Aurora, Illinois 60502-9675
PH: 630.862.2100 FAX: 630.862.2199
E-Mail: cadd@cemcon.com Website: www.cemcon.com

DISC NO.: 782029 FILE NAME: FINAL WATSHED
DRAWN BY: JGC FLD. BK. / PG. NO.: ---
COMPLETION DATE: 12-16-19 JOB NO.: 782.029
XREF: TOPO, OVERALL PROJECT MANAGER: MAM/ARF

PLOT FILE CREATED: 12/13/2019 BY: JEFF GEBULA DRAWING PATH: P:\782029\DWG\ENG\DRAWINGS\EXHIBITS\FINAL WATSHED.DWG

PONDPACK INPUT AND

OUTPUT FILES



PROPOSED CONDITIONS POND PACK MODEL SCHEMATIC

Scenario Calculation Summary

Scenario Summary	
ID	22
Label	100yr-24HR
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	100yr-24hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	7.6 in	Storm Event	24Hr

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.010 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100yr-24HR	100	None	1.537	15.600	2.51	(N/A)	(N/A)
002	100yr-24HR	100	None	0.028	15.600	0.05	(N/A)	(N/A)
010	100yr-24HR	100	None	3.635	15.550	5.85	(N/A)	(N/A)
011	100yr-24HR	100	None	0.743	15.600	1.22	(N/A)	(N/A)
012	100yr-24HR	100	None	1.507	15.600	2.52	(N/A)	(N/A)
013	100yr-24HR	100	None	0.669	15.600	1.09	(N/A)	(N/A)
O-1	100yr-24HR	100	None	3.746	18.100	4.08	(N/A)	(N/A)
O-3	100yr-24HR	100	None	1.497	15.600	1.66	(N/A)	(N/A)
SWMF 01 (IN)	100yr-24HR	100	None	6.555	15.600	11.51	(N/A)	(N/A)
SWMF 01 (OUT)	100yr-24HR	100	None	3.718	18.250	4.06	730.62	3.578
SWMF 011 (IN)	100yr-24HR	100	None	1.431	15.600	1.67	(N/A)	(N/A)
SWMF 011 (OUT)	100yr-24HR	100	None	1.430	15.600	1.67	742.89	0.001

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 012 (IN)	100yr-24HR	100	None	1.507	15.600	2.52	(N/A)	(N/A)
SWMF 012 (OUT)	100yr-24HR	100	None	1.402	15.650	2.51	743.10	0.137

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
011 OVERFLOW	Pond Outlet	Upstream	1.431	15.600	1.67	SWMF 011	Pond Inflow
011 OVERFLOW	Pond Outlet	Outflow	1.430	15.600	1.67	SWMF 011	Pond Outflow
011 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
011 OVERFLOW	Pond Outlet	Downstream	6.555	15.600	11.51	SWMF 01	
012 OUTLET	Pond Outlet	Upstream	1.507	15.600	2.52	SWMF 012	Pond Inflow
012 OUTLET	Pond Outlet	Outflow	1.402	15.650	2.51	SWMF 012	Pond Outflow
012 OUTLET	Pond Outlet	Link	0.687	21.950	0.55		
012 OUTLET	Pond Outlet	Downstream	1.431	15.600	1.67	SWMF 011	
012 OVERFLOW	Pond Outlet	Upstream	1.507	15.600	2.52	SWMF 012	Pond Inflow
012 OVERFLOW	Pond Outlet	Outflow	1.402	15.650	2.51	SWMF 012	Pond Outflow
012 OVERFLOW	Pond Outlet	Link	0.714	15.600	2.05		
012 OVERFLOW	Pond Outlet	Downstream	6.555	15.600	11.51	SWMF 01	
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Upstream	6.555	15.600	11.51	SWMF 01	Pond Inflow
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Outflow	3.718	18.250	4.06	SWMF 01	Pond Outflow
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Link	3.718	18.250	4.06		
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Downstream	3.746	18.100	4.08	O-1	
WEHRL ROAD STORM SEWER	Pond Outlet	Upstream	1.431	15.600	1.67	SWMF 011	Pond Inflow

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
WEHRL ROAD STORM SEWER	Pond Outlet	Outflow	1.430	15.600	1.67	SWMF 011	Pond Outflow
WEHRL ROAD STORM SEWER	Pond Outlet	Link	1.497	15.600	1.66		
WEHRL ROAD STORM SEWER	Pond Outlet	Downstream	1.497	15.600	1.66	O-3	

Messages

Message Id	6
Scenario	(N/A)
Element Type	(N/A)
Element Id	-2
Label	(N/A)
Time	(N/A)
Message	There are user notifications available. Double-click this message to load these messages.
Source	Project File

Scenario Calculation Summary

Scenario Summary	
ID	28
Label	100yr-18hr
Notes	
Active Topology	<I> Base Active Topology
Hydrology	<I> Base Hydrology
Rainfall Runoff	100yr-18hr
Physical	<I> Base Physical
Initial Condition	<I> Base Initial Condition
Boundary Condition	<I> Base Boundary Condition
Infiltration and Inflow	<I> Base Infiltration and Inflow
Output	<I> Base Output
User Data Extensions	<I> Base User Data Extensions
PondPack Engine Calculation Options	<I> Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	7.0 in	Storm Event	18Hr

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.010 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100yr-18hr	100	None	1.387	11.700	3.04	(N/A)	(N/A)
002	100yr-18hr	100	None	0.025	11.700	0.05	(N/A)	(N/A)
010	100yr-18hr	100	None	3.293	11.700	7.08	(N/A)	(N/A)
011	100yr-18hr	100	None	0.671	11.700	1.47	(N/A)	(N/A)
012	100yr-18hr	100	None	1.355	11.700	3.03	(N/A)	(N/A)
013	100yr-18hr	100	None	0.604	11.700	1.31	(N/A)	(N/A)
O-1	100yr-18hr	100	None	4.420	14.400	4.08	(N/A)	(N/A)
O-3	100yr-18hr	100	None	1.330	11.700	1.85	(N/A)	(N/A)
SWMF 01 (IN)	100yr-18hr	100	None	6.017	11.700	13.99	(N/A)	(N/A)
SWMF 01 (OUT)	100yr-18hr	100	None	4.395	14.450	4.06	730.63	3.592
SWMF 011 (IN)	100yr-18hr	100	None	1.286	11.700	1.91	(N/A)	(N/A)
SWMF 011 (OUT)	100yr-18hr	100	None	1.286	11.700	1.91	742.98	0.001

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 012 (IN)	100yr-18hr	100	None	1.355	11.700	3.03	(N/A)	(N/A)
SWMF 012 (OUT)	100yr-18hr	100	None	1.348	11.750	3.01	743.12	0.144

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
011 OVERFLOW	Pond Outlet	Upstream	1.286	11.700	1.91	SWMF 011	Pond Inflow
011 OVERFLOW	Pond Outlet	Outflow	1.286	11.700	1.91	SWMF 011	Pond Outflow
011 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
011 OVERFLOW	Pond Outlet	Downstream	6.017	11.700	13.99	SWMF 01	
012 OUTLET	Pond Outlet	Upstream	1.355	11.700	3.03	SWMF 012	Pond Inflow
012 OUTLET	Pond Outlet	Outflow	1.348	11.750	3.01	SWMF 012	Pond Outflow
012 OUTLET	Pond Outlet	Link	0.615	18.300	0.59		
012 OUTLET	Pond Outlet	Downstream	1.286	11.700	1.91	SWMF 011	
012 OVERFLOW	Pond Outlet	Upstream	1.355	11.700	3.03	SWMF 012	Pond Inflow
012 OVERFLOW	Pond Outlet	Outflow	1.348	11.750	3.01	SWMF 012	Pond Outflow
012 OVERFLOW	Pond Outlet	Link	0.733	11.750	2.56		
012 OVERFLOW	Pond Outlet	Downstream	6.017	11.700	13.99	SWMF 01	
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Upstream	6.017	11.700	13.99	SWMF 01	Pond Inflow
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Outflow	4.395	14.450	4.06	SWMF 01	Pond Outflow
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Link	4.395	14.450	4.06		
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Downstream	4.420	14.400	4.08	O-1	
WEHRL ROAD STORM SEWER	Pond Outlet	Upstream	1.286	11.700	1.91	SWMF 011	Pond Inflow

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
WEHRL ROAD STORM SEWER	Pond Outlet	Outflow	1.286	11.700	1.91	SWMF 011	Pond Outflow
WEHRL ROAD STORM SEWER	Pond Outlet	Link	1.330	11.700	1.85		
WEHRL ROAD STORM SEWER	Pond Outlet	Downstream	1.330	11.700	1.85	O-3	

Messages

Message Id	6
Scenario	(N/A)
Element Type	(N/A)
Element Id	-2
Label	(N/A)
Time	(N/A)
Message	There are user notifications available. Double-click this message to load these messages.
Source	Project File

Scenario Calculation Summary

Scenario Summary	
ID	34
Label	2yr-24hr
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	2yr-24hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	2	Rainfall Type	Time-Depth Curve
Total Depth	3.0 in	Storm Event	24Hr

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.010 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	2yr-24hr	2	None	0.407	15.600	0.77	(N/A)	(N/A)
002	2yr-24hr	2	None	0.007	15.600	0.01	(N/A)	(N/A)
010	2yr-24hr	2	None	1.003	15.600	1.87	(N/A)	(N/A)
011	2yr-24hr	2	None	0.197	15.600	0.38	(N/A)	(N/A)
012	2yr-24hr	2	None	0.376	15.600	0.74	(N/A)	(N/A)
013	2yr-24hr	2	None	0.180	15.600	0.34	(N/A)	(N/A)
O-1	2yr-24hr	2	None	0.647	19.550	0.79	(N/A)	(N/A)
O-3	2yr-24hr	2	None	0.568	15.650	0.88	(N/A)	(N/A)
SWMF 01 (IN)	2yr-24hr	2	None	1.589	15.600	2.99	(N/A)	(N/A)
SWMF 01 (OUT)	2yr-24hr	2	None	0.639	19.600	0.78	726.92	0.980
SWMF 011 (IN)	2yr-24hr	2	None	0.538	15.650	0.80	(N/A)	(N/A)
SWMF 011 (OUT)	2yr-24hr	2	None	0.538	15.650	0.80	742.57	0.001

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 012 (IN)	2yr-24hr	2	None	0.376	15.600	0.74	(N/A)	(N/A)
SWMF 012 (OUT)	2yr-24hr	2	None	0.341	17.100	0.50	742.94	0.095

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
011 OVERFLOW	Pond Outlet	Upstream	0.538	15.650	0.80	SWMF 011	Pond Inflow
011 OVERFLOW	Pond Outlet	Outflow	0.538	15.650	0.80	SWMF 011	Pond Outflow
011 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
011 OVERFLOW	Pond Outlet	Downstream	1.589	15.600	2.99	SWMF 01	
012 OUTLET	Pond Outlet	Upstream	0.376	15.600	0.74	SWMF 012	Pond Inflow
012 OUTLET	Pond Outlet	Outflow	0.341	17.100	0.50	SWMF 012	Pond Outflow
012 OUTLET	Pond Outlet	Link	0.341	17.100	0.50		
012 OUTLET	Pond Outlet	Downstream	0.538	15.650	0.80	SWMF 011	
012 OVERFLOW	Pond Outlet	Upstream	0.376	15.600	0.74	SWMF 012	Pond Inflow
012 OVERFLOW	Pond Outlet	Outflow	0.341	17.100	0.50	SWMF 012	Pond Outflow
012 OVERFLOW	Pond Outlet	Link	0.000	0.000	0.00		
012 OVERFLOW	Pond Outlet	Downstream	1.589	15.600	2.99	SWMF 01	
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Upstream	1.589	15.600	2.99	SWMF 01	Pond Inflow
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Outflow	0.639	19.600	0.78	SWMF 01	Pond Outflow
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Link	0.639	19.600	0.78		
MODIFIED RESTRICTOR STRUCTURE	Pond Outlet	Downstream	0.647	19.550	0.79	O-1	
WEHRL ROAD STORM SEWER	Pond Outlet	Upstream	0.538	15.650	0.80	SWMF 011	Pond Inflow

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
WEHRL ROAD STORM SEWER	Pond Outlet	Outflow	0.538	15.650	0.80	SWMF 011	Pond Outflow
WEHRL ROAD STORM SEWER	Pond Outlet	Link	0.568	15.650	0.88		
WEHRL ROAD STORM SEWER	Pond Outlet	Downstream	0.568	15.650	0.88	O-3	

Messages

Message Id	6
Scenario	(N/A)
Element Type	(N/A)
Element Id	-2
Label	(N/A)
Time	(N/A)
Message	There are user notifications available. Double-click this message to load these messages.
Source	Project File

Table of Contents

Table of Contents

Time-Depth Curve: 24Hr	
Label	24Hr
Start Time	0.000 hours
Increment	1.200 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 1.200 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.1	0.2	0.3	0.4
6.000	0.5	0.6	0.7	0.8	1.0
12.000	1.2	1.4	1.7	2.1	2.4
18.000	2.6	2.7	2.8	2.9	3.0
24.000	3.0	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	24Hr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.270 hours
Area (User Defined)	3.330 acres

Computational Time Increment	0.036 hours
Time to Peak (Computed)	15.588 hours
Flow (Peak, Computed)	0.77 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	0.77 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	3.330 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	0.410 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.407 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.270 hours
Computational Time Increment	0.036 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.97 ft³/s
Unit peak time, Tp	0.180 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.720 hours
Total unit time, Tb	0.900 hours

Storm Event	24Hr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.190 hours
Area (User Defined)	0.060 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	15.605 hours
Flow (Peak, Computed)	0.01 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	0.01 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	0.060 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	0.007 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.007 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.190 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.36 ft³/s
Unit peak time, Tp	0.127 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.507 hours
Total unit time, Tb	0.633 hours

Storm Event	24Hr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.310 hours
Area (User Defined)	7.630 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	15.624 hours
Flow (Peak, Computed)	1.87 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	1.87 ft³/s

Drainage Area	
SCS CN (Composite)	84.600
Area (User Defined)	7.630 acres
Maximum Retention (Pervious)	1.8 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	1.013 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.003 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.310 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	27.89 ft³/s
Unit peak time, Tp	0.207 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.827 hours
Total unit time, Tb	1.033 hours

Storm Event	24Hr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	1.610 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	15.600 hours
Flow (Peak, Computed)	0.38 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	0.38 ft³/s

Drainage Area	
SCS CN (Composite)	83.000
Area (User Defined)	1.610 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	0.198 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.197 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.30 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Storm Event	24Hr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	3.420 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	15.600 hours
Flow (Peak, Computed)	0.74 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	0.74 ft³/s

Drainage Area	
SCS CN (Composite)	80.800
Area (User Defined)	3.420 acres
Maximum Retention (Pervious)	2.4 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.3 in
Runoff Volume (Pervious)	0.379 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.376 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.50 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Storm Event	24Hr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	1.430 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	15.600 hours
Flow (Peak, Computed)	0.34 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	15.600 hours
Flow (Peak Interpolated Output)	0.34 ft³/s

Drainage Area	
SCS CN (Composite)	83.600
Area (User Defined)	1.430 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	0.181 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.180 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.48 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
724.60	0.000
725.00	0.139
726.00	0.540
727.00	1.019
728.00	1.585
729.00	2.253
730.00	3.031
731.00	3.916
731.50	4.399

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
742.00	0.000
743.00	0.001
744.00	0.002
744.50	0.048
745.00	0.090

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
742.50	0.000
743.00	0.108
744.00	0.405

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	745.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward + Reverse	TW	744.50	745.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	744.50 ft
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	744.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	12" RCP STORM SEWER	Forward	TW	742.50	744.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 12" RCP STORM SEWER Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	12.0 in
Length	175.00 ft
Length (Computed Barrel)	175.00 ft
Slope (Computed)	0.002 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.031
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.094
T2 ratio (HW/D)	1.196
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	743.59 ft	T1 Flow	2.75 ft³/s
T2 Elevation	743.70 ft	T2 Flow	3.14 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	744.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward + Reverse	TW	743.00	744.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	743.00 ft
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	724.60 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	731.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	100yr orfice	Forward	TW	728.30	731.50
Orifice-Circular	Orifice - 1	Forward	TW	725.00	728.30
Rectangular Weir	STRUCTURE WEIR	Forward	TW	728.00	728.30
Rectangular Weir Tailwater Settings	Weir - 1 Tailwater	Forward	TW	731.00 (N/A)	731.50 (N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	731.00 ft
Weir Length	20.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: STRUCTURE WEIR Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	728.00 ft
Weir Length	6.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	725.00 ft
Orifice Diameter	4.8 in
Orifice Coefficient	0.600

Structure ID: 100yr orfice Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	724.45 ft
Orifice Diameter	8.0 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	742.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	745.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	10" RCP STORM SEWER	Forward	TW	742.00	745.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 10" RCP STORM SEWER Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	10.0 in
Length	175.00 ft
Length (Computed Barrel)	175.03 ft
Slope (Computed)	0.017 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.040
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.087
T2 ratio (HW/D)	1.189
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	742.91 ft	T1 Flow	1.74 ft³/s
T2 Elevation	742.99 ft	T2 Flow	1.99 ft³/s

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	724.60	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.010	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	19.600	726.92	0.980

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	15.600	0.74	0.000	0.00
Pond Outflow...	17.100	0.50	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.376	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.341	Forward

Mass Balance (ac-ft)		
Volume (Initial ICPM)	0.000	ac-ft
Volume (Total In ICPM)	1.589	ac-ft
Volume (Total Out ICPM)	0.639	ac-ft
Volume (Ending)	0.950	ac-ft
Elevation (Ending)	726.86	ft
Difference	0.000	ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0	%

Subsection: Interconnected Pond Routing Summary
Label: SWMF 011

Return Event: 2 years
Storm Event: 24Hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	742.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.010	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	15.650	742.57	0.001

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	15.600	0.74	0.000	0.00
Pond Outflow...	17.100	0.50	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.376	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.341	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	0.538 ac-ft
Volume (Total Out ICPM)	0.538 ac-ft
Volume (Ending)	0.000 ac-ft
Elevation (Ending)	742.24 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	742.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.010	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	16.900	742.94	0.095

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	15.600	0.74	0.000	0.00
Pond Outflow...	17.100	0.50	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.376	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.341	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	0.376 ac-ft
Volume (Total Out ICPM)	0.341 ac-ft
Volume (Ending)	0.035 ac-ft
Elevation (Ending)	742.66 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Index

PONDPACK SUPPORTING DOCUMENTATION

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 12/12/2019
Location Subarea 001 Checked Date

Circle one: Present (Developed)

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Residential 1/4 Acre	83			3.33	276.39
			Totals =		3.33	276.390

1/ Use only one CN source per line.

CN (weighted) = Total Product / Total Area = 276.390 / 3.330 = 83.000

Use CN = 83.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project WEHRLI SOUTH By ARF Date 12/12/2019
Location Subarea 002 Checked Date

Circle one: Present (Developed)

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Residential 1/4 Acre	83			0.06	4.98
			Totals =		0.06	4.980

1/ Use only one CN source per line.

CN (weighted) = Total Product / Total Area = 4.980 / 0.060 = 83.000

Use CN = 83.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Project		By	ARF	Date	12/12/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 001

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.04			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.244	+	=	0.244

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			224			
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\,V}$		hr	0.027	+	=	0.027

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\,V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.271
	min	16

Project		By	ARF	Date	12/12/2019
Location	NAPERVILLE IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 002

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	71			
4. Two-yr 24-hr rainfall, P_2		in	3.04			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.186	+	=	0.186

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L						
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\,V}$		hr		+	=	

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw compute r		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\,V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.186
	min	11

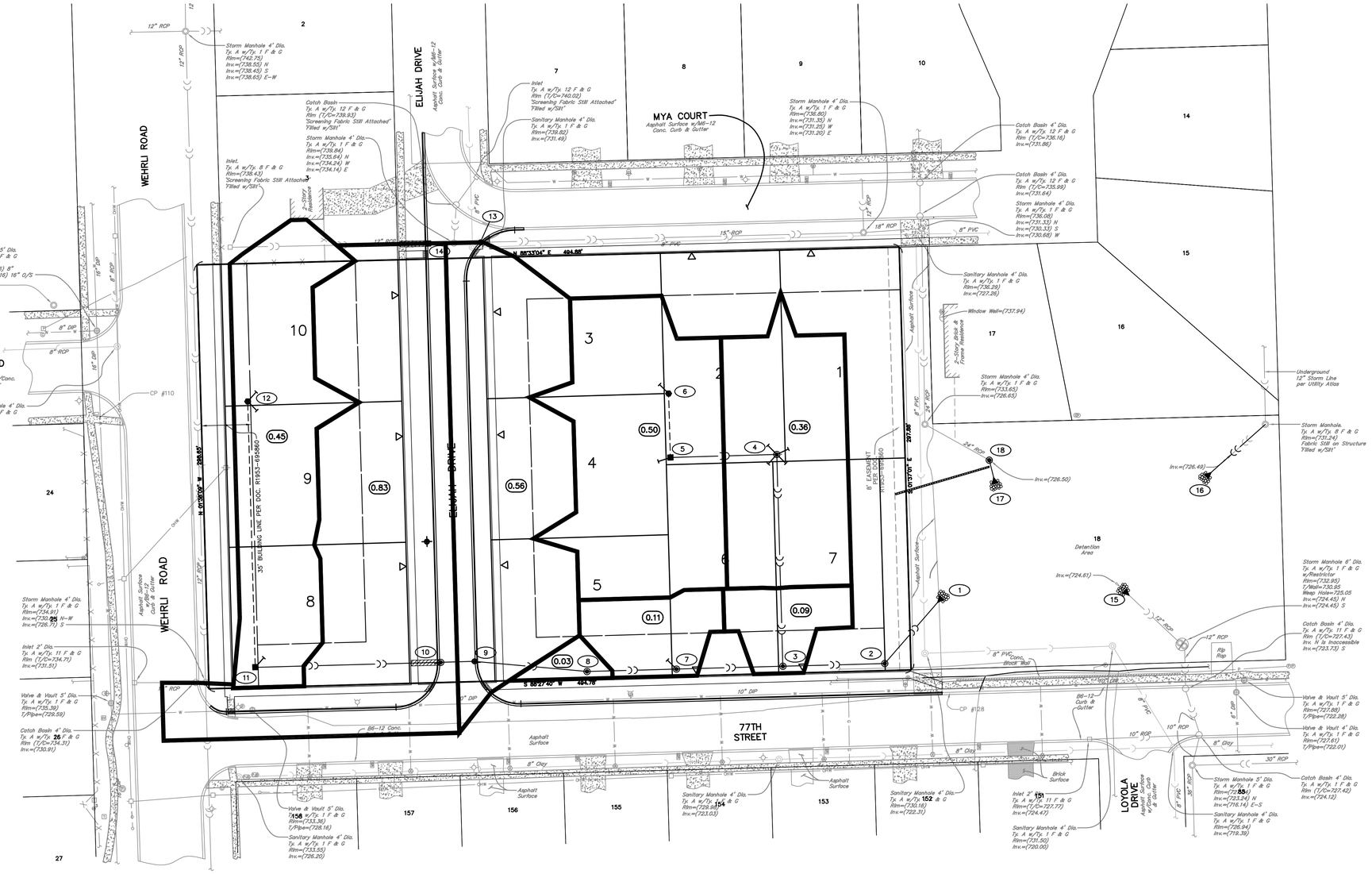
Job #: 782.029
Project: 77th Street Project

Date: February 13, 2020
Revised:
By: ARF

001 STAGE/ STORAGE RELATIONSHIP					
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**	
724.6	14460	0.332	0.000	**0.000**	
725.0	15810	0.363	0.139	**0.139**	
726.0	19110	0.439	0.401	**0.540**	
727.0	22670	0.520	0.480	**1.019**	
728.0	26580	0.610	0.565	**1.585**	
729.0	31630	0.726	0.668	**2.253**	
730.0	36160	0.830	0.778	**3.031**	
731.0	40920	0.939	0.885	**3.916**	OverFlow
731.5	43350	0.995	0.484	**4.399**	

EXHIBIT H

CATCHMENT EXHIBIT



LEGEND

EXISTING	PROPOSED	DESCRIPTION
		STORM SEWER
		STORM MANHOLE
		CATCH BASIN
		INLET
		CLEANOUT
		SLOPE INLET BOX
		HEADWALL
		END SECTION
		SUMP DRAIN CONDUIT
	(XXX)	DRAINAGE AREA IN ACRES

PROPOSED	DESCRIPTION
(No.)	NUMBERING SYSTEM USED ON PLANS FOR DRAINAGE STRUCTURE IDENTIFICATION

PREPARED FOR:
OAK CREEK CAPITAL PARTNERS, LLC
P.O. BOX 5726
NAPERVILLE, IL 60567
(847) 514-9144

PREPARED BY:
CEMCON, Ltd.
Consulting Engineers, Land Surveyors & Planners
2280 White Oak Circle, Suite 100
Aurora, Illinois 60502-9675
Ph: 630.862.2100 Fax: 630.862.2199
E-Mail: cadd@cemcon.com Website: www.cemcon.com

REVISIONS

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION

OVERALL UTILITY PLAN

77TH STREET SUBDIVISION

FILE NAME: CATCHMENT	DSGN. BY: MAM	JOB NO.: 782.029	FLD. BK./PG.: ---	SHEET NO.
DIR: 782029	DRN. BY: JGC	DATE: 12-16-19	SCALE: 1" = 40'	1 of 1

PLOT FILE CREATED: 12/13/2019 8:31 AM BY JEFF CEBULA DRAWING LAST SAVED: 12/13/2019 8:30 AM BY JEFF DRAWING PATH: P:\782029\DWG\ENGINEERING\DRAWINGS\EXHIBITS\CATCHMENT.DWG

EXHIBIT I

STORM SEWER

SUPPORTING CALCULATIONS

Calculated Runoff Coefficient - C Value (Structure 3)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	4,075	SF	**C**

Total Impervious Area:	2,701	SF	**D**
Total Pervious Area:	1,374	SF	**E**

Percent Impervious: [Q/L]	66.3 %	**F**
Percent Pervious: [R/L]	33.7 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.75**

Calculated Runoff Coefficient - C Value (Structure 4)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	15,760	SF	**C**

Total Impervious Area:	4,011	SF	**D**
Total Pervious Area:	11,749	SF	**E**

Percent Impervious: [Q/L]	25.5 %	**F**
Percent Pervious: [R/L]	74.5 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.50**

Calculated Runoff Coefficient - C Value (Structure 5)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	21,928	SF	**C**

Total Impervious Area:	6,520	SF	**D**
Total Pervious Area:	15,408	SF	**E**

Percent Impervious: [Q/L]	29.7 %	**F**
Percent Pervious: [R/L]	70.3 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.53**

Calculated Runoff Coefficient - C Value (Structure 7)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	4,968	SF	**C**

Total Impervious Area:	2,167	SF	**D**
Total Pervious Area:	2,801	SF	**E**

Percent Impervious: [Q/L]	43.6 %	**F**
Percent Pervious: [R/L]	56.4 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.61**

Calculated Runoff Coefficient - C Value (Structure 8)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	1,171	SF	**C**

Total Impervious Area:	0	SF	**D**
Total Pervious Area:	1,171	SF	**E**

Percent Impervious: [Q/L]	0.0 %	**F**
Percent Pervious: [R/L]	100.0 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.35**

Calculated Runoff Coefficient - C Value (Structure 9)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	24,600	SF	**C**

Total Impervious Area:	13,318	SF	**D**
Total Pervious Area:	11,282	SF	**E**

Percent Impervious: [Q/L]	54.1 %	**F**
Percent Pervious: [R/L]	45.9 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.67**

Calculated Runoff Coefficient - C Value (Structure 10)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	36,145	SF	**C**

Total Impervious Area:	17,860	SF	**D**
Total Pervious Area:	18,285	SF	**E**

Percent Impervious: [Q/L]	49.4 %	**F**
Percent Pervious: [R/L]	50.6 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.65**

Calculated Runoff Coefficient - C Value (Structure 11)

Job No.: 782029
Date December 11, 2019
By: ARF

A	B
Inpervious Runoff Coefficient	**Pervious Runoff Coefficient**
0.95	**0.35**

Total Area: (D+E)	19,399	SF	**C**

Total Impervious Area:	5,400	SF	**D**
Total Pervious Area:	13,999	SF	**E**

Percent Impervious: [Q/L]	27.8 %	**F**
Percent Pervious: [R/L]	72.2 %	**G**

Runoff Coefficient (C): [(F*A) + (G*B)] **0.52**

PROJECT: 77TH Street Subdivision
JOB NO.: 782.029

STORM SEWER CALCULATIONS
(10 Year Critical Duration Storm)

BY: ARF
DATE: 12-11-2019
REVISED: 03-05-2020

Upstream Node Number	Downstream Node Number	Length (ft)	Inlet Area (acres)	Runoff Coefficient	Inlet CA (acres)	Total CA (acres)	TC (min)	Sys Flow Time (min)	I (in/hr)	Q (cfs)	Size (inch)	S (%)	Capacity (cfs)	Velocity (ft/s)	Upstream Rim (ft)	Upstream HGL (ft)	Upstream Invert (ft)	Downstream Rim (ft)	Downstream HGL (ft)	Downstream Invert (ft)
FES 1																				
11	10	129	0.45	0.52	0.23	0.23	10.00	10.00	6.78	1.60	12	1.28	4.03	4.83	732.80	730.04	729.50	731.60	728.77	727.85
10	9	26	0.83	0.65	0.54	0.77	10.00	10.44	6.67	5.20	15	0.96	6.33	5.76	731.60	728.77	727.85	731.60	728.68	727.60
9	8	79	0.56	0.67	0.38	1.15	10.00	10.52	6.65	7.70	18	1.00	10.50	6.49	731.60	728.68	727.60	731.20	727.76	726.81
5	4	75	0.50	0.53	0.27	0.27	10.00	10.00	6.78	1.81	12	1.00	3.56	4.55	731.00	728.37	727.80	731.00	727.79	727.05
8	7	63	0.03	0.35	0.01	1.16	10.00	10.72	6.60	7.72	18	0.90	9.99	6.24	731.20	727.89	726.81	730.70	727.34	726.24
4	3	149	0.36	0.50	0.18	0.45	10.00	10.27	6.71	3.01	15	0.50	4.58	3.99	731.00	727.79	727.05	730.70	727.00	726.30
7	3	75	0.11	0.61	0.07	1.23	10.00	10.89	6.56	8.11	18	0.91	10.00	6.30	730.70	727.34	726.24	730.70	726.82	725.56
3	2	72	0.09	0.75	0.07	1.74	10.00	11.09	6.51	11.42	21	0.90	15.05	6.88	730.70	726.82	725.56	730.70	726.05	724.91
2	1	61	N/A	N/A	N/A	1.74	N/A	11.26	6.47	11.34	24	0.51	16.13	5.56	730.70	726.15	724.91	726.50	725.81	724.60

PROJECT: 77TH Street Subdivision
JOB NO.: 782.029

STORM SEWER CALCULATIONS
(100 Year Critical Duration Storm)

BY: ARF
DATE: 12-11-2019
REVISED: 03-05-2020

Upstream Node Number	Downstream Node Number	Length (ft)	Inlet Area (acres)	Runoff Coefficient	Inlet CA (acres)	Total CA (acres)	TC (min)	Sys Flow Time (min)	I (in/hr)	Q (cfs)	Size (inch)	S (%)	Capacity (cfs)	Velocity (ft/s)	Upstream Rim (ft)	Upstream HGL (ft)	Upstream Invert (ft)	Downstream Rim (ft)	Downstream HGL (ft)	Downstream Invert (ft)
FES 1																				
11	10	129	0.45	0.52	0.23	0.23	10.00	10.00	11.34	2.67	12	1.28	4.03	3.41	732.80	732.33	729.50	731.60	731.60	727.85
10	9	26	0.83	0.65	0.54	0.77	10.00	10.63	11.08	8.64	15	0.96	6.33	7.04	731.60	731.60	727.85	731.60	731.13	727.60
9	8	79	0.56	0.67	0.38	1.15	10.00	10.69	11.05	12.80	18	1.00	10.50	7.24	731.60	731.13	727.60	731.20	729.96	726.81
5	4	75	0.50	0.53	0.27	0.27	10.00	10.00	11.34	3.03	12	1.00	3.56	3.86	731.00	729.23	727.80	731.00	728.68	727.05
8	7	63	0.03	0.35	0.01	1.16	10.00	10.87	10.98	12.83	18	0.90	9.99	7.26	731.20	729.96	726.81	730.70	729.02	726.24
4	3	149	0.36	0.50	0.18	0.45	10.00	10.32	11.21	5.03	15	0.50	4.58	4.10	731.00	728.68	727.05	730.70	727.78	726.30
7	3	75	0.11	0.61	0.07	1.23	10.00	11.02	10.92	13.50	18	0.91	10.00	7.64	730.70	729.02	726.24	730.70	727.78	725.56
3	2	72	0.09	0.75	0.07	1.74	10.00	11.18	10.85	19.02	21	0.90	15.05	7.91	730.70	727.78	725.56	730.70	726.74	724.91
2	1	61	N/A	N/A	N/A	1.74	N/A	11.33	10.79	18.91	24	0.51	16.13	6.02	730.70	726.74	724.91	726.50	726.17	724.60

Project 77TH Street | By ARF | Date 3/19/2019
Location Section A-A | Checked | Date

Check one: ☐ Present ☑ Developed
Check one: ☐ Tc ☐ Tt

SECTION A-A SWMF 001 OVERFLOW

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)

		Segment ID		
1.	Surface Description (Table 3-1)			
2.	Manning's roughness coeff., n (Table 3-1)			
3.	Flow length, L (total L ≤ 300 ft)	ft		
4.	Two-yr 24-hr rainfall, P_2	in		
5.	Land slope, s	ft/ft		
6.	$Tc = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$	hr		

Shallow Concentrated Flow

		Segment ID		
7.	Surface description (paved or unpaved)			
8.	Flow length, L			
9.	Watercourse slope, s			
10.	Average velocity, V (figure 3-1)			
11.	$T_t = \frac{L}{3600\ V}$	hr		

Channel Flow

		Segment ID			
12.	Cross sectional flow area, a	ft^2			
13.	Wetted perimeter, pw	ft			
14.	Hydraulic radius, r= a/pw compute r	ft			
15.	Channel Slope, s	ft/ft			
16.	Manning's roughness coeff., n				
17.	$V= 1.49\ r^{2/3}\ s^{1/2} / n$	ft/s			
18.	Flow length, L	ft			
19.	$T_t = \frac{L}{3600\ V}$	hr		+	=

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) — hr / min

Determine Height Of Water For The Overland Flood Route At Trapezoid Weir Location

Assumption: 100 year event used for intensity

Governing Equations:

Flow:
Q=ciA where: Q is rate of flow (cfs)
c is runoff coefficient
i is intensity (in/hr); i=Tc
A is area (Acres)

Flow Through A Trapeziod Weir:

Q=(DC)*(L*(H^(3/2))+(Z*(H^(5/2))))

where: DC is the discharge coefficient

H is the depth of 100 year high water level measured from the bottom of the notch

Z is Tan(Theta/2)
L is the length of notch at bottom, ft.

Constants:

Runoff Coefficient:	
Discharge Coefficient At Weir:	3.00
Distance From T/F To F/G:	
Intensity - I=Tc:	

Calculations:

Lot No.	T/F	F/G	Side Setback		Notch Length	Trib. Area* (Acres)	Q* (cfs)	Tan Mu (deg.)	Angle (deg.)	Theta (deg.)	Tan 1/2 Theta (deg.)	F/G and Weir Diff.	Depth	100 Year HWL
BERM	732.00	732.00	25.0	730.80	20		17.42	20.833	87.25	174.39	20.41	1.2	0.420	731.22
BERM	731.80	731.80	20.0					20.000	87.14			1.0		

* Flow from 1 cfs per acre of upstream area

EXHIBIT J

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