Attachment E

City of Sherwood Oregon

Home of the Tualatin River National Wildlife Refuge

Case No. _____
Fee _____
Receipt # _____
Date _____
TYPE _____

City of Sherwood
Application for Land Use Action

Type of Land Use Action Requested: (check all that apply)

- ☐ Annexation
- ☐ Plan Amendment (Proposed Zone _____)
- ☐ Planned Unit Development
- ☒ Site Plan (square footage of building and parking area)
- ☐ Variance (list standards to be varied in description)
- ☐ Conditional Use
- ☐ Partition (# of lots _____)
- ☐ Subdivision (# of lots _____)
- ☐ Other: _____

By submitting this form the Owner, or Owner's authorized agent/ representative, acknowledges and agrees that City of Sherwood employees, and appointed or elected City Officials, have authority to enter the project site at all reasonable times for the purpose of inspecting project site conditions and gathering information related specifically to the project site.

Note: See City of Sherwood current Fee Schedule, which includes the "Publication/Distribution of Notice" fee, at **www.sherwoodoregon.gov.** Click on Government/Finance/Fee Schedule.

Owner/Applicant Information:

Applicant: Matthew Bridegroom - CIDA Inc. Phone: 503-226-1285
Applicant Address: 15895 SW 72nd Ave Suite 200, Portland, OR 97224 Email: matthewb@cidainc.com
Owner: Jim & Brooks Bayne Phone: 971-235-9608
Owner Address: 19435 SW 129th Ave, Tualatin, OR 97062 Email: brooks@afpsys.com
Contact for Additional Information: Brooks Bayne

Property Information:

Street Location: TBD
Tax Lot and Map No: 2S129DC01600
Existing Structures/Use: Vacant
Existing Plan/Zone Designation: Light Industrial
Size of Property(ies) 2 acres

Proposed Action:

Purpose and Description of Proposed Action:

We propose to develop a new 15,000 sf HVAC manufacturing structure with associated office space and outdoor storage space.

Proposed Use: Manufacturing

Proposed No. of Phases (one year each): 1

Continued on Reverse

LAND USE APPLICATION FORM

Authorizing Signatures:

I am the owner/authorized agent of the owner empowered to submit this application and affirm that the information submitted with this application is correct to the best of my knowledge.

I further acknowledge that I have read the applicable standards for review of the land use action I am requesting and understand that I must demonstrate to the City review authorities compliance with these standards prior to approval of my request.

Matthew Bridegroom Digitally signed by Matthew Bridegroom Date: 2025.07.31 13:48:37-07'00' — 07/31/2025

Applicant's Signature — Date

Owner's Signature — 8-1-25 Date

The following materials must be submitted with your application or it will not be accepted at the counter. Once taken at the counter, the City has up to 30 days to review the materials submitted to determine if we have everything we need to complete the review. Applicant can verify submittal includes specific materials necessary for the application per checklist.

- [x] **3 Copies of Application Form*** completely filled out and signed by the property owner (or person with authority to make decisions on the property.
- [x] **Copy of Deed** to verify ownership, easements, etc.
- [x] **At least 3 folded** sets of plans*
- [x] **At least 3 copies** of narrative addressing application criteria*
- [x] **Fee** (along with calculations utilized to determine fee if applicable)
- [ ] **Neighborhood Meeting Verification** including affidavit, sign-in sheet and meeting summary (required for Type III, IV and V projects)

* **Note** that the required numbers of copies identified on the checklist are required for completeness; however, upon initial submittal applicants are encouraged to submit only 3 copies for completeness review. Prior to completeness, the required number of copies identified on the checklist and one full electronic copy will be required to be submitted.

Washington County, Oregon **2021-075182**
D-DW
Stn=2 S AKINS **07/02/2021 12:26:27 PM**
$30.00 $11.00 $5.00 $60.00 $1,600.00 **$1,706.00**

I, Joe Nelson, Interim Director of Assessment and Taxation and Ex-Officio County Clerk for Washington County, Oregon, do hereby certify that the within instrument of writing was received and recorded in the book of records of said county.

Joe Nelson, Interim Director of
Assessment and Taxation, Ex-Officio

File No.: 21-177825

WFG Title 21-177825 COMM

Grantor
WFG Investments, LLC, an Idaho limited liability company and the Grabowski Family Trust dated August 13, 1993

Grantee
JBMAC Ventures, LLC, an Oregon limited liability company
19435 SW 129th Avenue
Tualatin, OR 97062

After recording return to
JBMAC Ventures, LLC, an Oregon limited liability company
19435 SW 129th Avenue
Tualatin, OR 97062

Until requested, all tax statements shall be sent to
JBMAC Ventures, LLC, an Oregon limited liability company
19435 SW 129th Avenue
Tualatin, OR 97062
Tax Acct No(s): 2S129DC-00500, R548161, R2118788, R2118789

Reserved for Recorder's Use

STATUTORY WARRANTY DEED

WFG Investments, LLC, an Idaho limited liability company and Robert C. Grabowski and Barbara G. Grabowski, as Trustees of The Grabowski Family Trust, as tenants in common, as to Parcel I
Robert C. Grabowski and Barbara G. Grabowski, Trustees of the Grabowski Family Trust, dated August 13, 1993, as to Parcel II, Grantor(s) convey and warrant to JBMAC Ventures, LLC, an Oregon limited liability company, Grantee(s), the real property described in the attached Exhibit A, subject only to those liens and encumbrances set forth on the attached Exhibit B.

The true consideration for this conveyance is **$1,600,000.00**. (Here comply with requirements of ORS 93.030)

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009 AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

Executed this 30 day of June, 2021

WFG Investments, LLC, an Idaho limited liability company

By:_____
Name: William F. Gallagher
Its: Managing Member

By:_____
Name: Carol Gallagher
Its: Managing Member

the Grabowski Family Trust dated August 13, 1993

By:_____
Name: Robert C. Grabowski
Its: Trustee

By:_____
Name: Barbara G. Grabowski
Its: Trustee

STATE OF ~~OREGON~~ Idaho
COUNTY OF Ada

This instrument was acknowledged before me this 30 day of June, 2021 by William F. Gallagher and Carol Gallagher as Managing Members of William F. GallagherWFG Investments, LLC, an Idaho limited liability company, on behalf of the limited liability company.

_____
Notary Public for Oregon
My Commission Expires: 1-27-2026

LADONNA NETJES
NOTARY PUBLIC
STATE OF IDAHO
COMMISSION #20200289
MY COMMISSION EXPIRES 1/27/2026

STATE OF OREGON
COUNTY OF _____

This instrument was acknowledged before me this _____ day of June, 2021 by Robert C. Grabowski, as Trustee, and Barbara G. Grabowski, as Trustee, of the Grabowski Family Trust dated August 13, 1993, on behalf of the Trust.

_____
Notary Public for Oregon
My Commission Expires: _____

Executed this _____ day of June, 2021

WFG Investments, LLC, an Idaho limited liability company

By:_____
Name: William F. Gallagher
Its: Managing Member

By:_____
Name: Carol Gallagher
Its: Managing Member

the Grabowski Family Trust dated August 13, 1993

By: RCG
Name: Robert C. Grabowski
Its: Trustee

By: Barbara G Grabowski
Name: Barbara G. Grabowski
Its: Trustee

STATE OF OREGON
COUNTY OF _____

This instrument was acknowledged before me this _____ day of June, 2021 by William F. Gallagher and Carol Gallagher as Managing Members of William F. GallagherWFG Investments, LLC, an Idaho limited liability company, on behalf of the limited liability company

_____
Notary Public for Oregon
My Commission Expires: _____

STATE OF ~~OREGON~~ Idaho
COUNTY OF Blaine

This instrument was acknowledged before me this 30th day of June, 2021 by Robert C. Grabowski, as Trustee, and Barbara G. Grabowski, as Trustee, of the Grabowski Family Trust dated August 13, 1993, on behalf of the Trust.

Vaelene K. Bryant
Notary Public for ~~Oregon~~ Idaho
My Commission Expires: 08/10/2021

VAELENE K BRYANT
Notary Public - State of Idaho
Commission Number 54613
My Commission Expires 08-10-2021

EXHIBIT "A"
LEGAL DESCRIPTION

PARCEL I:

A parcel of land situated in the Southeast one-quarter of Section 29, Township 2 South, Range 1 West of the Willamette Meridian, in the City of Sherwood, County of Washington and State of Oregon, being more particularly described as follows:

Commencing at the Southwest corner of the Southeast one-quarter of said Section 29; thence North 89°59'00" East, along the South line of said Southeast one-quarter of Section 29, a distance of 1726.21 feet to the Southerly extension of the West line of that parcel conveyed to Frontier Leather Company by document recorded in Book 467, page 108, Washington County Deed Records; thence North 00°01'00" West along said West line and the Southerly extension thereof, a distance of 347.41 feet to the Southwest corner of that parcel conveyed to Transpacific International, Inc. by document recorded as Fee No. 96082349, Washington County Deed Records; thence North 89°59'00" East, along the South line thereof, a distance of 350.00 feet to the Southeast corner thereof; thence North 00°01'00" West along the East line thereof a distance of 400.00 feet to the Northeast corner thereof; thence South 89°59'00" West along the North line thereof a distance of 225.00 feet to an angle point therein; thence South 44°59'00" West continuing along said North line a distance of 176.78 feet to a point on the West line of the aforementioned Frontier Leather Company parcel and the true point of beginning; thence South 00°01'00" East along said West line a distance of 168.36 feet; thence South 48°52'28" West a distance of 426.44 feet; thence North 42°10'49" West a distance of 295.85 feet to the Southeasterly right-of-way line of the Southern Pacific Railroad, said point being 45.00 feet from, when measured at right angles to, the center line of said railroad; thence North 47°49'15" East along said Southeasterly right-of-way line a distance of 396.92 feet to an angle point therein; thence North 42°10'45" West continuing along said Southeasterly right-of-way line a distance of 15.00 feet; thence North 47°49'15" East continuing along said Southeasterly right-of-way line a distance of 318.04 feet to the Northwest corner of the aforementioned Frontier Leather Company parcel; thence South 00°01'00" East along said West line a distance of 261.58 feet to the true point of beginning.

PARCEL II:

Parcel 1 and 2, PARTITION PLAT NO. 2003-030, in the City of Sherwood, County of Washington and State of Oregon.

TOGETHER WITH non-exclusive easement for ingress and egress as described in Access Easement and Joint Maintenance Agreement recorded July 15, 2010, Recording No. 2010-053595.

EXHIBIT "B"
Exceptions

1. Possible Easement as disclosed by instrument, including the terms and provisions thereof:

For	: Electric Transmission lines, and appurtenances with rights to "danger trees"
Granted to	: Portland General Electric Company, an Oregon Corporation
Recorded	: June 12, 1959
Recording No(s)	: (book) 418 (page) 678
Affects	: the East 12.5 feet of premises as disclosed by DRG EB 4071 attached to document.

2. Terms and provisions of Permanent Easement Agreement::

For	: Underground sewer line and permitted waste and maintenance responsibilities
Between	: Linke Enterprises of Oregon, Inc., an Oregon corporation
formerly	known as Frontier Leather Company, Inc
And	: Transpacific International, Inc., an Oregon corporation
Recorded	: August 8, 1995
Recording No(s).	: 95055118
Affects	: appurtenant rights over property lying East of Parcel 1 Partition Plat No. 2003-030

3. Prospective Purchase Agreement, including the terms and provisions thereof with ground water restrictions, land use restrictions and Easement for right of entry:

Between	: Oregon Department of Environmental Quality
And	: Pacific III, LLC
Recorded	: March 19, 2002
Recording No.	: 2002-032053

As amended or modified by Easement and Equitable Servitude, including ghe terms and provisions thereof:

Recorded	: April 3, 2008
Recording No.	: 2008-029679

4. Effect, if any of Declaration of Private Access and Utility Easement, including the terms and provisions thereof:

Recorded	: September 24, 2002
Recording No(s)	: 2002-111387
Affects	: Parcel 1 Partition Plat No. 2003-030 - also delineated on the Partition plat.

NOTE: When property becomes under one ownership, the above easement would merge.

5. Effect if any, of Declaration of Private Access and Utility Easement, including the terms and provisions thereof:

Recorded	: September 24, 2002
Recording No(s)	: 2002-111388
Affects	: Parcel 2, Partition Plat No. 2003-030 - also delineated on the partition plat.

NOTE: When property becomes under one ownership, the above easement would merge.

6. Access Easement and Maintenance Agreement, including the terms and provisions thereof:

For	: reciprocal easement to be used for ingress, egress and utility purposes
To	owner of Tax Lot 600 in the Southeast quarter of Section 29 T2S, R1W and the general public at large
Recorded	: July 15, 2010
Recording No(s)	: 2010-053593

(Affects Parcel 1, Partition Plat 2003-30 see document for location for the benefit of 2S129D-00600)

7. Access Easement and Maintenance Agreement, including the terms and provisions thereof:

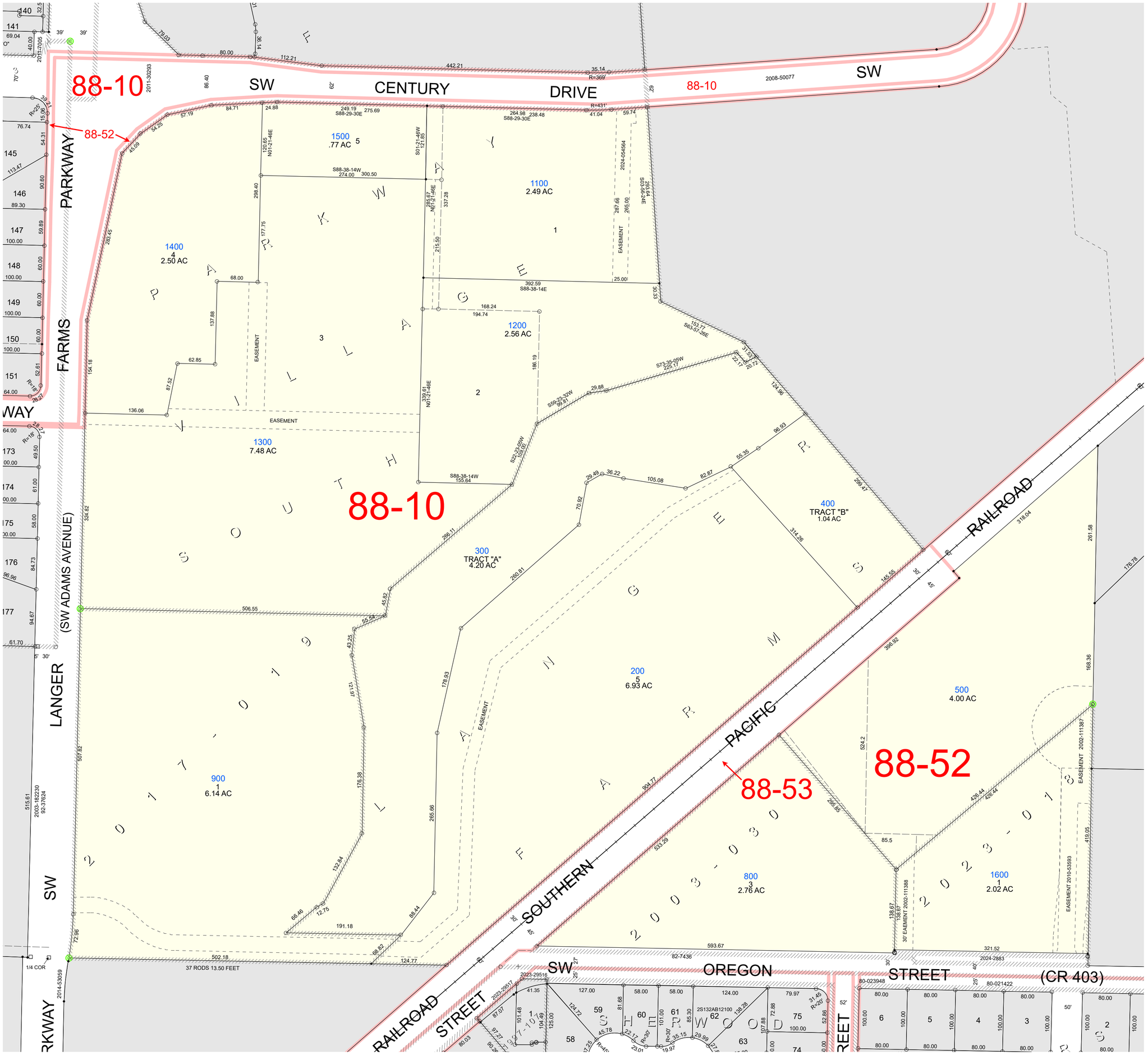
For	: reciprocal easement to be used for ingress, egress and utility purposes
To	: Owner of Tax Lot 602 in the Southeast quarter of Section 29 T2S R1W and the general public at large
Recorded	: July 15, 2010
Recording No(s)	: 2010-053594

(Affects Parcel I, Partition Plat No. 2003-030 for the benefit of 2S129D 0602)

8. Terms and provisions of Access Easement and Joint Maintenance Agreement::

For	: ingress and egress
Between	: Sherwood Oaks Care Facility, LLC, an Oregon limited liability company
And	: Pacific III, LLC, an Oregon limited liability company and general public at large
Recorded	: July 15, 2010
Recording No(s)	: 2010-053595

9. 2021/2022 real property taxes a lien due but not yet payable

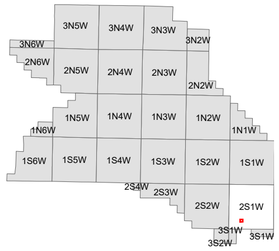


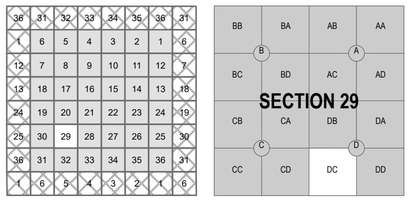
2S129DC

WASHINGTON COUNTY OREGON

SW 1/4 SE 1/4 SECTION 29 T2S R1W

SCALE 1"= 100'





FOR ADDITIONAL MAPS VISIT OUR WEBSITE AT
www.washingtoncountyor.gov/gis

- Plat Lot Corner
- Adjusted Lot Corner
- Lot Corner in Road
- Urban Land Hook
- Initial Point of Plat
- Approximate DLC Corner
- Found DLC Corner
- Stationing
- Taxlot Line
- Old Lot Line
- Plat Boundary
- Easement ROW
- Easement Centerline
- Condo Unit Boundary
- Public Road Centerline
- Railroad Centerline
- Stream
- Donation Land Claim
- Tax Code Line

15-12 Tax Code

Approximate Section Corner

Found Section Corner

Cancelled Taxlots For: 2S129DC
100, 1000, 700, 600

Feet
0 50 100 200 300

Assessment
CARTOGRAPHY
Taxation

PLOT DATE: 1/16/2025
Rotation: 0

FOR ASSESSMENT PURPOSES ONLY - DO NOT RELY ON FOR OTHER USE

Map areas delineated by either gray shading or a cross-hatched pattern are for reference only and may not indicate the most current property boundaries. Please consult the appropriate map for the most current information.

Digmap

SHERWOOD
2S129DC

Affidavit of Mailing

DATE: 09/09/25

STATE OF OREGON)
)
Washington County)

I, Matthew Bridegroom, representative for the JB Mac / GH McCullach proposed development project do hereby certify that the attached notice to adjacent property owners and recognized neighborhood organizations that are within 1,000 feet of the subject project, was placed in a U.S. Postal receptacle on 08/25/25.

Representatives Name: Matthew Bridegroom
Name of the Organization: CIDA Inc representing JBMAC Ventures LLC

Updated October 2010

NEIGHBORHOOD MEETING SIGN IN SHEET

Proposed Project: GH McCulloch

Proposed Project Location: SW Oregon St. & SW Lower Roy St.

Project Contact: Matthew Bridegroom

Meeting Location: Marjorie Stewart Community Center

Meeting Date: 09/08/25

Name	Address	E-Mail	Please identify yourself (check all that apply)			
			Resident	Property owner	Business owner	Other
Matthew Bridegroom		matthewb@cidainc.com				X
DIRK OTIS		dirk@stratusdevelopers.com				X
Christie Heusser		cheusser72@Gmail.com	X			
Kathy + Bob Michaud-Tradd		kmichaudtradd@yahoo.com	✓			
Barbara Bowes		Bjbowes42@ydhro.com		*		
Calla Lilly	22070 S.W. Chesapeake Place, Sherwood	NONE		*		
LEO VAUGHN	15039 SW MERRYMAN	leov1957@YAHOO.COM	X	X	X	

Updated October 2010

Project Meeting Minutes

09/08/2025, 5:00pm, Marjorie Stewart Community Center

Project No: 250139.01

Project Name: GH McCulloch

Subject: Neighborhood Meeting

By: Matthew Bridegroom

Distribution: City of Sherwood

Attendees: Attendance sign-in sheet attached.

Meeting Summary: Dirk Otis from Stratus Real Estate Developers and Matthew Bridegroom from CIDA Inc are representing the building tenants and current land owner MB Family Properties and JB Mac.

Dirk and Matthew welcome attendees and set up an easel with property site plan on display.

Dirk explains who the tenants and eventual property owners are and their connection to the current property owner with some background and updates to the neighboring property to the north currently under construction. Matthew explains some of the planned architectural features along the frontage.

Questions about building color are asked:
- Response: Earth tones or black, white, and grey scale with wood accents

Questions on what GH McCulloch of MB Family Properties do:
- Response: Steel fabrication

Questions on traffic study and truck sizes:
- Response: Traffic study was done to account for future light industrial uses. Truck sizes are smaller than semi-trucks.

Questions on street improvements:
- Response: Half-street improvements have already been completed. The other side of the street will be done by the city or county at a later date.

Questions about building size:
- Response: Building is similar in size to the northern property and the existing Zenport property; likely smaller.

Meeting adjourns: Approximately 5:45pm

ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS

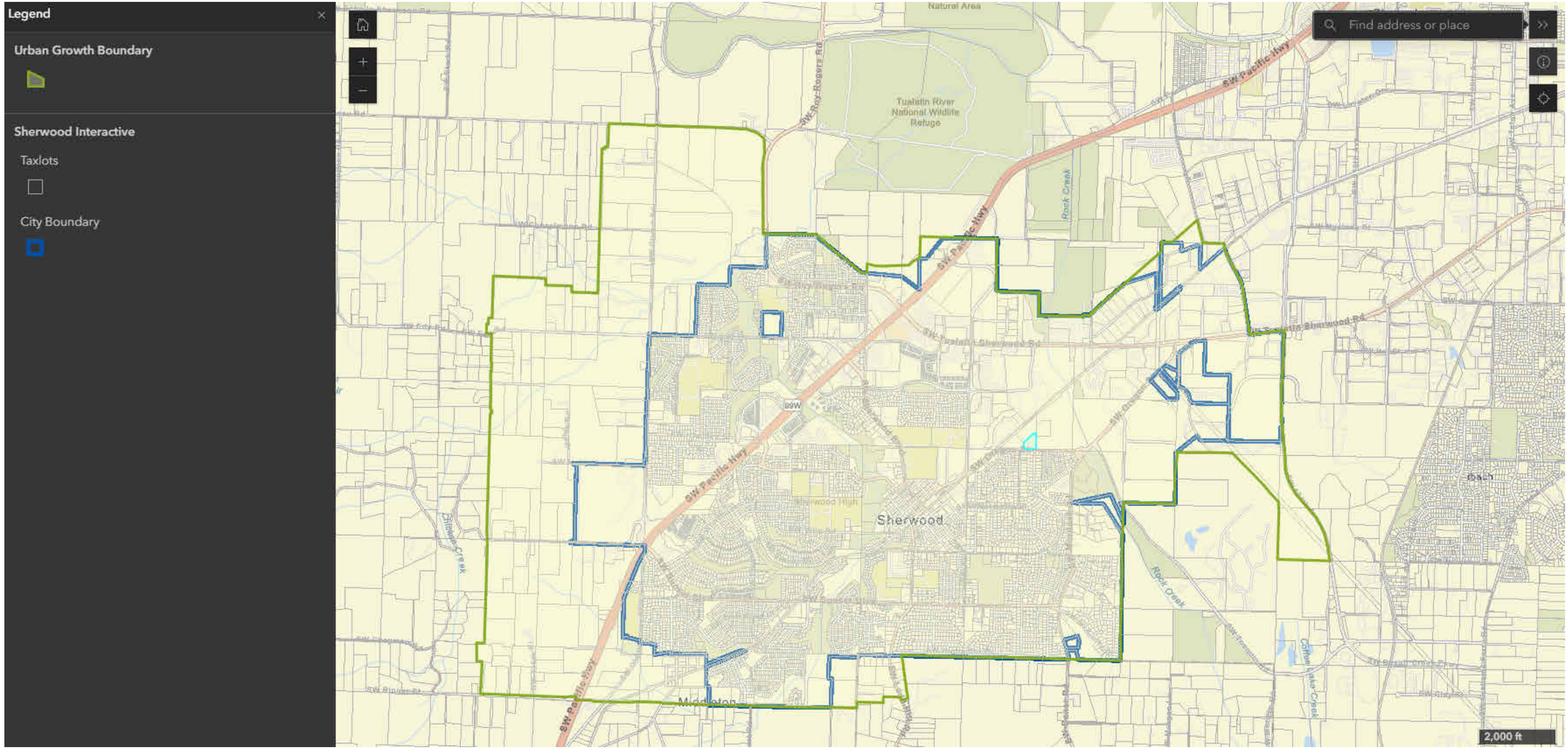
POSITIVE IMPACT.
BALANCED DESIGN.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285

PO BOX 4746
MEDFORD, OR 97501
PHONE: 541.330.6322

INFO@CIDAINC.COM
WWW.CIDAINC.COM
WBE #10209

Every effort has been made to accurately record this meeting. If any errors or omissions are noted, recipients are asked to please provide written response within five days of receipt.



CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
LANDSCAPE
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM
© 2025 CIDA, INC. ALL RIGHTS RESERVED

DRAWING TITLE: VICINITY MAP

PROJECT:
GH McCULLOCH
TBD, OREGON ST, SHERWOOD, OR 97140

JOB: 250139.01 DATE: 07/09/2025

DRAWING: 4 SK

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

TYPE III –LAND USE REVIEW

Applicant's Submittal

09/09/25

APPLICANT: CIDA – c/o Matthew Bridegroom
15895 SW 72nd Avenue
Suite 200
Portland, OR 97224

OWNER: JBMAC Ventures, LLC
19435 SW 129th Avenue
Tualatin, OR 97062
Dirk Otis, Owner Representative

LOCATION: **2S129DC01600**
No situs

I. BACKGROUND:

Existing Conditions

The project site is located at the undeveloped lot 2S129DC01600 that fronts Oregon Street in Sherwood, OR. This parcel is a portion of the 6-acre property that was formerly the Old Tannery site. A lot line consolidation was recorded last year and consolidated two tax lots (2S129DC 700 and 2S129DC 600) into one. The lot proposed for development totals approximately 2-acres and is zoned LI (Light Industrial). Across SW Oregon St to the south is a residential neighborhood, zoned Low Density Residential.

A shared utility and access easement provides for access and utility connection across this property to the northern parcel 2S129DC00500. Improvements approved under LU 2022-017 include pedestrian connection from Oregon Street to this lot along this access easement. Street frontage along Oregon Street has also been fully improved and connected into the long term connecting trail known as Ice Age Tonquin Trail.

Project Description

CIDA Inc. is representing JB Mac for the development of an approximately 15,000 square foot pre-engineered metal building, a fenced material handling yard that will have some distribution and receiving truck traffic. The building program includes approximately 3,000 square feet of office, 3,000 square feet of mezzanine storage, and the remainder of the building is programmed for industrial use.

II. APPLICANT RESPONSE TO APPLICABLE REGULATIONS

16.31 – Industrial Land Use Districts

16.31.020 - Uses

Manufacture, compounding, processing, assembling, packaging, treatment, fabrication of products contained wholly within an enclosed building provided exterior odor and noise is consistent with municipal code standards and there is no unscreened storage and not otherwise regulated elsewhere in the code. Permitted in LI

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

Response: The proposed tenant, GH McCulloch, is a mechanical and structural contractor, manufacturing and distributing mechanical equipment, and is thus a permitted use in LI Zone.

16.31.030 – Development Standards

B. Development Standards – Except as otherwise provided, required minimum lot areas and dimensions and setbacks shall be:

Development Standards by Zone	*LI*	*GI*	*EI*
Lot area - industrial uses:	***10,000 SF***	*20,000 SF*	*3 acres [9]*
Lot area - commercial uses (subject to Section 16.31.050):	***10,000 SF***	*20,000 SF*	*10,000 SF*
Lot width at front property line:	***100 feet***		
Lot width at building line:	***100 feet***		
Front yard setback [11]	***20 feet***	*None*	*20 feet*
Side yard setback [10]	***None***	*None*	*None*
Rear yard setback [11]	***None***	*None*	*None*
Corner lot street side [11]	***20 feet***	*None*	*20 feet*
Height [11]	***50 feet***		

[10] When a yard is abutting a residential zone or public park, there shall be a minimum setback of forty (40) feet provided for properties zoned Employment Industrial and Light Industrial zones, and a minimum setback of fifty (50) feet provided for properties zoned General Industrial.

[11] Structures located within one hundred (100) feet of a residential zone shall be limited to the height requirements of that residential zone. (Low Density Residential max height limit = 30' or 2 stories)

Response: The lot size of the site is approximately 87,991 SF, which is greater than the minimum 10,000 SF required. The lot width at the front property line is 321' which is greater than the minimum 100'. The lot width at building line is also 321" which is greater than the minimum 100'. The front yard setback is 20' which meets the minimum required. The proposed building is 2 stories and 28'-2" tall, which conforms to the height restriction set in place by the neighboring Low Density Residential zone.

16.58 – Vision Clearance and Fence Standards

16.58.010 – Clear Vision Areas

A. A clear vision area shall be maintained on the corners of all property at the intersection of two (2) streets, intersection of a street with a railroad, or intersection of a street with an alley or private driveway.

B. A clear vision area shall consist of a triangular area, two (2) sides of which are lot lines measured from the corner intersection of the street lot lines for a distance specified in this regulation; or, where the lot lines have rounded corners, the lot lines extended in a straight line to a point of intersection, and so measured, and the third side of which is a line across the corner of the lot joining the non-intersecting ends of the other two (2) sides.

C. A clear vision area shall contain no planting, sight obscuring fence, wall, structure, or temporary or permanent obstruction exceeding two and one-half (2½) feet in height, measured from the top of the curb, or where no curb exists, from the established street center line grade, except that trees exceeding this height may be located in this area, provided all branches and foliage are removed to the height of seven (7) feet above the ground on the sidewalk side and ten (10) feet on the street side.

The following requirements shall govern clear vision areas:

1. In all zones, the minimum distance shall be twenty (20) feet.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

2. In all zones, the minimum distance from corner curb to any driveway shall be twenty-five (25) feet.
3. Where no setbacks are required, buildings may be constructed within the clear vision area.

Response: Vision Triangles will be implemented onto the drive aisle off SW Oregon Street along the east side of the lot as indicated on the site plan. No plantings in this zone will be over 2'-6"

16.58.020 – Fences, Walls, and Hedges
D. Location—Non-Residential Zone:
1. Fences up to eight (8) feet high are allowed along front, rear and side property lines, subject to Section 16.58.010. (Clear Vision Areas) and building department requirements.
2. A sound wall is permitted when required as a part of a development review or concurrent with a road improvement project. A sound wall may not be taller than twenty (20) feet.
3. Hedges up to twelve (12) feet tall are allowed.
E. General Conditions—All Fences:
1. Retaining, masonry, concrete, and modular retaining walls may not be constructed within the eight-foot public utility easement (PUE) located on the front and corner street side yards, without approval from the City Engineer.
2. Fences must be structurally sound and maintained in good repair. A fence may not be propped up in any way from the exterior side.
3. Chain link fencing is not allowed in any required residential front yard setback.
4. The finished side of the fence must face the street or the neighboring property. This does not preclude finished sides on both sides.
5. Buffering: If a proposed development is adjacent to a dissimilar use such as a commercial use adjacent to a residential use, or development adjacent to an existing farming operation, a buffer plan that includes, but is not limited to, setbacks, fencing, landscaping, and maintenance via a homeowner's association or managing company must be submitted and approved as part of the preliminary plat or site plan review process per Section 16.90.020 and Chapter 16.122.
6. In the event of a conflict between this Section and the clear vision standards of Section 16.58.010, the standards in Section 16.58.010 prevail.

Response: Fencing along the property is proposed to be less than 8' high with the finish side facing outwards and will not intervene into the clear vision standards.

16.70 – General Provisions

16.70.020 – Neighborhood Meeting
A. The purpose of the neighborhood meeting is to solicit input and exchange information about the proposed development.
B. Applicants of Type III, IV and V applications are required to hold a meeting, at a public location for adjacent property owners and recognized neighborhood organizations that are within 1,000 feet of the subject application, prior to submitting their application to the City. Notification of the neighborhood meeting shall be mailed 14 calendar days prior to the meeting date. Affidavits of mailing, sign-in sheets and a summary of the meeting notes must be included with the application when submitted. Applicants for Type II land use action are encouraged, but not required to hold a neighborhood meeting.
1. Projects requiring a neighborhood meeting in which the City or Urban Renewal District is the property owner or applicant shall also provide published and posted notice of the neighborhood meeting consistent with the notice requirements in 16.72.020.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

Response: The proposed project is a Type III application. A neighborhood meeting was held on 09/08/2025 with a notice sent out two week prior on 08/25/25. An affidavit, sign-in sheet, and meeting summary has been provided.

16.72 – Procedures for Processing Development Permits

16.72.010 – Generally

A. Classifications

Except for Final Development Plans for Planned Unit Developments, which are reviewed per Section 16.40.030, all quasi-judicial development permit applications and legislative land use actions shall be classified as one of the following:

4.Type III

The following quasi-judicial actions shall be subject to a Type III review process:

a. Conditional Uses.

b. Site Plan Review — between 15,001 and 40,000 square feet of floor area, parking or seating capacity except those within the Old Town Overlay District, per Section 16.72.010.A.

c. Subdivisions between 11—50 lots.

Response: The proposed project will be subject to Type III Site Plan review with the building be over 15,000 square feet, including mezzanine, but bunder 40,000 square feet.

16.72.020 – Public Notice and Hearing

A. Newspaper Notice

Notices of all public hearings for Type III, IV and V land use actions required by this Code shall be published in a newspaper of general circulation available within the City two (2) calendar weeks prior to the initial scheduled hearing before the Hearing Authority and shall be published one additional time in the Sherwood Archer, Sherwood Gazette or similarly local publication, no less than 5 days prior to the initial scheduled hearing before the hearing authority.

B. Posted Notice

1. Notices of all Type II, III, IV and V land use actions required by this Code shall be posted by the City in no fewer than five (5) conspicuous locations within the City, not less than fourteen (14) calendar days in advance of the staff decision on Type II applications or twenty (20) calendar days in advance of the initial hearing before the Hearing Authority for Type III, IV and V applications.

2. Signage must be posted on the subject property fourteen (14) calendar days in advance of the staff decision on Type II applications and twenty (20) calendar days in advance of the initial hearing before the Hearing Authority for Type III, IV and V applications.

a. on-site posted notice shall provide a general description of the land use action proposed, the project number and where additional information can be obtained.

b. On-site posted notice shall be designed to be read by motorists passing by; the exact size and font style to be determined by the City.

c. On-site posted notice shall be located on the property in a manner to be visible from the public street. For large sites or sites with multiple street frontages, more than one sign may be required.

C. Mailed Notice

I. For Type II, III, IV and V actions specific to a property or group of properties, the City shall send written notice by regular mail to owners of record of all real property within one thousand (1,000) feet from the property subject to the land use action. Written notice shall also be sent to Oregon Department of Transportation (ODOT), Metro, the applicable transit service provider and other affected or potentially affected agencies. If the subject property is located adjacent to or split by a railroad crossing ODOT Rail Division shall also be sent public notice.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

Response: Signage will be posted on site prior to the hearing as required.

16.90 – Site Planning

16.90.020 Site Plan Review

D Required Findings

No site plan approval will be granted unless each of the following is found:

1. The proposed development meets applicable zoning district standards and design standards in Division II, and all provisions of Divisions V, VI, VIII and IX.

Response: The proposed development will meet applicable zoning and design standards as demonstrated in this application.

2. The proposed development can be adequately served by services conforming to the Community Development Plan, including but not limited to water, sanitary facilities, storm water, solid waste, parks and open space, public safety, electric power, and communications.

Response: Services will be provided on site including water, sanitary, storm water, solid waste, park and open space, public safety, and utilities including electricity, natural gas, telephone and data.

3. Covenants, agreements, and other specific documents are adequate, in the City's determination, to assure an acceptable method of ownership, management, and maintenance of structures, landscaping, and other on-site features.

Response: The property is under a single ownership and will maintain their property. We do not believe covenants are needed at this time.

4. The proposed development preserves significant natural features to the maximum extent feasible, including but not limited to natural drainage ways, wetlands, trees, vegetation (including but not limited to environmentally sensitive lands), scenic views, and topographical features, and conforms to the applicable provisions of Division VIII of this Code and Chapter 5 of the Community Development Code.

Response: Per AKS evaluation, there are no wetlands or significant natural features on site. There is also no significant trees or vegetation on site feasible to preserve. Natural drainage ways will be preserved.

5. For developments that are likely to generate more than 400 average daily trips (ADTs), or at the discretion of the City Engineer, the applicant must provide adequate information, such as a traffic impact analysis (TIA) or traffic counts, to demonstrate the level of impact to the surrounding transportation system.

Response: The site is not anticipated to generate more than 400 average daily trips. AFP with the site just north of this property submitted a trip count for a 20,000 sf building and demonstrated that it would not trigger a TIA.

16.90.020 Site Plan Review

7. Industrial developments provide employment opportunities for citizens of Sherwood and the region as a whole. The proposed industrial development is designed to enhance areas visible from arterial and collector streets by reducing the "bulk" appearance of large buildings. Industrial design standards include the following:

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

a. Portions of the proposed industrial development within 200 feet of an arterial or collector street and visible to the arterial or collector (i.e. not behind another building) must meet any three of the following five design criteria:

(1) Primary building entries should be readily identifiable and well-defined through the use of pedestrian scale improvements such as, but not limited to, projections, recesses, columns, roof structures, extra landscaping, hardscapes, seating, or other design elements.

(2) A minimum of two (2) building materials used to break up vertical facade street facing frontages (no T-111 or aluminum siding).

(3) Maximum thirty-five (35) foot setback for all parts of the building from the property line separating the site from all arterial or collector streets (required visual corridor falls within this maximum setback area).

(4) Parking is located to the side or rear of the building when viewed from the arterial or collector.

(5) Loading areas are located to the side or rear of the building when viewed from the arterial or collector. If a loading area is visible from an arterial or collector, it must be screened with vegetation or a screen made of materials matching the building materials.

b. A minimum 15% window glazing shall be required for all frontages facing an arterial or collector.

c. All roof-mounted equipment shall be required to be screened with materials complimentary to the building design materials.

Response: The proposed street facing façade meets the following three design criteria;
(1) The primary building entrances is inset from the rest of the building, features a change in siding material, has exposed columns, and an increase in use of glazing.
(2) Four building materials as well as glazing break up the façade.
(5) Loading areas are located in the back of the building.
The south façade facing the street is 4,323.5 sf. 15% of 4,323.5 = 648.5 sf. A total of 653 sf of glazing is provided which exceeds the minimum 15%.
No roof mounted equipment is proposed.

8. Driveways that are more than twenty-four (24) feet in width shall align with existing streets or planned streets as shown in the Local Street Connectivity Map in the adopted Transportation System Plan (Figure 17), except where prevented by topography, rail lines, freeways, pre-existing development, or leases, easements, or covenants.

Response: The driveway will align with SW Lower Roy St.in accordance with the access easement

16.92.030 - Site Area Landscaping and Perimeter Screening Standards

A. Perimeter Screening and Buffering

1. Perimeter Screening Separating Residential Zones:

A minimum six-foot high sight-obscuring wooden fence, decorative masonry wall, or evergreen screen, shall be required along property lines separating residential zones from commercial, institutional/public or industrial zones subject to the provisions of Chapter 16.48.020 (Fences, Walls and Hedges).

2. Perimeter Landscaping Buffer

a. A minimum ten (10) foot wide landscaped strip comprised of trees, shrubs and ground cover shall be provided between off-street parking, loading, or vehicular use areas on separate, abutting, or adjacent properties.

3. Perimeter Landscape Buffer Reduction

If the separate, abutting property to the proposed development contains an existing perimeter landscape buffer of at least five (5) feet in width, the applicant may reduce

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

the proposed site's required perimeter landscaping up to five (5) feet maximum, if the development is not adjacent to a residential zone. For example, if the separate abutting perimeter landscaping is five (5) feet, then applicant may reduce the perimeter landscaping to five (5) feet in width on their site so there is at least five (5) feet of landscaping on each lot.

Response: The site does not share a property line with a residential zone. A minimum 10' landscape buffer is provided around the site. A landscape buffer reduction is implemented along the north property line as the neighboring property provides more than 10' of landscaping.

B. Parking Area Landscaping

4. Required Landscaping

There shall be at least forty-five (45) square feet parking area landscaping for each parking space located on the site. The amount of required plant materials are based on the number of spaces as identified below.

Response: In addition to landscape islands, there will be landscaping along the perimeter of the parking area in order to meet the area landscaping requirements for number of spaces
24 parking spaces x 45sqft = 1,080 sf landscaping
3,200+ sq. ft landscaping immediately surrounding parking > 1,080 sq. ft. required

5. Amount and Type of Required Parking Area Landscaping

a. Number of Trees required based on Canopy Factor

Small trees have a canopy factor of less than forty (40), medium trees have a canopy factor from forty (40) to ninety (90), and large trees have a canopy factor greater than ninety (90);

(1) Any combination of the following is required:

(i) One (1) large tree is required per four (4) parking spaces;
(ii) One (1) medium tree is required per three (3) parking spaces; or
(iii) One (1) small tree is required per two (2) parking spaces.
(iv) At least five (5) percent of the required trees must be evergreen.

(2) Street trees may be included in the calculation for the number of required trees in the parking area.

b. Shrubs:

(1) Two (2) shrubs are required per each space
(2) For spaces where the front two (2) feet of parking spaces have been landscaped instead of paved, the standard requires one (1) shrub per space. Shrubs may be evergreen or deciduous.

c. Ground cover plants:

(1) Any remainder in the parking area must be planted with ground cover plants.
(2) The plants selected must be spaced to cover the area within three (3) years. Mulch does not count as ground cover.

Response: Landscaping plans have been provided to demonstrate compliance with the amount and type of canopy cover.

6. Individual Landscape Islands Requirements

d. (3) Industrial uses: one (1) island for every twelve (12) contiguous parking spaces.

Response: The longest contiguous parking is 9 spaces, therefore landscape islands are not required.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

C. Screening of Mechanical Equipment, Outdoor Storage, Service and Delivery Areas
All mechanical equipment, outdoor storage and manufacturing, and service and delivery areas, shall be screened from view from all public streets and any adjacent residential zones. If unfeasible to fully screen due to policies and standards, the applicant shall make efforts to minimize the visual impact of the mechanical equipment.

Response: Mechanical equipment, outdoor storage, and loading all occur to the rear of the proposed building and screened from view from the public street.

16.94. – Off-Street Parking and Loading

16.94.020 – Off-Street Parking Standards
Table 1 – Industrial = 1.6 parking spaces per thousand square feet.

Response: 15,000sqft x 1.6 = 24 parking spaces provided.

B. Dimensional and General Configuration Standards
1. Dimensions For the purpose of this Chapter, a "parking space" means a stall nine (9) feet in width and twenty (20) feet in length. Up to twenty five (25) percent of required parking spaces may have a minimum dimension of eight (8) feet in width and eighteen (18) feet in length so long as they are signed as compact car stalls.

Response: All parking spaces are designed to be 9 feet by 20 feet.

3. Wheel Stops
a. Parking spaces along the boundaries of a parking lot or adjacent to interior landscaped areas or sidewalks shall be provided with a wheel stop at least four (4) inches high, located three (3) feet back from the front of the parking stall as shown in the above diagram.
c. The paved portion of the parking stall length may be reduced by three (3) feet if replaced with three (3) feet of low-lying landscape or hardscape in lieu of a wheel stop; however, a curb is still required. In other words, the traditional three-foot vehicle overhang from a wheel stop may be low-lying landscaping rather than an impervious surface.

Response: Wheel stops will be provided at parking stalls along the sidewalk.

C. Bicycle Parking Facilities
1. General Provisions
a. Applicability. Bicycle parking spaces shall be provided for new development, changes of use, and major renovations, defined as construction valued at twenty-five (25) percent or more of the assessed value of the existing structure.
Table 4: Industrial – 2 or 1 per 40 spaces, whichever is greater

Response: 2 short-term bicycle parking spots will be provided near the main entrance to the building.

16.94.030 – Off-Street Loading Standards
B. Separation of Areas
Any area to be used for the maneuvering of delivery vehicles and the unloading or loading of materials shall be separated from designated off-street parking areas and designed to prevent the encroachment of delivery vehicles onto off-street parking areas or public streets. Off-street parking areas used to fulfill the requirements of this Chapter shall not be used for loading and unloading operations.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

Response: Loading operations are designed to occur on the northside (rear) of the building.

16.96 – On-Site Circulation

16.96.010 – On-Site Pedestrian and Bicycle Circulation

D. Connection to Streets

1. Except for joint access per this Section, all ingress and egress to a use or parcel shall connect directly to a public street, excepting alleyways with paved sidewalk.

Response: Road and sidewalk to the site and building entrance will be provided from SW Oregon Street via the existing access easement.

16.96.030 – Minimum Non-Residential Pedestrian Circulation Standards

A. Sidewalks and Curbs

1. *A private pathway/sidewalk system extending throughout the development site shall be required to connect to existing development, to public rights-of-way with or without improvements, to parking and storage areas, and to connect all building entrances to one another. The system shall also connect to transit facilities within five hundred (500) feet of the site, future phases of development, and whenever possible to parks and open spaces.*
2. *Curbs shall also be required at a standard approved by the Hearing Authority. Private pathways/sidewalks shall be connected to public rights-of-way along driveways but may be allowed other than along driveways if approved by the Hearing Authority.*
3. *Private Pathway/Sidewalk Design. Private pathway surfaces shall be concrete, asphalt, brick/masonry pavers, or other pervious durable surface. Primary pathways connecting front entrances to the right of way shall be at least 6 feet wide and conform to ADA standards. Secondary pathways between buildings and within parking areas shall be a minimum of four (4) feet wide and/or conform to ADA standards. Where the system crosses a parking area, driveway or street, it shall be clearly marked with contrasting paving materials or raised crosswalk (hump). At a minimum all crosswalks shall include painted striping.*

Response: A 6-foot wide sidewalk extends from SW Oregon Street to the building entrance and across the length of the proposed parking area.

16.96.040 – General Requirements for On-Site Vehicle Circulation

B. Joint Access

Two (2) or more uses, structures, or parcels of land are strongly encouraged to utilize jointly the same ingress and egress when the combined ingress and egress of all uses, structures, or parcels of land satisfy the other requirements of this Code, provided that satisfactory legal evidence is presented to the City in the form of deeds, easements, leases, or contracts to clearly establish the joint use. In some cases, the City may require a joint access to improve safety, vision clearance, site distance, and comply with access spacing standards for the applicable street classification.

C. Connection to Streets

Except for joint access per this Section, all ingress and egress to a use or parcel shall connect directly to a public street, excepting alleyways.

Response: Both subject property and property to the north will share an existing access easement from SW Oregon Street.

16.96.060 – Minimum Non-Residential Vehicle Circulation Standards

A. Driveways

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

2. Industrial: Improved hard surfaced driveways are required as follows:

Required Parking Spaces	*Number of Driveways*	*Minimum Width One-Way (Pair)*	*Minimum Width Two-Way*
1-49	*1*	*15 feet*	*24 feet*
50 or more	*2*	*15 feet*	*24 feet*

3. Surface materials are encouraged to be pervious when appropriate, considering soils, anticipated vehicle and other pertinent factors.

Response: The parking area provides a 24-foot two-way driveway. The paved yard in the rear has an approximately 227 foot wide opening from the shared accessway.

16.98 – On-Site Storage

16.98.020 – Solid Waste and Recycling Storage
All uses shall provide solid waste and recycling storage receptacles which are adequately sized to accommodate all solid waste generated on site. All solid waste and recycling storage areas and receptacles shall be located out of public view. Solid waste and recycling receptacles for multi-family, commercial, industrial and institutional uses shall be screened by six (6) foot high sight-obscuring fence or masonry wall and shall be easily accessible to collection vehicles.

Response: A 10'-0" by 20'-0" CMU block wall area is shown to the northeast corner of the building and complies with PRIDE Disposal Company's requirements.

16.98.030 – Material Storage

B. Standards. Except as per Section 16.98.040, all service, repair, storage, and merchandise display activities carried on in connection with any commercial or industrial activity, and not conducted within an enclosed building, shall be screened from the view of all adjacent properties and adjacent streets by a six (6) foot to eight (8) foot high, sight obscuring fence subject to chapter 16.58.020. In addition, unless adjacent parcels to the side and rear of the storage area have existing solid evergreen screening or sight-obscuring fencing in place, new evergreen screening no less than three (3) feet in height shall be planted along side and rear property lines. Where other provisions of this Code require evergreen screening, fencing, or a landscaped berm along side and rear property lines, the additional screening stipulated by this Section shall not be required.

Response: A 6'-0" privacy fence will be placed around the site to obscure visibility of exterior storage areas.

16.106 – Transportation Facilities

16.106.010 – Generally

A. Creation

Public streets shall be created in accordance with provisions of this Chapter. Except as otherwise provided, all street improvements and rights-of-way shall conform to standards for the City's functional street classification, as shown on the Transportation System Plan (TSP) Map (Figure 17) and other applicable City standards. The following table depicts the guidelines for the street characteristics.

Type of Street: *40' Commercial/Industrial Not Exceeding 3000 vehicles per day = 64' Right of Way Width, 2 Number of Lanes, 20' Minimum Lane Width, 8' On Street Parking Width, No Bike Lane. 6' Sidewalk Width, 5' Landscape Strip, No Median*

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

Response: Streets improvements have already been fully improved to comply with current standards.

16.106.040 – Design
Standard cross sections showing street design and pavement dimensions are located in the City of Sherwood's Engineering Design Manual.

B. Alignment
All proposed streets shall, as far as practicable, be in alignment with existing streets. In no case shall the staggering of streets create a "T" intersection or a dangerous condition. Street offsets of less than one hundred (100) feet are not allowed.

Response: The new street giving access to the site will align with SW Lower Roy St.

16.106.060 – Sidewalks

B. Design Standards

1. Arterial and Collector Streets
Arterial and collector streets shall have minimum six (6) or eight (8) foot wide sidewalks/multi-use paths, located as required by this Code. Residential areas shall have a minimum of a six (6) foot wide sidewalk and commercial industrial areas shall have a minimum of an eight (8) foot wide sidewalk.

1. Local Streets
Local streets shall have minimum five (5) foot wide sidewalks, located as required by this Code.

Response: A 6' wide sidewalk to the proposed development will connect to the existing 12' wide sidewalk along SW Oregon St.

16.160.080 – Traffic Impact Analysis (TIA)

B. Applicability
A traffic impact analysis (TIA) shall be required to be submitted to the City with a land use application at the request of the City Engineer or if the proposal is expected to involve one (1) or more of the following:

1. An amendment to the Sherwood Comprehensive Plan or zoning map.
2. A new direct property approach road to Highway 99W is proposed.
3. The proposed development generates fifty (50) or more PM peak-hour trips on Highway 99W, or one hundred (100) PM peak-hour trips on the local transportation system.
4. An increase in use of any adjacent street or direct property approach road to Highway 99W by ten (10) vehicles or more per day that exceed the twenty thousand-pound gross vehicle weight.
5. The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.
6. A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.

Response: The site is not anticipated to generate more than 400 average daily trips. AFP with the site just north of this property submitted a trip count for a 20,000 sf building and demonstrated that it would not trigger a TIA.

16.108 – Improvement Plan Review

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

16.108.010 – Preparation and Submission
An improvement plan shall be prepared and stamped by a Registered Civil Engineer certifying compliance with City specifications. Two (2) sets of the plan shall be submitted to the City for review. An improvements plan shall be accompanied by a review fee as per this Section.

Response: Civil drawings are provided in this submittal package.

16.110 – Sanitary Sewers
16.110.010 – Required Improvements
Sanitary sewers shall be installed to serve all new developments and shall connect to existing sanitary sewer mains. Provided, however, that when impractical to immediately connect to a trunk sewer system, the use of septic tanks may be approved, if sealed sewer laterals are installed for future connection and the temporary system meets all other applicable City, Clean Water Services, Washington County and State sewage disposal standards.

Response: Sanitary sewers will be provided and connect to sewer mains. An existing sewer manhole is located in the new driveway that will be connected to. See utility plan in submittal package.

16.112 – Water Supply

16.112.010 – Required Improvements
Water lines and fire hydrants conforming to City and Fire District standards shall be installed to serve all building sites in a proposed development. All waterlines shall be connected to existing water mains or shall construct new mains appropriately sized and located in accordance with the Water System Master Plan.

Response: Water lines and fire hydrants conforming to City and Fire District standards will be installed and connected to water mains. Stubs are already in place to connect to. See utility plan in submittal package.

16.112.020 – Design Standards
B. Fire Protection
All new development shall comply with the fire protection requirements of Chapter 16.116, the applicable portions of Chapter 7 of the Community Development Plan, and the Fire District.

Response: Water lines and fire hydrants are provided and sized by the civil engineer.

16.114 – Storm Water

16.114.010 – Required Improvements
Storm water facilities, including appropriate source control and conveyance facilities, shall be installed in new developments and shall connect to the existing downstream drainage systems consistent with the Comprehensive Plan and the requirements of the Clean Water Services water quality regulations contained in their Design and Construction Standards R&O 04-9, or its replacement

Response: Storm water will be designed by the civil engineer and in accordance with Clean Water Services. Existing private storm sewers are stubbed and will be connected to.

16.116 – Fire Protection

16.116.010 – Required Improvements

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

When land is developed so that any commercial or industrial structure is further than two hundred and fifty (250) feet or any residential structure is further than five hundred (500) feet from an adequate water supply for fire protection, as determined by the Fire District, the developer shall provide fire protection facilities necessary to provide adequate water supply and fire safety.

B. Fire Flow
Standards published by the Insurance Services Office, entitled "Guide for Determination of Required Fire Flows" shall determine the capacity of facilities required to furnish an adequate fire flow. Fire protection facilities shall be adequate to convey quantities of water, as determined by ISO standards, to any outlet in the system, at no less than twenty (20) pounds per square inch residual pressure. Water supply for fire protection purposes shall be restricted to that available from the City water system. The location of hydrants shall be taken into account in determining whether an adequate water supply exists.

Response: Fire connections will be provided through a new 8" water stub being installed as part of the improvements currently under construction (case file LU 2022-017 SP).

C. Access to Facilities
Whenever any hydrant or other appurtenance for use by the Fire District is required by this Chapter, adequate ingress and egress shall be provided. Access shall be in the form of an improved, permanently maintained roadway or open paved area, or any combination thereof, designed, constructed, and at all times maintained, to be clear and unobstructed. Widths, height clearances, ingress and egress shall be adequate for District firefighting equipment. The Fire District, may further prohibit vehicular parking along private accessways in order to keep them clear and unobstructed, and cause notice to that effect to be posted.

Response: A fire lane is provided to the site and meets the requirements of Tualatin Valley Fire & Rescue for access to the site. Electric gates along the fire lane will be operable to the fire department. Adequate space for truck turnaround is provided on site.

D. Hydrants
Hydrants located along private, accessways shall either have curbs painted yellow or otherwise marked prohibiting parking for a distance of at least fifteen (15) feet in either direction, or where curbs do not exist, markings shall be painted on the pavement, or signs erected, or both, given notice that parking is prohibited for at least fifteen (15) feet in either direction.

Response: No fire hydrants will be located along the private accessway.

16.118 – Public and Private Utilities

16.118.010 – Purpose
Public telecommunication conduits as well as conduits for franchise utilities including, but not limited to, electric power, telephone, natural gas, lighting, and cable television shall be installed to serve all newly created lots and developments in Sherwood.

Response: Utilities including electricity, natural gas, telephone and data will be brought to the site.

16.118.030 – Underground Facilities
Except as otherwise provided, all utility facilities, including but not limited to, electric power, telephone, natural gas, lighting, cable television, and telecommunication cable, shall be placed underground, unless specifically authorized for above ground installation, because the points of connection to existing utilities make underground installation impractical, or for other reasons deemed acceptable by the City.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

Response: All utilities will be brought to site underground.

16.142 – Parks, Trees, and Open Spaces

16.142.040 – Visual Corridors

A. Corridors Required

New developments located outside of the Old Town Overlay with frontage on Highway 99W, or arterial or collector streets designated on Figure 8-1 of the Transportation System Plan shall be required to establish a landscaped visual corridor according to the following standards

Collector: 10' width

Response: 10' of landscaping will be maintained on the north side of the sidewalk along SW Oregon St.

16.142.060 – Street Trees

A. Installation of Street Trees on New or Redeveloped Property.

Trees are required to be planted to the following specifications along public streets abutting or within any new development or re-development. Planting of such trees shall be a condition of development approval. The City shall be subject to the same standards for any developments involving City-owned property, or when constructing or reconstructing City streets. After installing street trees, the property owner shall be responsible for maintaining the street trees on the owner's property or within the right-of-way adjacent to the owner's property.

Response: Street trees will be planted in the planter strip with minimum two caliper inch trunk diameter, selected from the approved tree listed, and spaced according to canopy spread.

16.142.070 – Trees on Property Subject to Certain Land Use Applications

B. Applicability

All applications including a Type II - IV land use review, shall be required to preserve trees or woodlands, as defined by this Section to the maximum extent feasible within the context of the proposed land use plan and relative to other codes, policies, and standards of the City Comprehensive Plan.

Response: No trees of substance are on site that are necessary or feasible to preserve.

16.144 – Wetland, Habitat, and Natural Areas

16.144.020 – Standards

A. The applicant shall identify and describe the significance and functional value of wetlands on the site and protect those wetlands from adverse effects of the development. A facility complies with this standard if it complies with the criteria of subsections A.1.a and A.1.b, below:

1. The facility will not reduce the area of wetlands on the site, and development will be separated from such wetlands by an area determined by the Clean Water Services Design and Construction Standards R&O 00-7 or its replacement provided Section 16.140.090 does not require more than the requested setback.

a. A natural condition such as topography, soil, vegetation or other feature isolates the area of development from the wetland.

b. Impact mitigation measures will be designed, implemented, and monitored to provide effective protection against harm to the wetland from sedimentation, erosion, loss of surface or ground water supply, or physical trespass.

Response: Per AKS evaluation, there are no wetlands are on site.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

B. The applicant shall provide appropriate plans and text that identify and describe the significance and functional value of natural features on the site (if identified in the Community Development Plan, Part 2) and protect those features from impacts of the development or mitigate adverse effects that will occur.

Response: Per AKS evaluation, there are no significant natural features on site.

16.146 – Noise
16.146.020 – Noise Sensitive Uses
When proposed commercial and industrial uses do not adjoin land exclusively in commercial or industrial zones, or when said uses adjoin special care, institutional, or parks and recreational facilities, or other uses that are, in the City's determination, sensitive to noise impacts, then:

A. The applicant shall submit to the City a noise level study prepared by a professional acoustical engineer. Said study shall define noise levels at the boundaries of the site in all directions.

B. The applicant shall show that the use will not exceed the noise standards contained in OAR 340-35-035, based on accepted noise modeling procedures and worst case assumptions when all noise sources on the site are operating simultaneously.

Response: The site is not adjoined to dissimilar zones. Operations are due to occur during regular weekday business hours during the daytime. Noises are anticipated to primarily standard vehicular.

16.148 – Vibrations
16.148.010 – Generally
All otherwise permitted commercial, industrial, and institutional uses shall not cause discernible vibrations that exceed a peak of 0.002 gravity at the property line of the originating use, except for vibrations that last five (5) minutes or less per day, based on a certification by a professional engineer.

Response: Proposed use does not anticipate outstanding vibrations.

16.150 – Air Quality
16.148.020 – Proof of Compliance
Proof of compliance with air quality standards as per Section 16.150.010 shall be in the form of copies of all applicable State permits, or if permits have not been issued, submission by the applicant, and acceptance by the City, of a report certified by a professional engineer indicating that the proposed use will comply with State air quality standards. Depending on the nature and size of the use proposed, the applicant may, in the City's determination, be required to submit to the City a report or reports substantially identical to that required for issuance of State Air Contaminant Discharge Permits.

Response: The tenant will comply with applicable State air quality rules and statutes.

16.152 – Odors
16.152.020 – Standards
The applicant shall submit a narrative explanation of the source, type and frequency of the odorous emissions produced by the proposed commercial, industrial, or institutional use. In evaluating the potential for adverse impacts from odors, the City shall consider the density and characteristics of surrounding populations and uses, the duration of any odorous emissions, and other relevant factors.

Response: Proposed use does not anticipate notable odorous emissions.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

16.154 – Heat and Glare

16.154.020 – Standards

Except for exterior lighting, all otherwise permitted commercial, industrial, and institutional uses shall conduct any operations producing excessive heat or glare entirely within enclosed buildings. Exterior lighting shall be directed away from adjoining properties, and the use shall not cause such glare or lights to shine off site in excess of one-half (0.5) foot candle when adjoining properties are zoned for residential uses.

Response: All exterior lighting will be directed downward onto the site and away from other properties.

16.156 – Energy Conservation

16.156.020 – Standards

A. Building Orientation - The maximum number of buildings feasible shall receive sunlight sufficient for using solar energy systems for space, water or industrial process heating or cooling. Buildings and vegetation shall be sited with respect to each other and the topography of the site so that unobstructed sunlight reaches the south wall of the greatest possible number of buildings between the hours of 9:00 AM and 3:00 PM, Pacific Standard Time on December 21st.

B. Wind - The cooling effects of prevailing summer breezes and shading vegetation shall be accounted for in site design. The extent solar access to adjacent sites is not impaired vegetation shall be used to moderate prevailing winter wind on the site.

Response: The building is sited with access to daylight and cooling winds.

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

COMPLETENESS RESPONSE LETTER

LU 2025-008 SP GH McCulloch Industrial

Owner:
JBMAC Ventures, LLC
19435 SW 19th Avenue
Tualatin, OR 97062

Applicant:
CIDA Inc. – Matthew Bridegroom
15895 SW 72nd Avenue
Portland, OR 97224

Dear Arthur,

The following is in response to the incomplete items noted in your letter dated October 09, 2025. The item numbers correspond to the items in your letter, as well as the letters from Engineering and CWS and narrate how we have addressed each of the incomplete items.

REQUIRED INFORMATION (RESPONSE):

Planning Department Comments:

1. Please discard original hard copies that were submitted, they are out of date. These hard copies were submitted with the original application, when it was understood the application was to be a Type II Land Use Review. When we resubmitted as a Type III review, we understood that we did not need to submit updated hard copies until the digital package was deemed complete.
2. Page numbers have been added.
3. A first-floor plan and mezzanine plan has been added. The mezzanine plan shows its square footage.
4. The overall use of the site is office, fabrication and distribution of materials for a heating and plumbing contractor/supplier as allowed outright per the Uses Table of 16.31.020 under "Building, heating, plumbing, or electrical contractor and suppliers, building maintenance services, and similar uses." The north hardscape area is in service to the operations of the contractor and will to be used for parking trailers, fleet trucks, and forklifts; for receiving and distribution material handling and maneuvering, and as a temporary production and equipment staging area. The exterior yard will not be used for product storage, which will occur inside the building.
5. Per the Sherwood Municipal code definitions, the 'building height' is defined as "The vertical distance above a reference datum measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or <u>to the average height of the highest gable of a pitched or hipped roof</u>." The average height of the gabled roof of this project is at 28'-2" which is below the 30' maximum allowable height. The elevations on sheet AE0.1 have been updated to show the average height, rather than the ridge height.
6. Vision Clearance:
    a. Vision Triangles were shown on A0.1, with keynote 11 pointing at one of the triangles. The triangles have been shaded for added clarity.
    b. There is no proposed vegetation over 2.5' in the vision clearance triangles. Vision clearance triangles are now shown on the landscaping plan for clarity.
7. Site Plan Review:
    a. As noted above, the hard copies that were part of the original submittal should be discarded. Cladding materials have been clarified on elevations on sheet AE0.1. Cut sheets have also been added to the submittal.
    b. The proposed cladding materials that break up the vertical façade include: (1) a horizontal wood-look T & G cladding system; (2) a horizontal box rib vertical metal siding panel in a light grey, (3) a vertical metal wall panel in a dark grey as the primary cladding material, with (4) a vertical wainscot skirting in a third complementary grey color, and (5) storefront glazing in a pattern that create interest along the main façade and around the entry. In addition to the variety

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

of cladding materials, the entry area is recessed to create a three-dimensional element.

c. The hardscape area north of the building is screened by a fence as indicated by keynote 4 on 1/A0.1. The keynote has been updated to clarify that the fence will have black vinyl slats for sight obscurity.
d. Elevations have been modified to show the façade area, area of glazing, and the percentage or each. Only the South façade has been calculated in this submittal, since it is the only façade that faces a collector street. Previous calculations included East and West facades, which have now been eliminated from the calculations since they do not face an arterial or collector.

8. Site Area Landscaping:
    a. Required landscaping in the 10' wide perimeter landscaping buffer is now shown and labeled on sheet L1.0.
    b. Required landscaping in perimeter landscaping buffer reduction area shown and labeled on sheet L1.0.
    c. Parking area landscape areas are called out on sheet L1.0.
    d. The landscape island immediately east of the trash enclosure is now shown with complete landscaping on sheet L1.0.
    e. Coordination with PGE is ongoing for electrical equipment placement onsite. Final location and required landscaping will be shown on Final Landscaping Plans. Final mechanical equipment layout is in process. Mechanical equipment anticipated to be located inside the building and on the north side of the building, and the building and perimeter fence will provide required screening.
9. The outdoor service and delivery area will be screened by chain-link fence with black vinyl slats as required by section 16.92.030.C. 16.98.030.B states "Where other provisions of this Code require evergreen screening, fencing, or a landscaped berm along side and rear property lines, the additional screening stipulated by this Section (Material Storage 16.98.030) shall not be required". As such, additional landscaping is not required since fencing is required and provided under another provision of the Code.
10. Cut sheets have been provided for cladding materials, bike parking, and lighting

Engineering Department Comments:
Transportation: TVF&R SPL has been provided in the updated submittal package.

Storm Sewer: A preliminary stormwater memo has been added to the updated submittal package.

CWS Comments:
To better address the specific comments in the incompleteness letter, we are splitting this into 4 bullets to align with the Engineering Comments and including our Preliminary Memo we are sending to CWS as part of the coordination on the Stormwater flows to the City's receiving Regional Facility.

1. We have included a Preliminary Stormwater Memo addressing the site constraints we have encountered. We are currently working with City staff and Clean Water Services (CWS) to determine if the City can and will take any additional storm flows from the site as part of a new Fee-In-Lieu agreement.

2. Due to site constraints limiting the depth of excavation combined with the relatively high Invert Elevation of the receiving storm system main in Oregon Street, treatment is proposed after detention and flow control using Contech Storm Filter Cartridges in accordance with the submitted Stormwater Plan (See Sheet C3.0). (See response #4 for additional detail)

15895 SW 72ND AVE
SUITE 200
PORTLAND, OR 97224
PHONE: 503.226.1285
FAX: 503.226.1670
INFO@CIDAINC.COM
WWW.CIDAINC.COM

3. In accordance with the Preliminary Stormwater Memo and Plans, the proposed water quality treatment will occur after detention and flow control due to limited "fall" available within the overall stormwater system treatment train. (See response #4 for additional detail)

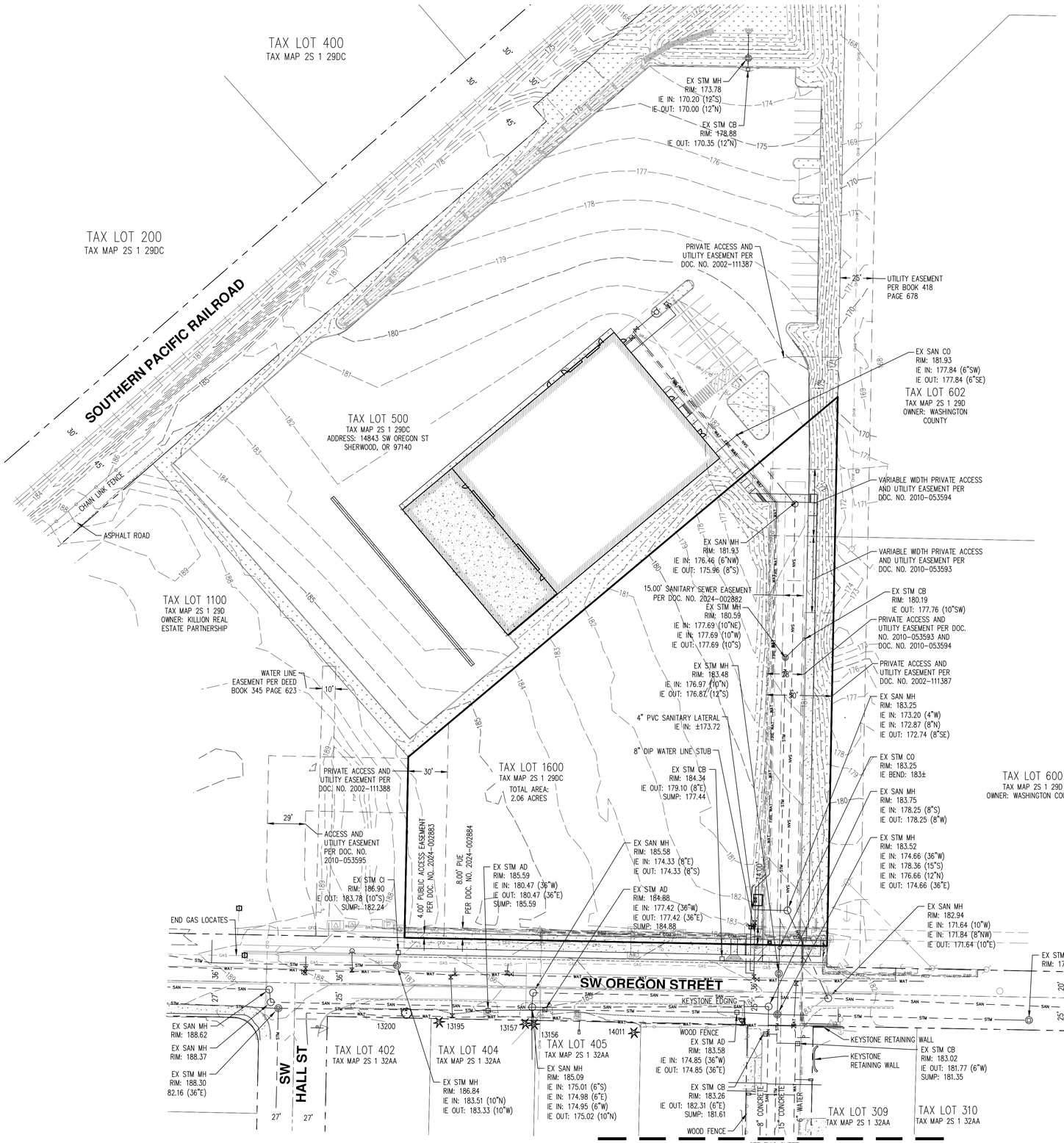
4. We will be requesting a variance from CWS requirement 4.09.3(c)(2)(f) due to site constraints which limit our ability to incorporate standard pre-treatment manholes due to the excavation depth restrictions in the DEQ NFA letter, relatively flat site slopes, and limited available fall within our overall stormwater treatment train to the City's public stormwater main in Oregon Street. The proposed detention pipes combined with the downstream flow control structure prior to the cartridge filters will act to create necessary sedimentation time and provide for an equivalent level of pretreatment normally provided within the system prior to a cartridge filter. The detention systems will be designed with a Containment Row to allow for easy access for cleaning and maintenance of retained sediments, and do not include infiltration of untreated stormwater.

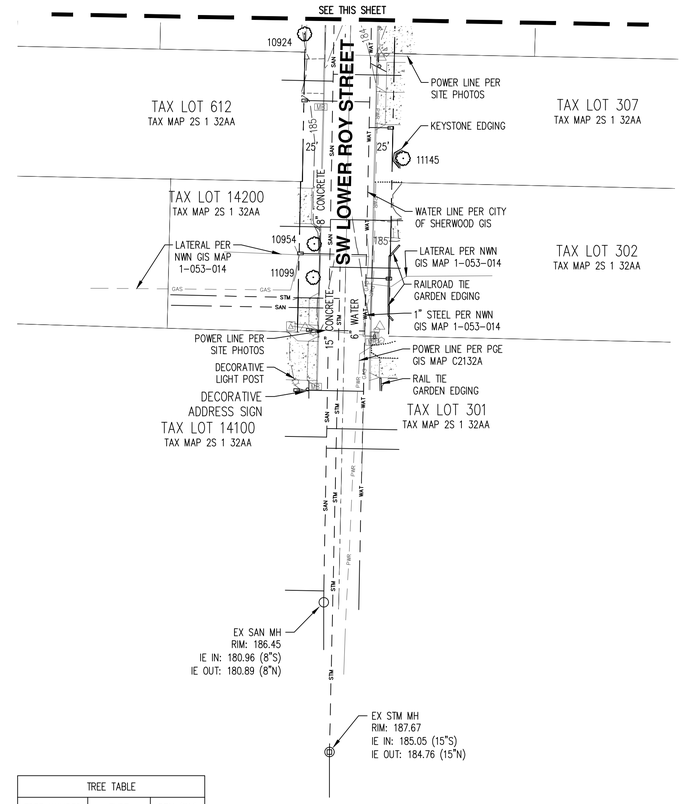
I hope that the information above along with the submitted plans and documents address the comments adequately. Please let me know if additional information is needed.

Sincerely,

Matthew Bridegroom
Project Architect, CIDA

Enclosures:
Cc:





TREE TABLE		
TREE NUMBER	TYPE	DBH (IN.)
10924	DECIDUOUS	9,9,9,10,11
10954	DECIDUOUS	6
11099	DECIDUOUS	7
11145	DECIDUOUS	28
~~12554~~	~~DECIDUOUS~~	~~8~~
~~12555~~	~~DECIDUOUS~~	~~14~~
~~12556~~	~~DECIDUOUS~~	~~14,28~~
13156	CONIFEROUS	11
13157	CONIFEROUS	18
13195	CONIFEROUS	18
13200	DECIDUOUS	7,8
14011	CONIFEROUS	32

NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBERS 21021448, 21021450, 22167610, 22358630, AND 22358631. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
2. FIELD WORK WAS CONDUCTED FEBRUARY 3 – 4, 2021 AND JUNE 10, 2022 AND JANUARY 18, 2023.
3. VERTICAL DATUM: ELEVATIONS ARE BASED ON A 2" DIAMETER BRASS CAP MARKED "NO. 1, 1988", IN A MONUMENT BOX NEAR THE SOUTH EDGE OF PAVEMENT OF HIGHWAY 99 WEST 300 FEET± SOUTHWEST OF SIX CORNERS. ELEVATION: 210.40 FEET (NGVD29).
4. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. BOUNDARIES MAY BE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.
5. CONTOUR INTERVAL IS 1 FOOT.
6. TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE DETERMINED BY VISUAL INSPECTION. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.
7. AT THE TIME OF THIS SURVEY, AFP SYSTEMS (CITY OF SHERWOOD PLANNING CASE FILE NO. LU 2022-017 SP) WAS UNDER CONSTRUCTION. NOTED SITE IMPROVEMENTS AND SANITARY AND STORM SEWER ELEVATIONS ON TAX LOT 500 AND PRIVATE ACCESS AND UTILITY EASEMENTS ARE PER APPROVED AFP SYSTEMS CONSTRUCTION PLANS, DATED 4/11/2025.

N

SCALE: 1"=40 FEET

40 0 8 20 40

ORIGINAL PAGE SIZE: 30" X 42"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

EXISTING CONDITIONS PLAN
GH MCCULLOCH
SHERWOOD, OREGON

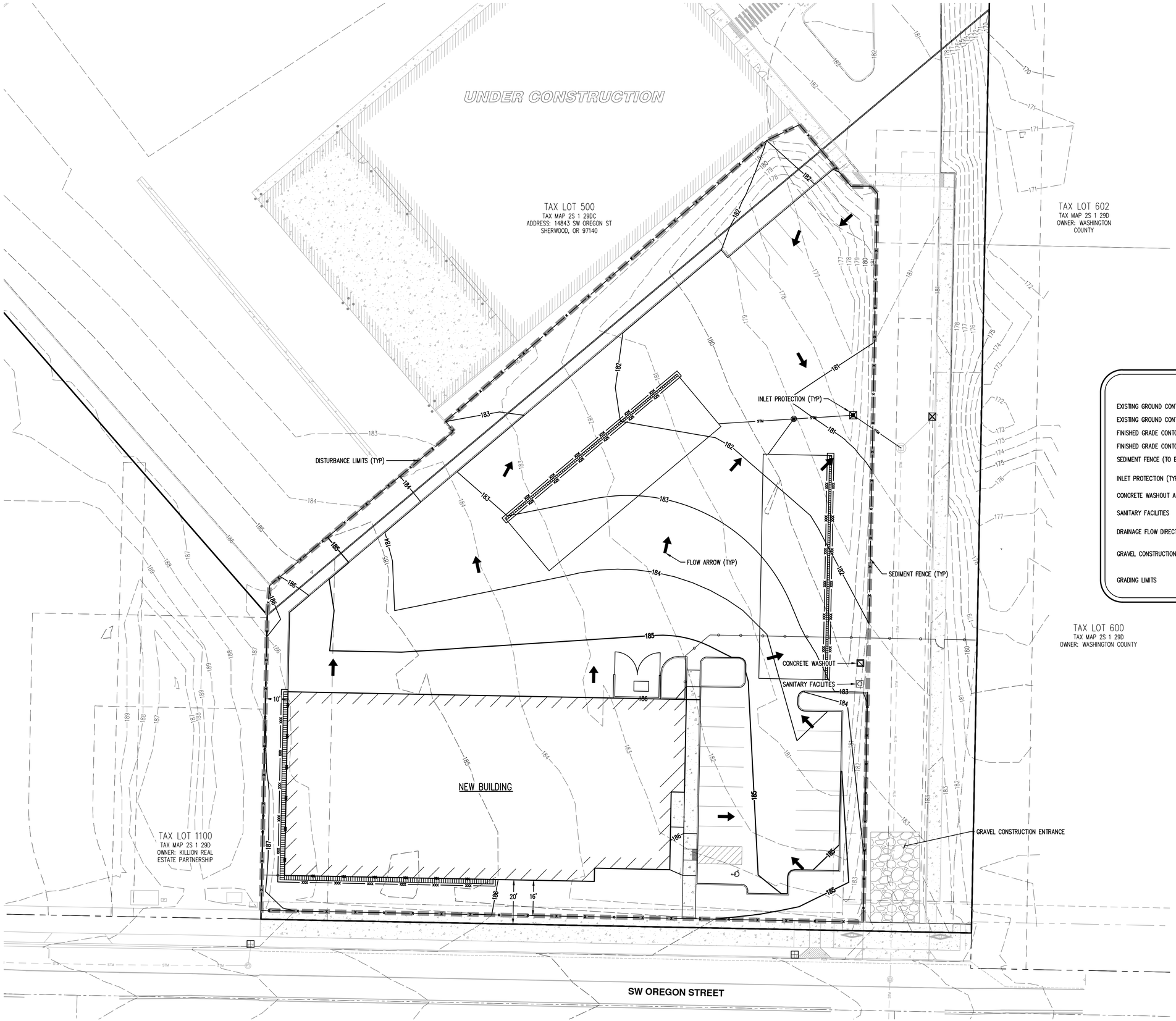
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JANUARY 9, 2007
NICK WHITE
70652LS
RENEWS: 6/30/26

PRELIMINARY
NOT FOR CONSTRUCTION

JOB NUMBER:	8627-06
DATE:	10/28/2025
DESIGNED BY:	
DRAWN BY:	MSD/RLB
CHECKED BY:	NSW

C0.2

AKS DRAWING FILE: 8627-06EXCOND.DWG | LAYOUT: C0.2



LEGEND

EXISTING GROUND CONTOUR (1 FT)	
EXISTING GROUND CONTOUR (5 FT)	350
FINISHED GRADE CONTOUR (1 FT)	
FINISHED GRADE CONTOUR (5 FT)	345
SEDIMENT FENCE (TO BE INSTALLED PRIOR TO GRADING)	x x
INLET PROTECTION (TYP)	
CONCRETE WASHOUT AREA	
SANITARY FACILITIES	
DRAINAGE FLOW DIRECTION	
GRAVEL CONSTRUCTION ENTRANCE	
GRADING LIMITS	

N

SCALE: 1"=20 FEET

20 0 4 10 20

ORIGINAL PAGE SIZE: 24" x 36"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

PRELIMINARY GRADING, EROSION, AND SEDIMENT CONTROL PLAN

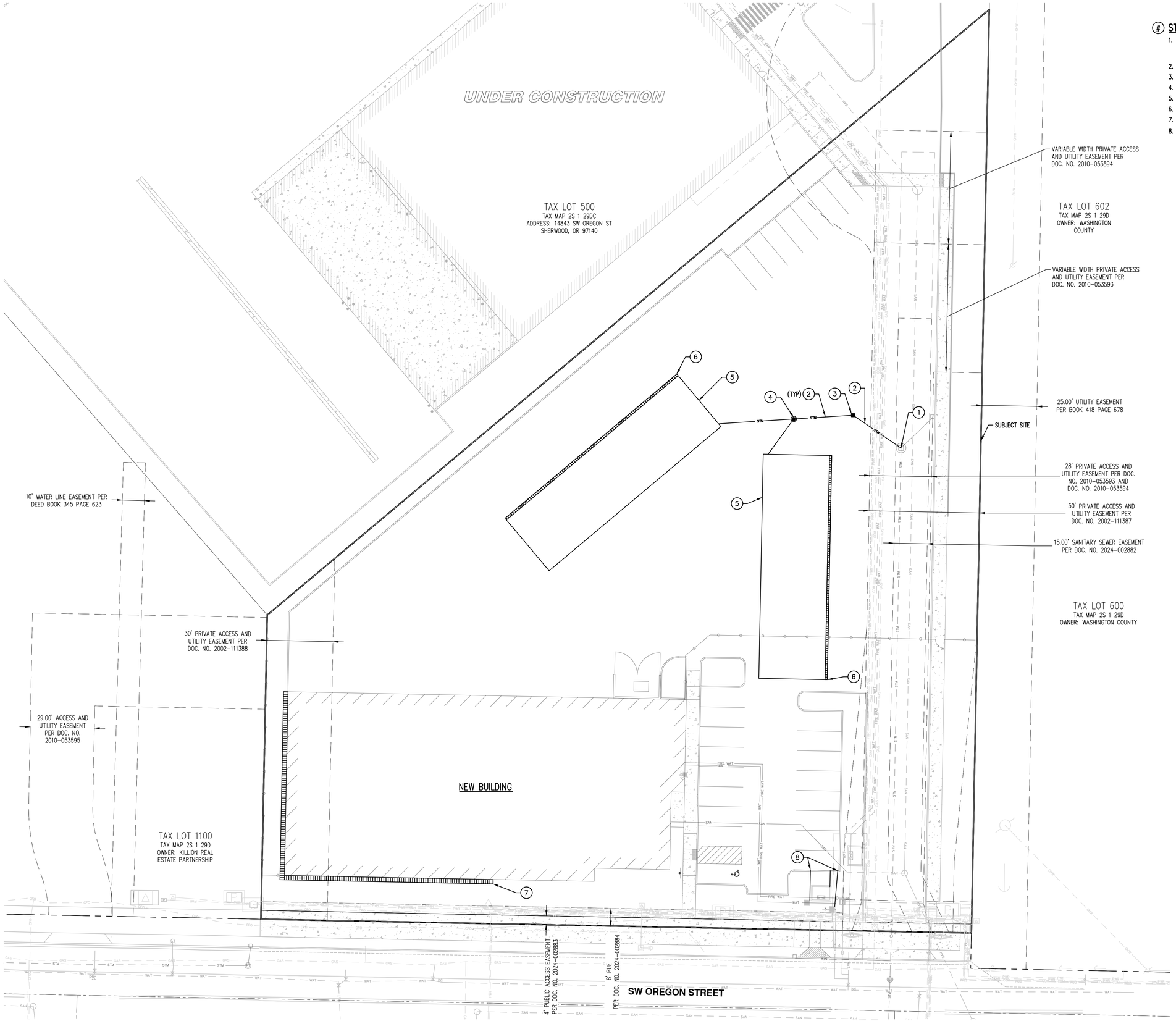
GH MCCULLOCH
SHERWOOD, OREGON

REGISTERED PROFESSIONAL ENGINEER
OREGON
BRIAN C. CARLSON
PRELIMINARY NOT FOR CONSTRUCTION
RENEWS: 12/31/2025

JOB NUMBER:	8627-06
DATE:	10/28/2025
DESIGNED BY:	GJG
DRAWN BY:	RLB
CHECKED BY:	BCC

C2.0

AKS DRAWING FILE: 8627-06 GRADING.DWG | LAYOUT: C2.0



(#) STORMWATER KEYED NOTES:

1. CONNECTION TO NEW STORMWATER MANHOLE TO BE INSTALLED WITH TAX LOT 500 IMPROVEMENTS CURRENTLY UNDER CONSTRUCTION (CITY OF SHERWOOD PLANNING CASE FILE NO. LU 2022-017 SP).
2. NEW STORMWATER DRAINAGE PIPE.
3. NEW STORMFILTER CATCHBASIN.
4. NEW FLOW CONTROL MANHOLE.
5. NEW UNDERGROUND STORMWATER DETENTION SYSTEM.
6. NEW STORMWATER SLOT DRAIN.
7. NEW STORMWATER FRENCH DRAIN.
8. NEW 1 1/2" VAULT DRAIN PIPE AT CURBSIDE WEEPHOLE.

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

PRELIMINARY STORMWATER DRAINAGE PLAN
GH MCCULLOCH
SHERWOOD, OREGON

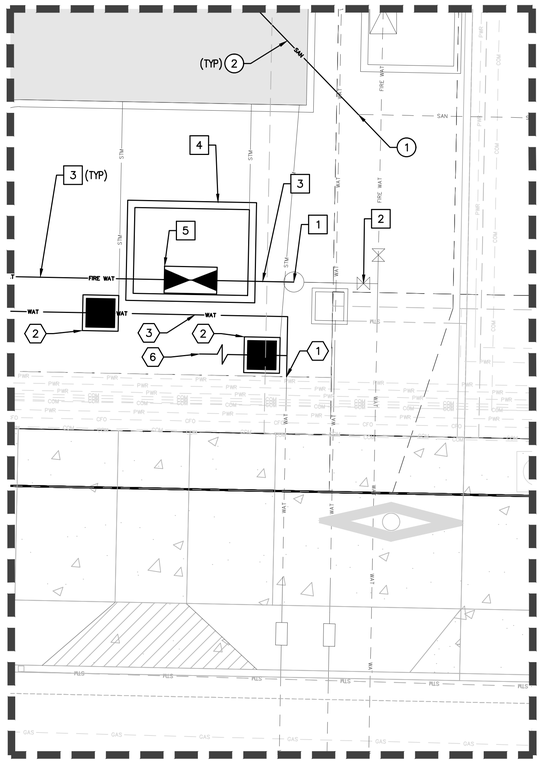
REGISTERED PROFESSIONAL ENGINEER
OREGON
R. G. CARLSON
PRELIMINARY NOT FOR CONSTRUCTION

RENEWS: 12/31/2025

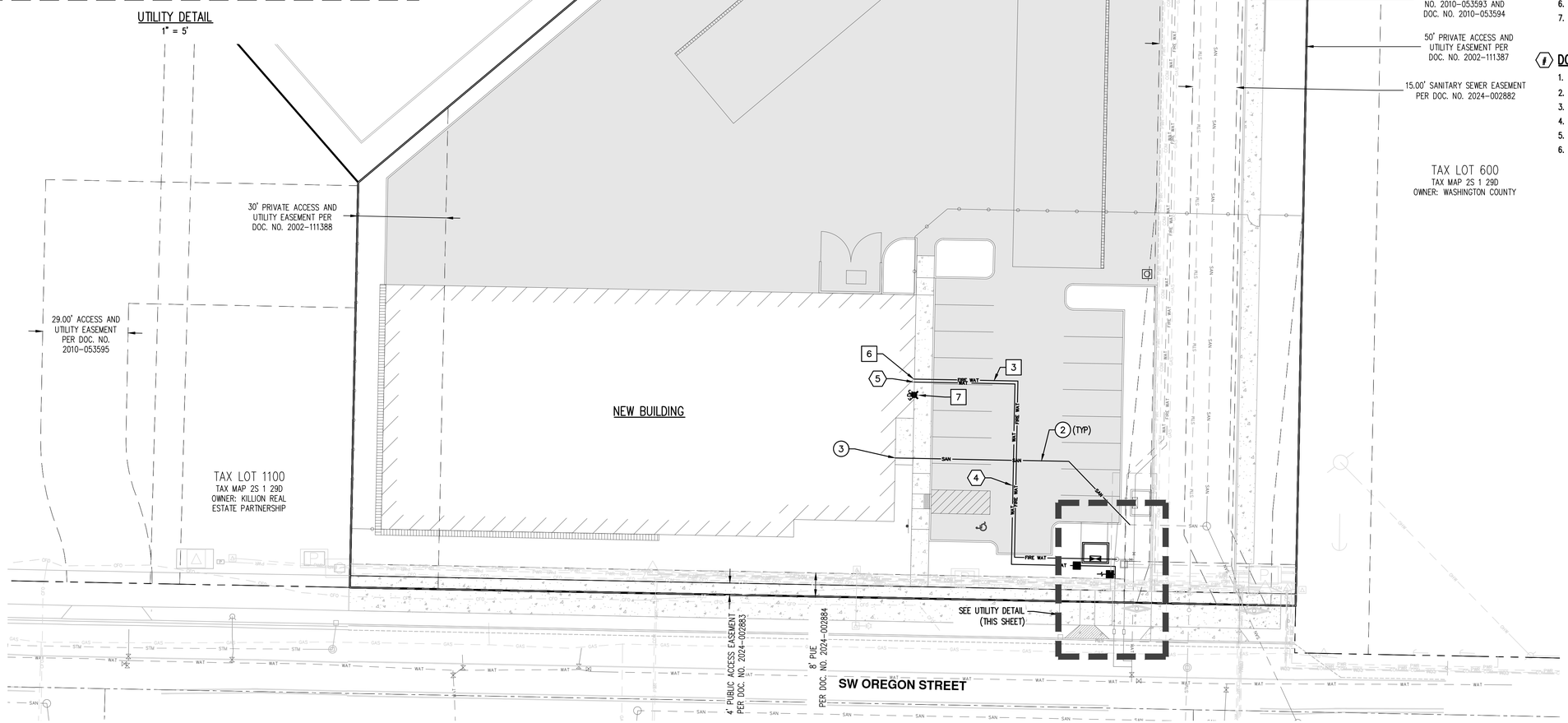
JOB NUMBER:	8627-06
DATE:	10/28/2025
DESIGNED BY:	GJG
DRAWN BY:	RLB
CHECKED BY:	BCC

C3.0

AKS DRAWING FILE: 8627-06 STORMDWG | LAYOUT: C3.0



UTILITY DETAIL
1" = 5'



SANITARY SEWER KEYED NOTES:

1. CONNECTION TO NEW SANITARY SEWER MANHOLE TO BE INSTALLED WITH TAX LOT 500 IMPROVEMENTS CURRENTLY UNDER CONSTRUCTION (CITY OF SHERWOOD PLANNING CASE FILE NO. LU 2022-017 SP).
2. NEW SANITARY SEWER LATERAL.
3. NEW SANITARY SEWER SERVICE FOR BUILDING CONNECTION.

FIRE WATER KEYED NOTES:

1. CONNECT TO EXISTING 8" WATER STUB TO BE INSTALLED WITH TAX LOT 500 IMPROVEMENTS CURRENTLY UNDER CONSTRUCTION (CITY OF SHERWOOD PLANNING CASE FILE NO. LU 2022-017 SP). REMOVE EXISTING BLOW OFF.
2. EXISTING 8" MJ GATE VALVE.
3. NEW FIRE WATER MAIN.
4. NEW DOUBLE CHECK DETECTOR ASSEMBLY VAULT
5. NEW DOUBLE CHECK DETECTOR ASSEMBLY.
6. NEW FIRE WATER SERVICE FOR BUILDING CONNECTION.
7. NEW FDC CONNECTION.

DOMESTIC WATER KEYED NOTES:

1. CONNECT TO EXISTING 2" WATER SERVICE.
2. NEW 2" REDUCED PRESSURE BACKFLOW DEVICE.
3. NEW DOMESTIC WATER DOUBLE CHECK.
4. NEW DOMESTIC WATER LINE.
5. NEW WATER SERVICE FOR BUILDING CONNECTION.
6. CONNECT TO EXISTING IRRIGATION WATER SYSTEM.

N

SCALE: 1"=20 FEET
20 0 4 10 20
ORIGINAL PAGE SIZE: 24" x 36"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

PRELIMINARY COMPOSITE UTILITY PLAN
GH MCCULLOCH
SHERWOOD, OREGON

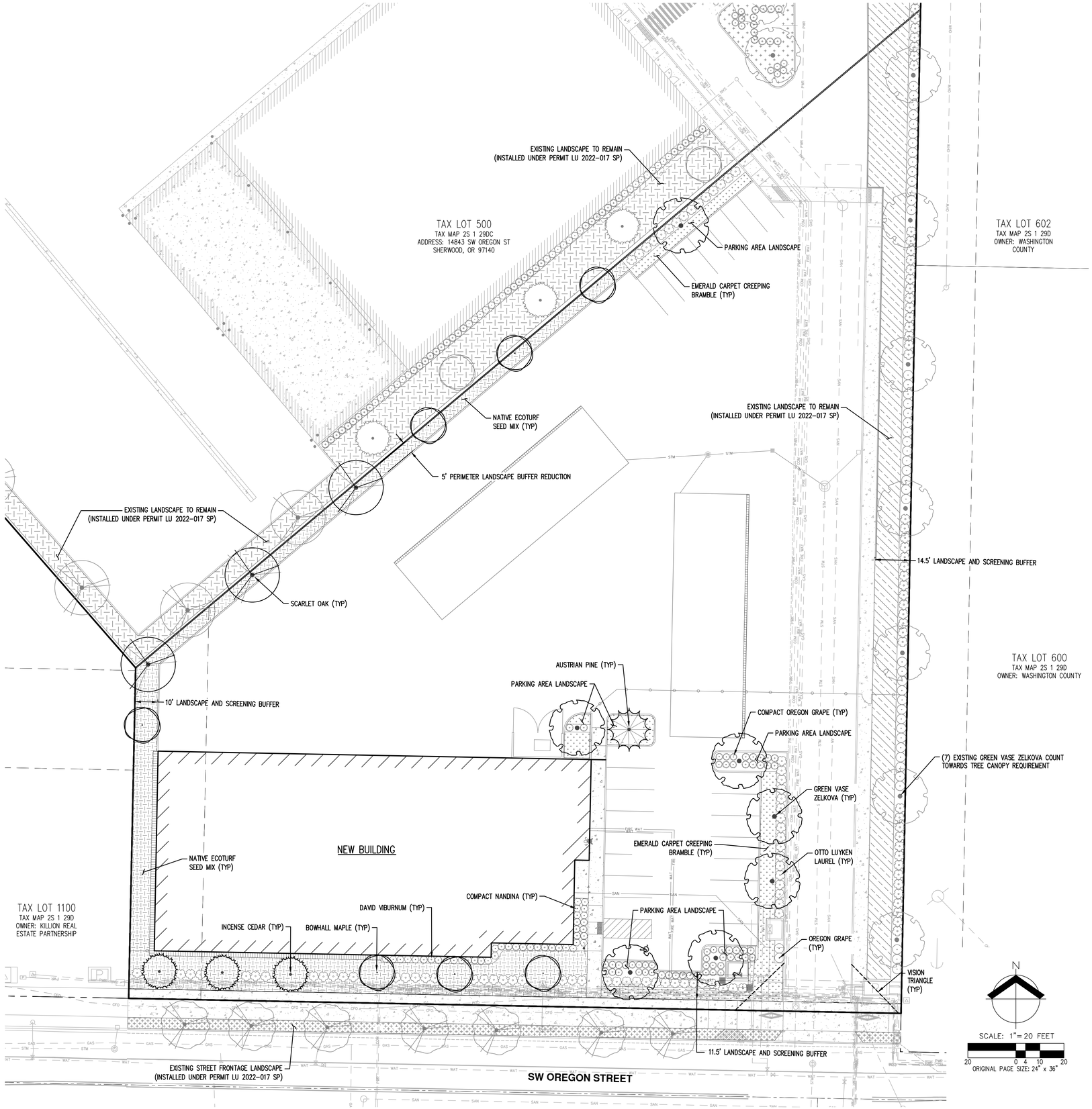
REGISTERED PROFESSIONAL ENGINEER
OREGON
JAN. 28, 1986
BRIAN C. CARLSON
PRELIMINARY
NOT FOR CONSTRUCTION

RENEWS: 12/31/2025

JOB NUMBER:	8627-06
DATE:	10/28/2025
DESIGNED BY:	GJG
DRAWN BY:	RLB
CHECKED BY:	BCC

C4.0

AKS DRAWING FILE: 8627-06 UTILDWG | LAYOUT: C4.0



PRELIMINARY PLANT SCHEDULE

SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE/CONTAINER	SPACING
TREES					
	7	ACER RUBRUM 'BOWHALL' SMALL TREE (CANOPY FACTOR 15)	BOWHALL RED MAPLE	2" CAL. B&B	AS SHOWN
	3	CALOCEDRUS DECURRENS MEDIUM TREE (CANOPY FACTOR 60)	INCENSE CEDAR	6' HT. B&B	AS SHOWN
	1	PINUS NIGRA LARGE TREE (CANOPY FACTOR 100)	AUSTRIAN PINE	6' HT. B&B	AS SHOWN
	3	QUERCUS COCCINEA LARGE TREE (CANOPY FACTOR 150)	SCARLET OAK	2" CAL. B&B	AS SHOWN
	7	ZELKOVA SERRATA 'GREEN VASE' LARGE TREE (CANOPY FACTOR 192)	GREEN VASE ZELKOVA	2" CAL. B&B	AS SHOWN

SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE/CONTAINER	SPACING
SHRUBS					
	2	MAHONIA AQUIFOLIUM	OREGON GRAPE	2 GAL CONT.	48" o.c.
	22	MAHONIA AQUIFOLIUM 'COMPACTA'	COMPACT OREGON GRAPE	1 GAL. CONT.	36" o.c.
	21	NANDINA DOMESTICA 'COMPACTA'	COMPACT NANDINA	2 GAL CONT.	36" o.c.
	73	PRUNUS LAUROCERASUS 'OTTO LUYKEN'	OTTO LUYKEN ENGLISH LAUREL	2 GAL CONT.	48" o.c.
	56	VIBURNUM DAVIDII	DAVID VIBURNUM	1 GAL CONT.	36" o.c.
GROUND COVERS					
	184	RUBUS CALYCINOIDES 'EMERALD CARPET'	EMERALD CARPET CREEPING BRAMBLE	1 GAL CONT.	36" o.c.
	4,705 SF±	NATIVE ECOTURF SEED MIX – SUNMARK SEEDS (OR APPROVED EQUAL) NATIVE RED FESCUE 45%; BLUE GRAMA 25%; BUFFALOGRASS 20%; PRAIRIE JUNEGRASS 7%; STRAWBERRY CLOVER 3%; APPLY AT A RATE OF 1 LB. PER 1,000 SF OR AS RECOMMENDED BY SUPPLIER			

GENERAL LANDSCAPE NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PLANT QUANTITIES. IF DISCREPANCIES OCCUR, DESIGN INTENT PREVAILS OVER QUANTITIES LISTED.
2. PLANTING PLAN IS INTENDED TO SHOW DESIGN INTENT ONLY AND IS PRELIMINARY. PLANT SPECIES, SIZES, LOCATIONS, QUANTITIES, AND OTHER PLAN CHANGES MAY BE SUBSTITUTED OR REVISED PRIOR TO FINAL SUBMITTAL DUE TO SITE CONDITIONS AND PLANT AVAILABILITY WHERE ALLOWED BY SHERWOOD DESIGN STANDARDS.
3. ALL TREES SHALL CONFORM TO APPLICABLE CITY OF SHERWOOD DESIGN STANDARDS AND MEET THE REQUIREMENTS OF THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN) STANDARDS FOR NURSERY STOCK (ANSI Z60.2) FOR GRADE NO. 1 OR BETTER. PLANT IN ACCORDANCE WITH "BEST-PRACTICE" INDUSTRY STANDARDS ADOPTED BY THE OREGON LANDSCAPE CONTRACTORS BOARD (OLCB).
4. CONTRACTOR SHALL INSTALL ROOT BARRIER ADJACENT TO HARD SURFACE FOR TREES WITHIN 4' OF PAVING. ROOT BARRIER SHALL BE A MINIMUM OF 18" DEEP X 10' LONG AND CENTERED ON THE TREE TRUNK ADJACENT TO PAVING.
5. DOUBLE STAKE ALL TREES. REFER TO CITY OF SHERWOOD STANDARD TREE PLANTING DETAIL.
6. ALL TREES SHALL BE PLANTED A MINIMUM OF 3' O.C. FROM BACK OF PAVING. CONTRACTOR SHALL FIELD ADJUST IF NECESSARY TO AVOID CONFLICTS WITH UTILITIES, LIGHTS, VAULTS, BUILDING AND ROOF OVERHANGS, EXISTING VEGETATION AND TREE CANOPIES, ETC.
7. SOIL PREPARATION: ALL TREE, SHRUB, AND GROUNDCOVER AREAS SHALL HAVE A MINIMUM OF 12" OF CLEAN TOPSOIL, PLUS AN ADDITIONAL 24" OF NON-COMPACTED SUBSOIL AVAILABLE. EXISTING NATIVE SOIL OR STOCKPILED TOPSOIL STRIPPING MAY BE USED. TOPSOIL SHALL BE RICH DARK BROWN IN COLOR AND VOID OF ROOTS, PLANTS, WEED SEEDS, SOD, STONES, CLAY LUMPS, ALKALI SALTS, DEBRIS, AND OTHER EXTRANEOUS MATERIALS HARMFUL TO PLANT GROWTH. FINISH GRADE OF NEW PLANTING AREAS SHALL SEAMLESSLY MEET FINISH GRADE OF EXISTING LANDSCAPE AREAS TO REMAIN AND AS SHOWN ON GRADING PLANS. TOPSOIL SHALL BE PLACED AND WORKED IN FRIABLE (WORKABLE) CONDITION. BACKFILL ALL PLANTING HOLES WITH 1/3 ORGANIC MATERIALS, 1/3 TOPSOIL, AND 1/3 SANDY LOAM.
8. MULCH: APPLY 3" DEEP MEDIUM GRIND OR SHREDDED DARK HEMLOCK OR FIR MULCH AROUND ALL PLANTINGS. DO NOT COVER FOLIAGE OR ROOT CROWNS OF PLANTS WITH BARK MULCH. TREES AND OTHER PLANTS SHALL BE SET TO ACCOMMODATE MULCH APPLICATION WITHOUT BURYING ROOT CROWNS.
9. IRRIGATION: LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING A PERMANENT, UNDERGROUND "DESIGN-BUILD" IRRIGATION SYSTEM TO WATER ALL NEW PLANTING BED AREAS. COORDINATE POINT-OF-CONNECTION (POC), CITY APPROVED DOUBLE-CHECK VALVE ASSEMBLY, AND SLEEVING LOCATIONS WITH GENERAL CONTRACTOR PRIOR TO INSTALLATION OF HARD SURFACING (SIDEWALKS, ROADWAYS, ETC.).

PARKING LOT LANDSCAPE DATA

TOTAL PARKING SPACES = 24
PARKING LOT TREES REQUIRED = 1 LARGE TREE PER 4 PARKING SPACES;
1 MEDIUM TREE PER 3 PARKING SPACES; 1 SMALL TREE PER 2 PARKING SPACES
PARKING LOT TREES PROPOSED = 6 LARGE TREES (24 SPACES)
TOTAL PARKING LOT SHRUBS REQUIRED = 48 SHRUBS
TOTAL PARKING LOT SHRUBS PROPOSED = 57 SHRUBS

TREE CANOPY REQUIREMENT

SITE AREA = ±89,293 SF
30% TREE CANOPY REQUIREMENT = 26,788 SF

STANDARD HAS BEEN MET BY PROVIDING 37,976 SF TREE CANOPY CALCULATED AS FOLLOWS:

(7)	ACER RUBRUM 'BOWHALL'	= (3.14* 7.5X7.5)	= 176.6 SF X 7	= 1,236 SF
(3)	CALOCEDRUS DECURRENS	= (3.14* 15X15)	= 706.5 SF X 3	= 2,120 SF
(1)	PINUS NIGRA	= (3.14* 20X20)	= 1,256 SF X 1	= 1,256 SF
(3)	QUERCUS COCCINEA	= (3.14* 25X25)	= 1,962.5 SF X 3	= 5,888 SF
(7)	ZELKOVA SERRATA 'GREEN VASE'	= (3.14* 25X25)	= 1,962.5 SF X 7	= 13,738 SF
(7)	ZELKOVA SERRATA 'GREEN VASE' (EXISTING)	= (3.14* 25X25)	= 1,962.5 SF X 7	= 13,738 SF
				TOTAL 37,976 SF

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM
ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

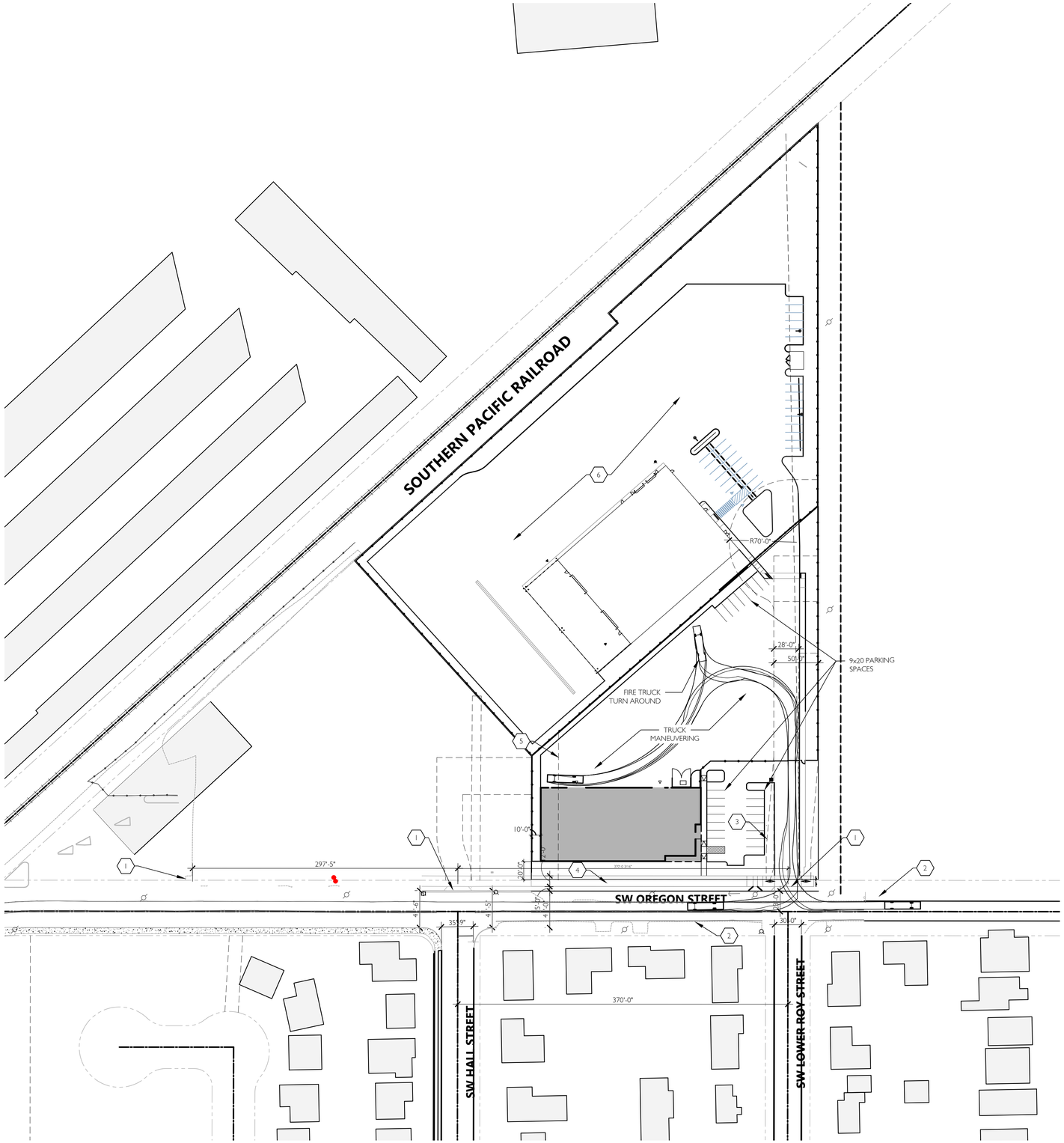
PRELIMINARY LANDSCAPE PLAN
GH MCCULLOCH
SHERWOOD, OREGON

REGISTERED PROFESSIONAL LANDSCAPE ARCHITECT
1025
TIMOTHY E. BOWER
OREGON
PRELIMINARY NOT FOR CONSTRUCTION
RENEWS: 11/30/2026

JOB NUMBER:	8627-06
DATE:	10/24/2025
DESIGNED BY:	TEB
DRAWN BY:	TEB
CHECKED BY:	BCC

L1.0

AKS DRAWING FILE: 8627-06 LANDSCAPE.DWG | LAYOUT: L1.0



NORTH 1 AT0.1

TRANSPORTATION PLAN

SCALE: 1"= 60'-0"

NORTH 2 AT0.1

GENERAL CIRCULATION PLAN

SCALE: NTS

LEGEND

- BUS STOP
- 97 TUALATIN-SHERWOOD BUS ROUTE
- 94 PACIFIC/SHERWOOD BUS ROUTE
- ARTERIAL ROAD
- COLLECTOR ROAD

KEYNOTES

1. EXISTING CURB CUT
2. NO CURBS EAST OF PROPERTY OR ON SOUTH SIDE OF OREGON ST ACROSS FROM PROPERTY
3. EXISTING ACCESS EASEMENT
4. FRONTAGE ALREADY IMPROVED
5. EXISTING EASEMENT TO BE REMOVED
6. DEVELOPMENT UNDER CONSTRUCTION

Owner: JBMAC VENTURES LLC
Applicant: CIDA Inc - Matthew Bridegroom

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUED DATE	
04/30/25	PRE-APP
08/01/25	LAND USE

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR:
GH McCULLOCH
SHERWOOD, OR

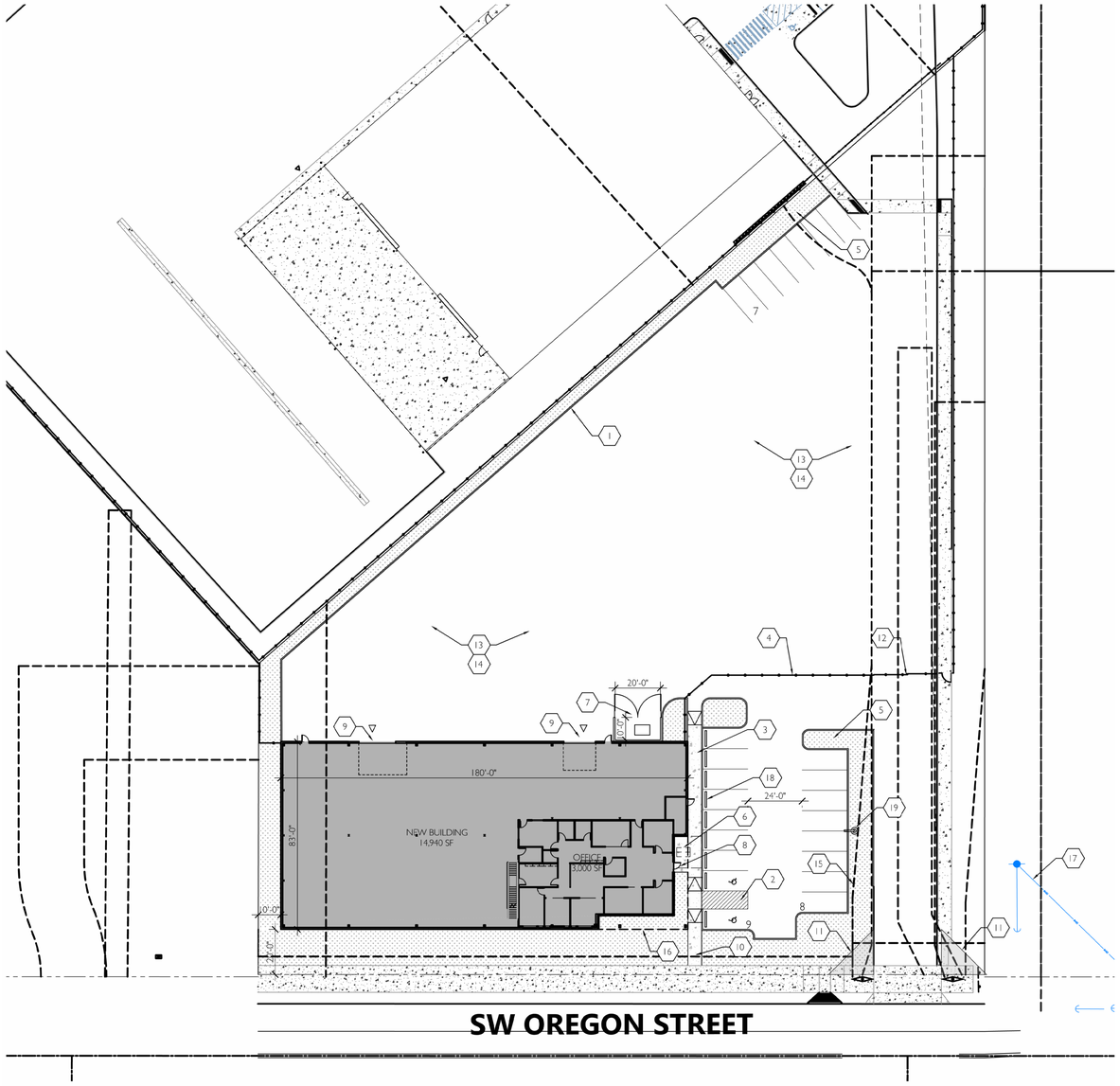
SITE TRANSPORTATION PLAN

AT0.1

JOB NO. 250139.01

©2023 CIDA, P.C./CIDA ALL RIGHTS RESERVED

C:\Users\Matthew\AppData\Local\Temp\AcPublish_13\844\SITE PLAN transportation.dwg Aug 01, 2025 - 11:27am



NORTH

1 A0.1

SITE PLAN

SCALE: 1"= 30'-0"

KEYNOTES

1. CONCRETE CURB
2. ACCESS STRIPING
3. CONCRETE SIDEWALK
4. 6'-0" HIGH BLACK VINYL COATED CHAINLINK FENCE, WITH BLACK SLATS
5. LANDSCAPE AREA
6. BIKE PARKING - 2 STALLS -- 24"x6' CLR EACH, W/ 5' MANEUVERING 1 SIDE
7. TRASH ENCLOSURE W/ SCREENED CHAIN-LINK FENCING AND GATES
8. PRIMARY BUILDING ENTRANCE
9. DRIVE-IN OVERHEAD DOORS
10. ACCESSIBLE ROUTE FROM PUBLIC RIGHT OF WAY
11. 20'x20' CLEAR VISION TRIANGLE
12. SLIDING GATE, WIDTH OF DRIVE
13. ASPHALT PAVEMENT PER CIVIL DOCUMENTS
14. EXTERIOR STORAGE AREA
15. EXISTING ACCESS AND UTILITY EASEMENTS
16. CANOPY ABOVE
17. EXISTING OVERHEAD POWERLINE
18. CONCRETE WHEEL STOPS
19. LIGHT POLE

SITE INFORMATION

TAX LOT:	2S129DC01600
ADDRESS:	TBD OREGON STREET
	SHERWOOD, OR
SITE AREA:	2.00 ACRES
BUILDING AREA:	14,940 SF (ROOF) 14,506 (FOOTPRINT)
OFFICE:	3,000 SF
STORAGE MEZZ:	3,000 SF
WAREHOUSE:	10,916 SF
TOTAL:	16,916 SF

PARKING PROVIDED:

TYPE	SIZE	# PROVIDED
STANDARD	9' X 20'	22 STALLS
COMPACT	8' X 18'	0 STALLS
H/C ACCESSIBLE	9' X 20"	2 STALLS
TOTAL PROVIDED PARKING:		24 STALLS

LEGEND

- HANDICAP PARKING STALL
- FIRE HYDRANT
- DRIVE-IN OVERHEAD DOOR
- LANDSCAPING
- CONCRETE

Owner: JBMAC VENTURES LLC
Applicant: CIDA Inc - Matthew Bridegroom

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUED DATE
04/30/25 PRE-APP
08/01/25 LAND USE
08/27/25 APPRAISAL SET

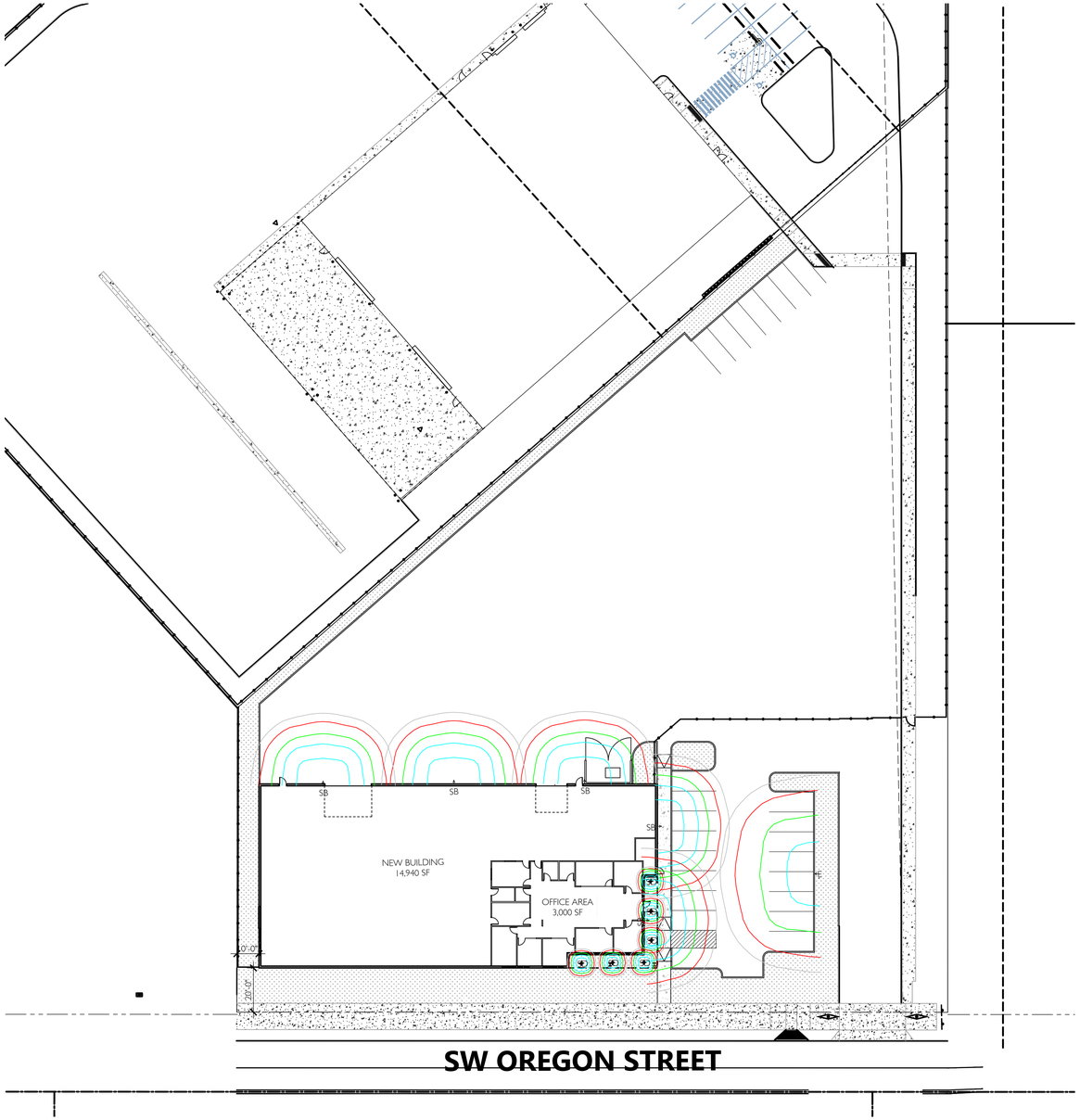
CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR:
GH McCULLOCH
SHERWOOD, OR

SITE PLAN
A0.1
JOB NO. 250139.01

©2023 CIDA, P.C./CIDA ALL RIGHTS RESERVED

Esubset#25019101 - GH McCulloch\01-Current\CAD\A0.1 SCHEMATIC SITE PLAN GH-P.dwg Nov 04, 2025 - 2:49pm



NORTH

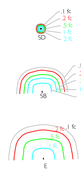
1 AL0.1 **SITE LIGHTING PLAN**

SCALE: 1"= 30'-0"

GENERAL NOTES

- CONTRACTOR SHALL VERIFY AND CONFIRM EXISTING CONDITIONS SHOWN OR IMPLIED ON DRAWINGS PRIOR TO START OF CONSTRUCTION. NOTIFY ENGINEER OF ANY DISCREPANCIES.
- SITE LIGHTING IS DIAGRAMMATIC. FINAL DESIGN SHALL BE BY ELECTRICAL CONTRACTOR.
- ISOLUMS SHOWN ILLUSTRATE APPROXIMATE .5 FC RING IN PARKING AND ACCESSIBLE AREAS
- LIGHTING STANDARDS SHOWN IN PARKING AREAS SHALL BE ENCASED IN 1'-6" DIAMETER x 3'-0" TALL SOLID CONCRETE BASES
- ALL LIGHTING SHOWN SHALL BE MODIFIED WITH CUTOFF FIXTURES AS REQUIRED TO PREVENT LIGHT FROM SHINNING DIRECTLY OFF DEVELOPED AREA.
- FIXTURES AND POLES SHALL BE DARK BRONZE ANODIZED

LEGEND



SD HALO HC6 LED DOWNLIGHT CANOPY MOUNTED LIGHT FIXTURE @ 11'-0" A.F.F.

SB LITHONIA WALL PACK 40K LED PDBXD BUILDING MOUNTED @ 22'-6" A.F.F.

E LIGHT POLE MOUNTED LIGHT - 25' HIGH POLE

Owner: JBMAC VENTURES LLC
Applicant: CIDA Inc - Matthew Bridegroom

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUED DATE	
04/30/25	PRE-APP
08/01/25	LAND USE

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR:
GH McCULLOCH
SHERWOOD, OR

SITE LIGHTING

AL0.1

JOB NO. 250139.01

©2023 CIDA, P.C./CIDA ALL RIGHTS RESERVED

C:\Users\Matthew\AppData\Local\Temp\AcPublish_11164\SITE LIGHTING PLAN.dwg, Aug 01, 2025 - 11:31am

NORTH

1
AU0.1

SURROUNDING USES

SCALE: 1"= 100'-0"

Owner: JBMAC VENTURES LLC
Applicant: CIDA Inc - Matthew Bridegroom

LEGEND

- LIGHT INDUSTRIAL (LI)
- LIGHT INDUSTRIAL PUD (LI PUD)
- MEDIUM DENSITY RESIDENTIAL LOW (MDR)
- MEDIUM DENSITY RESIDENTIAL LOW PUD (MDR PUD)
- LOW DENSITY RESIDENTIAL (LDR)

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUED DATE	
04/30/25	PRE-APP
08/01/25	LAND USE

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR:
GH McCULLOCH
SHERWOOD, OR

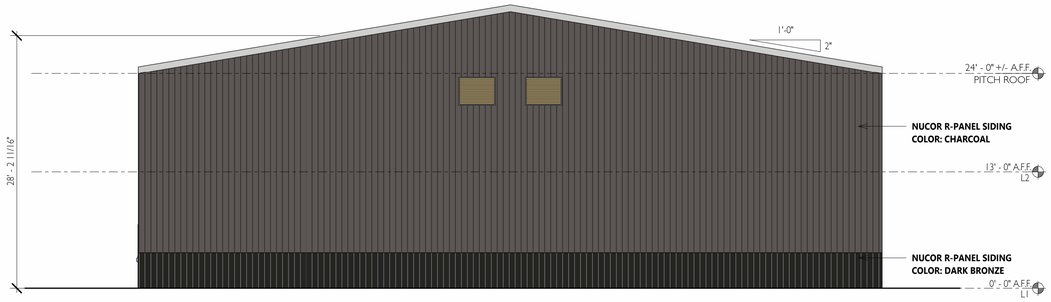
SURROUNDING USES

AU0.1

JOB NO. 250139.01

©2023 CIDA, P.C./CIDA ALL RIGHTS RESERVED

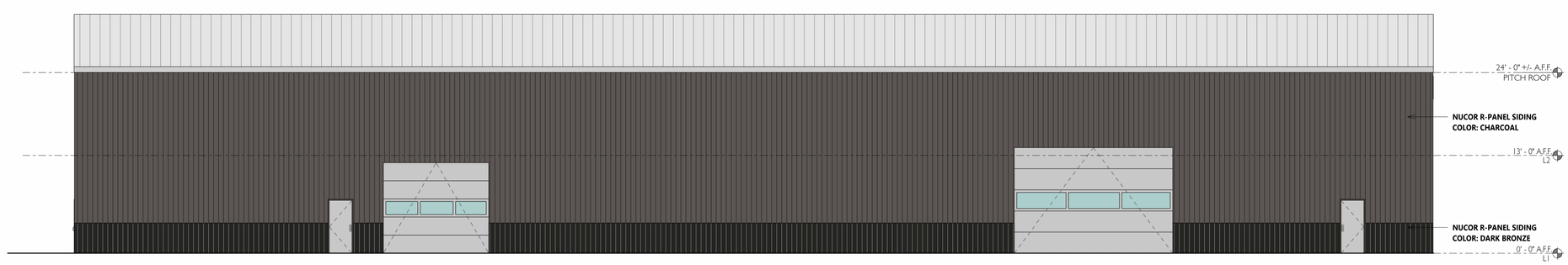
C:\Users\Matthew\AppData\Local\Temp\Acrobat_1\1354495\TE PLAN surrounding uses.dwg Aug 01, 2025 - 11:31am



1 AE0.1 **WEST**
1/8" = 1'-0"

2 AE0.1 **EAST**
1/8" = 1'-0"

3 AE0.1 **SOUTH**
1/8" = 1'-0"



4 AE0.1 **NORTH**
1/8" = 1'-0"

11/5/2025 9:19:40 AM

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUE DATE

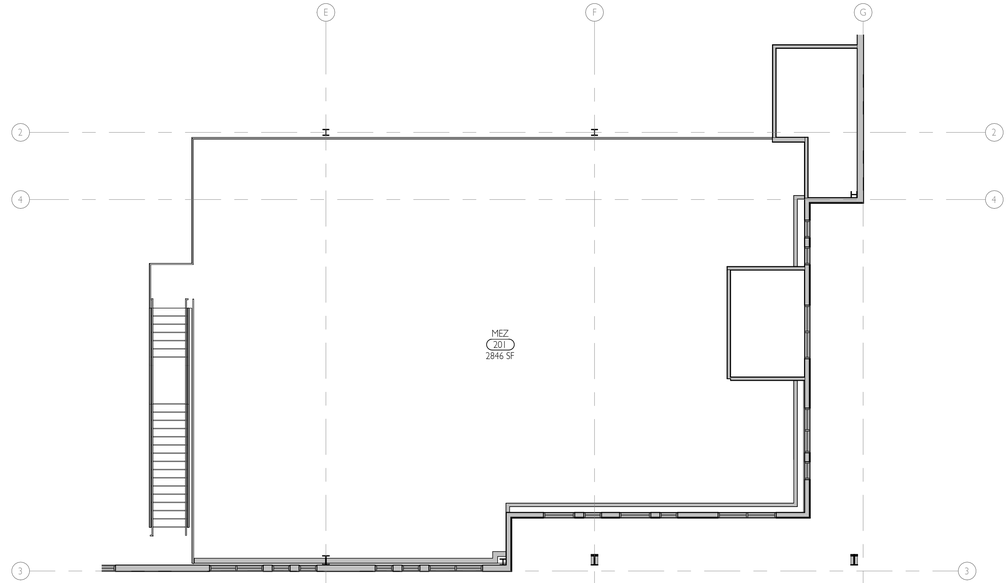
1	PRE-APP	04/30/2025
2	LAND USE	08/01/2025

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR
GH McCULLOCH
TBD, OREGON ST, SHERWOOD, OR 97140

ELEVATIONS
AE0.1
250139.01

©2025 CIDA, P.C./CIDA ALL RIGHTS RESERVED



2 AP0.1 **MEZZANINE**
1/8" = 1'-0"

1 AP0.1 **FIRST FLOOR**
1/8" = 1'-0"

10/23/2025 3:08:19 PM

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUE DATE

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR
GH McCULLOCH
TBD, OREGON ST, SHERWOOD, OR 97140

FLOOR PLANS
AP0.1
250139.01

©2025 CIDA, P.C./CIDA ALL RIGHTS RESERVED

700 NE Multnomah Street, Suite 190
Portland, OR 97232
Phone (503) 230-8488 Fax (503) 296-5869

WFG National Title Insurance Company
Trevor Cheyne
700 NE Multnomah Street, Suite 190
Portland, OR 97232

Date Prepared: May 20, 2025

SECOND SUPPLEMENTAL PRELIMINARY TITLE REPORT

Order Number: **25-138033**
Escrow Officer: Trevor Cheyne
Phone: (503) 444-7047
Fax: (503) 296-5869
Email: tcheyne@wfgtitle.com

Seller(s): **JBMAC Ventures, LLC, an Oregon limited liability company**
Buyer(s): **MB Family Properties LLC**

Property: **14843 SW Oregon Street, Sherwood, OR 97140**

The following items have been amended:
Effective date changed; Deleted Exception No. 7; Added Exceptions 24 and 25

WFG National Title Insurance Company, is prepared to issue a title insurance policy, as of the effective date and in the form and amount shown on Schedule A, subject to the conditions, stipulations and exclusions from coverage appearing in the policy form and subject to the exceptions shown on Schedule B. This Report (and any Amendments) is preliminary to and issued solely for the purpose of facilitating the issuance of a policy of title insurance at the time the real estate transaction in question is closed and no liability is assumed in the Report. The Report shall become null and void unless a policy is issued and the full premium paid.

This report is for the exclusive use of the person to whom it is addressed. Title insurance is conditioned on recordation of satisfactory instruments that establish the interests of the parties to be insured; until such recordation, the Company may cancel or revise this report for any reason.

SCHEDULE A

1. The effective date of this preliminary title report is **8:00 A.M.** on **14th day of May, 2025**
2. The policies and endorsements to be insured and the related charges are:

Policy/Endorsement Description	Liability		Charge
ALTA 2021 Owners Policy	**$1,350,000.00**		**$2,625.00**
Basic Owner's Rate		**$2,625.00**	
OTIRO 110 Domestic Partners		**$0.00**	

Proposed Insured: MB Family Properties LLC

Policy/Endorsement Description	Liability		Charge
ALTA 2021 Ext. Loan Policy	**TBD**		**$100.00**
Basic Loan Rate		**$0.00**	
OTIRO 209.10 and 222 Commercial		**$100.00**	

Proposed Insured: To Follow

This is a preliminary billing only, a consolidated statement of charges, credits and advances, if any, in connection with this order will be provided at closing.

3. Title to the land described herein is vested in:

   JBMAC Ventures, LLC, an Oregon limited liability company

4. The estate or interest in land is:

   Fee Simple

5. The land referred to in this report is described as follows:

   SEE ATTACHED EXHIBIT “A” ATTACHED HERETO AND MADE A PART HEREOF

EXHIBIT “A”
LEGAL DESCRIPTION

Parcel 1, Partition Plat No. 2023-018 in the City of Sherwood, County of Washington and State of Oregon.

TOGETHER WITH non-exclusive Easement for Ingress and Egress as described in Access Easement and Joint Maintenance Agreement recorded July 15, 2010, Recording No. 2010-053595.

SCHEDULE B

GENERAL EXCEPTIONS

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the public records.

2. Facts, rights, interests or claims which are not shown by the public records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.

3. Easements, or claims of easement, not shown by the public records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.

4. Any encroachment (of existing improvements located on the subject land onto adjoining land or of existing improvements located on adjoining land onto the subject land), encumbrance, violation, variation, or adverse circumstance affecting the title that would be disclosed by an accurate and complete land survey of the subject land.

5. Any lien, or right to a lien, for services, labor, material, equipment rental or workers compensation heretofore or hereafter furnished, imposed by law and not shown by the public records.

SPECIAL EXCEPTIONS

6. Possible Easement as disclosed by instrument, including the terms and provisions thereof:
   For : Electric Transmission lines, and appurtenances with rights
   to"danger trees"
   Granted to : Portland General Electric Company, an Oregon Corporation
   Recorded : June 12, 1959
   Recording No(s) : (book) 418 (page) 678
   Affects : the East 12.5 feet of premises as disclosed by DRG EB 4071
   attached to document.

   Also, delineated on Partition Plat No. 2023-018.

7. Intentionally Deleted.

8. Prospective Purchase Agreement, including the terms and provisions thereof with ground water restrictions, land use restrictions and Easement for right of entry:

Between	:	Oregon Department of Environmental Quality
And	:	Pacific III, LLC
Recorded	:	March 19, 2002
Recording No.	:	2002-032053

   As amended or modified by Easement and Equitable Servitude, including ghe terms and provisions thereof:

Recorded	:	April 3, 2008
Recording No.	:	2008-029679

9. Easement, including the terms and provisions thereof:

For	:	Private Access and Utility
Recorded	:	September 24, 2002
Recording No(s)	:	2002-111387
Affects	:	a portion of the premises herein - also delineated on the Partition Plat 2003-030 and 2023-018 with possible maintenance provisions included..

10. Easement, including the terms and provisions thereof:

For	:	Private Access and Utility Easement
Recorded	:	September 24, 2002
Recording No(s)	:	2002-111388
Affects	:	a portion of the premises herein - also delineated on the Partition Plat 2003-030 and 2023-018 with possible maintenance provisions included..

11. Access Easement and Maintenance Agreement, including the terms and provisions thereof:

For	:	reciprocal easement to be used for ingress, egress and utility purposes
To	:	owner of Tax Lot 600 in the Southeast quarter of Section 29 T2S, R1W and the general public at large
Recorded	:	July 15, 2010
Recording No(s)	:	2010-053593

(Affects Parcel I, Partition Plat No. 2003-030 for the benefit of 2S129D 0602)
Also, delineated on Partition Plat No. 2023-018.

12. Access Easement and Maintenance Agreement, including the terms and provisions thereof:

For	:	reciprocal easement to be used for ingress, egress and utility purposes
To	:	Owner of Tax Lot 602 in the Southeast quarter of Section 29 T2S R1W and the general public at large
Recorded	:	July 15, 2010
Recording No(s)	:	2010-053594

(Affects Parcel I, Partition Plat No. 2003-030 for the benefit of 2S129D 0602)
Also, delineated on Partition Plat No. 2023-018.

13. Terms and provisions of Access Easement and Joint Maintenance Agreement::

For	:	ingress and egress
Between	:	Sherwood Oaks Care Facility, LLC, an Oregon limited liability company
And	:	Pacific III, LLC, an Oregon limited liability company and general public at large
Recorded	:	July 15, 2010
Recording No(s)	:	2010-053595

14. Covenants, Conditions, Restrictions & Easements, including the terms and provisions thereof, as shown on the recorded Partition Plat No. 2023-018.

15. Easement, including the terms and provisions thereof:

For	:	Utility
Granted to	:	Portland General Electric Company
Recorded	:	October 24, 2023
Recording No(s)	:	2023-044192

16. Easement, including the terms and provisions thereof:

For	:	Sanitary Sewer
Granted to	:	City of Sherwood
Recorded	:	January 19, 2024
Recording No(s)	:	2024-002882

17. Easement, including the terms and provisions thereof:

For	:	Public Access
Granted to	:	City of Sherwood
Recorded	:	January 19, 2024
Recording No(s)	:	2024-002883

18. Easement, including the terms and provisions thereof:

For	:	Public Utility
Granted to	:	City of Sherwood
Recorded	:	January 19, 2024
Recording No(s)	:	2024-002884

19. City liens, if any, of the City of Sherwood. No search as property is Vacant Land.

20. Trust Deed, including the terms and provisions thereof to secure the amount noted below and other amounts secured thereunder, if any:

Grantor	:	JBMAC Ventures, LLC
Trustee	:	Moran P. Kevin and at Law Attorney
Beneficiary	:	Heritage Bank
Dated	:	June 28, 2021
Recorded	:	July 2, 2021
Recording No(s)	:	2021-075183
Amount	:	$800,000.00

Affects additional property

As amended and/or modified by instrument:

Recorded	:	July 11, 2024
Recording No(s)	:	2024-029865

21. The requirement that a copy of the Operating Agreement of JBMAC Ventures, LLC,, an Oregon limited liability company be submitted to us for examination. Any conveyance or encumbrance by said Company should be executed in accordance with the Operating Agreement of said Company.

22. Parties in possession, or claiming to be in possession, other than the vestees shown herein. For the purposes of ALTA Extended coverage, we will require an Affidavit of Possession be completed and returned to us. Exception may be taken to such matters as may be shown thereby.

23. Statutory liens for labor or materials, including liens for contributions due to the State of Oregon for unemployment compensation and for workmen's compensation, which have now gained or hereafter may gain priority over the lien of the insured mortgage where no notice of such liens appear of record.

24. Trust Deed, including the terms and provisions thereof to secure the amount noted below and other amounts secured thereunder, if any:

Grantor	:	JBMAC Ventures, LLC, an Oregon limited liablity company
Trustee	:	Kevin P. Moran, Attorney at Law
Beneficiary	:	Heritage Bank
Dated	:	May 6, 2025
Recorded	:	May 13, 2025
Recording No(s)	:	2025-020980
Amount	:	$525,000.00

25. Assignment of Leases and Rents, including the terms and provisions thereof:

To	:	Heritage Bank
Recorded	:	May 13, 2025
Recording No(s)	:	2025-020981

Given as additional security for the Trust Deed recorded May 13, 2025 as Recording No(s) 2025-020980.

END OF EXCEPTIONS

NOTE: Taxes paid in full for 2024-2025

Levied Amount	:	$10,041.62
Property ID No.	:	R2229066
Levy Code	:	088.52

Map Tax Lot No. : 2S129DC01600

NOTE: In no event shall WFG National Title Insurance Company have any liability for the tax assessor's imposition of any additional assessments for omitted taxes unless such taxes have been added to the tax roll and constitute liens on the property as of the date of closing. Otherwise, such omitted taxes shall be the sole, joint and several responsibility of seller(s) and buyer(s), as they may determine between themselves.

NOTE: The requirement that a copy of the Operating Agreement of MB Family Properties LLC, an Oregon limited liability company be submitted to us for examination. Any conveyance or encumbrance by said Company should be executed in accordance with the Operating Agreement of said Company.

NOTE: We find NO judgments or Federal Tax Liens against the name(s) of MB Family Properties LLC.

NOTE: The Oregon Corporation Commission disclosed that JBMAC Ventures, LLC, is an active Oregon limited liability company:

Filed	:	April 13, 2021
Member	:	Jim Bayne
Member	:	Brooks Bayne
Registered Agent	:	DCA Administrative Services, LLC

NOTE: The Oregon Corporation Commission disclosed that MB Family Properties LLC, is an active Oregon limited liability company:

Filed	:	June 6, 2024
Manager	:	Ryan Barker
Manager	:	Grant McCulloch IV
Registered Agent	:	Watkinson Laird Rubenstein, P.C.

NOTE: The following is incorporated herein for information purposes only and is not part of the exception from coverage (Schedule B-II of the prelim and Schedule B of the policy):The following instrument(s), affecting said property, is (are) the last instrument(s) conveying subject property filed for record within 24 months of the effective date of this preliminary title report:

None of Record

NOTE: Links for additional supporting documents:

Vesting Deed
Assessor map
Aerial map

NOTE: Due to current conflicts or potential conflicts between state and federal law, which conflicts may extend to local law, regarding marijuana, if the transaction to be insured involves property which is currently used or is to be used in connection with a marijuana enterprise, including but not limited to the cultivation, storage, distribution, transport, manufacture, or sale of marijuana and/or products containing marijuana, the Company declines to close or insure the transaction, and this Preliminary Title Report shall automatically be considered null and void and of no force and effect.

NOTE: The following applicable recording fees will be charged by the county:

Multnomah County-First Page	$86.00
Washington County-First Page	$81.00
Clackamas County-First Page	$93.00
Each Additional Page	$ 5.00
Non-standard Document Fee	$20.00
E-recording Fee	$ 3.00

Washington County Ordinance No. 193, recorded May 13, 1977 in Washington County, Oregon imposes a tax of $1.00 per $1,000.00 or fraction thereof on the transfer of real property located within Washington County.

NOTE: IMPORTANT INFORMATION REGARDING PROPERTY TAX PAYMENTS

Fiscal Year:	July 1st through June 30th
Taxes become a lien on real property, but are not yet payable.	July 1st
Taxes become certified and payable (approximately on this date)	October 15th
First one third payment of taxes are due	November 15th
Second one third payment of taxes are due	February 15th
Final payment of taxes are due	May 15th

Discounts: If two thirds are paid by November 15th, a 2% discount will apply.

If the full amount of the taxes are paid by November 15th, a 3% discount will apply.

Interest: Interest accrues as of the 15th of each month based on any amount that is unpaid by the due date. No interest is charged if the minimum amount is paid according to the above mentioned payment schedule.

NOTE: THE FOLLOWING NOTICE IS REQUIRED BY STATE LAW: YOU WILL BE REVIEWING, APPROVING AND SIGNING IMPORTANT DOCUMENTS AT CLOSING. LEGAL CONSEQUENCES FOLLOW FROM THE SELECTION AND USE OF THESE DOCUMENTS. YOU MAY CONSULT AN ATTORNEY ABOUT THESE DOCUMENTS. YOU SHOULD CONSULT AN ATTORNEY IF YOU HAVE QUESTIONS OR CONCERNS ABOUT THE TRANSACTION OR ABOUT THESE DOCUMENTS. IF YOU WISH TO REVIEW TRANSACTION DOCUMENTS THAT YOU HAVE NOT SEEN, CONTACT THE ESCROW AGENT.

End of Report

Your Escrow Officer
Trevor Cheyne
WFG National Title Insurance Company
700 NE Multnomah Street, Suite 190
Portland, OR 97232
Phone: **(503) 444-7047**
Fax: **(503) 296-5869**
Email: **TeamTrevor@wfgnationaltitle.com**

Your Title Officer
Tammera Appel
WFG National Title Insurance Company
12909 SW 68th Pkwy., Suite 350
Portland, OR 97223
Phone: **(503) 431-8513**
Fax:
Email: **tappel@wfgnationaltitle.com**

WFG National Title Insurance Company
a Williston Financial Group company

WFG National Title Insurance Company is prepared to issue, as of the date specified in the attached Preliminary Title Report (the Report), a policy or policies of title insurance as listed in the Report and describing the land and the estate or interest set forth, insuring against loss which may be sustained by reason of any defect, lien or encumbrance not shown or referred to as a General or Specific Exception or not excluded from coverage pursuant to the printed Exclusions and Conditions of the policy form(s).

The printed General Exceptions and Exclusions from the coverage of the policy or policies are listed in Exhibit One to the Report. In addition, the forms of the policy or policies to be issued may contain certain contract clauses, including an arbitration clause, which could affect the party's rights. Copies of the policy forms should be read. They are available from the office which issued the Report.

The Report (and any amendments) is preliminary to and issued solely for the purpose of facilitating the issuance of a policy of title insurance at the time the real estate transaction in question is closed and no liability is assumed in the Report.

The policy(s) of title insurance to be issued will be policy(s) of WFG National Title Insurance Company.

Please read the Specific Exceptions shown in the Report and the General Exceptions and Exclusions listed in Exhibit One carefully. The list of Specific and General Exceptions and Exclusions are meant to provide you with notice of matters which are not covered under the terms of the title insurance policy to be issued and should be read and carefully considered.

It is important to note that the Report is not an abstract of title, a written representation as to the complete condition of the title of the property in question, and may not list all liens, defects and encumbrances affecting title to the land.

The Report is for the exclusive use of the parties to this transaction, and the Company does not have any liability to any third parties or any liability under the terms of the policy(s) to be issued until the full premium is paid. Until all necessary documents are recorded in the public record, the Company reserves the right to amend the Report.

Countersigned

Exhibit One
2006 American Land Title Association Loan Policy 6-17-06
EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions, or location of any improvement erected on the Land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed, or agreed to by the Insured Claimant;
   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 13, or 14); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law.
6. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in Covered Risk 13(b) of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the Insured Mortgage in the Public Records. This Exclusion does not modify or limit the coverage provided under Covered Risk 11(b).

THE ABOVE POLICY FORM MAY BE ISSUED TO AFFORD EITHER Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

SCHEDULE B - GENERAL EXCEPTIONS FROM COVERAGE

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the public records.
2. Facts, rights, interests or claims which are not shown by the public records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easement, not shown by the public records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.
4. Any encroachment (of existing improvements located on the subject land onto adjoining land or of existing improvements located on adjoining land onto the subject land), encumbrance, violation, variation, or adverse circumstance affecting the title that would be disclosed by an accurate and complete land survey of the subject land.
5. Any lien, or right to a lien, for services, labor, material, equipment rental or workers compensation heretofore or hereafter furnished, imposed by law and not shown by the public records.

2006 AMERICAN LAND TITLE ASSOCIATION OWNER'S POLICY 6-17-06
EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions, or location of any improvement erected on the Land;
   (iii) the subdivision of land; or
   (iv) environmental protection;
   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.
   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed, or agreed to by the Insured Claimant;
   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 and 10; or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.
4. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction vesting the Title as shown in Schedule A, is
   (a) a fraudulent conveyance or fraudulent transfer; or
   (b) a preferential transfer for any reason not stated in Covered Risk 9 of this policy.
5. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

SCHEDULE B - GENERAL EXCEPTIONS FROM COVERAGE

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records; proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the public records.
2, Facts, rights, interests or claims which are not shown by the public records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.
3. Easements, or claims of easement, not shown by the public records; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.
4. Any encroachment (of existing improvements located on the subject land onto adjoining land or of existing improvements located on adjoining land onto the subject land), encumbrance, violation, variation, or adverse circumstance affecting the title that would be disclosed by an accurate and complete land survey of the subject land.

Any lien, or right to a lien, for services, labor, material, equipment rental or workers compensation heretofore or hereafter furnished, imposed by law and not shown by the public records.

Williston Financial Group Privacy Notice

Williston Financial Group LLC, WFG National Title Insurance Company, and each of the affiliates listed below (collectively "WFG" or the "WFG Family") believe it is important to protect your privacy and confidences. We recognize and respect the privacy expectations of our customers. We believe that making you aware of how we collect information about you, how we use that information, and with whom we share that information will form the basis for a relationship of trust between us. This Privacy Notice provides that explanation. We reserve the right to change this Privacy Notice from time to time.

WFG's primary business is providing appraisal, title insurance, and escrow services for the sale or refinance of real property. This can be a complicated process involving multiple parties, many of whom have been selected by our customers, each filling a specialized role. In part, you have hired WFG to coordinate and smooth the passage of the information necessary for an efficient settlement or closing.

In the course of this process, WFG collects a significant amount of personal and identifying information about the parties to a transaction, including sensitive items that include but are not limited to: your contact information, including email addresses, Social Security numbers, driver's license, and other identification numbers and information; financial, bank and insurance information; information about past and proposed mortgages and loans; information about properties you currently or previously owned; your mortgage application package; and the cookie, IP address, and other information captured automatically by computer systems.

Much of this information is gathered from searches of public land, tax, court and credit records to make certain that any liens, challenges or title defects are addressed properly. Some of the information that is collected is provided by you or the computer systems you use. We also may receive information from real estate brokers and agents, mortgage brokers and lenders, and others working to facilitate your transaction, as well as information from public, private or governmental databases including credit bureaus, 'no-fly' lists, and terrorist 'watch lists'.

What Information is Shared?

WFG DOES NOT SELL any of your information to non-affiliated companies for marketing or any other purpose.

However, some of the same information does get shared with persons inside and outside the WFG Family in order to facilitate and complete your transaction.

For example:

- Information, draft documents, and closing costs will pass back and forth between WFG and your mortgage broker and lender to facilitate your transaction.
- Information, including purchase agreements and amendments, will pass back and forth between WFG and the real estate agents and brokers, the mortgage brokers and lenders, the lawyers and accountants, and others involved in facilitating the transaction.
- WFG may order property searches and examinations from title searchers, abstractors and title plants.
- WFG may use third parties to obtain tax information, lien information, payoff information, and condominium or homeowners' association information.
- Third parties may be engaged to prepare documents in connection with your transaction.
- Surveys, appraisals, and inspections may be ordered.
- Within the WFG Family of companies, we may divide up the work to handle each closing in the most efficient manner possible and to meet specific legal and licensing requirements. Certain parts of your closing (for example a search or disbursement) may be handled by another division or company within the WFG Family.

- When it is time for signatures, your complete closing package may be sent to a notary, remote online notary, or notary service company who will arrange to meet with you to sign documents. The notary will, in turn, send signed copies back to us along with copies of your driver's license or other identity documents, usually by mail, UPS, Federal Express or another courier service.
- Your deed, mortgage and other documents required to perfect title will be recorded with the local recorder of deeds.
- In some cases, we use an outside service to coordinate the recording or electronic-recording of those instruments, and they will receive copies of your deeds, mortgages and other recordable documents to process, scan and send on to the recording office.
- Information within your title policy may be shared with WFG National Title Insurance Company title policy issuing agents to facilitate future financial transactions involving your property.
- Various government agencies get involved. The law requires us to provide certain information to the IRS, the U.S. Department of the Treasury, local and state tax authorities, and other regulatory and governmental agencies.
- **WFG title policy issuing agents only**: personal information provided by you may be shared with a third party for the purposes of facilitating training to obtain CE/CLE credits.

You have a choice in the selection of a mortgage broker, lender, real estate broker or agent and others that make up your 'transaction team.' Information flows to and from the members of the transaction team you have selected to facilitate an efficient transaction for you.

When WFG selects and engages a third party provider, we limit the scope of the information shared with that third party to the information reasonably necessary for that service provider to provide the requested services. With most, we have entered into agreements in which they expressly commit to maintain a WFG customer's information in strict confidence and use the information only for purposes of providing the requested services, clearing title, preventing fraud and addressing claims under our title insurance policies.

How does WFG use your Information?

We may use your personal information in a variety of ways, including but not limited to:

- Provide the products, services and title insurance you have requested, and to close and facilitate your transaction.
- Provide and use historic transaction information to facilitate future financial transactions.
- Coordinate and manage the appraisal process.
- Handle a claim or provide other services relating to your title insurance policies.
- Create, manage, and maintain your account.
- Operate and improve WFG's applications and websites, including WFG MyHome®, WFG's secure communication and transaction portal. Your information is used for access management, payment processing, site administration, internal operations, troubleshooting, data analysis, testing, research, and for statistical purposes.
- Respond to your requests, feedback or inquiries.
- Comply with laws, regulations, and other legal requirements.
- Comply with relevant industry standards and our policies, including managing WFG's risk profile through reinsurance.
- Protect and enforce your rights and the rights of other users against unlawful activity, including identity theft and fraud.
- Protect and enforce our collective rights arising under any agreements entered into between WFG and you or any other third party.
- Protect the integrity and maintain security of our applications, websites, and products.
- Operate, evaluate, and improve our business.
- Provide you with information about products, services, and promotions from WFG or third parties that may interest you.
- **WFG title policy issuing agents only**: Provide you with a training platform to obtain CE/CLE credits

How Do We Store and Protect Your Personal Information?

Although no system can guarantee the complete security of your personal information, we will use our best efforts to maintain commercially reasonable technical, organizational, and physical safeguards, consistent with applicable law, to protect your personal information and our systems and sites from malicious intrusions or hacking.

How Long Do We Keep Your Personal Information?

We keep your personal information for as long as necessary to comply with the purpose for which it was collected, our business needs, and our legal and regulatory obligations. We may store some personal information indefinitely. If we dispose of your personal information, we will do so in a way that is secure and appropriate to the nature of the information subject to disposal.

Computer Information

When you access a WFG website, or communicate with us by e-mail, we may automatically collect and store more information than you are expressly providing when you fill out a survey or send an email. This may include:

- Your IP Address.
- Your email address, your alias and, social media handles.
- The type of browser and operating system you use.
- The time of your visit.
- The pages of our site you visit.
- Cookies.

In order to provide you with customized service, we make use of Web browser cookies. Cookies are files that help us identify your computer and personalize your online experience. You may disable cookies on your computer, but you may not be able to download online documents or access certain websites unless cookies are enabled.

The technical information we collect is used for administrative and technical purposes and to prevent fraud and provide identity verification. For instance, we may use it to count the number of visitors to our website and determine the most popular pages. We may also use it to review types of technology you are using, determine which link brought you to our website, assess how our advertisements on other websites are working, help with maintenance, and improve our customers' experience.

We may compare information gathered on previous visits to verify that we are interacting with the same parties and not a potential imposter.

If we ask you to fill out any forms or surveys, we will use the information we receive only for the specific purposes indicated in those forms or surveys.

The information you and your transaction team send us in emails or attached to an email, or provide through any of our online tools, is used for purposes of providing title, escrow and appraisal management services and used for the purposes described above.

In addition to the above, if you use an eClosing platform to sign your real estate transaction additional information may be collected. This may include:

- Your IP address.
- Your location.
- Your email address and your alias.
- The type of browser and operating system you use.
- The time of your visit.
- Your biometrics.
- Your image.
- Video recording of your transaction signing.
- Transaction metadata.
- Cookies.

Links to Third Party Sites

Our Applications and Websites may contain links to third-party websites and services. Please note that these links are provided for your convenience and information, and the websites and services may operate independently from us and have their own privacy policies or notices, which we strongly suggest you review. This Privacy Notice applies to WFG's applications and websites only.

Do Not Track

Because there is not an industry-standard process or defined criteria to permit a user to opt-out of tracking their online activities ("Do Not Track"), our websites do not currently change the way they operate based upon detection of a Do Not Track or similar signal. Likewise, we cannot assure that third parties are not able to collect information about your online activities on WFG websites or applications.

Social Media Integration

Our applications, websites, and products contain links to and from social media platforms. You may choose to connect to us through a social media platform, such as Facebook, Twitter, Google, etc. When you do, we may collect from the social media platform additional information from or about you, such as your screen names, profile picture, contact information, contact list, and the profile pictures of your contacts. The social media platforms may also collect information from you.

When you click on a social plug-in, such as Facebook's "Like" button, Twitter's "tweet" button, or the Google+, that particular social network's plug-in will be activated and your browser will directly connect to that provider's servers. Your action in clicking on the social plug-in causes information to be passed to the social media platform.

We do not have control over the collection, use and sharing practices of social media platforms. We therefore encourage you to review their usage and disclosure policies and practices, including their data security practices, before using social media platforms.

How Can You "Opt-Out?"

We do not sell your information; therefore there is no need to opt-out of such reselling. Under various laws, you can opt-out of the sharing of your information for more narrow purposes. For additional detail, consult the Links under the "Legal" Notices attached below.

The "Legal" Notices

To comply with various federal and state laws, we are required to provide more complete legal notices and disclosures – see links below. The state-specific statutes referenced therein may also give residents of those states additional rights and remedies.

Privacy Notice for California Residents - https://national.wfgnationaltitle.com/privacy-notice-california

Privacy Notice for Oregon Residents - https://national.wfgnationaltitle.com/privacy-notice-oregon

How to Contact Us

If you have any questions about WFG's privacy notice or how we protect your information, please contact WFG:

- By email: Consumerprivacy@willistonfinancial.com
- By telephone: 833-451-5718
- By fax: 503-974-9596
- By mail: 12909 SW 68th Pkwy, Suite 350, Portland, OR 97223

WFG FAMILY

WILLISTON FINANCIAL GROUP LLC
WFG NATIONAL TITLE INSURANCE COMPANY
WFG LENDER SERVICES, LLC
WFGLS TITLE AGENCY OF UTAH, LLC
WFG NATIONAL TITLE COMPANY OF WASHINGTON, LLC
WFG NATIONAL TITLE COMPANY OF CALIFORNIA
WFG NATIONAL TITLE COMPANY OF TEXAS, LLC D/B/A WFG NATIONAL TITLE COMPANY
UNIVERSAL TITLE PARTNERS, LLC
VALUTRUST SOLUTIONS, LLC
MYHOME, A WILLISTON FINANCIAL GROUP COMPANY, LLC (formerly known as WILLISTON ENTERPRISE SOLUTIONS & TECHNOLOGY, LLC)
WFG NATIONAL TITLE COMPANY OF CLARK COUNTY, WA, LLC, D/B/A WFG NATIONAL TITLE

Rev 12.20.2022

FACTS	WHAT DOES WILLISTON FINANCIAL GROUP DO WITH YOUR PERSONAL INFORMATION?
Why?	Financial companies choose how they share your personal information. Federal law gives consumers the right to limit some but not all sharing. Federal law also requires us to tell you how we collect, share, and protect your personal information. Please read this notice carefully to understand what we do.
What?	The types of personal information we collect and share depend on the product or service you have with us. This information can include: • Social Security number and other government identification information • Your name, address, phone, and email • Information about the property, any liens and restrictions • Financial Information including credit history and other debt • Financial account information, including wire transfer instructions.
How?	All financial companies need to share customers' personal information to run their everyday business. In the section below, we list the reasons financial companies can share their customers' personal information; the reasons Williston Financial Group chooses to share; and whether you can limit this sharing.

Reasons we can share your personal information	Does Williston Financial Group share?	Can you limit this sharing?
For our everyday business purposes— such as to process your transactions, maintain your account(s), respond to court orders and legal investigations, or report to credit bureaus	Yes	No
For our marketing purposes— to offer our products and services to you	Yes	No
For joint marketing with other financial companies	No	We don't share
For our affiliates' everyday business purposes— information about your transactions and experiences	Yes	No
For our affiliates' everyday business purposes— information about your creditworthiness	No	We don't share
For our affiliates to market to you	No	We don't share
For nonaffiliates to market to you	No	We don't share

To limit our sharing	• Call 833-451-5718—our menu will prompt you through your choice(s) • Visit us online: http://bit.ly/WFGsConsumerPrivacyInformationRequestPage or e-mailing us at consumerprivacy@willistonfinancial.com • Mail the form below Please note: If you are a new customer, we can begin sharing your information from the date we sent this notice. When you are no longer our customer, we continue to share your information as described in this notice. However, you can contact us at any time to limit our sharing.
Questions?	Call 833-451-5718 or Email consumerprivacy@willistonfinancial.com

- - - -

Who we are	
Who is providing this notice	Williston Financial Group, LLC and its affiliates and subsidiaries as listed below:
What we do	
How does Williston Financial Group protect my personal information?	To protect your personal information from unauthorized access and use, we use security measures that comply with federal law. These measures include computer safeguards and secured files and buildings. We limit access to your information to employees that need to use the information to process or protect transaction. We take industry standard (IPSEC) measures to protect against malicious intrusions or hacking
How does Williston Financial Group collect my personal information?	We collect your personal information, for example, when you • Apply for insurance • Engage us to provide appraisal, title and escrow services • Give us your contact information • Provide your mortgage information • Show your driver's license We also collect your personal information from others, such as real estate agents and brokers, mortgage brokers, lenders, credit bureaus, affiliates, and others
Why can't I limit all sharing?	Federal law gives you the right to limit only • sharing for affiliates' everyday business purposes—information about your creditworthiness • affiliates from using your information to market to you • sharing for nonaffiliates to market to you State laws and individual companies may give you additional rights to limit sharing. See below for more on your rights under state law.
What happens when I limit sharing for an account I hold jointly with someone else?	Your choices will apply to everyone on your policy.
Definitions	
Affiliates	Companies related by common ownership or control. They can be financial and nonfinancial companies. Our affiliates include companies with a common corporate identity, including those listed below.
Nonaffiliates	Companies not related by common ownership or control. They can be financial and nonfinancial companies. Nonaffilliates we share with can include real estate agents and brokers, mortgage brokers, lenders, appraisers, abstractors and title searchers and others as appropriate to facilitate your transaction.
Joint marketing	A formal agreement between nonaffiliated financial companies that together market financial products or services to you. Williston Financial Group does not jointly market.
Other important information	
As a resident or citizen of certain states, we may have to provide additional state specific privacy notices and you may have rights other than as set forth above. The links below will provide state specific information: **Privacy Notice for California Residents** - https://national.wfgnationaltitle.com/privacy-notice-california **Privacy Notice for Oregon Residents** - https://national.wfgnationaltitle.com/privacy-notice-oregon	

Clean Water Services

SENSITIVE AREA PRE-SCREENING SITE ASSESSMENT

Clean Water Services File Number 25-001759

1. **Jurisdiction:** Sherwood

2. **Property Information** (example: 1S234AB01400)
   Tax lot ID(s): 2S129DC01600

   OR **Site Address:** n/a
   City, State, Zip: Sherwood,Oregon,97140
   Nearest cross street:

3. **Owner Information**
   Name: c/o Dirk Otis
   Company: MB Family Properties, LLC
   Address: 19363 Willamette Dr. #133
   City, State, Zip: West Linn,Oregon,97068
   Phone/fax: 503-913-7463
   Email: dirk@stratusdevelopers.com

4. **Applicant Information**
   Name: Matthew Bridegroom
   Company: CIDA Inc
   Address: 15895 SW 72nd Ave #200
   City, State, Zip: Portland,Oregon,97224
   Phone/fax: 5032261285
   Email: matthewb@cidainc.com

4. **Development Activity** (check **all** that apply)
   - ☐ Addition to single family residence (rooms, deck, garage)
   - ☐ Lot line adjustment
   - ☐ Minor land partition
   - ☐ Residential condominium
   - ☐ Commercial condominium
   - ☐ Residential subdivision
   - ☐ Commercial subdivision
   - ☒ Single lot commercial
   - ☐ Multi lot commercial

   Other

6. **Will the project involve any off-site work?** ☐ Yes ☒ No ☐ Unknown
   Location and description of off-site work:

7. **Additional comments or information that may be needed to understand your project:**

This application does NOT replace Grading and Erosion Control Permits, Connection Permits, Building Permits, Site Development Permits, DEQ 1200-C Permit or other permits as issued by the Department of Environmental Quality, Department of State Lands and/or Department of the Army COE. All required permits and approvals must be obtained and completed under applicable local, state, and federal law.

By signing this form, the Owner or Owner's authorized agent or representative, acknowledges and agrees that employees of Clean Water Services have authority to enter the project site at all reasonable times for the purpose of inspecting project site conditions and gathering information related to the project site. I certify that I am familiar with the information contained in this document, and to the best of my knowledge and belief, this information is true, complete, and accurate.

Print/type name Matthew Bridegroom Print/type title Project Architect

Signature ONLINE SUBMITTAL Date 6/27/2025

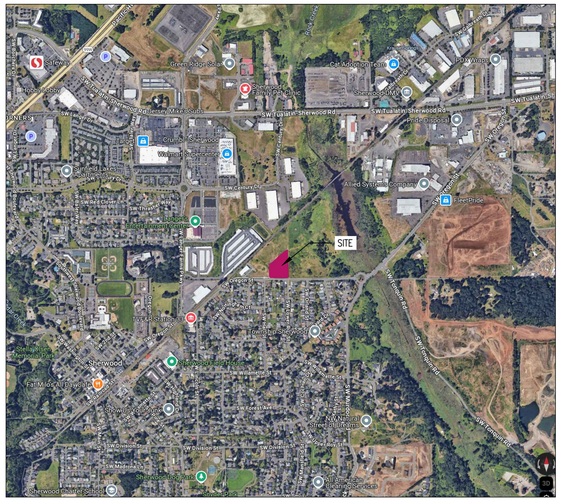
FOR DISTRICT USE ONLY

- ☐ Sensitive areas potentially exist on site or within 200' of the site. **THE APPLICANT MUST PERFORM A SITE ASSESSMENT PRIOR TO ISSUANCE OF A SERVICE PROVIDER LETTER.** If Sensitive Areas exist on the site or within 200 feet on adjacent properties, a Natural Resources Assessment Report may also be required.
- ☐ Based on review of the submitted materials and best available information sensitive areas do not appear to exist on site or within 200' of the site. This Sensitive Area Pre-Screening Site Assessment does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered. This document will serve as your Service Provider Letter as required by Resolution and Order 19-5, Section 3.02.1, as amended by Resolution and Order 19-22. All required permits and approvals must be obtained and completed under applicable local, State and federal law.
- ☐ Based on review of the submitted materials and best available information the above referenced project will not significantly impact the existing or potentially sensitive area(s) found near the site. This Sensitive Area Pre-Screening Site Assessment does NOT eliminate the need to evaluate and protect additional water quality sensitive areas if they are subsequently discovered. This document will serve as your Service Provider Letter as required by Resolution and Order 19-5, Section 3.02.1, as amended by Resolution and Order 19-22. All required permits and approvals must be obtained and completed under applicable local, state and federal law.
- ☒ **THIS SERVICE PROVIDER LETTER IS NOT VALID UNLESS** 1 **CWS APPROVED SITE PLAN(S) ARE ATTACHED.**
- ☒ The proposed activity does not meet the definition of development or the lot was platted after 9/9/95 ORS 92.040(2). **NO SITE ASSESSMENT OR SERVICE PROVIDER LETTER IS REQUIRED.**

Reviewed by Mila Gonzalez Lima Date 07/02/2025

Once complete, email to: **SPLReview@cleanwaterservices.org** • Fax: **(503) 681-4439**
OR mail to: SPL Review, Clean Water Services, 2550 SW Hillsboro Highway, Hillsboro, Oregon 97123

Revised 2/2020



VICINITY MAP - NTS

SITE INFORMATION

TAX LOT:	2S129DC01600	
ADDRESS:	TBD OREGON STREET	
	SHERWOOD, OR	
SITE AREA:	2.00 ACRES	
BUILDING AREA:		
OFFICE:		3,000 SF
STORAGE MEZZ:		3,000 SF
WAREHOUSE:		11,920 SF
TOTAL:		17,920 SF

LANDSCAPE AREA :
PROPOSED: XXXXX

PARKING PROVIDED:

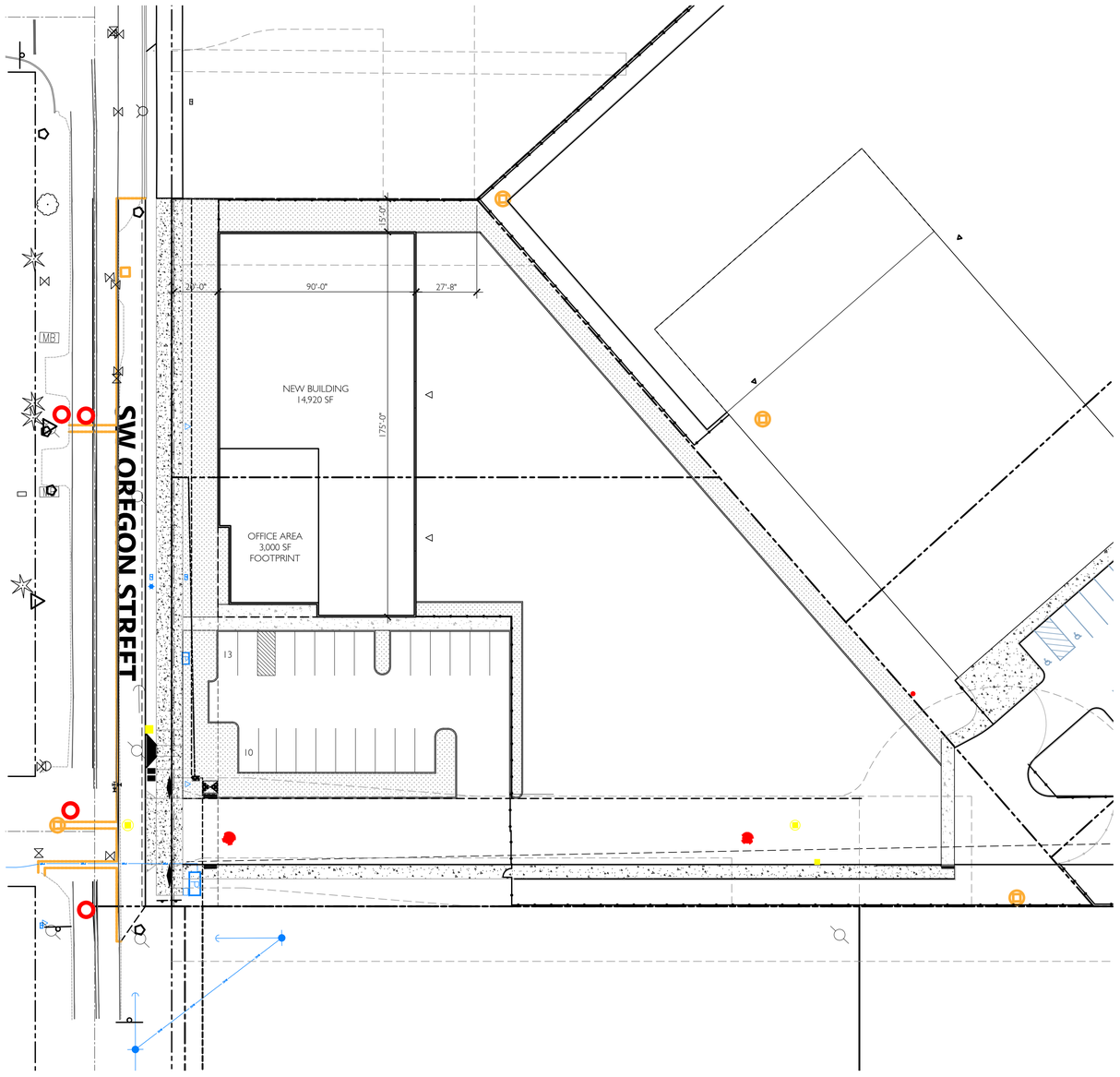
TYPE	SIZE	# PROVIDED
STANDARD	9' X 20'	16 STALLS
COMPACT	8' X 20'	5 STALLS
H/C ACCESSIBLE	9' X 20''	2 STALLS
TOTAL PROVIDED PARKING:		23 STALLS

LEGEND

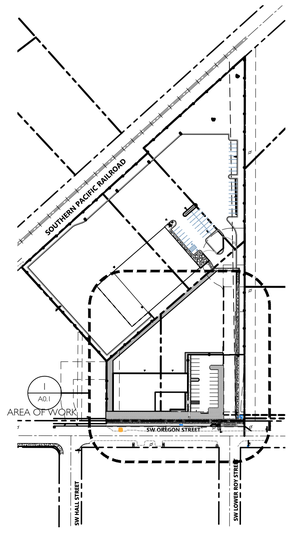
- HANDICAP PARKING STALL
- FIRE HYDRANT
- BOLLARD
- CATCH BASIN
- DRIVE-IN OVERHEAD DOOR
- DOCK-HIGH OVERHEAD DOOR

Approved by: Mila Lima
Date: 07/02/2025
Attachment _1_ of _1_
Clean Water Services

Owner: MB Family Properties, LLC
Applicant: CIDA Inc - Matthew Bridegroom



NORTH 1 A0.1 **SITE PLAN**
SCALE: 1"= 30'-0"



NORTH 2 A0.1 **OVERALL KEY PLAN**
SCALE: NOT TO SCALE

ISSUED DATE
04/30/25 Pre-App

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS

15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR:
OREGON STREET - SOUTH LOT
SHERWOOD, OR

SITE PLAN
A0.1

©2023 CIDA, P.C./CIDA ALL RIGHTS RESERVED

P★R★I★D★E
DISPOSAL COMPANY
P.O. Box 820 Sherwood, OR 97140
Phone: (503) 625-6177 Fax: (503) 625-6179

July 22, 2025

Matthew Bridegroom
CIDA
503.226.1285 x 325

Re: SW Oregon St and SW Lower Roy St

We have reviewed the site plan for the above-mentioned project. The site plan shows one enclosure on the property measuring 10' deep and 20' wide, which allows for straight on access. Enclosures are for trash and recycling containers only; no other materials shall be stored in them.

The other details on the site plan are not shown. These requirements will need to be met to ensure our access:

- The gates need to be hinged in front of the enclosure walls to allow for the full 20' width. This will also allow for the 120-degree opening angle that is required.
- There should be no center post at access point.
- The gates need cane bolts and holes put in place for the gates to be locked in the open and closed position. The holes for the gates to be held open need to be at the full 120-degree opening angle.
- There must be 25' of overhead clearance.

Any future modification to this site plan will require additional approval.

If you have any questions, feel free to contact me.

Sincerely,

Kristen Tabscott
Pride Disposal Co.
(503) 625-6177

rs

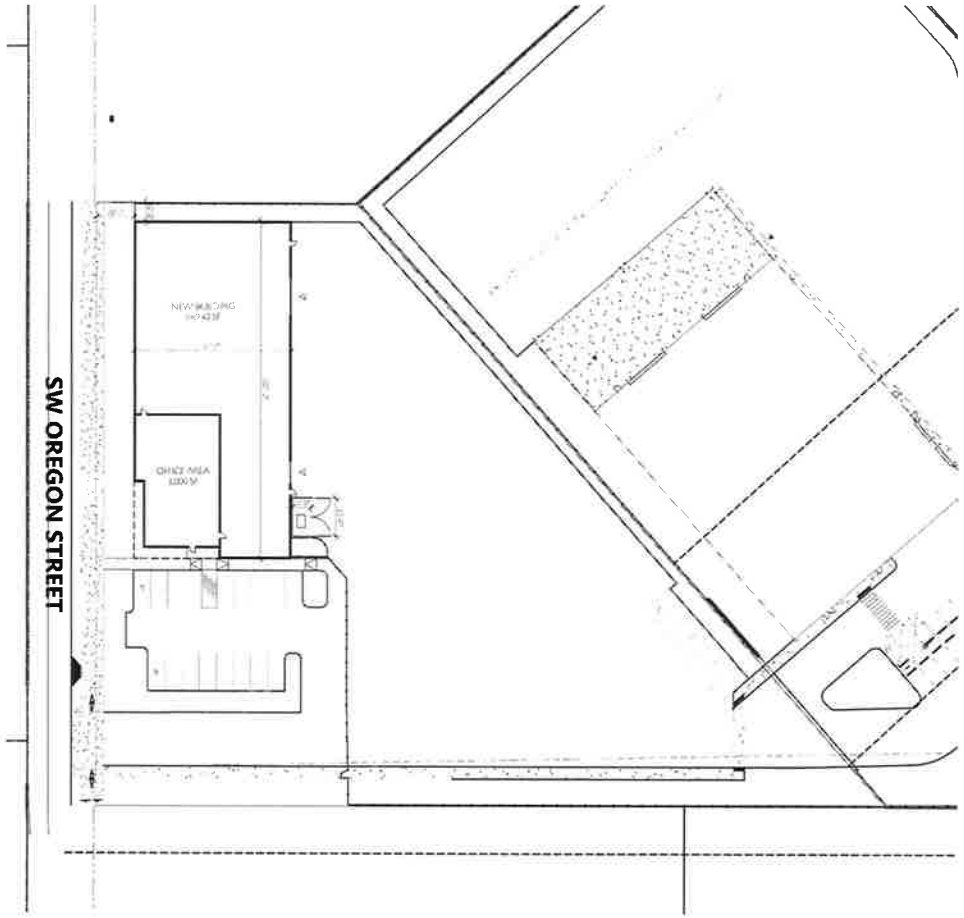
SITE INFORMATION

TAX LOT	2S 130CD 1300
ADDRESS	18170 OREGON STREET
	SHERWOOD, OR
SITE AREA	2.00 ACRES
BUILDING AREA	
OFFICE	600 SF
STORAGE	800 SF
WAREHOUSE	11,600 SF
TOTAL	13,000 SF
LANDSCAPE AREA	
TOTAL	0.0 AC
PARKING PROVIDED	
TYPE	# PROVIDED
STANDARD	9' X 20' 20 STALLS
COMPACT	8' X 18' 13 STALLS
HC ACCESSIBLE	9' X 20' 1 STALLS
TOTAL TRUCK STANDING	4 STALLS

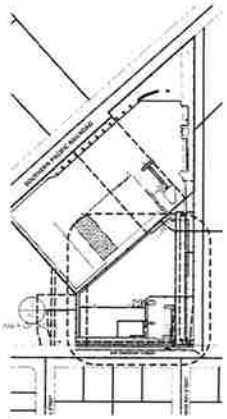
LEGEND

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

Owner: MB Family Properties, LLC
Applicant: CIDA Inc - Matthew Bridegroom



NORTH 1 A0.1 **SITE PLAN**



NORTH 2 A0.1 **OVERALL KEY PLAN**

CIDA

NEW CONSTRUCTION FOR
GH McCULLOCH
SHERWOOD, OR

SITE PLAN
A0.1

FIRE CODE / LAND USE / BUILDING REVIEW APPLICATION

Tualatin Valley Fire & Rescue

North Operating Center
11945 SW 70th Avenue
Tigard, OR 97223
Phone: 503-649-8577

South Operating Center
8445 SW Elligsen Rd
Wilsonville, OR 97070
Phone: 503-649-8577

REV 6-30-20

Project Information

Applicant Name: Matthew Bridegroom

Address: 15895 SW 72nd Avenue, Portland, OR 97224

Phone: 503-226-1285

Email: matthewb@cidainc.com

Site Address: TBD

City: Sherwood

Map & Tax Lot #: 2S129DC01600

Business Name: GH McCulloch

Land Use/Building Jurisdiction: City of Sherwood

Land Use/ Building Permit # LU 2025-008 SP GH McCulloch Industrial

Choose from: Beaverton, Tigard, Newberg, Tualatin, North Plains, West Linn, Wilsonville, Sherwood, Rivergrove, Durham, King City, Washington County, Clackamas County, Multnomah County, Yamhill County

Project Description
Approximately 15,000 SF industrial building with 3,000 SF office.

Permit/Review Type (check one):

- ☐ Land Use / Building Review - Service Provider Permit
- ☐ Emergency Radio Responder Coverage Install/Test
- ☐ LPG Tank (Greater than 2,000 gallons)
- ☐ Flammable or Combustible Liquid Tank Installation (Greater than 1,000 gallons)
  - * Exception: Underground Storage Tanks (UST) are deferred to DEQ for regulation.
- ☐ Explosives Blasting (Blasting plan is required)
- ☐ Exterior Toxic, Pyrophoric or Corrosive Gas Installation (in excess of 810 cu.ft.)
- ☐ Tents or Temporary Membrane Structures (in excess of 10,000 square feet)
- ☐ Temporary Haunted House or similar
- ☐ OLCC Cannabis Extraction License Review
- ☐ Ceremonial Fire or Bonfire (For gathering, ceremony or other assembly)

For Fire Marshal's Office Use Only

TVFR Permit # 2025-0186

Permit Type: SPP- Sherwood

Submittal Date: 10/10/2025

Assigned To: DFM Arn

Due Date: NA

Fees Due: Ø

Fees Paid: Ø

Approval/Inspection Conditions
(For Fire Marshal's Office Use Only)

This section is for application approval only

0430 10/14/2025
Fire Marshal or Designee Date

Conditions: See approved fire service plans. Fire Department connection TBD.

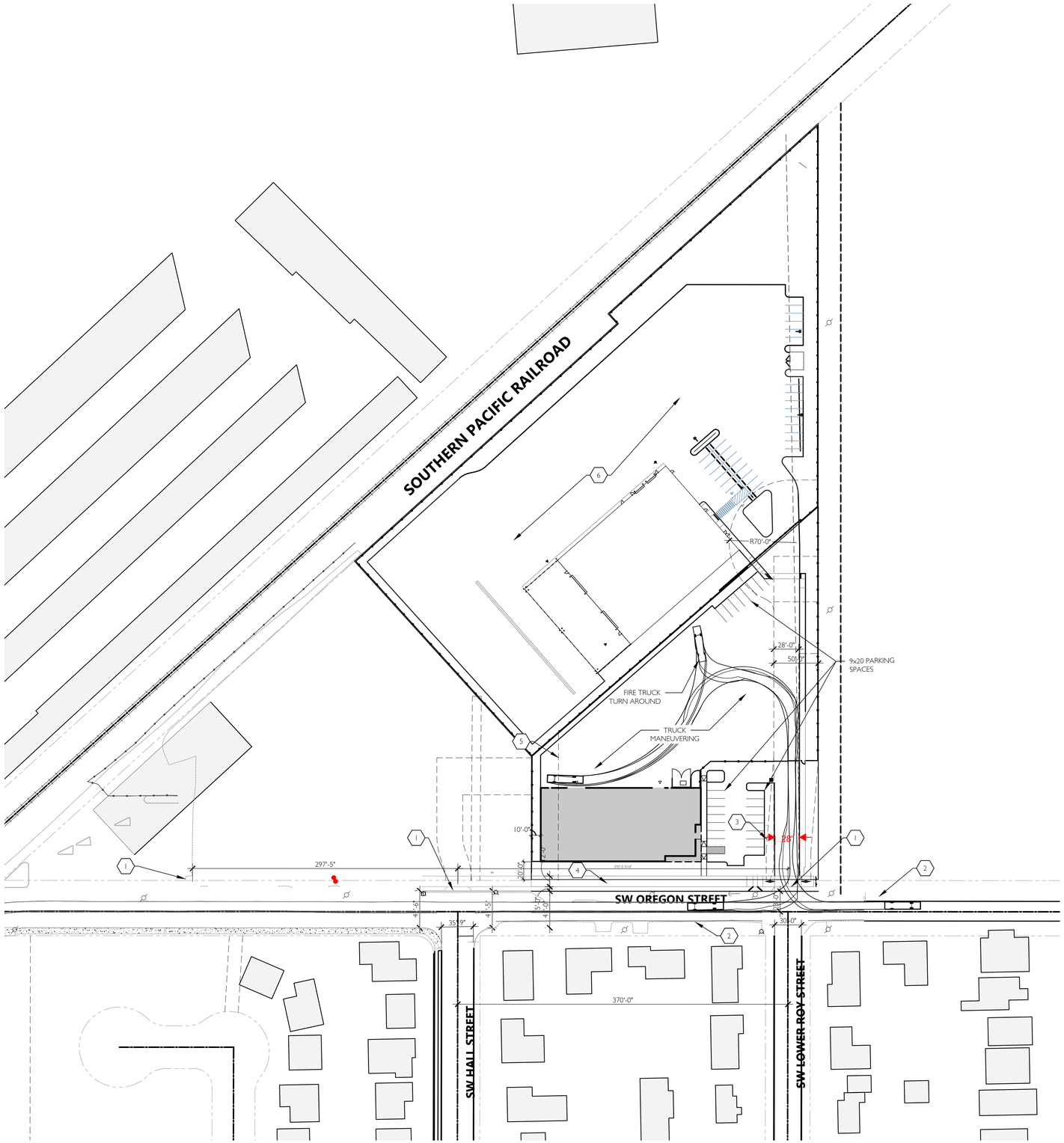
See Attached Conditions: ☐ Yes ☒ No

Site Inspection Required: ☒ Yes ☐ No

This section used when site inspection is required

Inspection Comments:

Final TVFR Approval Signature & Emp ID Date



1 TRANSPORTATION PLAN

FS-1 SCALE: 1"= 60'-0"

KEYNOTES

1. EXISTING CURB CUT
2. NO CURBS EAST OF PROPERTY OR ON SOUTH SIDE OF OREGON ST ACROSS FROM PROPERTY
3. EXISTING ACCESS EASEMENT
4. FRONTAGE ALREADY IMPROVED
5. EXISTING EASEMENT TO BE REMOVED
6. DEVELOPMENT UNDER CONSTRUCTION

TVF&R Tualatin Valley Fire & Rescue

APPROVED PLANS

APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS.

Deputy Fire Marshal II

TVF&R Permit# 2025-0186

Owner: JBMAC VENTURES LLC
Applicant: CIDA Inc - Matthew Bridegroom

FD Notes: Fire Department Connection (FDC) location to be determined (OFC 912.2).

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUED DATE	
04/30/25	PRE-APP
08/01/25	LAND USE

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS

15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR:
GH McCULLOCH
SHERWOOD, OR

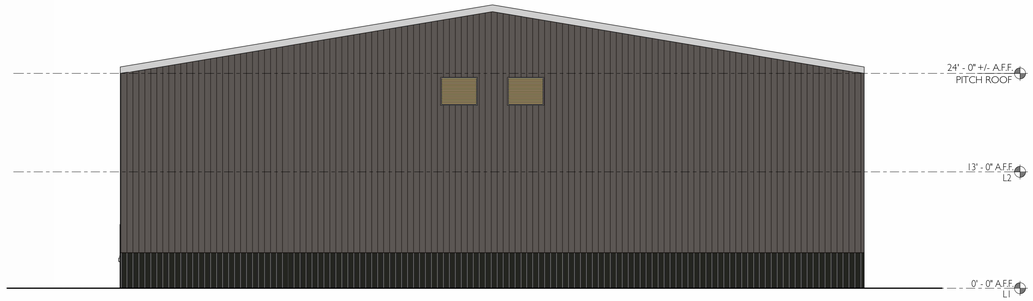
SITE TRANSPORTATION PLAN

FS-1

JOB NO. 250139.01

©2023 CIDA, P.C./CIDA . ALL RIGHTS RESERVED

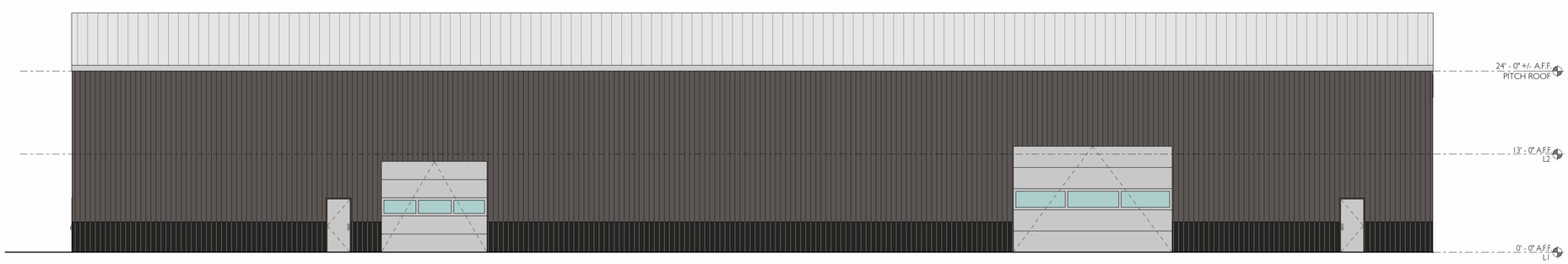
C:\Users\Plotters\AppData\Local\Temp\AcPublish_13\84693\TE PLAN transportation.dwg, Aug 01, 2025 - 11:27am



1 **WEST**
FS-2 1/8" = 1'-0"

2 **EAST**
FS-2 1/8" = 1'-0"

3 **SOUTH**
FS-2 1/8" = 1'-0"



4 **NORTH**
FS-2 1/8" = 1'-0"

TVF&R
Tualatin Valley Fire & Rescue
APPROVED PLANS
APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS
Deputy Fire Marshal II
TVF&R Permit# 2025-0186

PRELIMINARY PLAN ONLY- NOT FOR CONSTRUCTION

ISSUE DATE

1	PRE-APP	04/30/2025
2	LAND USE	08/01/2025

CIDA
ARCHITECTURE
ENGINEERING
PLANNING
INTERIORS
15895 SW 72ND AVE SUITE 200
PORTLAND, OREGON 97224
TEL: 503.226.1285
FAX: 503.226.1670
WWW.CIDAINC.COM

NEW CONSTRUCTION FOR
GH McCULLOCH
TBD, OREGON ST, SHERWOOD, OR 97140

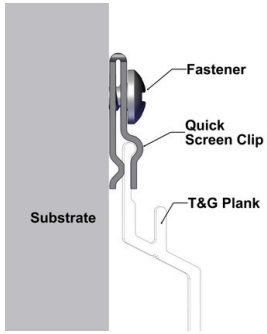
ELEVATIONS
FS-2
250139.01

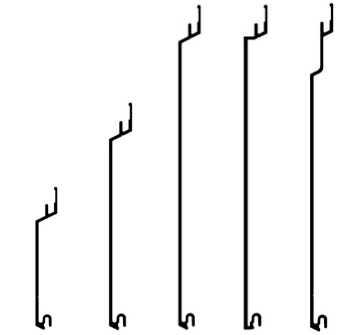
©2025 CIDA, P.C./CIDA ALL RIGHTS RESERVED

9/9/2025 10:58:31 AM

TONGUE & GROOVE
CLADDING SYSTEM

TYPICAL ISOMETRIC





PROFILES
V-Groove: 2-1/2", 4", 6"
Smooth: 6"
Channel: 6"
Standard Lengths: 24', 2-1/2"(12')
96 SQ FT/box

COMPONENTS - Standard Lengths: 12'

Traditional: Starter Strip, Back-to Back Starter Strip, 2" Corner Set, 1-3/8" Two Piece J-Track, 1-3/8" Termination Set, Compression Joint (24'), 1-1/2" Flat Reveal Set, 1-1/2" U-Reveal Set, 1-1/2" T&G U-Reveal, 2" Offset Flat Reveal

Craftsman: 7/8" J-Track, 3/4" Inside Corner, 1" Outside Corner, 3/4" U-Reveal Set, 3/4" T&G U-Reveal

Precision: 5/8" Starter J-Track, 3/16" Outside Corner, 5/8" J-Track, 5/8" Two Piece J-Track, 5/8" Termination Set, 1/2" Flat Reveal, 1/2" T&G Flat Reveal

T&G_IS_RG_V8

FINISHES
Woodgrains, solid color, naturally aged metal, custom solid color matching (additional lead times apply)

ATTACHMENT
Planks: Quick-screen clips w. #10 Pan Head screws* @ 32" o.c. (standard).
- Quick-screen Clips: Included in order for 32" o.c. spacings, purchase extra for 16" o.c. spacings. For purchase (extra): 100 pcs/Bag, 1500 pcs/Box

Trims: Hard fasten w. #10 Pan Head screws* @ 16" o.c. *Screws not included.

BIM & CAD
RVT & DWG files available, see website for details

LEAD TIME
Most Popular Finishes
-ready to ship within 1 week
Additional Finishes
-ready to ship within 14 weeks

LONGBOARD®
INSPIRING ARCHITECTURE

info@longboardproducts.com
longboardproducts.com
800 604 0343

TECHNICAL SPECIFICATIONS

PHYSICAL DATA
6063-T5 Extruded Aluminum
100% Recyclable
Warranty: Finish:15 year (standard)/20 year* (ultra) (*10 week lead time);
Aluminum: 50 year
Weight (lbs/sqft): ~1.5

TESTING
ICC-ESR 4182 Evaluation Report - Division: 07 00 00 Thermal and Moisture Protection Section: 07 46 00 - Siding

AAMA 509 Rainscreen: W1, V2

LARR - Los Angeles Department of Building Safety (LADBS) accepts ICC-ES reports as proof of compliance

Florida Product Code: FL41934

Miami Dade, Florida, Notice of Acceptance(NOA): NOA No. 22-0209.01 -Expiration Date: January 26, 2028

Impact testing: TAS 201

WUI (The Wildland-Urban Interface) – California Department of Forestry & Fire Protection Office of the State Fire Marshal Listing No. 8140-2286:0500

Fire Rating: Class A Non-Combustible by ASTM E136 & ASTM E84 ; A2-s1,d0 by EN 13501-1

Light Reflectance: 5% (Black) up to 73.2% (Ultra White)

Wind load: Up to 121 psf (5794 Pa) TAS 202, TAS 203

Finish Options

Achieve your vision.

Whether creating a space that offers the warmth and appearance of Woodgrains, or the modern industrialized look of Naturally Aged Metals, we have a finish option for you.

Require a custom finish or color? Our experienced color-matching team can make it a reality!

Contact us to confirm lead times for orders greater than 15k sq.ft in the Most Popular Finishes category.

Longboard Finish Classification

Type: Woodgrain / Solid / Metallic / Speckle / Naturally Aged Metal
Surface: Smooth / Textured
Sheen: Matte / Satin / Glossy
Performance: AAMA 2604 / AAMA 2605
Finish Warranty: 15 Year / 20 Year

Click / Scan the QR code to check our latest lead times and explore available options!

LONGBOARD®
INSPIRING ARCHITECTURE

Woodgrains

Longboard's woodgrain finishes have a slight texture with matte sheen.

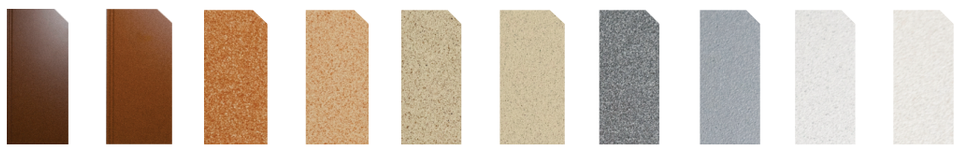
Black Oak, Burnt Cherry, Italian Rosewood, Dark Olive, Light Olive, Dark Walnut, Dark National Walnut, Light National Walnut, Table Walnut, Dark Antique Oak, National Mahogany, Western Cedar, Dark Cherry, Dark Acacia, Dark Bamboo

Dark Knotty Pine, Light Bamboo, Dark Fir, Light Cherry, Light Fir, Light Oak, Southern Yellow Pine, Rock Elm, Birchwood, Blonde Oak, Beechwood, Grey Hemlock, Driftwood, Grey Douglas Fir, White Oak

Solid & Specialty

Onyx Black	Dark Brown	Classic Bronze	Slate Grey	Venus	Bone White	Ultra White	Platinum Ice	Ceramic Clay	Moonstone	Old Navy	Medium Blue	Brick Red	Chilli Pepper	Copper Penny
Textured Matte	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Glossy*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*	*Smooth Satin*
Solid	Solid	Solid	Solid	Metallic	Solid	Solid	Metallic	Solid	Metallic	Solid	Solid	Solid	Solid	Metallic

Speckle



Brownstone	Baked Clay	Burnt Sienna	Biscotti	Relic Stone	Limestone	Bedrock	Pebble	Alabaster	Portland Stone
Textured Matte	*Textured Matte*	*Smooth Matte*	*Smooth Matte*	*Textured Matte*	*Textured Matte*	*Textured Matte*	*Textured Matte*	*Textured Matte*	*Textured Matte*
Speckle	Speckle	Speckle	Speckle	Speckle	Speckle	Speckle	Speckle	Speckle	Speckle

Naturally Aged Metals

Liberty	Brooklyn	Eiffel	Empire	Golden Gate
Textured Matte	*Smooth Glossy*	*Textured Matte*	*Textured Matte*	*Textured Matte*
Naturally Aged Metal	Naturally Aged Metal	Naturally Aged Metal	Naturally Aged Metal	Naturally Aged Metal

Print, Screens, and our pictures do not accurately reflect aspects of our finishes – textures, sheen, woodgrain hues, etc. Always order a physical sample before purchase! Our Color Bars swatches and samples will provide an accurate representation.

If a custom finish is required, we will work with our industry leading coating suppliers to develop a custom finish solution. All finishes are rigorously tested for corrosion and weathering resistance to ensure that it will stand up and deliver superior performance in the built environment.

We perform accelerated weathering testing in our onsite laboratory and work closely with coating suppliers to review weathering results of finishes undergoing natural Florida exposure testing. Our disciplined approach to powder coating, quality and process control distinguishes it as industry leading product manufacturer and ensures that its premium products stay looking beautiful for many, many years.

Metal Sales™

SPECIFICATION DATA

Metal Sales Manufacturing Corporation

This specification data sheet is provided by Metal Sales Manufacturing Corporation as a technical support tool incident to the sale of its Concealed Fastened Wall Panel products. Contact Metal Sales for more information on these and other products.
Telephone: 800.406.7387
metalsales.us.com

Section 07 42 13 - METAL WALL PANELS

1. PRODUCT NAMES

Empire Line™: EM15-126, EM15-168, EM15-1266, EM15-1275, EM-1284, EM15-1293, EM15-1210 and EM15-1211 metal wall panels

2. MANUFACTURER

Metal Sales Manufacturing Corporation
7800 Highway 60
Sellersburg, IN 47172
800.406.7387
502.855.4300
Fax: 502.855.4200
Web: metalsales.us.com
E-Mail: rgage@metalsales.us.com

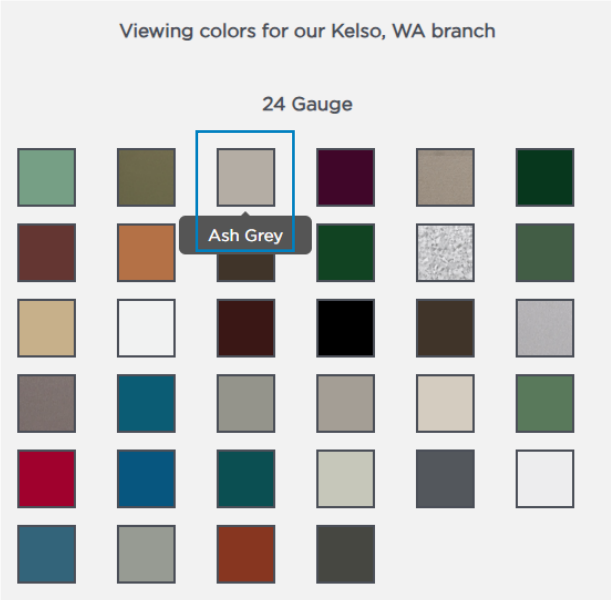
3. PRODUCT DESCRIPTION

Basic Use

For more than 60 years, Metal Sales has earned a reputation as the premier provider of metal building components and accessories. Metal Sales maintains the industry's largest professional sales and service team, supported by 21 branches located throughout the United States and offers a full line of high quality metal roof and wall panels for agricultural, commercial, architectural, industrial and residential projects of every shape and size for both new construction and retrofit applications. Metal Sales is dedicated to leading the metal building component industry, by setting new standards for operating efficiency, product design, active service management and lasting value.

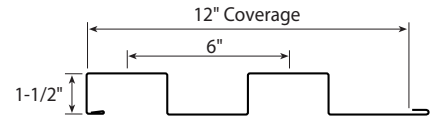
Manufacturer Memberships and Affiliations

CRRC - Cool Roof Rating Council
MCA - Metal Construction Association
NRCA - National Roofing Contractors Association
ILFI - International Living Future Institute
MasterSpec

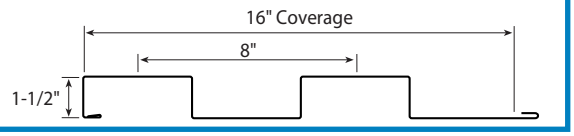


EM15 Series

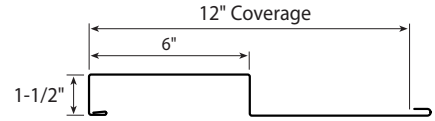
EM15-126



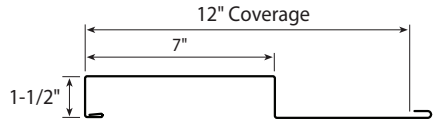
EM15-168



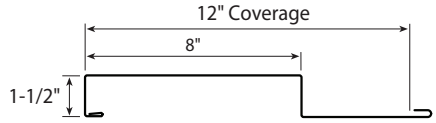
EM15-1266



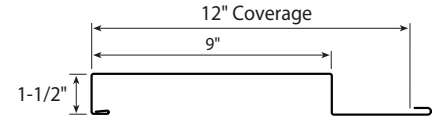
EM15-1275



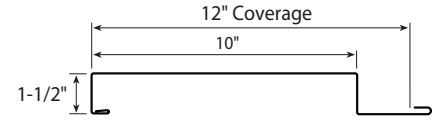
EM15-1284



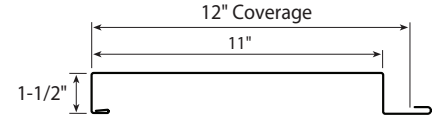
EM15-1293



EM15-1210



EM15-1211



Metal Sales™

SPECIFICATION DATA

4. TECHNICAL DATA

Applicable Standards

●ASTM A 653 - Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process

●ASTM A 792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

●ASTM B 209 - Standard Specification for Aluminum and Aluminum-alloy Sheet and Plate

●ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

●ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

●ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials

●ASTM E 283 - Standard Test Method for Determining rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across Specimen

●ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

●ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference

●ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

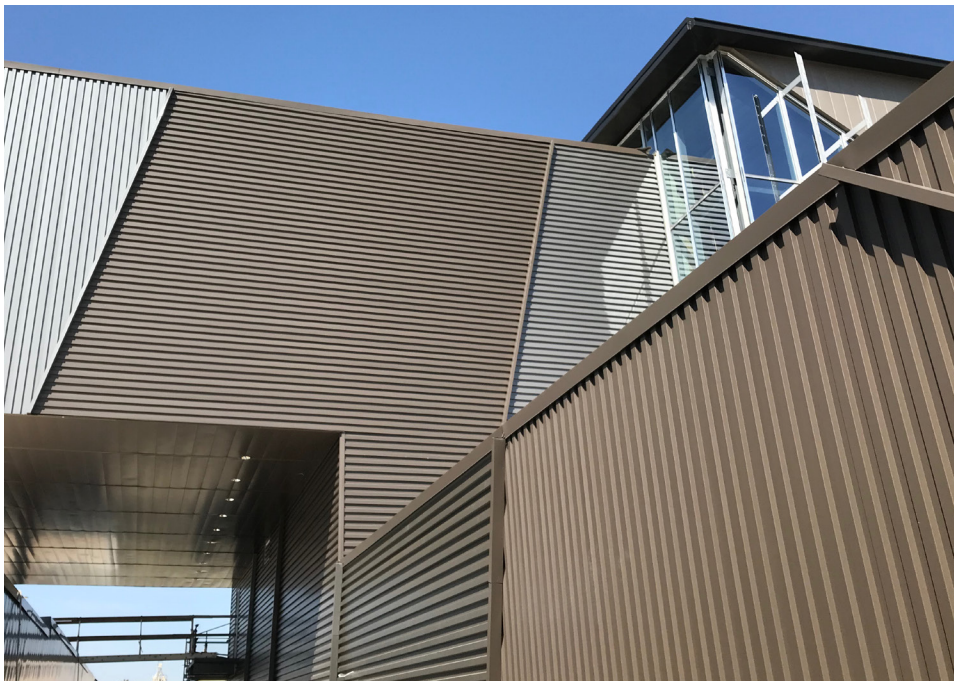
Underwriters Laboratories (UL):

●UL 263 - Fire Tests of Building Construction and Materials

Physical Properties:
Test reports are available to design professionals upon request.

Note: Industry designation for material thickness is moving away from "gauge" to decimal thickness in inches. Metal Sales recommends use of a minimum thickness requirement of 0.0230 inch (0.58 mm) instead of 24 gauge, 0.0296 inch (0.75 mm) instead of 22 gauge and 0.0356 inch (0.90 mm) instead of 20 gauge. For Galvalume-coated steel, specify AZ50 for painted material or AZ55 for unpainted material.

Approval Organizations:
Florida Building Code 2023



Technical Properties for Empire Series™: EM15-126, EM15-168, EM15-1266, EM15-1275, EM15-1284, EM15-1293, EM15-1210 and EM15-1211:

►Panel Coverage: 12 inches (304.8 mm) or 16 inches (406.4 mm)
►Panel Depth: 1.5 inches (38.1 mm)
►Attachment: Concealed clip
►Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 or AZ55 coating designation, structural quality, Grade 50, 0.0230-inch (0.58-mm) or 0.0296-inch (0.75-mm) minimum thickness
►Material: Zinc-coated steel sheet, ASTM A 653, G90 coating designation, structural quality, Grade 33, 0.0356-inch (0.90-mm) minimum thickness
►Material: Aluminumm sheet, per ASTM B 209, Alloy 3003-H14 or 3105-H24, 0.032-inch (0.81-mm) or 0.040-inch (1.02-mm) nominal thickness
►Application: Designed for application over open framing or solid substrate
►Rib Configuration: Box
►Surface Finish: PVDF (Kynar 500), Multi-pass PVDF, Marblique, Plastisol or Weathering Steel
►Color: Select from manufacturer's standard colors.
►Testing: Fire Resistance Rating: Complies with UL 263, depending on assembly. 2023 Florida Building Code Approved: FL34027.4

Environmental Considerations
Construction metals generally are readily recyclable at the end of their service life. The raw materials used in manufacture of metal wall panels also come from recycled sources. Pre-consumer and post-consumer recycled content varies. Consult with manufacturer for more information.

Fire Performance
In accordance with ASTM E 84:
Flame Spread Index: 25 or less (Class A)
Smoke Developed Index: 0

5. INSTALLATION

Handling and Storage
Handle and store product according to Metal Sales recommendations. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation. Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

Metal Sales™

SPECIFICATION DATA

Typical Assemblies
-Wood sheathing on stud framing with moisture barrier
-Wood sheathing on girt framing with moisture barrier
-Metal deck on framing with rigid insulation and moisture barrier

Preparation
Install substrate boards over deck and sheathing over entire surface using recommended fasteners. Anchor metal panels to supports according to metal panel manufacturer's recommendations. Ensure panel supports are plumb and in-plane. Limit in-plane variance to no more than a total of 1/4 inch (6 mm) on 10 feet (3 m).

Underlayment Installation
Install self-adhering sheet underlayment and felt underlayment as required. Install flashing in compliance with requirements in Division 07 Section "Sheet Metal Flashing and Trim" and Metal Sales recommendations.

Thermal Insulation Installation
Install polyethylene vapor retarder if required. Install board insulation if required, in compliance with installation requirements in Division 07 Section "Thermal Insulation" requirements. Install blanket insulation if required, in compliance with installation requirements in Division 07 Section "Thermal Insulation".

Metal Wall Panel Installation
Verify that site conditions are acceptable for installation. Do not proceed with installation until unacceptable conditions are corrected. Comply with panel manufacturer's installation instructions including but not limited to special techniques, interface with other work and integration of systems. Fasten metal wall panels to supports with concealed clips at each side-seam joint location, spacing and using proper fasteners as recommended by panel manufacturer. Comply with installation tolerances as required.

Accessory Installation
Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components. For Flashing and Trim, comply with performance requirements, manufacturer's written installation instructions and the SMACNA "Architectural Sheet Metal Manual". Provide concealed fasteners where possible and install units to true level and plumb. Install work with moisture barrier, laps, joints and seams that will be permanently watertight.

Field Quality Control
If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

Precautions, Cleaning and Protection
Touch-up paint is used to cover and protect unexpected scratches on the paint finish that may occur during installation of panel. Touch-up paint will not weather as well or at the same rate as the original system. Test in an area that will not be noticeable. Metallic paint colors are available at an additional charge. Minor differences in color and appearance are normal and to be expected.

To minimize possible differences in appearance, an entire project should be painted at one time, from one batch of paint, using the same application equipment. Additionally, fabricated panels, flat sheet and flashings should be oriented in the same direction.

After installation remove temporary coverings and protection of adjacent work areas. Repair or replace any installed products that have been damaged. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance. Remove and lawfully dispose of construction debris from Project site. Protect installed product and finish surfaces from damage during construction.

Building Codes
Current data on building code requirements and product compliance may be obtained from Metal Sales technical support specialists. Installation must comply with the requirements of authority having jurisdiction.

6. AVAILABILITY AND COST

Availability
Metal Sales products are nationally distributed and supported from 21 convenient locations nationwide, including Alaska. Manufacturer has the ability to ship worldwide. Contact manufacturer for information on local availability.

Cost
Budget installed cost information may be obtained from a local Metal Sales distributor or directly from the manufacturer.

7. WARRANTY

Weather Tightness Warranty
Metal Sales Weather Tightness Warranties are available in several forms. Request sample warranty documents from manufacturer for review and editing assistance. Metal Sales warranty excludes failure due to physical damage and surface deterioration due to exposure to salt environments. Warranty Period is optionally 5, 10 or 20 years.

Type 2 Warranty:
Trim and side-lap warranty, with dollar limit
Type 4 Warranty:
Trim and side-lap warranty, with no dollar limit

Paint Finish Warranty
Metal Sales standard PVDF (Kynar 500®) Fluorocarbon System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period. Deterioration shall include, but is not limited to, color fading of more than 5 Hunter units when tested according to ASTM D 2244, chalking in excess of a No. 8 rating when tested according to ASTM D 4214 or cracking, checking, peeling or failure of paint to adhere to bare metal. Warranty Period for film integrity is 45 years and for chalk and fade rating is 35 years. Metal Sales warranty excludes surface deterioration due to physical damage and exposure to salt environments.

8. MAINTENANCE

No specific maintenance is required for properly installed Metal Sales concealed-fastened wall panel products. Periodic inspection to verify system integrity, drainage functionality and repair of storm damage is advised.

9. TECHNICAL SERVICES

Technical assistance, including more detailed information, product literature, test results, project lists, assistance in preparing project specifications and arrangements for application supervision, is available by contacting Metal Sales.

10. FILING SYSTEMS

Additional product information is available from the manufacturer, upon request and from MasterSpec.

01-2024

Nucor Buildings Group R-Panel Metal Wall Panel System

The R-Panel wall is a strong, attractive wall panel ideal for commercial, community, and industrial applications. This panel delivers what most builders, contractors, and owners have come to expect from us in a versatile and attractive building system.

Panel Credentials

- ASTM E283 Test Method for Determining Air Leakage Through Wall Systems
- ASTM E331 Test Method for Water Penetration of Exterior Wall Systems
- State of Florida Product Approval
- UL263 Fire Tests of Building Construction and Materials

Panel Specifications

						TOP IN COMPRESSION		BOTTOM IN COMPRESSION	
Gage	Thickness (in.)	Yield (ksi)	Tensile (ksi)	Panel Wt. (psf)	I_x (Gross) (in^4)	S_x (eff.) (in^3)	M_a (kip-in)	S_x (eff.) (in^3)	M_a (kip-in)
26	0.0177	80	82	0.86	0.0490	0.0378	1.3590	0.0462	1.6593
24	0.0222	80	82	1.08	0.0633	0.0543	1.9520	0.0588	2.1133

Panel Capacity (psf)

	26 GAGE		24 GAGE	
SPAN (ft.)	Pressure[7]	Suction[4,8]	Pressure[7]	Suction[4,8]
3.0	79	72	120	75
3.5	68	62	103	64
4.0	59	54	90	56
4.5	53	48	80	50
5.0	47	43	69	45
5.5	43	37	57	41
6.0	37	31	48	38
6.5	32	26	41	35
7.0	28	23	36	32
7.5	24	20	31	29

NOTES

1. Section properties were calculated in accordance with AISI S100/CSA S136, 2016 Edition.
2. Panels were checked for bending, shear, combined bending and shear, web crippling, deflection and panel pullover.
3. Deflection is limited to Span/60.
4. Panel pullover limits are based on d'w = 0.44".
5. Thermal load has not been considered.
6. Capacities are based on a 3-span condition with equal length spans.
7. "Pressure" load is applied inward on the outer surface towards supports.
8. "Suction" load is applied outward on the inner surface away from panel supports.

PVDF Cool Colors

PVDF (Polyvinylidene Fluoride) utilizes a two-coat system featuring fade resistant color, incredible durability, and environmentally-friendly “cool” technology.

NUCOR BUILDING SYSTEMS
a NUCOR® company

Regal White (RW)

Reflective White (RF)

Warm White (WW)

Pearl Gray (PG)

Desert Sand (DS)

Surrey Beige (SU)

Slate Gray (SG)

Royal Blue (RO)

Terra Cotta (TC)

Cypress Green (CY)

Dark Bronze (DB)

Brite Red (BT)

Charcoal (CH)

Midnight Black (BL)

Galvalume ★ (GM)

★ Non-PVDF. The Galvalume coating process is likely to result in variances in spangle (size, number, and reflection) from coil to coil which may result in noticeable shade variations. Galvalume is also subject to variable weathering and may appear to have different shades due to weathering characteristics. These shade variations are not cause for rejection. The term “TBK” on the Order Document refers to “To Be Selected” from standard PVDF colors as shown on this chart. Please note that PVDF is a slight upcharge over SP.

© 2025 NUCOR BUILDING SYSTEMS **04/25**

PVDF Cool Colors

Product Specifications

a NUCOR® company

Solar Reflectance, Thermal Emittance and Solar Reflectance Index (SRI)

Solar Reflectance

To be considered "cool," products must have a Solar Reflectance of at least .25. Solar Reflectance is the fraction of the total solar energy that is reflected away from a surface.

Thermal Emittance

Thermal Emittance is the measure of a panel's ability to release heat that it has absorbed.

Solar Reflectance Index (SRI)

Put Solar Reflectance and Thermal Emittance together and you get the Solar Reflectance Index (SRI). SRI is calculated by using the values of solar reflectance, thermal emittance and a medium wind coefficient. The higher the SRI value, the lower its surface temperature and consequently, the heat gain into the building. Metal roofs coated with pigmented PVDF resin achieve an SRI of 24-88, depending on the color.

Conventional roof surfaces have low reflectance (0.05 to 0.25) and high thermal emittance (typically over .85). Roof panels with both high reflectance and high emittance can reduce the surface temperature by as much as 30-50% based on color and geographic location, which will result in a reduced heat gain to the building, therefore reducing the energy demand.

GALVALUME® is a registered trademark of BIEC International Inc., and some of its licensed producers. Galvalume is the substrate to which paint is factory-applied. This coating is what determines the roofing product's reflective properties.

All information contained within is subject to change without notice. Please contact your sales representative to ensure most current information.

**NOTE: CRRC values are based on a color group (family) not a NBG specific color. The Cool Colors Spec Sheet available by scanning the QR code above has specific values provided by the paint manufacturer.*

PVDF COOL PANEL COLORS & RATINGS

Scan codes below for the most current Cool (reflective) Roof ratings.*

Cool Coatings Spec Sheet

Cool Roof Rating Council Directory

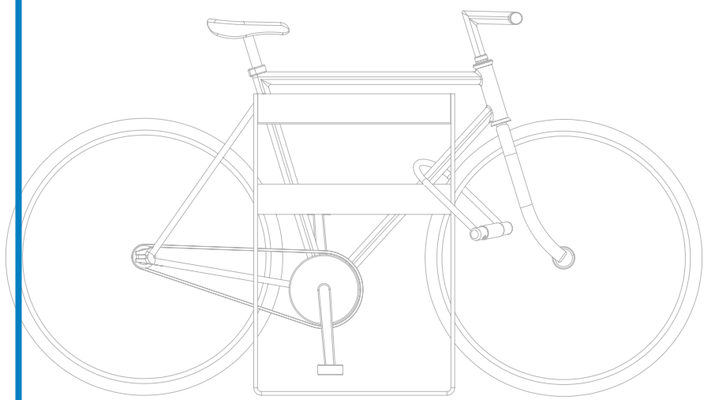
PVDF COOL TECHNICAL INFORMATION

PVDF Performance Testing		
Industry Specifications Compliance	AAMA[1] 621-02 Requirements	Voluntary Specification, for High Performance Organic Coatings on Coil Coated Architetural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel
	AAMA 2605-17A Requirements	Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (Coil Coating appendix)
Substrates	Pretreated substrates: Galvalume®, Hot-Dipped Galvanized (HDG) steel & Aluminum.	
Dry Film Thickness	ASTM D1400	0.2 - 0.3 mil primer; 0.7 - 0.8 mil topcoat
Gloss	ASTM D523 @ 60°	25 - 35

Physical Testing	Test Methods	Test Result
Solar Reflectance	ASTM E903	>25% Initial; > 15% after 3 years >65% Initial; >50% after 3 years
Emissivity	ASTM C1371, ASTM E408	0.80 (80%) minutes
Pencil Hardness	ASTM D3363	F-2H
Flexibility	T-Bend, ASTM D4145	0 - 2 T-Bend; No pick off
Adhesion	ASTM D3359	No adhesion loss
Reverse Impact	ASTM D2794	No cracking or adhesion loss
Abrasion, Falling Sand	ASTM D968	65 - 85 /mil
Mortar Resistance	ASTM C267	No effect
Detergent Resistance	ASTM D2248 3% detergent @ 100°F (72 hrs.)	No effect
Acid Resistance	ASTM D1308 10% muriatic acid - 24 hrs. 20% sulfuric acid - 18 hrs.	No effect
Acid Rain Test	Kesternich SO2, DIN 50018	15 cycles; No objectionable color change
Alkali Resistance	ASTM D1308 10%, 25% NaOH, 1 hr.	No effect
Salt Spray Resistance	ASTM B117 5% salt fog @ 95°F	None or few #8 blisters; Max. average 1/16" Scribe creep; Passes 1000 hrs.
Humidity Resistance	ASTM D714, ASTM D2247 (100% relative humidity @ 95°F)	Passes 1500 hrs. No #8 blisters
Exterior Exposure	ASTM D2244 (Color) ASTM D4214 (Caulking) 10 yrs. @ 45°F, South Florida	Max. Δ5 fade Max. 8 chalk
Surface Burning Characteristics	ASTM E84	Flame Spread Index: Class A Smoke Developed Index: Class A

© 2025 NUCOR BUILDING SYSTEMS **04/25**

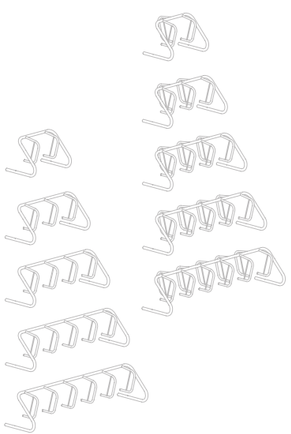
NEW! Vilas™

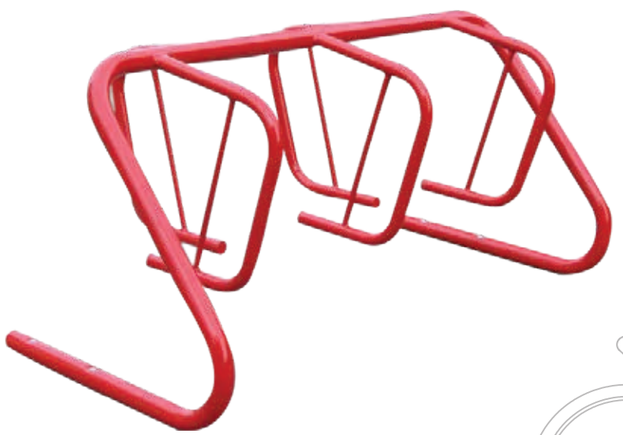


VABR-2-WI-SF

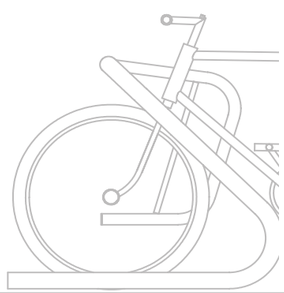
- 3/8" x 2" Flat Bar and 1 x 3 Profile Board
- Recycled Plastic or Ipe Profile Board
- Parks 2 Bikes
- Galvanized or Powder Coated
- Surface Mount

Spartan™



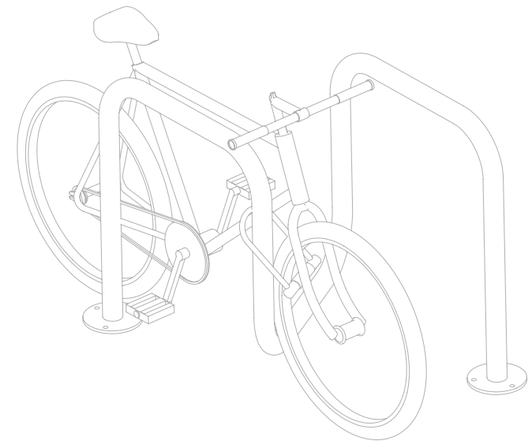


SPR-DBL-5-FS



- 34" High, Constructed of 2-3/8" OD and 1-5/8" OD Steel Tubing with a ¾" Diameter Steel Rod for Locking
- Parks 2-13 Bikes
- Galvanized or Powder Coated
- In-Ground, Surface Mount, or Freestanding
- Clean Lines which Combine both Form and Function while Keeping Bikes Neatly Aligned and Upright
- Offers a 25" Spacing between Bikes and All-Welded Construction

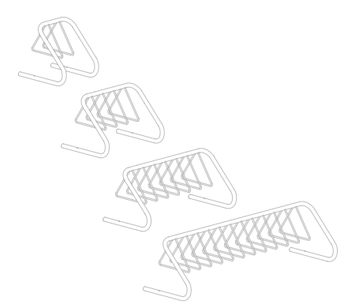
Genesis™

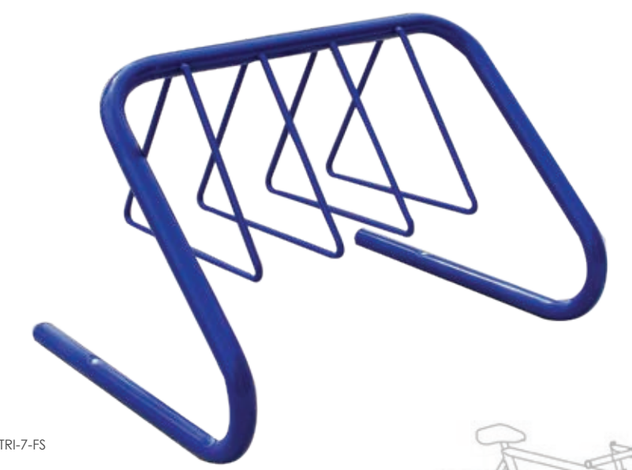


GNS-8-SF

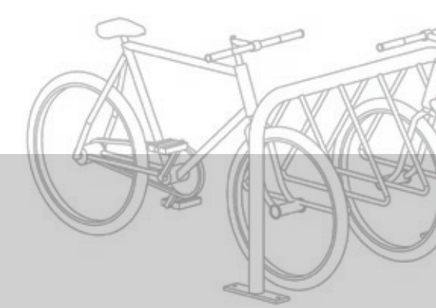
- 2-3/8" OD Steel Tubing
- Parks 2-8 Bikes
- Galvanized, Powder Coated, or Stainless Steel
- In-Ground or Surface Mount
- Two Points of Contact, Guides Bikes into Proper Position, and Provides Sufficient Spacing for Bikes

Triton™



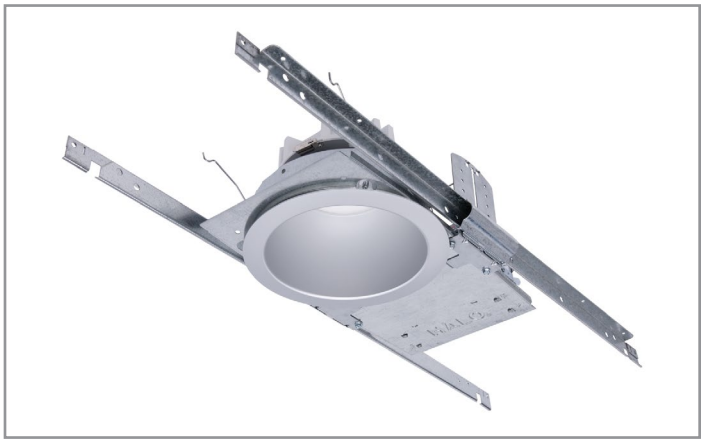


TRI-7-FS



- 34" High, Constructed of 2-3/8" OD Steel Tubing and a ¾" Diameter Solid Steel Rod
- Parks 5-14 Bikes
- Galvanized or Powder Coated
- In-Ground, Surface Mount, or Freestanding
- Ease of Loading from both Sides, Versatile, Accepts all Types of Bikes and Allows Locking of Frame and Wheel with U-Lock

Project		Catalog #		Type	
Prepared by		Notes		Date	



HALO Commercial

HC6 | HM6 | 61 | 61PS

6-inch LED downlight and wall wash

Typical Applications

Office • Healthcare • Hospitality • Institutional • Mixed-Use/Retail

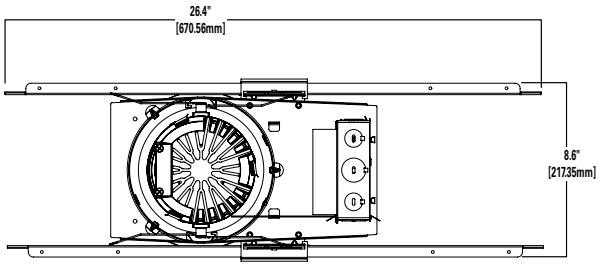
Interactive Menu

- Order Information page 2
- Product Specifications page 4
- Photometric Data page 5
- Energy & Performance Data page 8
- Connected Systems page 10
- Product Warranty

Top Product Features

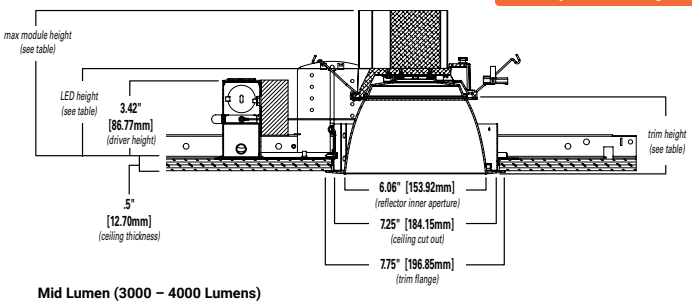
- New construction/remodel series; 500 to 6,000 lumens
- Narrow, Medium and Wide distributions; Wall wash with rotatable linear spread lens
- 2700K, 3000K, 3500K, 4000K, 5000K CCT; 80 or 90 CRI
- Universal voltage 120V-277V; Standard 0-10V driver dims to 1%
- Mounting frame converts to remodel that installs from below the ceiling
- Quick Spec emergency backup mounting frames - fast delivery option

Dimensional and Mounting Details



NEW CONSTRUCTION - MID LUMEN
3000 AND 4000 LUMEN

additional product diagrams



Mid Lumen (3000 – 4000 Lumens)

Distribution	Max. Module Height	Trim Height	LED Height
Narrow	6.6"	3.4"	3.8"
Medium	6.7"	3.5"	3.9"
Wide	6.5"	3.3"	3.7"
Baffle	6.5"	3.3"	3.7"

Mounting Frame Order Information

Sample Number: HC620D010REM7 – HM60525835 - 61MDC

A complete luminaire consists of a housing frame, LED module, and reflector (ordered separately)

Mounting Frame	Lumens	Driver Options	Factory Installed Emergency & Connected Lighting Options	Accessories (Order & Install Separately)
HC6 = 6" new construction downlight housing **HC6CP** = 6" new construction housing, Chicago Plenum - CCEA compliant	**05** = 500 lm **07** = 750 lm **10** = 1000 lm **15** = 1500 lm **20** = 2000 lm **25** = 2500 lm **30** = 3000 lm **35** = 3500 lm **40** = 4000 lm **45** = 4500 lm [7] **50** = 5000 lm [7] **55** = 5500 lm [7] **60** = 6000 lm [7]	**D010**=UNV 120-277V, 50/60Hz, 0-10V 1%-100% dimming at 120-277V on 0-10V controls **Canada Option 500-4000 lumens: D010347** = 347VAC 50/60Hz 0-10V 1%-100% dimming. For 500, 750, 1000, 1500, 2000, 2500, 3000, 3500, 4000lm models only [1] **Canada Option 4500-6000 lumens: D010X347** = step down transformer factory installed (with standard "D010" 120V-277V LED driver). For 4500, 5000, 5500, 6000lm models only [1]	**REM7** = 7 watt emergency battery pack with remote test / indicator light, use with D010 only [1] [2] [6] **REM14** = 14 watt emergency battery pack with remote test / indicator light, use with D010 only [1] [2] [6] **IEM7** = 7 watt emergency battery pack with integral test / indicator light, use with D010 only [1] [2] [6] **IEM14** = 14 watt emergency battery pack with integral test / indicator light, use with D010 only [1] [2] [6] **BOD7ST** = 7.5 watt Bodine self-test emergency battery pack with remote test / indicator light, use with D010 only [1] [2] [6] **WTA** = Factory WaveLinx PRO Tilemount Sensor Kit [4] **WTK** = Factory WaveLinx LITE Tilemount Sensor Kit [5] **WPN** = WaveLinx PRO Wireless Node without Sensor [9] **WLN** = WaveLinx LITE Wireless Node without Sensor [10]	**HB128APK** = L channel hanger bar, 26", pair (replacement) **RMB22** = Adjustable wood joist mounting bars, pair, extend to 22" long **HSA6** = Slope Adapter for 6" Aperture Housings, Specify Slope (refer to instructions for installing housing and trim) **H347** = 347 to 120V step down transformer, 75VA **H347200** = 347 to 120V step down transformer, 200VA **WTA** = Field WaveLinx PRO Tilemount Sensor Kit [4] **WTK** = Field WaveLinx LITE Tilemount Sensor Kit [5]
		DLV = Distributed Low Voltage dimming driver 1%-100%, 1000-4000 lumens only. For use with DLVP system only, refer to DLVP specifications for details. [1]	**REMV7** = 7 watt emergency battery pack with remote test / indicator light, use with DLV only [1] [2] [3] [6] **REMV14** = 14 watt emergency battery pack with remote test / indicator light, use with DLV only [1] [2] [3] [6] **IEMV7** = 7 watt emergency battery pack with integral test / indicator light, use with DLV only [1] [2] [3] [6] **IEMV14** = 14 watt emergency battery pack with integral test / indicator light, use with DLV only [1] [2] [3] [6]	
Notes	**Notes** (7) Marked Spacing: Center to Center of Adjacent Luminaires = 36" Center of Luminaire to Building Member = 18" Minimum overhead = 0.5	**Notes** (1) Not available with CP models	**Notes** (1) Not available with CP models (2) Not available with D010347 (347V models) (3) ULus for U.S. only (4) WTA = WaveLinx PRO tilemount sensor kit for daylight dimming, PIR motion sensing, and optional RLTS - Real Time Location Services, use with D010 only. (Refer to WaveLinx PRO specifications.) (5) WTK = WaveLinx LITE tilemount sensor kit for daylight dimming, PIR motion sensing, use with D010 only. (Refer to WaveLinx LITE specifications.) (6) Emergency battery backup options are Non-IC only, and rated for a minimum starting temperature of 0°C (9) WPN = WaveLinx PRO wireless node provides luminaire-level control with scene and zone configuration without an integrated sensor; Connects wirelessly with daylight dimming sensor and PIR motion sensor if desired. Use with 0-10V driver only. Not compatible with 347V or Chicago plenum. (Refer to WaveLinx PRO specifications.) (10) WLN = WaveLinx LITE wireless node provides luminaire-level control with scene and zone configuration without an integrated sensor; Connects wirelessly with daylight dimming sensor and PIR motion sensor if desired. Use with 0-10V driver only. Not compatible with 347V or Chicago plenum. (Refer to WaveLinx LITE specifications.)	**Notes** (4) WTA = WaveLinx PRO tilemount sensor kit for daylight dimming, PIR motion sensing, and optional RLTS - Real Time Location Services, use with D010 only. (Refer to WaveLinx PRO specifications.) (5) WTK = WaveLinx LITE tilemount sensor kit for daylight dimming, PIR motion sensing, use with D010 only. (Refer to WaveLinx LITE specifications.)

LED Module Order Information

LED Module	Lumens	CRI/CCT	
HM6 = 6" LED Modules For use with HC6 - HC6CP New Construction housings only	**0525** = 500 - 2500 lumen **3040** = 3000-4000 lumen **4560** = 4500-6000 lumen	**827** = 80CRI, 2700K **830** = 80CRI, 3000K **835** = 80CRI, 3500K **840** = 80CRI, 4000K **850** = 80CRI, 5000K	**927** = 90CRI, 2700K **930** = 90CRI, 3000K **935** = 90CRI, 3500K **940** = 90CRI, 4000K **950** = 90CRI, 5000K
Notes	**Notes**	**Notes**	

Trim Order Information

Reflector	Distribution[8]	Finish	Flange	Accessories
61 = 6" conical reflector	**ND** = narrow 55° beam angle 0.97 SC **MD** = medium 60° beam angle 1.10 SC **WD** = wide 65° beam angle 1.28 SC **RWW** = rotatable wall wash with linear spread lens	**C** = Specular clear **H** = Semi-specular clear **W** = White	**Blank** = Polished flange standard with C & H reflectors **Blank** = White flange standard with W reflector **WF** = White flange option available with C & H reflectors **BF** = Black Flange option available with C, H & W reflectors	**61RWWPK** = Replacement part kit - wall wash lens insert - for use with 61RWW* only.
Notes	**Notes** (8) Values are nominal, with specular clear reflector, other finishes and field results may vary.	**Notes**	**Notes**	**Notes**

Baffle	Distribution[8]	Finish	Flange	Accessories
61 = 6" baffle reflector	**WD** = wide 65° beam angle 1.28 SC (nominal) **RWW** = rotatable wall wash with linear spread lens	**BB** = Black baffle **WB** = White baffle	**Blank** = White flange standard with BB, & WB reflectors **BF** = Black flange option available with BB reflectors	**61RWWPK** = Replacement part kit - wall wash lens insert - for use with 61RWW* only.
Notes	**Notes** (8) Values are nominal, with specular clear reflector, other finishes and field results may vary.	**Notes**	**Notes**	**Notes**

Reflector	Distribution[8]	Finish	Flange
61PS = 6" non-conductive polymer 'dead front' conical reflector[9]	**MD** = medium 60° beam angle 1.10 SC (nominal)	**W** = White	**Blank** = White flange standard with W reflector **BF** = Black Flange option available with W reflectors
Notes (9) 61PS is 1000-2000 lumens Non-IC rated. 500 & 750 lumens IC rated. 61PS is not for use over 2000lm in Non-IC or over 750lm in IC.	**Notes** (8) Values are nominal, with specular clear reflector, other finishes and field results may vary.	**Notes**	**Notes**

IEM Reflector	Distribution[8]	Finish	Flange	Integral Emergency
61 = 6" IEM reflector for integral emergency only	**ND** = narrow 55° beam angle 0.97 SC **MD** = medium 60° beam angle 1.10 SC **WD** = wide 65° beam angle 1.28 SC	**C** = Specular clear **H** = Semi-specular clear **W** = White	**Blank** = Polished flange standard with C & H reflectors **Blank** = White flange standard with W reflector **WF** = White flange option available with C & H reflectors **BF** = Black flange option available with C, H, & W reflectors	**IEM** = Reflector for use with integral emergency housings only. Provides access hole for integral emergency test switch.
Notes	**Notes** (8) Values are nominal, with specular clear reflector, other finishes and field results may vary.	**Notes**	**Notes**	**Notes**

IEM Baffle	Distribution[8]	Finish	Flange	Integral Emergency
61 = 6" IEM baffle reflector for integral emergency only	**WD** = wide 65° beam angle 1.28 SC (nominal)	**BB** = Black baffle **WB** = White baffle	**Blank** = White flange standard with BB, & WBreflectors **BF** = Black flange option with BB reflectors	**IEM** = Reflector for use with integral emergency housings only. Provides access hole for integral emergency test switch.
Notes	**Notes** (8) Values are nominal, with specular clear reflector, other finishes and field results may vary.	**Notes**	**Notes**	**Notes**

Product Specifications

Housing Frame
- Boat shaped galvanized steel plaster frame with adjustable plaster lip
- Accommodates 1/2" to 1-1/2" thick ceilings
- Installs in new construction or from below the finished ceiling (non-accessible) for remodeling (with mounting bars removed)
- Provided with two remodel clips to secure the frame to the ceiling

Universal Mounting Bracket
- Adjusts 2" vertically from above and below the ceiling
- Use with the included mounting bars or with 1/2" Electric Metallic Tube (EMT)
- Removable to facilitate remodeling installation from below the finished ceiling

Mounting Bars
- Captive pre-installed No Fuss™ mounting bars lock to T-grid with screwdriver or pliers
- Centering detents allow for consistent positioning of fixtures

LED Module
- Proximity phosphors over chip on board LEDs provide a uniform source with high efficiency and no pixilation
- Available in 80 or 90 color rendering index (CRI)
- Color accuracy within 3 SDCM provides color consistency and uniformity
- 90 CRI option: R9>50 (refer to chromaticity information for details)
- Available in 2700K, 3000K, 3500K, 4000K and 5000K correlated color temperature (CCT)
- Lumen options include 500, 750, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000 lumens (nominal)
- Passive thermal management achieves 60,000 hours at 70% lumen maintenance (L70) in insulated ceilings (IC) and non-IC applications
- Integral connector allows quick connection to housing flex

Reflector
- Self-flanged aluminum reflectors available in narrow, medium or wide distribution patterns
- Medium distribution polymer non-conductive matte white reflector may be used to meet local codes for 'dead front' applications (500 & 750 lumen max. in IC and 2000 lumen max. in Non-IC)
- Integral diffuse lens provides visual shielding
- Wall wash reflector features a rotatable linear spread lens for alignment of vertical illumination
- Reflectors attach to LED module with three speed clamps
- Available in multiple painted or plated finishes

Reflector/Module Retention
- Reflector/module assembly is securely retained in the housing with two torsion springs

Driver
- Field-replaceable constant current driver provides low noise operation
- Universal 120-277VAC 50/60Hz input standard
- Continuous, 1% to 100% dimming with 0-10V analog control
- Optional low-voltage DC driver for use with Distributed Low Voltage Power (DLVP) system
- Distributed Low Voltage Power (DLVP) system combines power, lighting and controls with ease of installation (refer to DLVP Design Guide at www.cooperlighting.com for details)

Canada Options
- 347VAC 50/60Hz; 1% dimming on 0 -10V analog control, for 500, 750, 1000, 1500, 2000, 2500, 3000, 3500, 4000 lumen models only
- 347V step down transformer factory installed with the standard "D010" 120V-277V, LED driver on 4500, 5000, 5500, 6000 lumen models only

Emergency Option
- Provides 90 minutes of standby lighting, meeting most life safety codes for egress lighting
- Available with integral or remote charge indicator and test switch
- Available Self-Test (self-diagnostic) with remote charge indicator and test switch
- Quick Spec emergency ordering option for quick-turn projects

Connected Lighting System
Two WaveLinx connected solutions to choose from. Refer to WaveLinx system specifications and application guides for details.

WaveLinx PRO Tilemount Sensor Kit
- WaveLinx PRO WTA tilemount sensor kit offers daylight dimming, PIR motion sensing, scene and zone configuration, automatic commissioning; and optional RLTS - Real Time Location Services available.

WaveLinx PRO Wireless Node
- WaveLinx PRO WPN wireless node provides luminaire-level control with scene and zone configuration without an integrated sensor; Connects wirelessly with daylight dimming sensor and PIR motion sensor if desired. Use with 0-10V driver only. **Note:** Not compatible with 347V or Chicago plenum.

WaveLinx LITE Tilemount Sensor Kit
- WaveLinx LITE WTK tilemount sensor kit offers daylight dimming and PIR motion sensing, scene and grouping configuration.

WaveLinx LITE Wireless Node
- WaveLinx LITE WLN wireless node provides luminaire level control with scene and zone configuration without an integrated sensor; Connects wirelessly with daylight dimming sensor and PIR motion sensor if desired. Use with 0-10V driver only. **Note:** Not compatible with 347V or Chicago plenum.

WaveLinx Tilemount Sensor Kits Application
- The WTA and WTK tilemount sensor kits include a control module mounted on the luminaire junction box via 1/2" knock-out, and a tilemount sensor on 54-inch whip; for ceiling installation by direct-mount spring clips or via mounting bracket in octagon ceiling boxes.
- The WTA and WTK tilemount sensor kits may be ordered as factory installed on the luminaire, or ordered separately as a field installed accessory kit.
- **Note: WaveLinx PRO devices are only compatible with the WaveLinx PRO system.**
- **Note: WaveLinx LITE devices are only compatible with the WaveLinx LITE system.**

Junction Box
- Galvanized steel junction box
- 20 in^3 internal volume excluding voltage barrier
- 25 in^3 internal total volume
- Voltage barrier for 0-10V dimming wires (occupies one 1/2" pry-out space)
- Listed for eight #12 AWG (four in, four out) 90˚C conductors and feed-thru branch wiring
- Three 1/2" and two 3/4" trade size pry-outs available
- Three 4-port push wire nuts for mains voltage with 1-port for fixture connection

Compliance
- cULus Certified to UL 1598 / C22.2 No. 250.0, suitable for damp locations and wet locations in covered ceilings only
- Emergency options provided with UL Listed emergency drivers to UL 924 / C22.2 No. 141, suitable for indoor/damp locations
- IP20 - Above finished ceiling; IP65 - Below finished ceiling
- Non-Insulated ceiling (Non-IC) rated for 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000 lumen models (insulation must be kept 3" from top and sides)
- Insulated ceiling (IC) rated for 500, 750, 1000, 1500, 2000 lumen models and suitable for direct contact with air permeable insulation* (IC models are also suitable for Non-IC installations)
- Non-IC marked spacing required for 4500, 5000, 5500, 6000 lumen models
  - Marked Spacing Center to Center of Adjacent Luminaires = 36"
  - Center of Luminaire to Building Member = 18"
  - Minimum overhead = 0.5"
- Airtight per ASTM-E283-04
- Suitable for use in clothes closets when installed in accordance with the NEC 410.16 spacing requirements
- EMI/RFI emissions FCC CFR Title 47 Part 15 Class A at 120/277V
- Contains no mercury or lead and RoHS compliant
- Photometric testing completed in accordance of IES LM-79-08
- Lumen maintenance projection in accordance of IES LM-80-08 and TM-21-11
- 500, 750, 1,000, 1,500 and 2,000 lumen, 90 CRI, ICAT models may be used to comply with State of California Title 24 residential code, per JA8 certification standards
- May be used to comply with State of California Title 24 non-residential code as a dimmable LED luminaire
- ENERGY STAR® certified, reference certified light fixtures database

*Not for use in direct contact with spray foam insulation, consult NEMA LSD57-2013

Warranty
- Five year limited warranty, consult website for details. www.cooperlighting.com/legal

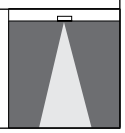
Photometric Data

View IES files

NARROW DISTRIBUTION - SPECULAR CLEAR FINISH, 2000 LUMEN MODEL, 80 CRI, 3500K

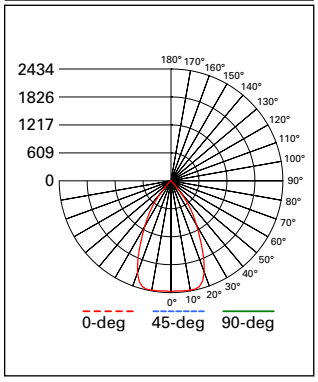
NARROW (55° BEAM*)

Test Number	P581878
Housing	HC620D010
Module	HM60525835
Reflector	61NDC
Lumens	2228 Lm
Efficacy	111.4 Lm/W
SC	0.93
UGR	11.7

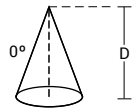


CANDLEPOWER DISTRIBUTION

Downlight



CONE OF LIGHT



MH	FC	L	W
5.5'	80.2	5	5
7'	49.5	6.4	6.4
8'	37.9	7.4	7.4
9'	30	8.2	8.2
10'	24.3	9.2	9.2
12'	16.9	11	11

CANDELA TABLE

Degrees Vertical	Candela
0	2427
5	2422
15	2405
25	1621
35	761
45	118
55	12
65	3
75	2
85	0
90	0

ZONAL LUMEN SUMMARY

Zone	Lumens	% Fixture
0-30	1636	73.4
0-40	2098	94.2
0-60	2223	99.8
0-90	2228	100
90-180	0	0
0-180	2228	100

LUMINANCE

Average Candela Degrees	Average 0° Luminance
45	9187
55	1118
65	376
75	318
85	0

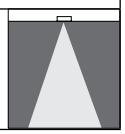
*Value are nominal with specular clear reflectors, other finishes and field results may vary.
SC = Spacing Criteria
UGR = Unified Glare Rating

To estimate lumen output in emergency mode, multiply nominal battery wattage by LPW. Example: 6W x 115 LPW = 690 Lumens.

MEDIUM DISTRIBUTION - SPECULAR CLEAR FINISH, 2000 LUMEN MODEL, 80 CRI, 3500K

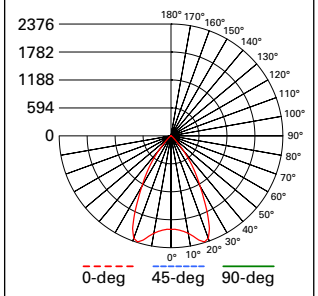
MEDIUM (60° BEAM*)

Test Number	P581875
Housing	HC620D010
Module	HM60525835
Reflector	61MDC
Lumens	2307 Lm
Efficacy	115.3 Lm/W
SC	1.06
UGR	11.8

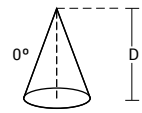


CANDLEPOWER DISTRIBUTION

Downlight



CONE OF LIGHT



MH	FC	L	W
5.5'	68.7	5.6	5.6
7'	42.4	7.2	7.2
8'	32.5	8.2	8.2
9'	25.7	9.4	9.4
10'	20.8	10.4	10.4
12'	14.4	12.4	12.4

CANDELA TABLE

Degrees Vertical	Candela
0	1998
5	2022
15	2307
25	1842
35	796
45	126
55	15
65	4
75	2
85	0
90	0

ZONAL LUMEN SUMMARY

Zone	Lumens	% Fixture
0-30	1671	72.4
0-40	2163	93.8
0-60	2301	99.7
0-90	2307	100
90-180	0	0
0-180	2307	100

LUMINANCE

Average Candela Degrees	Average 0° Luminance
45	9753
55	1395
65	571
75	318
85	0

*Value are nominal with specular clear reflectors, other finishes and field results may vary.
SC = Spacing Criteria
UGR = Unified Glare Rating

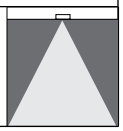
To estimate lumen output in emergency mode, multiply nominal battery wattage by LPW. Example: 6W x 115 LPW = 690 Lumens.

Photometric Data

View IES files

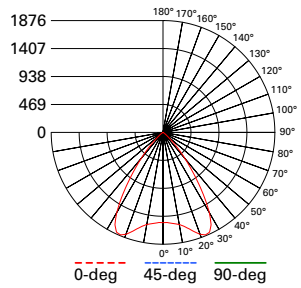
WIDE DISTRIBUTION - SPECULAR CLEAR FINISH, 2000 LUMEN MODEL, 80 CRI, 3500K

WIDE (65° BEAM*)	
Test Number	P581885
Housing	HC620D010
Module	HM60525835
Reflector	61WDC
Lumens	2359 Lm
Efficacy	118 Lm/W
SC	1.28
UGR	11.6

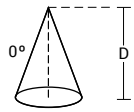


CANDLEPOWER DISTRIBUTION

Downlight



CONE OF LIGHT



MH	FC	L	W
5.5'	50.5	7	7
7'	31.2	8.8	8.8
8'	23.9	10.2	10.2
9'	18.8	11.4	11.4
10'	15.3	12.8	12.8
12'	10.6	15.4	15.4

CANDELA TABLE

Degrees Vertical	Candela
0	1526
5	1540
15	1685
25	1861
35	1027
45	252
55	32
65	6
75	2
85	0
90	0

ZONAL LUMEN SUMMARY

Zone	Lumens	% Fixture
0-30	1461	61.9
0-40	2105	89.2
0-60	2351	99.6
0-90	2359	100
90-180	0	0
0-180	2359	100

LUMINANCE

Average Candela Degrees	Average 0° Luminance
45	19506
55	3078
65	765
75	318
85	0

*Value are nominal with specular clear reflectors, other finishes and field results may vary.
SC = Spacing Criteria
UGR = Unified Glare Rating

To estimate lumen output in emergency mode, multiply nominal battery wattage by LPW. Example: 6W x 115 LPW = 690 Lumens.

Photometric Multipliers (Nominal Lumen Values)

500 Lumen	750 Lumen	1000 Lumen	1500 Lumen	2000 Lumen	2500 Lumen	3000 Lumen	3500 Lumen
0.33	0.44	0.54	0.74	1.00	1.12	1.46	1.76

4000 Lumen	4500 Lumen	5000 Lumen	5500 Lumen	6000 Lumen
1.81	2.17	2.28	2.38	2.65

Multipliers for relative lumen values with other series models.

Color Finish Multipliers

Finish code	C	H	W/WB	BB
Finish	Specular Clear	Semi-Specular	Matte White White Baffle	Black Baffle
Multiplier	1.00	0.92	0.91	0.82

Multipliers for relative lumen values with other color finishes.

CCT Multipliers – 80CRI

2700K	3000K	3500K	4000K	5000K
0.92	0.98	1.00	1.03	1.03

Multipliers for relative lumen values with other series color temperatures.

CCT Multipliers – 90CRI

2700K	3000K	3500K	4000K	5000K
0.77	0.84	0.89	0.90	0.90

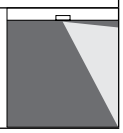
Multipliers for relative lumen values with other series color temperatures.

Photometric Data

View IES files

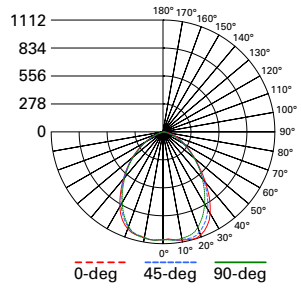
WALL WASH DISTRIBUTION - SPECULAR CLEAR FINISH, 2000 LUMEN MODEL, 80 CRI, 3500K

WALL WASH	
Test Number	P581882
Housing	HC620D010
Module	HM60525835
Reflector	61RWWC
Lumens	2179 Lm
Efficacy	109 Lm/W
SC	1.15



CANDLEPOWER DISTRIBUTION

Downlight



CANDELA TABLE	
Degrees Vertical	Candela
0	1080
5	1081
15	1112
25	1034
35	800
45	514
55	319
65	184
75	85
85	12
90	0

ZONAL LUMEN SUMMARY		
Zone	Lumens	% Fixture
0-30	849	39
0-40	1313	60.2
0-60	1978	90.8
0-90	2179	100
90-180	0	0
0-180	2179	100

LUMINANCE	
Average Candela Degrees	Average 0° Luminance
45	39810
55	30479
65	23907
75	17983
85	7359

SC = Spacing Criteria, nominal for specular clear reflector, other may vary.

To estimate lumen output in emergency mode, multiply nominal battery wattage by LPW. Example: 6W x 115 LPW = 690 Lumens.

SINGLE UNIT FOOTCANDLES

	2.5' from wall (distance from fixture along wall)						
1	19.3	13.8	6.1	2.2	0.7	0.3	0.1
2	29.1	22.6	12.3	5.7	2.5	1.2	0.6
3	27.6	22.5	13.8	7.3	3.7	1.9	1
4	21	18.2	12.4	7.4	4.2	2.4	1.4
5	14.4	13.1	9.9	6.6	4.1	2.5	1.6
6	9.7	9.1	7.5	5.5	3.7	2.5	1.6
7	6.7	6.4	5.5	4.3	3.2	2.2	1.5
8	4.7	4.6	4.1	3.4	2.7	2	1.4
9	3.4	3.3	3.1	2.7	2.2	1.7	1.3
10	2.5	2.5	2.4	2.1	1.8	1.4	1.1

MULTIPLE UNIT FOOTCANDLES

	2.5' from wall (Distance from fixture along 3')			2.5' from wall (Distance from fixture along 4')		
1	21.5	19.1	21.5	20	12.1	20
2	34.7	34.4	34.7	31.6	24.6	31.6
3	34.9	36	34.9	31.3	27.6	31.3
4	28.4	30.7	28.4	25.2	24.8	25.2
5	21	23.2	21	18.6	19.8	18.6
6	15.2	16.8	15.2	13.4	15	13.4
7	11	12	11	9.9	11	9.9
8	8.1	8.7	8.1	7.4	8.2	7.4
9	6.1	6.5	6.1	5.6	6.2	5.6
10	4.6	4.9	4.6	4.3	4.7	4.3

Photometric Multipliers (Nominal Lumen Values)

500 Lumen	750 Lumen	1000 Lumen	1500 Lumen	2000 Lumen	2500 Lumen	3000 Lumen	3500 Lumen
0.33	0.44	0.54	0.74	1.00	1.12	1.46	1.76

4000 Lumen	4500 Lumen	5000 Lumen	5500 Lumen	6000 Lumen
1.81	2.17	2.28	2.38	2.65

Multipliers for relative lumen values with other series models.

Color Finish Multipliers

Finish code	C	H	W/WB	BB
Finish	Specular Clear	Semi-Specular	Matte White White Baffle	Black Baffle
Multiplier	1.00	0.92	0.91	0.82

Multipliers for relative lumen values with other color finishes.

CCT Multipliers – 80CRI

2700K	3000K	3500K	4000K	5000K
0.92	0.98	1.00	1.03	1.03

Multipliers for relative lumen values with other series color temperatures.

CCT Multipliers – 90CRI

2700K	3000K	3500K	4000K	5000K
0.77	0.84	0.89	0.90	0.90

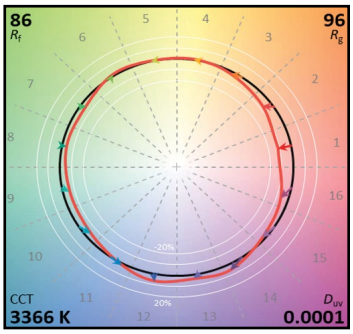
Multipliers for relative lumen values with other series color temperatures.

Note: Refer to IES files for more product data.

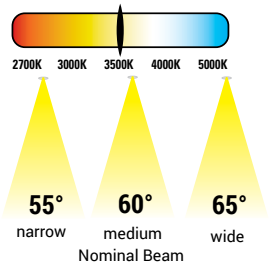
Energy & Performance Data

COLOR METRICS - TM-30-15 & CRI/CIE (3500K)

80 CRI Color Metric Summary - 3500K*

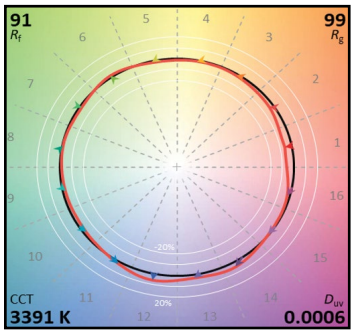


TM-30-15	Rf = 86
	Rg = 95.5
CRI/CIE	Ra = 83.8
	R9 = 10.3

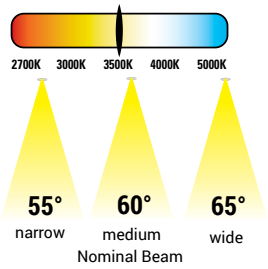


— Reference Illuminant — Test Source

90 CRI Color Metric Summary - 3500K*



TM-30-15	Rf = 91.1
	Rg = 99
CRI/CIE	Ra = 92.4
	R9 = 55.1



— Reference Illuminant — Test Source

* Color values are based on 61WDWB reflector, other finishes and field results may vary.

ENERGY DATA

Series	500 lumen		750 lumen		1000 lumen		1500 lumen		2000 lumen	
Input Voltage 120-277VAC	120V	277V	120V	277V	120V	277V	120V	277V	120V	277V
Input Current (A)	0.051	0.026	0.067	0.036	0.083	0.039	0.119	0.053	0.171	0.077
Input Power (W)	6.1	6.5	7.9	8.3	10	10.4	14.5	14.5	20.9	20.6
In-rush (A)	1.9	8.4	2	8.4	2.2	8.5	2.7	8.5	2.1	9.7
Inrush duration (μs)	251	135	237	133	250	134	250	139	245	131
THD (%)	6.2	13.5	7.4	8.8	5.4	10.3	10	6.7	6.5	7.9
PF	≥ 0.99	≥ 0.9	≥ 0.98	≥ 0.92	≥ 0.99	≥ 0.95	≥ 0.99	≥ 0.97	≥ 0.99	≥ 0.96

Series	2500 lumen		3000 lumen		3500 lumen		4000 lumen		4500 lumen	
Input Voltage 120-277VAC	120V	277V	120V	277V	120V	277V	120V	277V	120V	277V
Input Current (A)	0.23	0.103	0.24	0.107	0.292	0.152	0.351	0.159	0.384	0.172
Input Power (W)	27.5	27.5	28.6	28.5	34.6	35.1	42.1	42.1	45.9	45.6
In-rush (A)	2.5	5.6	2.5	11.6	3.4	13.9	3.1	14.7	3.1	14.8
Inrush duration (μs)	232	123	216	111	183	95	200	98	202	100
THD (%)	6.5	8.1	7.8	8.3	5.6	10	4.1	9.5	4.5	8.5
PF	≥ 0.99	≥ 0.96	≥ 0.99	≥ 0.96	≥ 0.99	≥ 0.93	≥ 0.99	≥ 0.94	≥ 0.99	≥ 0.95

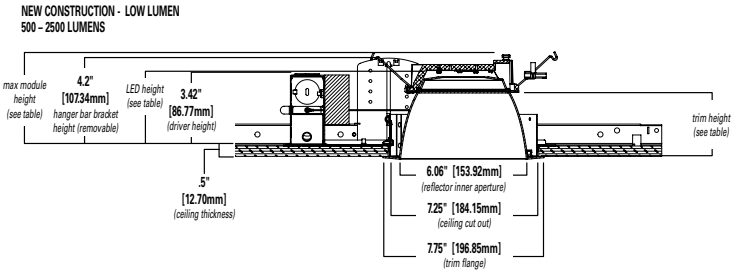
Series	5000 lumen		5500 lumen		6000 lumen	
Input Voltage 120-277VAC	120V	277V	120V	277V	120V	277V
Input Current (A)	0.419	0.186	0.457	0.201	0.489	0.214
Input Power (W)	50.1	49.5	54.6	53.7	58.4	57.4
In-rush (A)	3.1	15	3.2	14.8	3.4	14.8
Inrush duration (μs)	202	117	196	131	192	121
THD (%)	5.5	7.6	7	7.2	8.1	7.2
PF	≥ 0.99	≥ 0.96	≥ 0.99	≥ 0.96	≥ 0.99	≥ 0.97

Minimum starting temperature -30°C (-22°F)* (Nominal input 120-277VAC & 100% of rated output power)
Sound Rating: Class A standards

Notes:
* Emergency Battery packs are rated for a minimum starting temperature of 0°C.

Dimensional and Mounting Details

NEW CONSTRUCTIONS - LOW LUMEN 500 – 2500 LUMENS



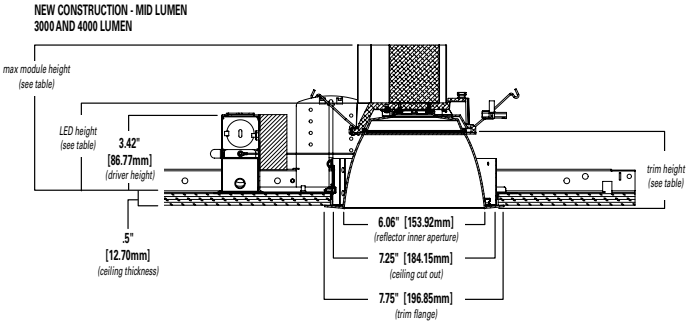
Low Lumen (500 – 2500 Lumens)*

Distribution	Max. Module Height	Trim Height	LED Height
Narrow	4.5″	3.4″	3.8″
Medium	4.6″	3.5″	3.9″
Wide	4.4″	3.3″	3.7″
Baffle	4.4″	3.3″	3.7″

*Max. height w/removable hanger bar bracket 4.2″

Low Lumen Module

NEW CONSTRUCTIONS - MID LUMEN 3000 – 4000 LUMENS

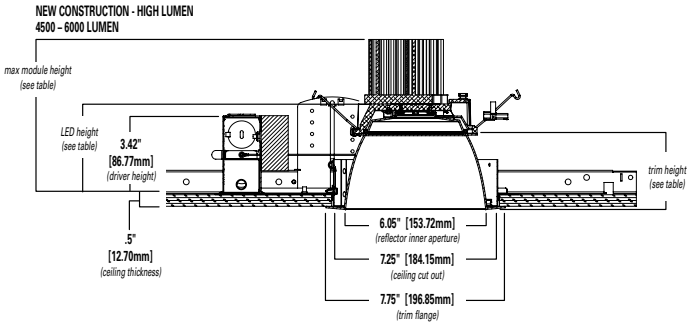


Mid Lumen (3000 – 4000 Lumens)

Distribution	Max. Module Height	Trim Height	LED Height
Narrow	6.6″	3.4″	3.8″
Medium	6.7″	3.5″	3.9″
Wide	6.5″	3.3″	3.7″
Baffle	6.5″	3.3″	3.7″

Mid Lumen Module

NEW CONSTRUCTIONS - HIGH LUMEN 4500 – 6000 LUMENS

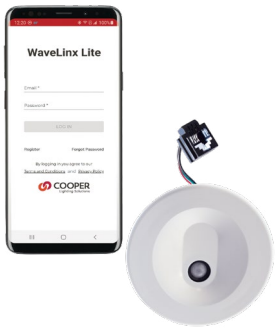


High Lumen (4500 – 6000 Lumens)

Distribution	Max. Module Height	Trim Height	LED Height
Narrow	6.9″	3.4″	3.8″
Medium	7.0″	3.5″	3.9″
Wide	6.8″	3.3″	3.7″
Baffle	6.8″	3.3″	3.7″

High Lumen Module

Connected Solutions



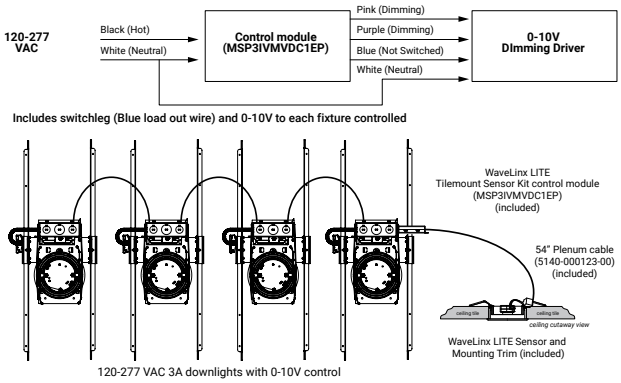
WaveLinx LITE - WTK Tilemount Sensor

WaveLinx LITE devices only compatible with the WaveLinx LITE system.

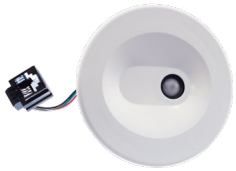
- Intuitive Android™ or Apple® iOS® app for basic system code compliant set up and configuration via Bluetooth
- Up to 28 unique areas per project site (WaveLinx LITE Bluetooth network)
- Up to 50 devices for an area, any one of 16 control zones, up to 6 occupancy sets, and custom lighting scenes
- Automatic occupancy or vacancy, sensor sensitivity, daylight dimming, etc. configurable through the app
- Refer to the WaveLinx system specifications for details

Device Security | Manual Dimmer | Occupancy Sensor | Daylighting Control | Manually Switched ON/OFF | Tuning Control | Lumen Maintenance Control | Scenes

WaveLinx LITE WTK Tilemount Wiring Diagram



WaveLinx LITE Bluetooth Enabled System



WaveLinx PRO – WTA Tilemount Sensor

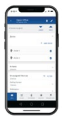
WaveLinx PRO devices only compatible with the WaveLinx PRO system.

- WaveLinx PRO tilemount functionality configures zones and customizes settings from one secure mobile app
- Automatic code commissioning that meets the strictest codes
- Fixtures and sensors integrate with Wireless Area Controller, Wall Stations, and Control Devices
- Stand-Alone Offices or Entire Building Network Installations

Downlights with tilemount sensor wireless communication
Highly efficient LED fixtures

WaveLinx Area Controller
Provides centralized coordination of multiple area control options

Wireless Wall Station/Receptacle
Provides customized wireless control of each area



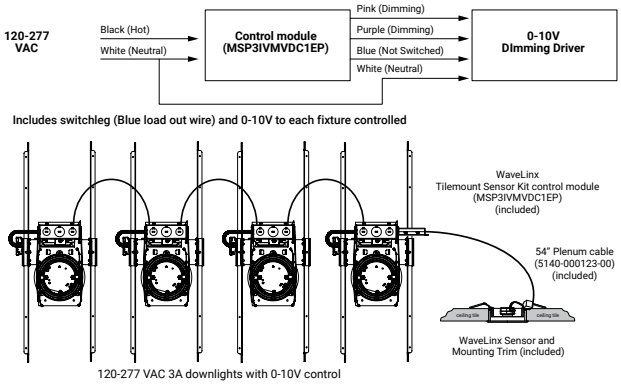
Mobile Applications
Provides personalized, local control from a tablet or smartphone

WaveLinx mobile app settings

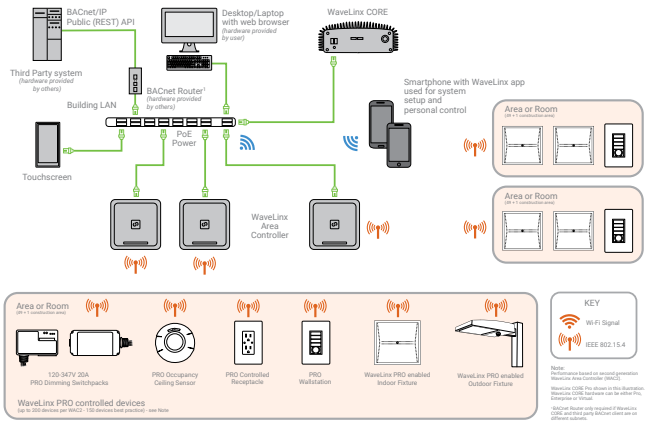
Manual Dimmer | Occupancy Sensor | Lumen Maintenance Control | Daylighting Control

Receptacle Control | Tuning Control | Scheduling | Manually Switched ON/OFF | Demand Response

WaveLinx WTA Tilemount Wiring Diagram



WaveLinx CORE Building Management Integration



Connected Solutions

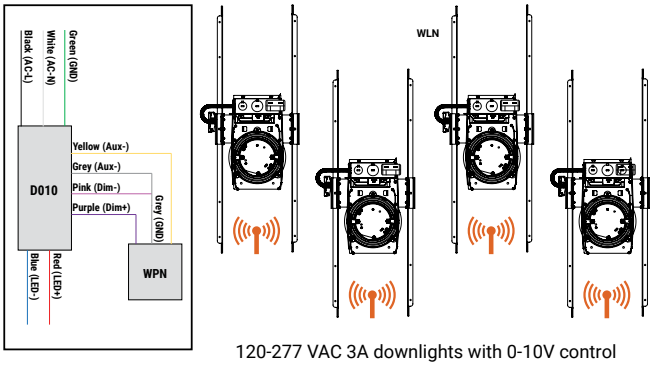
WaveLinx LITE Wireless Node - WLN

WaveLinx LITE devices only compatible with the WaveLinx LITE system.

- Intuitive Android™ or Apple® iOS® app for basic system code compliant set up and configuration via Bluetooth
- Up to 28 unique areas per project site (WaveLinx LITE Bluetooth network)
- Up to 50 devices for an area, any one of 16 control zones, up to 6 occupancy sets, and custom lighting scenes
- Refer to the WaveLinx system specifications for details

WaveLinx mobile app settings

WaveLinx LITE Wireless Node (WLN) Wiring Diagram



120-277 VAC 3A downlights with 0-10V control

WaveLinx LITE Bluetooth Enabled System

WaveLinx PRO Wireless Node - WPN

WaveLinx PRO devices only compatible with the WaveLinx PRO system.

- WaveLinx Wireless functionality configures zones and customizes settings from one secure mobile app
- Automatic code commissioning that meets the strictest codes
- Fixtures and sensors integrate with WaveLinx Area Controller, Wall Stations, and Control Devices
- Stand-Alone Offices or Entire Building Network Installations

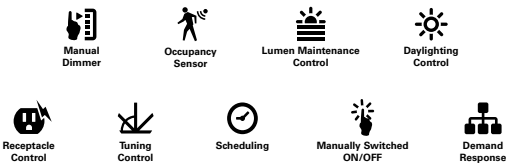
Downlights with wireless communication
Highly efficient LED fixtures

WaveLinx Area Controller
Provides centralized coordination of multiple area control options

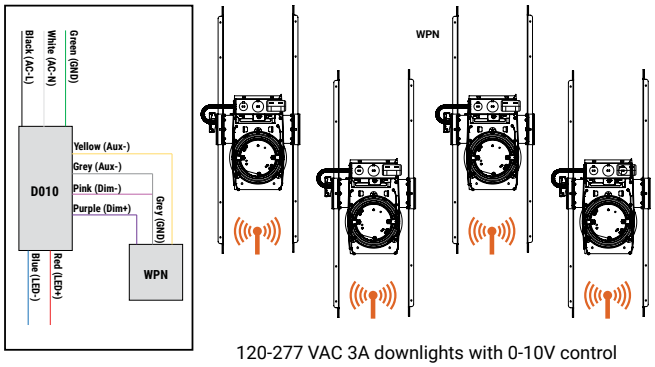
Wireless Wall Station/Receptacle
Provides customized wireless control of each area

Mobile Applications
Provides personalized, local control from a tablet or smartphone

WaveLinx mobile app settings

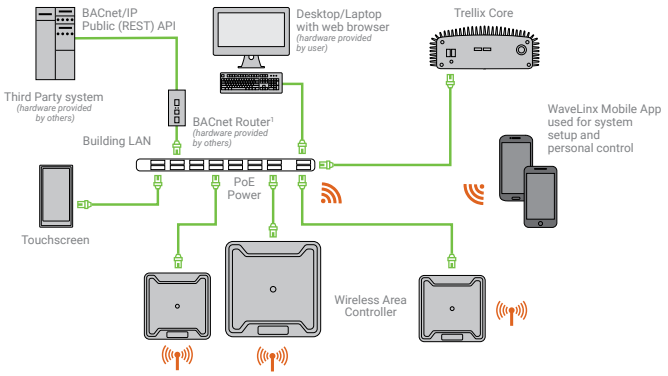


WaveLinx PRO Wireless Node (WPN) Wiring Diagram



120-277 VAC 3A downlights with 0-10V control

WaveLinx CORE Building Management Integration



Cooper Lighting Solutions
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.cooperlighting.com

© 2025 Cooper Lighting Solutions
All Rights Reserved.

Specifications and dimensions subject to change without notice.

WPX LED
Wall Packs

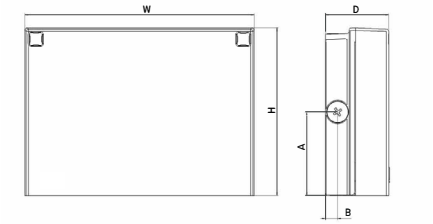
Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications



Front View **Side View**

Luminaire	Height (H)	Width (W)	Depth (D)	Side Conduit Location		Weight
				A	B	
WPX1	8.1" (20.6 cm)	11.1" (28.3 cm)	3.2" (8.1 cm)	4.0" (10.3 cm)	0.6" (1.6 cm)	6.1 lbs (2.8kg)
WPX2	9.1" (23.1 cm)	12.3" (31.1 cm)	4.1" (10.5 cm)	4.5" (11.5 cm)	0.7" (1.7 cm)	8.2 lbs (3.7kg)
WPX3	9.5" (24.1 cm)	13.0" (33.0 cm)	5.5" (13.7 cm)	4.7" (12.0 cm)	0.7" (1.7 cm)	11.0 lbs (5.0kg)

Introduction

The WPX LED wall packs are energy-efficient, cost-effective, and aesthetically appealing solutions for both HID wall pack replacement and new construction opportunities. Available in three sizes, the WPX family delivers 1,550 to 9,200 lumens with a wide, uniform distribution.

The WPX full cut-off solutions fully cover the footprint of the HID glass wall packs that they replace, providing a neat installation and an upgraded appearance. Reliable IP66 construction and excellent LED lumen maintenance ensure a long service life. Photocell and emergency egress battery options make WPX ideal for every wall mounted lighting application.

Ordering Information

EXAMPLE: WPX2 LED 40K MVOLT DDBXD

Series		Color Temperature		Voltage		Options		Finish	
WPX1 LED P1	1,550 Lumens, 11W [1]	30K	3000K	MVOLT	120V - 277V	(blank)	None	DDBXD	Dark bronze
WPX1 LED P2	2,900 Lumens, 24W	40K	4000K	347	347V [3]	E4WH	Emergency battery backup, CEC compliant (4W, 0°C min) [2]	DWHXD	White
WPX2 LED	6,000 Lumens, 47W	50K	5000K			E14WC	Emergency battery backup, CEC compliant (14W, -20°C min) [2]	DBLXD	Black
WPX3 LED	9,200 Lumens, 69W					PE	Photocell [3]	Note : For other options, consult factory.	

Note: The lumen output and input power shown in the ordering tree are average representations of all configuration options. Specific values are available on request.

NOTES

1. All WPX wall packs come with 6kV surge protection standard, except WPX1 LED P1 package which comes with 2.5kV surge protection standard. Add SPD6KV option to get WPX1 LED P1 with 6kV surge protection.
   Sample nomenclature: WPX1 LED P1 40K MVOLT SPD6KV DDBXD
2. Battery pack options only available on WPX1 and WPX2.
3. Battery pack options not available with 347V and PE options.

FEATURES & SPECIFICATIONS

INTENDED USE

The WPX LED wall packs are designed to provide a cost-effective, energy-efficient solution for the one-for-one replacement of existing HID wall packs. The WPX1, WPX2 and WPX3 are ideal for replacing up to 150W, 250W, and 400W HID luminaires respectively. WPX luminaires deliver a uniform, wide distribution. WPX is rated for -40°C to 40°C.

CONSTRUCTION

WPX feature a die-cast aluminum main body with optimal thermal management that both enhances LED efficacy and extends component life. The luminaires are IP66 rated, and sealed against moisture or environmental contaminants.

ELECTRICAL

Light engine(s) configurations consist of high-efficacy LEDs and LED lumen maintenance of L90/100,000 hours. Color temperature (CCT) options of 3000K, 4000K and 5000K with minimum CRI of 70. Electronic drivers ensure system power factor >90% and THD <20%. All luminaires have 6kV surge protection (Note: WPX1 LED P1 package comes with a standard surge protection rating of 2.5kV. It can be ordered with an optional 6kV surge protection).
All photocell (PE) operate on MVOLT (120V - 277V) input.

Note: The standard WPX LED wall pack luminaires come with field-adjustable drive current feature. This feature allows tuning the output current of the LED drivers to adjust the lumen output (to dim the luminaire).

INSTALLATION

WPX can be mounted directly over a standard electrical junction box. Three 1/2 inch conduit ports on three sides allow for surface conduit wiring. A port on the back surface allows poke-through conduit wiring on surfaces that don't have an electrical junction box. Wiring can be made in the integral wiring compartment in all cases. WPX is only recommended for installations with LEDs facing downwards.

LISTINGS

CSA Certified to meet U.S. and Canadian standards. Suitable for wet locations. IP66 Rated. DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified. International Dark Sky Association (IDA) Fixture Seal of Approval (FSA) is available for all products on this page utilizing 3000K color temperature only.

WARRANTY

5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25°C. Specifications subject to change without notice.

© 2020-2022 Acuity Brands Lighting, Inc. All rights reserved.

Performance Data

Electrical Load

Luminaire	Input Power (W)	120V	208V	240V	277V	347V
WPX1 LED P1	11W	0.09	0.05	0.05	0.04	0.03
WPX1 LED P2	24W	0.20	0.12	0.10	0.09	0.07
WPX2	47W	0.39	0.23	0.20	0.17	0.14
WPX3	69W	0.58	0.33	0.29	0.25	0.20

Projected LED Lumen Maintenance

Data references the extrapolated performance projections in a 25°C ambient, based on 6,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	50,000	75,000	100,000
Lumen Maintenance Factor	>0.94	>0.92	>0.90

HID Replacement Guide

Luminaire	Equivalent HID Lamp	WPX Input Power
WPX1 LED P1	100W	11W
WPX1 LED P2	150W	24W
WPX2	250W	47W
WPX3	400W	69W

Lumen Output

Luminaire	Color Temperature	Lumen Output
WPX1 LED P1	3000K	1,537
	4000K	1,568
	5000K	1,602
WPX1 LED P2	3000K	2,748
	4000K	2,912
	5000K	2,954
WPX2	3000K	5,719
	4000K	5,896
	5000K	6,201
WPX3	3000K	8,984
	4000K	9,269
	5000K	9,393

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-50°C (32-122°F).

Ambient	Ambient	Lumen Multiplier
0°C	32°F	1.05
5°C	41°F	1.04
10°C	50°F	1.03
15°C	59°F	1.02
20°C	68°F	1.01
25°C	77°F	1.00
30°C	86°F	0.99
35°C	95°F	0.98
40°C	104°F	0.97

Emergency Egress Battery Packs

The emergency battery backup is integral to the luminaire — no external housing or back box is required. The emergency battery will power the luminaire for a minimum duration of 90 minutes and deliver minimum initial output of 550 lumens. Both battery pack options are CEC compliant.

Battery Type	Minimum Temperature Rating	Power (Watts)	Controls Option	Ordering Example
Standard	0°C	4W	E4WH	WPX2 LED 40K MVOLT **E4WH** DDBXD
Cold Weather	-20°C	14W	E14WC	WPX2 LED 40K MVOLT **E14WC** DDBXD

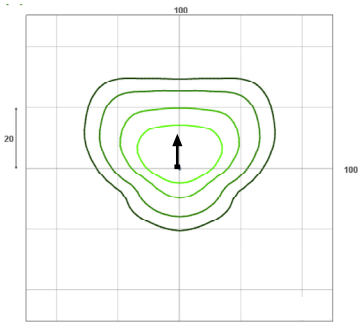
Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit the Lithonia Lighting WPX LED homepage. Tested in accordance with IESNA LM-79 and LM-80 standards

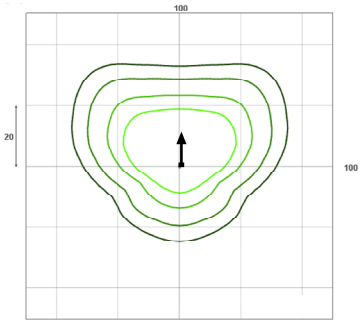
LEGEND

- 0.1 fc
- 0.2 fc
- 0.5 fc
- 1.0 fc

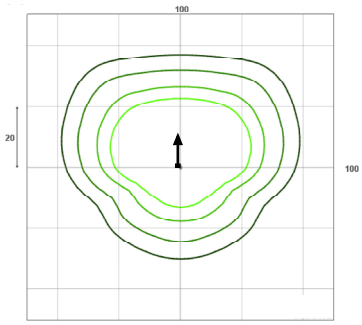
WPX1 LED P1



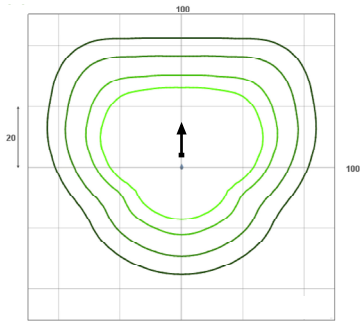
WPX1 LED P2



WPX2 LED



WPX3 LED



Mounting Height = 12 Feet.

© 2020-2022 Acuity Brands Lighting, Inc. All rights reserved.

25 Foot Square Steel Light Pole, 4 Inch Width, 7 Gauge, Dark Bronze, Quick Ship

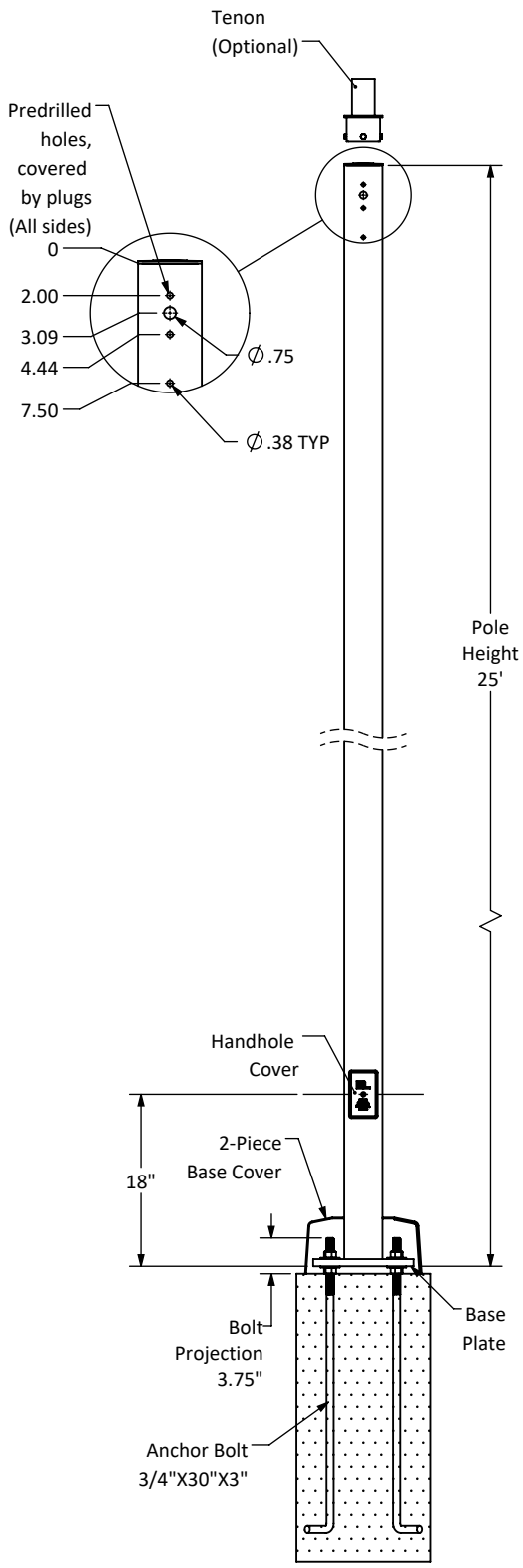
WARELIGHT select

Job: _____

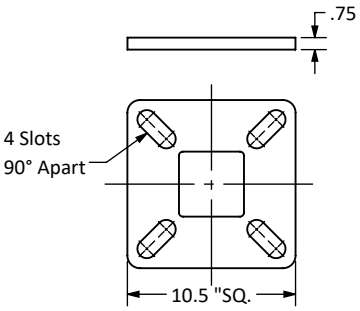
Job Site: _____ State: _____ Client Name: _____

Notes: _____ Approvals: _____ Date: _____

Pole Top Options: A removable top cap is provided.
Predrilled mounting holes are standard.
2-3⁄8 inch removable steel tenon is provided as an option.
Pole Shaft and Height: 4 inch square 7 gauge commercial grade steel with minimum yield strength of 50,000 psi. Pole height is 25 ft.
Handhole: 3” X 5” size reinforced handhole is located at 18 inches from the base. A ground lug with set screw is located near the handhole opening for proper grounding of the pole.
Color: Dark Bronze.
Anchor Bolts: A set of 4 galvanized steel anchor bolts is provided with each pole assembly. Each anchor bolt includes 2 nuts and 2 washers. Top portion of the anchor bolt is threaded for securing and leveling the pole with the provided nuts and washers. An actual size paper anchor bolt template is provided.
Bolt Circle: 8.5 inches (Bolt Circle Range: 8"-11").
Base Cover: Two-piece ABS plastic base cover is provided.
Warranty: 1 Year.
Foundation design: Foundation should be designed by an engineer familiar with local soil and wind conditions as well as local code where the pole(s) will be installed.



Maximum EPA with 1.3 Gust Factor (Square Feet)					Pole Weight (lbs)
110 mph	120 mph	130 mph	140 mph	150 mph	
10.9	7.6	6.0	4.0	1.9	240



Base Plate

Disclaimer: All dimensions and specifications are subject to change without any notice. Energy Light, Inc. is not responsible for any claims arising from improper loading (what is attached to the light pole), improper use, incorrect foundation design and/or installation.

WARELIGHT

INDUSTRIAL AND COMMERCIAL
LIGHTING MFR SINCE 2003

PROJECT NAME
ITEM #
FIXTURE SCHEDULE
NOTES

WL-PLF G3 Series

The Quasar G3 LED Area/Parking Lot lighting fixture is applicable for both commercial and residential illumination at the places where you need a large amount of light such as parking lots, driveways, outdoor courts (basketball, tennis, volleyball, etc.).

Specifications – 300W

CRI	>80	Surge	10kV
Light Source	LED	Housing	Die-cast Aluminum
Dimmable	1-10V	Mount	Adjustable Slipfitter
CCT	5000K	Operating Temperature	-40° C to 45° C (-40° F to 104° F)
Wattage	300W	Optic	Type 3 or Type 5
LPW	133	Voltage	120-277
Finish	Bronze	Warranty	5 Years
Ratings	cULus, IP65		

** Data is considered to be representative of the series. Actual production may vary between up to ±10% of initial delivered lumens.

c UL us IP65 WARRANTY 5 YEARS

2750 South 163rd St., New Berlin, WI 53151 • (888) 454-4480
Website: Warehouse-lighting.com • Email: requests@warehouse-lighting.com

WARELIGHT

INDUSTRIAL AND COMMERCIAL LIGHTING MFR SINCE 2003

PROJECT NAME
ITEM #
FIXTURE SCHEDULE
NOTES

Order Information

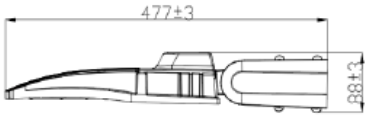
Area Light Quasar Gen 3

Example: WL-PLF-150W-40K-T3-B-ASF-MV-G3

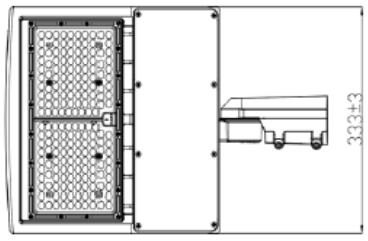
Fixture Type	Wattage	CCT	Optic	Finish	Mount	Voltage	Generation
WL-PLF	**100W** 100 Watts **150W** 150 Watts **300W** 300 Watts	**40K** 4000 *(40K only available in 150W)* **50K** 5000K	**T3** Type 3 *(150W T3 in 4000K only)* **T5** Type 5	**B** Bronze	**ASF** Adjustable Slipfitter **APM** Round/Square Pole Mount **AYM** Adjustable Yoke Mount	**MV** Universal Voltage 120-277V	**G3** Generation 3

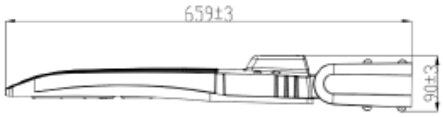
DLC Information

Item	DLC Version	DLC ID	Wattage	Lumens*
WL-PLF-100W-50K-T5-B-ASF-MV-G3	5.1P	S-ZOXJD1	100	13582
WL-PLF-100W-50K-T3-B-ASF-MV-G3	5.1P	S-9HNBW8	100	13403
WL-PLF-150W-40K-T3-B-ASF-MV-G3	5.1P	S-ZE6PBT	150	19059
WL-PLF-150W-50K-T3-B-ASF-MV-G3	5.1P	S-C0TN7O	150	19582
WL-PLF-150W-50K-T5-B-ASF-MV-G3	5.1P	S-6PUX80	150	19857
WL-PLF-300W-50K-T3-B-ASF-MV-G3	5.1P	S-4OSYLF	300	40473
WL-PLF-300W-50K-T5-B-ASF-MV-G3	5.1P	S-BEO32X	300	41066

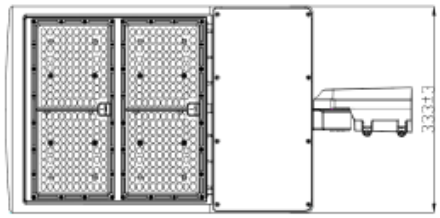


WL-PLF-100W/150W





WL-PLF-300W



2750 South 163rd St., New Berlin, WI 53151 • (888) 454-4480
Website: Warehouse-lighting.com • Email: requests@warehouse-lighting.com

PRELIMINARY STORMWATER DESIGN SUMMARY TECHNICAL MEMORANDUM

Date: 11/4/2025
To: City of Sherwood
From: Blair Carlson, PE, CH - Principal
Project Name: GH McCulloch
AKS Job No.: 8627-06
Project Site: Tax Map 2S129DC Tax Lot 1600, City of Sherwood, OR

Subject: GH McCulloch Stormwater Design Summary

PRELIMINARY

The stormwater quality, quantity, and hydromodification of this site has been previously addressed in previous stormwater reports submitted for projects AFP Systems and JB Mac (LU2022-017). A portion of this site frontage and shared access are covered under a fee in lieu approved under the AFP Systems and JB Mac projects with the City of Sherwood (City) and Clean Water Services (CWS) in accordance with the stormwater connection permit number LU2022-017. This project area includes the undeveloped portion of Tax Lot 1600, previously designated as Tax Lot 600 and 700 prior to lot consolidation under LU2022-23, designated as "Parcel 1" on previous stormwater reports to date, and has been included in approved stormwater management analysis for Tax Lot 500, Tax Lot 1600, and frontage improvements of SW Oregon Street. The Final Stormwater Report, dated February 2025, referenced by this memo is included in Attachment A. In Attachment A, this project is referenced as future "Part 2". The stormwater analysis and report of the public system and regional facility is being prepared by Kittleson & Associates on behalf of the City of Sherwood (City). Per discussions with City staff, the City is prepared to accept a portion of this stormwater runoff from the development of Tax Lot 1600 in their regional facility. The purpose of this technical memo is to evaluate the proposed stormwater management for this site in accordance with CWS and City requirements.

Existing Conditions

The portion of this site being analyzed consists of the undeveloped portion of Tax Lot 1600. The site is covered in existing vegetation with moderate slopes. The site has a high point of ±187 and a low point of ±176. Stormwater sheet flows northeast across the site to the existing low point.

Proposed Conditions

The proposed improvements include a new building, shared access, landscaping, asphalt paving, and associated grading activities. The improvements will result in a net increase of ±90,565 SF of impervious area. Stormwater runoff will be captured by a filter cartridge catch basin and slotted

drains. The runoff captured by the slotted drains will be conveyed to underground detention chambers, and then to the filter cartridge catch basin. The filter cartridge catch basin outfalls to the existing manhole in the shared driveway, where it is ultimately routed to the public system in SW Oregon Street.

CWS Requirements

- Stormwater Quantity
    - The improvements of this site trigger the criteria found in CWS *Design and Construction Standards (R&O 19-5 as amended by R&O 19-22), Section 4.02: Water Quantity Control Requirements*. The following table summarizes the peak flow calculations of the contributing basin that have been reported to be routed to the regional facility, and the peak flow calculations for the contributing basin to the regional facility for post-development conditions of this project:

Table 1: Pre and Post Development On-Site Flows (Part 2)

Recurrence Interval (Years)	Peak Existing On-site Flows (cfs)*	Peak Post-Development On-Site Flows (cfs)*	Peak On-site Flow Increase or (Decrease) – (cfs)*	Peak Frontage (Off-Site) Flows Previously Approved with Fee-in-Lieu	Total Peak Post-Development Flows Proposed to Regional Facility (cfs)**
2	0.23 [50% of 2-yr=0.11]	0.26	0.03 [50% of 2-yr: 0.15]	0.16	0.42
5	0.40	0.33	(0.07)	0.21	0.54
10	0.51	0.41	(0.10)	0.23	0.64
25	0.66	0.74	0.08	0.26	1.00

*Does not include flows from frontage improvements previously approved with fee-in-lieu.

***Includes flows from frontage improvements previously approved with fee-in-lieu.

PRELIMINARY

- Hydromodification
    - Per CWS *R&O 19-5 as amended by R&O 19-22, Section 4.03: Hydromodification Approach Requirements*, because the improvements of this project will result in the addition and/or modification of 12,000 SF of impervious surface, Hydromodification Assessment is required. The Hydromodification Approach Category for medium projects, between 12,000 SF and 80,000 SF of newly added impervious area, is Category 2.
        - Hydromodification for the private improvements of this project will be addressed by peak-flow matching detention, to the extent practical, with excess flows to be proposed to the City to be accepted to their future regional facility accompanied by fee-in-lieu.
- Water Quality
    - Water quality of this site has already been addressed by agreement for the City of Sherwood to accept all runoff from this site at their regional facility for treatment. That agreement was for the undeveloped conditions of this project, and Per *CWS R&O 19-5 as amended by R&O 19-22, Section 4.04: Water Quality Treatment Requirement*, water quality mitigation is required when a site creates or modifies 1,000 SF of impervious surface, therefore water quality mitigation is required for these improvements. The required treatment area is as follows:
        - Area = New Impervious + 3(Modified Imp. – Permanently Removed Imp.)
            - Area = 90,565 SF + 3(0 SF – 0 SF) = 90,565 SF
    - Water quality management for the new impervious surfaces from the improvements of this site will be addressed by 5 Contech StormFilter ZPG Cartridges.

Downstream Analysis

Stormwater runoff from the improvements of this project are not anticipated to be increased from previously reported conditions. Therefore, there will be no negative impacts to downstream.

Attachments:

Exhibit A: *AFP Systems Site Improvements Final Stormwater Report* (February 2025)
Exhibit B: Pre-Improvements Basin Map and HydroCAD Reports
Exhibit C: Post-Improvements Basin Map and HydroCAD Reports
Exhibit D: Water Quality Calculations

PRELIMINARY

Exhibit A:
AFP SYSTEMS SITE IMPROVEMENTS FINAL STORMWATER REPORT (February, 2025)

PRELIMINARY

AFP Systems Site Improvements
Sherwood, Oregon

Final Stormwater Report

PRELIMINARY

Date: February 2025

Client: AFP Systems Site Improvements, LLC
19435 SW 129TH AVE
Tualatin, OR 97062

Engineering Contact: Blair Carlson, PE, CH - Principal
(503) 563-6151 | carlsonb@aks-eng.com

Prepared By: Jay Gostynski
(503) 563-6151 | gosytnskij@aks-eng.com

Engineering Firm: AKS Engineering & Forestry, LLC
12965 SW Herman Road, Suite 100
Tualatin, OR 97062

AKS Job Number: 8627-03 & 8627-04

REGISTERED PROFESSIONAL ENGINEER
82830PE
OREGON
APRIL 8, 2009
BLAIR G. CARLSON

RENEWAL DATE: 12/31/2025

AKS ENGINEERING & FORESTRY

www.aks-eng.com

Contents

1.0 Purpose of Report **2**
2.0 Project Location/Description **2**
3.0 Regulatory Design Criteria **2**
3.1 Stormwater Quantity 2
3.2 Hydromodification 2
3.3 Stormwater Quality 3
4.0 Design Methodology **4**
5.0 Design Parameters **4**
5.1 Design Storms 4
5.2 Predeveloped Site Conditions 4
5.2.1 Site Topography 4
5.2.2 Land Use 4
5.3 Soil Type 5
5.4 Post-Developed Site Conditions 5
5.4.1 Site Topography 5
5.4.2 Land Use 5
5.4.3 Description of Off-Site Contributing Basins 5
6.0 Stormwater Analyses **5**
6.1 Proposed Stormwater Conduit Sizing and Inlet Spacing 5
6.2 Proposed Stormwater Quality Control Facility 5
6.3 Hydromodification 6
6.4 Proposed Stormwater Quantity Control Facility 6
6.5 Temporary Stormwater Management of Parcel 1 (Part 2) 7
6.6 Downstream Analysis 7

Tables

Table 5-1: Rainfall Intensities 4
Table 5-2: Hydrologic Soil Group Ratings 5
Table 6-1: Pre and Post Development On-Site Flows (Part 1) 6
Table 6-2: Pre and Post Development On-Site Flows (Part 2) 7
Table 6-3: Temporary Sediment Trap (Part 2, Parcel 1) 7

Exhibits

Exhibit A: Vicinity Map

Appendices

Appendix A: Pre-Developed Catchment Basins Map and Peak Flow Calculations - HydroCAD
Appendix B: Post-Developed Catchment Basins Map and Peak Flow Calculations - HydroCAD
Appendix C: TR-55 Runoff Curve Numbers
Appendix D: USDA-NRCS Soil Resource Report
Appendix E: Stormwater Quality Calculations

PRELIMINARY

FINAL STORMWATER REPORT

AFP SYSTEMS SITE IMPROVEMENTS
SHERWOOD, OREGON

1.0 Purpose of Report

The purpose of this report is to analyze the effects the proposed development will have on the existing stormwater conveyance system; document the criteria, methodology, and informational sources used to design the proposed stormwater system; and present the results of the preliminary hydraulic analysis.

2.0 Project Location/Description

The AFP Systems Site Improvements project is located at Tax Lot 500 and Parcel 1 (formerly Tax Lots 600 and 700) Washington County Tax Map 2S 1 29DC, Sherwood, Oregon. Improvements are split into two parts. Part 1 encompasses Tax Lot 500 and includes the construction of an industrial building, paved parking, private underground utilities, and stormwater management facility. Part 2 encompasses Parcel 1 and includes the construction of a shared driveway and frontage improvements to SW Oregon Street. Per discussion with City of Sherwood staff, stormwater runoff from Part 1 of the development will be managed by a private facility while runoff from Part 2 of the development will be routed to the public system for treatment at a regional facility.

3.0 Regulatory Design Criteria

3.1 Stormwater Quantity

Per *CWS Design and Construction Standards Manual for Sanitary Sewer and Surface Water Management* (R&O 19-5, as amended by R&O 19-22), Section 4.02.1, Mitigation Requirement, the District or City shall determine which of the following techniques may be used:

a. *Construction of permanent on-site stormwater quantity detention facilities designed in accordance with this Chapter; or*

b. *Enlargement or improvement of the downstream conveyance system in accordance with this Chapter and Chapter 5; or*

c. *Payment of a Storm and Surface Water Management System Development Charge (SWM SDC), as provided in CWS Ordinance 28, which includes a water quantity component to meet these requirements. If district or City requires that an on-site detention facility be constructed, the development shall be eligible for a credit against SWM SDC fees, as provided in District Ordinance and Rules.*

Per R&O 19-5, as amended by R&O 19-22, Section 4.02.2, Criteria for Requiring On-Site Detention for Conveyance Capacity, on-site detention is required when any of the following conditions exist:

1. *There is an identified downstream deficiency and the District or City determines that detention rather than conveyance system enlargement is the more effective solution.*

2. *There is an identified regional detention site within the boundary of the development.*

3. *Water quantity facilities are required by District-adopted watershed management plans or subbasin master plans or District- approved subbasin strategy.*

3.2 Hydromodification

Per R&O 19-5, as amended by R&O 19-22, Section 4.03, Hydromodification Approach Requirements, implementing or funding techniques to reduce impacts to the downstream receiving water body is

PRELIMINARY

required when a new development or other activities create or modify 1,000 square feet or more of impervious surfaces or increase the amount or rate of surface water leaving the site. The funding can be directed, or the following techniques can be implemented to reduce impacts to the downstream receiving water body:

a. *Construction of permanent LIDA designed in accordance with this Chapter; or*

b. *Construction of a permanent stormwater detention facility designed in accordance with this Chapter; or*

c. *Construction or funding of a hydromodification approach that is consistent with a District-approved subbasin strategy; or*

d. *Payment of a Hydromodification Fee-In-Lieu.*

Per R&O 19-5, as amended by R&O 19-22, Section 4.03.3, the receiving reach for this project is Rock Creek. The Risk Level for the receiving reach identified for this project is Low. The Development Class was determined using the Hydromodification Map provided by CWS. The project site is classified as a Developed Area. Per Section 4.08.1, Impervious Area Used in Design, the project site is classified as a Large Project as it is greater than 80,000 square feet. Using these input parameters, per Table 4-2, Hydromodification Approach Project Category Table (shown below), the project falls within Category 2. See details in the appendices of this report for further information.

TABLE 4-2
HYDROMODIFICATION APPROACH PROJECT CATEGORY TABLE

<table>
<tr><th>Development Class/ Risk Level</th><th>Small Project 1,000 – 12,000 SF</th><th>Medium Project >12,000 – 80,000 SF</th><th>Large Project > 80,000 SF</th></tr>
<tr><td>Expansion/High</td><td rowspan="6">Category 1</td><td rowspan="2">Category 3</td><td rowspan="5">Category 3</td></tr>
<tr><td>Expansion/ Moderate</td></tr>
<tr><td>Expansion/ Low</td><td>Category 2</td></tr>
<tr><td>Developed/ High</td><td>Category 3</td></tr>
<tr><td>Developed/ Moderate</td><td rowspan="2">Category 2</td><td rowspan="2">Category 2</td></tr>
<tr><td>Developed/ Low</td></tr>
</table>

Table 4-2 from R&O 19-5, as amended by R&O 19-22

Per R&O 19-5, as amended by R&O 19-22, Section 4.03.5b, Hydromodification Approach Selection – Category 2, any of the following options may be used to address hydromodification:

1. *Infiltration facility, using the Standard LIDA Sizing, described in Section 4.08.5; or*
2. *Peak-Flow Matching Detention, using design criteria described in Section 4.08.6; or*
3. *Combination of Infiltration facility and Peak-Flow Matching Detention, using criteria described in Section 4.08.5 and 4.08.6; or*
4. *Any option listed in Category 3.*

3.3 Stormwater Quality

Per R&O 19-5, as amended by R&O 19-22, Section 4.04, Water Quality Treatment Requirements, implementing or funding a permanent water quality approach is required when a new development or other activities create or modify 1,000 square feet or more of impervious surfaces, or increase the amount

PRELIMINARY

of stormwater runoff or pollution leaving the site. Unless there is a more efficient and effective regional approach within the subbasin that was designed to incorporate the development, or there is an approach in the subbasin which is demonstrated to have the capacity to treat the site.

This project will create approximately 163,575 square feet of new impervious area, therefore requiring water quality mitigation. Stormwater quality management for Part 1 of this project will be met by the combination of a stormwater quality manhole and new stormwater facility for subbasin 1.1, and a stormwater swale for subbasin 1.2. Stormwater quality management for Part 2 of this project will be met by a public regional stormwater facility.

Per discussion with City of Sherwood Staff, all stormwater runoff resulting from improvements to Parcel 1 is to be routed to the public system. This runoff will be treated at a public regional facility. A stormwater report being completed by Kittelson & Associates on behalf of the city of Sherwood includes the subject site within their area of analysis. An exhibit included as Appendix B of this report highlights the area to be routed to the regional facility.

4.0 Design Methodology

The Santa Barbara Urban Hydrograph (SBUH) Method was used to analyze stormwater runoff from the site. This method uses the Soil Conservation Service (SCS) Type 1A 24-hour design storm. HydroCAD 10.00-22 computer software aided in the analysis. Representative runoff curve numbers (CN) were obtained from the Natural Resources Conservation Service (NRCS) *Technical Release 55* and are included in the appendices.

5.0 Design Parameters

5.1 Design Storms

Stormwater mains, inlets, and laterals for the site are placed at locations that adequately collect and convey the stormwater for the proposed improvements. Per R&O 19-5, as amended by R&O 19-22, Section 5.05.2, the stormwater analysis used the 24-hour design storm for the evaluation and design of the existing and proposed stormwater facilities. The following 24-hour rainfall intensities from Section 4.08.2 Table 4-4 were used as the design storms for the recurrence interval:

Table 5-1: Rainfall Intensities

Recurrence Interval (Years)	Total Precipitation Depth (Inches)
2	2.50
5	3.10
10	3.45
25	3.90

5.2 Predeveloped Site Conditions

5.2.1 Site Topography

Existing on-site grades generally vary from ±2 to 5 percent, with most of the site draining to the northeast. The site has a high point of ±187 feet along the western property line and a low point of ±162 feet in the northeast corner. Stormwater eventually sheet flows off the site to the east currently.

5.2.2 Land Use

The property is zoned Light Industrial (LI). The property is open grassland and is currently undeveloped.

PRELIMINARY

5.3 Soil Type

The soil beneath the project area is classified as Aloha Silt Loam and Quatama Loam, according to the NRCS Web Soil Survey for Washington County. The following table outlines the Hydrologic Soil Group rating for the soil type:

Table 5-2: Hydrologic Soil Group Ratings

NRCS Map Unit Identification	NRCS Soil Classification	Hydrologic Soil Group Rating
1	Aloha Silt Loam	C
37A	Quatama Loam	C

Further information on this soil type is included in the Geotech Report and NRCS Soil Resource Report located in the appendices of this report.

5.4 Post-Developed Site Conditions

5.4.1 Site Topography

The on-site grade will be modified to create a flat pad for the new building and gently sloped impervious surfaces for proper drainage. All stormwater from the new impervious areas will be collected by new or existing stormwater infrastructure and will not impact surrounding properties. Post-Development flow paths will generally mimic Pre-Development flow paths.

5.4.2 Land Use

The property's zoning will remain LI.

5.4.3 Description of Off-Site Contributing Basins

The surrounding properties do not direct any stormwater runoff towards the development area.

6.0 Stormwater Analyses

6.1 Proposed Stormwater Conduit Sizing and Inlet Spacing

The proposed storm system pipes will be sized using Manning's equation to convey the peak flows from the 25-year storm event.

6.2 Proposed Stormwater Quality Control Facility

Stormwater quality management for Part 1 of this project will be met by the combination of a stormwater quality manhole and new private stormwater facility for subbasin 1.1, and a private stormwater swale for subbasin 1.2. The new stormwater quality manhole, facility and swale have been designed per CWS Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as amended by R&O 19-22). The stormwater quality manhole, stormwater facility, and stormwater swale have been sized to treat runoff from all impervious surfaces on Tax Lot 500. Detailed calculations are included as Appendix E.

Stormwater quality management for Part 2 of this project will be met by a public regional stormwater facility. Per discussions with City of Sherwood Staff, all stormwater runoff resulting from improvements to Parcel 1 is to be routed to the public system. This runoff will be treated for water quality at a public regional facility. A stormwater report being completed by Kittelson & Associates on behalf of the City of Sherwood includes the subject site within their area of analysis. An exhibit included as Appendix B of this report highlights the area to be routed to the regional facility.

PRELIMINARY

6.3 Hydromodification

Part 1 of this project will create approximately 140,480 SF of new impervious surface. The proposed site improvements will reduce impacts to the downstream receiving water body by implementing a private stormwater quality facility designed per CWS standards. Per R&O 19-5, as amended by R&O 19-22, Section 4.03.5b, Hydromodification Approach Selection – Category 2, hydromodification will be met to the fullest potential of the site by peak-flow matching. Post-developed runoff rates from the site will not exceed the predeveloped runoff rates for 50% of the 2-year, 5-year and 10-year design storms, when on-site stormwater infrastructure is accounted for.

Part 2 of this project will create approximately 23,095 SF of new impervious surface. Per discussions with City of Sherwood Staff, all stormwater runoff resulting from improvements to Parcel 1 is to be routed to the public system. This runoff will be managed by a public regional facility. A stormwater report being completed by Kittelson & Associates on behalf of the City of Sherwood includes the subject site within their area of analysis. An exhibit included as Appendix B of this report highlights the area to be routed to the regional facility.

6.4 Proposed Stormwater Quantity Control Facility

Stormwater quantity management for the newly created impervious areas in Part 1 will be addressed by the construction of a stormwater quality facility in the northeast corner of the site. The following table summarizes the pre and post developed flows from the stormwater facility. Post developed flows are limited to less than the allowable pre-development peak flows, as outlined within CWS stormwater quantity and hydromodification management requirements.

See Equations 1 for additional information regarding the allowable release rate from the Private Facility for the 2-yr storm event.

<u>Equation 1: 50 percent of the 2-Year Storm</u>

$$Pre\ Developed\ 2\ Year = 0.42\ cfs$$

$$Required\ Private\ Facility\ Flow\ Reduction\ (50\%\ of\ 2\ Year) = \frac{(0.42\ cfs)}{2} = 0.21\ cfs$$

Table 6-1: Pre and Post Development On-Site Flows (Part 1)

Recurrence Interval (Years)	Peak Pre-Development Flows (cfs)	Peak Post-Development Flows (cfs)*	Peak Flow Increase or (Decrease) – (cfs)
2	0.42 (50% of 2-yr=0.21)	0.21	0.00
5	0.73	0.43	(0.30)
10	0.94	0.61	(0.33)
25	1.21	0.82	(0.39)

Based on the peak flow comparison in the table above, the total peak flow rates for the Part 1 project area do not exceed 50% of the 2-year, 5-year, and 10-year design storms.

Stormwater quantity management for the newly created impervious areas in Part 2 will be addressed by a public regional facility operated by the City of Sherwood. The following table summarizes the pre and post developed flows from the Part 2 project area.

PRELIMINARY

Table 6-2: Pre and Post Development On-Site Flows (Part 2)

Recurrence Interval (Years)	Peak Pre-Development Flows (cfs)	Peak Post-Development Flows (cfs)*	Peak Flow Increase or (Decrease) – (cfs)
2	0.28 (50% of 2-yr=0.14)	0.50	+0.36
5	0.48	0.71	+0.23
10	0.61	0.85	+0.24
25	0.78	1.03	+0.25

Based on the peak flow comparison in the table above, the total peak flow rates from the Part 2 project area exceed the 50% of the 2-year, 5-year, and 10-year design storm. Due to the increase in peak flows resulting from Part 2 of the development additional stormwater quantity management will be required. Per discussions with City of Sherwood staff, the City is prepared to accept all stormwater runoff from the development of Parcel 1 in their regional facility. A stormwater report being completed by Kittelson & Associates on behalf of the city of Sherwood provides additional information on how the city will treat and manage this stormwater.

6.5 Temporary Stormwater Management of Parcel 1 (Part 2)

A temporary sediment trap will be installed to manage stormwater runoff from a contributing area of ±1.5 acres until future development of Parcel 1. Stormwater from the contributing area will sheet flow through vegetation surrounding the temporary sediment trap and ultimately discharge to the public system. This analysis is only intended to cover the temporary nature of the proposed conditions until development of Parcel 1. The future conditions of Parcel 1 will require additional analysis and design per CWS and City of Sherwood requirements. See the Post-Developed Catchment Basin Map in Appendix B of this report and Table 6-3 below for additional information.

Table 6-3: Temporary Sediment Trap (Part 2, Parcel 1)

Sediment Trap Area	±2,050 SF
Contributing Basin Area	±1.5 AC
Bottom of Sediment Trap Elevation	±176.50
Beehive Overflow Rim Elevation	±179.50
Emergency Overflow Elevation	±180.70

6.6 Downstream Analysis

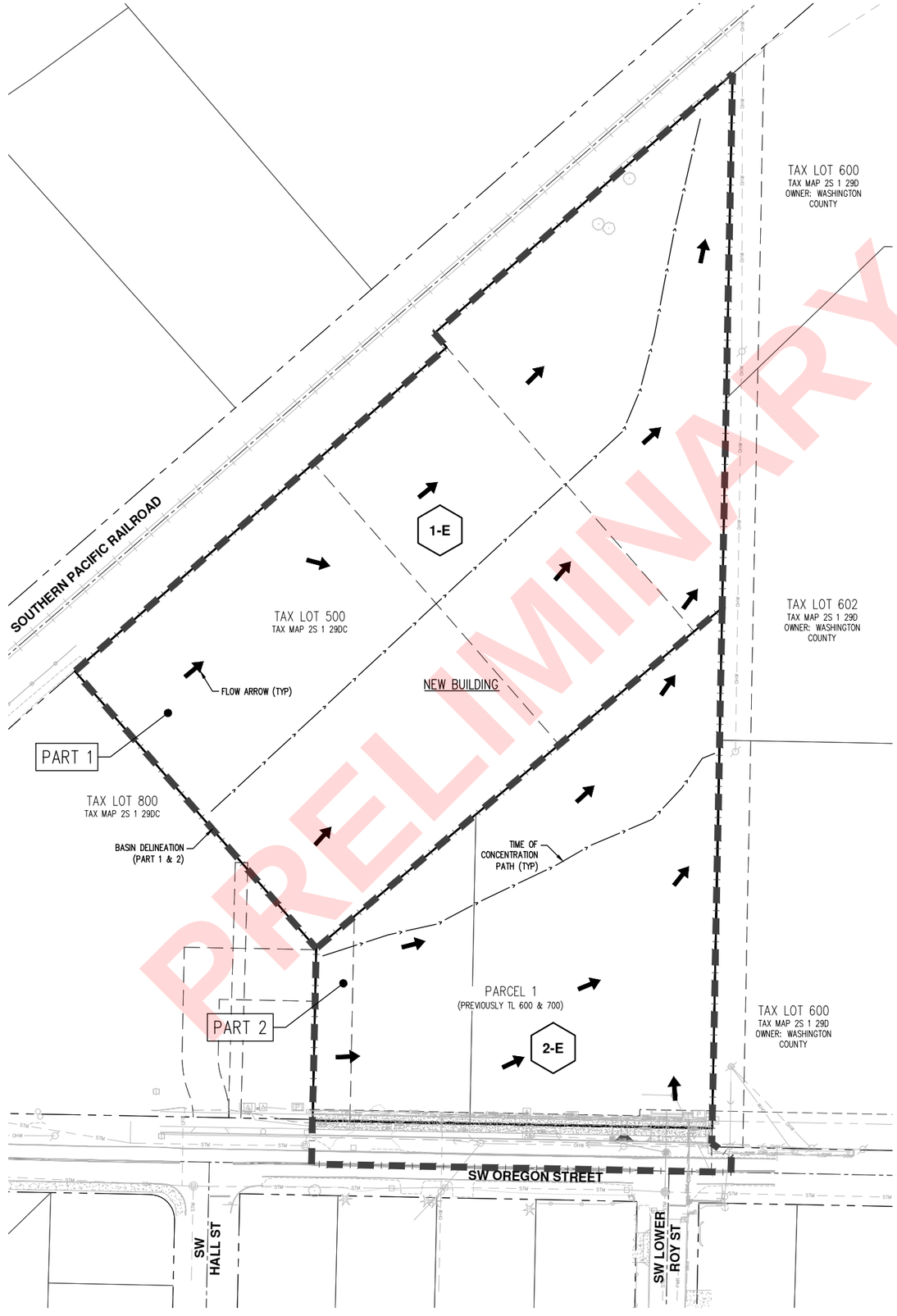
Stormwater from Part 1 of this project discharges to an existing drainage ditch at the northeast corner of the site. Stormwater then sheet flows through existing vegetation approximately 1,000 feet east into Rock Creek. As shown in table 6-1 the private stormwater facility will result in a decrease in peak flow during the 25-year storm event when compared to the pre-developed condition. Therefore, the existing drainage patterns downstream of the project site are expected be adequate and will be retained.

Stormwater from Part 2 of this project discharges to the public stormwater system. As part of the analysis being completed by Kittelson & Associates the downstream capacity of the public system is being assessed. Any deficiencies in the existing network will be identified by Kittelson & Associates and addressed by the City of Sherwood.

PRELIMINARY

Appendix A: Pre-Developed Catchment Basins Map and Peak Flow Calculations - HydroCAD

PRELIMINARY



LEGEND

BASIN DELINEATION (PART 1 & 2)	
SUBBASIN DELINEATION	
TIME OF CONCENTRATION PATH	
SUBBASIN	XX
FLOW ARROW	

NOTES:

1. CATCHMENT AREAS SHOWN ON THIS MAP ARE:
   - SHOWN TO ILLUSTRATE THE SUBCATCHMENT DELINEATION BASED ON EXISTING CONDITIONS PRIOR TO THE JBMAC VENTURES DEVELOPMENT.

N

SCALE: 1"=50 FEET

50 0 10 25 50

ORIGINAL PAGE SIZE: 22" x 34"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

PRE-DEVELOPED CATCHMENT BASINS MAP
OREGON STREET JBMAC
SHERWOOD, OREGON

REGISTERED PROFESSIONAL ENGINEER
OREGON
JUNE 8, 2003
BRIAN G. CARLSON
PRELIMINARY NOT FOR CONSTRUCTION

RENEWS:

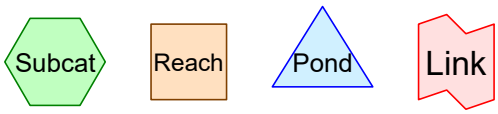
JOB NUMBER:	8627-03
DATE:	01/04/2024
DESIGNED BY:	APC & TJ
DRAWN BY:	APC
CHECKED BY:	BGC

PRE

AKS DRAWING FILE: 8627-03 BASIN AREA PRE.DWG | LAYOUT: PRE

PRELIMINARY

Part 1 **Part 2**



Routing Diagram for 8627-03 Pre-DEV
Prepared by AKS Engineering & Forestry, LLC, Printed 1/4/2024
HydroCAD® 10.00-22 s/n 01338 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.253	79	50-75% Grass cover, Fair, HSG C (1-E, 2-E)
0.090	92	Paved roads w/open ditches, 50% imp, HSG C (2-E)
6.343	**79**	**TOTAL AREA**

PRELIMINARY

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
6.343	HSG C	1-E, 2-E
0.000	HSG D	
0.000	Other	
6.343		**TOTAL AREA**

PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1-E: Existing Runoff Area=175,130 sf 0.00% Impervious Runoff Depth=0.84"
Flow Length=707' Slope=0.0300 '/' Tc=28.3 min CN=79/0 Runoff=0.42 cfs 0.281 af

Subcatchment 2-E: Existing Runoff Area=101,150 sf 1.94% Impervious Runoff Depth=0.87"
Flow Length=363' Tc=22.8 min CN=79/98 Runoff=0.28 cfs 0.167 af

Link 1L: Flow Summary Part 1 Inflow=0.42 cfs 0.281 af
Primary=0.42 cfs 0.281 af

Link 2L: Flow Summary Part 2 Inflow=0.28 cfs 0.167 af
Primary=0.28 cfs 0.167 af

Total Runoff Area = 6.343 ac Runoff Volume = 0.448 af Average Runoff Depth = 0.85"
99.29% Pervious = 6.298 ac 0.71% Impervious = 0.045 ac

PRELIMINARY

Summary for Subcatchment 1-E: Existing

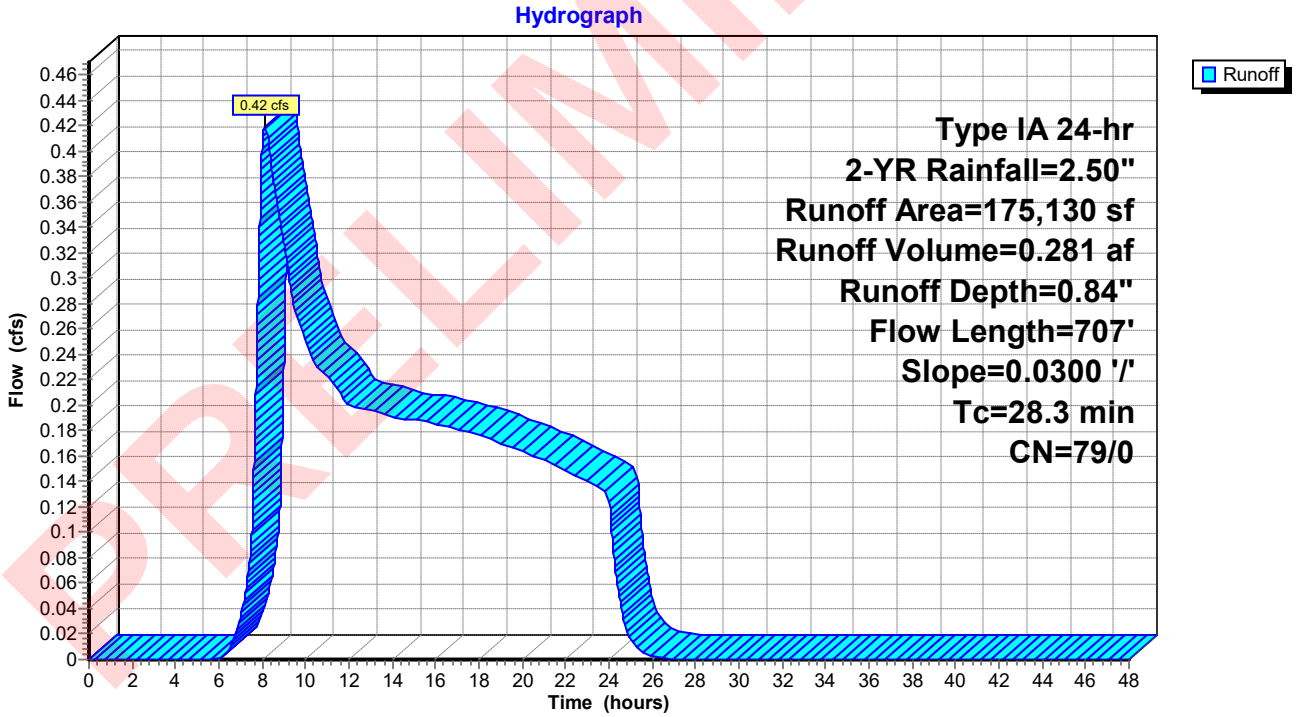
Runoff = 0.42 cfs @ 8.13 hrs, Volume= 0.281 af, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
175,130	79	50-75% Grass cover, Fair, HSG C
175,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0300	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
5.6	407	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
28.3	707	Total			

Subcatchment 1-E: Existing



PRELIMINARY

Summary for Subcatchment 2-E: Existing

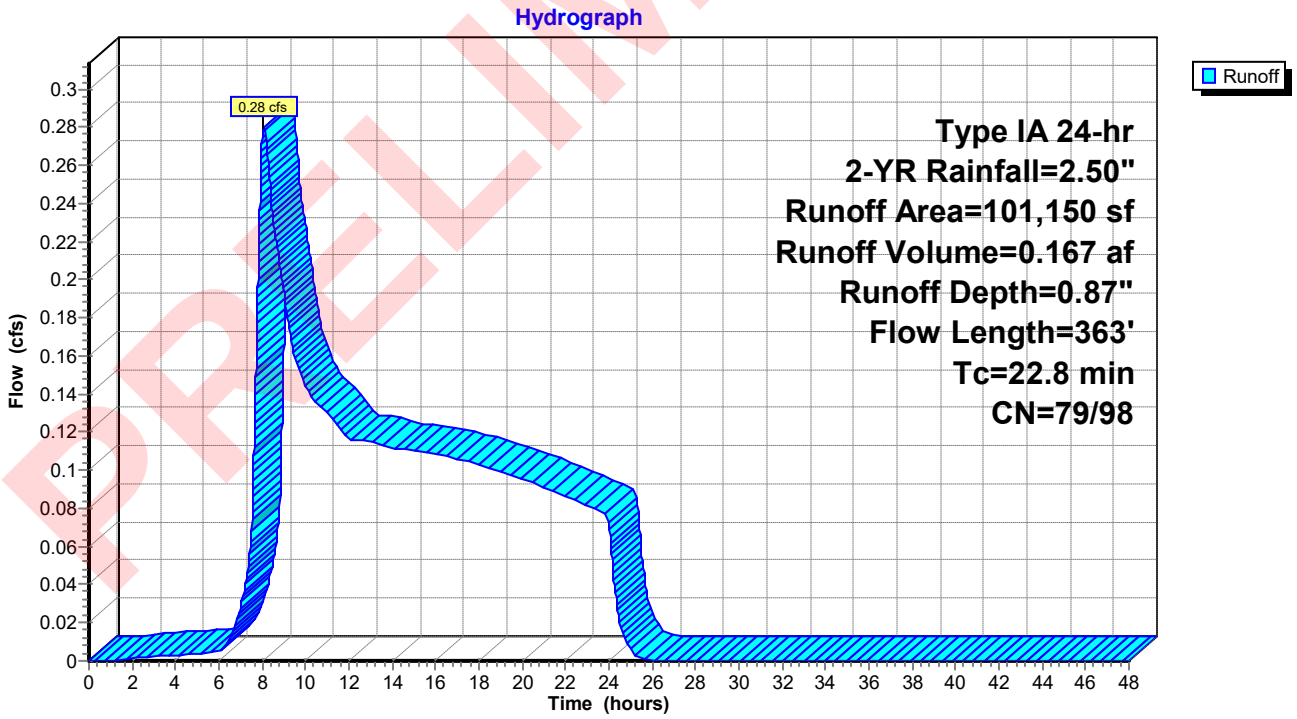
Runoff = 0.28 cfs @ 8.03 hrs, Volume= 0.167 af, Depth= 0.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
97,235	79	50-75% Grass cover, Fair, HSG C
3,915	92	Paved roads w/open ditches, 50% imp, HSG C
101,150	80	Weighted Average
99,193		98.06% Pervious Area
1,958		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



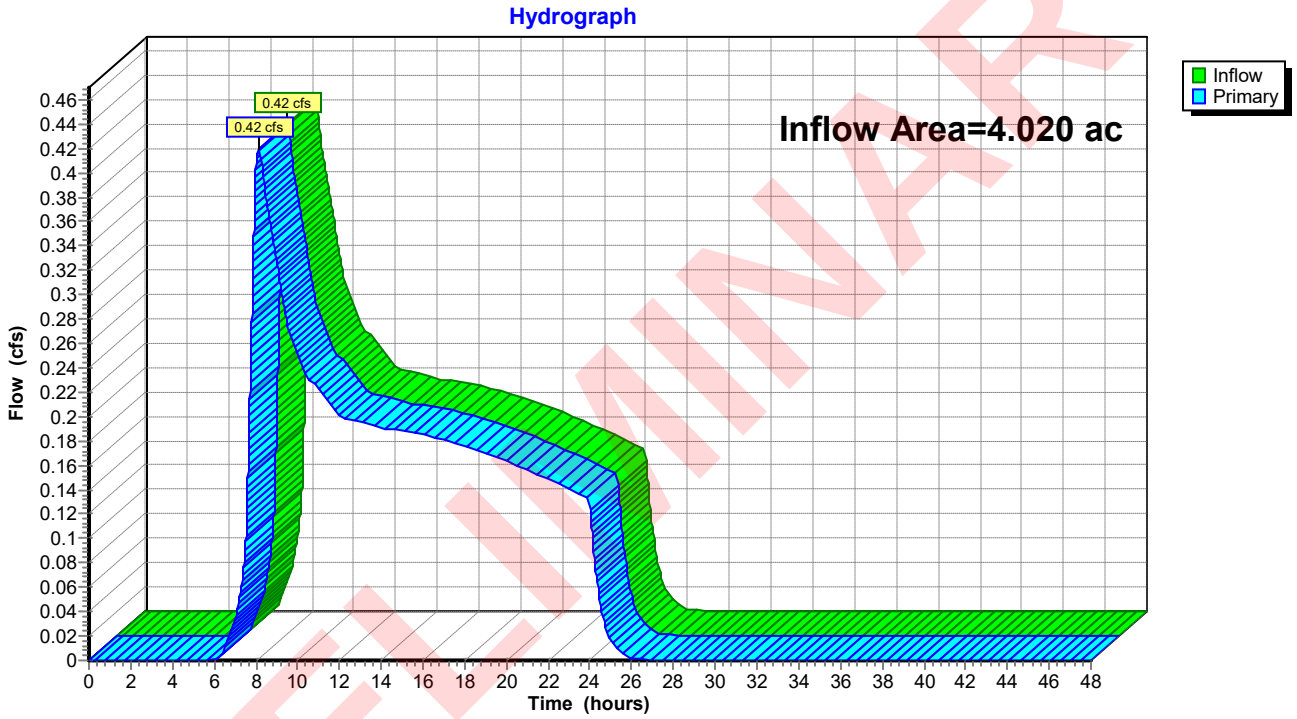
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 0.00% Impervious, Inflow Depth = 0.84" for 2-YR event
Inflow = 0.42 cfs @ 8.13 hrs, Volume= 0.281 af
Primary = 0.42 cfs @ 8.13 hrs, Volume= 0.281 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



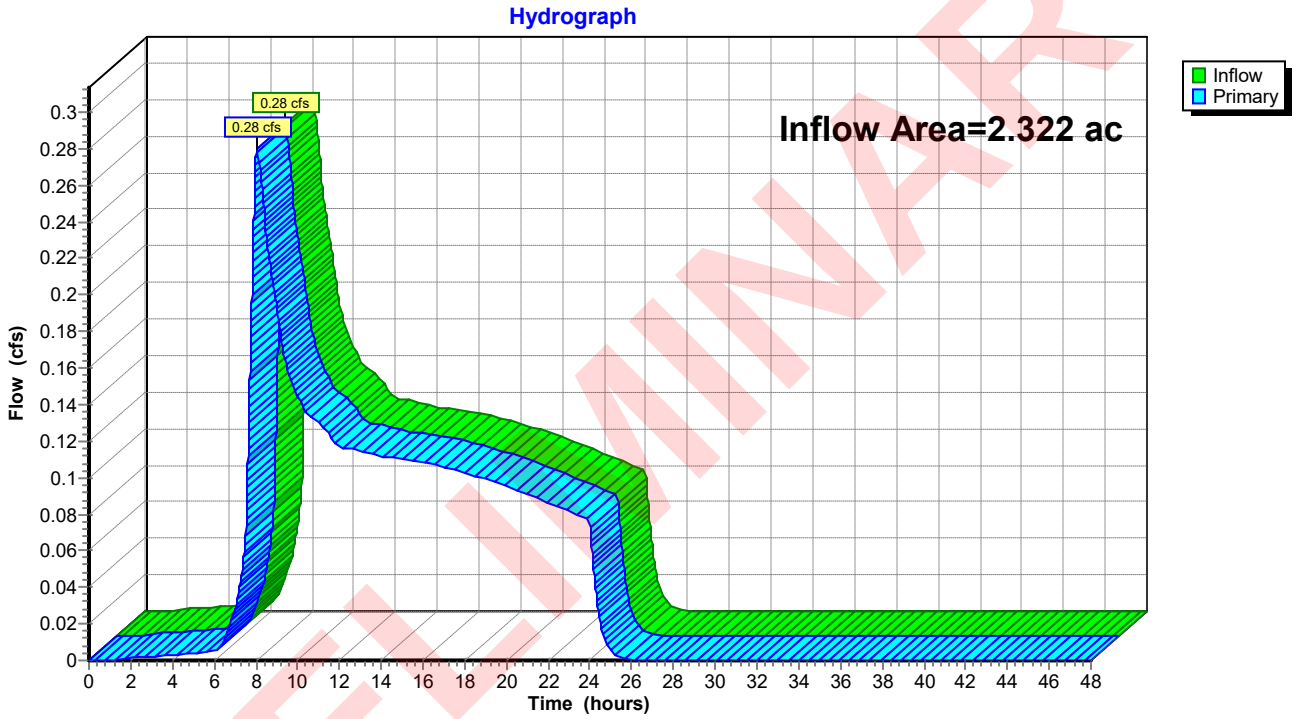
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.322 ac, 1.94% Impervious, Inflow Depth = 0.87" for 2-YR event
Inflow = 0.28 cfs @ 8.03 hrs, Volume= 0.167 af
Primary = 0.28 cfs @ 8.03 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1-E: Existing Runoff Area=175,130 sf 0.00% Impervious Runoff Depth=1.26"
Flow Length=707' Slope=0.0300 '/' Tc=28.3 min CN=79/0 Runoff=0.73 cfs 0.423 af

Subcatchment 2-E: Existing Runoff Area=101,150 sf 1.94% Impervious Runoff Depth=1.29"
Flow Length=363' Tc=22.8 min CN=79/98 Runoff=0.48 cfs 0.250 af

Link 1L: Flow Summary Part 1 Inflow=0.73 cfs 0.423 af
Primary=0.73 cfs 0.423 af

Link 2L: Flow Summary Part 2 Inflow=0.48 cfs 0.250 af
Primary=0.48 cfs 0.250 af

Total Runoff Area = 6.343 ac Runoff Volume = 0.673 af Average Runoff Depth = 1.27"
99.29% Pervious = 6.298 ac 0.71% Impervious = 0.045 ac

PRELIMINARY

Summary for Subcatchment 1-E: Existing

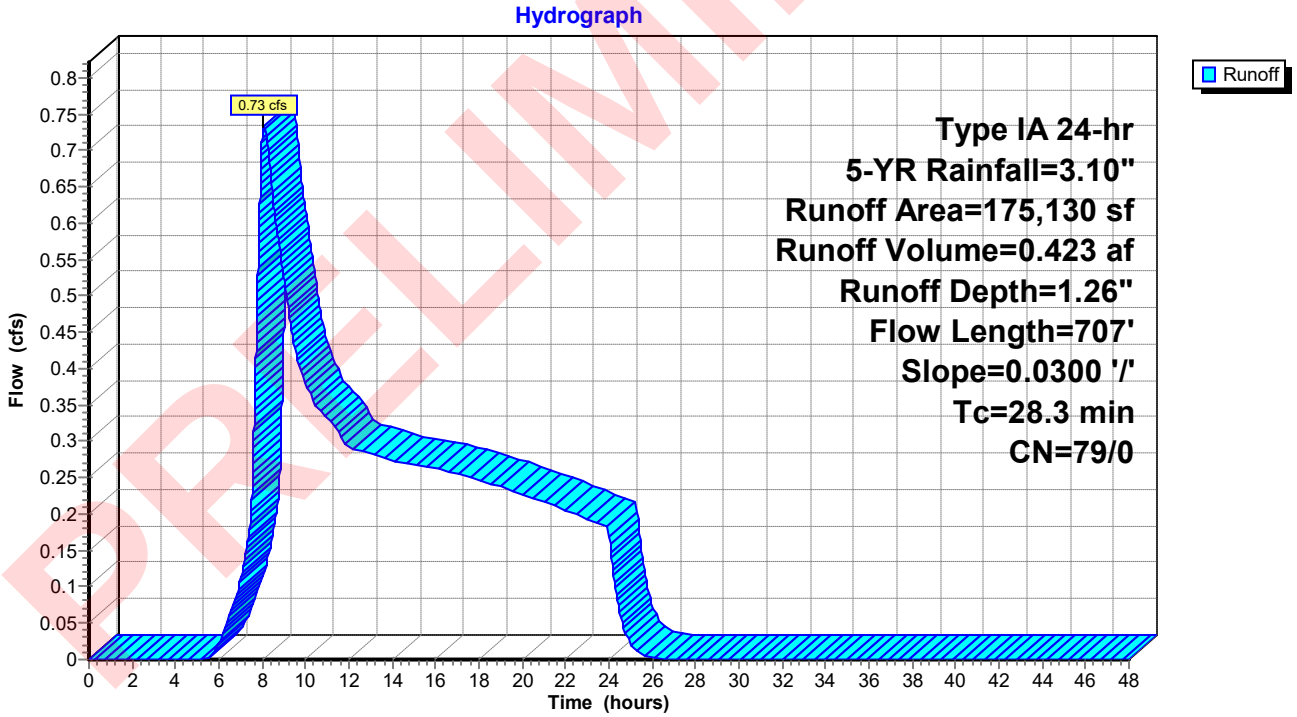
Runoff = 0.73 cfs @ 8.07 hrs, Volume= 0.423 af, Depth= 1.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
175,130	79	50-75% Grass cover, Fair, HSG C
175,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0300	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
5.6	407	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
28.3	707	Total			

Subcatchment 1-E: Existing



PRELIMINARY

Summary for Subcatchment 2-E: Existing

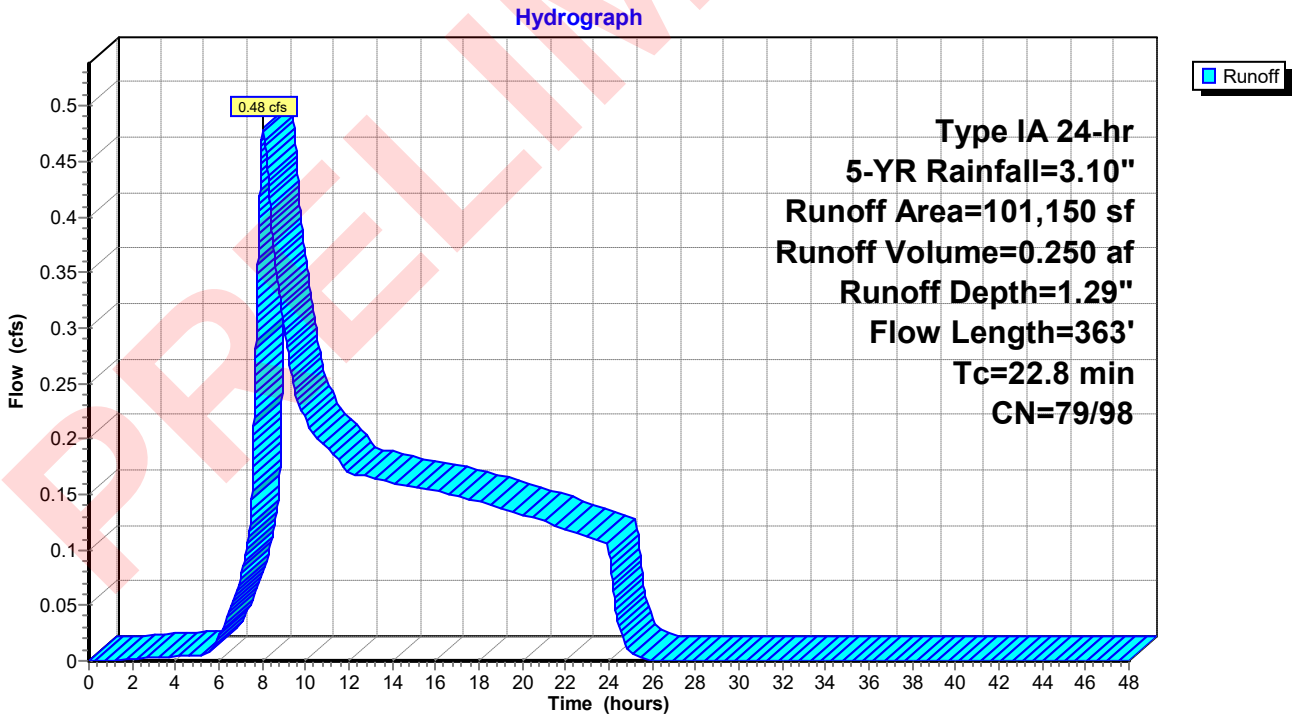
Runoff = 0.48 cfs @ 8.01 hrs, Volume= 0.250 af, Depth= 1.29"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
97,235	79	50-75% Grass cover, Fair, HSG C
3,915	92	Paved roads w/open ditches, 50% imp, HSG C
101,150	80	Weighted Average
99,193		98.06% Pervious Area
1,958		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



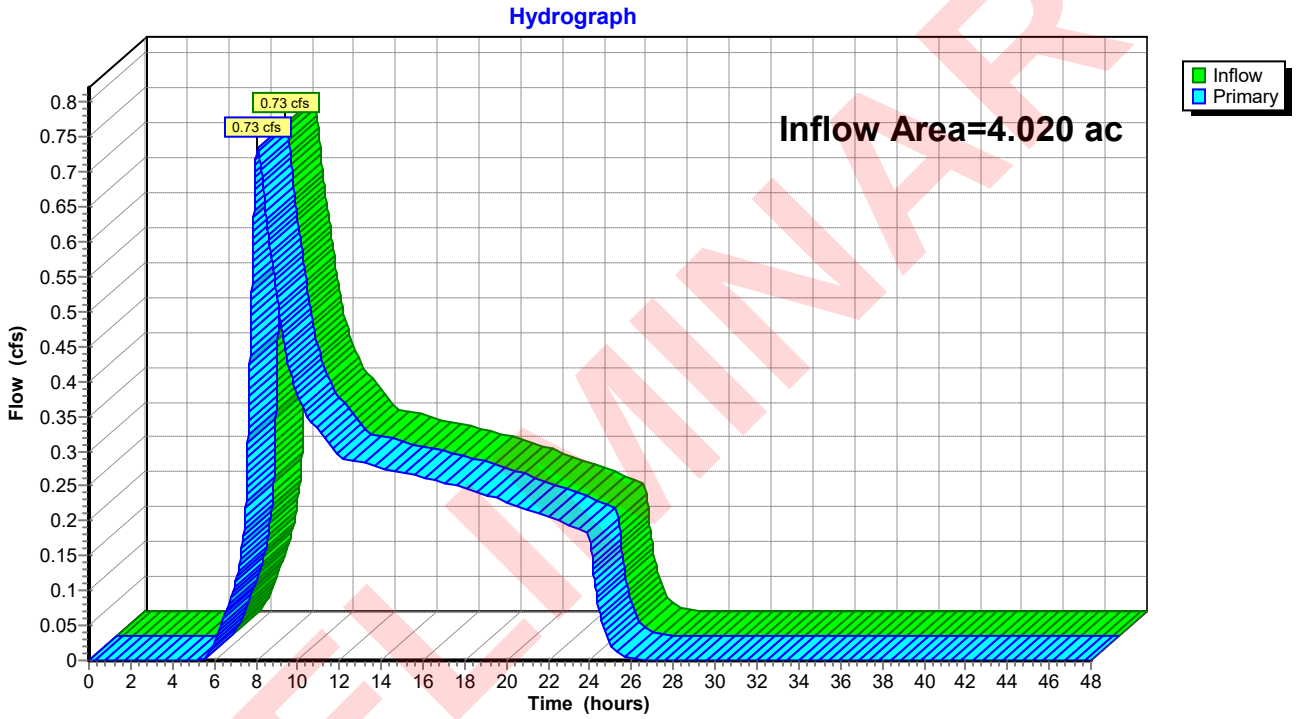
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 0.00% Impervious, Inflow Depth = 1.26" for 5-YR event
Inflow = 0.73 cfs @ 8.07 hrs, Volume= 0.423 af
Primary = 0.73 cfs @ 8.07 hrs, Volume= 0.423 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



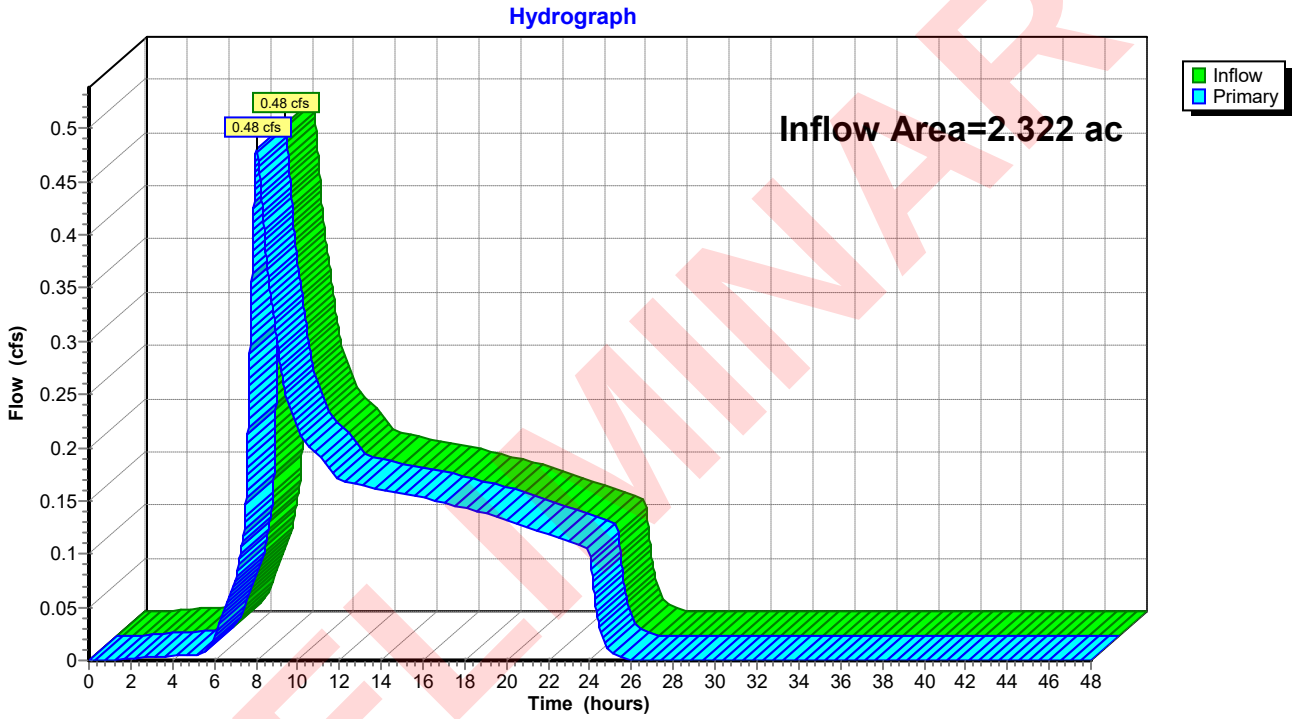
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.322 ac, 1.94% Impervious, Inflow Depth = 1.29" for 5-YR event
Inflow = 0.48 cfs @ 8.01 hrs, Volume= 0.250 af
Primary = 0.48 cfs @ 8.01 hrs, Volume= 0.250 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1-E: Existing Runoff Area=175,130 sf 0.00% Impervious Runoff Depth=1.53"
Flow Length=707' Slope=0.0300 '/' Tc=28.3 min CN=79/0 Runoff=0.94 cfs 0.512 af

Subcatchment 2-E: Existing Runoff Area=101,150 sf 1.94% Impervious Runoff Depth=1.56"
Flow Length=363' Tc=22.8 min CN=79/98 Runoff=0.61 cfs 0.302 af

Link 1L: Flow Summary Part 1 Inflow=0.94 cfs 0.512 af
Primary=0.94 cfs 0.512 af

Link 2L: Flow Summary Part 2 Inflow=0.61 cfs 0.302 af
Primary=0.61 cfs 0.302 af

Total Runoff Area = 6.343 ac Runoff Volume = 0.814 af Average Runoff Depth = 1.54"
99.29% Pervious = 6.298 ac 0.71% Impervious = 0.045 ac

PRELIMINARY

Summary for Subcatchment 1-E: Existing

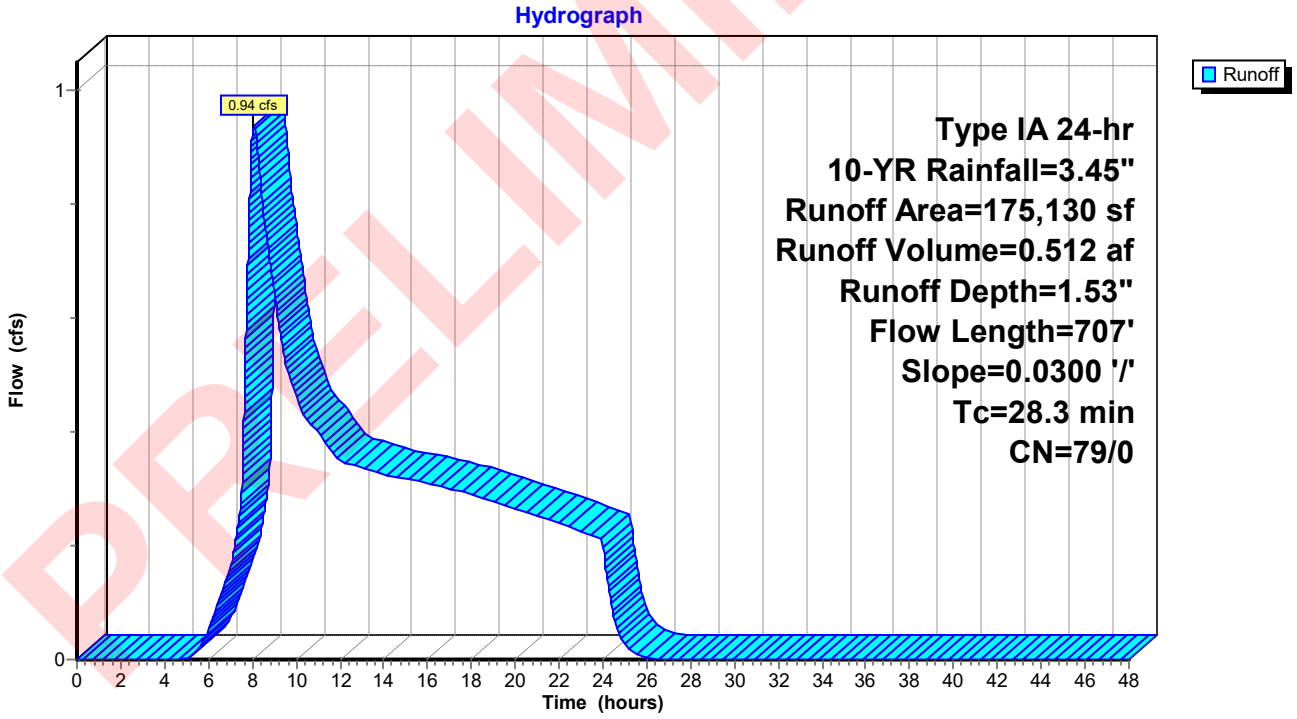
Runoff = 0.94 cfs @ 8.04 hrs, Volume= 0.512 af, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
175,130	79	50-75% Grass cover, Fair, HSG C
175,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0300	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
5.6	407	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
28.3	707	Total			

Subcatchment 1-E: Existing



PRELIMINARY

Summary for Subcatchment 2-E: Existing

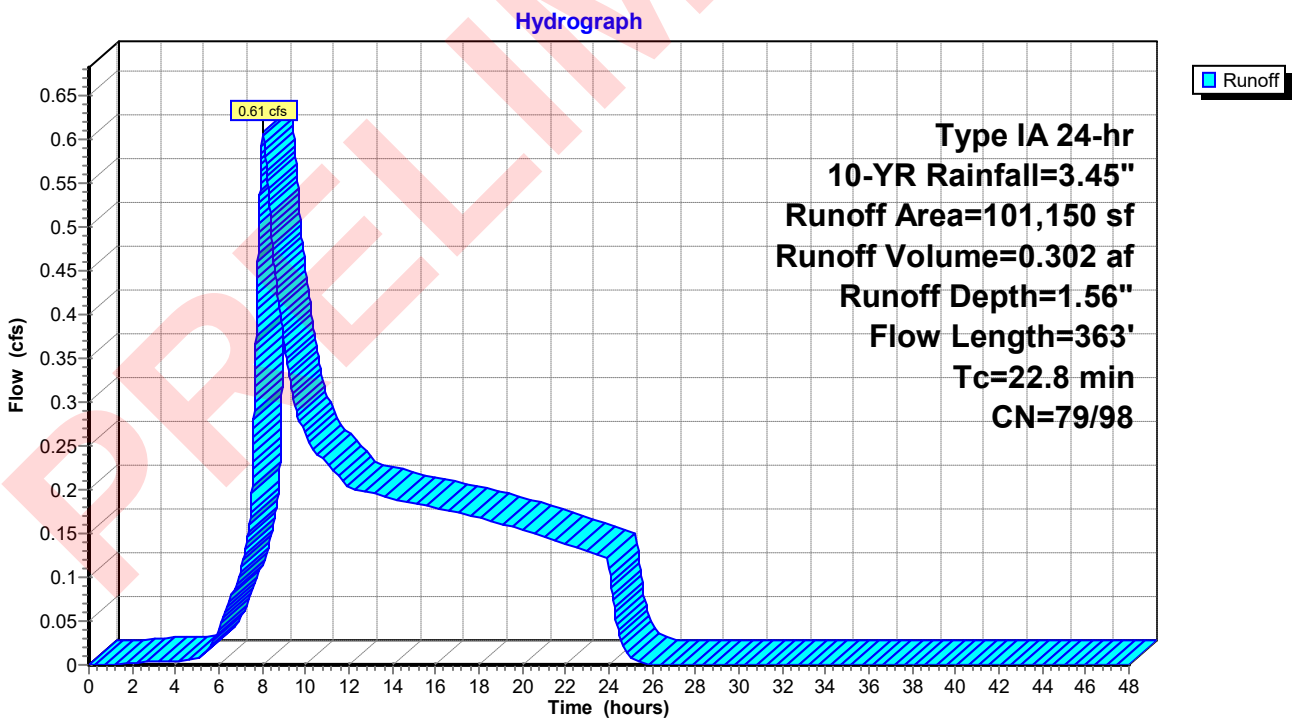
Runoff = 0.61 cfs @ 8.01 hrs, Volume= 0.302 af, Depth= 1.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
97,235	79	50-75% Grass cover, Fair, HSG C
3,915	92	Paved roads w/open ditches, 50% imp, HSG C
101,150	80	Weighted Average
99,193		98.06% Pervious Area
1,958		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



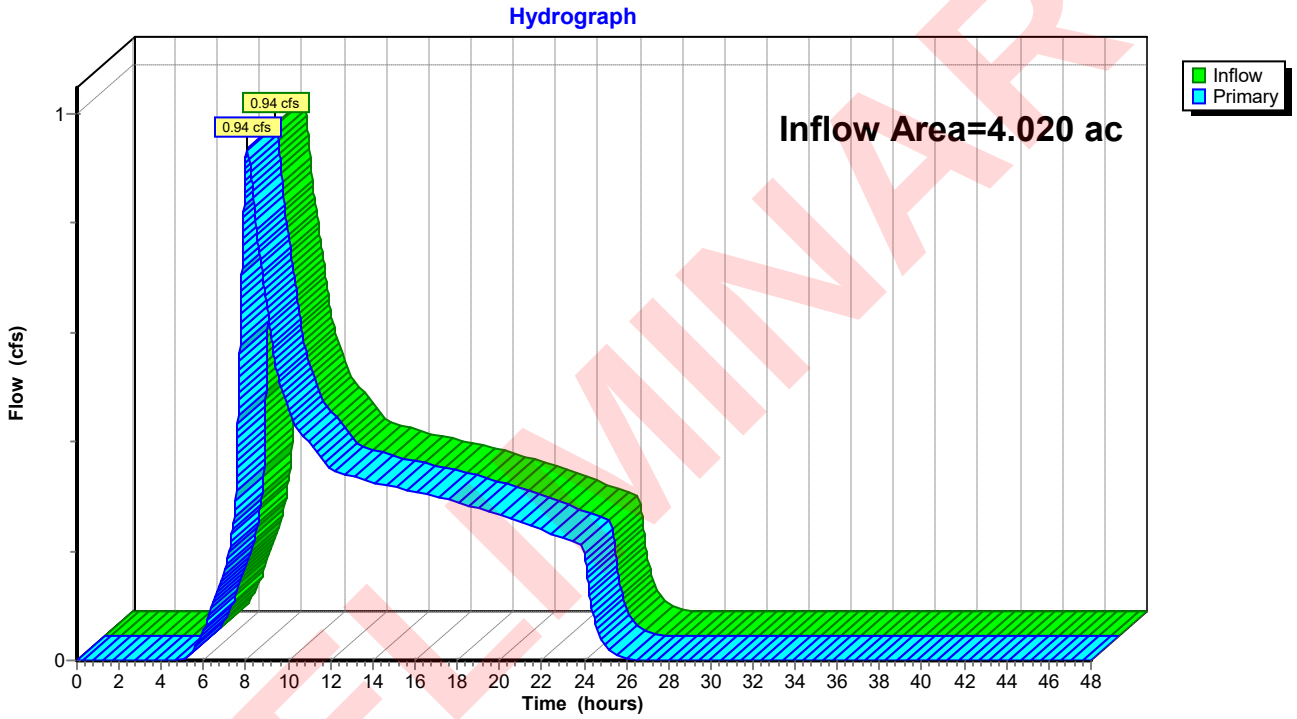
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 0.00% Impervious, Inflow Depth = 1.53" for 10-YR event
Inflow = 0.94 cfs @ 8.04 hrs, Volume= 0.512 af
Primary = 0.94 cfs @ 8.04 hrs, Volume= 0.512 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



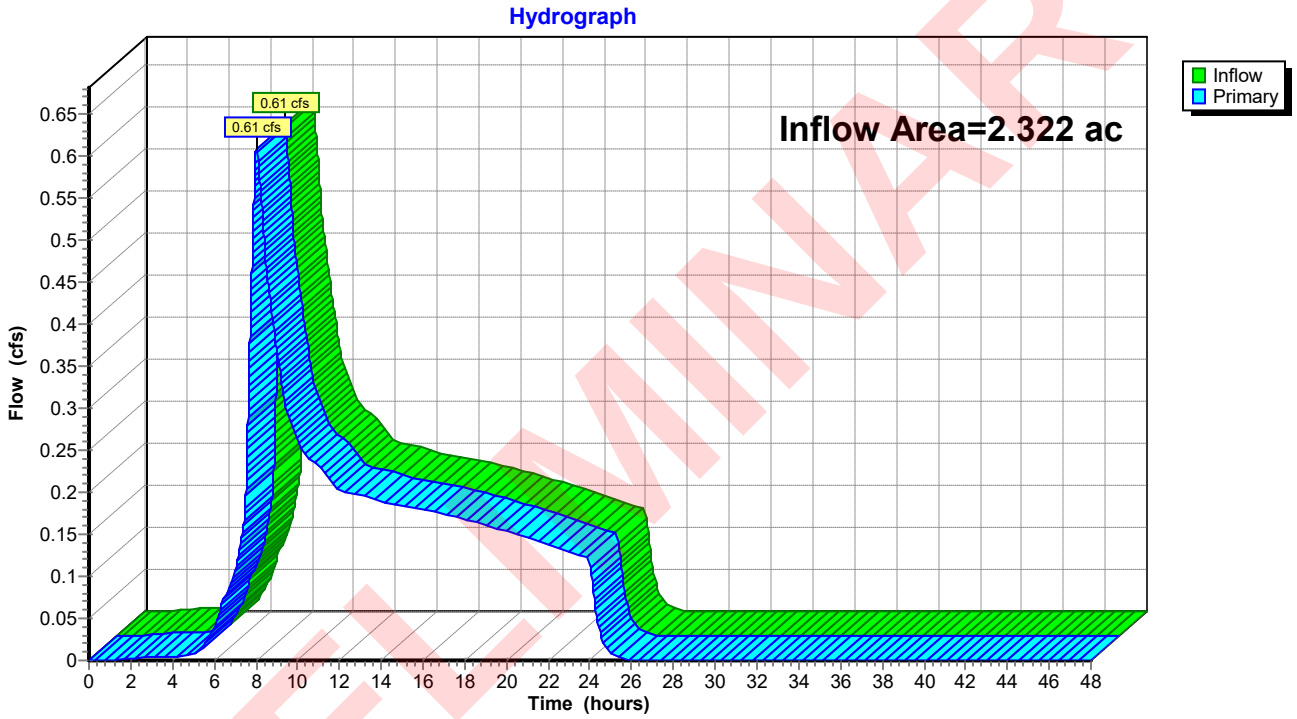
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.322 ac, 1.94% Impervious, Inflow Depth = 1.56" for 10-YR event
Inflow = 0.61 cfs @ 8.01 hrs, Volume= 0.302 af
Primary = 0.61 cfs @ 8.01 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1-E: Existing Runoff Area=175,130 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=707' Slope=0.0300 '/' Tc=28.3 min CN=79/0 Runoff=1.21 cfs 0.631 af

Subcatchment 2-E: Existing Runoff Area=101,150 sf 1.94% Impervious Runoff Depth=1.92"
Flow Length=363' Tc=22.8 min CN=79/98 Runoff=0.78 cfs 0.371 af

Link 1L: Flow Summary Part 1 Inflow=1.21 cfs 0.631 af
Primary=1.21 cfs 0.631 af

Link 2L: Flow Summary Part 2 Inflow=0.78 cfs 0.371 af
Primary=0.78 cfs 0.371 af

Total Runoff Area = 6.343 ac Runoff Volume = 1.002 af Average Runoff Depth = 1.90"
99.29% Pervious = 6.298 ac 0.71% Impervious = 0.045 ac

PRELIMINARY

Summary for Subcatchment 1-E: Existing

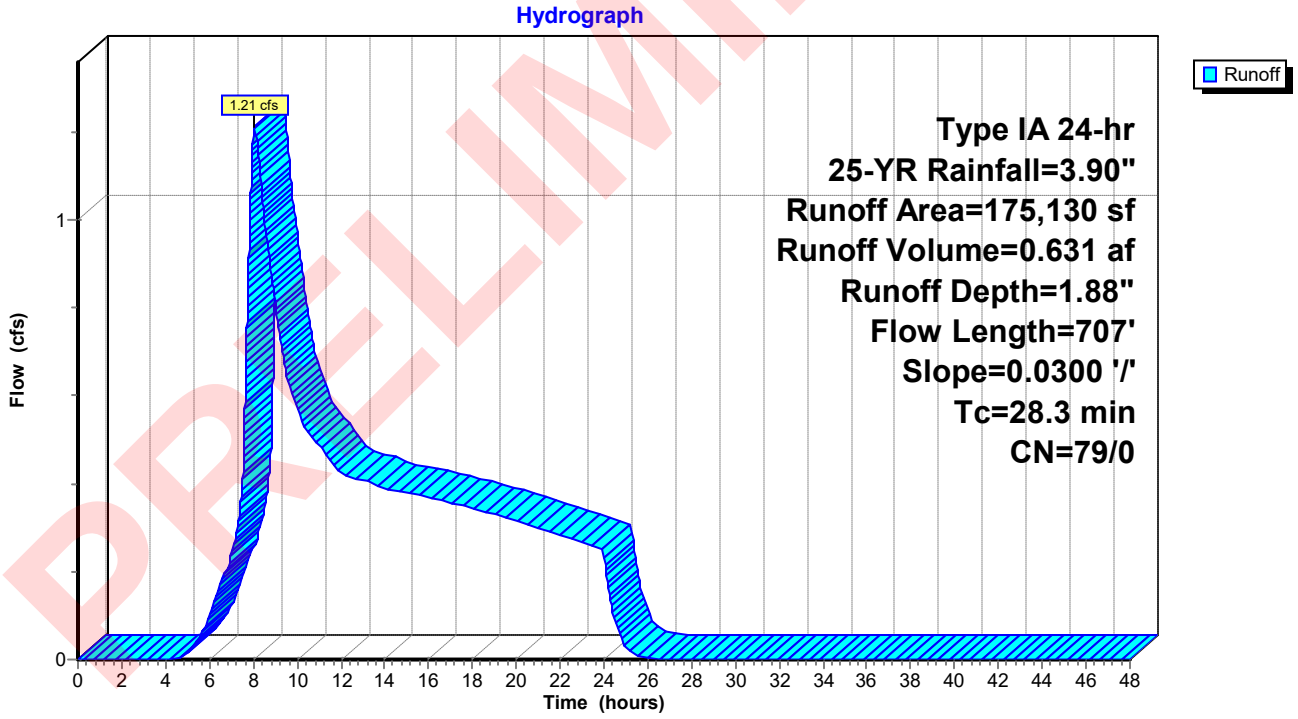
Runoff = 1.21 cfs @ 8.02 hrs, Volume= 0.631 af, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
175,130	79	50-75% Grass cover, Fair, HSG C
175,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	300	0.0300	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
5.6	407	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
28.3	707	Total			

Subcatchment 1-E: Existing



PRELIMINARY

Summary for Subcatchment 2-E: Existing

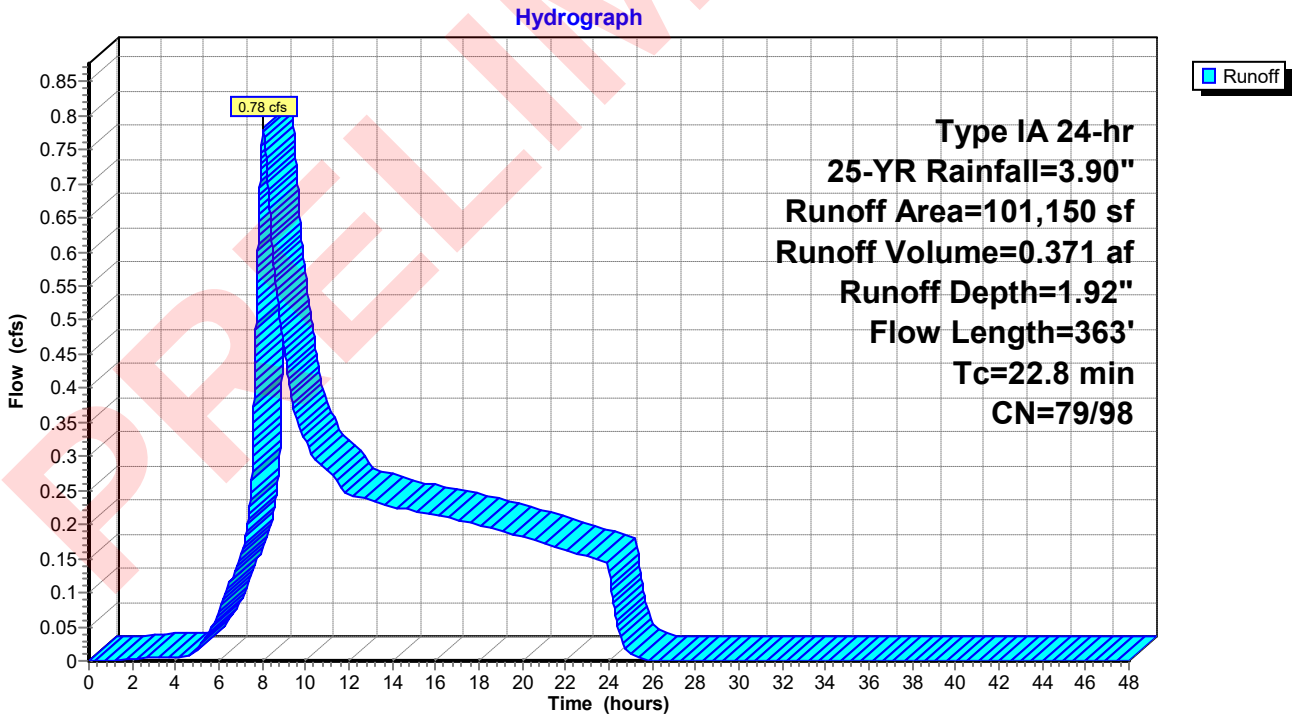
Runoff = 0.78 cfs @ 8.01 hrs, Volume= 0.371 af, Depth= 1.92"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
97,235	79	50-75% Grass cover, Fair, HSG C
3,915	92	Paved roads w/open ditches, 50% imp, HSG C
101,150	80	Weighted Average
99,193		98.06% Pervious Area
1,958		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



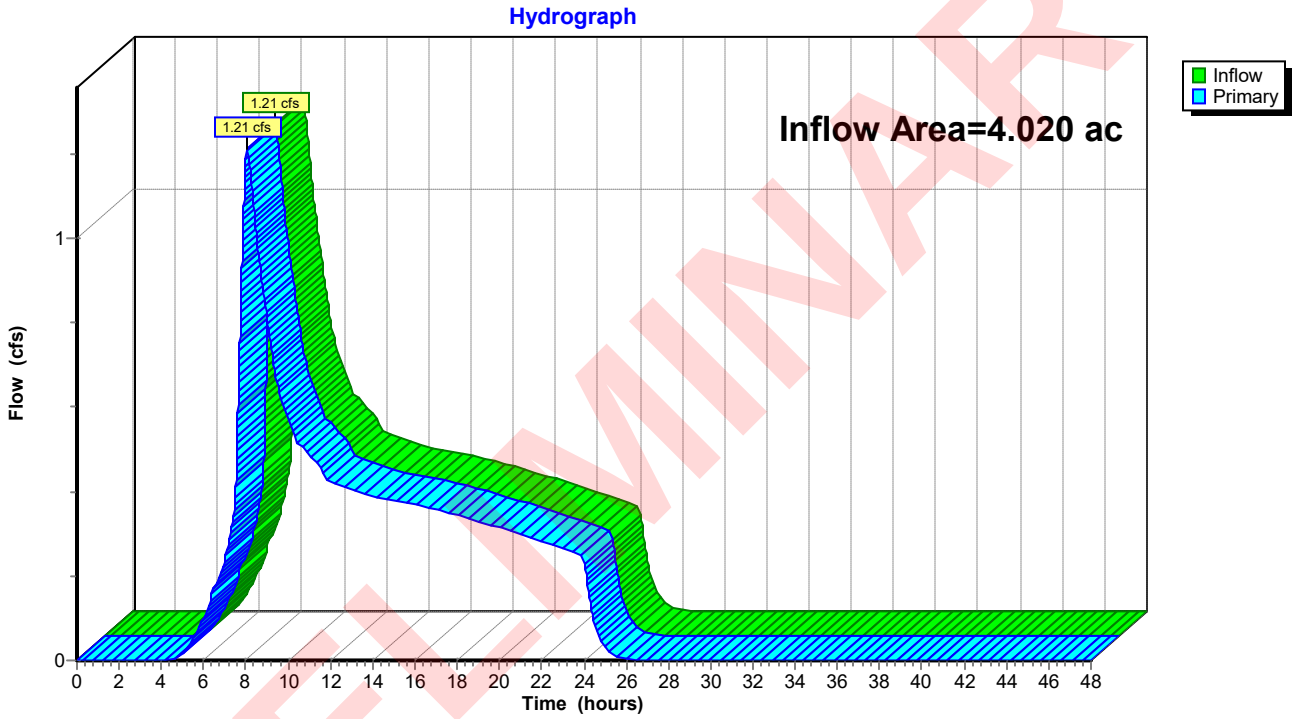
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 0.00% Impervious, Inflow Depth = 1.88" for 25-YR event
Inflow = 1.21 cfs @ 8.02 hrs, Volume= 0.631 af
Primary = 1.21 cfs @ 8.02 hrs, Volume= 0.631 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



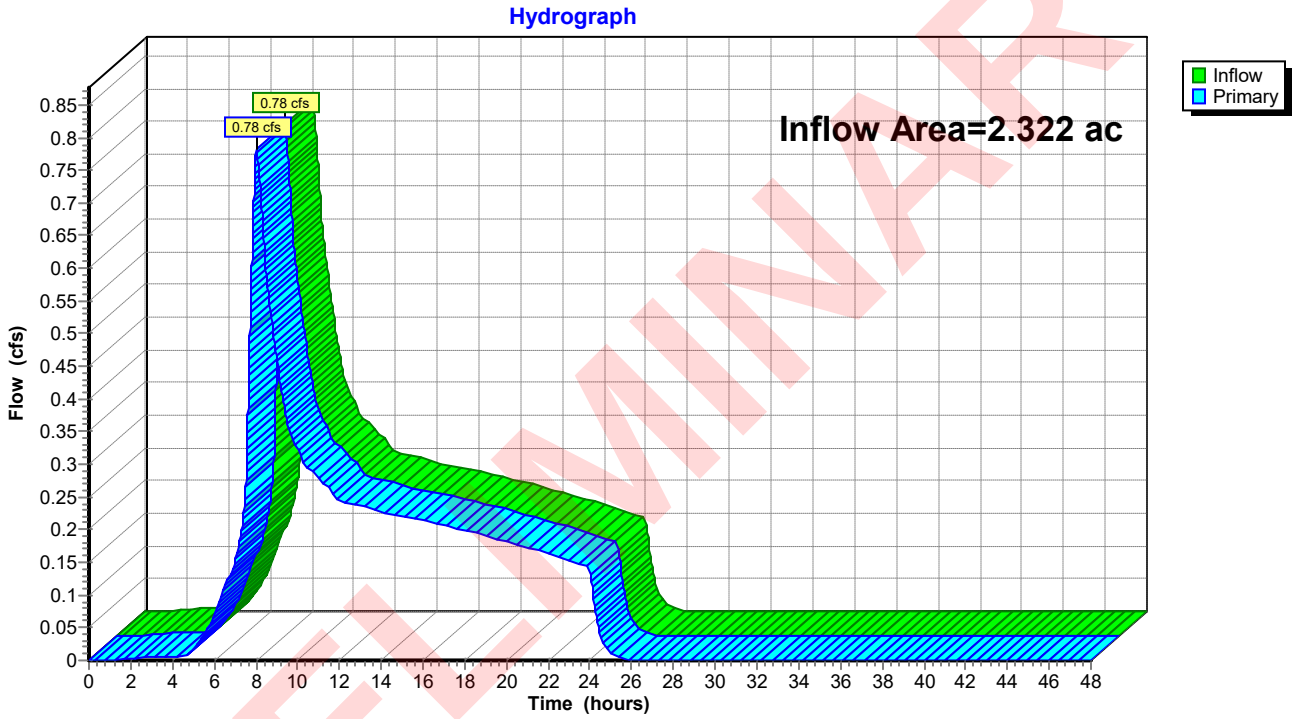
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.322 ac, 1.94% Impervious, Inflow Depth = 1.92" for 25-YR event
Inflow = 0.78 cfs @ 8.01 hrs, Volume= 0.371 af
Primary = 0.78 cfs @ 8.01 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

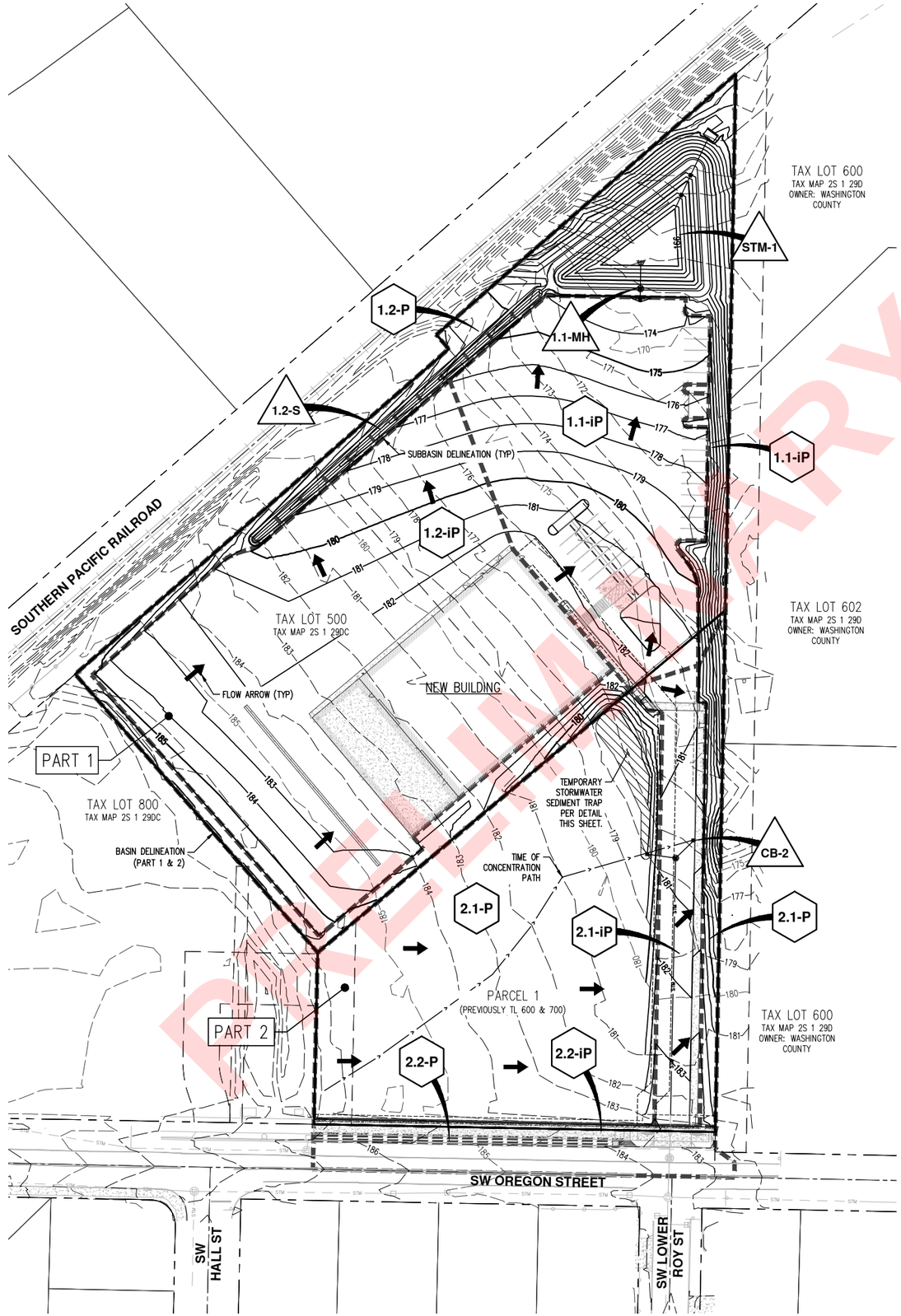
Link 2L: Flow Summary Part 2

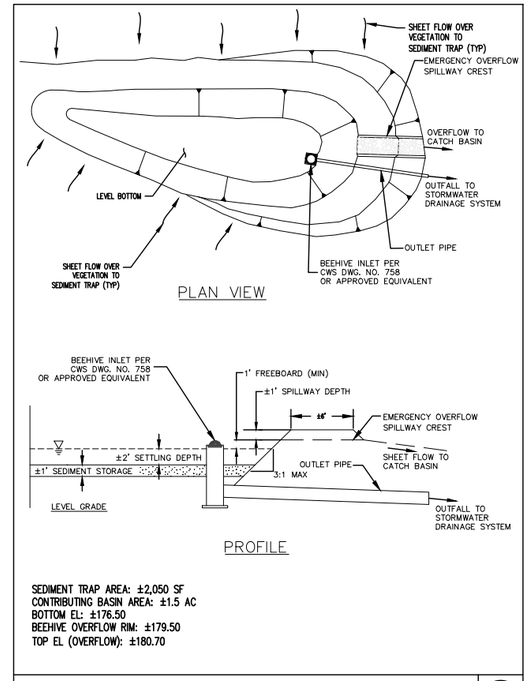


PRELIMINARY

Appendix B: Post-Developed Catchment Basins Map and Peak Flow Calculations - HydroCAD

PRELIMINARY





TEMPORARY SEDIMENT TRAP
NTS

19
C204

LEGEND

SUBBASIN DELINEATION	
TIME OF CONCENTRATION PATH	
SUBBASIN	XX
STORMWATER POND/CB	X
FLOW ARROW	

NOTES:

1. CATCHMENT AREAS SHOWN ON THIS MAP ARE:
   - SHOWN TO ILLUSTRATE THE SUBCATCHMENT DELINEATION AS A RESULT OF THE JBMAC VENTURES DEVELOPMENT.
   - USED FOR PURPOSES OF CONVEYANCE SIZING FOR THE JBMAC DEVELOPMENT ONLY. A REVIEW OF THE STORM DRAIN SYSTEM DOWNSTREAM OF THE SUBJECT SITE IS ADDRESSED IN THE "JBMAC VENTURES FINAL STORMWARER REPORT".
   - NOT INTENDED FOR WATER QUALITY CALCULATIONS. STORMWATER QUALITY CRITERIA FOR THIS SITE WERE FORMERLY ADDRESSED IN THE "JBMAC VENTURES FINAL STORMWATER REPORT."

N

SCALE: 1"=50 FEET
50 0 10 25 50
ORIGINAL PAGE SIZE: 22" x 34"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

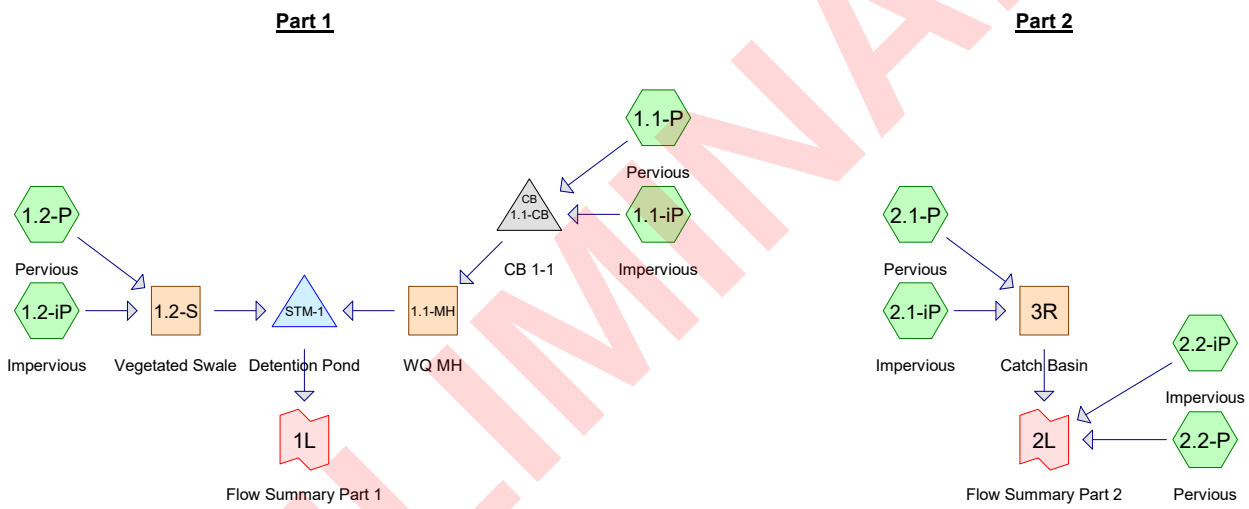
POST-DEVELOPED CATCHMENT BASINS MAP
OREGON STREET JBMAC
SHERWOOD, OREGON

REGISTERED PROFESSIONAL ENGINEER
OREGON
JANUARY 28, 2003
BRIAN G. CARLSON
PRELIMINARY NOT FOR CONSTRUCTION
RENEWS:

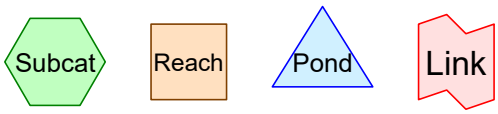
JOB NUMBER:	8627-03
DATE:	02/14/2025
DESIGNED BY:	APC & TJ
DRAWN BY:	APC
CHECKED BY:	BGC

POST

AKS DRAWING FILE: 8627-03 BASIN AREA POSTDWG | LAYOUT: POST



PRELIMINARY



Routing Diagram for 8627-03 POST-DEV
Prepared by AKS Engineering & Forestry, LLC, Printed 1/4/2024
HydroCAD® 10.00-22 s/n 01338 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.522	79	50-75% Grass cover, Fair, HSG C (1.1-P, 1.2-P, 2.1-P, 2.2-P)
3.800	98	Roof/Drive Aisle (1.1-iP, 1.2-iP, 2.1-iP, 2.2-iP)
6.322	**90**	**TOTAL AREA**

PRELIMINARY

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.522	HSG C	1.1-P, 1.2-P, 2.1-P, 2.2-P
0.000	HSG D	
3.800	Other	1.1-iP, 1.2-iP, 2.1-iP, 2.2-iP
6.322		**TOTAL AREA**

PRELIMINARY

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1-iP: Impervious Runoff Area=50,490 sf 100.00% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=0/98 Runoff=0.67 cfs 0.219 af

Subcatchment 1.1-P: Pervious Runoff Area=18,450 sf 0.00% Impervious Runoff Depth=0.84"
Tc=5.0 min CN=79/0 Runoff=0.07 cfs 0.030 af

Subcatchment 1.2-iP: Impervious Runoff Area=89,985 sf 100.00% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=0/98 Runoff=1.19 cfs 0.391 af

Subcatchment 1.2-P: Pervious Runoff Area=16,205 sf 0.00% Impervious Runoff Depth=0.84"
Tc=5.0 min CN=79/0 Runoff=0.06 cfs 0.026 af

Subcatchment 2.1-iP: Impervious Runoff Area=13,000 sf 100.00% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=0/98 Runoff=0.17 cfs 0.056 af

Subcatchment 2.1-P: Pervious Runoff Area=74,080 sf 0.00% Impervious Runoff Depth=0.84"
Flow Length=409' Tc=27.4 min CN=79/0 Runoff=0.18 cfs 0.119 af

Subcatchment 2.2-iP: Impervious Runoff Area=12,065 sf 100.00% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=0/98 Runoff=0.16 cfs 0.052 af

Subcatchment 2.2-P: Pervious Runoff Area=1,110 sf 0.00% Impervious Runoff Depth=0.84"
Tc=5.0 min CN=79/0 Runoff=0.00 cfs 0.002 af

Reach 1.1-MH: WQ MH Avg. Flow Depth=0.14' Max Vel=10.85 fps Inflow=0.73 cfs 0.249 af
12.0" Round Pipe n=0.010 L=26.3' S=0.1369 '/' Capacity=17.14 cfs Outflow=0.73 cfs 0.249 af

Reach 1.2-S: Vegetated Swale Avg. Flow Depth=0.60' Max Vel=0.46 fps Inflow=1.25 cfs 0.417 af
n=0.240 L=300.0' S=0.0190 '/' Capacity=8.43 cfs Outflow=1.18 cfs 0.417 af

Reach 3R: Catch Basin Avg. Flow Depth=0.23' Max Vel=2.75 fps Inflow=0.34 cfs 0.175 af
10.0" Round Pipe n=0.010 L=302.0' S=0.0050 '/' Capacity=2.01 cfs Outflow=0.34 cfs 0.175 af

Pond 1.1-CB: CB 1-1 Peak Elev=170.60' Inflow=0.73 cfs 0.249 af
12.0" Round Culvert n=0.013 L=7.4' S=0.0203 '/' Outflow=0.73 cfs 0.249 af

Pond STM-1: Detention Pond Peak Elev=171.09' Storage=16,700 cf Inflow=1.90 cfs 0.666 af
Outflow=0.21 cfs 0.620 af

Link 1L: Flow Summary Part 1 Inflow=0.21 cfs 0.620 af
Primary=0.21 cfs 0.620 af

Link 2L: Flow Summary Part 2 Inflow=0.50 cfs 0.229 af
Primary=0.50 cfs 0.229 af

Total Runoff Area = 6.322 ac Runoff Volume = 0.895 af Average Runoff Depth = 1.70"
39.89% Pervious = 2.522 ac 60.11% Impervious = 3.800 ac

PRELIMINARY

Summary for Subcatchment 1.1-iP: Impervious

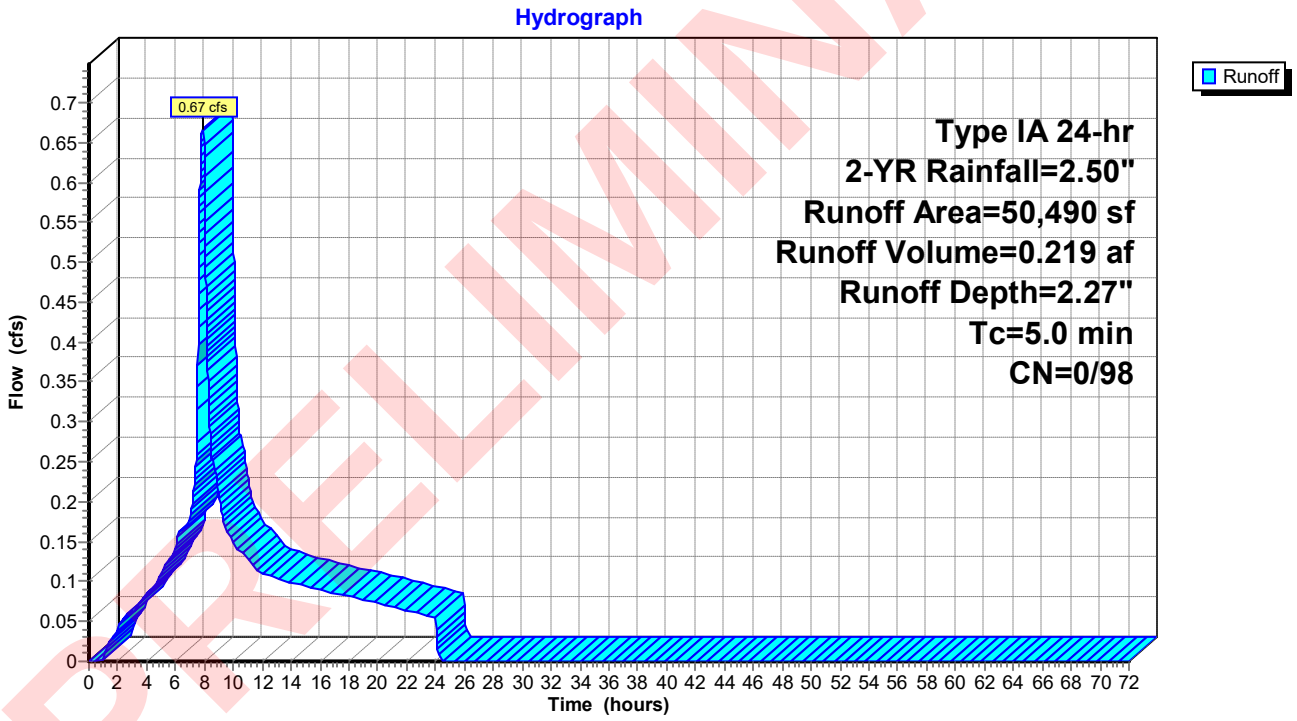
Runoff = 0.67 cfs @ 7.88 hrs, Volume= 0.219 af, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

	Area (sf)	CN	Description
*	50,490	98	Roof/Drive Aisle
	50,490		100.00% Impervious Area

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

Subcatchment 1.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.1-P: Pervious

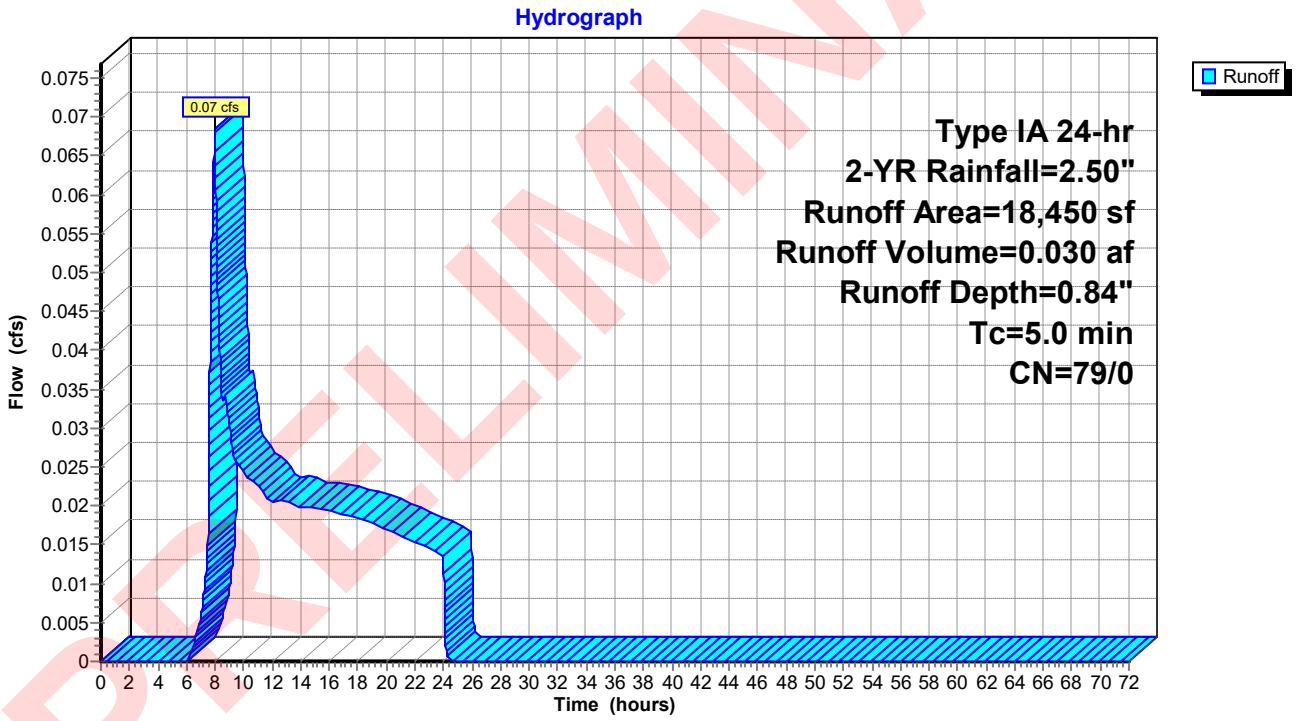
Runoff = 0.07 cfs @ 8.00 hrs, Volume= 0.030 af, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
18,450	79	50-75% Grass cover, Fair, HSG C
18,450		100.00% Pervious Area

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

Subcatchment 1.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 1.2-iP: Impervious

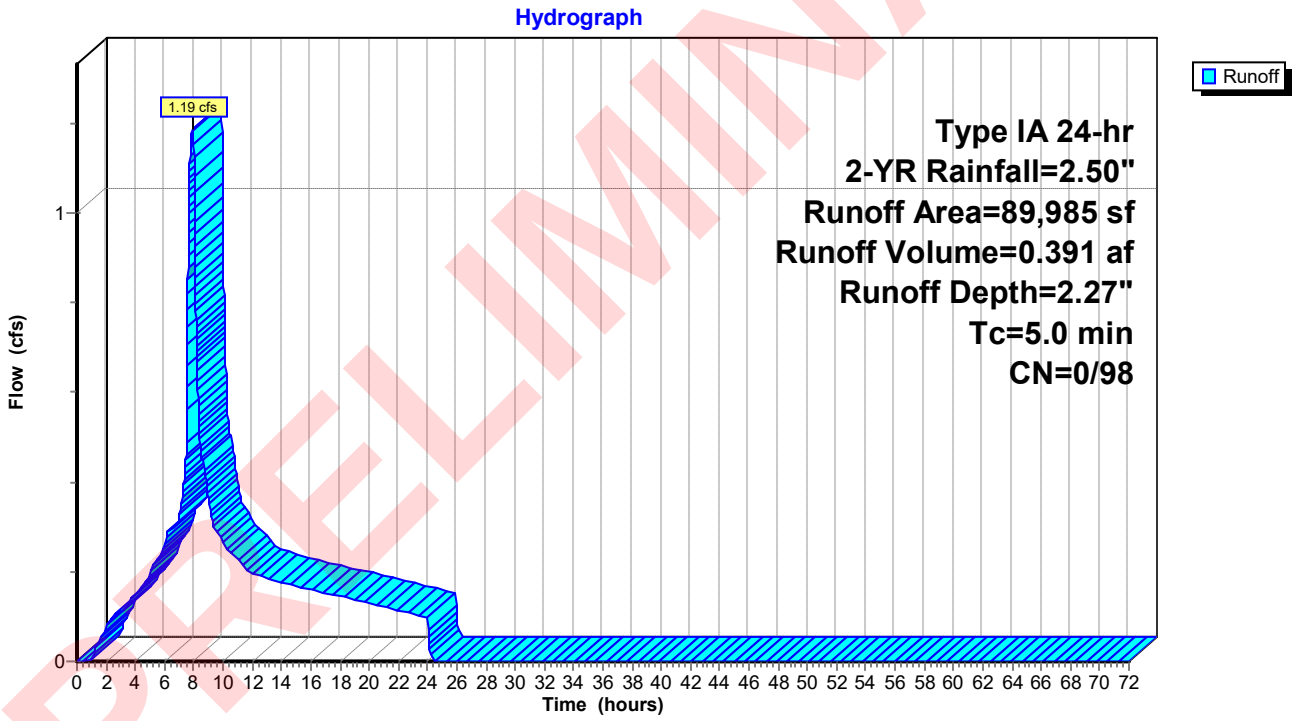
Runoff = 1.19 cfs @ 7.88 hrs, Volume= 0.391 af, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

	Area (sf)	CN	Description
*	89,985	98	Roof/Drive Aisle
	89,985		100.00% Impervious Area

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

Subcatchment 1.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.2-P: Pervious

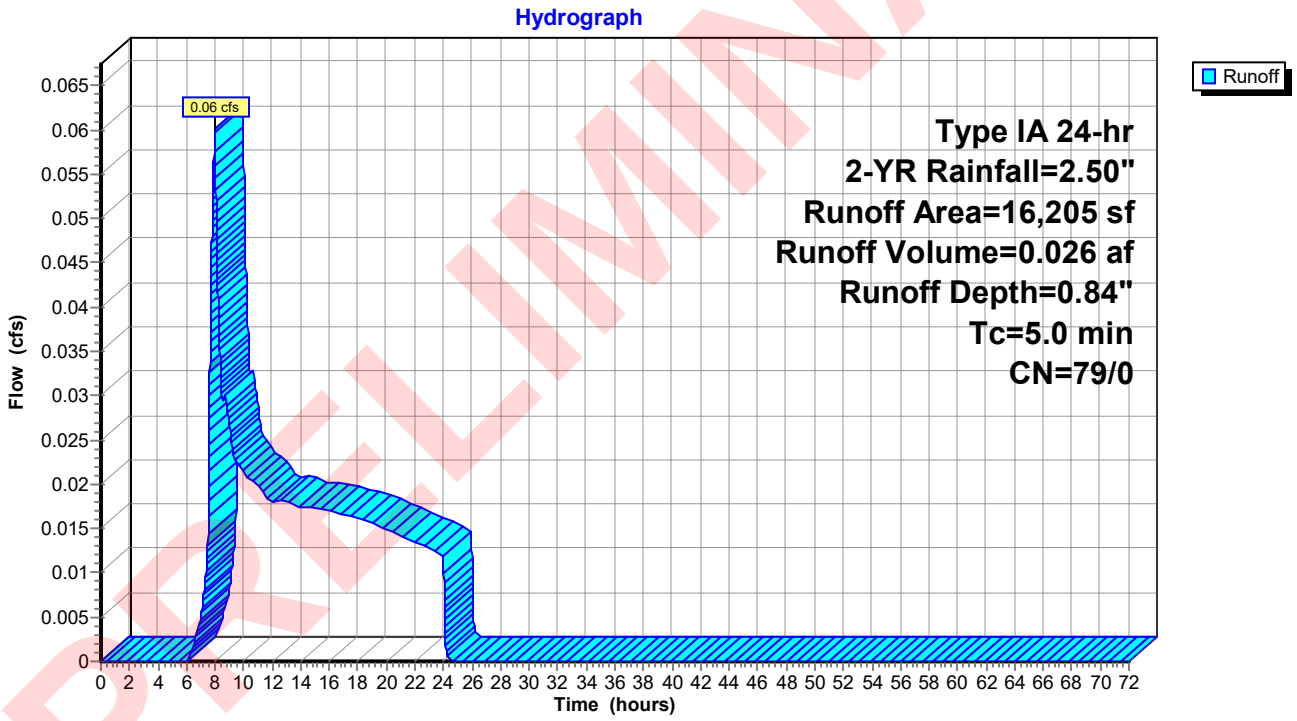
Runoff = 0.06 cfs @ 8.00 hrs, Volume= 0.026 af, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
16,205	79	50-75% Grass cover, Fair, HSG C
16,205		100.00% Pervious Area

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

Subcatchment 1.2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

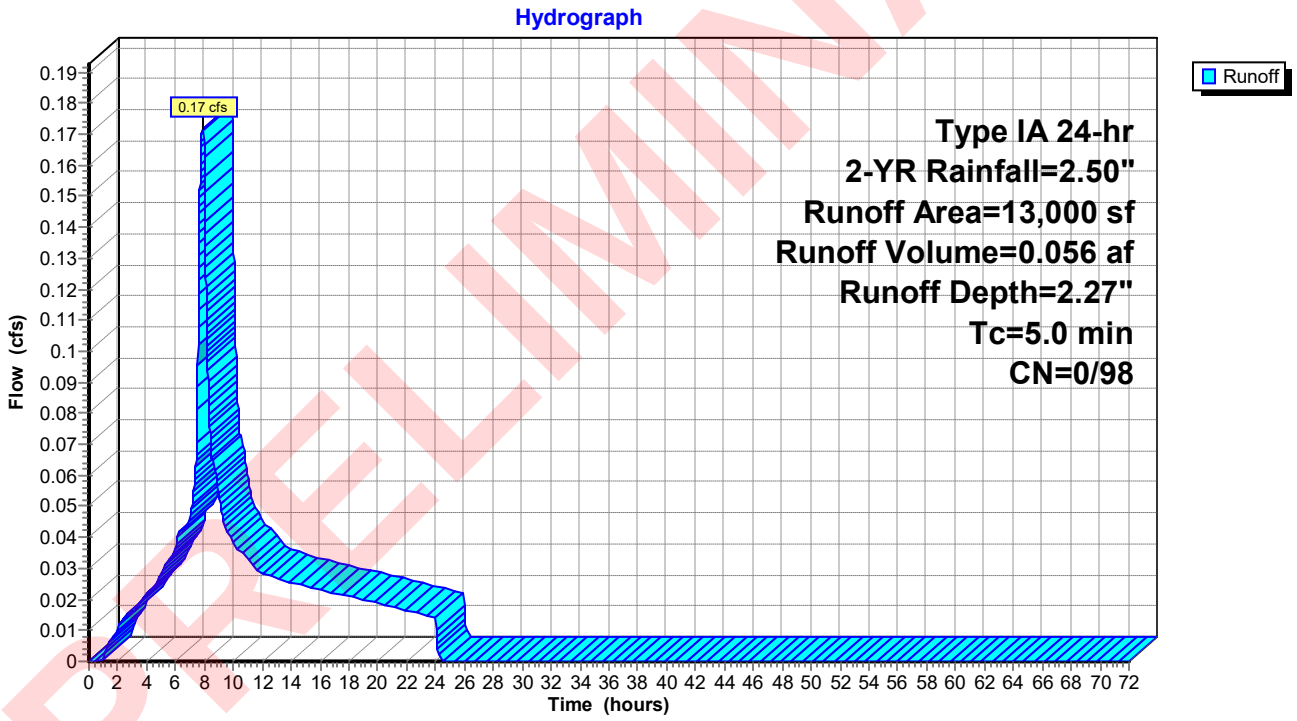
Runoff = 0.17 cfs @ 7.88 hrs, Volume= 0.056 af, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

	Area (sf)	CN	Description
*	13,000	98	Roof/Drive Aisle
	13,000		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

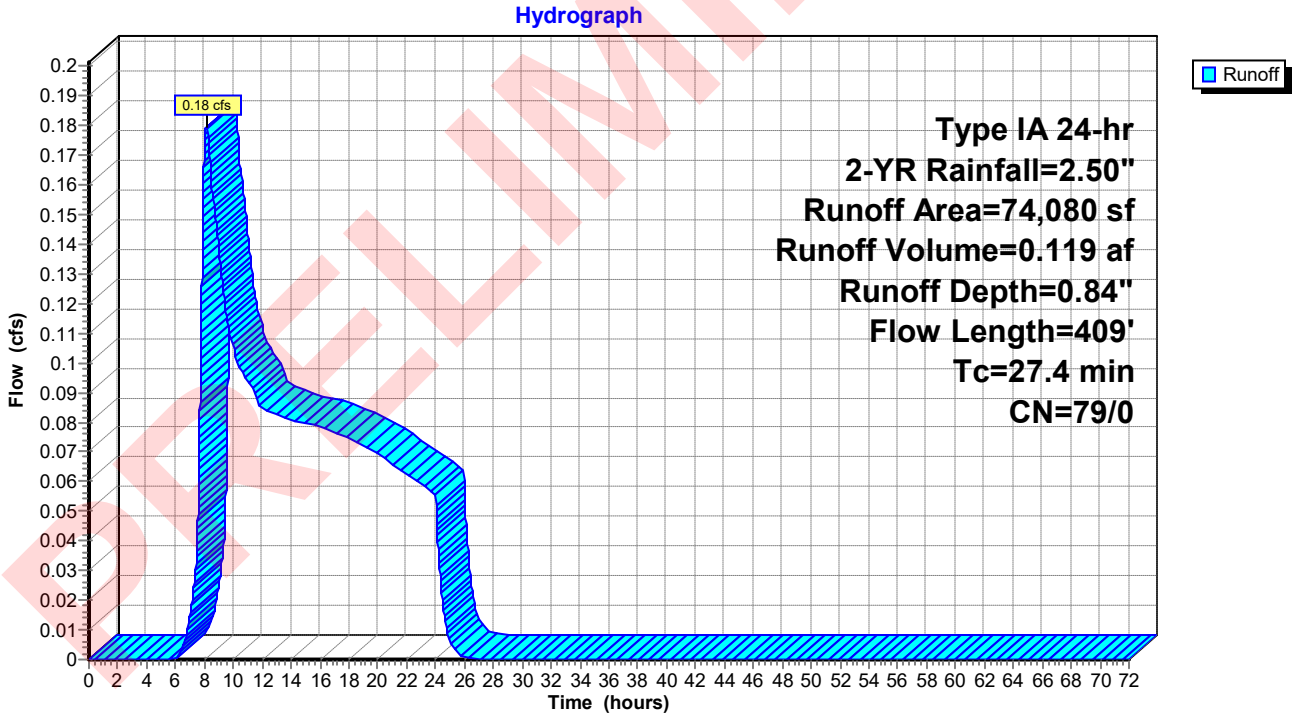
Runoff = 0.18 cfs @ 8.12 hrs, Volume= 0.119 af, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
74,080	79	50-75% Grass cover, Fair, HSG C
74,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.2-iP: Impervious

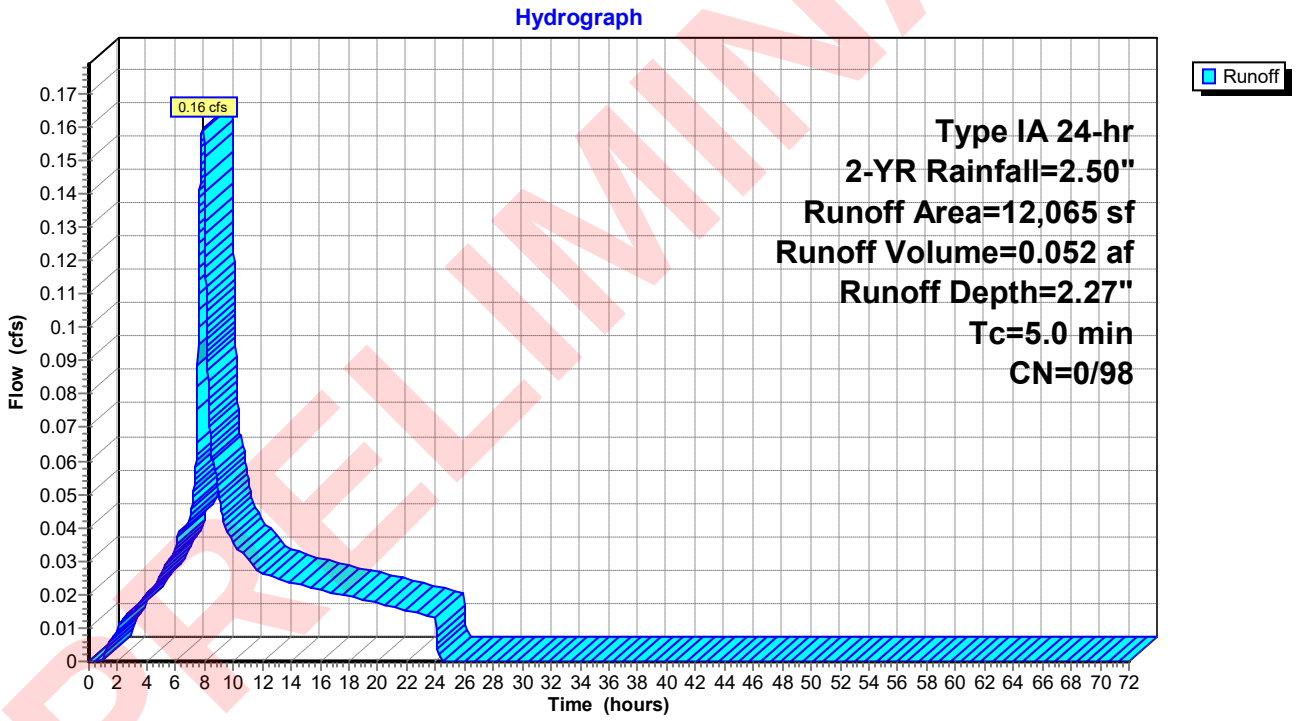
Runoff = 0.16 cfs @ 7.88 hrs, Volume= 0.052 af, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

	Area (sf)	CN	Description
*	12,065	98	Roof/Drive Aisle
	12,065		100.00% Impervious Area

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

Subcatchment 2.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.2-P: Pervious

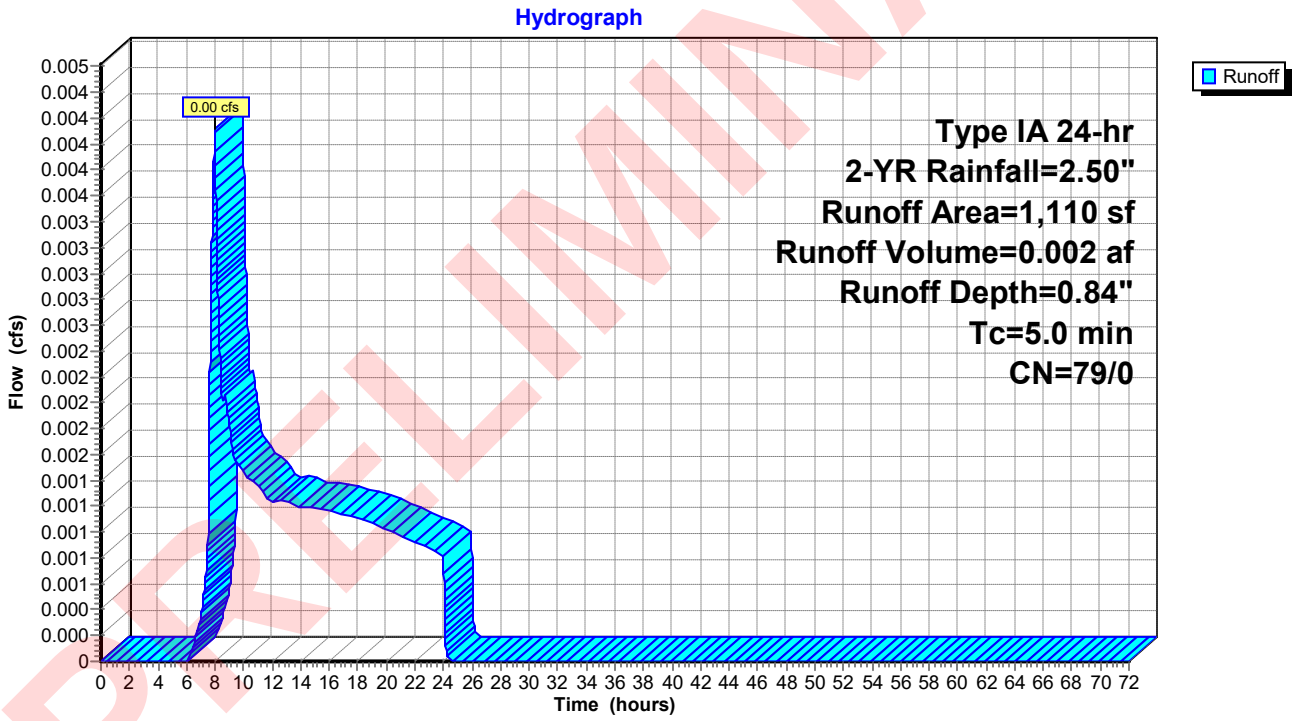
Runoff = 0.00 cfs @ 8.00 hrs, Volume= 0.002 af, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
1,110	79	50-75% Grass cover, Fair, HSG C
1,110		100.00% Pervious Area

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

Subcatchment 2.2-P: Pervious



PRELIMINARY

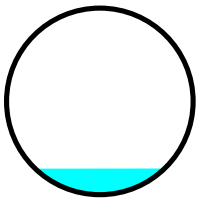
Summary for Reach 1.1-MH: WQ MH

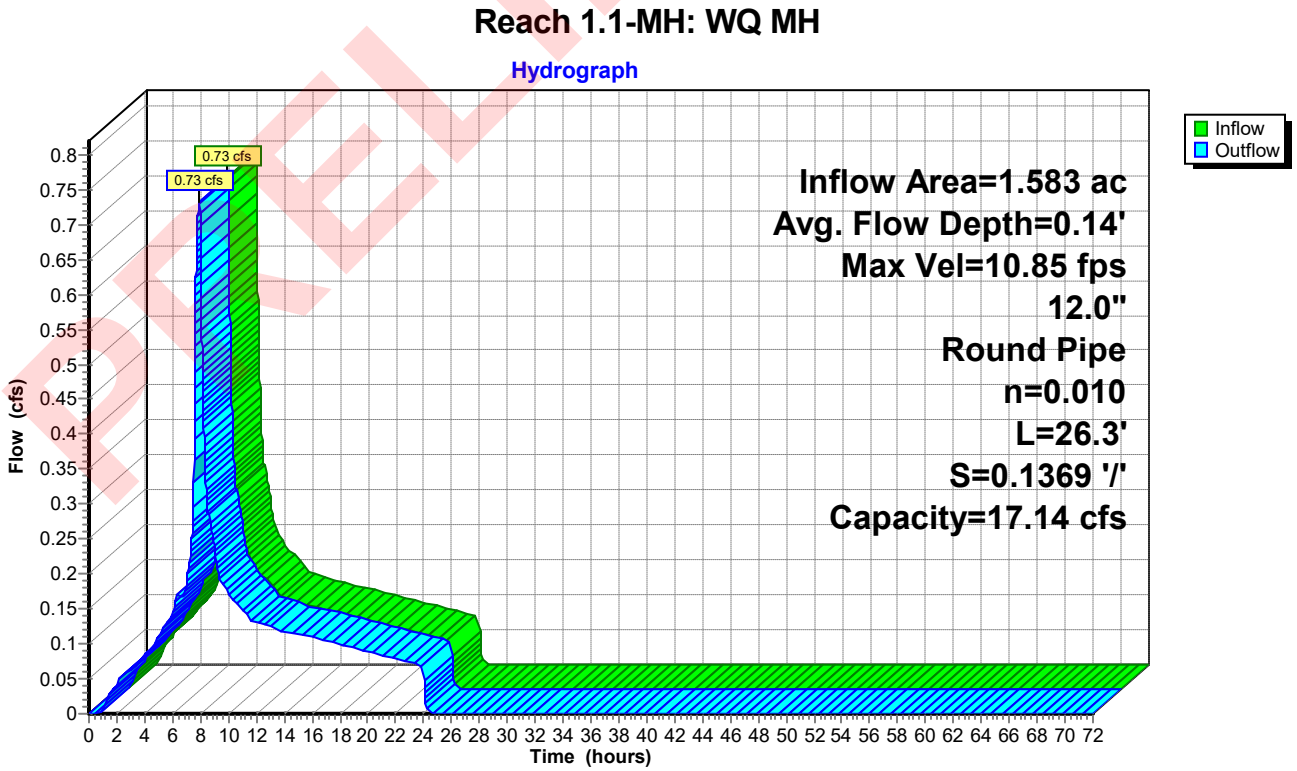
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 1.89" for 2-YR event
Inflow = 0.73 cfs @ 7.90 hrs, Volume= 0.249 af
Outflow = 0.73 cfs @ 7.90 hrs, Volume= 0.249 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 10.85 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 6.12 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.14'
Defined Flood Depth= 171.30' Flow Area= 23.4 sf, Capacity= -12,228.33 cfs
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 17.14 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 26.3' Slope= 0.1369 '/'
Inlet Invert= 169.60', Outlet Invert= 166.00'





PRELIMINARY

Summary for Reach 1.2-S: Vegetated Swale

Inflow Area = 2.438 ac, 84.74% Impervious, Inflow Depth = 2.05" for 2-YR event
Inflow = 1.25 cfs @ 7.89 hrs, Volume= 0.417 af
Outflow = 1.18 cfs @ 8.01 hrs, Volume= 0.417 af, Atten= 5%, Lag= 7.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.46 fps, Min. Travel Time= 11.0 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 25.3 min

Peak Storage= 778 cf @ 8.01 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 1.50' Flow Area= 10.5 sf, Capacity= 8.43 cfs

Custom cross-section, Length= 300.0' Slope= 0.0190 '/'
Constant n= 0.240
Inlet Invert= 178.70', Outlet Invert= 173.00'

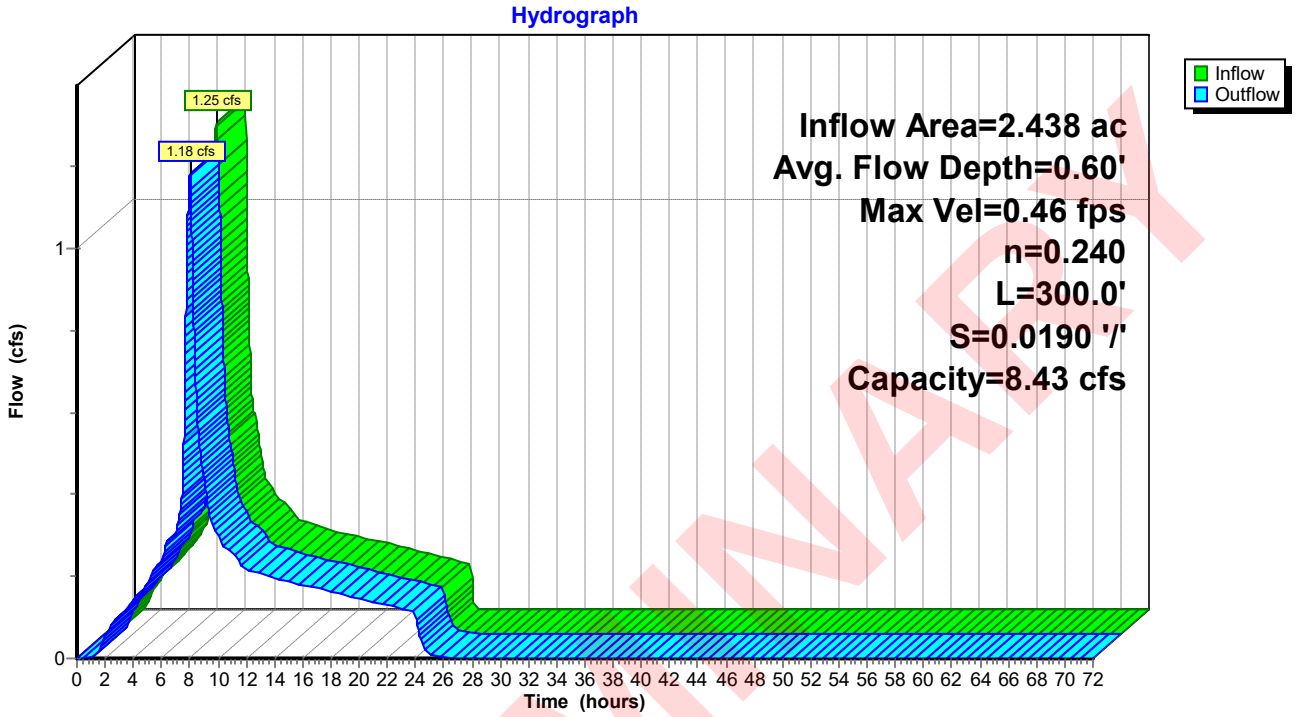
‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	1.50	0.00
2.50	0.50	1.00
4.50	0.00	1.50
6.50	0.00	1.50
8.50	0.50	1.00
11.00	1.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
0.50	2.0	6.1	600	0.81
1.50	10.5	11.5	3,150	8.43

PRELIMINARY

Reach 1.2-S: Vegetated Swale



PRELIMINARY

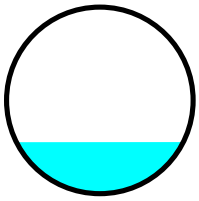
Summary for Reach 3R: Catch Basin

Inflow Area = 1.999 ac, 14.93% Impervious, Inflow Depth = 1.05" for 2-YR event
Inflow = 0.34 cfs @ 8.00 hrs, Volume= 0.175 af
Outflow = 0.34 cfs @ 8.01 hrs, Volume= 0.175 af, Atten= 1%, Lag= 0.7 min

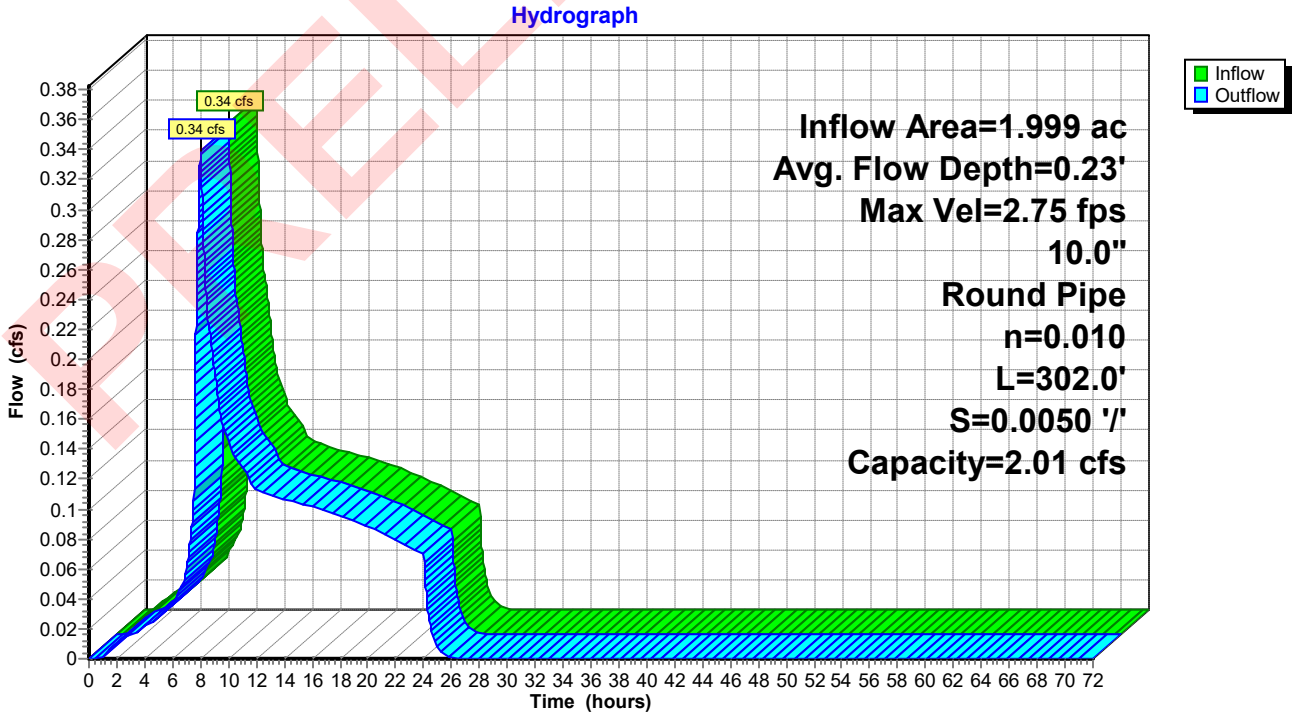
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.75 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 3.1 min

Peak Storage= 37 cf @ 8.01 hrs
Average Depth at Peak Storage= 0.23'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,793.61 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.01 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 302.0' Slope= 0.0050 '/'
Inlet Invert= 176.89', Outlet Invert= 175.38'



Reach 3R: Catch Basin



PRELIMINARY

Summary for Pond 1.1-CB: CB 1-1

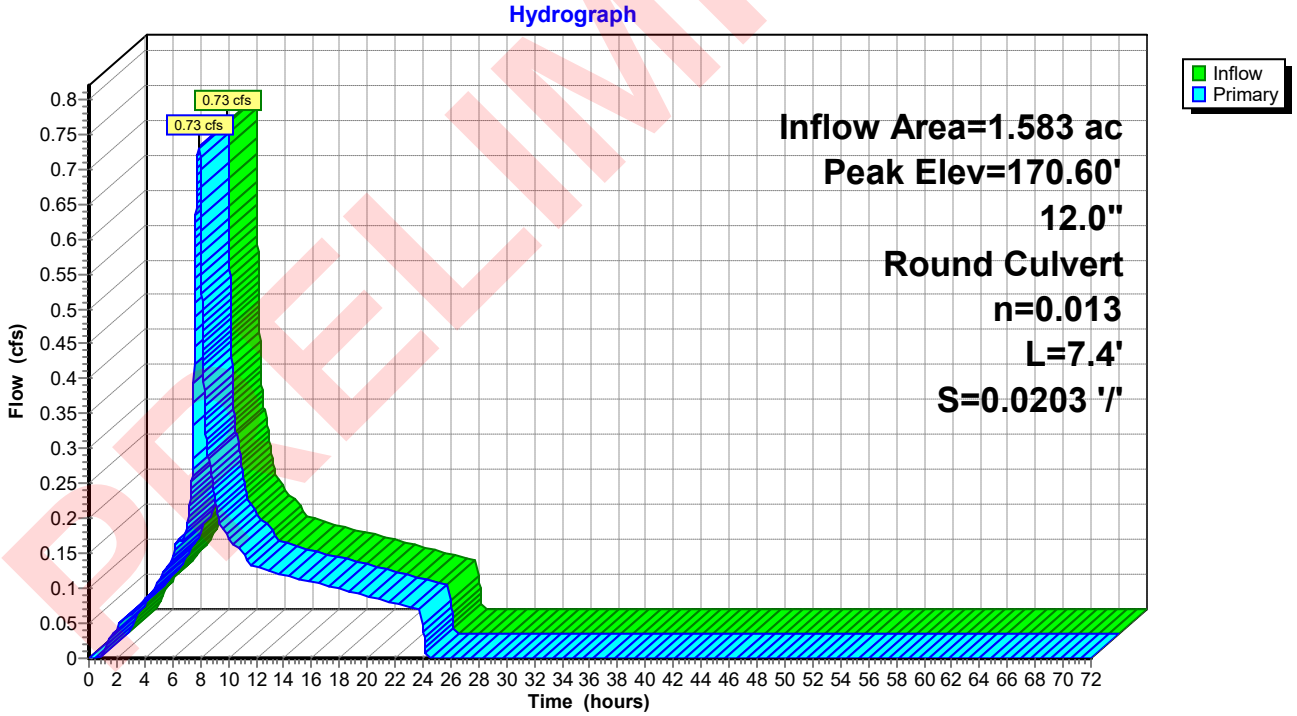
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 1.89" for 2-YR event
Inflow = 0.73 cfs @ 7.90 hrs, Volume= 0.249 af
Outflow = 0.73 cfs @ 7.90 hrs, Volume= 0.249 af, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 7.90 hrs, Volume= 0.249 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 170.60' @ 7.90 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.14'	**12.0" Round Culvert** L= 7.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.14' / 169.99' S= 0.0203 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.73 cfs @ 7.90 hrs HW=170.60' TW=169.74' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.73 cfs @ 3.05 fps)

Pond 1.1-CB: CB 1-1



PRELIMINARY

Summary for Pond STM-1: Detention Pond

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth = 1.99" for 2-YR event
Inflow = 1.90 cfs @ 7.98 hrs, Volume= 0.666 af
Outflow = 0.21 cfs @ 22.13 hrs, Volume= 0.620 af, Atten= 89%, Lag= 849.0 min
Primary = 0.21 cfs @ 22.13 hrs, Volume= 0.620 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 171.09' @ 22.13 hrs Surf.Area= 5,540 sf Storage= 16,700 cf

Plug-Flow detention time= 995.7 min calculated for 0.620 af (93% of inflow)
Center-of-Mass det. time= 946.2 min (1,645.2 - 699.0)

Volume	Invert	Avail.Storage	Storage Description
#1	166.00'	25,571 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

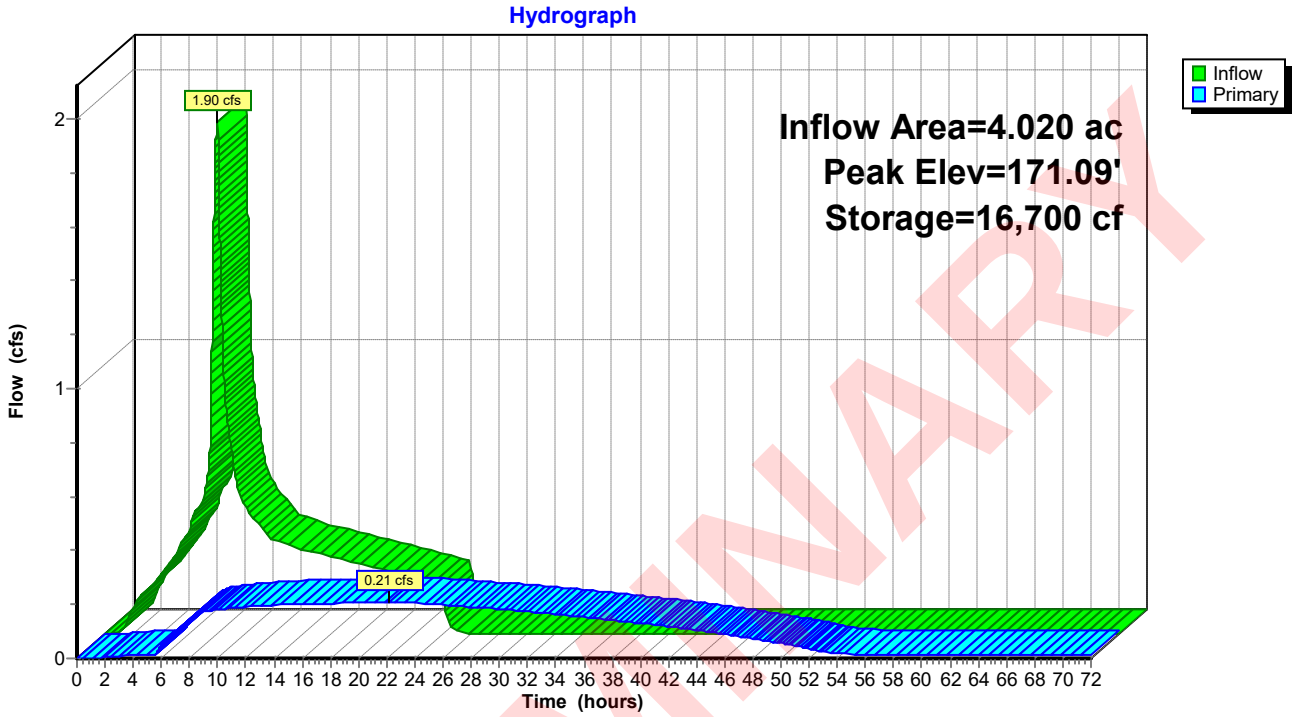
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
166.00	1,435	183.3	0	0	1,435
167.00	2,038	218.4	1,728	1,728	2,575
167.50	2,379	236.0	1,103	2,831	3,221
168.50	3,140	271.1	2,751	5,582	4,660
169.50	4,004	302.9	3,563	9,145	6,141
170.50	4,950	328.0	4,469	13,613	7,440
171.50	5,971	351.4	5,453	19,066	8,750
172.50	7,053	370.2	6,504	25,571	9,888

Device	Routing	Invert	Outlet Devices
#1	Primary	165.24'	**12.0" Round Outlet Pipe** L= 33.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.24' / 164.00' S= 0.0369 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	166.00'	**0.7" Vert. WQ Outlet** C= 0.600
#3	Device 1	167.50'	**1.9" Vert. Detention** C= 0.600
#4	Device 1	171.20'	**2.2' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.21 cfs @ 22.13 hrs HW=171.09' TW=0.00' (Dynamic Tailwater)
└─**1=Outlet Pipe** (Passes 0.21 cfs of 8.75 cfs potential flow)
  ├─**2=WQ Outlet** (Orifice Controls 0.03 cfs @ 10.83 fps)
  ├─**3=Detention** (Orifice Controls 0.18 cfs @ 9.02 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

PRELIMINARY

Pond STM-1: Detention Pond



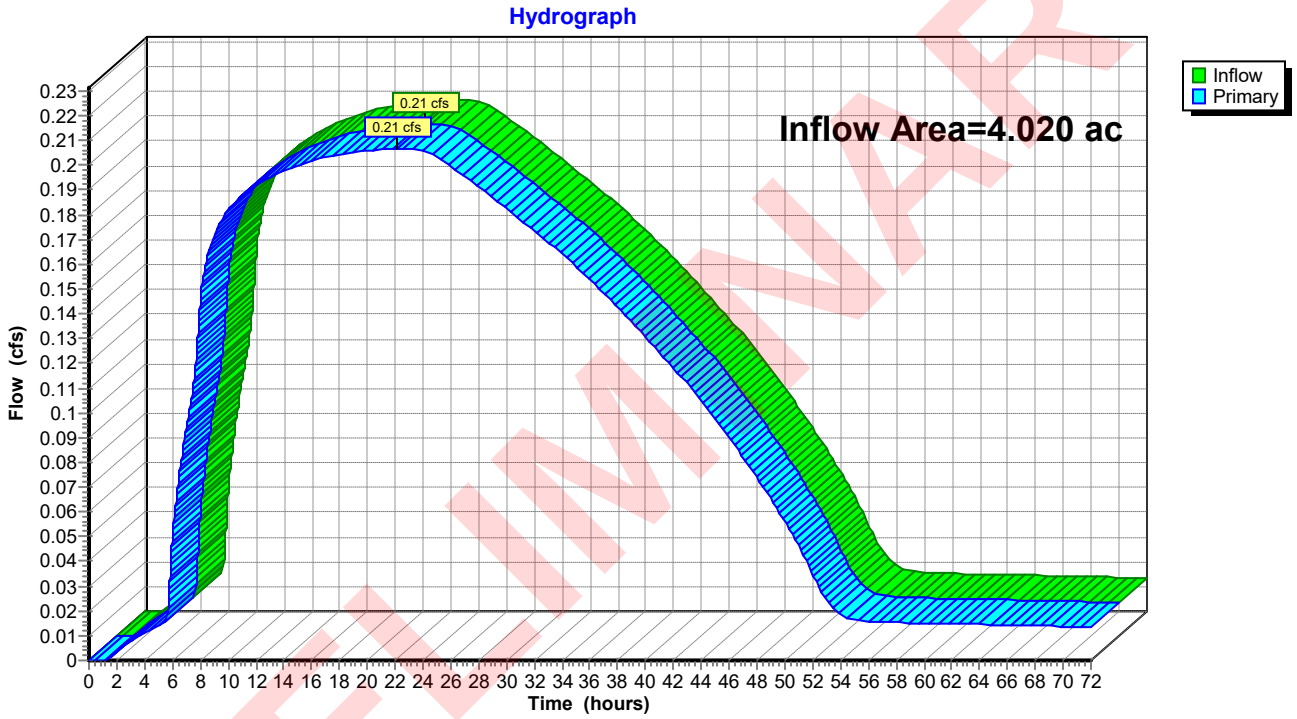
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth > 1.85" for 2-YR event
Inflow = 0.21 cfs @ 22.13 hrs, Volume= 0.620 af
Primary = 0.21 cfs @ 22.13 hrs, Volume= 0.620 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



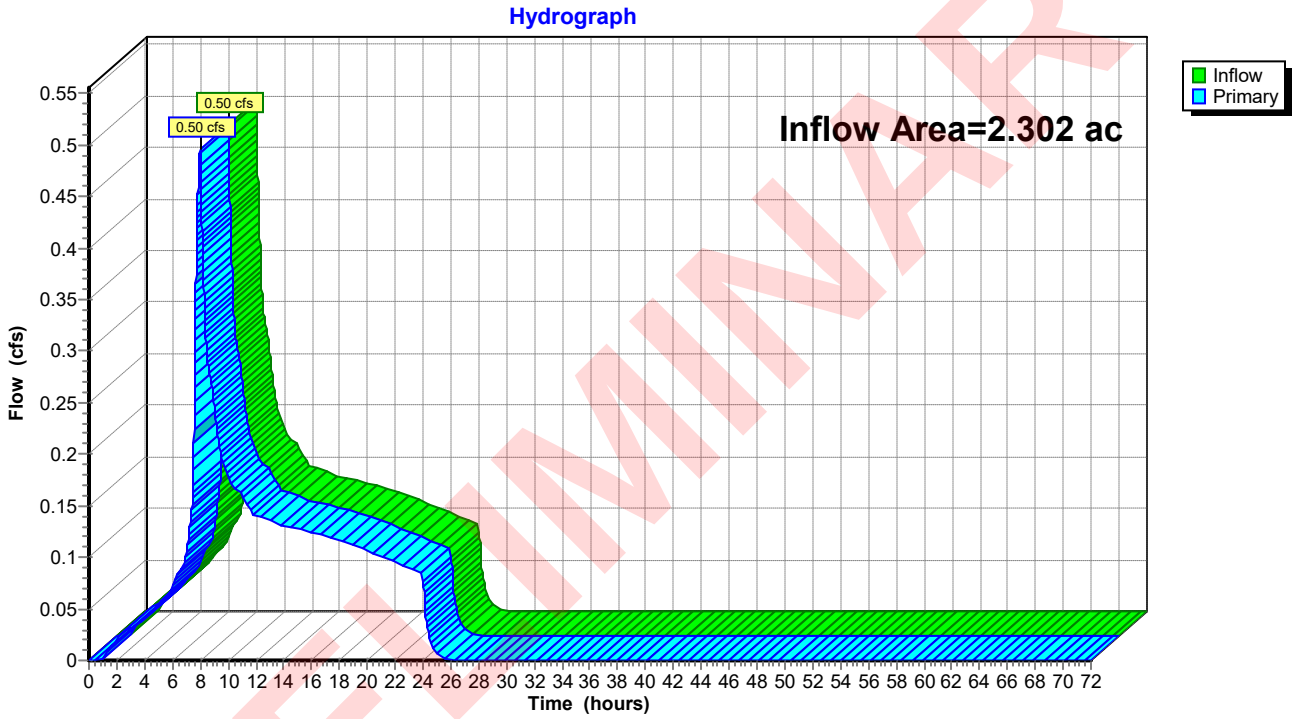
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.302 ac, 25.00% Impervious, Inflow Depth = 1.20" for 2-YR event
Inflow = 0.50 cfs @ 8.00 hrs, Volume= 0.229 af
Primary = 0.50 cfs @ 8.00 hrs, Volume= 0.229 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1-iP: Impervious Runoff Area=50,490 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=0/98 Runoff=0.84 cfs 0.277 af

Subcatchment 1.1-P: Pervious Runoff Area=18,450 sf 0.00% Impervious Runoff Depth=1.26"
Tc=5.0 min CN=79/0 Runoff=0.11 cfs 0.045 af

Subcatchment 1.2-iP: Impervious Runoff Area=89,985 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=0/98 Runoff=1.49 cfs 0.494 af

Subcatchment 1.2-P: Pervious Runoff Area=16,205 sf 0.00% Impervious Runoff Depth=1.26"
Tc=5.0 min CN=79/0 Runoff=0.10 cfs 0.039 af

Subcatchment 2.1-iP: Impervious Runoff Area=13,000 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=0/98 Runoff=0.22 cfs 0.071 af

Subcatchment 2.1-P: Pervious Runoff Area=74,080 sf 0.00% Impervious Runoff Depth=1.26"
Flow Length=409' Tc=27.4 min CN=79/0 Runoff=0.31 cfs 0.179 af

Subcatchment 2.2-iP: Impervious Runoff Area=12,065 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=0/98 Runoff=0.20 cfs 0.066 af

Subcatchment 2.2-P: Pervious Runoff Area=1,110 sf 0.00% Impervious Runoff Depth=1.26"
Tc=5.0 min CN=79/0 Runoff=0.01 cfs 0.003 af

Reach 1.1-MH: WQ MH Avg. Flow Depth=0.16' Max Vel=11.72 fps Inflow=0.95 cfs 0.322 af
12.0" Round Pipe n=0.010 L=26.3' S=0.1369 '/' Capacity=17.14 cfs Outflow=0.95 cfs 0.322 af

Reach 1.2-S: Vegetated Swale Avg. Flow Depth=0.67' Max Vel=0.49 fps Inflow=1.59 cfs 0.533 af
n=0.240 L=300.0' S=0.0190 '/' Capacity=8.43 cfs Outflow=1.52 cfs 0.533 af

Reach 3R: Catch Basin Avg. Flow Depth=0.29' Max Vel=3.09 fps Inflow=0.52 cfs 0.250 af
10.0" Round Pipe n=0.010 L=302.0' S=0.0050 '/' Capacity=2.01 cfs Outflow=0.52 cfs 0.250 af

Pond 1.1-CB: CB 1-1 Peak Elev=170.68' Inflow=0.95 cfs 0.322 af
12.0" Round Culvert n=0.013 L=7.4' S=0.0203 '/' Outflow=0.95 cfs 0.322 af

Pond STM-1: Detention Pond Peak Elev=171.30' Storage=17,887 cf Inflow=2.45 cfs 0.854 af
Outflow=0.43 cfs 0.808 af

Link 1L: Flow Summary Part 1 Inflow=0.43 cfs 0.808 af
Primary=0.43 cfs 0.808 af

Link 2L: Flow Summary Part 2 Inflow=0.71 cfs 0.319 af
Primary=0.71 cfs 0.319 af

Total Runoff Area = 6.322 ac Runoff Volume = 1.173 af Average Runoff Depth = 2.23"
39.89% Pervious = 2.522 ac 60.11% Impervious = 3.800 ac

PRELIMINARY

Summary for Subcatchment 1.1-iP: Impervious

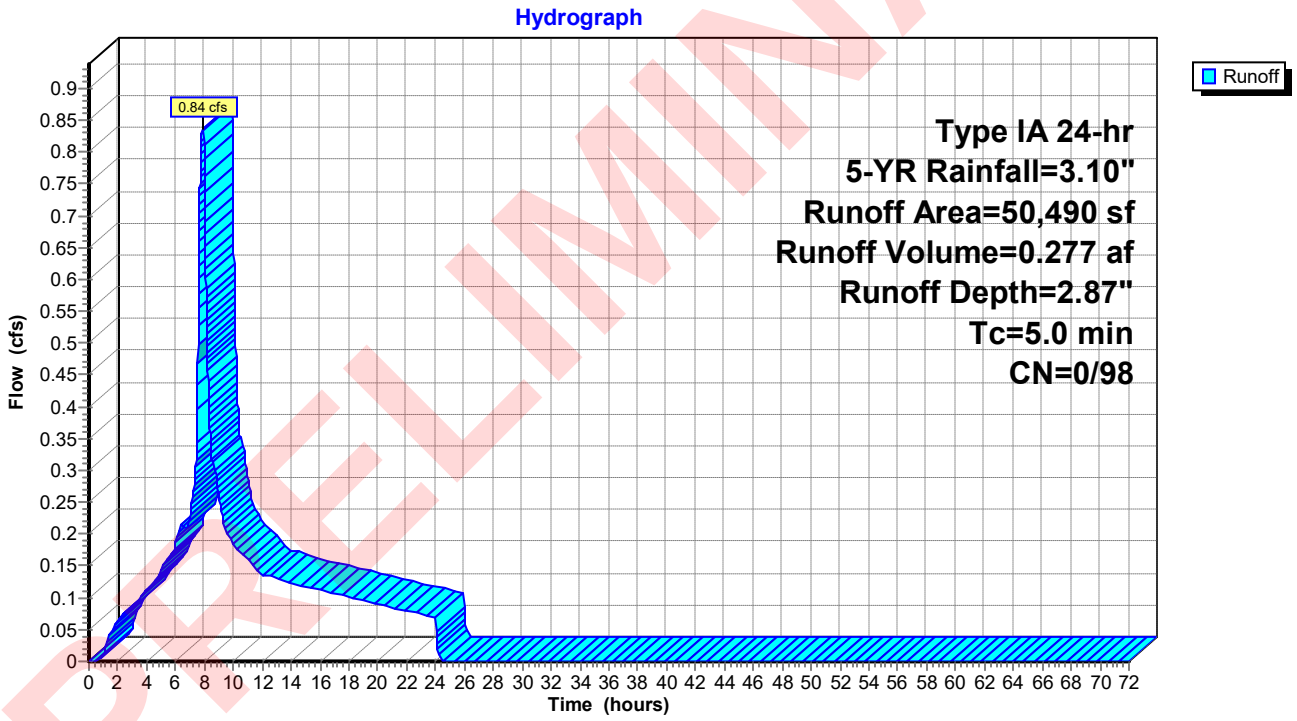
Runoff = 0.84 cfs @ 7.88 hrs, Volume= 0.277 af, Depth= 2.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	50,490	98	Roof/Drive Aisle
	50,490		100.00% Impervious Area

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

Subcatchment 1.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.1-P: Pervious

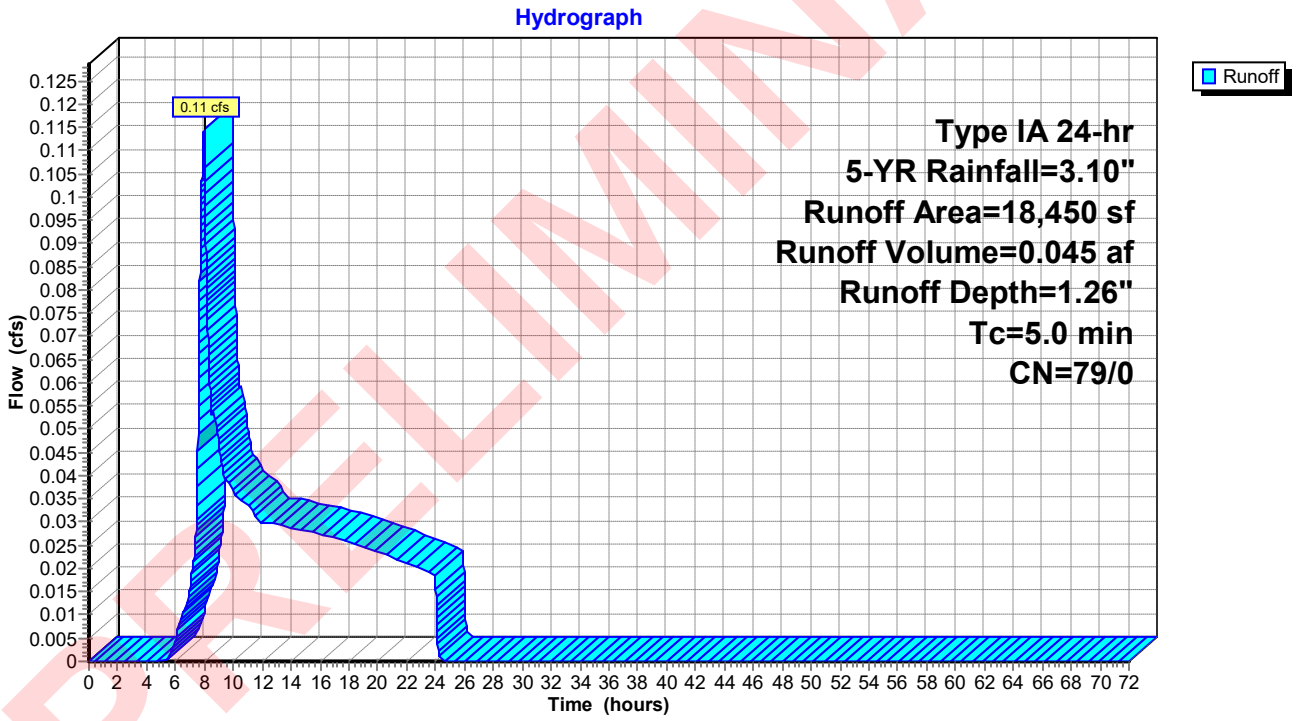
Runoff = 0.11 cfs @ 8.00 hrs, Volume= 0.045 af, Depth= 1.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
18,450	79	50-75% Grass cover, Fair, HSG C
18,450		100.00% Pervious Area

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

Subcatchment 1.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 1.2-iP: Impervious

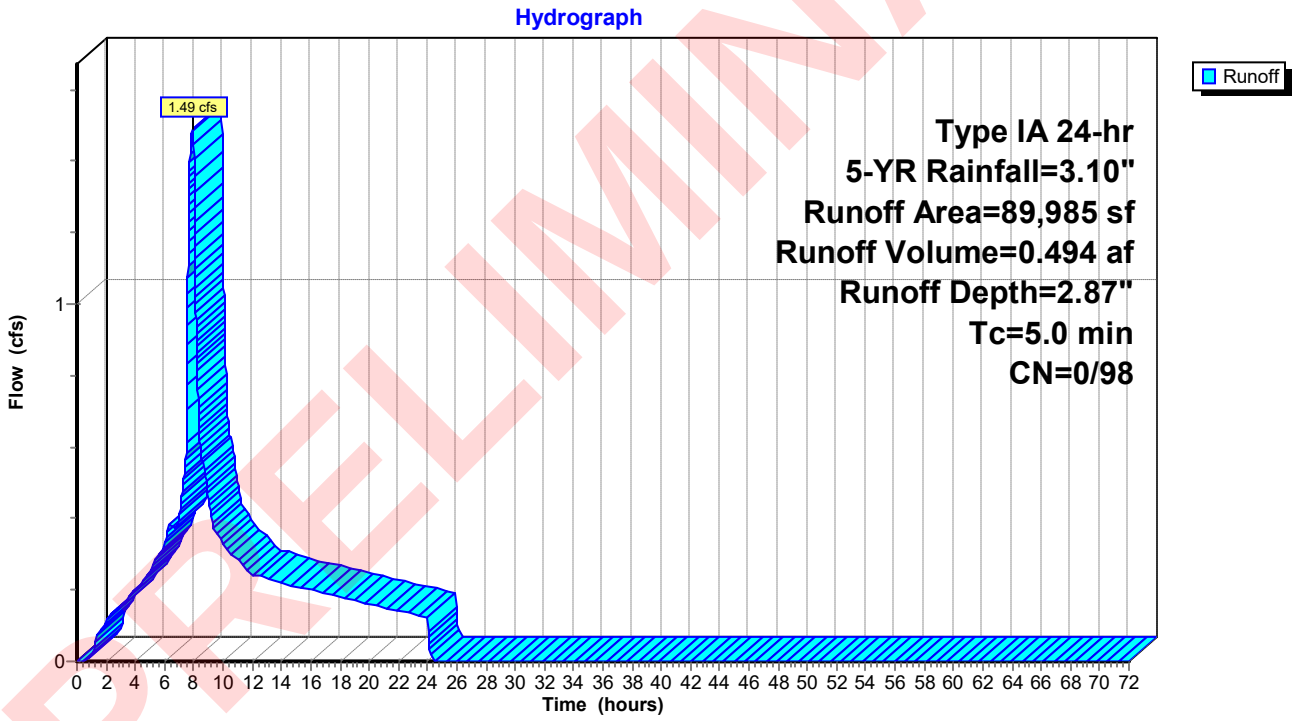
Runoff = 1.49 cfs @ 7.88 hrs, Volume= 0.494 af, Depth= 2.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	89,985	98	Roof/Drive Aisle
	89,985		100.00% Impervious Area

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

Subcatchment 1.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.2-P: Pervious

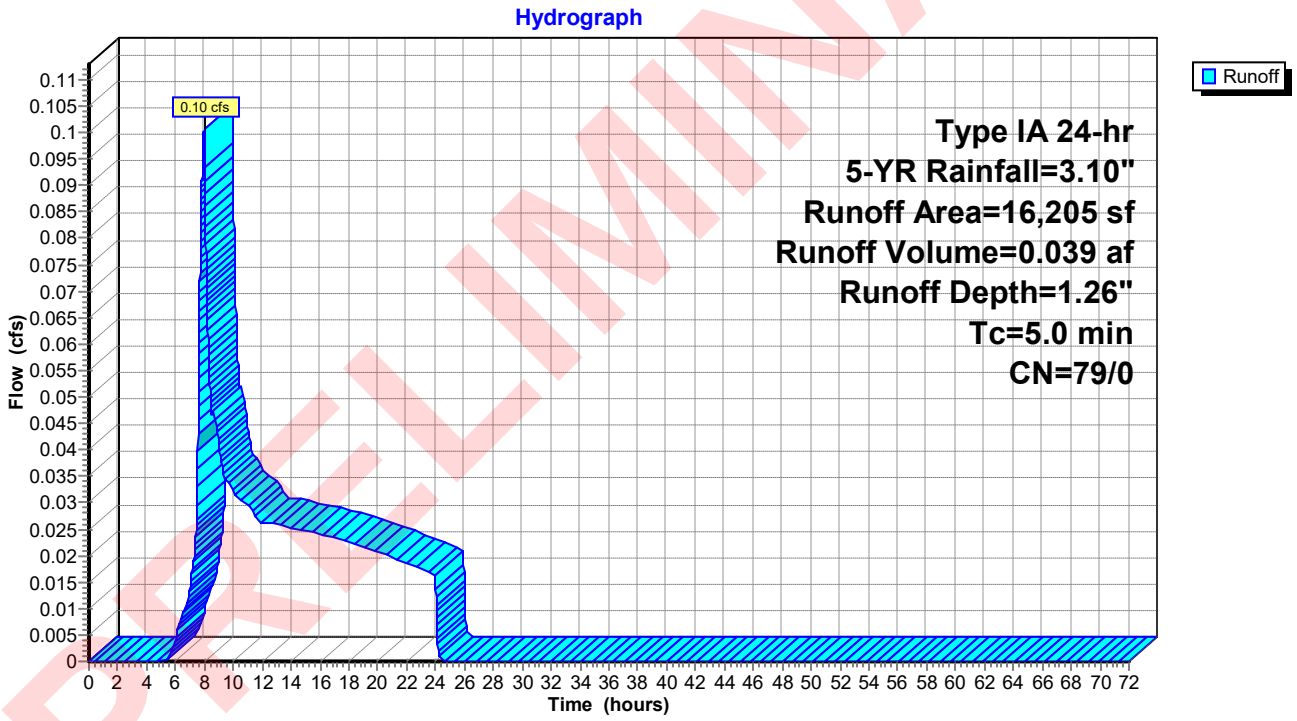
Runoff = 0.10 cfs @ 8.00 hrs, Volume= 0.039 af, Depth= 1.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
16,205	79	50-75% Grass cover, Fair, HSG C
16,205		100.00% Pervious Area

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

Subcatchment 1.2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

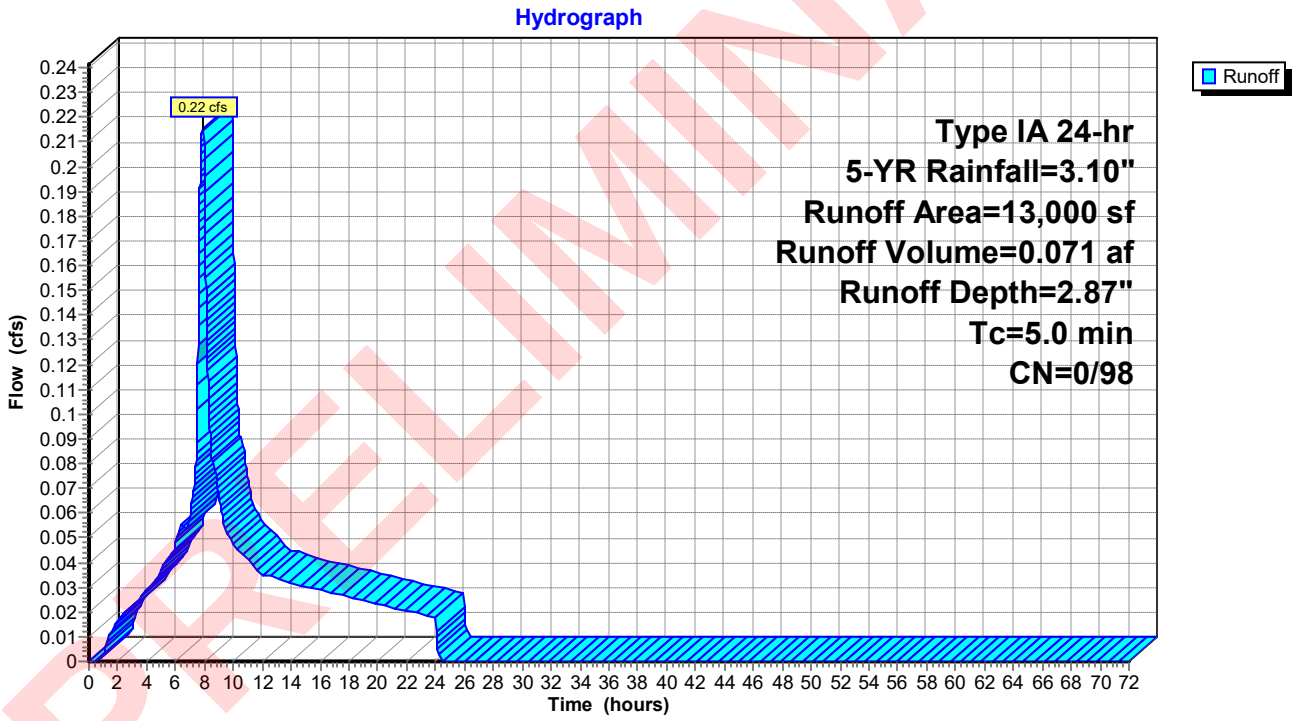
Runoff = 0.22 cfs @ 7.88 hrs, Volume= 0.071 af, Depth= 2.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	13,000	98	Roof/Drive Aisle
	13,000		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

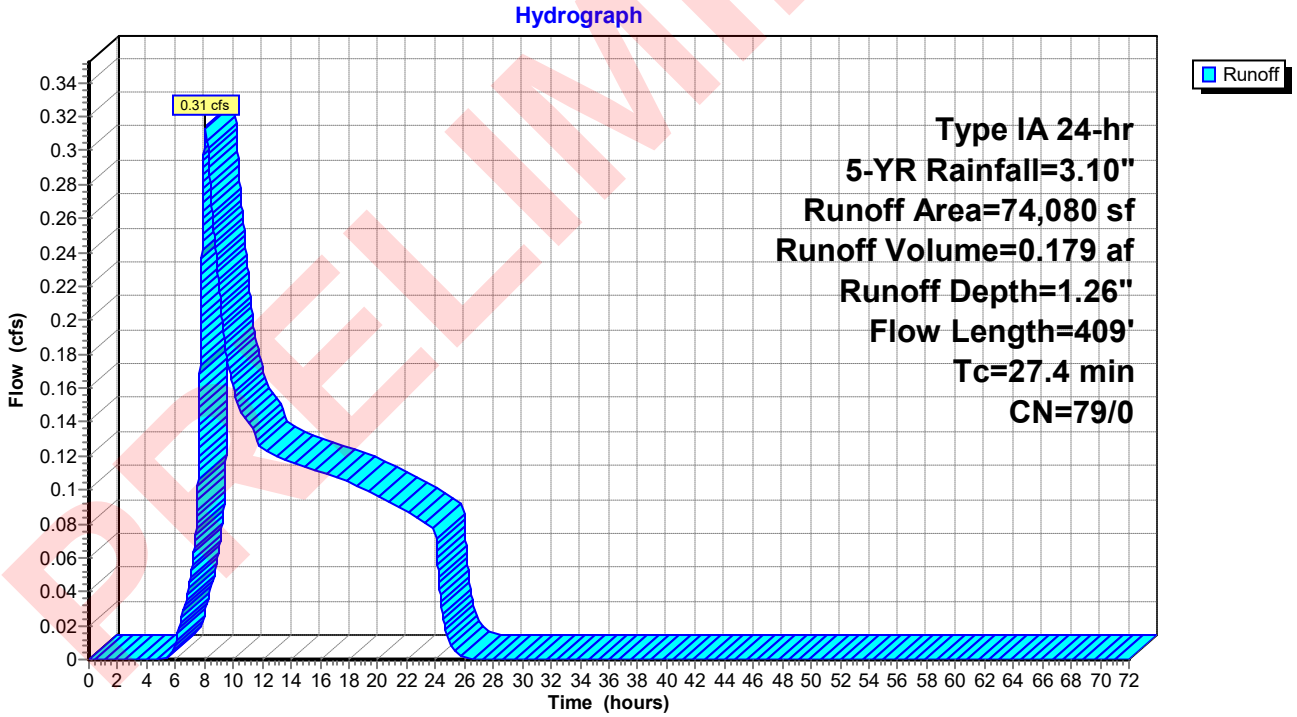
Runoff = 0.31 cfs @ 8.05 hrs, Volume= 0.179 af, Depth= 1.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
74,080	79	50-75% Grass cover, Fair, HSG C
74,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.2-iP: Impervious

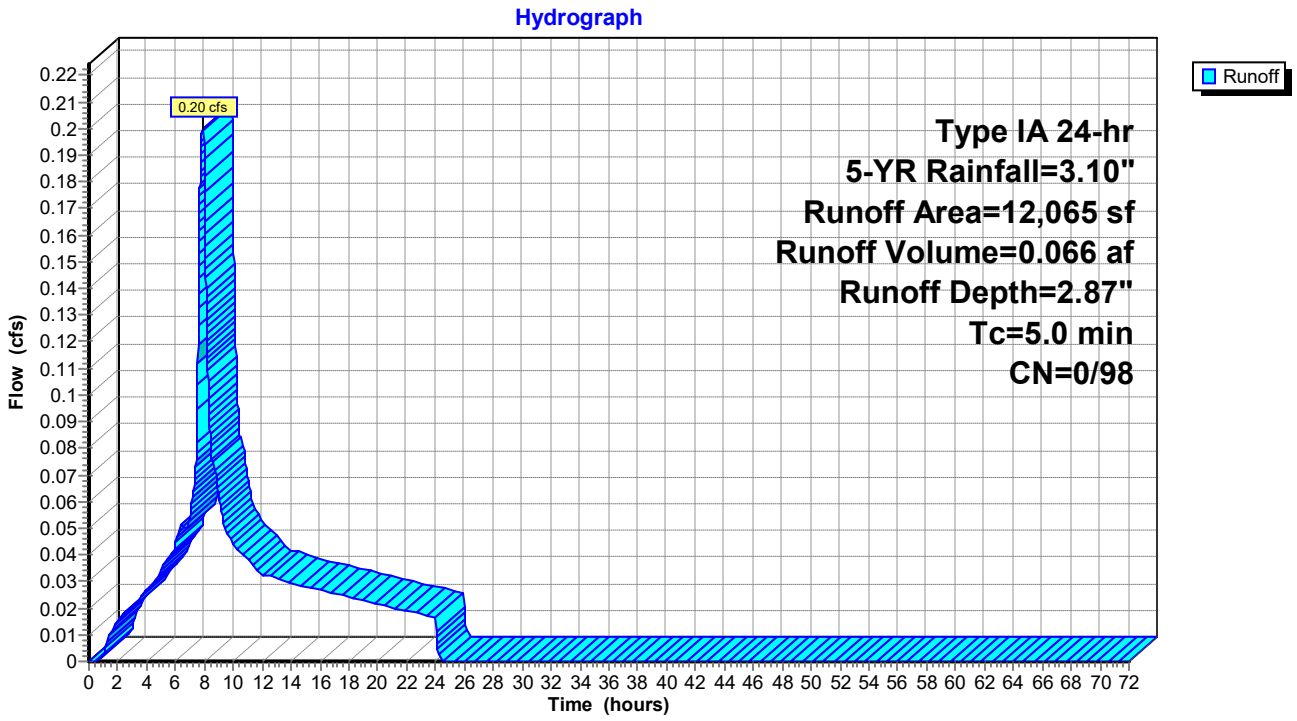
Runoff = 0.20 cfs @ 7.88 hrs, Volume= 0.066 af, Depth= 2.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	12,065	98	Roof/Drive Aisle
	12,065		100.00% Impervious Area

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

Subcatchment 2.2-iP: Impervious



Summary for Subcatchment 2.2-P: Pervious

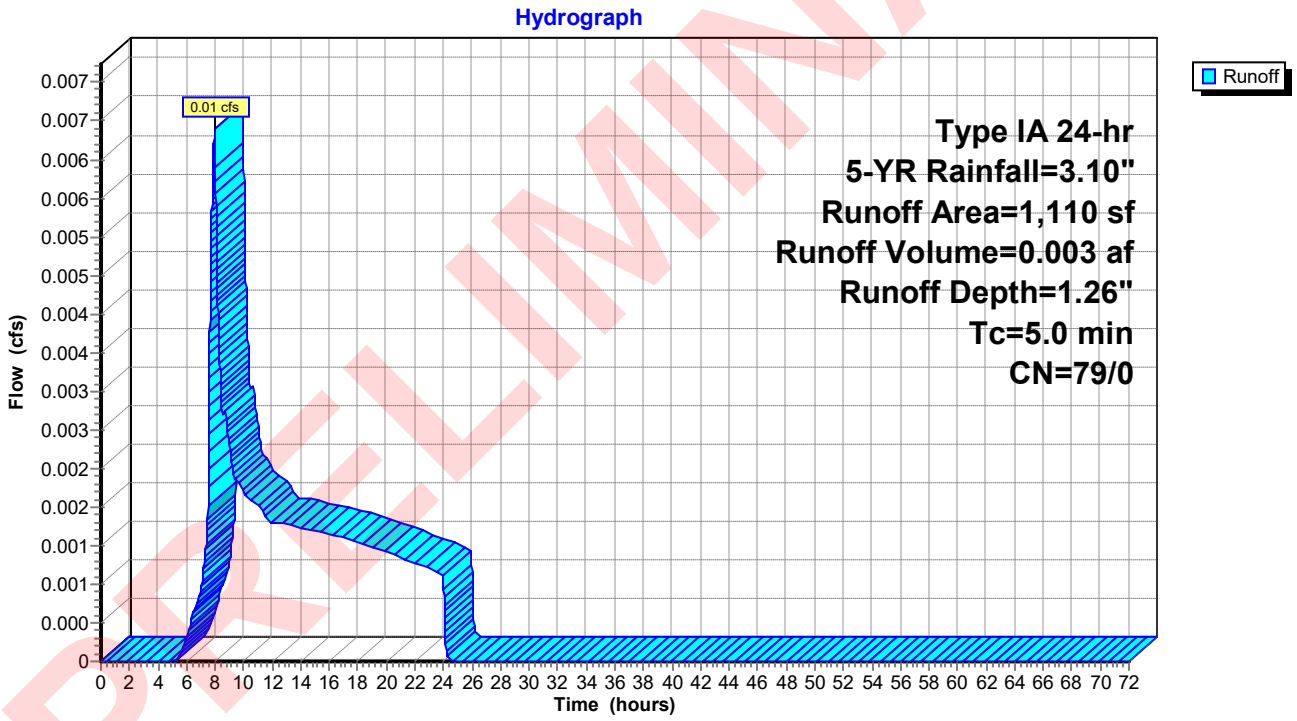
Runoff = 0.01 cfs @ 8.00 hrs, Volume= 0.003 af, Depth= 1.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
1,110	79	50-75% Grass cover, Fair, HSG C
1,110		100.00% Pervious Area

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

Subcatchment 2.2-P: Pervious



PRELIMINARY

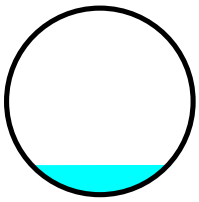
Summary for Reach 1.1-MH: WQ MH

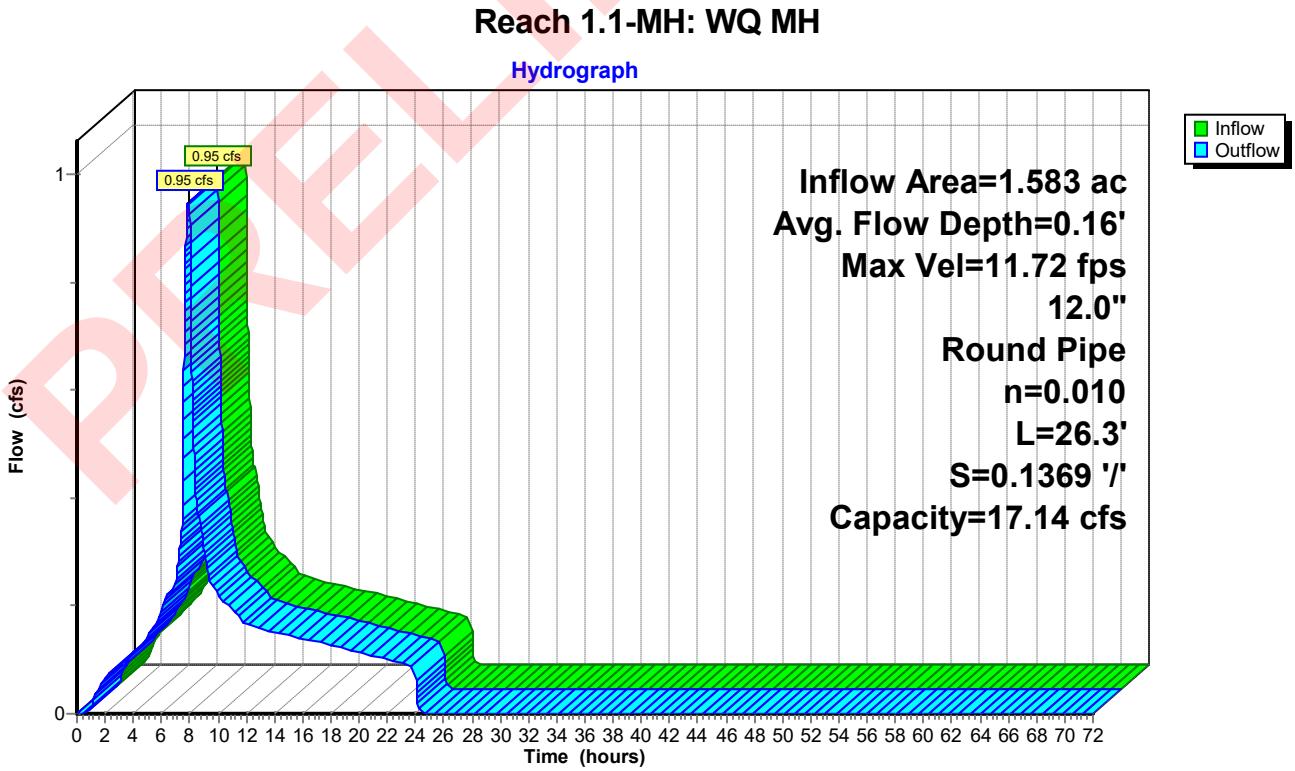
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 2.44" for 5-YR event
Inflow = 0.95 cfs @ 7.90 hrs, Volume= 0.322 af
Outflow = 0.95 cfs @ 7.90 hrs, Volume= 0.322 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 11.72 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 6.59 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.16'
Defined Flood Depth= 171.30' Flow Area= 23.4 sf, Capacity= -12,228.33 cfs
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 17.14 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 26.3' Slope= 0.1369 '/'
Inlet Invert= 169.60', Outlet Invert= 166.00'





PRELIMINARY

Summary for Reach 1.2-S: Vegetated Swale

Inflow Area = 2.438 ac, 84.74% Impervious, Inflow Depth = 2.62" for 5-YR event
Inflow = 1.59 cfs @ 7.89 hrs, Volume= 0.533 af
Outflow = 1.52 cfs @ 8.01 hrs, Volume= 0.533 af, Atten= 4%, Lag= 7.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.49 fps, Min. Travel Time= 10.1 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 23.7 min

Peak Storage= 926 cf @ 8.01 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 1.50' Flow Area= 10.5 sf, Capacity= 8.43 cfs

Custom cross-section, Length= 300.0' Slope= 0.0190 '/'
Constant n= 0.240
Inlet Invert= 178.70', Outlet Invert= 173.00'

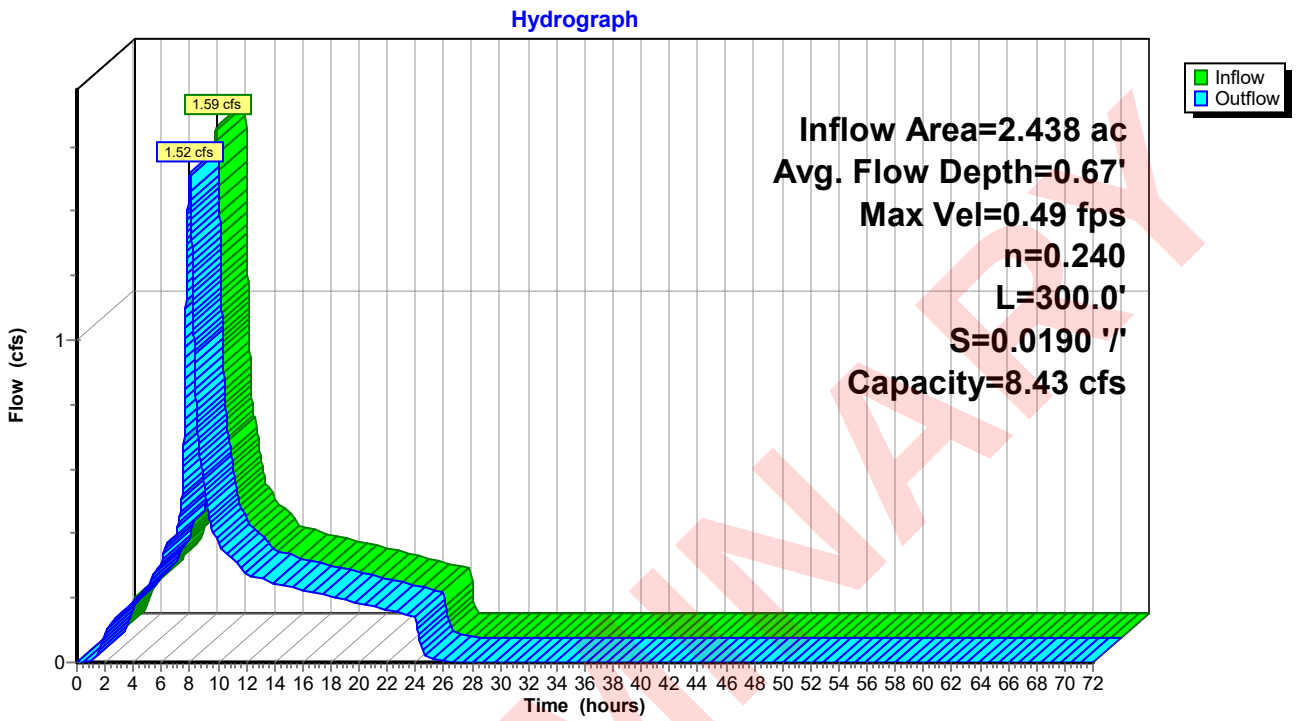
‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	1.50	0.00
2.50	0.50	1.00
4.50	0.00	1.50
6.50	0.00	1.50
8.50	0.50	1.00
11.00	1.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
0.50	2.0	6.1	600	0.81
1.50	10.5	11.5	3,150	8.43

PRELIMINARY

Reach 1.2-S: Vegetated Swale



PRELIMINARY

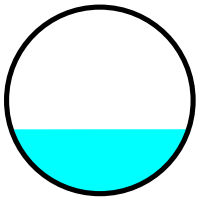
Summary for Reach 3R: Catch Basin

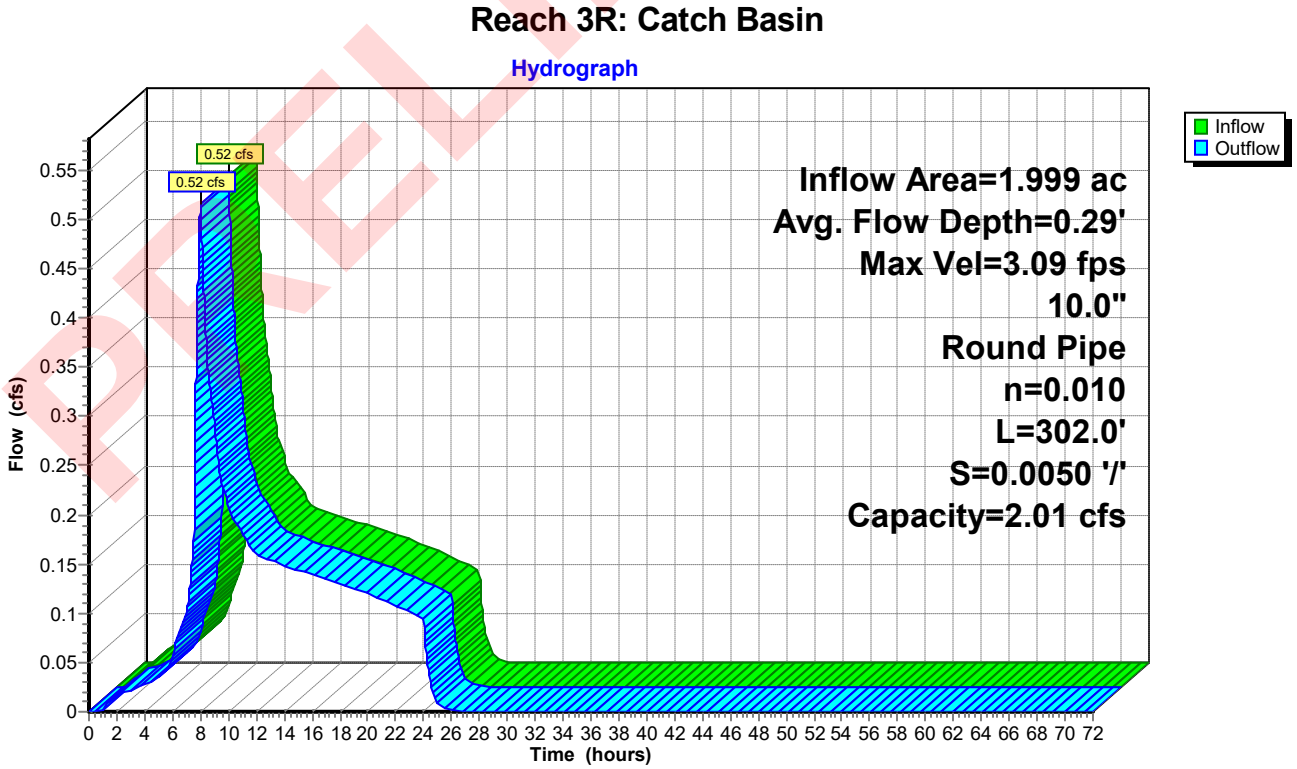
Inflow Area = 1.999 ac, 14.93% Impervious, Inflow Depth = 1.50" for 5-YR event
Inflow = 0.52 cfs @ 8.00 hrs, Volume= 0.250 af
Outflow = 0.52 cfs @ 8.01 hrs, Volume= 0.250 af, Atten= 1%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.09 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 2.8 min

Peak Storage= 50 cf @ 8.01 hrs
Average Depth at Peak Storage= 0.29'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,793.61 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.01 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 302.0' Slope= 0.0050 '/'
Inlet Invert= 176.89', Outlet Invert= 175.38'





PRELIMINARY

Summary for Pond 1.1-CB: CB 1-1

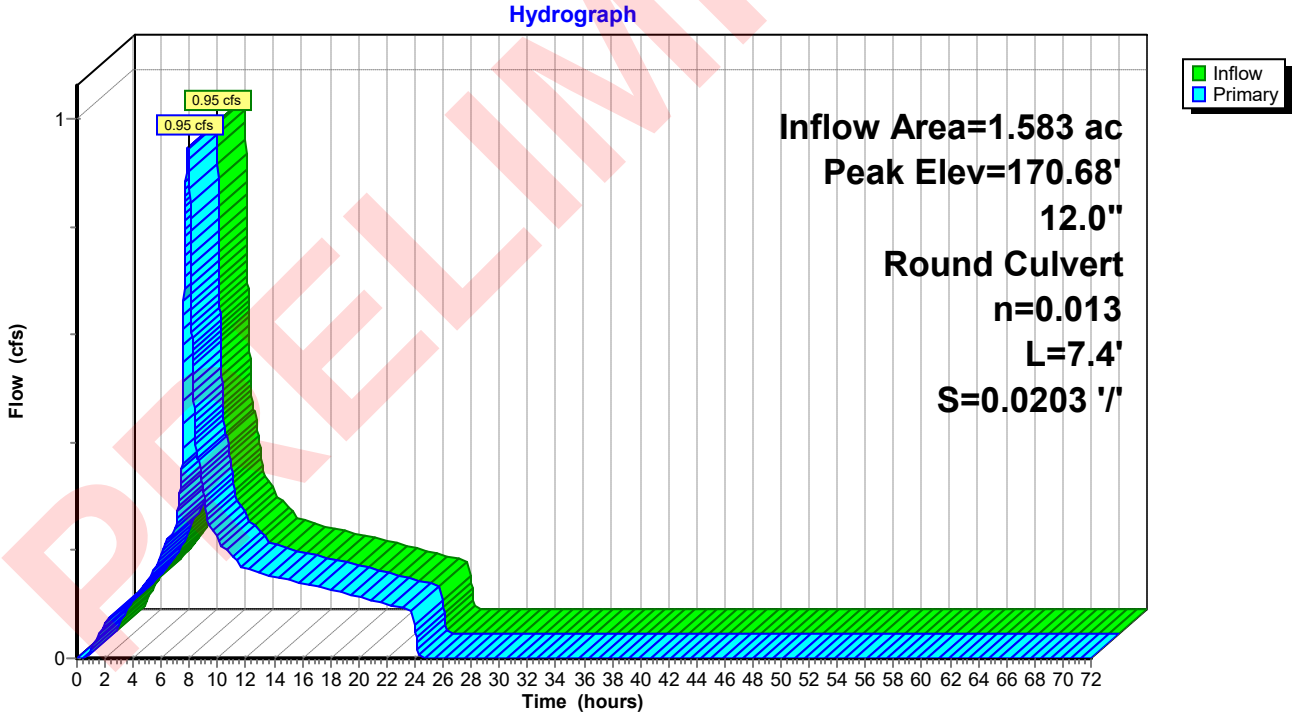
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 2.44" for 5-YR event
Inflow = 0.95 cfs @ 7.90 hrs, Volume= 0.322 af
Outflow = 0.95 cfs @ 7.90 hrs, Volume= 0.322 af, Atten= 0%, Lag= 0.0 min
Primary = 0.95 cfs @ 7.90 hrs, Volume= 0.322 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 170.68' @ 7.90 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.14'	**12.0" Round Culvert** L= 7.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.14' / 169.99' S= 0.0203 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.95 cfs @ 7.90 hrs HW=170.68' TW=169.76' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.95 cfs @ 3.20 fps)

Pond 1.1-CB: CB 1-1



PRELIMINARY

Summary for Pond STM-1: Detention Pond

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth = 2.55" for 5-YR event
Inflow = 2.45 cfs @ 7.98 hrs, Volume= 0.854 af
Outflow = 0.43 cfs @ 12.59 hrs, Volume= 0.808 af, Atten= 82%, Lag= 276.9 min
Primary = 0.43 cfs @ 12.59 hrs, Volume= 0.808 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 171.30' @ 12.59 hrs Surf.Area= 5,758 sf Storage= 17,887 cf

Plug-Flow detention time= 861.5 min calculated for 0.808 af (95% of inflow)
Center-of-Mass det. time= 821.2 min (1,513.6 - 692.4)

Volume	Invert	Avail.Storage	Storage Description
#1	166.00'	25,571 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

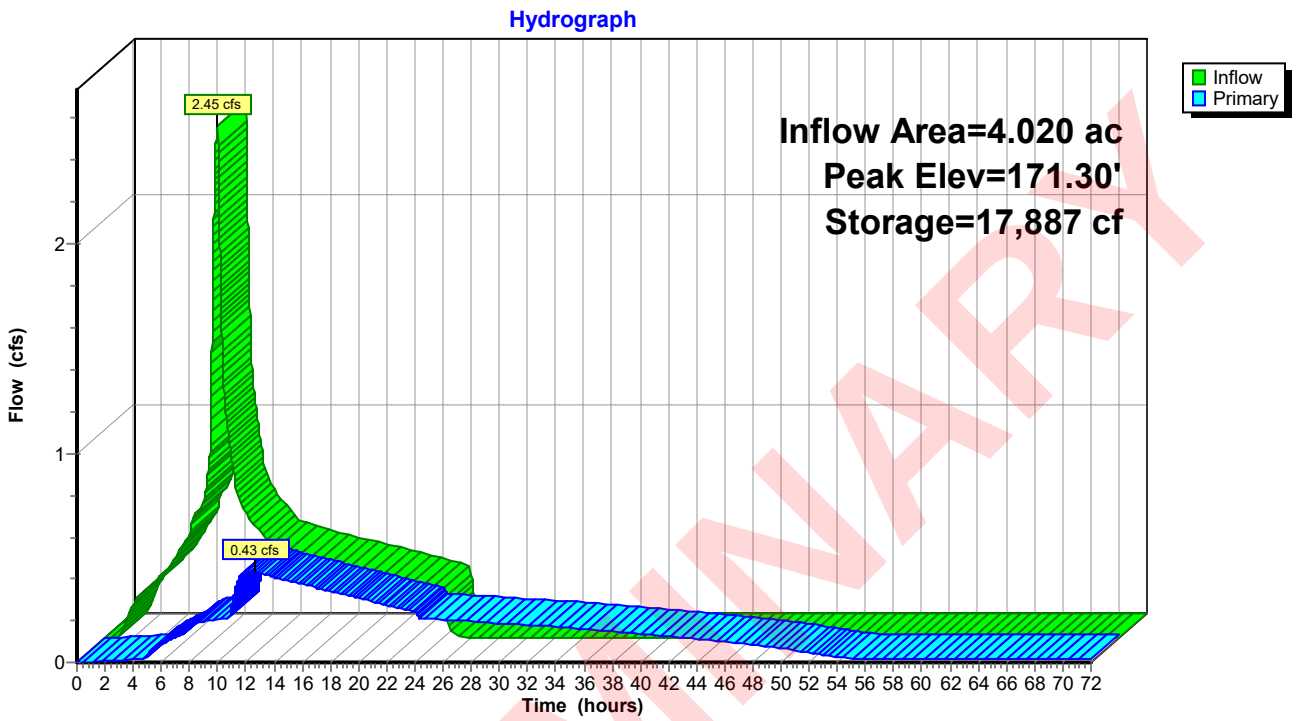
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
166.00	1,435	183.3	0	0	1,435
167.00	2,038	218.4	1,728	1,728	2,575
167.50	2,379	236.0	1,103	2,831	3,221
168.50	3,140	271.1	2,751	5,582	4,660
169.50	4,004	302.9	3,563	9,145	6,141
170.50	4,950	328.0	4,469	13,613	7,440
171.50	5,971	351.4	5,453	19,066	8,750
172.50	7,053	370.2	6,504	25,571	9,888

Device	Routing	Invert	Outlet Devices
#1	Primary	165.24'	**12.0" Round Outlet Pipe** L= 33.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.24' / 164.00' S= 0.0369 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	166.00'	**0.7" Vert. WQ Outlet** C= 0.600
#3	Device 1	167.50'	**1.9" Vert. Detention** C= 0.600
#4	Device 1	171.20'	**2.2' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.43 cfs @ 12.59 hrs HW=171.30' TW=0.00' (Dynamic Tailwater)
└─**1=Outlet Pipe** (Passes 0.43 cfs of 8.92 cfs potential flow)
  ├─**2=WQ Outlet** (Orifice Controls 0.03 cfs @ 11.05 fps)
  ├─**3=Detention** (Orifice Controls 0.18 cfs @ 9.29 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.22 cfs @ 1.03 fps)

PRELIMINARY

Pond STM-1: Detention Pond



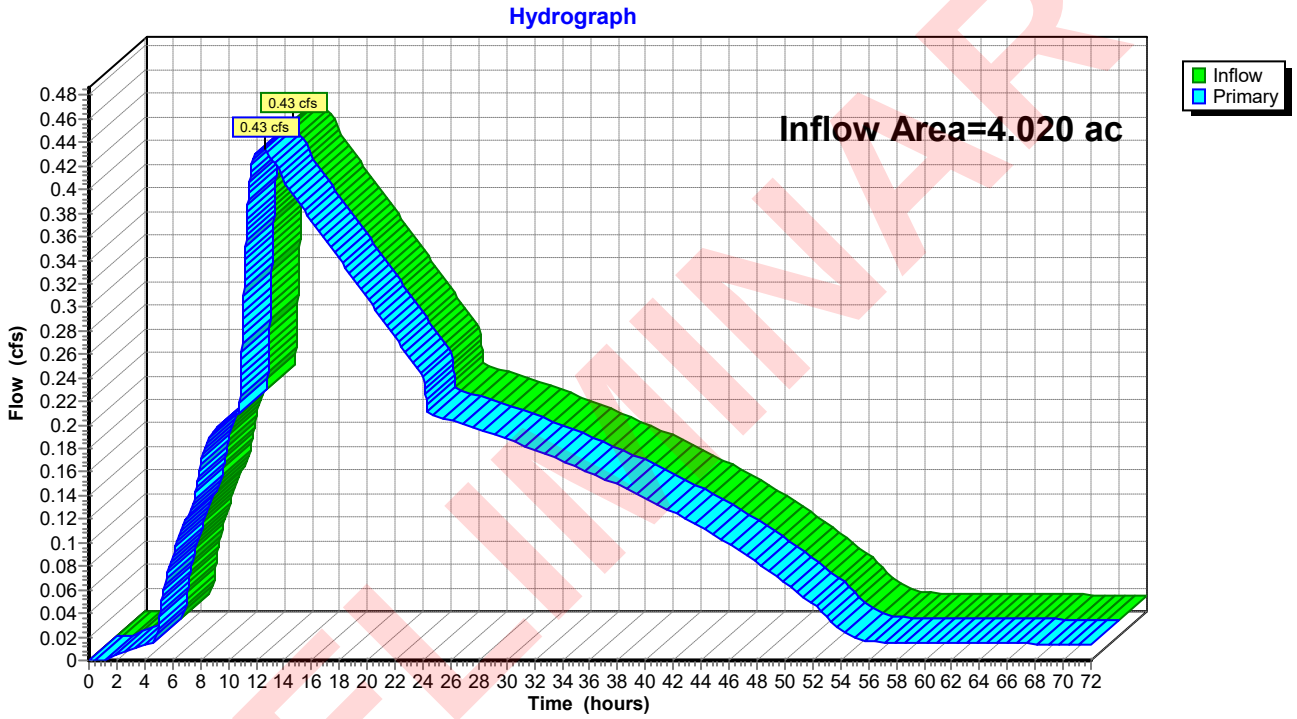
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth > 2.41" for 5-YR event
Inflow = 0.43 cfs @ 12.59 hrs, Volume= 0.808 af
Primary = 0.43 cfs @ 12.59 hrs, Volume= 0.808 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



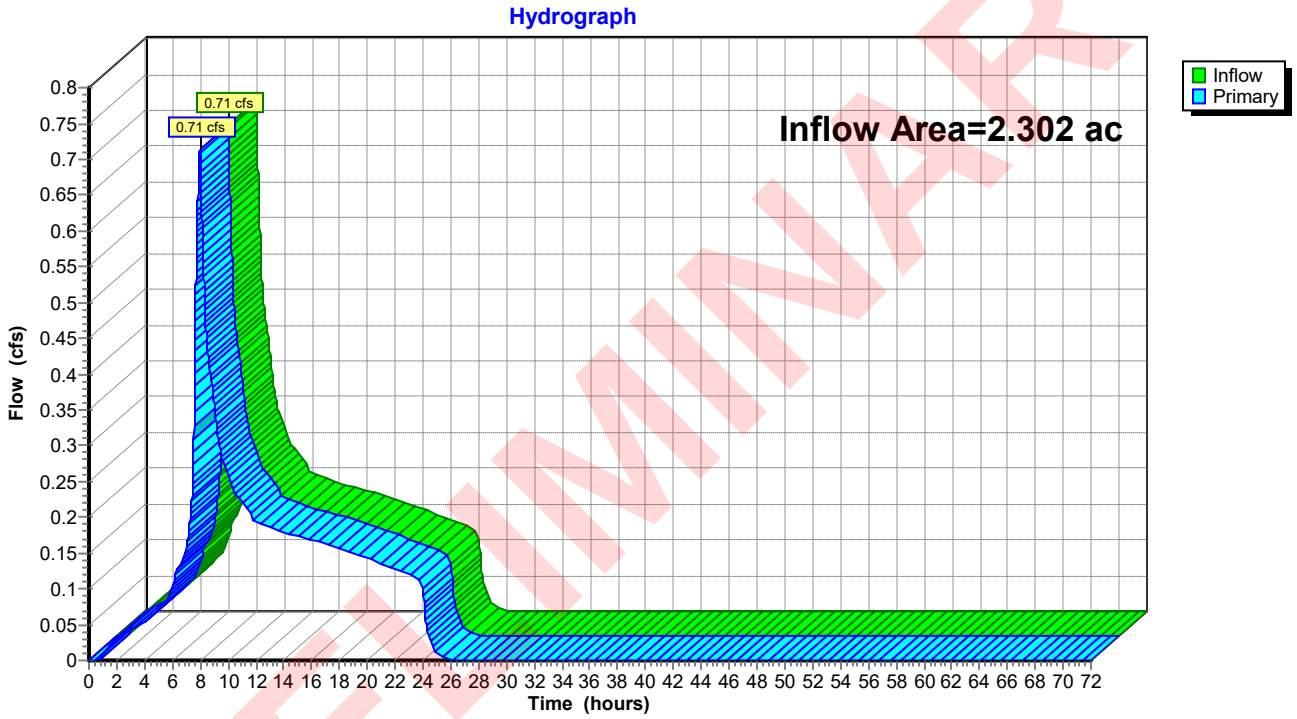
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.302 ac, 25.00% Impervious, Inflow Depth = 1.66" for 5-YR event
Inflow = 0.71 cfs @ 8.00 hrs, Volume= 0.319 af
Primary = 0.71 cfs @ 8.00 hrs, Volume= 0.319 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1-iP: Impervious Runoff Area=50,490 sf 100.00% Impervious Runoff Depth=3.22"
Tc=5.0 min CN=0/98 Runoff=0.94 cfs 0.311 af

Subcatchment 1.1-P: Pervious Runoff Area=18,450 sf 0.00% Impervious Runoff Depth=1.53"
Tc=5.0 min CN=79/0 Runoff=0.14 cfs 0.054 af

Subcatchment 1.2-iP: Impervious Runoff Area=89,985 sf 100.00% Impervious Runoff Depth=3.22"
Tc=5.0 min CN=0/98 Runoff=1.67 cfs 0.554 af

Subcatchment 1.2-P: Pervious Runoff Area=16,205 sf 0.00% Impervious Runoff Depth=1.53"
Tc=5.0 min CN=79/0 Runoff=0.13 cfs 0.047 af

Subcatchment 2.1-iP: Impervious Runoff Area=13,000 sf 100.00% Impervious Runoff Depth=3.22"
Tc=5.0 min CN=0/98 Runoff=0.24 cfs 0.080 af

Subcatchment 2.1-P: Pervious Runoff Area=74,080 sf 0.00% Impervious Runoff Depth=1.53"
Flow Length=409' Tc=27.4 min CN=79/0 Runoff=0.40 cfs 0.216 af

Subcatchment 2.2-iP: Impervious Runoff Area=12,065 sf 100.00% Impervious Runoff Depth=3.22"
Tc=5.0 min CN=0/98 Runoff=0.22 cfs 0.074 af

Subcatchment 2.2-P: Pervious Runoff Area=1,110 sf 0.00% Impervious Runoff Depth=1.53"
Tc=5.0 min CN=79/0 Runoff=0.01 cfs 0.003 af

Reach 1.1-MH: WQ MH Avg. Flow Depth=0.17' Max Vel=12.16 fps Inflow=1.08 cfs 0.365 af
12.0" Round Pipe n=0.010 L=26.3' S=0.1369 '/' Capacity=17.14 cfs Outflow=1.08 cfs 0.365 af

Reach 1.2-S: Vegetated Swale Avg. Flow Depth=0.71' Max Vel=0.51 fps Inflow=1.79 cfs 0.601 af
n=0.240 L=300.0' S=0.0190 '/' Capacity=8.43 cfs Outflow=1.72 cfs 0.601 af

Reach 3R: Catch Basin Avg. Flow Depth=0.32' Max Vel=3.26 fps Inflow=0.63 cfs 0.296 af
10.0" Round Pipe n=0.010 L=302.0' S=0.0050 '/' Capacity=2.01 cfs Outflow=0.63 cfs 0.296 af

Pond 1.1-CB: CB 1-1 Peak Elev=170.72' Inflow=1.08 cfs 0.365 af
12.0" Round Culvert n=0.013 L=7.4' S=0.0203 '/' Outflow=1.08 cfs 0.365 af

Pond STM-1: Detention Pond Peak Elev=171.35' Storage=18,175 cf Inflow=2.77 cfs 0.966 af
Outflow=0.62 cfs 0.919 af

Link 1L: Flow Summary Part 1 Inflow=0.62 cfs 0.919 af
Primary=0.62 cfs 0.919 af

Link 2L: Flow Summary Part 2 Inflow=0.85 cfs 0.374 af
Primary=0.85 cfs 0.374 af

Total Runoff Area = 6.322 ac Runoff Volume = 1.340 af Average Runoff Depth = 2.54"
39.89% Pervious = 2.522 ac 60.11% Impervious = 3.800 ac

PRELIMINARY

Summary for Subcatchment 1.1-iP: Impervious

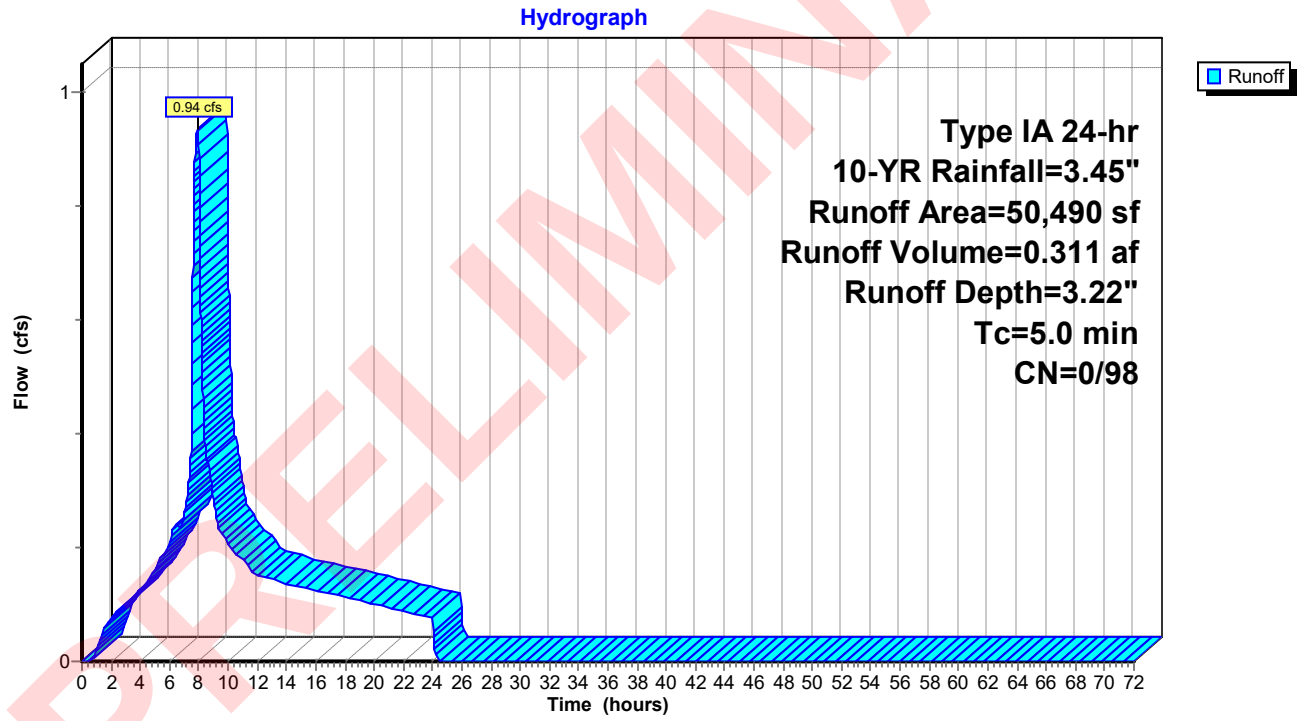
Runoff = 0.94 cfs @ 7.88 hrs, Volume= 0.311 af, Depth= 3.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

	Area (sf)	CN	Description
*	50,490	98	Roof/Drive Aisle
	50,490		100.00% Impervious Area

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

Subcatchment 1.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.1-P: Pervious

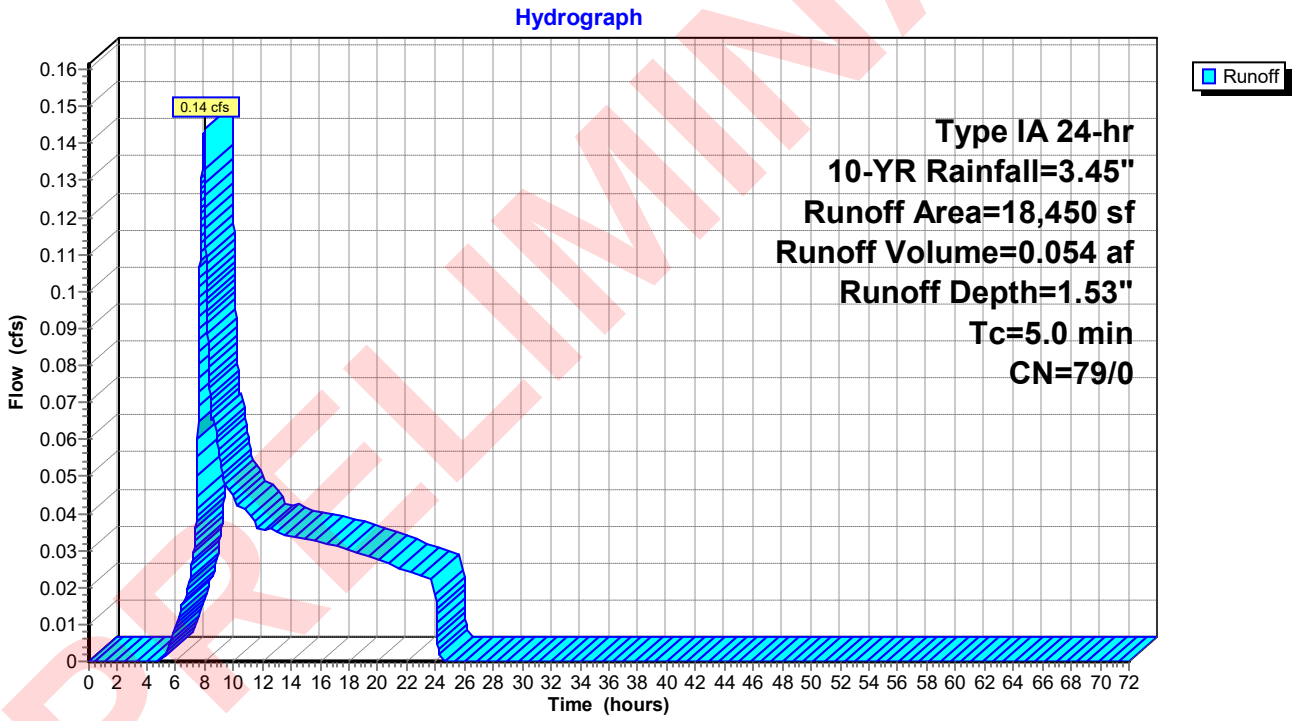
Runoff = 0.14 cfs @ 7.99 hrs, Volume= 0.054 af, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
18,450	79	50-75% Grass cover, Fair, HSG C
18,450		100.00% Pervious Area

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

Subcatchment 1.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 1.2-iP: Impervious

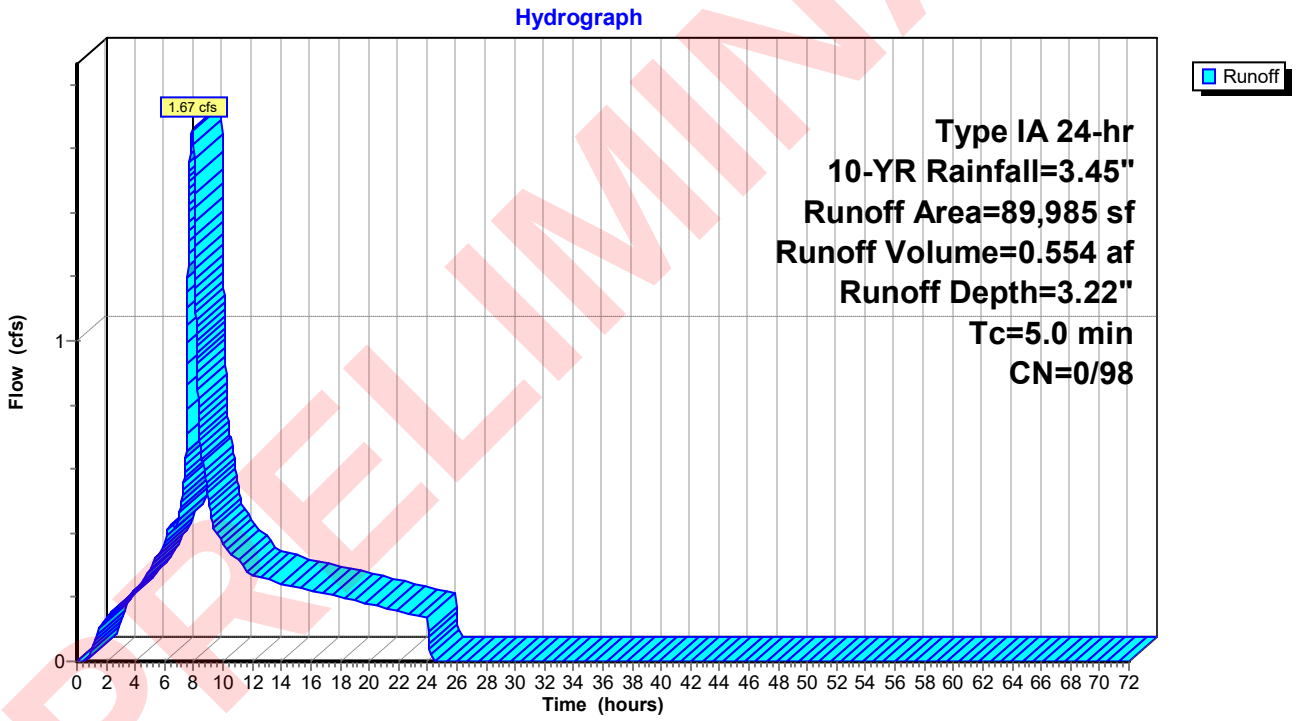
Runoff = 1.67 cfs @ 7.88 hrs, Volume= 0.554 af, Depth= 3.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

	Area (sf)	CN	Description
*	89,985	98	Roof/Drive Aisle
	89,985		100.00% Impervious Area

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

Subcatchment 1.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.2-P: Pervious

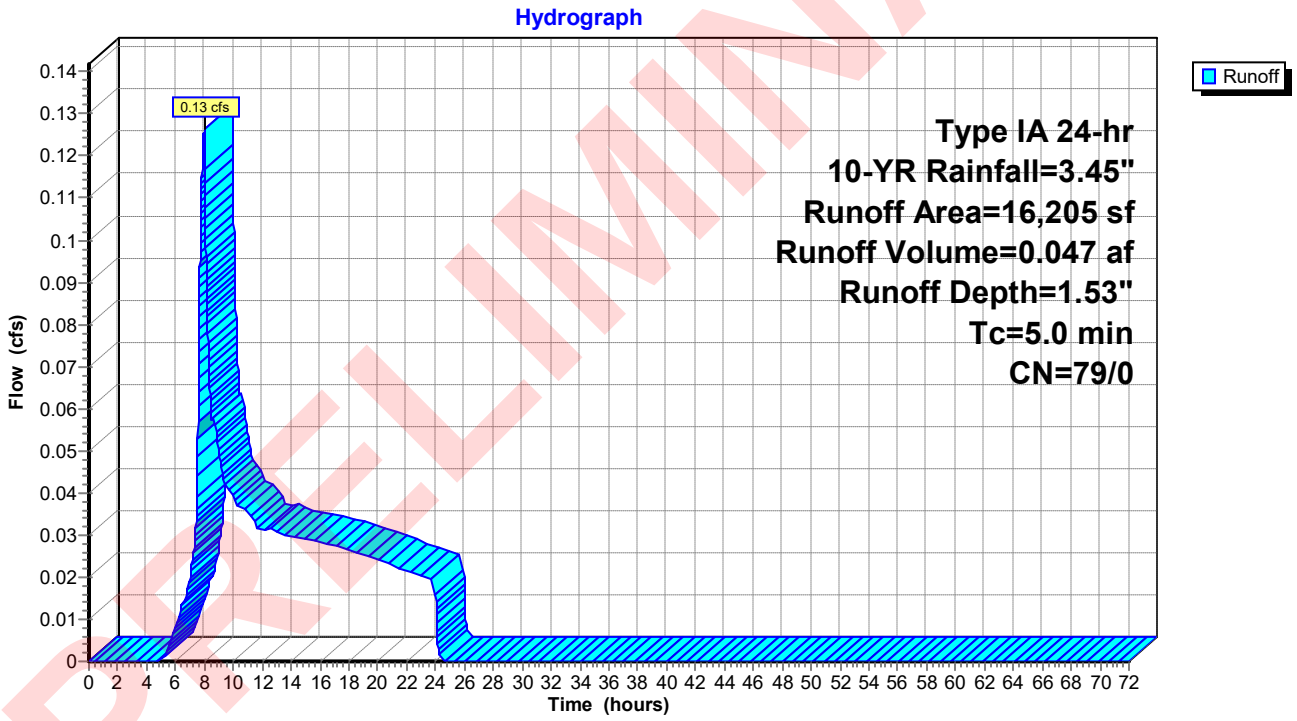
Runoff = 0.13 cfs @ 7.99 hrs, Volume= 0.047 af, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
16,205	79	50-75% Grass cover, Fair, HSG C
16,205		100.00% Pervious Area

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

Subcatchment 1.2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

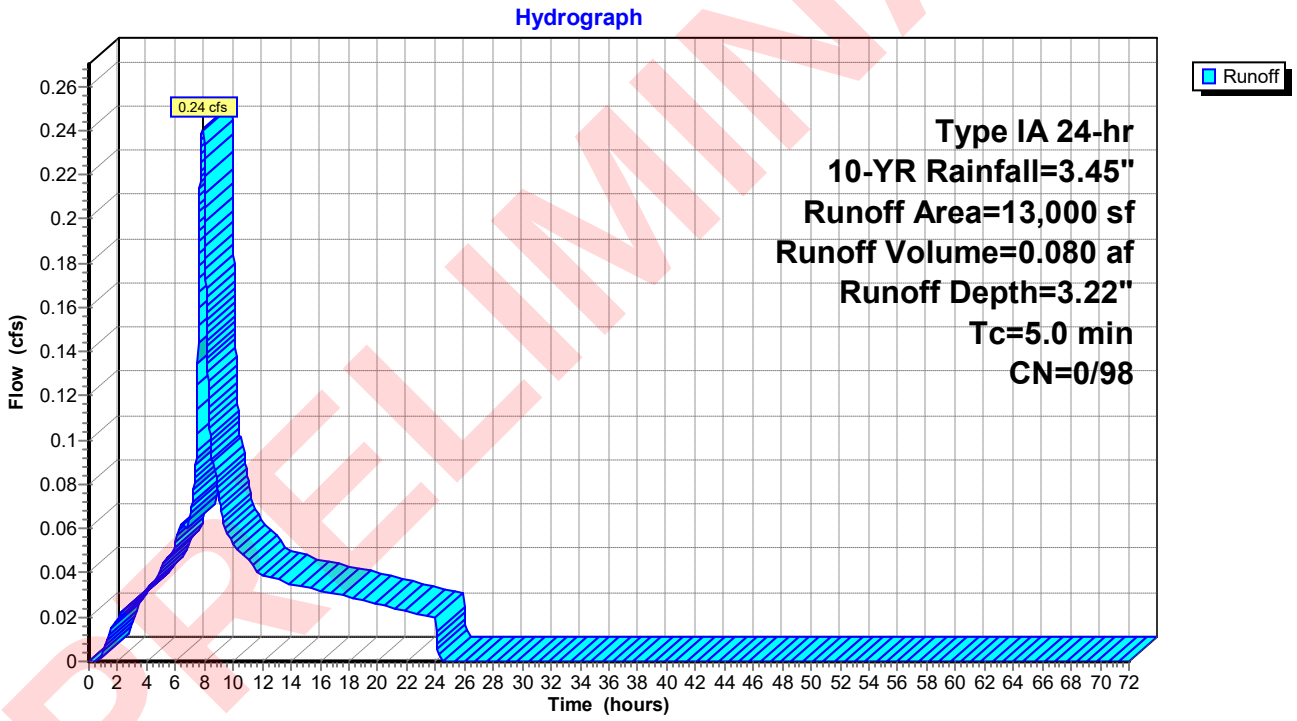
Runoff = 0.24 cfs @ 7.88 hrs, Volume= 0.080 af, Depth= 3.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

	Area (sf)	CN	Description
*	13,000	98	Roof/Drive Aisle
	13,000		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

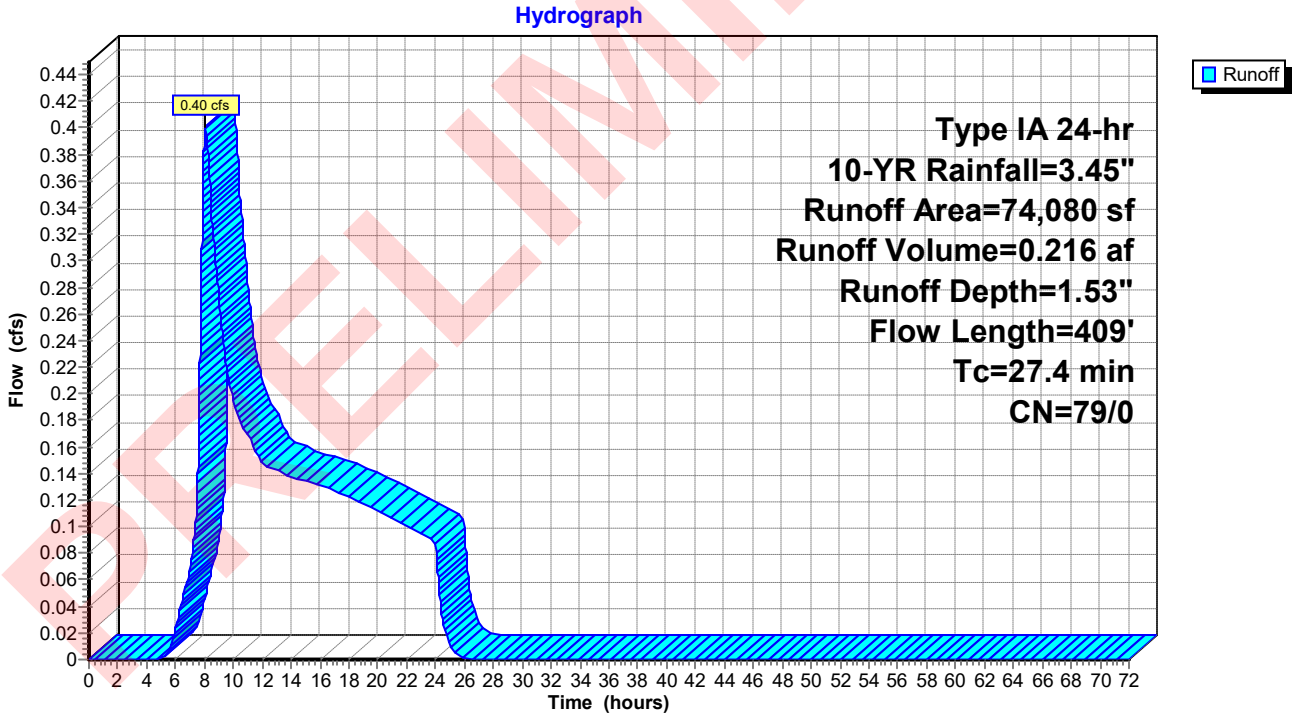
Runoff = 0.40 cfs @ 8.03 hrs, Volume= 0.216 af, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
74,080	79	50-75% Grass cover, Fair, HSG C
74,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.2-iP: Impervious

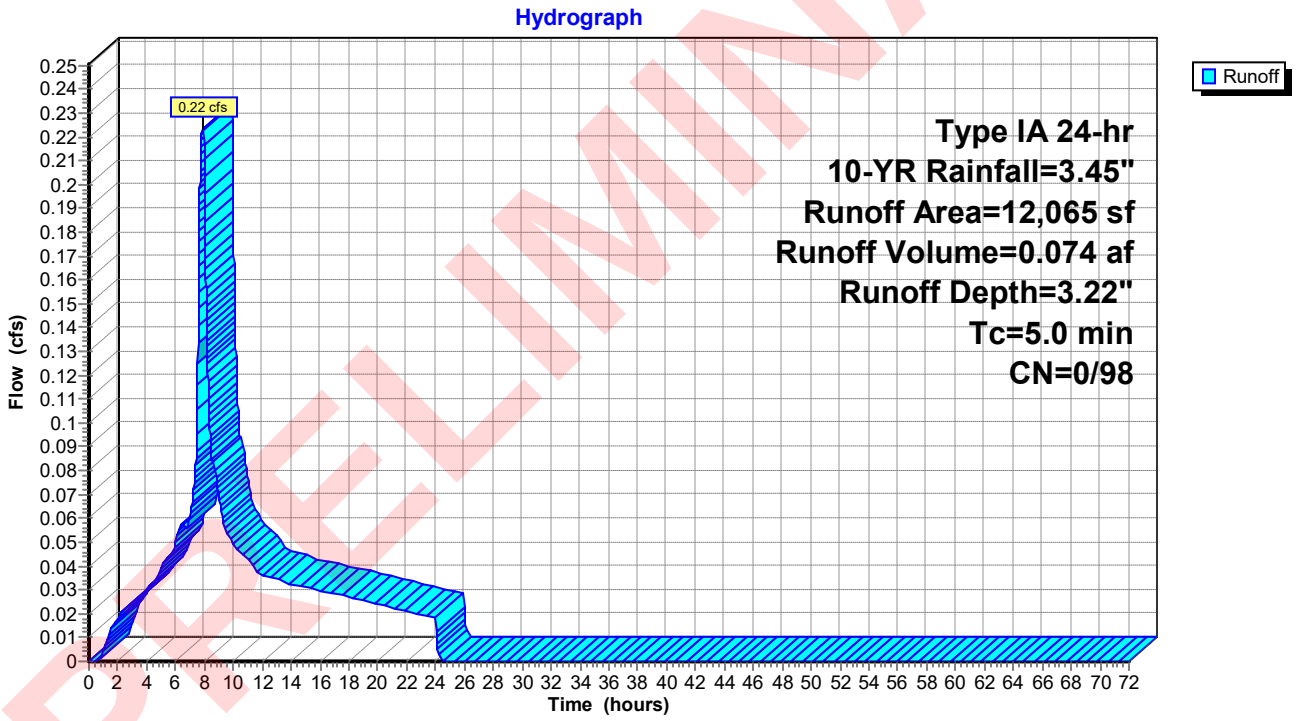
Runoff = 0.22 cfs @ 7.88 hrs, Volume= 0.074 af, Depth= 3.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

	Area (sf)	CN	Description
*	12,065	98	Roof/Drive Aisle
	12,065		100.00% Impervious Area

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

Subcatchment 2.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.2-P: Pervious

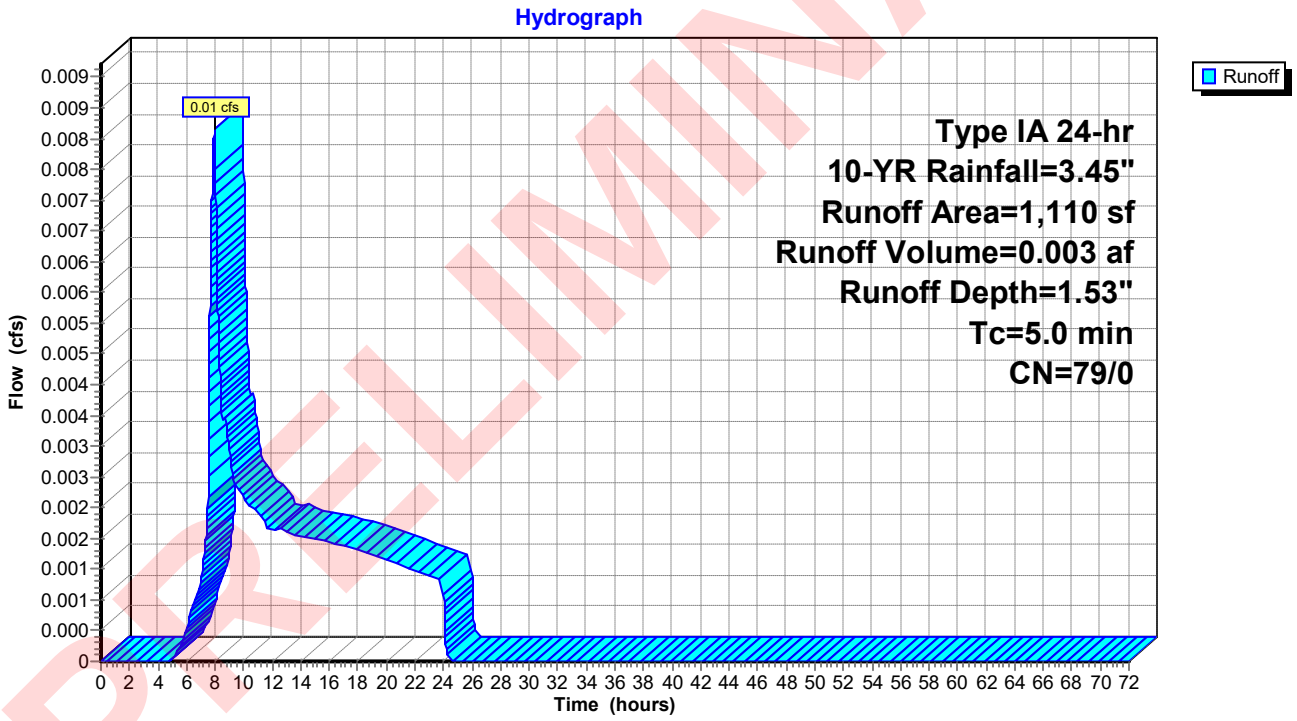
Runoff = 0.01 cfs @ 7.99 hrs, Volume= 0.003 af, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
1,110	79	50-75% Grass cover, Fair, HSG C
1,110		100.00% Pervious Area

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

Subcatchment 2.2-P: Pervious



PRELIMINARY

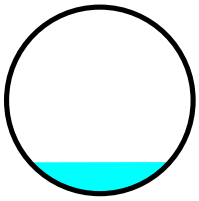
Summary for Reach 1.1-MH: WQ MH

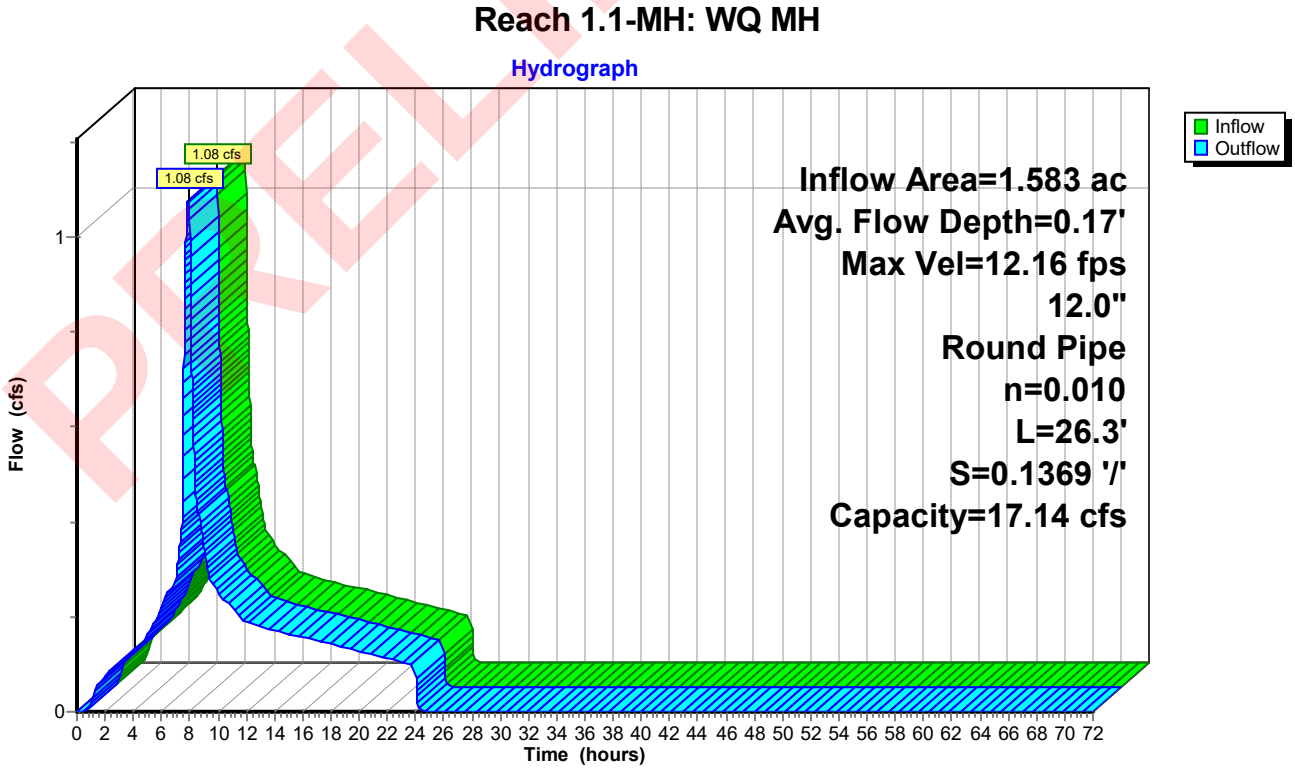
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 2.76" for 10-YR event
Inflow = 1.08 cfs @ 7.89 hrs, Volume= 0.365 af
Outflow = 1.08 cfs @ 7.89 hrs, Volume= 0.365 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 12.16 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 6.83 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 7.89 hrs
Average Depth at Peak Storage= 0.17'
Defined Flood Depth= 171.30' Flow Area= 23.4 sf, Capacity= -12,228.33 cfs
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 17.14 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 26.3' Slope= 0.1369 '/'
Inlet Invert= 169.60', Outlet Invert= 166.00'





PRELIMINARY

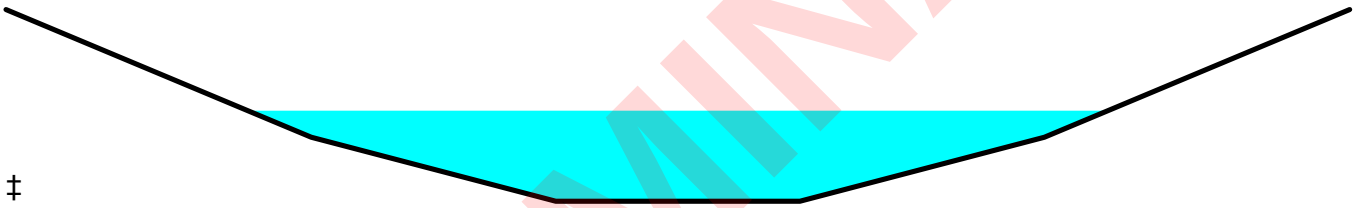
Summary for Reach 1.2-S: Vegetated Swale

Inflow Area = 2.438 ac, 84.74% Impervious, Inflow Depth = 2.96" for 10-YR event
Inflow = 1.79 cfs @ 7.89 hrs, Volume= 0.601 af
Outflow = 1.72 cfs @ 8.00 hrs, Volume= 0.601 af, Atten= 4%, Lag= 7.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.51 fps, Min. Travel Time= 9.8 min
Avg. Velocity = 0.22 fps, Avg. Travel Time= 23.0 min

Peak Storage= 1,008 cf @ 8.00 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 1.50' Flow Area= 10.5 sf, Capacity= 8.43 cfs

Custom cross-section, Length= 300.0' Slope= 0.0190 '/'
Constant n= 0.240
Inlet Invert= 178.70', Outlet Invert= 173.00'



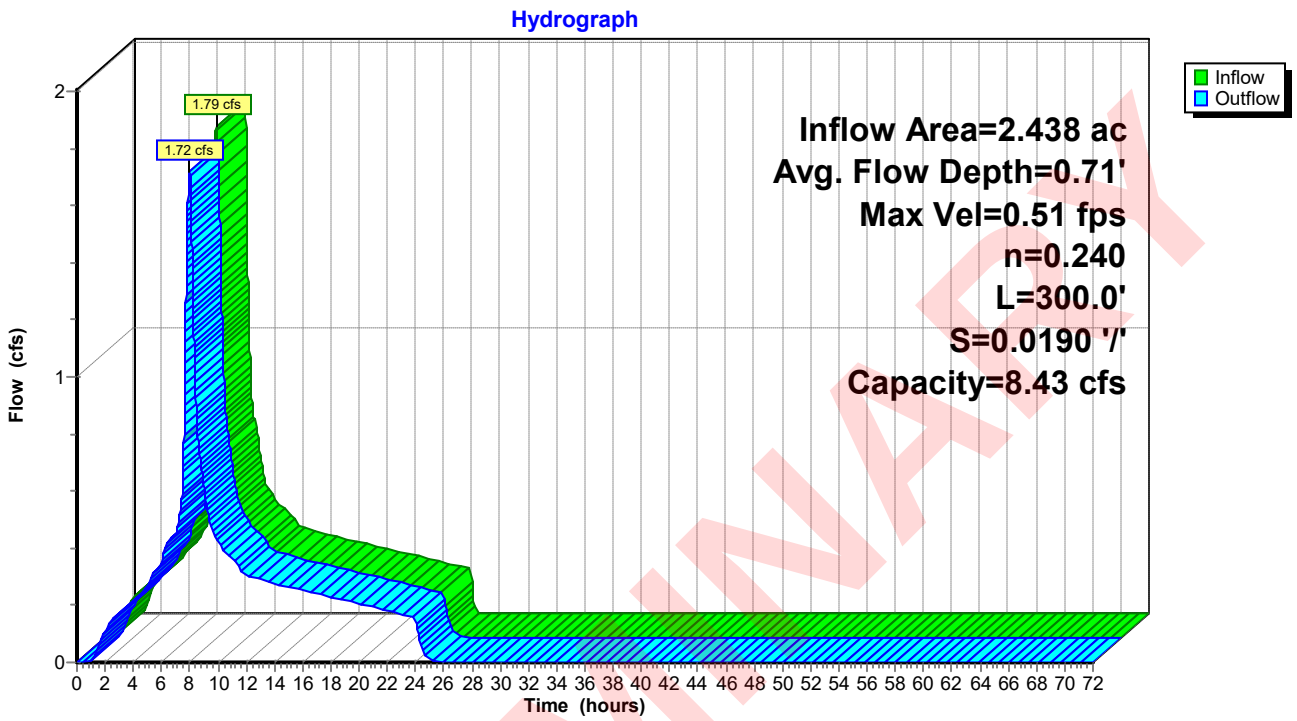
‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	1.50	0.00
2.50	0.50	1.00
4.50	0.00	1.50
6.50	0.00	1.50
8.50	0.50	1.00
11.00	1.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
0.50	2.0	6.1	600	0.81
1.50	10.5	11.5	3,150	8.43

PRELIMINARY

Reach 1.2-S: Vegetated Swale



PRELIMINARY

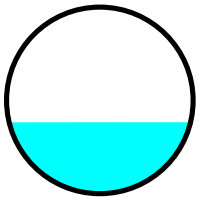
Summary for Reach 3R: Catch Basin

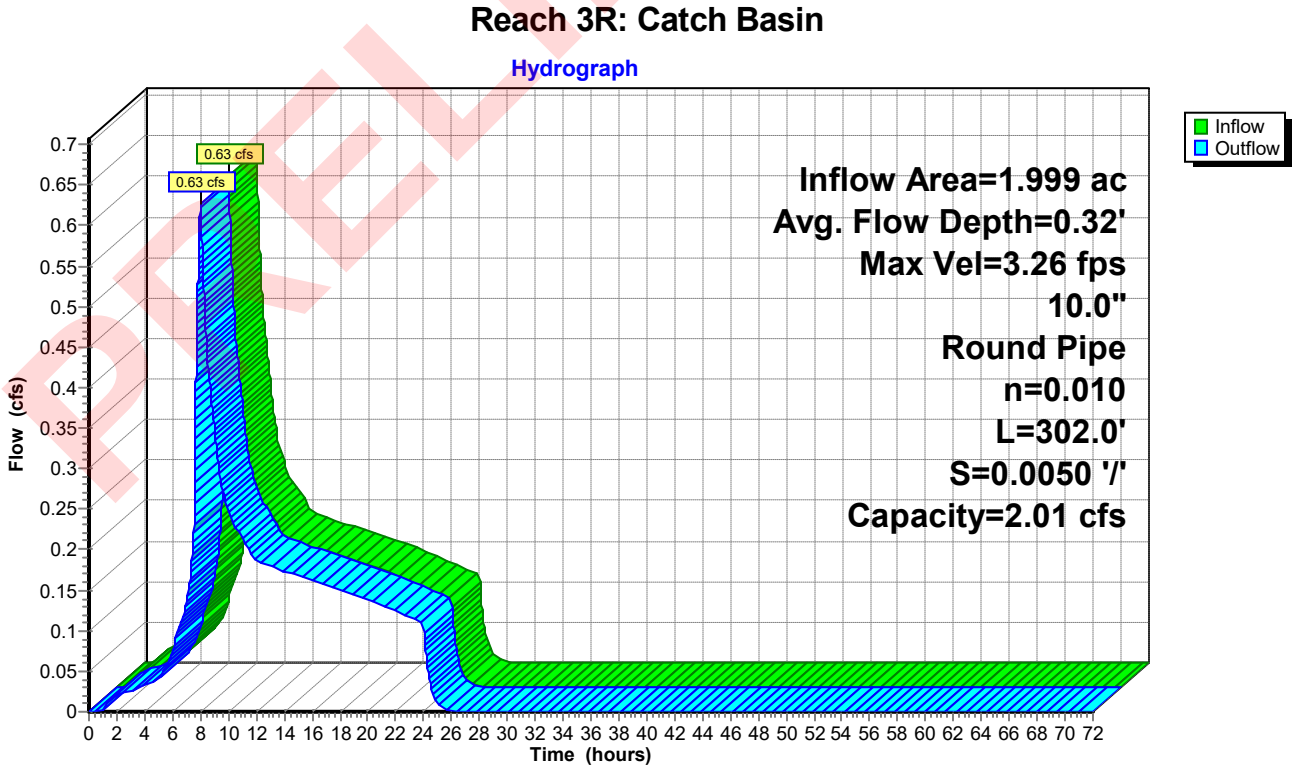
Inflow Area = 1.999 ac, 14.93% Impervious, Inflow Depth = 1.78" for 10-YR event
Inflow = 0.63 cfs @ 8.00 hrs, Volume= 0.296 af
Outflow = 0.63 cfs @ 8.01 hrs, Volume= 0.296 af, Atten= 1%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.26 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.85 fps, Avg. Travel Time= 2.7 min

Peak Storage= 58 cf @ 8.01 hrs
Average Depth at Peak Storage= 0.32'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,793.61 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.01 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 302.0' Slope= 0.0050 '/'
Inlet Invert= 176.89', Outlet Invert= 175.38'





PRELIMINARY

Summary for Pond 1.1-CB: CB 1-1

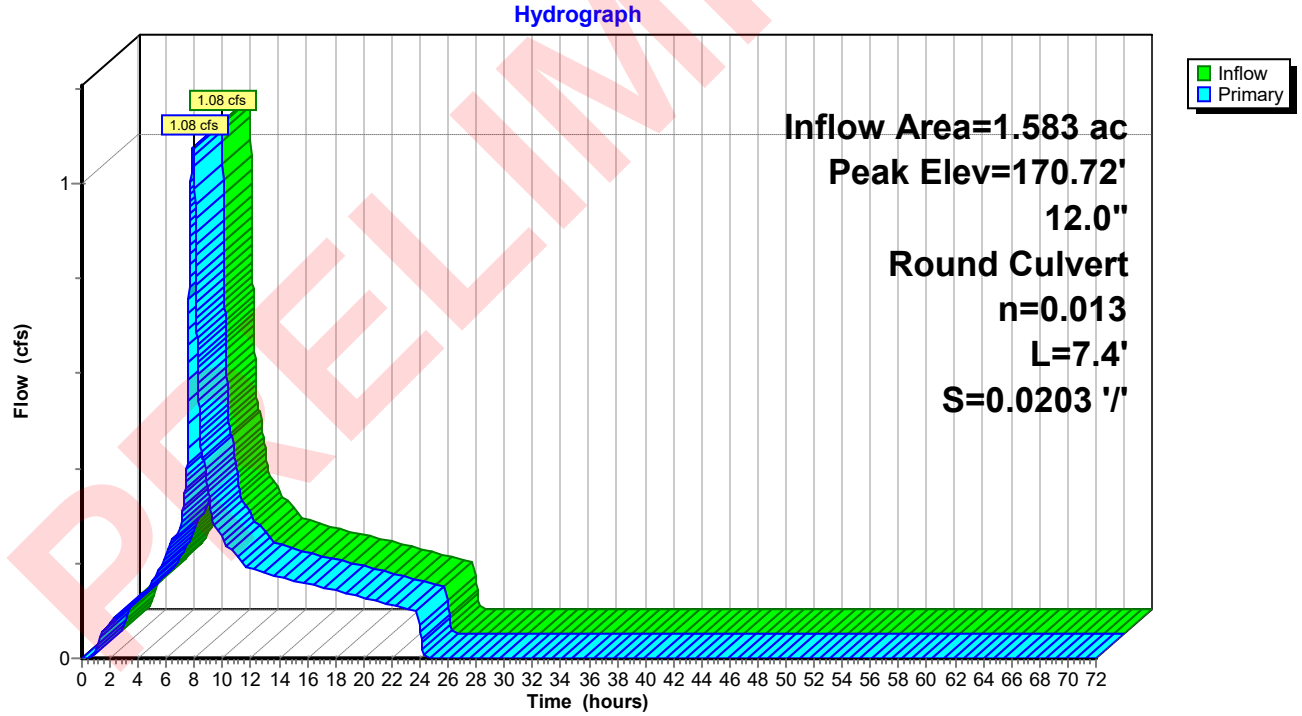
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 2.76" for 10-YR event
Inflow = 1.08 cfs @ 7.89 hrs, Volume= 0.365 af
Outflow = 1.08 cfs @ 7.89 hrs, Volume= 0.365 af, Atten= 0%, Lag= 0.0 min
Primary = 1.08 cfs @ 7.89 hrs, Volume= 0.365 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 170.72' @ 7.89 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.14'	**12.0" Round Culvert** L= 7.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.14' / 169.99' S= 0.0203 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.08 cfs @ 7.89 hrs HW=170.72' TW=169.77' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.08 cfs @ 3.28 fps)

Pond 1.1-CB: CB 1-1



PRELIMINARY

Summary for Pond STM-1: Detention Pond

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth = 2.88" for 10-YR event
Inflow = 2.77 cfs @ 7.97 hrs, Volume= 0.966 af
Outflow = 0.62 cfs @ 10.39 hrs, Volume= 0.919 af, Atten= 78%, Lag= 144.8 min
Primary = 0.62 cfs @ 10.39 hrs, Volume= 0.919 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 171.35' @ 10.39 hrs Surf.Area= 5,810 sf Storage= 18,175 cf

Plug-Flow detention time= 774.0 min calculated for 0.919 af (95% of inflow)
Center-of-Mass det. time= 738.0 min (1,427.3 - 689.3)

Volume	Invert	Avail.Storage	Storage Description
#1	166.00'	25,571 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

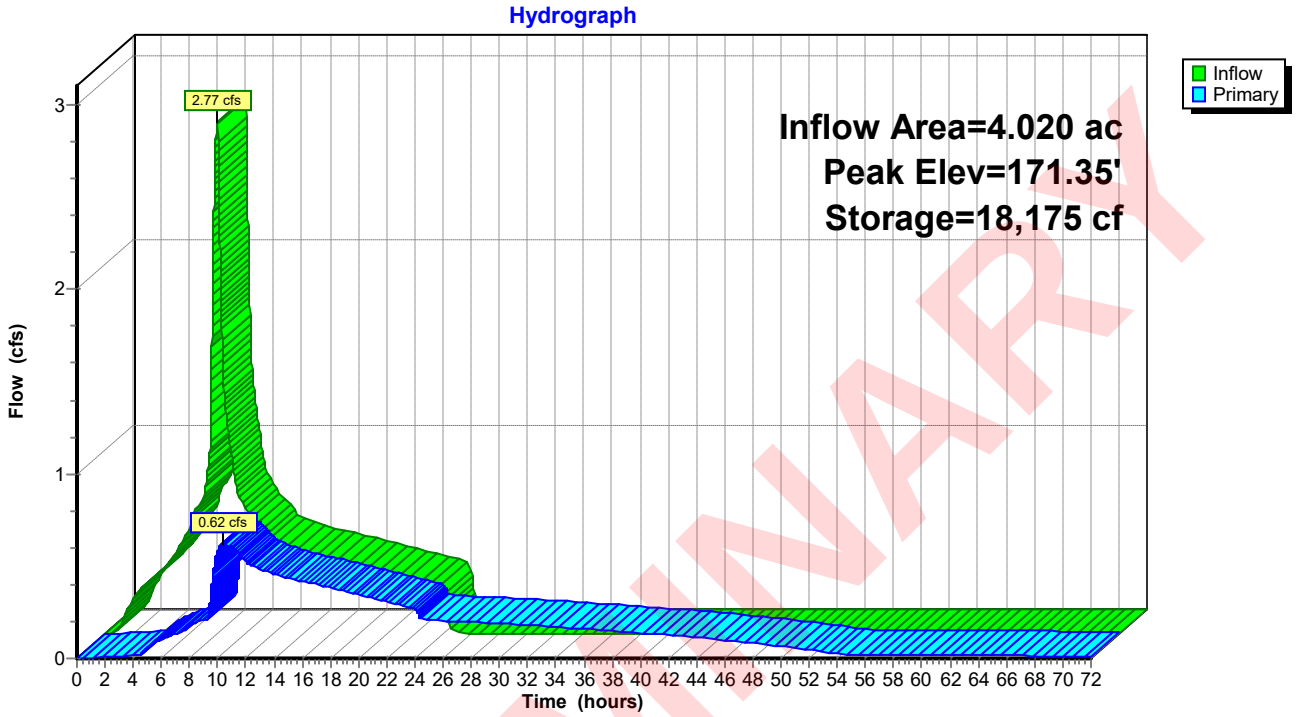
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
166.00	1,435	183.3	0	0	1,435
167.00	2,038	218.4	1,728	1,728	2,575
167.50	2,379	236.0	1,103	2,831	3,221
168.50	3,140	271.1	2,751	5,582	4,660
169.50	4,004	302.9	3,563	9,145	6,141
170.50	4,950	328.0	4,469	13,613	7,440
171.50	5,971	351.4	5,453	19,066	8,750
172.50	7,053	370.2	6,504	25,571	9,888

Device	Routing	Invert	Outlet Devices
#1	Primary	165.24'	**12.0" Round Outlet Pipe** L= 33.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.24' / 164.00' S= 0.0369 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	166.00'	**0.7" Vert. WQ Outlet** C= 0.600
#3	Device 1	167.50'	**1.9" Vert. Detention** C= 0.600
#4	Device 1	171.20'	**2.2' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.62 cfs @ 10.39 hrs HW=171.35' TW=0.00' (Dynamic Tailwater)
└─**1=Outlet Pipe** (Passes 0.62 cfs of 8.96 cfs potential flow)
  ├─**2=WQ Outlet** (Orifice Controls 0.03 cfs @ 11.11 fps)
  ├─**3=Detention** (Orifice Controls 0.18 cfs @ 9.35 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.41 cfs @ 1.26 fps)

PRELIMINARY

Pond STM-1: Detention Pond



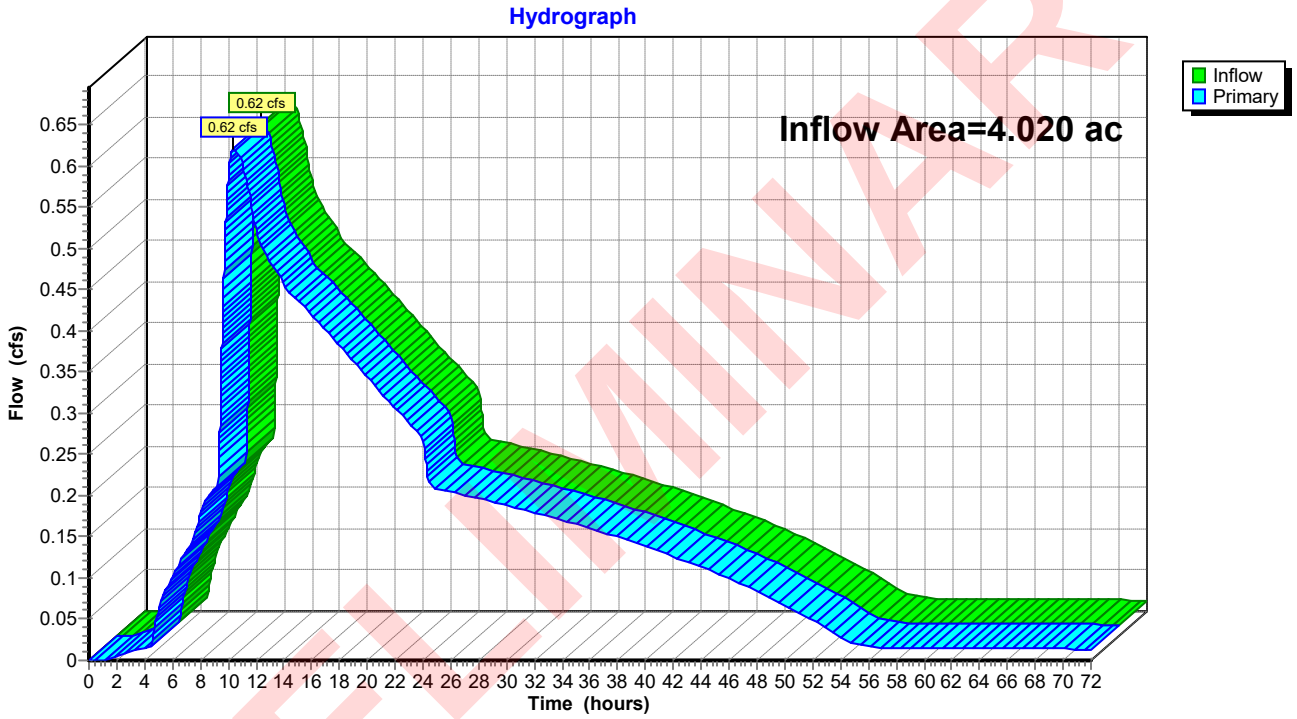
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth > 2.74" for 10-YR event
Inflow = 0.62 cfs @ 10.39 hrs, Volume= 0.919 af
Primary = 0.62 cfs @ 10.39 hrs, Volume= 0.919 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



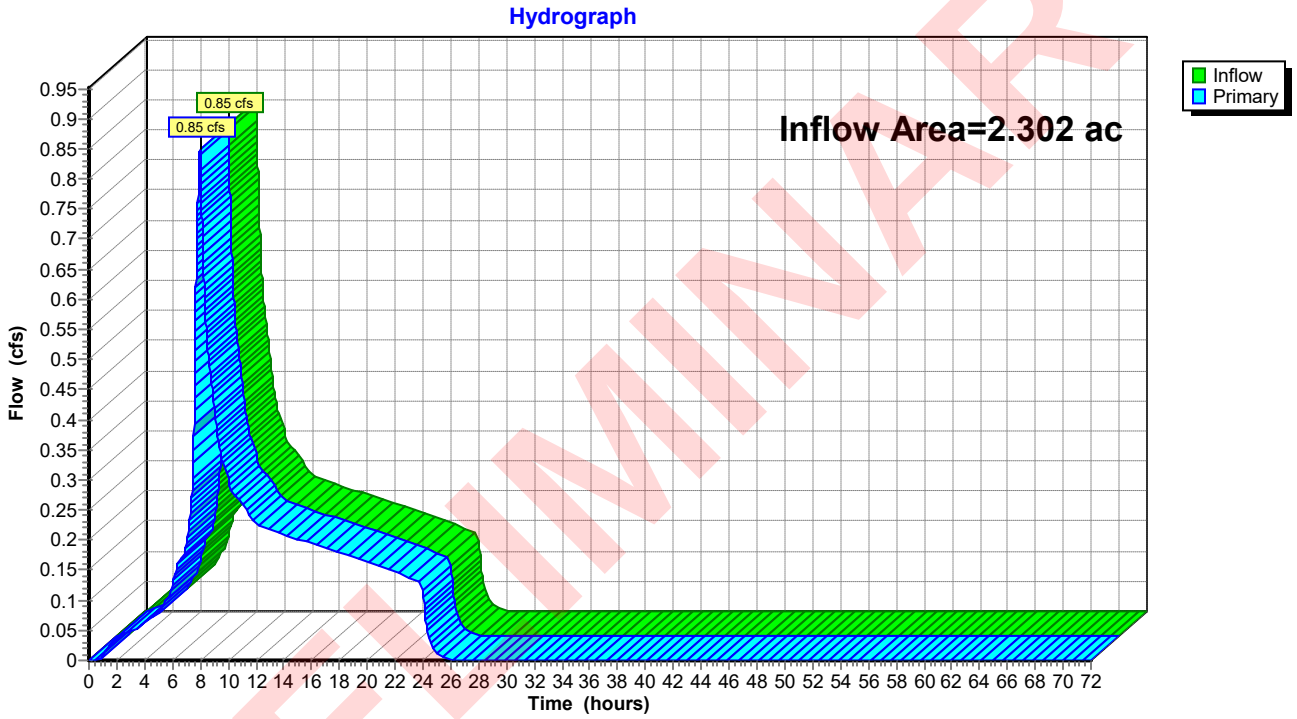
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.302 ac, 25.00% Impervious, Inflow Depth = 1.95" for 10-YR event
Inflow = 0.85 cfs @ 8.00 hrs, Volume= 0.374 af
Primary = 0.85 cfs @ 8.00 hrs, Volume= 0.374 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1-iP: Impervious Runoff Area=50,490 sf 100.00% Impervious Runoff Depth=3.67"
Tc=5.0 min CN=0/98 Runoff=1.06 cfs 0.354 af

Subcatchment 1.1-P: Pervious Runoff Area=18,450 sf 0.00% Impervious Runoff Depth=1.88"
Tc=5.0 min CN=79/0 Runoff=0.18 cfs 0.066 af

Subcatchment 1.2-iP: Impervious Runoff Area=89,985 sf 100.00% Impervious Runoff Depth=3.67"
Tc=5.0 min CN=0/98 Runoff=1.89 cfs 0.631 af

Subcatchment 1.2-P: Pervious Runoff Area=16,205 sf 0.00% Impervious Runoff Depth=1.88"
Tc=5.0 min CN=79/0 Runoff=0.16 cfs 0.058 af

Subcatchment 2.1-iP: Impervious Runoff Area=13,000 sf 100.00% Impervious Runoff Depth=3.67"
Tc=5.0 min CN=0/98 Runoff=0.27 cfs 0.091 af

Subcatchment 2.1-P: Pervious Runoff Area=74,080 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=409' Tc=27.4 min CN=79/0 Runoff=0.52 cfs 0.267 af

Subcatchment 2.2-iP: Impervious Runoff Area=12,065 sf 100.00% Impervious Runoff Depth=3.67"
Tc=5.0 min CN=0/98 Runoff=0.25 cfs 0.085 af

Subcatchment 2.2-P: Pervious Runoff Area=1,110 sf 0.00% Impervious Runoff Depth=1.88"
Tc=5.0 min CN=79/0 Runoff=0.01 cfs 0.004 af

Reach 1.1-MH: WQ MH Avg. Flow Depth=0.18' Max Vel=12.69 fps Inflow=1.24 cfs 0.420 af
12.0" Round Pipe n=0.010 L=26.3' S=0.1369 '/' Capacity=17.14 cfs Outflow=1.24 cfs 0.420 af

Reach 1.2-S: Vegetated Swale Avg. Flow Depth=0.76' Max Vel=0.53 fps Inflow=2.05 cfs 0.689 af
n=0.240 L=300.0' S=0.0190 '/' Capacity=8.43 cfs Outflow=1.97 cfs 0.689 af

Reach 3R: Catch Basin Avg. Flow Depth=0.36' Max Vel=3.45 fps Inflow=0.78 cfs 0.358 af
10.0" Round Pipe n=0.010 L=302.0' S=0.0050 '/' Capacity=2.01 cfs Outflow=0.78 cfs 0.358 af

Pond 1.1-CB: CB 1-1 Peak Elev=170.77' Inflow=1.24 cfs 0.420 af
12.0" Round Culvert n=0.013 L=7.4' S=0.0203 '/' Outflow=1.24 cfs 0.420 af

Pond STM-1: Detention Pond Peak Elev=171.43' Storage=18,627 cf Inflow=3.19 cfs 1.110 af
Outflow=0.97 cfs 1.063 af

Link 1L: Flow Summary Part 1 Inflow=0.97 cfs 1.063 af
Primary=0.97 cfs 1.063 af

Link 2L: Flow Summary Part 2 Inflow=1.03 cfs 0.447 af
Primary=1.03 cfs 0.447 af

Total Runoff Area = 6.322 ac Runoff Volume = 1.556 af Average Runoff Depth = 2.95"
39.89% Pervious = 2.522 ac 60.11% Impervious = 3.800 ac

PRELIMINARY

Summary for Subcatchment 1.1-iP: Impervious

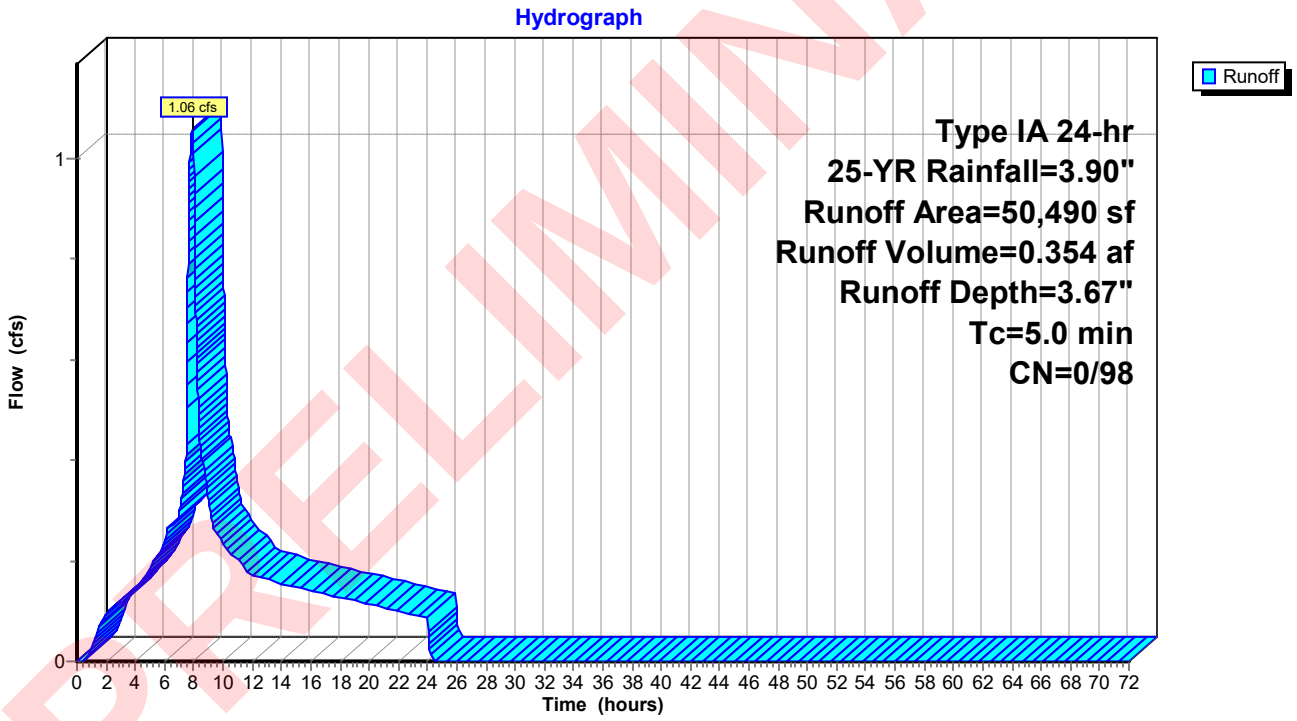
Runoff = 1.06 cfs @ 7.88 hrs, Volume= 0.354 af, Depth= 3.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

	Area (sf)	CN	Description
*	50,490	98	Roof/Drive Aisle
	50,490		100.00% Impervious Area

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

Subcatchment 1.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.1-P: Pervious

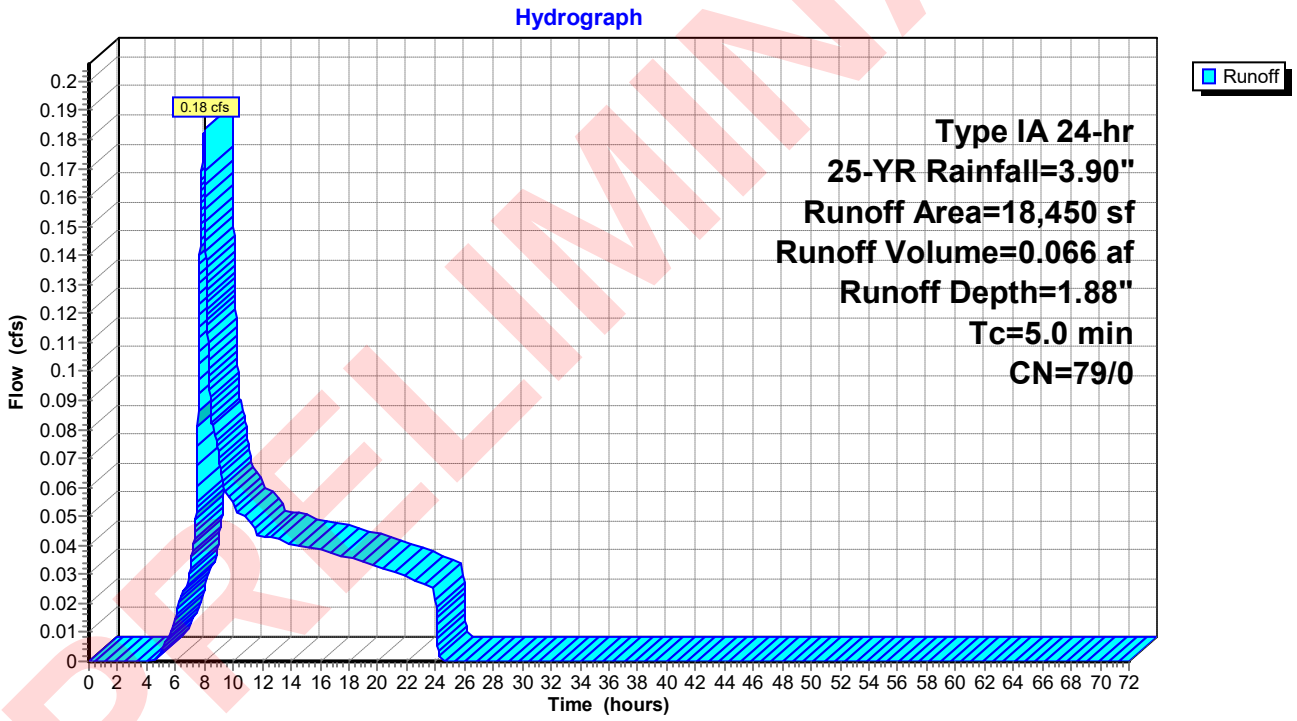
Runoff = 0.18 cfs @ 7.98 hrs, Volume= 0.066 af, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
18,450	79	50-75% Grass cover, Fair, HSG C
18,450		100.00% Pervious Area

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

Subcatchment 1.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 1.2-iP: Impervious

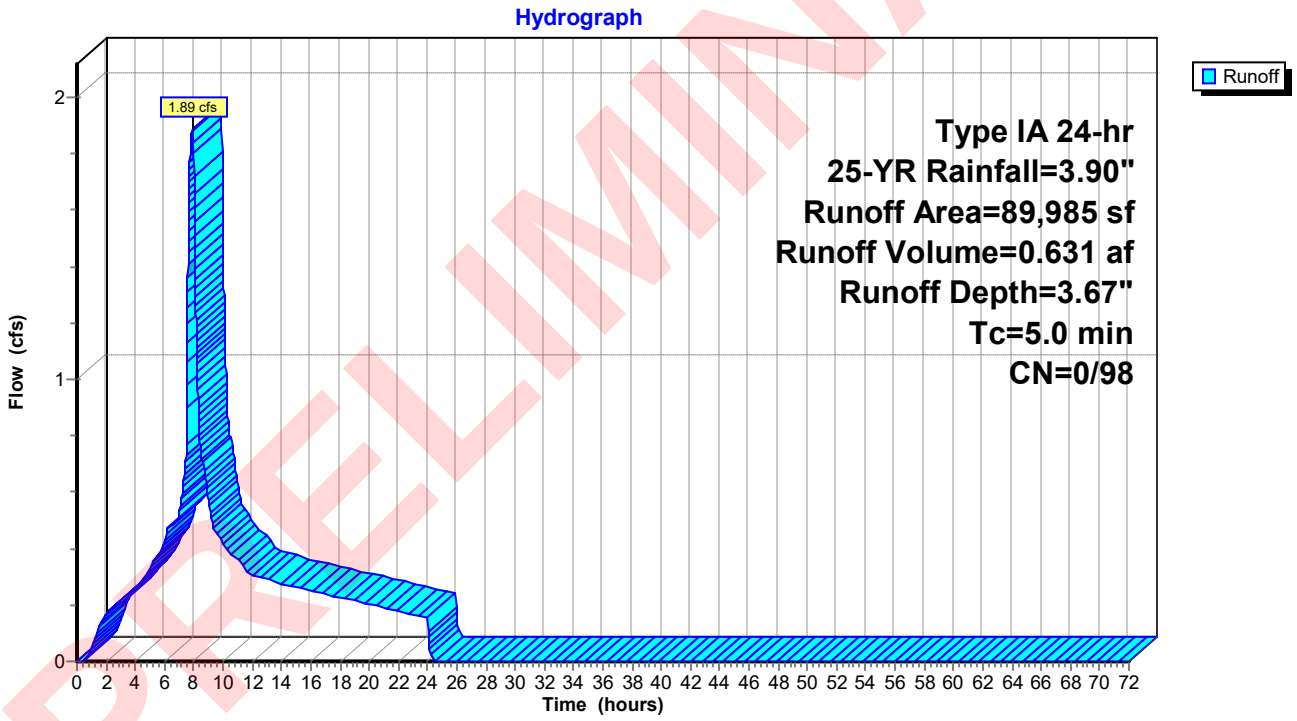
Runoff = 1.89 cfs @ 7.88 hrs, Volume= 0.631 af, Depth= 3.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

	Area (sf)	CN	Description
*	89,985	98	Roof/Drive Aisle
	89,985		100.00% Impervious Area

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

Subcatchment 1.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 1.2-P: Pervious

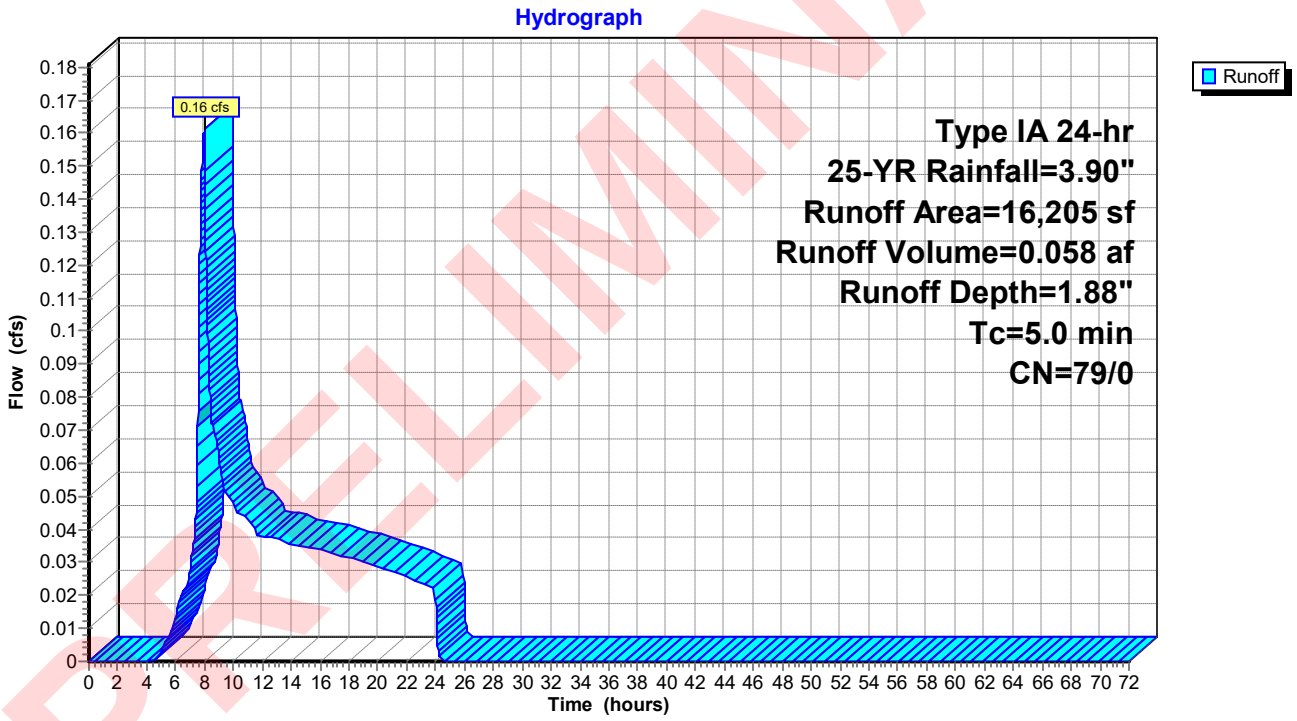
Runoff = 0.16 cfs @ 7.98 hrs, Volume= 0.058 af, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
16,205	79	50-75% Grass cover, Fair, HSG C
16,205		100.00% Pervious Area

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

Subcatchment 1.2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

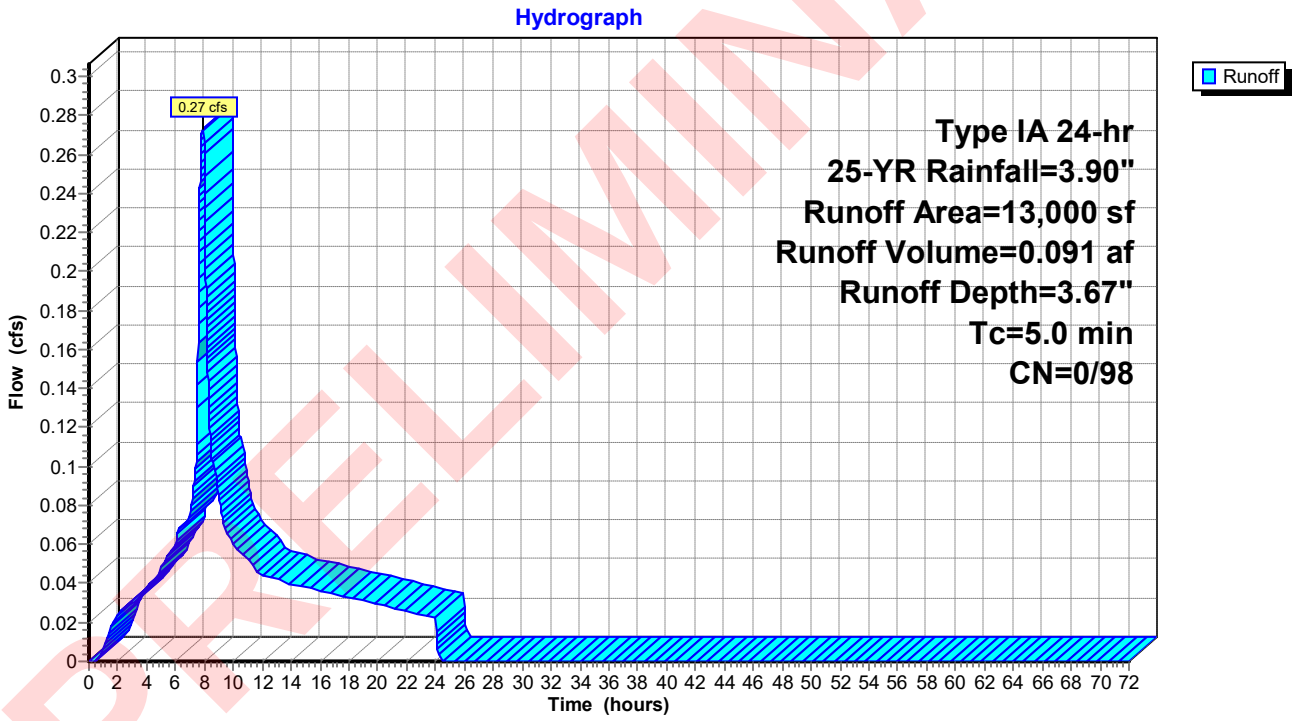
Runoff = 0.27 cfs @ 7.88 hrs, Volume= 0.091 af, Depth= 3.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

	Area (sf)	CN	Description
*	13,000	98	Roof/Drive Aisle
	13,000		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

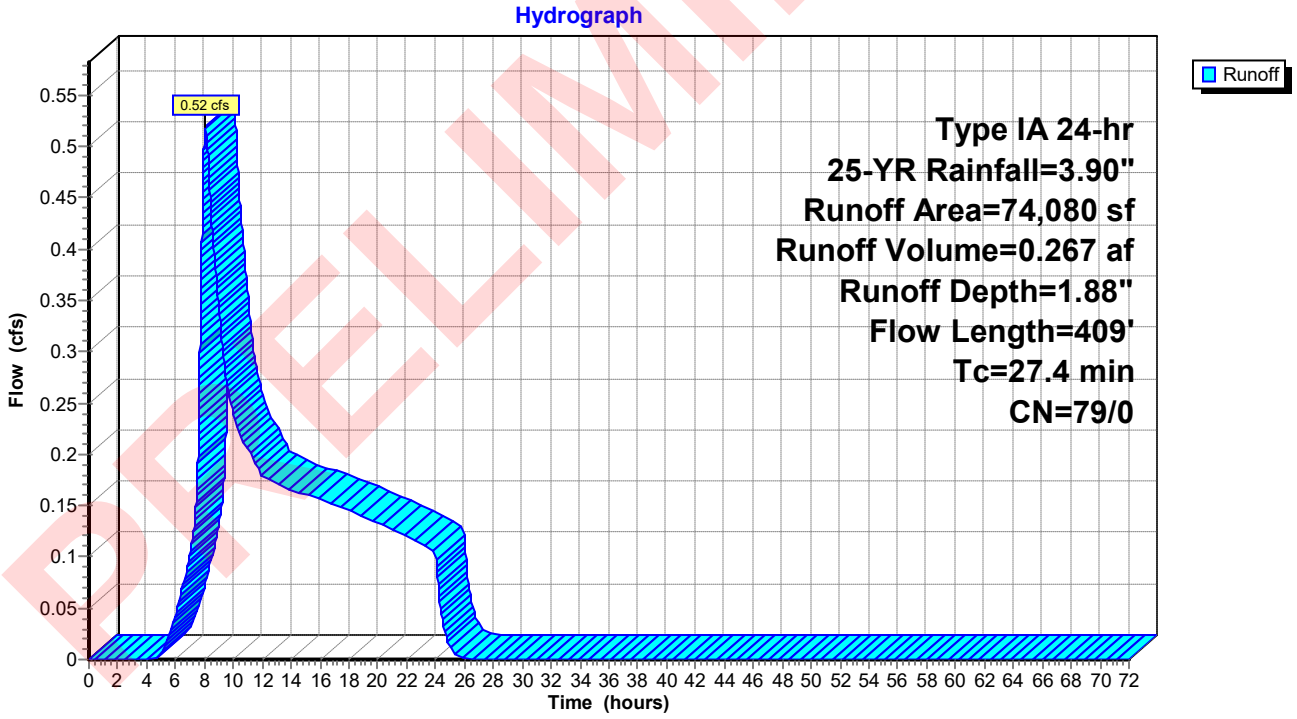
Runoff = 0.52 cfs @ 8.01 hrs, Volume= 0.267 af, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
74,080	79	50-75% Grass cover, Fair, HSG C
74,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.2-iP: Impervious

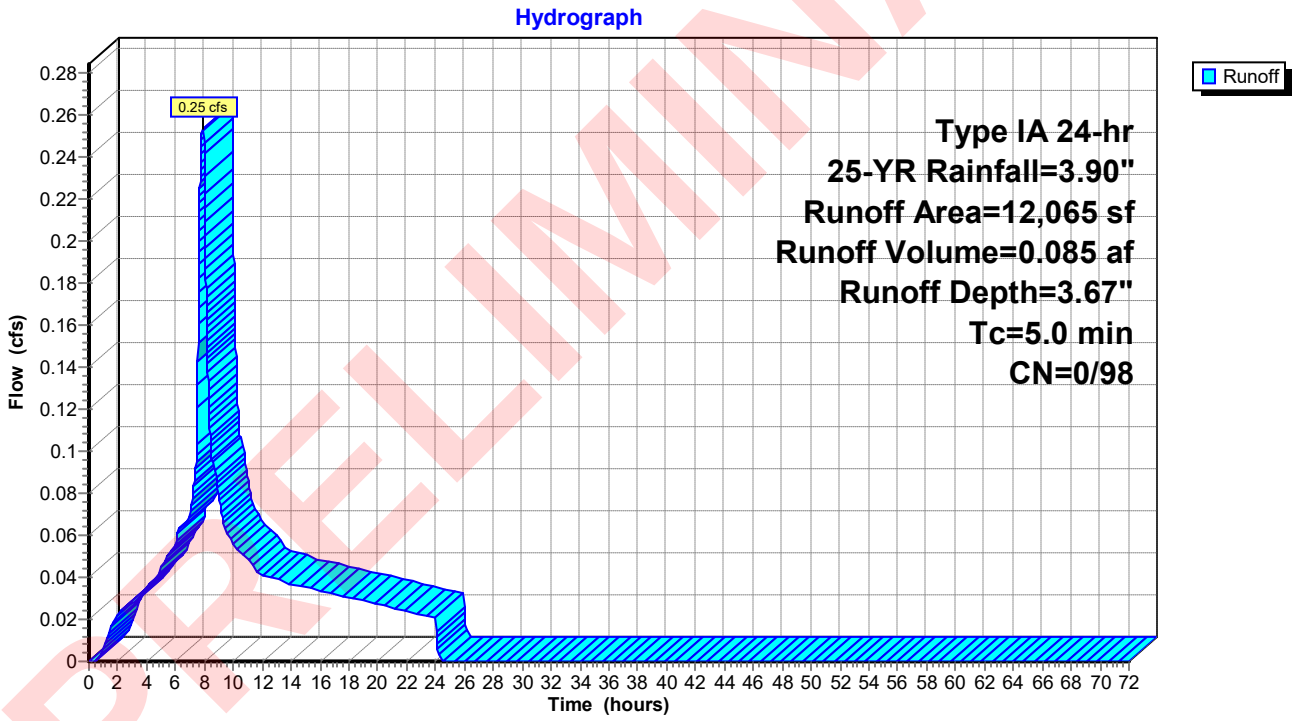
Runoff = 0.25 cfs @ 7.88 hrs, Volume= 0.085 af, Depth= 3.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

	Area (sf)	CN	Description
*	12,065	98	Roof/Drive Aisle
	12,065		100.00% Impervious Area

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

Subcatchment 2.2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.2-P: Pervious

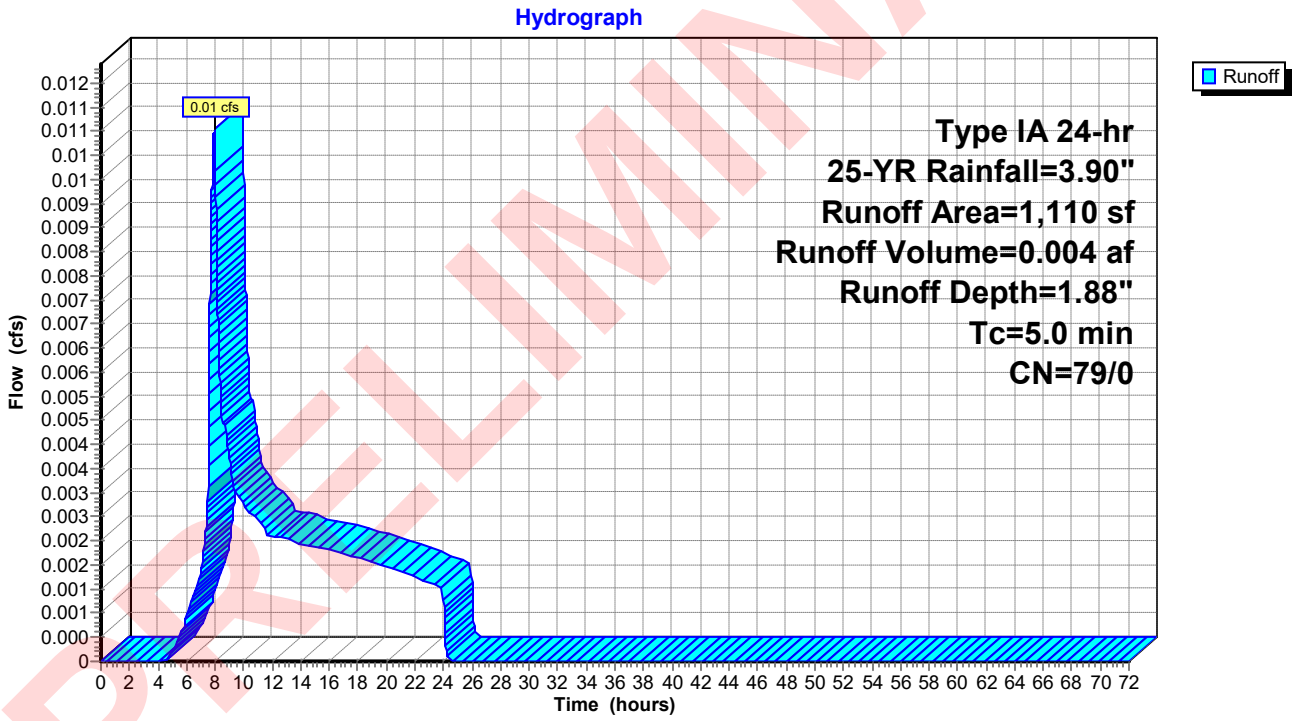
Runoff = 0.01 cfs @ 7.98 hrs, Volume= 0.004 af, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
1,110	79	50-75% Grass cover, Fair, HSG C
1,110		100.00% Pervious Area

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

Subcatchment 2.2-P: Pervious



PRELIMINARY

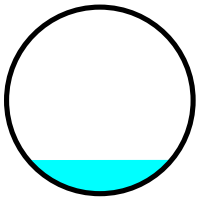
Summary for Reach 1.1-MH: WQ MH

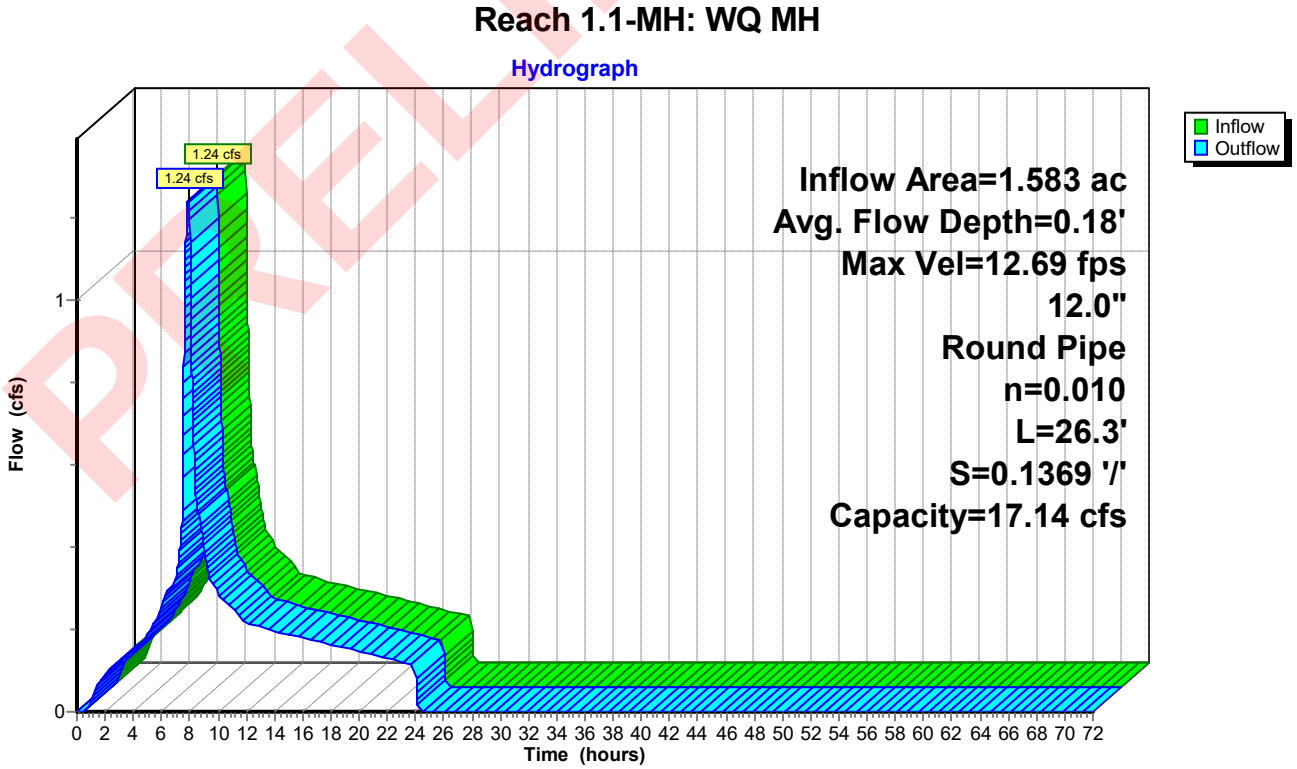
Inflow Area = 1.583 ac, 73.24% Impervious, Inflow Depth = 3.19" for 25-YR event
Inflow = 1.24 cfs @ 7.89 hrs, Volume= 0.420 af
Outflow = 1.24 cfs @ 7.89 hrs, Volume= 0.420 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 12.69 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 7.12 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 7.89 hrs
Average Depth at Peak Storage= 0.18'
Defined Flood Depth= 171.30' Flow Area= 23.4 sf, Capacity= -12,228.33 cfs
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 17.14 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 26.3' Slope= 0.1369 '/'
Inlet Invert= 169.60', Outlet Invert= 166.00'





PRELIMINARY

Summary for Reach 1.2-S: Vegetated Swale

Inflow Area = 2.438 ac, 84.74% Impervious, Inflow Depth = 3.39" for 25-YR event
Inflow = 2.05 cfs @ 7.89 hrs, Volume= 0.689 af
Outflow = 1.97 cfs @ 8.00 hrs, Volume= 0.689 af, Atten= 4%, Lag= 7.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.53 fps, Min. Travel Time= 9.4 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 22.2 min

Peak Storage= 1,111 cf @ 8.00 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 1.50' Flow Area= 10.5 sf, Capacity= 8.43 cfs

Custom cross-section, Length= 300.0' Slope= 0.0190 '/'
Constant n= 0.240
Inlet Invert= 178.70', Outlet Invert= 173.00'

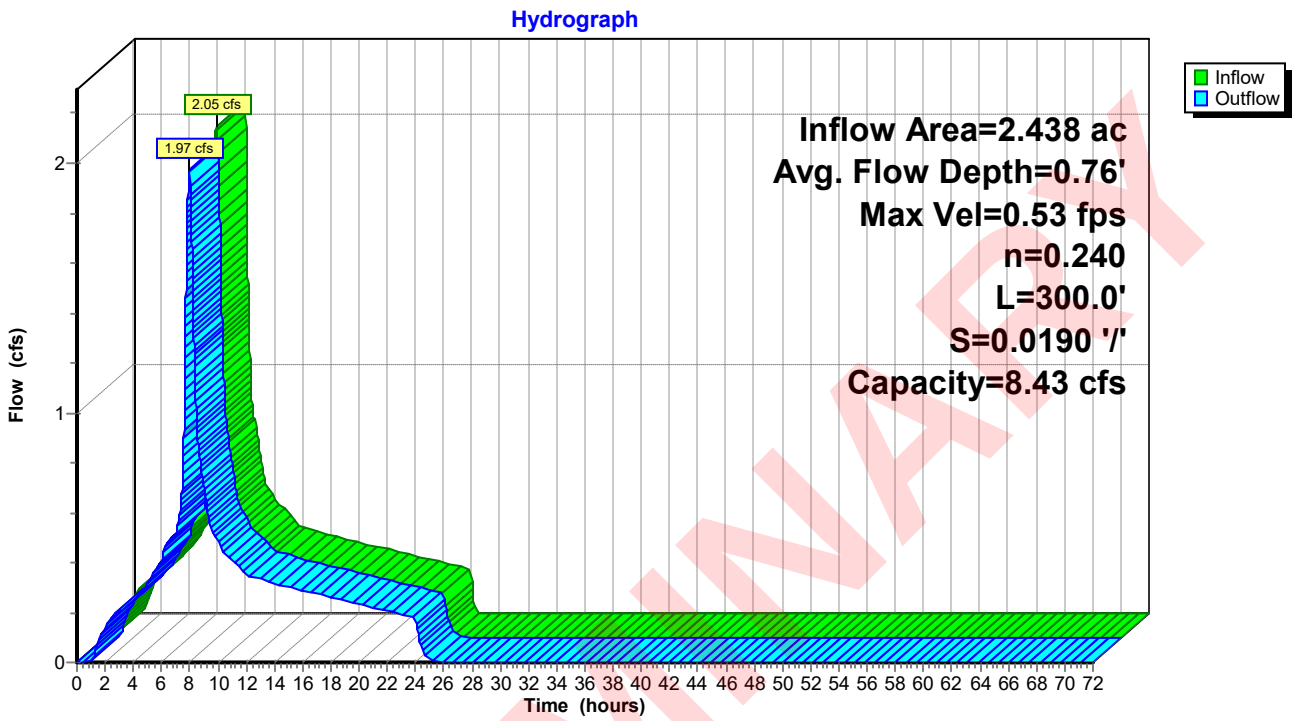
‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	1.50	0.00
2.50	0.50	1.00
4.50	0.00	1.50
6.50	0.00	1.50
8.50	0.50	1.00
11.00	1.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
0.50	2.0	6.1	600	0.81
1.50	10.5	11.5	3,150	8.43

PRELIMINARY

Reach 1.2-S: Vegetated Swale



PRELIMINARY

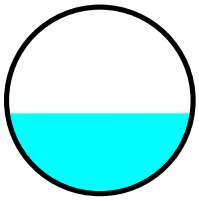
Summary for Reach 3R: Catch Basin

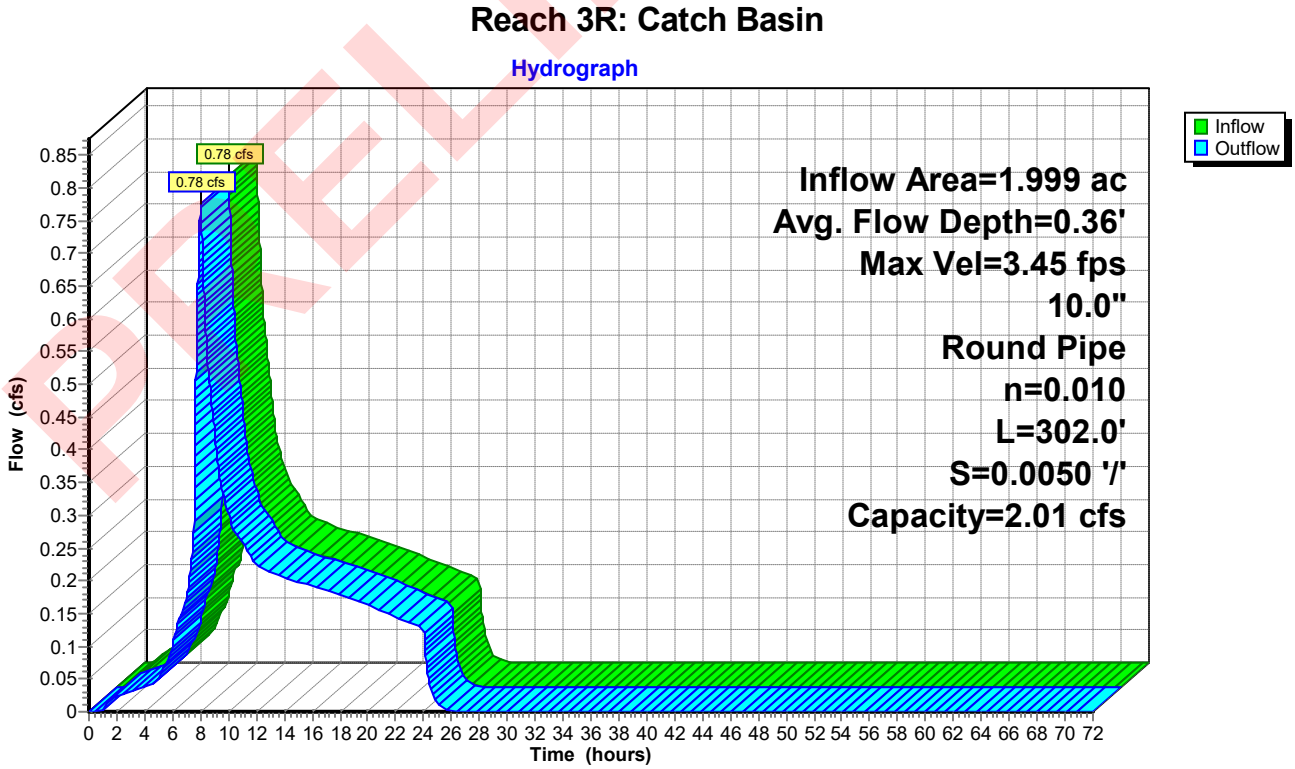
Inflow Area = 1.999 ac, 14.93% Impervious, Inflow Depth = 2.15" for 25-YR event
Inflow = 0.78 cfs @ 8.00 hrs, Volume= 0.358 af
Outflow = 0.78 cfs @ 8.01 hrs, Volume= 0.358 af, Atten= 1%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.45 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.94 fps, Avg. Travel Time= 2.6 min

Peak Storage= 68 cf @ 8.01 hrs
Average Depth at Peak Storage= 0.36'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,793.61 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 2.01 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 302.0' Slope= 0.0050 '/'
Inlet Invert= 176.89', Outlet Invert= 175.38'





PRELIMINARY

Summary for Pond 1.1-CB: CB 1-1

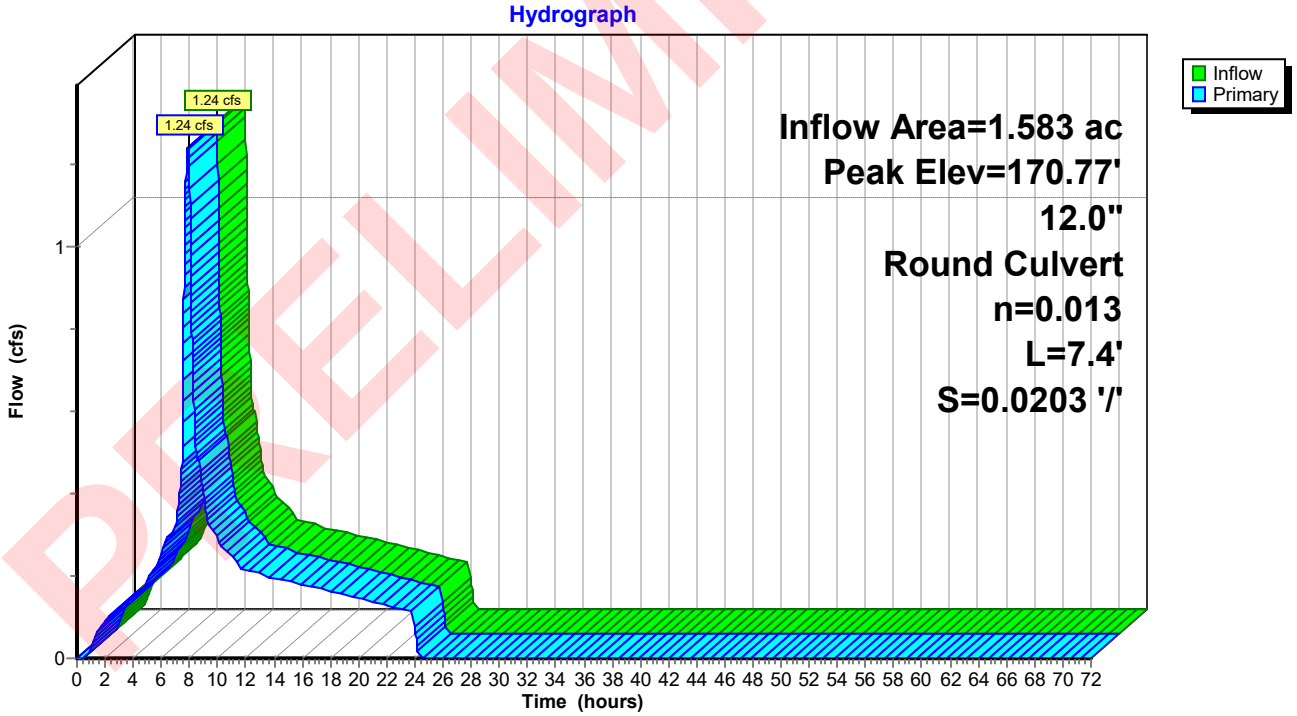
Inflow Area =	1.583 ac, 73.24% Impervious, Inflow Depth = 3.19" for 25-YR event				
Inflow =	1.24 cfs @	7.89 hrs,	Volume=	0.420 af	
Outflow =	1.24 cfs @	7.89 hrs,	Volume=	0.420 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.24 cfs @	7.89 hrs,	Volume=	0.420 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 170.77' @ 7.89 hrs
Flood Elev= 172.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	170.14'	**12.0" Round Culvert** L= 7.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.14' / 169.99' S= 0.0203 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.24 cfs @ 7.89 hrs HW=170.77' TW=169.78' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.24 cfs @ 3.38 fps)

Pond 1.1-CB: CB 1-1



PRELIMINARY

Summary for Pond STM-1: Detention Pond

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth = 3.31" for 25-YR event
Inflow = 3.19 cfs @ 7.97 hrs, Volume= 1.110 af
Outflow = 0.97 cfs @ 9.21 hrs, Volume= 1.063 af, Atten= 70%, Lag= 74.6 min
Primary = 0.97 cfs @ 9.21 hrs, Volume= 1.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 171.43' @ 9.21 hrs Surf.Area= 5,892 sf Storage= 18,627 cf

Plug-Flow detention time= 682.5 min calculated for 1.063 af (96% of inflow)
Center-of-Mass det. time= 651.2 min (1,337.1 - 685.9)

Volume	Invert	Avail.Storage	Storage Description
#1	166.00'	25,571 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

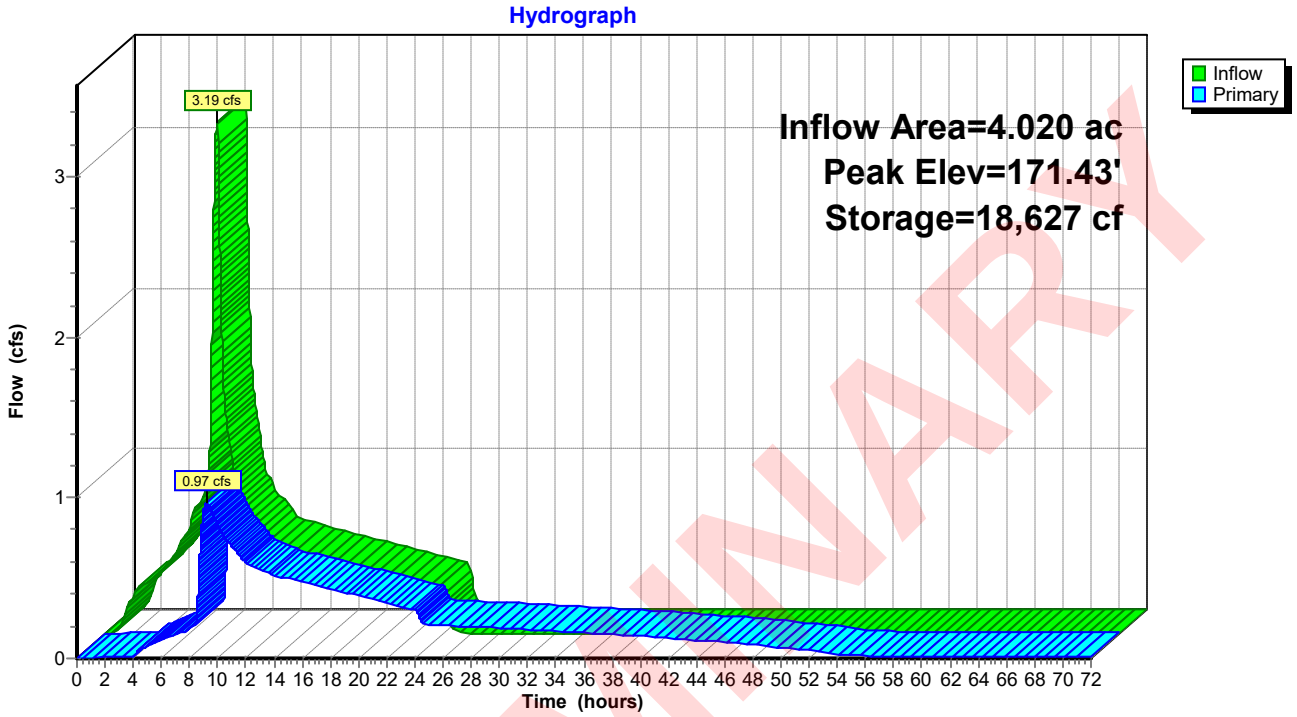
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
166.00	1,435	183.3	0	0	1,435
167.00	2,038	218.4	1,728	1,728	2,575
167.50	2,379	236.0	1,103	2,831	3,221
168.50	3,140	271.1	2,751	5,582	4,660
169.50	4,004	302.9	3,563	9,145	6,141
170.50	4,950	328.0	4,469	13,613	7,440
171.50	5,971	351.4	5,453	19,066	8,750
172.50	7,053	370.2	6,504	25,571	9,888

Device	Routing	Invert	Outlet Devices
#1	Primary	165.24'	**12.0" Round Outlet Pipe** L= 33.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.24' / 164.00' S= 0.0369 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	166.00'	**0.7" Vert. WQ Outlet** C= 0.600
#3	Device 1	167.50'	**1.9" Vert. Detention** C= 0.600
#4	Device 1	171.20'	**2.2' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.97 cfs @ 9.21 hrs HW=171.43' TW=0.00' (Dynamic Tailwater)
└─**1=Outlet Pipe** (Passes 0.97 cfs of 9.02 cfs potential flow)
  ├─**2=WQ Outlet** (Orifice Controls 0.03 cfs @ 11.19 fps)
  ├─**3=Detention** (Orifice Controls 0.19 cfs @ 9.44 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.76 cfs @ 1.55 fps)

PRELIMINARY

Pond STM-1: Detention Pond



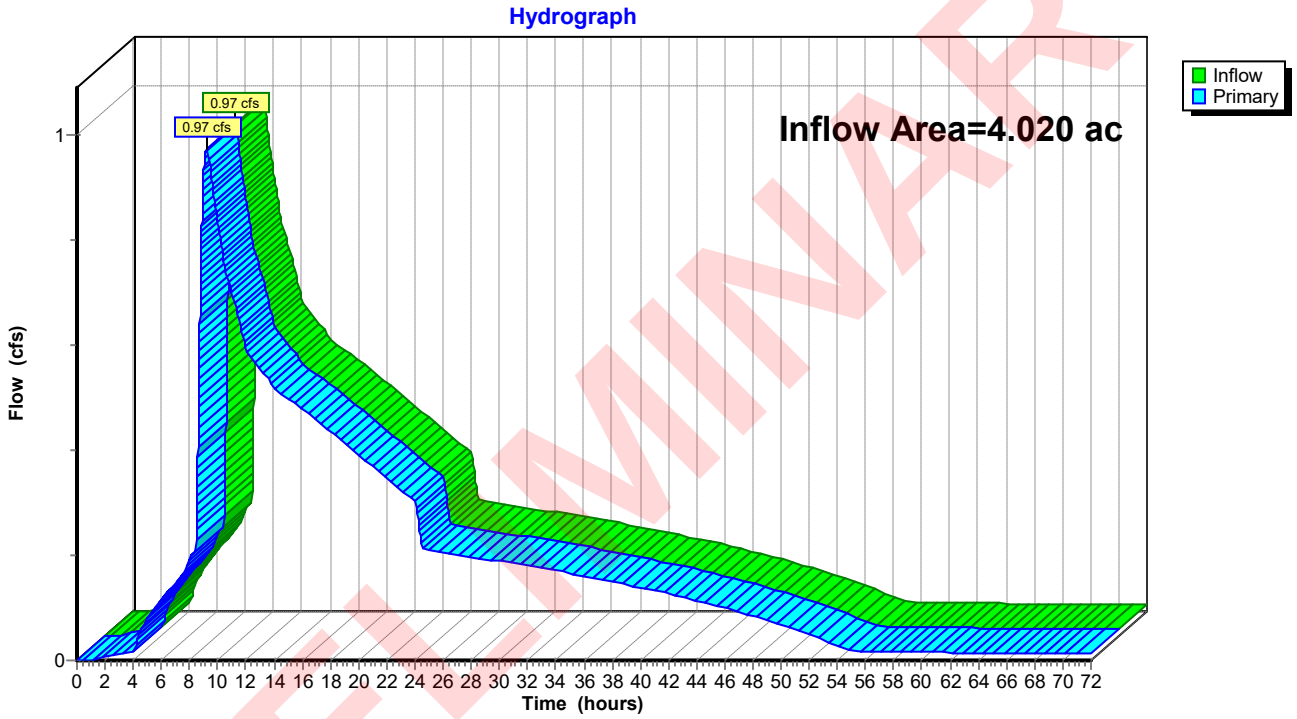
PRELIMINARY

Summary for Link 1L: Flow Summary Part 1

Inflow Area = 4.020 ac, 80.21% Impervious, Inflow Depth > 3.17" for 25-YR event
Inflow = 0.97 cfs @ 9.21 hrs, Volume= 1.063 af
Primary = 0.97 cfs @ 9.21 hrs, Volume= 1.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Flow Summary Part 1



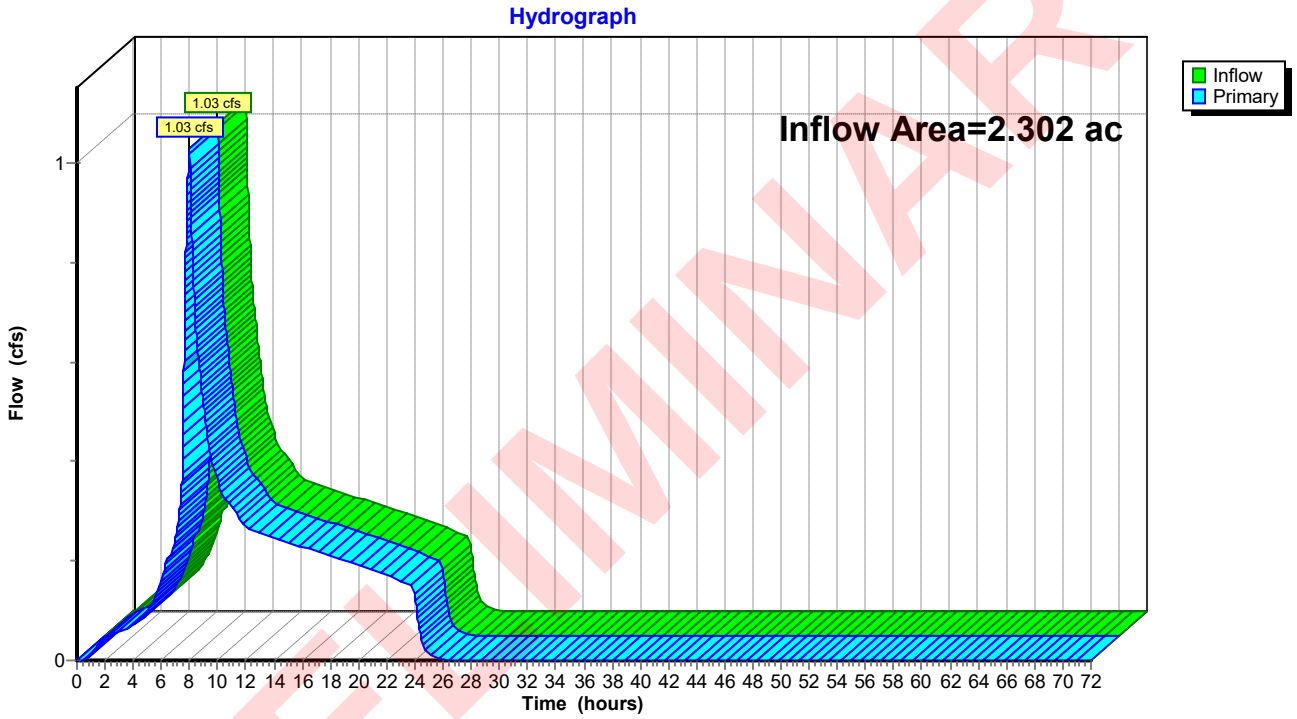
PRELIMINARY

Summary for Link 2L: Flow Summary Part 2

Inflow Area = 2.302 ac, 25.00% Impervious, Inflow Depth = 2.33" for 25-YR event
Inflow = 1.03 cfs @ 8.00 hrs, Volume= 0.447 af
Primary = 1.03 cfs @ 8.00 hrs, Volume= 0.447 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Flow Summary Part 2



PRELIMINARY

Appendix C: TR-55 Runoff Curve Numbers

PRELIMINARY

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

PRELIMINARY

Appendix D: USDA-NRCS Soil Resource Report

PRELIMINARY

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Washington County, Oregon

JBMac Ventures

PRELIMINARY

June 14, 2022

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

PRELIMINARY

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

PRELIMINARY

Contents

Preface.....2
Soil Map.....5
Soil Map.....6
Legend.....7
Map Unit Legend.....8
Map Unit Descriptions.....8
Washington County, Oregon.....10
1—Aloha silt loam.....10
37A—Quatama loam, 0 to 3 percent slopes.....11
References.....13

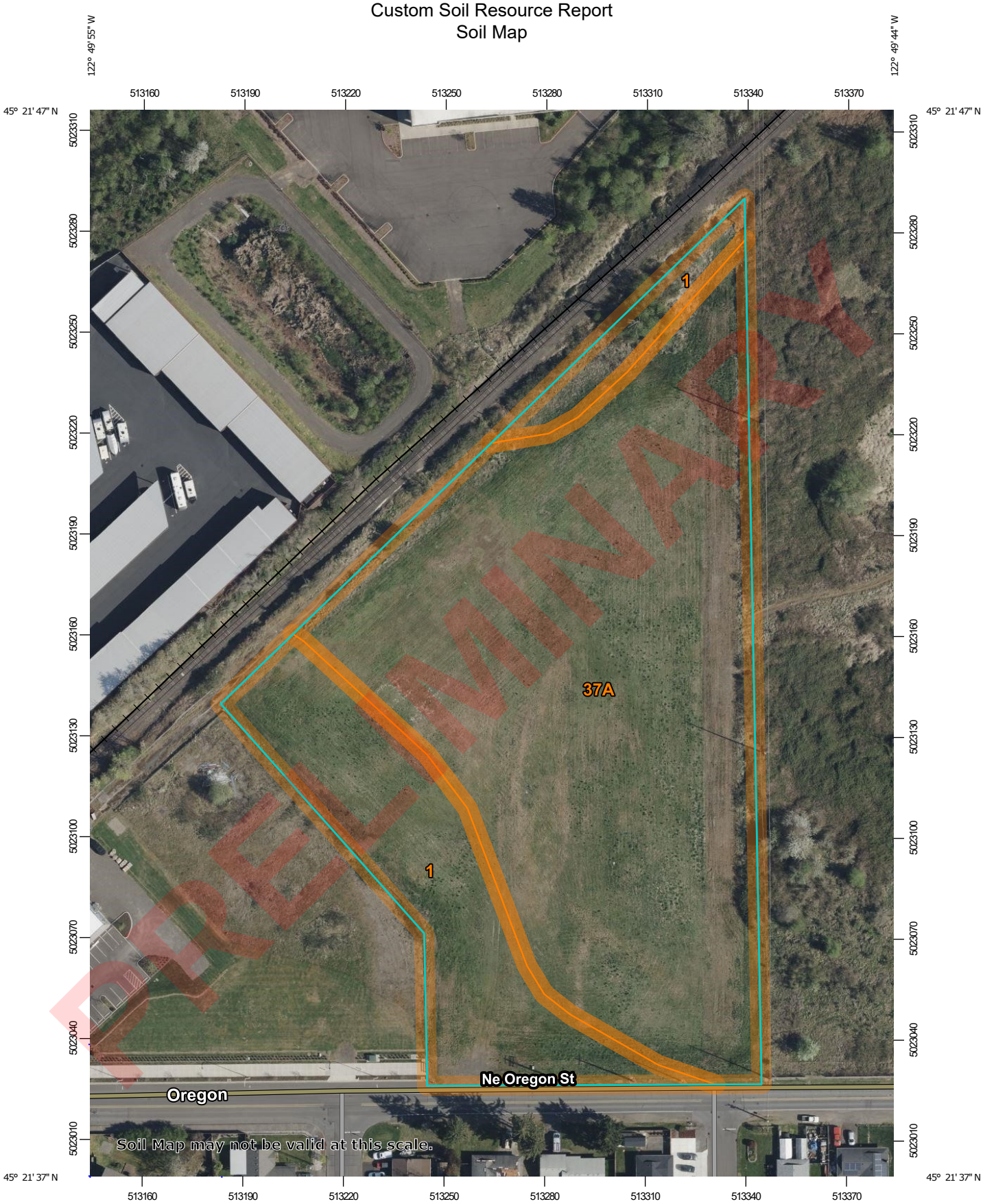
PRELIMINARY

Soil Map

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

PRELIMINARY

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,540 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 21, Oct 27, 2021

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

Date(s) aerial images were photographed: Apr 16, 2021—Apr 18, 2021

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

PRELIMINARY

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Aloha silt loam	1.6	25.4%
37A	Quatama loam, 0 to 3 percent slopes	4.7	74.6%
Totals for Area of Interest		**6.3**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

PRELIMINARY

Washington County, Oregon

1—Aloha silt loam

Map Unit Setting

National map unit symbol: 21x8
Elevation: 150 to 250 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Aloha and similar soils: 90 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aloha

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old loamy alluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 46 inches: silt loam
H3 - 46 to 65 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R002XC007OR - Valley Swale Group
Forage suitability group: Somewhat Poorly Drained (G002XY005OR)
Other vegetative classification: Somewhat Poorly Drained (G002XY005OR)
Hydric soil rating: No

Minor Components

Huberly

Percent of map unit: 1 percent
Landform: Terraces

PRELIMINARY

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

37A—Quatama loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 21zl
Elevation: 140 to 250 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Quatama and similar soils: 85 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quatama

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 15 inches: loam
H2 - 15 to 30 inches: clay loam
H3 - 30 to 62 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R002XC008OR - Valley Terrace Group

PRELIMINARY

Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Huberly

Percent of map unit: 4 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

PRELIMINARY

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

PRELIMINARY

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

PRELIMINARY

Appendix E: Stormwater Quality Calculations

PRELIMINARY

STORMWATER QUALITY CALCULATIONS

Project: AFP Systems Site Improvements
AKS Job No.: 8627-03
Date: 1/4/2024
Done By: JG
Checked By: TRJ

IMPERVIOUS AREA

Total Impervious Area: 50,490 sf

WATER DESIGN QUALITY VOLUME (WQV)

(Per CWS 4.08.5a2 - R&O 19-22)

$$WQV = \frac{0.36'' \text{ X Area (ft)}}{12'' \text{ per ft}} = \mathbf{1515} \text{ cubic feet}$$

WATER QUALITY FLOW (WQF)

(Per CWS 4.08.5a3 - R&O 19-05)

$$WQF = \frac{WQV \text{ (sf)}}{4*60*60} = \mathbf{0.105} \text{ cfs}$$

WATER QUALITY MANHOLE SUMP VOLUME CALCULATIONS

(Per CWS 4.09.1 - R&O 19-22)

CWS Criteria: Sump Volume = 20 cubic feet per 1.0 cfs of flow

25-year Flow through WQ Manhole 1-1 =	**2.6**	**cfs**		
Calculated Manhole Sump Volume =	**52**	**cubic feet**		
Calculated Manhole Sump Depth (60" Dia. Manhole) =	**2.6**	**ft**	<	5 feet maximum

PRELIMINARY

EXTENDED DRY BASIN DESIGN & CALCULATIONS

Hydraulic Design Criteria (Per CWS 4.09.5a/b/c - R&O 19-22)

Permanent Pool Depth: 0.2 ft
Permanent Pool covers bottom of basin
Design Detention Volume: 1.0 x Water Quality Volume (WQV)
Water Quality Drawdown Time: 48 hours
Maximum Depth of WQ Pool: 5 ft
Avoid direct flow across WQ pond to avoid short circuiting

Extended Dry Basin Sizing Design:

Bottom Slope (ft/ft)	Minimum Bottom Width (ft)	Side Slopes H:V	Top of Pond Elev. (ft)	Perm. Pool Depth (ft)	Pool Bottom Area (sf)	Bottom of Pool Elev. (ft)
0.0	16	3.0	172.50	0.2	1435	166.00

Water Quality Flow Hydraulic Calculations:

Q (cfs)	Pool Elev. at WQV (ft)	Orifice CL Elevation (ft)	Calculated Orifice Diameter (in)	Max. Pool Elev., 10-yr Event (ft)	Calculated Pond WQV (cubic feet)	Calculated WQV Pool Depth (ft)
0.01	166.90	166.03	0.7	171.00	1527	0.9

Check Against Design Criteria:

	Calculated		Meet CWS Criteria?			
Minimum Freeboard:	1.5	feet	**Yes**	more than	1	foot
Minimum Bottom Width:	16	feet	**Yes**	greater than	4	feet
Maximum Pool Depth at WQV:	0.9	feet	**Yes**	less than	5	feet
Detained Water Quality Volume:	1527	cubic feet	**Yes**	greater than	1515	cf

PRELIMINARY

AFP SYSTEMS SITE IMPROVEMENTS - SWALE

Job No. 8627-03
Date: 1/4/2024
Prepared by: JG
Checked by: TRJ

Hydraulic Design Criteria (Per CWS 4.06.2 - R&O 19-5, as amended by R&O 19-22)

Design Flow: Water Quality Flow
Minimum Hydraulic Residence Time: 9 minutes
Maximum Water Design Depth: 0.5 feet
Minimum Freeboard: 1.0 foot (for facilities not protected from high flows)
Manning's "n" Value: 0.24
Maximum Velocity: 2.0 fps based on the 25-year flow

Vegetated Swale - 1.2-S

Impervious Area used in Design (Per CWS 4.05.5d - R&O 19-5, as amended by R&O 19-22)

VEGETATED SWALE	89,985	SF
		SF
Total Site Impervious Area	89,985	SF

Design Impervious Area **89,985 SF**

Water Quality Volume (Per CWS 4.05.6b - R&O 07-20)

Water Quality Storm Event = 0.36 in. falling in 24 hrs
Water Quality Volume (WQV) =

$$\frac{0.36 \text{ (in)} \times \text{Area (SF)}}{12 \text{ (in./ft.)}} = \mathbf{2{,}700} \text{ CF}$$

Water Quality Flow (Per CWS 4.05.6b - R&O 07-20)

Water Quality Flow (WQF) =

$$\frac{\text{WQV (cu.ft.)}}{14{,}400 \text{ seconds}} = \mathbf{0.19} \text{ CFS}$$

Swale Sizing:

Slope	Bottom Width	Manning's #	Side Slope
(ft/ft)	(ft)	"n"	H:V
0.019	2	0.24	4

Swale Hydraulics:

Q	Flow Depth	Flow Area	Wp	R	Velocity
(cfs)	(ft)	(sq.ft.)	(ft)	(ft)	(fps)
0.19	0.26	0.79	4.14	0.19	0.28

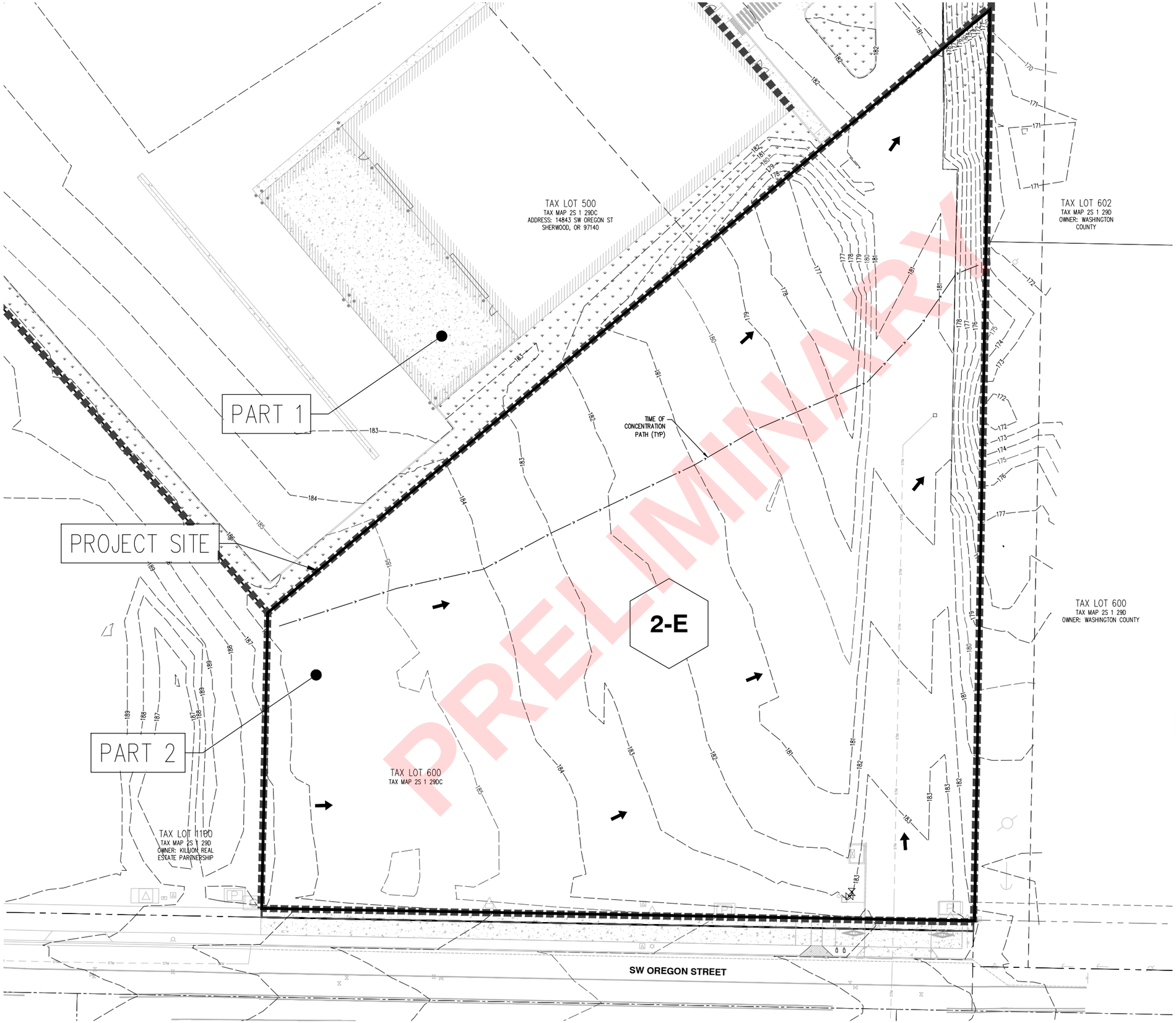
Swale Length

Length of swale for 9 minutes residence time = **153-FT** 100-FT MIN

PRELIMINARY

Exhibit B:
Pre-Improvements Basin Map and HydroCAD Reports

PRELIMINARY



LEGEND

SUBBASIN DELINEATION

SUBBASIN (XX)

FLOW ARROW

N

SCALE: 1" = 20 FEET

20 0 4 10 20

ORIGINAL PAGE SIZE: 24" x 36"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING • SURVEYING • NATURAL RESOURCES
FORESTRY • PLANNING • LANDSCAPE ARCHITECTURE

PRE-DEVELOPED CATCHMENT BASINS MAP

GH MCCULLOCH
SHERWOOD, OREGON

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 28, 2006
GREG G. CARLSON

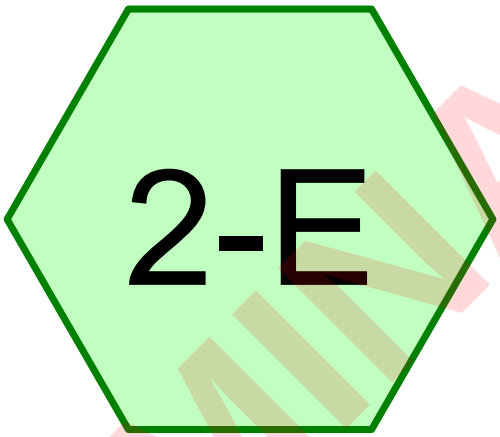
PRELIMINARY
NOT FOR CONSTRUCTION

RENEWS: 12/31/2025

JOB NUMBER:	8627-06
DATE:	09/08/2025
DESIGNED BY:	GJG
DRAWN BY:	RLB
CHECKED BY:	BCC

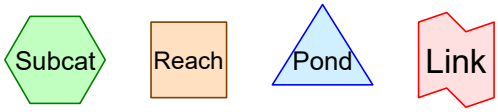
PRE

AKS DRAWING FILE: 8627-06 PRE-DEVELOPED.DWG | LAYOUT: PRE



Existing

PRELIMINARY



Routing Diagram for 8627-06 Pre-DEV
Prepared by AKS Engineering & Forestry, LLC, Printed 11/4/2025
HydroCAD® 10.00-22 s/n 01338 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
88,000	79	50-75% Grass cover, Fair, HSG C (2-E)
88,000	**79**	**TOTAL AREA**

PRELIMINARY

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
88,000	HSG C	2-E
0	HSG D	
0	Other	
88,000		**TOTAL AREA**

PRELIMINARY

Ground Covers (all 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
0	0	88,000	0	0	88,000	50-75% Grass cover, Fair	
0	**0**	**88,000**	**0**	**0**	**88,000**	**TOTAL AREA**	

PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-E: Existing Runoff Area=88,000 sf 0.00% Impervious Runoff Depth=0.84"
Flow Length=363' Tc=22.8 min CN=79/0 Runoff=0.23 cfs 6,141 cf

Total Runoff Area = 88,000 sf Runoff Volume = 6,141 cf Average Runoff Depth = 0.84"
100.00% Pervious = 88,000 sf 0.00% Impervious = 0 sf

PRELIMINARY

Summary for Subcatchment 2-E: Existing

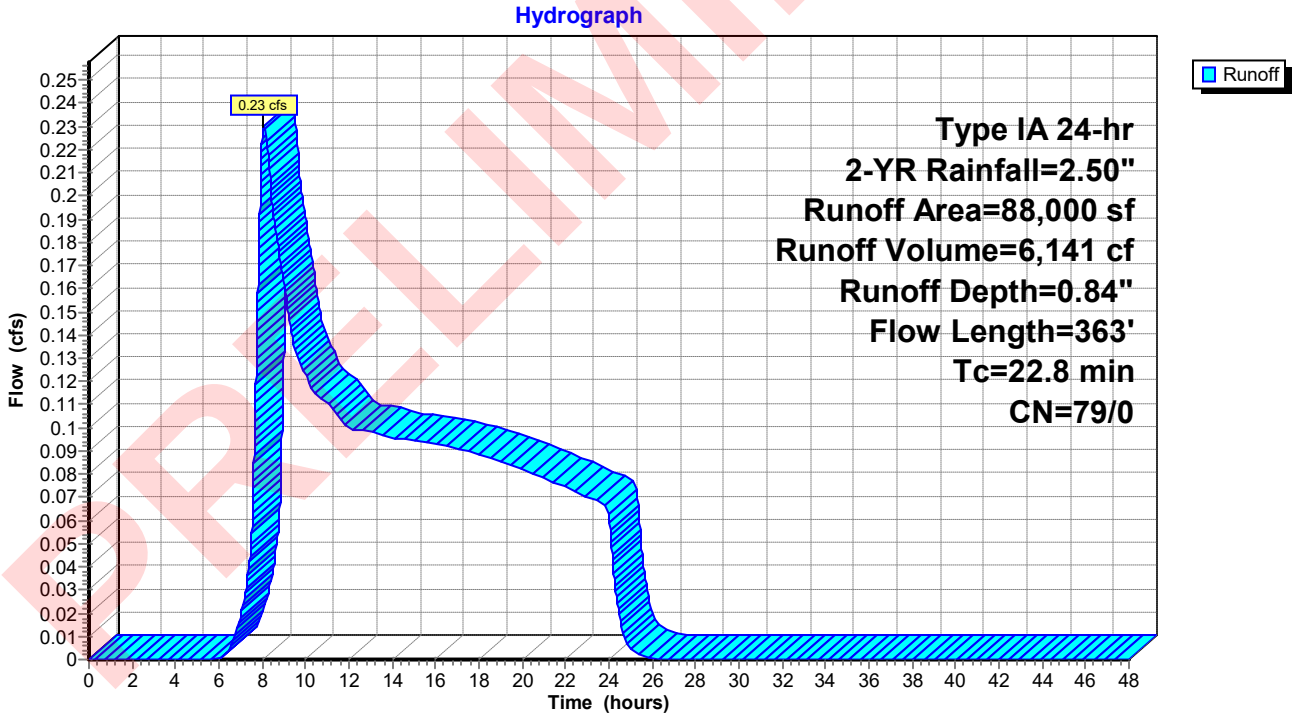
Runoff = 0.23 cfs @ 8.05 hrs, Volume= 6,141 cf, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
88,000	79	50-75% Grass cover, Fair, HSG C
88,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-E: Existing Runoff Area=88,000 sf 0.00% Impervious Runoff Depth=1.26"
Flow Length=363' Tc=22.8 min CN=79/0 Runoff=0.40 cfs 9,255 cf

Total Runoff Area = 88,000 sf Runoff Volume = 9,255 cf Average Runoff Depth = 1.26"
100.00% Pervious = 88,000 sf 0.00% Impervious = 0 sf

PRELIMINARY

Summary for Subcatchment 2-E: Existing

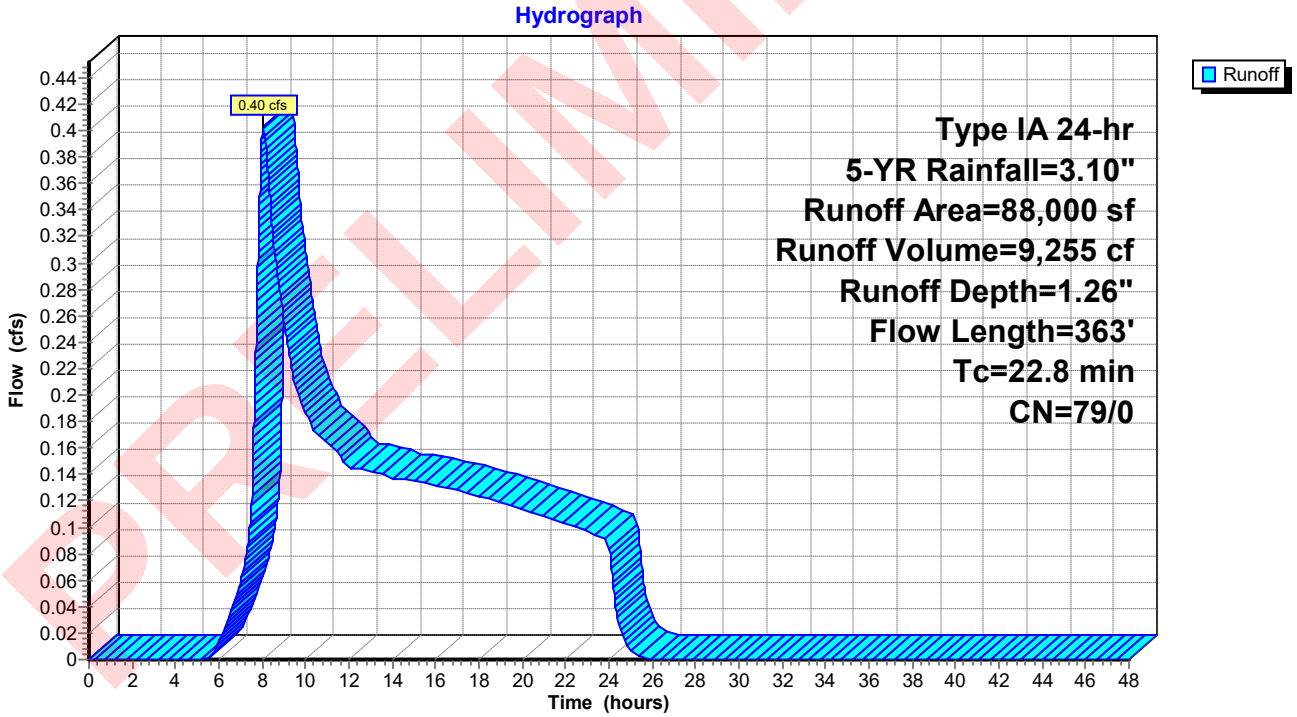
Runoff = 0.40 cfs @ 8.01 hrs, Volume= 9,255 cf, Depth= 1.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
88,000	79	50-75% Grass cover, Fair, HSG C
88,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-E: Existing Runoff Area=88,000 sf 0.00% Impervious Runoff Depth=1.53"
Flow Length=363' Tc=22.8 min CN=79/0 Runoff=0.51 cfs 11,200 cf

Total Runoff Area = 88,000 sf Runoff Volume = 11,200 cf Average Runoff Depth = 1.53"
100.00% Pervious = 88,000 sf 0.00% Impervious = 0 sf

PRELIMINARY

Summary for Subcatchment 2-E: Existing

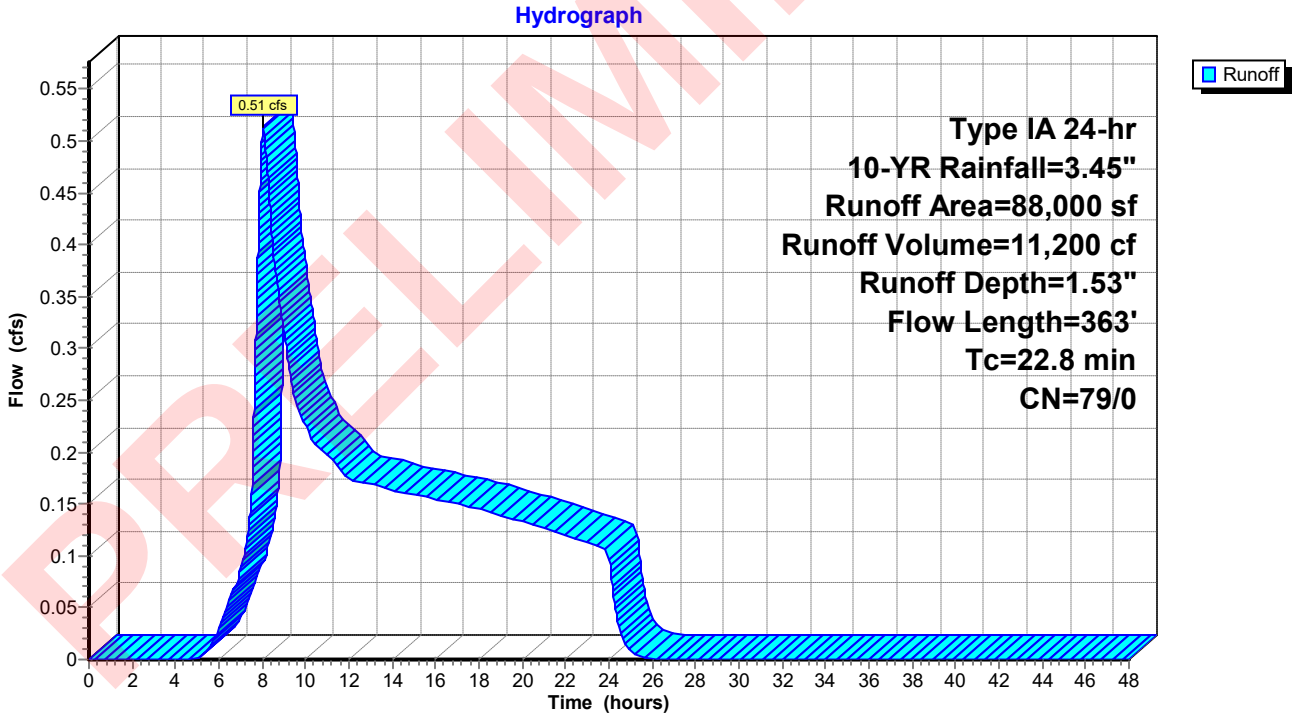
Runoff = 0.51 cfs @ 8.01 hrs, Volume= 11,200 cf, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
88,000	79	50-75% Grass cover, Fair, HSG C
88,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

Subcatchment 2-E: Existing



PRELIMINARY

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-E: Existing Runoff Area=88,000 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=363' Tc=22.8 min CN=79/0 Runoff=0.66 cfs 13,806 cf

Total Runoff Area = 88,000 sf Runoff Volume = 13,806 cf Average Runoff Depth = 1.88"
100.00% Pervious = 88,000 sf 0.00% Impervious = 0 sf

PRELIMINARY

Summary for Subcatchment 2-E: Existing

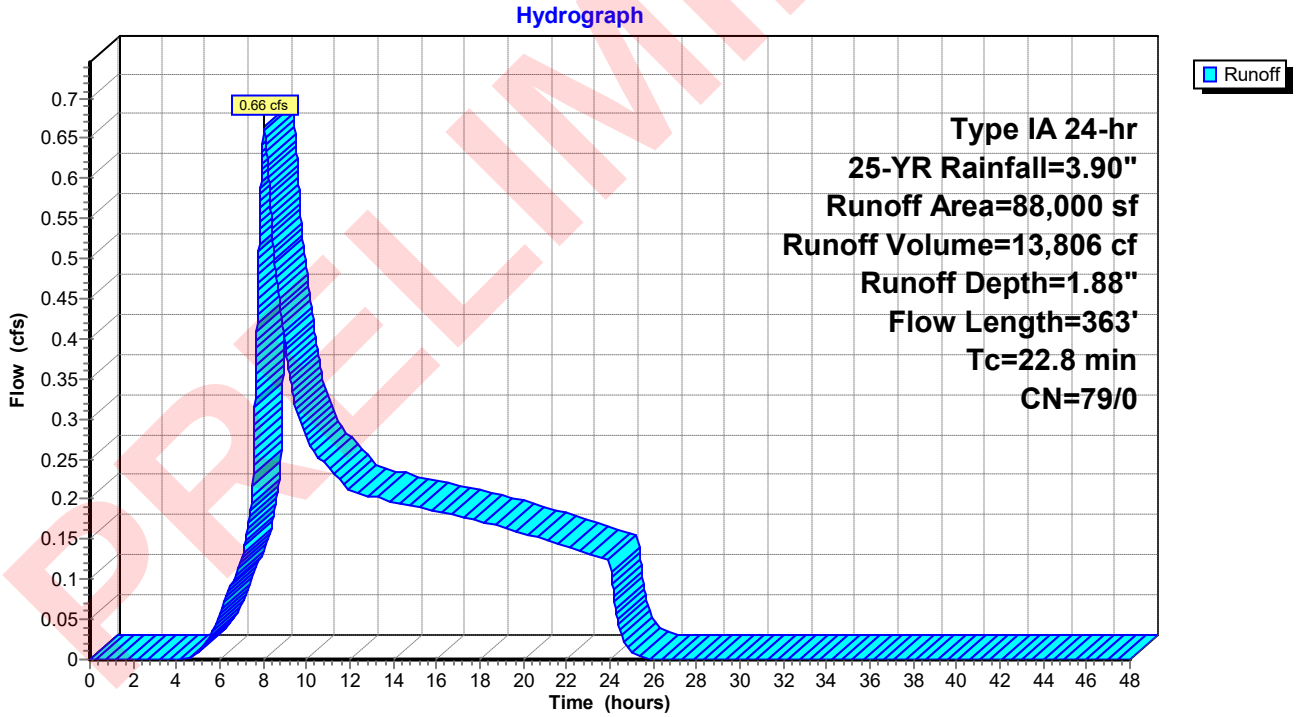
Runoff = 0.66 cfs @ 8.01 hrs, Volume= 13,806 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
88,000	79	50-75% Grass cover, Fair, HSG C
88,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	300	0.0316	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.50"
0.6	63	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.8	363	Total			

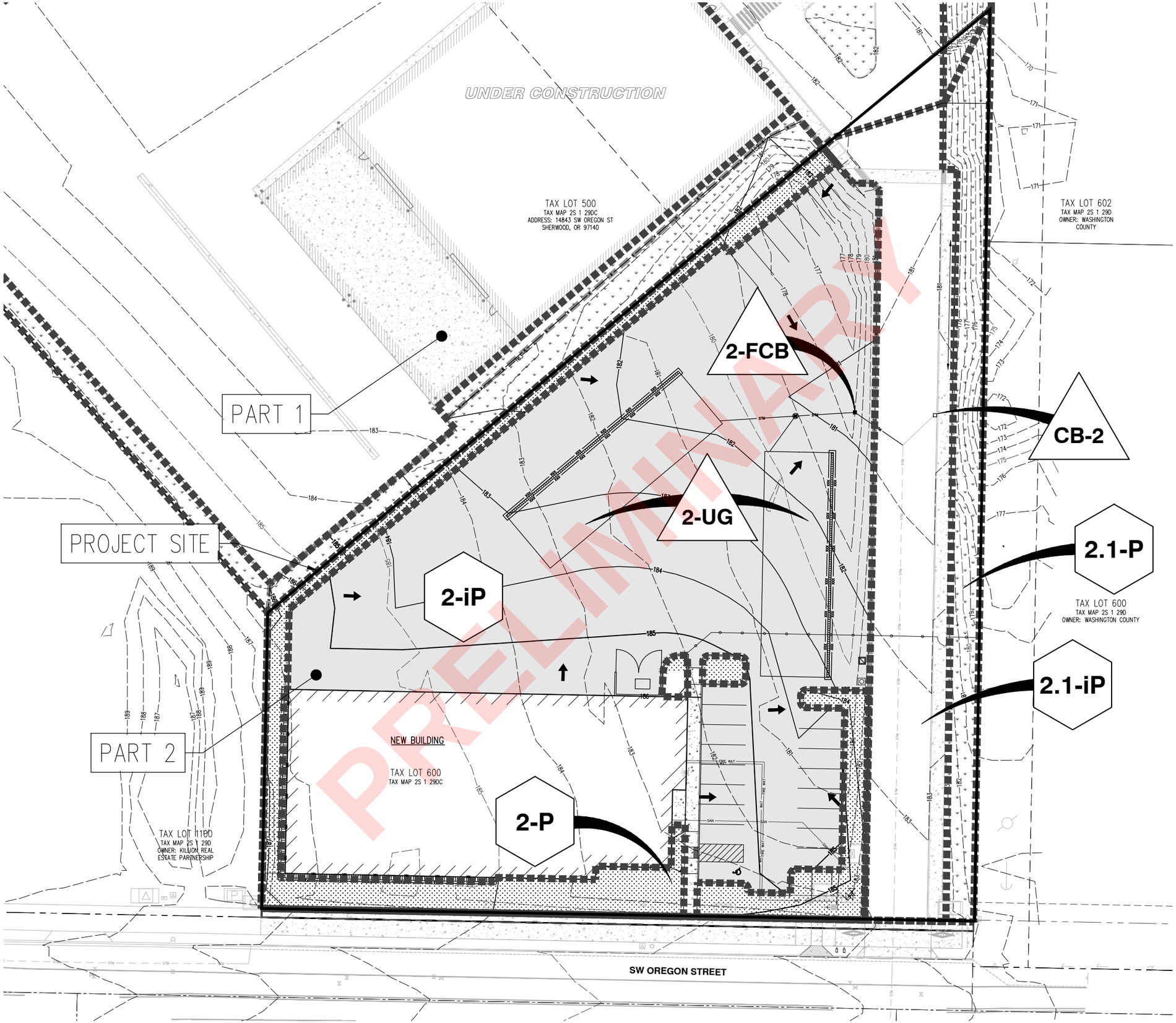
Subcatchment 2-E: Existing



PRELIMINARY

Exhibit C:
Post-Improvements Basin Map and HydroCAD Reports

PRELIMINARY



LEGEND

SUBBASIN DELINEATION	
SUBBASIN	XX
STORMWATER CHAMBERS/CB	X
FLOW ARROW	

N

SCALE: 1"= 20 FEET

20 0 4 10 20

ORIGINAL PAGE SIZE: 24" x 36"

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING • SURVEYING • NATURAL RESOURCES
FORESTRY • PLANNING • LANDSCAPE ARCHITECTURE

POST-DEVELOPED CONTRIBUTING BASIN
GH MCCULLOCH
SHERWOOD, OREGON

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 29, 2025
BRIAN C. CARLSON

PRELIMINARY
NOT FOR CONSTRUCTION

RENEWS: 12/31/2025

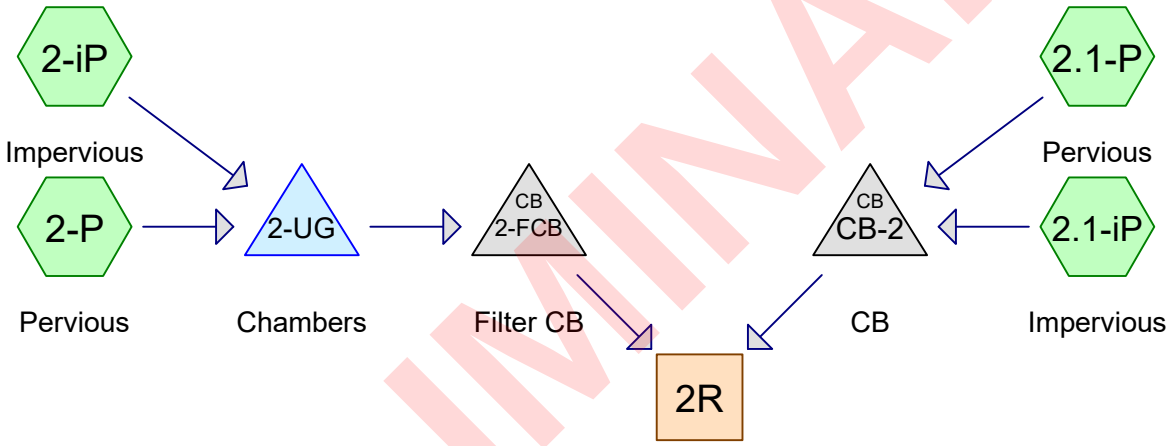
JOB NUMBER:	8627-06
DATE:	08/07/2025
DESIGNED BY:	GJG
DRAWN BY:	RLB
CHECKED BY:	BCC

POST

AKS DRAWING FILE: 8627-06 POST-DEVELOPED.DWG | LAYOUT: POST

Exhibit D:
Water Quality Calculations

PRELIMINARY



PRELIMINARY

Subcat Reach Pond Link

Routing Diagram for 8627-06 POST-DEV
Prepared by AKS Engineering & Forestry, LLC, Printed 11/4/2025
HydroCAD® 10.00-22 s/n 01338 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
14,980	74	>75% Grass cover, Good, HSG C (2-P, 2.1-P)
59,390	98	Impervious (2-iP)
13,630	98	Roof/Drive Aisle (2.1-iP)
88,000	**94**	**TOTAL AREA**

PRELIMINARY

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
14,980	HSG C	2-P, 2.1-P
0	HSG D	
73,020	Other	2-iP, 2.1-iP
88,000		**TOTAL AREA**

PRELIMINARY

Ground Covers (all 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
0	0	14,980	0	0	14,980	>75% Grass cover, Good	
0	0	0	0	59,390	59,390	Impervious	
0	0	0	0	13,630	13,630	Roof/Drive Aisle	
0	**0**	**14,980**	**0**	**73,020**	**88,000**	**TOTAL AREA**	

PRELIMINARY

Time span=0.00-64.00 hrs, dt=0.10 hrs, 641 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-iP: Impervious Runoff Area=59,390 sf 100.00% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=0/98 Runoff=0.79 cfs 11,238 cf

Subcatchment 2-P: Pervious Runoff Area=8,770 sf 0.00% Impervious Runoff Depth=0.61"
Tc=5.0 min CN=74/0 Runoff=0.02 cfs 445 cf

Subcatchment 2.1-iP: Impervious Runoff Area=13,630 sf 100.00% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=0/98 Runoff=0.18 cfs 2,579 cf

Subcatchment 2.1-P: Pervious Runoff Area=6,210 sf 0.00% Impervious Runoff Depth=0.61"
Flow Length=409' Tc=27.4 min CN=74/0 Runoff=0.01 cfs 315 cf

Reach 2R: Avg. Flow Depth=0.23' Max Vel=2.13 fps Inflow=0.26 cfs 13,400 cf
10.0" Round Pipe n=0.010 L=206.0' S=0.0030 '/' Capacity=1.56 cfs Outflow=0.26 cfs 13,400 cf

Pond 2-FCB: Filter CB Peak Elev=178.04' Inflow=0.12 cfs 10,506 cf
10.0" Round Culvert n=0.013 L=26.0' S=0.0050 '/' Outflow=0.12 cfs 10,506 cf

Pond 2-UG: Chambers Peak Elev=179.57' Storage=5,445 cf Inflow=0.80 cfs 11,683 cf
Outflow=0.12 cfs 10,506 cf

Pond CB-2: CB Peak Elev=178.05' Inflow=0.19 cfs 2,894 cf
10.0" Round Culvert n=0.013 L=21.3' S=0.0028 '/' Outflow=0.19 cfs 2,894 cf

Total Runoff Area = 88,000 sf Runoff Volume = 14,577 cf Average Runoff Depth = 1.99"
17.02% Pervious = 14,980 sf 82.98% Impervious = 73,020 sf

PRELIMINARY

Summary for Subcatchment 2-iP: Impervious

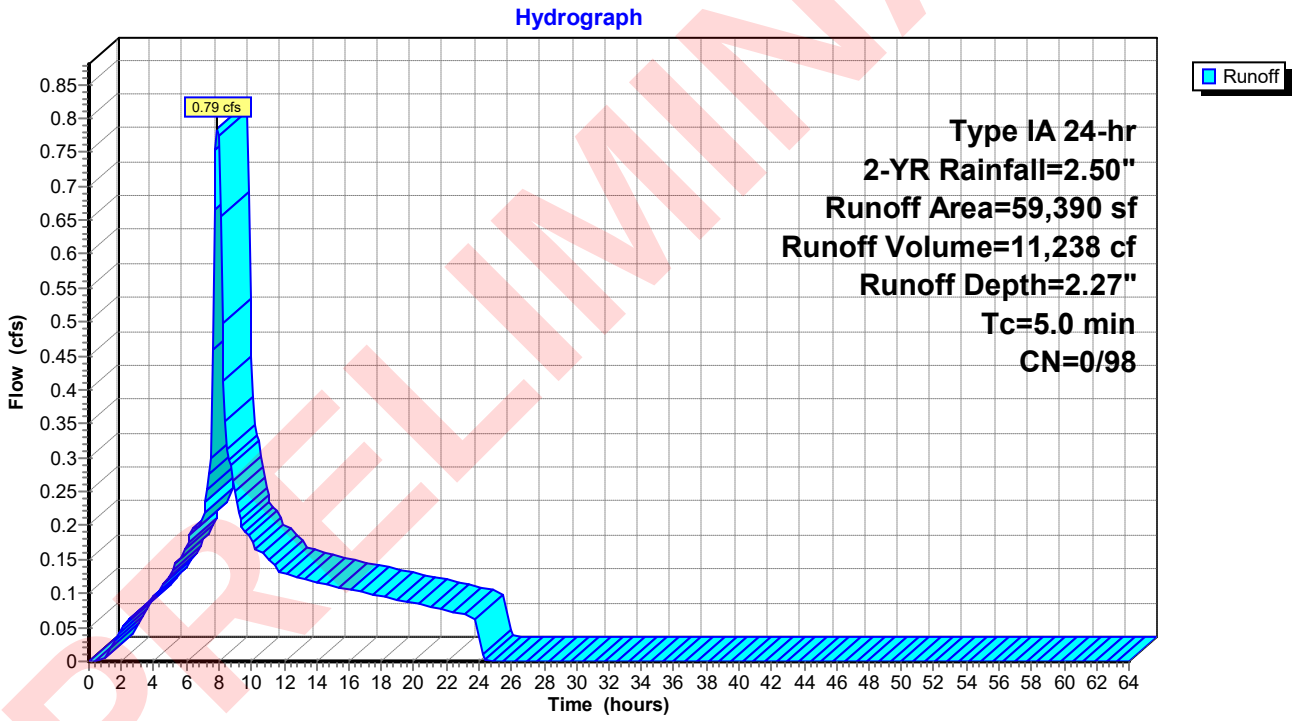
Runoff = 0.79 cfs @ 7.92 hrs, Volume= 11,238 cf, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

	Area (sf)	CN	Description
*	59,390	98	Impervious
	59,390		100.00% Impervious Area

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

Subcatchment 2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2-P: Pervious

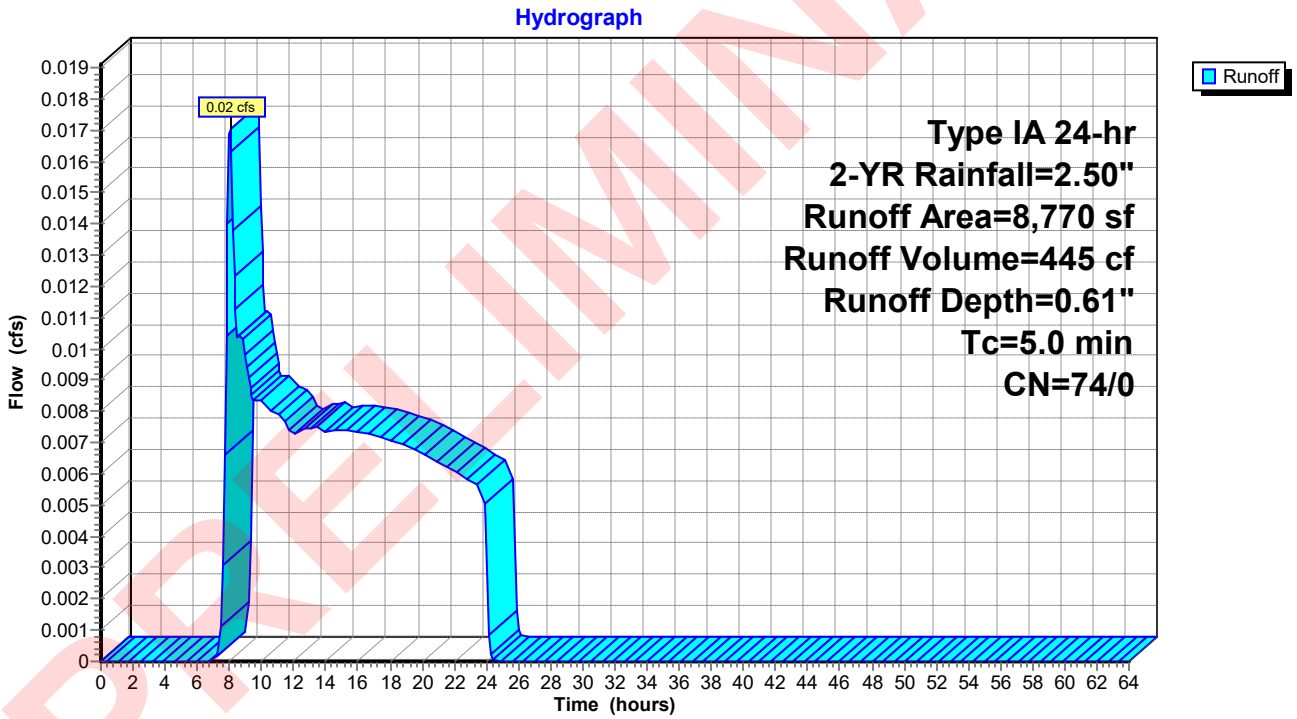
Runoff = 0.02 cfs @ 8.03 hrs, Volume= 445 cf, Depth= 0.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
8,770	74	>75% Grass cover, Good, HSG C
8,770		100.00% Pervious Area

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

Subcatchment 2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

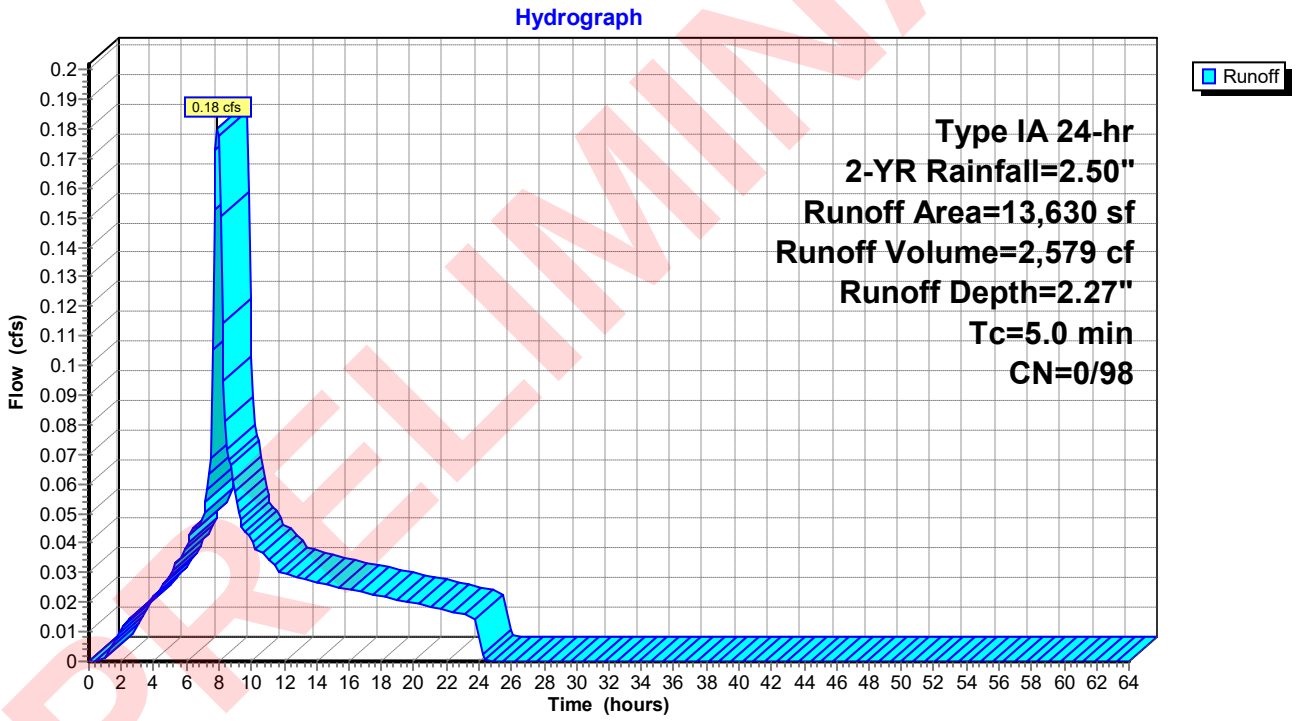
Runoff = 0.18 cfs @ 7.92 hrs, Volume= 2,579 cf, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

	Area (sf)	CN	Description
*	13,630	98	Roof/Drive Aisle
	13,630		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

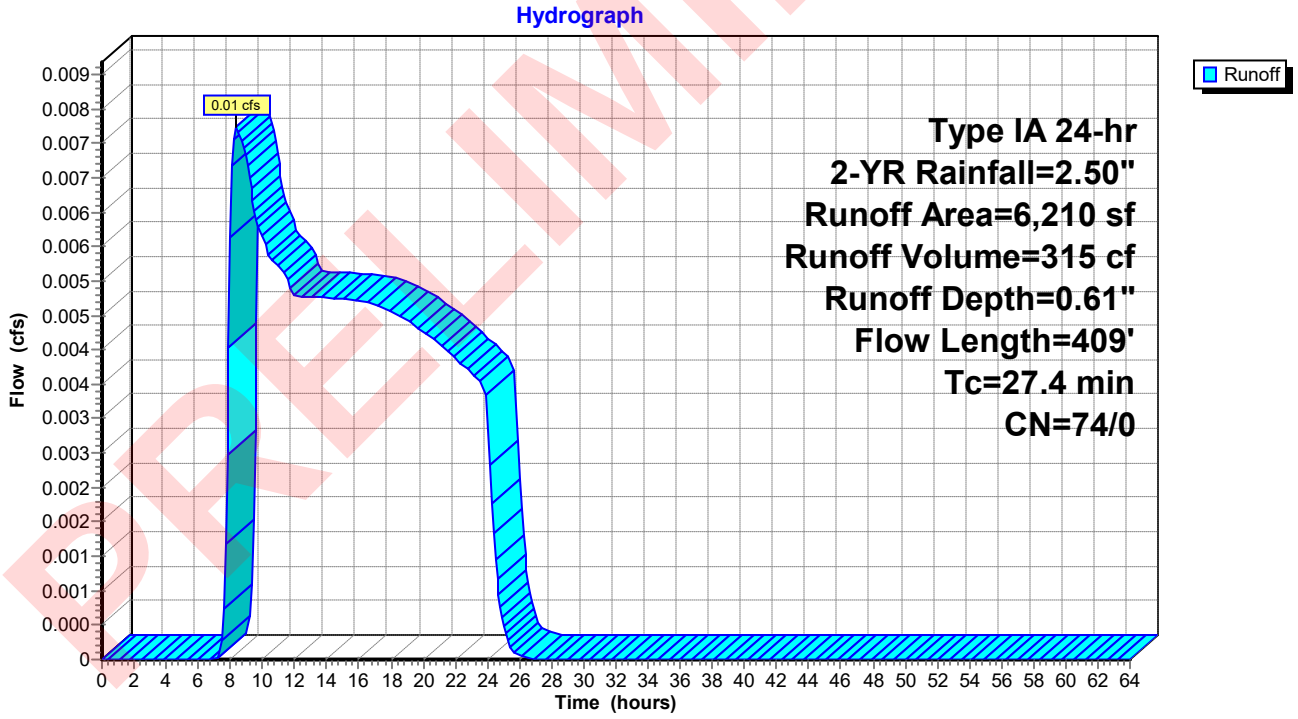
Runoff = 0.01 cfs @ 8.35 hrs, Volume= 315 cf, Depth= 0.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 2-YR Rainfall=2.50"

Area (sf)	CN	Description
6,210	74	>75% Grass cover, Good, HSG C
6,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

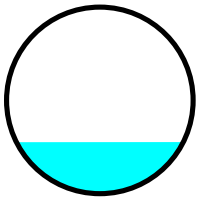
Summary for Reach 2R:

Inflow Area = 88,000 sf, 82.98% Impervious, Inflow Depth > 1.83" for 2-YR event
Inflow = 0.26 cfs @ 7.96 hrs, Volume= 13,400 cf
Outflow = 0.26 cfs @ 7.98 hrs, Volume= 13,400 cf, Atten= 0%, Lag= 0.8 min

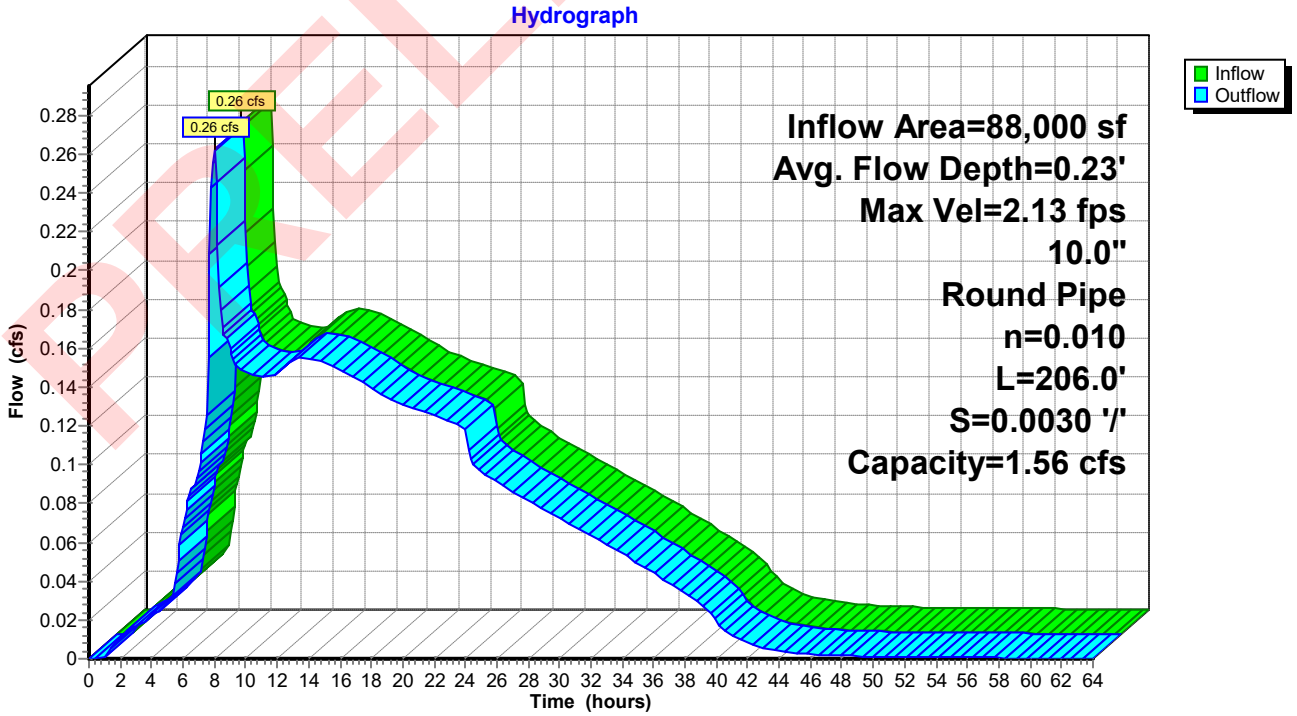
Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Max. Velocity= 2.13 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.11 fps, Avg. Travel Time= 3.1 min

Peak Storage= 25 cf @ 7.98 hrs
Average Depth at Peak Storage= 0.23'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,391.57 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 1.56 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 206.0' Slope= 0.0030 '/'
Inlet Invert= 177.69', Outlet Invert= 177.07'



Reach 2R:



PRELIMINARY

Summary for Pond 2-FCB: Filter CB

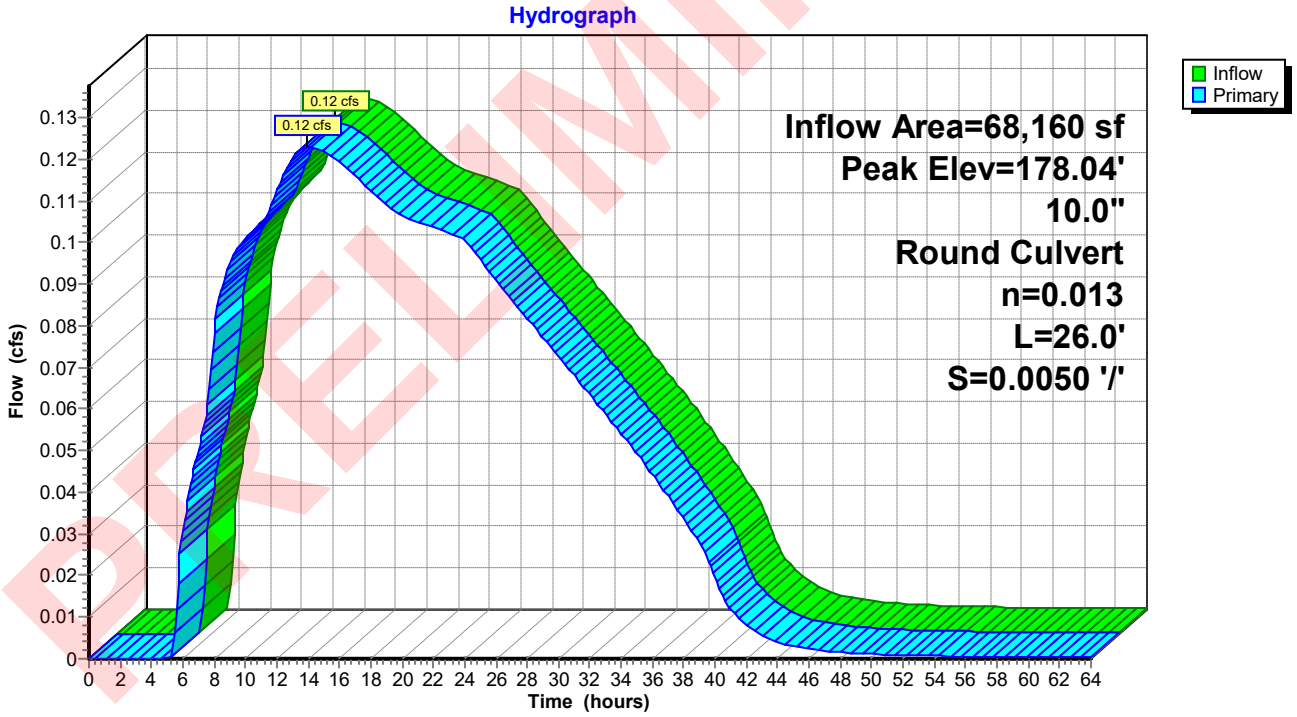
Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth > 1.85" for 2-YR event
Inflow = 0.12 cfs @ 13.88 hrs, Volume= 10,506 cf
Outflow = 0.12 cfs @ 13.88 hrs, Volume= 10,506 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 13.88 hrs, Volume= 10,506 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.04' @ 13.80 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.82'	**10.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.82' / 177.69' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.12 cfs @ 13.88 hrs HW=178.04' TW=177.87' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.12 cfs @ 1.61 fps)

Pond 2-FCB: Filter CB



PRELIMINARY

Summary for Pond 2-UG: Chambers

Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth = 2.06" for 2-YR event
Inflow = 0.80 cfs @ 7.93 hrs, Volume= 11,683 cf
Outflow = 0.12 cfs @ 13.88 hrs, Volume= 10,506 cf, Atten= 85%, Lag= 356.9 min
Primary = 0.12 cfs @ 13.88 hrs, Volume= 10,506 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 179.57' @ 13.88 hrs Surf.Area= 6,363 sf Storage= 5,445 cf

Plug-Flow detention time= 654.8 min calculated for 10,490 cf (90% of inflow)
Center-of-Mass det. time= 586.2 min (1,270.2 - 684.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	4,132 cf	**101.00'W x 63.00'L x 2.00'H Field A** 12,726 cf Overall - 2,395 cf Embedded = 10,331 cf x 40.0% Voids
#2A	178.50'	2,395 cf	**CMP Round 12** x 150 Inside #1 Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf Overall Size= 12.0"W x 12.0"H x 20.00'L Row Length Adjustment= +1.00' x 0.79 sf x 50 rows
		6,528 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.45'	**10.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.45' / 178.32' S= 0.0048 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#2	Device 1	180.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height
#3	Device 1	179.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	178.45'	**1.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=0.12 cfs @ 13.88 hrs HW=179.57' TW=178.04' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.12 cfs of 1.77 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.93 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.11 cfs @ 5.01 fps)

PRELIMINARY

Pond 2-UG: Chambers - Chamber Wizard Field A

Chamber Model = CMP Round 12 (Round Corrugated Metal Pipe)
Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf
Overall Size= 12.0"W x 12.0"H x 20.00'L
Row Length Adjustment= +1.00' x 0.79 sf x 50 rows

12.0" Wide + 12.0" Spacing = 24.0" C-C Row Spacing

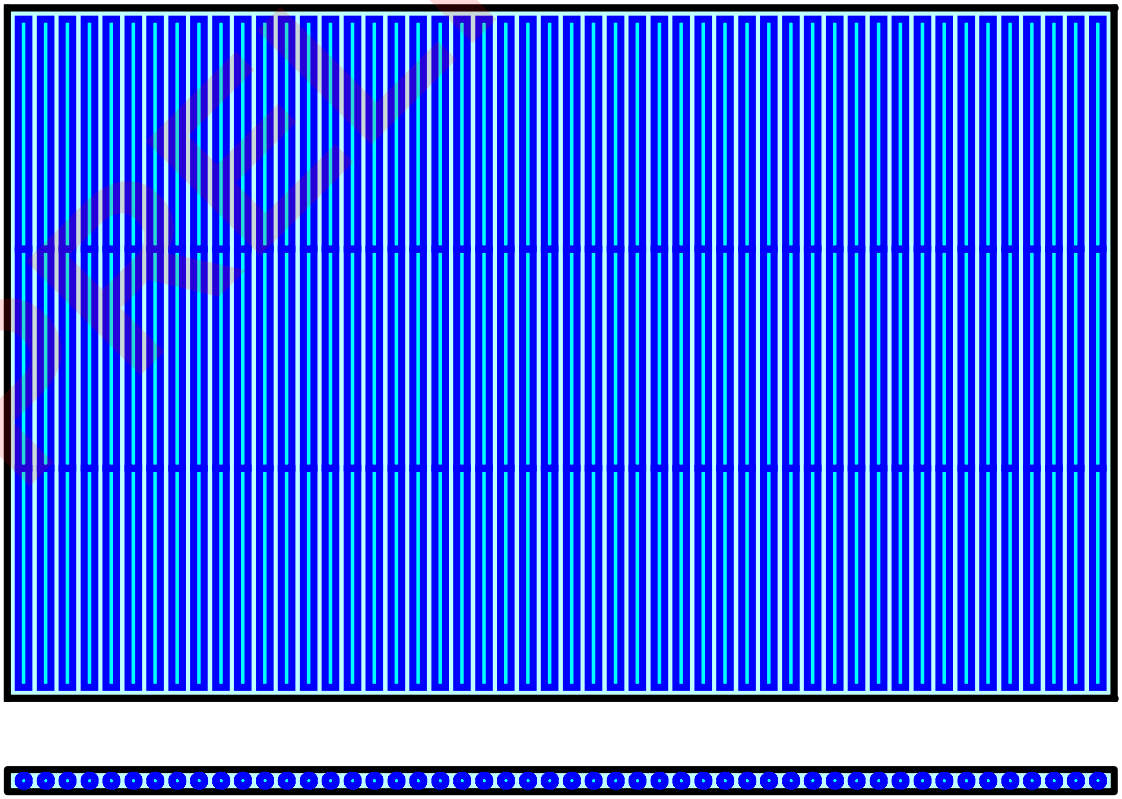
3 Chambers/Row x 20.00' Long +1.00' Row Adjustment = 61.00' Row Length +12.0" End Stone x 2 = 63.00' Base Length
50 Rows x 12.0" Wide + 12.0" Spacing x 49 + 12.0" Side Stone x 2 = 101.00' Base Width
6.0" Base + 12.0" Chamber Height + 6.0" Cover = 2.00' Field Height

150 Chambers x 15.7 cf +1.00' Row Adjustment x 0.79 sf x 50 Rows = 2,395.5 cf Chamber Storage

12,726.0 cf Field - 2,395.5 cf Chambers = 10,330.5 cf Stone x 40.0% Voids = 4,132.2 cf Stone Storage

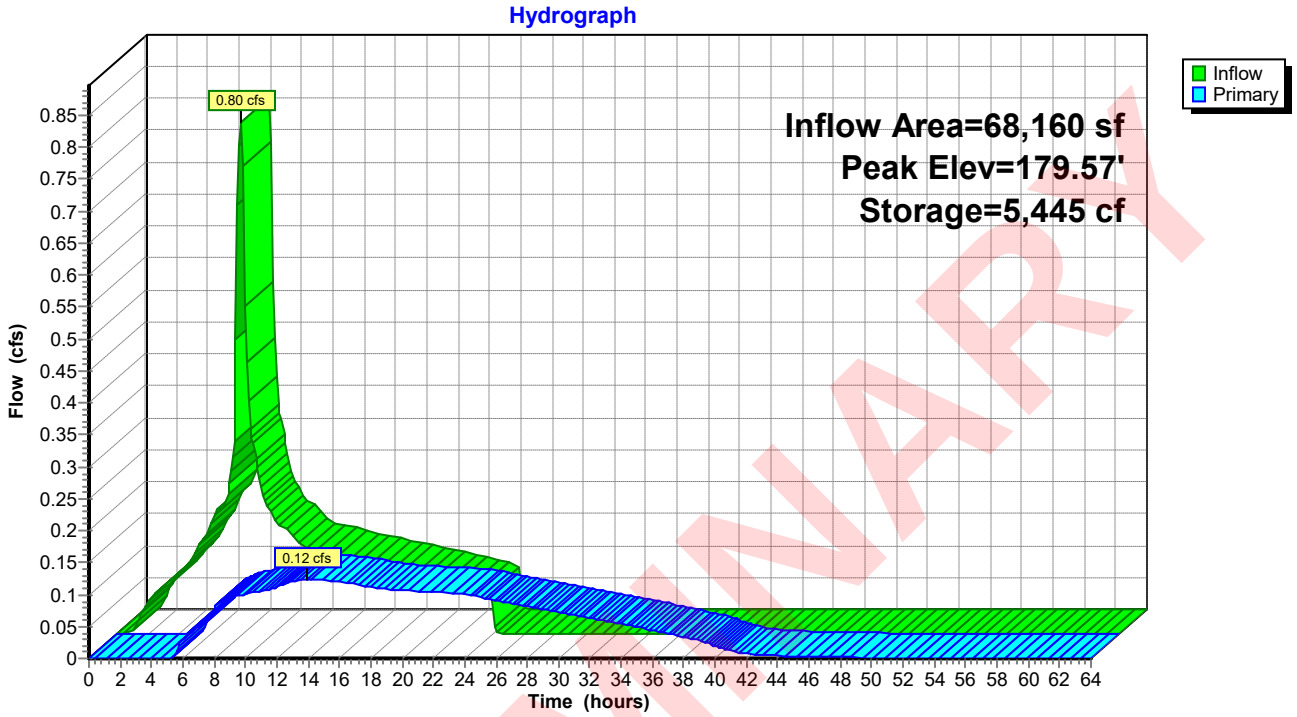
Chamber Storage + Stone Storage = 6,527.7 cf = 0.150 af
Overall Storage Efficiency = 51.3%
Overall System Size = 63.00' x 101.00' x 2.00'

150 Chambers
471.3 cy Field
382.6 cy Stone



PRELIMINARY

Pond 2-UG: Chambers



PRELIMINARY

Summary for Pond CB-2: CB

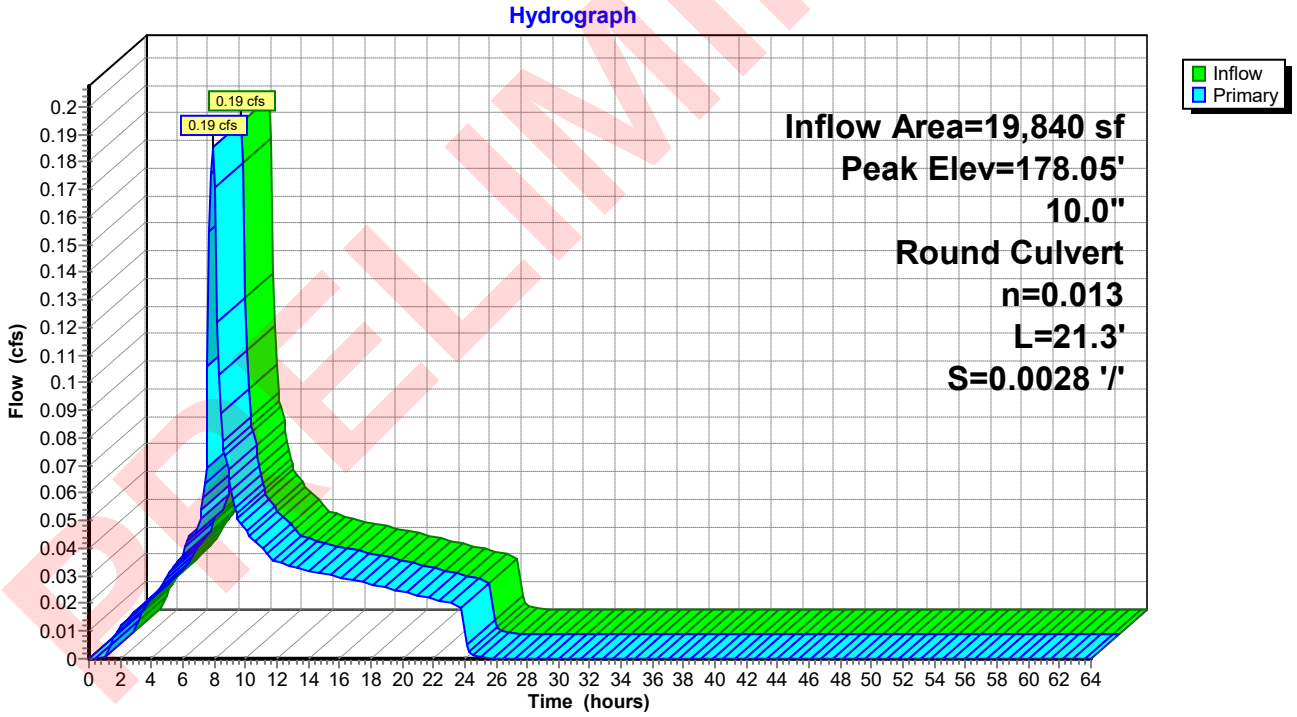
Inflow Area = 19,840 sf, 68.70% Impervious, Inflow Depth = 1.75" for 2-YR event
Inflow = 0.19 cfs @ 7.94 hrs, Volume= 2,894 cf
Outflow = 0.19 cfs @ 7.94 hrs, Volume= 2,894 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 7.94 hrs, Volume= 2,894 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.05' @ 7.95 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.75'	**10.0" Round Culvert** L= 21.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.75' / 177.69' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.18 cfs @ 7.94 hrs HW=178.04' TW=177.92' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.18 cfs @ 1.60 fps)

Pond CB-2: CB



PRELIMINARY

Time span=0.00-64.00 hrs, dt=0.10 hrs, 641 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-iP: Impervious Runoff Area=59,390 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=0/98 Runoff=0.98 cfs 14,194 cf

Subcatchment 2-P: Pervious Runoff Area=8,770 sf 0.00% Impervious Runoff Depth=0.97"
Tc=5.0 min CN=74/0 Runoff=0.04 cfs 711 cf

Subcatchment 2.1-iP: Impervious Runoff Area=13,630 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=0/98 Runoff=0.23 cfs 3,257 cf

Subcatchment 2.1-P: Pervious Runoff Area=6,210 sf 0.00% Impervious Runoff Depth=0.97"
Flow Length=409' Tc=27.4 min CN=74/0 Runoff=0.02 cfs 503 cf

Reach 2R: Avg. Flow Depth=0.26' Max Vel=2.27 fps Inflow=0.33 cfs 17,487 cf
10.0" Round Pipe n=0.010 L=206.0' S=0.0030 '/' Capacity=1.56 cfs Outflow=0.33 cfs 17,487 cf

Pond 2-FCB: Filter CB Peak Elev=178.13' Inflow=0.24 cfs 13,727 cf
10.0" Round Culvert n=0.013 L=26.0' S=0.0050 '/' Outflow=0.24 cfs 13,727 cf

Pond 2-UG: Chambers Peak Elev=179.75' Storage=5,902 cf Inflow=1.02 cfs 14,904 cf
Outflow=0.24 cfs 13,727 cf

Pond CB-2: CB Peak Elev=178.09' Inflow=0.24 cfs 3,761 cf
10.0" Round Culvert n=0.013 L=21.3' S=0.0028 '/' Outflow=0.24 cfs 3,761 cf

Total Runoff Area = 88,000 sf Runoff Volume = 18,665 cf Average Runoff Depth = 2.55"
17.02% Pervious = 14,980 sf 82.98% Impervious = 73,020 sf

PRELIMINARY

Summary for Subcatchment 2-iP: Impervious

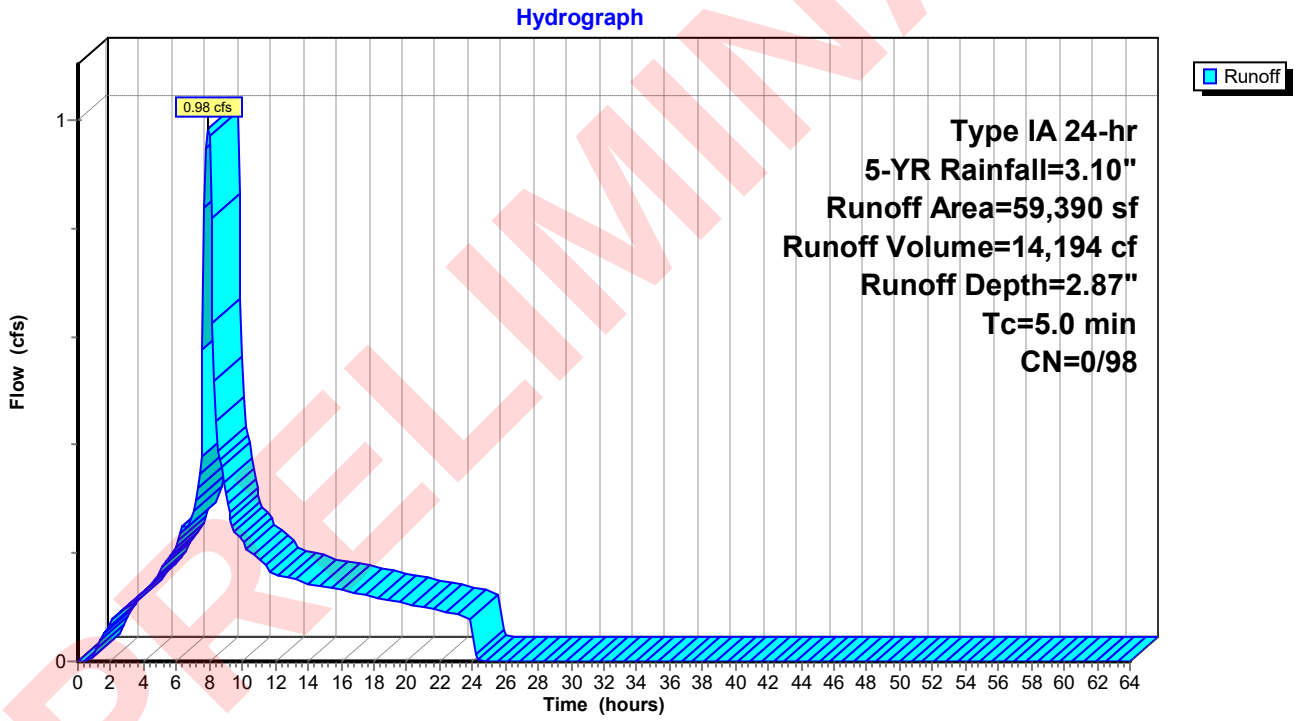
Runoff = 0.98 cfs @ 7.92 hrs, Volume= 14,194 cf, Depth= 2.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	59,390	98	Impervious
	59,390		100.00% Impervious Area

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

Subcatchment 2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2-P: Pervious

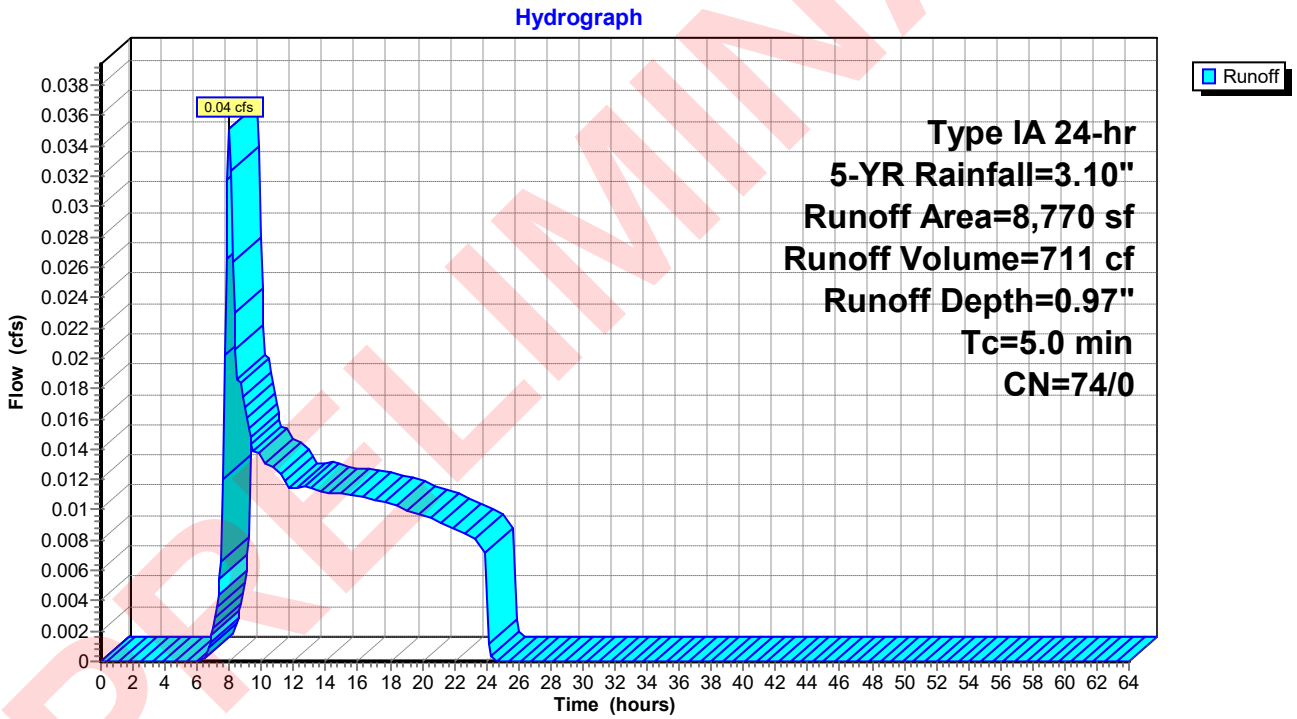
Runoff = 0.04 cfs @ 8.00 hrs, Volume= 711 cf, Depth= 0.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
8,770	74	>75% Grass cover, Good, HSG C
8,770		100.00% Pervious Area

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

Subcatchment 2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

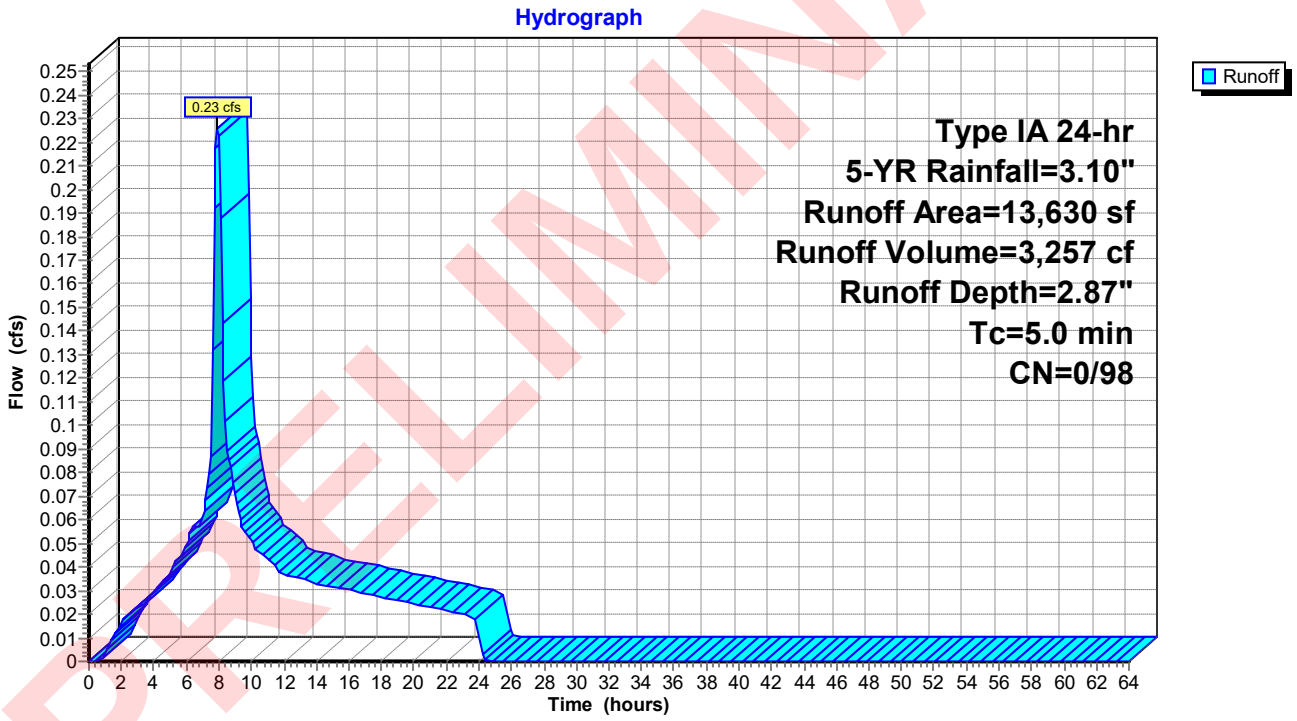
Runoff = 0.23 cfs @ 7.92 hrs, Volume= 3,257 cf, Depth= 2.87"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	13,630	98	Roof/Drive Aisle
	13,630		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

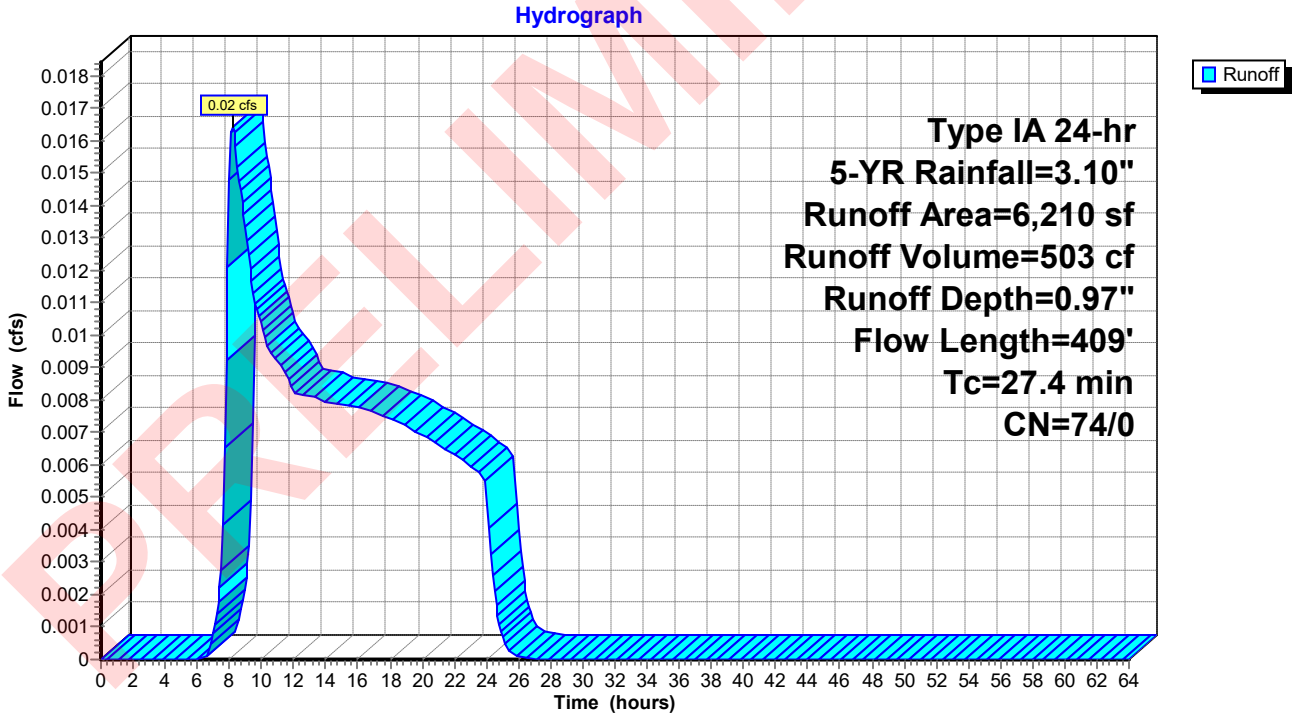
Runoff = 0.02 cfs @ 8.20 hrs, Volume= 503 cf, Depth= 0.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 5-YR Rainfall=3.10"

Area (sf)	CN	Description
6,210	74	>75% Grass cover, Good, HSG C
6,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

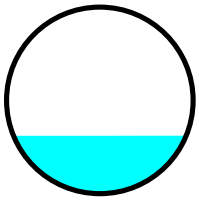
Summary for Reach 2R:

Inflow Area = 88,000 sf, 82.98% Impervious, Inflow Depth > 2.38" for 5-YR event
Inflow = 0.33 cfs @ 7.96 hrs, Volume= 17,487 cf
Outflow = 0.33 cfs @ 7.98 hrs, Volume= 17,487 cf, Atten= 0%, Lag= 0.8 min

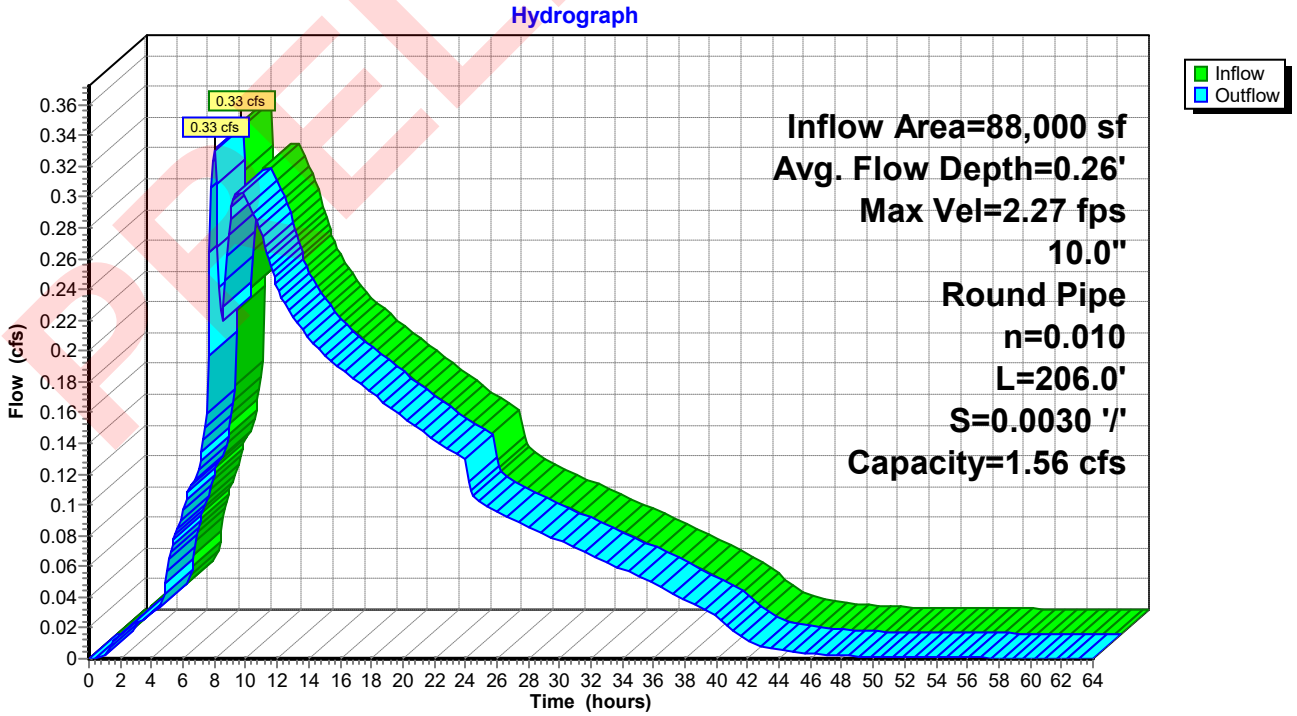
Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Max. Velocity= 2.27 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.18 fps, Avg. Travel Time= 2.9 min

Peak Storage= 30 cf @ 7.98 hrs
Average Depth at Peak Storage= 0.26'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,391.57 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 1.56 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 206.0' Slope= 0.0030 '/'
Inlet Invert= 177.69', Outlet Invert= 177.07'



Reach 2R:



PRELIMINARY

Summary for Pond 2-FCB: Filter CB

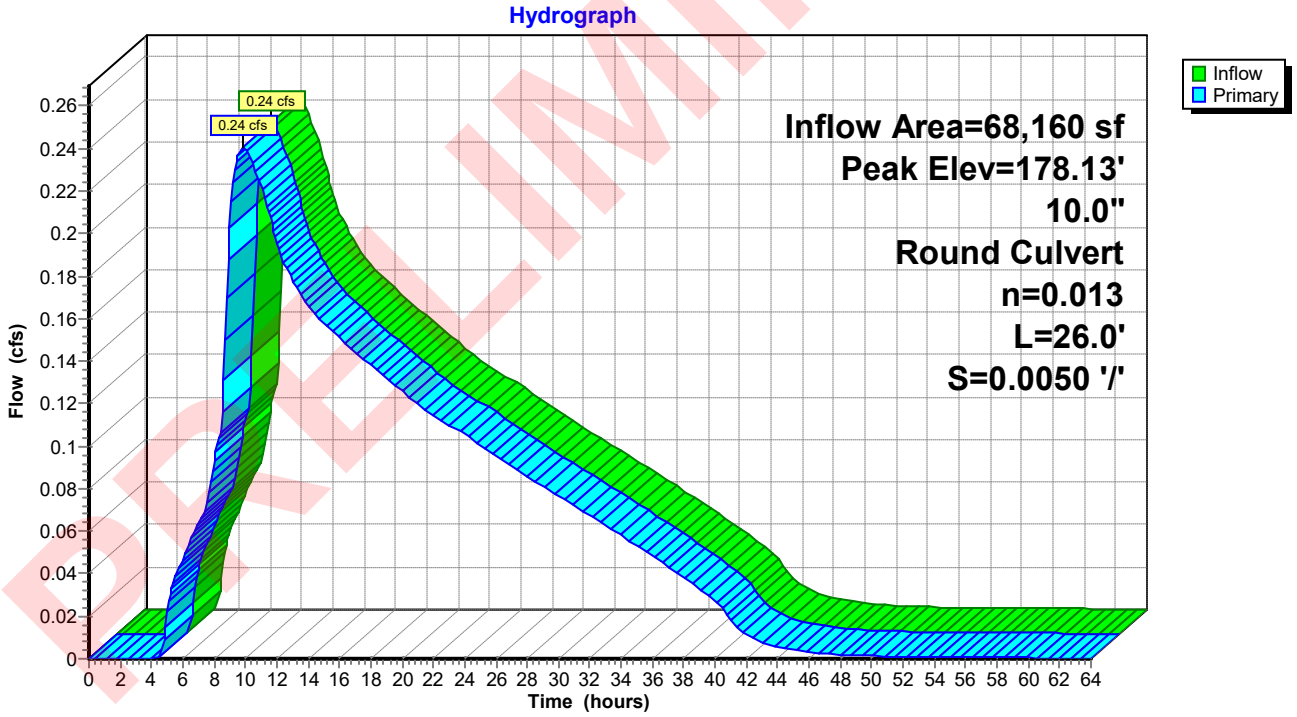
Inflow Area =	68,160 sf,	87.13% Impervious,	Inflow Depth >	2.42"	for 5-YR event
Inflow =	0.24 cfs @	9.90 hrs,	Volume=	13,727 cf	
Outflow =	0.24 cfs @	9.90 hrs,	Volume=	13,727 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.24 cfs @	9.90 hrs,	Volume=	13,727 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.13' @ 9.85 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.82'	**10.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.82' / 177.69' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.24 cfs @ 9.90 hrs HW=178.13' TW=177.94' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.24 cfs @ 1.92 fps)

Pond 2-FCB: Filter CB



PRELIMINARY

Summary for Pond 2-UG: Chambers

Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth = 2.62" for 5-YR event
Inflow = 1.02 cfs @ 7.93 hrs, Volume= 14,904 cf
Outflow = 0.24 cfs @ 9.90 hrs, Volume= 13,727 cf, Atten= 76%, Lag= 118.1 min
Primary = 0.24 cfs @ 9.90 hrs, Volume= 13,727 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 179.75' @ 9.90 hrs Surf.Area= 6,363 sf Storage= 5,902 cf

Plug-Flow detention time= 556.6 min calculated for 13,727 cf (92% of inflow)
Center-of-Mass det. time= 499.4 min (1,177.8 - 678.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	4,132 cf	**101.00'W x 63.00'L x 2.00'H Field A** 12,726 cf Overall - 2,395 cf Embedded = 10,331 cf x 40.0% Voids
#2A	178.50'	2,395 cf	**CMP Round 12** x 150 Inside #1 Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf Overall Size= 12.0"W x 12.0"H x 20.00'L Row Length Adjustment= +1.00' x 0.79 sf x 50 rows
		6,528 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.45'	**10.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.45' / 178.32' S= 0.0048 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#2	Device 1	180.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height
#3	Device 1	179.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	178.45'	**1.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=0.24 cfs @ 9.90 hrs HW=179.75' TW=178.13' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.24 cfs of 2.11 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Orifice Controls 0.12 cfs @ 1.72 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.12 cfs @ 5.41 fps)

PRELIMINARY

Pond 2-UG: Chambers - Chamber Wizard Field A

Chamber Model = CMP Round 12 (Round Corrugated Metal Pipe)
Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf
Overall Size= 12.0"W x 12.0"H x 20.00'L
Row Length Adjustment= +1.00' x 0.79 sf x 50 rows

12.0" Wide + 12.0" Spacing = 24.0" C-C Row Spacing

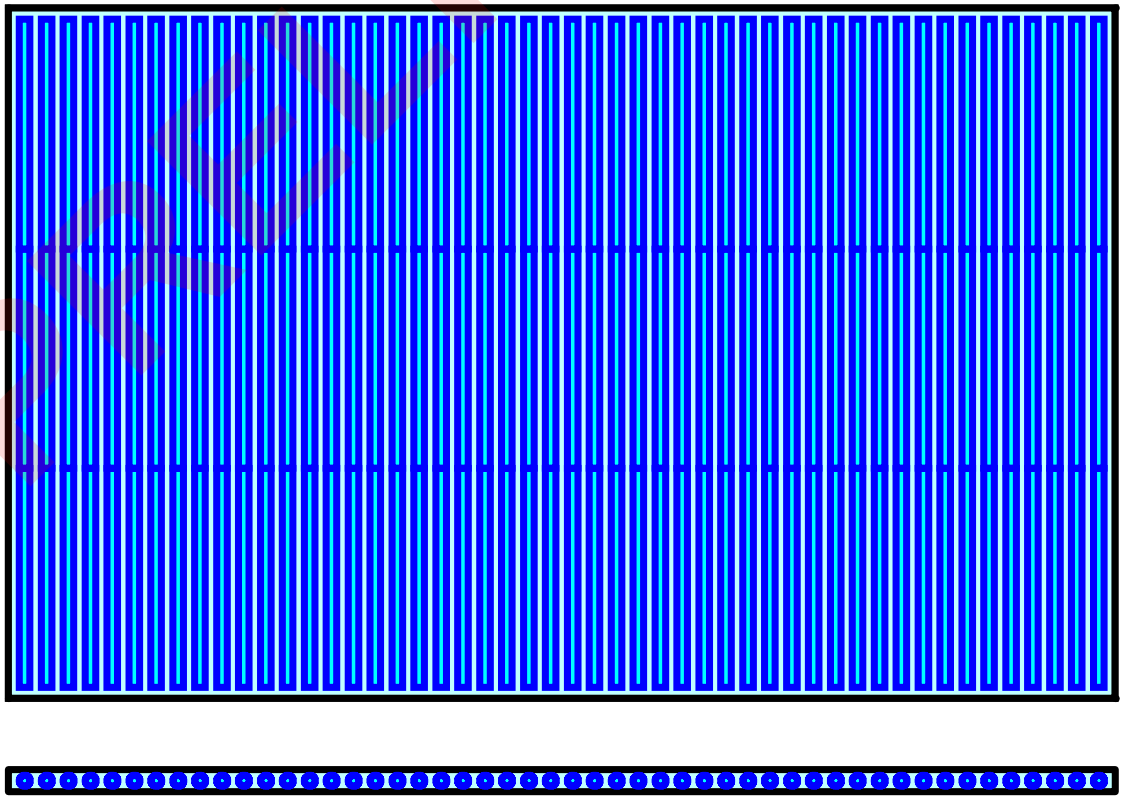
3 Chambers/Row x 20.00' Long +1.00' Row Adjustment = 61.00' Row Length +12.0" End Stone x 2 = 63.00' Base Length
50 Rows x 12.0" Wide + 12.0" Spacing x 49 + 12.0" Side Stone x 2 = 101.00' Base Width
6.0" Base + 12.0" Chamber Height + 6.0" Cover = 2.00' Field Height

150 Chambers x 15.7 cf +1.00' Row Adjustment x 0.79 sf x 50 Rows = 2,395.5 cf Chamber Storage

12,726.0 cf Field - 2,395.5 cf Chambers = 10,330.5 cf Stone x 40.0% Voids = 4,132.2 cf Stone Storage

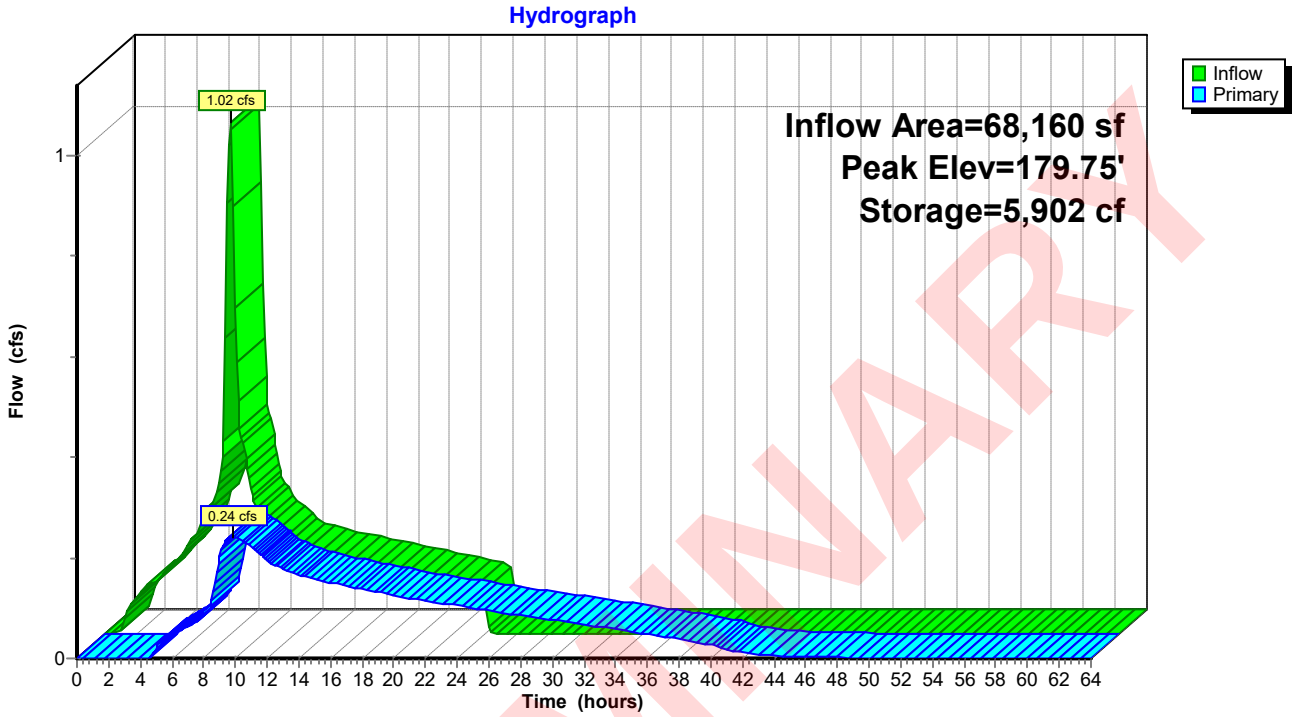
Chamber Storage + Stone Storage = 6,527.7 cf = 0.150 af
Overall Storage Efficiency = 51.3%
Overall System Size = 63.00' x 101.00' x 2.00'

150 Chambers
471.3 cy Field
382.6 cy Stone



PRELIMINARY

Pond 2-UG: Chambers



PRELIMINARY

Summary for Pond CB-2: CB

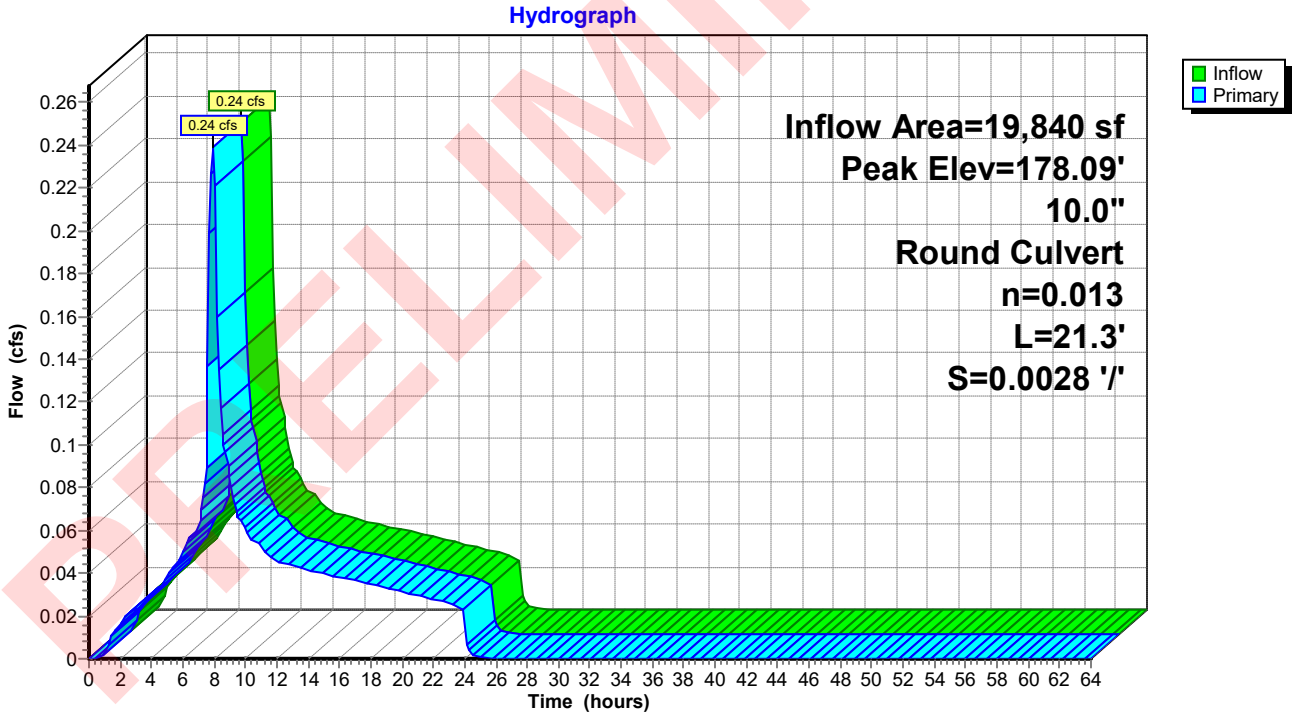
Inflow Area =	19,840 sf,	68.70% Impervious,	Inflow Depth =	2.27"	for 5-YR event
Inflow =	0.24 cfs @	7.95 hrs,	Volume=	3,761 cf	
Outflow =	0.24 cfs @	7.95 hrs,	Volume=	3,761 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.24 cfs @	7.95 hrs,	Volume=	3,761 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.09' @ 7.95 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.75'	**10.0" Round Culvert** L= 21.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.75' / 177.69' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.24 cfs @ 7.95 hrs HW=178.08' TW=177.95' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.24 cfs @ 1.73 fps)

Pond CB-2: CB



PRELIMINARY

Time span=0.00-64.00 hrs, dt=0.10 hrs, 641 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-iP: Impervious Runoff Area=59,390 sf 100.00% Impervious Runoff Depth=3.22"
Tc=5.0 min CN=0/98 Runoff=1.10 cfs 15,920 cf

Subcatchment 2-P: Pervious Runoff Area=8,770 sf 0.00% Impervious Runoff Depth=1.21"
Tc=5.0 min CN=74/0 Runoff=0.05 cfs 881 cf

Subcatchment 2.1-iP: Impervious Runoff Area=13,630 sf 100.00% Impervious Runoff Depth=3.22"
Tc=5.0 min CN=0/98 Runoff=0.25 cfs 3,654 cf

Subcatchment 2.1-P: Pervious Runoff Area=6,210 sf 0.00% Impervious Runoff Depth=1.21"
Flow Length=409' Tc=27.4 min CN=74/0 Runoff=0.02 cfs 624 cf

Reach 2R: Avg. Flow Depth=0.29' Max Vel=2.42 fps Inflow=0.41 cfs 19,900 cf
10.0" Round Pipe n=0.010 L=206.0' S=0.0030 '/' Capacity=1.56 cfs Outflow=0.41 cfs 19,900 cf

Pond 2-FCB: Filter CB Peak Elev=178.18' Inflow=0.32 cfs 15,623 cf
10.0" Round Culvert n=0.013 L=26.0' S=0.0050 '/' Outflow=0.32 cfs 15,623 cf

Pond 2-UG: Chambers Peak Elev=179.88' Storage=6,228 cf Inflow=1.15 cfs 16,801 cf
Outflow=0.32 cfs 15,623 cf

Pond CB-2: CB Peak Elev=178.11' Inflow=0.27 cfs 4,277 cf
10.0" Round Culvert n=0.013 L=21.3' S=0.0028 '/' Outflow=0.27 cfs 4,277 cf

Total Runoff Area = 88,000 sf Runoff Volume = 21,078 cf Average Runoff Depth = 2.87"
17.02% Pervious = 14,980 sf 82.98% Impervious = 73,020 sf

PRELIMINARY

Summary for Subcatchment 2-iP: Impervious

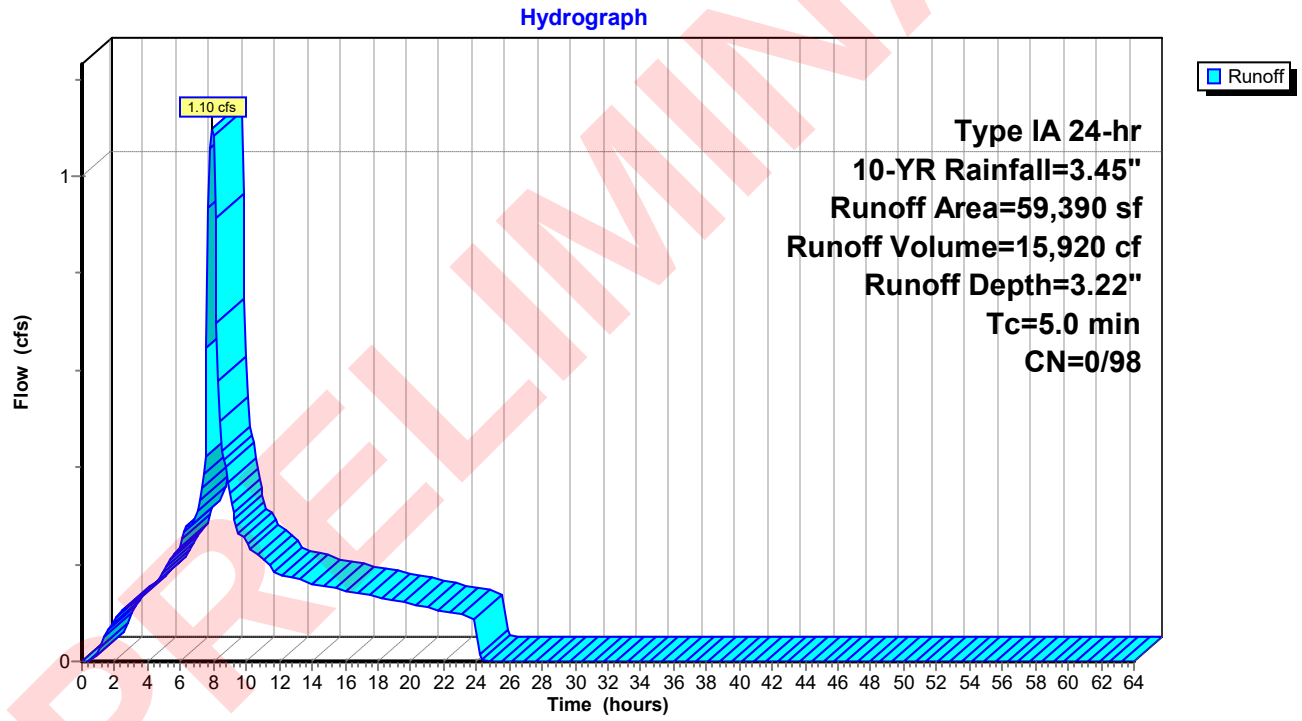
Runoff = 1.10 cfs @ 7.92 hrs, Volume= 15,920 cf, Depth= 3.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

	Area (sf)	CN	Description
*	59,390	98	Impervious
	59,390		100.00% Impervious Area

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

Subcatchment 2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2-P: Pervious

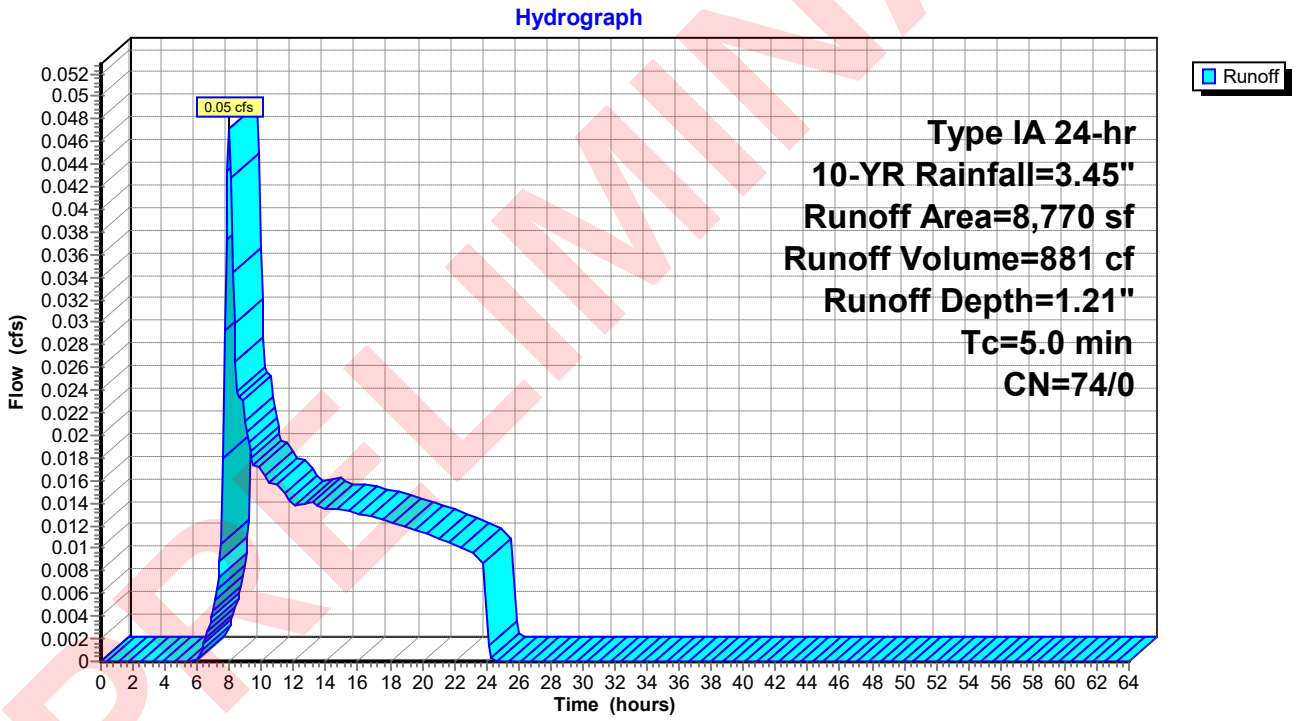
Runoff = 0.05 cfs @ 8.00 hrs, Volume= 881 cf, Depth= 1.21"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
8,770	74	>75% Grass cover, Good, HSG C
8,770		100.00% Pervious Area

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

Subcatchment 2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

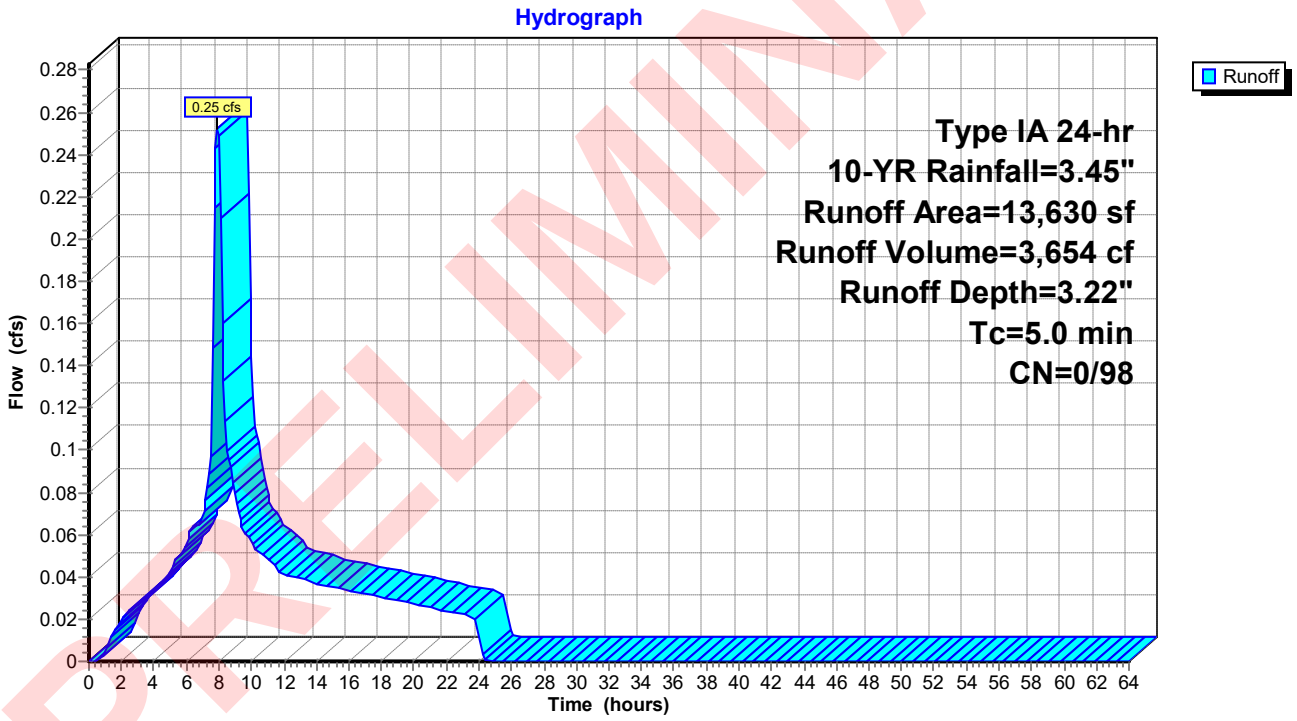
Runoff = 0.25 cfs @ 7.92 hrs, Volume= 3,654 cf, Depth= 3.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

	Area (sf)	CN	Description
*	13,630	98	Roof/Drive Aisle
	13,630		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

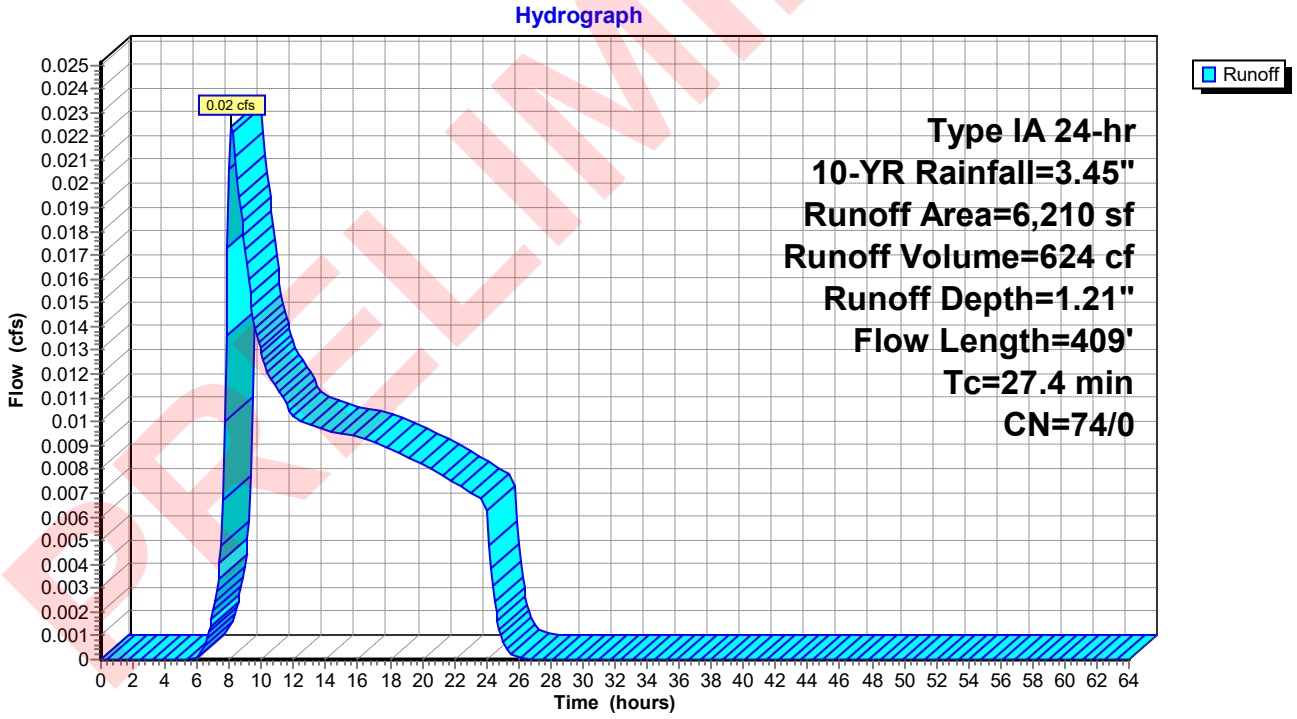
Runoff = 0.02 cfs @ 8.15 hrs, Volume= 624 cf, Depth= 1.21"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 10-YR Rainfall=3.45"

Area (sf)	CN	Description
6,210	74	>75% Grass cover, Good, HSG C
6,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

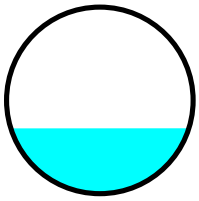
Summary for Reach 2R:

Inflow Area = 88,000 sf, 82.98% Impervious, Inflow Depth > 2.71" for 10-YR event
Inflow = 0.41 cfs @ 8.92 hrs, Volume= 19,900 cf
Outflow = 0.41 cfs @ 8.94 hrs, Volume= 19,900 cf, Atten= 0%, Lag= 1.1 min

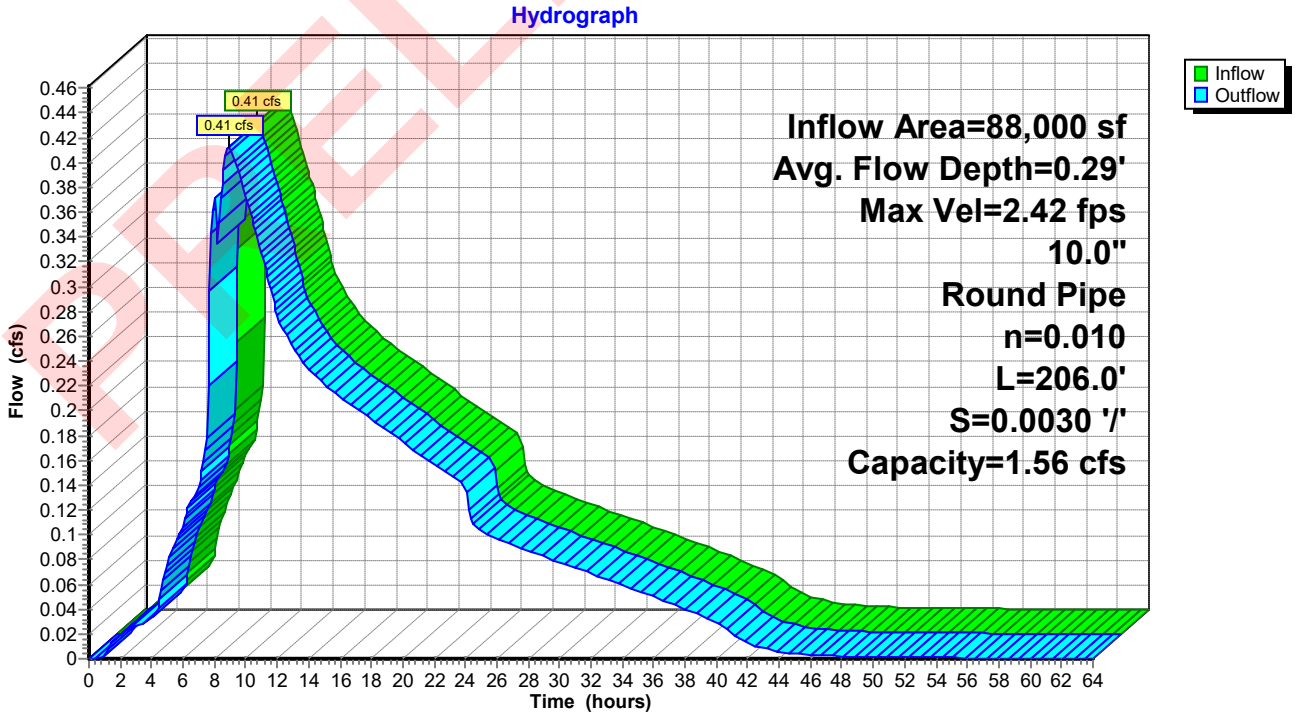
Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Max. Velocity= 2.42 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 2.8 min

Peak Storage= 35 cf @ 8.94 hrs
Average Depth at Peak Storage= 0.29'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,391.57 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 1.56 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 206.0' Slope= 0.0030 '/'
Inlet Invert= 177.69', Outlet Invert= 177.07'



Reach 2R:



PRELIMINARY

Summary for Pond 2-FCB: Filter CB

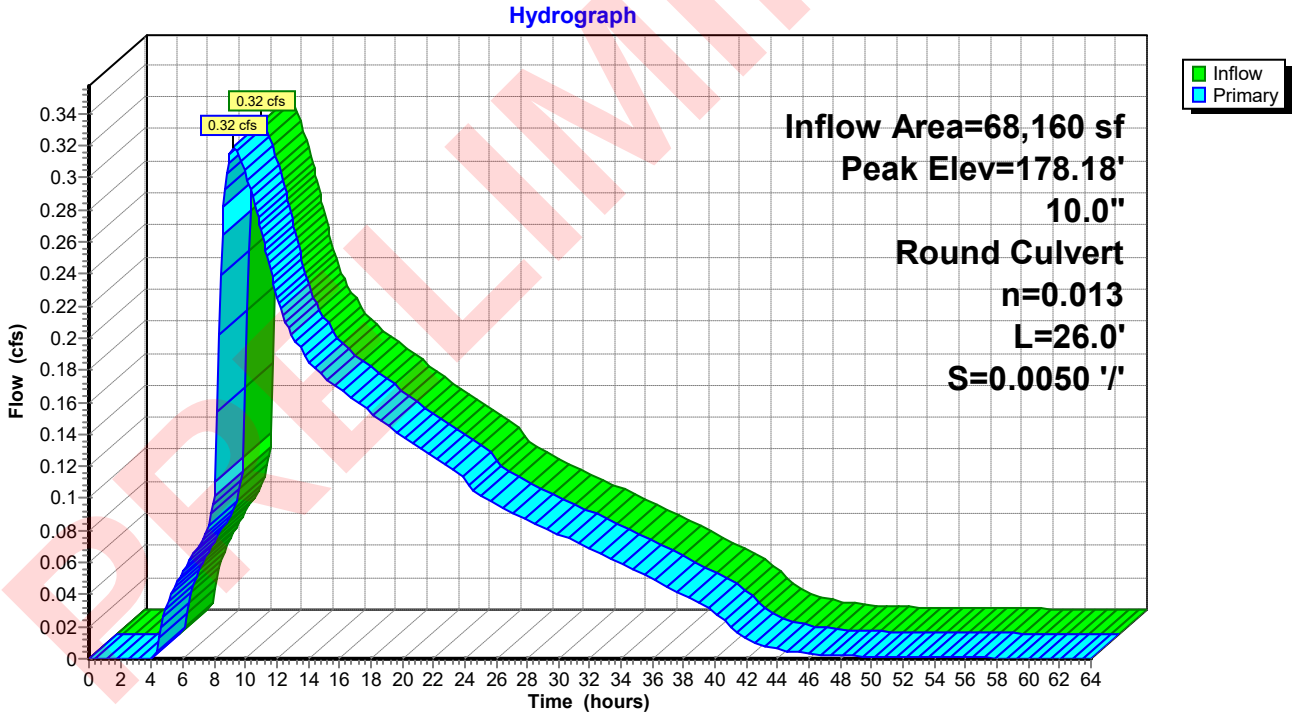
Inflow Area =	68,160 sf,	87.13% Impervious,	Inflow Depth >	2.75"	for 10-YR event
Inflow =	0.32 cfs @	9.25 hrs,	Volume=	15,623 cf	
Outflow =	0.32 cfs @	9.25 hrs,	Volume=	15,623 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.32 cfs @	9.25 hrs,	Volume=	15,623 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.18' @ 9.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.82'	**10.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.82' / 177.69' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.32 cfs @ 9.25 hrs HW=178.18' TW=177.98' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.32 cfs @ 2.06 fps)

Pond 2-FCB: Filter CB



PRELIMINARY

Summary for Pond 2-UG: Chambers

Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth = 2.96" for 10-YR event
Inflow = 1.15 cfs @ 7.93 hrs, Volume= 16,801 cf
Outflow = 0.32 cfs @ 9.25 hrs, Volume= 15,623 cf, Atten= 72%, Lag= 79.0 min
Primary = 0.32 cfs @ 9.25 hrs, Volume= 15,623 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 179.88' @ 9.25 hrs Surf.Area= 6,363 sf Storage= 6,228 cf

Plug-Flow detention time= 504.3 min calculated for 15,599 cf (93% of inflow)
Center-of-Mass det. time= 455.8 min (1,131.6 - 675.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	4,132 cf	**101.00'W x 63.00'L x 2.00'H Field A** 12,726 cf Overall - 2,395 cf Embedded = 10,331 cf x 40.0% Voids
#2A	178.50'	2,395 cf	**CMP Round 12** x 150 Inside #1 Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf Overall Size= 12.0"W x 12.0"H x 20.00'L Row Length Adjustment= +1.00' x 0.79 sf x 50 rows
		6,528 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.45'	**10.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.45' / 178.32' S= 0.0048 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#2	Device 1	180.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height
#3	Device 1	179.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	178.45'	**1.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=0.32 cfs @ 9.25 hrs HW=179.88' TW=178.18' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.32 cfs of 2.33 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Orifice Controls 0.19 cfs @ 2.23 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.12 cfs @ 5.68 fps)

PRELIMINARY

Pond 2-UG: Chambers - Chamber Wizard Field A

Chamber Model = CMP Round 12 (Round Corrugated Metal Pipe)
Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf
Overall Size= 12.0"W x 12.0"H x 20.00'L
Row Length Adjustment= +1.00' x 0.79 sf x 50 rows

12.0" Wide + 12.0" Spacing = 24.0" C-C Row Spacing

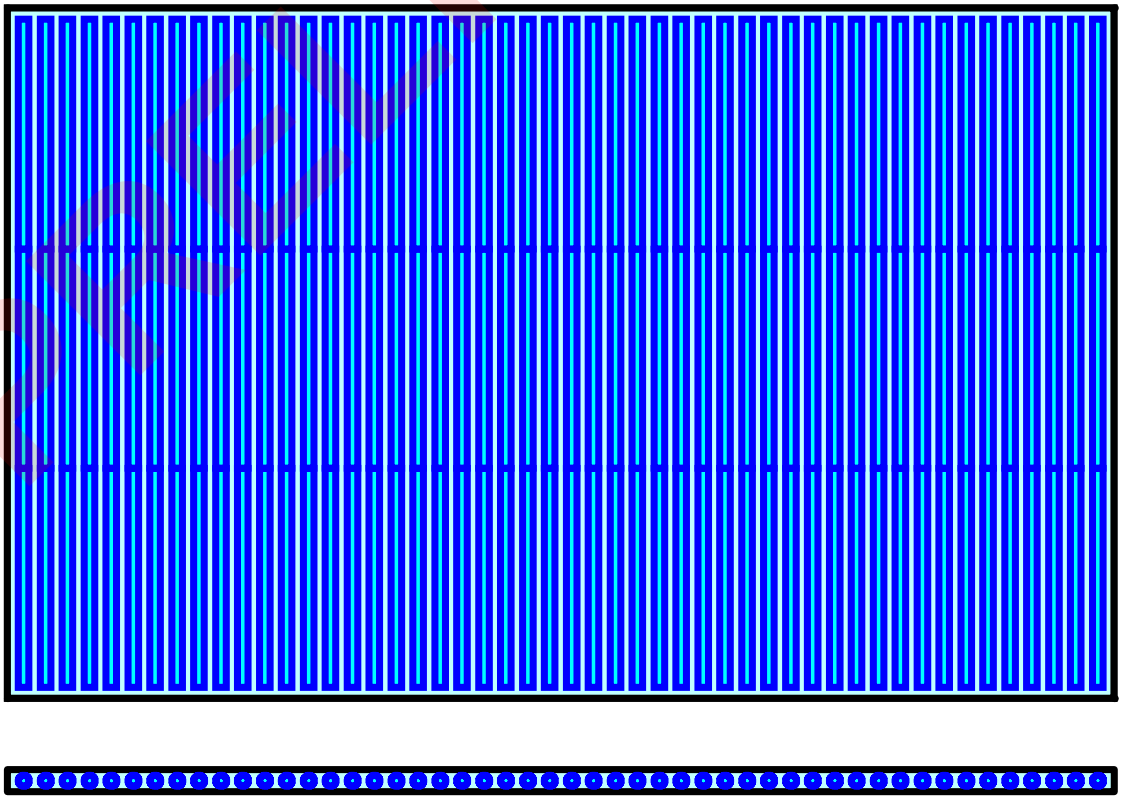
3 Chambers/Row x 20.00' Long +1.00' Row Adjustment = 61.00' Row Length +12.0" End Stone x 2 = 63.00' Base Length
50 Rows x 12.0" Wide + 12.0" Spacing x 49 + 12.0" Side Stone x 2 = 101.00' Base Width
6.0" Base + 12.0" Chamber Height + 6.0" Cover = 2.00' Field Height

150 Chambers x 15.7 cf +1.00' Row Adjustment x 0.79 sf x 50 Rows = 2,395.5 cf Chamber Storage

12,726.0 cf Field - 2,395.5 cf Chambers = 10,330.5 cf Stone x 40.0% Voids = 4,132.2 cf Stone Storage

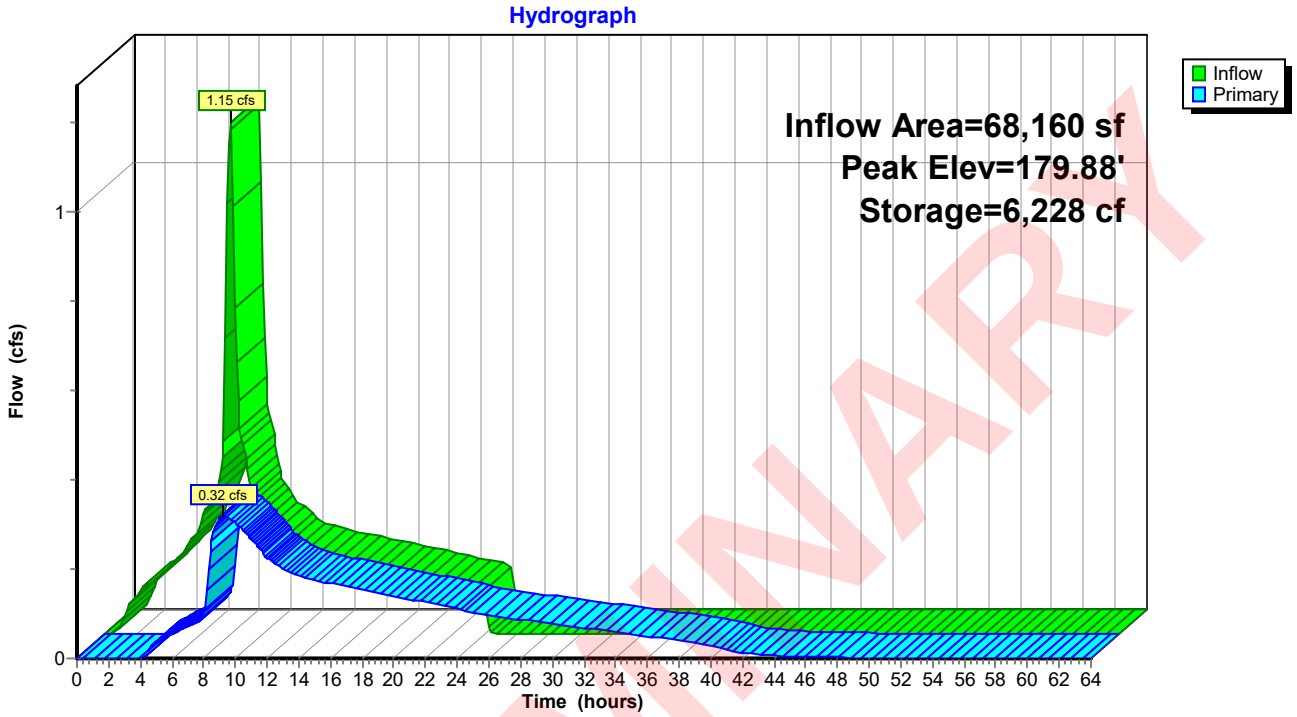
Chamber Storage + Stone Storage = 6,527.7 cf = 0.150 af
Overall Storage Efficiency = 51.3%
Overall System Size = 63.00' x 101.00' x 2.00'

150 Chambers
471.3 cy Field
382.6 cy Stone



PRELIMINARY

Pond 2-UG: Chambers



PRELIMINARY

Summary for Pond CB-2: CB

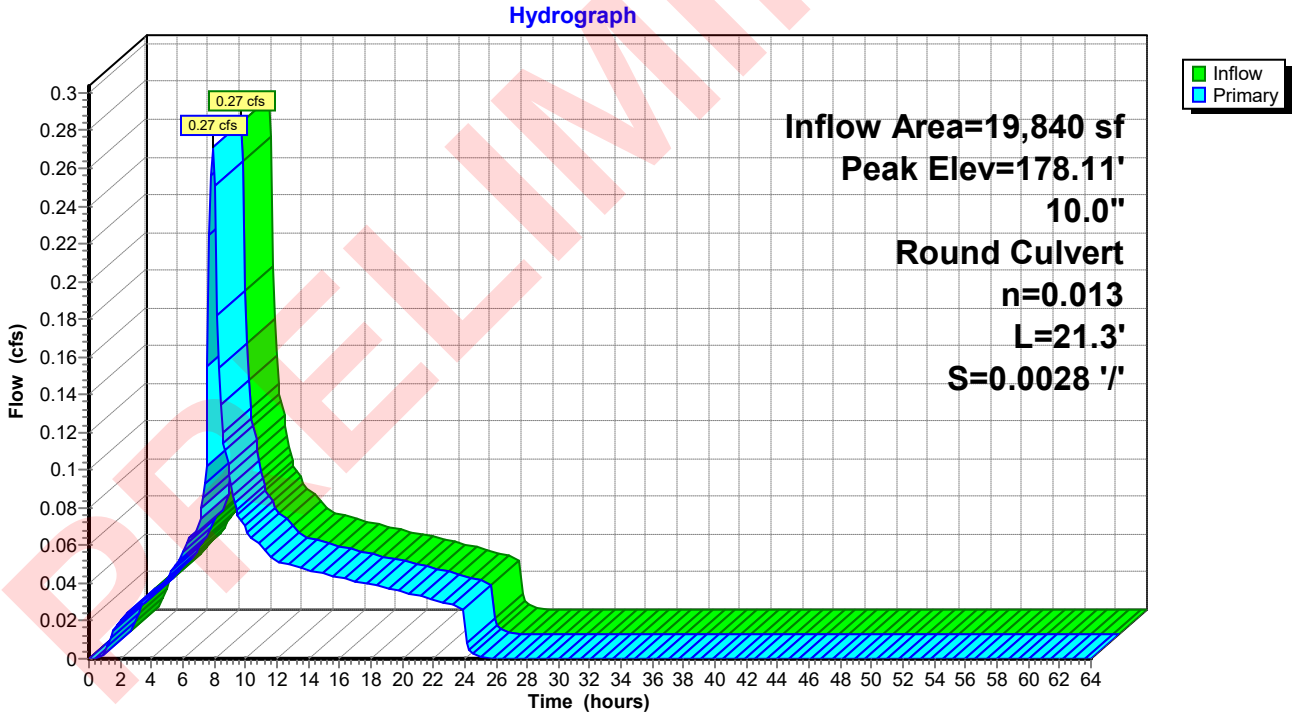
Inflow Area = 19,840 sf, 68.70% Impervious, Inflow Depth = 2.59" for 10-YR event
Inflow = 0.27 cfs @ 7.95 hrs, Volume= 4,277 cf
Outflow = 0.27 cfs @ 7.95 hrs, Volume= 4,277 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 7.95 hrs, Volume= 4,277 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.11' @ 7.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.75'	**10.0" Round Culvert** L= 21.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.75' / 177.69' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.27 cfs @ 7.95 hrs HW=178.11' TW=177.96' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.27 cfs @ 1.79 fps)

Pond CB-2: CB



PRELIMINARY

Time span=0.00-64.00 hrs, dt=0.10 hrs, 641 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-iP: Impervious Runoff Area=59,390 sf 100.00% Impervious Runoff Depth=3.67"
Tc=5.0 min CN=0/98 Runoff=1.25 cfs 18,140 cf

Subcatchment 2-P: Pervious Runoff Area=8,770 sf 0.00% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=74/0 Runoff=0.06 cfs 1,113 cf

Subcatchment 2.1-iP: Impervious Runoff Area=13,630 sf 100.00% Impervious Runoff Depth=3.67"
Tc=5.0 min CN=0/98 Runoff=0.29 cfs 4,163 cf

Subcatchment 2.1-P: Pervious Runoff Area=6,210 sf 0.00% Impervious Runoff Depth=1.52"
Flow Length=409' Tc=27.4 min CN=74/0 Runoff=0.03 cfs 788 cf

Reach 2R: Avg. Flow Depth=0.40' Max Vel=2.81 fps Inflow=0.79 cfs 23,027 cf
10.0" Round Pipe n=0.010 L=206.0' S=0.0030 '/' Capacity=1.56 cfs Outflow=0.74 cfs 23,027 cf

Pond 2-FCB: Filter CB Peak Elev=178.34' Inflow=0.63 cfs 18,076 cf
10.0" Round Culvert n=0.013 L=26.0' S=0.0050 '/' Outflow=0.63 cfs 18,076 cf

Pond 2-UG: Chambers Peak Elev=180.07' Storage=6,528 cf Inflow=1.31 cfs 19,254 cf
Outflow=0.63 cfs 18,076 cf

Pond CB-2: CB Peak Elev=178.14' Inflow=0.31 cfs 4,952 cf
10.0" Round Culvert n=0.013 L=21.3' S=0.0028 '/' Outflow=0.31 cfs 4,952 cf

Total Runoff Area = 88,000 sf Runoff Volume = 24,205 cf Average Runoff Depth = 3.30"
17.02% Pervious = 14,980 sf 82.98% Impervious = 73,020 sf

PRELIMINARY

Summary for Subcatchment 2-iP: Impervious

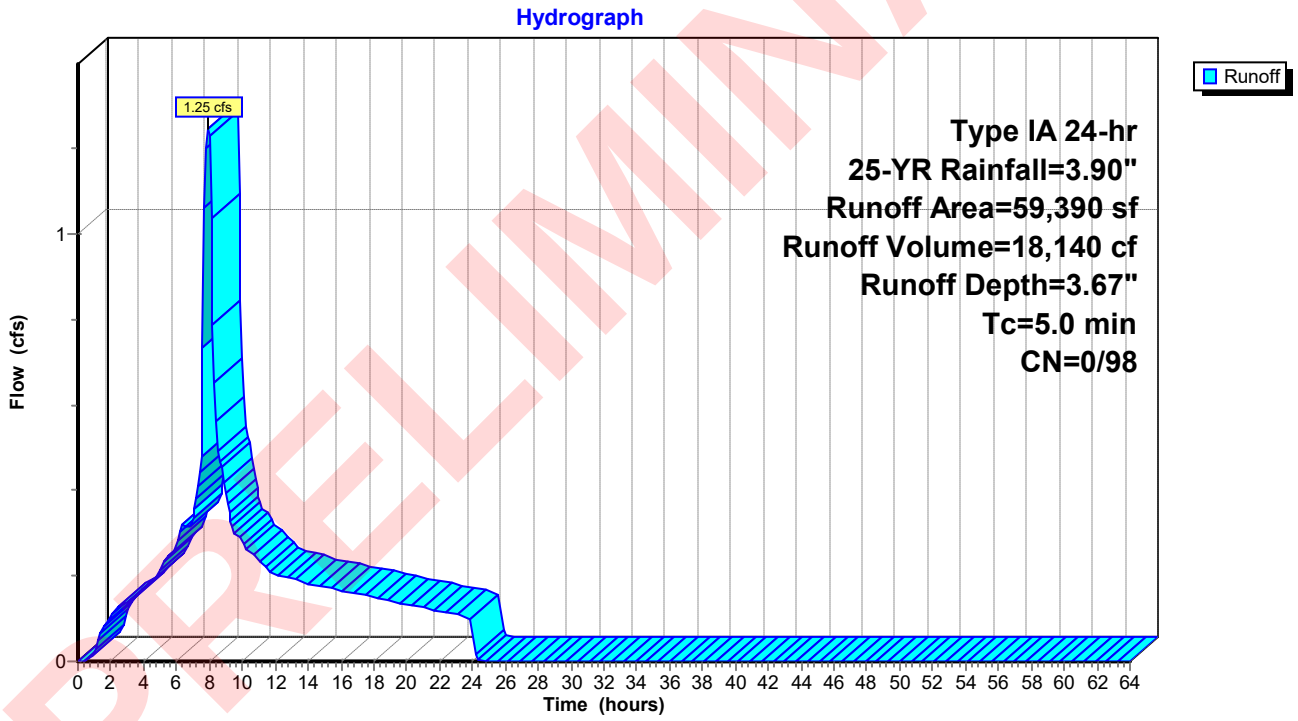
Runoff = 1.25 cfs @ 7.92 hrs, Volume= 18,140 cf, Depth= 3.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

	Area (sf)	CN	Description
*	59,390	98	Impervious
	59,390		100.00% Impervious Area

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

Subcatchment 2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2-P: Pervious

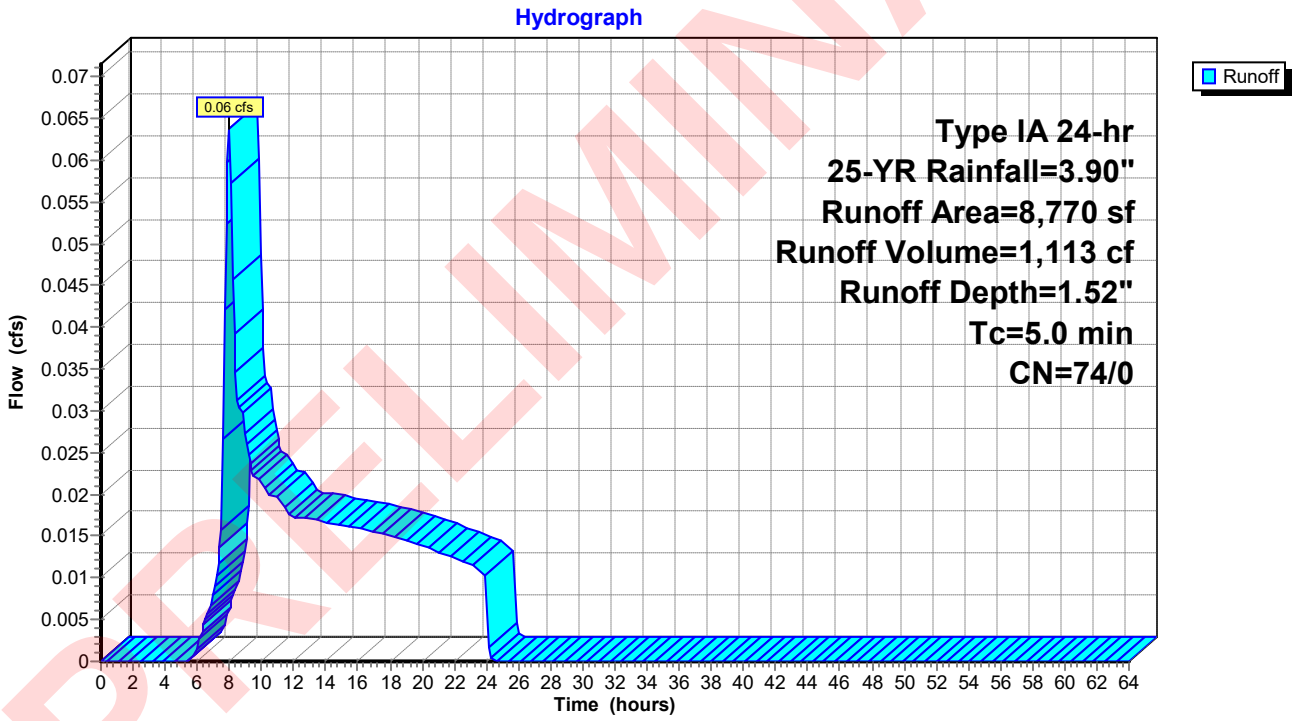
Runoff = 0.06 cfs @ 7.99 hrs, Volume= 1,113 cf, Depth= 1.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
8,770	74	>75% Grass cover, Good, HSG C
8,770		100.00% Pervious Area

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

Subcatchment 2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

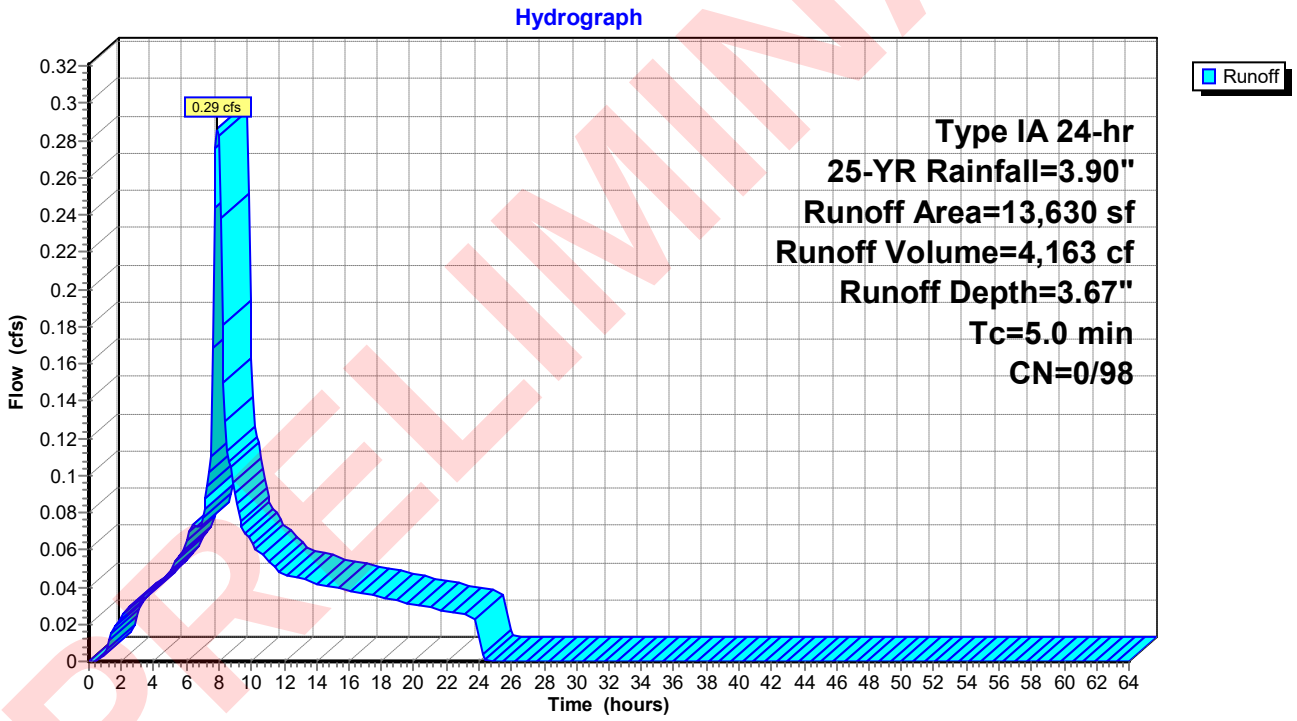
Runoff = 0.29 cfs @ 7.92 hrs, Volume= 4,163 cf, Depth= 3.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

	Area (sf)	CN	Description
*	13,630	98	Roof/Drive Aisle
	13,630		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

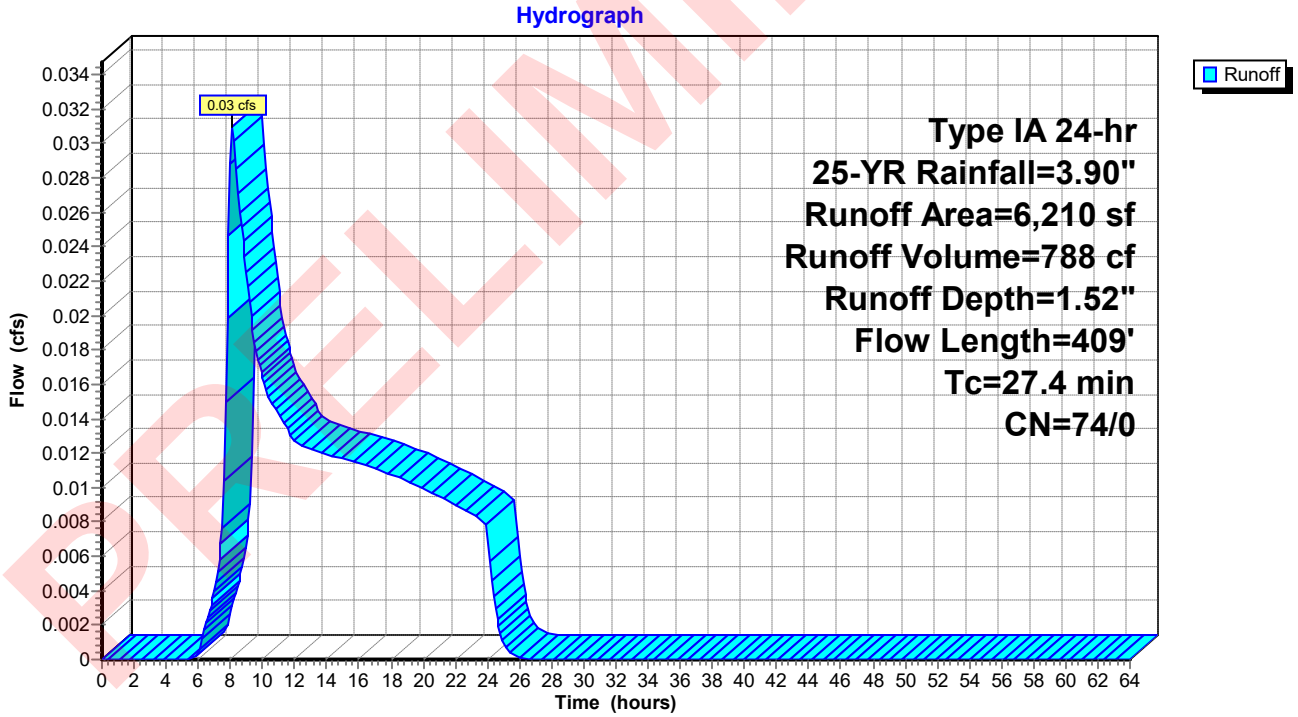
Runoff = 0.03 cfs @ 8.14 hrs, Volume= 788 cf, Depth= 1.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 25-YR Rainfall=3.90"

Area (sf)	CN	Description
6,210	74	>75% Grass cover, Good, HSG C
6,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

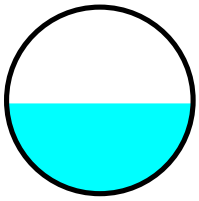
Summary for Reach 2R:

Inflow Area = 88,000 sf, 82.98% Impervious, Inflow Depth > 3.14" for 25-YR event
Inflow = 0.79 cfs @ 8.41 hrs, Volume= 23,027 cf
Outflow = 0.74 cfs @ 8.44 hrs, Volume= 23,027 cf, Atten= 6%, Lag= 1.5 min

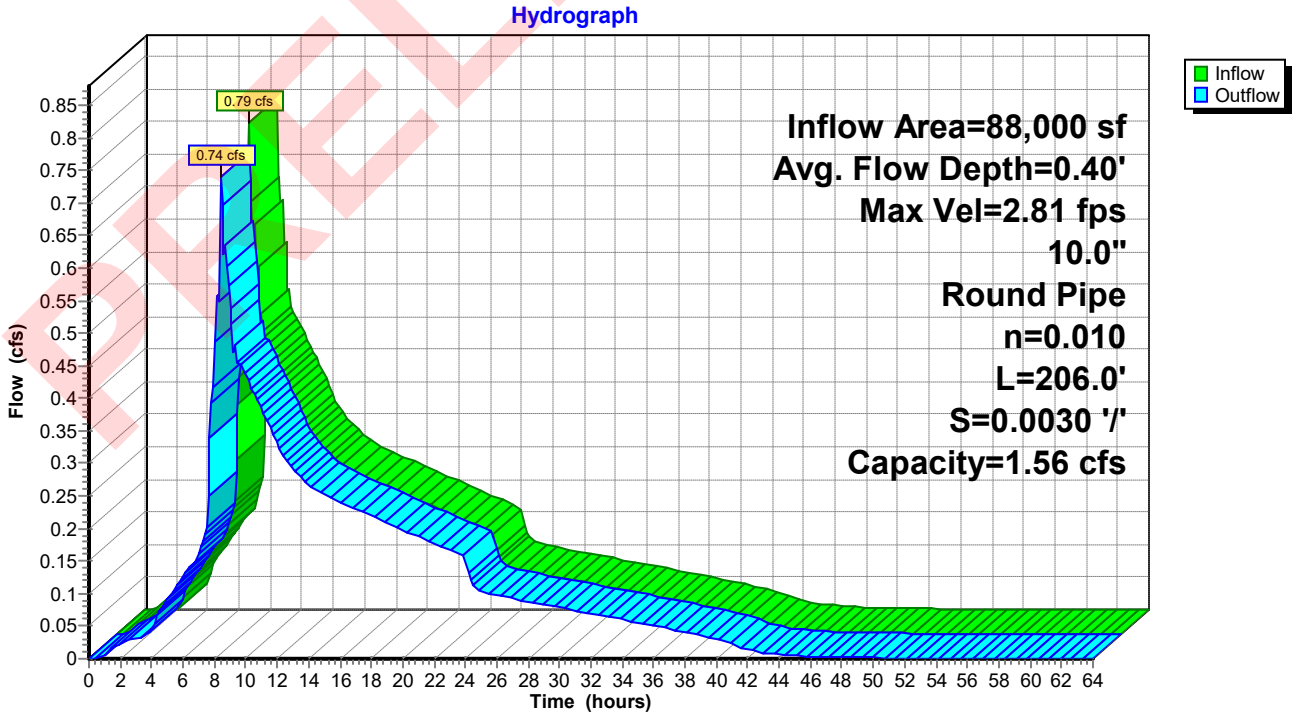
Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Max. Velocity= 2.81 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 2.7 min

Peak Storage= 54 cf @ 8.44 hrs
Average Depth at Peak Storage= 0.40'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,391.57 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 1.56 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 206.0' Slope= 0.0030 '/'
Inlet Invert= 177.69', Outlet Invert= 177.07'



Reach 2R:



PRELIMINARY

Summary for Pond 2-FCB: Filter CB

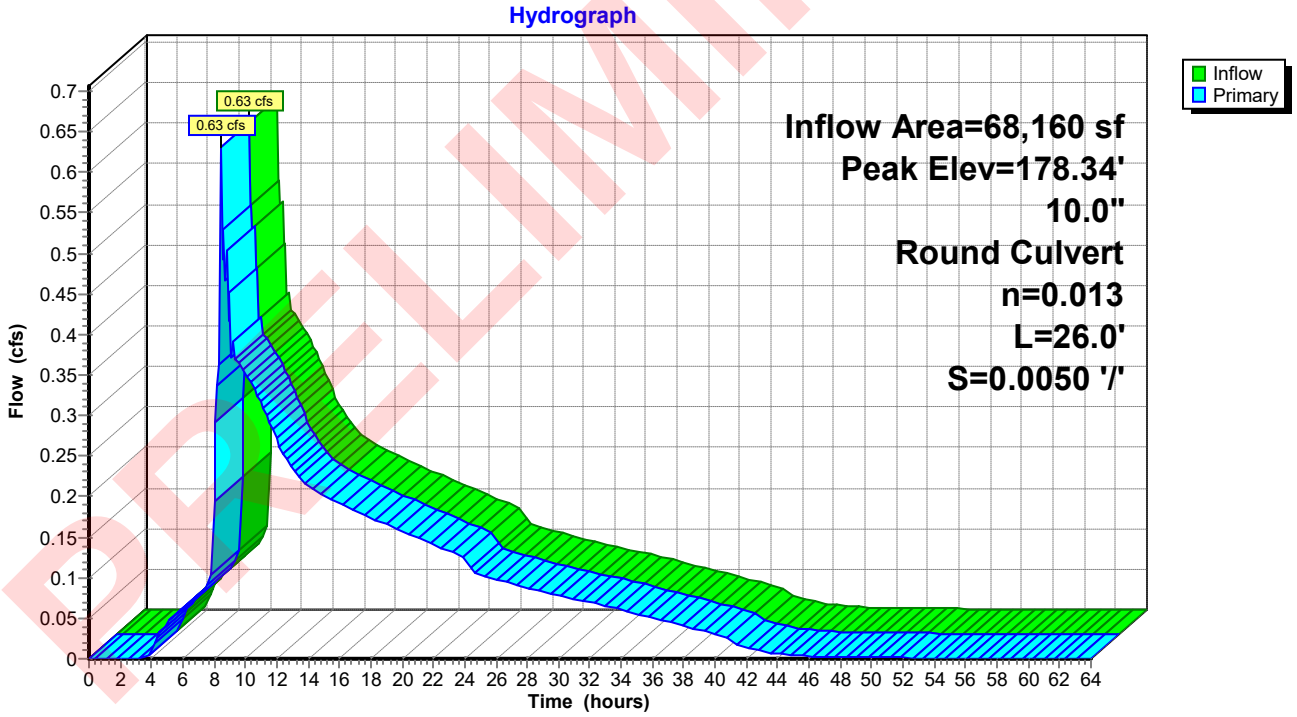
Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth > 3.18" for 25-YR event
Inflow = 0.63 cfs @ 8.42 hrs, Volume= 18,076 cf
Outflow = 0.63 cfs @ 8.42 hrs, Volume= 18,076 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 8.42 hrs, Volume= 18,076 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.34' @ 8.42 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.82'	**10.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.82' / 177.69' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.60 cfs @ 8.42 hrs HW=178.33' TW=178.09' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.60 cfs @ 2.45 fps)

Pond 2-FCB: Filter CB



PRELIMINARY

Summary for Pond 2-UG: Chambers

Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth = 3.39" for 25-YR event
Inflow = 1.31 cfs @ 7.93 hrs, Volume= 19,254 cf
Outflow = 0.63 cfs @ 8.42 hrs, Volume= 18,076 cf, Atten= 52%, Lag= 29.3 min
Primary = 0.63 cfs @ 8.42 hrs, Volume= 18,076 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 180.07' @ 8.43 hrs Surf.Area= 6,363 sf Storage= 6,528 cf

Plug-Flow detention time= 455.4 min calculated for 18,076 cf (94% of inflow)
Center-of-Mass det. time= 410.2 min (1,083.3 - 673.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	4,132 cf	**101.00'W x 63.00'L x 2.00'H Field A** 12,726 cf Overall - 2,395 cf Embedded = 10,331 cf x 40.0% Voids
#2A	178.50'	2,395 cf	**CMP Round 12** x 150 Inside #1 Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf Overall Size= 12.0"W x 12.0"H x 20.00'L Row Length Adjustment= +1.00' x 0.79 sf x 50 rows
		6,528 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.45'	**10.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.45' / 178.32' S= 0.0048 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#2	Device 1	180.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height
#3	Device 1	179.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	178.45'	**1.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=0.60 cfs @ 8.42 hrs HW=180.06' TW=178.33' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.60 cfs of 2.60 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.21 cfs @ 0.82 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.26 cfs @ 3.03 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.13 cfs @ 6.04 fps)

PRELIMINARY

Pond 2-UG: Chambers - Chamber Wizard Field A

Chamber Model = CMP Round 12 (Round Corrugated Metal Pipe)
Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf
Overall Size= 12.0"W x 12.0"H x 20.00'L
Row Length Adjustment= +1.00' x 0.79 sf x 50 rows

12.0" Wide + 12.0" Spacing = 24.0" C-C Row Spacing

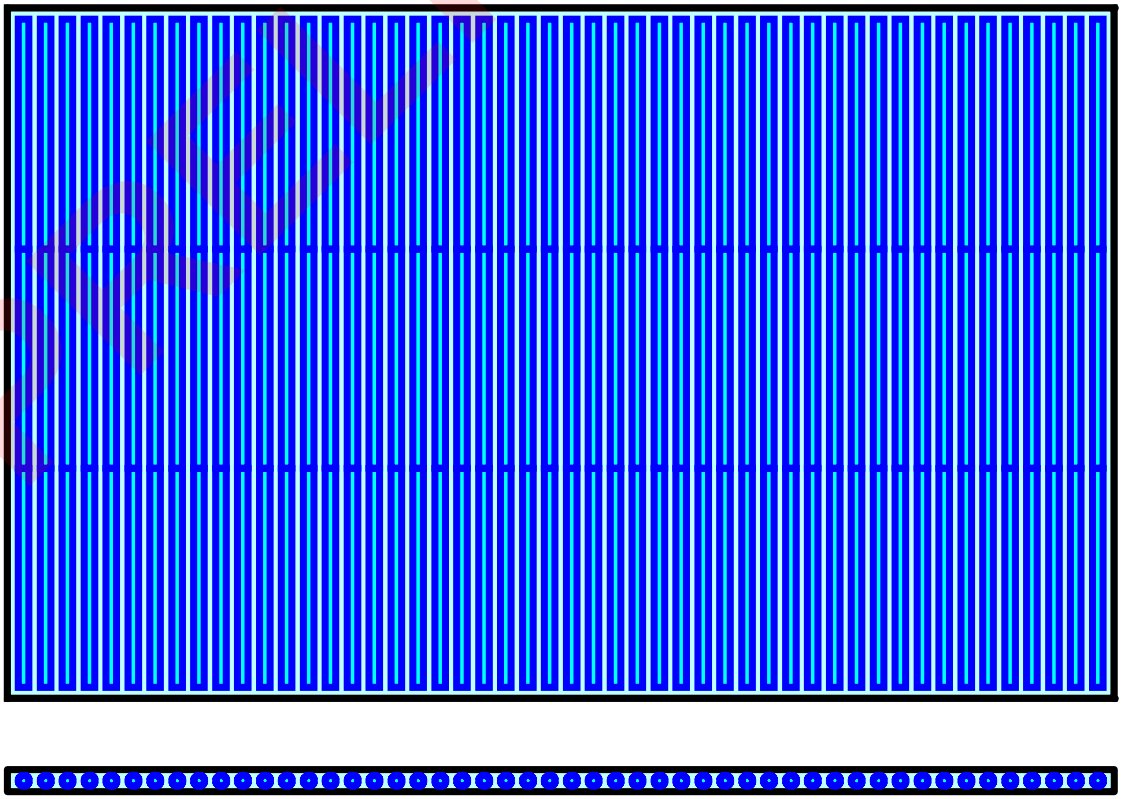
3 Chambers/Row x 20.00' Long +1.00' Row Adjustment = 61.00' Row Length +12.0" End Stone x 2 = 63.00' Base Length
50 Rows x 12.0" Wide + 12.0" Spacing x 49 + 12.0" Side Stone x 2 = 101.00' Base Width
6.0" Base + 12.0" Chamber Height + 6.0" Cover = 2.00' Field Height

150 Chambers x 15.7 cf +1.00' Row Adjustment x 0.79 sf x 50 Rows = 2,395.5 cf Chamber Storage

12,726.0 cf Field - 2,395.5 cf Chambers = 10,330.5 cf Stone x 40.0% Voids = 4,132.2 cf Stone Storage

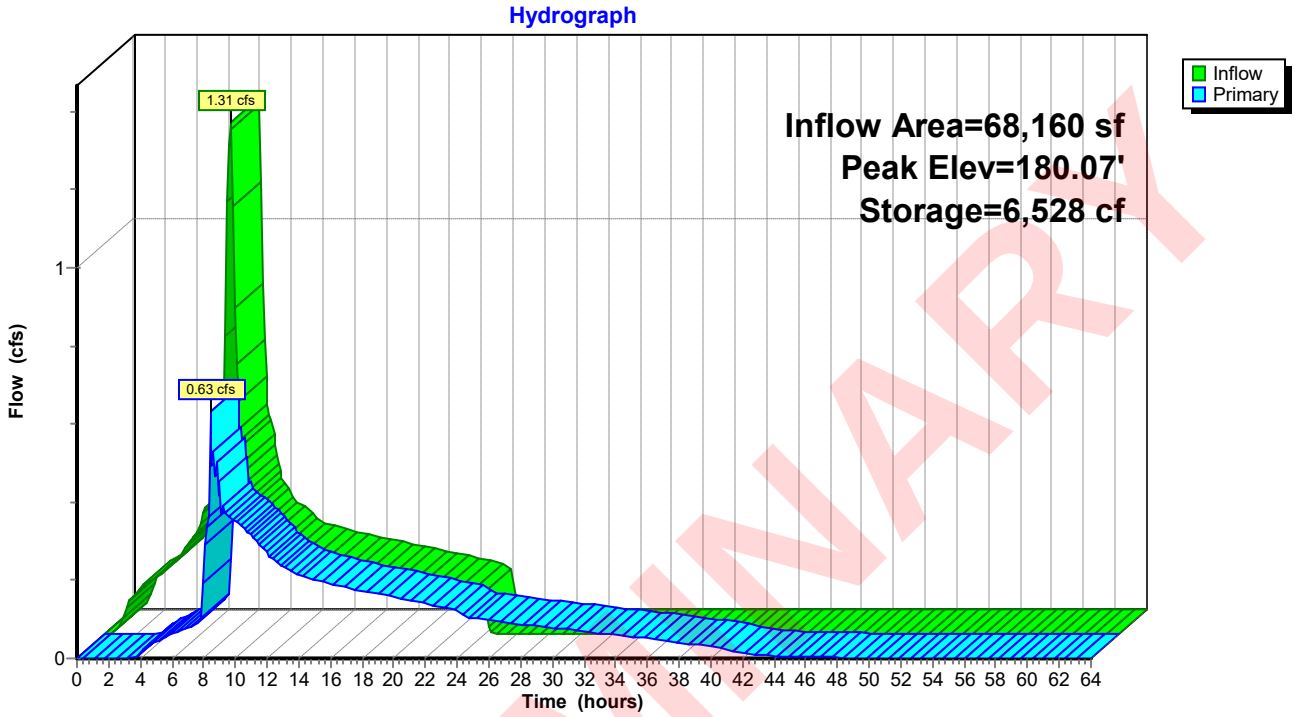
Chamber Storage + Stone Storage = 6,527.7 cf = 0.150 af
Overall Storage Efficiency = 51.3%
Overall System Size = 63.00' x 101.00' x 2.00'

150 Chambers
471.3 cy Field
382.6 cy Stone



PRELIMINARY

Pond 2-UG: Chambers



PRELIMINARY

Summary for Pond CB-2: CB

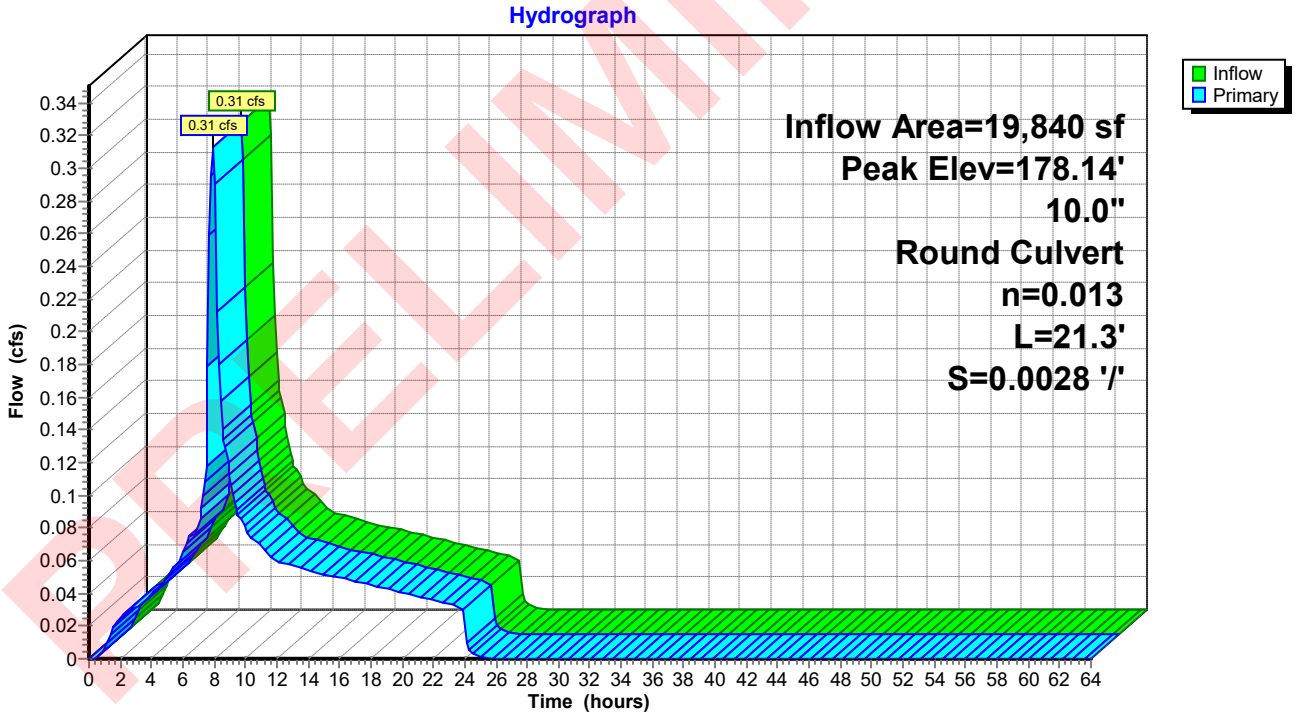
Inflow Area = 19,840 sf, 68.70% Impervious, Inflow Depth = 2.99" for 25-YR event
Inflow = 0.31 cfs @ 7.95 hrs, Volume= 4,952 cf
Outflow = 0.31 cfs @ 7.95 hrs, Volume= 4,952 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 7.95 hrs, Volume= 4,952 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.14' @ 8.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.75'	**10.0" Round Culvert** L= 21.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.75' / 177.69' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.31 cfs @ 7.95 hrs HW=178.14' TW=178.00' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.31 cfs @ 1.84 fps)

Pond CB-2: CB



PRELIMINARY

Time span=0.00-64.00 hrs, dt=0.10 hrs, 641 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-iP: Impervious Runoff Area=59,390 sf 100.00% Impervious Runoff Depth=4.26"
Tc=5.0 min CN=0/98 Runoff=1.45 cfs 21,103 cf

Subcatchment 2-P: Pervious Runoff Area=8,770 sf 0.00% Impervious Runoff Depth=1.97"
Tc=5.0 min CN=74/0 Runoff=0.09 cfs 1,441 cf

Subcatchment 2.1-iP: Impervious Runoff Area=13,630 sf 100.00% Impervious Runoff Depth=4.26"
Tc=5.0 min CN=0/98 Runoff=0.33 cfs 4,843 cf

Subcatchment 2.1-P: Pervious Runoff Area=6,210 sf 0.00% Impervious Runoff Depth=1.97"
Flow Length=409' Tc=27.4 min CN=74/0 Runoff=0.04 cfs 1,021 cf

Reach 2R: Avg. Flow Depth=0.83' Max Vel=3.24 fps Inflow=2.08 cfs 27,231 cf
10.0" Round Pipe n=0.010 L=206.0' S=0.0030 '/' Capacity=1.56 cfs Outflow=1.57 cfs 27,230 cf

Pond 2-FCB: Filter CB Peak Elev=178.96' Inflow=1.76 cfs 21,367 cf
10.0" Round Culvert n=0.013 L=26.0' S=0.0050 '/' Outflow=1.76 cfs 21,367 cf

Pond 2-UG: Chambers Peak Elev=180.22' Storage=6,528 cf Inflow=1.53 cfs 22,545 cf
Outflow=1.76 cfs 21,367 cf

Pond CB-2: CB Peak Elev=178.54' Inflow=0.37 cfs 5,864 cf
10.0" Round Culvert n=0.013 L=21.3' S=0.0028 '/' Outflow=0.37 cfs 5,864 cf

Total Runoff Area = 88,000 sf Runoff Volume = 28,409 cf Average Runoff Depth = 3.87"
17.02% Pervious = 14,980 sf 82.98% Impervious = 73,020 sf

PRELIMINARY

Summary for Subcatchment 2-iP: Impervious

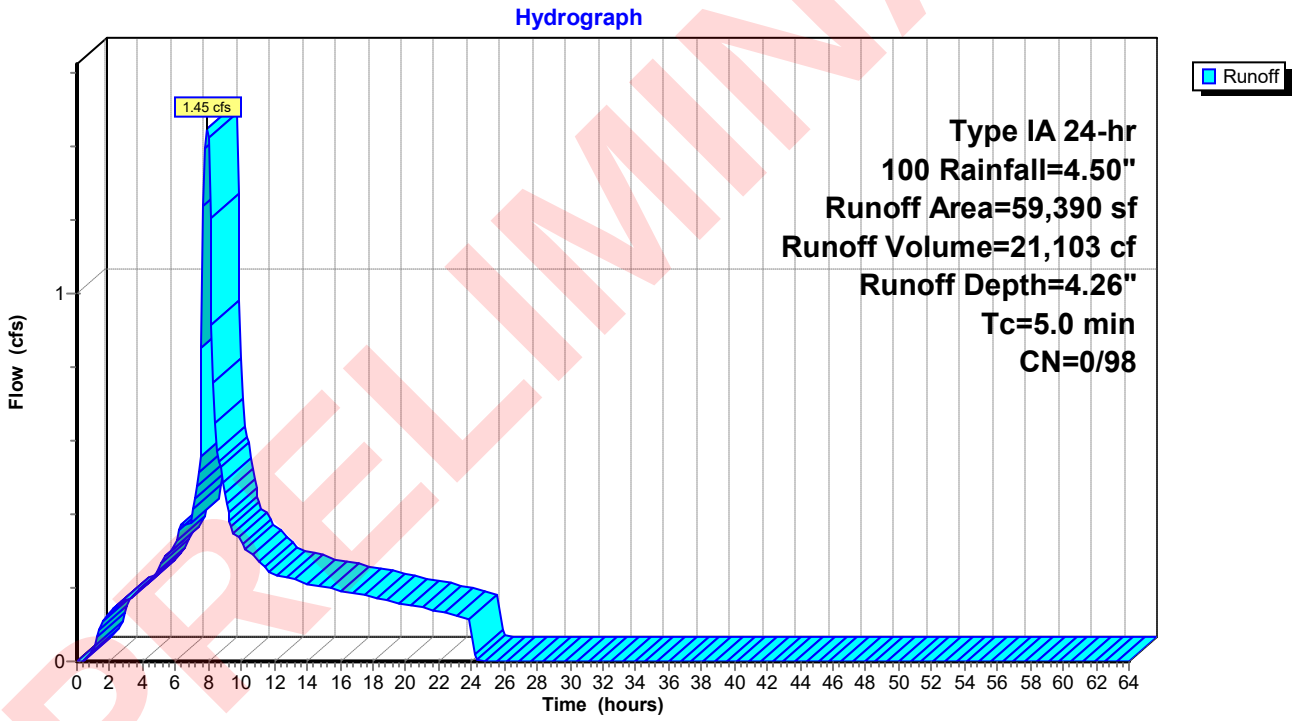
Runoff = 1.45 cfs @ 7.92 hrs, Volume= 21,103 cf, Depth= 4.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 100 Rainfall=4.50"

	Area (sf)	CN	Description
*	59,390	98	Impervious
	59,390		100.00% Impervious Area

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

Subcatchment 2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2-P: Pervious

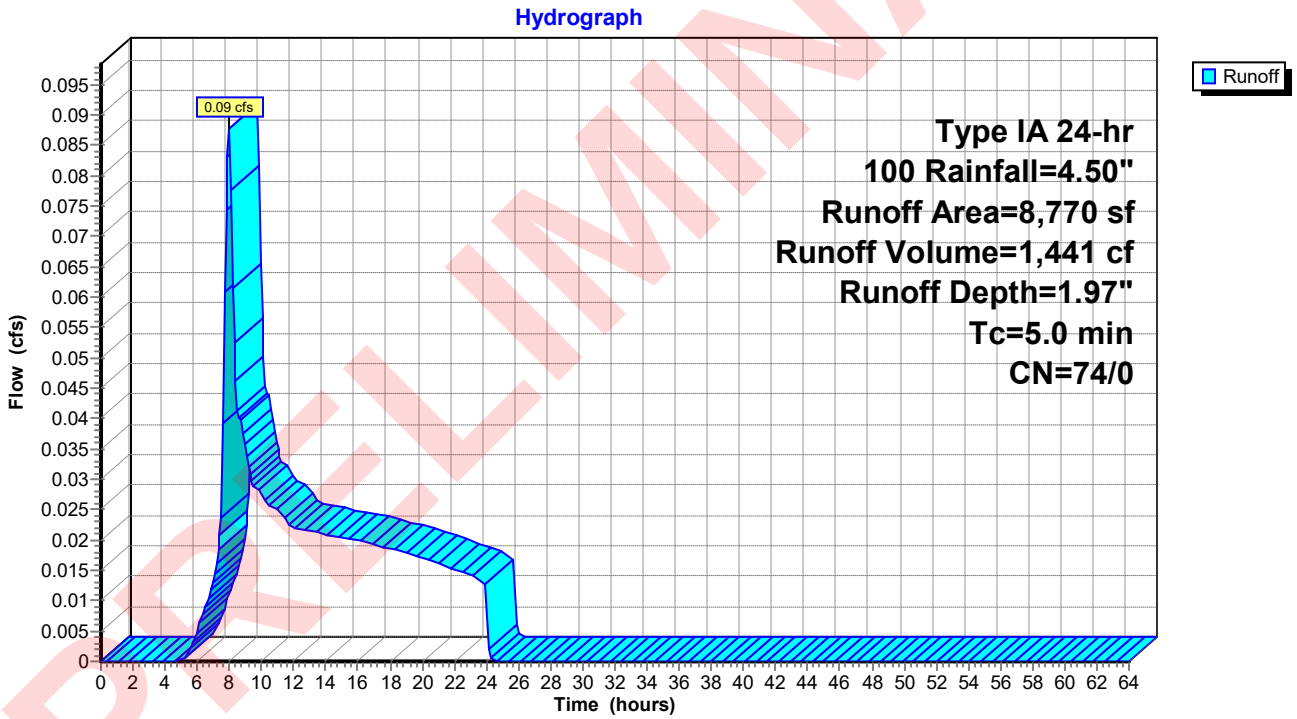
Runoff = 0.09 cfs @ 7.98 hrs, Volume= 1,441 cf, Depth= 1.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 100 Rainfall=4.50"

Area (sf)	CN	Description
8,770	74	>75% Grass cover, Good, HSG C
8,770		100.00% Pervious Area

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

Subcatchment 2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

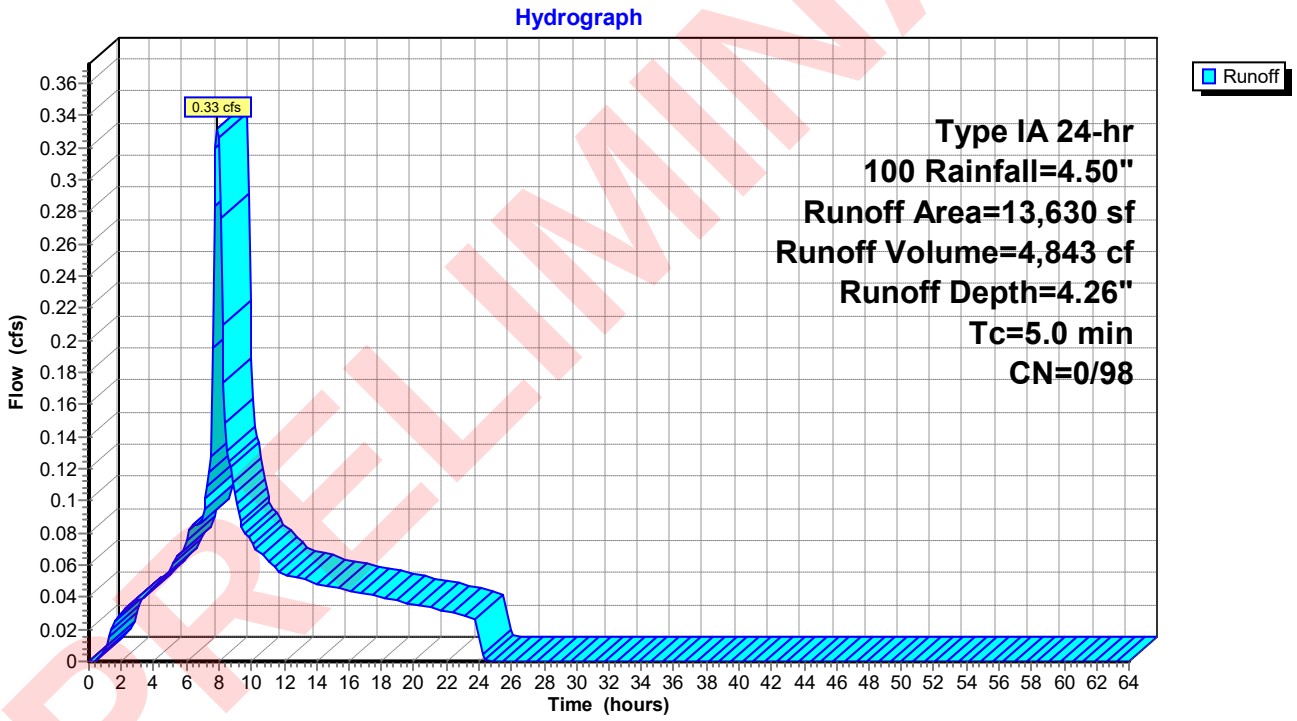
Runoff = 0.33 cfs @ 7.92 hrs, Volume= 4,843 cf, Depth= 4.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 100 Rainfall=4.50"

	Area (sf)	CN	Description
*	13,630	98	Roof/Drive Aisle
	13,630		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

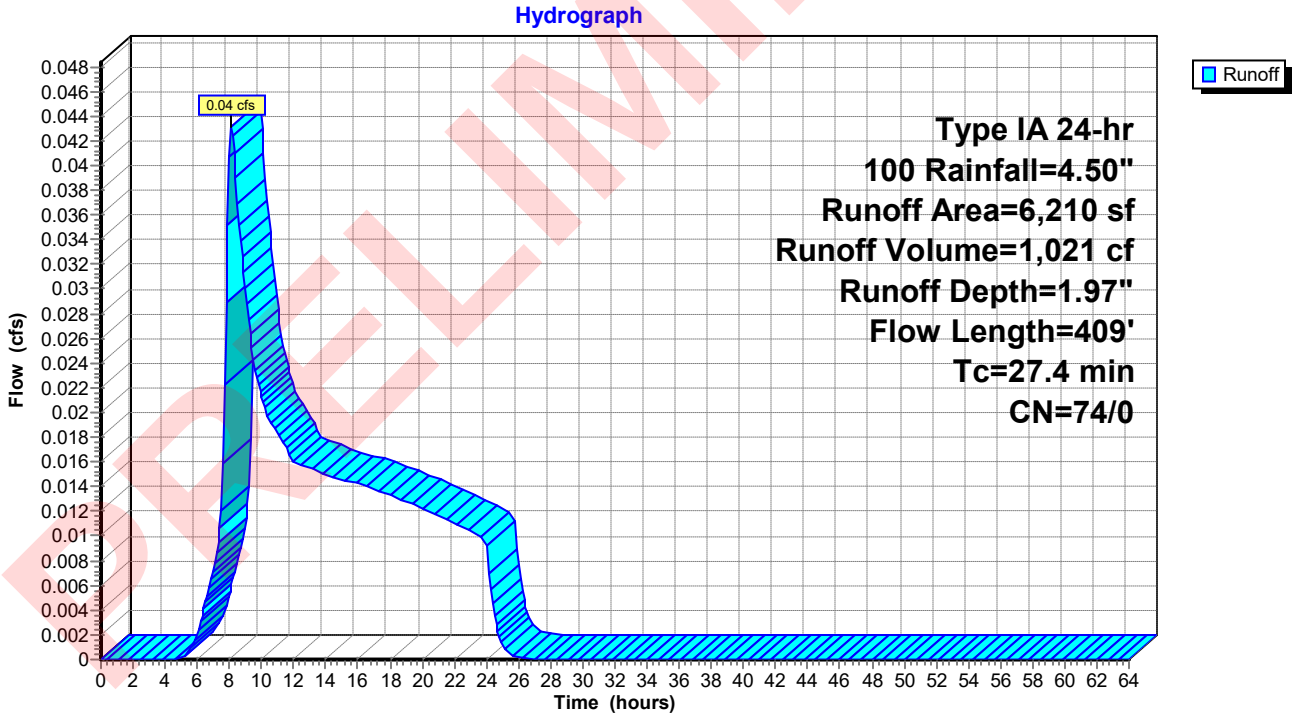
Runoff = 0.04 cfs @ 8.13 hrs, Volume= 1,021 cf, Depth= 1.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 100 Rainfall=4.50"

Area (sf)	CN	Description
6,210	74	>75% Grass cover, Good, HSG C
6,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

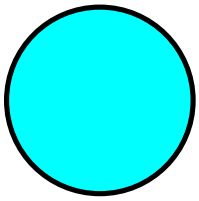
Summary for Reach 2R:

Inflow Area = 88,000 sf, 82.98% Impervious, Inflow Depth > 3.71" for 100 event
Inflow = 2.08 cfs @ 8.08 hrs, Volume= 27,231 cf
Outflow = 1.57 cfs @ 8.11 hrs, Volume= 27,230 cf, Atten= 25%, Lag= 1.9 min

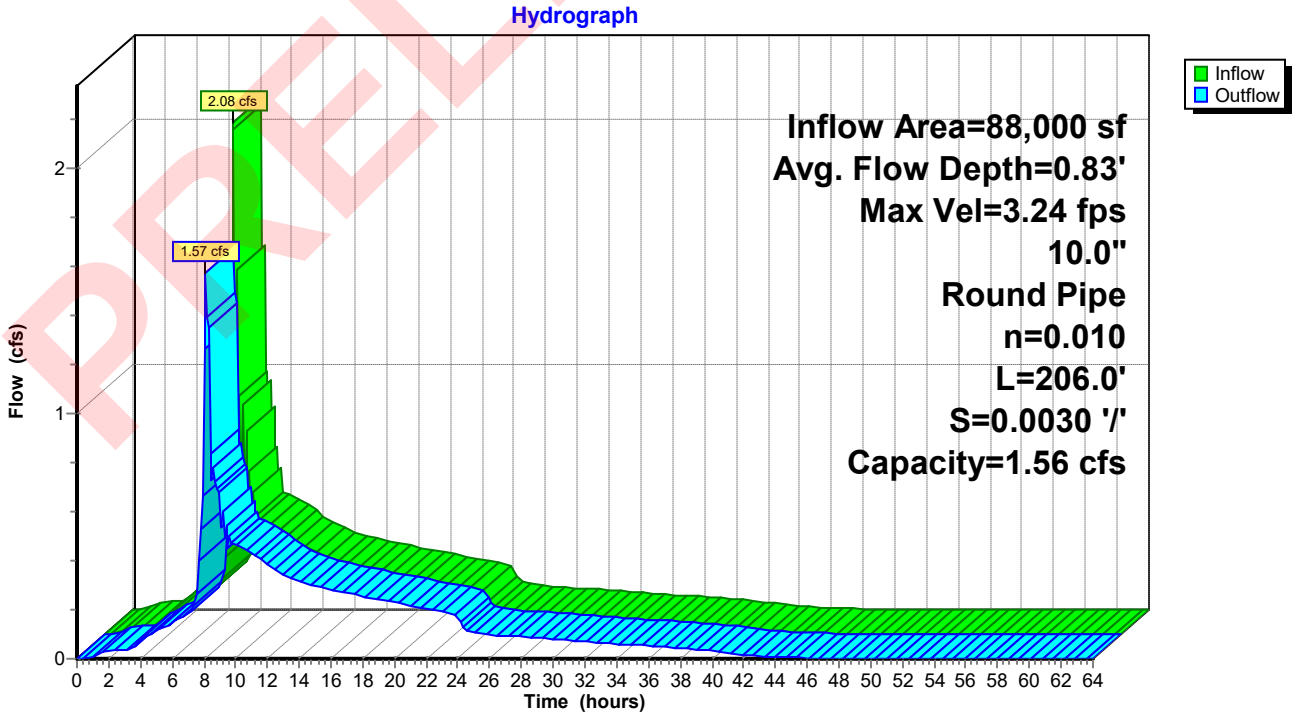
Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Max. Velocity= 3.24 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 2.7 min

Peak Storage= 112 cf @ 8.11 hrs
Average Depth at Peak Storage= 0.83'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,391.57 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 1.56 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 206.0' Slope= 0.0030 '/'
Inlet Invert= 177.69', Outlet Invert= 177.07'



Reach 2R:



PRELIMINARY

Summary for Pond 2-FCB: Filter CB

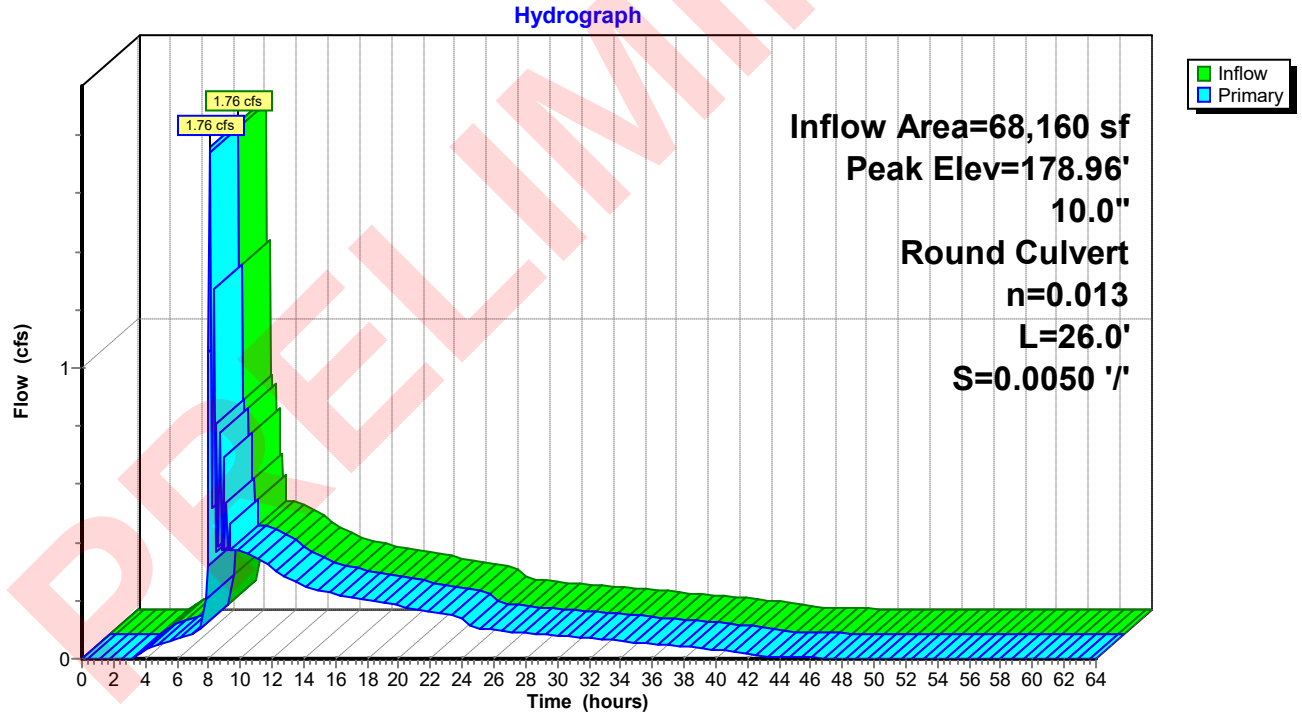
Inflow Area =	68,160 sf,	87.13% Impervious,	Inflow Depth >	3.76"	for 100 event
Inflow =	1.76 cfs @	8.09 hrs,	Volume=	21,367 cf	
Outflow =	1.76 cfs @	8.09 hrs,	Volume=	21,367 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.76 cfs @	8.09 hrs,	Volume=	21,367 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.96' @ 8.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.82'	**10.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.82' / 177.69' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=1.69 cfs @ 8.09 hrs HW=178.90' TW=178.49' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.69 cfs @ 3.11 fps)

Pond 2-FCB: Filter CB



PRELIMINARY

Summary for Pond 2-UG: Chambers

Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth = 3.97" for 100 event
Inflow = 1.53 cfs @ 7.93 hrs, Volume= 22,545 cf
Outflow = 1.76 cfs @ 8.09 hrs, Volume= 21,367 cf, Atten= 0%, Lag= 9.5 min
Primary = 1.76 cfs @ 8.09 hrs, Volume= 21,367 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 180.22' @ 8.08 hrs Surf.Area= 6,363 sf Storage= 6,528 cf

Plug-Flow detention time= 399.9 min calculated for 21,367 cf (95% of inflow)
Center-of-Mass det. time= 360.9 min (1,031.0 - 670.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	4,132 cf	**101.00'W x 63.00'L x 2.00'H Field A** 12,726 cf Overall - 2,395 cf Embedded = 10,331 cf x 40.0% Voids
#2A	178.50'	2,395 cf	**CMP Round 12** x 150 Inside #1 Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf Overall Size= 12.0"W x 12.0"H x 20.00'L Row Length Adjustment= +1.00' x 0.79 sf x 50 rows
		6,528 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.45'	**10.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.45' / 178.32' S= 0.0048 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#2	Device 1	180.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height
#3	Device 1	179.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	178.45'	**1.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=1.63 cfs @ 8.09 hrs HW=180.20' TW=178.90' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.63 cfs of 2.79 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.20 cfs @ 1.49 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.31 cfs @ 3.53 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.12 cfs @ 5.49 fps)

PRELIMINARY

Pond 2-UG: Chambers - Chamber Wizard Field A

Chamber Model = CMP Round 12 (Round Corrugated Metal Pipe)
Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf
Overall Size= 12.0"W x 12.0"H x 20.00'L
Row Length Adjustment= +1.00' x 0.79 sf x 50 rows

12.0" Wide + 12.0" Spacing = 24.0" C-C Row Spacing

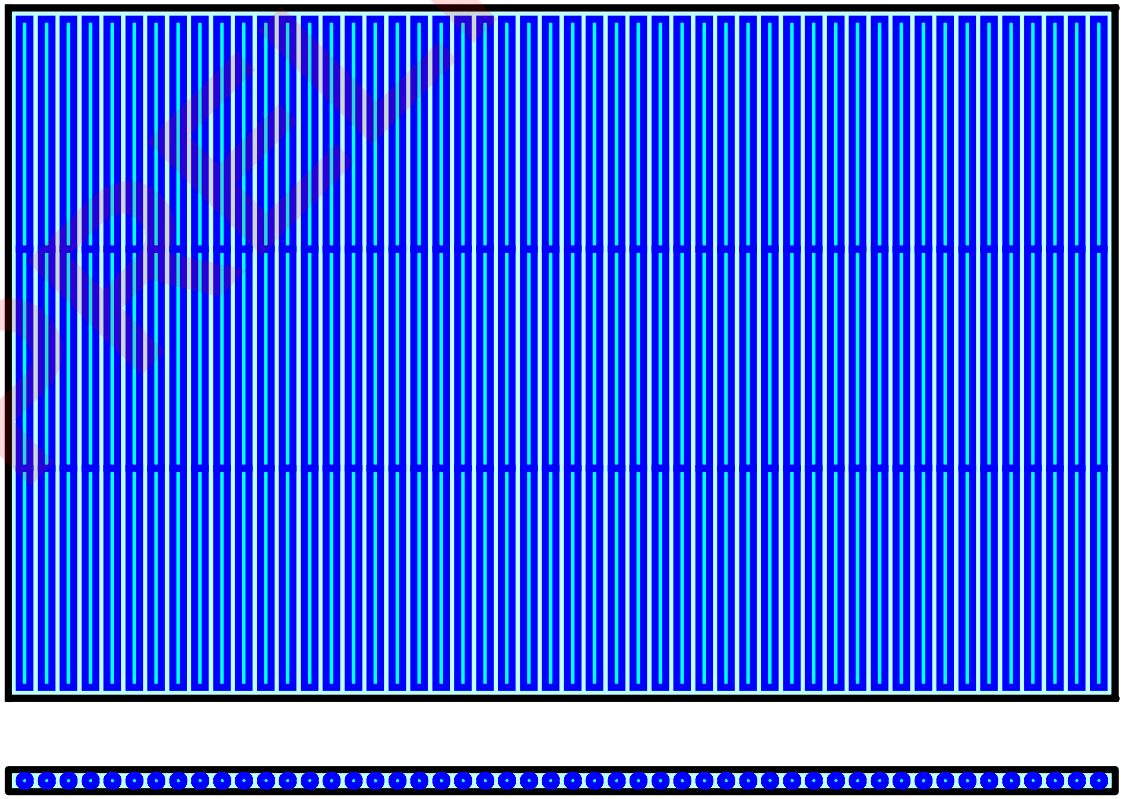
3 Chambers/Row x 20.00' Long +1.00' Row Adjustment = 61.00' Row Length +12.0" End Stone x 2 = 63.00' Base Length
50 Rows x 12.0" Wide + 12.0" Spacing x 49 + 12.0" Side Stone x 2 = 101.00' Base Width
6.0" Base + 12.0" Chamber Height + 6.0" Cover = 2.00' Field Height

150 Chambers x 15.7 cf +1.00' Row Adjustment x 0.79 sf x 50 Rows = 2,395.5 cf Chamber Storage

12,726.0 cf Field - 2,395.5 cf Chambers = 10,330.5 cf Stone x 40.0% Voids = 4,132.2 cf Stone Storage

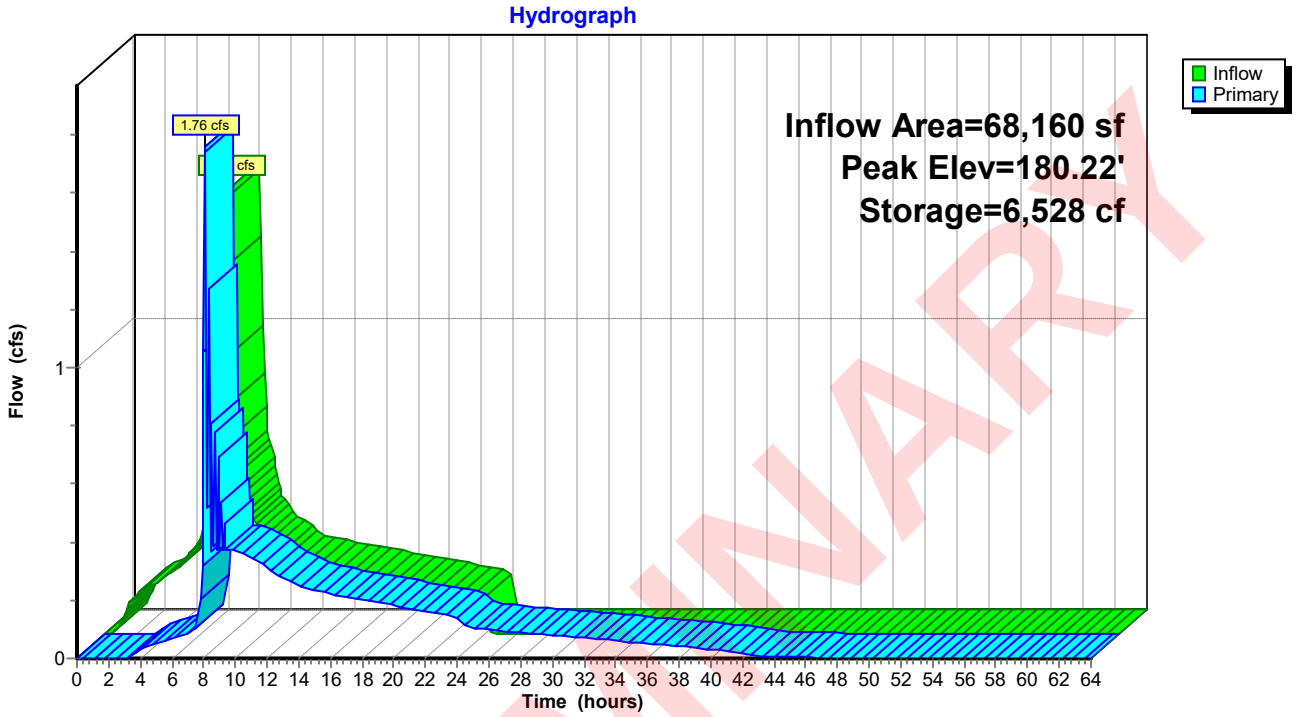
Chamber Storage + Stone Storage = 6,527.7 cf = 0.150 af
Overall Storage Efficiency = 51.3%
Overall System Size = 63.00' x 101.00' x 2.00'

150 Chambers
471.3 cy Field
382.6 cy Stone



PRELIMINARY

Pond 2-UG: Chambers



PRELIMINARY

Summary for Pond CB-2: CB

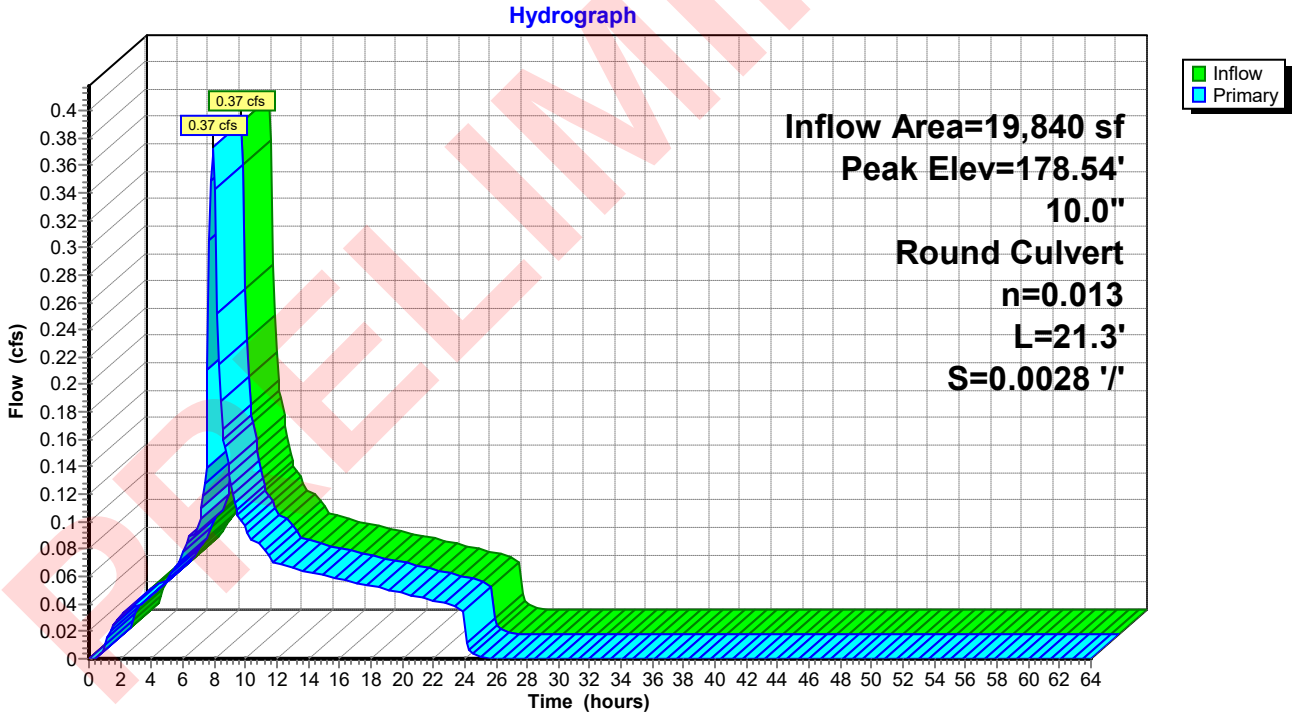
Inflow Area = 19,840 sf, 68.70% Impervious, Inflow Depth = 3.55" for 100 event
Inflow = 0.37 cfs @ 7.95 hrs, Volume= 5,864 cf
Outflow = 0.37 cfs @ 7.95 hrs, Volume= 5,864 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 7.95 hrs, Volume= 5,864 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.54' @ 8.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.75'	**10.0" Round Culvert** L= 21.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.75' / 177.69' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.38 cfs @ 7.95 hrs HW=178.26' TW=178.17' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.38 cfs @ 1.58 fps)

Pond CB-2: CB



PRELIMINARY

Time span=0.00-64.00 hrs, dt=0.10 hrs, 641 points x 2
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2-iP: Impervious Runoff Area=59,390 sf 100.00% Impervious Runoff Depth=0.19"
Tc=5.0 min CN=0/98 Runoff=0.23 cfs 964 cf

Subcatchment 2-P: Pervious Runoff Area=8,770 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=74/0 Runoff=0.00 cfs 0 cf

Subcatchment 2.1-iP: Impervious Runoff Area=13,630 sf 100.00% Impervious Runoff Depth=0.19"
Tc=5.0 min CN=0/98 Runoff=0.05 cfs 221 cf

Subcatchment 2.1-P: Pervious Runoff Area=6,210 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=409' Tc=27.4 min CN=74/0 Runoff=0.00 cfs 0 cf

Reach 2R: Avg. Flow Depth=0.10' Max Vel=1.31 fps Inflow=0.05 cfs 221 cf
10.0" Round Pipe n=0.010 L=206.0' S=0.0030 '/' Capacity=1.56 cfs Outflow=0.05 cfs 221 cf

Pond 2-FCB: Filter CB Peak Elev=177.82' Inflow=0.00 cfs 0 cf
10.0" Round Culvert n=0.013 L=26.0' S=0.0050 '/' Outflow=0.00 cfs 0 cf

Pond 2-UG: Chambers Peak Elev=178.38' Storage=964 cf Inflow=0.23 cfs 964 cf
Outflow=0.00 cfs 0 cf

Pond CB-2: CB Peak Elev=177.91' Inflow=0.05 cfs 221 cf
10.0" Round Culvert n=0.013 L=21.3' S=0.0028 '/' Outflow=0.05 cfs 221 cf

Total Runoff Area = 88,000 sf Runoff Volume = 1,185 cf Average Runoff Depth = 0.16"
17.02% Pervious = 14,980 sf 82.98% Impervious = 73,020 sf

PRELIMINARY

Summary for Subcatchment 2-iP: Impervious

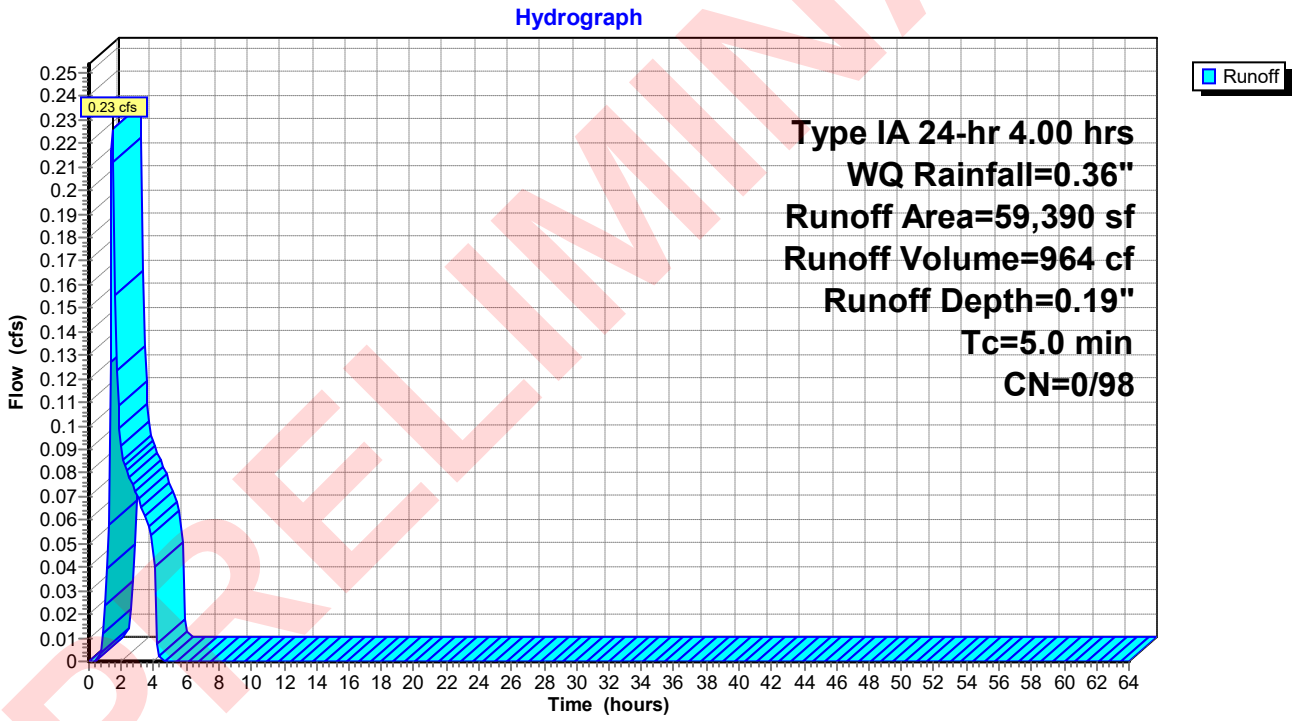
Runoff = 0.23 cfs @ 1.45 hrs, Volume= 964 cf, Depth= 0.19"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 4.00 hrs WQ Rainfall=0.36"

	Area (sf)	CN	Description
*	59,390	98	Impervious
	59,390		100.00% Impervious Area

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

Subcatchment 2-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2-P: Pervious

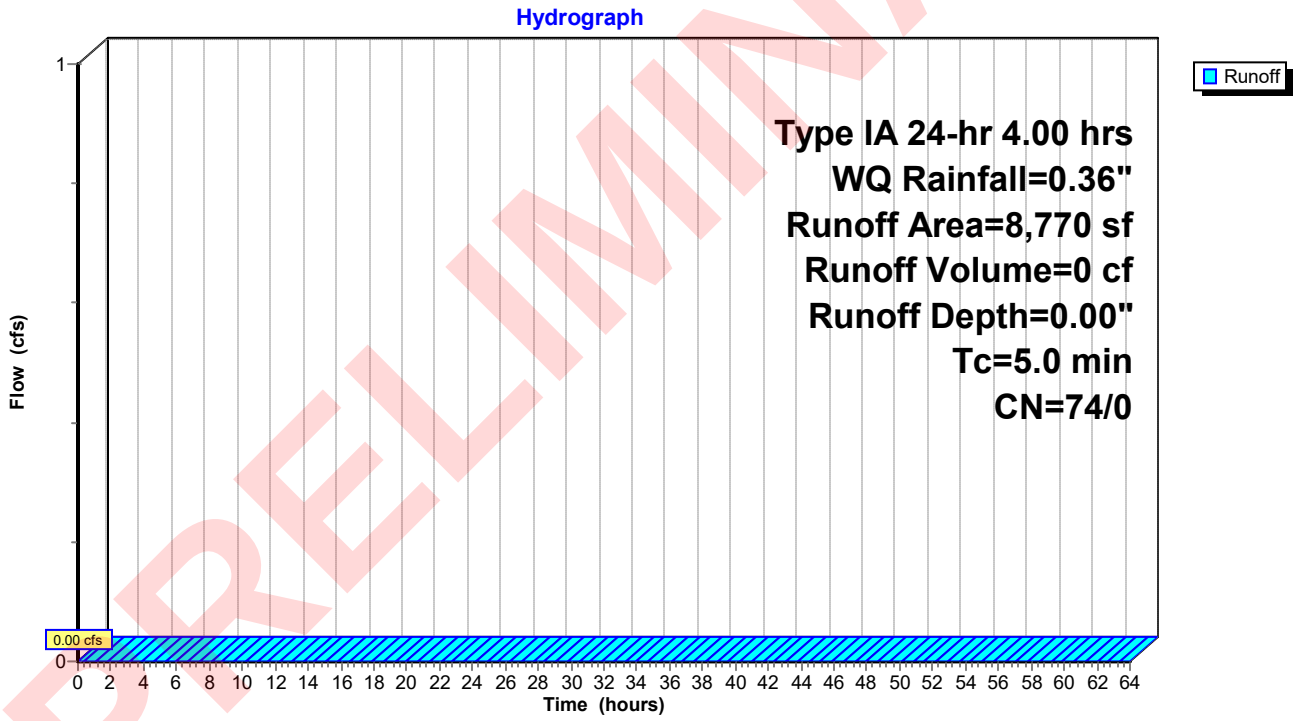
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 4.00 hrs WQ Rainfall=0.36"

Area (sf)	CN	Description
8,770	74	>75% Grass cover, Good, HSG C
8,770		100.00% Pervious Area

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

Subcatchment 2-P: Pervious



PRELIMINARY

Summary for Subcatchment 2.1-iP: Impervious

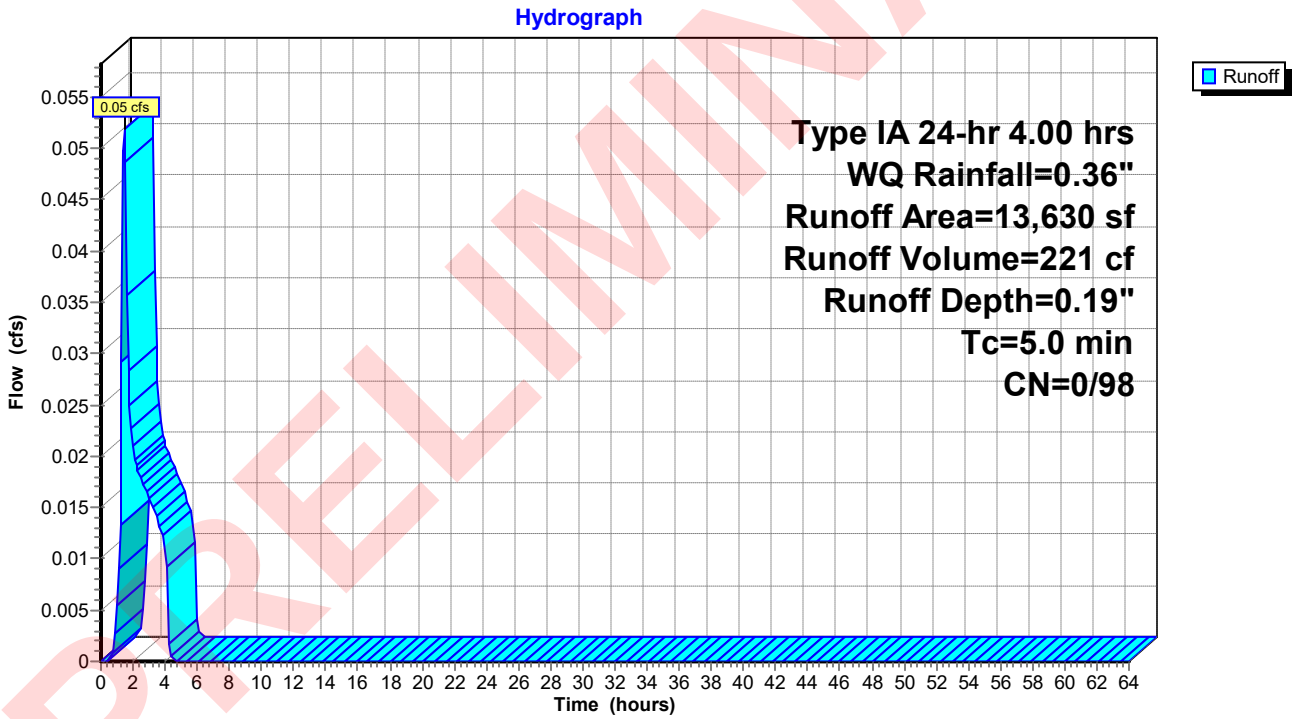
Runoff = 0.05 cfs @ 1.45 hrs, Volume= 221 cf, Depth= 0.19"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 4.00 hrs WQ Rainfall=0.36"

	Area (sf)	CN	Description
*	13,630	98	Roof/Drive Aisle
	13,630		100.00% Impervious Area

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

Subcatchment 2.1-iP: Impervious



PRELIMINARY

Summary for Subcatchment 2.1-P: Pervious

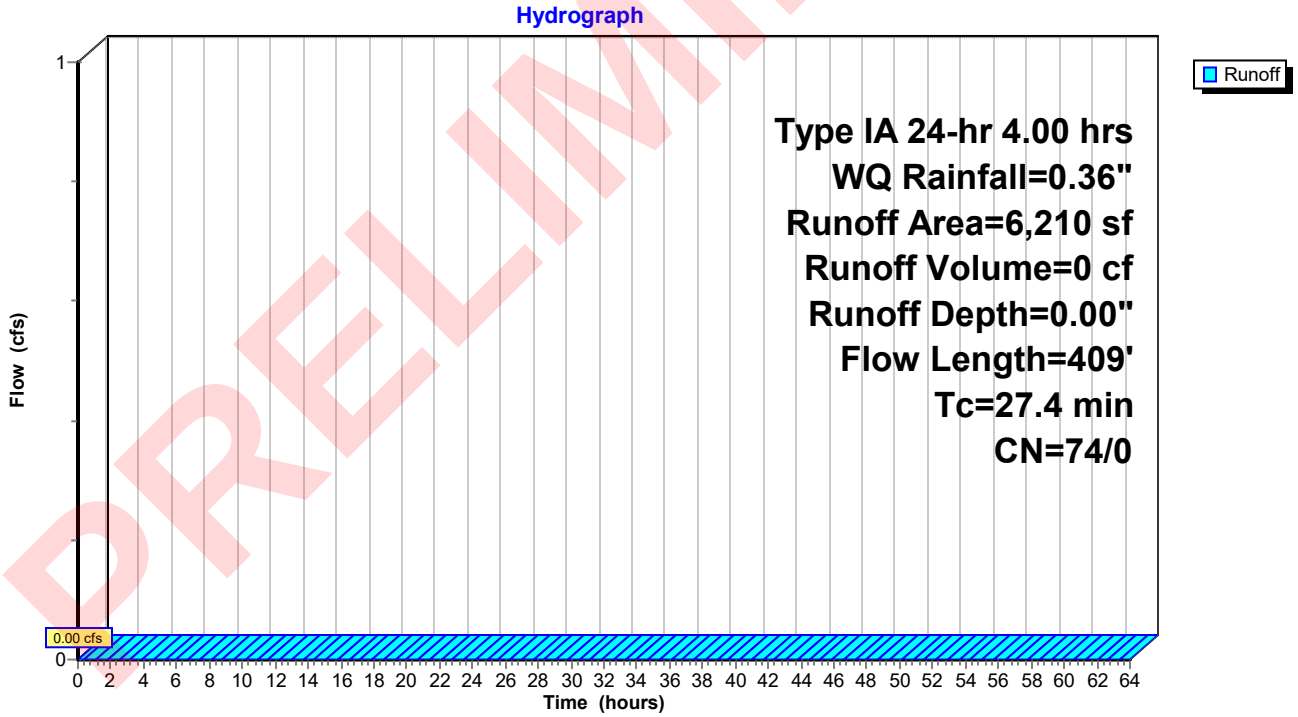
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-64.00 hrs, dt= 0.10 hrs
Type IA 24-hr 4.00 hrs WQ Rainfall=0.36"

Area (sf)	CN	Description
6,210	74	>75% Grass cover, Good, HSG C
6,210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	300	0.0220	0.19		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.50"
1.7	109	0.0227	1.05		**Shallow Concentrated Flow, Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
27.4	409	Total			

Subcatchment 2.1-P: Pervious



PRELIMINARY

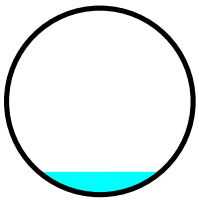
Summary for Reach 2R:

Inflow Area = 88,000 sf, 82.98% Impervious, Inflow Depth = 0.03" for WQ event
Inflow = 0.05 cfs @ 1.45 hrs, Volume= 221 cf
Outflow = 0.05 cfs @ 1.49 hrs, Volume= 221 cf, Atten= 2%, Lag= 2.9 min

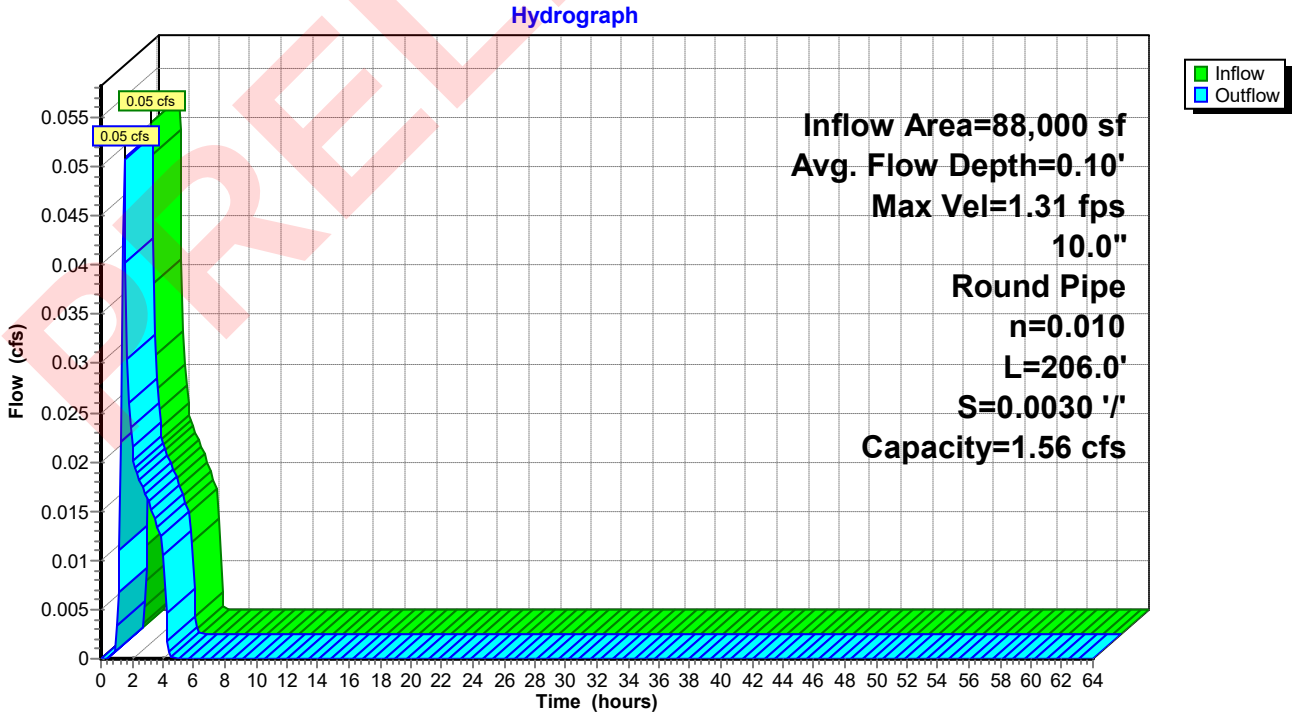
Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Max. Velocity= 1.31 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 4.3 min

Peak Storage= 8 cf @ 1.49 hrs
Average Depth at Peak Storage= 0.10'
Defined Flood Depth= 177.89' Flow Area= 20.2 sf, Capacity= -1,391.57 cfs
Bank-Full Depth= 0.83' Flow Area= 0.5 sf, Capacity= 1.56 cfs

10.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 206.0' Slope= 0.0030 '/'
Inlet Invert= 177.69', Outlet Invert= 177.07'



Reach 2R:



PRELIMINARY

Summary for Pond 2-FCB: Filter CB

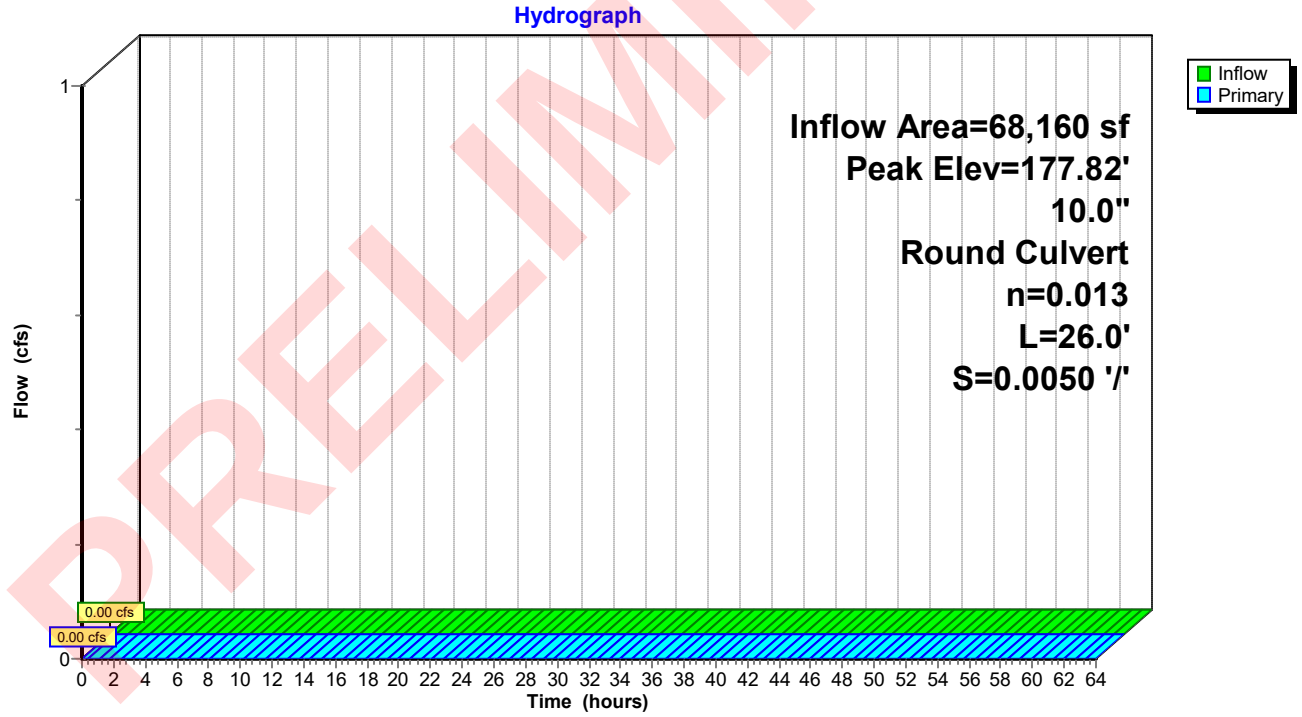
Inflow Area =	68,160 sf,	87.13% Impervious,	Inflow Depth =	0.00"	for WQ event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 177.82' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.82'	**10.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.82' / 177.69' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=177.82' TW=177.69' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond 2-FCB: Filter CB



PRELIMINARY

Summary for Pond 2-UG: Chambers

Inflow Area = 68,160 sf, 87.13% Impervious, Inflow Depth = 0.17" for WQ event
Inflow = 0.23 cfs @ 1.45 hrs, Volume= 964 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 178.38' @ 6.10 hrs Surf.Area= 6,363 sf Storage= 964 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	4,132 cf	**101.00'W x 63.00'L x 2.00'H Field A** 12,726 cf Overall - 2,395 cf Embedded = 10,331 cf x 40.0% Voids
#2A	178.50'	2,395 cf	**CMP Round 12** x 150 Inside #1 Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf Overall Size= 12.0"W x 12.0"H x 20.00'L Row Length Adjustment= +1.00' x 0.79 sf x 50 rows
		6,528 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.45'	**10.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.45' / 178.32' S= 0.0048 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#2	Device 1	180.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.8' Crest Height
#3	Device 1	179.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	178.45'	**1.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' TW=177.82' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

PRELIMINARY

Pond 2-UG: Chambers - Chamber Wizard Field A

Chamber Model = CMP Round 12 (Round Corrugated Metal Pipe)
Effective Size= 12.0"W x 12.0"H => 0.79 sf x 20.00'L = 15.7 cf
Overall Size= 12.0"W x 12.0"H x 20.00'L
Row Length Adjustment= +1.00' x 0.79 sf x 50 rows

12.0" Wide + 12.0" Spacing = 24.0" C-C Row Spacing

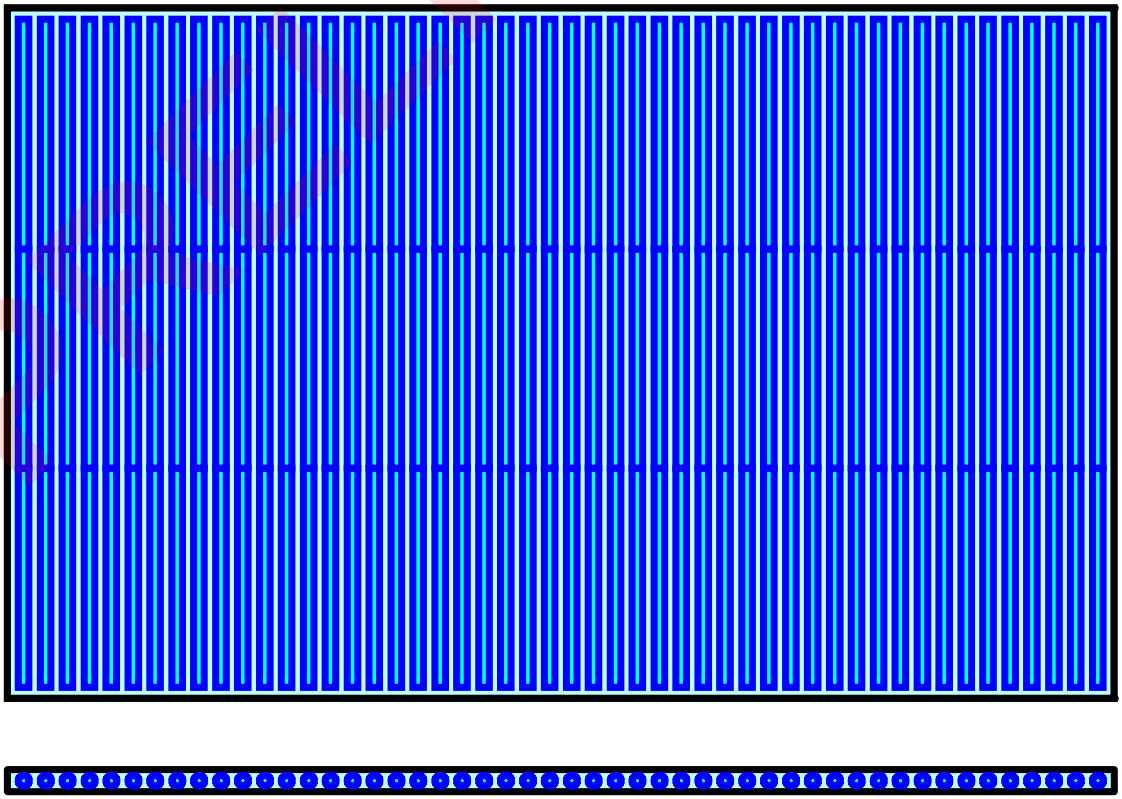
3 Chambers/Row x 20.00' Long +1.00' Row Adjustment = 61.00' Row Length +12.0" End Stone x 2 = 63.00' Base Length
50 Rows x 12.0" Wide + 12.0" Spacing x 49 + 12.0" Side Stone x 2 = 101.00' Base Width
6.0" Base + 12.0" Chamber Height + 6.0" Cover = 2.00' Field Height

150 Chambers x 15.7 cf +1.00' Row Adjustment x 0.79 sf x 50 Rows = 2,395.5 cf Chamber Storage

12,726.0 cf Field - 2,395.5 cf Chambers = 10,330.5 cf Stone x 40.0% Voids = 4,132.2 cf Stone Storage

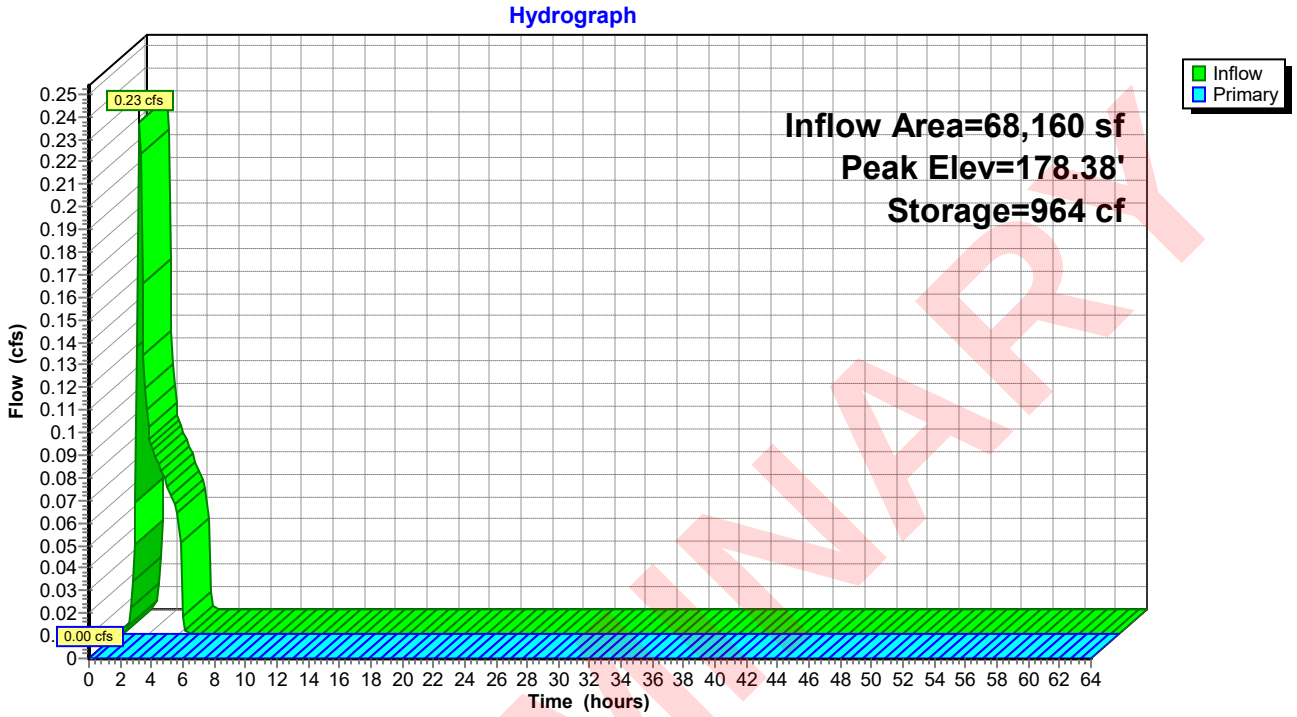
Chamber Storage + Stone Storage = 6,527.7 cf = 0.150 af
Overall Storage Efficiency = 51.3%
Overall System Size = 63.00' x 101.00' x 2.00'

150 Chambers
471.3 cy Field
382.6 cy Stone



PRELIMINARY

Pond 2-UG: Chambers



PRELIMINARY

Summary for Pond CB-2: CB

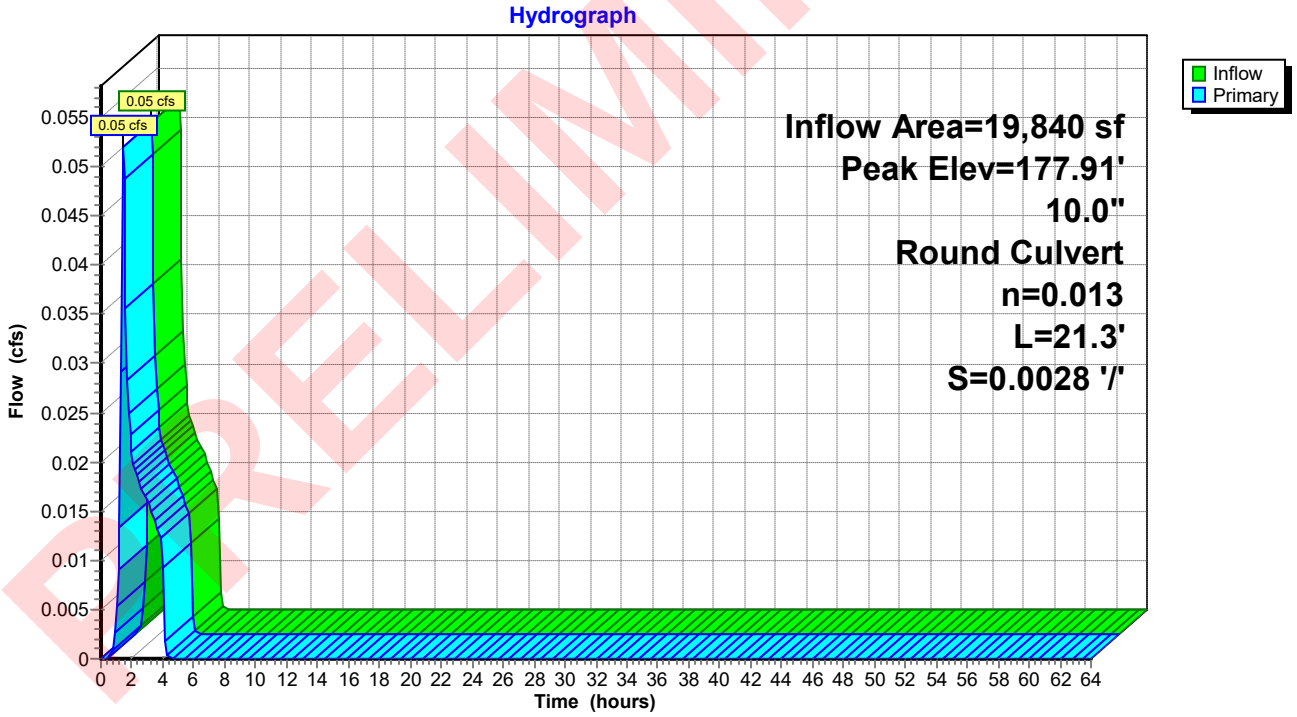
Inflow Area =	19,840 sf, 68.70% Impervious, Inflow Depth = 0.13" for WQ event				
Inflow =	0.05 cfs @	1.45 hrs, Volume=	221 cf		
Outflow =	0.05 cfs @	1.45 hrs, Volume=	221 cf, Atten= 0%, Lag= 0.0 min		
Primary =	0.05 cfs @	1.45 hrs, Volume=	221 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-64.00 hrs, dt= 0.10 hrs / 2
Peak Elev= 177.91' @ 1.45 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	177.75'	**10.0" Round Culvert** L= 21.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.75' / 177.69' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf

Primary OutFlow Max=0.05 cfs @ 1.45 hrs HW=177.90' TW=177.79' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.05 cfs @ 1.11 fps)

Pond CB-2: CB



PRELIMINARY

STORMWATER QUALITY CALCULATIONS

AKS ENGINEERING & FORESTRY, LLC | 12965 SW Herman Rd, Suite 100 | Tualatin, OR 97062
p: 503.563.6151 | f: 503.563.6152 | www.aks-eng.com

PROJECT
GH McCulloch

AKS JOB NO.
8627-06

DATE
9/4/2025

PREPARED FOR:
GH McCulloch

ADDRESS
Tax Lot 1600
Tax Map 2S129DC

CITY/STATE/ZIP
Sherwood, OR 97140

PROJECT MANAGER:
BGC

PREPARED BY:
GJG

REVIEWED BY:
TRJ

IMPERVIOUS AREA USED IN DESIGN

Per CWS 4.08.1.d.1. - R&O 19-22

90,565 square feet

WATER QUALITY VOLUME (WQV)

Per CWS 4.08.5.a.2 - R&O 19-22

$$WQV = \frac{0.36 \text{ in. X Area (ft.)}}{12 \text{ in. per ft.}} =$$

2,717 cubic feet

WATER QUALITY FLOW (WQF)

Per CWS 4.08.5.a.3 - R&O 19-22

$$WQF = \frac{WQV \text{ (sf)}}{14{,}400 \text{ seconds}} =$$

0.19 cubic feet per second

CONTECH STORMFILTER® DESIGN PARAMETERS

Number of Cartridges Required, N:

$$N = Q_{treat} (449_{gpm/cfs} / Q_{cart\ gpm/cart})$$

where:

Q_{treat} = Water Quality Flow (WQF)

$Q_{cart\ gpm/cart}$ = Treatment per Cartridge = 15 $_{gpm/cart}$

CONTECH STORMFILTER® SIZING

N = 5.69

Therefore, 6 cartridge(s) required.

PRELIMINARY