PL201900127
PL2019-127
Skywater Tech Foundry
2401 and 2411 East 86th Street

SkyWater Technology Foundry Proposed Expansion

DRC – Submission: Project Narrative

Application Number: PL201900127

July 24, 2019

Property Owner:

SkyWater Technology Foundry, Inc.
2401 East 86th Street
Bloomington, MN 55425
952-851-5200

Prepared by:

TEGRA Group
Alliiance
Sambatek
McGough Construction

PL201900127
PL2019-127
Skywater Tech Foundry
2401 and 2411 East 86th Street

Section 1: Requested Action

The requested actions with this submission are as following:

1) Major Renovation to the development plans for a proposed building expansion at SkyWater Technology Foundry, and
2) Rezoning from CO-1 to IT (Innovation and Technology)

The development application steps for the proposed expansion at SkyWater Technology Foundry will follow the below proposed schedule:

Pre-application DRC submission	June 19 (complete)
Pre-application DRC Meeting	June 25 (complete)
DRC Submission	July 24
Post-application DRC Meeting	August 6
Planning Commission Meeting	August 29
City Council (Hearing)	September 23

Included in this DRC submission are the following items:

1) Project Narrative with supporting documentation
2) Design Drawings, including: site and civil plans, construction staging plan, building floor and roof plans, and building elevations
3) Draft Memorandum – Parking Study, dated July 18, 2019 (written by Alliant Engineering)
4) Development Application Fee:
   - $1,660: Rezoning
   - $830: Revision to preliminary development plan
   - $830: Major revision to final development plan

   Total Application Fees: $3,320

Section 2 – Project Location

The proposed expansion project is located at 2401 and 2411 East 86th Street on property owned by the applicant, SkyWater Technology Foundry, Inc., platted as Lot 1, Block 1 and Lot 2, Block 1 of the Cypress Addition. The proposed expansion will be located along a portion of the south facade of the existing facility area that is currently used for landscaping, vehicular circulation and parking.

Section 3 – Proposed Project

The proposed project includes a two-story building expansion of the existing 330,765 square foot facility. The proposed expansion footprint is approximately 34,075 square foot for a total expansion area of approximately 66,724 square feet. Of this total, approximately 15,000 sf will be Class 10 Clean Room Fab, with the remaining area to include sub-fab area, mechanical area, chase, corridors and other support spaces. The proposed addition would be located on the south façade of the existing FAB 4C with access to the FAB space from the existing clean link. The existing SUBFAB 4C stair enclosures would be removed and connections to the proposed SUBFAB 4D addition would be included as part of the new addition. Demolition work within the existing building would be limited to new construction connections

to the existing building and to accommodate MEP connections. Additional modifications to interior spaces will be limited to accommodate tool and supply deliveries into the proposed expansion area.

SkyWater's operation runs 24 hours per day utilizing the semiconductor industry standard of (2) 12-hour shifts. The proposed expansion will add approximately 30 to 50 positions to SkyWater's current workforce.

The overall dimensions of the expansion area are approximately 267 feet by 127.5 feet, with the building height limited to 30'-6" feet from the lowest exterior grade. The proposed addition will be constructed of a cast-in-place concrete structural waffle slab on concrete columns and footings, consistent with existing building materials. The structural systems will be designed to accommodate similar vibration criteria as the existing building. Structural steel and composite concrete floor and roof assemblies may be used in specific areas as necessary. The exterior wall system will be an insulated precast concrete panel assembly to match the existing buildings exterior wall design. The exterior wall system will be designed and specified as architectural concrete with integrated color. Mechanical equipment will be located on the roof structure of the expansion area. All mechanical equipment located on the roof structure will be set back from the building's edge by a minimum of twelve feet and will be screened from view. A 2,827 square foot exterior yard area for additional mechanical equipment is proposed along the west elevation of the expansion area. The yard will be enclosed using the same material choices as used on the building wall system.

A pre-application DRC meeting occurred on June 25, 2019. Responses to pre-application DRC submission comments are provided as part of this submission. See Exhibit A: Pre-Application Comment Response Letter.

Section 4 – Zoning Code

A) Zoning

The SkyWater Technology facility is located in an existing planned unit development with a CO-1 base zone. As part of this DRC submission, the applicant is seeking to rezone the property to Innovative and Technology (IT) zoning district. Rezoing to IT will also eliminate the need to seek a conditional-use permit request given SkyWater's operations as a computer component manufacturer are a permitted use in IT.

B) Project Phasing and Construction Schedule

It is anticipated with proper approvals in place, construction on the proposed expansion will begin in Fall of 2019. A preliminary construction schedule has been developed. See Exhibit E: Construction Schedule.

C) Stormwater Management

A stormwater management report has been completed, see Exhibit B: SkyWater Technology Foundry Stormwater Management Report.

D) Floor Area Ratio

The site is 609,771 square feet (approx. 14 acres). The existing building area of the SkyWater facility is calculated at 330,765 square feet, the proposed expansion will add approximately 66,724 gross square feet which will result in a FAR of 0.65. The approved range for IT zoning is 0.4 – 1.0.

E) Parking

The current site provides 464 parking stalls. The proposed expansion would reduce the total count by 139 spaces. In response to the anticipated code required parking count with the expansion, the City of Bloomington retained Alliant Engineering in June 2019 to conduct a parking study (see Exhibit C: SkyWater Parking Study - Draft, July 19, 2019).

As outlined in the Alliant Parking Study, current zoning code requires 479 parking stalls and 508 under future conditions creating a deficiency under current and future conditions. Using data collected by Alliant and SkyWater shows that the maximum observed existing parking demand was 234 vehicles. The study concludes that based on the observations of existing conditions that the minimum required parking stalls with the proposed expansion is 273 stalls. The proposed site plan exceeds this requirement with 294 stalls.

Six (6) long term bike parking spaces have been incorporated into the proposed improvements. Spaces are within 50 feet of the building's primary visitor and employee entrance.

F) Anticipated Peak and Avg Water/Wastewater Flow

SkyWater has provided a response to questions and requests for information made by members of the City of Bloomington's Engineering Department (Exhibit D). A determination will be made if upgrades are needed upon the review and analysis from the City and its designated utilities engineer.

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EXHIBIT – A

Pre-Application Submission Comment Response Letter

TEGRA
GROUP

PL201900127
PL2019-127
Skywater Tech Foundry
2401 and 2411 East 86th Street

July 24, 2019

Mike Centinario
City of Bloomington
1800 West Old Shakopee Road
Bloomington, MN 55431-3027

SUBJECT: **Application: PL201900127**
SkyWater Technology Foundry, Inc.
2401 and 2411 East 86th Street
Pre-Application DRC Comments – June 25, 2019: **Responses**

Dear Mr. Centinario:

Please see our responses to pre-application DRC comments (dated June 25, 2019) below:

Planning Review – Pre-App Contact: Mike Centinario at mcentinario@BloomingtonMN.gov, (952) 563-8921

1) SkyWater Technology Foundry is an existing planned development with a CO-1 base zone. The expansion represents a major revision to the approved preliminary and final development plans. Planning Commission and City Council review are required.

2) The City is seeking to proactively rezone properties guided for Innovation and Technology land uses in the Comprehensive Plan to the Innovation and Technology (IT) zoning district. Has a rezoning request been considered as part of the application? The benefit of rezoning to IT is it would eliminate the need for a conditional use permit - research laboratories and computer component manufacturing are conditional uses in CO-1 while they are permitted uses in IT. Further, the maximum structure coverage within the CO-1 district is 30% whereas the IT zone allows for much more development intensity.
   - Response: Applicant is requesting a rezoning to IT as part of this submission.

3) The "Potential Alternate Proof-of-Parking" location is not an option due to burial mound buffer areas.
   - Response: The current plans eliminate any potential ground disturbing activities from burial mound buffer areas.

4) The southeast corner of the proof of parking ramp is likely within a burial mound buffer area. Buffer area must be left unaltered.
   - Response: The current plans eliminate any potential ground disturbing activities from burial mound buffer areas.

5) 479 stalls is the parking requirement for the existing facility. The addition will increase the parking requirement. One stall per 500 square feet of "fab" space is required.
   - Response: Based on the draft parking study provided by the City's consultant on 7/19/19, it is our understanding that the minimum required parking stalls with the proposed addition is 273 stalls. The proposed site plan includes 294 stalls.

6) A proof of parking structure cannot be approved by the City. Structured parking will likely be needed unless the parking study underway determines it is not necessary. There are design efficiencies to increase parking beyond what is depicted on the concept site plan.
   - Response: The proof-of-parking structure has been eliminated from the plans.

7) The site is within Safety Zone B, as designated by MSP Airport zoning standards. Fuel storage tank farms and above-ground fuel tanks are prohibited. Would there be any new fuel tanks as part of the expansion?
   - Response: No new fuel tanks will be added as part of this expansion.

   Depending on the height of the building, an FAA No Hazard Determination may be needed. So long as construction cranes do not exceed 130 feet above grade, an Airport Zoning Permit would not be required.
   - Response: Construction cranes used for this expansion project will not exceed 130 feet above grade.

8) Provide a sidewalk connection from the building to public sidewalk or street.
   - Response: A sidewalk connection from the building to the public sidewalk is included in the plans.

9) Show location of a bike rack and bike rack detail on the plan.
   - Response: A bike rack and detail have been added to the plans.

10) Correct the number of parking spaces required by city code and the number of spaces provided on the site plan. One stall per 500 square feet of production space is required and one stall per 1,000 square feet of warehouse/storage.

    If SkyWater would like adjacent parking at the church site to "count" towards meeting parking requirements, details on the shared use parking agreement must be outlined for review. SkyWater must have permanent access to the stalls.
    - Response: Based on the draft parking study provided by the City's consultant (Alliant Engineering) on 7/19/19, it is our understanding that the minimum required parking stalls with the proposed addition is 273 stalls. The proposed site plan includes 294 stalls.

11) Landscaping requirements would be based on the disturbance area of the project. Any disturbed area of the parking lot must meet minimum requirements, such as landscape parking islands that meet dimensional requirements and have at least one deciduous tree.
    - Response: Landscaping has been provided in accordance with code requirements.

12) Parking lot and exterior security lighting must meet Section 21.301.07. A minimum of 1.0 foot-candles is required on the parking surface (which may be reduced to 0.5 foot-candles for the outer perimeter of the parking lot.
    - Response: If existing conditions do not already exist to meet current requirements, parking lot and exterior security lighting will be upgraded to meet Section 21.301.07.

13) Exterior materials must meet Section 19.63.08. It appears the existing building has been painted, which is not permitted by City Code. If concrete is the preferred material, it must meet be "architectural concrete." Provide detailed specifications of the proposed concrete panels. All exterior concrete must be integrally colored.
    - Response: Exterior wall systems for the expansion portion of the building will be designed and specified as architectural concrete with integrated color. See architecture drawings.

14) Interior trash and recycling must be provided. Exterior trash enclosures are not permitted.

15) Each parking lot island must be 8 feet wide (inside to inside measurements) and must have a minimum of one tree.
    - Response: New parking lot islands have been designed in accordance with these requirements.

Building Department Review - Pre-App Contact: Duke Johnson at djohnson@BloomingtonMN.gov, (952)
563-8959

1) Must meet current MN State Building Code

2) SAC review by MET council will be required.

3) Plans must include a current building code analysis.

4) When 80% of plans are completed, a preliminary plan review meeting can be set up with Building & Inspections manager.

Fire Department Review - Pre-App Contact: Kris Kaiser at kkaiser@BloomingtonMN.gov, (952) 563-8968

1) Provide for the new structure and maintain for existing structures emergency vehicle access throughout the property.

- Response: See turning movements included with civil plans.

2) Provide adequate turning radius for BFD Ladder 3 for all emergency vehicle access lanes.
   - Response: See turning movements included with civil plans.

3) Maintain emergency vehicle access and circulation throughout the property.
   - Response: See turning movements included with civil plans.

4) Hydrant coverage shall be provided within 150' of all portions of the structure.
   - Response: Hydrants at that building addition are spaced accordingly.

5) Fire Hose Valves shall be provided throughout all levels of the parking ramp.
   - Response: Parking ramp is no longer proposed as proof-of-parking option.

Traffic Review - Pre-App Contact: Brian Hansen at bhansen@BloomingtonMN.gov, (952) 563-4543

1) Provide appropriate MMUTCD references for signs proposed for circulating traffic. All private signage must be installed outside of the city right-of-way.
   - Response: New directional signage is not proposed

2) All parking stall striping must be painted white. Parking islands must be 3-feet shorter than the parking stall and 8-feet wide.
   - Response: Striping color and dimensions are shown accordingly

3) Disabled parking signage and pavement markings must be placed in accordance with ADA and MMUTCD
   - Response: Refer to ADA signage and pavement markings details in the plan set.

4) All construction and post-construction parking and storage of equipment and materials must be on-site. Use of public streets for private construction parking, loading/unloading, and storage will not be allowed.
   - Response: All construction and post construction parking will occur on site or on the directly adjacent, neighboring Evergreen Church property. All equipment/material storage will occur on-site.

5) Install crosswalk pavement markings in accordance with MMUTCD
   - Response: Crosswalk pavement markings are not proposed.

6) Provide bicycle parking, number to be provided by City Engineer. Show location of a bike rack and bike rack detail on the plan.
   - Response: Bicycle parking is shown on the site plan.

7) Please indicate where construction, material and equipment staging will be located. Please also indicate where existing parking stalls impacted by construction activities will be temporarily relocated to in order to maintain the current required parking supply.
   - Response: See construction staging information in plan set.

Utility Review - Pre-App Contact: Brian Hansen at bhansen@BloomingtonMN.gov, (952) 563-4543

1) The sewer mains downstream of the SkyWater facility are filling up with a compound that looks like grease but maintenance crews say it isn't grease. There is some evidence from CCTV inspection that the lines may have surcharged at times in the past. Please work with Bloomington Utilities to figure out how to safely get this removed from the mains and stop further discharge of the material.
   - Response: Applicant has worked with and resolved the identification of the material and source.

2) Provide civil plans for the project. Plan sheets may include grading, drainage, utility, erosion control, traffic control, civil site, etc.

3) Provide peak hour and average day water demand and wastewater flow estimates.
   - Response: SkyWater has provided a response to questions and requests for information made by members of the City of Bloomington's Engineering Department (Exhibit D). A determination will be made if upgrades are needed upon the review and analysis from the City and its designated utilities engineer.

4) Utility as-builts must be provided prior to issuance of Certificate of Occupancy.

5) Use updated city standard details for driveways, utilities, erosion control, etc. found on the website at www.bloomingtonmn.gov/information-sheets-and-handouts-engineering-division
   - Response: City standard details are included in the plan set

6) Utility permits are required for connections to the public storm, sanitary, and water system. Contact Utilities (952-563-8777) for permit information.

7) A minimum 10-foot horizontal separation and 18-inch vertical separation is required between watermain and sewers.
   - Response: Required separation is shown for proposed utilities.

8) Provide valves for system isolation (longest interval cannot exceed 400 feet) and for building isolation without shutting down supply to hydrants.
   - Response: A new building service is not proposed. Valves have been added at 400' intervals for relocated watermain.

9) Install hydrants to provide fire protection for entire building. Each hydrant covers 150-foot radius.

- Response: Hydrants are proposed to provide required coverage to the building addition. Hydrant coverage of the existing building is not proposed to be modified.

10) Provide a minimum of 8-feet and a maximum of 10-feet of cover over all water lines, valves, services, etc.
    - Response: A note has been added to the utility plan to address this requirement.

11) Use Class 52 DIP water main for pipe 12-inches in diameter and smaller. A minimum 8 mil polywrap is required on all DIP.
    - Response: Utility Plan notes have been updated accordingly.

12) Minnesota Department of Health (MDH) water permit/review may be required. Provide a copy of MDH approval letter or written confirmation from MDH that no permit/approval is required.

13) Minnesota Pollution Control Agency (MPCA) sanitary sewer permit/review may be required. Provide a copy of MPCA approval letter or written confirmation from MPCA that no permit/approval is required.

14) Taps of live water mains are done by City forces and paid for and coordinated with the Contractor.
    - Response: Utility Plan notes have been updated accordingly.

15) Utility and mechanical contractors must coordinate the installation of all water and sewer service pipes into the building to accommodate city inspection and testing.
    - Response: Contractors will coordinate construction schedule to align with required inspection and testing.

16) All components of the water system, up to the water meter or fire service equipment must utilize protective internal coatings meeting current ANSI/AWWA standards for cement mortar lining or special coatings. The use of unlined or uncoated pipe is not allowed.
    - Response: Utility Plan notes have been updated accordingly.

Water Resources Review - Pre-App Contact: Brian Hansen at bhansen@BloomingtonMN.gov, (952) 5634543

1) If proposing underground stormwater infiltration location may require geotechnical review to ensure Bluff stability.
    - Response: The proposed subsurface stormwater infiltration system is located near the building addition, approximately 400' from the east side of the site, with the bluff beginning beyond that point to the east.

2) Provide civil plans for the project. Plan sheets may include grading, drainage, utility, erosion control, traffic control, civil site, etc.

3) Utility as-builts must be provided prior to issuance of Certificate of Occupancy.

4) Provide stormwater management plan meeting the requirements of Bloomington Comprehensive Surface Water Management Plan.
   - Response: A stormwater management plan is included with this submittal.

5) A maintenance agreement must be signed by the property owner and recorded at Hennepin County.

6) A National Pollutant Discharge Elimination System (NPDES) construction site permit and Storm Water Pollution Prevention Plan (SWPPP) must be provided.

7) An erosion control bond is required.

8) Show erosion control BMP locations on the plan

9) List erosion control maintenance notes on the plan.

10) HDPE pipe connections into all concrete structures must be made with water tight materials utilizing an A-Lok or WaterStop gasket or boot, cast-in-place rubber boot, or approved equal. Where the alignment precludes the use of the above approved watertight methods, Conseal 231 WaterStop sealant, or approved equal will only be allowed as approved by the Engineer.
   - Response: Utility plan notes have been updated accordingly.

11) Utility permits are required for connections to the public storm, sanitary, and water system. Contact Utilities (952-563-8777) for permit information.

12) After staff approval of stormwater management plans, provide an extra set of plans for staff to submit to Lower Minnesota River Watershed District.

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EXHIBIT – B

SkyWater Technology Foundry Stormwater Management Report

Sambatek

Engineering | Surveying | Planning | Environmental

PRELIMINARY STORMWATER MANAGEMENT PLAN

FOR

PL201900127
PL2019-127
Skywater Tech Foundry
2401 and 2411 East 86th Street

ICE CASTLE

BLOOMINGTON, MN

PREPARED BY:

BRADY BUSSELMAN & JOSH BALZER

07/23/2019

Project Introduction

The proposed project is located a few blocks south of highway 494 and just east of E Old Shakopee Road in Bloomington, MN. The project will add an approximately 37,784 sf (footprint) building expansion to the existing building structure. Improvements will be made to the parking lot area as well. The project is located within the Lower Minnesota River Watershed District (LMRWD) and the City of Bloomington is the permitting authority. Rate control, volume control and water quality are required onsite.

Existing Conditions

The existing site contains a large industrial building with associated parking lot. Impervious surfaces cover most of the site. The soils in the area are known to be generally type B silty sand soils. It is assumed until further exploration that these sands may be classified as HSG type B and are well suited for infiltration. Stormwater runoff onsite generally drains overland to a series of catch basins which flow to the north side of the site where they discharge to an existing stormwater basin. The basin outlet flows to the east where the ultimate discharge point is the Minnesota river.

Proposed Conditions

The proposed development includes building expansion and parking lot improvements. New or fully re-constructed impervious surfaces onsite will be minimized by maintaining original parking lot grades and drainage patterns to the maximum extent practicable. Mill and overlay is proposed for the majority of the parking lot area. Some utilities will be re-routed or added to service the site and the proposed building addition. Stormwater runoff will be routed to an underground infiltration system to provide rate control, volume control and water quality improvements to the site.

Rate Control

The City of Bloomington and LMRWD require rate control for the 2-, 10-, and 100-year design storms. Runoff rate control calculations were performed in HydroCAD using the Atlas 14 rainfall depths and MSE 3 rainfall distribution. The proposed site improvements are a benefit to the surrounding area because the overall impervious area on the site is reduced. The reduction in impervious area from the existing to the proposed condition and replacing parking lot with a flat-roofed building will help to lower the runoff rates on the site. The proposed site also includes an underground infiltration basin that will reduce runoff rates as well. However, the intent of the infiltration basin is to function as a means of water quality and volume control and not necessarily rate control. Rate control was analyzed by modeling in Hydrocad without the use of the infiltration basin. The results of the analysis are summarized in the tables below. Detailed calculations and drainage maps may be found in the appendices.

Maximum Rate of Runoff (cfs)

Storm Event	Total Existing	Total Proposed
2-year	17.65	15.58
10-year	27.45	25.17
100-year	49.79	47.07

WATER QUALITY

The City of Bloomington states that for projects that disturb land greater than 50 cy or 5,000 sf, all stormwater runoff from disturbed areas shall be treated to at least 60% total phosphorus removal and at least 90% for total suspended solids removal. Water quality will be met onsite through the use of an underground infiltration system.

To evaluate the water quality requirements for the disturbed portion of the site, a MIDS model has been developed. Under the site information tab, the proposed disturbed impervious and proposed disturbed pervious areas were inputted to the appropriate boxes under the Land Cover section, which indicates the total area being evaluated. The proposed underground infiltration basin was modeled in the MIDS program and the total impervious and pervious areas that drain to the proposed infiltration basin were assigned to that basin. It should be noted that the actual drainage area to the proposed infiltration basin has a greater amount of impervious than the disturbed impervious area. For the purposes of determining the water quality, only the total amount of disturbed impervious area is modeled as flowing to the basin because the additional impervious area beyond what is required is expected to bypass the infiltration basin.

Nutrient Analysis

BMP	TSS Removal (%)	TP Removal (%)
Underground Infiltration Basin	90	90

VOLUME REDUCTION

The City of Bloomington requires that the proposed site will retain on-site a volume equivalent to 1.1 inches of runoff from the new and/or fully reconstructed impervious area. The city also requires that pre-treatment be provided and that water levels draw down in 48 hours or less.

$$Required\ Infiltration\ Volume(ft^3) = V_{inf} = 1(in) * \frac{1\ ft}{12\ in} * New\ Impervious\ Area\ (ft^2)$$

$$V_{inf}(ft^3) = 1.1(in) * \frac{1\ ft}{12\ in} * 67{,}000(\ ft^2) = 6{,}142\ ft^3$$

Volume Control Analysis		
New/ Fully Reconstructed Impervious Surface	67,000	sf
Design Infiltration/Filtration Rainfall Event	1.1	in
Required Infiltration/Filtration Volume	**6,142**	**cf**
Maximum Allowable Infiltration Rate	0.45	in/hr
Required Drawdown Time	48	hrs
Maximum Live Storage Depth	**1.8**	**ft**
Provided Volume Below Outlet	**6,472**	**cf**

STORM SEWER CONVEYANCE

Storm sewer capacity has been analyzed with a spreadsheet utilizing manning's equation and the rational method. The spreadsheet has been attached to the report and can be found in Appendix D. The proposed storm sewer has been analyzed up to CBMH 102. As noted in the rate control section, runoff rates are reduced by the proposed project improvements. Therefore, storm sewer to the west of CBMH 102 is intended to match the existing pipes that were already servicing the site. The majority of the pipe heading to the north of the site was found to be 24" pipe at 1.00%. However, it was found that the existing pipe between STMH 100, STMH 100-A and the existing STMH decreased in slope downstream to 0.8%. In order to correct this existing problem, a 27" pipe at 0.8% has been proposed to prevent any future capacity issues. Our scope did not include analysis of existing pipes downstream or upstream of the project area.

Emergency Overflow

In the event of a clog in the system or a rainfall event larger than the design events, the grading plan has been designed with emergency overflows to convey runoff through the site.

Stormwater System Operations & Maintenance

An operations and maintenance agreement will be prepared if required at final design.

Erosion & Sediment Control

A comprehensive Stormwater Pollution Prevention Plan (SWPPP) meeting the requirements of the 2018 MPCA NPDES permit will be included in the site development final design plan set.

Summary

The proposed Ice Castle project will meet the requirements of the Lower Minnesota River Watershed, the City of Bloomington, and the MPCA through construction of an underground infiltration system. The proposed improvements will reduce the site impervious area and the infiltration basin BMP will provide the required rate control, volume control and water quality improvements prior to discharging stormwater runoff from the site to downstream receiving waters.

If you have any questions, comments, or additional information regarding this report, please contact me at bbusselman@sambatek.com or 763-476-6010.

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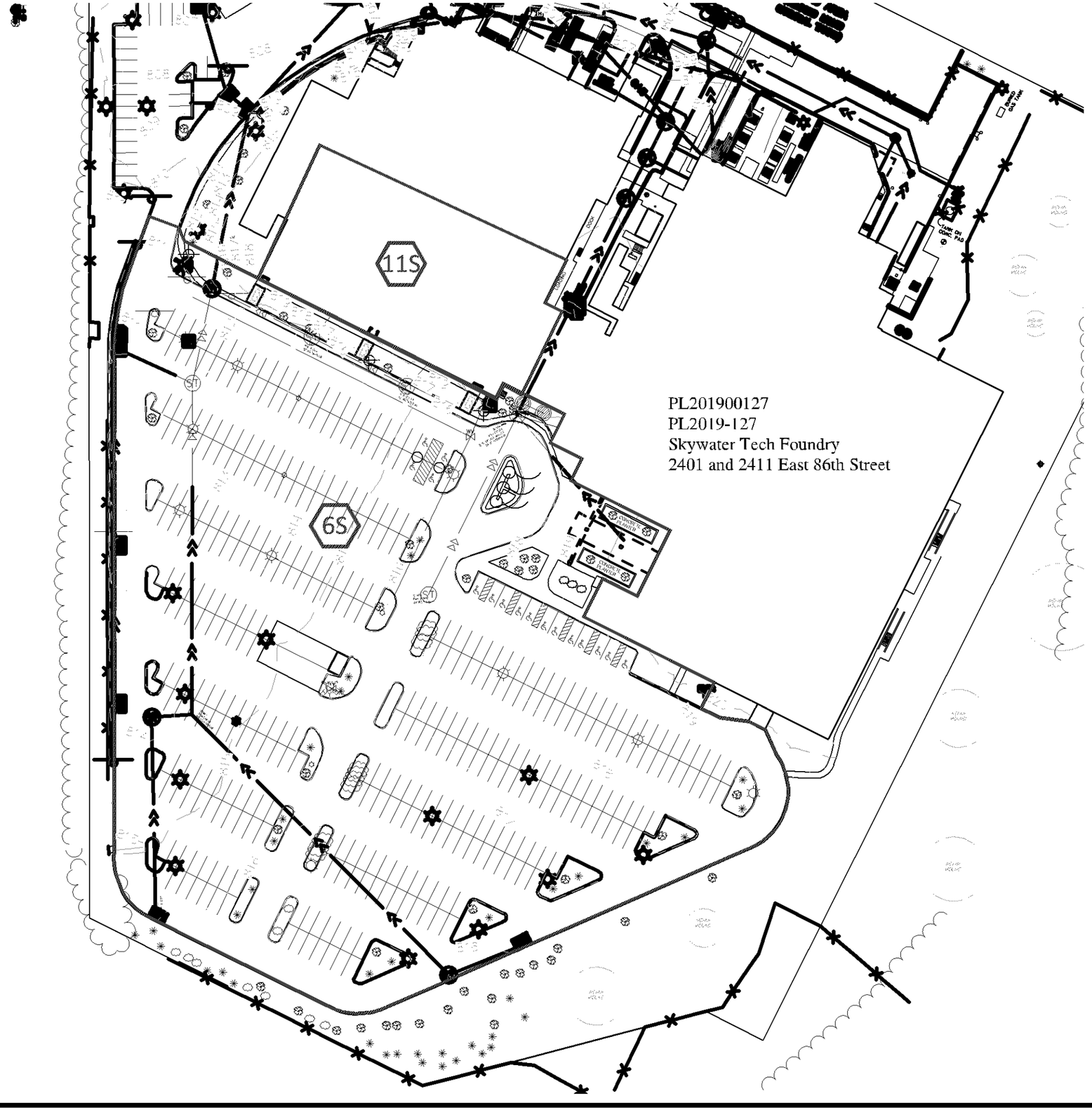
APPENDIX A – DRAINAGE DIAGRAMS



LEGEND

- XX — LINK
- XX — POND
- XX — REACH
- XX — SUB-CATCHMENT

NORTH

0 NTS

SCALE IN FEET

Sambatek
www.sambatek.com
12800 Whitewater Drive, Suite 300
Minnetonka, MN 55343
763.476.6010 telephone
763.476.8532 facsimile
Engineering | Surveying | Planning | Environmental

Client

Project
ICE CASTLE

Location
BLOOMINGTON, MN

Certification

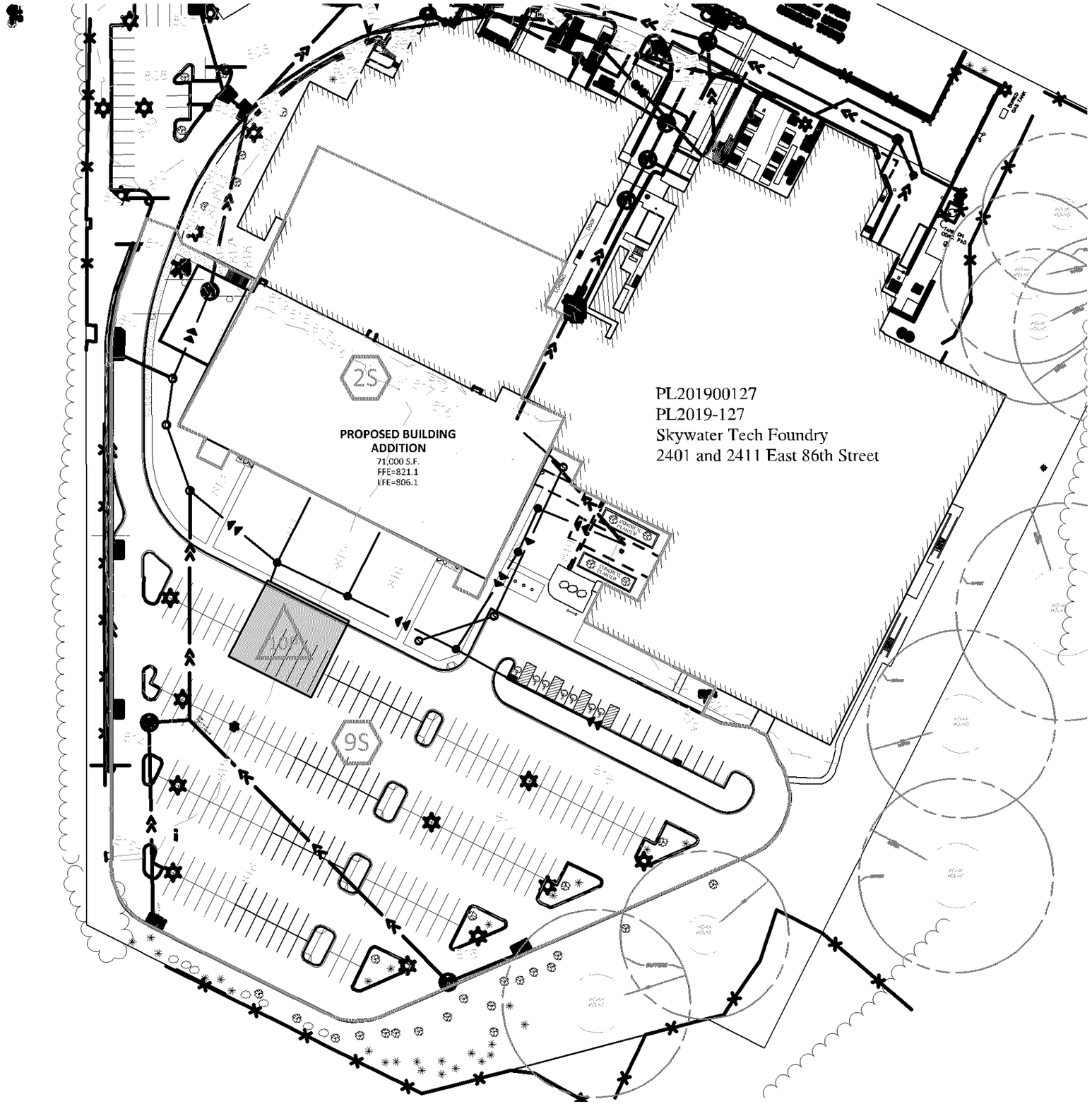
Summary
Approved: BDB Drawn: JEB

Revision History
No. Date By Submittal / Rev.

Sheet Title
EXISTING DRAINAGE MAP

Sheet No. Revision
1/2

Project No. 21846



LEGEND

- XX — LINK
- XX — POND
- XX — REACH
- XX — SUB-CATCHMENT

NORTH

0 NTS

SCALE IN FEET

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Client

Project
ICE CASTLE

Location
BLOOMINGTON, MN

Certification

Summary
Approved: BDB Drawn: JEB

Revision History
No. Date By Submittal / Rev.

Sheet Title
PROPOSED DRAINAGE MAP

Sheet No. Revision
2/2

Project No. 21846

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APPENDIX B – HYDROCAD CALCULATIONS

PL201900127
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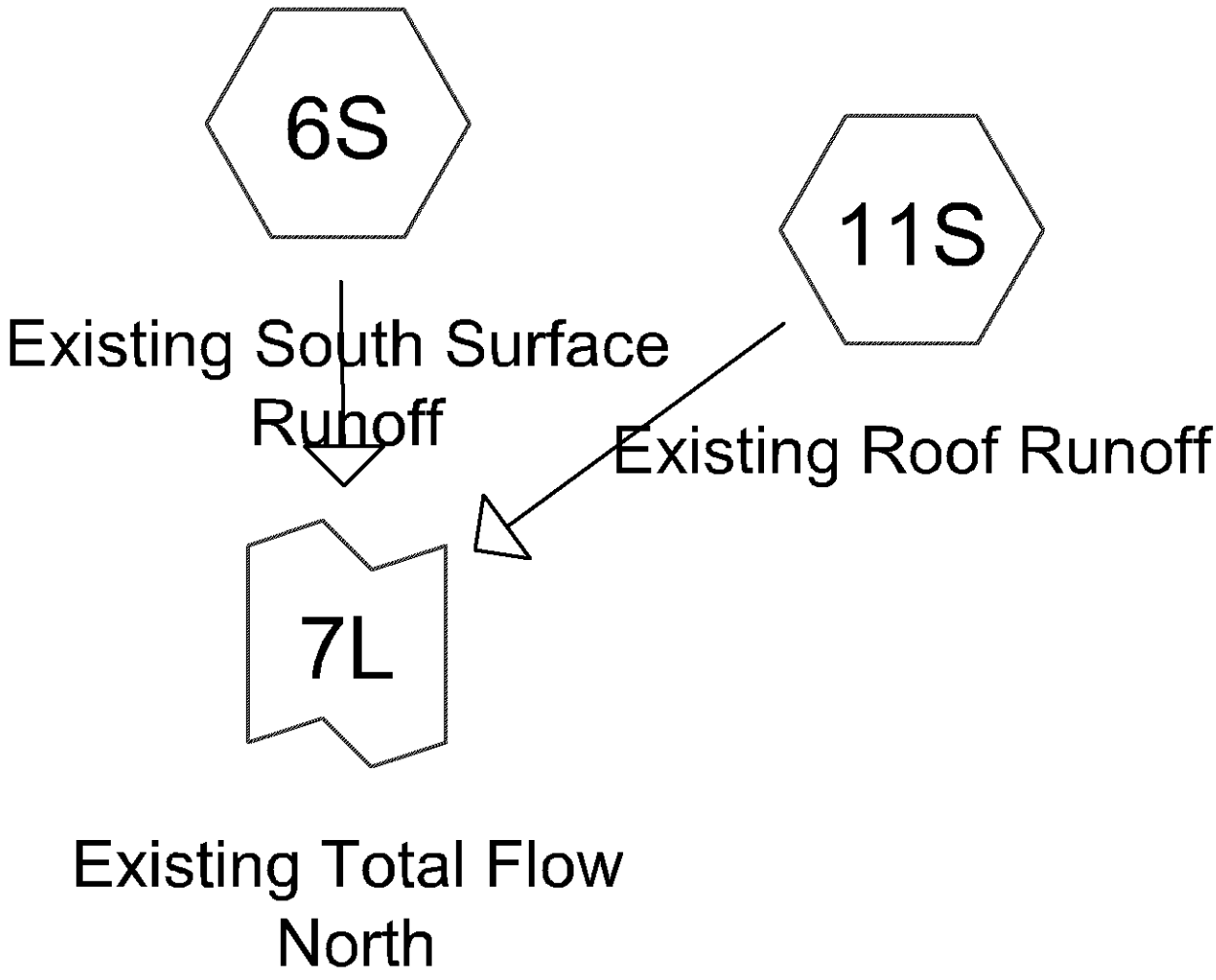
Skywater Tech Foundry
2401 and 2411 East 86th Street



Subcat Reach Pond Link

Routing Diagram for 21846-Ice Castle 2019-07-23
Prepared by {enter your company name here}, Printed 7/23/2019
HydroCAD® 10.00-20 s/n 01876 © 2017 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.451	61	>75% Grass cover, Good, HSG B (6S)
4.348	98	Paved parking, HSG B (6S)
0.594	98	Roofs, HSG B (11S)
5.392	**95**	**TOTAL AREA**

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
5.392	HSG B	6S, 11S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
5.392		**TOTAL AREA**

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.451	0.000	0.000	0.000	0.451	>75% Grass cover, Good	6S
0.000	4.348	0.000	0.000	0.000	4.348	Paved parking	6S
0.000	0.594	0.000	0.000	0.000	0.594	Roofs	11S
0.000	**5.392**	**0.000**	**0.000**	**0.000**	**5.392**	**TOTAL AREA**	

Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment6S: Existing South Runoff Area=209,022 sf 90.61% Impervious Runoff Depth=2.28"
Tc=10.0 min CN=95 Runoff=16.01 cfs 0.913 af

Subcatchment11S: Existing Roof Runoff Runoff Area=25,863 sf 100.00% Impervious Runoff Depth=2.60"
Tc=15.0 min CN=98 Runoff=1.80 cfs 0.129 af

Link 7L: Existing Total Flow North Inflow=17.65 cfs 1.042 af
Primary=17.65 cfs 1.042 af

Total Runoff Area = 5.392 ac Runoff Volume = 1.042 af Average Runoff Depth = 2.32"
8.36% Pervious = 0.451 ac 91.64% Impervious = 4.942 ac

Summary for Subcatchment 6S: Existing South Surface Runoff

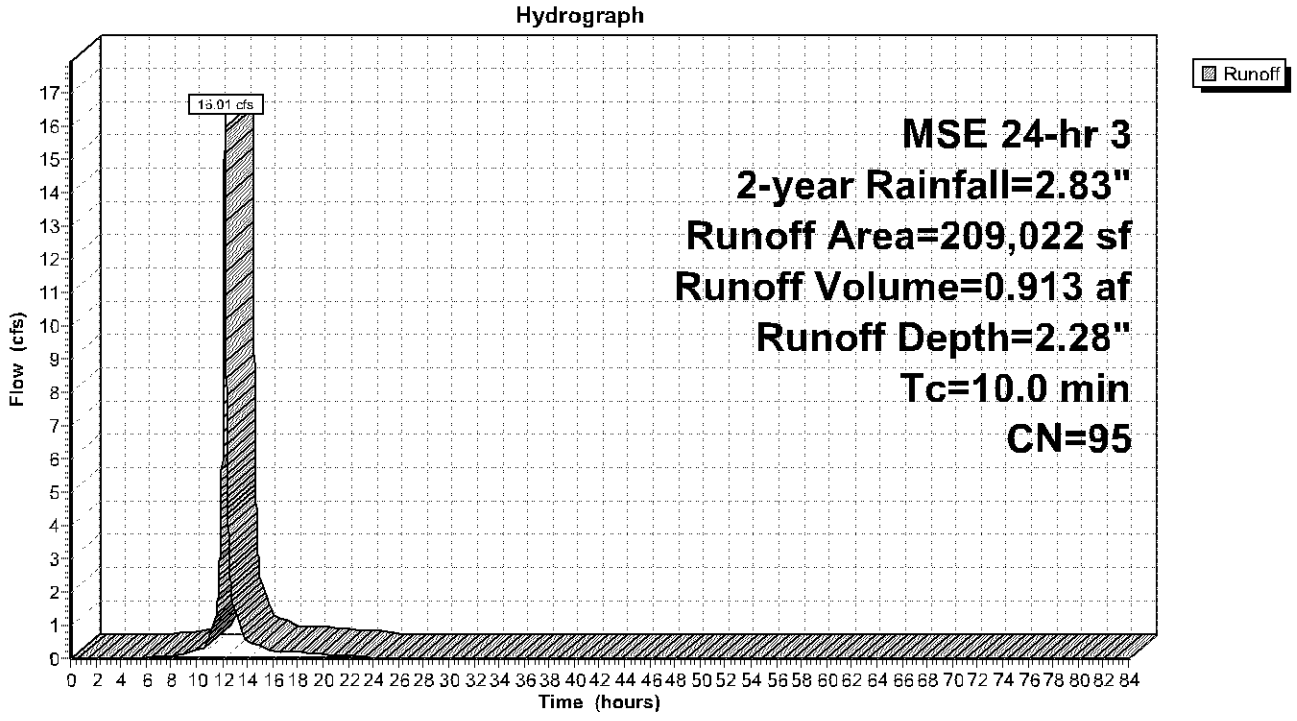
Runoff = 16.01 cfs @ 12.17 hrs, Volume= 0.913 af, Depth= 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.83"

Area (sf)	CN	Description
189,392	98	Paved parking, HSG B
19,630	61	>75% Grass cover, Good, HSG B
209,022	95	Weighted Average
19,630		9.39% Pervious Area
189,392		90.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 6S: Existing South Surface Runoff



Summary for Subcatchment 11S: Existing Roof Runoff

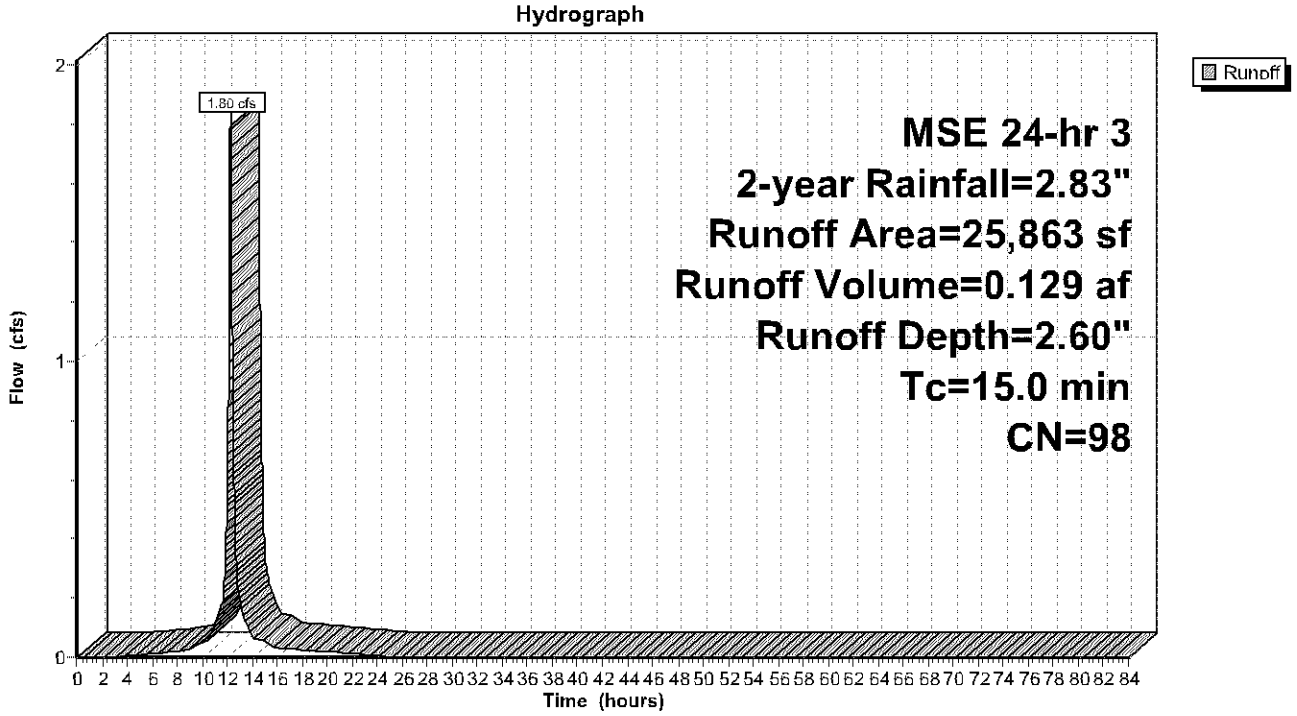
Runoff = 1.80 cfs @ 12.22 hrs, Volume= 0.129 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.83"

Area (sf)	CN	Description
25,863	98	Roofs, HSG B
25,863		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					**Direct Entry,**

Subcatchment 11S: Existing Roof Runoff



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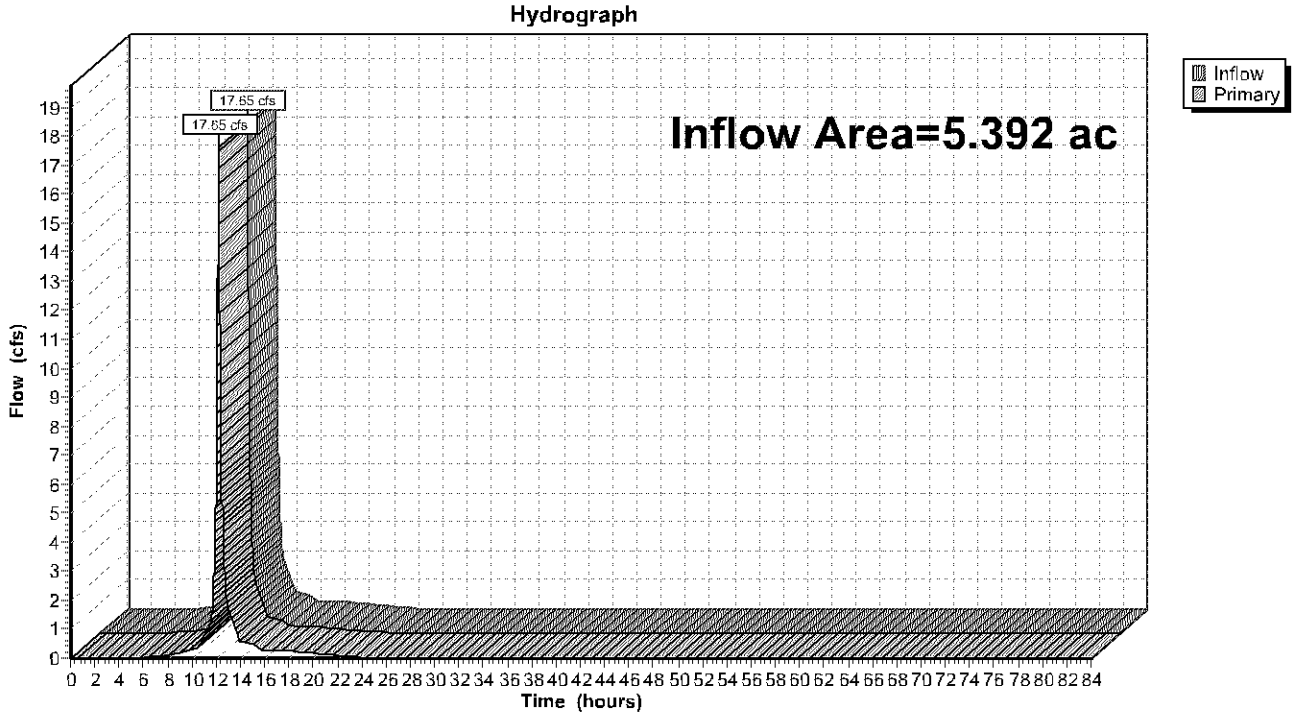
Summary for Link 7L: Existing Total Flow North

Inflow Area = 5.392 ac, 91.64% Impervious, Inflow Depth = 2.32" for 2-year event
Inflow = 17.65 cfs @ 12.17 hrs, Volume= 1.042 af
Primary = 17.65 cfs @ 12.17 hrs, Volume= 1.042 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Link 7L: Existing Total Flow North



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Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment6S: Existing South Runoff Area=209,022 sf 90.61% Impervious Runoff Depth=3.67"
Tc=10.0 min CN=95 Runoff=24.98 cfs 1.467 af

Subcatchment11S: Existing Roof Runoff Runoff Area=25,863 sf 100.00% Impervious Runoff Depth=4.00"
Tc=15.0 min CN=98 Runoff=2.73 cfs 0.198 af

Link 7L: Existing Total Flow North Inflow=27.45 cfs 1.665 af
Primary=27.45 cfs 1.665 af

Total Runoff Area = 5.392 ac Runoff Volume = 1.665 af Average Runoff Depth = 3.70"
8.36% Pervious = 0.451 ac 91.64% Impervious = 4.942 ac

Summary for Subcatchment 6S: Existing South Surface Runoff

Runoff = 24.98 cfs @ 12.17 hrs, Volume= 1.467 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (sf)	CN	Description
189,392	98	Paved parking, HSG B
19,630	61	>75% Grass cover, Good, HSG B
209,022	95	Weighted Average
19,630		9.39% Pervious Area
189,392		90.61% Impervious Area

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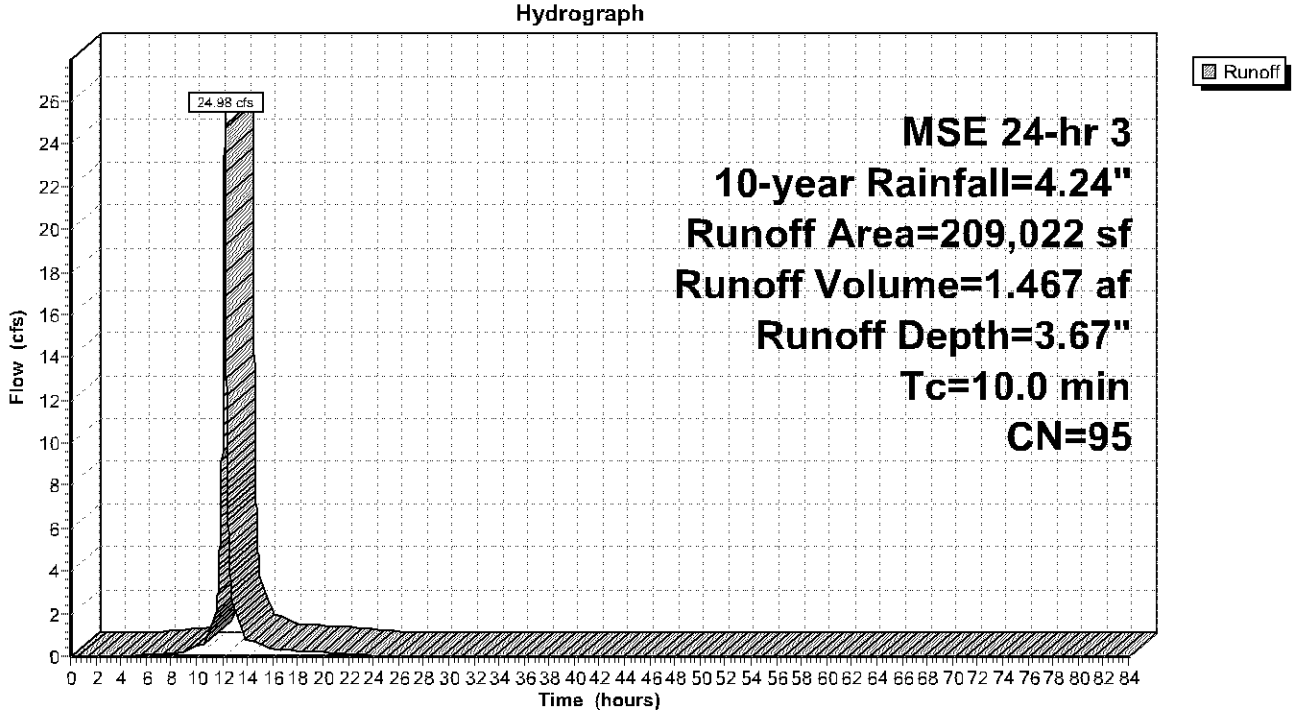
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 6S: Existing South Surface Runoff



Summary for Subcatchment 11S: Existing Roof Runoff

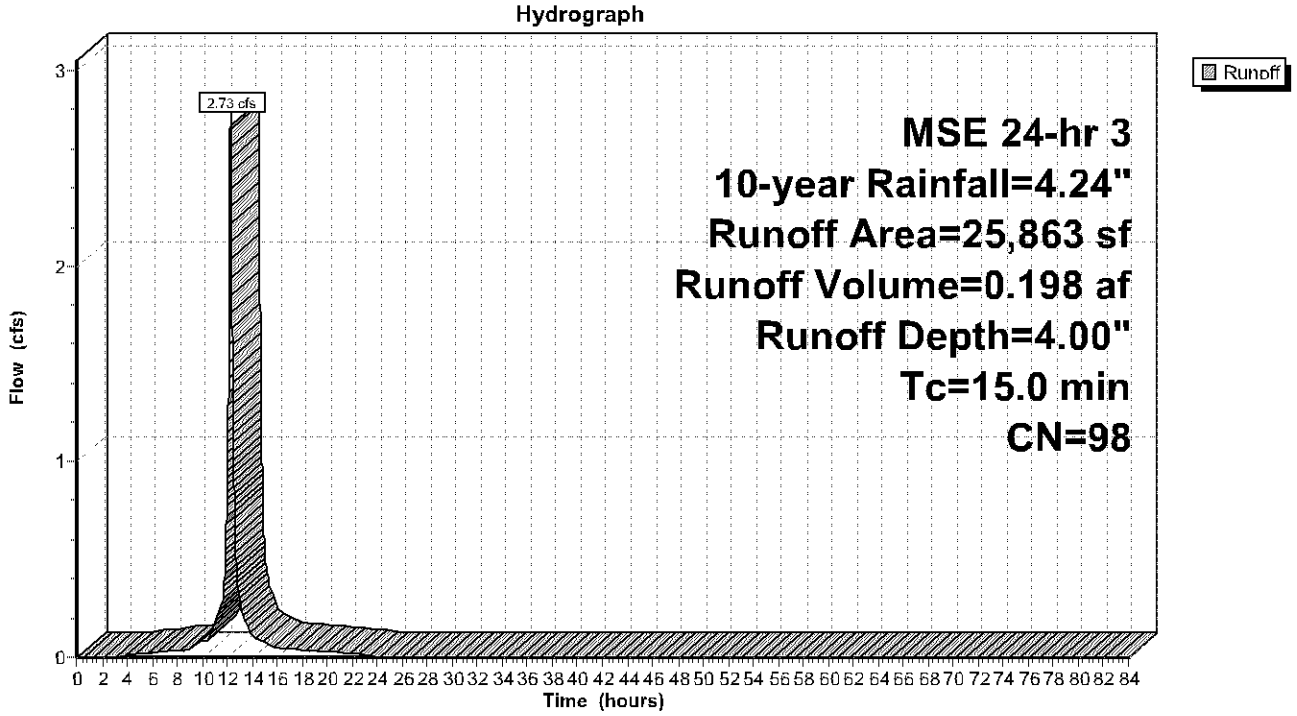
Runoff = 2.73 cfs @ 12.22 hrs, Volume= 0.198 af, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (sf)	CN	Description
25,863	98	Roofs, HSG B
25,863		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					**Direct Entry,**

Subcatchment 11S: Existing Roof Runoff



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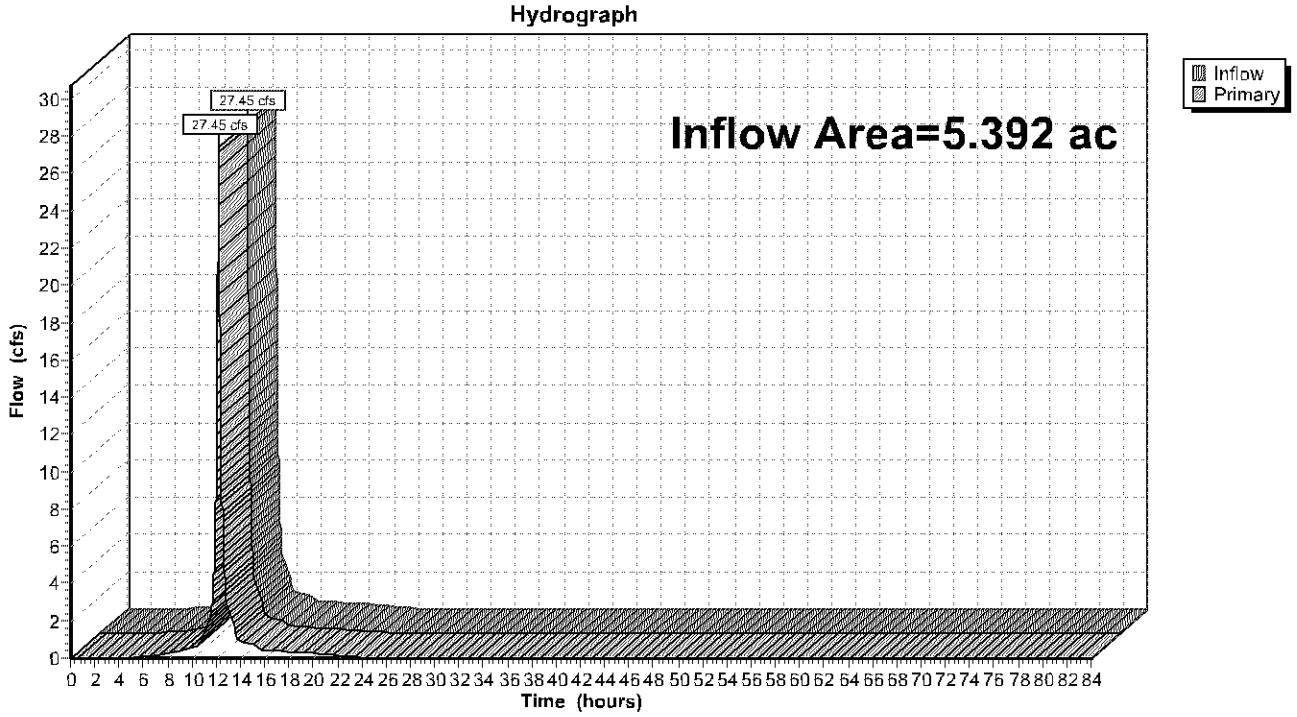
Summary for Link 7L: Existing Total Flow North

Inflow Area = 5.392 ac, 91.64% Impervious, Inflow Depth = 3.70" for 10-year event
Inflow = 27.45 cfs @ 12.17 hrs, Volume= 1.665 af
Primary = 27.45 cfs @ 12.17 hrs, Volume= 1.665 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Link 7L: Existing Total Flow North



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Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment6S: Existing South Runoff Area=209,022 sf 90.61% Impervious Runoff Depth=6.90"
Tc=10.0 min CN=95 Runoff=45.40 cfs 2.760 af

Subcatchment11S: Existing Roof Runoff Runoff Area=25,863 sf 100.00% Impervious Runoff Depth=7.26"
Tc=15.0 min CN=98 Runoff=4.85 cfs 0.359 af

Link 7L: Existing Total Flow North Inflow=49.79 cfs 3.120 af
Primary=49.79 cfs 3.120 af

Total Runoff Area = 5.392 ac Runoff Volume = 3.120 af Average Runoff Depth = 6.94"
8.36% Pervious = 0.451 ac 91.64% Impervious = 4.942 ac

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Summary for Subcatchment 6S: Existing South Surface Runoff

Runoff = 45.40 cfs @ 12.17 hrs, Volume= 2.760 af, Depth= 6.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=7.50"

Area (sf)	CN	Description
189,392	98	Paved parking, HSG B
19,630	61	>75% Grass cover, Good, HSG B
209,022	95	Weighted Average
19,630		9.39% Pervious Area
189,392		90.61% Impervious Area

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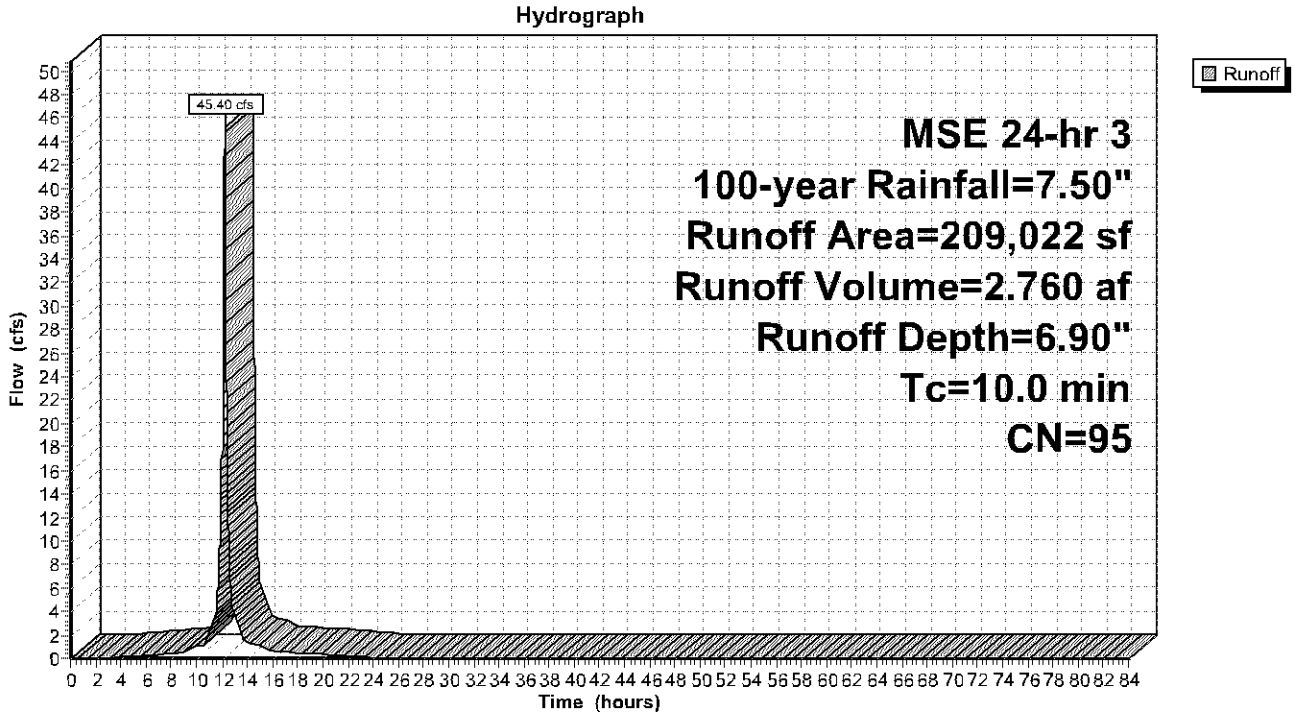
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 6S: Existing South Surface Runoff



Summary for Subcatchment 11S: Existing Roof Runoff

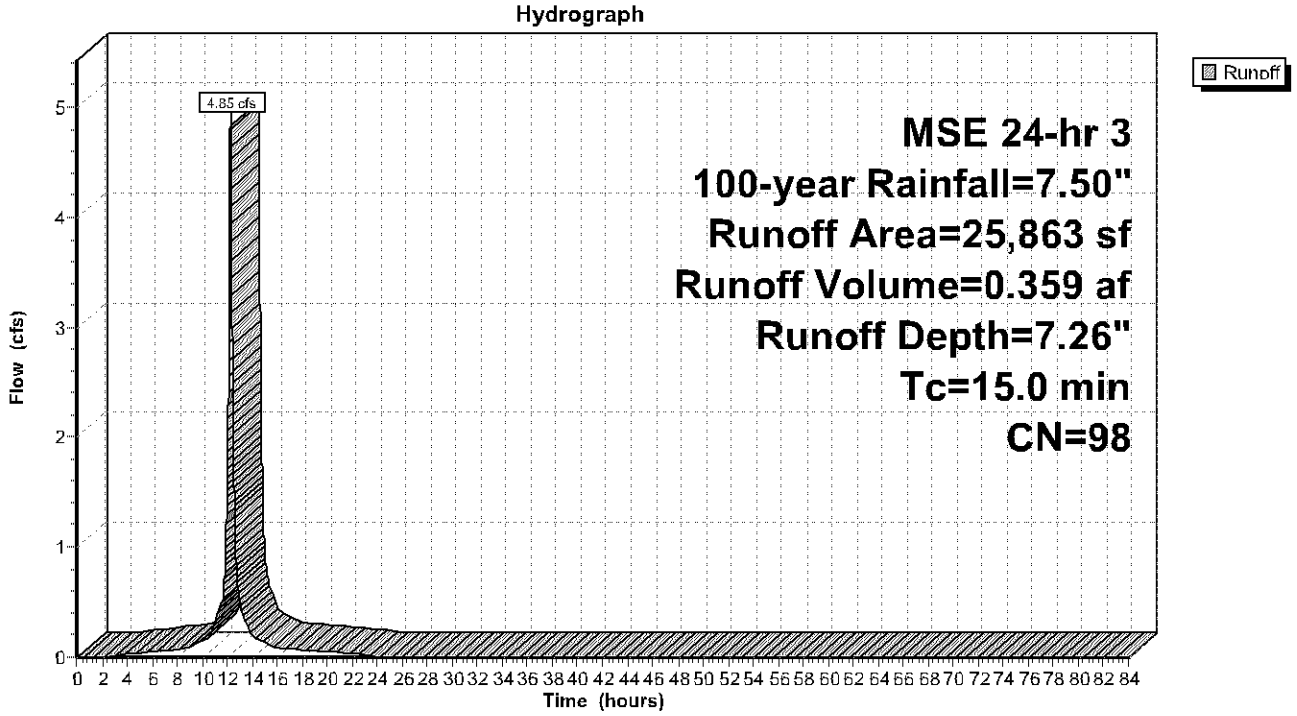
Runoff = 4.85 cfs @ 12.22 hrs, Volume= 0.359 af, Depth= 7.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=7.50"

Area (sf)	CN	Description
25,863	98	Roofs, HSG B
25,863		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					**Direct Entry,**

Subcatchment 11S: Existing Roof Runoff



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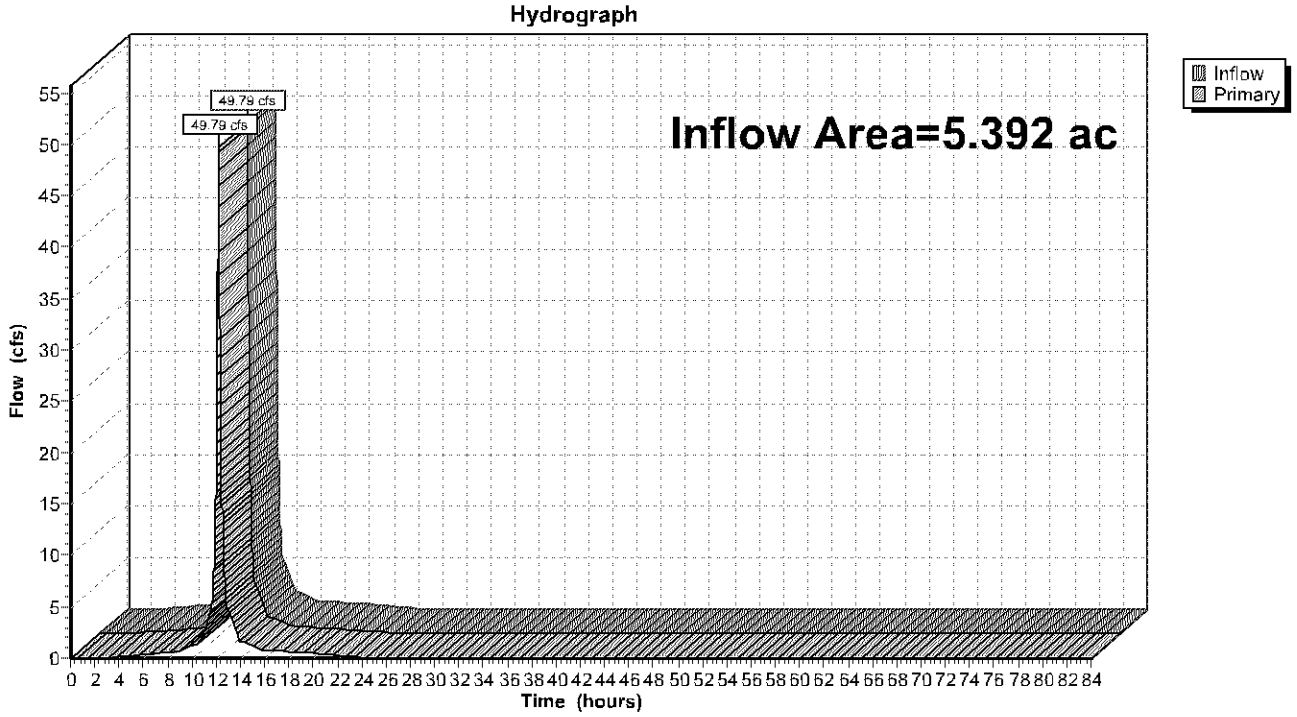
Summary for Link 7L: Existing Total Flow North

Inflow Area = 5.392 ac, 91.64% Impervious, Inflow Depth = 6.94" for 100-year event
Inflow = 49.79 cfs @ 12.17 hrs, Volume= 3.120 af
Primary = 49.79 cfs @ 12.17 hrs, Volume= 3.120 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Link 7L: Existing Total Flow North



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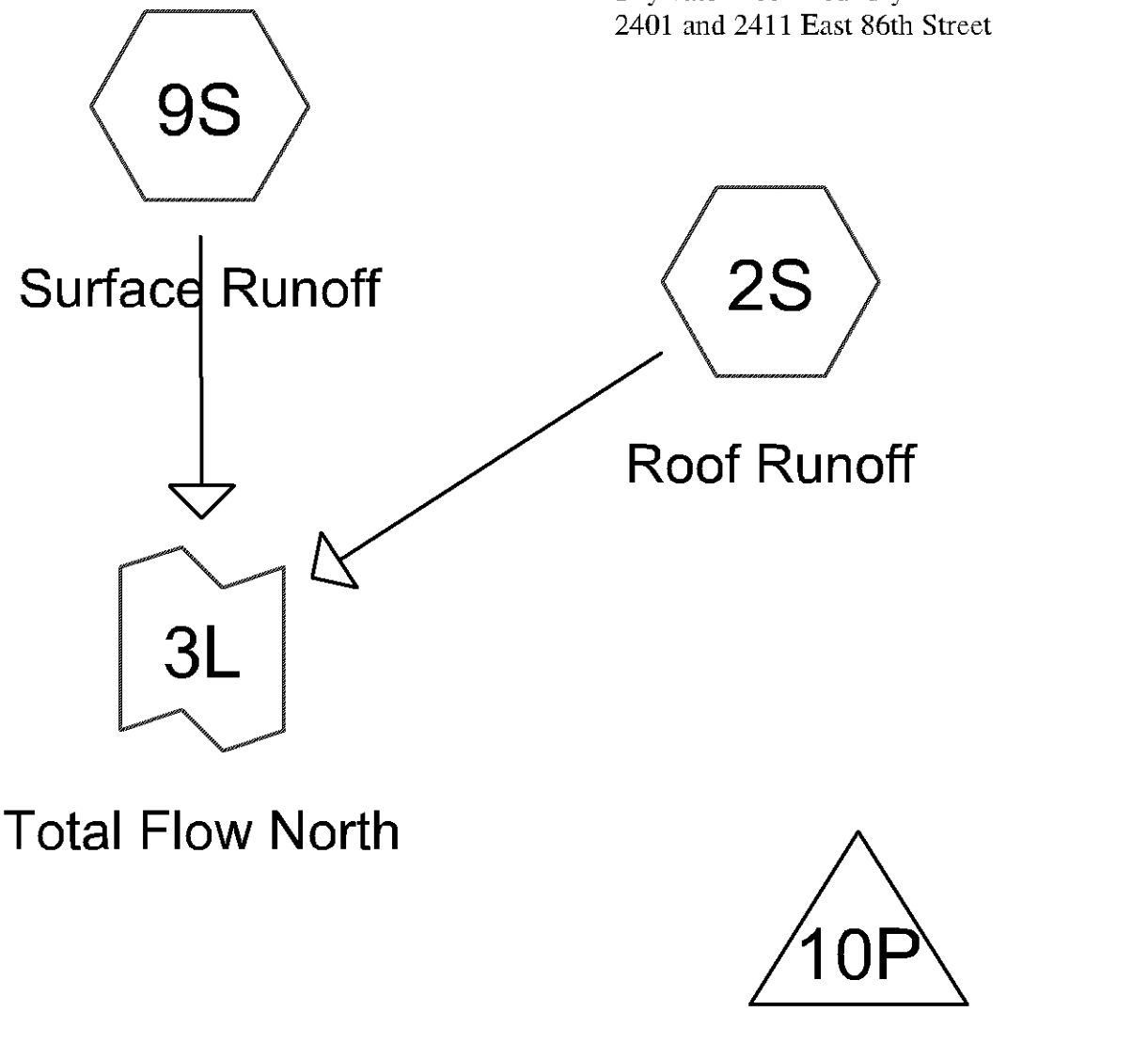

Subcat Reach Pond Link

Routing Diagram for 21846-Ice Castle 2019-07-23
Prepared by {enter your company name here}, Printed 7/23/2019
HydroCAD® 10.00-20 s/n 01876 © 2017 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.809	61	>75% Grass cover, Good, HSG B (9S)
3.188	98	Paved parking, HSG B (9S)
1.394	98	Roofs, HSG B (2S)
5.392	**92**	**TOTAL AREA**

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
5.392	HSG B	2S, 9S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
5.392		**TOTAL AREA**

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.809	0.000	0.000	0.000	0.809	>75% Grass cover, Good	9S
0.000	3.188	0.000	0.000	0.000	3.188	Paved parking	9S
0.000	1.394	0.000	0.000	0.000	1.394	Roofs	2S
0.000	**5.392**	**0.000**	**0.000**	**0.000**	**5.392**	**TOTAL AREA**	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	10P	809.70	808.83	87.0	0.0100	0.013	24.0	0.0	0.0

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Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Roof Runoff Runoff Area=60,737 sf 100.00% Impervious Runoff Depth=2.60"
Tc=15.0 min CN=98 Runoff=4.24 cfs 0.302 af

Subcatchment9S: Surface Runoff Runoff Area=174,148 sf 79.75% Impervious Runoff Depth=1.91"
Tc=10.0 min CN=91 Runoff=11.67 cfs 0.637 af

Pond 10P: Underground Infiltration Basin Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af

Link 3L: Total Flow North Inflow=15.58 cfs 0.939 af
Primary=15.58 cfs 0.939 af

Total Runoff Area = 5.392 ac Runoff Volume = 0.939 af Average Runoff Depth = 2.09"
15.01% Pervious = 0.809 ac 84.99% Impervious = 4.583 ac

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Summary for Subcatchment 2S: Roof Runoff

Runoff = 4.24 cfs @ 12.22 hrs, Volume= 0.302 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.83"

Area (sf)	CN	Description
34,874	98	Roofs, HSG B
25,863	98	Roofs, HSG B
60,737	98	Weighted Average
60,737		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					**Direct Entry,**

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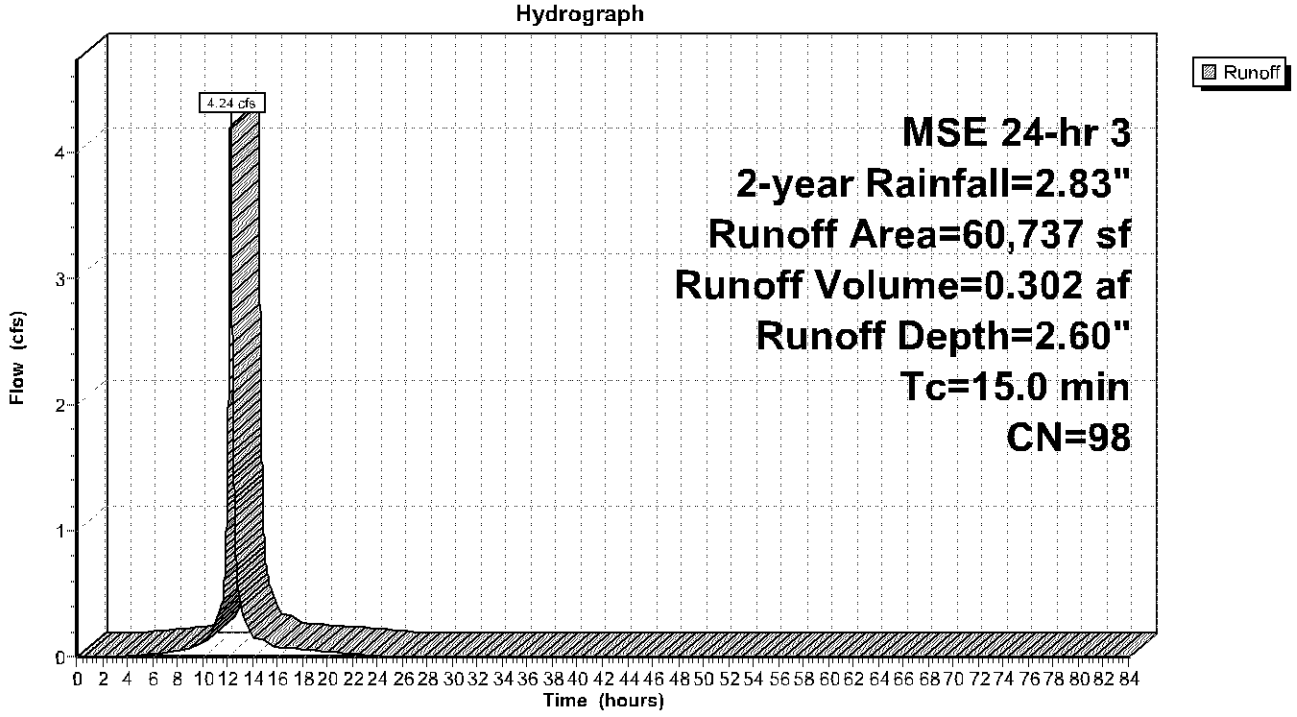
Subcatchment 2S: Roof Runoff



Summary for Subcatchment 9S: Surface Runoff

Runoff = 11.67 cfs @ 12.17 hrs, Volume= 0.637 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-year Rainfall=2.83"

Area (sf)	CN	Description
14,160	61	>75% Grass cover, Good, HSG B
121,638	98	Paved parking, HSG B
21,099	61	>75% Grass cover, Good, HSG B
17,251	98	Paved parking, HSG B
174,148	91	Weighted Average
35,259		20.25% Pervious Area
138,889		79.75% Impervious Area

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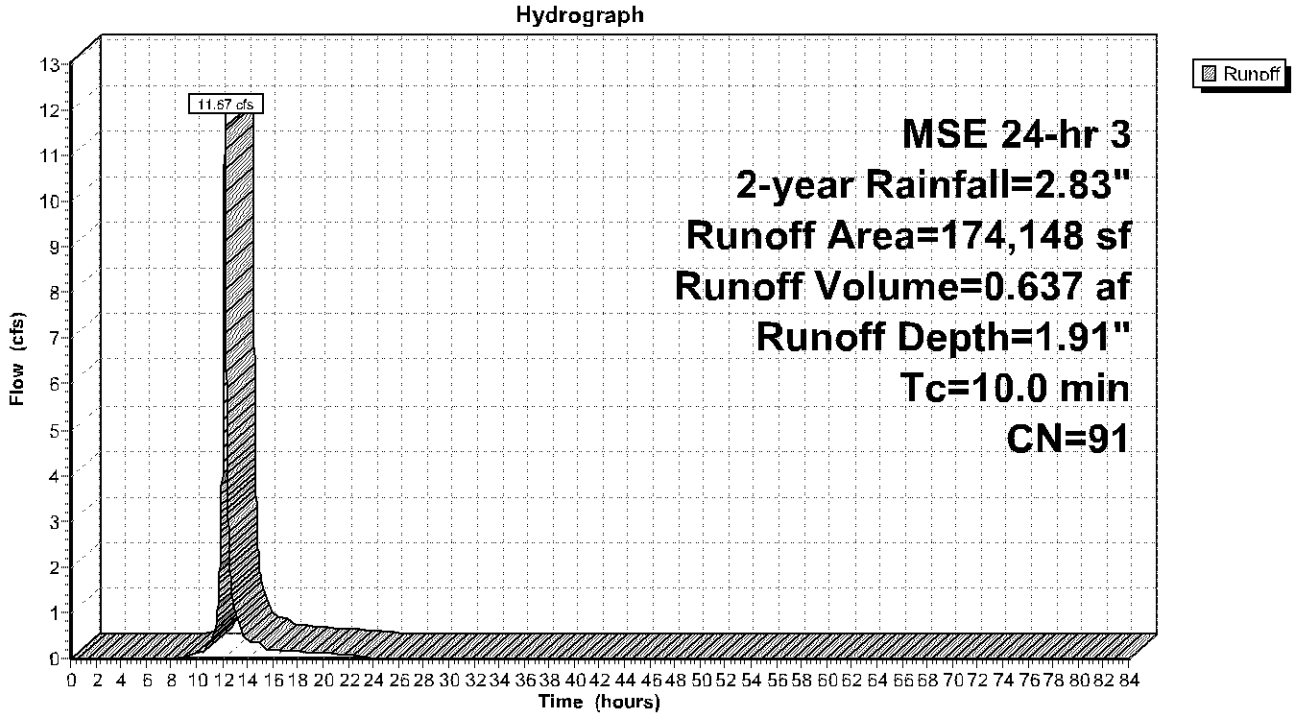
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Surface Runoff



Summary for Pond 10P: Underground Infiltration Basin

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	807.90'	4,224 cf	**68.17'W x 88.64'L x 2.33'H Field A** 14,099 cf Overall - 3,538 cf Embedded = 10,561 cf x 40.0% Voids
#2A	808.40'	3,538 cf	**ADS_StormTech SC-310 +Cap** x 240 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Rows of 12 Chambers
		7,762 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	807.90'	**0.450 in/hr Exfiltration over Surface area**
#2	Primary	809.70'	**24.0" Round Culvert** L= 87.0' Ke= 0.500 Inlet / Outlet Invert= 809.70' / 808.83' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

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Pond 10P: Underground Infiltration Basin - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

12 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 86.64' Row Length +12.0" End Stone x 2 = 88.64' Base Length
20 Rows x 34.0" Wide + 6.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

240 Chambers x 14.7 cf = 3,538.1 cf Chamber Storage

14,098.7 cf Field - 3,538.1 cf Chambers = 10,560.6 cf Stone x 40.0% Voids = 4,224.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,762.3 cf = 0.178 af
Overall Storage Efficiency = 55.1%
Overall System Size = 88.64' x 68.17' x 2.33'

240 Chambers
522.2 cy Field
391.1 cy Stone

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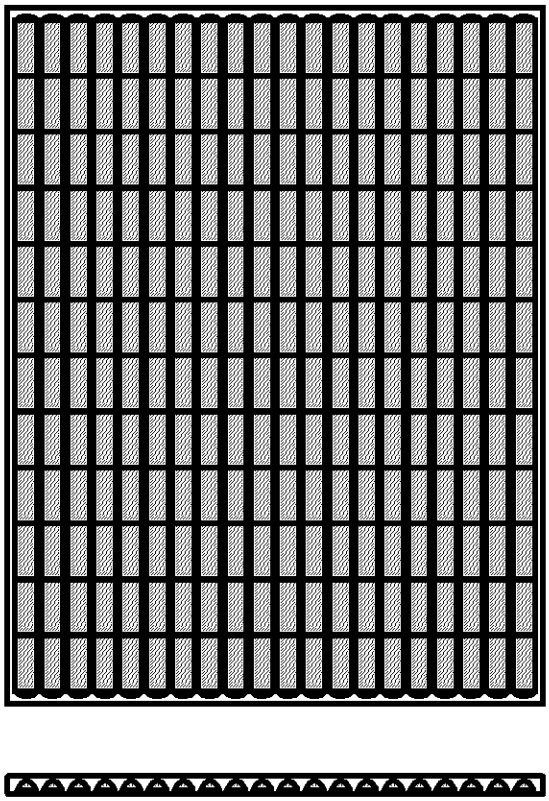
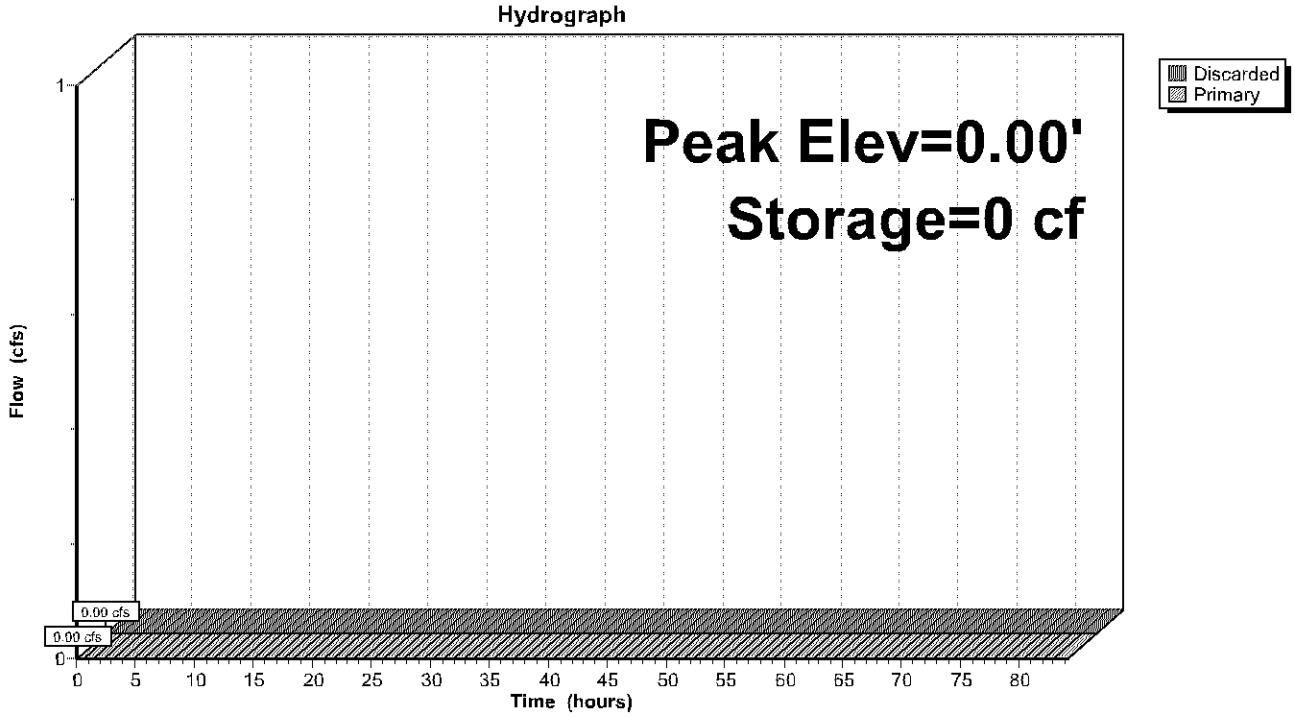


Pond 10P: Underground Infiltration Basin



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Stage-Area-Storage for Pond 10P: Underground Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
807.90	**6,042**	0
807.95	6,042	121
808.00	6,042	242
808.05	6,042	363
808.10	6,042	483
808.15	6,042	604
808.20	6,042	725
808.25	6,042	846
808.30	6,042	967
808.35	6,042	1,088
808.40	6,042	1,208
808.45	6,042	1,453
808.50	6,042	1,696
808.55	6,042	1,938
808.60	6,042	2,178
808.65	6,042	2,416
808.70	6,042	2,652
808.75	6,042	2,885
808.80	6,042	3,116
808.85	6,042	3,344
808.90	6,042	3,569
808.95	6,042	3,791
809.00	6,042	4,009
809.05	6,042	4,224
809.10	6,042	4,436
809.15	6,042	4,643
809.20	6,042	4,845
809.25	6,042	5,043
809.30	6,042	5,234
809.35	6,042	5,420
809.40	6,042	5,599
809.45	6,042	5,768
809.50	6,042	5,926
809.55	6,042	6,073
809.60	6,042	6,211
809.65	6,042	6,344
809.70	6,042	6,472
809.75	6,042	6,594
809.80	6,042	6,715
809.85	6,042	6,836
809.90	6,042	6,957
809.95	6,042	7,078
810.00	6,042	7,198
810.05	6,042	7,319
810.10	6,042	7,440
810.15	6,042	7,561
810.20	6,042	**7,682**
810.25	6,042	**7,762**
810.30	6,042	7,762
810.35	6,042	7,762
810.40	6,042	7,762
810.45	6,042	7,762
810.50	6,042	7,762
810.55	6,042	7,762
810.60	6,042	7,762
810.65	6,042	7,762
810.70	6,042	7,762
810.75	6,042	7,762
810.80	6,042	7,762
810.85	6,042	7,762
810.90	6,042	7,762
810.95	6,042	7,762
811.00	6,042	7,762
811.05	6,042	7,762
811.10	6,042	7,762
811.15	6,042	7,762
811.20	6,042	7,762
811.25	6,042	7,762
811.30	6,042	7,762
811.35	6,042	7,762
811.40	6,042	7,762
811.45	6,042	7,762
811.50	6,042	7,762
811.55	6,042	7,762
811.60	6,042	7,762
811.65	6,042	7,762
811.70	6,042	7,762

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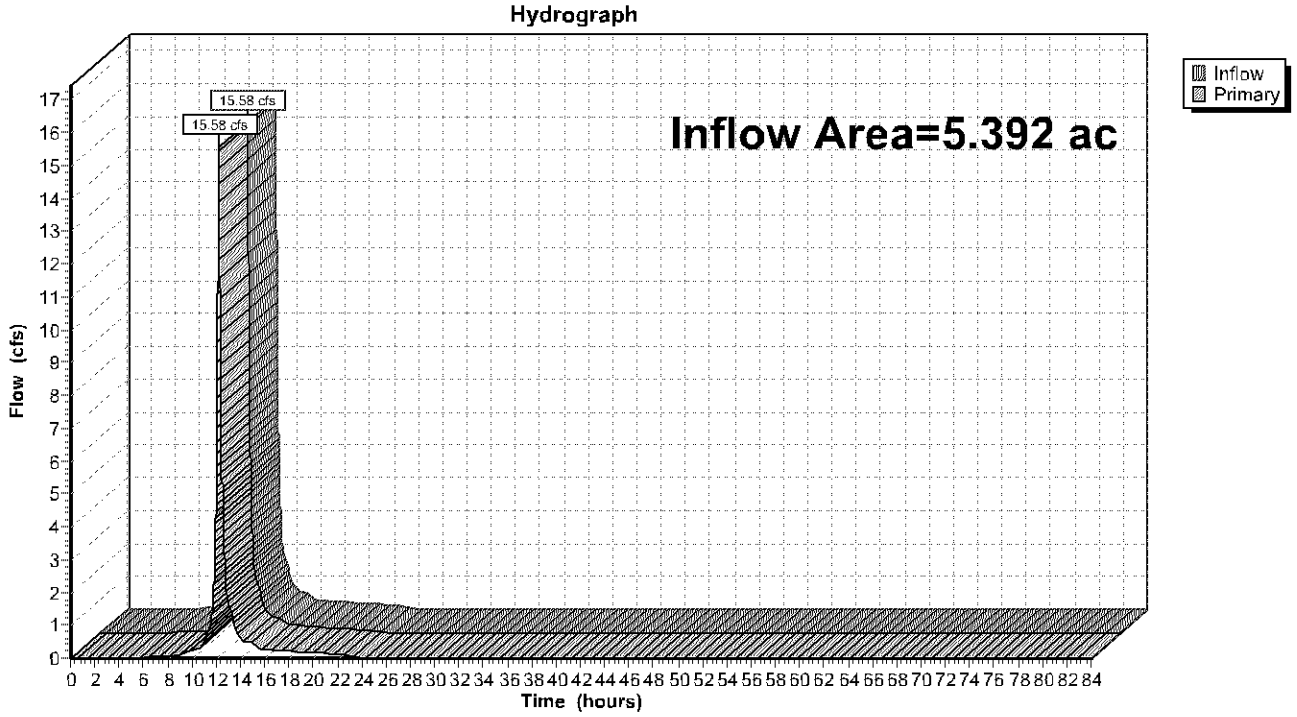
Summary for Link 3L: Total Flow North

Inflow Area = 5.392 ac, 84.99% Impervious, Inflow Depth = 2.09" for 2-year event
Inflow = 15.58 cfs @ 12.18 hrs, Volume= 0.939 af
Primary = 15.58 cfs @ 12.18 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Link 3L: Total Flow North



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Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Roof Runoff Runoff Area=60,737 sf 100.00% Impervious Runoff Depth=4.00"
Tc=15.0 min CN=98 Runoff=6.40 cfs 0.465 af

Subcatchment9S: Surface Runoff Runoff Area=174,148 sf 79.75% Impervious Runoff Depth=3.25"
Tc=10.0 min CN=91 Runoff=19.28 cfs 1.082 af

Pond 10P: Underground Infiltration Basin Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af

Link 3L: Total Flow North Inflow=25.17 cfs 1.547 af
Primary=25.17 cfs 1.547 af

Total Runoff Area = 5.392 ac Runoff Volume = 1.547 af Average Runoff Depth = 3.44"
15.01% Pervious = 0.809 ac 84.99% Impervious = 4.583 ac

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Summary for Subcatchment 2S: Roof Runoff

Runoff = 6.40 cfs @ 12.22 hrs, Volume= 0.465 af, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (sf)	CN	Description
34,874	98	Roofs, HSG B
25,863	98	Roofs, HSG B
60,737	98	Weighted Average
60,737		100.00% Impervious Area

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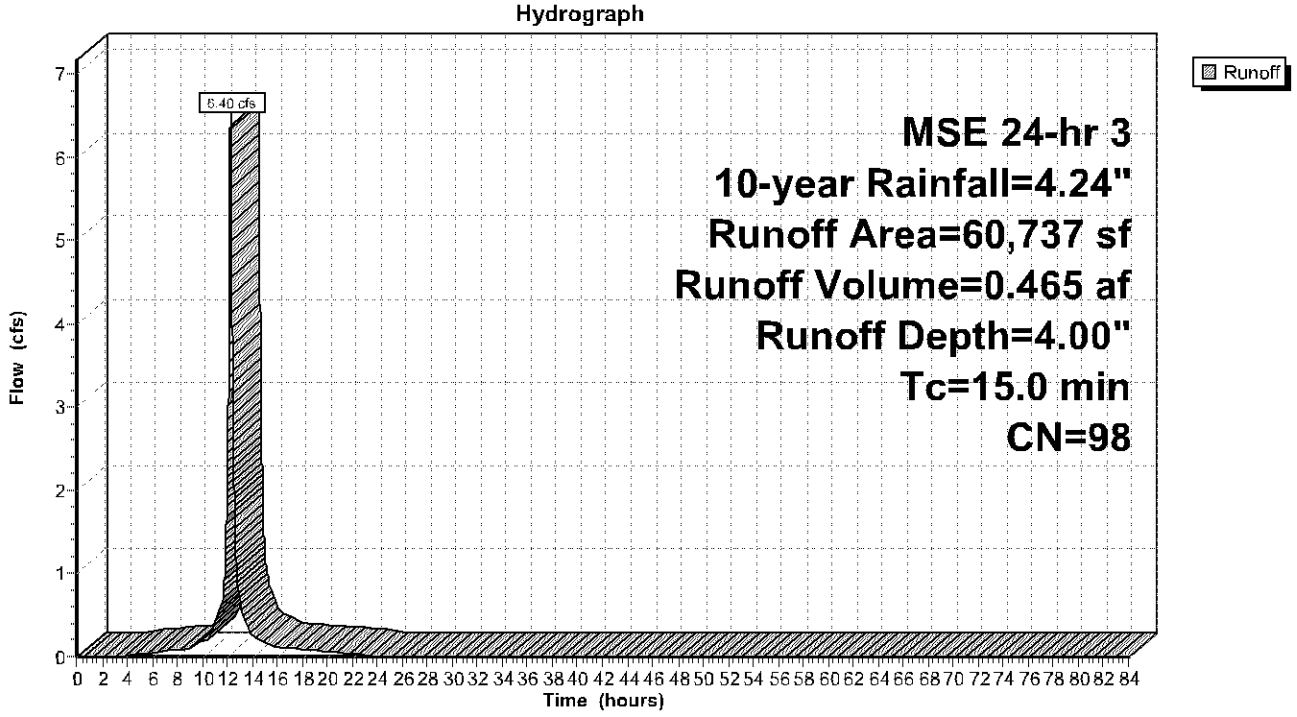
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					**Direct Entry,**

Subcatchment 2S: Roof Runoff



Summary for Subcatchment 9S: Surface Runoff

Runoff = 19.28 cfs @ 12.17 hrs, Volume= 1.082 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-year Rainfall=4.24"

Area (sf)	CN	Description
14,160	61	>75% Grass cover, Good, HSG B
121,638	98	Paved parking, HSG B
21,099	61	>75% Grass cover, Good, HSG B
17,251	98	Paved parking, HSG B
174,148	91	Weighted Average
35,259		20.25% Pervious Area
138,889		79.75% Impervious Area

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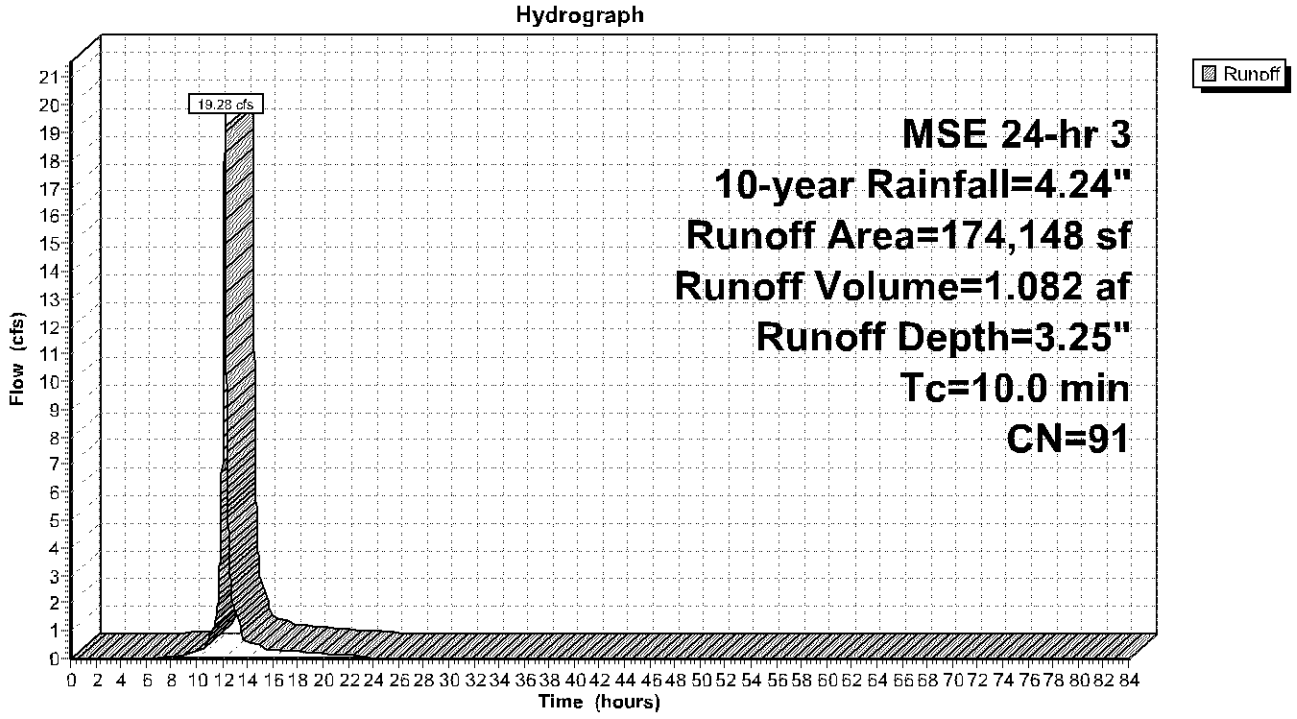
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Surface Runoff



Summary for Pond 10P: Underground Infiltration Basin

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	807.90'	4,224 cf	**68.17'W x 88.64'L x 2.33'H Field A** 14,099 cf Overall - 3,538 cf Embedded = 10,561 cf x 40.0% Voids
#2A	808.40'	3,538 cf	**ADS_StormTech SC-310 +Cap** x 240 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Rows of 12 Chambers
		7,762 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	807.90'	**0.450 in/hr Exfiltration over Surface area**
#2	Primary	809.70'	**24.0" Round Culvert** L= 87.0' Ke= 0.500 Inlet / Outlet Invert= 809.70' / 808.83' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

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Pond 10P: Underground Infiltration Basin - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

12 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 86.64' Row Length +12.0" End Stone x 2 = 88.64' Base Length
20 Rows x 34.0" Wide + 6.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

240 Chambers x 14.7 cf = 3,538.1 cf Chamber Storage

14,098.7 cf Field - 3,538.1 cf Chambers = 10,560.6 cf Stone x 40.0% Voids = 4,224.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,762.3 cf = 0.178 af
Overall Storage Efficiency = 55.1%
Overall System Size = 88.64' x 68.17' x 2.33'

240 Chambers
522.2 cy Field
391.1 cy Stone

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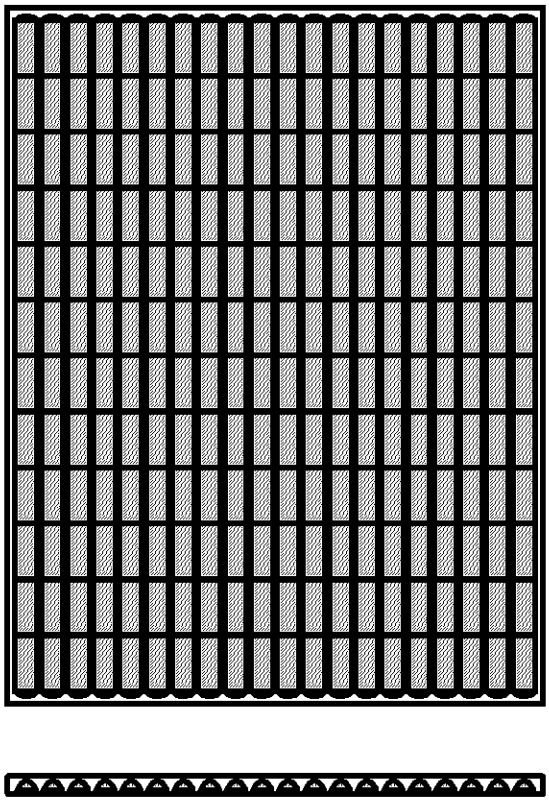
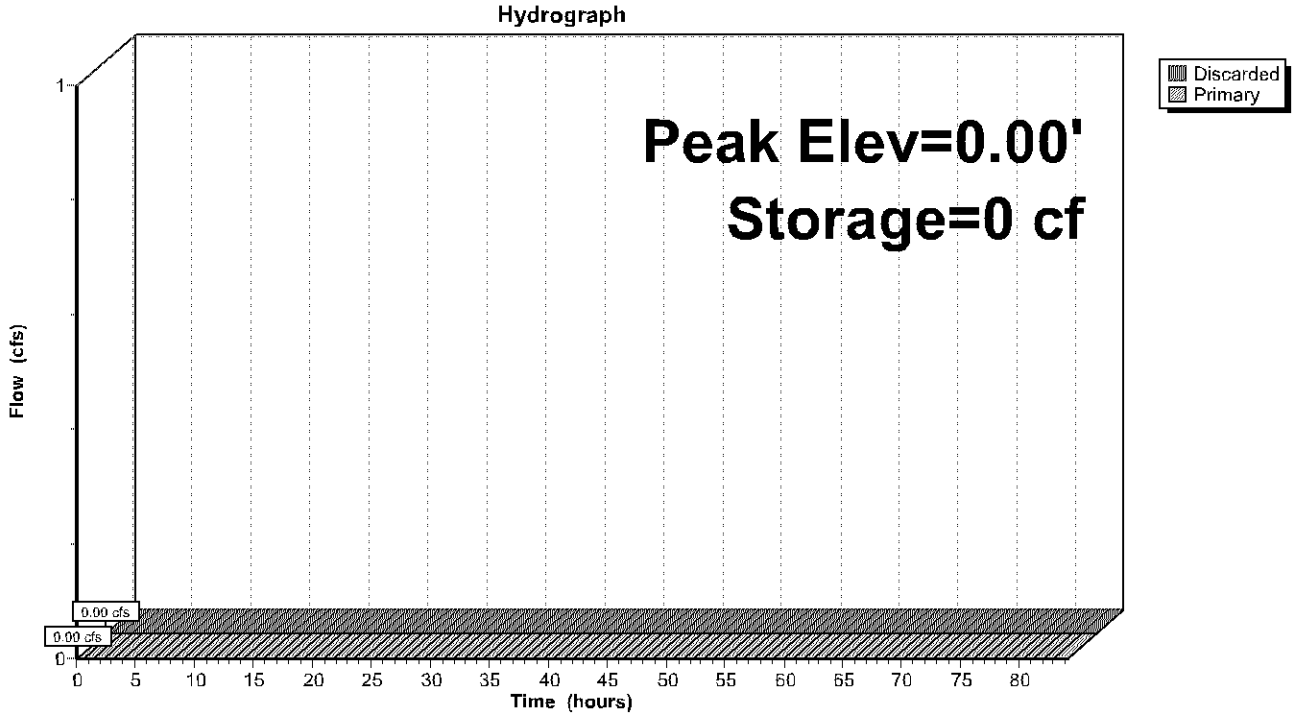


Pond 10P: Underground Infiltration Basin



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Stage-Area-Storage for Pond 10P: Underground Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
807.90	**6,042**	0
807.95	6,042	121
808.00	6,042	242
808.05	6,042	363
808.10	6,042	483
808.15	6,042	604
808.20	6,042	725
808.25	6,042	846
808.30	6,042	967
808.35	6,042	1,088
808.40	6,042	1,208
808.45	6,042	1,453
808.50	6,042	1,696
808.55	6,042	1,938
808.60	6,042	2,178
808.65	6,042	2,416
808.70	6,042	2,652
808.75	6,042	2,885
808.80	6,042	3,116
808.85	6,042	3,344
808.90	6,042	3,569
808.95	6,042	3,791
809.00	6,042	4,009
809.05	6,042	4,224
809.10	6,042	4,436
809.15	6,042	4,643
809.20	6,042	4,845
809.25	6,042	5,043
809.30	6,042	5,234
809.35	6,042	5,420
809.40	6,042	5,599
809.45	6,042	5,768
809.50	6,042	5,926
809.55	6,042	6,073
809.60	6,042	6,211
809.65	6,042	6,344
809.70	6,042	6,472
809.75	6,042	6,594
809.80	6,042	6,715
809.85	6,042	6,836
809.90	6,042	6,957
809.95	6,042	7,078
810.00	6,042	7,198
810.05	6,042	7,319
810.10	6,042	7,440
810.15	6,042	7,561
810.20	6,042	**7,682**
810.25	6,042	**7,762**
810.30	6,042	7,762
810.35	6,042	7,762
810.40	6,042	7,762
810.45	6,042	7,762
810.50	6,042	7,762
810.55	6,042	7,762
810.60	6,042	7,762
810.65	6,042	7,762
810.70	6,042	7,762
810.75	6,042	7,762
810.80	6,042	7,762
810.85	6,042	7,762
810.90	6,042	7,762
810.95	6,042	7,762
811.00	6,042	7,762
811.05	6,042	7,762
811.10	6,042	7,762
811.15	6,042	7,762
811.20	6,042	7,762
811.25	6,042	7,762
811.30	6,042	7,762
811.35	6,042	7,762
811.40	6,042	7,762
811.45	6,042	7,762
811.50	6,042	7,762
811.55	6,042	7,762
811.60	6,042	7,762
811.65	6,042	7,762
811.70	6,042	7,762

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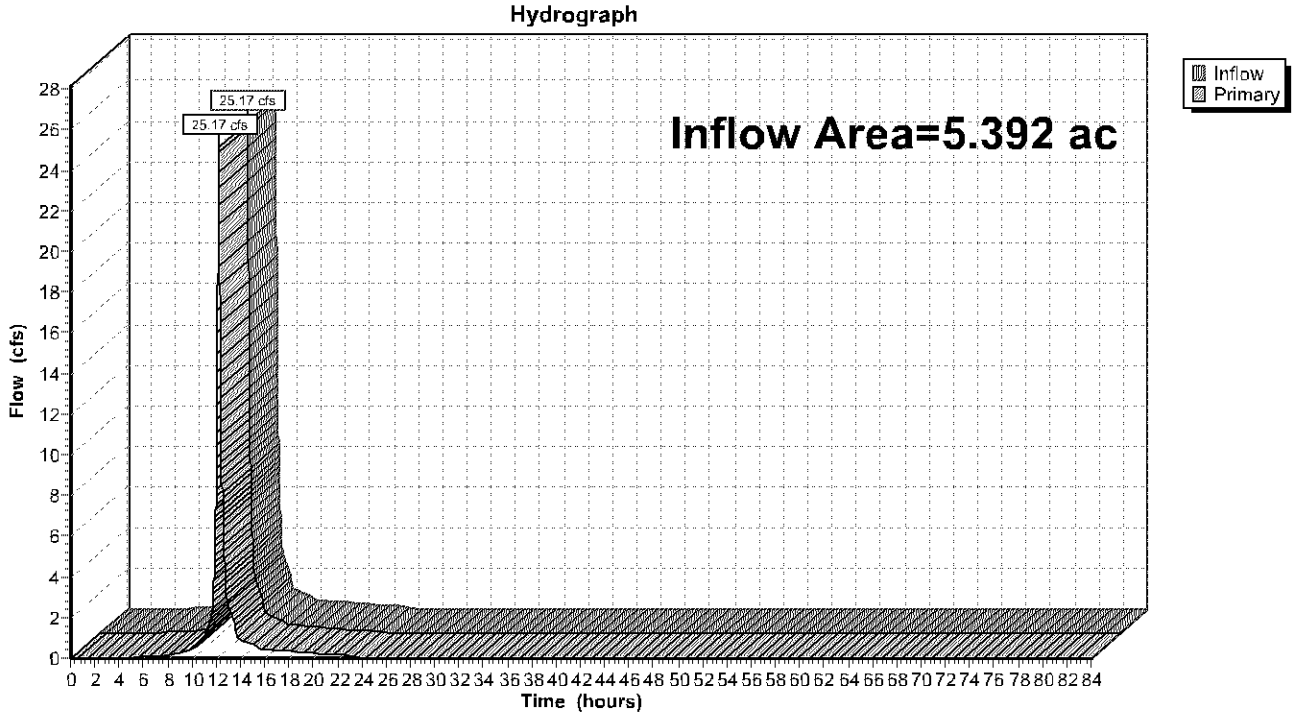
Summary for Link 3L: Total Flow North

Inflow Area = 5.392 ac, 84.99% Impervious, Inflow Depth = 3.44" for 10-year event
Inflow = 25.17 cfs @ 12.18 hrs, Volume= 1.547 af
Primary = 25.17 cfs @ 12.18 hrs, Volume= 1.547 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Link 3L: Total Flow North



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Time span=0.00-84.00 hrs, dt=0.01 hrs, 8401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Roof Runoff Runoff Area=60,737 sf 100.00% Impervious Runoff Depth=7.26"
Tc=15.0 min CN=98 Runoff=11.39 cfs 0.844 af

Subcatchment9S: Surface Runoff Runoff Area=174,148 sf 79.75% Impervious Runoff Depth=6.43"
Tc=10.0 min CN=91 Runoff=36.64 cfs 2.143 af

Pond 10P: Underground Infiltration Basin Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af

Link 3L: Total Flow North Inflow=47.07 cfs 2.986 af
Primary=47.07 cfs 2.986 af

Total Runoff Area = 5.392 ac Runoff Volume = 2.986 af Average Runoff Depth = 6.65"
15.01% Pervious = 0.809 ac 84.99% Impervious = 4.583 ac

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Summary for Subcatchment 2S: Roof Runoff

Runoff = 11.39 cfs @ 12.22 hrs, Volume= 0.844 af, Depth= 7.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=7.50"

Area (sf)	CN	Description
34,874	98	Roofs, HSG B
25,863	98	Roofs, HSG B
60,737	98	Weighted Average
60,737		100.00% Impervious Area

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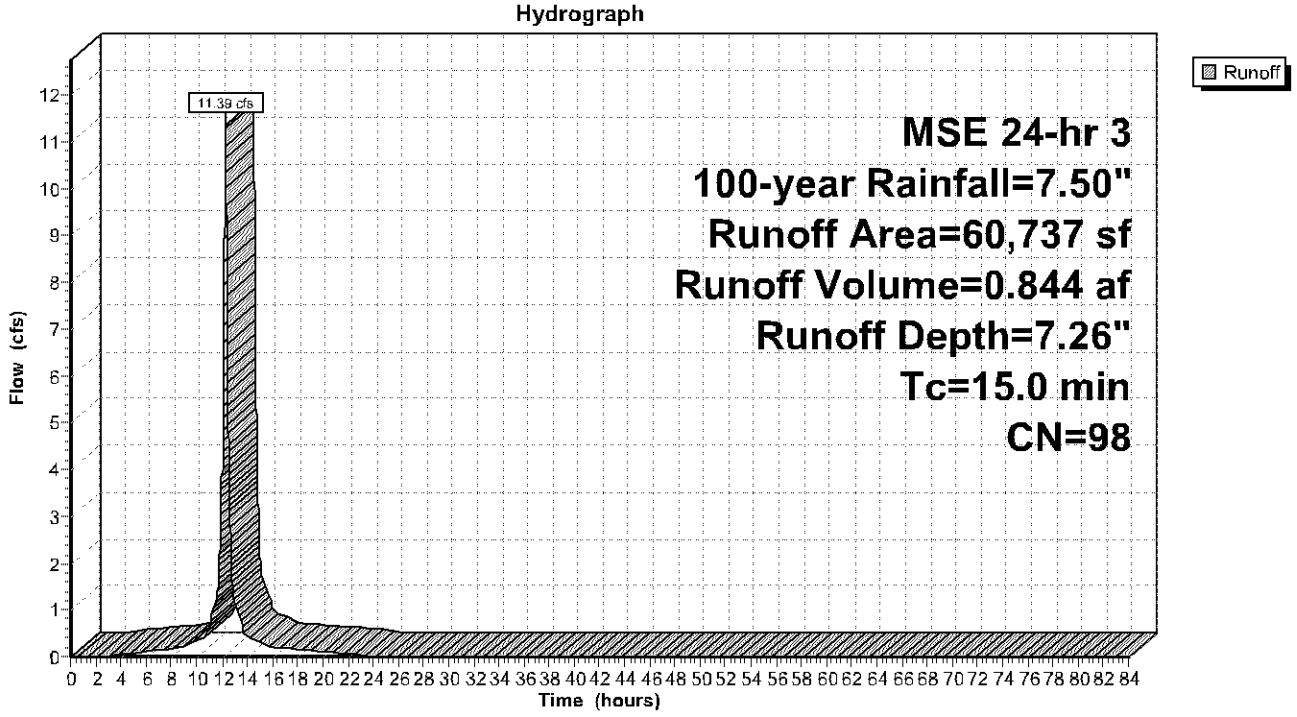
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					**Direct Entry,**

Subcatchment 2S: Roof Runoff



Summary for Subcatchment 9S: Surface Runoff

Runoff = 36.64 cfs @ 12.17 hrs, Volume= 2.143 af, Depth= 6.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-year Rainfall=7.50"

Area (sf)	CN	Description
14,160	61	>75% Grass cover, Good, HSG B
121,638	98	Paved parking, HSG B
21,099	61	>75% Grass cover, Good, HSG B
17,251	98	Paved parking, HSG B
174,148	91	Weighted Average
35,259		20.25% Pervious Area
138,889		79.75% Impervious Area

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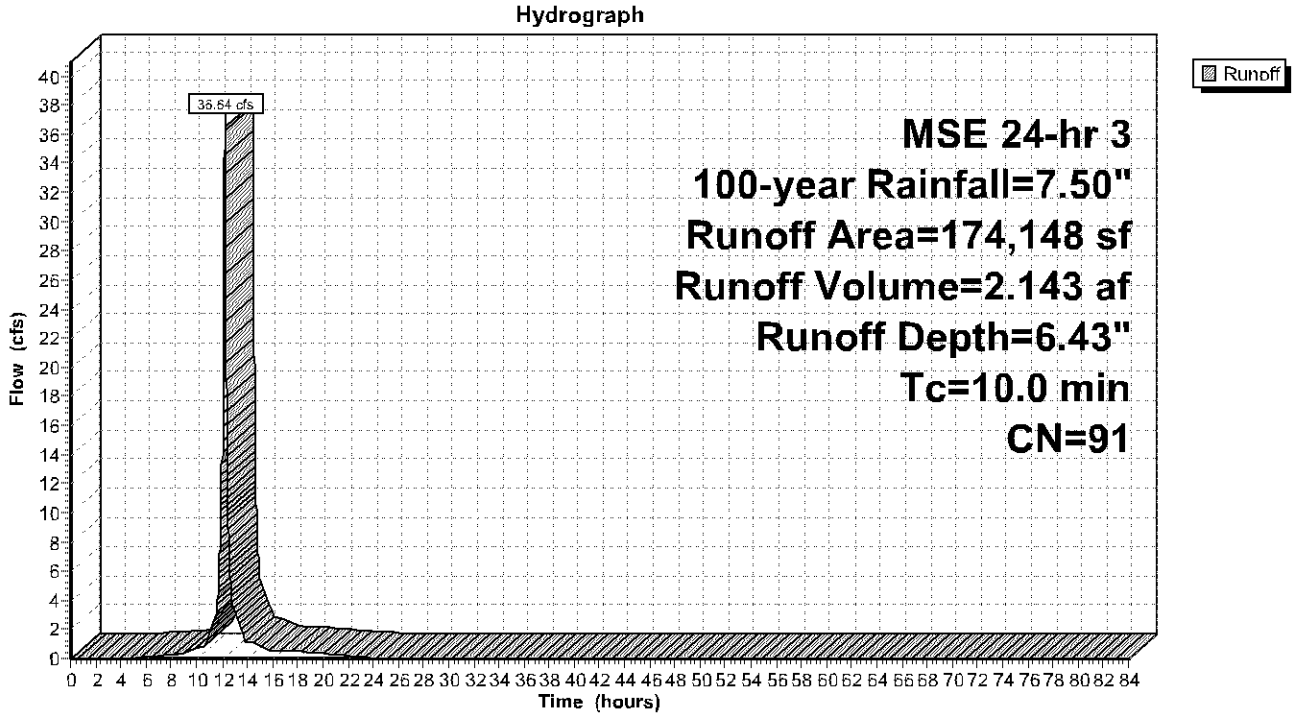
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Surface Runoff



Summary for Pond 10P: Underground Infiltration Basin

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	807.90'	4,224 cf	**68.17'W x 88.64'L x 2.33'H Field A** 14,099 cf Overall - 3,538 cf Embedded = 10,561 cf x 40.0% Voids
#2A	808.40'	3,538 cf	**ADS_StormTech SC-310 +Cap** x 240 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Rows of 12 Chambers
		7,762 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	807.90'	**0.450 in/hr Exfiltration over Surface area**
#2	Primary	809.70'	**24.0" Round Culvert** L= 87.0' Ke= 0.500 Inlet / Outlet Invert= 809.70' / 808.83' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

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Pond 10P: Underground Infiltration Basin - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

12 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 86.64' Row Length +12.0" End Stone x 2 = 88.64' Base Length
20 Rows x 34.0" Wide + 6.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

240 Chambers x 14.7 cf = 3,538.1 cf Chamber Storage

14,098.7 cf Field - 3,538.1 cf Chambers = 10,560.6 cf Stone x 40.0% Voids = 4,224.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,762.3 cf = 0.178 af
Overall Storage Efficiency = 55.1%
Overall System Size = 88.64' x 68.17' x 2.33'

240 Chambers
522.2 cy Field
391.1 cy Stone

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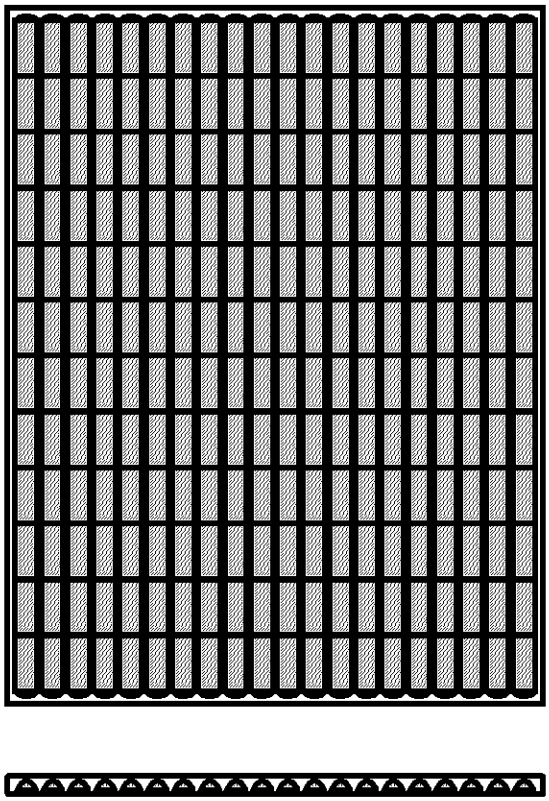
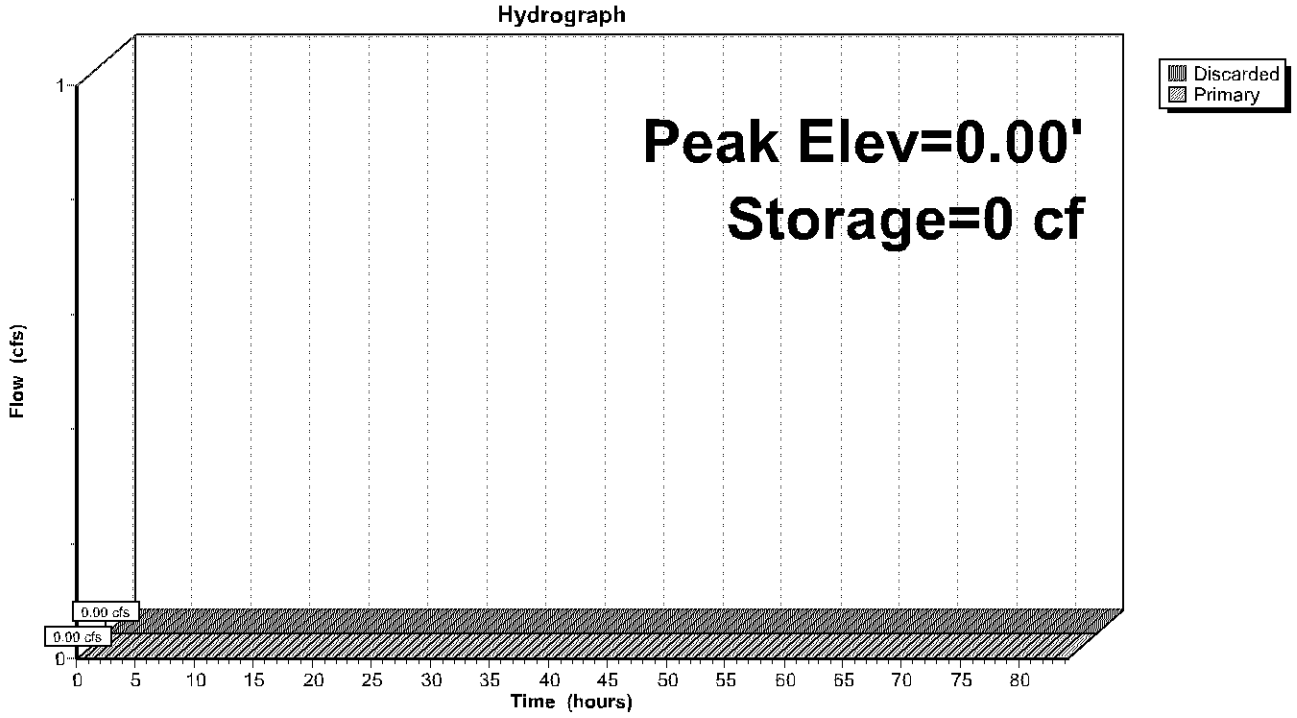


Pond 10P: Underground Infiltration Basin



Stage-Area-Storage for Pond 10P: Underground Infiltration Basin

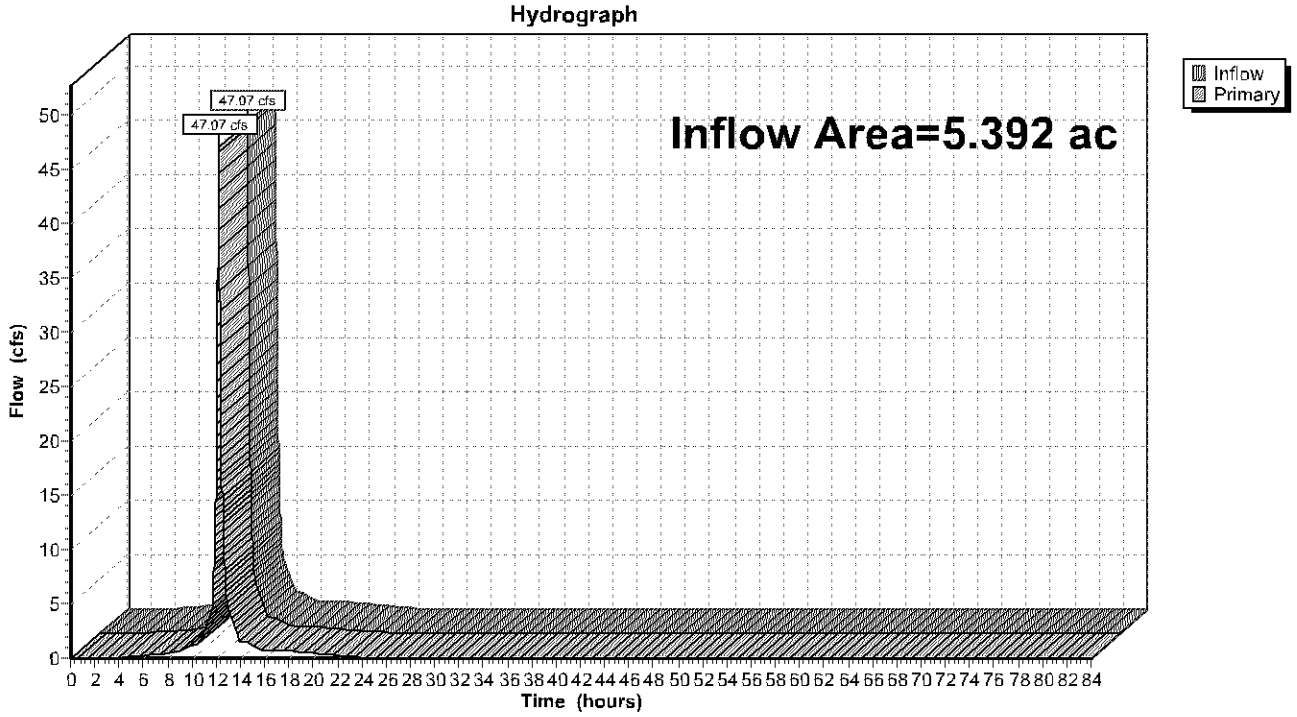
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
807.90	**6,042**	0
807.95	6,042	121
808.00	6,042	242
808.05	6,042	363
808.10	6,042	483
808.15	6,042	604
808.20	6,042	725
808.25	6,042	846
808.30	6,042	967
808.35	6,042	1,088
808.40	6,042	1,208
808.45	6,042	1,453
808.50	6,042	1,696
808.55	6,042	1,938
808.60	6,042	2,178
808.65	6,042	2,416
808.70	6,042	2,652
808.75	6,042	2,885
808.80	6,042	3,116
808.85	6,042	3,344
808.90	6,042	3,569
808.95	6,042	3,791
809.00	6,042	4,009
809.05	6,042	4,224
809.10	6,042	4,436
809.15	6,042	4,643
809.20	6,042	4,845
809.25	6,042	5,043
809.30	6,042	5,234
809.35	6,042	5,420
809.40	6,042	5,599
809.45	6,042	5,768
809.50	6,042	5,926
809.55	6,042	6,073
809.60	6,042	6,211
809.65	6,042	6,344
809.70	6,042	6,472
809.75	6,042	6,594
809.80	6,042	6,715
809.85	6,042	6,836
809.90	6,042	6,957
809.95	6,042	7,078
810.00	6,042	7,198
810.05	6,042	7,319
810.10	6,042	7,440
810.15	6,042	7,561
810.20	6,042	**7,682**
810.25	6,042	**7,762**
810.30	6,042	7,762
810.35	6,042	7,762
810.40	6,042	7,762
810.45	6,042	7,762
810.50	6,042	7,762
810.55	6,042	7,762
810.60	6,042	7,762
810.65	6,042	7,762
810.70	6,042	7,762
810.75	6,042	7,762
810.80	6,042	7,762
810.85	6,042	7,762
810.90	6,042	7,762
810.95	6,042	7,762
811.00	6,042	7,762
811.05	6,042	7,762
811.10	6,042	7,762
811.15	6,042	7,762
811.20	6,042	7,762
811.25	6,042	7,762
811.30	6,042	7,762
811.35	6,042	7,762
811.40	6,042	7,762
811.45	6,042	7,762
811.50	6,042	7,762
811.55	6,042	7,762
811.60	6,042	7,762
811.65	6,042	7,762
811.70	6,042	7,762

Summary for Link 3L: Total Flow North

Inflow Area = 5.392 ac, 84.99% Impervious, Inflow Depth = 6.65" for 100-year event
Inflow = 47.07 cfs @ 12.18 hrs, Volume= 2.986 af
Primary = 47.07 cfs @ 12.18 hrs, Volume= 2.986 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-84.00 hrs, dt= 0.01 hrs

Link 3L: Total Flow North



APPENDIX C – MIDS CALCULATOR RESULTS FOR WATER QUALITY

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Project Information

Calculator Version:	Version 3: January 2017
Project Name:	ICE CASTLE
User Name / Company Name:	SAMBATEK
Date:	2019-07-18
Project Description:	
Construction Permit?:	Yes

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55425
Annual Rainfall (inches):	31.7
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		0.688			0.688
			Impervious Area (acres)		1.585
				Total Area (acres)	2.273

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		0.478			0.478
			Impervious Area (acres)		1.585
				Total Area (acres)	2.063

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Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	6329	ft3
Volume removed by BMPs towards performance goal:	6329	ft3
Percent volume removed towards performance goal	**100**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	3.9071	acre-ft
Annual runoff volume removed by BMPs:	3.5138	acre-ft
Percent annual runoff volume removed:	**90**	**%**
Post development annual particulate P load:	1.754	lbs
Annual particulate P removed by BMPs:	1.577	lbs
Post development annual dissolved P load:	1.435	lbs
Annual dissolved P removed by BMPs:	1.29	lbs
Percent annual total phosphorus removed:	**90**	**%**
Post development annual TSS load:	579.2	lbs
Annual TSS removed by BMPs:	520.9	lbs
Percent annual TSS removed:	**90**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
1 - Underground infiltration	6472	6329	6329	0	100

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
1 - Underground infiltration	3.8072	0	3.5137	0.2935	92

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Underground infiltration	1.7087	0	1.577	0.1317	92

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Underground infiltration	1.398	0	1.2902	0.1078	92

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
1 - Underground infiltration	564.38	0	520.88	43.5	92

BMP Schematic

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APPENDIX D – STORM SEWER SPREADSHEET

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Sambatek

Stormwater Design Worksheet

Project:	Ice Castle	
Client:		
Sambatek #:	21846	
Date:	7/23/2019	
Engineer:	jb	
Rainfall:		10 year
County:		Hennepin
Region:		Hennepin

Notes
> User inputs are in colored cells
> Spreadsheet will automatically combine areas and flows based on structure name
> User will have to manually update the Tc value at junctions (greater of the tributaries)
> When inserting additional rows, copy THE ENTIRE row (click on the row nubmer on the far left)
> Rows beginning with a green cell indicate the first structure in a run, yellow cells indicate a downstream structure

>Structure depth turns red if not between 3 an
>Last lower invert turns red if not equal to goa

Structure From	To	Tributary Area (sf)	Impervious (%)	Tributary Area (ac)	Runoff Coeff. (C)	Sum CA (ac)	T_c (min)	Time of Flow (min)	Intensity (in/hr)	Runoff (cfs)	Length (lf)	Pipe Diameter (in)	Slope (%)	Pipe Manning's n	Pipe Capacity (cfs)	Velocity (fps) Full	Velocity (fps) Actual	Depth of Flow	Rim	Upper Invert	Drop Thru Pipe	Lower Invert	Drop Thru Structure	Structure Depth	Pipe Cover at U/S MH (ft)	Pipe Cover at D/S MH (ft)
Pipe Run 1														RCP												
RD 1	106	3929	100%	0.09	0.95	0.086	7.00	0.28	6.613	**0.57**	72	10	2.00%	0.013	**3.10**	5.7	4.3	0.24562	815.10	815.10	1.44	813.66		0.00	-0.83	3.41
106	105	2512	100%	0.06	0.95	0.140	7.28	0.13	6.506	**0.91**	37	12	2.00%	0.013	**5.04**	6.4	4.9	0.3	817.90	813.66	0.74	812.92		4.24	3.24	3.98
105	104	1330	100%	0.03	0.95	0.169	7.40	0.38	6.458	**1.09**	90	15	1.00%	0.013	**6.46**	5.3	3.9	0.35	817.90	812.92	0.90	812.02		4.98	3.73	3.98
104	103	1575	10%	0.04	0.46	0.516	7.78	0.29	6.311	**3.26**	93	15	1.00%	0.013	**6.46**	5.3	5.3	0.6	817.25	812.02	0.93	811.09		5.23	3.98	3.56
103	102	5143	0%	0.12	0.40	1.226	8.08	0.12	6.203	**7.61**	61	15	2.00%	0.013	**9.13**	7.4	8.3	0.9	815.90	811.09	1.22	809.87		4.81	3.56	3.58
102	Basin	5802	0%	0.13	0.40	1.942	8.20	0.01	6.164	**11.97**	9	15	4.00%	0.013	**12.92**	10.5	11.9	0.9	814.80	809.87	0.36	809.51		4.93	3.68	-810.76
																						end				
Pipe Run 2														RCP												
104b	104a	8559	90%	0.20	0.90	0.176	7.00	0.59	6.613	**1.16**	143	12	1.00%	0.013	**3.56**	4.5	4.0	0.39066	818.10	815.10	1.43	813.67		3.00	2.00	3.03
104a	104	7529	90%	0.17	0.90	0.331	7.59	0.17	6.385	**2.11**	49	12	1.00%	0.013	**3.56**	4.5	4.7	0.6	817.70	813.67	0.49	813.18		4.03	3.03	-814.18
Pipe Run 3														RCP												
RD2	103	30368	100%	0.70	0.95	0.662	15.00	0.13	4.580	**3.03**	54	12	2.00%	0.013	**5.04**	6.4	6.7	0.56218			1.08	-1.08		0.00	-1.00	0.08
Pipe Run 4														RCP												
RD3	102	30368	100%	0.70	0.95	0.662	15.00	0.13	4.580	**3.03**	54	12	2.00%	0.013	**5.04**	6.4	6.7	0.56218			1.08	-1.08		0.00	-1.00	0.08

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EXHIBIT – C

SkyWater Parking Study – Draft, June 19, 2019

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DRAFT MEMORANDUM

DATE: July 18, 2019

TO: Brian Hansen, City of Bloomington

FROM: Jordan Schwarze, PE, Alliant Engineering
Ellie Lee, EIT, Alliant Engineering

SUBJECT: **SkyWater Parking Study**

Introduction

Alliant Engineering, Inc. has conducted a parking study in response to a proposed addition to the existing SkyWater Technology Foundry facility at 2401 E 86th Street in Bloomington, MN. The proposed addition is expected to increase onsite production capacity and add 30 to 50 jobs. The site currently offers 464 parking stalls to accommodate employees and visitors. The proposed addition would be built on a portion of the existing parking lot and require the removal of approximately 139 parking stalls, resulting in 325 parking stalls provided on site in the future. It should be noted that SkyWater plans to have an agreement with Evergreen Church, located immediately west at 2300 E 88th Street, for the use of up to 85 parking stalls Monday-Friday.

Study Purpose

The purpose of this study is to show that the reduction in onsite parking supply can support the proposed expansion, deviating the parking supply required by Bloomington Zoning Code. To achieve this, the following goals have been established:

- Document typical operations and existing use of the SkyWater facility, including the hours of operation, seasonal operation considerations, employees per shift, public hours for visitors and deliveries, as well as any special events that may generate significant parking demand.
- Determine the existing peak parking demand through observations at the SkyWater facility.
- Document City Code parking requirements for the proposed future conditions.
- Estimate future parking demand for both 30- and 50-added-employee alternatives.
- Compare the estimated future parking demand against the proposed parking supply to determine a surplus or deficit.
- Document any impacts to surrounding roadways and properties if estimated future parking demand exceeds the proposed parking supply.
- Identify any potential parking demand mitigation or alternative parking supply options that could be considered in the event of any expected parking supply shortfalls.

Existing Conditions

The SkyWater facility is used as a foundry for semiconductor manufacturing, design, research, and development. The facility has clean room space as well as an office area. Manufacturing occurs 7 days per week, 365 days per year, and there are no special seasonal operation considerations. Public hours for visitors and deliveries are typically 8:00 AM to 5:00 PM Monday through Friday. The SkyWater facility does not hold any special events generating significant parking demand.

SkyWater operates two 12-hour manufacturing shifts 7 days per week, beginning at 6:00 AM and 6:00 PM. Four manufacturing crews (A, B, C, D crews) staff these shifts, with one manufacturing crew assigned to each 12-hour shift (e.g. crews A/B staff alternating 12-hour shifts for several days followed by crews C/D staffing alternating 12-hour shifts for several days). SkyWater also employs engineering, management, and support staff (E crew), which generally operate under traditional business hours (8:00 AM to 5:00 PM) Monday through Friday. Of the 498 total current employees, crews numbers are broken down as follows:

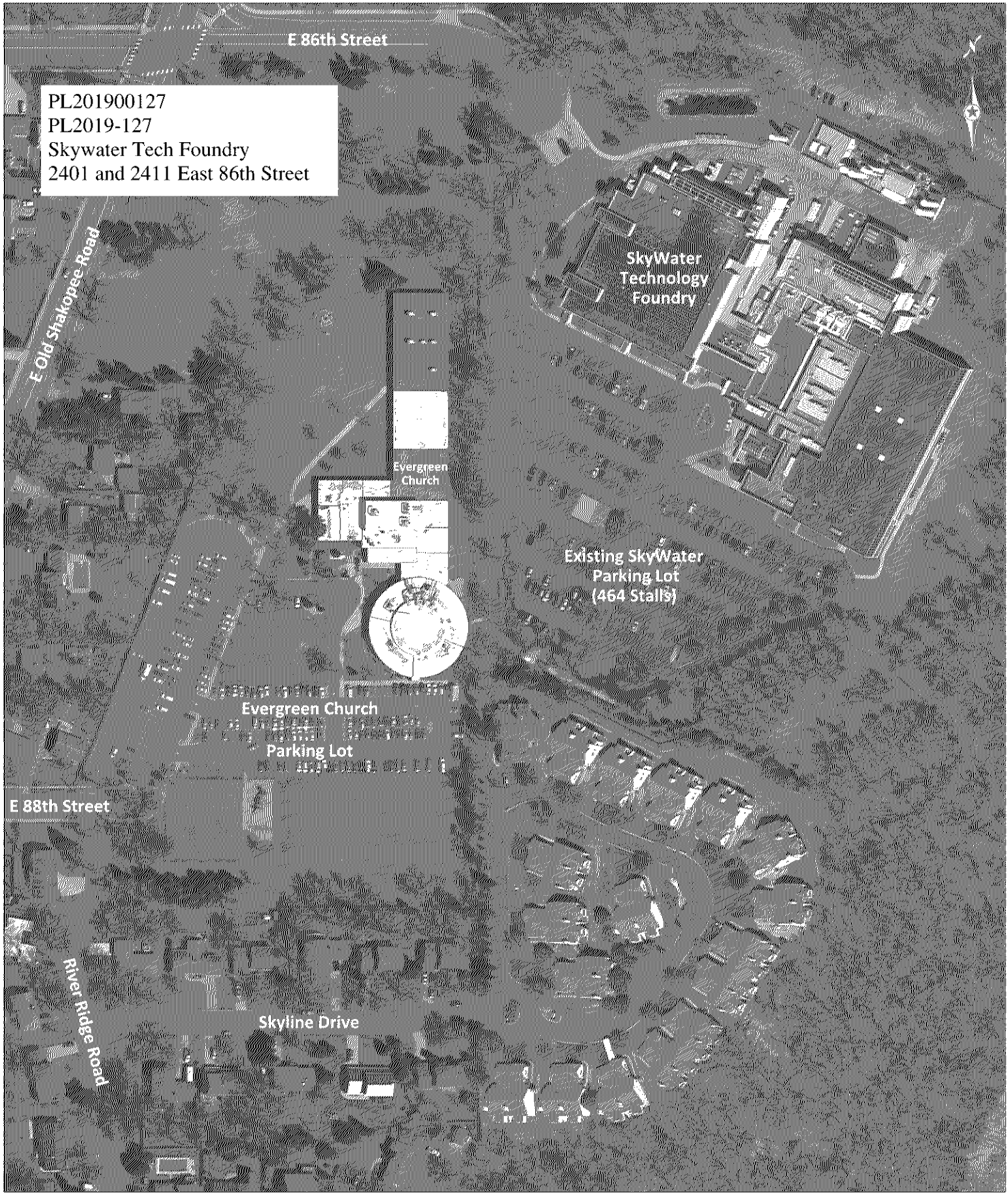
- A: 83 (Manufacturing)
- B: 86 (Manufacturing)
- C: 88 (Manufacturing)
- D: 85 (Manufacturing)
- E: 156 (Engineering, Management, and Support Staff)

As illustrated in **Figure 1**, the SkyWater facility currently provides 464 parking stalls onsite for employees and visitors. The proposed building addition would be constructed on a portion of the current parking lot, which would require the removal of approximately 139 parking stalls, resulting in 325 total parking stalls remaining onsite.

Parking Observations

To document typical weekday parking demand, parking data was initially collected over two days during the week of June 24, 2019. Parking counts were collected in 15-minute intervals between 5:00-9:00 AM and 3:00-7:00 PM to document conditions before, during, and after shift changes. The peak parking demand was observed at 9:00 AM on both initial weekdays of data collection. Considering parking counts were still rising at 9:00 AM, additional parking data was collected from 8:00 AM to Noon on Tuesday, July 2, 2019 to ensure the approximate time of peak parking demand was captured. On Tuesday, July 2, 2019, parking counts were observed to peak at 10:30 AM. Based on this peak, the parking demand curves from the week of June 24, 2019 were interpolated to Noon to estimate peak parking demand without the influence of employee vacations the week of the Independence Day holiday.

In addition to Alliant parking observations, SkyWater collected its own set of parking counts between June 6, 2019 and June 19, 2019. The combined weekday parking data is plotted in the chart of **Figure 2**. Alliant and SkyWater data align well in the chart, and despite small spikes in parking demand near manufacturing shift changes, it is evident that weekday parking demand typically peaks between 9:00 AM and Noon.

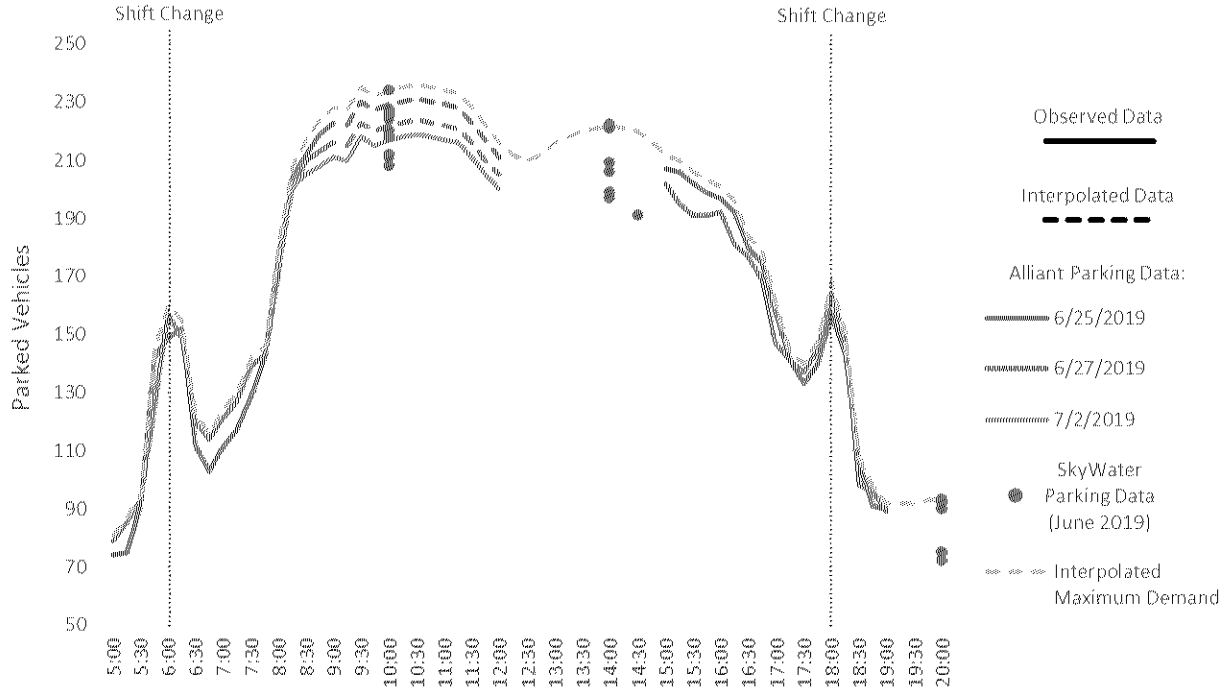


SkyWater Parking Study

Figure 1
Existing Site Characteristics

ALLIANT ENGINEERING

Figure 2. Weekday Parking Demand



It should be noted that Saturday/Sunday parking conditions were not studied due to the presence of significant engineering, management, and support staff only on weekdays. With decreased weekend demand, SkyWater is able to lend a portion of its parking lot to Evergreen Church on Saturdays/Sundays for church service and event overflow parking.

Table 1 summarizes key existing weekday parking data. The observed peak parking demand was 234 vehicles as documented by SkyWater at 10:00 AM on June 11, 2019. Based on observed maximums throughout the day over all collection periods by Alliant and SkyWater, an interpolated maximum demand curve was developed. Based on this curve, an interpolated peak parking demand of 236 vehicles was estimated.

Table 1. Key Existing Weekday Parking Data

Parking Parameter	Alliant Engineering		SkyWater	
	Observed	Interpolated	Observed	Interpolated
Peak Demand	223	231	234	236
Existing Parking Supply	464			
Parking Surplus	241	233	230	228

At the observed and interpolated peak parking demands, the existing SkyWater parking lot is only approximately half occupied.

Future Conditions

Based on observations of existing conditions, an analysis was conducted to determine if the proposed parking supply is expected to be adequate under future conditions. It should be noted that parking generation estimates based on the Institute of Transportation Engineers (ITE) Parking Generation Manual were not developed due to the complexity of the study site. ITE-based estimates are unlikely to accurately project parking demand for the complex mix of multiple onsite land uses and 24-hour staffing in shifts.

Bloomington Zoning Code Parking Requirement

The Bloomington Zoning Code regulates the minimum off-street parking supply for various land uses. Relevant land uses to this site are Office, Clean Room, and Equipment Storage. City Code parking requirements were obtained from City of Bloomington staff. Code required parking for the proposed expanded SkyWater facility is shown in **Table 2**. Based on City Code, the SkyWater facility is required to have 479 parking stalls under existing conditions and 508 parking stalls under future conditions. These requirements exceed the current and proposed parking supply of 464 stalls and 325 stalls respectively (parking deficits of 15 stalls and 183 stalls respectively). Therefore, a data-driven approach is necessary to estimate the adequacy of the proposed parking supply.

Table 2. Bloomington Zoning Code Parking Requirements

Land Use	Rate	Area (Square Feet)	Required Parking Stalls
Office (Existing)	1 Stall / 285 SF GLA	84,457	296
Clean Room (Existing)	1 Stall / 500 SF GLA	67,554	135
Equipment Storage (Existing)	1 Stall / 1000 SF GLA	47,835	48
Clean Room (Proposed)	1 Stall / 500 SF GLA	14,500	29
		Total Parking Requirement	**508**

Alternative A – 30 New Employees

As noted previously, the proposed SkyWater expansion is expected to lead to the addition of 30 to 50 new jobs onsite. Future peak parking demand was initially estimated for a 30-new-job alternative. Two conservative methods of estimating future parking demand including new employees were used:

- Method 1 (One Vehicle/New Employee):
  - Assumes one parked vehicle/new employee
  - Assumes 30 new employees are divided evenly across crews A-E (6 employees/crew)
  - Under this method, approximately 12 added parked vehicles would be expected near shift changes (e.g. crews A/B) and during traditional business hours (e.g. crews A/E)
    - Assumes a 12-vehicle increase to the existing interpolated peak parking demand of 236 vehicles = 248 vehicles

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- Method 2 (Employee Percentage Increase):
  - Assumes a six percent increase (528 future employees versus 498 current employees) in the existing interpolated peak parking demand of 236 vehicles = 250 vehicles

Alternative B – 50 New Employees

Future peak parking demand was subsequently estimated for a 50-new-job alternative. Similar methods of estimating future parking demand including new employees were used:

- Method 1 (One Vehicle/New Employee):
  - Assumes one parked vehicle/new employee
  - Assumes 50 new employees are divided evenly across crews A-E (10 employees/crew)
  - Under this method, approximately 20 added parked vehicles would be expected near shift changes (e.g. crews A/B) and during traditional business hours (e.g. crews A/E)
    - Assumes a 20-vehicle increase to the existing interpolated peak parking demand of 236 vehicles = 256 vehicles
- Method 2 (Employee Percentage Increase):
  - Assumes a 10 percent increase (548 future employees versus 498 current employees) in the existing interpolated peak parking demand of 236 vehicles = 260 vehicles

A summary of the estimated future weekday peak parking demand is shown in **Table 3**. Factoring a five percent parking supply contingency to guard against unnecessary site circulation and the perception of inadequate parking, the proposed parking lot is expected to have a surplus of at least 50 stalls at peak parking demand under all employee alternatives and analysis methods. Impacts to adjacent roadways and properties, including Evergreen Church, are not expected. While an agreement is planned for the use of up to 85 parking stalls at Evergreen Church Monday-Friday, the analysis indicates these parking stalls are unlikely to be needed by SkyWater employees.

Table 3: Estimated Future Weekday Peak Parking Demand

Parking Parameter	Estimation Method	
	Method 1: One Vehicle/New Employee	Method 2: Employee Percentage Increase
Proposed Parking Supply	325 Stalls	
Existing Interpolated Peak Parking Demand	236 Vehicles	
Alternative A: 30 New Employees		
Added Peak Parking Demand	12 Vehicles	14 Vehicles
Total Peak Parking Demand	248 Vehicles	250 Vehicles
Five Percent Contingency	(12) Stalls	(13) Stalls
Parking Surplus	**65 Stalls**	**62 Stalls**
Alternative B: 50 New Employees		
Added Peak Parking Demand	20 Vehicles	24 Vehicles
Total Peak Parking Demand	256 Vehicles	260 Vehicles
Five Percent Contingency	(13) Stalls	(13) Stalls
Parking Surplus	**56 Stalls**	**52 Stalls**

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Conclusions

The following conclusions are offered for consideration:

- SkyWater Technology Foundry, located at 2401 E 86th Street in Bloomington, MN is proposing an expansion that would increase onsite production capacity and add 30 to 50 jobs. The proposed addition would be built on a portion of the existing parking lot and require the removal of approximately 139 parking stalls, resulting in 325 parking stalls provided on site in the future (464 parking stalls currently).
- Based on Bloomington Zoning Code, the SkyWater facility is required to have 479 parking stalls under existing conditions and 508 parking stalls under future conditions.
    - These requirements exceed the current and proposed parking supply of 464 stalls and 325 stalls respectively (parking deficits of 15 stalls and 183 stalls respectively).
- From the combination of Alliant and SkyWater collected data, the maximum observed existing parking demand was 234 vehicles.
    - Based on observed maximums throughout the day over all collection periods by Alliant and SkyWater, an interpolated maximum demand curve was developed. Based on this curve, an existing interpolated peak parking demand of 236 vehicles was estimated.
- Based on observations of existing conditions, an analysis was conducted to determine if the proposed parking supply is expected to be adequate under future conditions. Under an alternative in which 50 new employees are added, a maximum peak parking demand of 260 vehicles was estimated.
    - Factoring a five percent parking supply contingency to guard against unnecessary site circulation and the perception of inadequate parking, the proposed parking lot is expected to have a surplus of at least 50 stalls at peak parking demand.
- Impacts to adjacent roadways and properties, including Evergreen Church, are not expected as a result of the proposed expansion. While an agreement is planned for the use of up to 85 parking stalls at the adjacent Evergreen Church Monday-Friday, the analysis indicates these parking stalls are unlikely to be needed by SkyWater employees.

EXHIBIT – D
Response to Request for Information Regarding Wastewater Flow

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Skywater Tech Foundry
2401 and 2411 East 86th Street

Bryan Suchy

From: Sam Marroquin <Sam.Marroquin@SkyWaterTechnology.com>
Sent: Thursday, July 18, 2019 1:24 PM
To: Hansen, Brian; Bryan Suchy; Brad Ferguson
Cc: 'bzibrowski@oxbowindustries.com'; William Groboski; Pete Roth
Subject: RE: SkyWater Proposed Expansion - Sewer Flow Information Needed

Brian,

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2401 and 2411 East 86th Street

Eric and Shawn were on-site today to walkthrough our domestic water systems.

Please see below for the answers to the questions.

Feel free to contact me if you have any other questions or would like to visit.

Thank you,

Sam Marroquin | Facilities Director Sr
Office: 952-851-5291
Mobile: 512-565-0874
Sam.Marroquin@SkyWaterTechnology.com
2401 East 86th Street, Bloomington, MN 55425
www.skywatertechnology.com

From: Hansen, Brian <bhansen@BloomingtonMN.gov>
Sent: Wednesday, July 17, 2019 4:36 PM
To: 'bsuchy@tegragroup.com' <bsuchy@tegragroup.com>; Brad Ferguson <Brad.Ferguson@SkyWaterTechnology.com>; Sam Marroquin <Sam.Marroquin@SkyWaterTechnology.com>
Cc: 'bzibrowski@oxbowindustries.com' <bzibrowski@oxbowindustries.com>
Subject: SkyWater Proposed Expansion - Sewer Flow Information Needed

** NOTICE **: This email originated from outside of the SkyWater organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. ** NOTICE **:

All,

As follow up to the meeting that was held recently with City of Bloomington Utilities Staff I was hoping that you could provide me with the additional information requested below from our Utility Engineer.

Below is a graph of average daily sewer flows (in gpd) from the Skywater meter over the last 10 years. While the City has these average daily flow rates, we need to examine peak flow rates. To make sure we model Skywater's forecast flow correctly we need the following information:

1. *What is the peak flow rate from the existing pumping system at Skywater?*

Peak flowrate with current 3HP pumps are: 1 pump - ~150gm; both pumps - ~250gpm

2. *Are there multiple pumps that would increase the peak flow rate if more than one pump was needed?*

The current pump configuration for the wastewater system is 2 - 3HP pumps - lead & lag. The lag pump is set to operate automatically if the lead pump needs assistance

3. *At our meeting it was indicated that the pumps would not be upsized with the expansion. Please confirm that this is still the case.*

SkyWater does not need to upsize the pumps due to expansion needs, however, we have 5HP pumps as our current spares that would replace our 3HP pumps upon failure.

4. *Does Skywater have the ability to hold the sewer flows in a storage tank and discharge it at controlled rates or at off peak flow periods?*

SkyWater does not have the capability to hold the sewer flows. Our current tank volume is only 1250 gallons.

5. *Would Skywater please provide the City with electronic flow monitoring data from the sewer meter? Preferably a two week period with readings every 5 to 15 minutes.*

SkyWater is not currently able to monitor wastewater flow. We will try to connect a datalogger to see if we have the capability. In our walkthrough this morning, 7/18/2019, with Eric Schoon and Shawn Statesbery, they offered to add 'smart' (with integrated connection port for SkyWater's Facility Control System) hardware capability along with radios for ease of reading by City personnel to our wastewater and supply water pipes (4 meter/radio setups total) at no charge to SkyWater. Skywater has no issues with allowing the City of Bloomington to install the necessary hardware to obtain the data being requested.

6. *If meter data isn't possible would Skywater please share pumping data regarding pump starts and durations? Again this is to get an idea of the flow parameters from Skywater.*

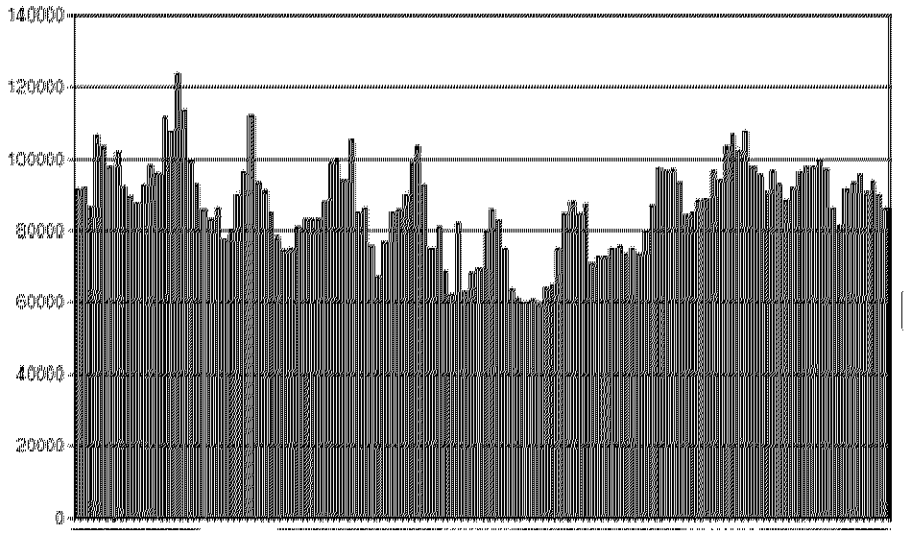
SkyWater does not have pump start and duration records. Only a totalizer for run time on each pump.

7. *The graph below shows some variation in average daily flow rates over the last 10 years. Does Skywater anticipate that daily flow rates will rise 20% higher than current flow rates or 20% higher than the largest flows experienced in 2010 records?*

The anticipated increase is to the current daily flow rate.

8. *Eventually we will need Skywater's sanitary sewer average daily and peak rate flow projections for their entire expanded facility. We understand that this is still in the works.*

The City will need this information soon so that if system upgrades are needed the design process can be started.



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Based on this additional information and our Utilities Engineer's analysis we will be able to determine if upgrades are needed and what those may entail.

Bryan – Regarding your voicemail I'd be happy to talk through the process and how that would affect your development application that you are putting together but I think some of that will be determined following the receipt of the information requested above and our Utilities Engineer's analysis.

If there are any additional questions please feel free to contact me. Thank you.

Brian Hansen | Development Coordinator
City of Bloomington | Public Works | Engineering
1700 West 98th Street | Bloomington, MN 55431
Direct: 952-563-4543
bhansen@BloomingtonMN.gov

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EXHIBIT – E
Construction Schedule

Activity ID	Activity Name	Original Duration	Start	Finish
Project Ice Castle		507.00	Jul-19-19	Jul-23-21
Milestones		243.00	Sep-16-19	Aug-31-20
SKY-20	Start Construction	0.00	Sep-16-19	
SKY-31	Substantial Completion/TCO	0.00		Aug-3-20
SKY-33	Final Completion	0.00		Aug-31-20
Preconstruction		46.00	Jul-19-19	Sep-24-19
City Entitlement Process		44.00	Jul-19-19	Sep-23-19
SKY-10	City Meeting to Review Parking Study	0.00		Jul-19-19*
SKY-11	DRC Submittal	0.00	Jul-24-19	
SKY-12	Post- App DRC Meeting	0.00	Aug-6-19*	
SKY-13	Planning Comission Meeting	0.00	Aug-29-19*	
SKY-18	City Council Meeting	0.00	Sep-12-19*	
SKY-21	City Council REZONING Hearing	0.00	Sep-23-19*	
Permitting		17.00	Aug-30-19	Sep-24-19
SKY-14	Demolition & Grading Permit	10.00	Aug-30-19	Sep-13-19
SKY-15	Sitework & Foundation Permits	15.00	Aug-30-19	Sep-20-19
SKY-16	MPCA - SWPPP Notification	10.00	Aug-30-19	Sep-13-19
SKY-17	Building Permit	17.00	Aug-30-19	Sep-24-19
Construction		468.00	Sep-16-19	Jul-23-21
Sitework		31.00	Sep-16-19	Oct-28-19
SKY-19	Mobilize (SWPP, Trailers, Etc)	5.00	Sep-16-19	Sep-20-19
SKY-22	Site Prep & Site Utilities	25.00	Sep-24-19	Oct-28-19
Substructure		40.00	Oct-14-19	Dec-10-19
SKY-23	Substructure (Foundations, Footings, Backfill, Slab On Grade)	40.00	Oct-14-19	Dec-10-19
Superstructure & Skin		43.00	Nov-4-19	Jan-9-20
SKY-25	Erect Precast	15.00	Nov-4-19	Nov-22-19
SKY-24	Erect Structural Steel	20.00	Nov-18-19	Dec-17-19
SKY-26	Decking & Detail	20.00	Nov-25-19	Dec-26-19
A1770	Roofing	11.00	Dec-20-19	Jan-9-20
Interior Buildout		180.00	Dec-16-19	Aug-31-20
SKY-27	MEP Equipment & Rough Ins	60.00	Dec-16-19	Mar-12-20
SKY-28	CIP Columns, SOG & Waffle Slab Structure	35.00	Feb-7-20	Mar-26-20
SKY-29	Fab and Sub Fab MEP Rough In	45.00	Mar-13-20	May-14-20
SKY-30	Fab and Sub Fab Interior Finishes & Devices	55.00	May-15-20	Aug-3-20
SKY-32	Facility Comissioning	20.00	Aug-4-20	Aug-31-20
Post Construction		225.00	Sep-1-20	Jul-23-21
SKY-34	Tool Installation	65.00	Sep-1-20	Dec-4-20
SKY-35	Owner Testing and Production	160.00	Dec-7-20	Jul-23-21

Remaining Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Project Ice Castle
Milestone Summary Schedule
Jul-23-19

McGough Construction