AGENDA OF THE PLANNING
COMMISSION
CITY OF BIRCHWOOD VILLAGE
WASHINGTON COUNTY, MINNESOTA
January 26th, 2023
7:00 P.M.

CALL TO ORDER

APPROVE AGENDA

REGULAR AGENDA

A. Appoint Secretary to take Minutes for this 1/26/2023 Meeting in Lieu of Michael Kraemer's Absence
B. Approve Dec 1 PC Meeting Minutes* (pp. 2-4)
C. Review Current Commissioner Terms* (p. 5)
D. Review Variance Application 23-01-VB (469 Lake Ave)* (pp.6-95)

ADJOURN

* Denotes items that have supporting documentation provided

MEETING MINUTES (Draft)

Birchwood Planning Commission Regular Meeting

City Hall - 7:00 PM Regular Meeting 12/1/2022

Submitted by Michael Kraemer – secretary

COMMISSIONERS PRESENT: —- Andy Sorenson - Chairman, Ryan Hankins – Vice Chairman, Joe Evans, Michael Kraemer

COMMISSIONERS ABSENT: Michelle Maiers-Atakpu

OTHERS PRESENT: None

CALL TO ORDER Meeting called to order by Chairman Andy Sorenson at 7:10 PM.

1. PUBLIC FORUM – none
2. APPROVE AGENDA
    a. Introduction by Chairman Andy Sorenson to add Items D – Review of Planning Commission Members scheduled terms, Item E – Review of December meeting date, and Item F – Procedures to allow participation by planning commission members if they plan to be out of town.
    b. Hankins moved to add Items D through F to the agenda and was 2nd by Evans. Vote: Yes – 4, No – 0. Motion to approve amended agenda passed.
3. REGULAR AGENDA
    a. Item A – Review/Approve October 27, 2022 Meeting Minutes
        i. Motion by Sorenson, 2nd by Hankins to correct a typo on Item 3.d.ii and approve as corrected. Vote: Yes - 4, No – 0, Motion to approve the corrected minutes passed.
    b. Item B – 8 Oak Hill Ct Rooftop Solar Project Conditional Use Permit
        i. Danielle DeMarre – Director of Permissions and Design with All Energy Solar was present representing the system designer and property owner.
        ii. Commission discussion included the following:
            1. Review of project parties responsible for design, permitting and compliance with City of Birchwood City Code and Minnesota State Electrical Code.
            2. Ms DeMarre indicated the project is being reviewed by Xcel Energy and has already addressed interconnect requirements and has received Xcel Energy interconnect permit.
            3. Ms. DeMarre clarified Commission plan review questions regarding roof access setbacks for fireman access as addressed in the MN State Electrical Code.

4. Ms. DeMarre indicated the design life of the project is 25 years and at the end of that period the de-commissioning and disposal of the solar array is the total responsibility of the property owner.

iii. ***Commission Action:***

1. The advisory motion to recommend approval of the projects Conditional Use Permit as presented was made by Hankins and 2nd by Evans. Vote Yes – 4, No—0 Advisory motion passed.

iv. *Commission Suggestion for Future City Code Review*: The Commission suggested the city review its CUP for Solar Projects and consider adding an element of roof structural strength review to ensure a qualified person is reviewing and signing off that the structure can support the proposed additional solar system load.

c. Item C – Review "Building in the City of Birchwood" Document.

1. The Commission reviewed the "Building in the City of Birchwood" document prepared by Commission members Joe Evans and Ryan Hankins. The purpose of the document is to provide a narrative aid to assist residents of the Village who may be contemplating projects or work on their property. The document is intended to review procedures, processes and permits and assist property owners in understanding the City's processes.
2. ***Commission Action:*** Motion by Hankins and 2nd by Kraemer to thank Commissioner Evans the work preparing the document, recommend the document be brought to the Council for review and support and added to the City web site at a point in early calendar year 2023. Vote Yes – 4, No—0. Motion adopted.

d. Item D – Planning Commissioner's Terms

i. ***Commission Request:***

1. The city clerk reviews the current Planning Commissioner's appointment dates and prepare of summary of duration of existing terms and which ones are up for re-appointment in January 2023.

2. The city clerk adds an agenda item to the January 2023 Planning Commission agenda identifying re-appointment action needed and adding the annual election of Commission officers for 2023.

e. Item E – December 22, 2022 Meeting Date

i. ***Commission Action:***

1. It was determined that most Commissioners would be available for the December 22, 2022 meeting date if needed so there was no need to change the meeting date to avoid the holiday. No action taken.

4. ADJOURN 8:17 PM

a. Motion by Hankins, 2nd by Evans to adjourn meeting. Vote: Yes – 4, No – 0. Motion passed.

Planning Commissioner Terms As of 2023.01.10 City Council Meeting

Planning Commissioner	Term start date	Appointed	Term Expiration	Role	Notes
Michelle Maiers-Atakpu	Jan 2021	April 2021	Dec 2023		In April 2021 she was appointed to fill the vacancy of John Lund whose term began in Jan 2021 and will expire Dec. 2023.
Michael McKenzie	Jan 2021	Jan 2023 (to fill the vacanacy)	Dec 2023	Secretary	In January 2023, he was appointed to fill the vacancy of Ryan Hanson who was appointed in Jan 2021 and term expires Dec 2023
Mike Kraemer	Jan 2021	Jan 2021	Dec 2023	Secretary	
Joe Evans	Jan 2022	Jan 2023 (officially appointed to begin the term that started in Jan 2022)	Dec 2024		Joe Evans appointed in July, 2021 to complete the previous commissioner's term that ran until Dec 2021. His new term then started in Jan 2022. In January of 2023 he was appointed (backdated) to his term that began Jan 2022 and will end December 31st 2024.
Andy Sorenson	Jan 2023	Jan 2023	Dec 2025	Chair	

City of Birchwood Village

Petition for Variance Application

207 Birchwood Ave, Birchwood, MN 55110
Phone: 651-426-3403 Fax: 651-426-7747
Email: info@cityofbirchwood.com

FOR OFFICIAL USE ONLY

Application Received Date: _____ Amount Paid: $_____

Payment Type (Circle One): **Cash** / **Check** / **Money Order** / **Credit Card**

Check/Money Order #_____

Application Complete? Yes ☐ No ☐ If no, date application was deemed complete: _____

Signature of City Planner: _____ Date: _____

Completed requests for variances submitted prior to the first Thursday of the month will be considered by the Planning Commission at its next meeting on the fourth Thursday of the month. Requests submitted after the first Thursday of the month will be considered at the following meeting. All final decisions on variance applications are made by the City Council, which meets on the second Tuesday every month.

1. Name of Applicant(s) Dr. Jim Barthel

   Address 469 Lake Avenue

   City Birchwood Village State MN Zip Code 55110

   Business Phone N/A Home Phone 651-283-1453 (cell)

2. Address of Property Involved if different from above: Same as above.

3. Name of Property Owner(s) if different from above and describe Applicant's interest in the property:
   Same as above.

4. Specific Code Provision from which Variance is requested: See attached Addendum, 1/4/23.

5. Describe in narrative form what the Applicant is proposing to do that requires a variance:
   See attached Addendum, 1/4/23.

6. Type of Project:

- □ New Construction (empty lot)
- □ Addition
- □ Demolition
- □ Landscaping
- □ Repair or removal of nonconforming structure
- ☒ Other (describe) Remove existing home, build new home. Existing attached garage to remain.

7. Type of Structure Involved:

- ☒ Single Dwelling
- □ Double Dwelling
- □ Garage
- □ Addition
- □ Tennis Court
- □ Pool
- □ Grading/Filling
- □ Other (describe) _____

8. Using the criteria from the City Code for a variance (see last page), explain why a variance is justified in this situation and describe what "Practical Difficulties" exist:

See attached Addendum, 1/4/23.

9. Describe any measures the Applicant is proposing to undertake if the variance is granted, including measures to decrease the amount of water draining from the property:

See attached Addendum, 1/4/23.

10. Describe any alternatives the Applicant considered (if any) that do not require a variance:

Per current City Code, the existing lot is by definition a non-conforming lot and it is therefore impossible to proceed with permitted construction without requesting variance to applicable City Code, as requested in this Application.

11. Can an emergency vehicle (Fire Truck or Ambulance) access all structures on the property after the proposed change? Yes ☒ No □

12. Does the proposed change bring any other nonconforming use into conformity with the City Building Code? Yes □ No ☒

    If yes, explain: _____

    _____

13. Are there other governmental regulations that apply to the proposed action, including requirements of the Rice Creek Watershed District? Yes □ No ☒

    If yes, please identify the regulations AND attach evidence demonstrating compliance:

    _____

14. Please provide the applicable information in the following Table:

	EXISTING	PROPOSED	CHANGE
1. Total Square Footage of Lot	13,029 sf	13,029 sf	0 sf
2. Maximum Impervious Surface (25% of item 1)	3,257.25 sf	3,257.25 sf	0 sf
3. Roof Surface	2,286 sf	3,021 sf	+735 sf
4. Sidewalks	691 sf	0 sf	-691 sf
5. Driveways	1,071 sf	643 sf	-428 sf
6. Other Impervious Surface	101 sf	14 sf	-87 sf
7. Total of Items 3-6	4,149 sf	3,678 sf	-471 sf
8. Percent Impervious Surface	31.84%	28.2%	-3.64%
9. Percent Impervious Surface after Mitigation	(no mitigation) 31.84%	16.2%	-15.64%

15. Please attach the following:

    ☒ Legal description of property.

    ☒ Plot plan drawn to scale showing existing and proposed new and changed structures on the lot. Also show existing structures on adjacent lots.

Files available for download:
https://sathre.sharefile.com/d-sd477538d04054cd7a47b1b0f1fcde608

Criteria for Granting a Variance. Pursuant to Minn. Stat. Sec. 462.357, subd. 6, as it may be amended from time to time, the Planning Commission may issue recommendations to the City Council for variances from the provisions of this zoning code. A variance is a modification or variation of the provisions of this zoning code as applied to a specific piece of property.

Variances to the strict application of the provisions of the Code may be granted, however, no variance may be granted that would allow any use that is prohibited within the City. Conditions and safeguards may be imposed on the variances so granted. A variance shall not be granted unless the following criteria are met:

SUBD. 1.

A. Variances shall only be permitted
   i. when they are in harmony with the general purposes and intent of the ordinance and
   ii. when the variances are consistent with the comprehensive plan.

B. Variances may be granted when the applicant for the variance establishes that there are practical difficulties in complying with the zoning ordinance.

SUBD. 2. "Practical difficulties," as used in connection with the granting of a variance, means that

i. Special conditions or circumstances exist which are peculiar to the land, structure, or building involved.

ii. The condition which result in the need for the variance were not created by the applicant's action or design solution. The applicant shall have the burden of proof for showing that no other reasonable design solution exists.

iii. The granting of a variance will result in no increase in the amount of water draining from the property.

iv. Granting the variance will not impair an adequate supply of light and air to adjacent property, or unreasonably diminish or impair established property values within the surrounding area, or in any other respect impair the public health, safety, or welfare of the residents of the City.

v. No variance shall be granted simply because there are no objections or because those who do not object outnumber those who do.

vi. Financial gain or loss by the applicant shall not be considered if reasonable use for the property exists under terms of the Zoning Code.

NOTICE:

***The City and its representatives accept no responsibility for errors and/or damages caused due to incomplete and/or inaccurate information herein. It is the responsibility of the applicant to ensure the accuracy and completeness of this information.**

***The City will hold applicant responsible for any damage to public property that occurs in the course of performing the activities of this permit.**

***Under penalty of perjury the applicant declares that the information provided in and enclosed herewith is complete and all documents represented are true and correct representations of the actual project/building that will be built in conformance with such representation if approved.**

Signature of Applicant: James Barthel Date: 01/05/23

January 4, 2023

Addendum to Petition for Variance Application

Dr. James Barthel, 469 Lake Avenue, City of Birchwood Village

4. Specific Code Provision from which Variance is requested:

   1) Variance Request (Impervious Surface Surfaces), City Code 302.050 IMPERVIOUS SURFACES
      a. A variance is required because the proposed lot coverage exceeds the 25% impervious surface coverage allowable by current City Code. The existing impervious surface coverage of the property is 31.84% and the proposed plan is requesting a variance to allow 28.2% coverage.

   [Note: It is our understanding that the following Variances have been previously requested and approved, as recorded in full detail in City of Birchwood Village Minutes of City Council Meeting Via Teleconference, March 8, 2022, 7:00 PM and City of Birchwood Village Memorandum, March 24, 2022.

   2) Variance Request #1 (Minimum Lot Width Requirement): A variance from City Code 302.015. UNDERSIZED LOTS.
      a. Minimum lot width requirement at front building line is 42 feet, which is less than the City Code required minimum lot width of 48 feet (80 feet x 60%.)
   3) Variance Request #3 (Minimum Setback Requirement for the North Side Yard): A variance from City Code 302.020.2. MINIMUM SETBACK REQUIREMENTS.
      a. Revised setback of 8.5 feet on both the north and south property lines for 64 feet. This is a 2.5 feet improvement over the existing condition on the north side and maintains the same setback on the south side.
   4) Variance Request #4 (Minimum Setback Requirement for the South Side Yard): A variance from City Code 302.020.2 MINIMUM SETBACK REQUIREMENTS.]
      a. Revised setback of 8.5 feet on both the north and south property lines for 64 feet. This is a 2.5 feet improvement over the existing condition on the north side and maintains the same setback on the south side.

   [Note: Variance Request #2 (Minimum Setback Requirement for the Driveway): A variance from City Code 302.020.2 was denied at the March 8, 2023 City Council Meeting. This site concern was addressed internally by moving the driveway adjacent to the structure and maintaining the required 1' ft setback on the south property line.]

5. Describe in narrative form what the Applicant is proposing to do that requires a variance:

   See Letter from Homeowner, dated January 4, 2023. The Homeowner endeavors to improve his property by removing the existing home and building a new home that keeps with the character and scale of the neighborhood and allows him to age in place and enjoy his property.

The Homeowner has worked closely with Architect, Michael Sharratt, Sharratt Design and Company, Builder, Kyle Hunt, Kyle Hunt & Partners, and Civil Engineer, Dan Schmidt, Sathre-Bergquist, to design a home that both fits as closely as possible within the required City codes and confines of the lot.

A variance is required because the proposed lot coverage exceeds the 25% impervious surface coverage allowable by current City Code. The existing impervious surface coverage of the property is 31.84% and the proposed plan is requesting a variance to allow 28.2% impervious surface coverage, after mitigation, 16.2% impervious surface coverage.

8. Using the criteria from the City Code for a variance (see last page), explain why a variance is justified in this situation and describe what "Practical Difficulties" exist:

These difficulties must be and are unique to the property as it exists. The land owner also has rights and privileges to any legal non-conformities that exist not created by the land owner.

1) Lot size is non-conforming in size / area:

The required minimum lot size is 15,000 SF. 469 Lake Avenue is 13,029 SF, which equates to only 87% of the required area. When combined with the lot length of over 300 feet, by calculation and actuality, this property is very deep relative to its width. This unchangeable characteristic logically causes structure and driveway surfaces to be excessive beyond what would be required on a more "normal" lot. The ratio of lot depth to lot width at the front setback is 13%. A lot of 13,029 SF that has the minimum 80 feet of width required could be only 163 feet deep, or 49%. This differential in the nature of lot area, combined with its shape, is a clear practical difficulty to put the property to a reasonable use when compared with conforming lots.

2) Lot width is extremely non-conforming:

The required minimum lot width is 80 feet at the "front building line." 469 Lake Avenue is 41 feet wide at this location, which equates to only 51% of the required width. Per Section 302.015 of the Birchwood Village Zoning Code, the city has a provision for what it terms "undersized lots." It states the following:

> *"Any lot of record as of January 1, 1975, which remains in its then-existing dimensions and which does not meet the requirements of the Code may nevertheless be utilized for single-family detached dwelling purposes provided the requirements of 302.010 are at least 60% of those required."*

As stated above, 469 Lake Avenue is only 51% as wide as the minimum required for standard lots, or 15% smaller than what Birchwood requires for an "undersized lot." There are many practical difficulties for 469 Lake Avenue that Dr. Barthel did not create, including lot size, length, width, elevation, and present structures. The very obvious issue of width non-conformity cannot be changed in order to put 469 Lake Avenue to a

reasonable use. The existing home located on the property is 30.3 feet wide, while the proposed home width is 28.0 feet wide. This building width reduction is an obvious effort to propose a reasonable and responsible project.

3) Existing hardcover is non-compliant at 31.84%:

The existing hardcover is the same as it was when Dr. Barthel purchased 469 Lake Avenue in 1998. The proposed project, through the use of scientifically engineered mitigation practices, is reducing the effective hardcover to 16.0% — significantly below the existing non-conforming hardcover. These types of mitigation systems are available to help create a high level of improvement to storm water run-off, whereas in the past this issue was not addressed at all. This action is proposed to significantly address getting run-off water into the ground immediately, in lieu of surface drainage directly into the lake or affecting immediate neighbors in any way.

4) Existing non-conforming garage to remain:

Dr. Barthel has utilized this garage since he purchased the property in 1998. The practical difficulties involved in allowing this structure to remain are as follows:

- By Minnesota state statutes, it is a legal non-conformity that is allowed to remain without expansion.
- In an age of diminishing earth's resources, significant revisions or complete removal and rebuilding of similar lake-related storage is unreasonable, unnecessary, and wasteful.
- A landfill is not the correct location for an existing and functional asset such as this. Therefore, we have made all efforts to preserve this amenity.

5) Alternative pursuits to addressing practical difficulties:

Through an extensive and long design process, many options were investigated to put this property to a reasonable use. Design options needed to address each of the following factors:

a. Respectful and responsible use of the land through an approach of betterment.
b. Addressing Dr. Barthel's needs of health and of creating an easy-to-use home.
c. Meeting or exceeding Birchwood Village requirements in a reasonable way given the constraints of a very non-conforming site.
d. Recognizing this project does not change the use of the land as single-family use.
e. Meeting the goals of time and economics.

It is no small task to blend all of these disparate elements into a cohesive response. This can only happen through the thorough investigation of many alternatives, which the Barthel team has pursued. This proposal is the culmination of all those alternative design and engineering efforts.

9. Describe any measures the Applicant is proposing to undertake if the variance is granted, including measure to decrease the amount of water draining from the property:

   To mitigate the 28.2% proposed Impervious Surface, a Pavedrain system will be installed on the property. This system is designed to collect and disperse stormwater runoff, effectively mitigating the proposed Impervious Surface to 16.2%.

   Drainage Area Stormwater Management Plan, Hydrocad Report, Pave Drain product specifications, Existing and Proposed Survey documents are posted for viewing/download at:

   https://sathre.sharefile.com/d-sd477538d04054cd7a47b1b0f1fcde608

January 4, 2023

Re: Variance Application, 469 Lake Avenue, Submission 1/4/23

Letter from the Homeowner:

Hello, I am Dr. Jim Barthel and I am on the property at 469 Lake Ave. in Birchwood Minnesota since 1998. I am 74 years old and unfortunately have been diagnosed with the early stages of Parkinson's disease. I say that not looking for pity, but to help you understand that I am designing a home that will allow me to live out my years, I guess they use the term "age in place."

I have always loved the area and have decided to make the investment in a new house on this property to live out the rest of my years.

I have enlisted the team of Kyle Hunt, of Kyle Hunt & Partners, as my builder and Mike Sharratt of Sharratt Design company, as my architect. They have enlisted Dan Schmidt of Sathre Bergquist, for the surveying and civil engineering.

I have been asked to comment on the practical difficulties of this property, as you can see the property runs quite deep from street to lake, running over 300 feet, this causes the inherent issue of a longer driveway if you want to place your home closer to the lake, which is my desire. The long driveway of course equates to a likely higher percentage of hardcover. The lot is quite narrow as well, measuring less than 50 feet in width throughout much of the buildable area which makes for a very, very narrow house when considering the current ordinance of 10 foot side yard setbacks, which the current structure does not abide by. I would like to replace my home with something that still has a sense of scale, but also allows for more than one room of the width facing the lake.

I have enjoyed living on White Bear Lake for many years, I raised my daughters right here in Birchwood and have owned this property since 1998. Mike Sharratt has designed a home that I think is a very good response to all of the non-conforming aspects of this site. I would appreciate your consideration for the time, effort and thoughtfulness this plan provides for me to be able to live out my years here in Birchwood. Thank you again.

Sincerely,

AuthentiSIGN'
James Barthel 01/05/23

Dr. Jim Barthel

Certificate ID: EF1C48E3-4F8D-ED11-AC20-0050F2765AB1

Signing Information:

Signing Name: Barthel Variance Application, January 2023

ID: EF1C48E3-4F8D-ED11-AC20-0050F2765AB1

Start Date: Jan 05, 2023 05:23:01 PM CST **End Date:** Jan 05, 2023 05:33:25 PM CST

 # Signers: 1 **# Reviewers:** 0 **# CC:** 0

Creator: Kyle Hunt **Email:** kyle.hunt@kylehuntpartners.com

Document Information:

Document Name: COMBINED_VARIANCE_APPLICATION 2023

ID: 28725713-508D-ED11-AC20-0050F2765AB1

Pages: 9 **# Signature Blocks:** 2 **# Initial Blocks:** 0

Participant Activity:

Name: James Barthel **Type:** RemoteSigner

Email: jh47barthel@gmail.com

TOS/STAESP/CCD: Accepted: Jan 05, 2023 05:28:10 PM CST [74.222.71.108]

EULA/TOS Version: https://secure.authentisign.com/assets/files/Authentisign_TOS_202106.pdf

STAESP Version: https://secure.authentisign.com/assets/files/Authentisign_STAESP_202106.pdf

CCD Version: https://secure.authentisign.com/assets/files/Authentisign_CCD_202106.pdf

Document: Signed And Accepted: Jan 05, 2023 05:33:24 PM CST [74.222.71.108]

Signature / Initials:

Signature:

Initials:

Certificate ID: EF1C48E3-4F8D-ED11-AC20-0050F2765AB1

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Scope of Consent

You agree to receive electronic notices, disclosures, and electronic signature documents with all related and identified documents and disclosures provided over the course of your relationship with the **Sender**. You may at any point withdraw your consent by following the procedures described below.

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To receive the above information electronically, you will need all of the following:

- a computer or tablet device with internet access
- a working individual email address
- a supported operating system and browser from list table below

Operating System	Apple Safari	Mozilla® Firefox	Edge	Chrome
Windows 7/8/10	N/A	60 or higher	84 or higher	80 or higher
Mac OS X 10.9 or higher	13.1 or higher	60 or higher	N/A	80 or higher
Android 7.0 or higher	N/A	N/A	N/A	80 or higher
Apple - IOS 10.0 or higher	13.5 or higher	N/A	N/A	80 or higher

JavaScript and Cookies must be enabled in the browser.

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- Email Subject line: "Request for Paper Documents"
  Include your full name, email address, telephone number, postal address and the signing name found in the **Invitation** in the body of the email.
  *Note: There could be per page and delivery fees required by the **Sender** to send the paper documents.*
- Email Subject line: "Withdraw Consent to Conduct Business Electronically"
  Include your full name, email address, telephone number, postal address and the signing name found in the **Invitation** in the body of the email.
- Email Subject line: "Update Contact Information"
  Include your full name, email address, telephone number, postal address and the signing name found in the **Invitation** in the body of the email, along with the requested change(s) to your contact information

SATHRE-BERGQUIST, INC.

150 SOUTH BROADWAY, WAYZATA, MINNESOTA, 55391

TEL:(952)476-6000 FAX:(952)476-0104 WEB:WWW.SATHRE.COM

Response Memorandum

To: City of Birchwood

From: Dan Schmidt, P.E.
Sathre-Bergquist, Inc.

Date: January 5, 2023

Regarding: Thatcher Engineering, Inc. Memorandum dated March 24, 2022

Applicant: Dr. James Barthel. 469 Lake Avenue, Birchwood Village, MN 55110

City of Birchwood:

Please see our responses to the TEI Comments shown in blue.

Based on TEI's understanding of the Updated Plan, it shows that an impervious surface calculation done using the City Code's definition of impervious surface is required and has not been submitted. This Updated Plan cannot be further reviewed by the City until after an impervious surface calculation done using the City Code's definition of impervious surface is submitted.

Response: The original submittal had the hard cover calculations broken down a couple of different ways. The Proposed Hard Cover was shown On the Proposed Certificate of Survey just below the title block in red as shown below:

Proposed Impervious Areas

Lot Area	=	13,029 S.F.
House Area	=	1,808 S.F.
Existing Garage Area	=	959 S.F.
Utility Pads Area	=	14 S.F.
Entry Porch Area	=	30 S.F.
Screen Porch Area	=	224 S.F.
Impervious Driveway	=	643 S.F.
Total Area	=	3,678 S.F.

Pre-Mitigation
Impervious Surface Coverage = 28.2%

Proposed Pervious Areas

Pervious Sidewalk Area	=	297 S.F.
Pervious Patio Area	=	319 S.F.
Pervious Driveway	=	1,094 S.F.

City Code 300.020.24 states: "Impervious Surface. A ground surface covered or compacted with material so as to substantially retard the entry of water into the soil, and to cause water to remain on the surface or to run off the surface in greater quantities or at an increased rate of flow than would occur if there was a natural soil surface.

Impervious surfaces shall include improvements utilizing concrete, asphalt, gravel, or other non- porous materials. Examples of impervious surfaces include, but are not limited to, roads, driveways, parking areas, swimming pools, sidewalks, patios, **rooftops**, and covered decks.

Examples of impervious surfaces resulting from compacting are unpaved or un-graveled driveways and parking areas.

Response: The Pave Drain system has been a proven infiltration system and has also been specifically designed to be a reservoir for storm water. It has accepted installation techniques that prevent the compaction of the existing soils and can be seen in the attached brochure. The Pave Drain system is designed for the purpose to infiltrate water into the ground. It is a widely accepted Best Management Practices by the Minnesota Storm Water Manual. The following is a clip from the Minnesota Storm Water Manual.

PERMEABLE PAVEMENT

BMPS FOR STORMWATER FILTRATION > PERMEABLE PAVEMENT

Green Infrastructure: Permeable pavement can be an important tool for retention and detention of stormwater runoff. Permeable pavement may provide additional benefits, including reducing the need for de-icing chemicals, and providing a durable and aesthetically pleasing surface.

An example of pervious concrete.

Permeable pavements allow stormwater runoff to filter through surface voids into an underlying stone reservoir for temporary storage and/or infiltration. The most commonly used permeable pavement surfaces are pervious concrete, porous asphalt, and permeable interlocking concrete pavers (PICP). Permeable pavements have been used for areas with light traffic at commercial and residential sites to replace traditional impervious surfaces in low-speed roads, alleys, parking lots, driveways, sidewalks, plazas, and patios. While permeable pavements can withstand truck loads, permeable pavement has not been proven in areas exposed to high repetitions of trucks or in high speed areas because its' structural performance and surface stability have not yet been consistently demonstrated in such applications. https://stormwater.pca.state.mn.us/index.php/Permeable_pavement

An impervious surface calculation done using the City Code's definition of impervious surface is required for the following reason:

1. The Updated Plan states: "Treated Impervious: This is the building area that is impervious but infiltrated in the Pave Drain system" and uses this area as a pervious surface in the calculation. However, this Treated Impervious building area is a rooftop and is an impervious surface based on the City Code's definition of impervious surface.

Response: The revised plans have broken down the surface area categories into 4 categories on the Drainage Area Sheet:

Drainage Area	Pervious, Grass (sf)	Pervious BMP (sf)	Impervious (sf)	Total (sf)	Untreated Impervious
8p	1024.5		1112.5	2137.0	1112.5
7P	644.5	2031.0	1567.5	4243.0	0.0
10P	290.0			290.0	0.0
5P	5043.0	0.0	998.0	6040.0	998.0
12P		319.0	0.0	319.0	0.0
	==========	==========	==========	==========	==========
	7002	2350	3678	13029	2110.5
	Impervious Surface Coverage		28.2%		
	Untreated Impervious Percentage		16.2%		
Notes:					
1.0 Pervious pavers with 3 feet of separation from the water table is not considered impervious.					
2.0 The first 1.1 inches of rainfall flowing over the PaveDrain system will be infiltrated and will be considered mitigated.					

CONCLUSIONS

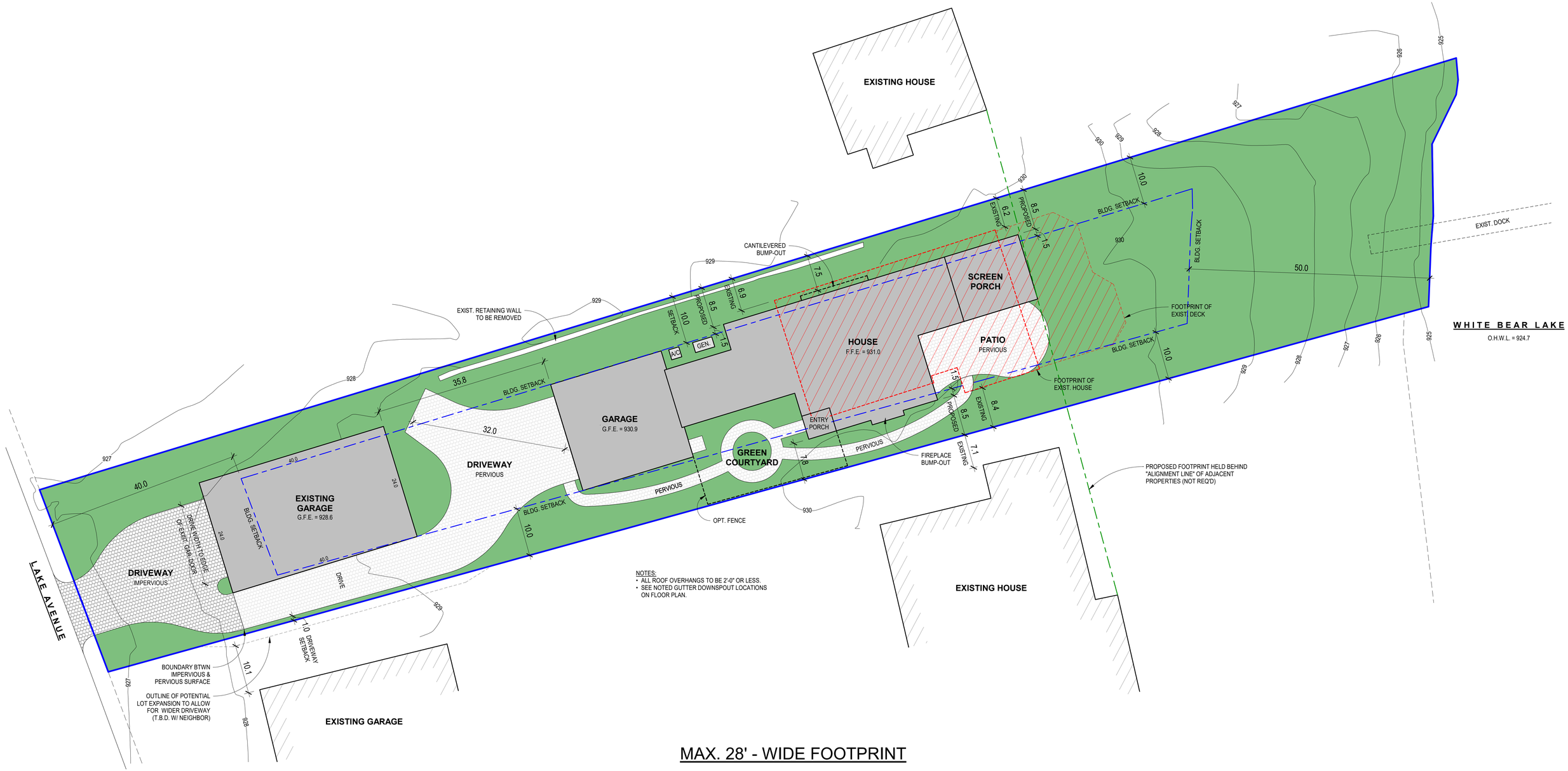
1. The information in the Updated Plan does not meet City Code requirements.
   Response: We believe the plans with the additional information meet the City Code Requirements.

2. The Updated Plan cannot be further reviewed by the City until after an impervious surface calculation done using the City Code's definition of impervious surface is submitted
   Response: See attached plans and attached tables.

If you have any questions or comments, please contact me at 952-476-6000.

Daniel L. Schmidt

Daniel L. Schmidt
Professional Land Surveyor, Registration Number 26147



NOTES:
- ALL ROOF OVERHANGS TO BE 2'-0" OR LESS.
- SEE NOTED GUTTER DOWNSPOUT LOCATIONS ON FLOOR PLAN.

MAX. 28' - WIDE FOOTPRINT

PRELIMINARY ARCHITECTURAL SITE PLAN
1" = 10'-0"

(PER EXISTING & PROPOSED SURVEYS PREPARED BY SATHRE-BERGQUIST, INC.)

N

sharratt design company

464 SECOND STREET
SUITE 100
EXCELSIOR, MN 55331

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info@sharrattdesign.com

PROJECT TEAM

ARCHITECT

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464 SECOND STREET, SUITE 100
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CONTACT: MIKE SHARRATT (952-470-9750)

STRUCTURAL ENGINEER

T.B.D.

GENERAL CONTRACTOR

KYLE HUNT & PARTNERS
18324 MINNETONKA BLVD
DEEPHAVEN, MN 55391
CONTACT: (952-476-5999)

SHEET INDEX

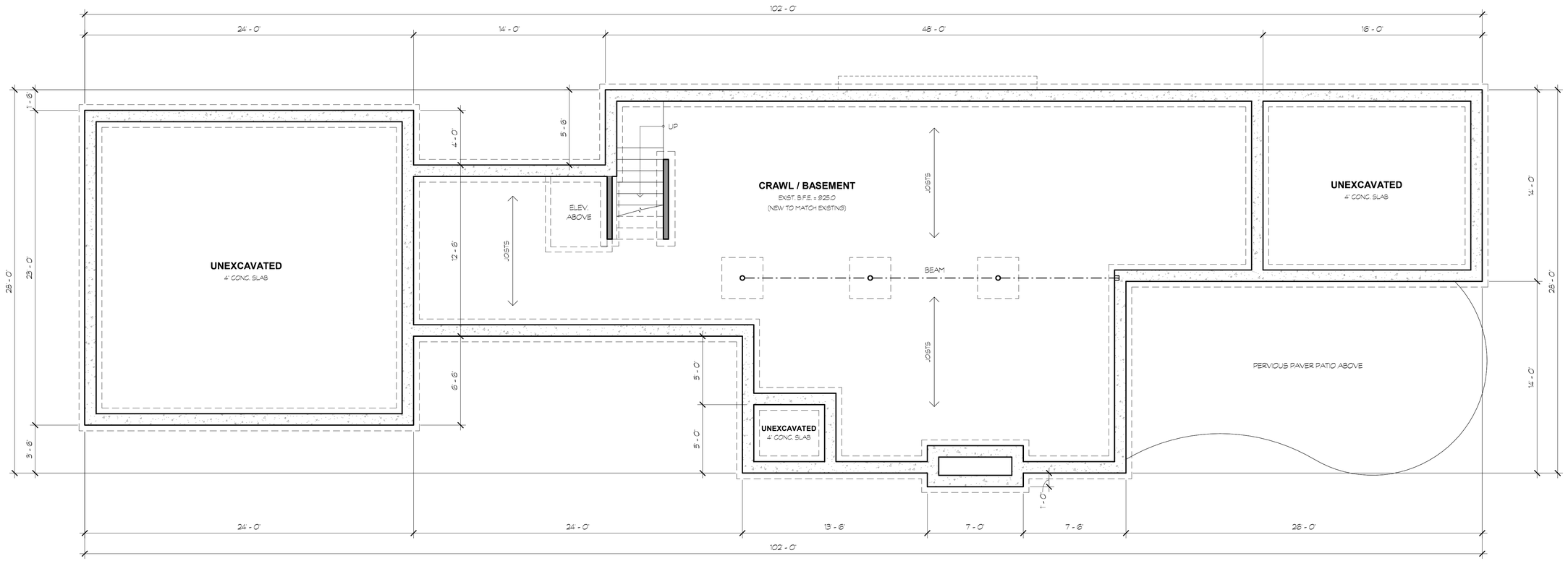
ISSUED FOR	07/16/21	08/26/21	09/07/21	10/29/21	11/04/21	12/15/21	12/22/21	01/03/22	01/04/22	01/05/22	01/17/22	02/16/22	11/30/22
PROGRESS SET	X	X	X	X	X	X	X	X	X	X	X	X	X
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A1 NUMBER



FOUNDATION PLAN

1/4" = 1'-0"

0' 5' 10' 20'

sharratt design & company

464 SECOND STREET
SUITE 100
EXCELSIOR, MN 55331

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PROJECT TEAM

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SHEET INDEX

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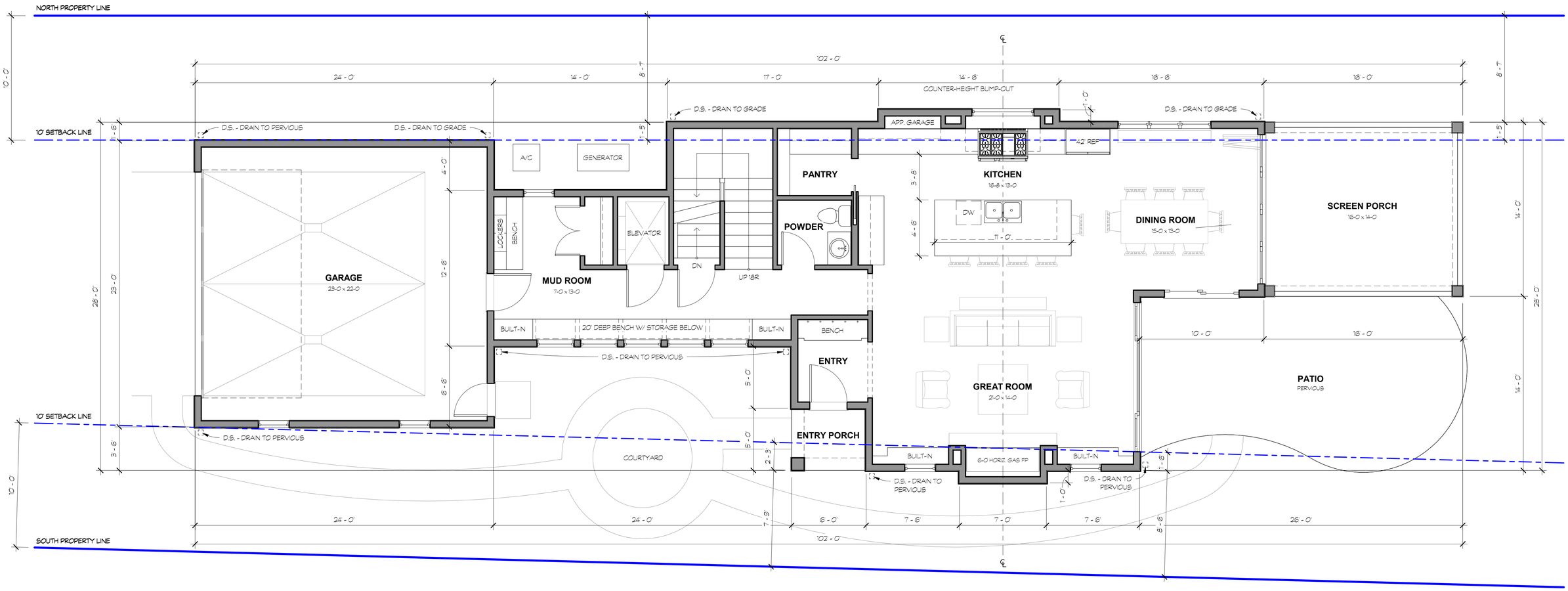
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A2 NUMBER



MAIN LEVEL FLOOR PLAN

1/4" = 1'-0"

0' 5' 10' 20'

MAX. 28' - WIDE FOOTPRINT

LIVING SPACE	
MAIN LEVEL	1262 SF
UPPER LEVEL	1623 SF
Grand total	2885 SF

ADDITIONAL SPACE	
GARAGE	546 SF
SCREEN PORCH	224 SF
ENTRY PORCH	30 SF
PATIO	225 SF
MASTER TERRACE	224 SF
Grand total	1249 SF

sharratt design & company

464 SECOND STREET
SUITE 100
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PROJECT TEAM

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STRUCTURAL ENGINEER

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GENERAL CONTRACTOR

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18324 MINNETONKA BLVD
DEEPHAVEN, MN 55391
CONTACT: (952-476-5999)

SHEET INDEX

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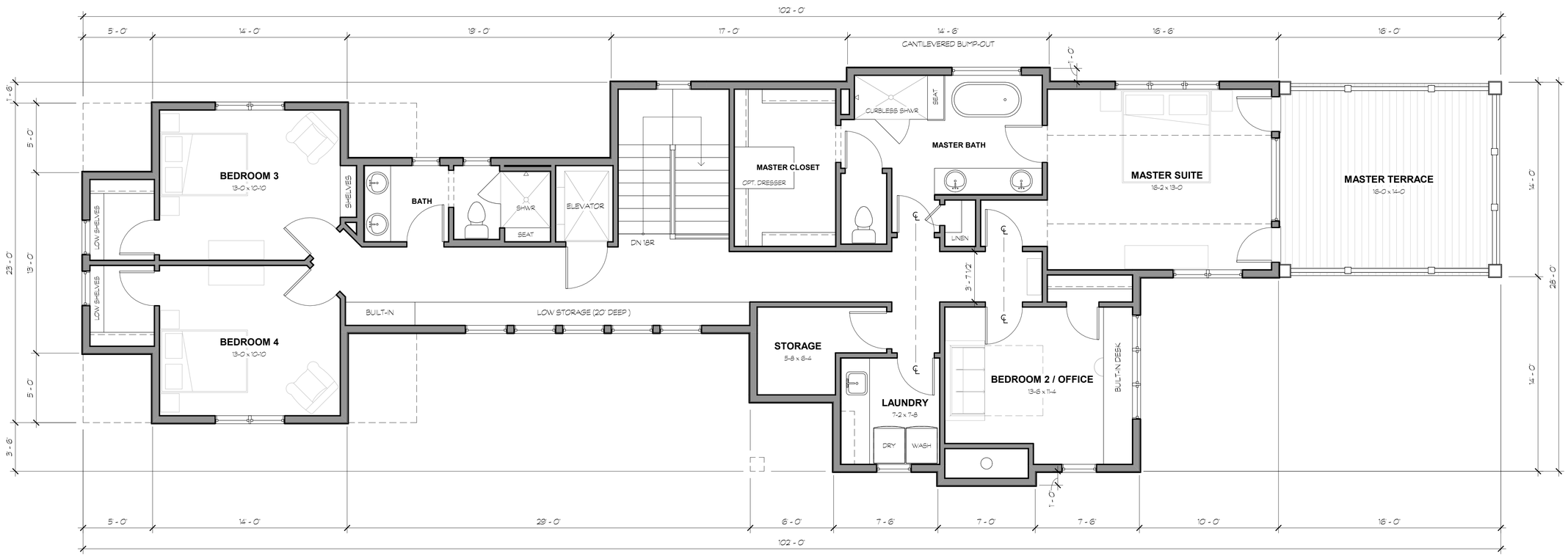
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A3 NUMBER



UPPER LEVEL FLOOR PLAN

1/4" = 1'-0"

0' 5' 10' 20'

LIVING SPACE	
MAIN LEVEL	1262 SF
UPPER LEVEL	1623 SF
Grand total	2885 SF

ADDITIONAL SPACE	
GARAGE	548 SF
SCREEN PORCH	224 SF
ENTRY PORCH	30 SF
PATIO	225 SF
MASTER TERRACE	224 SF
Grand total	1249 SF

sharratt design & company

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PROJECT TEAM

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SHEET INDEX

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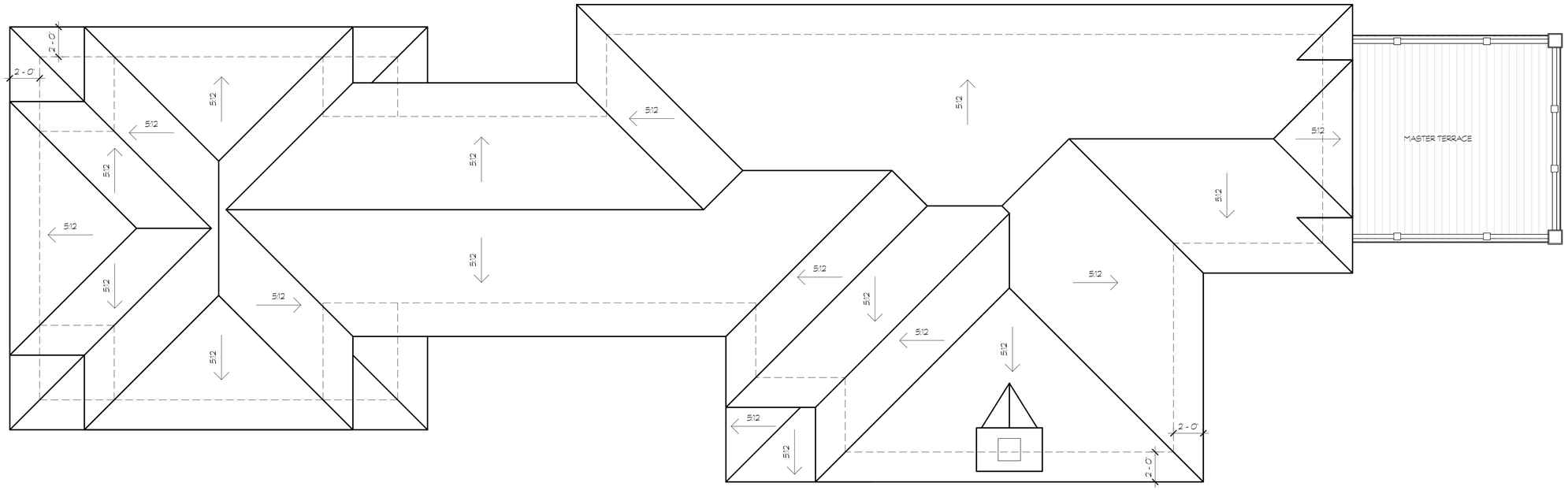
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A4 NUMBER



NOTE: ALL ROOF OVERHANGS TO BE 2-0" OR LESS

ROOF PLAN

1/4" = 1'-0"

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PROJECT TEAM

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DEEPHAVEN, MN 55391
CONTACT: (952-476-5999)

SHEET INDEX

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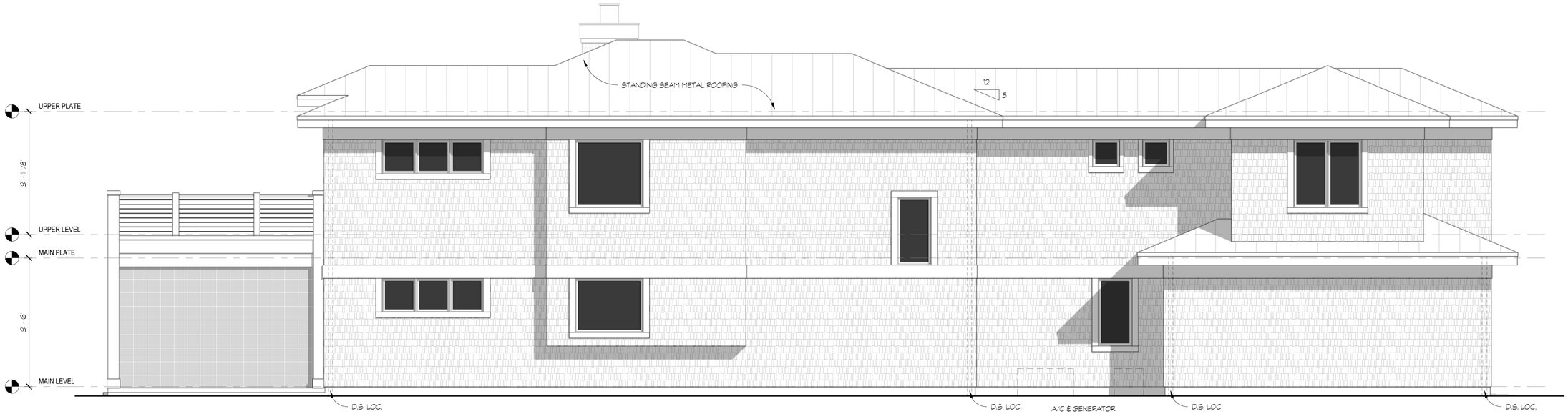
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

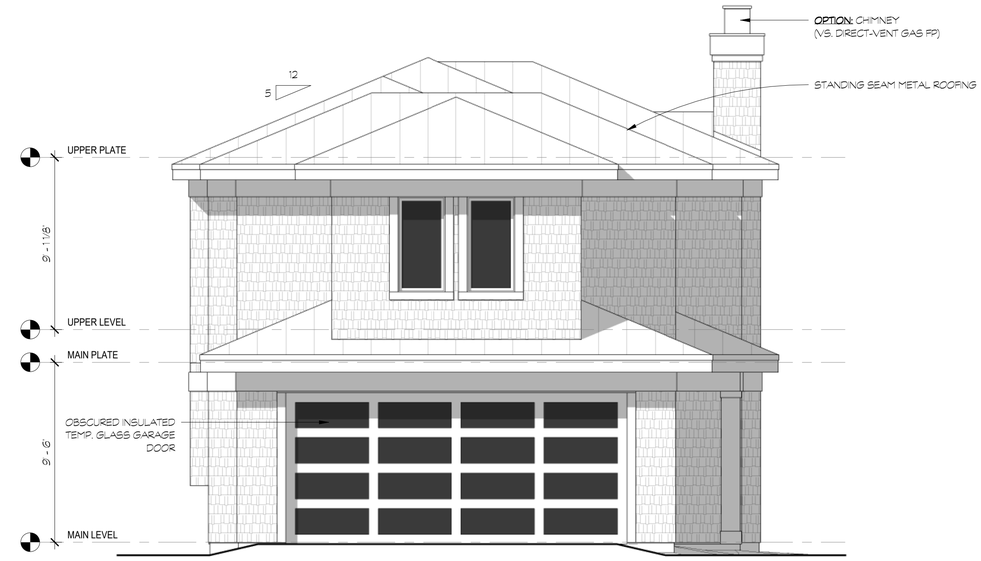
469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A5 NUMBER



NORTH ELEVATION (CONCEPTUAL - FINAL DESIGN MAY VARY)

1/4" = 1'-0"



WEST ELEVATION (CONCEPTUAL - FINAL DESIGN MAY VARY)

1/4" = 1'-0"

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464 SECOND STREET
SUITE 100
EXCELSIOR, MN 55331

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PROJECT TEAM

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STRUCTURAL ENGINEER

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GENERAL CONTRACTOR

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DEEPHAVEN, MN 55391
CONTACT: (952-476-5999)

SHEET INDEX

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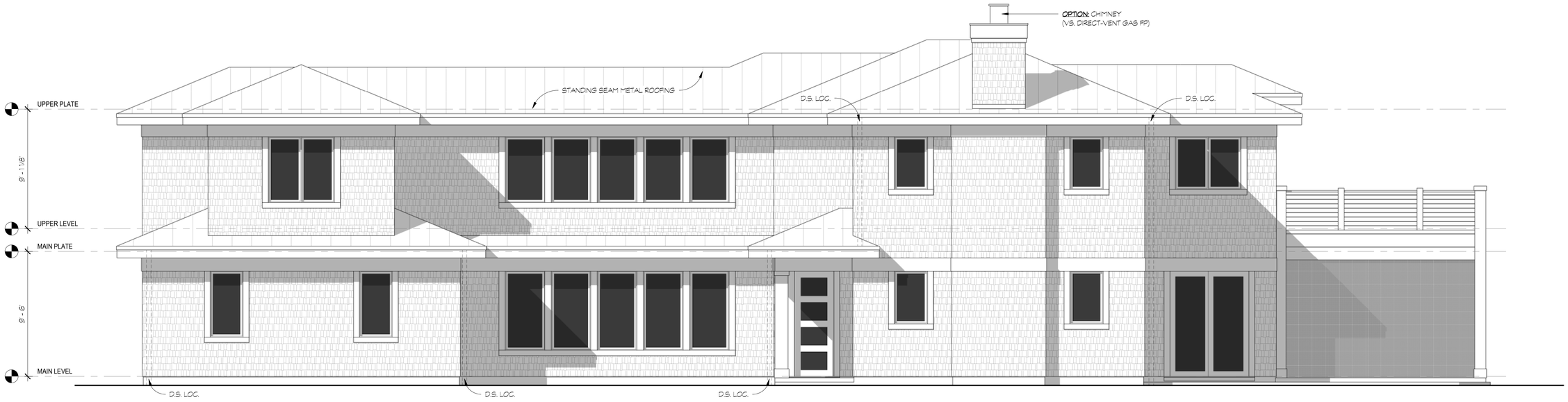
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A6 NUMBER



SOUTH ELEVATION (CONCEPTUAL - FINAL DESIGN MAY VARY)

1/4" = 1'-0"

EAST ELEVATION (CONCEPTUAL - FINAL DESIGN MAY VARY)

1/4" = 1'-0"

sharratt design company

464 SECOND STREET
SUITE 100
EXCELSIOR, MN 55331

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PROJECT TEAM

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CONTACT: MIKE SHARRATT (952-470-9750)

STRUCTURAL ENGINEER

T.B.D.

GENERAL CONTRACTOR

KYLE HUNT & PARTNERS
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DEEPHAVEN, MN 55391
CONTACT: (952-476-5992)

SHEET INDEX

ISSUED FOR	07/16/21	08/26/21	09/07/21	10/29/21	11/04/21	12/15/21	12/22/21	01/03/22	01/04/22	01/05/22	01/17/22	02/16/22	11/30/22
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MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A7 NUMBER

EXTERIOR RENDERING 1

EXTERIOR RENDERING 2

sharratt design & company

464 SECOND STREET
SUITE 100
EXCELSIOR, MN 55331

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PROJECT TEAM

ARCHITECT

SHARRATT DESIGN & COMPANY, LLC
464 SECOND STREET, SUITE 100
EXCELSIOR, MN 55331
CONTACT: MIKE SHARRATT (952-470-9750)

STRUCTURAL ENGINEER

T.B.D.

GENERAL CONTRACTOR

KYLE HUNT & PARTNERS
18324 MINNETONKA BLVD
DEEPHAVEN, MN 55391
CONTACT: (952-476-5999)

SHEET INDEX

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PROGRESS SET	X	X	X	X	X	X	X	X	X	X	X	X	X
MEETING SET	X				X		X						
VARIANCE APP. SET			X										
BID SET													
PERMIT SET													
REVISIONS													
CONSTRUCTION SET													

PROPOSED CONSTRUCTION OF THE:

BARTHEL HOME

469 LAKE AVENUE
WHITE BEAR LAKE, MN

SHEET A8 NUMBER

DESCRIPTION OF PROPERTY SURVEYED

Lot 16, Block 1, LAKEWOOD PARK 3RD DIVISION, according to the recorded plat thereof, Washington County, Minnesota.

STANDARD NOTES

1) **Site Address**: 469 Lake Avenue, Birchwood Village, Minnesota 55391

2) A title opinion was not furnished to the surveyor as part of this survey. Only easements per the recorded plat are shown unless otherwise denoted hereon.

3) **Flood Zone Information**: X (area determined to be outside of the 0.2% annual chance floodplain) and Zone A (Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are not determined. Mandatory flood insurance purchase requirements and floodplain management standards apply.) per Flood Insurance Rate Map, Community Panel No. 27163C0240E, effective date of 02/03/2010.

4) **Parcel Area Information**: Gross Area: 13,029 s.f. ± ~ 0.30 acres ±
*We do not affirmatively insure the quantity of acreage set forth in the description

5) **Benchmark**: Elevations are based on MN/DOT Geodetic Station Name: PARAGON which has an elevation of: 929.60 feet (NAVD88).

6) Principal Structure Setbacks - Street(s): 40 feet (Lake Avenue)
Side: 10 feet
Lake: 50 feet (From Ordinary High Water Line)
Height: 30 feet
Hardcover: 25 percent of lot area
**302.015 UNDERSIZED LOTS. Any lot of record as of January 1, 1975, which remains in its then-existing dimensions and which does not meet the requirements of this Code may nevertheless be utilized for single-family detached dwelling purposes provided the requirements of 302.010 are at least 60% of those as required.

Please note that the zoning information shown hereon may have been amended through a city process. We recommend that a zoning letter be obtained from the Zoning Administrator for the current restrictions for this site. All setback information and hardcover data for planning and design must be verified by all parties involved in the design and planning process.

We have not received the current zoning classification and building setback requirements from the insurer.

7) **Utilities**: We have shown the location of utilities on the surveyed property by observed evidence only. There may be underground utilities encumbering the subject property we are unaware. Please note that we have not placed a Gopher State One Call for this survey. There may or may not be underground utilities in the mapped area, therefore extreme caution must be exercise before any excavation takes place on or near this site. Also, please note that seasonal conditions may inhibit our ability to visibly observe all the utilities located on the subject property. Before digging, you are required by law to notify Gopher State One Call at least 48 hours in advance at 651/454-0002.

Existing Hardcover

Lot Area	=	13,029 S.F.
House Area	=	1,327 S.F.
Garage Area	=	959 S.F.
Driveway Area	=	10,71 S.F.
Concrete Area	=	691 S.F.
Ret Wall Area	=	101 S.F.
Total Area	=	4,149 S.F.
Coverage = 31.84%		

Existing Elevations

Garage Floor Elevation	= 928.6
First Floor Elevation	= 931.7
Lowest Opening Elevation	= 929.5
Basement Floor Elevation	= 925.0

SURVEY LEGEND

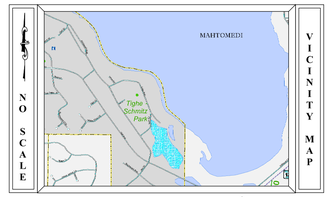
- CAST IRON MONUMENT
- IRON PIPE MONUMENT SET
- IRON PIPE MONUMENT FOUND
- DRILL HOLE FOUND
- CHISELED "X" MONUMENT SET
- CHISELED "X" MONUMENT FOUND
- REBAR MONUMENT FOUND
- PK NAIL MONUMENT SET
- PK NAIL MONUMENT FOUND
- PK NAIL W/ ALUMINUM DISC
- SURVEY CONTROL POINT
- A/C UNIT
- CABLE TV PEDESTAL
- ELECTRIC TRANSFORMER
- ELECTRIC MANHOLE
- ELECTRIC METER
- ELECTRIC OUTLET
- YARD LIGHT
- LIGHT POLE
- FIBER OPTIC MANHOLE
- FIRE DEPT. HOOK UP
- FLAG POLE
- FUEL PUMP
- FUEL TANK
- PROPANE TANK
- GAS METER
- GAS VALVE
- GAS MANHOLE
- GENERATOR
- GUARD POST
- HAND HOLE
- MAIL BOX
- PIEZOMETER
- POWER POLE
- GUY WIRE
- ROOF DRAIN
- LIFT STATION
- SANITARY MANHOLE
- SANITARY CLEANOUT
- STORM MANHOLE
- STORM DRAIN
- CATCH BASIN
- FLARED END SECTION
- TREE CONIFEROUS
- TREE DECIDUOUS
- TREE CONIFEROUS REMOVED
- TREE DECIDUOUS REMOVED
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- UTILITY MANHOLE
- UTILITY PEDESTAL
- UTILITY VAULT
- WATERMAIN MANHOLE
- WATER METER
- WATER SPIGOT
- WELL
- MONITORING WELL
- CURB STOP
- GATE VALVE
- HYDRANT
- IRRIGATION VALVE
- POST INDICATOR VALVE
- SIGN
- SOIL BORING
- WOE WALKOUT ELEVATION
- FFE FIRST FLOOR ELEVATION
- GFE GARAGE FLOOR ELEVATION
- TOF TOP OF FOUNDATION ELEV.
- LOE LOWEST OPENING ELEV.
- CONCRETE
- BITUMINOUS
- BUILDING SETBACK LINE
- CABLE TV
- CONCRETE CURB
- CONTOUR EXISTING
- CONTOUR PROPOSED
- GUARD RAIL
- DRAIN TILE
- ELECTRIC UNDERGROUND
- FENCE
- FIBER OPTIC UNDERGROUND
- GAS UNDERGROUND
- OVERHEAD UTILITY
- TREE LINE
- SANITARY SEWER
- STORM SEWER
- TELEPHONE UNDERGROUND
- RETAINING WALL
- UTILITY UNDERGROUND
- WATERMAIN
- TRAFFIC SIGNAL
- RAILROAD TRACKS
- RAILROAD SIGNAL
- RAILROAD SWITCH
- SATELLITE DISH
- WETLAND BUFFER SIGN

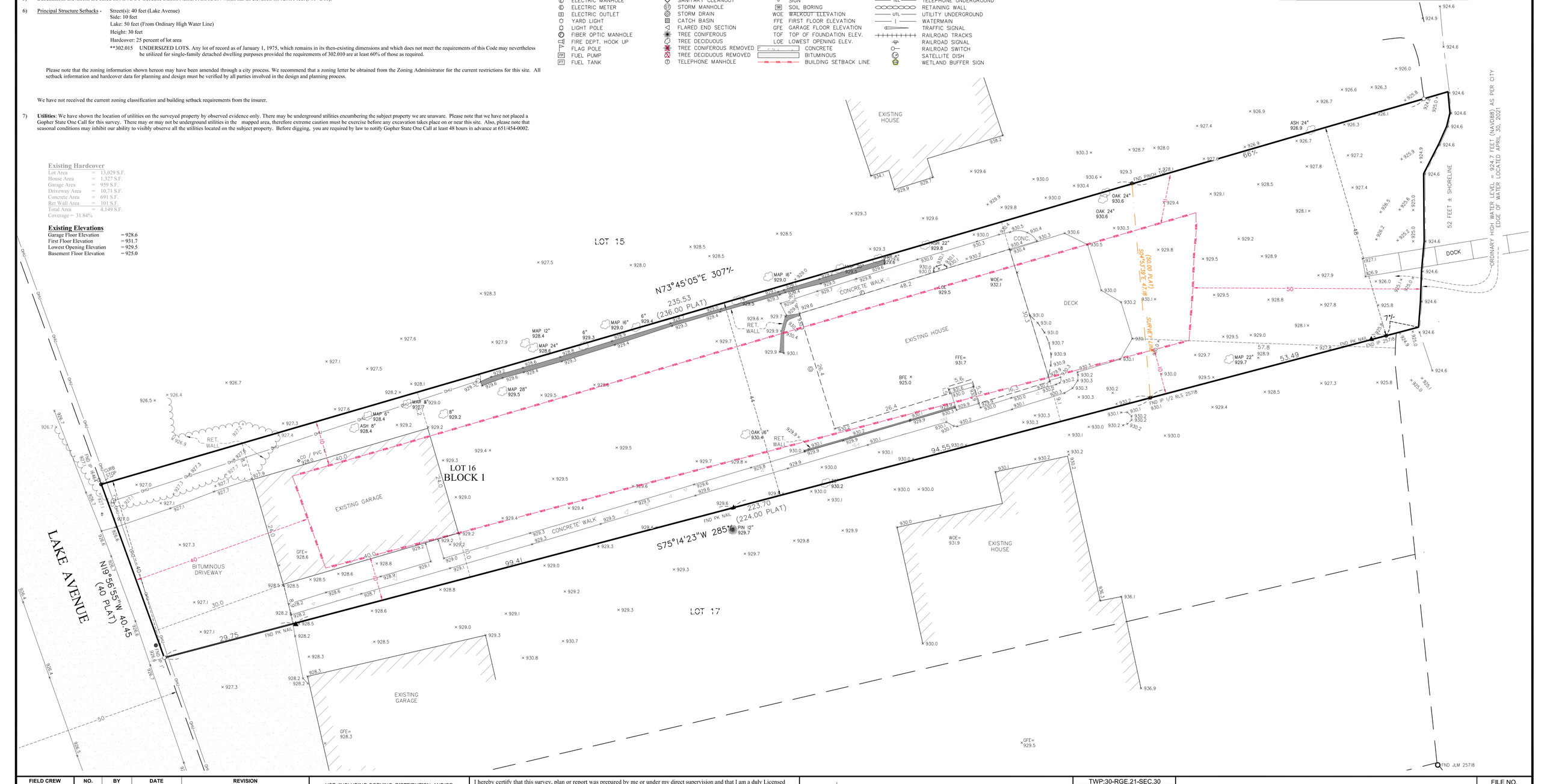
SCALE IN FEET 10 5 0 5 10 20

NORTH

Bearings are based on the Washington County Coordinate System (NAD 83 - 1986 adj.)

VICINITY MAP — NO SCALE





FIELD CREW	NO.	BY	DATE	REVISION
DM AK	1	EMW	5/20/2021	ADDED BASEMENT FLOOR ELEVATION
DRAWN	2	EMW	9/3/2021	REVISED EXISTING HARDCOVER
JPR/EMW	3	DLS	2/15/2022	REVISED OHW
CHECKED				
DLS				
DATE				
4/28/21				

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.

Dated this 19th day of May, 2021.

Daniel L. Schmidt

Daniel L. Schmidt, PLS Minnesota License No. 26147
schmidt@sathre.com

SATHRE-BERGQUIST, INC.
150 SOUTH BROADWAY WAYZATA, MN. 55391 (952) 476-6000
WWW.SATHRE.COM

TWP:30-RGE.21-SEC.30
Washington County

BIRCHWOOD VILLAGE, MINNESOTA

CERTIFICATE OF SURVEY
PREPARED FOR:
JAMES BARTHEL
ON BEHALF OF KYLE HUNT & PARTNERS

FILE NO. 4930-042

1 / 1

029

DESCRIPTION OF PROPERTY SURVEYED

Lot 16, Block 1, LAKEWOOD PARK 3RD DIVISION, according to the recorded plat thereof, Washington County, Minnesota.

STANDARD NOTES

1) **Site Address**: 469 Lake Avenue, Birchwood Village, Minnesota 55110

2) A title opinion was not furnished to the surveyor as part of this survey. Only easements per the recorded plat are shown unless otherwise denoted hereon.

3) **Flood Zone Information**: X (area determined to be outside of the 0.2% annual chance floodplain) and Zone A (Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are not determined. Mandatory flood insurance purchase requirements and floodplain management standards apply.) per Flood Insurance Rate Map, Community Panel No. 27163C0240E, effective date of 02/03/2010.

4) **Parcel Area Information**: Gross Area: 13,029 s.f. ± ~ 0.30 acres ±
*We do not affirmatively insure the quantity of acreage set forth in the description

5) **Benchmark**: Elevations are based on MN/DOT Geodetic Station Name: PARAGON which has an elevation of: 929.60 feet (NAVD88).

6) **Zoning:** Principal Structure Setbacks - Street(s): 40 feet (Lake Avenue)
Side: 10 feet
Lake: 50 feet (From Ordinary High Water Line)
Height: 30 feet
Hardcover: 25 percent of lot area
Minimum Lot Area: 15,000 s.f. Minimum Lot Width: 80 feet
**302.015 UNDERSIZED LOTS. Any lot of record as of January 1, 1975, which remains in its then-existing dimensions and which does not meet the requirements of this Code may nevertheless be utilized for single-family detached dwelling purposes provided the requirements of 302.010 are at least 60% of those as required.

Please note that the zoning information shown hereon may have been amended through a city process. We recommend that a zoning letter be obtained from the Zoning Administrator for the current restrictions for this site. All setback information and hardcover data for planning and design must be verified by all parties involved in the design and planning process.

We have not received the current zoning classification and building setback requirements from the insurer.

7) **Utilities**: We have shown the location of utilities on the surveyed property by observed evidence only. There may be underground utilities encumbering the subject property we are unaware. Please note that we have not placed a Gopher State One Call for this survey. There may or may not be underground utilities in the mapped area, therefore extreme caution must be exercise before any excavation takes place on or near this site. Also, please note that seasonal conditions may inhibit our ability to visibly observe all the utilities located on the subject property. Before digging, you are required by law to notify Gopher State One Call at least 48 hours in advance at 651/454-0002.

SURVEY LEGEND

- CAST IRON MONUMENT
- IRON PIPE MONUMENT SET
- IRON PIPE MONUMENT FOUND
- DRILL HOLE FOUND
- CHISELED "X" MONUMENT SET
- CHISELED "X" MONUMENT FOUND
- REBAR MONUMENT FOUND
- PK NAIL MONUMENT SET
- PK NAIL MONUMENT FOUND
- PK NAIL W/ ALUMINUM DISC
- SURVEY CONTROL POINT
- A/C UNIT
- CABLE TV PEDESTAL
- ELECTRIC TRANSFORMER
- ELECTRIC MANHOLE
- ELECTRIC METER
- ELECTRIC OUTLET
- YARD LIGHT
- LIGHT POLE
- FIBER OPTIC MANHOLE
- FIRE DEPT. HOOK UP
- FLAG POLE
- FUEL PUMP
- FUEL TANK
- PROPANE TANK
- GAS METER
- GAS VALVE
- GAS MANHOLE
- GENERATOR
- GUARD POST
- HAND HOLE
- MAIL BOX
- PIEZOMETER
- POWER POLE
- GUY WIRE
- ROOF DRAIN
- LIFT STATION
- SANITARY MANHOLE
- SANITARY CLEANOUT
- STORM MANHOLE
- STORM DRAIN
- CATCH BASIN
- FLARED END SECTION
- TREE CONIFEROUS
- TREE DECIDUOUS
- TREE CONIFEROUS REMOVED
- TREE DECIDUOUS REMOVED
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- UTILITY MANHOLE
- UTILITY PEDESTAL
- UTILITY VAULT
- WATERMAIN MANHOLE
- WATER METER
- WATER SPIGOT
- WELL
- MONITORING WELL
- CURB STOP
- GATE VALVE
- HYDRANT
- IRRIGATION VALVE
- POST INDICATOR VALVE
- SIGN
- SOIL BORING
- WOE WALKOUT ELEVATION
- FFE FIRST FLOOR ELEVATION
- GFE GARAGE FLOOR ELEVATION
- TOF TOP OF FOUNDATION ELEV.
- LOE LOWEST OPENING ELEV.
- CONCRETE
- BITUMINOUS
- BUILDING SETBACK LINE
- CABLE TV
- CONCRETE CURB
- CONTOUR EXISTING
- CONTOUR PROPOSED
- GUARD RAIL
- DRAIN TILE
- ELECTRIC UNDERGROUND
- FENCE
- FIBER OPTIC UNDERGROUND
- GAS UNDERGROUND
- OVERHEAD UTILITY
- TREE LINE
- SANITARY SEWER
- STORM SEWER
- TELEPHONE UNDERGROUND
- RETAINING WALL
- UTILITY UNDERGROUND
- WATERMAIN
- TRAFFIC SIGNAL
- RAILROAD TRACKS
- RAILROAD SIGNAL
- RAILROAD SWITCH
- SATELLITE DISH
- WETLAND BUFFER SIGN

10 5 0 5 10 20
SCALE IN FEET

NORTH

Bearings are based on the Washington County Coordinate System (NAD 83 - 1986 adj.)

VICINITY MAP
NO SCALE
MAHTOMEDI
Tighe Schmitz Park

Existing Hardcover

Lot Area	=	13,029 S.F.
House Area	=	1,327 S.F.
Garage Area	=	959 S.F.
Driveway Area	=	10,71 S.F.
Concrete Area	=	691 S.F.
Ret Wall Area	=	101 S.F.
Total Area	=	4,149 S.F.
Coverage =		31.84%

Existing Elevations

Garage Floor Elevation	= 928.6
First Floor Elevation	= 931.7
Lowest Opening Elevation	= 929.5
Basement Floor Elevation	= 925.0

Proposed Impervious Areas

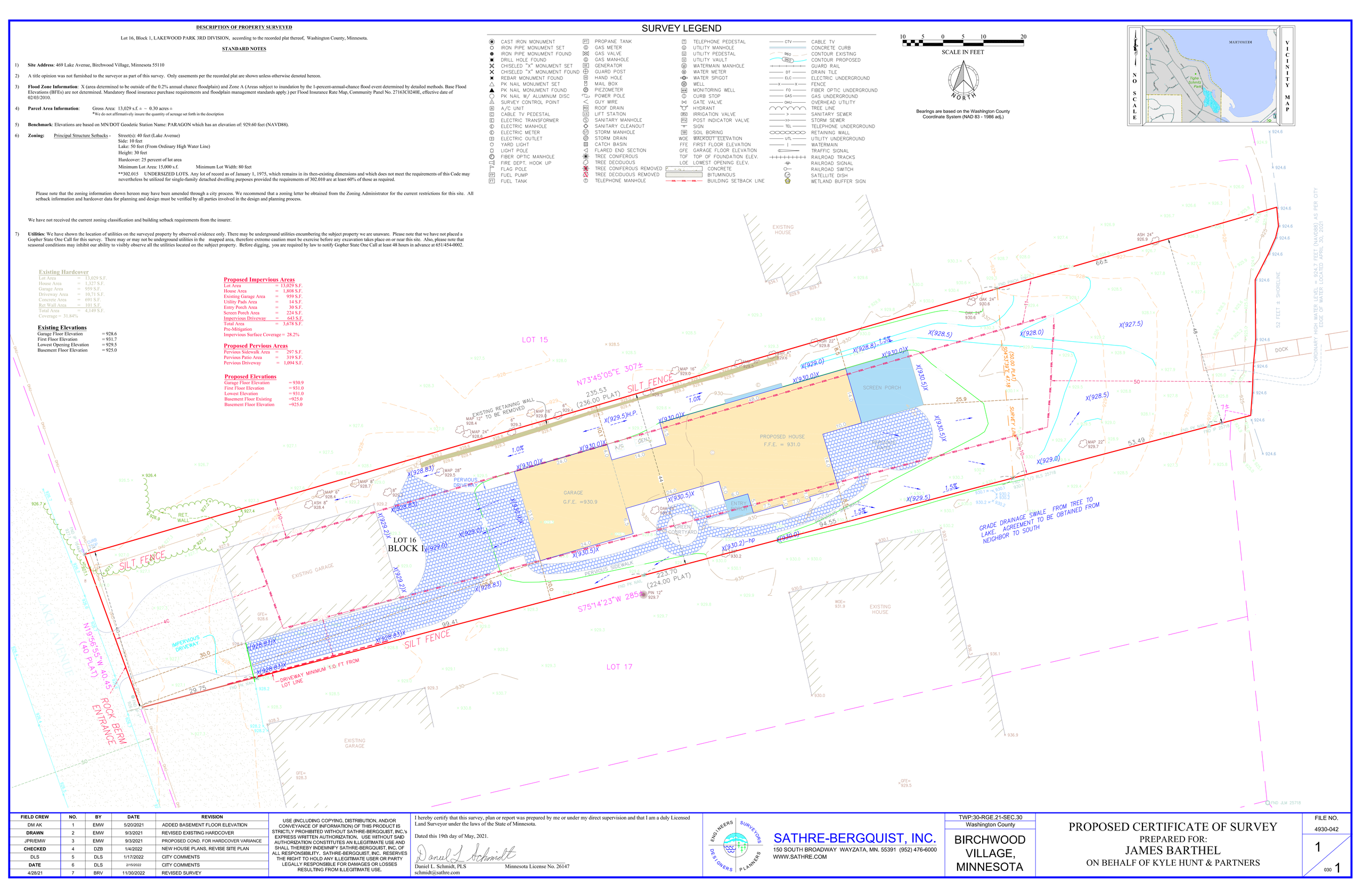
Lot Area	=	13,029 S.F.
House Area	=	1,808 S.F.
Existing Garage Area	=	959 S.F.
Utility Pads Area	=	14 S.F.
Entry Porch Area	=	30 S.F.
Screen Porch Area	=	224 S.F.
Impervious Driveway	=	643 S.F.
Total Area	=	3,678 S.F.
Pre-Mitigation		
Impervious Surface Coverage =		28.2%

Proposed Pervious Areas

Pervious Sidewalk Area	=	297 S.F.
Pervious Patio Area	=	319 S.F.
Pervious Driveway	=	1,094 S.F.

Proposed Elevations

Garage Floor Elevation	= 930.9
First Floor Elevation	= 931.0
Lowest Elevation	= 931.0
Basement Floor Existing	=925.0
Basement Floor Elevation	=925.0



FIELD CREW	NO.	BY	DATE	REVISION
DM AK	1	EMW	5/20/2021	ADDED BASEMENT FLOOR ELEVATION
DRAWN	2	EMW	9/3/2021	REVISED EXISTING HARDCOVER
JPR/EMW	3	EMW	9/3/2021	PROPOSED COND. FOR HARDCOVER VARIANCE
CHECKED	4	DZB	1/4/2022	NEW HOUSE PLANS, REVISE SITE PLAN
DLS	5	DLS	1/17/2022	CITY COMMENTS
DATE	6	DLS	2/15/2022	CITY COMMENTS
4/28/21	7	BRV	11/30/2022	REVISED SURVEY

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.

Dated this 19th day of May, 2021.

Daniel L. Schmidt, PLS Minnesota License No. 26147
schmidt@sathre.com

SATHRE-BERGQUIST, INC.
150 SOUTH BROADWAY WAYZATA, MN. 55391 (952) 476-6000
WWW.SATHRE.COM

TWP:30-RGE.21-SEC.30
Washington County

BIRCHWOOD VILLAGE, MINNESOTA

PROPOSED CERTIFICATE OF SURVEY
PREPARED FOR:
JAMES BARTHEL
ON BEHALF OF KYLE HUNT & PARTNERS

FILE NO. 4930-042

1
030 1

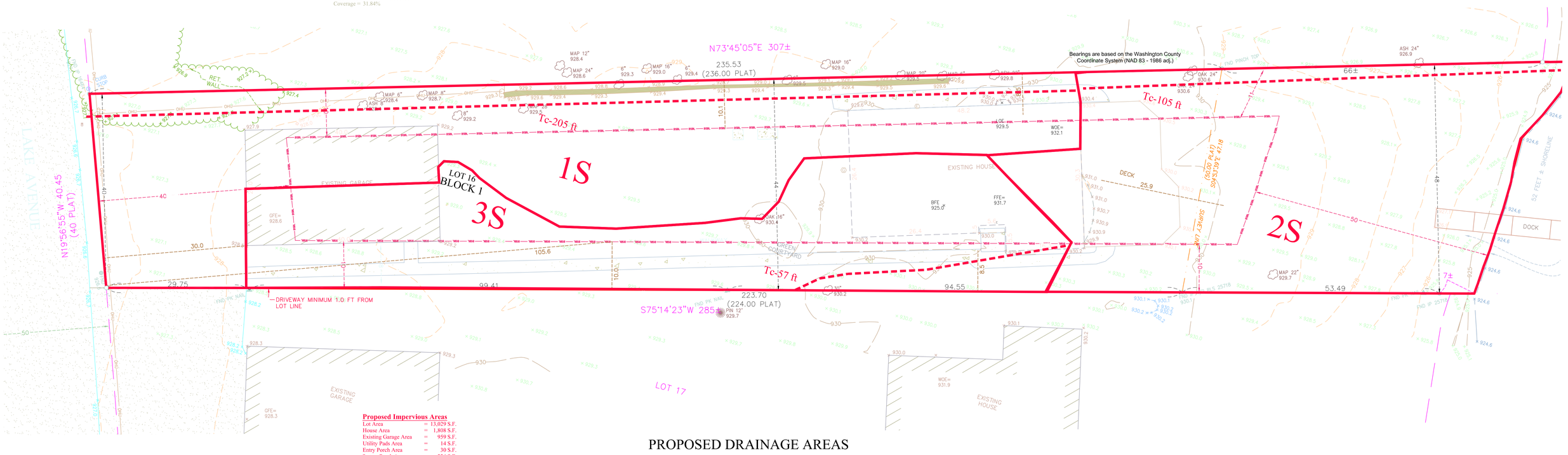
Existing Hardcover

Lot Area	=	13,029 S.F.
House Area	=	1,327 S.F.
Garage Area	=	959 S.F.
Driveway Area	=	10,71 S.F.
Concrete Area	=	691 S.F.
Ret Wall Area	=	101 S.F.
Total Area	=	4,149 S.F.
Coverage =		31.84%

EXISTING DRAINAGE AREAS

10 5 0 5 10 20
SCALE IN FEET

NORTH



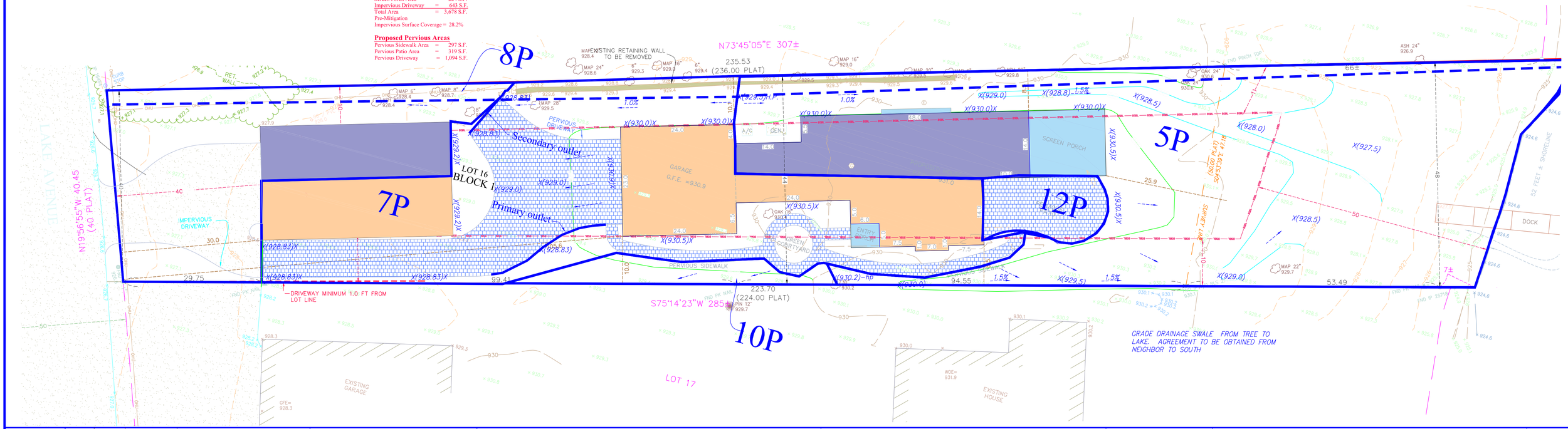
Proposed Impervious Areas

Lot Area	=	13,029 S.F.
House Area	=	1,808 S.F.
Existing Garage Area	=	959 S.F.
Utility Pads Area	=	14 S.F.
Entry Porch Area	=	30 S.F.
Screen Porch Area	=	224 S.F.
Impervious Driveway	=	643 S.F.
Total Area	=	3,678 S.F.
Pre-Mitigation		
Impervious Surface Coverage	=	28.2%

Proposed Pervious Areas

Pervious Sidewalk Area	=	297 S.F.
Pervious Patio Area	=	319 S.F.
Pervious Driveway	=	1,094 S.F.

PROPOSED DRAINAGE AREAS



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CHECKED	4	DZB	1/4/2022	NEW HOUSE PLANS, REVISE SITE PLAN
DLS	5	DLS	2/15/2022	CITY COMMENTS
DATE	6	DLS	1/15/2022	RE-SUBMITTAL
4/28/21				

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.

Dated this 19th day of May, 2021.

Daniel L. Schmidt

Daniel L. Schmidt, PLS — Minnesota License No. 26147
schmidt@sathre.com

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150 SOUTH BROADWAY WAYZATA, MN. 55391 (952) 476-6000
WWW.SATHRE.COM

TWP:30-RGE.21-SEC.30
Washington County

BIRCHWOOD VILLAGE, MINNESOTA

DRAINAGE AREAS
PREPARED FOR:
JAMES BARTHEL
ON BEHALF OF KYLE HUNT & PARTNERS

FILE NO.
4930-042

1
031 1

Drainage Area	Pervious, Grass (sf)	Pervious BMP (sf)	Impervious (sf)	Total (sf)	Untreated Impervious
8p	1024.5		1112.5	2137.0	1112.5
7P	644.5	2031.0	1567.5	4243.0	0.0
10P	290.0			290.0	0.0
5P	5043.0	0.0	998.0	6040.0	998.0
12P		319.0	0.0	319.0	0.0
	==========	==========	==========	==========	==========
	7002	2350	3678	13029	2110.5
	Impervious Surface Coverage		28.2%		
	Untreated Impervious Percentage		16.2%		

Notes:

1.0 Pervious pavers with 3 feet of seperation from the water table is not considered impervious.

2.0 The first 1.1 inches of rainfall flowing over the PaveDrain system will be infiltrated and will be considered mitigated.

Summary:

We have 4 different types of surface on this project:

1. Grass is considered permeable and does not require any treatment. This area is shown in Green.

2. Permeable Pavers. The pavers are considered pervious if they are permeable and they meet the requirement in the staff report listed below. This area is shown in blue.

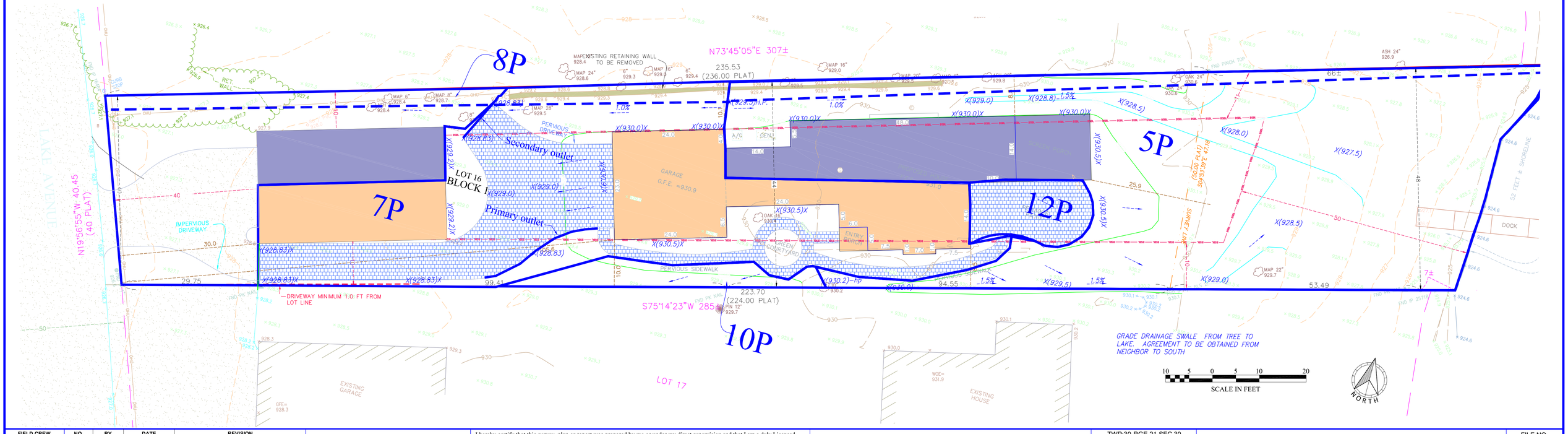
"The base of installed infiltration structures or practices must be a minimum of three feet above the established ground water table or the Ordinary High Water Level of White Bear Lake, whichever is higher."

3. Impervious. This is the building areas and the pave drain areas with less than 3 feet of separation from the ground water. This area is shown in purple.

4. Treated Impervious: This is the building area that is impervious but infiltrated in the pavedrain system. This area is shown in peach.

The only area that is creating uncontrolled runoff on this site for a 1.1" design storm is the area shown in purple. The impervious percentage for this area is 16%.

PROPOSED DRAINAGE AREAS



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4/28/21				

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DRAINAGE AREAS
PREPARED FOR:
JAMES BARTHEL
ON BEHALF OF KYLE HUNT & PARTNERS

FILE NO. 4930-042

1 of 032 1

PAVE DRAIN®

STORMWATER'S ARCH ENEMY

THE LOWEST MAINTENANCE PERMEABLE PAVEMENT SOLUTION

4 Million SF and Counting

BETTER DESIGNED PERMEABLE PAVEMENT

PaveDrain - A better permeable pavement. All other permeable pavements began with an impermeable pavement surface, which they made permeable. PaveDrain began as an erosion control surface that was made into an ADA-compliant pavement surface. Millions of square feet and over a decade of performance data confirm that it is truly a best management practice for stormwater.

PaveDrain uses a patented arch design under the block to create an internal storage chamber that is used as a reservoir for stormwater runoff. PaveDrain meets the requirements by the ADA by having a ¼" gap between each individual PaveDrain block.

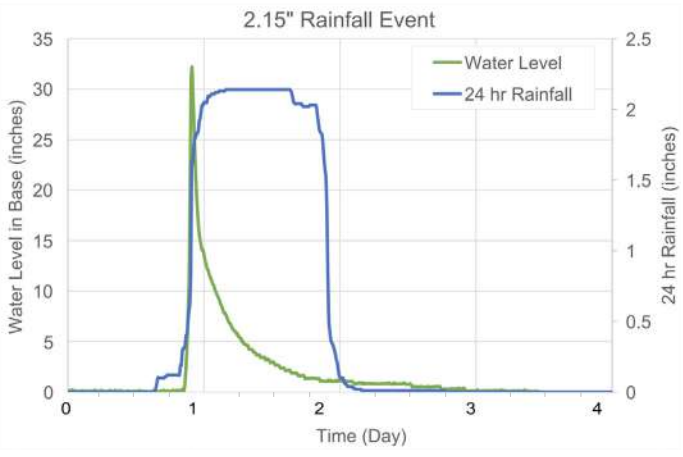
WHY PRE-CLOG YOUR JOINTS AND PORES?

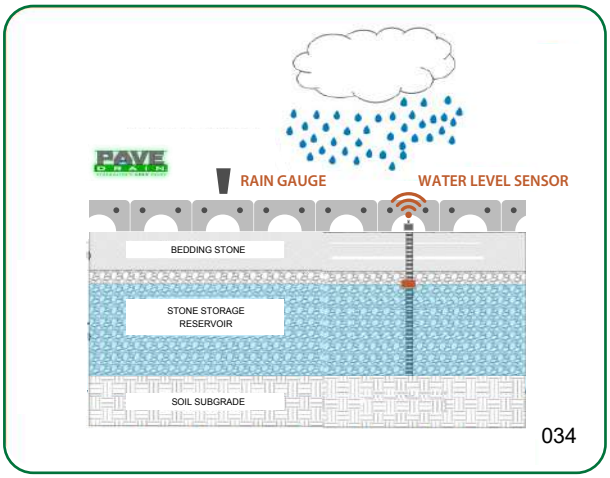
The PaveDrain system incorporates an OPEN JOINT system for easier maintenance and cleaning.

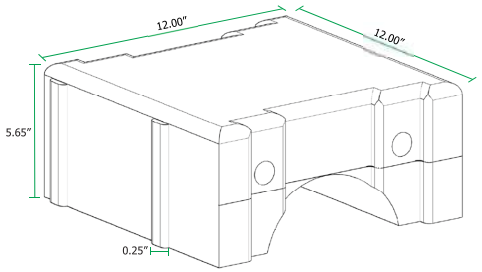
PaveDrain blocks work with existing infrastructure and can be used as the form for concrete or asphalt pours. Half blocks and end blocks square off corners eliminating cutting AND small pieces that are easier to dislodge.

VERIFIED PERFORMANCE

Digital documentation of the stormwater infiltrated can be sent to your computer.

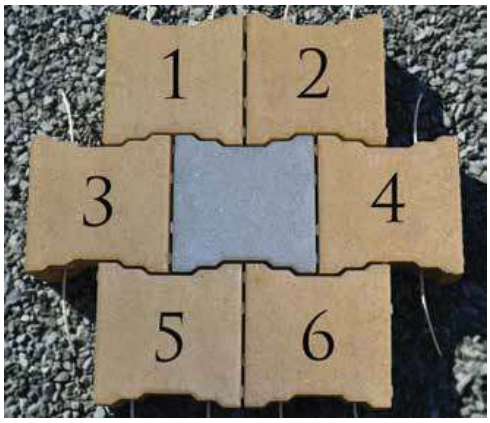






The PaveDrain block is 12" x 12" but also has two 0.25" Spacer Tabs on each side of the block. Please consider these when measuring.

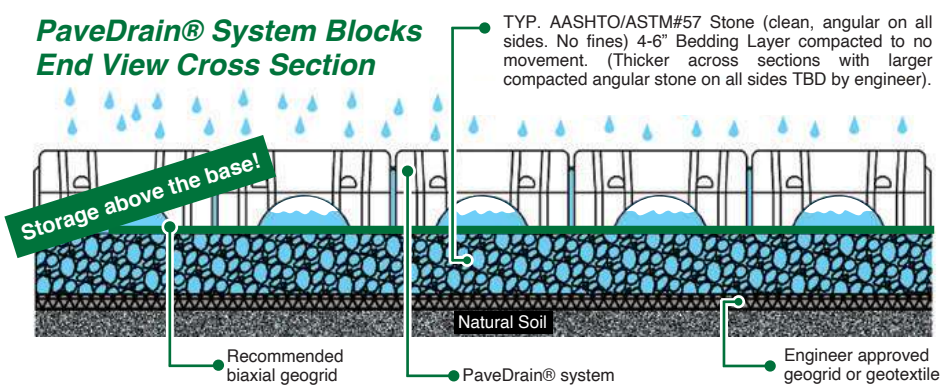
Each block is geometrically interlocked with 6 neighboring units



INFILTRATION PERFORMANCE

Initial Infiltration : 1,600+ in/hr

+2 years with no maintenance : 1,500 in/hr



PAVEDRAIN COLORS

Able to handle heavy traffic: fire trucks, garbage trucks, and semis (HS-25 rated).

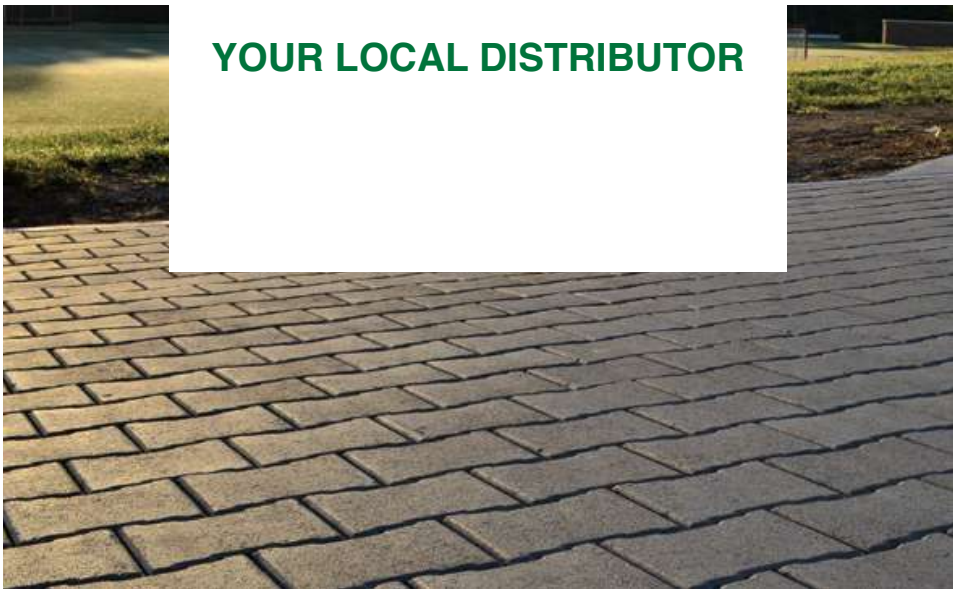
MAINTENANCE AND REPAIR

Decades of installations have shown that most PaveDrain surfaces require **little to no maintenance**. When needed, filled or obstructed joints can be cleaned with a vacuum truck or a PaveDrain Vac Head - restoring the system to **90%+ of its original performance**. Repair of individual PaveDrain blocks can be accomplished by a block extractor without affecting the surrounding blocks or surface.

SIMPLIFIED MAINTENANCE

Smaller Sites: PaveDrain Vac Head

Larger Sites: Pure Vacuum Truck



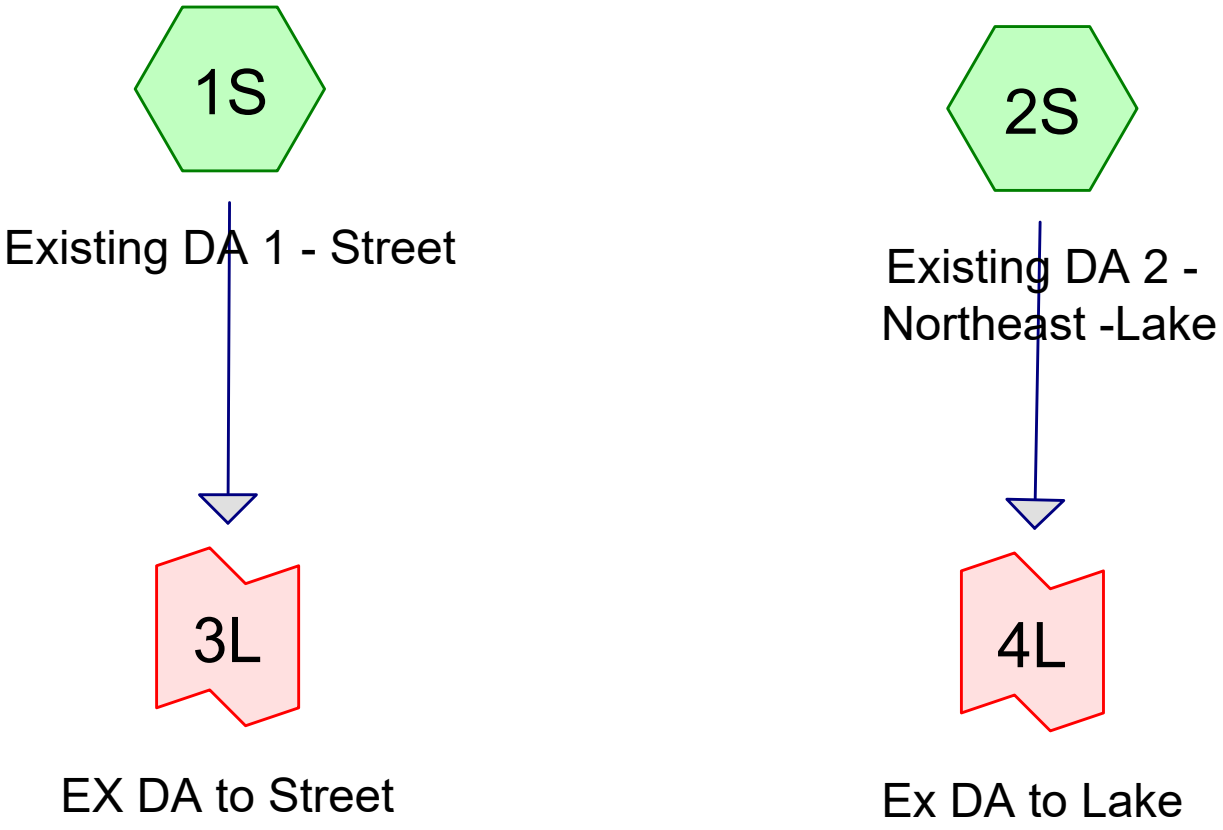
YOUR LOCAL DISTRIBUTOR

Winter Weather Handled

Can Plow and Seal To Prevent Salt Damage

PaveDrain, LLC | (888) 575-5339 | info@pavedrain.com | www.pavedrain.com

Existing Routing



Subcat Reach Pond Link

Routing Diagram for 4930-42 STORM DESIGNa
Prepared by Sathre-Bergquist, Inc., Printed 1/28/2022
HydroCAD® 10.10-7a s/n 03665 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YR	MSE 24-hr	3	Default	24.00	1	2.87	2
2	10-YR	MSE 24-hr	3	Default	24.00	1	4.28	2
3	100-YR	MSE 24-hr	3	Default	24.00	1	7.47	2
4	100-YR B-B	Type II 24-hr		Default	24.00	2	7.44	2
5	Custom	MSE 24-hr	3	Default	24.00	1	7.47	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
8,676	68	<50% Grass cover, Poor, HSG A (1S, 2S)
3,316	98	Unconnected roofs, HSG A (1S)
833	98	Water Surface, HSG A (2S)
12,825	**78**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
12,825	HSG A	1S, 2S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
12,825		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Nur
8,676	0	0	0	0	8,676	<50% Grass cover, Poor	
3,316	0	0	0	0	3,316	Unconnected roofs	
833	0	0	0	0	833	Water Surface	
12,825	**0**	**0**	**0**	**0**	**12,825**	**TOTAL AREA**	

Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing DA 1 - Street Runoff Area=8,643 sf 38.37% Impervious Runoff Depth=1.36"
Flow Length=205' Slope=0.0100 '/' Tc=24.2 min CN=WQ Runoff=0.24 cfs 978 cf

Subcatchment2S: Existing DA 2 - Runoff Area=4,182 sf 19.92% Impervious Runoff Depth=0.97"
Flow Length=95' Slope=0.0100 '/' Tc=13.1 min CN=WQ Runoff=0.11 cfs 340 cf

Link 3L: EX DA to Street Inflow=0.24 cfs 978 cf
Primary=0.24 cfs 978 cf

Link 4L: Ex DA to Lake Inflow=0.11 cfs 340 cf
Primary=0.11 cfs 340 cf

Total Runoff Area = 12,825 sf Runoff Volume = 1,318 cf Average Runoff Depth = 1.23"
67.65% Pervious = 8,676 sf 32.35% Impervious = 4,149 sf

Summary for Subcatchment 1S: Existing DA 1 - Street

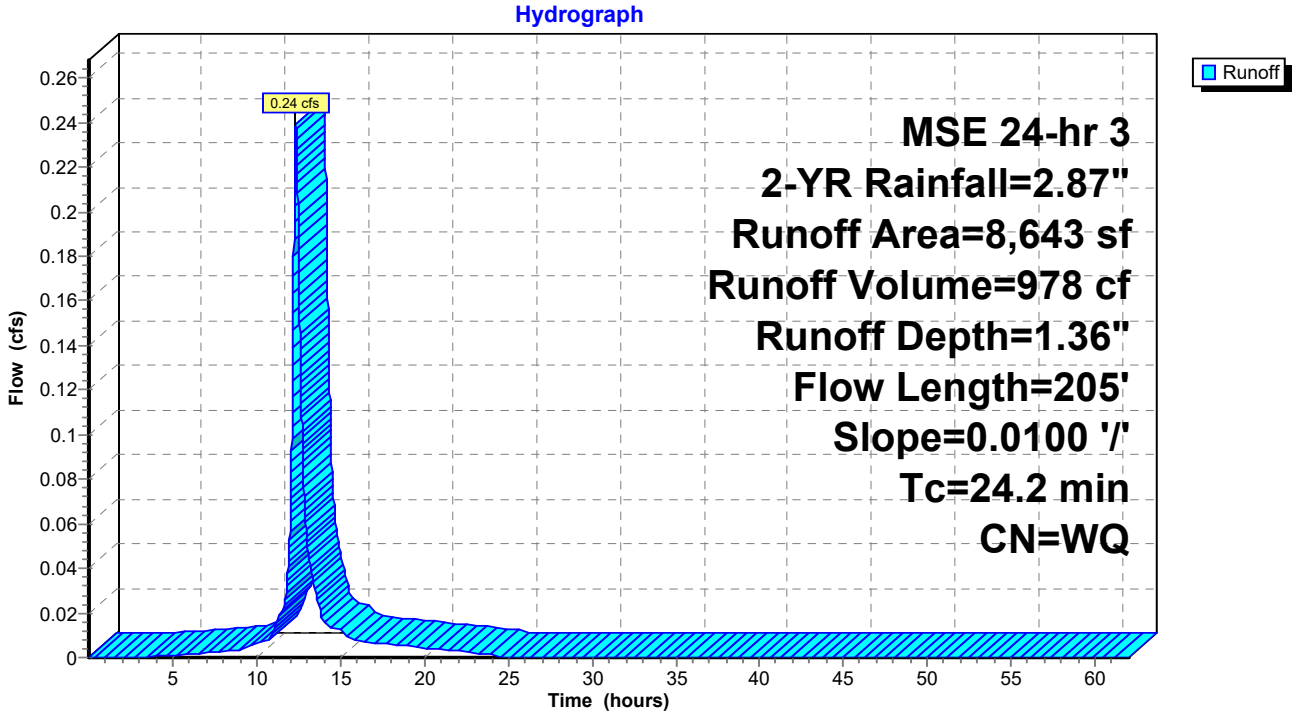
Runoff = 0.24 cfs @ 12.34 hrs, Volume= 978 cf, Depth= 1.36"
Routed to Link 3L : EX DA to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-YR Rainfall=2.87"

Area (sf)	CN	Description
3,316	98	Unconnected roofs, HSG A
5,327	68	<50% Grass cover, Poor, HSG A
8,643		Weighted Average
5,327		61.63% Pervious Area
3,316		38.37% Impervious Area
3,316		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	205	0.0100	0.14		**Sheet Flow, Ex DA 1** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 1S: Existing DA 1 - Street



Summary for Subcatchment 2S: Existing DA 2 - Northeast -Lake

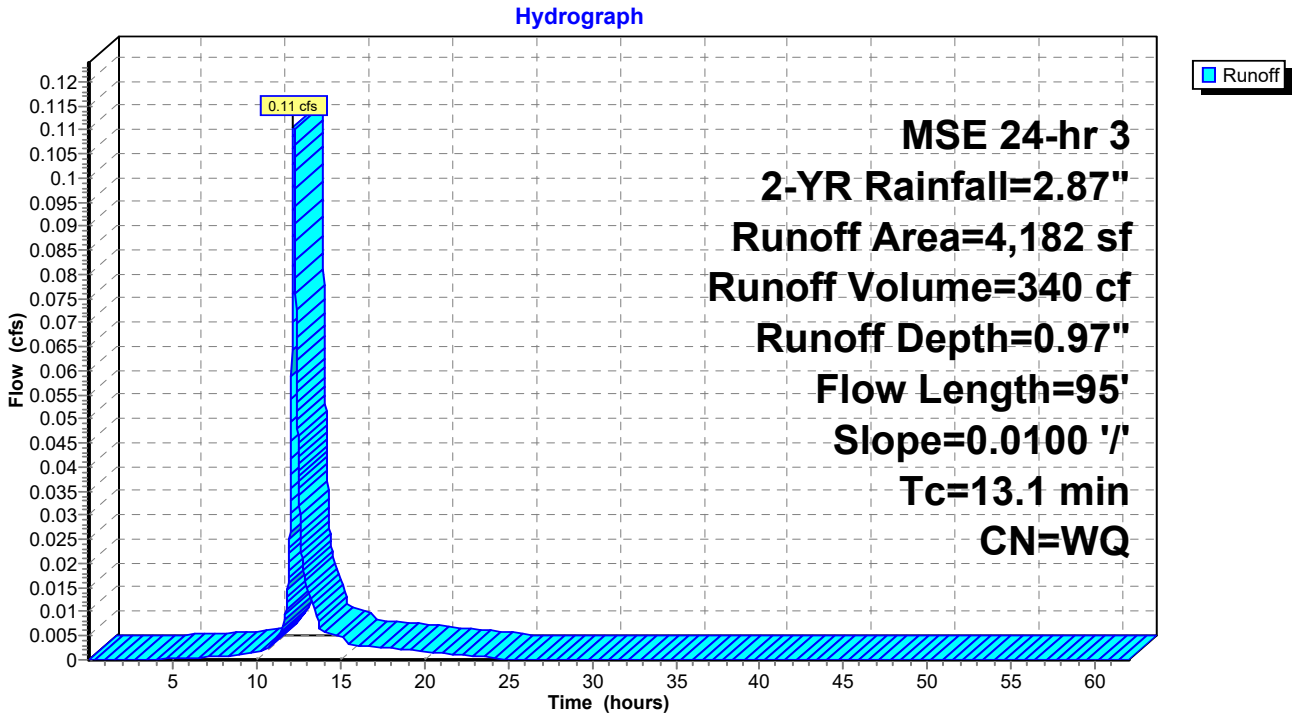
Runoff = 0.11 cfs @ 12.22 hrs, Volume= 340 cf, Depth= 0.97"
Routed to Link 4L : Ex DA to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-YR Rainfall=2.87"

Area (sf)	CN	Description
833	98	Water Surface, HSG A
3,349	68	<50% Grass cover, Poor, HSG A
4,182		Weighted Average
3,349		80.08% Pervious Area
833		19.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	95	0.0100	0.12		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 2S: Existing DA 2 - Northeast -Lake

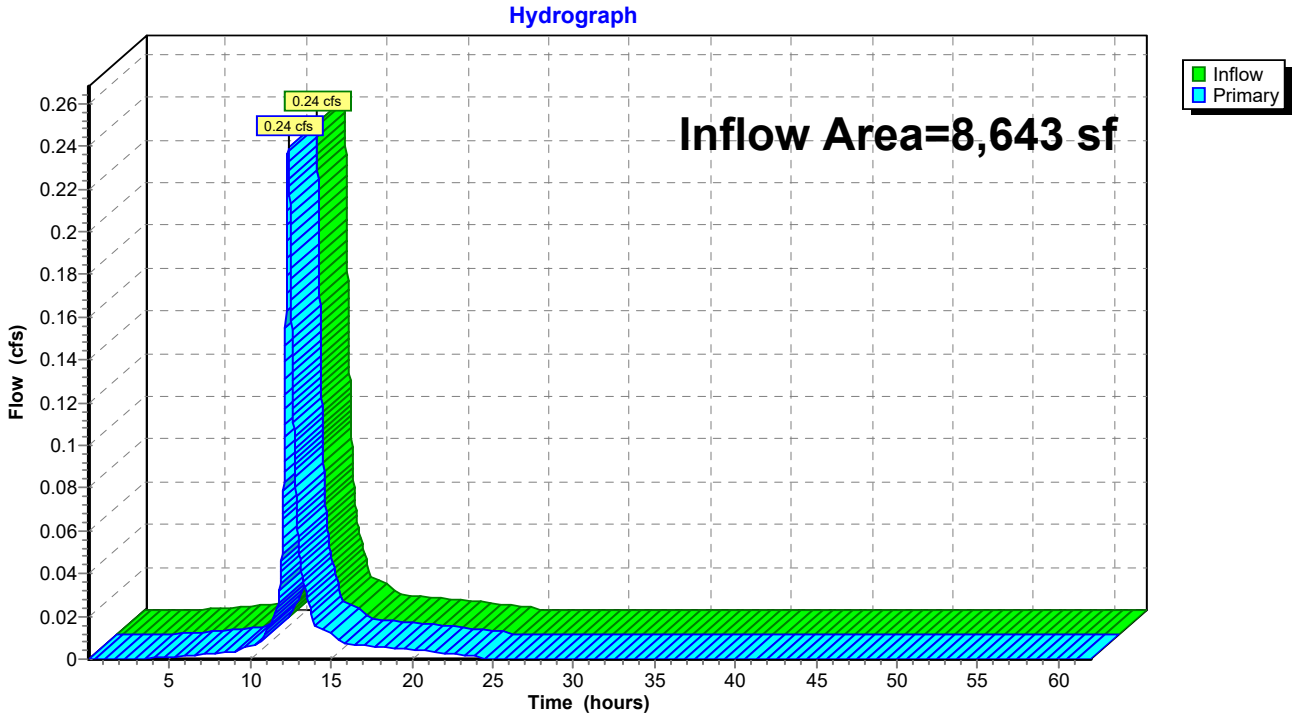


Summary for Link 3L: EX DA to Street

Inflow Area = 8,643 sf, 38.37% Impervious, Inflow Depth = 1.36" for 2-YR event
Inflow = 0.24 cfs @ 12.34 hrs, Volume= 978 cf
Primary = 0.24 cfs @ 12.34 hrs, Volume= 978 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 3L: EX DA to Street

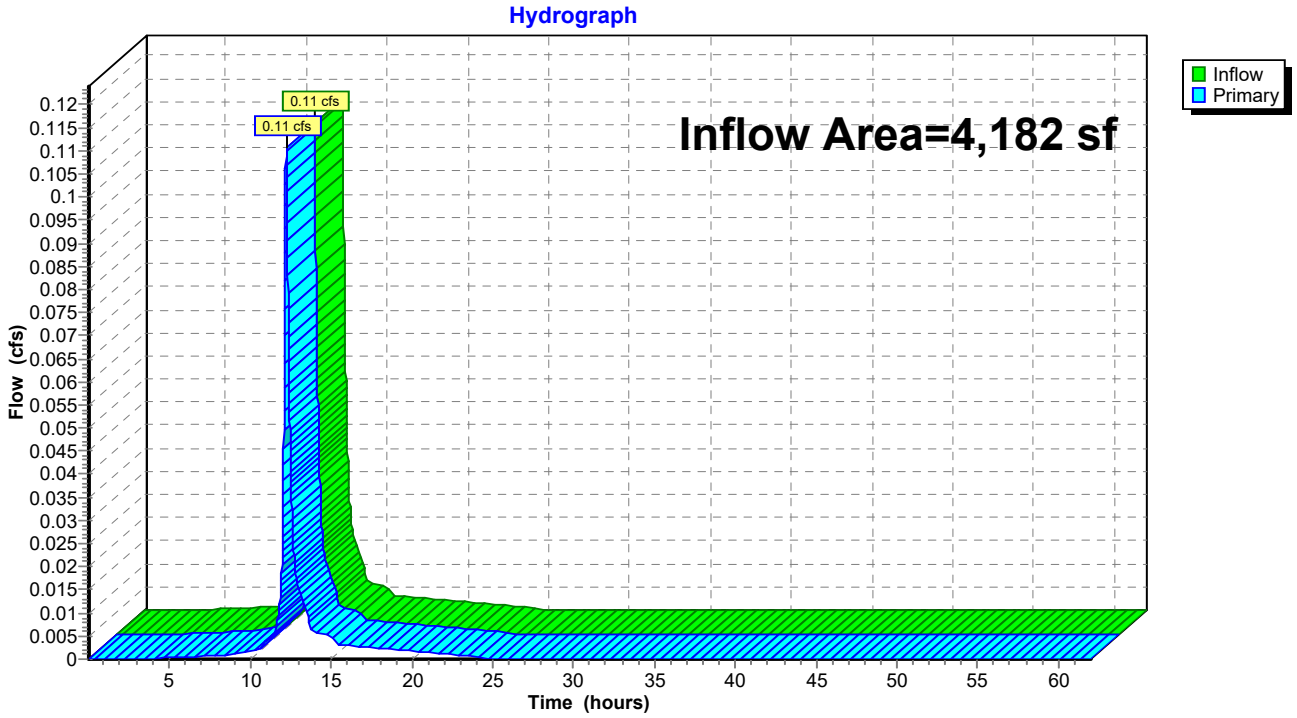


Summary for Link 4L: Ex DA to Lake

Inflow Area = 4,182 sf, 19.92% Impervious, Inflow Depth = 0.97" for 2-YR event
Inflow = 0.11 cfs @ 12.22 hrs, Volume= 340 cf
Primary = 0.11 cfs @ 12.22 hrs, Volume= 340 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 4L: Ex DA to Lake



Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing DA 1 - Street Runoff Area=8,643 sf 38.37% Impervious Runoff Depth=2.41"
Flow Length=205' Slope=0.0100 '/' Tc=24.2 min CN=WQ Runoff=0.44 cfs 1,733 cf

Subcatchment2S: Existing DA 2 - Runoff Area=4,182 sf 19.92% Impervious Runoff Depth=1.92"
Flow Length=95' Slope=0.0100 '/' Tc=13.1 min CN=WQ Runoff=0.23 cfs 667 cf

Link 3L: EX DA to Street Inflow=0.44 cfs 1,733 cf
Primary=0.44 cfs 1,733 cf

Link 4L: Ex DA to Lake Inflow=0.23 cfs 667 cf
Primary=0.23 cfs 667 cf

Total Runoff Area = 12,825 sf Runoff Volume = 2,400 cf Average Runoff Depth = 2.25"
67.65% Pervious = 8,676 sf 32.35% Impervious = 4,149 sf

Summary for Subcatchment 1S: Existing DA 1 - Street

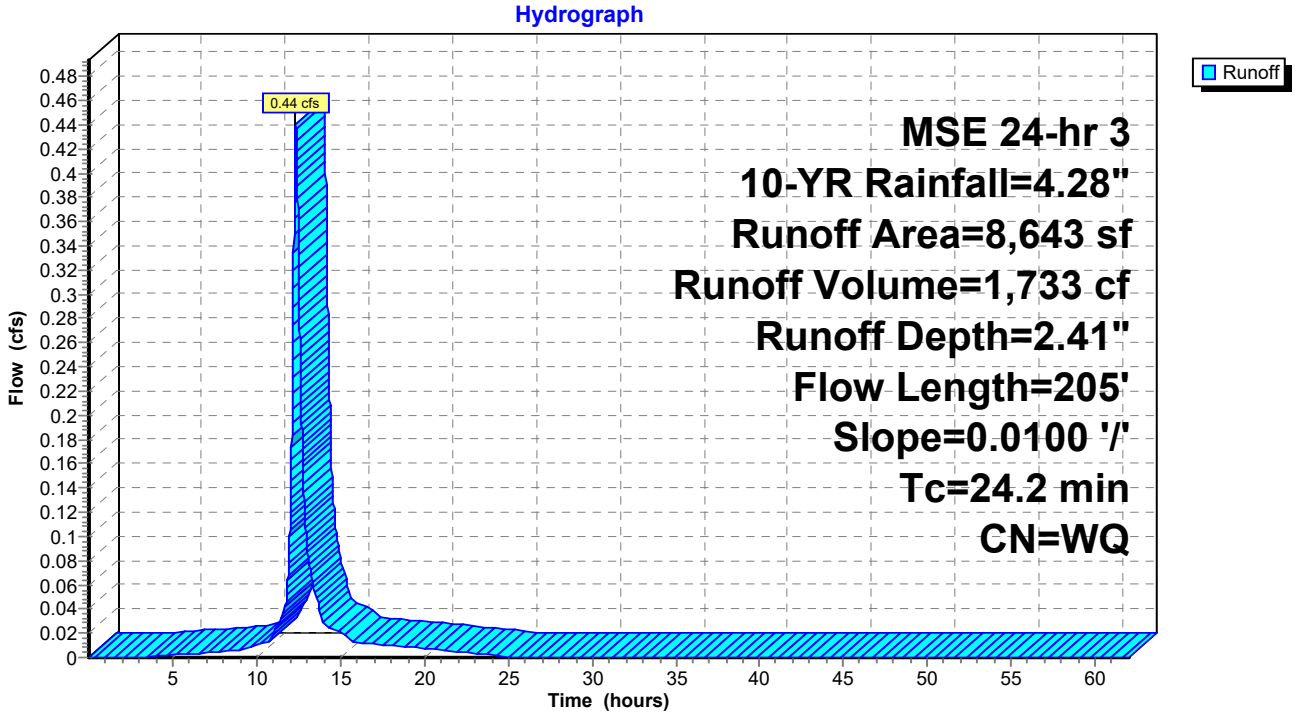
Runoff = 0.44 cfs @ 12.34 hrs, Volume= 1,733 cf, Depth= 2.41"
Routed to Link 3L : EX DA to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-YR Rainfall=4.28"

Area (sf)	CN	Description
3,316	98	Unconnected roofs, HSG A
5,327	68	<50% Grass cover, Poor, HSG A
8,643		Weighted Average
5,327		61.63% Pervious Area
3,316		38.37% Impervious Area
3,316		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	205	0.0100	0.14		**Sheet Flow, Ex DA 1** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 1S: Existing DA 1 - Street



Summary for Subcatchment 2S: Existing DA 2 - Northeast -Lake

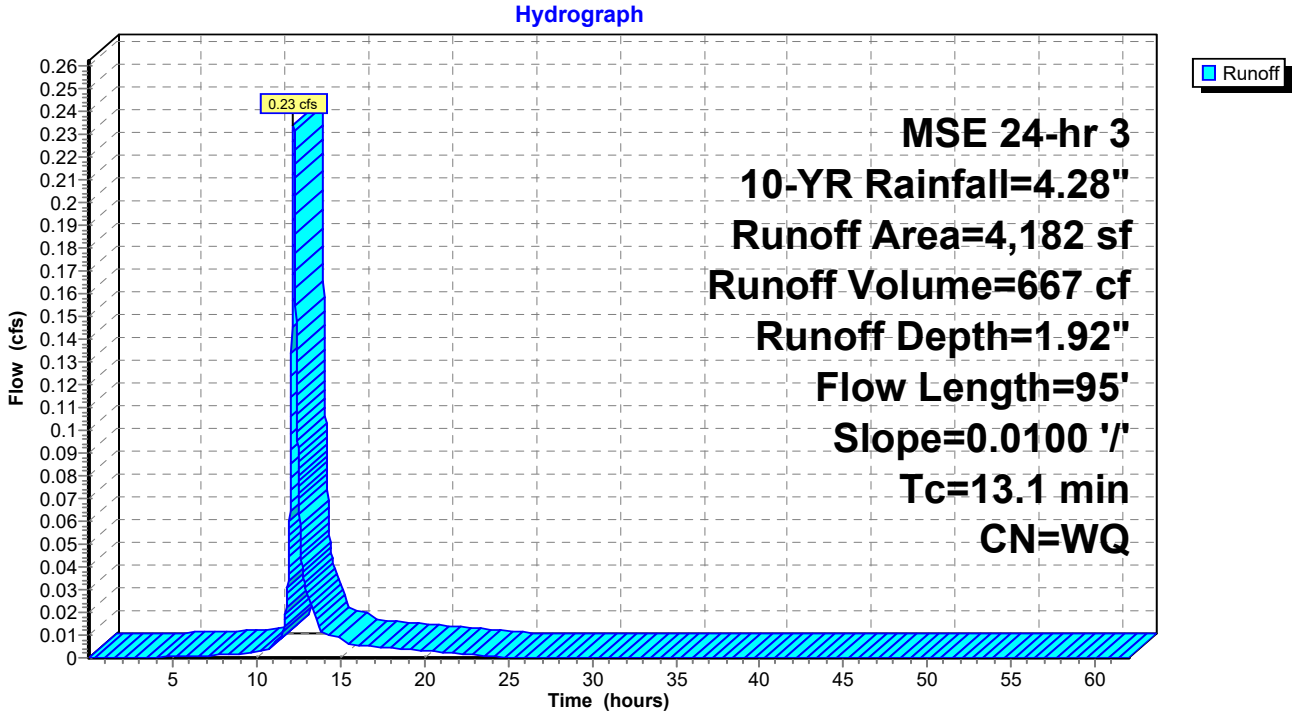
Runoff = 0.23 cfs @ 12.21 hrs, Volume= 667 cf, Depth= 1.92"
Routed to Link 4L : Ex DA to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-YR Rainfall=4.28"

Area (sf)	CN	Description
833	98	Water Surface, HSG A
3,349	68	<50% Grass cover, Poor, HSG A
4,182		Weighted Average
3,349		80.08% Pervious Area
833		19.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	95	0.0100	0.12		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 2S: Existing DA 2 - Northeast -Lake

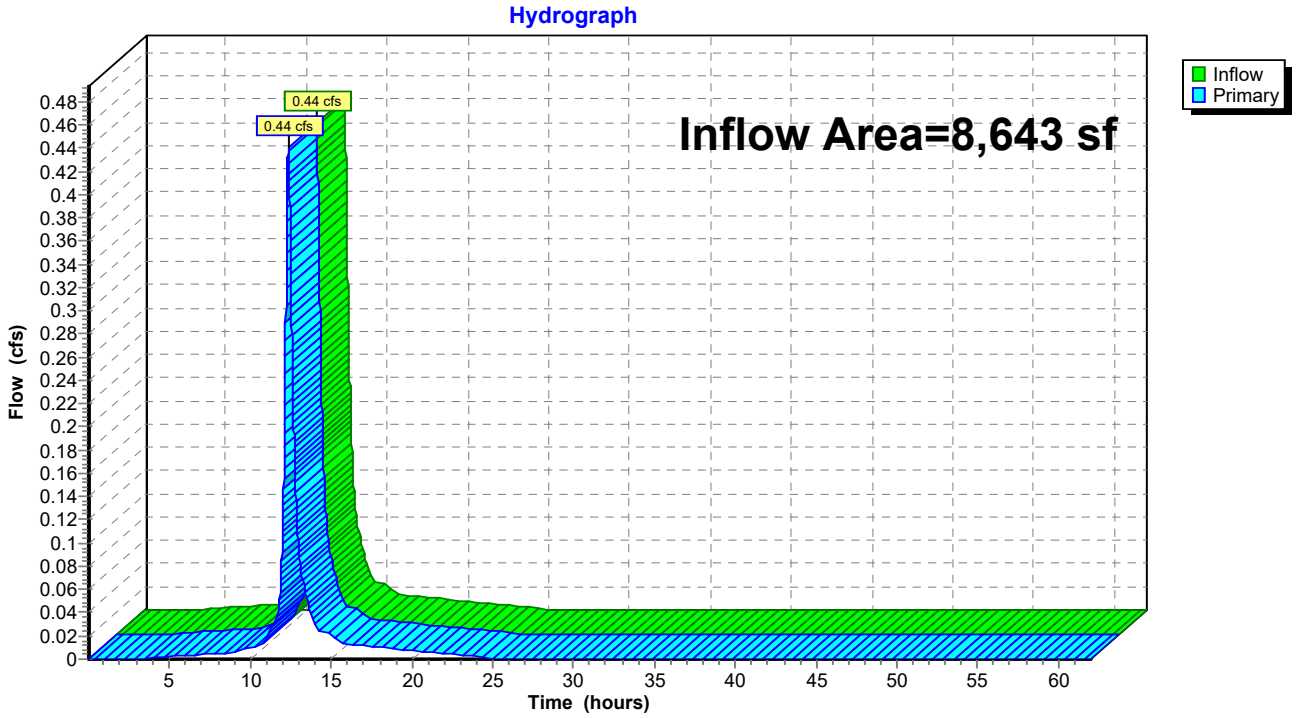


Summary for Link 3L: EX DA to Street

Inflow Area = 8,643 sf, 38.37% Impervious, Inflow Depth = 2.41" for 10-YR event
Inflow = 0.44 cfs @ 12.34 hrs, Volume= 1,733 cf
Primary = 0.44 cfs @ 12.34 hrs, Volume= 1,733 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 3L: EX DA to Street

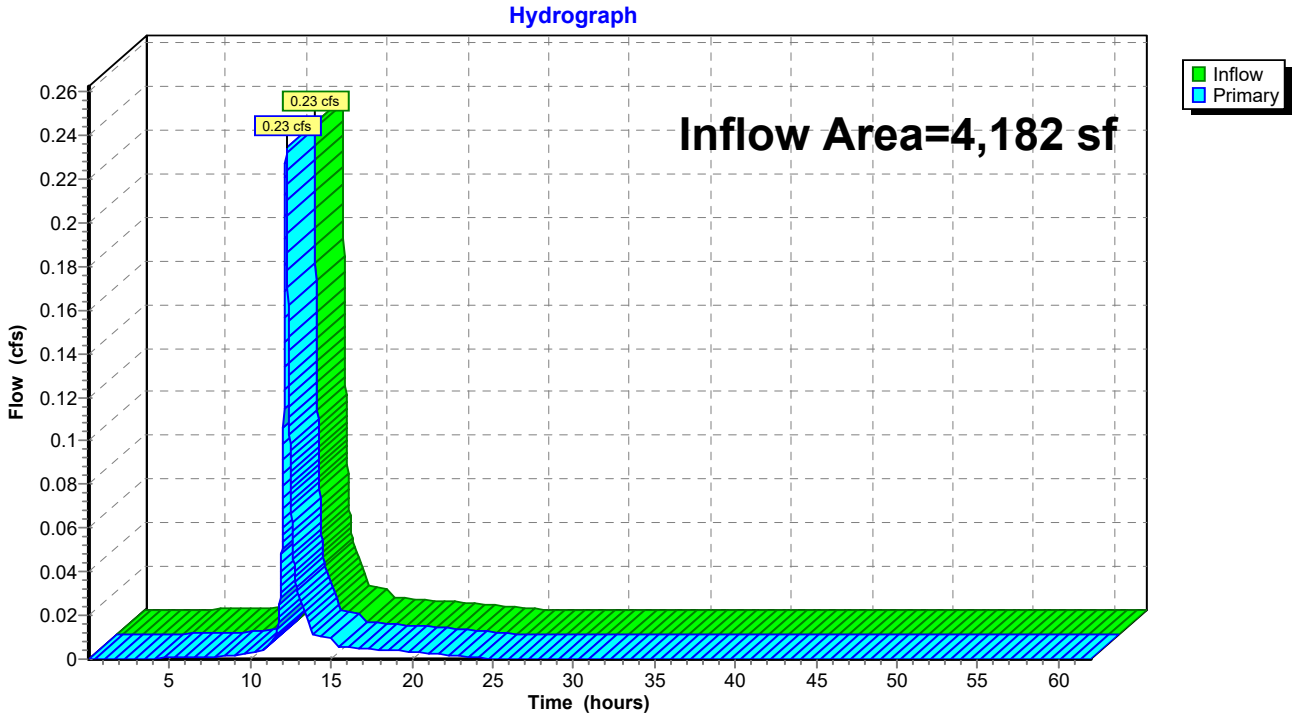


Summary for Link 4L: Ex DA to Lake

Inflow Area = 4,182 sf, 19.92% Impervious, Inflow Depth = 1.92" for 10-YR event
Inflow = 0.23 cfs @ 12.21 hrs, Volume= 667 cf
Primary = 0.23 cfs @ 12.21 hrs, Volume= 667 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 4L: Ex DA to Lake



Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing DA 1 - Street Runoff Area=8,643 sf 38.37% Impervious Runoff Depth=5.11"
Flow Length=205' Slope=0.0100 '/' Tc=24.2 min CN=WQ Runoff=0.96 cfs 3,682 cf

Subcatchment2S: Existing DA 2 - Runoff Area=4,182 sf 19.92% Impervious Runoff Depth=4.48"
Flow Length=95' Slope=0.0100 '/' Tc=13.1 min CN=WQ Runoff=0.57 cfs 1,561 cf

Link 3L: EX DA to Street Inflow=0.96 cfs 3,682 cf
Primary=0.96 cfs 3,682 cf

Link 4L: Ex DA to Lake Inflow=0.57 cfs 1,561 cf
Primary=0.57 cfs 1,561 cf

Total Runoff Area = 12,825 sf Runoff Volume = 5,243 cf Average Runoff Depth = 4.91"
67.65% Pervious = 8,676 sf 32.35% Impervious = 4,149 sf

Summary for Subcatchment 1S: Existing DA 1 - Street

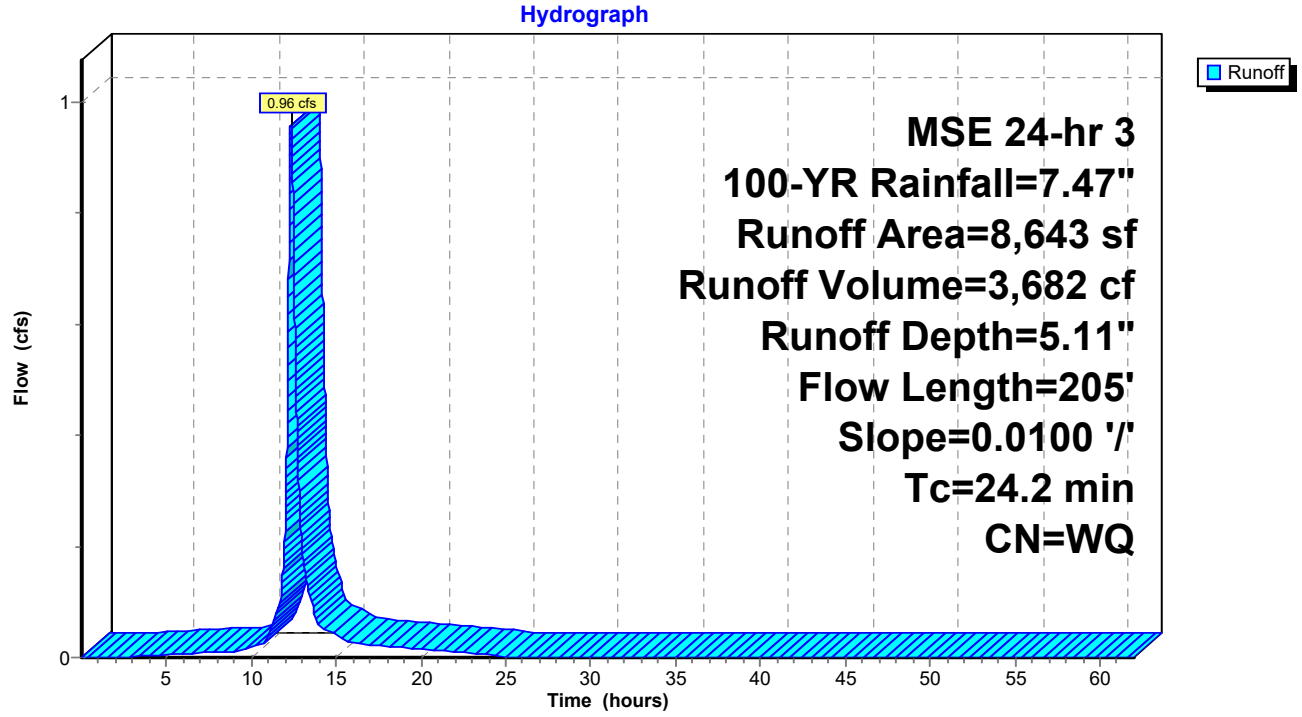
Runoff = 0.96 cfs @ 12.34 hrs, Volume= 3,682 cf, Depth= 5.11"
Routed to Link 3L : EX DA to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-YR Rainfall=7.47"

Area (sf)	CN	Description
3,316	98	Unconnected roofs, HSG A
5,327	68	<50% Grass cover, Poor, HSG A
8,643		Weighted Average
5,327		61.63% Pervious Area
3,316		38.37% Impervious Area
3,316		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	205	0.0100	0.14		**Sheet Flow, Ex DA 1** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 1S: Existing DA 1 - Street



Summary for Subcatchment 2S: Existing DA 2 - Northeast -Lake

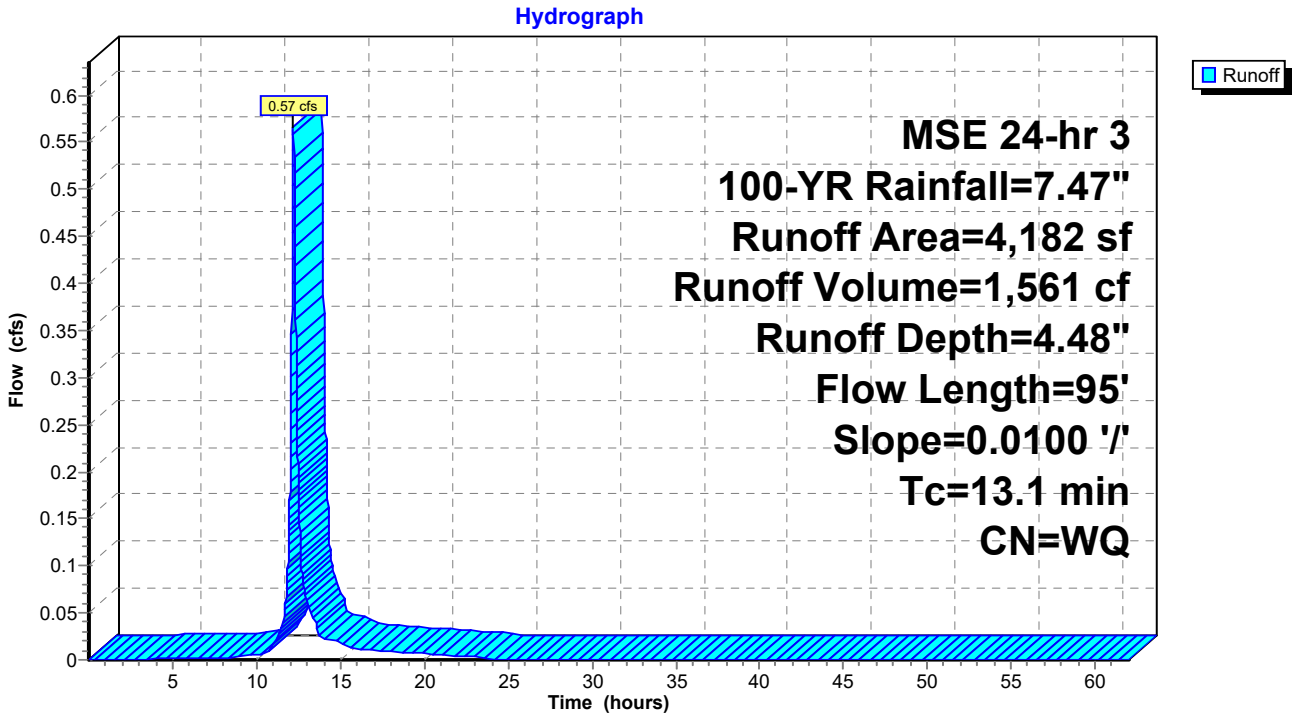
Runoff = 0.57 cfs @ 12.21 hrs, Volume= 1,561 cf, Depth= 4.48"
Routed to Link 4L : Ex DA to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-YR Rainfall=7.47"

Area (sf)	CN	Description
833	98	Water Surface, HSG A
3,349	68	<50% Grass cover, Poor, HSG A
4,182		Weighted Average
3,349		80.08% Pervious Area
833		19.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	95	0.0100	0.12		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 2S: Existing DA 2 - Northeast -Lake

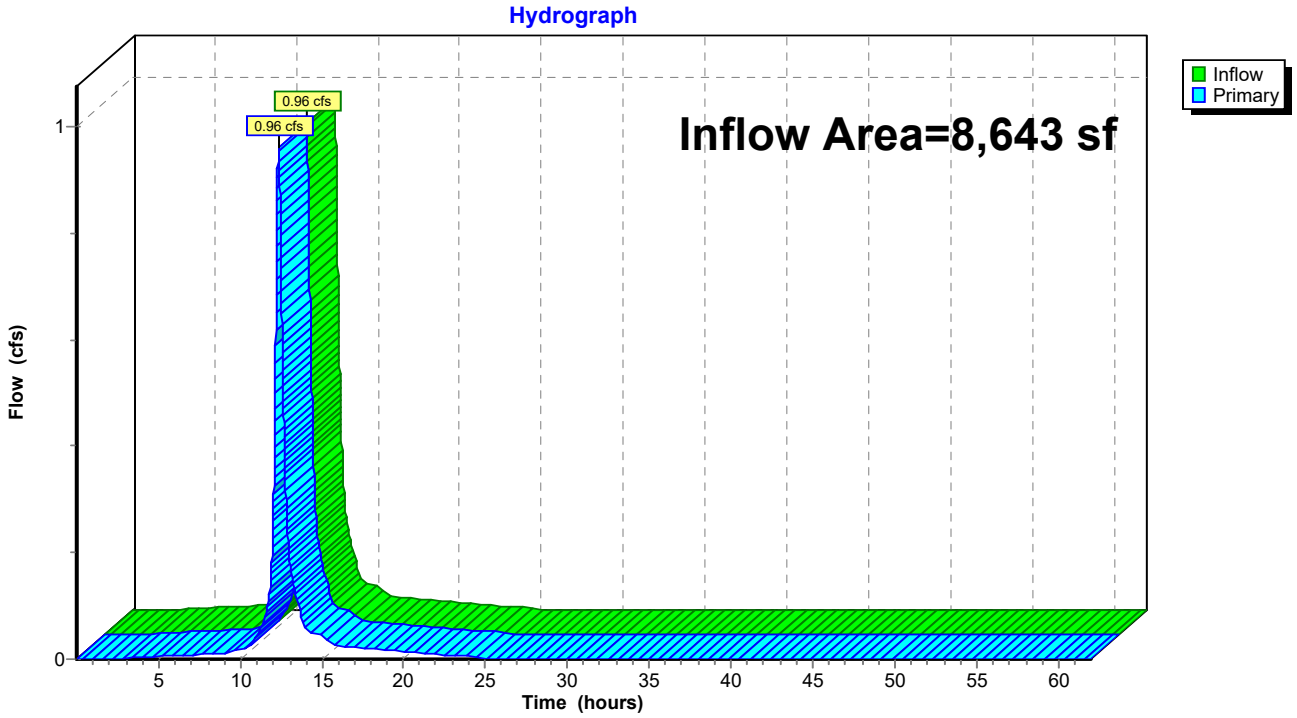


Summary for Link 3L: EX DA to Street

Inflow Area = 8,643 sf, 38.37% Impervious, Inflow Depth = 5.11" for 100-YR event
Inflow = 0.96 cfs @ 12.34 hrs, Volume= 3,682 cf
Primary = 0.96 cfs @ 12.34 hrs, Volume= 3,682 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 3L: EX DA to Street

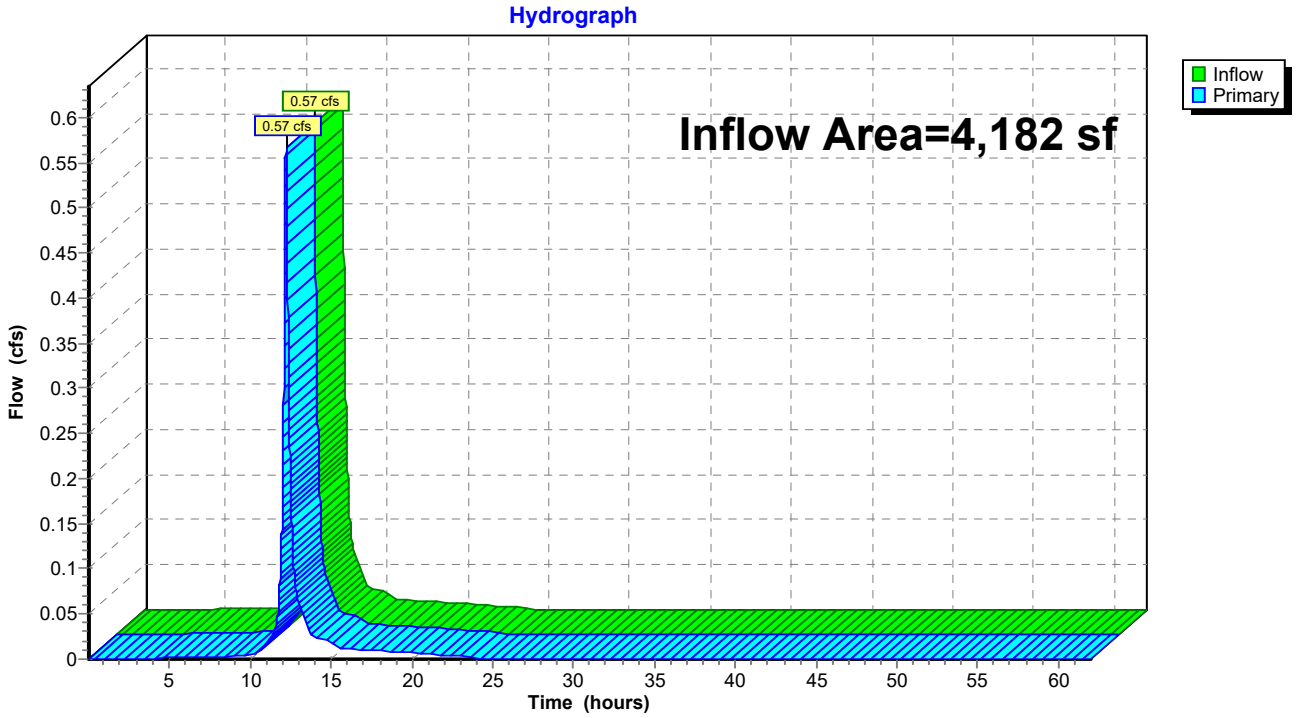


Summary for Link 4L: Ex DA to Lake

Inflow Area = 4,182 sf, 19.92% Impervious, Inflow Depth = 4.48" for 100-YR event
Inflow = 0.57 cfs @ 12.21 hrs, Volume= 1,561 cf
Primary = 0.57 cfs @ 12.21 hrs, Volume= 1,561 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 4L: Ex DA to Lake



Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing DA 1 - Street Runoff Area=8,643 sf 38.37% Impervious Runoff Depth=12.04"
Flow Length=205' Slope=0.0100 '/' Tc=24.2 min CN=WQ Runoff=1.18 cfs 8,671 cf

Subcatchment2S: Existing DA 2 - Runoff Area=4,182 sf 19.92% Impervious Runoff Depth=11.26"
Flow Length=95' Slope=0.0100 '/' Tc=13.1 min CN=WQ Runoff=0.75 cfs 3,924 cf

Link 3L: EX DA to Street Inflow=1.18 cfs 8,671 cf
Primary=1.18 cfs 8,671 cf

Link 4L: Ex DA to Lake Inflow=0.75 cfs 3,924 cf
Primary=0.75 cfs 3,924 cf

Total Runoff Area = 12,825 sf Runoff Volume = 12,595 cf Average Runoff Depth = 11.78"
67.65% Pervious = 8,676 sf 32.35% Impervious = 4,149 sf

Summary for Subcatchment 1S: Existing DA 1 - Street

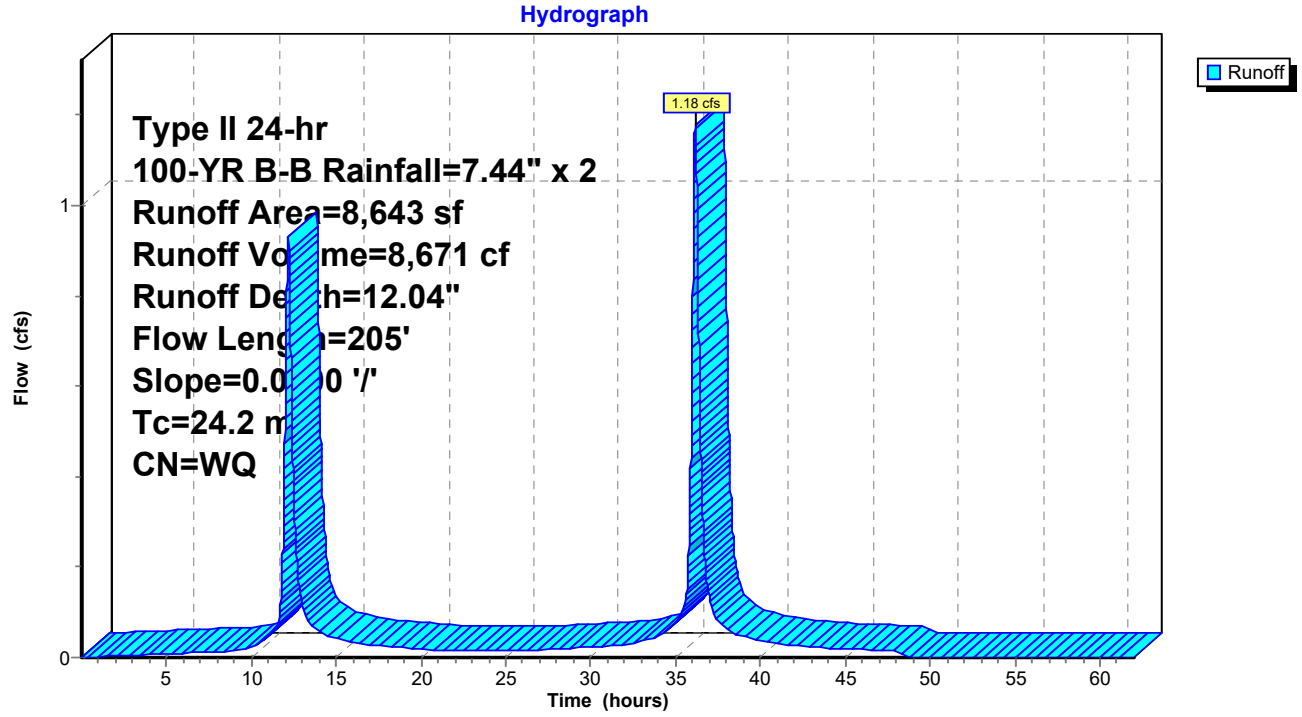
Runoff = 1.18 cfs @ 36.16 hrs, Volume= 8,671 cf, Depth=12.04"
Routed to Link 3L : EX DA to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-YR B-B Rainfall=7.44" x 2

Area (sf)	CN	Description
3,316	98	Unconnected roofs, HSG A
5,327	68	<50% Grass cover, Poor, HSG A
8,643		Weighted Average
5,327		61.63% Pervious Area
3,316		38.37% Impervious Area
3,316		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	205	0.0100	0.14		**Sheet Flow, Ex DA 1** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 1S: Existing DA 1 - Street



Summary for Subcatchment 2S: Existing DA 2 - Northeast -Lake

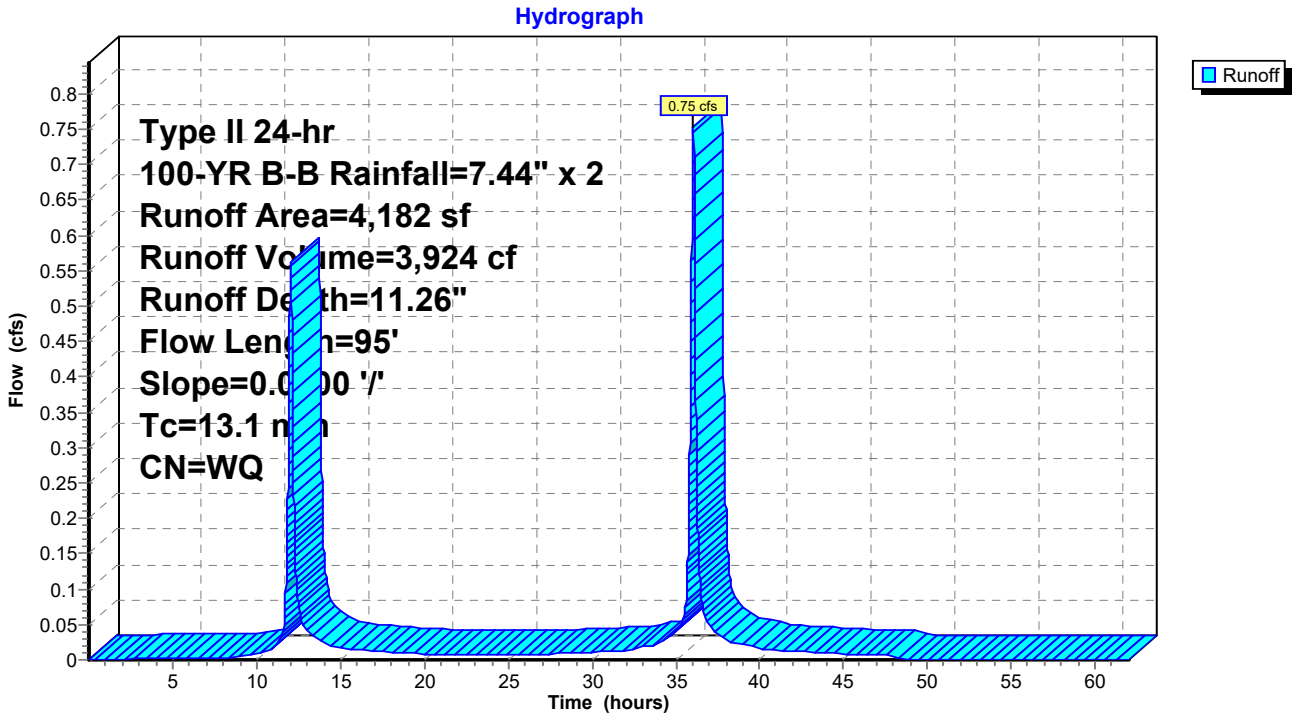
Runoff = 0.75 cfs @ 36.04 hrs, Volume= 3,924 cf, Depth=11.26"
Routed to Link 4L : Ex DA to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-YR B-B Rainfall=7.44" x 2

Area (sf)	CN	Description
833	98	Water Surface, HSG A
3,349	68	<50% Grass cover, Poor, HSG A
4,182		Weighted Average
3,349		80.08% Pervious Area
833		19.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	95	0.0100	0.12		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 2S: Existing DA 2 - Northeast -Lake

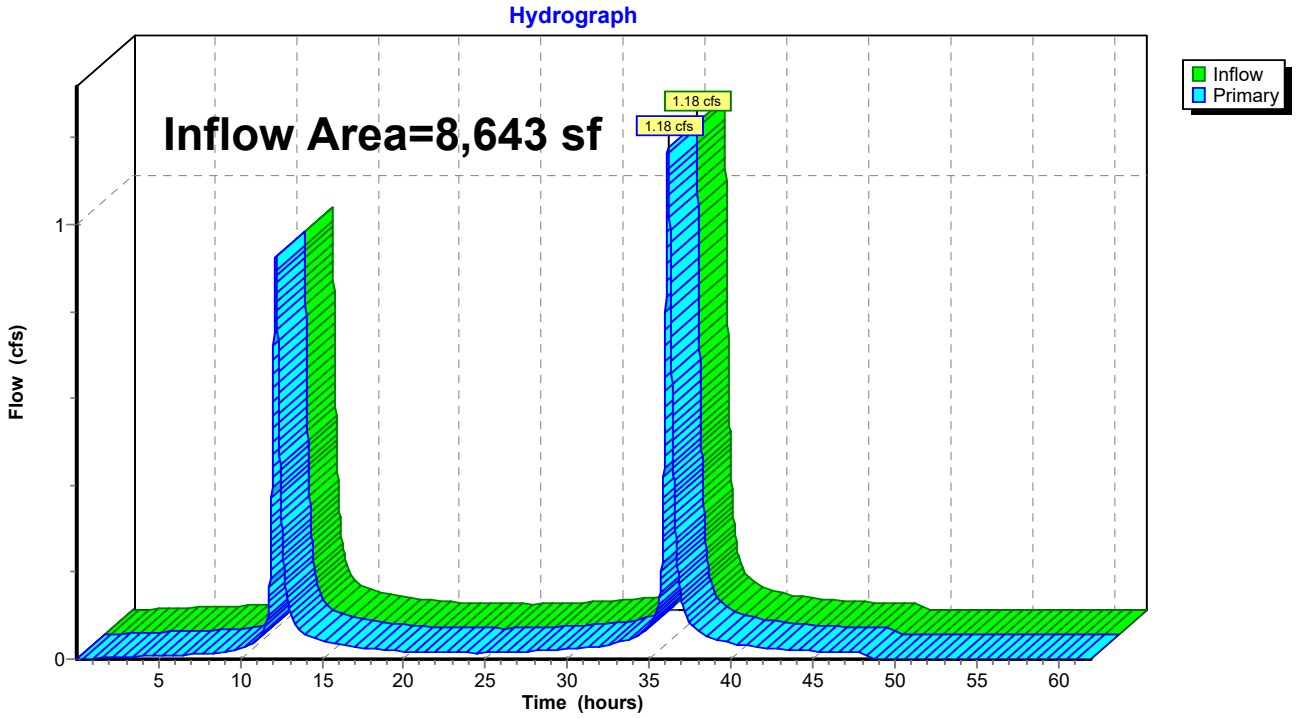


Summary for Link 3L: EX DA to Street

Inflow Area = 8,643 sf, 38.37% Impervious, Inflow Depth = 12.04" for 100-YR B-B event
Inflow = 1.18 cfs @ 36.16 hrs, Volume= 8,671 cf
Primary = 1.18 cfs @ 36.16 hrs, Volume= 8,671 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 3L: EX DA to Street

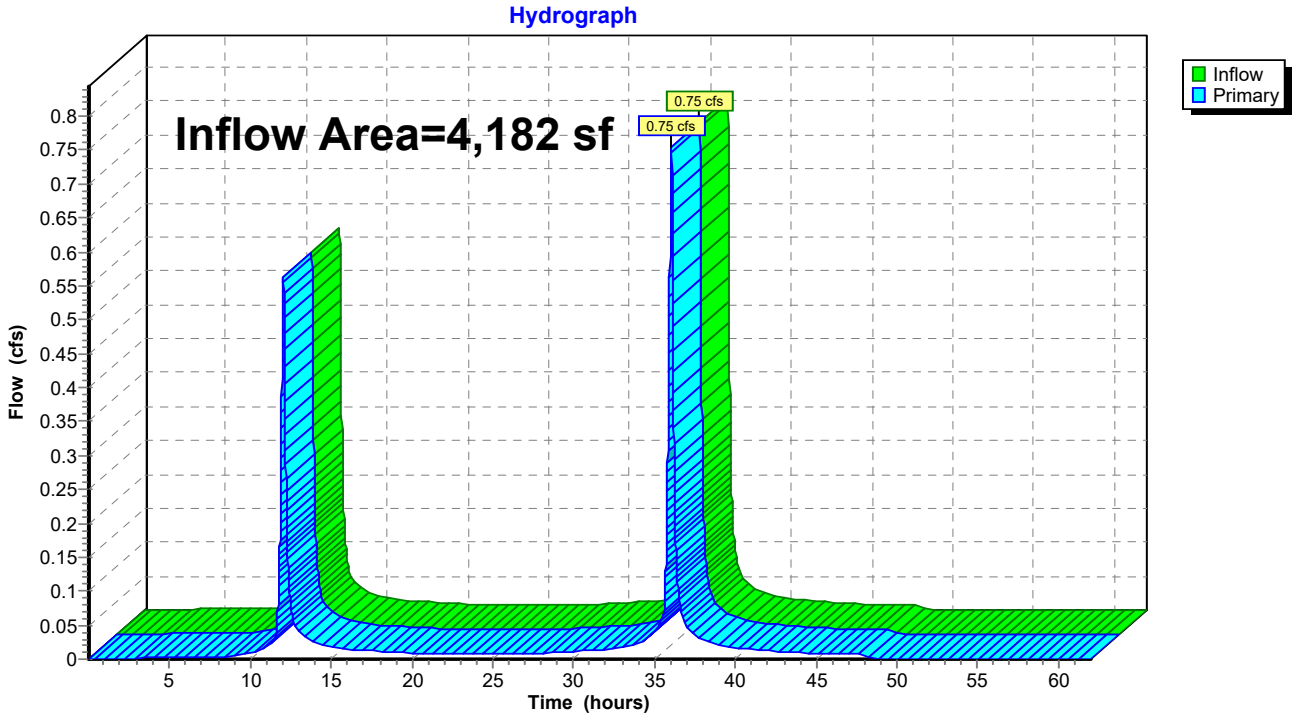


Summary for Link 4L: Ex DA to Lake

Inflow Area = 4,182 sf, 19.92% Impervious, Inflow Depth = 11.26" for 100-YR B-B event
Inflow = 0.75 cfs @ 36.04 hrs, Volume= 3,924 cf
Primary = 0.75 cfs @ 36.04 hrs, Volume= 3,924 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 4L: Ex DA to Lake



Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing DA 1 - Street Runoff Area=8,643 sf 38.37% Impervious Runoff Depth=5.11"
Flow Length=205' Slope=0.0100 '/' Tc=24.2 min CN=WQ Runoff=0.96 cfs 3,682 cf

Subcatchment2S: Existing DA 2 - Runoff Area=4,182 sf 19.92% Impervious Runoff Depth=4.48"
Flow Length=95' Slope=0.0100 '/' Tc=13.1 min CN=WQ Runoff=0.57 cfs 1,561 cf

Link 3L: EX DA to Street Inflow=0.96 cfs 3,682 cf
Primary=0.96 cfs 3,682 cf

Link 4L: Ex DA to Lake Inflow=0.57 cfs 1,561 cf
Primary=0.57 cfs 1,561 cf

Total Runoff Area = 12,825 sf Runoff Volume = 5,243 cf Average Runoff Depth = 4.91"
67.65% Pervious = 8,676 sf 32.35% Impervious = 4,149 sf

Summary for Subcatchment 1S: Existing DA 1 - Street

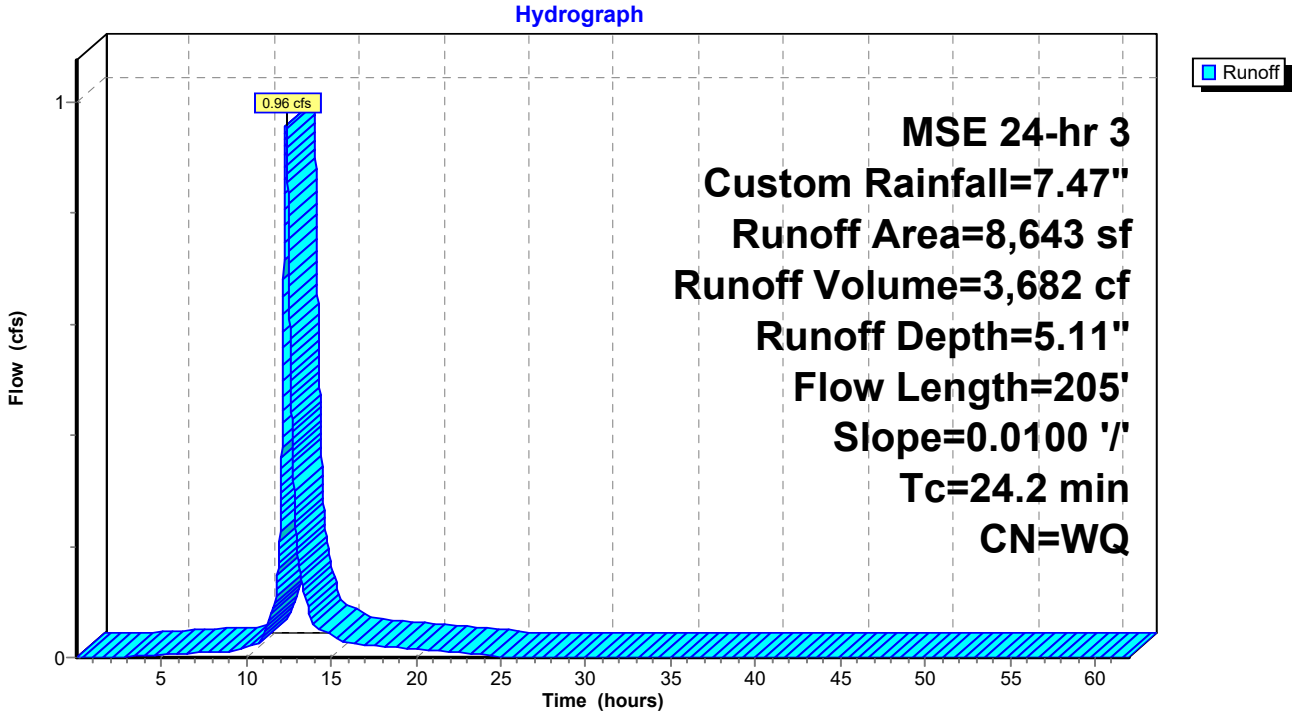
Runoff = 0.96 cfs @ 12.34 hrs, Volume= 3,682 cf, Depth= 5.11"
Routed to Link 3L : EX DA to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 Custom Rainfall=7.47"

Area (sf)	CN	Description
3,316	98	Unconnected roofs, HSG A
5,327	68	<50% Grass cover, Poor, HSG A
8,643		Weighted Average
5,327		61.63% Pervious Area
3,316		38.37% Impervious Area
3,316		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	205	0.0100	0.14		**Sheet Flow, Ex DA 1** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 1S: Existing DA 1 - Street



Summary for Subcatchment 2S: Existing DA 2 - Northeast -Lake

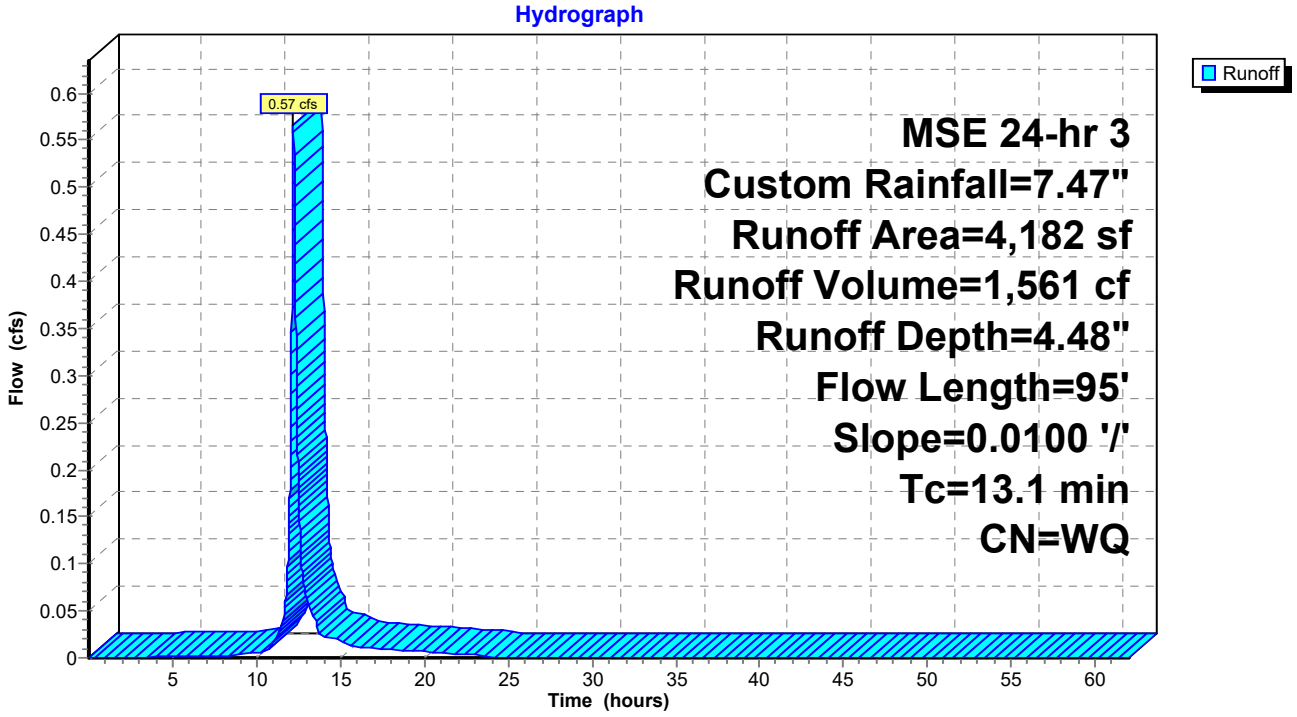
Runoff = 0.57 cfs @ 12.21 hrs, Volume= 1,561 cf, Depth= 4.48"
Routed to Link 4L : Ex DA to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 Custom Rainfall=7.47"

Area (sf)	CN	Description
833	98	Water Surface, HSG A
3,349	68	<50% Grass cover, Poor, HSG A
4,182		Weighted Average
3,349		80.08% Pervious Area
833		19.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	95	0.0100	0.12		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 2S: Existing DA 2 - Northeast -Lake

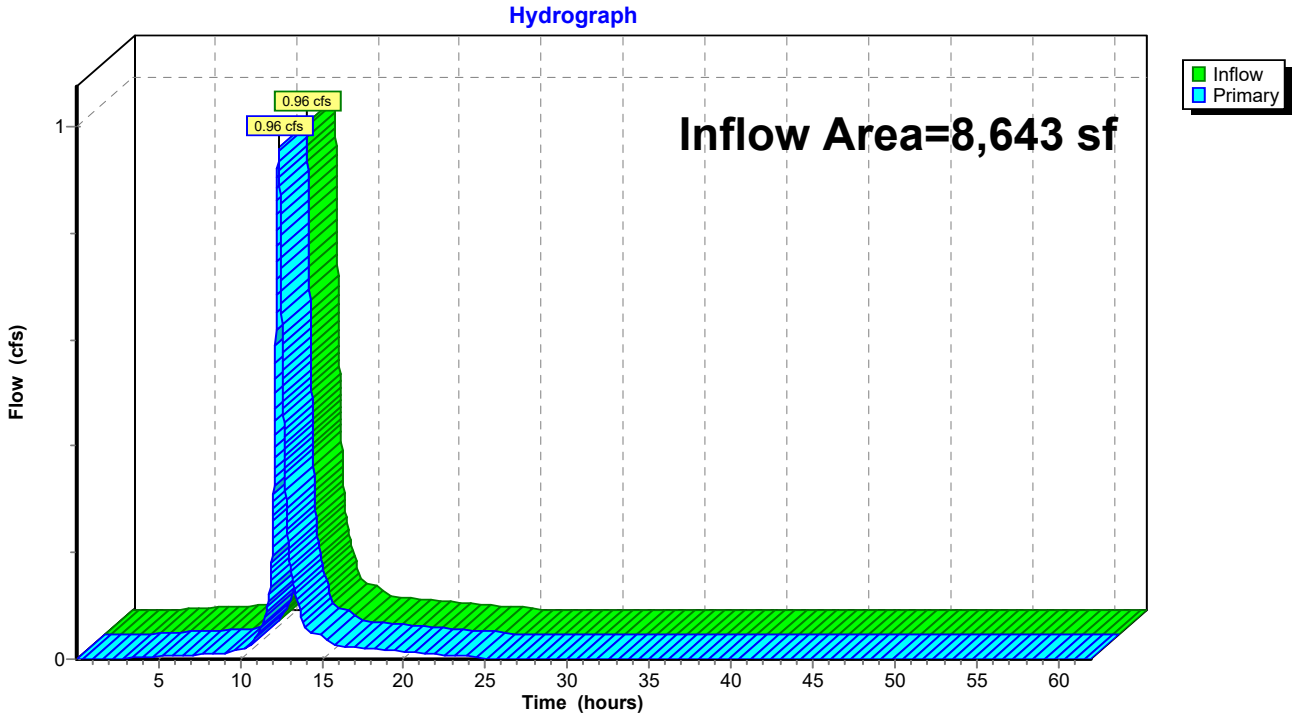


Summary for Link 3L: EX DA to Street

Inflow Area = 8,643 sf, 38.37% Impervious, Inflow Depth = 5.11" for Custom event
Inflow = 0.96 cfs @ 12.34 hrs, Volume= 3,682 cf
Primary = 0.96 cfs @ 12.34 hrs, Volume= 3,682 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 3L: EX DA to Street

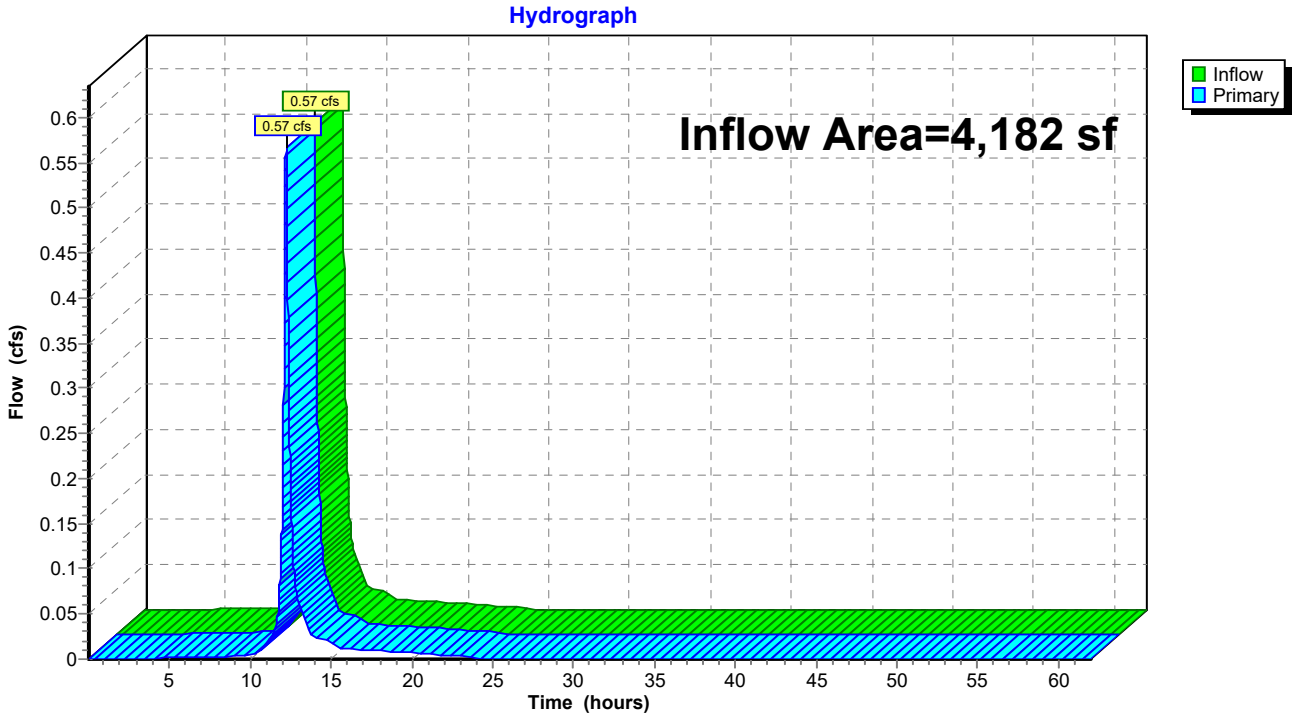


Summary for Link 4L: Ex DA to Lake

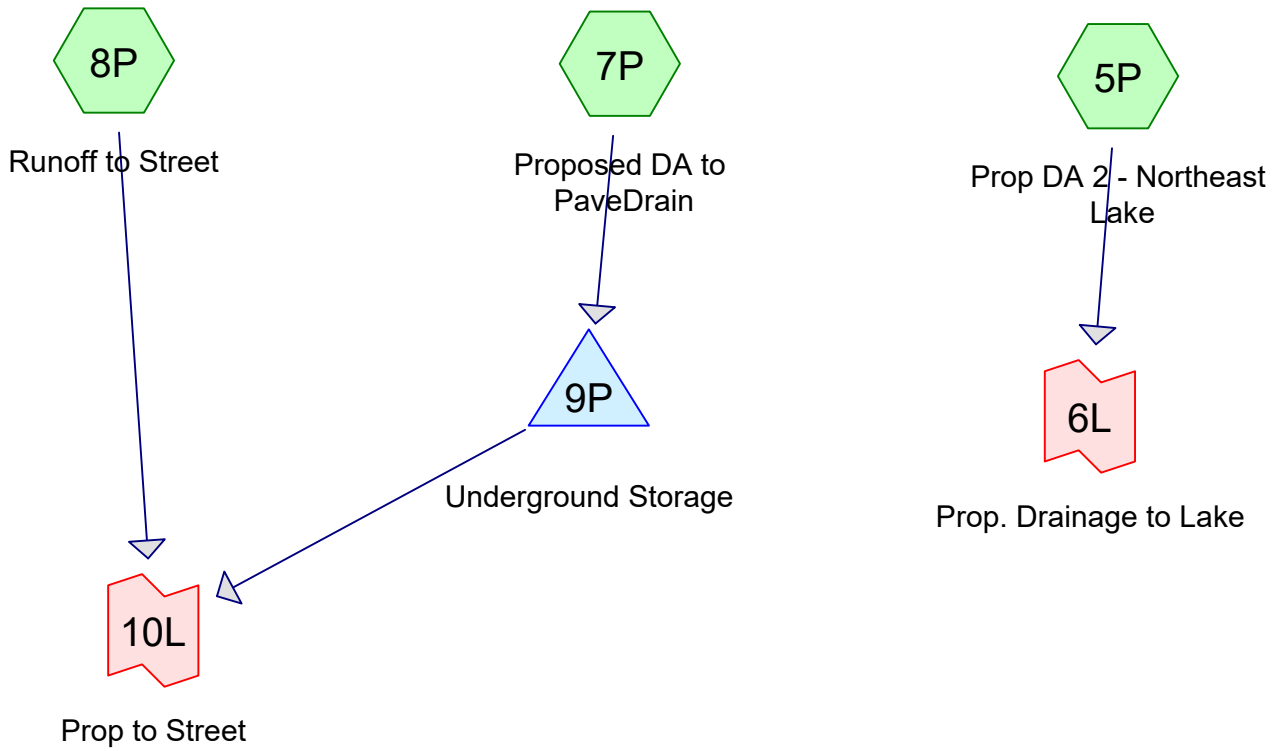
Inflow Area = 4,182 sf, 19.92% Impervious, Inflow Depth = 4.48" for Custom event
Inflow = 0.57 cfs @ 12.21 hrs, Volume= 1,561 cf
Primary = 0.57 cfs @ 12.21 hrs, Volume= 1,561 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 12L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 4L: Ex DA to Lake



Proposed Routing



Subcat Reach Pond Link

Routing Diagram for 4930-42 STORM DESIGNa
Prepared by Sathre-Bergquist, Inc., Printed 1/28/2022
HydroCAD® 10.10-7a s/n 03665 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YR	MSE 24-hr	3	Default	24.00	1	2.87	2
2	10-YR	MSE 24-hr	3	Default	24.00	1	4.28	2
3	100-YR	MSE 24-hr	3	Default	24.00	1	7.47	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
5,477	39	>75% Grass cover, Good, HSG A (5P, 7P)
1,783	38	>75% Grass cover, Good, HSG A (8P)
704	98	Paved parking, HSG A (8P)
994	98	Roofs, HSG A (5P)
3,730	98	Unconnected roofs, HSG A (7P)
12,688	**64**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
12,688	HSG A	5P, 7P, 8P
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
12,688		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
7,260	0	0	0	0	7,260	>75% Grass cover, Good	
704	0	0	0	0	704	Paved parking	
994	0	0	0	0	994	Roofs	
3,730	0	0	0	0	3,730	Unconnected roofs	
12,688	**0**	**0**	**0**	**0**	**12,688**	**TOTAL AREA**	

Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5P: Prop DA 2 - Northeast Runoff Area=5,644 sf 17.61% Impervious Runoff Depth=0.46"
Flow Length=167' Slope=0.0100 '/' Tc=20.6 min CN=WQ Runoff=0.06 cfs 219 cf

Subcatchment7P: Proposed DA to Runoff Area=4,557 sf 81.85% Impervious Runoff Depth=2.16"
Tc=10.0 min CN=WQ Runoff=0.31 cfs 820 cf

Subcatchment8P: Runoff to Street Runoff Area=2,487 sf 28.31% Impervious Runoff Depth=0.75"
Flow Length=132' Slope=0.0100 '/' Tc=24.8 min CN=WQ Runoff=0.04 cfs 155 cf

Pond 9P: Underground Storage Peak Elev=929.42' Storage=389 cf Inflow=0.31 cfs 820 cf
Discarded=0.02 cfs 820 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 820 cf

Link 6L: Prop. Drainage to Lake Inflow=0.06 cfs 219 cf
Primary=0.06 cfs 219 cf

Link 10L: Prop to Street Inflow=0.04 cfs 155 cf
Primary=0.04 cfs 155 cf

Total Runoff Area = 12,688 sf Runoff Volume = 1,194 cf Average Runoff Depth = 1.13"
57.22% Pervious = 7,260 sf 42.78% Impervious = 5,428 sf

Summary for Subcatchment 5P: Prop DA 2 - Northeast Lake

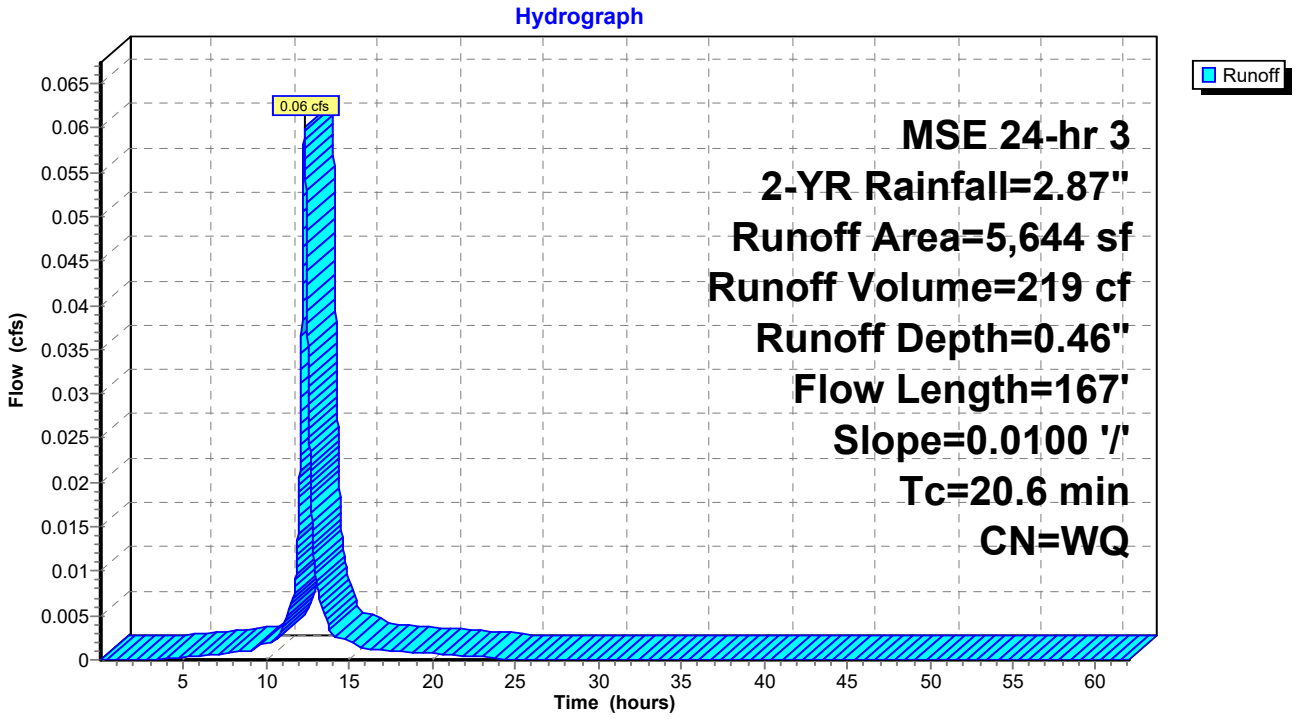
Runoff = 0.06 cfs @ 12.29 hrs, Volume= 219 cf, Depth= 0.46"
Routed to Link 6L : Prop. Drainage to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-YR Rainfall=2.87"

Area (sf)	CN	Description
994	98	Roofs, HSG A
4,650	39	>75% Grass cover, Good, HSG A
5,644		Weighted Average
4,650		82.39% Pervious Area
994		17.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	167	0.0100	0.14		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 5P: Prop DA 2 - Northeast Lake



Summary for Subcatchment 7P: Proposed DA to PaveDrain

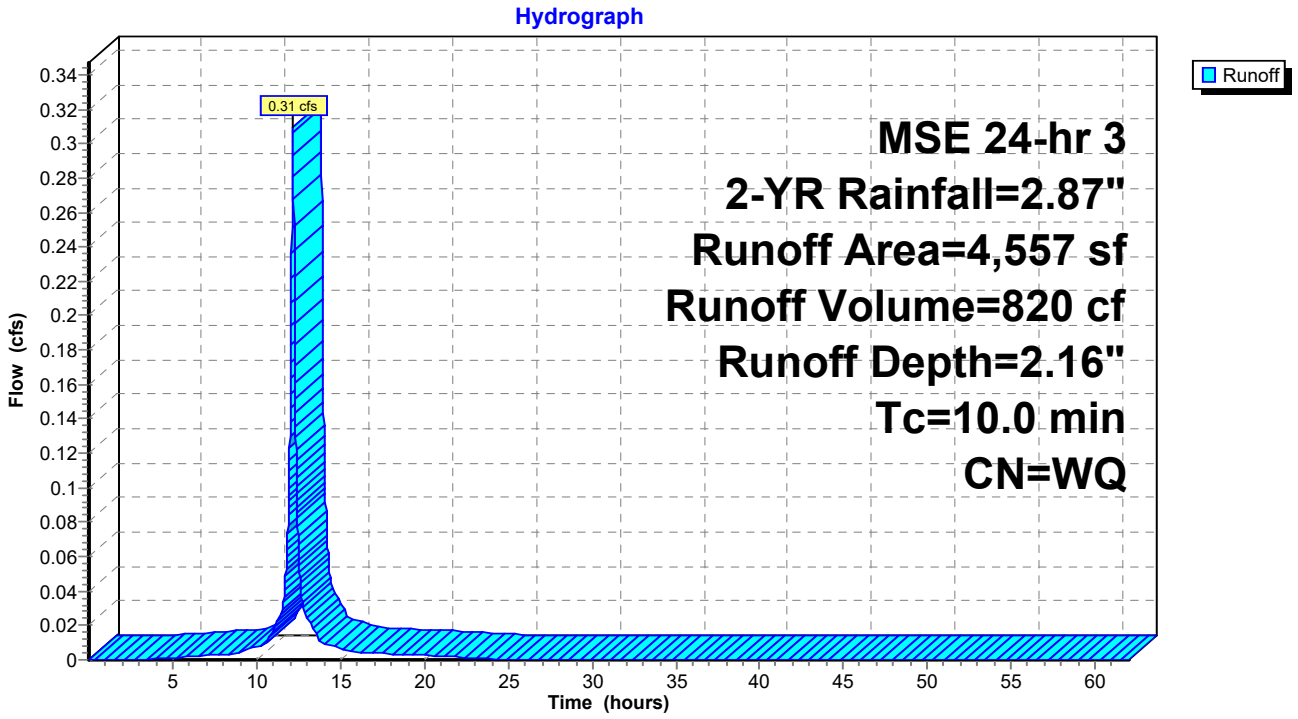
Runoff = 0.31 cfs @ 12.17 hrs, Volume= 820 cf, Depth= 2.16"
Routed to Pond 9P : Underground Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-YR Rainfall=2.87"

Area (sf)	CN	Description
3,730	98	Unconnected roofs, HSG A
827	39	>75% Grass cover, Good, HSG A
4,557		Weighted Average
827		18.15% Pervious Area
3,730		81.85% Impervious Area
3,730		100.00% Unconnected

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

Subcatchment 7P: Proposed DA to PaveDrain



Summary for Subcatchment 8P: Runoff to Street

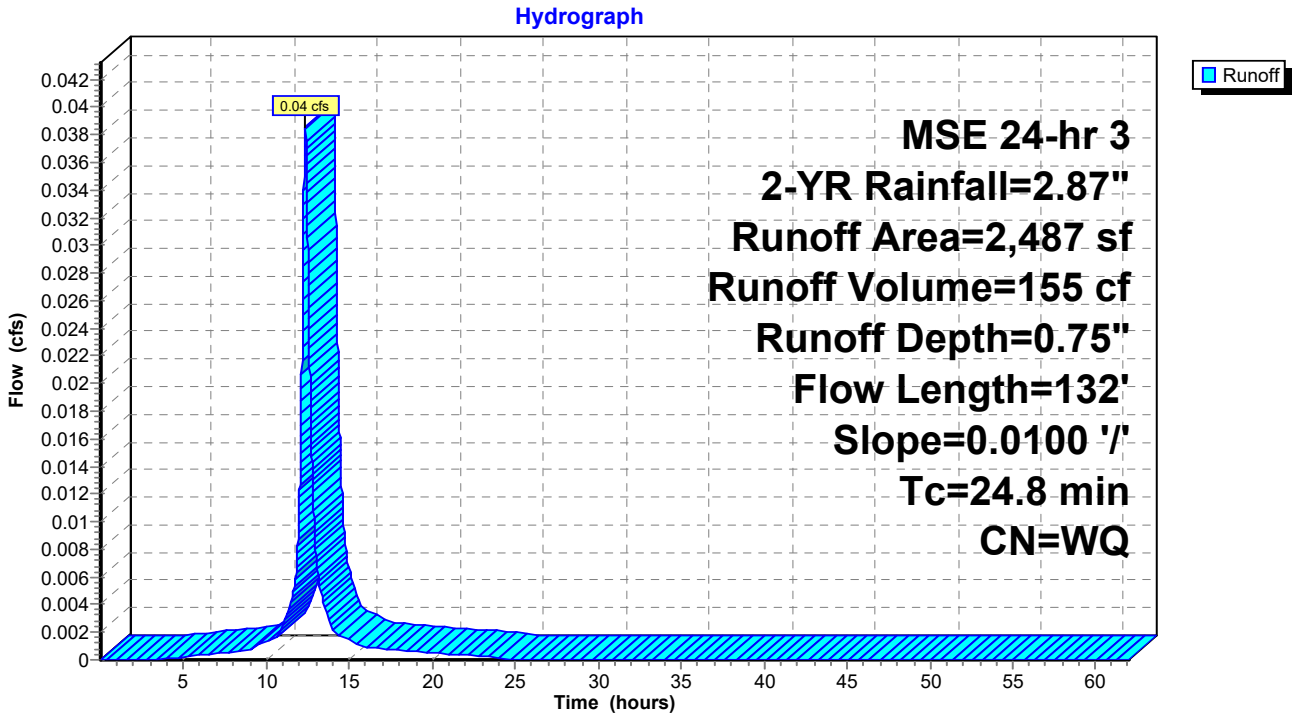
Runoff = 0.04 cfs @ 12.34 hrs, Volume= 155 cf, Depth= 0.75"
Routed to Link 10L : Prop to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-YR Rainfall=2.87"

	Area (sf)	CN	Description
	704	98	Paved parking, HSG A
*	1,783	38	>75% Grass cover, Good, HSG A
	2,487		Weighted Average
	1,783		71.69% Pervious Area
	704		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	132	0.0100	0.09		**Sheet Flow, Drainage to Front** Grass: Dense n= 0.240 P2= 2.87"

Subcatchment 8P: Runoff to Street



Summary for Pond 9P: Underground Storage

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=185)

Inflow Area = 4,557 sf, 81.85% Impervious, Inflow Depth = 2.16" for 2-YR event
Inflow = 0.31 cfs @ 12.17 hrs, Volume= 820 cf
Outflow = 0.02 cfs @ 11.49 hrs, Volume= 820 cf, Atten= 93%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.49 hrs, Volume= 820 cf
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0 cf
Routed to Link 10L : Prop to Street

Routing by Dyn-Stor-Ind method, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 929.42' @ 13.28 hrs Surf.Area= 1,098 sf Storage= 389 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 146.0 min (903.4 - 757.4)

Volume	Invert	Avail.Storage	Storage Description
#1	928.33'	955 cf	**Pavedrain System (Pyramidal)** Listed below (Recalc)

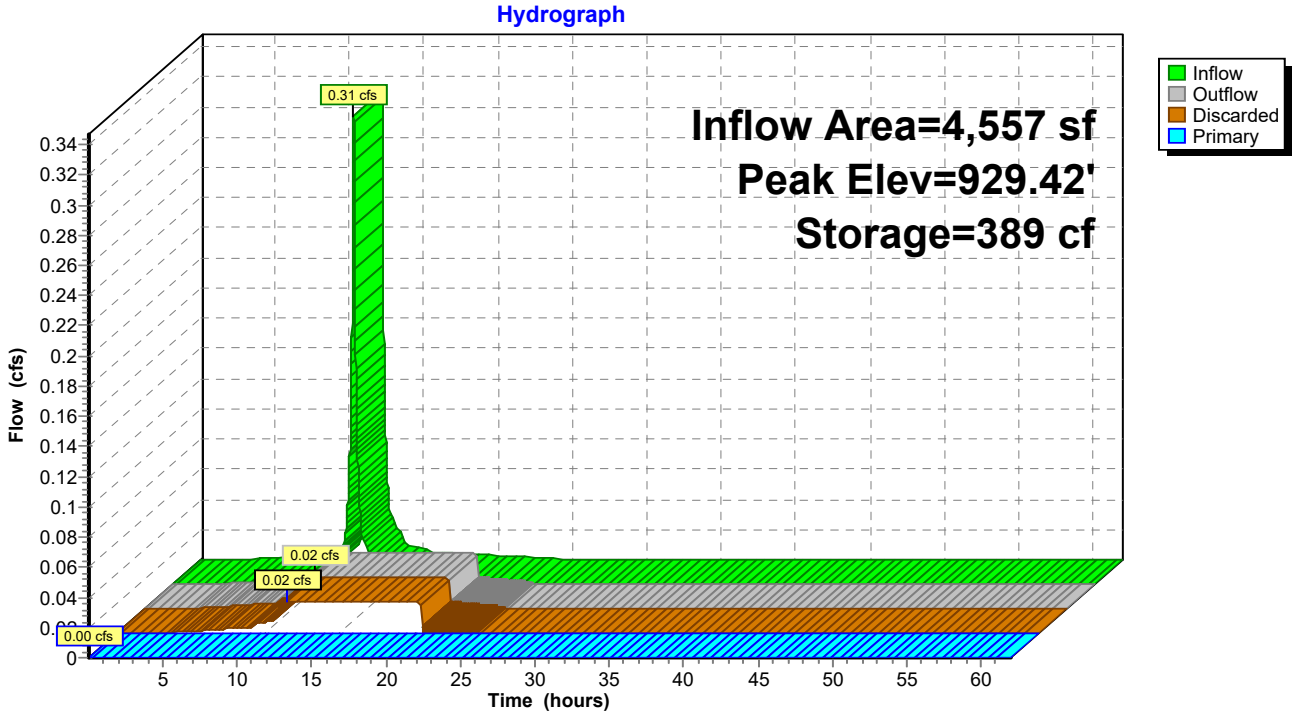
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
928.33	1,098	0.0	0	0	1,098
928.34	1,098	40.0	4	4	1,099
929.01	1,098	40.0	294	299	1,188
929.02	1,098	20.0	2	301	1,189
929.50	1,098	20.0	105	406	1,253
929.51	1,098	100.0	11	417	1,254
930.00	1,098	100.0	538	955	1,319

Device	Routing	Invert	Outlet Devices
#1	Discarded	928.33'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	929.49'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.02 cfs @ 11.49 hrs HW=928.34' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=928.33' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Underground Storage

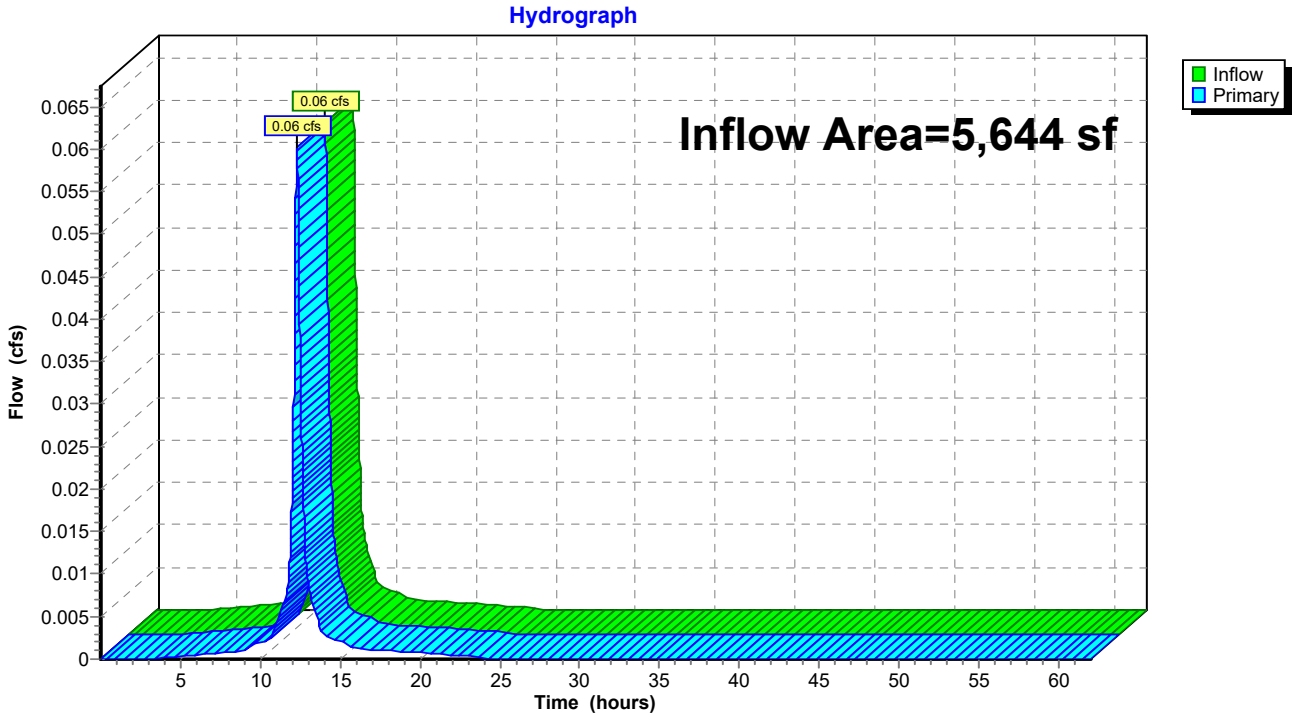


Summary for Link 6L: Prop. Drainage to Lake

Inflow Area = 5,644 sf, 17.61% Impervious, Inflow Depth = 0.46" for 2-YR event
Inflow = 0.06 cfs @ 12.29 hrs, Volume= 219 cf
Primary = 0.06 cfs @ 12.29 hrs, Volume= 219 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 13L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 6L: Prop. Drainage to Lake

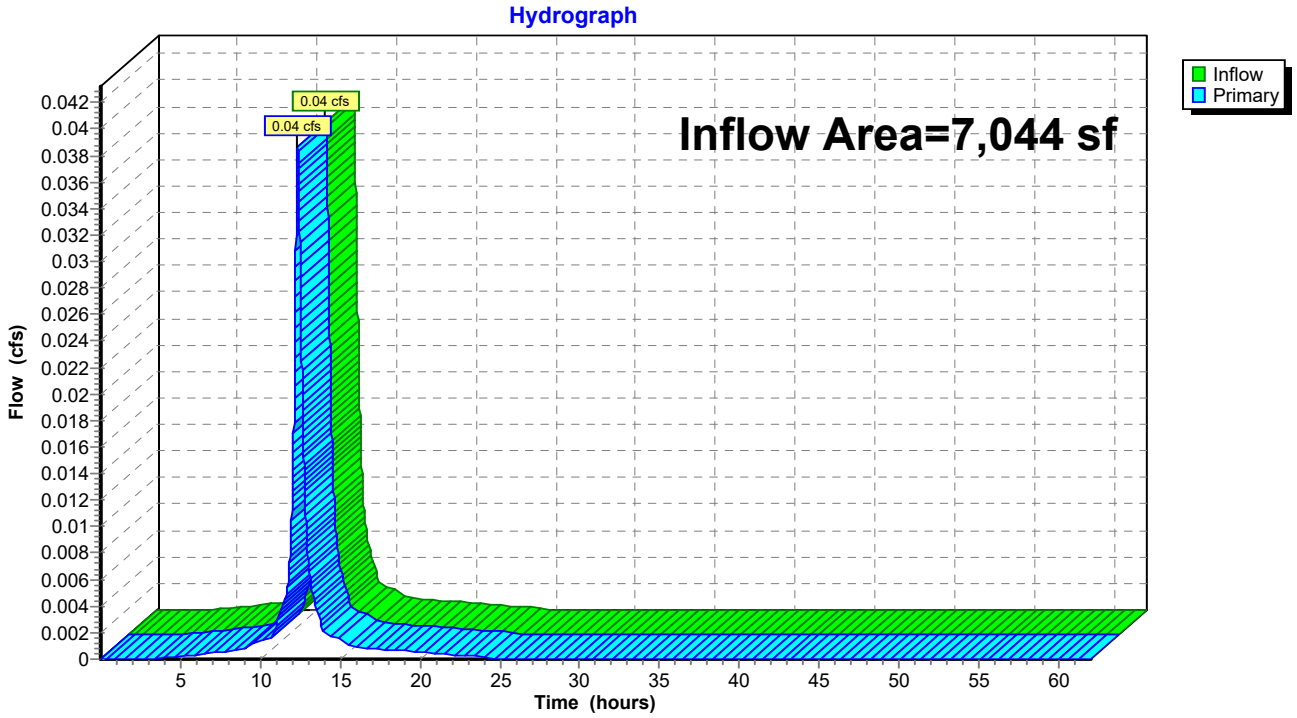


Summary for Link 10L: Prop to Street

Inflow Area = 7,044 sf, 62.95% Impervious, Inflow Depth = 0.26" for 2-YR event
Inflow = 0.04 cfs @ 12.34 hrs, Volume= 155 cf
Primary = 0.04 cfs @ 12.34 hrs, Volume= 155 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 13L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 10L: Prop to Street



Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5P: Prop DA 2 - Northeast Runoff Area=5,644 sf 17.61% Impervious Runoff Depth=0.78"
Flow Length=167' Slope=0.0100 '/' Tc=20.6 min CN=WQ Runoff=0.09 cfs 366 cf

Subcatchment7P: Proposed DA to Runoff Area=4,557 sf 81.85% Impervious Runoff Depth=3.32"
Tc=10.0 min CN=WQ Runoff=0.47 cfs 1,263 cf

Subcatchment8P: Runoff to Street Runoff Area=2,487 sf 28.31% Impervious Runoff Depth=1.19"
Flow Length=132' Slope=0.0100 '/' Tc=24.8 min CN=WQ Runoff=0.06 cfs 246 cf

Pond 9P: Underground Storage Peak Elev=929.51' Storage=416 cf Inflow=0.47 cfs 1,263 cf
Discarded=0.02 cfs 984 cf Primary=0.34 cfs 279 cf Outflow=0.36 cfs 1,263 cf

Link 6L: Prop. Drainage to Lake Inflow=0.09 cfs 366 cf
Primary=0.09 cfs 366 cf

Link 10L: Prop to Street Inflow=0.39 cfs 525 cf
Primary=0.39 cfs 525 cf

Total Runoff Area = 12,688 sf Runoff Volume = 1,874 cf Average Runoff Depth = 1.77"
57.22% Pervious = 7,260 sf 42.78% Impervious = 5,428 sf

Summary for Subcatchment 5P: Prop DA 2 - Northeast Lake

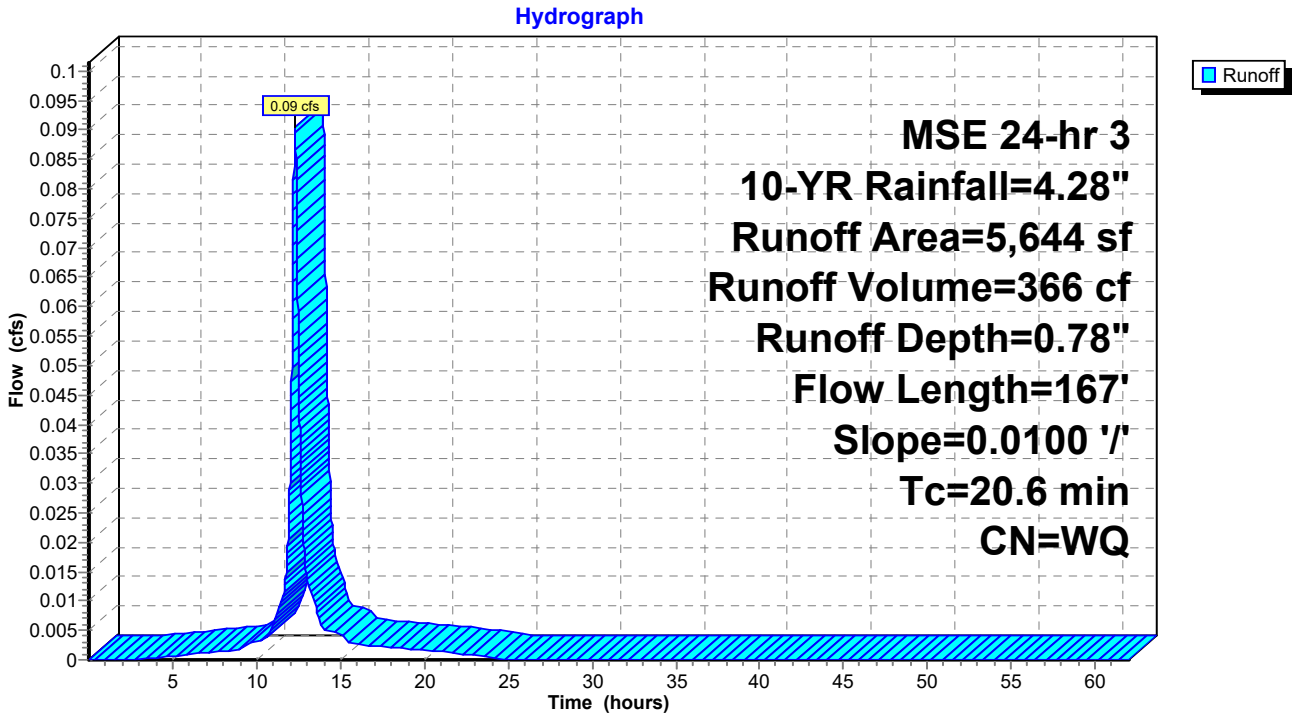
Runoff = 0.09 cfs @ 12.29 hrs, Volume= 366 cf, Depth= 0.78"
Routed to Link 6L : Prop. Drainage to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-YR Rainfall=4.28"

Area (sf)	CN	Description
994	98	Roofs, HSG A
4,650	39	>75% Grass cover, Good, HSG A
5,644		Weighted Average
4,650		82.39% Pervious Area
994		17.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	167	0.0100	0.14		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 5P: Prop DA 2 - Northeast Lake



Summary for Subcatchment 7P: Proposed DA to PaveDrain

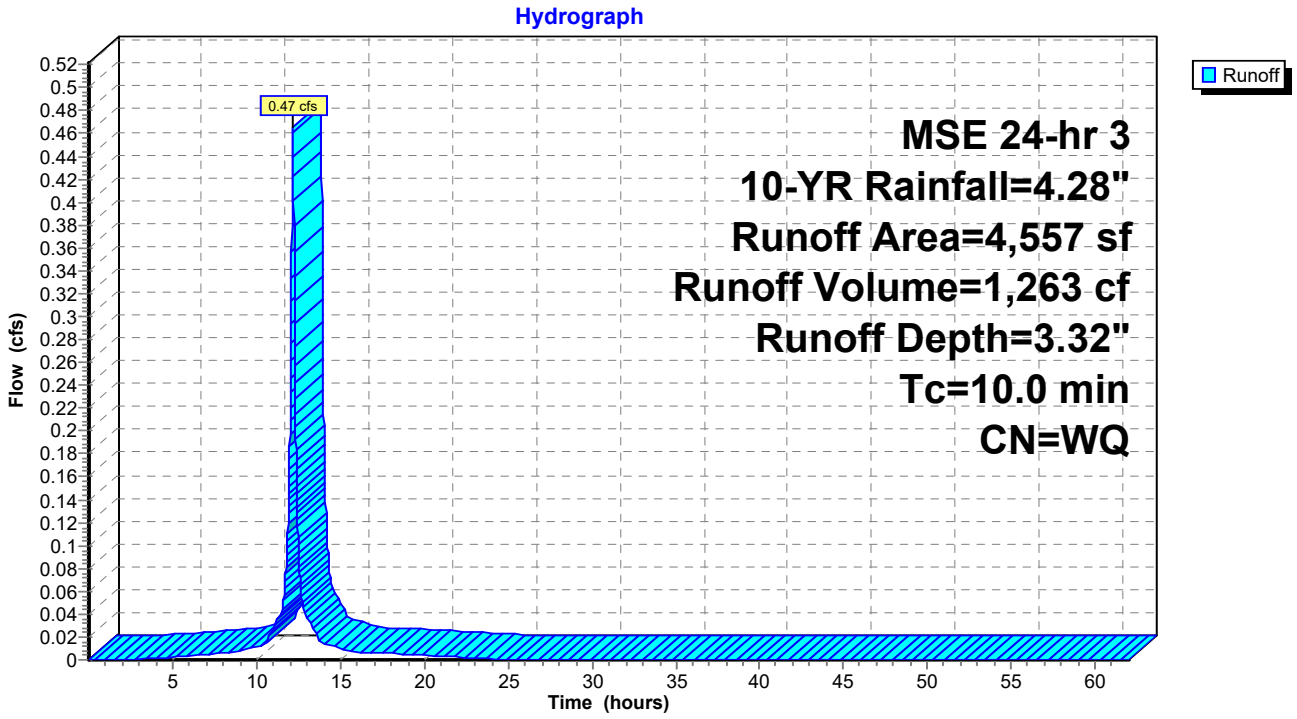
Runoff = 0.47 cfs @ 12.17 hrs, Volume= 1,263 cf, Depth= 3.32"
Routed to Pond 9P : Underground Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-YR Rainfall=4.28"

Area (sf)	CN	Description
3,730	98	Unconnected roofs, HSG A
827	39	>75% Grass cover, Good, HSG A
4,557		Weighted Average
827		18.15% Pervious Area
3,730		81.85% Impervious Area
3,730		100.00% Unconnected

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

Subcatchment 7P: Proposed DA to PaveDrain



Summary for Subcatchment 8P: Runoff to Street

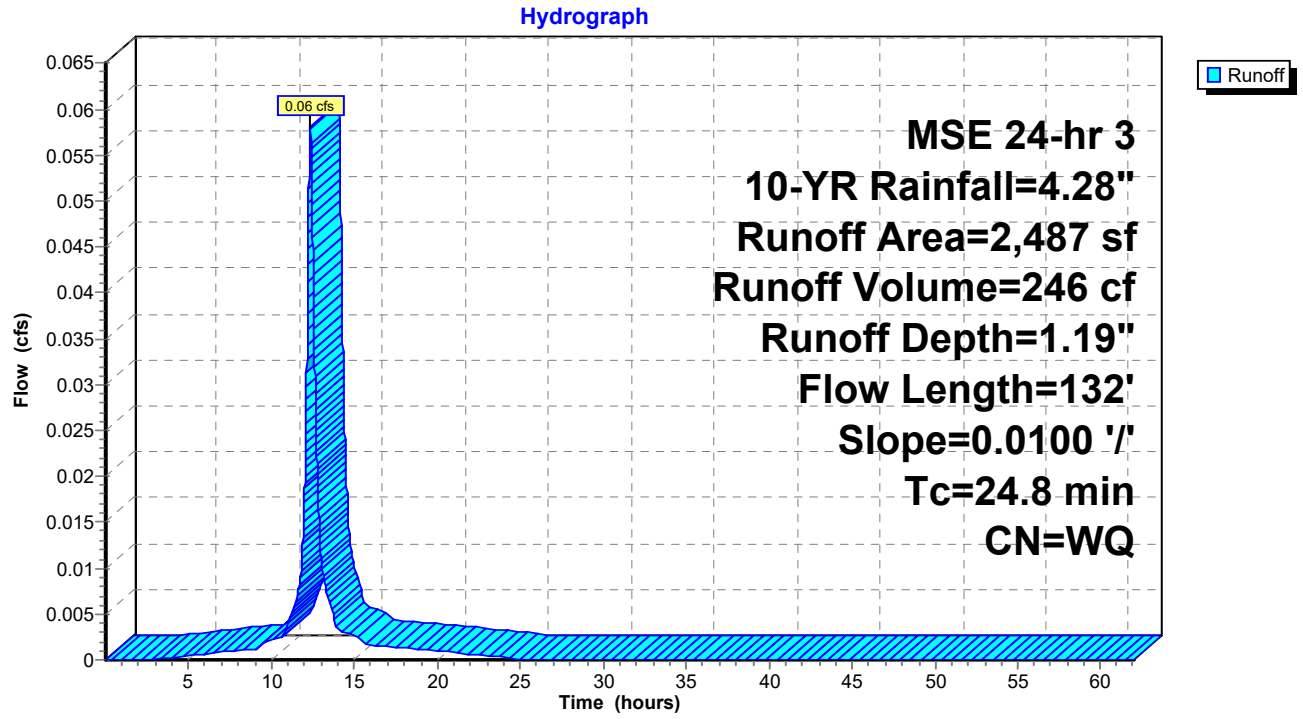
Runoff = 0.06 cfs @ 12.34 hrs, Volume= 246 cf, Depth= 1.19"
Routed to Link 10L : Prop to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-YR Rainfall=4.28"

	Area (sf)	CN	Description
	704	98	Paved parking, HSG A
*	1,783	38	>75% Grass cover, Good, HSG A
	2,487		Weighted Average
	1,783		71.69% Pervious Area
	704		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	132	0.0100	0.09		**Sheet Flow, Drainage to Front** Grass: Dense n= 0.240 P2= 2.87"

Subcatchment 8P: Runoff to Street



Summary for Pond 9P: Underground Storage

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=108)

Inflow Area = 4,557 sf, 81.85% Impervious, Inflow Depth = 3.32" for 10-YR event
Inflow = 0.47 cfs @ 12.17 hrs, Volume= 1,263 cf
Outflow = 0.36 cfs @ 12.24 hrs, Volume= 1,263 cf, Atten= 22%, Lag= 4.2 min
Discarded = 0.02 cfs @ 11.02 hrs, Volume= 984 cf
Primary = 0.34 cfs @ 12.24 hrs, Volume= 279 cf
Routed to Link 10L : Prop to Street

Routing by Dyn-Stor-Ind method, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 929.51' @ 12.24 hrs Surf.Area= 1,098 sf Storage= 416 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 121.8 min (874.0 - 752.2)

Volume	Invert	Avail.Storage	Storage Description
#1	928.33'	955 cf	**Pavedrain System (Pyramidal)** Listed below (Recalc)

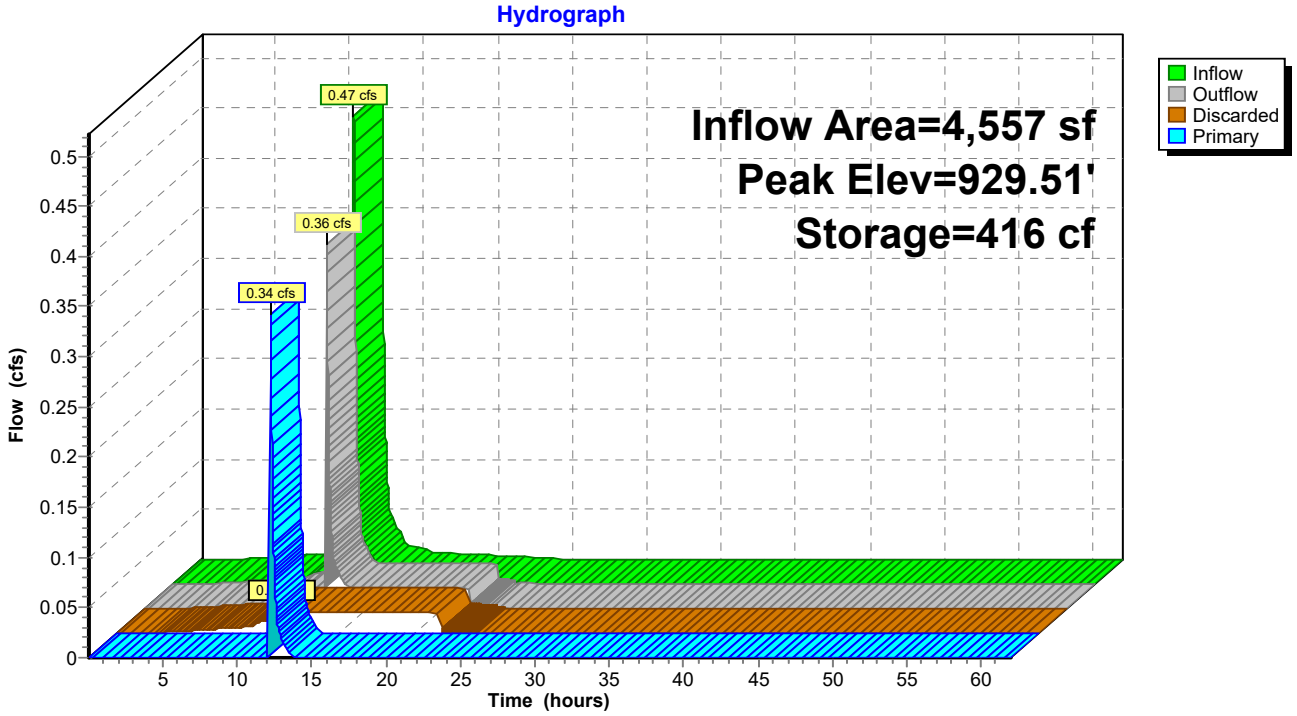
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
928.33	1,098	0.0	0	0	1,098
928.34	1,098	40.0	4	4	1,099
929.01	1,098	40.0	294	299	1,188
929.02	1,098	20.0	2	301	1,189
929.50	1,098	20.0	105	406	1,253
929.51	1,098	100.0	11	417	1,254
930.00	1,098	100.0	538	955	1,319

Device	Routing	Invert	Outlet Devices
#1	Discarded	928.33'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	929.49'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.02 cfs @ 11.02 hrs HW=928.34' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.34 cfs @ 12.24 hrs HW=929.51' TW=0.00' (Dynamic Tailwater)
↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.34 cfs @ 0.45 fps)

Pond 9P: Underground Storage

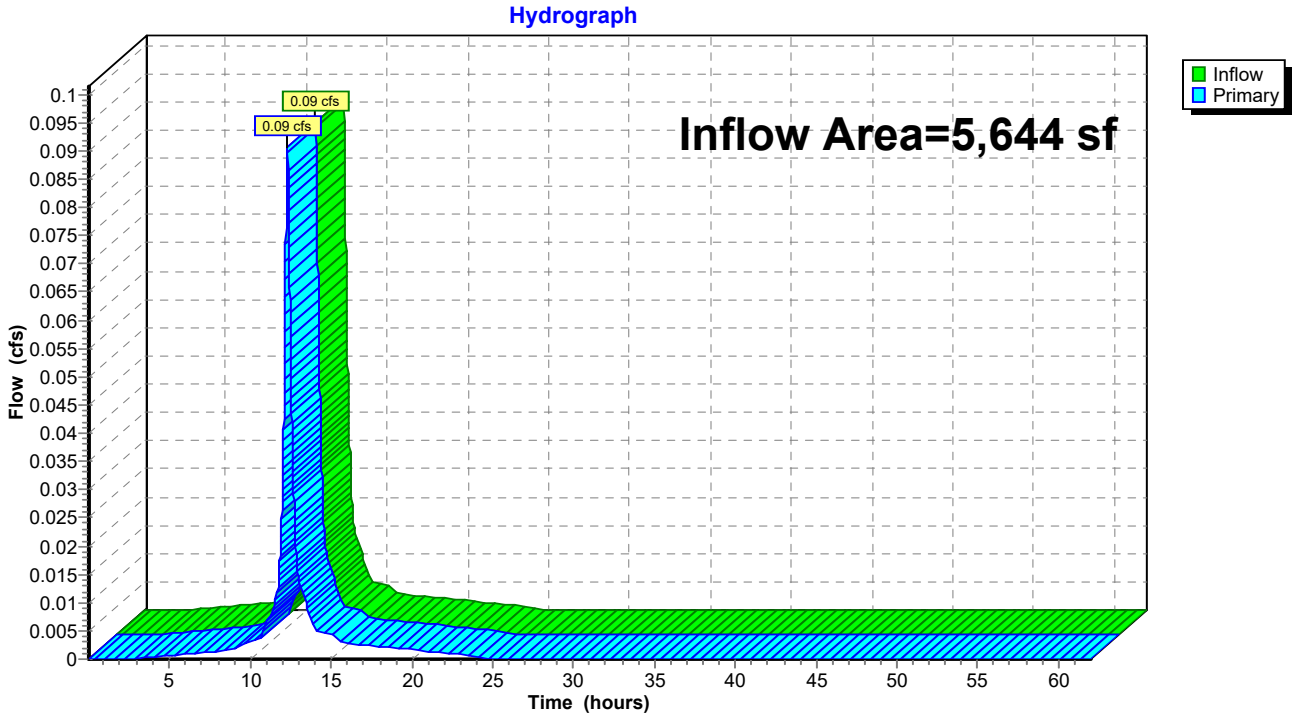


Summary for Link 6L: Prop. Drainage to Lake

Inflow Area = 5,644 sf, 17.61% Impervious, Inflow Depth = 0.78" for 10-YR event
Inflow = 0.09 cfs @ 12.29 hrs, Volume= 366 cf
Primary = 0.09 cfs @ 12.29 hrs, Volume= 366 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 13L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 6L: Prop. Drainage to Lake

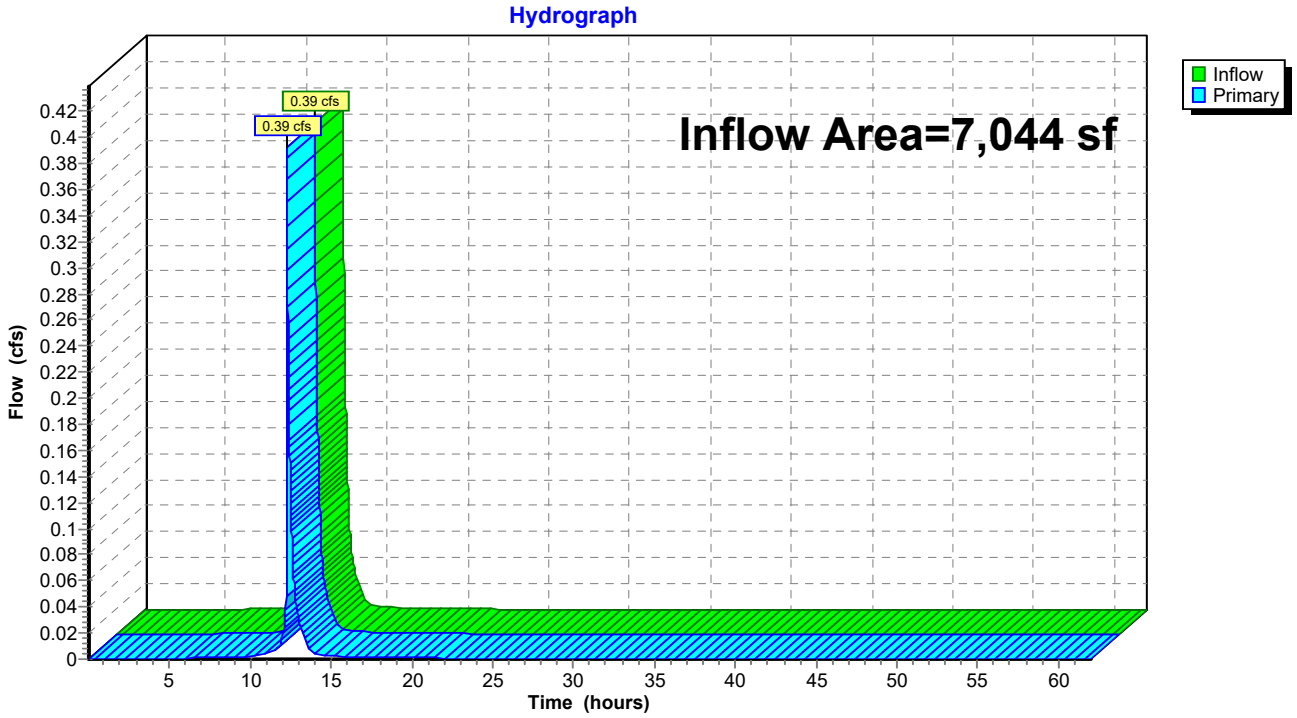


Summary for Link 10L: Prop to Street

Inflow Area = 7,044 sf, 62.95% Impervious, Inflow Depth = 0.89" for 10-YR event
Inflow = 0.39 cfs @ 12.24 hrs, Volume= 525 cf
Primary = 0.39 cfs @ 12.24 hrs, Volume= 525 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 13L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 10L: Prop to Street



Time span=0.01-62.00 hrs, dt=0.01 hrs, 6200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment5P: Prop DA 2 - Northeast Runoff Area=5,644 sf 17.61% Impervious Runoff Depth=2.05"
Flow Length=167' Slope=0.0100 '/' Tc=20.6 min CN=WQ Runoff=0.22 cfs 964 cf

Subcatchment7P: Proposed DA to Runoff Area=4,557 sf 81.85% Impervious Runoff Depth=6.09"
Tc=10.0 min CN=WQ Runoff=0.83 cfs 2,313 cf

Subcatchment8P: Runoff to Street Runoff Area=2,487 sf 28.31% Impervious Runoff Depth=2.67"
Flow Length=132' Slope=0.0100 '/' Tc=24.8 min CN=WQ Runoff=0.12 cfs 552 cf

Pond 9P: Underground Storage Peak Elev=929.52' Storage=432 cf Inflow=0.83 cfs 2,313 cf
Discarded=0.02 cfs 1,279 cf Primary=0.81 cfs 1,033 cf Outflow=0.83 cfs 2,313 cf

Link 6L: Prop. Drainage to Lake Inflow=0.22 cfs 964 cf
Primary=0.22 cfs 964 cf

Link 10L: Prop to Street Inflow=0.88 cfs 1,586 cf
Primary=0.88 cfs 1,586 cf

Total Runoff Area = 12,688 sf Runoff Volume = 3,829 cf Average Runoff Depth = 3.62"
57.22% Pervious = 7,260 sf 42.78% Impervious = 5,428 sf

Summary for Subcatchment 5P: Prop DA 2 - Northeast Lake

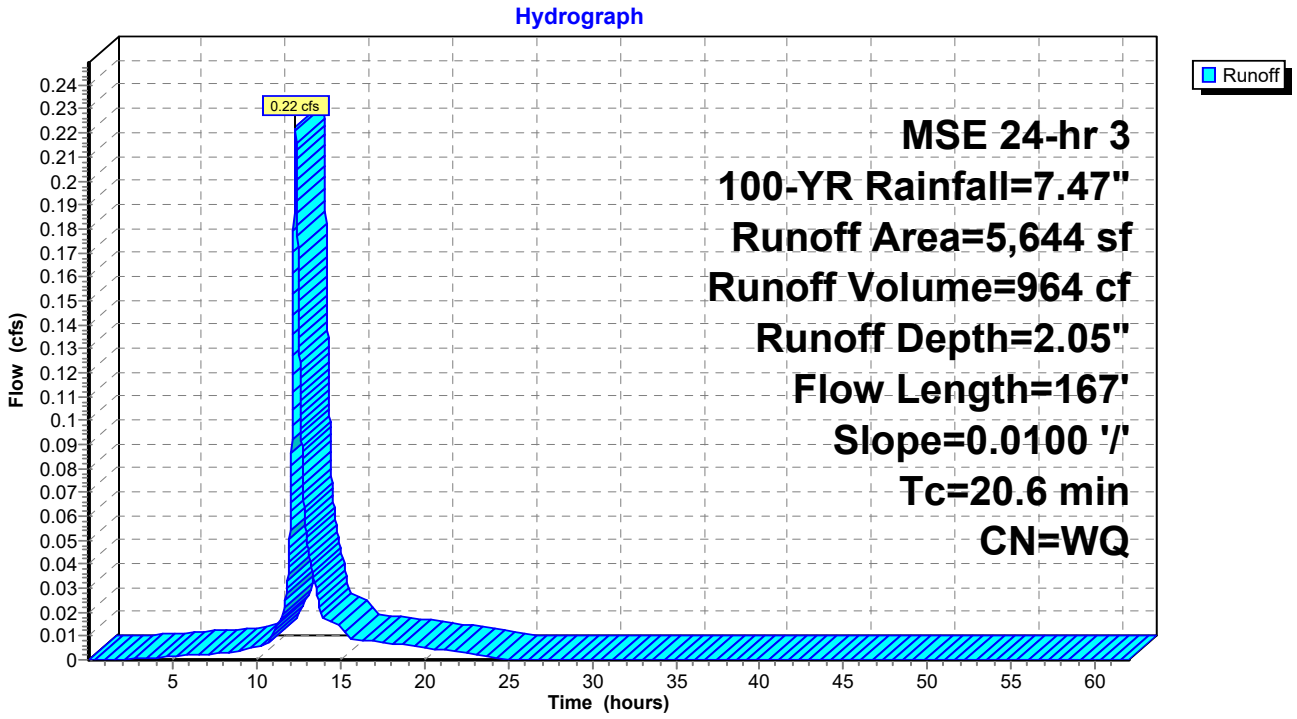
Runoff = 0.22 cfs @ 12.33 hrs, Volume= 964 cf, Depth= 2.05"
Routed to Link 6L : Prop. Drainage to Lake

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-YR Rainfall=7.47"

Area (sf)	CN	Description
994	98	Roofs, HSG A
4,650	39	>75% Grass cover, Good, HSG A
5,644		Weighted Average
4,650		82.39% Pervious Area
994		17.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	167	0.0100	0.14		**Sheet Flow, ED DA Lake** Grass: Short n= 0.150 P2= 2.87"

Subcatchment 5P: Prop DA 2 - Northeast Lake



Summary for Subcatchment 7P: Proposed DA to PaveDrain

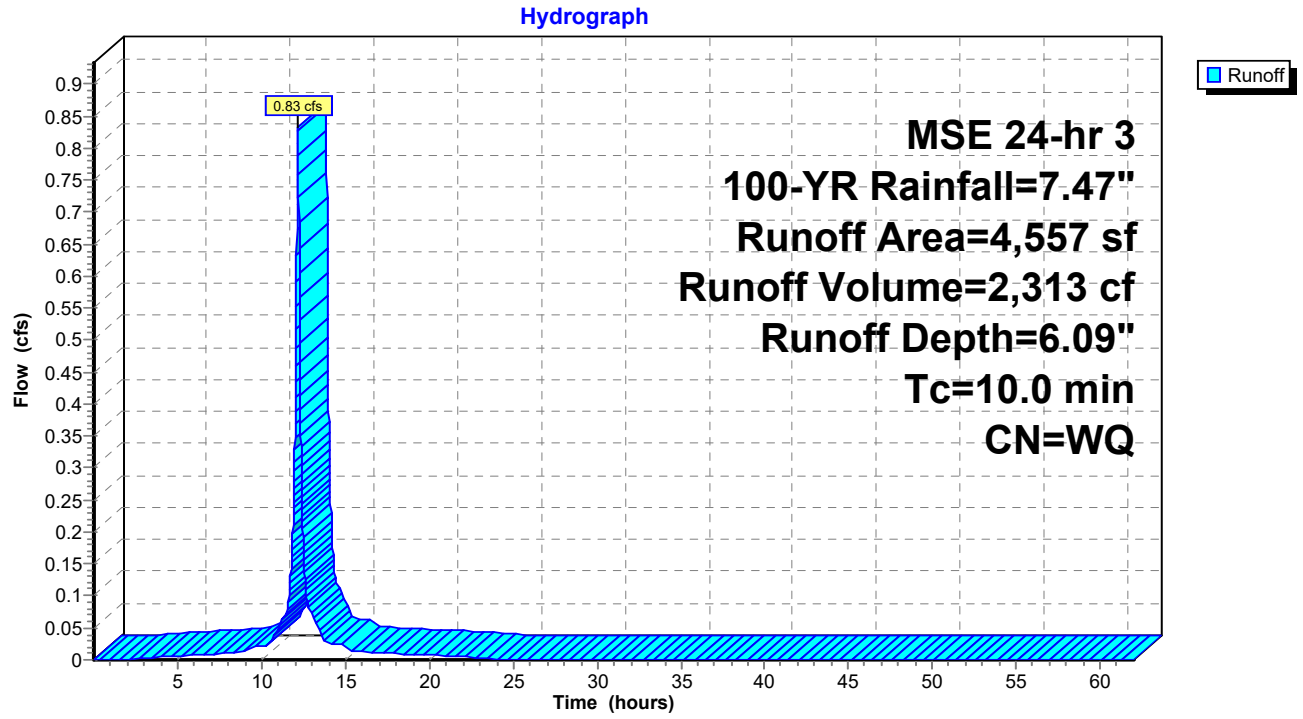
Runoff = 0.83 cfs @ 12.17 hrs, Volume= 2,313 cf, Depth= 6.09"
Routed to Pond 9P : Underground Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-YR Rainfall=7.47"

Area (sf)	CN	Description
3,730	98	Unconnected roofs, HSG A
827	39	>75% Grass cover, Good, HSG A
4,557		Weighted Average
827		18.15% Pervious Area
3,730		81.85% Impervious Area
3,730		100.00% Unconnected

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

Subcatchment 7P: Proposed DA to PaveDrain



Summary for Subcatchment 8P: Runoff to Street

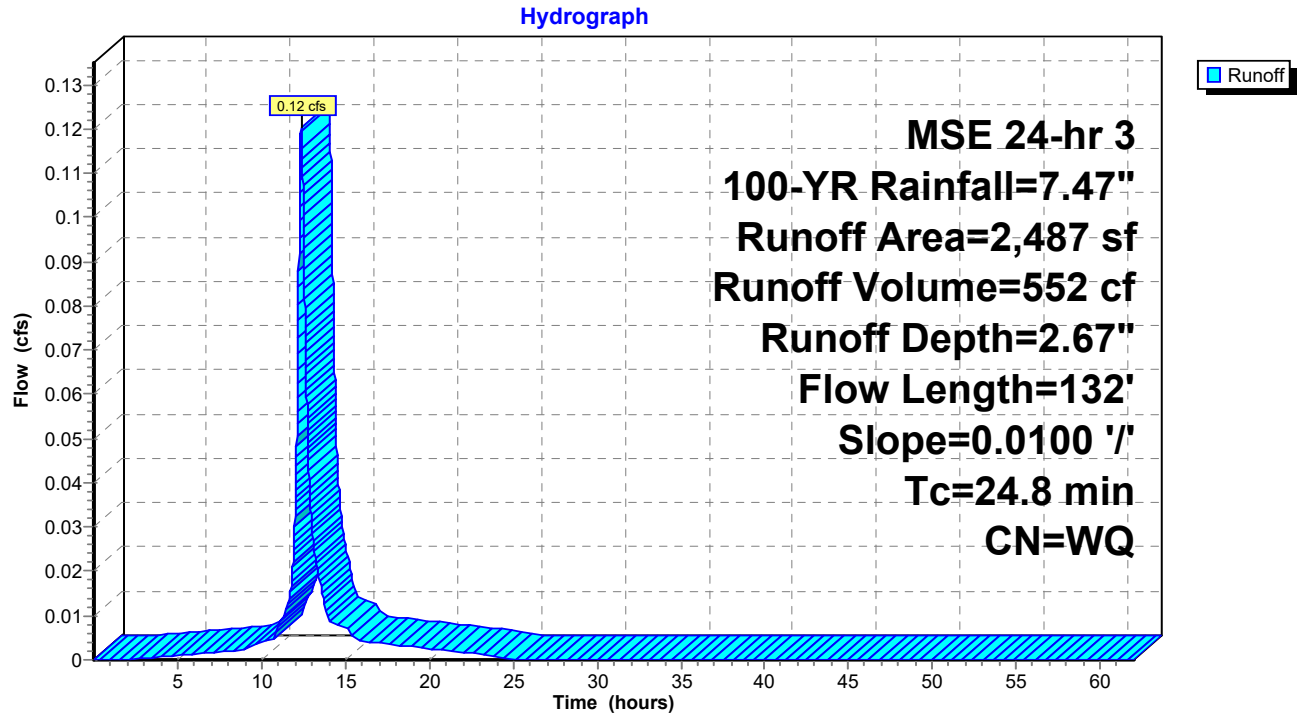
Runoff = 0.12 cfs @ 12.37 hrs, Volume= 552 cf, Depth= 2.67"
Routed to Link 10L : Prop to Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-YR Rainfall=7.47"

	Area (sf)	CN	Description
	704	98	Paved parking, HSG A
*	1,783	38	>75% Grass cover, Good, HSG A
	2,487		Weighted Average
	1,783		71.69% Pervious Area
	704		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	132	0.0100	0.09		**Sheet Flow, Drainage to Front** Grass: Dense n= 0.240 P2= 2.87"

Subcatchment 8P: Runoff to Street



Summary for Pond 9P: Underground Storage

Inflow Area = 4,557 sf, 81.85% Impervious, Inflow Depth = 6.09" for 100-YR event
Inflow = 0.83 cfs @ 12.17 hrs, Volume= 2,313 cf
Outflow = 0.83 cfs @ 12.18 hrs, Volume= 2,313 cf, Atten= 0%, Lag= 0.5 min
Discarded = 0.02 cfs @ 10.21 hrs, Volume= 1,279 cf
Primary = 0.81 cfs @ 12.18 hrs, Volume= 1,033 cf
Routed to Link 10L : Prop to Street

Routing by Dyn-Stor-Ind method, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 929.52' @ 12.18 hrs Surf.Area= 1,098 sf Storage= 432 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 92.7 min (840.5 - 747.8)

Volume	Invert	Avail.Storage	Storage Description
#1	928.33'	955 cf	**Pavedrain System (Pyramidal)** Listed below (Recalc)

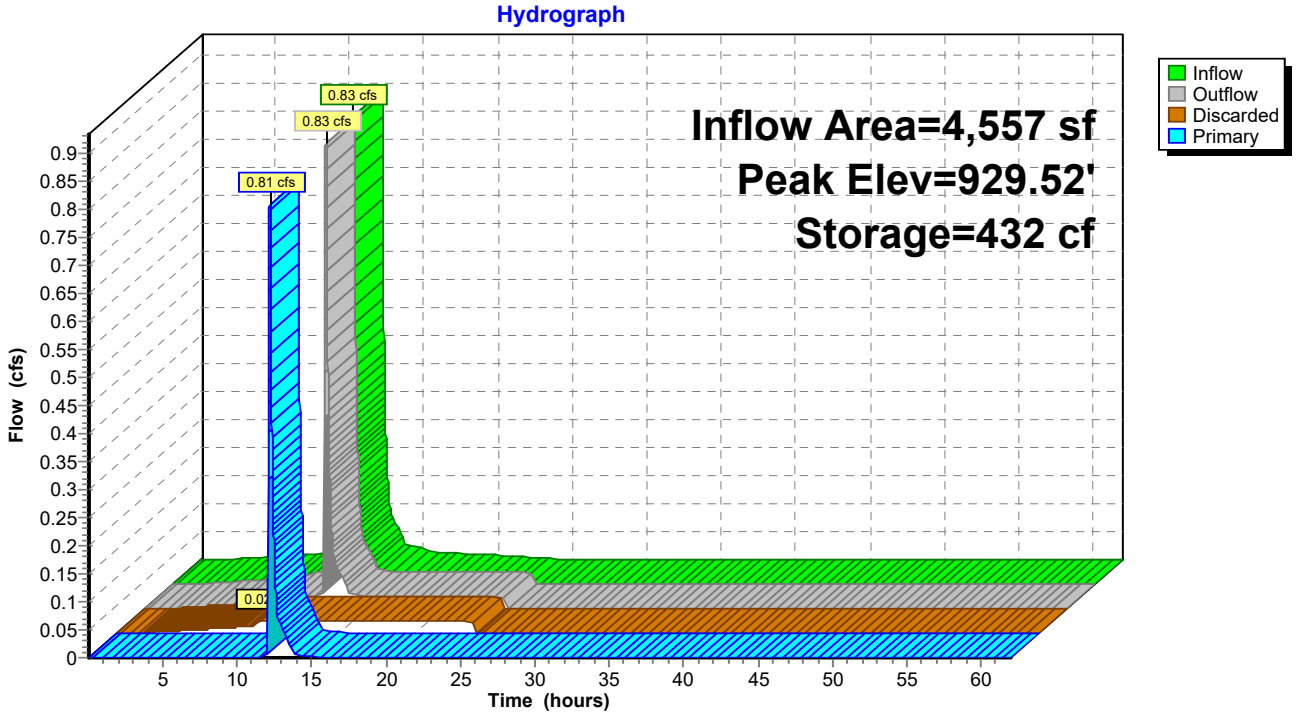
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
928.33	1,098	0.0	0	0	1,098
928.34	1,098	40.0	4	4	1,099
929.01	1,098	40.0	294	299	1,188
929.02	1,098	20.0	2	301	1,189
929.50	1,098	20.0	105	406	1,253
929.51	1,098	100.0	11	417	1,254
930.00	1,098	100.0	538	955	1,319

Device	Routing	Invert	Outlet Devices
#1	Discarded	928.33'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	929.49'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.02 cfs @ 10.21 hrs HW=928.34' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.81 cfs @ 12.18 hrs HW=929.52' TW=0.00' (Dynamic Tailwater)
↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.81 cfs @ 0.60 fps)

Pond 9P: Underground Storage

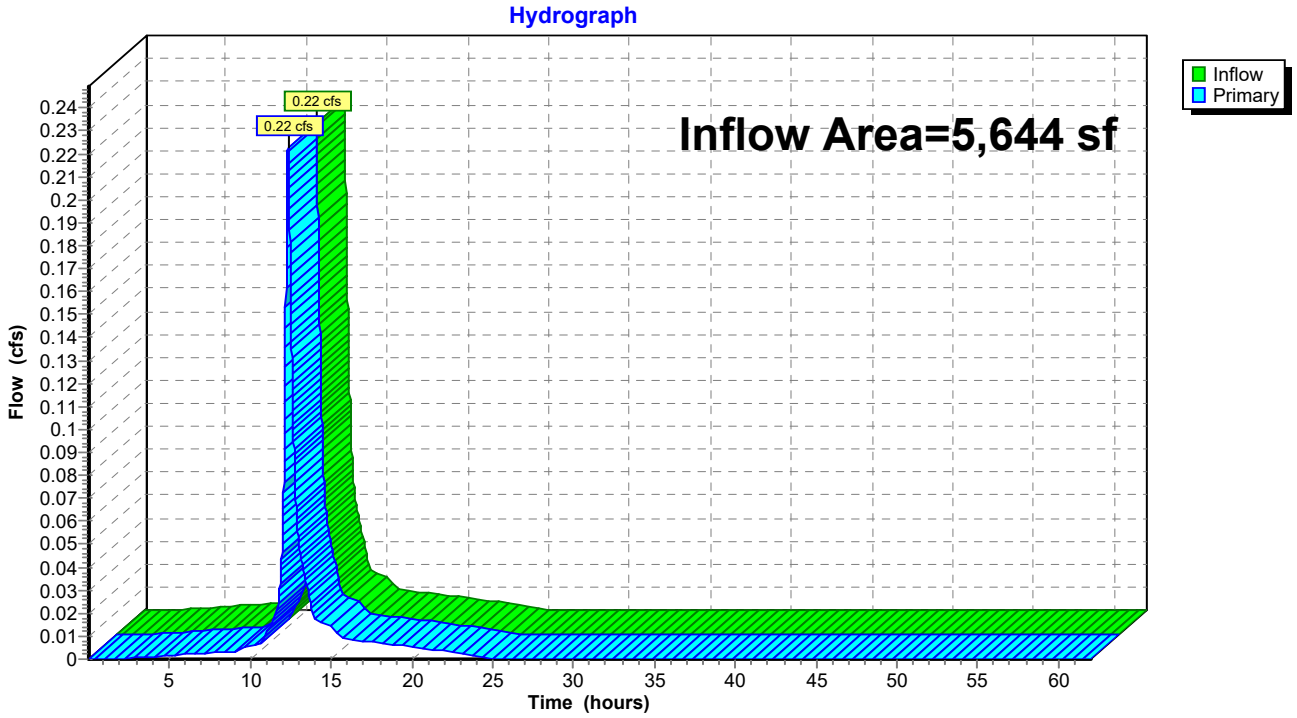


Summary for Link 6L: Prop. Drainage to Lake

Inflow Area = 5,644 sf, 17.61% Impervious, Inflow Depth = 2.05" for 100-YR event
Inflow = 0.22 cfs @ 12.33 hrs, Volume= 964 cf
Primary = 0.22 cfs @ 12.33 hrs, Volume= 964 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 13L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 6L: Prop. Drainage to Lake



Summary for Link 10L: Prop to Street

Inflow Area = 7,044 sf, 62.95% Impervious, Inflow Depth = 2.70" for 100-YR event
Inflow = 0.88 cfs @ 12.18 hrs, Volume= 1,586 cf
Primary = 0.88 cfs @ 12.18 hrs, Volume= 1,586 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 13L

Primary outflow = Inflow, Time Span= 0.01-62.00 hrs, dt= 0.01 hrs

Link 10L: Prop to Street