AGENDA

Rogers City Council

April 22, 2025 - 7:00 PM

Worksession at 5:30 p.m.

1. CALL TO ORDER AND PLEDGE OF ALLEGIANCE

2. OPEN FORUM

Individuals may address the Council about any item not contained on the regular agenda. A maximum of 10 minutes is allocated for the Forum. If the full 10 minutes are not needed for the Forum, the Mayor will continue with the agenda. If additional time is needed for the Forum, the Council will continue the Forum following Other Business on the agenda. The Council will take no official action on items discussed at the Forum, with the exception of referral to staff of Commission for future report.

3. PRESENTATIONS

4. APPROVE AGENDA

Council members may add items to the agenda for discussion purposes or staff direction only. The Council will not normally take official action on items added to the agenda.

5. CONSENT AGENDA

These items are considered to be routine and will be enacted by one motion. There will be no separate discussion of these items unless a Councilmember so requests, in which event the item will be removed from the Consent Agenda and placed elsewhere on the agenda.

5.1 Approval of the April 8, 2025 City Council Meeting Minutes

5.2 Approval of Bills and Claims

5.3 Approval of Resolution 2025-29; A Resolution Providing Municipal Approval to the Issuance of a Minnesota Lawful Gambling License to the Rogers Lions Club at Broadway Bar and Pizza Located at 14040 Rogers Drive, Rogers, MN

5.4 Approval of Application for Gambling Exempt Permit for Mary Queen of Peace Catholic Church

5.5 Approval of an Easement Encroachment Agreement for the Property at 22000 Industrial Blvd

5.6 Approval of a Easement Encroachment Agreement and Trail Easement with

Veit Related to the Veit Headquarters Property at 14000 Veit Place

5.7 Approval of the First Amendment to the Purchase Agreement with Duffy Development to Allow for an Additional 60-Days to Close

5.8 Approval of Resolution 2025-28 Authorizing the Submission of an Environmental Response Fund (ERF) Application to Hennepin County for the Civic Campus Site

5.9 Approve Deferred Assessment Agreement for PID 21-120-23-44-0004 (Hofford)

5.10 Approval of Exterior Furniture Fixtures and Equipment (FFE) for South Community Park

5.11 Approve Resolution 2025-31, Approving Site Plan and Conditional Use Permit for Creative Lawn & Landscapes at 14005 Northdale Blvd.

5.12 Authorization to Advertise for Bids for Construction of Territorial Park

5.13 Authorize Execution of Early Grading Agreement for Northview Preserve (Knapp Property, Preliminary Plat Approved).

5.14 Approval of Ordinance 2025-02 Establishing City Plumbing Plan Review, Permitting, and Inspection Process

5.15 Approval of 2024 Year-End Closing Activity

5.16 Approve Resolution No. 2025-33, A Resolution Approving the Application to Fill Wetlands to Facilitate Northview Preserve Development

5.17 Approve AIA Document A133-2019, Standard Form of Agreement Between the City of Rogers and RJM Construction as Construction Manager and Constructor

6. PUBLIC HEARINGS

7. GENERAL BUSINESS

7.1 Consider Naming Rights Contract for the Rogers Activity Center

7.2 Consideration of a Site Plan and Variance Request by T5 Rogers, LLC for the Property Located at 13510 Rogers Drive.

7.3 Approval of Hire of Kaari Grandlund Nelson for the Position of Fire Inspector/Educator

7.4 Approval of Hire for Tessa Knutson as Paid-on-Call Firefighter

7.5 Consider Applications by Rachel Development for Preliminary Plat and Planned Unit Development for Cowley Lake Preserve (169-lot subdivision)

8. CORRESPONDENCE AND REPORTS

9. ADJOURN TO CLOSED SESSION

10. ADJOURN

[MEET_FOOT]

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.1

Subject: Approval of the April 8, 2025 City Council Meeting Minutes
Prepared By: Stacie Brown, City Clerk

Recommended Council Action
Motion to approve the April 8, 2025 City Council meeting minutes.

Overview / Background / Analysis

Staff Recommendation
Motion to approve the April 8, 2025 City Council meeting minutes.

Financial Impact: **Source Fund**:

Budgeted? N/A

Supporting Documentation
A. 04082025min

1. CALL TO ORDER AND PLEDGE OF ALLEGIANCE

The regular meeting of the City Council of the City of Rogers was called to order by Mayor Klick on Tuesday, April 8, 2025, at 7:00 PM at Rogers Community Center, 21201 Memorial Drive, Rogers, MN, 55374 and online in the Zoom application.

Council present: Shannon Klick, Kevin Jullie, Mark Eiden, Joel Brockman
Council excused: Amy Enga

Staff present: Steve Stahmer, Administrator; Stacy Scharber, Assistant City Administrator/HR Director; Bridget Bruska, Finance Director; Patrick Farrens, Fire Chief; Doran Cote, Public Works Director/City Engineer; Brett Angell, Community Development Director; and Stacie Brown, City Clerk.

2. OPEN FORUM

No one came forward.

3. PRESENTATIONS

None.

4. APPROVE AGENDA

Set as submitted.

5. CONSENT AGENDA

5.1 Approval of March 25, 2025 City Council Meeting Minutes

5.2 Approval of Bills and Claims

5.3 Approval of Resolution 2025-26 Supporting the Retention of City Zoning Authority

5.4 Approval of Purchase and Replacement of Garage Doors and Floor Coverings at Fire Station 1

5.5 Approval of a Right-of-Way License Agreement with Lariat Companies Related to the Rogers Tech Center Development

5.6 Approve Expanded Scope of Services to Inspect and Repair Well #8, City Project No. 2506

5.7 Approve Change Order No. 3 (Labor) and Change Order No. 4 (Material), Rogers Indoor Turf Facility, City Project No. 2201

5.8 Approval to Purchase Network Equipment

Councilor Brockman moved, Councilor Jullie seconded a motion to approve the Consent Agenda. Motion carried 4-0.

6. PUBLIC HEARINGS

None.

7. GENERAL BUSINESS

7.1 **Approve the Hiring of Pete Moen as Public Works Superintendent**

Public Works Director/City Engineer Cote recalled Council's acceptance of Public Works Superintendent Simmons' resignation on February 25, 2025, and subsequent process to backfill the role. Cote shared that the position was posted for two weeks, eight applications were received and scored, and the four highest-scoring candidates were offered interviews. However, one of the four individuals withdrew his name from consideration. A panel of Public Works supervisors conducted interviews for the three remaining candidates on April 1, 2025, and Pete Moen was selected as the top candidate.

Mr. Moen most recently served as the Streets and Parks Supervisor at the City of Brooklyn Center. Prior to that, he held roles as the Utilities Supervisor, Utilities Lead, and Street Maintenance Worker at the City of Plymouth. He has retained his Class SC Sewer License, Class C Water Operators License, and Commercial Driver's License, and is proficient in nearly all types of Public Works equipment. During the panel interview, staff learned that Mr. Moen's knowledge, storm sewer background and equipment proficiency played an integral role in resolving flooding issues in Plymouth after an excessive rainfall incident. Additionally, he and his staff were critical to maintaining City operations in Brooklyn Center during the pandemic and several periods of civil unrest.

Councilor Eiden moved, Councilor Brockman seconded a motion to approve the hiring of Pete Moen as Public Works Superintendent. Motion carried 4-0.

7.2 **Approve Purchase of Indoor Playground for Turf Fieldhouse**

Parks and Recreation Director Bauer shared that after considering options for playground to be installed that the new Turf Fieldhouse, the Parks and Recreation Advisory Commission recommended moving forward with constructing an indoor playground. Bauer shared factors in selecting the vendor, as well as structural design details and renderings of the proposed play structure from all sides, reviewing each of the features in detail. The design incorporates recommendations from the Commission for a tube slide extending from top to bottom, as well as dome lookouts over the field. Additionally, the heights within the structure are adequate to allow a parent to access the different levels to attend to their child. Bauer noted this type of playground has "no climb" netting, which is important due to the structure being located on the mezzanine level of the facility.

Councilor Brockman asked about the railing around the edge. Bauer explained there will be an 8' barrier on the north side of the playground, and along the front and sides will be 6' tempered glass. Brockman inquired on additional access to the batting cages, and Bauer replied that there will also be access on the north side to meet fire code. Mayor Klick noted that she has heard from a number of people that the indoor option was preferred. Bauer explained that they are considering storage cubes for shoes and hand sanitizing stations. Eiden asked if there is a sanitation schedule planned within the operating costs, and Bauer stated it will likely be handled by staff internally, and annual maintenance will be handled through the vendor. This is the same vendor who has done most of the indoor playgrounds in the metro area. Councilor Jullie inquired on the materials, and Bauer shared that the grid system is a Schedule 80 PVC pipe, anchored to the spancrete, and the floor will be the same resilient rubber which is in the ice arena. Brockman asked if this was included in the budget for the Fieldhouse, and Bauer stated that Local Option Sales Tax (LOST) dollars can be utilized. Klick asked if the playground will be named, and Bauer replied that has been discussed and is a possibility.

Councilor Eiden moved, Mayor Klick seconded a motion to Approve the purchase of indoor playground equipment for the Turf Fieldhouse. Motion carried 4-0.

7.3 **Consider Park Pavilion Purchase for South Community Park**

Parks and Recreation Director Bauer explained that at South Community Park there is a 30' x 40" area which has been called out as a location for a shade structure; for protection from rain and/or sun. The Parks and Recreation Advisory Commission has reviewed several options for building sizes and materials and has expressed preference for a pavilion matching the buildings which are currently being constructed at the park. Bauer reviewed the bid tabulation, pillar options, and pricing for each; noting that since there is stone on the warming house, that option would match well. Any options would still be lower than other vendors' pricing.

Councilor Eiden asked if the columns would be completely treated, or only partially, and Bauer confirmed they would be completely treated, unless wrapped. Councilor Jullie asked if there would be gutters, and Bauer stated there would not be gutters, as the structure would be surrounded by concrete on all sides. Councilor Brockman asked if the drip edge would land on concrete or dirt, and Bauer confirmed it would be concrete. Mayor Klick inquired about the sturdiness of two specific options (in the event of bad weather), and Bauer stated that they're all anchored in the same way. City Administrator Stahmer noted that if left in the bare-wood product may look like an after-thought; however, wrapping the posts in the same steel would match the other structures. Brockman asked if roofs over the dugouts have been discussed, and Bauer shared that prices have been reviewed, ranging from $90,000 - 190,000 for all eight dugouts. Various options are being considered and discussed however, a decision has not been made yet.

Mayor Klick inquired about the additional cost for the steel wrapping, and Bauer stated it would be an additional $2,400. Council's consensus was to move forward with the steel-wrapped pillars.

Councilor Brockman moved, Councilor Eiden seconded a motion to approve a park pavilion purchase for South Community Park with the addition of steel wraps. Motion carried 4-0.

8. OTHER BUSINESS

None.

9. CORRESPONDENCE AND REPORTS

None.

10. ADJOURN

Mayor Klick adjourned the meeting at 7:29 p.m.

Respectfully submitted,

Stacie Brown
City Clerk

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.2

Subject: Approval of Bills and Claims
Prepared By: Bridget Bruska, Finance Director

Recommended Council Action
Motion to approve bills and claims as presented.

Overview / Background / Analysis
According to the City's purchasing policy, all purchases made by City staff must be reviewed and approved by the City Council during each Council meeting via the consent agenda.

The accounts payable registers detailing the payments issued by the City since the cutoff date of the last Council meeting are attached to this item.

Staff Recommendation
Motion to approve bills and claims as presented.

Financial Impact: N/A **Source Fund**: N/A

Budgeted? N/A

Supporting Documentation
A. AP Cover Sheet
B. 04-04-2025 Checks #94963-95004 & ACH Payments
C. 04-11-2025 Checks #95005-95049 & ACH Payments
D. 04-11-2025 Checks #95050-95061 - UB Overpayments

CITY OF ROGERS
04.22.2025 CITY COUNCIL MEETING
OPERATING ACCOUNTS - ADDITIONAL CLAIMS PAID/TO BE PAID

City Payroll Checks, Taxes & Misc Fees Paid		
4/3/2025	ADP Child Support/Garnishment	124.62
4/3/2025	ADP Direct Deposits	250,079.28
4/11/2025	ADP Fees	1,225.72
4/11/2025	ADP Fees	780.30
4/11/2025	ADP Fees	1,053.00
4/11/2025	ADP Fees	1,773.19
4/3/2025	ADP Payroll Taxes	99,385.79
4/10/2025	Health Equity FSA/DCAP	376.00
4/7/2025	ICMA Deferred Compensation	2,528.83
4/3/2025	Optum Health Plan Fund	5,912.95
4/11/2025	PERA	70,465.32
4/7/2025	State of MN HCSP	34,894.22
4/7/2025	State of MN - Deferred Comp	11,840.00
4/2/2025	Standard Life Insurance - April	1,644.25
4/3/2025	The Hartford - April	2,057.53
Payroll & Misc Fee Expenditures		484,141.00
City Checks & ACH Paid		
04.04.2025	City Checks & ACH Paid (94963-95004)	2,360,320.30
04.11.2025	City Checks & ACH Paid (95005-95049)	1,157,323.47
04.11.2025	City Checks UB Overpayments (95050-95061)	562.25
City Check & ACH Expenditures		3,518,206.02
City Misc ACH/Wires Paid		
4/2/2025	Credit Card Fees City	9,476.63
4/2/2025	Civic Pay Fees Utility Billing	3,964.04
4/3/2025	Finnly Sports Payments Credit Card Fees RAC	1,404.14
4/3/2025	Payment Services Network Processing Fees	371.35
4/9/2025	Building Permit Surcharge	13,708.30
4/11/2025	Wells Fargo Client Analysis Fees	1,850.23
4/8/2025	MNDOR - Water Sales Tax	3,166.00
City ACH/Wire Expenditures		33,940.69
	City Total To Be Approved	**4,036,287.71**
Liquor Misc ACH/Wires Paid		
4/3/2025	Credit Card Processing Fees - RWAS	5,402.30
4/3/2025	Credit Card Processing Fees - RWAS	478.32
4/3/2025	Credit Card Interchange Fees- RWAS	117.46
Liquor ACH/Wire Expenditures		5,998.08
	Liquor Total to Be Approved	**5,998.08**

Accounts Payable

Computer Check Proof List by Vendor

User: bbruska
Printed: 04/03/2025 - 8:45AM
Batch: 00001.04.2025

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: actfl	Action Fleet Inc			Check Sequence: 1	ACH Enabled: False
I7718	SQ1-Replacement Board	267.49	04/04/2025	100-420-2210-44040-0000	
	Check Total:	267.49			
Vendor: ale360	Alert 360			Check Sequence: 2	ACH Enabled: False
40095031	Monitoring-FD April '25	20.85	04/04/2025	100-420-2210-43880-0000	
40095031	Monitoring-CR April '25	26.54	04/04/2025	100-410-1940-43880-0000	
	Check Total:	47.39			
Vendor: ancom	Ancom Communications Inc			Check Sequence: 3	ACH Enabled: True
126996	St 2 Radio System	1,313.00	04/04/2025	449-420-2210-45200-2209	
	Check Total:	1,313.00			
Vendor: aspmi	Aspen Mills			Check Sequence: 4	ACH Enabled: False
351053	Leather Name Tag X2-Hudson	30.70	04/04/2025	100-420-2210-42180-0000	
351054	Leather Name Tag X2-Mueller	29.70	04/04/2025	100-420-2210-42180-0000	
	Check Total:	60.40			
Vendor: belco	Bellboy Corporation			Check Sequence: 5	ACH Enabled: True
0207226900	THC	1,010.58	04/04/2025	609-497-9760-42535-0000	
	Check Total:	1,010.58			
Vendor: Wirbe	BreakThru Beverage Minnesota Wine & Sprirts			Check Sequence: 6	ACH Enabled: True
120683900	Liquor	171.00	04/04/2025	609-497-9760-42510-0000	
120684552	Liquor	6,192.76	04/04/2025	609-497-9760-42510-0000	
120684553	Mix	129.95	04/04/2025	609-497-9760-42540-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
120684554	Wine	398.16	04/04/2025	609-497-9760-42530-0000	
	Check Total:	6,891.87			
Vendor: capbe	Capitol Beverage			Check Sequence: 7	ACH Enabled: True
3113451	Beer	-29.50	04/04/2025	609-497-9760-42520-0000	
3113452	Beer	4,948.45	04/04/2025	609-497-9760-42520-0000	
3113452	Liquor	46.40	04/04/2025	609-497-9760-42510-0000	
	Check Total:	4,965.35			
Vendor: cdwgo	CDW Government			Check Sequence: 8	ACH Enabled: True
AD3V76D	Computer Part - 2025 Squads	249.24	04/04/2025	400-420-2100-45500-0000	
	Check Total:	249.24			
Vendor: cencu	Center Cut Meats, LLC			Check Sequence: 9	ACH Enabled: True
Feb/Mar 2025	Senior Dining - 2/25 & 3/25	2,414.50	04/04/2025	100-450-5186-43444-0000	
	Check Total:	2,414.50			
Vendor: cenen	CenterPoint Energy Resources Corp.			Check Sequence: 10	ACH Enabled: False
11626254-4	Gas - Splash Pad March	115.10	04/04/2025	100-450-5200-43830-0000	
	Check Total:	115.10			
Vendor: cenen	CenterPoint Energy Resources Corp.			Check Sequence: 11	ACH Enabled: False
5542017-8	Gas - Sr. Center March	18.43	04/04/2025	100-450-5186-43830-0000	
	Check Total:	18.43			
Vendor: cenen	CenterPoint Energy Resources Corp.			Check Sequence: 12	ACH Enabled: False
5490566-6	Gas - PW March	919.05	04/04/2025	100-430-3000-43830-0000	
5490566-6	Gas - CH March	393.88	04/04/2025	100-410-1940-43830-0000	
	Check Total:	1,312.93			
Vendor: cenen	CenterPoint Energy Resources Corp.			Check Sequence: 13	ACH Enabled: False
10203497-2	Gas - March PD	1,441.49	04/04/2025	100-420-2100-43830-0000	
	Check Total:	1,441.49			

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: cenen	CenterPoint Energy Resources Corp.			Check Sequence: 14	ACH Enabled: False
11177201-8	Gas - Event Center March	604.04	04/04/2025	100-410-1941-43830-0000	
	Check Total:	604.04			
Vendor: cenen	CenterPoint Energy Resources Corp.			Check Sequence: 15	ACH Enabled: False
6791320-2	RAC Gas 2/25 - 3/26	3,168.73	04/04/2025	205-450-5205-43830-0000	
	Check Total:	3,168.73			
Vendor: cenhy	Central Hydraulics, Inc.			Check Sequence: 16	ACH Enabled: True
00642819	1/2 X 3/8 PTR-S PIPE-FEMALE PIPE REDUCI	12.51	04/04/2025	602-495-9490-42103-0000	
00642819	6602-8-10 NIPPLE	45.67	04/04/2025	602-495-9490-42103-0000	
00642819	6601-8-10 COUPLER	219.92	04/04/2025	602-495-9490-42103-0000	
00642830	1/2 FF-S PIPE - PIPE	4.39	04/04/2025	602-495-9490-42104-0000	
00642830	1/2 X 3/8 FF-S PIPE - PIPE	6.17	04/04/2025	602-495-9490-42104-0000	
	Check Total:	288.66			
Vendor: embpw	Century Link			Check Sequence: 17	ACH Enabled: False
313022581	TELEPHONE SVC - HASSAN TOWN HALL M	62.35	04/04/2025	100-410-1940-43210-0000	
	Check Total:	62.35			
Vendor: roucp	Chad Mueller			Check Sequence: 18	ACH Enabled: False
03252025	BLS Training - 4 Officers	160.00	04/04/2025	100-420-2100-44360-0000	
	Check Total:	160.00			
Vendor: berbe	Chas. A. Bernick, Inc.			Check Sequence: 19	ACH Enabled: False
10337303	Beer	1,153.90	04/04/2025	609-497-9760-42520-0000	
	Check Total:	1,153.90			
Vendor: cinco	Cintas Corporation			Check Sequence: 20	ACH Enabled: True
4225324409	Uniform - PK 3/26/25	14.74	04/04/2025	100-450-5200-42180-0000	
4225324409	Uniform - WTR 3/26/25	6.02	04/04/2025	601-494-9440-42180-0000	
4225324409	Mats & Towels 3/26/25	63.24	04/04/2025	100-430-3000-44060-0000	
4225324409	Uniform - Gen'l. Gov't. Bldgs. 3/26/25	2.95	04/04/2025	100-410-1940-42180-0000	
4225324409	Uniform - Janitorial 3/26/25	2.24	04/04/2025	100-410-1940-44060-0000	

Invoice No		Description	Amount	Pmt Date	Acct Number	Reference
4225324409		Uniform - PW 3/26/25	25.03	04/04/2025	100-430-3000-42180-0000	
4225324409		Uniform - SWR 3/26/25	6.02	04/04/2025	602-495-9490-42180-0000	
4225329720		CR Floor Mats 3/26/25	8.86	04/04/2025	100-410-1940-44060-0000	
		Check Total:	129.10			
Vendor:	citsp	City of Saint Paul			Check Sequence: 21	ACH Enabled: False
IN61886		NP - Women's Leadership Conference	180.00	04/04/2025	100-420-2100-44360-0000	
		Check Total:	180.00			
Vendor:	munco	CivicPlus LLC			Check Sequence: 22	ACH Enabled: True
330964		Agenda Mgmt Software 4.23.25 - 12/31/25	5,413.10	04/04/2025	100-410-1325-43190-0000	
330964		Agenda Mgmt Software 01.01.26 - 04.22.26	2,706.55	04/04/2025	100-000-0000-15500-0000	
		Check Total:	8,119.65			
Vendor:	dahdi	Dahlheimer Distributing Co.			Check Sequence: 23	ACH Enabled: True
2430435		NA	60.00	04/04/2025	609-497-9760-42540-0000	
2430437		THC	1,970.00	04/04/2025	609-497-9760-42535-0000	
2430438		Beer	6,546.85	04/04/2025	609-497-9760-42520-0000	
2432632		Beer	12,303.60	04/04/2025	609-497-9760-42520-0000	
		Check Total:	20,880.45			
Vendor:	danman	Dangerous Man Brewing			Check Sequence: 24	ACH Enabled: True
IN-7354		Beer	240.00	04/04/2025	609-497-9760-42520-0000	
		Check Total:	240.00			
Vendor:	diamo	Diamond Mowers Inc.			Check Sequence: 25	ACH Enabled: True
281324		11-1501 CLEVIS FLAIL	135.50	04/04/2025	100-430-3120-42103-0000	
281324		11-1146 VMI NUT NYLOCK JAM 7/16 NC	14.00	04/04/2025	100-430-3120-42103-0000	
281324		Freight	25.67	04/04/2025	100-430-3120-42103-0000	
281324		11-0506 BOLT 7/16 X 3-1/4 NC 1/2" THREAD	104.00	04/04/2025	100-430-3120-42103-0000	
281393		11-0504 VMI SOCKET CAP 7/16-14X1.5 GR8	10.88	04/04/2025	100-430-3120-42103-0000	
281393		35-0008 SHAFT STUB GROUND ROLLER	162.88	04/04/2025	100-430-3120-42103-0000	
281393		Freight	141.80	04/04/2025	100-430-3120-42103-0000	
281393		12-0007 BELT DOUBLE 530 V	105.33	04/04/2025	100-430-3120-42103-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
281393	12-0009 BELT V DOUBLE 630	125.00	04/04/2025	100-430-3120-42103-0000	
281393	10-0001 FLANGE 1-3/8 BRG GROUND ROLL	1,049.24	04/04/2025	100-430-3120-42103-0000	
281421	31-0761 BOLT GROUND ROLL PLATE INTRI	139.22	04/04/2025	100-430-3120-42103-0000	
281421	11-0752 VMI SOCKET CAP 3/8-16 X 1 GR 8 B	8.64	04/04/2025	100-430-3120-42103-0000	
281421	Freight	24.13	04/04/2025	100-430-3120-42103-0000	
281602	10-0006 BEARING CUTTER SHAFT - REPLA	806.77	04/04/2025	100-430-3120-42103-0000	
	Check Total:	2,853.06			
Vendor: cldis	Dick Family Inc.			Check Sequence: 26	ACH Enabled: True
2078668	Beer	522.50	04/04/2025	609-497-9760-42520-0000	
2078668	Liquor	88.86	04/04/2025	609-497-9760-42510-0000	
	Check Total:	611.36			
Vendor: drysu	Drywall Supply, Inc.			Check Sequence: 27	ACH Enabled: False
425363	Damage Dep. Ref'd - Drywall Supply Event 12/9	200.00	04/04/2025	100-000-0000-22000-0000	
	Check Total:	200.00			
Vendor: dunham	Dunham			Check Sequence: 28	ACH Enabled: False
20254761	Engineering-St 2 60% Complete	6,330.00	04/04/2025	449-420-2210-43030-2209	
	Check Total:	6,330.00			
Vendor: ecsi	ECSI System Integrators			Check Sequence: 29	ACH Enabled: True
25030308	Annual Support Agreement	2,950.00	04/04/2025	100-410-1330-43190-0000	
	Check Total:	2,950.00			
Vendor: facmo	Elliot Auto Supply Co, Inc.			Check Sequence: 30	ACH Enabled: False
1-10593668	WIX 57325 Lube Filter	8.52	04/04/2025	100-430-3000-42103-0000	
1-10593668	WIX 33606 Fuel Water Separator	22.04	04/04/2025	100-430-3000-42103-0000	
1-10593668	WIX 49266 Cabin Air Panel	30.88	04/04/2025	100-430-3000-42103-0000	
1-10593668	WIX 46476 Radial Seal Outer Air	36.60	04/04/2025	100-430-3000-42103-0000	
1-10593668	MIX 49783 Radial Seal Outer Air	42.36	04/04/2025	100-430-3000-42103-0000	
128-213748	WIX 51791 Lube Filter	7.80	04/04/2025	100-430-3000-42103-0000	
128-214030	DEL 22956295 BLADE ASM-RANDO (SLP-1)	11.32	04/04/2025	100-420-2210-42103-0000	
128-214030	DEL 8-02216 HYBRID WIPER BL {SLP-1)-Sq	26.20	04/04/2025	100-420-2210-42103-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
	Check Total:	185.72			
Vendor: fehco	Fehn Companies, Inc			Check Sequence: 31	ACH Enabled: False
1235397	Damage Deposit Ref'd - Fehn Holiday Party 12/1	75.00	04/04/2025	100-000-0000-22000-0000	
	Check Total:	75.00			
Vendor: feren	Ferguson Enterprises #1657			Check Sequence: 32	ACH Enabled: False
1489578	114 FLT BIBB WASHERS 25/PK	7.83	04/04/2025	100-410-1941-42102-0000	
1489816	FLT BIBB WSHR / SCRW BX KIT	37.49	04/04/2025	100-410-1941-42102-0000	
1497613	PFXCCS33 LF 3/4 FIP X SWT DIELEC UNION	21.79	04/04/2025	601-494-9440-42102-0000	
1497613	GBRNFM LF 3/4X3 BRS NIP GBL	10.97	04/04/2025	601-494-9440-42102-0000	
1497613	GBRNFL LF 3/4X2-1/2 BRS NIP GBL	9.51	04/04/2025	601-494-9440-42102-0000	
	Check Total:	87.59			
Vendor: hencosh	Hennepin County Accounts Receivable			Check Sequence: 33	ACH Enabled: False
1000243897	Jail Per Diem - February	392.36	04/04/2025	100-420-2100-43100-0000	
	Check Total:	392.36			
Vendor: hencoen	Hennepin County Treasurer			Check Sequence: 34	ACH Enabled: False
1295024	SCP Concession Stand Plan Review Fee	146.00	04/04/2025	410-450-5200-45300-2104	
1295435	SCP 2025 FOOD SERV LIC	211.00	04/04/2025	100-450-5120-44380-0000	
	Check Total:	357.00			
Vendor: inbre	Insight Brewing			Check Sequence: 35	ACH Enabled: False
22743	THC	645.00	04/04/2025	609-497-9760-42535-0000	
	Check Total:	645.00			
Vendor: piopr	iPROMOTEu			Check Sequence: 36	ACH Enabled: False
2386201P18	EE Logo Workwear	17.25	04/04/2025	100-000-0000-11500-0000	
2386201P18	EE Logo Workwear	119.72	04/04/2025	100-410-1325-42000-0000	
	Check Total:	136.97			
Vendor: johbr	Johnson Brothers Liquor Co.			Check Sequence: 37	ACH Enabled: False
2754209	Liquor	1,183.38	04/04/2025	609-497-9760-42510-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
2754210	Wine	526.50	04/04/2025	609-497-9760-42530-0000	
2754238	Liquor	4,103.20	04/04/2025	609-497-9760-42510-0000	
2754239	Wine	2,941.70	04/04/2025	609-497-9760-42530-0000	
6949301	Wine	748.20	04/04/2025	609-497-9760-42530-0000	
6949336	Liquor	1,521.66	04/04/2025	609-497-9760-42510-0000	
6949337	Wine	1,278.40	04/04/2025	609-497-9760-42530-0000	
6949338	Mix	73.75	04/04/2025	609-497-9760-42540-0000	
6949339	THC	300.00	04/04/2025	609-497-9760-42535-0000	
	Check Total:	12,676.79			
Vendor: shagr	Kelbro Company			Check Sequence: 38	ACH Enabled: False
3129704	Ice	35.44	04/04/2025	609-497-9760-42570-0000	
	Check Total:	35.44			
Vendor: btac	Melanie Koenen			Check Sequence: 39	ACH Enabled: True
1035	AG - Wellness Visit #4	130.00	04/04/2025	100-420-2100-43140-0000	
	Check Total:	130.00			
Vendor: lawpr	Lawson Products			Check Sequence: 40	ACH Enabled: False
9312344734	85490M01 13.4Lx5/16W Black Nylon Ty-Rap	178.96	04/04/2025	100-450-5200-42100-0000	
9312344734	94613 15.25 Nylon Cable Ties	174.18	04/04/2025	100-450-5200-42100-0000	
	Check Total:	353.14			
Vendor: locsu	Locators & Supplies, Inc.			Check Sequence: 41	ACH Enabled: True
0319501-IN	Freight	56.96	04/04/2025	100-410-1950-42100-0000	
0319501-IN	AER-249 Fl. Pink Construction Marking Paint 2(	431.92	04/04/2025	100-410-1950-42100-0000	
0319634-IN	BLK-P451W-B Flags Blue Printed 4x5x21" Wir	263.80	04/04/2025	601-494-9440-42100-0000	
0319634-IN	BLK-P451W-G Flags Green Printed 4x5x21" W	263.80	04/04/2025	602-495-9490-42100-0000	
	Check Total:	1,016.48			
Vendor: lyn&mc	Lynde & McLeod, Inc			Check Sequence: 42	ACH Enabled: False
I023483	YARDWASTE ACTIVITY FOR MARCH 2025	147.50	04/04/2025	100-450-5200-43180-0000	
	Check Total:	147.50			

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: maceq	MacQueen Equipment, Inc.			Check Sequence: 43	ACH Enabled: True
P46357	Helmet Front-CH2	121.80	04/04/2025	100-420-2210-42106-0000	
	Check Total:	121.80			
Vendor: marco	Marco Inc			Check Sequence: 44	ACH Enabled: True
INV13682469	Printer Logic Licenses	3,008.00	04/04/2025	100-410-1330-43190-0000	
	Check Total:	3,008.00			
Vendor: midva	MidStates Valuation LLC			Check Sequence: 45	ACH Enabled: False
MN02-25-5904	Appraisal Report: Land	-1,500.00	04/04/2025	402-000-0000-10100-5000	
MN02-25-5904	Appraisal Report: Land	1,500.00	04/04/2025	402-000-0000-10100-0000	
MN02-25-5904	Appraisal Report: Land	1,500.00	04/04/2025	402-430-3121-44310-1409	
	Check Total:	1,500.00			
Vendor: mnlab	MN Dept of Labor & Industry			Check Sequence: 46	ACH Enabled: False
ABR0349600X	Pressure Vessel-ST 2	20.00	04/04/2025	100-420-2210-44010-0000	
	Check Total:	20.00			
Vendor: schso	MN Equipment Inc.			Check Sequence: 47	ACH Enabled: True
P41801	Chain Saw Fan Housing	76.62	04/04/2025	100-420-2210-44040-0000	
	Check Total:	76.62			
Vendor: towma	Monroe Towmaster LLC			Check Sequence: 48	ACH Enabled: True
476268	#40-017 Provide/Install Camera On Hot Box	782.00	04/04/2025	100-430-3000-44040-0000	
	Check Total:	782.00			
Vendor: musso	Musco Sports Lighting LLC			Check Sequence: 49	ACH Enabled: True
437075	NCP Lighting 2025-2026	475.00	04/04/2025	100-450-5200-43100-0000	
	Check Total:	475.00			
Vendor: napa	NAPA Auto Parts			Check Sequence: 50	ACH Enabled: False
384594	LED MDL 44 STROBE-GMT - #35-024	123.44	04/04/2025	601-494-9440-42103-0000	
384594	LED MDL 44 STROBE-GMT - #35-024	123.44	04/04/2025	602-495-9490-42103-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
	Check Total:	246.88			
Vendor: norto	Northern Tool & Equipment			Check Sequence: 51	ACH Enabled: False
540501084253651	43144-#5.5 40 (DEGREE) 1/4' NPT - #20-004	15.19	04/04/2025	603-496-9495-42103-0000	
	Check Total:	15.19			
Vendor: offde	Office Depot			Check Sequence: 52	ACH Enabled: False
412993487001	Toilet Paper And Paper Towels	158.41	04/04/2025	100-420-2100-42100-0000	
416252206001	USB Drives - 8 16 4 GB	151.46	04/04/2025	100-420-2100-42000-0000	
416252740001	Memo Book - Office Supplies	31.96	04/04/2025	100-420-2100-42000-0000	
416252741001	Paper Office Supplies	199.51	04/04/2025	100-420-2100-42000-0000	
416252744001	Memo Books - Hunt	14.57	04/04/2025	100-420-2100-42000-0000	
416841011001	Toilet Paper And Paper Towels	315.22	04/04/2025	100-420-2100-42100-0000	
	Check Total:	871.13			
Vendor: perpl	Performance Plus LLC			Check Sequence: 53	ACH Enabled: True
01032119	Preplacement Medical Exam	387.00	04/04/2025	100-420-2210-44080-0000	
	Check Total:	387.00			
Vendor: potso	Potentia MN Solar Fund 1, LLC			Check Sequence: 54	ACH Enabled: True
MN-INV-2502-165	RAC Solar - Feb 2025	1,854.89	04/04/2025	205-450-5205-43810-0000	
MN-INV-2502-172	PD Solar - Feb 2025	262.08	04/04/2025	100-420-2100-43810-0000	
MN-INV-2502-173	Well 5 Solar - Feb 2025	316.62	04/04/2025	601-494-9440-43810-0000	
MN-INV-2502-174	Water Booster Stn Solar - Feb 2025	316.62	04/04/2025	601-494-9440-43810-0000	
MN-INV-2502-175	Well 5 Solar - Feb 2025	316.62	04/04/2025	601-494-9440-43810-0000	
MN-INV-2502-176	Well 7 Solar - Feb 2025	316.62	04/04/2025	601-494-9440-43810-0000	
MN-INV-2502-181	RAC Solar - Feb 2025	1,324.89	04/04/2025	205-450-5205-43810-0000	
MN-INV-2502-182	PD Solar - Feb 2025	540.68	04/04/2025	100-420-2100-43810-0000	
MN-INV-2502-187	FD Solar - Feb 2025	92.25	04/04/2025	100-420-2210-43810-0000	
MN-INV-2502-187	CR Solar - Feb 2025	117.42	04/04/2025	100-410-1940-43810-0000	
MN-INV-2502-188	City Hall Solar - Feb 2025	80.70	04/04/2025	100-410-1940-43810-0000	
MN-INV-2502-188	Public Works Solar - Feb 2025	188.31	04/04/2025	100-430-3000-43810-0000	
MN-INV-2502-189	RWAS Solar - Feb 2025	430.42	04/04/2025	609-497-9760-43810-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
	Check Total:	6,158.12			
Vendor: potso	Potentia MN Solar Fund 1, LLC			Check Sequence: 55	ACH Enabled: True
MN-INV-2409-165	RAC Solar - Sept 2024	6,271.54	04/04/2025	205-450-5205-43810-0000	
MN-INV-2409-172	PD Solar - Sept 2024	1,128.53	04/04/2025	100-420-2100-43810-0000	
MN-INV-2409-173	Well 6 Solar - Sept 2024	1,363.39	04/04/2025	601-494-9440-43810-0000	
MN-INV-2409-174	Water Booster Stn - Sept 2024	1,363.39	04/04/2025	601-494-9440-43810-0000	
MN-INV-2409-175	Well 5 Solar - Sept 2024	1,363.39	04/04/2025	601-494-9440-43810-0000	
MN-INV-2409-176	Well 7 Solar - Sept 2024	1,363.39	04/04/2025	601-494-9440-43810-0000	
MN-INV-2409-181	RAC Solar - Sept 2024	5,007.51	04/04/2025	205-450-5205-43810-0000	
MN-INV-2409-182	PD Solar - Sept 2024	2,043.52	04/04/2025	100-420-2100-43810-0000	
MN-INV-2409-187	FD Solar - Sept 2024	718.15	04/04/2025	100-420-2210-43810-0000	
MN-INV-2409-187	CR Solar - Sept 2024	914.01	04/04/2025	100-410-1940-43810-0000	
MN-INV-2409-188	CH Solar - Sept 2024	628.23	04/04/2025	100-410-1940-43810-0000	
MN-INV-2409-188	PW Solar - Sept 2024	1,465.86	04/04/2025	100-430-3000-43810-0000	
MN-INV-2409-189	RWAS Solar - Sept 2024	3,350.56	04/04/2025	609-497-9760-43810-0000	
	Check Total:	26,981.47			
Vendor: premr	PreCise MRM LLC			Check Sequence: 56	ACH Enabled: True
IN200-2004543	5MB Flat Data Plan US With NAF C-US-5MB	260.00	04/04/2025	100-430-3120-43190-0000	
	Check Total:	260.00			
Vendor: rogtr	Rogers True Value Hardware Inc			Check Sequence: 57	ACH Enabled: False
29282	Oil & Plugs	28.77	04/04/2025	100-420-2210-44040-0000	
29311	NIPPLE 3/4" X 3" MPT	11.49	04/04/2025	601-494-9440-42104-0000	
29311	ADAPTER 3/4COPR3/4FPT	4.79	04/04/2025	601-494-9440-42104-0000	
	Check Total:	45.05			
Vendor: souwi	Southern Glazers Wine & Spirits of Minnesota			Check Sequence: 58	ACH Enabled: False
2604744	Liquor	212.14	04/04/2025	609-497-9760-42510-0000	
	Check Total:	212.14			
Vendor: sprso	Springbrook Holding Co LLC			Check Sequence: 59	ACH Enabled: False
INV-020232	CivicPay Transaction Fee - March 2025	1,035.32	04/04/2025	601-494-9440-44300-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
INV-020232	CivicPay Transaction Fee - March 2025	117.65	04/04/2025	100-430-3245-44300-0000	
INV-020232	CivicPay Transaction Fee - March 2025	894.14	04/04/2025	602-495-9490-44300-0000	
INV-020232	CivicPay Transaction Fee - March 2025	305.89	04/04/2025	603-496-9495-44300-0000	
	Check Total:	2,353.00			
Vendor: strei	Streicher's Inc.			Check Sequence: 60	ACH Enabled: False
I1752826	Embroidery For Shirts - Sgt Nelson	21.99	04/04/2025	100-420-2100-42180-0000	
	Check Total:	21.99			
Vendor: accbe	TASC			Check Sequence: 61	ACH Enabled: False
IN3414776	Continuant Fee & Election Packet March	40.19	04/04/2025	100-410-1325-44300-0000	
	Check Total:	40.19			
Vendor: terge	Terra General Contractors, LLC			Check Sequence: 62	ACH Enabled: True
Pay App #3	Pay App #3-Turf Facility-Material	1,701,300.89	04/04/2025	410-450-5200-45200-2201	
Pay App #3	Pay App #3-Turf Facility-Labor	336,336.29	04/04/2025	410-450-5200-45200-2201	
Pay App #4	Pay App #4-SCP Warming House & Heated Stor	140,760.80	04/04/2025	410-450-5200-45200-2104	
	Check Total:	2,178,397.98			
Vendor: titma	Titan Machinery Inc			Check Sequence: 63	ACH Enabled: False
PS0671139-1	87613203 WASHERS	10.40	04/04/2025	100-430-3000-42103-0000	
	Check Total:	10.40			
Vendor: touem	Touch'em All Carwash LLC			Check Sequence: 64	ACH Enabled: True
March 2025	PD Car Washes - March	252.56	04/04/2025	100-420-2100-44040-0000	
	Check Total:	252.56			
Vendor: urbgr	Urban Growler Brewing Company, LLC			Check Sequence: 65	ACH Enabled: False
E-39260	Beer	303.00	04/04/2025	609-497-9760-42520-0000	
	Check Total:	303.00			
Vendor: grain	W.W. Grainger, Inc.			Check Sequence: 66	ACH Enabled: True
9452447486	5JC36 SOLENOID VALVE BRASS NC AIR IN	405.50	04/04/2025	601-494-9440-42104-0000	
9452664742	#15-017 4DJA5 BALL CONE SPRING CHECK	21.05	04/04/2025	100-430-3120-42103-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
	Check Total:	426.55			
Vendor: watco	Watson Company			Check Sequence: 67	ACH Enabled: True
148506	RAC Concessions & Supplies	583.74	04/04/2025	205-450-5205-42550-0000	
	Check Total:	583.74			
Vendor: wolda	WOLD Architects and Engineers			Check Sequence: 68	ACH Enabled: True
99533	Police Addition And Renovation	20,386.20	04/04/2025	400-420-2100-43030-2202	
	Check Total:	20,386.20			
Vendor: xcele	Xcel Energy			Check Sequence: 69	ACH Enabled: False
51-0015164726-1	Liftstations March	4.19	04/04/2025	602-495-9490-43810-0000	
51-0015164726-1	Liftstations February	9.62	04/04/2025	602-495-9490-43810-0000	
	Check Total:	13.81			
Vendor: xcele	Xcel Energy			Check Sequence: 70	ACH Enabled: False
51-0015186280-8	Temp. Electric Service @ Turf Facility February	1,913.06	04/04/2025	410-450-5200-44310-2201	
	Check Total:	1,913.06			
Vendor: xcele	Xcel Energy			Check Sequence: 71	ACH Enabled: False
51-0013206663-3	Extension Of Electric Facilities	29,266.13	04/04/2025	410-450-5200-45300-2201	
	Check Total:	29,266.13			
Vendor: xcele	Xcel Energy			Check Sequence: 72	ACH Enabled: False
51-0014705272-9	Electric- Feb '25 St 2	913.23	04/04/2025	100-420-2210-43810-0000	
	Check Total:	913.23			
	Total for Check Run:	2,360,320.30			
	Total of Number of Checks:	72			

Accounts Payable

Computer Check Proof List by Vendor

User: bbruska
Printed: 04/10/2025 - 2:43PM
Batch: 00002.04.2025

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: acesa	Ace Trailer Sales			Check Sequence: 1	ACH Enabled: False
458723	Aluma 7814ES Edge Series Trailer 3500#	2,439.50	04/11/2025	100-450-5200-45800-0000	
458723	Aluma 7814ES Edge Series Trailer 3500#	1,219.75	04/11/2025	601-494-9440-45800-0000	
458723	Aluma 7814ES Edge Series Trailer 3500#	1,219.75	04/11/2025	602-495-9490-45800-0000	
	Check Total:	4,879.00			
Vendor: adini	Nikhila Adidamu			Check Sequence: 2	ACH Enabled: False
1223642	Damage Deposit Refund-Activity Rm 10/12/24-/	200.00	04/11/2025	100-000-0000-22000-0000	
	Check Total:	200.00			
Vendor: amerp	American Pressure Inc			Check Sequence: 3	ACH Enabled: True
149424	One Restore 5 Gallons	174.50	04/11/2025	100-430-3000-42160-0000	
	Check Total:	174.50			
Vendor: ancso	Anchor Solar Investments, LLC			Check Sequence: 4	ACH Enabled: True
City Hall 20 #2	City Hall Solar PPA - April	60.40	04/11/2025	100-410-1940-43810-0000	
City Hall 20 #2	PW Solar PPA - April	140.95	04/11/2025	100-430-3000-43810-0000	
City Hall PW 20	City Hall Solar PPA - April	59.60	04/11/2025	100-410-1940-43810-0000	
City Hall PW 20	PW Solar PPA - April	139.05	04/11/2025	100-430-3000-43810-0000	
N. Comm. Park 3	NCP Solar PPA - April	413.12	04/11/2025	100-450-5200-43810-0000	
PD 20	PD Solar PPA April	198.65	04/11/2025	100-420-2100-43810-0000	
PD 20 #2	PD Solar PPA - April	201.35	04/11/2025	100-420-2100-43810-0000	
RAC 20	RAC Solar PPA - April	198.65	04/11/2025	205-450-5205-43810-0000	
RAC 20 #2	RAC Solar PPA - April	201.35	04/11/2025	205-450-5205-43810-0000	
	Check Total:	1,613.12			

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: andenmn	Anderson Engineering of Minnesota, LLC			Check Sequence: 5	ACH Enabled: False
24176	WORK ON TERRITORIAL PARK	8,850.00	04/11/2025	404-450-5200-43030-2207	
	Check Total:	8,850.00			
Vendor: becje	Jeffrey Beck			Check Sequence: 6	ACH Enabled: True
Spring 2025	Tuition Reimbursement - J Beck Spring 2025	1,066.06	04/11/2025	100-420-2100-44360-0000	
	Check Total:	1,066.06			
Vendor: borst	Border States Industries, Inc.			Check Sequence: 7	ACH Enabled: True
930166679	LITH - CPHB 18LM SEF GCL MD MVOLT 4K	522.12	04/11/2025	100-430-3000-42102-0000	
	Check Total:	522.12			
Vendor: Wirbe	BreakThru Beverage Minnesota Wine & Sprirts			Check Sequence: 8	ACH Enabled: True
120797897	Liquor	1,220.50	04/11/2025	609-497-9760-42510-0000	
120797898	Mix	21.45	04/11/2025	609-497-9760-42540-0000	
120797899	Wine	1,404.30	04/11/2025	609-497-9760-42530-0000	
	Check Total:	2,646.25			
Vendor: cabcl	Cable Cloud			Check Sequence: 9	ACH Enabled: True
CC26480	CH & PW Building Cable Project	4,170.75	04/11/2025	100-410-1940-44010-0000	
	Check Total:	4,170.75			
Vendor: capbe	Capitol Beverage			Check Sequence: 10	ACH Enabled: True
3096219A	Beer Credit	-20.80	04/11/2025	609-497-9760-42520-0000	
3116530	Beer Credit	-8.78	04/11/2025	609-497-9760-42520-0000	
3116531	Beer	4,052.90	04/11/2025	609-497-9760-42520-0000	
	Check Total:	4,023.32			
Vendor: carbr	Brett Carlson			Check Sequence: 11	ACH Enabled: False
2024	2024 Planning Commission	275.00	04/11/2025	100-410-1910-41030-0000	
	Check Total:	275.00			
Vendor: carja	Jan Cartwright			Check Sequence: 12	ACH Enabled: False
2024	2024 Planning Commission	125.00	04/11/2025	100-410-1410-41030-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
	Check Total:	125.00			
Vendor: cdwgo	CDW Government			Check Sequence: 13	ACH Enabled: True
AD4KC1R	Touch Display For Register 1	365.80	04/11/2025	609-497-9760-42010-0000	
AD5H59A	City Administrator Monitors & Dock	1,245.45	04/11/2025	100-410-1325-42010-0000	
	Check Total:	1,611.25			
Vendor: embpw	Century Link			Check Sequence: 14	ACH Enabled: False
313975749	TELEPHONE SERVICE - PW March	180.40	04/11/2025	100-430-3000-43210-0000	
313975749	Telephone Service - WTR March	62.00	04/11/2025	601-494-9440-43210-0000	
313975749	TELEPHONE SERVICE - SWR March	55.66	04/11/2025	602-495-9490-43210-0000	
313975749	TELEPHONE SERVICE - RAC March	199.95	04/11/2025	205-450-5205-43210-0000	
	Check Total:	498.01			
Vendor: berbe	Chas. A. Bernick, Inc.			Check Sequence: 15	ACH Enabled: False
10337302	THC	467.00	04/11/2025	609-497-9760-42535-0000	
10340298	THC	1,211.00	04/11/2025	609-497-9760-42535-0000	
10340299	Beer	718.50	04/11/2025	609-497-9760-42520-0000	
	Check Total:	2,396.50			
Vendor: cinco	Cintas Corporation			Check Sequence: 16	ACH Enabled: True
4220872478	RWAS Mats & Towels 2/12/25	116.68	04/11/2025	609-497-9760-44060-0000	
4222410554	RWAS Mats & Towels 2/26/25	187.76	04/11/2025	609-497-9760-44060-0000	
4223907064	RWAS Mats & Towels 3/12/25	116.68	04/11/2025	609-497-9760-44060-0000	
4225329709	RWAS Mats & Towels 3/26/25	238.08	04/11/2025	609-497-9760-44060-0000	
4226022158	Uniform - Gen'l. Gov't. Bldgs. 4/2/25	2.95	04/11/2025	100-410-1940-42180-0000	
4226022158	Uniform - SWR 4/2/25	6.16	04/11/2025	602-495-9490-42180-0000	
4226022158	Mats & Towels 4/2/25	22.00	04/11/2025	100-430-3000-44060-0000	
4226022158	Uniform - WTR 4/2/25	6.17	04/11/2025	601-494-9440-42180-0000	
4226022158	Uniform - PK 4/2/25	16.96	04/11/2025	100-450-5200-42180-0000	
4226022158	Uniform - PW 4/2/25	25.33	04/11/2025	100-430-3000-42180-0000	
4226022158	Uniform - Janitorial 4/2/25	2.24	04/11/2025	100-410-1940-44060-0000	
4226028451	PD Floor Mats 04/02/2025	70.96	04/11/2025	100-420-2100-44060-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
	Check Total:	811.97			
Vendor: citro	City of Rogers			Check Sequence: 17	ACH Enabled: False
004728-000	Utility Service-12909 Main St March	27.71	04/11/2025	100-410-1940-43820-0000	
004732-000	Utility Service-PW March	249.41	04/11/2025	100-430-3000-43820-0000	
004732-000	Utility Service-CH March	106.90	04/11/2025	100-410-1940-43820-0000	
008783-000	Utility Service-NCP Pk. Bldg. March	15.70	04/11/2025	100-450-5200-43820-0000	
011577-000	Utility Service-Splash Pad March	48.41	04/11/2025	100-450-5200-43820-0000	
012576-000	21701 Industrial Blvd. - Boyer Bldg. March	120.41	04/11/2025	100-410-1940-43820-0000	
	Check Total:	568.54			
Vendor: comca	Comcast Cable Communications Inc.			Check Sequence: 18	ACH Enabled: False
877210560000887	8772 10 560 000887 FD 04/2025	2.27	04/11/2025	100-420-2210-43210-0000	
	Check Total:	2.27			
Vendor: cumsa	Cummins Sales & Service			Check Sequence: 19	ACH Enabled: True
E4-250312630	#25-008 Generator Maintenance	1,467.52	04/11/2025	100-420-2210-44040-0000	
E4-250312631	#25-003 Generator Maintenance	1,178.53	04/11/2025	602-495-9490-44040-0000	
E4-250312632	#25-005 Generator Maintenance	1,467.52	04/11/2025	100-430-3000-44040-0000	
E4-250313176	#25-006 Generator Maintenance	1,467.52	04/11/2025	100-420-2100-44040-0000	
E4-250313177	#25-002 Generator Maintenance For Well #5	1,467.52	04/11/2025	601-494-9440-44040-0000	
	Check Total:	7,048.61			
Vendor: cusco	Customer Contact Services			Check Sequence: 20	ACH Enabled: True
4388-040125	Answering Service April	76.30	04/11/2025	602-495-9490-43100-0000	
4388-040125	Answering Service April	76.30	04/11/2025	601-494-9440-43100-0000	
	Check Total:	152.60			
Vendor: dahdi	Dahlheimer Distributing Co.			Check Sequence: 21	ACH Enabled: True
2427275	Beer Buy Down Credit	-204.05	04/11/2025	609-497-9760-42520-0000	
2436113	THC	83.00	04/11/2025	609-497-9760-42535-0000	
2436114	NA	227.95	04/11/2025	609-497-9760-42540-0000	
2436115	Liquor	940.00	04/11/2025	609-497-9760-42510-0000	
2436116	Beer	286.60	04/11/2025	609-497-9760-42520-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
2438375	NA	33.85	04/11/2025	609-497-9760-42540-0000	
2438379	Beer	5,012.84	04/11/2025	609-497-9760-42520-0000	
2438461	Beer Credit	-3.60	04/11/2025	609-497-9760-42520-0000	
	Check Total:	6,376.59			
Vendor: elich	Chris Eliason			Check Sequence: 22	ACH Enabled: False
1235361	Damage Deposit Refund-Grad Party 6/3/23 Elias	500.00	04/11/2025	100-000-0000-22000-0000	
	Check Total:	500.00			
Vendor: emeap	Emergency Apparatus Main. Inc.			Check Sequence: 23	ACH Enabled: False
135318	E21-Water Gauge	1,059.40	04/11/2025	100-420-2210-44040-0000	
135514	E11-Tank To Pump & Door Warning	1,346.41	04/11/2025	100-420-2210-44040-0000	
	Check Total:	2,405.81			
Vendor: esker	Esker Inc			Check Sequence: 24	ACH Enabled: True
460301483	Esker - March 2025	739.49	04/11/2025	100-410-1520-43190-0000	
	Check Total:	739.49			
Vendor: feren	Ferguson Enterprises #1657			Check Sequence: 25	ACH Enabled: False
1481669	RAP50115 RAPTOR 11 BASIN WRCH	20.87	04/11/2025	100-410-1940-42100-0000	
	Check Total:	20.87			
Vendor: finwa	Finken Water Centers			Check Sequence: 26	ACH Enabled: True
1480801	Hassan Hall Water Softener April	18.00	04/11/2025	100-410-1940-42100-0000	
	Check Total:	18.00			
Vendor: fisad	Adam Fisher			Check Sequence: 27	ACH Enabled: False
2024	2024 Planning Commission	200.00	04/11/2025	100-410-1910-41030-0000	
	Check Total:	200.00			
Vendor: fouge	Geri Fournier			Check Sequence: 28	ACH Enabled: True
04032025	LMC Loss Prevention Mileage Reimbursement	63.00	04/11/2025	100-430-3000-44360-0000	
	Check Total:	63.00			

Invoice No		Description	Amount	Pmt Date	Acct Number	Reference
Vendor:	gopst	Gopher State One-Call Inc			Check Sequence: 29	ACH Enabled: True
5030721		Locates March 2025	166.03	04/11/2025	601-494-9440-43150-0000	
5030721		Locates March 2025	166.02	04/11/2025	602-495-9490-43150-0000	
5030721		Locates March 2025	54.05	04/11/2025	603-496-9495-43150-0000	
		Check Total:	386.10			
Vendor:	heaeq	HealthEquity			Check Sequence: 30	ACH Enabled: False
jahf03g		FSA/DCAP Fees April	58.50	04/11/2025	100-410-1325-43015-0000	
		Check Total:	58.50			
Vendor:	hencofca	Hennepin County Fire Chiefs Assoc			Check Sequence: 31	ACH Enabled: False
25-019		Blue Card-Mueller-Parker-Scharber-Shaw-Smith	2,550.00	04/11/2025	207-420-2210-44360-0000	
		Check Total:	2,550.00			
Vendor:	henpu	Hennepin County Recorder			Check Sequence: 32	ACH Enabled: False
1000244475		RecordEASE Web Transactions April	48.75	04/11/2025	100-430-3000-44300-0000	
1000244475		RecordEASE Web Transactions April	48.75	04/11/2025	100-410-1325-44300-0000	
		Check Total:	97.50			
Vendor:	htgar	Hickey Thorstenson Grover LTD			Check Sequence: 33	ACH Enabled: True
23504		Reimbursables For RAC Exp/2nd Sheet Of Ice	348.85	04/11/2025	411-450-5205-43030-2406	
23504		Work On RAC Exp/2nd Sheet Of Ice	72,470.00	04/11/2025	411-450-5205-43030-2406	
		Check Total:	72,818.85			
Vendor:	hilin	Hillyard, Inc - Minneapolis			Check Sequence: 34	ACH Enabled: False
700644771		TNT1266786 BRACKET CASTER STATIC GR	83.49	04/11/2025	100-430-3000-42103-0000	
		Check Total:	83.49			
Vendor:	hohen	Hohensteins Inc			Check Sequence: 35	ACH Enabled: False
808453		Beer	465.00	04/11/2025	609-497-9760-42520-0000	
808455		Beer	42.00	04/11/2025	609-497-9760-42520-0000	
		Check Total:	507.00			
Vendor:	infos	InfoSend			Check Sequence: 36	ACH Enabled: False

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
284208	Infosend Printing Fees March 2025	169.09	04/11/2025	100-430-3245-43500-0000	
284208	Infosend Printing Fees March 2025	1,285.10	04/11/2025	602-495-9490-43500-0000	
284208	Infosend Printing Fees March 2025	439.64	04/11/2025	603-496-9495-43500-0000	
284208	Infosend Printing Fees March 2025	1,488.02	04/11/2025	601-494-9440-43500-0000	
	Check Total:	3,381.85			
Vendor: frobu	iSport Networks LLC			Check Sequence: 37	ACH Enabled: False
RAC250401	RAC Expansion Naming Rights Consult Phase II	2,000.00	04/11/2025	410-450-5200-43100-0000	
	Check Total:	2,000.00			
Vendor: jlgar	JLG Architects			Check Sequence: 38	ACH Enabled: True
20166-18	WORK ON ROGERS INDOOR TURF FACILI	9,067.28	04/11/2025	410-450-5200-43030-2201	
	Check Total:	9,067.28			
Vendor: johbr	Johnson Brothers Liquor Co.			Check Sequence: 39	ACH Enabled: False
128221	Liquor Credit	-5.34	04/11/2025	609-497-9760-42510-0000	
128222	Wine Credit	-16.25	04/11/2025	609-497-9760-42530-0000	
128229	Liquor Credit	-196.75	04/11/2025	609-497-9760-42510-0000	
128230	Wine Credit	-14.33	04/11/2025	609-497-9760-42530-0000	
128231	Liquor Credit	-4.08	04/11/2025	609-497-9760-42510-0000	
128232	Wine Credit	-12.67	04/11/2025	609-497-9760-42530-0000	
2740739	Wine Credit	-10.82	04/11/2025	609-497-9760-42530-0000	
2752345	Liquor	135.05	04/11/2025	609-497-9760-42510-0000	
2754240	Liquor	136.75	04/11/2025	609-497-9760-42510-0000	
2757669	Liquor	2,426.61	04/11/2025	609-497-9760-42510-0000	
2757670	Wine	945.00	04/11/2025	609-497-9760-42530-0000	
2759514	Liquor	195.25	04/11/2025	609-497-9760-42510-0000	
2759552	Liquor	80.75	04/11/2025	609-497-9760-42510-0000	
2759553	Liquor	701.35	04/11/2025	609-497-9760-42510-0000	
2759554	Wine	1,198.38	04/11/2025	609-497-9760-42530-0000	
2759555	Liquor	5,642.25	04/11/2025	609-497-9760-42510-0000	
540008	Wine Credit	-61.85	04/11/2025	609-497-9760-42530-0000	
545320	Wine Credit	-19.34	04/11/2025	609-497-9760-42530-0000	
545321	Wine Credit	-59.65	04/11/2025	609-497-9760-42530-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
6945540	Mix	198.47	04/11/2025	609-497-9760-42540-0000	
6945540	Liquor	75.50	04/11/2025	609-497-9760-42510-0000	
6953262	Wine	79.10	04/11/2025	609-497-9760-42530-0000	
6953293	Liquor	949.12	04/11/2025	609-497-9760-42510-0000	
6953294	Wine	794.40	04/11/2025	609-497-9760-42530-0000	
6953296	THC	369.00	04/11/2025	609-497-9760-42535-0000	
7510407	Wine Credit	-60.87	04/11/2025	609-497-9760-42530-0000	
7513653	Wine	121.75	04/11/2025	609-497-9760-42530-0000	
758032	Wine Credit	-13.10	04/11/2025	609-497-9760-42530-0000	
	Check Total:	13,573.68			
Vendor: keele	K E Electric LLC			Check Sequence: 40	ACH Enabled: False
25-022	St 1 Signage-Electrical	1,725.00	04/11/2025	449-420-2210-45200-2505	
	Check Total:	1,725.00			
Vendor: kueco	KUE Contractors Inc			Check Sequence: 41	ACH Enabled: False
Pay App #17	Pay App #17 - Fire Station 2	71,732.02	04/11/2025	449-420-2210-45200-2209	
	Check Total:	71,732.02			
Vendor: kussto	Todd Kussman			Check Sequence: 42	ACH Enabled: False
2024	2024 Planning Commission	175.00	04/11/2025	100-410-1910-41030-0000	
	Check Total:	175.00			
Vendor: lels	Law Enforcement Labor Services, Inc.			Check Sequence: 43	ACH Enabled: True
April 2025	April 2025 Union Dues	292.00	04/11/2025	100-000-0000-21709-0000	
April 2025	April 2025 Union Dues	1,168.00	04/11/2025	100-000-0000-21709-0000	
	Check Total:	1,460.00			
Vendor: leami	League of MN Cities Ins. Trust			Check Sequence: 44	ACH Enabled: False
40004759	2025 PC Ins Prem. - #7388 2025 Chevy Silverad	256.75	04/11/2025	100-420-2210-43600-0000	
40004759	2025 PC Ins Prem. - #3147 2025 Wstr 47X Chas	612.25	04/11/2025	100-430-3000-43600-0000	
	Check Total:	869.00			
Vendor: lmcit	LMCIT			Check Sequence: 45	ACH Enabled: False

Invoice No		Description	Amount	Pmt Date	Acct Number	Reference
1001413		Work Comp Deductible	316.56	04/11/2025	100-420-2210-41510-0000	
1001413		Work Comp Deductible	134.89	04/11/2025	100-420-2100-41510-0000	
		Check Total:	451.45			
Vendor:	lohcl	Clark Lohr			Check Sequence: 46	ACH Enabled: False
2024		2024 Planning Commission	225.00	04/11/2025	100-410-1910-41030-0000	
		Check Total:	225.00			
Vendor:	cleri	McDonald Distributing Company			Check Sequence: 47	ACH Enabled: True
798730		Liquor	1,509.13	04/11/2025	609-497-9760-42510-0000	
798730		Beer	122.15	04/11/2025	609-497-9760-42520-0000	
		Check Total:	1,631.28			
Vendor:	menar	Menards, Inc.			Check Sequence: 48	ACH Enabled: True
46022		2" BLK/GOLD NUMBER KIT	7.96	04/11/2025	100-430-3120-42240-0000	
46022		ELITE POST MOUNT STANDARD	79.96	04/11/2025	100-430-3120-42240-0000	
46022		2" BlK/WH1 NUMBER KIT	7.96	04/11/2025	100-430-3120-42240-0000	
46304		1/2" PVC UNION	4.62	04/11/2025	100-410-1941-42102-0000	
46304		DEBURRING TOOL	7.99	04/11/2025	100-410-1941-42100-0000	
46304		1/2X10' THIN WALL PVC PIP	3.29	04/11/2025	100-410-1941-42102-0000	
46304		3/8 X 18" THREADED ROD	2.29	04/11/2025	100-410-1941-42102-0000	
46304		1/2" 90DEG PVC ELBOW	2.16	04/11/2025	100-410-1941-42102-0000	
46304		1/2"SPLIT RING HANGER -CO	3.32	04/11/2025	100-410-1941-42102-0000	
46304		1/2" PVC MALE ADAPTER	1.18	04/11/2025	100-410-1941-42102-0000	
46304		1/2" PVC TEE	1.28	04/11/2025	100-410-1941-42102-0000	
46593		UNIVERSAL WALL BUTTON	11.48	04/11/2025	100-430-3000-42102-0000	
46593		32" ORANGE GEAR TIE 2PK	7.64	04/11/2025	100-430-3000-42102-0000	
46649		RO PRO PAINT SAFETY RED	46.97	04/11/2025	100-430-3120-42240-0000	
46649		RO PRO PAINT SAFETY BLUE	46.97	04/11/2025	100-430-3120-42240-0000	
46990		1/4 QC X 1/4 M ADAPTER	9.99	04/11/2025	601-494-9440-42102-0000	
46990		1/4 QC X 1/4 M ADAPTER	19.98	04/11/2025	601-494-9440-42102-0000	
46990		LEAF RAKE 24" STEEL	15.99	04/11/2025	601-494-9440-42102-0000	
46990		1/4 QC X 1/4 M ADAPTER	-9.99	04/11/2025	601-494-9440-42102-0000	
46990		HEAVY DUTY DUST PAN	11.97	04/11/2025	601-494-9440-42102-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
46990	LAWN-GARDEN ANGLE BROOM	9.97	04/11/2025	601-494-9440-42102-0000	
47129	LOBBY BROOM & DUST PAN	38.96	04/11/2025	100-410-1940-42100-0000	
47129	BROOM GRIPPER	15.78	04/11/2025	100-410-1940-42100-0000	
	Check Total:	347.72			
Vendor: metwe	Metro West Inspection Services			Check Sequence: 49	ACH Enabled: True
4539	March 2025 Building Inspections	48,381.83	04/11/2025	100-420-2400-43110-0000	
	Check Total:	48,381.83			
Vendor: metcou	Metropolitan Council Environmental Services			Check Sequence: 50	ACH Enabled: True
0001185294	May 2025 METC Services	113,442.32	04/11/2025	602-495-9490-43115-0000	
	Check Total:	113,442.32			
Vendor: mmba	Minn. Municipal Beverage Assoc			Check Sequence: 51	ACH Enabled: False
MMBA-DJ	MMBA Conference 4/26/25-4/29/25	909.00	04/11/2025	609-497-9760-44360-0000	
	Check Total:	909.00			
Vendor: mpca	Minnesota Pollution Control Agency			Check Sequence: 52	ACH Enabled: False
MS4 General Per	MS4 Storm Sewer Permit Fee	400.00	04/11/2025	603-496-9495-44380-0000	
	Check Total:	400.00			
Vendor: schso	MN Equipment Inc.			Check Sequence: 53	ACH Enabled: True
R52825	Chainsaw-Clutch Bearings Sprocket	189.70	04/11/2025	100-450-5200-42105-0000	
	Check Total:	189.70			
Vendor: mrcut	MR Cutting Edge, LLC			Check Sequence: 54	ACH Enabled: True
7368	Blade Sharpening	102.00	04/11/2025	205-450-5205-44040-0000	
	Check Total:	102.00			
Vendor: mulpe	Peter Mullin			Check Sequence: 55	ACH Enabled: False
2024	2024 Planning Commission	225.00	04/11/2025	100-410-1910-41030-0000	
	Check Total:	225.00			
Vendor: napa	NAPA Auto Parts			Check Sequence: 56	ACH Enabled: False

Invoice No		Description	Amount	Pmt Date	Acct Number	Reference
385431		TIRE VALVE	14.04	04/11/2025	100-430-3000-42103-0000	
386091		ADAPTER	3.71	04/11/2025	100-430-3000-42103-0000	
386091		ADAPTER	1.32	04/11/2025	100-430-3000-42103-0000	
		Check Total:	19.07			
Vendor:	norfa	Northwest Family Physicians PA Inc			Check Sequence: 57	ACH Enabled: False
31110		Random Test	35.00	04/11/2025	100-450-5200-44080-0000	
31110		Random Test	35.00	04/11/2025	100-430-3000-44080-0000	
31110		Random Test	51.00	04/11/2025	601-494-9440-44080-0000	
31110		Random Test	51.00	04/11/2025	602-495-9490-44080-0000	
		Check Total:	172.00			
Vendor:	nbh	Nothing But Hemp LLC			Check Sequence: 58	ACH Enabled: True
3342		THC	204.00	04/11/2025	609-497-9760-42535-0000	
3343		THC Credit	-32.50	04/11/2025	609-497-9760-42535-0000	
		Check Total:	171.50			
Vendor:	olssla	Laurie Olsson			Check Sequence: 59	ACH Enabled: False
1223644		Damage Deposit Refund-Baby Shower 10/20/24	200.00	04/11/2025	100-000-0000-22000-0000	
		Check Total:	200.00			
Vendor:	pauso	Paustis & Sons			Check Sequence: 60	ACH Enabled: True
128223		Liquor Credit	-21.67	04/11/2025	609-497-9760-42510-0000	
262316		Wine	1,514.00	04/11/2025	609-497-9760-42530-0000	
		Check Total:	1,492.33			
Vendor:	phepa	Paulina Phengmany			Check Sequence: 61	ACH Enabled: False
1223633		Damage Deposit Refund-Grad Party 6/8/24 -Phe	200.00	04/11/2025	100-000-0000-22000-0000	
		Check Total:	200.00			
Vendor:	plaza	Zachary Plansky			Check Sequence: 62	ACH Enabled: False
2024		2024 Planning Commission	225.00	04/11/2025	100-410-1910-41030-0000	
		Check Total:	225.00			

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: pomti	Pomp's Tire Service Inc.			Check Sequence: 63	ACH Enabled: True
700070796	#20-004 9R17.5/14 SUMITOMO ST717 555304	592.86	04/11/2025	100-430-3000-42103-0000	
700070849	#30-005 ST235/85R16/14 SAILUN S637T TRL	660.00	04/11/2025	100-430-3000-42103-0000	
	Check Total:	1,252.86			
Vendor: prelo	Premier Locating Inc			Check Sequence: 64	ACH Enabled: False
42998	Locates 3/16/25 - 3/31/25	126.00	04/11/2025	603-496-9495-43150-0000	
42998	Locates 3/16/25 - 3/31/25	387.00	04/11/2025	601-494-9440-43150-0000	
42998	Locates 3/16/25 - 3/31/25	387.00	04/11/2025	602-495-9490-43150-0000	
	Check Total:	900.00			
Vendor: repse	Republic Services #899			Check Sequence: 65	ACH Enabled: False
0899-004734481	Hassan Town Hall - Garbage March	108.48	04/11/2025	100-410-1940-43840-0000	
0899-004734547	PW-Garbage March	216.35	04/11/2025	100-430-3000-43840-0000	
0899-004734547	CH-Garbage March	92.72	04/11/2025	100-410-1940-43840-0000	
	Check Total:	417.55			
Vendor: rogtr	Rogers True Value Hardware Inc			Check Sequence: 66	ACH Enabled: False
29310	Screws & Clamp For Antennas	14.27	04/11/2025	449-420-2210-44310-2209	
29312	Fuse-R11	5.99	04/11/2025	100-420-2210-44040-0000	
29325	1x4 BLK Extrem Fastener(NO)	14.99	04/11/2025	100-430-3000-42100-0000	
29351	Round Point Shovel 48"L	43.99	04/11/2025	100-430-3120-42105-0000	
29351	Razorback LHSP Shovel	37.99	04/11/2025	100-430-3120-42105-0000	
	Check Total:	117.23			
Vendor: tcpro	Sabot Promotional LLC			Check Sequence: 67	ACH Enabled: True
68035	Window Stickers	80.00	04/11/2025	100-410-1910-43500-0000	
	Check Total:	80.00			
Vendor: sattaa	Aaron Sattersten			Check Sequence: 68	ACH Enabled: False
2024	2024 Planning Commission	200.00	04/11/2025	100-410-1910-41030-0000	
	Check Total:	200.00			
Vendor: simpli	Simplifile LC			Check Sequence: 69	ACH Enabled: False

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
930988297819SFL	Recording Fees 3/26/25	92.50	04/11/2025	100-410-1910-43520-0000	
	Check Total:	92.50			
Vendor: souwi	Southern Glazers Wine & Spirits of Minnesota			Check Sequence: 70	ACH Enabled: False
0107979	Liquor Credit	-269.91	04/11/2025	609-497-9760-42510-0000	
0107980	Liquor Credit	-269.91	04/11/2025	609-497-9760-42510-0000	
2604742	Liquor	2,674.03	04/11/2025	609-497-9760-42510-0000	
2604743	Wine	1,039.20	04/11/2025	609-497-9760-42530-0000	
2607370	Liquor	5.12	04/11/2025	609-497-9760-42510-0000	
2607371	Liquor	2,488.33	04/11/2025	609-497-9760-42510-0000	
2607372	Wine	1,216.80	04/11/2025	609-497-9760-42530-0000	
5124390	Liquor	3,074.26	04/11/2025	609-497-9760-42510-0000	
5124391	Liquor	3,074.26	04/11/2025	609-497-9760-42510-0000	
5124392	Wine	540.68	04/11/2025	609-497-9760-42530-0000	
	Check Total:	13,572.86			
Vendor: stise	Seth Stiebinger			Check Sequence: 71	ACH Enabled: False
2024	2024 Planning Commission	250.00	04/11/2025	100-410-1910-41030-0000	
	Check Total:	250.00			
Vendor: strei	Streicher's Inc.			Check Sequence: 72	ACH Enabled: False
I1754729	Uniform Items - Belt Boots & Shirt - Beck	234.98	04/11/2025	100-420-2100-42180-0000	
	Check Total:	234.98			
Vendor: terge	Terra General Contractors, LLC			Check Sequence: 73	ACH Enabled: True
Pay App #4	Pay App #4-Turf Facility Labor	652,173.49	04/11/2025	410-450-5200-45200-2201	
Pay App #4	Pay App #4-Turf Facility Material	68,679.04	04/11/2025	410-450-5200-45200-2201	
	Check Total:	720,852.53			
Vendor: trifo	Trilogy STEM Foundation			Check Sequence: 74	ACH Enabled: False
1235408	Damage Dep. Ref'd-Trilogy Fnd. Fundraiser 5/19	500.00	04/11/2025	100-000-0000-22000-0000	
	Check Total:	500.00			
Vendor: twicig	Twin City Garage Door Co.			Check Sequence: 75	ACH Enabled: True

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
415361273	Repair Broken Bushing On Opener. In Mechanic	3,440.40	04/11/2025	100-430-3000-44010-0000	
415913952	Replace Frame Assembly On Liftmaster Jacksha	1,090.00	04/11/2025	100-430-3000-44010-0000	
	Check Total:	4,530.40			
Vendor: vonco	Vonco II, LLC			Check Sequence: 76	ACH Enabled: True
V20000085640	Street Sweeping 4/2/25	197.32	04/11/2025	603-496-9495-44050-0000	
	Check Total:	197.32			
Vendor: grain	W.W. Grainger, Inc.			Check Sequence: 77	ACH Enabled: True
9461182801	24A785 FILM TAPE 2 IN X 36 YD YELLOW 5	119.09	04/11/2025	100-450-5200-42100-0000	
9461679830	468A90 GOOSENECK 1.42GPM WALL MOUI	621.53	04/11/2025	100-410-1941-42102-0000	
9461933278	4DJA7 BALL CONE SPRING CHECK VALVE	19.54	04/11/2025	100-430-3120-42103-0000	
	Check Total:	760.16			
Vendor: watla	Water Laboratories, Inc.			Check Sequence: 78	ACH Enabled: True
10437	Water Testing March 2025	180.00	04/11/2025	601-494-9440-44080-0000	
	Check Total:	180.00			
Vendor: welfit	Wellness That Fits LLC			Check Sequence: 79	ACH Enabled: False
#10437	Wellness Visit #6	175.00	04/11/2025	100-420-2100-43140-0000	
	Check Total:	175.00			
Vendor: weswh	Westside Wholesale Tire & Supply			Check Sequence: 80	ACH Enabled: True
960473	#15-008 TIRE DISPOSAL	120.00	04/11/2025	100-430-3000-44040-0000	
960473	#15-008 AIR LIQUID TL TIRE VALVE LOADI	30.00	04/11/2025	100-430-3000-44040-0000	
960473	#15-008 480/80R34 164A8 ALLIANCE 550 MU	2,918.00	04/11/2025	100-430-3000-44040-0000	
960473	#15-008 MOUNT TIRE-REPLACE REAR TIRI	200.00	04/11/2025	100-430-3000-44040-0000	
961063	18X950X8/4 P605 RM SMOOTH TL #10-018 &	81.06	04/11/2025	100-430-3000-42103-0000	
	Check Total:	3,349.06			
Vendor: yalme	Yale Mechanical, LLC			Check Sequence: 81	ACH Enabled: True
27782	RPZ Testing - FD	92.22	04/11/2025	100-420-2210-44010-0000	
27782	RPZ Testing - Event Ctr	164.67	04/11/2025	100-410-1941-44010-0000	
27782	RPZ Testing - RAC	494.01	04/11/2025	205-450-5205-44010-0000	

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
27782	RPZ Testing - PW Wash Bay	329.34	04/11/2025	100-430-3000-44010-0000	
27782	RPZ Testing - LCP & Splash Pad	494.01	04/11/2025	100-450-5200-44010-0000	
27782	RPZ Testing - RWAS	164.67	04/11/2025	609-497-9760-44010-0000	
27782	RPZ Testing - CR	72.45	04/11/2025	100-410-1940-44010-0000	
27782	RPZ Testing - PD	658.68	04/11/2025	100-420-2100-44010-0000	
	Check Total:	2,470.05			
Vendor: zarbr	Zarnoth Brush Works, Inc.			Check Sequence: 82	ACH Enabled: True
0201487-IN	#20-004 ZBW-CW-E-HD Elgin HD Poly Broom	656.00	04/11/2025	603-496-9495-42103-0000	
0201487-IN	#20-004 EL-1035525 Dirt Shoe - Front	53.60	04/11/2025	603-496-9495-42103-0000	
0201487-IN	#20-004 EL-1054322 Dirt Shoe - Rear	79.80	04/11/2025	603-496-9495-42103-0000	
	Check Total:	789.40			
Vendor: ziein	Ziegler, Inc.			Check Sequence: 83	ACH Enabled: True
IN001856924	2693755 Strainer #15-017	98.08	04/11/2025	100-430-3120-42103-0000	
IN001858102	RENTAL: 45' Hybrid Articulating Boom Lift	830.00	04/11/2025	100-450-5200-44100-0000	
IN001859941	#25-003 2644H202 - 907 Injection Pump	1,467.46	04/11/2025	602-495-9490-42103-0000	
IN001859941	#25-003 2644H202 - 907 Injection Pump	1,467.45	04/11/2025	601-494-9440-42103-0000	
IN001859992	7K9203 Seal: #20-006	38.32	04/11/2025	100-430-3000-42103-0000	
IN001859992	7K9208 Seal: #20-006	41.22	04/11/2025	100-430-3000-42103-0000	
IN001859992	4V2873 Brg Sleeve: #20-006	137.52	04/11/2025	100-430-3000-42103-0000	
IN001859992	4V2588 Pin A: #20-006	508.46	04/11/2025	100-430-3000-42103-0000	
IN001859992	4V3619 Pin A: #20-006	322.77	04/11/2025	100-430-3000-42103-0000	
IN001859992	4V2883 Brg Sleeve: #20-006	78.31	04/11/2025	100-430-3000-42103-0000	
IN001861846	4589585 Paint-Black	91.44	04/11/2025	100-430-3000-42103-0000	
IN001861846	5900196 Paint-Yellow	91.44	04/11/2025	100-430-3000-42103-0000	
	Check Total:	5,172.47			
	Total for Check Run:	1,157,323.47			
	Total of Number of Checks:	83			

Accounts Payable

Computer Check Proof List by Vendor

User: mrathlisberger@rogersmn.gov
Printed: 04/11/2025 - 9:23AM
Batch: 00003.04.2025

Invoice No	Description	Amount	Pmt Date	Acct Number	Reference
Vendor: UB*00445	Kaylee Benson			Check Sequence: 1	ACH Enabled: False
	Refund Check 010866-000, 13848 Dahlia Dr	7.91	04/11/2025	601-000-0000-20200-0000	
	Check Total:	7.91			
Vendor: UB*00440	Kelly Croteau			Check Sequence: 2	ACH Enabled: False
	Refund Check 009229-000, 21638 Evergreen Tr	30.87	04/11/2025	601-000-0000-20200-0000	
	Check Total:	30.87			
Vendor: UB*00448	Franklin Outdoor Advertising			Check Sequence: 3	ACH Enabled: False
	Refund Check 013691-000, 22402 Industrial Bl	7.32	04/11/2025	603-000-0000-20200-0000	
	Refund Check 013691-000, 22402 Industrial Bl	1.73	04/11/2025	603-000-0000-20200-0000	
	Check Total:	9.05			
Vendor: UB*00449	Cody & Shauna Heitzman			Check Sequence: 4	ACH Enabled: False
	Refund Check 011038-000, 24567 Superior Dr	12.42	04/11/2025	601-000-0000-20200-0000	
	Check Total:	12.42			
Vendor: UB*00441	Jonathan Lott			Check Sequence: 5	ACH Enabled: False
	Refund Check 012509-000, 13642 Marsh View	109.82	04/11/2025	601-000-0000-20200-0000	
	Check Total:	109.82			
Vendor: UB*00442	Bradley Mateja			Check Sequence: 6	ACH Enabled: False
	Refund Check 003148-000, 13964 Starlite Dr	63.40	04/11/2025	601-000-0000-20200-0000	
	Check Total:	63.40			
Vendor: UB*00447	Pulte Home of MN			Check Sequence: 7	ACH Enabled: False
	Refund Check 013609-000, 21977 Harvest Ave	55.98	04/11/2025	601-000-0000-20200-0000	

Invoice No		Description	Amount	Pmt Date	Acct Number	Reference
		Check Total:	55.98			
Vendor:	UB*00446	Pulte Homes of MN			Check Sequence: 8	ACH Enabled: False
		Refund Check 013732-000, 12797 Farnham Ln	36.75	04/11/2025	601-000-0000-20200-0000	
		Check Total:	36.75			
Vendor:	UB*00450	Pulte Homes of MN			Check Sequence: 9	ACH Enabled: False
		Refund Check 013468-000, 21972 Harvest Ave	40.90	04/11/2025	601-000-0000-20200-0000	
		Check Total:	40.90			
Vendor:	UB*00451	Brent Sipe			Check Sequence: 10	ACH Enabled: False
		Refund Check 010248-000, 11535 Trail Haven I	35.95	04/11/2025	601-000-0000-20200-0000	
		Check Total:	35.95			
Vendor:	UB*00444	Lisa & Kevin Six			Check Sequence: 11	ACH Enabled: False
		Refund Check 011379-000, 19212 Grass Lake T	76.58	04/11/2025	601-000-0000-20200-0000	
		Check Total:	76.58			
Vendor:	UB*00443	Marrea Wilson			Check Sequence: 12	ACH Enabled: False
		Refund Check 007386-000, 13092 Brookside Lı	82.62	04/11/2025	601-000-0000-20200-0000	
		Check Total:	82.62			
		Total for Check Run:	562.25			
		Total of Number of Checks:	12			

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.3

Subject: Approval of Resolution 2025-29; A Resolution Providing Municipal Approval to the Issuance of a Minnesota Lawful Gambling License to the Rogers Lions Club at Broadway Bar and Pizza Located at 14040 Rogers Drive, Rogers, MN

Prepared By: Stacie Brown, City Clerk

Recommended Council Action

Motion to approve Resolution 2025-29; A Resolution Providing Municipal Approval to the Issuance of a Minnesota Lawful Gambling License to the Rogers Lions Club at Broadway Bar & Pizza Located at 14040 Rogers Drive.

Overview / Background / Analysis

The Rogers Lions Club has submitted an application to conduct meat raffles and horse races on Monday nights at Broadway Bar & Pizza located at 14040 Rogers Drive.

Staff Recommendation

Motion to approve Resolution 2025-29; A Resolution Providing Municipal Approval to the Issuance of a Minnesota Lawful Gambling License to the Rogers Lions Club at Broadway Bar & Pizza Located at 14040 Rogers Drive.

Financial Impact: **Source Fund**:

Budgeted? N/A

Supporting Documentation

A. 2025-29 Providing Municipal Approval to Issuance of MN Gambling License - Rogers Lions - Broadway

RESOLUTION NO. 2025-29

A RESOLUTION PROVIDING MUNICIPAL APPROVAL TO THE ISSUANCE OF A MINNESOTA LAWFUL GAMBLING LICENSE TO THE ROGERS LIONS CLUB AT BROADWAY BAR AND PIZZA LOCATED AT 14040 ROGERS DRIVE, ROGERS, MN

WHEREAS, the Rogers Lions Club has made application for a Minnesota Lawful Gambling License at Broadway Bar and Pizza located at 14040 Rogers Drive, Rogers, MN; and

WHEREAS, the Rogers Lions Club is an active non-profit organization within the Rogers area that has generously contributed within the community; and

WHEREAS, the City Council finds that authorizing the operation of gambling in Broadway Bar and Pizza provides local civic organizations the opportunity to raise needed funds to undertake community oriented improvements that benefit the Rogers area.

NOW THEREFORE BE IT RESOLVED that the City Council of the City of Rogers hereby approves the issuance of a Lawful Gambling License to the Rogers Lions Club at Broadway Bar and Pizza located at 14040 Rogers Drive, Rogers, MN.

Moved by Councilmember , seconded by Councilmember

The following voted in favor of said resolution:

The following voted against said resolution:

The following abstained:

Whereupon said resolution was declared duly passed and adopted, and was signed by the Mayor, and attested by the Clerk dated this 22nd day of April, 2025.

_____
Mayor

ATTEST:

_____
City Clerk

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.4

Subject: Approval of Application for Gambling Exempt Permit for Mary Queen of Peace Catholic Church
Prepared By: Stacie Brown, City Clerk

Recommended Council Action
Motion to approve an application for Mary Queen of Peace Catholic Church to conduct bingo and raffles at 21304 Church Avenue on September 27 & 28, 2025.

Overview / Background / Analysis
Mary Queen of Peace Catholic Church has submitted an application to conduct bingo and raffles at 21304 Church Avenue on September 27 & 28, 2025.

Staff Recommendation
Motion to approve an application for Mary Queen of Peace Catholic Church to conduct bingo and raffles at 21304 Church Avenue on September 27 & 28, 2025.

Financial Impact: **Source Fund**:

Budgeted? N/A

Supporting Documentation
None

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.5

Subject: Approval of an Easement Encroachment Agreement for the Property at 22000 Industrial Blvd
Prepared By: Brett Angell, Community Development Director

Recommended Council Action
Motion to approve the Easement Encroachment Agreement with 22000 Industrial Blvd Own, LP for the property at 22000 Industrial Blvd.

Overview / Background / Analysis
In late January, I-94 Industrial Blvd Owner, LP ("Applicant") submitted a site plan application for a minor expansion of their parking lot at 22000 Industrial Blvd. The said parking lot improvements were minor in scale and were approved via administrative action. The improvements correspond to adding additional passenger vehicle parking to the southwest portion of the building. These improvements were necessitated by the recent leasing of a portion of the building to ABC Supply, a roofing supply company. ABC Supply is incorporating a small showroom space into the building and the parking is for guests.

Per the conditions of the administrative approval, the Applicant must enter into an Easement Encroachment Agreement with the city corresponding to the ramp and retaining wall improvements made within an easement. The agreement ensures the Applicant is responsible for the maintenance of the improvements and that the city still has the ability to enter the easement as necessary. A draft of the agreement is attached to this memorandum. Following full execution of the agreement, it is recorded against the property with Hennepin County.

Staff Recommendation
Staff recommends approval of the Easement Encroachment Agreement for the property at 22000 Industrial Blvd related to the parking lot improvements.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation
A. Easement Encroachment Agreement

EASEMENT ENCROACHMENT AGREEMENT

This Easement Encroachment Agreement is entered into on the 22nd day of April, 2025, between the City of Rogers, a Minnesota municipal corporation with its principal office at 22350 South Diamond Lake Road, Rogers, Minnesota, 55374 ("**City**") and 22000 Industrial Blvd Own, LP, a Delaware Limited Partnership with its principal office at 591 West Putnam Ave, Greenwich, CT 06830("**Owner**").

RECITALS

1. The Owner is the fee owner of the real property located at 22000 Industrial Boulevard, Rogers, Minnesota, 55374 ("**Subject Property**") which property is legally described as follows:

   Legal Description
   Lot 1, Block 1, Rogers Plastic Center 4th Addition, according to the recorded plat thereof, County of Hennepin, State of Minnesota.

2. The plat of Rogers Plastic Center 4th Addition contains a drainage and utility easement as shown on said plat; a portion of said drainage and utility easement encumbers the Subject Property (together, the "**Easement Area**").

3. The Owner has requested that they be permitted to construct or has constructed ramp and retaining wall improvements within the Easement Area; as shown on the site plan attached hereto as Exhibit A (the "**Improvement**"), which is incorporated into and made part of this Agreement.

4. The Owner has indicated a willingness to accept all risks and liabilities associated with the construction of the Improvement within the Easement Area.

5. The City has determined, by engineering review, that construction of the Improvement by the Owner will not adversely impact the function of the Easement Area.

6. The City Council is willing to grant the Owner's request subject to certain conditions.

NOW, THEREFORE, the parties hereto agree as follows:

1. The Owner is allowed to construct the Improvement on the Subject Property as approved by the City as part of the Owner's site plan review, in accordance with Exhibit A.

2. The size of the easement encroachment is shown on the site plan in Exhibit A and described on the attached Exhibit B ("**Easement Encroachment Area**"). The Easement Encroachment Area is limited to that portion of the drainage and utility easement needed to install and maintain the Improvement as shown on

the approved site plan.

3. The Improvement shall be installed and maintained such that it does not interfere with the drainage way or maintenance of the drainage and utility Easement Area.

4. The Owner accepts all risk and responsibility of constructing, using, maintaining, repairing, and improving the Improvement and agrees hereby to defend and indemnify the City from any and all damages or causes of action, whatsoever, to themselves or others, occurring as a result of the Improvement construction.

5. The City may, at its sole discretion, terminate this Agreement at any time by giving the then Owner of the Subject Property thirty (30) days advance written notice, except that no notice period will be required in the case of an emergency condition as determined solely by the City and the Agreement may then be terminated immediately. The Owner shall remove the Improvement to the extent it impacts the easement areas to the effective date of the termination of this Agreement. If the owner fails to do so, the City may remove the Improvement to the extent it impacts the easement areas and charge the cost of removal back to the Owner for reimbursement.

6. The City will be allowed to work and to maintain the area within the drainage and utility easement on the Subject Property if such need should arise for the easement to function properly.

7. This Agreement shall run with the land and shall be recorded against the title to the Subject Property.

[Remainder of Page Intentionally Left Blank]

22000 INDUSTRIAL BLVD OWNER, LP

Joseph Walker

Its: Authorized Signatory

STATE OF MINNESOTA)
) ss.
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this 15th day of April, 2025 by Joseph Walker, Authorized Signatory of 22000 Industrial Blvd Owner, LP, a Delaware Limited Partnership.

Notary Public

CITY OF ROGERS

_____
Shannon Klick

Its: Mayor

_____
Stacie Brown

Its: Clerk

STATE OF MINNESOTA)
) ss.
COUNTY OF HENNEPIN)

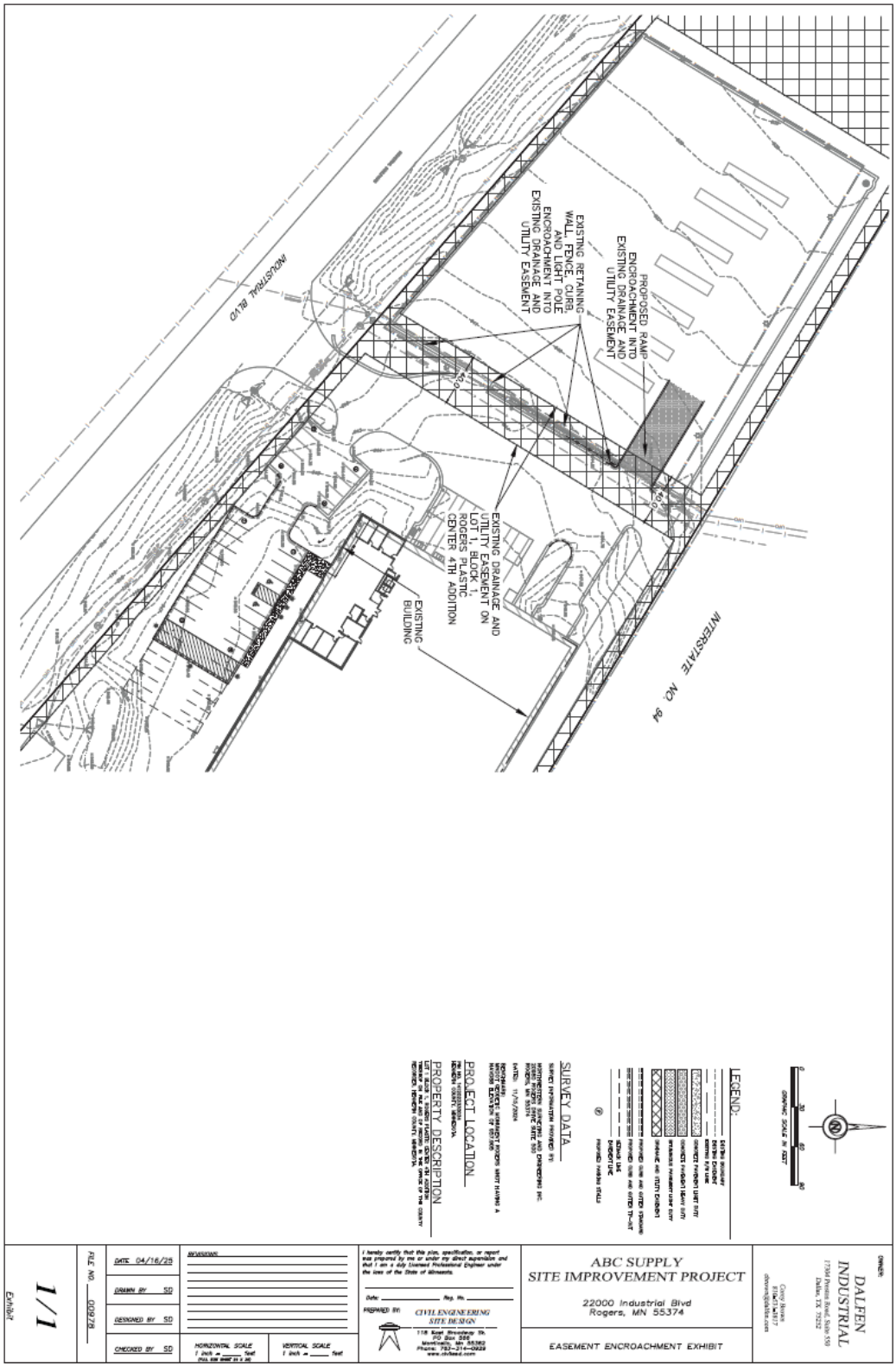
The foregoing instrument was acknowledged before me this 22nd day of April, 2025 by Shannon Klick and Stacie Brown, the Mayor and Clerk, respectively, for the City of Rogers.

_____
Notary Public

THIS INSTRUMENT WAS DRAFTED BY:
City of Rogers,
22350 South Diamond Lake Road
Rogers, Minnesota, 55374

EXHIBIT A

Depiction of the Easement Encroachment Area and the Improvement



A-1

EXHIBIT B

Legal Description

Lot 1, Block 1, Rogers Plastic Center 4th Addition, Hennepin County, Minnesota, according to the recorded plat thereof

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.6

Subject: Approval of a Easement Encroachment Agreement and Trail Easement with Veit Related to the Veit Headquarters Property at 14000 Veit Place
Prepared By: Brett Angell, Community Development Director

Recommended Council Action
Motion to approve an Easement Encroachment Agreement and Trail Easement with Veit Related to the Veit Headquarters property at 14000 Veit Place.

Overview / Background / Analysis
In November 2024, the City Council approved plans and new plat related to an expansion of the current Veit Headquarters facility at 14000 Veit Place. The re-plat of the property included the vacation of several old easements and adding new easements as deemed necessary. Following the City Council approval, staff worked with Veit representatives on finalizing all the related items needed for this development to move forward. Per the conditions of approval for the plat, the applicant was required to enter into an Easement Encroachment Agreement and Trail Easement with the City.

The Easement Encroachment Agreement pertains to multiple areas of the property and is entirely related to existing conditions for the property of items that are already installed. This includes some of their parking/storage areas, as well as retaining walls and landscaping near the entrance to the property. The Easement Encroachment Agreement ensures the applicant is responsible for maintenance of the improvements and the city is able to remove said improvements if needed. The Trail Easement corresponds to establishing a trail easement on Lot 1, Block 2 on the south side of Industrial Blvd. Said trail easement will be part of a future trail that is constructed in this area. Drafts of both agreements are attached to this memorandum.

Staff Recommendation
Staff recommends approval an Easement Encroachment Agreement and Trail Easement with Veit Related to the Veit Headquarters property at 14000 Veit Place.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation
A. Draft Easement Encroachment Agreement
B. Draft Trail Easement

EASEMENT ENCROACHMENT AGREEMENT

This Easement Encroachment Agreement is entered into on the 22nd day of April 2025, between the City of Rogers, a Minnesota municipal corporation with its principal office at 22350 South Diamond Lake Road, Rogers, Minnesota, 55374 ("**City**") and Veit Companies, LLC, a Minnesota limited liability company with its principal office at 14000 Veit Place, Rogers, Minnesota 55374 ("**Owner**").

RECITALS

1. The Owner is the fee owner of the real property located at 14000 Veit Place, Rogers, Minnesota, 55374 ("**Subject Property**") which property is legally described as follows:

   Legal Description
   Lot 1 Block 1, Veit Headquarters, according to the recorded plat thereof, County of Hennepin, State of Minnesota.

2. The plat of Veit Headquarters contains a drainage and utility easement as shown on said plat; a portion of said drainage and utility easement encumbers the Subject Property (together, the "**Easement Area**").

3. The Owner has requested that they be permitted to construct or has constructed parking lot, retaining wall, and landscaping improvements within the Easement Area; as shown on the site plan attached hereto as Exhibit A (the "**Improvement**"), which is incorporated into and made part of this Agreement.

4. The Owner has indicated a willingness to accept all risks and liabilities associated with the construction of the Improvement within the Easement Area.

5. The City has determined, by engineering review, that construction of the Improvement by the Owner will not adversely impact the function of the Easement Area.

6. The City Council is willing to grant the Owner's request subject to certain conditions.

NOW, THEREFORE, the parties hereto agree as follows:

1. The Owner is allowed to construct the Improvement on the Subject Property as approved by the City as part of the Owner's site plan review, in accordance with Exhibit A.

2. The size of the easement encroachment is shown on the site plan in Exhibit A and described on the attached Exhibit B ("**Easement Encroachment Area**"). The Easement Encroachment Area is limited to that portion of the drainage and utility easement needed to install and maintain the Improvement as shown on

the approved site plan.

3. The Improvement shall be installed and maintained such that it does not interfere with the drainage way or maintenance of the drainage and utility Easement Area.

4. The Owner accepts all risk and responsibility of constructing, using, maintaining, repairing, and improving the Improvement and agrees hereby to defend and indemnify the City from any and all damages or causes of action, whatsoever, to themselves or others, occurring as a result of the Improvement construction.

5. The City may, at its sole discretion, terminate this Agreement at any time by giving the then Owner of the Subject Property thirty (30) days advance written notice, except that no notice period will be required in the case of an emergency condition as determined solely by the City and the Agreement may then be terminated immediately. The Owner shall remove the Improvement to the extent it impacts the easement areas to the effective date of the termination of this Agreement. If the owner fails to do so, the City may remove the Improvement to the extent it impacts the easement areas and charge the cost of removal back to the Owner for reimbursement.

6. The City will be allowed to work and to maintain the area within the drainage and utility easement on the Subject Property if such need should arise for the easement to function properly.

7. This Agreement shall run with the land and shall be recorded against the title to the Subject Property.

[Remainder of Page Intentionally Left Blank]

VEIT COMPANIES, LLC

_____
Name

Its:

STATE OF MINNESOTA)
) ss.
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this _____ day of _____, 2025 by _____, president of Veit Companies, LLC, a Minnesota limited liability company.

_____
Notary Public

CITY OF ROGERS

_____
Shannon Klick

Its: Mayor

_____
Stacie Brown

Its: Clerk

STATE OF MINNESOTA)
) ss.
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this _____ day of _____, 2025 by Shannon Klick and Stacie Brown, the Mayor and Clerk, respectively, for the City of Rogers.

_____
Notary Public

THIS INSTRUMENT WAS DRAFTED BY:
City of Rogers,
22350 South Diamond Lake Road
Rogers, Minnesota, 55374

EXHIBIT A

Depiction of the Easement Encroachment Area and the Improvement

[See attached.]

EXHIBIT B

Description of the Easement Encroachment Area

That part of Lot 1, Block 1, Veit Headquarters, Hennepin County, Minnesota, according to the recorded plat thereof, described as follows:

DECLARATION OF PERMANENT TRAIL EASEMENT

THIS INSTRUMENT is made this 22nd day of April, 2025, by Veit Companies, LLC, a limited liability company, located at 14000 Veit Place, Rogers, MN 55374 ("Grantor"), in favor of the City of Rogers, a Minnesota municipal corporation ("City" or "Grantee").

RECITALS

A. Grantor is the owner of that certain real property in the City legally described in Exhibit A attached hereto ("Subject Property").

B. Grantor has agreed to grant a Permanent Trail Easement ("Trail Easement") over across, under and through a portion of the Property ("Trail Easement Area"), as legally described in Exhibit B attached hereto and as depicted in Exhibit C attached hereto, on the following terms and conditions.

TERMS OF EASEMENT

1. Grant of Easement. Grantor does hereby grant onto Grantee, its successors and assigns, a permanent, non-exclusive, easement for public trail purposes over, across, under and through the Trail Easement Area.

2. Scope of Easement. The Trail Easement includes the right of Grantee, its contractors, agents, servants and assigns include the rights to enter upon the Trail Easement Area at reasonable times to construct, reconstruct, inspect, repair, maintain and improve a public trail system over, across, under and through the Trail Easement Area together with the right to grade, level, fill, drain and excavate the Trail Easement Area, and further right to remove trees, bushes, undergrowth and other obstructions interfering with the location, construction and maintenance of the Trail Easement. The Trail Easement also includes the right of the Grantee, its contractors, agents, and employees to locate, relocate, construct,

operate, maintain, alter, repair, and improve trail facilities within the described Trail Easement Area. As used herein, "trail purposes" is defined as the use of trail facilities for recreational purposes by pedestrians, non-motorized bicycles, public safety (police and fire) and public works vehicles, and electric-powered wheelchairs and small electric carts operated by physically disabled people. The use of trail facilities by snowmobiles, dirt bikes, motorcycles, all-terrain vehicles, or other motorized vehicles not expressly allowed herein or used to maintain the trail are not included within the scope of the easement granted herein and such uses are prohibited. Grantee may, but shall not be obligated to, impose such reasonable rules, regulations and ordinances governing the use of the Trail Easement as it deems appropriate and desirable.

3. Use of the Trail. Grantee, its officers, employees, agents, and contractors may operate motorized vehicles within the Trail Easement Area as needed to construct, reconstruct, maintain, improve, or alter the trail. Grantor may use the Trail Easement Area and may operate motorized vehicles on the trail in Grantor's discretion for purposes of constructing the trail facilities or other improvements related to the development of the land, provided such use does not unreasonably interfere with the use of the Trail Easement Area for trail purposes and does not damage the trail or its related structures.

4. Non-Interference and Improvements. Grantor shall not construct any buildings, structures, or other improvements within the Trail Easement Area except as is reasonably needed to accommodate its access to the Property and which do not unreasonably interfere with the use of the Trail Easement Area for trail purposes. Grantor shall have the right to continued access to roads, parking areas, and other improvements adjacent to the trail and shall have the right to enter upon the Trail Easement Area for any lawful purpose provided there is no interference with the use, maintenance, and operation of the Trail Easement Area for trail purposes.

5. Recordation. Grantee shall, at its own cost, record this document in a timely fashion in the office of the Dakota County Recorder and provide the Grantor a copy of the recorded document.

6. Entire Agreement. This document sets forth the entire agreement between the parties with respect to this easement and supersedes all prior discussions, negotiations, understandings, or agreements relating to the easement.

7. Prior Encumbrances. This easement is granted subject to all prior easements or encumbrances of record.

8. Warranty of Title. The Grantors warrant they are the owners of the Property and have the right, title and capacity to convey to the Grantee the easement herein.

9. Environmental Matters. The Grantee shall not be responsible for any costs, expenses, damages, demands, obligations, including penalties and reasonable attorney's fees, or losses resulting from any claims, actions, suits or proceedings based upon a release or threat

of release of any hazardous substances, pollutants, or contaminants that may have existed on, or that relate to, the easement area or Property prior to the date of this instrument.

10. Binding Effect. The terms and conditions of this instrument shall run with the land and be binding on the Grantor, the Grantee, and their successors, and assigns.

STATE DEED TAX DUE HEREON: NONE

Dated this 22nd day of April, 2025.

[signature page follows]

GRANTOR:

VEIT COMPANIES, LLC

_____

Its

STATE OF MINNESOTA)
) ss.
COUNTY OF)

The foregoing instrument was acknowledged before me this _____ day of _____ 2025, by

_____
Notary Public

THIS INSTRUMENT DRAFTED BY:

Kennedy & Graven, Chartered (MDT)
470 U.S. Bank Plaza
200 South Sixth Street
Minneapolis, MN 55402
(612) 337-9300

EXHIBIT A

SUBJECT PROPERTY
LEGAL DESCRIPTION

LOT 1, BLOCK 2, VEIT HEADQUARTERS, Hennepin County, Minnesota

EXHIBIT B

TRAIL EASEMENT AREA
LEGAL DESCRIPTION

TO BE INSERTED

EXHIBIT C

MAP OF TRAIL EASEMENT AREA

TO BE INSERTED

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.7

Subject: Approval of the First Amendment to the Purchase Agreement with Duffy Development to Allow for an Additional 60-Days to Close
Prepared By: Brett Angell, Community Development Director

Recommended Council Action
Motion to approve the first amendment to the purchase agreement with Duffy Development to allow for an additional 60-days to close.

Overview / Background / Analysis
On June 9th, 2020, the City of Rogers entered into a purchase agreement with Duffy Development ("Buyer") for the sale of city-owned property on Main Street related to the development of a new 40-unit senior affordable multifamily development with an attached senior center, which would be operated by the city, and a small commercial space. On July 13th, 2021, two separate purchase agreements were entered into with Duffy to further clarify the details of the sale with the intention that these agreements would replace the original 2020 agreement. On January 29th, 2025, the city entered into a new purchase agreement which replaced all previous agreements and clarified the remaining items as the city and developer push towards a closing.

Since the time of the most recent purchase agreement being executed, the Buyer and city staff have met on a weekly basis to discuss progress, issues, and updates as it pertains to the development. Over the course of this timeframe, the developer has completed numerous milestones to get closer to a closing date, including, but not limited to, submission of its financing package to Minnesota Housing to finalize its funding, submission of a building permit and partial payment to the city to complete the plan review, finalization of the construction contract, and submission of a final plat for the future re-plat of the property. With the additional non-refundable escrow payment related to the purchase agreement and the plan review fee for the building permit, the Buyer has submitted approximately $35,000 of non-refundable funds to the city since the January.

There have been challenges and issues that have arisen since the time of the purchase agreement being approved which have mostly been overcome through the developer taking on additional risk and investment within the project. These issues have been related to increased insurance costs, tariff impacts, and changes to some of the original investor and state financing.

The current agreement has a closing date of May 1st unless an extension has been granted. The proposed amendment to the purchase agreement grants an additional 60-

days to close, bringing the closing date to July 1st. The proposed extension is needed for the project to get further in the Minnesota Housing financing process. The developer has submitted all required items and is awaiting mortgage credit review. Once approved by mortgage credit, there is approximately a three-month timeframe until the developer is able to close on the financing. The proposed extension allows for both the city and the developer to receive the necessary assurances of the financing from Minnesota Housing.

At the time the recent 2025 agreement was approved, the council expressed a desire to see the project take place and that time was of the essence for the development and closing. Staff feel comfortable with the short extension based upon the weekly update calls with the developer and progress that the developer has made towards closing.

Staff Recommendation
Staff recommends approval of the first amendment to the purchase agreement with Duffy Development for additional time to closing.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation
A. First Amendment to Purchase Agreement

FIRST AMENDMENT TO PURCHASE AGREEMENT

THIS FIRST AMENDMENT is made and entered into this 22nd day of April, 2025 ("Effective Date"), by and between the City of Rogers, a Minnesota municipal corporation (the "Seller") and Duffy Development Company, Inc., a Minnesota corporation (the "Buyer").

RECITALS

1) The Seller is the fee owner of approximately 1.94 acres of real property legally described at Lot 2, Block 1, Main Street Center Addition, Hennepin County, Minnesota (the "Property").

2) The Seller has agreed to sell and the Buyer has agreed to purchase the Property subject to the terms and conditions of the purchase agreement duly executed between the parties on February 21st, 2025 (the "Purchase Agreement").

3) The parties agree to amend Section 3 Closing Date based upon the need for an additional 60 days for the Buyer's primary financer, Minnesota Housing, to complete the required approval steps for funding the development.

NOW, THEREFORE, the parties hereto agree as follows:

1) The Closing Date (Section 3 of the Purchase Agreement) shall be amended from May 1, 2025 to July 1, 2025.

2) All other terms of the purchase agreement and any amendments remain binding.

[*Signatures on following page.*]

BUYER:
Duffy Development Company, Inc.

By: _____
John Duffy, President

SELLER:
City of Rogers

By: _____
Shannon Klick, Mayor

By: _____
Stacie Brown, City Clerk

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.8

Subject: Approval of Resolution 2025-28 Authorizing the Submission of an Environmental Response Fund (ERF) Application to Hennepin County for the Civic Campus Site

Prepared By: Brett Angell, Community Development Director

Recommended Council Action

Motion to approve Resolution 2025-28 authorizing the submission of an environmental response fund application to Hennepin County for the Civic Campus development.

Overview / Background / Analysis

In 2023, the City of Rogers acquired multiple properties at County Rd 81 and Main Street which included the former Boyer Trucks property and former triplex property. Combined with the former Holiday gas station property, which the city acquired in 2015, the properties have a combined acreage of approximately 4.3 acres as a redevelopment site. Following the acquisition of the property, the City Council explored a few different redevelopment scenarios for the property. Ultimately, the direction was to move forward with exploring the site as a future civic campus site, which would include a new police department, new city hall facility, and related corridor amenities of parking and plaza space.

Over the course of the past two years, the city has contracted with Braun Intertec for environmentally-related items. This has included a Phase I Environmental Site Assessment (ESA), Phase II ESA, enrollment into the Voluntary Investigation and Cleanup (VIC) program, and completion of a Response Action Plan. Due to the previous uses of an industrial site and a former gas station which had leaks in the underground tanks, there are mitigation and remediation measures that must take place upon redevelopment. Much of the remediation is related to petroleum impacts from the former gas station.

On a bi-annual basis (spring and fall), Hennepin County solicits applications for municipalities to apply for funding through their Environmental Response Fund (ERF) program. ERF provides grant funding for environmental assessment and cleanup of contaminated sites where cost is a barrier. ERF is a long-standing program which has granted over 400 projects over $56 million in awards over the duration of the program's existence. The City of Rogers has utilized this grant program in the past, with the most recent award being related to the Duffy development on Main Street. The ERF program does not have restrictions on the use of grant funds for public developments, unlike the Metropolitan Council's Tax Base Revitalization Account (TBRA) or DEED Redevelopment Grant programs.

The proposed resolution authorizes staff to submit a grant application to Hennepin County for an ERF award. The proposed use of the funds is for soil water remediation. Staff are seeking to submit this grant application on May 1, 2025, for the spring 2025 round of funding. While there is no direct date for when the project will commence, the submission of a grant application at this time allows for the city to submit in future grant rounds, should the grant application not be funded this round, or have the certainty of the funding in place as design work continues. The grant application is anticipated to request approximately $500,000 for environmental cleanup.

Staff Recommendation

Staff recommends approval of Resolution 2025-28 authorizing the submission of an Environmental Response Fund application to Hennepin County for the Civic Campus site

Financial Impact: Not Applicable. **Source Fund**: Not Applicable.

Budgeted? N/A

Supporting Documentation

A. Resolution No. 2025-28

RESOLUTION NO. 2025-28

A RESOLUTION AUTHORIZING THE SUBMISSION OF AN ENVIRONMENTAL RESPONSE FUND APPLICATION TO HENNEPIN COUNTY FOR THE CIVIC CAMPUS DEVELOPMENT

WHEREAS, the City of Rogers currently owns property at 21701 Industrial Blvd (PIDs 2312023240025, 2312023240026, 2312023240004, and 2312023240006), 13017 Main Street (PID 2312023240023), and 13009 Main Street (2312023240014) which has a combined size of approximately 4.35 acres (collectively referred to as "Property"); and

WHEREAS, the City Council of the City of Rogers has identified this Property as a future civic campus site comprised of a new City Hall and Police Department; and

WHEREAS, under previous environmental testing of the Property, including but not limited to Phase I ESA, Phase II ESA, and RAP development, the Property has required environmental remediation for the future development of the site; and

WHEREAS, Hennepin County offers local municipalities the ability to apply for funds related to environmental work through the Environmental Response Fund (ERF) program; and

WHEREAS, the City of Rogers intends to apply for funding through the ERF program during the Spring 2025 application period.

NOW THEREFORE, BE IT RESOLVED, BY THE CITY COUNCIL OF THE CITY OF ROGERS, MINNESOTA, approves the civic campus environmental cleanup project, for which an Environmental Response Fund grant application is being submitted to the Hennepin County Environment and Energy Department on May 1st, 2025 by the City of Rogers and authorizes the Community Development Director to execute a grant agreement for the project should funding be awarded.

Moved by Councilmember , seconded by Councilmember

The following voted in favor of said resolution:

The following voted against the same:

The following abstained:

Whereupon said resolution was declared duly passed and adopted, and was signed by the Mayor, and attested by the City Clerk dated this 22nd day of April, 2025.

_____
Shannon Klick, Mayor

ATTEST:

_____
Stacie Brown, City Clerk

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.9

Subject: Approve Deferred Assessment Agreement for PID 21-120-23-44-0004 (Hofford)
Prepared By: Doran Cote, Public Works Director/City Engineer

Recommended Council Action
Motion to Approve Deferred Assessment Agreement for PID 21-120-23-44-0004 (Hofford)

Overview / Background / Analysis
As part of the Big Woods Crossing residential development, Forestar USA Real Estate Group installed water main and sanitary sewer across 23950 Territorial Road (Hofford) to serve the eastern part of their Big Woods Crossing development (see attached plans). That installation included a water and sewer service to serve the home on the Hofford property. Mr. Hofford now desires to connect his home to city water and sewer and would normally be required to pay water and sewer area charges at the time of connection. Since the Hoffords are not interested in developing their 5-acre parcel at this time, staff suggested and Hoffords agreed that deferring the assessments though an agreement would be preferable. This situation is similar to a recent development scenario when Birchwood was developed by DR Horton next to the Lucas property on Brockton Lane in 2020. The Lucas' entered into a Deferred Assessment Agreement so they would not immediately be subject to area charges and street assessments.

Staff Recommendation
Motion to Approve Deferred Assessment Agreement for PID 21-120-23-44-0004 (Hofford)

Financial Impact: $36,800 Deferred **Source Fund**: N/A

Budgeted? N/A

Supporting Documentation
A. Deferred Assessment Agreement
B. Pages Big Woods Planes

DEFERRED ASSESSMENT AGREEMENT
(Jeffrey and Jan Hofford / PID 21-120-23-44-0004)

THIS AGREEMENT is made this 11th day of April, 2025, by and between Jeffrey Hofford and Jan Hofford (collectively "Owner") and the City of Rogers, a Minnesota municipal corporation ("City").

WITNESSETH:

WHEREAS, Owner is the fee owner of land in Hennepin County, Minnesota, legally-described as follows:

> That part of the Southeast Quarter of the Southeast Quarter of Section 21, Township 120, Range 23, Hennepin County, Minnesota described as follows:
>
> Commencing at the northeast corner of said Southeast Quarter of the Southeast Quarter; thence South 00 degrees 37 minutes 43 seconds West, assumed bearing along the east line of said Southeast Quarter of the Southeast Quarter, a distance of 587.68 feet to the point of beginning of the centerline to be described; thence North 72 degrees 09 minutes 51 seconds West, a distance of 55.53 feet; thence northwesterly along a tangential curve, concave to the northeast, having a central angle of 05 degrees 20 minutes 55 seconds, a radius of 3042.05 feet for an arc distance of 283.98 feet to the west line of said East 320.00 feet of the Southeast Quarter of the Southeast Quarter and said centerline there terminating.

(the "Property"); and

WHEREAS, the City has extended public utilities benefitting the Property for current and future development generally located in an undeveloped area adjacent to Territorial Road, east of Tucker Road (the "Project"); and

WHEREAS, the City will levy special assessments for the Project; and

WHEREAS, completion of the Project will provide a special benefit to the Property; and

WHEREAS, Owner consents to completion of the Project and the levy of special assessments against the Property for the Project, all as provided herein.

NOW, THEREFORE, on the basis of the covenants herein, the parties hereto agree as follows:

1) Owner agrees that the increase in fair market value of the Property resulting from the Project will be at least equal to the amount of the special assessment levied against the Property, and that such increase in fair market value is a special benefit to the Property.

2) Owner agrees, by execution of this Agreement, to waive all hearings and notices associated with the special assessment of Property provided by Minnesota Statute §429.

3) City and Owner agree the Property shall be assessed as follows:

a. Owner consents to the City levying special assessments against the Property for the Project in the total amount of $36,800 in accordance with Minnesota Statute §429.061, and more specifically described as follows:

i.	Water Trunk	$13,800
ii.	Sewer Trunk	$11,960
iii.	Storm Sewer Trunk	$11,040

b. The City agrees to defer all special assessments assigned to the Property, at zero per percent (0%) interest, until the occurrence of any of the following events, at which time payment of all special assessments will be due and payable in full:

i. When the Property is sold;
ii. When the Property is improved; or
iii. When the Property is subdivided/combined.

c. Transfer of ownership of the Property by Owner to any heir shall not be deemed a sale of the Property and therefore shall not trigger payment of deferred interest being due by Owner to the City.

4) Owner agrees that any additional road or utility work required as a result of its future development will be at the sole cost of Owner.

5) The covenants, waivers and conditions contained in this Agreement shall bind the Owner and its successors and assigns and shall run with the Property. It is the intent of the parties hereto that this Agreement be in a form which is recordable among the land records of Hennepin County, Minnesota.

6) This Agreement shall automatically terminate upon the payment of the total special assessment amount noted above.

[The remainder of this page is intentionally left blank.]

IN WITNESS WHEREOF, the parties have set their hands the day and year first written above.

Jeffrey Hofford

Jan Hofford

STATE OF Minnesota)
) ss:
COUNTY OF Hennepin)

The foregoing instrument was acknowledged before me this 11th day of April, 2025, by Jeffrey Hofford and Jan Hofford.

Marcy Dalchow
Notary Public

NOTARY STAMP OR SEAL

MARCELLA C DALCHOW
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan 31, 2028

CITY OF ROGERS

By: _____
Shannon Klick
Its: Mayor

By: _____
Stacie Brown
Its: City Clerk

STATE OF MINNESOTA)
) ss:
COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this _____ day of _____, 2025, by Shannon Klick and Stacie Brown, the Mayor and City Clerk, respectively, of the City of Rogers, a Minnesota municipal corporation.

_____
Notary Public

NOTARY STAMP OR SEAL

Drafted by:
City of Rogers
22350 South Diamond Lake Road
Rogers, MN 55374
Phone: (763) 428-8580

© 2024 Westwood Professional Services, Inc.

OVERALL UTILITY LEGEND

EXISTING	PROPOSED	FUTURE	
SAN			SANITARY SEWER
			STORM SEWER
DT			DRAIN TILE
WAT			WATER MAIN
WAT			HYDRANT

GENERAL UTILITY NOTES

1. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION AND NOTIFY THE OWNER OF ANY DIFFERENCES.
2. UNLESS OTHERWISE NOTED, ALL MATERIALS, CONST. TECHNIQUES AND TESTING SHALL CONFORM TO THE 2018 ED. OF THE "STANDARD UTILITIES SPECIFICATIONS FOR WATER MAIN AND SERVICE LINE INSTALLATION AND SANITARY SEWER AND STORM SEWER INSTALLATION BY THE CITY ENGINEERING ASSOCIATION OF MINN." AND TO THE "STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION" MINN. DEPT. OF TRANS., 2020 EDITION AND SUPPLEMENTAL SPECIFICATIONS SEPTEMBER 2022. THE CONTRACTOR SHALL BE REQUIRED TO FOLLOW ALL PROCEDURES AS OUTLINED BY THE LOCAL AGENCY.
3. THE CONTRACTOR SHALL RECEIVE THE NECESSARY PERMITS FOR ALL WORK OUTSIDE OF THE PROPERTY LIMITS.
4. VERIFY EXISTING INVERT LOCATION & ELEVATION PRIOR TO BEGINNING CONSTRUCTION.
5. THE CONTRACTOR SHALL CONTACT "GOPHER STATE ONE CALL" FOR FOR UTILITY LOCATIONS PRIOR TO UTILITY INSTALLATION.

Call 48 Hours before digging:
811 or call811.com
Common Ground Alliance

STORM SEWER CASTING SCHEDULE

Structure			Casting Type
Number	Type	Dia.	
60	FES	27"	w/TRASHGUARD
61	STMH	48"	R-1642-B
62	CBMH	48"	R-4342
70	FES	24"	w/TRASHGUARD
71	STMH	48"	R-1642-B
72	CBMH	48"	R-4342
206	CBMH	60"	R-3067-VB
207	CB	2'x 3'	R-3067-VB
208	CBMH	48"	R-4342
209	CBMH	48"	R-4342
210	STMH	48"	R-1642-B
211	CBMH	48"	R-3067-VB
212	CB	2'x 3'	R-3501-TB
213	CBMH	48"	R-3067-V
214	CB	2'x 3'	R-3067-V
400	FES	18"	w/TRASHGUARD
401	CBMH	48"	R-3067-V
402	CB	2'x 3'	R-3067-V
403	STMH	48"	R-1642-B
500	FES	15"	w/TRASHGUARD
501	CBMH	60"	R-3067-V
502	CB	2'x 3'	R-3067-V
504	CBMH	48"	R-3067-V
505	CB	2'x 3'	R-3067-V
600	FES	21"	w/TRASHGUARD
601	CBMH	48"	R-3067-VB
602	CBMH	60"	R-3501-TB
603	CBMH	48"	R-3501-TL
607	FES	18"	w/TRASHGUARD
800	FES	18"	w/TRASHGUARD
801	CBMH	48"	R-3501-TL
802	CBMH	48"	R-3501-TR
803	CBMH	48"	R-3067-V
804	FES	15"	w/TRASHGUARD
900	FES	27"	w/TRASHGUARD
901	STMH	48"	R-1642-B
902	CBMH	60"	R-3067-V
903	CBMH	48"	R-3067-V
904	CB	2'x 3'	R-3067-V
905	CBMH	48"	R-3067-VB
906	CB	2'x 3'	R-3067-VB
907	FES	15"	w/TRASHGUARD
908	CBMH	48"	R-3501-TR
909	STMH	48"	R-1642-B
910	CBMH	48"	R-3067-V
911	CB	2'x 3'	R-3067-V
912	CBMH	48"	R-3067-VB
913	CB	2'x 3'	R-3067-VB
1004	CBMH	27"	R-4342
	...	...	

Hofford Property

WARNING!!
UNDERGROUND GAS PIPELINE!
NOTIFY NUSTAR ENERGY PRIOR TO WORK NEAR PIPELINE:
NUSTAR ENERGY
2288 County Road C W,
Roseville, MN 55113
(651) 636-1267

1" = 100'
0' 100' 200' 300'

CONSTRUCTION PLANS

BIG WOODS 2ND ADDITION

N:\0031278.02\DWG\CIVIL\UTILITY\0031278.02-OAF01.DWG

DESIGNED: CHF
CHECKED: CHF
DRAWN: EJK
HORIZONTAL SCALE: 100'
VERTICAL SCALE: 20' or 10'

INITIAL ISSUE: 02/02/24
REVISIONS:
1 05/02/24 CITY COMMENTS
2 05/22/24 CITY COMMENTS
3 . .
4 . .
5 . .

PREPARED FOR:
FORESTAR GROUP
20860 KENBRIDGE CT
LAKEVILLE, MN 55044

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
CHRISTIAN H. FROEMKE
DATE: 05/22/24 LICENSE NO. 56208

BIG WOODS 2ND ADDITION
ROGERS, MN

Westwood
Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
Fax (952) 937-5822 Minnetonka, MN 55343
Toll Free (888) 937-5150 westwoodps.com
Westwood Professional Services, Inc.

OVERALL

PROJECT NUMBER: 0031278.02

SHEET NUMBER: 2 OF 24
DATE: 05/22/24

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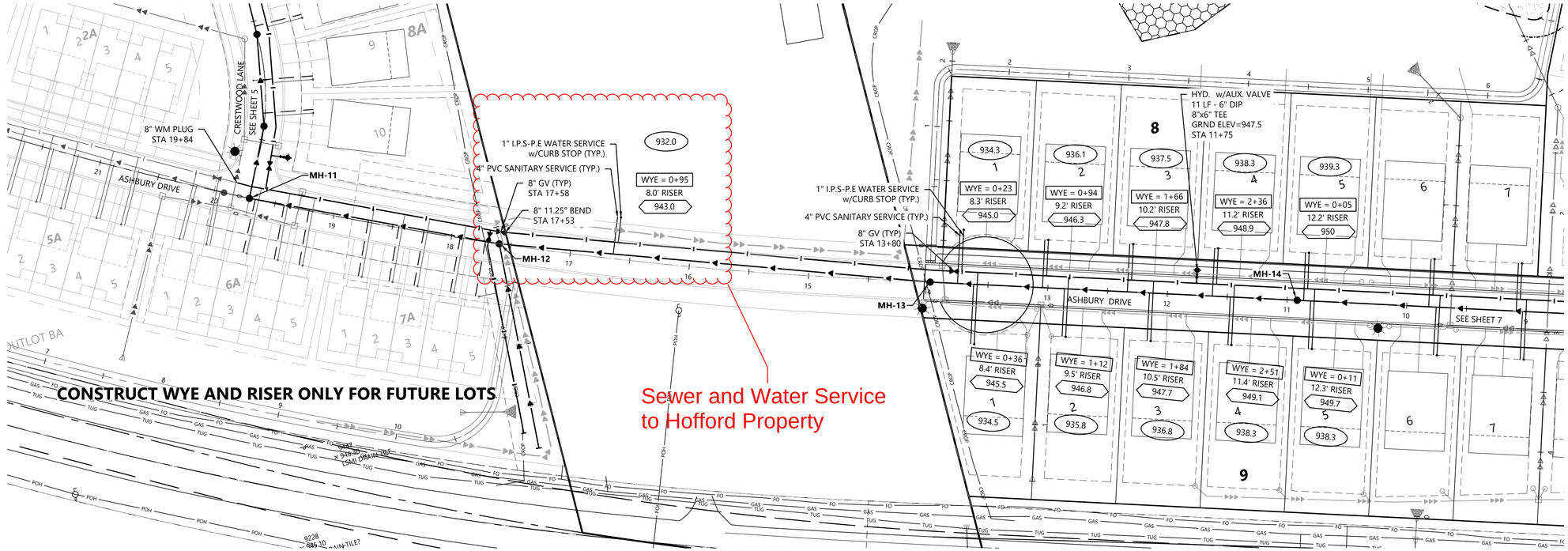
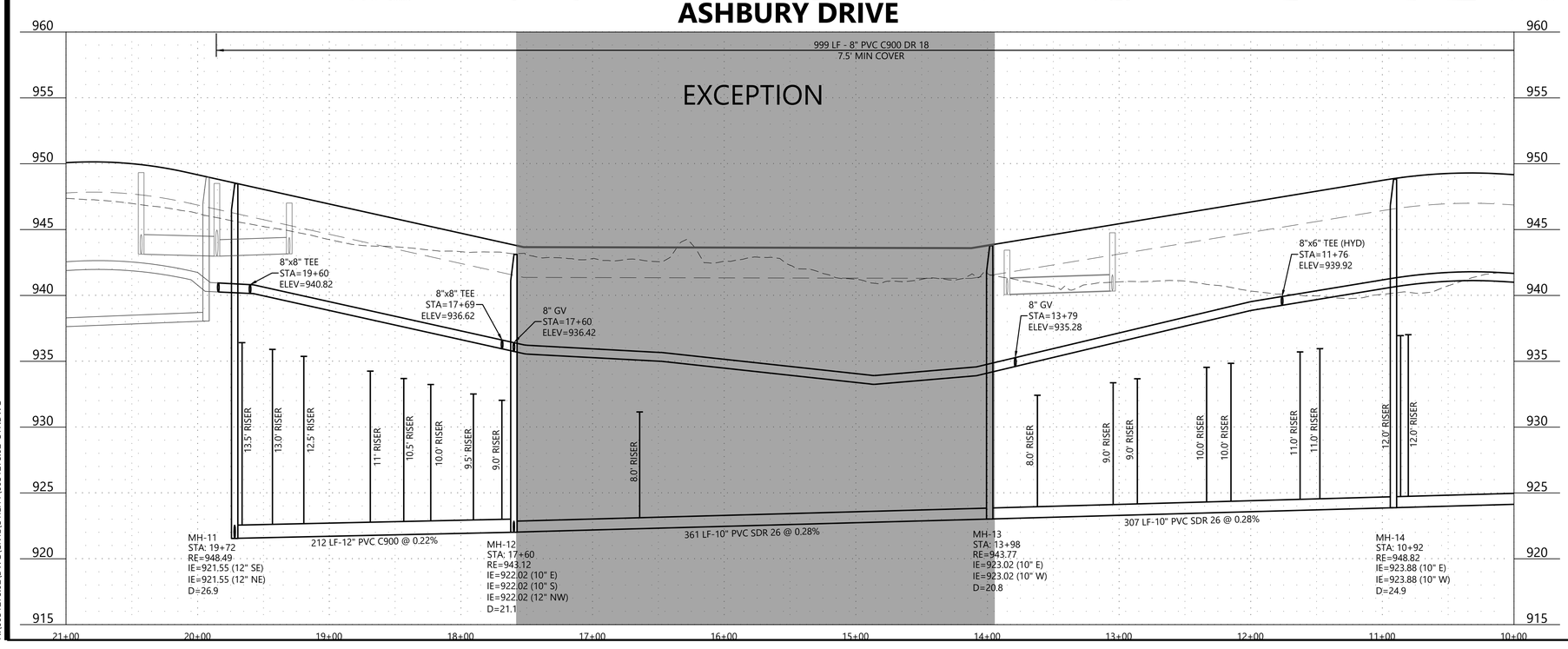


ASHBURY DRIVE



LEGEND

Call 48 Hours before digging:
811 or call811.com
Common Ground Alliance

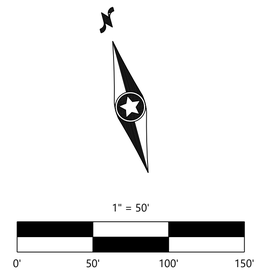
XXX.X	SANITARY SEWER SERVICE INVERT ELEVATION @ EASEMENT LINE
WYE = X+XX X.X' RISER	SANITARY SEWER SERVICE WYE LOCATION ON MAIN LINE FROM DOWNSTREAM MANHOLE
XXX.X	DENOTES ELEVATION OF THE TOP OF WATER SERVICE STOP BOX
A	WATER SERVICE TO THIS LOT SHALL BE INSTALLED UNDER PROPOSED STORM SEWER & SHALL MAINTAIN A MINIMUM VERTICAL SEPARATION FROM STORM PIPE OF 2.0 FEET
B	SANITARY SEWER SERVICE TO THIS LOT SHALL BE INSTALLED UNDER PROPOSED STORM SEWER - INSTALL RISER AT PROPERTY LINE

GENERAL NOTES

1. FLAG HYDRANTS.
2. EXTEND RODS ON DEEP VALVES.
3. ALL DROP MANHOLES TO BE CONSTRUCTED USING OUTSIDE DROPS.
4. ALL SANITARY SEWER SERVICES AT C900 DR 18 SANITARY SEWER MAIN USE 4"X12" DIP TEE AND 4" C900 DR 18 RISER.

BLK NO.	LOT NO.	S&W WYE=X+XX	XXX.X	L (FT)	XXX.X	RISER (VF)	
6A	1	0+22	938.5	46	950.2	N/A	LOT 1 & 2 INSTALL WITH FUTURE PHASE
	2	0+45	938.5	47	950.0	N/A	
	3	0+05	938.5	46	949.8	13.5	
	4	0+30	937.0	46	948.3	13.0	
	5	0+51	937.0	47	948.1	12.5	
7A	1	1+01	936.5	48	947.7	11.0	
	2	1+27	935.5	47	947.0	10.5	
	3	1+48	935.5	47	946.6	10.0	
	4	1+79	934.2	47	946.0	9.5	
	5	2+00	934.2	46	945.6	9.0	

CONSTRUCT WYE AND RISER ONLY FOR FUTURE LOTS



CONSTRUCTION PLANS

N:\0031278.02\DWG\CIVIL\UTILITY\0031278.02-UTF.DWG

BIG WOODS 2ND ADDITION

DESIGNED: CHF
CHECKED: CHF
DRAWN: EJK
HORIZONTAL SCALE: 50'
VERTICAL SCALE: 10' or 5'

INITIAL ISSUE: 02/02/24
REVISIONS:
1 05/02/24 CITY COMMENTS
2 05/22/24 CITY COMMENTS
3 . .
4 . .
5 . .

PREPARED FOR:

FORESTAR GROUP
20860 KENBRIDGE CT
LAKEVILLE, MN 55044

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

CHRISTIAN H. FROEMKE
DATE: 05/22/24 LICENSE NO. 56208

BIG WOODS 2ND ADDITION
ROGERS, MN

Westwood
Phone (952) 937-5150 12701 Whitewater Drive, Suite #300
Fax (952) 937-5822 Minnetonka, MN 55343
Toll Free (888) 937-5150 westwoodps.com
Westwood Professional Services, Inc.

SANITARY SEWER AND WATERMAIN CONSTRUCTION PLANS
PROJECT NUMBER: 0031278.02

SHEET NUMBER: 6 OF 24
DATE: 05/22/24

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.10

Subject: Approval of Exterior Furniture Fixtures and Equipment (FFE) for South Community Park
Prepared By: Mike Bauer, Parks & Recreation Director

Recommended Council Action

Overview / Background / Analysis

Staff recommends authorizing outdoor Furniture, Fixtures, and Equipment (FFE) to support programming and public use at South Community Park. These purchases are part of the park's final development phase for its outdoor amenities and will enhance both recreation opportunities and user experience.

The following equipment and furnishings will be purchased:

Item	Quantity	Total
Dugouts	8	$91,000
Bleachers	6	$42,750
Picnic Tables	13	$12,368
Garbage/Recycling Cans	8	$12,000
Portable Mounds	4	$11,017
Mound Covers 10’	4	$1,840
Bat Racks	8	$1,600
L Screens	2	$1,500
Home Plate Covers 10’	4	$1,480
Chalker (50lb Capacity)	2	$1,450
Hand Drags	4	$1,236
Bike Rack	1	$868
Rakes	4	$556
Mound Covers for Bullpen	1	$360
Batter’s Box Template	1	$250
Lip Broom	2	$198
Pro String Winder	1	$125
Tamper	1	$97
Push Brooms	2	$50

Broom/Dust Pans	2	$40
Anchor Dig Out Tool	2	$38
	Total	**Up to $180,823**

Funding for these purchases will **come from Fund 410—Local Option Sales Tax Proceeds** and **grant funds from the Hennepin County Youth Sports Program**.

The optional dugout coverings ($91,000) are also being considered, pending approval and possible partial funding by the Rogers Otsego Youth Baseball Association(ROYBA). If they decide not to pursue the dugout covers, they will not be ordered. A follow-up request for interior FFE will be submitted once we can occupy the building.

Staff Recommendation
Motion to authorize the purchase of outdoor Furniture, Fixtures, and Equipment for South Community Park in the amount of $89,823, with optional $91,000 for dugout coverings pending partnership with ROYBA.

Financial Impact: **$89,823 to $180,823**
Pending partnership with ROYBA

Source Fund: 410-Local Option Sales Tax/SCP Youth Sports Grant Funds

Budgeted? Yes

Supporting Documentation
A. Bleacher and Dugout Quote
B. DUG-10-40 - CUSTOMER ASSEMBLY
C. 3R25-3 - 3-Row x 25 FT Bleacher (44 Seats)
D. 5R19 - 5-Row x 19 FT Bleacher (52 Seats)
E. Estimate_2729_from_Portolite_Pitching_Mounds
F. Tables Quote

JW INDUSTRIES LLC
Team Oriented. Spectator Driven.
Athletic Facility Products & Custom Fabrications
5662 Glendale Avenue, Green Bay, WI 54313

April 2, 2025

City of Rogers
22350 South Diamond Lake Rd.
Rogers, MN 55374

Attn: Mike Bauer

Regarding: Dugout Roof Systems & Bleacher Seating Systems
Rogers (MN) SB Complex
JWI Quote #25-04-01AF

We are pleased to provide our pricing for this project. Our quote is based on the configuration and specifications detailed during our recent phone call. The following reiterates the items included in our proposal:

Price #1:

Dugout Roof Systems ---------- $91,000.00
(total for 8 units)

Model/Quantity
- JWI #DUG-10-40
- (8) Units

Configuration
- 10 feet deep x 40 feet long
- (8) support posts (3 at front + 5 at back)

Components
- Hot-dipped galvanized support posts
- Powder-coated over galvanized roof framing – Color: TBD
- Kynar finish roof sheeting – Color: Standard White
- All mounting hardware required to anchor to concrete slab (slab by others)

Option #1:

Colored Support Posts ---------- ("add" to Price #1) **$6,900.00**
(total for 8 units)

Price #2:

5-row x 19' Bleacher Units ---------- $30,350.00
(total for 4 units)

Model/Quantity
- JWI #5R19
- (4) Units

Capacity
- 52 spectators per unit

Configuration
- 5 rows high x 19 feet long
- Non-elevated (Row #1 seating is at grade)
- Row rise and depth: 8" x 24"
- Seating access aisles: (1) provided with mid-aisle railing

Components
- Support system: aluminum tube/angle frames bearing on hard surface (surface by others)
- Bench seating: 2x10 anodized aluminum plank
- Footboards: (2) 2x10 extruded aluminum plank
- Risers: 1 ½ x 9 extruded aluminum shape
- Guardrail: galvanized chain-link fabric and pipe with aluminum posts
- 2x6 Treated wood sill plates with galvanized stud anchors for attachment to surface

Option #2:

Colored Risers On Bleachers ---------- ("add" to Price #2) **$3,400.00**
(total for 4 units)

Price #3:

3-row x 25' Bleacher Units ---------- $5,500.00
(total for 2 units)

Model/Quantity
- JWI #3R25-3
- (2) Units

Capacity
- 44 spectators per unit

Configuration
- 3 rows high x 25 feet long
- Non-elevated (Row #1 seating is at grade)
- Row rise and depth: 8" x 24"
- Seating access aisles: (1) provided with mid-aisle railing

Components
- Support system: aluminum tube/angle frames bearing on hard surface (surface by others)
- Bench seating: 2x10 anodized aluminum plank
- Footboards: (1) 2x10 extruded aluminum plank
- 2x6 Treated wood sill plates with galvanized stud anchors for attachment to surface

Price #4:

Shipping Costs (added to above costs) – via dedicated carrier

- Shipping of Dugouts Only = **$2,000.00 (total)**
- Shipping of Dugouts & Bleachers = **$3,500.00 (total)**

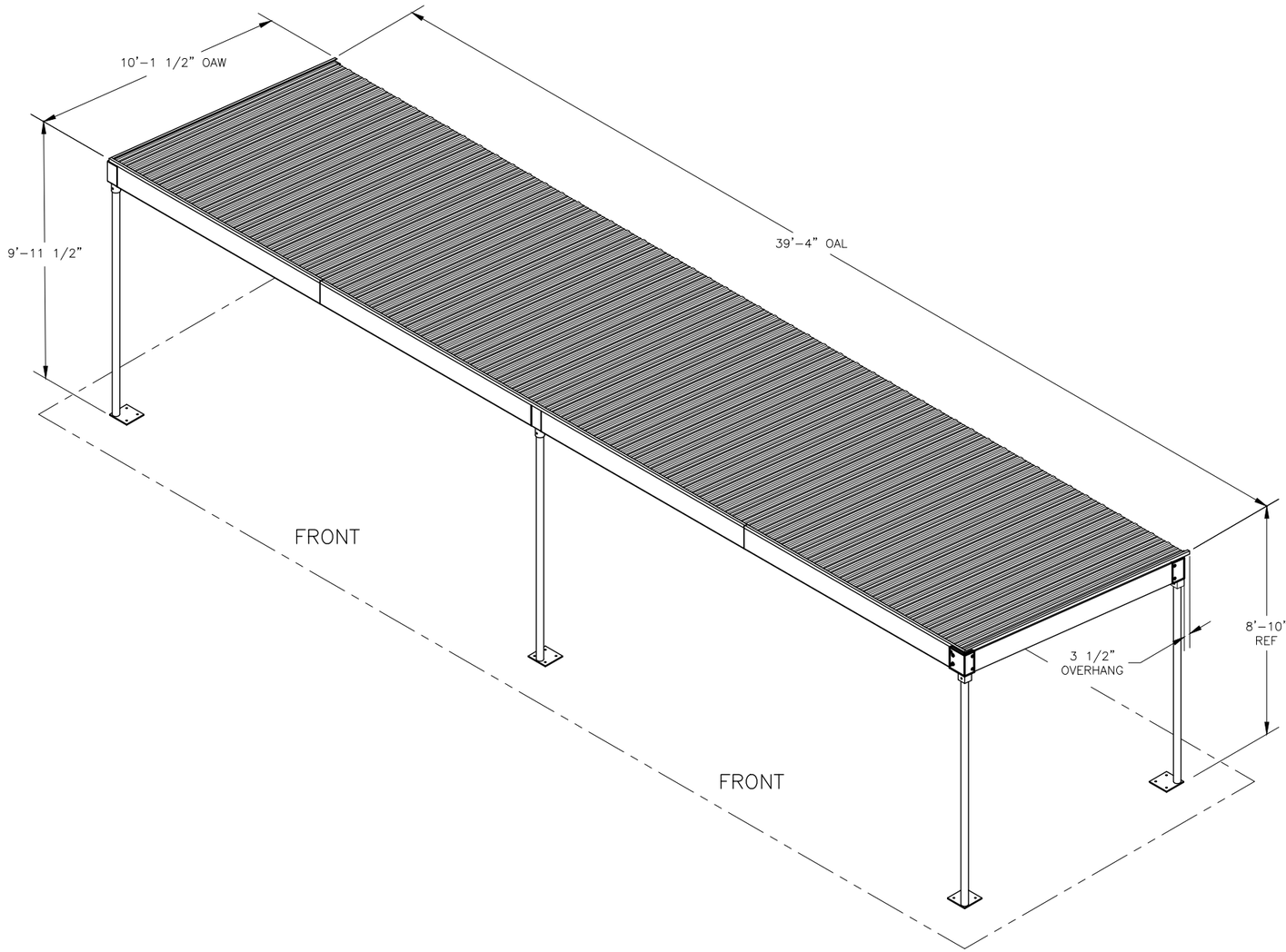
Key Items:

- Code Compliance
  IBC / ICC 300 Compliant
- Warranty
  Five years
- Lead Time = 6-8 Weeks
- Price retention - subject to review after 30 days from quote date
- Items included
  Component delivery to jobsite – Rogers, MN (per Price #4)
  Complete installation/assembly drawings & hardware
- Items ***not*** included
  Surface prep/hard surface under dugouts and bleacher systems
  Unloading/installation of components
  Fencing around dugouts systems
  Local or State permitting/fees
  Sales tax

If you should have any questions, please contact me at (414) 218-8805. Thank you.

J W INDUSTRIES, LLC

Mark Hans
Manager of Business Development
markh@jwindustriesinc.com



ASSEMBLY DRAWINGS
for
JWI 40 FT DUGOUT
MODEL #DUG-10-40

INDEX OF DRAWINGS – DUGOUT ASSEMBLY

SHEET 1: COVER PAGE
SHEET 2: POST LAYOUT
SHEET 3: FRAME ASSEMBLY
SHEET 4: ROOF PANEL INSTALLATION
SHEET 5: BILL OF MATERIAL

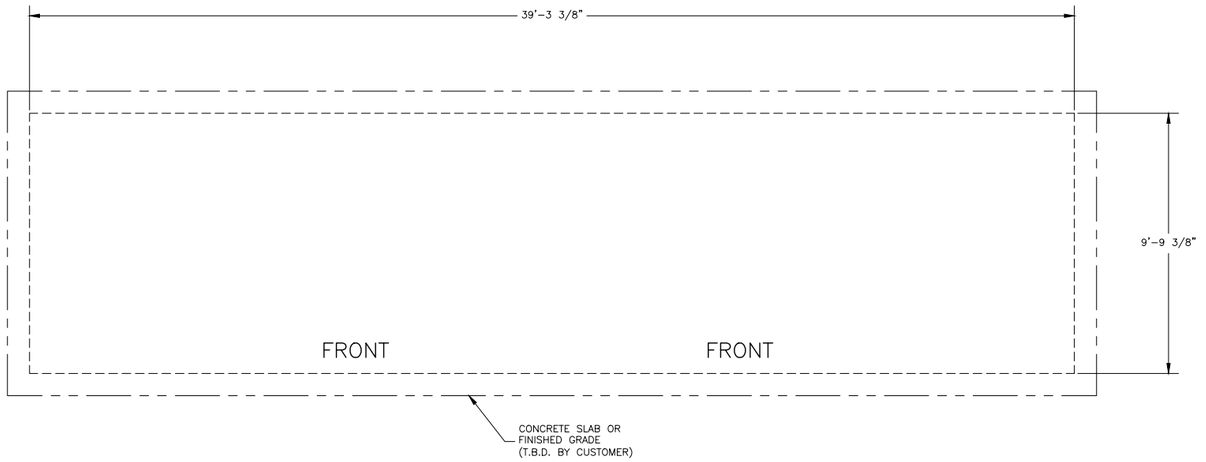
ADDITIONAL TOOLS REQUIRED:

9/16" SOCKET & OPEN ENDED WRENCHES
7/8" SOCKET & OPEN ENDED WRENCHES
3/4" SOCKET & OPEN ENDED WRENCHES
DRILL with 1/2" MASONRY DRILL BIT (FOR USE IN CONCRETE)
ELECTRIC SCREW GUN with 5/16" SOCKET BIT
TAPE MEASURE
LADDER
LEVEL
CHALK LINE

REV	DATE	DESCRIPTION	REV BY:

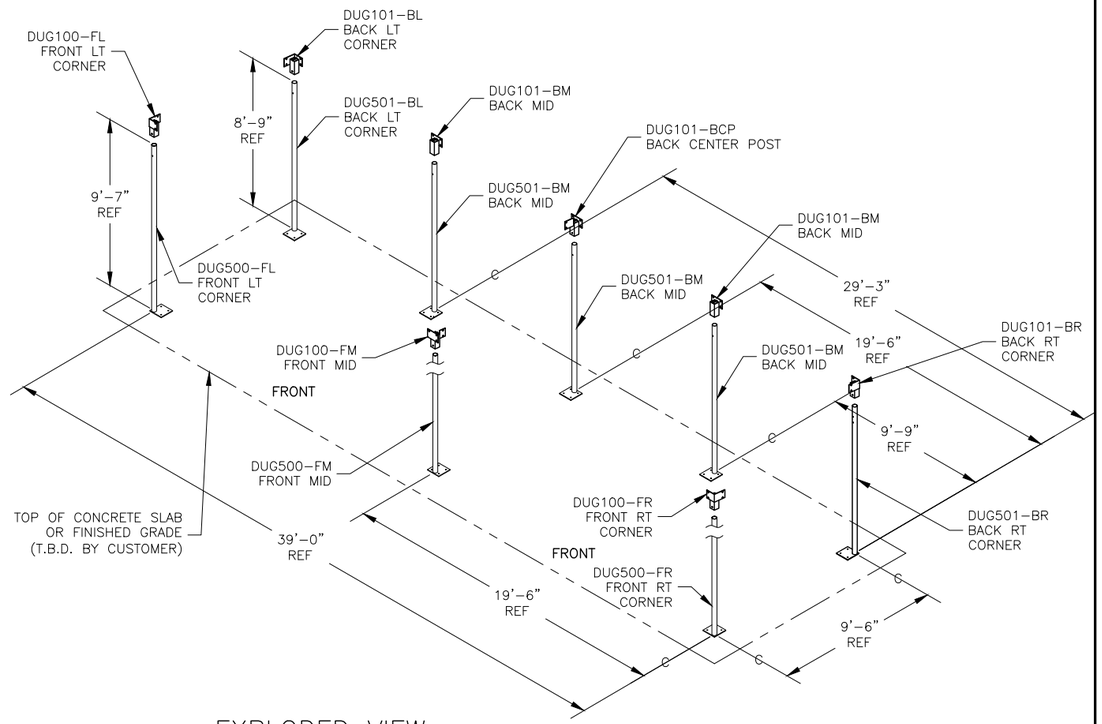
JW INDUSTRIES LLC.
5662 Glendale Ave.
Green Bay, WI 54313
(920) 865-7307 Fax (920) 865-7777
jwoffice@jwindustriesinc.com
"We provide everything except the spectators."

PROJECT: DUGOUT SYSTEM MODEL #DUG–10–40
CLIENT:
DESIGN FIRM: JW INDUSTRIES, LLC.
REPRESENTATIVE:
JOB#: DATE: DRAWN BY: SHEET NUMBER: DUG40–1



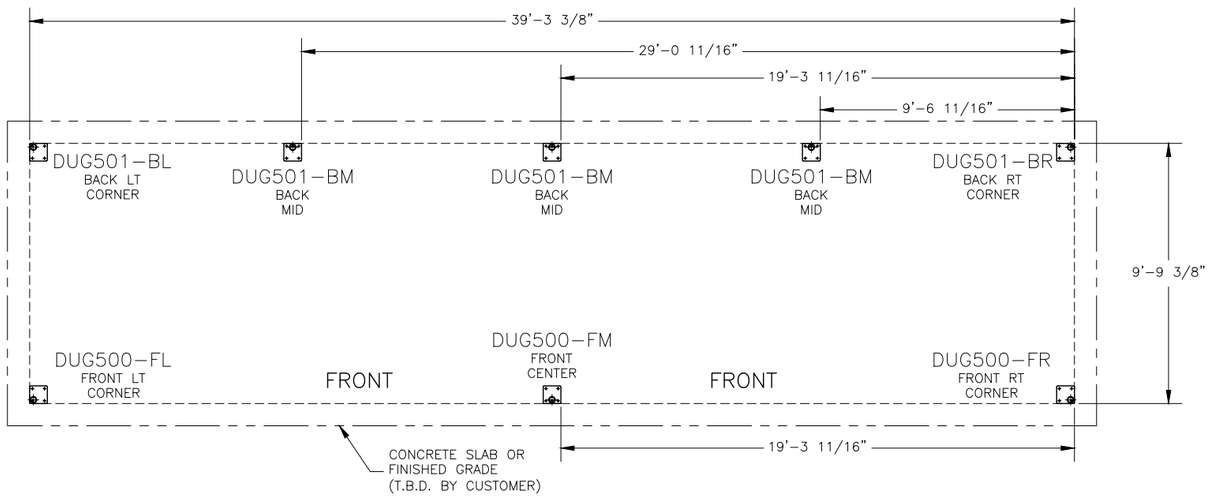
STEP 1

CHALK LINE RECTANGLE



EXPLODED VIEW

NOTE: DIMENSIONS SHOWN ARE TO THE CENTERS OF POSTS



STEP 2

POST POSITION LAYOUT

NOTE: DIMENSIONS SHOWN ARE TO THE OUTSIDES OF POST BASEPLATES

STEP 1

1) LAY OUT A CHALK LINE RECTANGLE ON YOUR CONCRETE SLAB OR BASE AS SHOWN ABOVE LEFT.
2) CHECK FOR SQUARENESS.

STEP 2

1) ATTACH GIRT CONNECTIONS TO THE TOP OF EACH POST USING (1) 1/2" x 4 1/2" GALV BOLT w/ (2) FLATWASHERS AND (1) NUT PER CONNECTION. ENSURE THAT ALL POST AND CONNECTOR DESIGNATIONS MATCH (EXAMPLE: DUG100-FL ATTACHES TO DUG500-FL).

STEP 3

1) ARRANGE POSTS AS SHOWN IN THE POST POSITION LAYOUT AT LEFT AND ABOVE.
2) DRILL ONE 1/2" DIA HOLE INTO THE CONCRETE SLAB AT EACH COLUMN, USING THE POST BASE PLATES AS A TEMPLATE.
3) ATTACH EACH COLUMN TO THE SLAB USING A 1/2" x 3 3/4" STUD ANCHOR. DO NOT FULLY TIGHTEN
4) DO NOT DRILL ANY ADDITIONAL HOLES OR ATTACH ADDITIONAL ANCHORS UNTIL AFTER SETTING ALL FRAMES AND CHECKING FINAL ALIGNMENT. SEE STEPS 4 & 5.

REV	DATE	DESCRIPTION	REV BY:

JW INDUSTRIES LLC.
5662 Glendale Ave.
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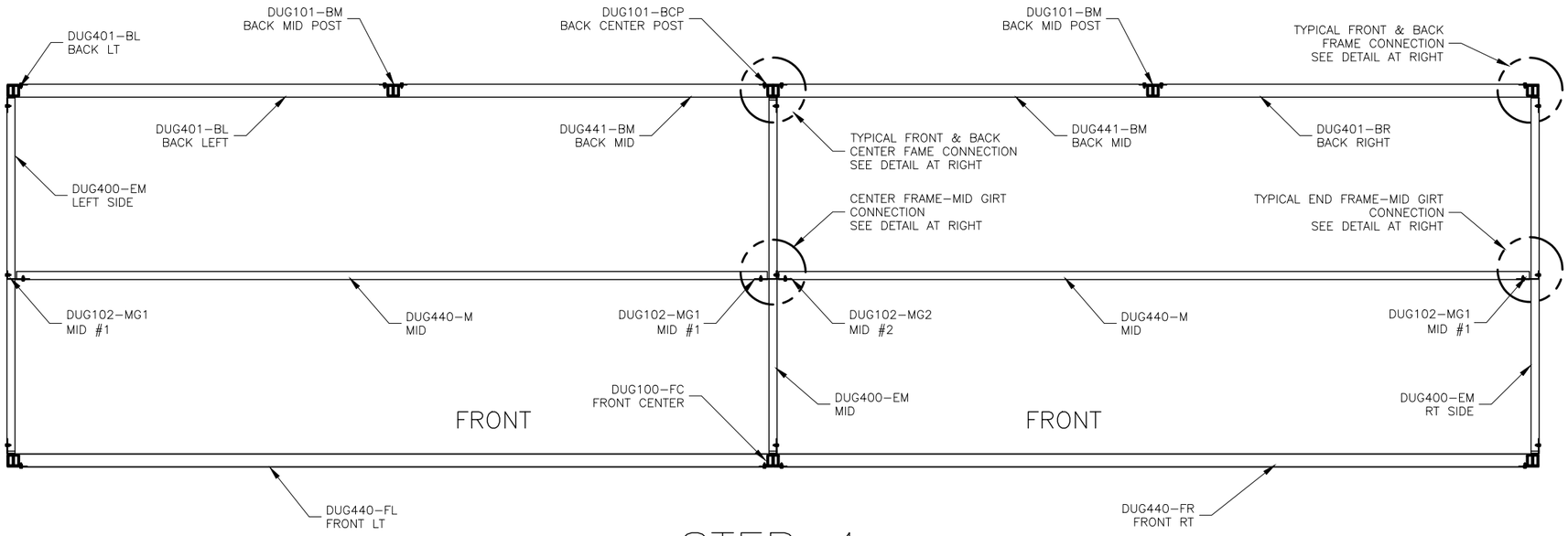
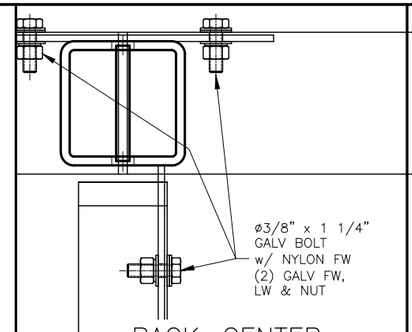
(920) 865-7307 Fax (920) 865-7777
jwoffice@jwindustriesinc.com
"We provide everything except the spectators."

PROJECT:	DUGOUT SYSTEM MODEL #DUG-10-40
CLIENT:	
DESIGN FIRM:	JW INDUSTRIES, LLC.
REPRESENTATIVE:	
JOB#:	DATE: DRAWN BY: SHEET NUMBER: DUG40-2

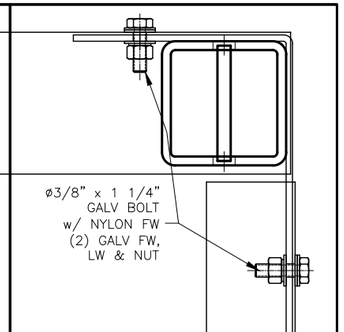


STEP 4

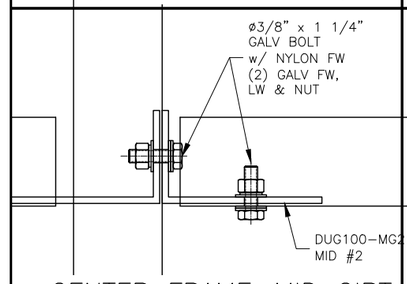
GIRT FRAMING



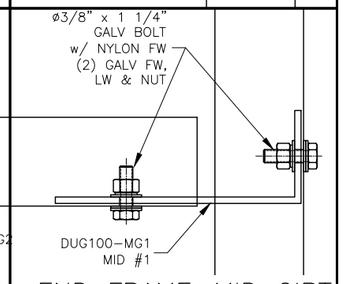
BACK–CENTER FRAME CONNECTIONS
(FRONT CENTER SIMILAR)



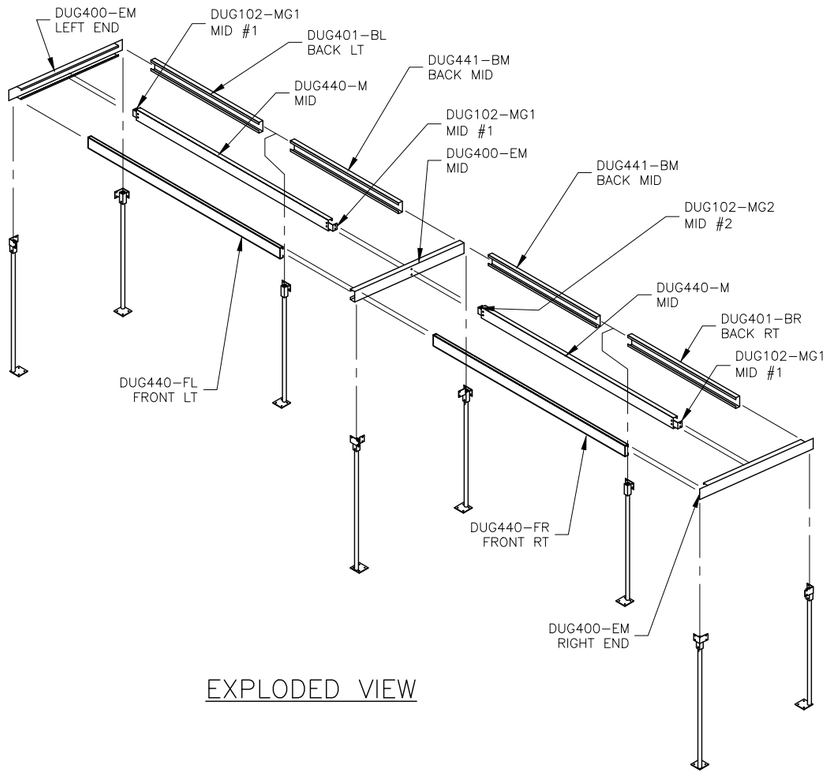
FRONT & BACK FRAME CONNECTIONS



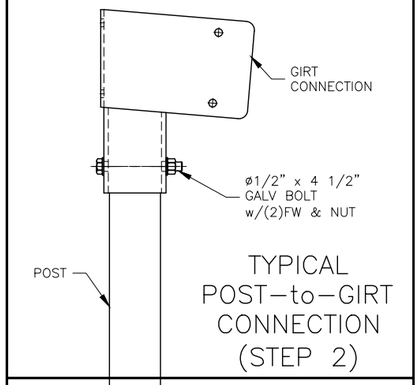
CENTER FRAME–MID GIRT CONNECTIONS



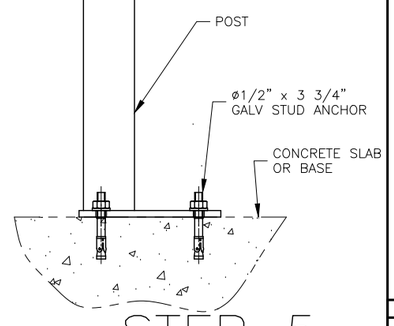
END FRAME–MID GIRT CONNECTIONS



EXPLODED VIEW



TYPICAL POST–to–GIRT CONNECTION (STEP 2)



STEP 5

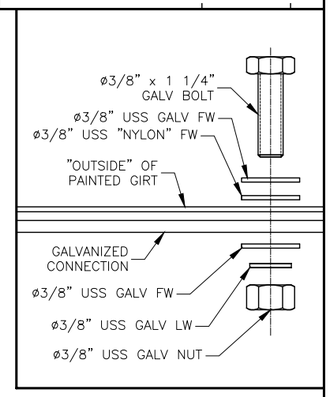
ANCHOR INSTALLATION

STEP 4

1) ASSEMBLE THE <u>BACK FRAME</u> BY ATTACHING THE BACK GIRTS (DUG401–BL, (2)DUG441–BM, & DUG401–BR) TO THE GIRT CONNECTIONS ON EACH BACK POST USING (4) 3/8" x 1 1/4" GALV BOLTS w/ (1) NYLON FW, (2) GALV FW, (1) LW AND (1) NUT EACH. ENSURE THAT THE BOLT HEADS ARE TO THE OUTSIDE OF THE UNIT AND THE "NYLON" FW IS <u>ALWAYS</u> AGAINST THE PAINTED GIRT. <u>DO NOT</u> FULLY TIGHTEN.
2) ASSEMBLE THE <u>FRONT FRAME</u> BY ATTACHING THE FRONT GIRTS (DUG440–FL & DUG440–FR) TO THE GIRT CONNECTIONS ON EACH FRONT POST USING (4) 3/8" x 1 1/4" GALV BOLTS w/ (1) NYLON FW, (2) GALV FW, (1) LW AND (1) NUT EACH.
3) ASSEMBLE THE <u>FRONT–TO–BACK FRAMES</u> BY ATTACHING THE END/MID GIRTS (DUG400–EM) TO THE GIRT CONNECTIONS ON THE END POSTS AND (1) ADDITIONAL END/MID GIRT (DUG400–EM) TO THE CENTER GIRT CONNECTIONS USING (4) 3/8" x 1 1/4" GALV BOLTS w/ (1) NYLON FW, (2) GALV FW, (1) LW AND (1) NUT EACH. NOTE: DUG400–EM WILL BE USED IN ALL (3) LOCATIONS).
4) ASSEMBLE THE <u>MID GIRTS</u> BY ATTACHING (2) MID #1 CONNECTIONS (DUG102–MG1) TO THE "LEFT" MID GIRT AND (1) MID #1 (DUG102–MG1) & (1) MID #2 (DUG102–MG2) CONNECTION TO THE "RIGHT" MID GIRT USING (2) 3/8" x 1 1/4" GALV BOLTS w/ (1) NYLON FW, (2) GALV FW, (1) LW AND (1) NUT EACH
5) ATTACH THE MID GIRTS TO THE FRONT–TO–BACK FRAMES AS SHOWN USING (2) 3/8" x 1 1/4" GALV BOLTS w/ (1) NYLON FW, (2) GALV FW, (1) LW AND (1) NUT EACH.
6) DOUBLE CHECK THAT THE GIRT FRAME IS SQUARE. ADJUST AS NECESSARY.
7) TIGHTEN ALL FASTENERS.

STEP 5

1) AFTER ALL FRAMES ARE SET AND ALL GIRTS ARE INSTALLED, DRILL THE REMAINING HOLES IN THE CONCRETE SLAB AND INSTALL THE REMAINING 1/2" x 3 3/4" STUD ANCHORS.

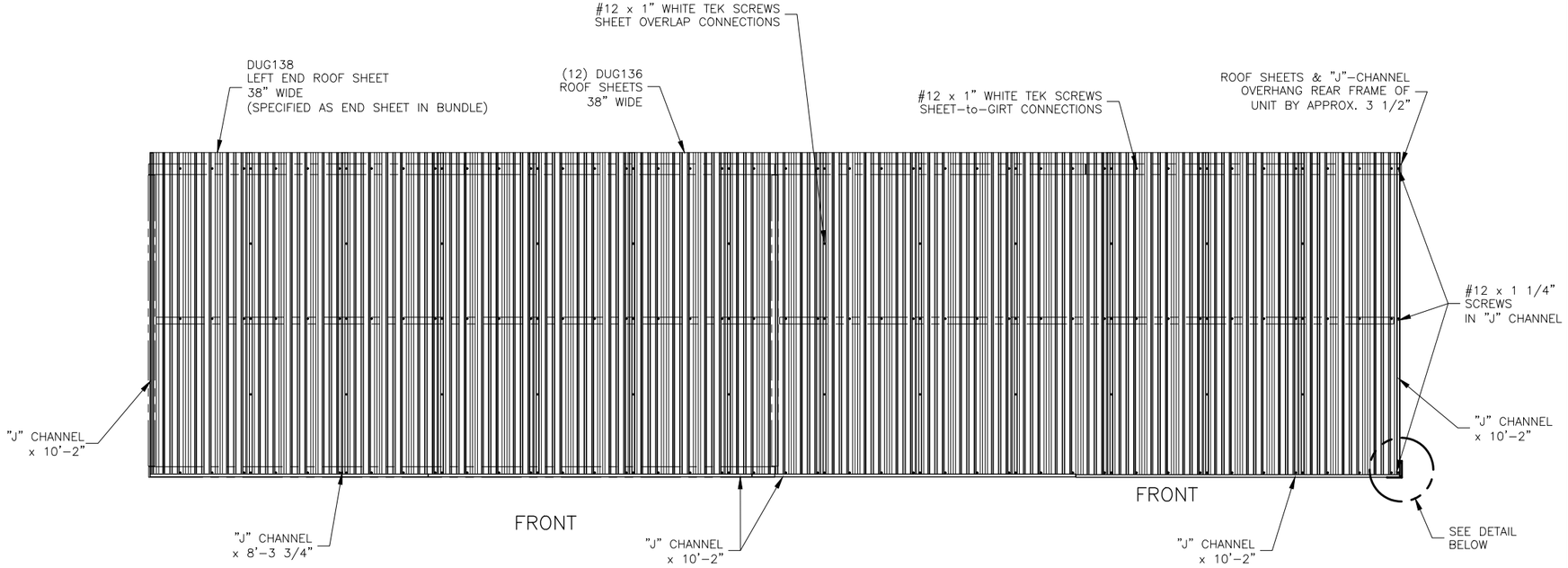


FASTENER CONNECTION DETAILS

REV	DATE	DESCRIPTION	REV BY:

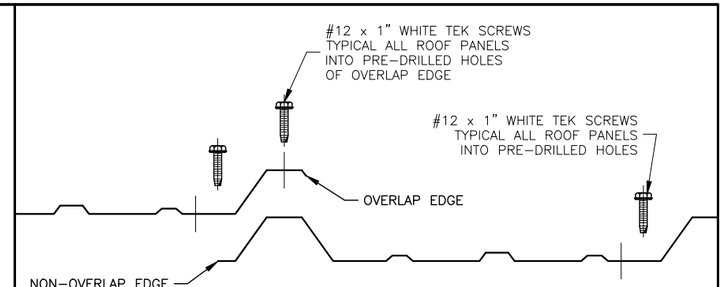
JW INDUSTRIES LLC.
5662 Glendale Ave.
Green Bay, WI 54313
(920) 865-7307 Fax (920) 865-7777
jwoffice@jwindustriesinc.com
"We provide everything except the spectators."

PROJECT:	DUGOUT SYSTEM MODEL #DUG–10–40
CLIENT:	
DESIGN FIRM:	JW INDUSTRIES, LLC.
REPRESENTATIVE:	
JOB#:	DATE: DRAWN BY: SHEET NUMBER: DUG40–3

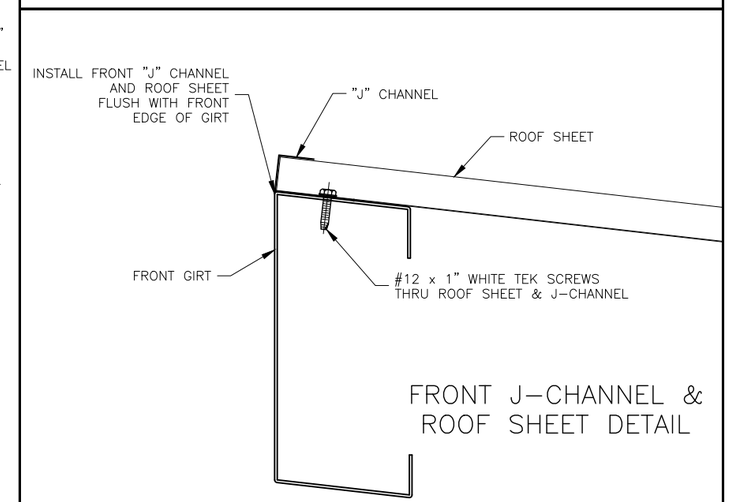


STEP 8

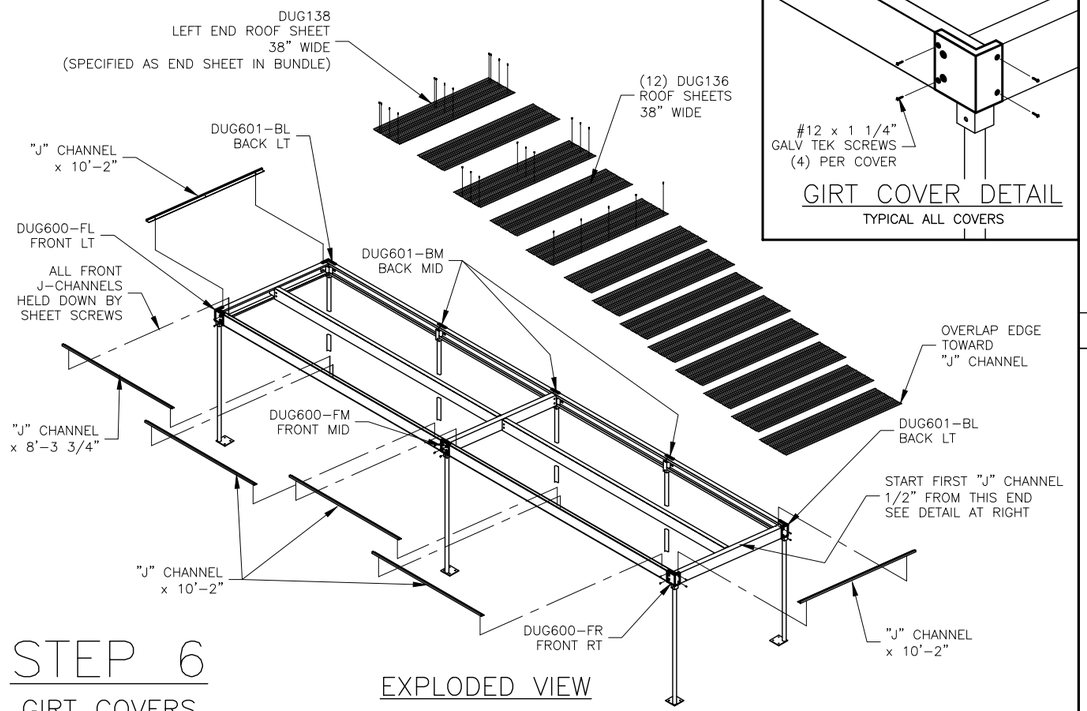
ROOF PANELS & "J" CHANNEL



SHEET OVERLAP DETAIL



FRONT J-CHANNEL &
ROOF SHEET DETAIL



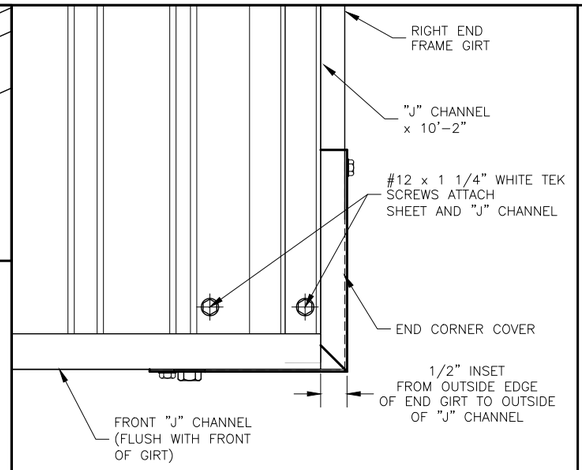
STEP 6

GIRT COVERS

EXPLODED VIEW

GIRT COVER DETAIL

TYPICAL ALL COVERS



STEP 7

RIGHT END "J" CHANNEL
& ROOF SHEET

STEP 6

1) ATTACH GIRT COVERS AS SHOWN USING (4)#12 x 1" GALV. TEK SCREWS PER COVER.

STEP 7

1) INSTALL BOTH END "J" CHANNELS FIRST, LOCATED 1/2" IN FROM THE OUTSIDE EDGES OF THE END GIRTS WITH (3) #12 x 1 1/4" WHITE SCREWS PER CHANNEL ALIGNED WITH GIRTS AS SHOWN.
2) INSTALL FIRST STANDARD ROOF SHEET ON THE RIGHT END WITH THE OVERLAP EDGE TOWARD THE "J" CHANNEL. INCLUDE FRONT "J" CHANNEL, STARTING WITH A 10'-2" PIECE. ATTACH BOTH USING THE SAME #12 x 1 1/4" WHITE SCREWS.
3) LAY OUT THE REMAINING FRONT "J" CHANNEL AND ROOF SHEETS INCLUDING 8'-8" "J" CHANNEL AND END SHEET ON LEFT END TO ENSURE PROPER FIT.
4) CHECK THAT THE SHEETS ARE SQUARE BEFORE FINAL FASTENING OF SCREWS! ADJUST AS NECESSARY.

STEP 8

1) INSTALL REMAINING #12 x 1 1/4" WHITE SCREWS IN THE "J" CHANNEL AND SHEETS USING PRE-DRILLED HOLES.
2) INSTALL #12 x 1 1/4" WHITE SCREWS IN THE SHEETS AT EACH OVERLAP IN THE PRE-DRILLED HOLES.

STEP 9

1) BE SURE TO WIPE OFF ANY DRILL SHAVINGS TO PREVENT RUSTING OF ROOF SHEETS.

REV	DATE	DESCRIPTION	REV BY:

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Green Bay, WI 54313
(920) 865-7307 Fax (920) 865-7777
jwoffice@jwindustriesinc.com
"We provide everything except the spectators."

PROJECT:	DUGOUT SYSTEM MODEL #DUG-10-40
CLIENT:	
DESIGN FIRM:	JW INDUSTRIES, LLC.
REPRESENTATIVE:	
JOB#:	DATE: DRAWN BY: SHEET NUMBER: DUG40-4

STEPS 1–3

PT/IT NUMBER	QTY. PER UNIT	QTY.	POSTS & GIRT CONNECTIONS — DESCRIPTION	REQ'D: 2 — PART NUMBER
1	1	2	POST, FRONT, LT, 9'–7", ASSY	DUG500–FL
2	1	2	POST, FRONT, MID, 9–7", ASSY	DUG500–FM
3	1	2	POST, FRONT, RT, 9'–7", ASSY	DUG500–FR
4	1	2	POST, BACK, LT, 8'–9", ASSY	DUG501–BL
5	3	6	POST, BACK, MID, 8'–9", ASSY	DUG501–BM
6	1	2	POST, BACK, RT, 8'–9", ASSY	DUG501–BR
7	1	2	GIRT CONNECTION, FRONT CORNER, LT, ASSY	DUG100–FL
8	1	2	GIRT CONNECTION, FRONT, MID, ASSY	DUG100–FM
9	1	2	GIRT CONNECTION, FRONT CORNER, RT, ASSY	DUG100–FR
10	1	2	GIRT CONNECTION, BACK CORNER, LT, ASSY	DUG101–BL
11	2	4	GIRT CONNECTION, BACK, MID, ASSY	DUG101–BM
12	1	2	GIRT CONNECTION, BACK GIRT, CENTER POST	DUG101–BCP
13	1	2	GIRT CONNECTION, BACK CORNER, RT, ASSY	DUG101–BR
1	8	16	1/2–13 x 4 1/2" A325 GALV BOLT	FSN139
2	8	16	1/2–13 DHA563 GALV STRUCTURAL NUT	FSN203
3	16	32	1/2" A325 GALV STRUCTURAL FLAT WASHER	FSN304
4	28	56	1/2 x 3 3/4" STUD ANCHOR GALVANIZED	FSN511

POWDER COATED COLOR: _____

STEPS 4 & 5

PT/IT NUMBER	QTY. PER UNIT	QTY.	GIRTS — DESCRIPTION	REQ'D: 2 — PART NUMBER
1	3	6	GIRT, 9'–1 1/4", END / MID, SAP	DUG400–EM
2	1	2	GIRT, FRONT 40', 19'–7 3/4", LT, EAVE, SAP	DUG440–FL
3	1	2	GIRT, FRONT 40', 19'–7 3/4", RT, EAVE, SAP	DUG440–FR
4	1	2	GIRT, BACK, 9'–10 3/4", LT, EAVE, SAP	DUG401–BL
5	2	4	GIRT, BACK 40', 9'–8 3/4", MID, EAVE, SAP	DUG441–BM
6	1	2	GIRT, BACK, 9'–10 3/4", RT, EAVE, SAP	DUG401–BR
7	2	4	GIRT, MID 40', 19'–3 1/4", SAP	DUG440–M
8	3	6	GIRT CONNECTION, MID #1, SAP (4"x6 3/4")	DUG102–MG1
9	1	2	GIRT CONNECTION, MID #2, SAP (4"x4 3/8")	DUG102–MG2
1	50	100	3/8" x 1 1/4" GALV BOLT	FSN110
2	50	100	3/8" GALV NUT	FSN200
3	100	200	3/8" GALV USS FLAT WASHER	FSN307
4	50	100	3/8" GALV LOCK WASHER	FSN316
5	50	100	3/8" ID x 1" OD NATURAL NYLON WASHER	FSN550

POWDER COATED COLOR: _____

STEP 6

PT/IT NUMBER	QTY. PER UNIT	QTY.	COVERS — DESCRIPTION	REQ'D: 2 — PART NUMBER
1	1	2	GIRT CONNECTION COVER, FRONT, LT, SAP	DUG600–FL
2	1	2	GIRT CONNECTION COVER, FRONT, RT, SAP	DUG600–FR
3	1	2	GIRT CONNECTION COVER, FRONT, MID, SAP	DUG600–FM
4	1	2	GIRT CONNECTION COVER, BACK, LT, SAP	DUG601–BL
5	1	2	GIRT CONNECTION COVER, BACK, RT, SAP	DUG601–BR
6	3	6	GIRT CONNECTION COVER, BACK, MID, SAP	DUG601–BM
1	32	64	#12x1 1/4 GALV TEK SCREW w/ 5/16 HEAD	FSN402
2	––	1	TOUCH–UP PAINT (BOTTLE) COLOR:_____	PUR7__

POWDER COATED COLOR: _____

STEPS 7 & 8

PT/IT NUMBER	QTY. PER UNIT	QTY.	ROOF SHEETING — DESCRIPTION	REQ'D: 2 — PART NUMBER
1	5	10	CHANNEL, J, ROOF x 122", SAP	DUG111–1002
2	1	2	CHANNEL, J, ROOF x 104 3/4", SAP	DUG111–0808.75
3	12	24	PANEL, ROOF, (STD) 38" WIDE x 122", SAP	DUG136
4	1	2	PANEL, ROOF, (40) 38" WIDE x 122", SAP	DUG138
1	180	360	#12x1 1/4 WHITE TEK SCREW w/ 5/16 HEAD	FSN411

COLOR: _____

PT/IT NUMBER	QTY. PER UNIT	QTY.	MISC ITEMS — DESCRIPTION	REQ'D: 2 — PART NUMBER
1	1	2	DUG–10–40 HARDWARE KITS	
2	––	1	BROWN ENVELOPE (PAPERWORK)	

IF YOU SHOULD HAVE ANY INSTALLATION QUESTIONS, PLEASE CONTACT YOUR JWI SALES REPRESENTATIVE OR JW INDUSTRIES, INC.

AT

1–800–J W SEATS
(1–800–597–3287)
OR
(920) 865–7307 (LOCAL)

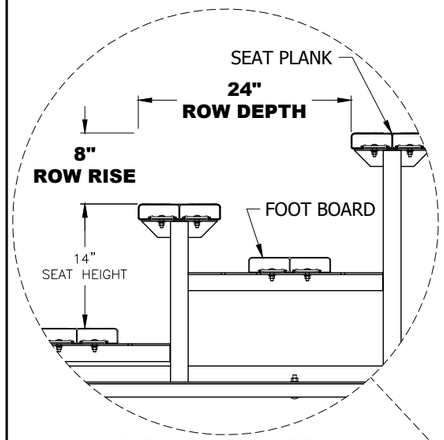
AND ASK FOR
DUGOUT CUSTOMER SERVICE

REV	DATE	DESCRIPTION	REV BY:

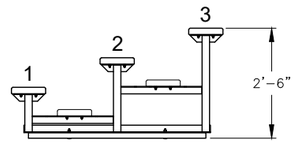
JW INDUSTRIES LLC.
5662 Glendale Ave.
Green Bay, WI 54313
(920) 865-7307 Fax (920) 865-7777
jwoffice@jwindustriesinc.com

"We provide everything except the spectators."

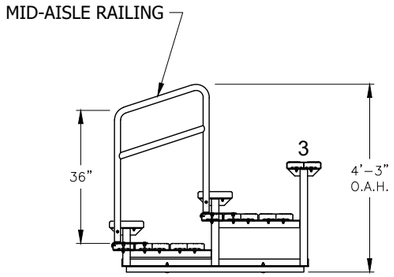
PROJECT: DUGOUT SYSTEM MODEL #DUG–10–40
CLIENT:
DESIGN FIRM: JW INDUSTRIES, LLC.
REPRESENTATIVE:
JOB#: DATE: DRAWN BY: SHEET NUMBER: DUG40–5



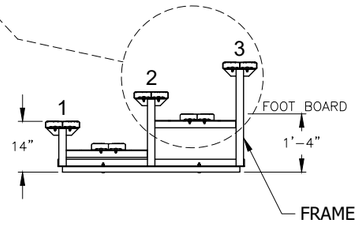
SEATING ROW DETAIL
(TYPICAL)



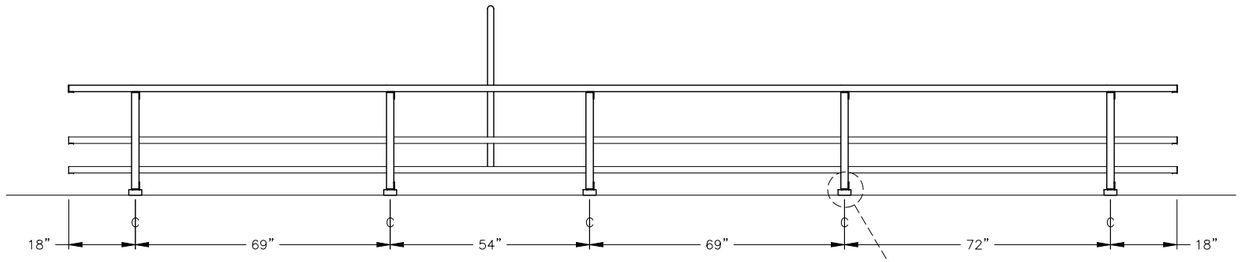
END VIEW



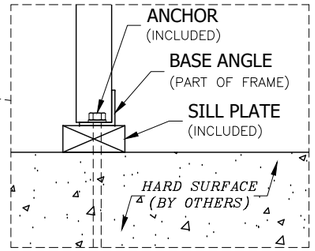
SECTION THRU AISLE



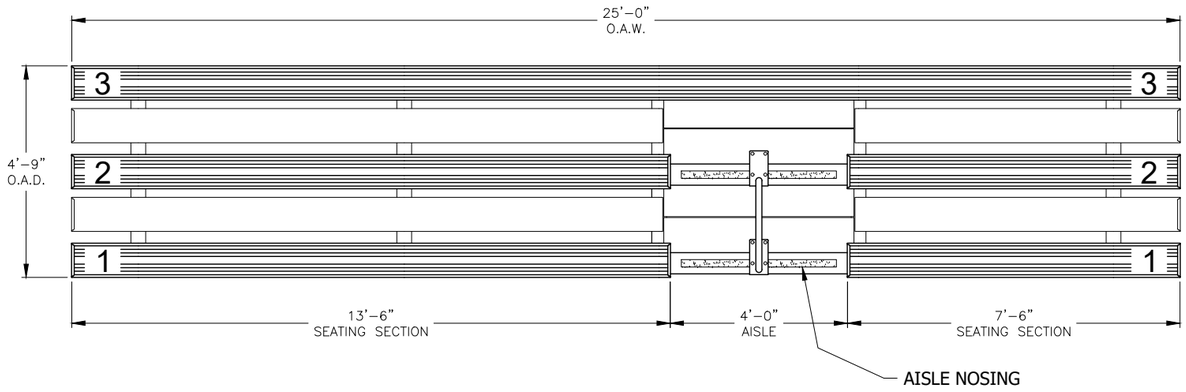
SECTION THRU SEATING



BACK VIEW



BLEACHER BASE DETAIL
TYPICAL ALL FRAMES



PLAN VIEW

MATERIALS & FINISH

FRAMES
- 2" x 2" ALUMINUM TUBE (UPRIGHTS)
- 2" x 2" ALUMINUM ANGLE (SEAT & FOOT BOARD SUPPORT)
- 2" x 2" ALUMINUM ANGLE (BASE)
- 1–PIECE WELDED CONSTRUCTION
- FINISH: MILL

PLANK
- 2 x 10 ALUMINUM EXTRUSION
- SEAT PLANK FINISH: ANODIZED
- FOOT BOARD FINISH: MILL

MID-AISLE RAILING
- 1 5/8" ROUND ALUMINUM TUBE
- FINISH: ANODIZED

AISLE NOSING
- 2" WIDE, NON–SKID
- COLOR: BLACK

FASTENERS
- GRADE 5
- FINISH: GALVANIZED

SILL PLATES
- 2x4 TREATED WOOD

ANCHORS
- 1/2" x 7" GALVANIZED ANCHOR *(CONCRETE)*
- 1/2" x 9" PIN *(ASPHALT or COMPACTED STONE)*

DESIGN PARAMETERS - BLEACHER
(AS PER 2015 IBC CODE - ICC 300-12)

CLASSIFICATION (SECTION 302)
ASSEMBLY – GROUP A
OCCUPANCY (SECTION 303)
A–5

LIVE LOADS
VERTICAL LOADS = 100 PSF
SEATS & FOOTBOARDS = 120 PLF
SEATING PLATFORMS = 100 PSF
AISLES = 100 PSF

SWAY LOADS
PARALLEL TO SEATING = 24 PLF
NORMAL TO SEATING = 10 PLF

WIND LOADS = 21 PSF
(BASED ON 120 MPH AND A STRUCTURE HEIGHT OF 10ft or LESS)

SEATING CAPACITY: 44*
*based on 18" seat width

UNIT WEIGHT: 415 LBS.

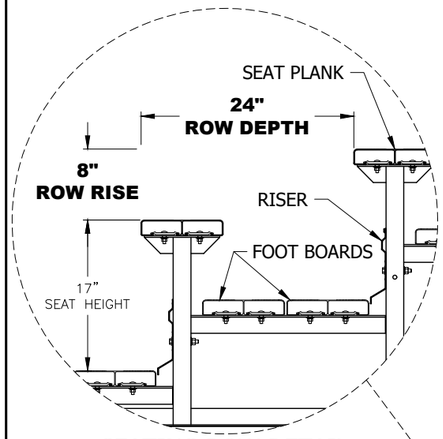
3 ROW x 25 FOOT BLEACHER

MODEL #3R25-3 (__) Units Required

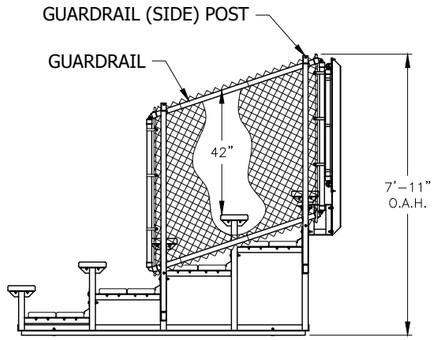
REV	DATE	DESCRIPTION	REV BY:

JW INDUSTRIES LLC.
5662 Glendale Ave.
Green Bay, WI 54313
(920) 865-7707 Fax (920) 865-7777
jwoffice@jwindustriesinc.com
"We provide everything except the spectators."

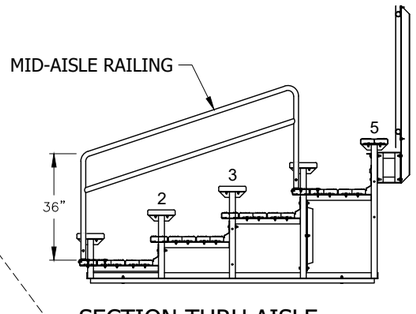
PROJECT:
CLIENT:
DESIGN FIRM: JW INDUSTRIES, LLC.
REPRESENTATIVE:
JOB #: DATE: DRAWN BY: SHEET NUMBER: 1 OF 1



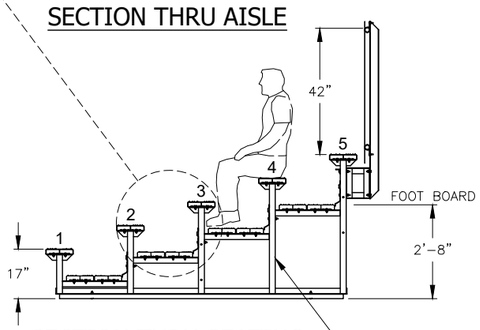
SEATING ROW DETAIL
(TYPICAL)



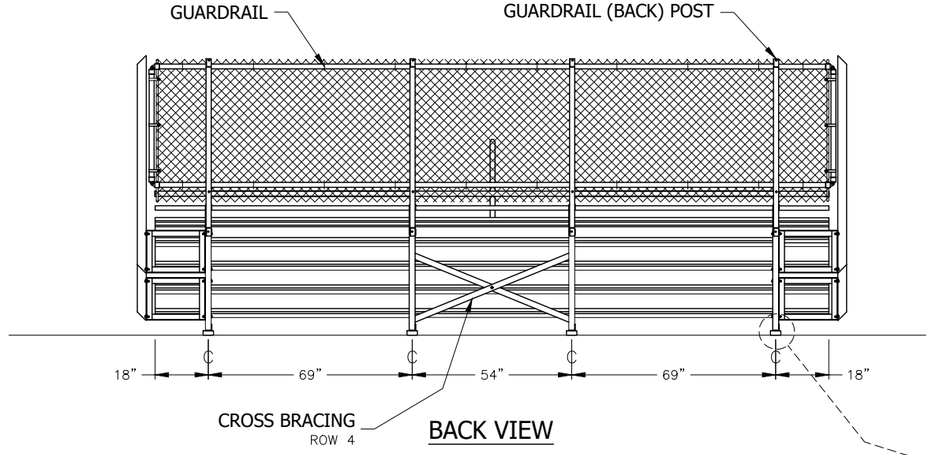
END VIEW



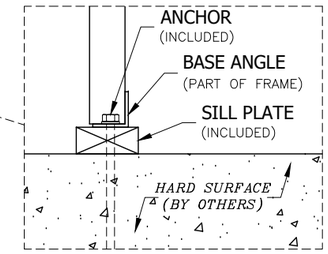
SECTION THRU AISLE



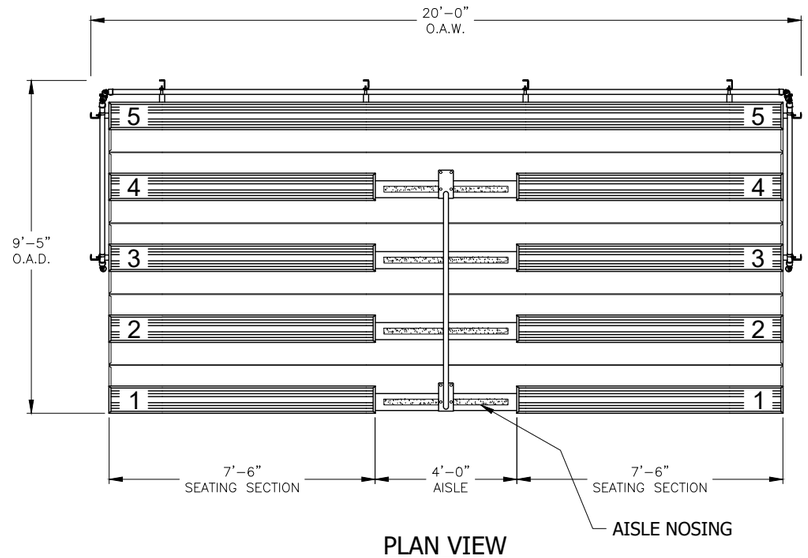
SECTION THRU SEATING



BACK VIEW



BLEACHER BASE DETAIL
TYPICAL ALL FRAMES



PLAN VIEW

MATERIALS & FINISH

FRAMES
- 2" x 2" ALUMINUM TUBE (UPRIGHTS)
- 2" x 2" ALUMINUM ANGLE (SEAT & FOOT BOARD SUPPORT)
- 2" x 2" ALUMINUM ANGLE (BASE)
- 1-PIECE WELDED CONSTRUCTION
- FINISH: MILL

CROSS BRACING
- 2" x 2" ALUMINUM ANGLE
- FINISH: MILL

PLANK
- 2 x 10 ALUMINUM EXTRUSION
- SEAT PLANK FINISH: ANODIZED
- FOOT BOARD FINISH: MILL

RISER
- 2 x 9 ALUMINUM EXTRUSION
- FINISH: MILL *(COLOR: OPTIONAL)*

GUARDRAIL
- 2" CHAINLINK (FABRIC)
- 1 5/8" STEEL TUBE (RAIL PIPE)
- FINISH: GALVANIZED

GUARDRAIL POSTS (SIDES & BACK)
- 3" ALUMINUM CHANNEL
- FINISH: MILL

MID-AISLE RAILING
- 1 5/8" ROUND ALUMINUM TUBE
- FINISH: ANODIZED

AISLE NOSING
- 2" WIDE, NON-SKID
- COLOR: BLACK

FASTENERS
- GRADE 5
- FINISH: GALVANIZED

SILL PLATES
- 2x4 TREATED WOOD

ANCHORS
- 1/2" x 7" GALVANIZED ANCHOR *(CONCRETE)*
- 1/2" x 18" PIN *(ASPHALT or COMPACTED STONE)*

DESIGN PARAMETERS - BLEACHER
(AS PER 2015 IBC CODE - ICC 300-12)

CLASSIFICATION (SECTION 302)
ASSEMBLY - GROUP A
OCCUPANCY (SECTION 303)
A-5

LIVE LOADS
VERTICAL LOADS = 100 PSF
SEATS & FOOTBOARDS = 120 PLF
SEATING PLATFORMS = 100 PSF
AISLES = 100 PSF

SWAY LOADS
PARALLEL TO SEATING = 24 PLF
NORMAL TO SEATING = 10 PLF

WIND LOADS = 21 PSF
(BASED ON 120 MPH AND A STRUCTURE HEIGHT OF 10ft or LESS)

GUARDRAILS = 50 PLF or 200 LB CONCENTRATED LOAD

SEATING CAPACITY: 52*
*based on 18" seat width

UNIT WEIGHT: 1095 LBS.

5 ROW x 19 FOOT BLEACHER

MODEL #5R19 (__) Units Required

REV	DATE	DESCRIPTION	REV BY:

JW INDUSTRIES LLC.
5662 Glendale Ave.
Green Bay, WI 54313
(920) 865-7307 Fax (920) 865-7777
jwoffice@jwindustriesinc.com
"We provide everything except the spectators."

PROJECT:	
CLIENT:	
DESIGN FIRM:	JW INDUSTRIES, LLC.
REPRESENTATIVE:	
JOB#:	DATE: DRAWN BY: SHEET NUMBER: 1 OF 1

Portolite Pitching Mounds

PO Box 145
Winsted, MN 55395
(800) 315-8115
chad@portolite.com

Estimate

ADDRESS
City of Rogers
22350 S Diamond Lake Rd
Rogers, MN 55374
Mike Bauer
(763) 428-1033

SHIP TO
City of Rogers
22350 S Diamond Lake Rd
Rogers, MN 55374
Mike Bauer
(763) 428-1033

ESTIMATE	2729
DATE	04/16/2025
EXPIRATION DATE	04/30/2025

DATE	SKU	DESCRIPTION	QTY	RATE	AMOUNT
6125TAN1PC	6125TAN1PC	6" Oversized One Piece Game Mound	4	2,899.00	11,596.00
Customer Pick Up	CPU	Customer Pick Up	1	0.00	0.00

Please note that all shipping costs provided are preliminary estimates and may be adjusted upon final invoicing.

SUBTOTAL	11,596.00
DISCOUNT 5%	-579.80
TAX	0.00
TOTAL	**$11,016.20**

Accepted By

Accepted Date

Premier Polysteel
A Division of ADA Enterprises, Inc.
305 Enterprise Drive
PO Box 77
Northwood, IA 50459
Ph: 641-324-2750 Fax: 641-324-1092
Toll Free US & Canada: 877-746-3826

Quote

Quote Number: 30446 Quoted Date: 04/02/2025

Quote To

Mike Bauer
City of Rogers
22350 S. Diamond Lake RD
Rogers, MN 55374
United States

Ph: 763-428-8580

Expiration Date: 04/16/2025
Terms: DueWhenShipped
Ship Via: WorldWideExp
Salesperson: Tim Solum
Reference:

Line	Quantity	Part Number/Desciption	Unit Price	Ext Price
001	10 ea	924-501-0G2 8' Champ Exp FS Table-G2 8' Champion Expanded Metal Free Standing Picnic Table-Legs and Brace-Gray, Seat and Top-Blue	$890.00	$8,900.00

Line	Quantity	Part Number/Desciption	Unit Price	Ext Price
002	3 ea	950-501-0G2 8' Chp Exp FS Acc Table -G2 8' Champion Expanded Metal Free Standing Accessible Picnic Table- Legs and Brace-Gray, Top and Seat-Blue	$890.00	$2,670.00

Line	Quantity	Part Number/Desciption	Unit Price	Ext Price
003	1 ea	FRT Shipping to zip 55374	$798.00	$798.00

Lead Time: 4 Weeks **Total:** **$12,368.00**

Payment Terms: As stated above

Freight: Please note this freight quote does not include a lift gate or special services. Should you need special services, let us know and we can adjust the quote as needed.

Warranty: All products manufactured by Premier Polysteel come with a 20 year limited warranty!

Cancellation Policy: Orders may be cancelled within 72 hours without penalty. Cancellation of order after 72 hours may be subject to restocking fees per our company terms.

All prices are net U.S. dollars. All local, state or other taxes, (if applicable) are the responsibility of the purchaser.

Quoted By: TIM

Premier Polysteel
A Division of ADA Enterprises, Inc.
305 Enterprise Drive
PO Box 77
Northwood, IA 50459
Ph: 641-324-2750 Fax: 641-324-1092
Toll Free US & Canada: 877-746-3826

Quote

Quote Number: 30446 Quoted Date: 04/02/2025

Quote To

Mike Bauer
City of Rogers
22350 S. Diamond Lake RD
Rogers, MN 55374
United States

Ph: 763-428-8580

Expiration Date: 04/16/2025

Terms: DueWhenShipped

Ship Via: WorldWideExp

Salesperson: Tim Solum

Reference:

Freight note: If you need a lift gate and have not requested one, please notify us ASAP. Your freight costs and services will need to be adjusted accordingly.

Quoted By: TIM

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.11

Subject: Approve Resolution 2025-31, Approving Site Plan and Conditional Use Permit for Creative Lawn & Landscapes at 14005 Northdale Blvd.
Prepared By: Alec Henderson, City Planner

Recommended Council Action
Motion to Approve Resolution 2025-31, Approving a Conditional Use Permit to Allow the Outdoor Storage of Materials and Site Plan for Improvements at the Creative Lawn & Landscapes Lot at 14005 Northdale Blvd.

Overview / Background / Analysis
Jordan Roberdeau of Creative Lawn & Landscaping has submitted a Zoning & Land Use application, requesting City approval of a Site Plan and Conditional Use Permit (CUP) for an expansion to the parking lot and Outdoor Storage at Creative Lawn & Landscaping, 14005 Northdale Boulevard (PID: 14-120-23-21-0010) (Subject Property). The proposal would reconstruct the gravel drive and parking areas in the front and rear to asphalt and include stormwater improvements to the property. The use of the property would include a CUP allowing, as an accessory use, the storage of materials in certain sections in the rear of the building and north of the rear parking lot. The rear parking lot would include areas for parking and loading of vehicles and equipment related to the business.

Creative Lawn and Landscapes initially purchased the parcel in 2014 and planned these improvements (Res No 2014-66). However, the improvements were never made and ultimately approvals were revoked in 2019 (Res No 2019-106) and Creative Lawn reduced their presence at the property. An application was received in 2020 which was later withdrawn due to issues with the plans. A new application was received in 2023 and deemed incomplete due to issues with the plans and stormwater plan. A revised application was received in March 2025.

The Planning Commission held a public hearing on April 7th, 2025 and heard testimony from the applicant. The Commission unanimously recommended approval of the site plan and conditional use permit.

Primary Issues to Consider

1. Land Use & Zoning
2. Site Plan & CUP

Analysis of Primary Issues

1. **Land Use & Zoning**

When Creative Lawn purchased property in 2014, the guidance was Commercial and zoning was B-3 General Business. During the span of time when Creative Lawn was creating new and revising plans, the 2040 Comprehensive Plan process reguided and rezoned the property. The Subject Property is now guided **High Density** in the Rogers 2040 Comprehensive Plan and the corresponding zoning for the Subject Property is **RC Regional Employment Center District**. The intent for the properties along Northdale Blvd is a redeveloped, mixed-used district which allows for a mix of residential, commercial and light industrial uses. The existing use of the property is technically permitted in the RC district as Contractor Services (falling within the light manufacturing definition). Outdoor storage of materials is permitted through a Conditional Use Permit in the RC district.

2. **Site Plan and Outdoor Storage**

The existing use on the site – Creative Lawn – will not be changed. Proposed changes to the site would include reconstructing the parking and drive aisles and the creation of two storage areas directly behind the building and to the north of the rear loading and parking area. The outdoor storage area includes approximately 6,300 sq ft of outdoor storage consisting of bins directly behind the building, and a plant storage area north of the parking lot. The site plan also indicates a seasonal greenhouse area. The planned improvements are consistent with previous plans and ultimately previous approvals. Outdoor Storage is regulated by section 125-84

The improvements include stormwater pond improvements. It is expected that the applicant will be required to enter into an agreement to ensure that the stormwater pond improvements are guaranteed (through surety) and ultimately completed per the plans. Elm Creek Watershed Commission permitting will be required prior to construction.

The parking code requires 7 stalls. 9 stalls are to be included initially, with the potential for 14 stalls through proof of parking. Parking requirements are satisfied.

No building modifications are planned. No lighting is planned for the lot other than maintaining existing building or site lighting already in place.

Landscaping

Landscaping is currently proposed to consist of 5 trees, turf, as well as 64 shrubs, perennial and flower plantings in front of the building and at the corners of the front parking areas. The property is within the Corridor overlay district and should also include a landscaped area in front of the front parking area adjacent to Northdale ROW (within the property). Additional landscaping will be required as a condition.

Staff Recommendation

Staff recommend approval of Resolution 2025-31, Approving a Conditional Use Permit to Allow the Outdoor Storage of Materials and Site Plan for Improvements at the Creative Lawn & Landscapes Lot at 14005 Northdale Blvd.

The Planning Commission recommended approval to the City Council for the Site Plan and Conditional Use Permit for outdoor storage of materials for Creative Lawn & Landscaping at 14005 Northdale Boulevard. Conditions should include:

1. Any gates shall have Knox Boxes or similar for emergency access by the Fire Department in case of emergency
2. The outdoor storage area shall not exceed 20% of the building and shall meet the performance standards for outdoor storage as regulated by section 125-84.
3. The Plans shall be revised to the satisfaction of the City Engineer, City Planner and Fire Department. Revisions shall be submitted and approved by the city prior to construction.
4. The Applicant shall be required to enter into any required agreements to ensure the improvements to the property are completed and post surety to guarantee the work.
5. The Applicant shall revise to the landscape plan to include a landscape area east of the front parking area adjacent to Right of Way consistent with Corridor rules per Section 125-67.
6. A screening fence shall be installed around the rear parking and storage areas to screen and secure the storage and parking areas in the rear of the building outside of the Drainage and Utility Easement.
7. The only storage and parking permitted on site shall be related to the use of the business and shall only be in the areas designated as storage on the plans. No personal vehicles or materials unrelated to the business shall be store or parked on site.
8. The drive aisles shall be installed to meet Fire Code requirements per the Fire Department.
9. Elm Creek Watershed Commission permitting shall be required prior to construction.

Financial Impact: NA **Source Fund**: NA

Budgeted? N/A

Supporting Documentation

A. Resolution No. 2025-31_Creative Lawn - Site Plan and CUP (1)
B. Location Map
C. Creative Lawn project 14005 Northdale Blvd Rogers -- site plans 2025-03-17
D. Creative Lawn Drainage Analysis 2025-03-17

CITY OF ROGERS
RESOLUTION NO. 2025-31

A RESOLUTION APPROVING A CONDITIONAL USE PERMIT TO ALLOW THE OUTDOOR STORAGE OF MATERIALS AND SITE PLAN FOR IMPROVEMENTS AT THE CREATIVE LAWN & LANDSCAPE LOT AT 14005 NORTHDALE BOULEVARD

WHEREAS, Creative Property Management LLC ("Owner") submitted a request for approval of a Conditional Use Permit ("CUP") to allow the outdoor storage of materials on designated sections of the property, and Site Plan approval for exterior improvements to the property located at 14005 Northdale Boulevard ("Subject Property"), as legally described in Exhibit A; and,

WHEREAS, the Subject Property is approximately 3.01 acres and guided as High Density, per the Rogers 2040 Comprehensive Plan, and zoned Regional Employment Center District (R); and,

WHEREAS, the Applicant has owned the property and operated at a reduced capacity at the property since 2014 is requesting approval for improvements to property and to store materials outdoors as it is related and accessory to the use of the building as a landscape business. The site plan as shown in Exhibit B; and,

WHEREAS, the Applicant has defined "materials" as including landscaping materials and live plants; and,

WHEREAS, the outdoor storage of materials is defined as a conditional use in the RC zoning district [§125-50 Table 4]; and,

WHEREAS, the Planning Commission ("Commission") considered the CUP request based on the current zoning regulations and the Comprehensive Plan designation; and,

WHEREAS, pursuant to Minnesota Statue §462.357 the Commission held a Public Hearing ("Hearing") on April 7th, 2025 to consider and receive public comment on said request for the outdoor storage of materials; and

WHEREAS, notice of the Hearing was posted, published in the City's official newspaper, and mailed to any and all owners of affected properties, as required by State Statute; and

WHEREAS, verbal comment was received and entered into the record; and,

WHEREAS, following the Hearing the Commission recommended approval of the said request for the outdoor storage of materials and site plan based on the following findings:

1. The CUP request is consistent and meets the criteria for conditional uses as regulated by Section 125-24 (c).

2. The outdoor storage of materials meets the performance standards as regulated by section 125-84 (e)(7).
3. The Site Plan is consistent with the requirements of Section 125-27.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ROGERS, MINNESOTA, the CUP request from Creative Property Management, LLC (Creative Lawn & Landscapes) is hereby approved to allow outdoor storage materials, as defined, in the designated area of the site, and the Site Plan for improvements is approved subject to the following conditions:

1. Any gates shall have Knox Boxes or similar for emergency access by the Fire Department in case of emergency
2. The outdoor storage area shall not exceed 20% of the building area and shall meet the performance standards for outdoor storage as regulated by section 125-84.
3. The Plans shall be revised to the satisfaction of the City Engineer, City Planner and Fire Department. Revisions shall be submitted and approved by the city prior to construction.
4. The Applicant shall be required to enter into any required agreements to ensure the improvements to the property are completed and post surety to guarantee the work.
5. The Applicant shall revise to the landscape plan to include a landscape area east of the front parking area adjacent to Right of Way consistent with Corridor rules per Section 125-67.
6. A screening fence shall be installed around the rear parking and storage areas to screen and secure the storage and parking areas in the rear of the building outside of the Drainage and Utility Easement.
7. The only storage and parking permitted on site shall be related to the use of the business and shall only be in the areas designated as storage on the plans. No personal vehicles or materials unrelated to the business shall be stored or parked on site.
8. Elm Creek Watershed Commission permitting shall be required prior to construction.

Moved by Councilmember , seconded by Councilmember

The following voted in favor of said resolution:

The following voted against the same:

The following abstained:

Whereupon said resolution was declared duly passes and adopted, and was signed by the Mayor, and attested by the Clerk dated 22nd day of April, 2025.

_____
Shannon Klick, Mayor

ATTEST:

_____
Stacie Brown, City Clerk

EXHIBIT A

LEGAL DESCRIPTION

Lot 1, Block 2, Remus Industrial Park 2nd Addition, Hennepin County, Minnesota

PID: 1412023210010

EXHIBIT B
SITE PLAN
[Revised Plan to be Inserted]

Hennepin County Property Map

Date: 4/16/2025

PARCEL ID: 1412023210010

OWNER NAME: Creative Property Mgmnt Llc

PARCEL ADDRESS: 14005 Northdale Blvd,Rogers MN 55374

PARCEL AREA: 3.01 acres, 130,914 sq ft

A-T-B: Abstract

SALE PRICE: $275,000

SALE DATE: 11/2014

SALE CODE: Warranty Deed

ASSESSED 2024, PAYABLE 2025
PROPERTY TYPE: Industrial-Preferred
HOMESTEAD: Non-Homestead
MARKET VALUE: $735,000
TAX TOTAL: $21,087.72

ASSESSED 2025, PAYABLE 2026
PROPERTY TYPE: Industrial
HOMESTEAD: Non-Homestead
MARKET VALUE: $735,000

Comments:

This data (i) is furnished 'AS IS' with no representation as to completeness or accuracy; (ii) is furnished with no warranty of any kind; and (iii) is not suitable for legal, engineering or surveying purposes. Hennepin County shall not be liable for any damage, injury or loss resulting from this data.

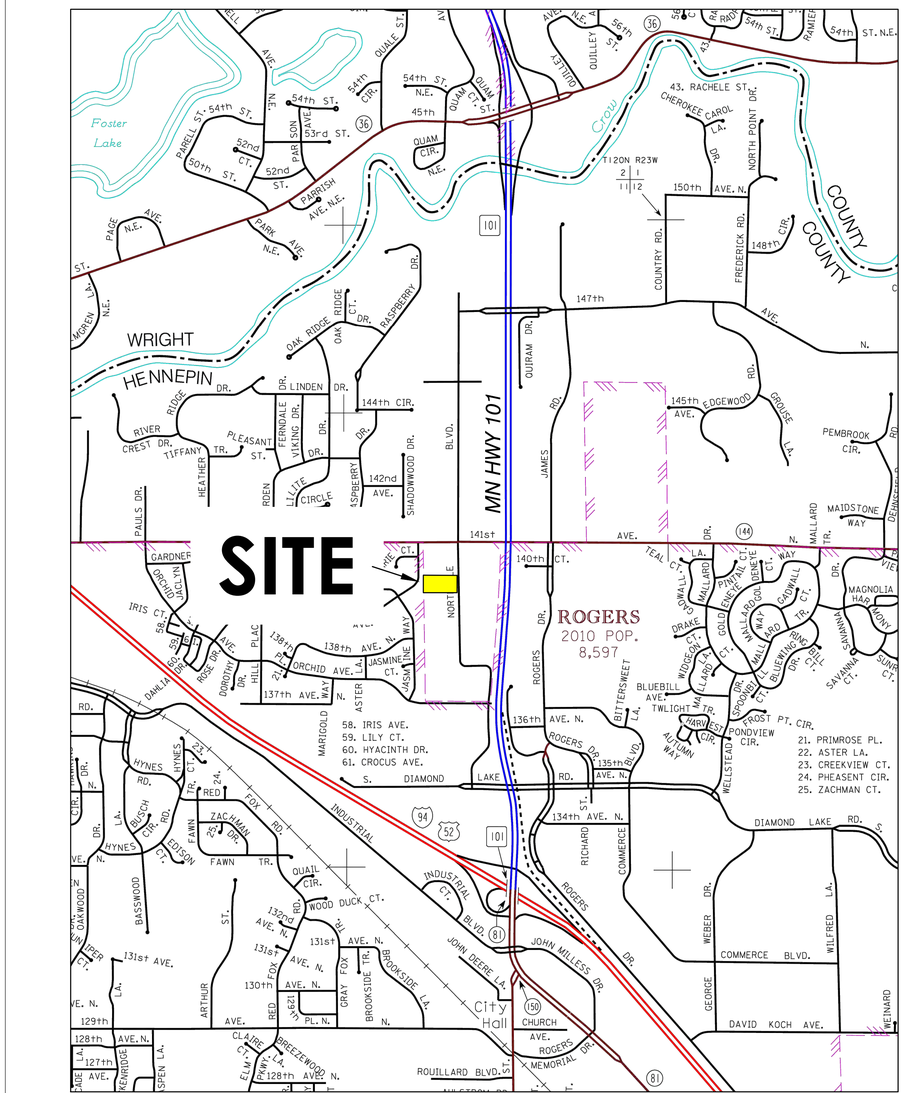
COPYRIGHT © HENNEPIN COUNTY 2025

CREATIVE LAWN AND LANDSCAPE

SITE IMPROVEMENT PROJECT

VICINITY MAP

NO SCALE



INDEX OF CIVIL SITE DRAWINGS:

C0	PROJECT LOCATION PLAN
C1	SITE PLAN
C2	GRADING AND DRAINAGE PLAN
C3	UTILITY PLAN
C4	STORM WATER POLLUTION PREVENTION PLAN
C5	EXISTING CONDITIONS AND REMOVALS PLAN
C6	DETAILS
C7	LANDSCAPE PLAN

CLIENT:

CREATIVE LAWN & LANDSCAPES Inc.
CREATIVE IDEAS FOR YOUR OUTDOOR LIFESTYLE

14005 Northdale Blvd
Rogers, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard Rogers, MN

PROJECT LOCATION PLAN

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

Date: 03/17/25 Reg. No. 24348

PREPARED BY: **CIVIL ENGINEERING SITE DESIGN**

118 East Broadway St.
PO Box 36
Monticello, MN 55362
Phone: 763-314-0929
www.civilesd.com

REVISIONS
05/18/15 REVISE POND & GRADING
10/20/15 UPDATED STORM WATER DESIGN
01/22/25 UPDATED CITY SUBMITTAL
03/17/25 CITY COMMENTS

VERTICAL SCALE
1 inch = ____ feet

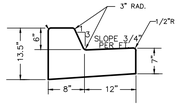
HORIZONTAL SCALE
1 inch = feet
(FOR 11x17 SHEET 24 x 36)

DATE	DRAWN BY	DESIGNED BY	CHECKED BY
07/09/14	SD	SD	SD

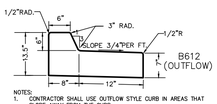
FILE NO. 00495

C0

Cover



B612 CURB & GUTTER STANDARD

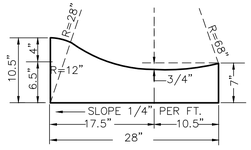


NOTES:
1. CONTRACTOR SHALL USE OUTFLOW STYLE CURB IN AREAS THAT SLOPE AWAY FROM THE CURB.

B612 OUTFLOW CURB & GUTTER (TIP-OUT FLOWLINE)

NOTES:
1) CONTROL JOINTS SHALL BE 7' MAXIMUM AND STABBED FRONT AND BACK.
2) AT ALL TRENCHES 2#4 REINFORCING RODS SHALL BE PLACED IN THE LOWER PORTION OF THE CURB 20 FEET IN LENGTH.
3) 2-#4 REINFORCING RODS AT CATCH BASINS NO LESS THEN 10 FEET IN LENGTH.

B612 CONCRETE CURB AND GUTTER DETAILS



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3) 2-#4 REINFORCING RODS AT CATCH BASINS NO LESS THEN 10 FEET IN LENGTH.

SUMOUNTABLE CONCRETE CURB AND GUTTER DETAILS

SITE DATA:

ZONING: RC – REGIONAL EMPLOYMENT CENTER DISTRICT

PROPOSED USE: COMMERICAL / INDUSTRIAL

GROSS LOT AREA: 130,914 SF = 3.0 ACRES

EXISTING BUILDING FOOTPRINT AREA: (GFA) 5,000 SF

PERCENT BUILDING COVERAGE: (% of gross lot 1 area)	3.8 %
FLOOR AREA RATIO (5,000 / 130,914)	0.038
EXISTING IMPERVIOUS AREA: (building, sidewalk, & pavement)	16,859 SF
EXISTING IMPERVIOUS AREA: (% of gross lot area)	12.9 %
PROPOSED IMPERVIOUS AREA: (building, sidewalk, & pavement including future greenhouse and future parking areas)	51,613 SF
PERCENT IMPERVIOUS AREA: (% of gross lot area)	39.4 %
PROPOSED PERVIOUS AREA: (landscape, turf area, & pond including plant storage areas)	79,301 SF
PERCENT PERVIOUS AREA: (% of gross lot area)	60.6 %

SETBACK: MINIMUM REQUIREMENTS

LOCATION:	BUILDING	PARKING
FRONT YARD	50	10
SIDE YARD	20*	10
REAR YARD	20*	10

* 50' IF ABUTTING RESIDENTIAL

PARKING DATA:

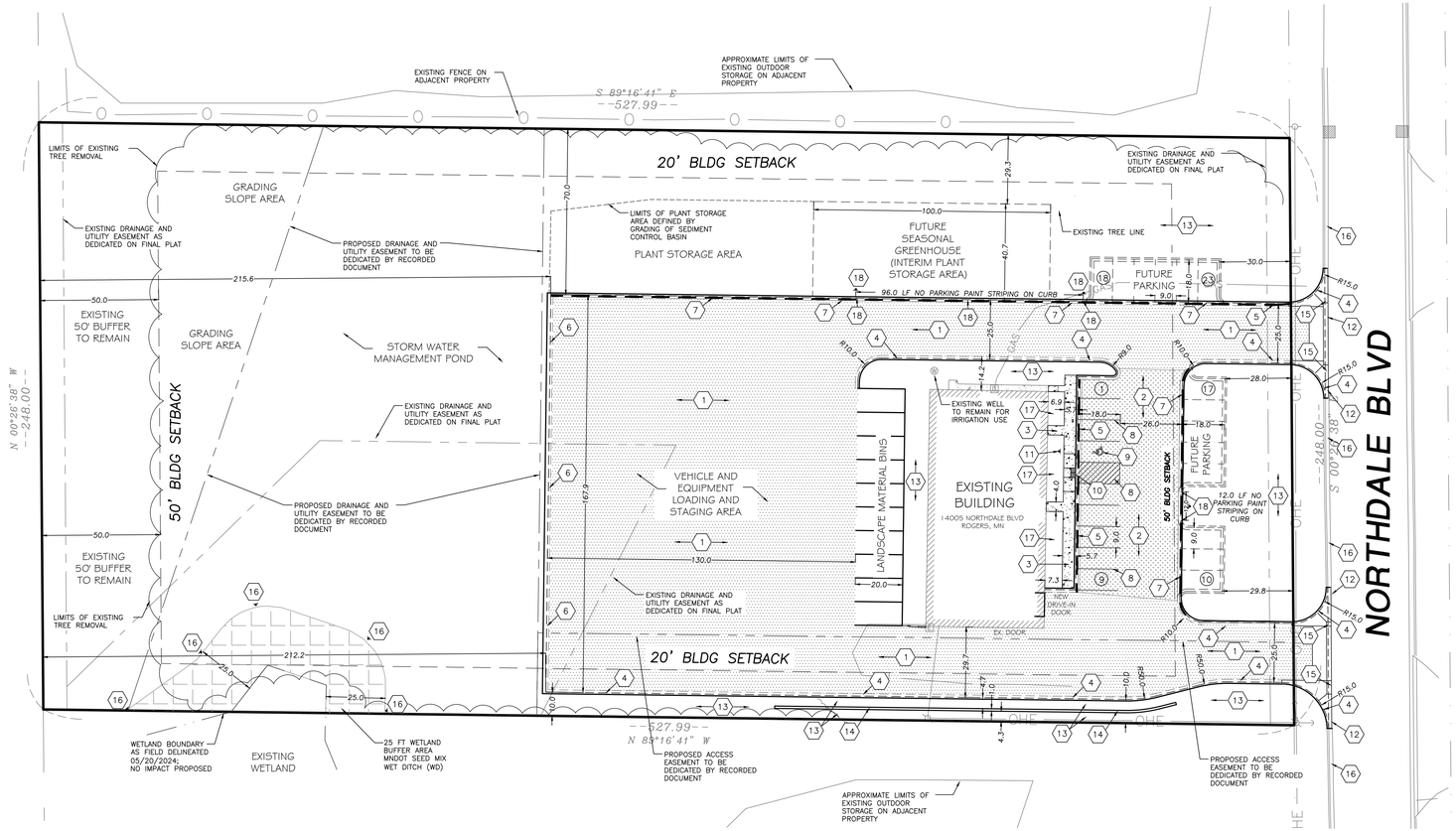
PROVIDED PARKING STALLS:
9 PARKING STALLS (INCL 1 HC STALL)
14 FUTURE PARKING STALLS
23 TOTAL

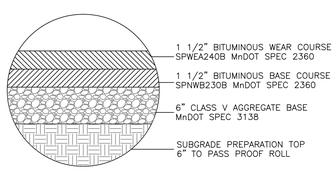
REQUIRED PARKING STALLS:
1/200 OFFICE x 1,000sf = 5 STALLS
1/2000 WAREHOUSE x 4,000sf = 2 STALLS
7 STALLS

WETLAND DELINEATION:

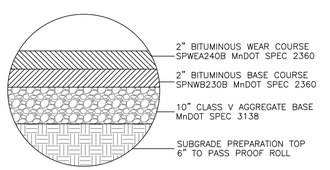
WETLAND DELINEATION PROVIDED BY:
ANDERSON ENGINEERING OF MINNESOTA, LLC
13605 1ST AVE N #100
PLYMOUTH, MN 55441

DATED: MAY 20, 2024





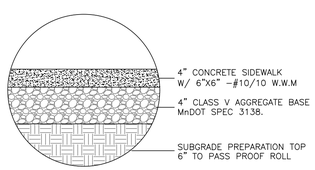
LIGHT DUTY



HEAVY DUTY

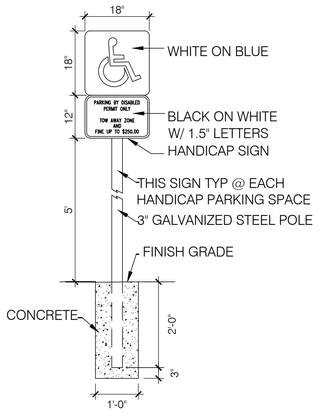
NOTE: SOILS SPECIFICATIONS SUPERSEDE ABOVE LISTED SPECIFICATIONS

BITUMINOUS PAVEMENT

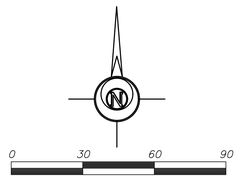


NOTES:
1. CONCRETE MIX SHALL CONFORM TO MNDOT SPEC. 2461 MIX No. 3Y22A FOR SLIPFORM PLACEMENT MIX No. 3Y32A FOR MANUAL PLACEMENT
2. CONTRACTOR SHALL SPACE THE CONTRACTION JOINTS AT 6'-0" O.C.
3. SOILS SPECIFICATIONS SUPERSEDE ABOVE LISTED SPECIFICATIONS

CONCRETE SIDEWALK



HANDICAP SIGN



SURVEY DATA

SURVEY INFORMATION PROVIDED BY:
MEYER ROHLIN LAND SERVICES
708 1st AVENUE NE
BUFFALO, MN 55313

DATED: JUNE 20, 2014

BENCHMARK:
MNDOT GEODETIC MONUMENT "STER MNDT" AT NORTHWEST QUADRANT OF CR144 AND HEATHER RIDGE DRIVE. ELEV.=912.505
DATUM: NAVD88

SITE PLAN LEGEND:

- LIGHT DUTY BITUMINOUS PAVEMENT
- HEAVY DUTY BITUMINOUS PAVEMENT
- CONCRETE PAVEMENT – SIDEWALK
- B612 CURB AND GUTTER STANDARD OR SURMOUNTABLE STANDARD
- B612 CURB AND GUTTER TIP-OUT OR SURMOUNTABLE TIP-OUT
- EXISTING EDGE OF PAVEMENT
- (#) PARKING COUNT

PROJECT LOCATION

PART OF THE E½ of the NW¼, SECTION 14 TOWNSHIP 120, RANGE 23, HENNEPIN COUNTY, MINNESOTA.

LEGAL DESCRIPTION

LOT 2, BLOCK 2,
REMUS INDUSTRIAL PARK SECOND ADDITION,
HENNEPIN COUNTY.

KEY NOTES

1. BITUMINOUS PAVEMENT – HEAVY DUTY. SEE SECTION THIS PAGE.
2. BITUMINOUS PAVEMENT – LIGHT DUTY. SEE SECTION THIS PAGE.
3. CONCRETE SIDEWALK – MAXIMUM 2% CROSS SLOPE.
4. B612 (6") CONCRETE CURB & GUTTER. MnDOT 2461 MIX 3Y22A SLIPFORM PLACEMENT OR MnDOT 2461 MIX 3Y32A MANUAL PLACEMENT.
5. B612 (6") CONCRETE OUTFLOW CURB & GUTTER. (TIP-OUT FLOWLINE). MnDOT 2461 MIX 3Y22A SLIPFORM PLACEMENT OR MnDOT 2461 MIX 3Y32A MANUAL PLACEMENT.
6. SURMOUNTABLE CONCRETE CURB & GUTTER. MnDOT 2461 MIX 3Y22A SLIPFORM PLACEMENT OR MnDOT 2461 MIX 3Y32A MANUAL PLACEMENT.
7. SURMOUNTABLE CONCRETE OUTFLOW CURB & GUTTER. (TIP-OUT FLOWLINE). MnDOT 2461 MIX 3Y22A SLIPFORM PLACEMENT OR MnDOT 2461 MIX 3Y32A MANUAL PLACEMENT.
8. PAINT 4" WIDE SOLID STRIPE – WHITE LATEX PAINT. (TYPICAL)
9. PAINT INTERNATIONAL SYMBOL OF ACCESSIBILITY – WHITE LATEX PAINT. (TYPICAL)
10. ACCESSIBLE PEDESTRIAN RAMP INCLUDING METAL DETECTABLE WARNING PLATES. COMPLY WITH MNDOT STANDARD PLAN 5-297.250
11. ACCESSIBLE PARKING SIGN (MNDOT #'S R7-8A AND R7-8B) ON BOLLARD POST. CENTER SIGN ON PARKING STALL. LOCATION PER GENERAL CONTRACTOR.
12. SAWCUT PAVEMENT AT MATCHLINE. MILL 18" WIDE AND 2" DEPTH OVERLAP FOR CLEAN EDGE
13. GREEN AREA – SEE LANDSCAPE PLAN.
14. LANDSCAPE RETAINING WALL. MAXIMUM 2.0' TALL. SEE ELEVATIONS ON SHEET C2. CONFIRM RETAINING WALL MATERIALS AND COLOR WITH OWNER.
15. COMMERCIAL DRIVE APRON (SEE DETAIL CON-12)
16. WETLAND BUFFER SIGN (SEE DETAIL)
17. ROCK AREA – SEE LANDSCAPE PLAN.
18. NO PARKING FIRE LANE SIGNS W/ 4" SOLID-YELLOW PAINT LATEX STRIPING ON CURB

PLAN NOTES:

1. ALL DIMENSIONS SHOWN ARE TO FACE OF CURB, EDGE OF SIDEWALK OR EXTERIOR OF BUILDING UNLESS OTHERWISE NOTED. REFER TO ARCHITECTURAL DRAWINGS FOR BUILDING DIMENSIONS AND SPECIFICATIONS FOR LOCATION OF EXITS, RAMPS, CONCRETE APRONS AND STOOPS.
2. TACK SHALL BE USED ON BITUMINOUS EDGE PRIOR TO PATCHING. MATCH EXISTING GRADES.
3. ALL CONCRETE SIDEWALKS ADJACENT TO BUILDING SHALL BE SEPARATED WITH A ½" EXPANSION JOINT.
4. CONTRACTOR SHALL VERIFY ALL CONDUIT REQUIREMENTS FOR LIGHTING, IRRIGATION, COMMUNICATION PEDESTAL, ETC WITH OWNER PRIOR TO PAVING.
5. ACCESSIBLE ROUTE SHALL BE PROVIDED FROM ACCESSIBLE STALLS TO BUILDING ENTRANCE (SEE ADAAG REQUIREMENTS). POLE MOUNT APPROVED SIGNS CENTERED ON STALLS. PAINT INTERNATIONAL SYMBOL OF ACCESSIBILITY ON STALL.
6. CONSTRUCT ACCESSIBLE PEDESTRIAN RAMP PER ADAAG AND MNDOT STANDARDS. PROVIDE CONTRASTING DETECTABLE WARNING STRIP.
7. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH FIRE MARSHAL FOR POSTING OF FIRE LANES, CURB MARKING AND SIGNAGE IF NEEDED.
8. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION AND REMOVAL OF ALL EXISTING SITE FEATURES THAT INTERFERE WITH NEW WORK AS SHOWN.

INDEX OF CIVIL SITE DRAWINGS:

C0	PROJECT LOCATION PLAN
C1	SITE PLAN
C2	GRADING AND DRAINAGE PLAN
C3	UTILITY PLAN
C4	STORM WATER POLLUTION PREVENTION PLAN
C5	EXISTING CONDITIONS AND REMOVALS PLAN
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CLIENT:

CREATIVE LAWN & LANDSCAPES, Inc.
CREATIVE IDEAS FOR YOUR OUTDOOR LIFESTYLE

14005 Northdale Blvd
Rogers, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard Rogers, MN

SITE PLAN

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

Signature: Scott Davis
Date: 03/17/25 Reg. No. 24348

PREPARED BY:
CIVIL ENGINEERING SITE DESIGN
118 East Broadway St.
PO Box 685
Monticello, MN 55362
Phone: 763-314-0929
www.civilesd.com

REVISIONS
05/16/15 REVISE POND & GRADING
10/20/15 UPDATED STORM WATER DESIGN
01/22/25 UPDATED CITY SUBMITTAL
03/17/25 CITY COMMENTS

VERTICAL SCALE 1 inch = ____ feet

HORIZONTAL SCALE 1 inch = ____ feet (FULL SIZE SHEET 24 x 36)

DATE	DRAWN BY	DESIGNED BY	CHECKED BY
07/09/14	SD	SD	SD

FILE NO. 00495

C1

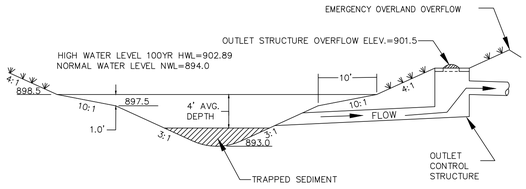
Site Plan

PROJECT LOCATION

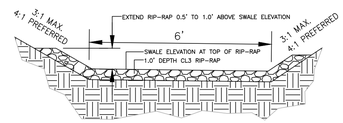
PART OF THE E½ of the NW¼,
SECTION 14 TOWNSHIP 120, RANGE 23,
HENNEPIN COUNTY, MINNESOTA.

LEGAL DESCRIPTION

LOT 2, BLOCK 2,
REMUS INDUSTRIAL PARK SECOND ADDITION,
HENNEPIN COUNTY.



TYPICAL POND BENCH GRADING



NOTE:
1. CONTRACTOR SHALL CLEAN OUT SWALE AS NECESSARY TO KEEP FREE FROM SEDIMENT OR AS DIRECTED BY CITY OR ENGINEER.

OVERFLOW SWALE/SPILLWAY DETAIL

LEGEND

- X 932.0 — Existing Spot Elevation
- 908 — Existing Contour
- Existing Tree Line
- Existing Wetland Boundary
- Existing Storm Sewer
- Propsed Storm Sewer
- × 925.30 — Proposed Spot Elevation
- 908 — Proposed Contour
- 1.9% — Pavement Grade
- Proposed Tree Line

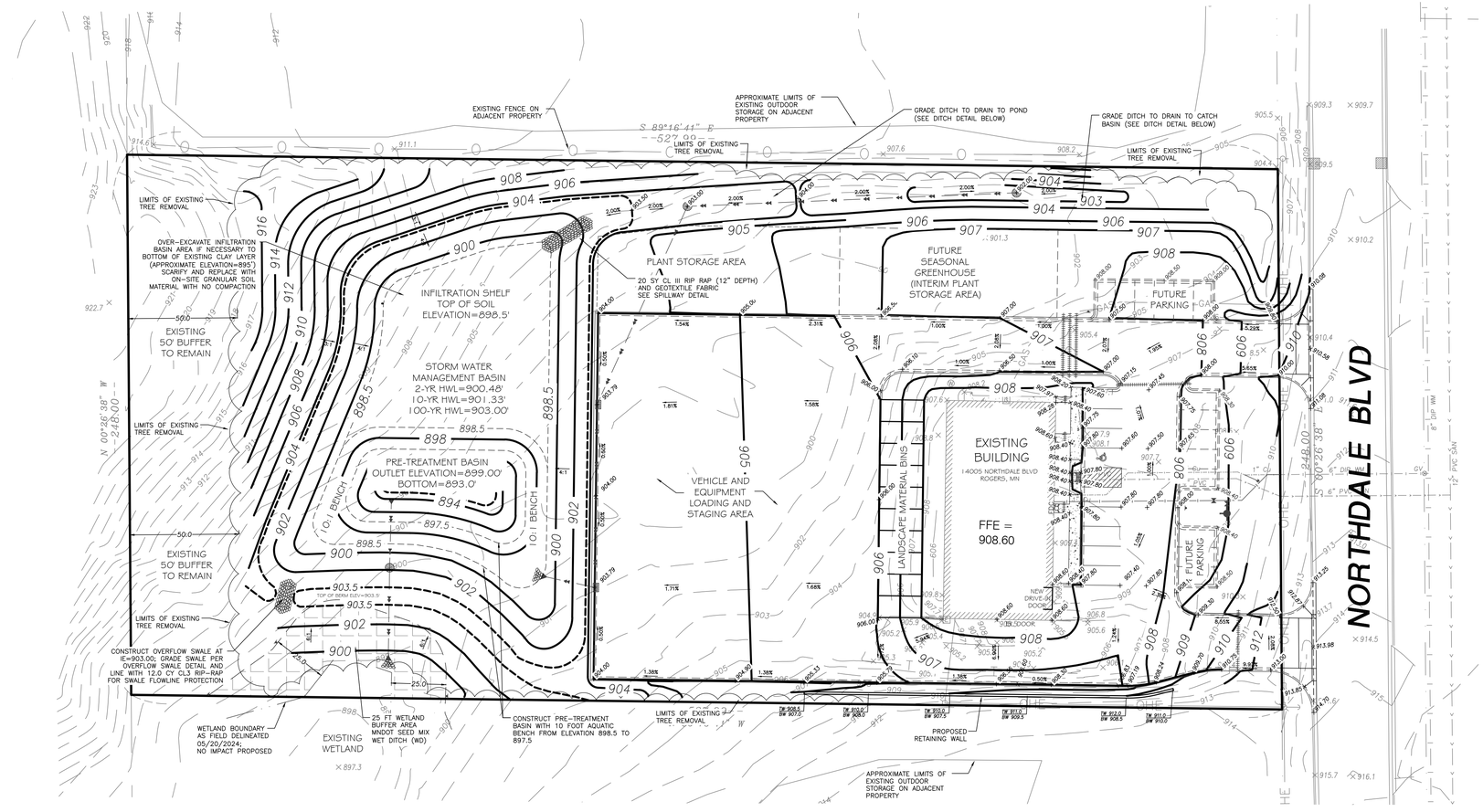
0 30 60 90
GRAPHIC SCALE IN FEET

SURVEY DATA

SURVEY INFORMATION PROVIDED BY:
MEYER ROHLIN LAND SERVICES
708 1st AVENUE NE
BUFFALO, MN 55313

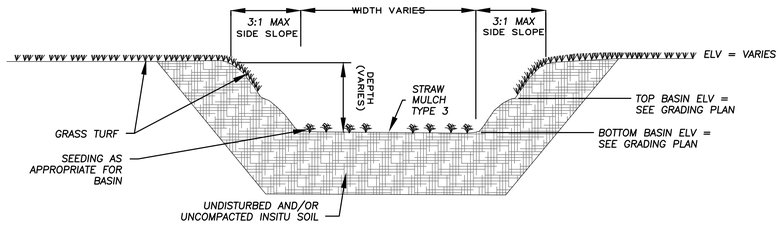
DATED: JUNE 20, 2014

BENCHMARK:
MNDOT GEODETIC MONUMENT "STER MNDT" AT NORTHWEST QUADRANT OF CR144 AND HEATHER RIDGE DRIVE. ELEV.=912.505
DATUM: NAVD88



GENERAL GRADING NOTES:

1. Specifications applicable for this project: Current standard specifications for Rogers, MN, and the latest Minnesota Department of Transportation Specifications for Highway Construction and all NPDES requirements except where modified by these contract documents.
2. OSHA requirements shall be followed for all work on this project.
3. The Contractor shall notify "Gopher State One Call" 48 hours prior to any excavation (1-800-252-1166.)
4. The Grading Contractor shall verify all locations and elevations of underground utilities with utility companies prior to any construction, and immediately notify the Engineer of any conflicts.
5. Erosion Control shall be constructed, as applicable, as sequenced below:
   A. Silt Fence.
   B. Rock Construction Entrance.
   C. Demolition
   D. Common excavation (grading).
   E. Seed and mulch or sod (See notes on Landscape plan).
6. Final Plat shall govern for easements and lot dimensions.
7. Any erosion control items necessary to protect adjacent properties shall be constructed by the Grading Contractor.
8. Erosion control maintenance shall be performed by the Grading Contractor, and removed as per the Contract Documents or as directed by the Engineer, followed by all necessary restoration of disturbed area. This work shall be incidental to the grading contract.
9. The Grading Contractor shall schedule the soils engineer to facilitate certification of all controlled fills in a timely fashion. Density tests shall meet the following:
   A. Within the upper 3' of streets, the Grading Contractor shall utilize approved soils that are within 1% of the optimum moisture content as defined by the Standard Proctor Test-ASTM: D-698 with compaction meeting 100% Standard Proctor Density and not exceeding this compaction by more than 1%. Below the upper 3', compaction shall meet 95% Standard Proctor Density, and be within 3% of the optimum moisture content. Grading tolerances shall be 0.1'.
   B. Grading tolerances for the remainder of the site shall be 0.25'.
10. All areas of unsuitable soils found in the pad described above that cannot be corrected shall be located in the field by the Grading Contractor. The Grading Contractor shall immediately notify the Engineer of these areas and provide information as to their size and location.
11. The Grading contractor shall provide positive drainage on the site at all times.
12. The Grading Contractor shall keep public streets and travel ways clear of soil and debris. Daily cleaning at the construction entrance shall be performed, especially at the end of each day's work.
13. All silt fence shall be removed at project completion.
14. All proposed elevations are at flow line unless otherwise noted.
15. All erosion control best manage practices shall be per City standards.
16. Modular Block and Concrete Cast-In-Place retaining walls are to be engineered as necessary per local code requirements. Retaining wall elevations shown denote the exposed portion of the wall only.



TYPICAL INFILTRATION BASIN CROSS-SECTION
NOT TO SCALE

INFILTRATION BASIN GENERAL NOTES:

1) INSTALL ALL TEMPORARY EROSION CONTROL MEASURES (IN ACCORDANCE WITH MnDOT GENERAL CONDITIONS 2573) PRIOR TO THE START OF ANY CONSTRUCTION OPERATION THAT MAY CAUSE ANY SEDIMENTATION OR SILTATION AT THE SITE.

2) INSTALL STORM DRAIN INLET PROTECTION TO PREVENT CLOGGING OF THE STORM SEWER AND SEDIMENT LOADS TO DOWNSTREAM STORM WATER FACILITIES OR WATERBODIES.

3) IF THE STORM WATER BMP IS BEING DESIGNED TO SERVE AS A TEMPORARY SEDIMENT BASIN, GRADE THE BMP TO WITHIN 12" ABOVE THE FINAL GRADE TO PROTECT THE UNDERLYING MATERIAL FROM CLOGGING. ONCE CONSTRUCTION IN THE CONTRIBUTING DRAINAGE AREA HAS BEEN COMPLETED AND THE SITE ISSTABILIZED, EXCAVATE THE INFILTRATION BASIN TO FINAL GRADE AND COMPLETE CONSTRUCTION OF THE INFILTRATION BASIN.

4) GRADING OF THE INFILTRATION BASIN SHALL BE ACCOMPLISHED USING LOW-IMPACT EARTH MOVING EQUIPMENT TO PREVENT COMPACTION OF THE UNDERLYING SOILS. SMALL TRACKED DOZERS AND BOBCATS WITH RUNNER TRACKS ARE RECOMMENDED.

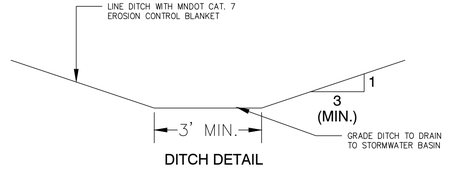
5) EXCAVATE THE INFILTRATION BASIN TO THE SPECIFIED DEPTH (ELEVATION). ALL SUB MATERIAL BELOW THE SPECIFIED ELEVATION SHALL BE LEFT UNDISTURBED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

6) IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BMP DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL WILL NEED TO BE REMOVED FROM THE INFILTRATION BASIN PRIOR TO INITIATING THE NEXT STEP IN THE INFILTRATION BASIN CONSTRUCTION PROCESS. THIS IS ESPECIALLY IMPORTANT IF THE INFILTRATION BASIN HAS BEEN DESIGNED TO INFILTRATE STORM WATER. SEDIMENT THAT HAS BEEN WASHED INTO THE INFILTRATION BASIN DURING THE EXCAVATION PROCESS CAN SEAL THE PERMEABLE MATERIAL, SIGNIFICANTLY REDUCING THE INFILTRATION CAPACITY OF THE SOILS.

7) INFILTRATION BASIN TO BE SEEDED WITH MNDOT SEED MIX WET DITCH (WD) AT 20 LB/AC OR APPROVED EQUAL. SEEDING SHALL CONFORM TO MnDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

8) BOTTOM OF INFILTRATION BASIN TO BE SEEDED AND SHALL BE MULCHED WITH CLEAN GRAIN STRAW (MnDOT TYPE 3) AT A RATE OF 2 TONS PER ACRE.

9) SEEDING AND INSTALLATION OF ANY EROSION CONTROL BLANKET NECESSARY SHALL BE COMPLETED WITHIN SEVEN DAYS (7) DAYS OF FINAL GRADING.



DITCH DETAIL

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C1	SITE PLAN
C2	GRADING AND DRAINAGE PLAN
C3	UTILITY PLAN
C4	STORM WATER POLLUTION PREVENTION PLAN
C5	EXISTING CONDITIONS AND REMOVALS PLAN
C6	DETAILS
C7	LANDSCAPE PLAN

CLIENT:

CREATIVE LAWN & LANDSCAPES, Inc.
CREATIVE IDEAS FOR YOUR OUTDOOR LIFESTYLE

14005 Northdale Blvd
Rogers, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT
14005 Northdale Boulevard
Rogers, MN

GRADING AND DRAINAGE PLAN

I, hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Date: 03/17/25 *Reg. No.* 24348

PREPARED BY:

CIVIL ENGINEERING
SITE DESIGN
118 East Broadway St.
PO Box 185
Monticello, MN 55362
Phone: 763-314-0929
www.civilesd.com

REVISIONS
05/16/15 REVISE POND & GRADING
10/20/15 UPDATED STORM WATER DESIGN
01/22/25 UPDATED CITY SUBMITTAL
03/17/25 CITY COMMENTS

VERTICAL SCALE
1 inch = ____ feet

HORIZONTAL SCALE
1 inch = ____ feet
(FULL SIZE SHEET 24 x 36)

DATE	DRAWN BY	DESIGNED BY	CHECKED BY
07/09/14	SD	SD	SD

FILE NO. 00495

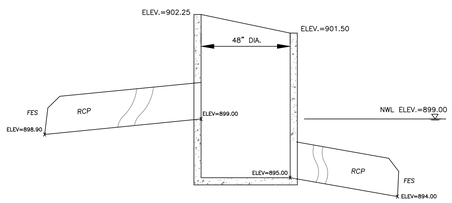
C2
Grading and Drainage Plan

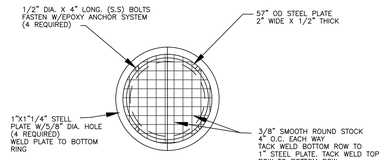
PROJECT LOCATION

PART OF THE E½ of the NW¼,
SECTION 14 TOWNSHIP 120, RANGE 23,
HENNEPIN COUNTY, MINNESOTA.

LEGAL DESCRIPTION

LOT 2, BLOCK 2,
REMUS INDUSTRIAL PARK SECOND ADDITION,
HENNEPIN COUNTY.





STORM WATER MANAGEMENT POND OUTLET CONTROL STRUCTURE OCS-1

LEGEND:

- EXISTING BITUMINOUS EDGE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER SERVICE
- EXISTING WATER SERVICE
- PROPOSED CURB AND GUTTER
- PROPOSED WATER SERVICE
- PROPOSED STORM SEWER

0 30 60 90

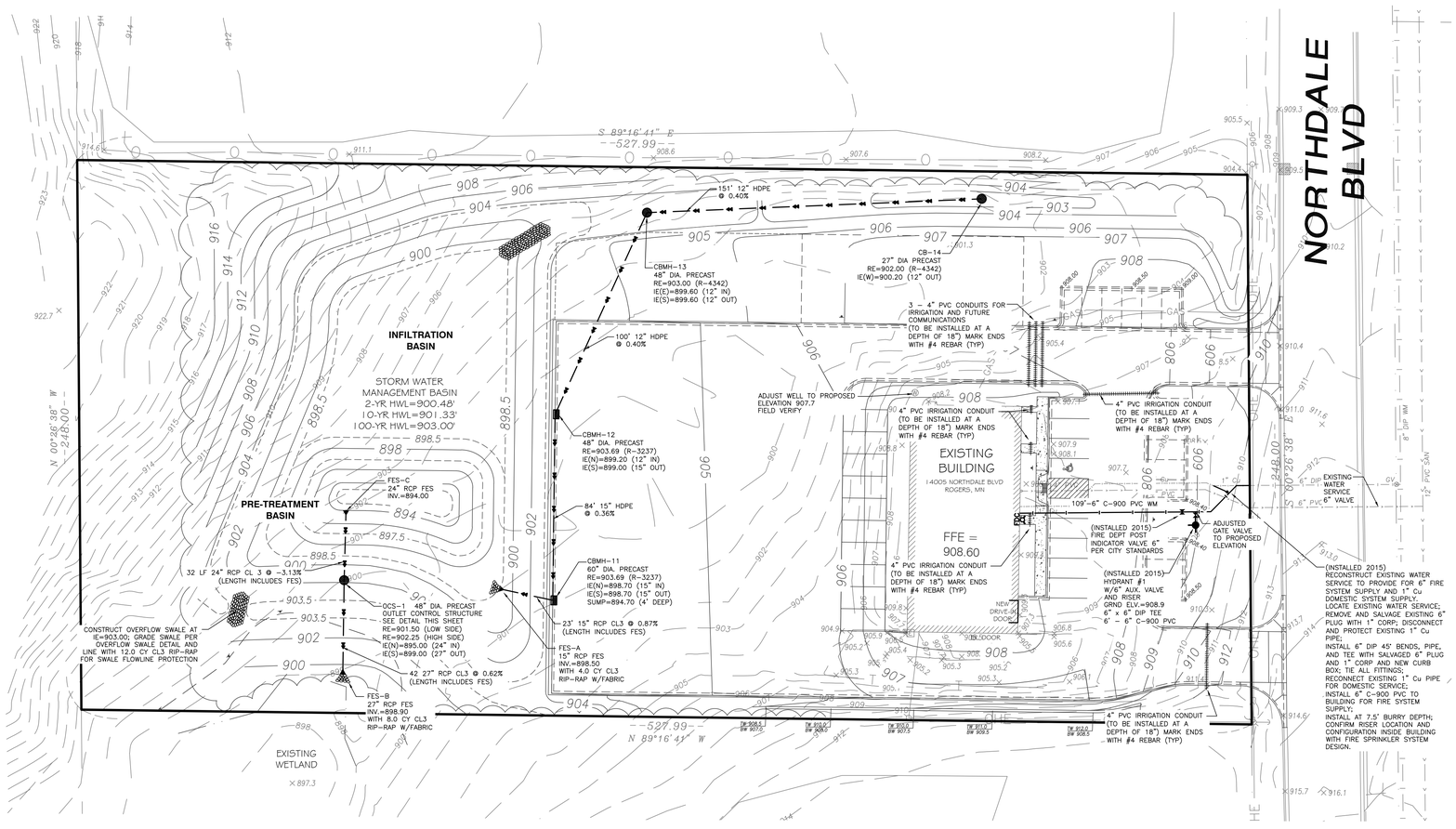
GRAPHIC SCALE IN FEET

SURVEY DATA

SURVEY INFORMATION PROVIDED BY:
MEYER ROHLIN LAND SERVICES
708 1st AVENUE NE
BUFFALO, MN 55313

DATED: JUNE 20, 2014

BENCHMARK:
MNDOT GEODETIC MONUMENT "STER MNDT" AT NORTHWEST QUADRANT OF CR144 AND HEATHER RIDGE DRIVE. ELEV.=912.505
DATUM: NAVD88



GENERAL UTILITY NOTES

1. Specifications applicable for this project: Current standard specifications for the City of Rogers, MN and all Minnesota Department of Health and MPCA requirements except where modified by these contract documents.
2. OSHA requirements shall be followed for all work on this project.
3. The Contractor shall notify "Gopher State One Call" 48 hours prior to any excavation (651-454-0002 or 1-800-252-1166 out state.)
4. The Contractor shall verify all locations and elevations of underground utilities with utility companies prior to any construction (storm sewer, sanitary sewer, water, natural gas, telephone, electric, etc.), and immediately notify the Engineer of any conflicts.
5. The Contractor shall protect all existing utilities and facilities to allow proper functioning during and after construction. Any required supporting structures shall be supplied by the Contractor as work incidental to the contract.
6. The contractor shall immediately notify the Engineer of any conflicts between existing utilities, and the proposed construction. The Engineer will coordinate with the Utility Company in question to determine the need for relocation of the existing utility.
7. Existing conditions such as sand in manholes or valve boxes shall be identified by the Contractor and these shall be reported to the Engineer prior to excavation by the Contractor. Once construction has begun, all damage to underground utilities will be assumed to have been caused by the Contractor, any repairs necessary shall be performed by the Contractor at the Contractor's expense.
8. Final Plat or Certificate Of Survey shall govern for easements.
9. The Contractor shall coordinate with the local jurisdiction to obtain permits and meter for water source. All associated costs shall be incidental to the Contract, including disposal of test water into City's sanitary sewer system. The Contractor shall not operate gate valves or hydrants on the City's water supply system.
10. The Contractor shall notify the City Engineer and the Project Engineer 48 hours prior to starting work or as required by the local jurisdiction or be subject to being shut down.
11. The Contractor shall keep access roads clear of soil or other debris, and perform daily street cleaning as required by the NPDES permit. Positive drainage, controlled with erosion control and erosion prevention measures as required by the NPDES permit shall be performed. Inlet protection shall be installed within 48 hours after inlet construction. Unless specified on the plans or as a bid item on the Bid Form, any temporary culverts, ditches, filter fabric, etc. necessary to accomplish this shall be performed as incidental to the Contract.
12. The Contractor shall preserve and protect the markers and monuments set for the subdivision of the land.
13. The Contractor shall schedule the soils engineer to facilitate certification of all controlled fills in a timely fashion. Density tests shall meet the following:
    A. Density tests shall be taken on all trenches at locations as determined by the Engineer or his representative.
    B. Within the upper 3' of streets, private drives and parking lots, Contractor shall utilize approved soils that are within 1% optimum moisture content as defined by the Standard Proctor Test-ASTM: D-698 with 100% Standard Proctor Density and not exceeding compaction by more than 1%. Below the upper 3', compaction shall meet 95%. Grading tolerances shall be 0.1'.
14. The Owner shall pay for all testing of soils compaction. Any areas which fail to meet the above standards shall be corrected and re-tested by the Owner's testing agent at the Contractor's expense.
15. Contractor shall provide temporary traffic control in compliance with MN/DOT "Temporary Traffic Control Zone Layouts Field Manual" dated 2011 for construction adjacent to travel ways.
17. Contractor shall be responsible for verification of the depth of existing stubs listed on this plan prior to the ordering of any fittings, structures, castings, etc. Engineer and the Owner shall not be responsible for any discrepancies found as depths are estimated.

INDEX OF CIVIL SITE DRAWINGS:

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CLIENT:

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Rogers, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard Rogers, MN

UTILITY PLAN

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Date: 03/17/25 Reg. No. 24348

PREPARED BY: *CIVIL ENGINEERING & SITE DESIGN*

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REVISIONS
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DATE	DRAWN BY	DESIGNED BY	CHECKED BY
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FILE NO. 00495

C3

Utility Plan

SWPP NARRATIVE

This project will consist of clearing and grub, grading, water service utilities, storm sewer utilities, parking lot consturction, and storm water management facilities.

First, perimeter silt fence and rock construction entrance shall be installed. Then site clearing and grubbing operations shall commence. The contractor shall dispose debris off–site within 24 hours. Then the site can be graded and utilities installed. Once final grade is established and certified, the site shall be stabilized with seed and mulch or erosion control blaket. Once vegetation is established, temporary erosion control measures shall be removed.

POLLUTION PREVENTION NOTES

Solid waste: collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction debris and other wastes must be disposed of properly off–site and must comply with MPCA requirements.

Hazardous materials: oils, gasoline, paint, and any hazardous substance must be properly stored, including secondary containment, to prevent spills, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal must be in compliance with MPCA regulations.

External washing of trucks or other construction vehicles is not allowed on site. No engine degreasing is allowed on site. No concrete washouts are allowed on site.

RESPONSIBLE PARTY

Contact information for the responsible party for erosion control is:

Creative Lawn and Landscape, Inc.
Jordan Roberdeau and Kirk Brum
763–389–2227 office

EROSION CONTROL NOTES

1. All devices necessary to control erosion and sediment (I.E. perimeter silt fence, rock construction entrances, swales, ponds, berms, ETC.) shall be installed prior to any other construction operations.
2. After completion of final grading, exposed soils must be permanently stabilized within 72 hours. Stabilization shall consist of disc–anchored seed & mulch or sod.
3. The site must be kept in a well drained condition at all times. The contractor shall be responsible for temporary ditches, or other means necessary to ensure proper drainage. The building pad must be provided with a positive outflow. This work shall be incidental to the grading contract.
4. Entering/exiting of the site shall occur only at rock construction entrance to reduce tracking of dirt onto paved streets. Sediment tracked onto streets during working hours must be reclaimed via street scraping and sweeping at the end of each working day.

RUNOFF ROUTING OFFSITE

Downstream water bodies receiving storm water runoff from the project site:
Overland natural waterways flowing southwest
Natural wetland areas to the west
Crow River Main Stem
Mississippi River

DESIGN CALCULATIONS

Design calculations, including soil types are on file with: Civil Engineering Site Design

SWPPP Designer: Scott Dahlke (Expires 2025)

EROSION CONTROL INSTALLATION SCHEDULE

1. Silt fence shall be installed or restored prior to any construction. Silt fence shall be located as shown to intercept runoff. The area located beyond the perimeter silt fence shall not be disturbed during construction.
2. Rock Construction Entrance shall be installed prior to grading operations.
3. All storm sewer inlets shall have inlet protection inserts installed. Inserts shall be "Road rain–Top Slab" or "Road Drain–Curb & Gutter" inlet protection devices as manufactured by WIMCO (or approved equal) and installed per manufacture's recommendations.
4. All erosion control installations shall remain in place and be maintained in good condition by the contractor until the site has been re–vegetated, at which time it shall be removed by the contractor. For proposed paved surface areas, the contractor may remove necessary silt fencing to construct roadway, while maintaining adequate erosion control in adjacent areas.
5. Sufficient topsoil shall be stockpiled to allow for the replacement of 4" topsoil for disturbed areas to be re–vegetated.
6. The contractor shall schedule site grading, utility installation and roadway construction so that the general site can be mulched and re–seeded soon after disturbance. Areas that will not be subject to construction traffic shall be seed and mulched or sodded within 72 hours of final grading.

EROSION CONTROL MAINTENANCE SCHEDULE

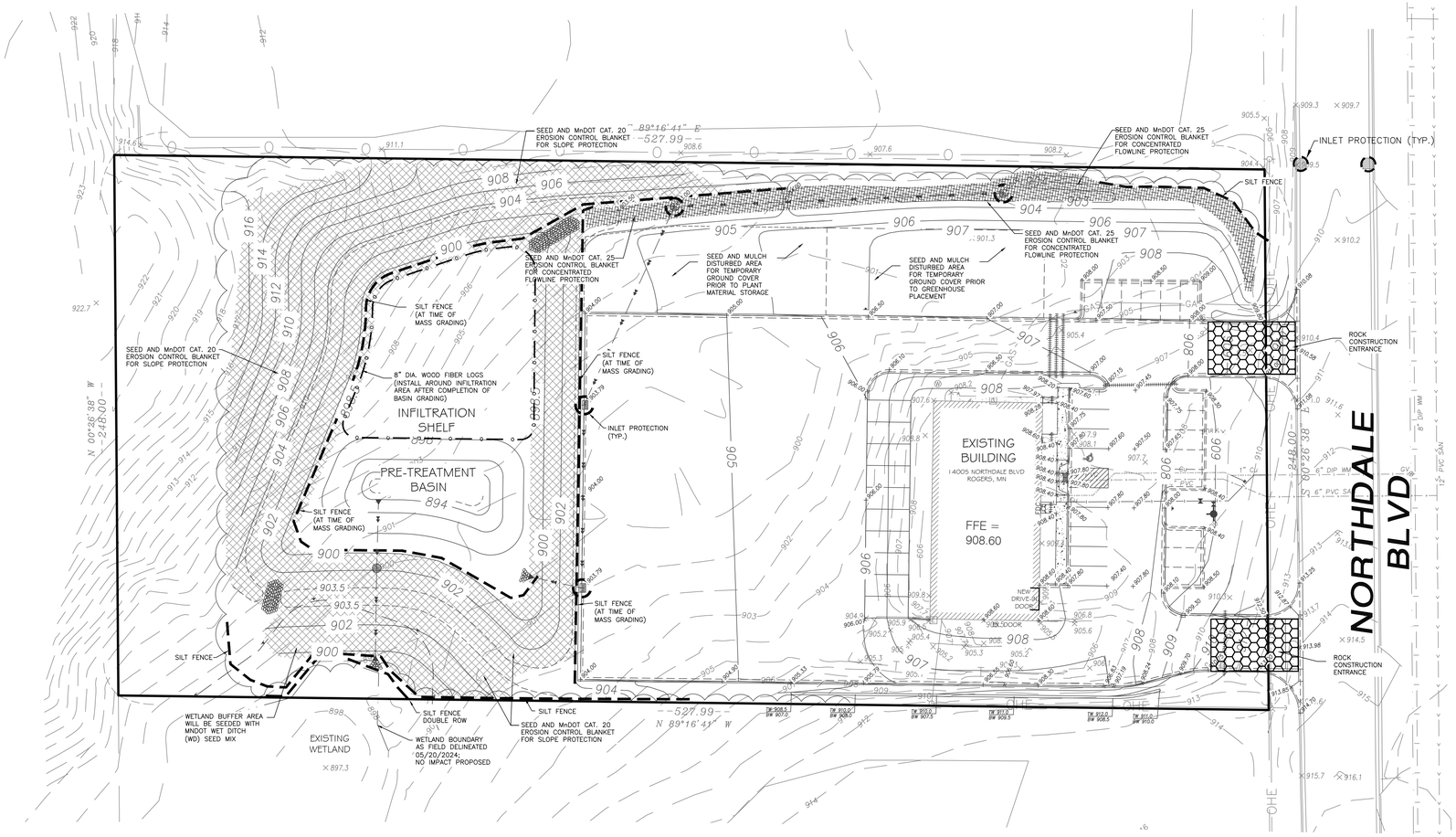
1. Erosion control measures shall be inspected by the contractor's representative and maintained by the contractor every Friday and within 24 hours after any rainfall event larger than 1/2" until the project is completed. Maintenance requirements are as follows: silt fence – 1/3 height of fence or damaged, remove sediment and/or repair fence within 24 hours; rock entrance – refresh as necessary to conform to detail; inlet protection inserts – remove sediment after each rain event, clean or replace filter when clogged; surface water – drain and stabilize, within 7 days of discovery; and street sweeping – remove all sediment tracked onto paved surfaces within 24 hours or as directed by City Engineer.
2. Replacement – Fabric shall be replaced promptly when it decomposes or becomes ineffective before the barrier is no longer necessary.
3. Any sediment remaining in place after silt fence is no longer required shall be dressed to conform with the existing grade, prepared, and seeded with appropriate seed mix, as directed by the engineer.
4. Removal of the silt fence– Silt fences shall be removed when they have served their useful purpose, but not before the upward sloping area has been permanently stabilized.

VEGETATION GROUND COVER RESTORATION

1. Stabilization of all exposed soil areas must be initiated immediately but in no case completed later than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased. Seeding and mulching shall conform to the latest NPDES requirements for installation schedule with regards to grading.
2. Permanent turf ground cover shall include all disturbed areas be covered with a minimum 6" topsoil and sodded or seeded as allowed by City. If not otherwise specified, turf seed to be MnDOT mix Southern Boulevard (SB) applied at 160 lbs/ac. MnDOT Type 3 mulch shall be applied at 2 tons/ac and disc anchored in areas not covered by sod or erosion blanket. Seeding and mulching shall conform to the latest NPDES requirements for installation schedule with regards to grading.
3. Temporary ground cover to be MnDOT seed mix Two–year Cover Crop (TCC) shall be applied at 25 lbs/ac, or equivalent as approved by City. MnDOT Type 1 mulch shall be applied at 2 tons/ac and disc anchored in areas not covered by sod or erosion blanket.
4. Fertilizer for turf shall be MnDOT Type 3 22–5–10 and applied at 350 lb/ac. Disc fertilizer into top 3" of soil. Specification reference is MnDOT 2574.
5. Dormant seed mix shall be used after November 1 or when temperatures do not exceed 40° F, using same rates specified above. No seed shall be placed on snow or ice greater than 2" in depth.
6. Any seeded areas that do not become established with vegetation shall be re–seeded at Contractor's expense.
7. Erosion blanket shall be installed in seed areas with ground surface slopes of 4H:1V or steeper.
8. Restoration with sod requires contractor to provide irrigation water maintenance for 60 days after sod placement or as specified by owner.

INFILTRATION BASIN NOTES

1. Initration area shall be staked off during construction to restrict heavy equipment traffic from compacting native soils.
2. Install appropriate temporary erosion control devices to prevent sediment from entering the practice during construction.
3. Grading of the infiltration basin shall be accomplished using low impact earth–moving equipment to prevent compaction of the underlying soils. Small tracked dozers and skid–steers with runner tracks are recommended.
4. In the event that sediment is introduced into the BMP during or immediately following excavation, this material will need to be removed from the basin prior to initiating the next step in the construction process.
5. Install sediment control around basin after completion of basin grading.
6. Seeding and installation of erosion control shall be completed within 48 hours of final grading of basin.

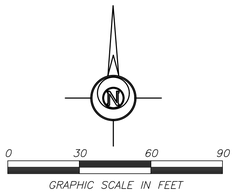


SITE DATA

PERCENT BUILDING COVERAGE: (% of gross lot 1 area)	3.8	%
FLOOR AREA RATIO (5,000 / 130,914)	0.038	
EXISTING IMPERVIOUS AREA: (building, sidewalk, & pavement)	16,859	SF
EXISTING IMPERVIOUS AREA: (% of gross lot area)	12.9	%
PROPOSED IMPERVIOUS AREA: (building, sidewalk, & pavement including future greenhouse and future parking areas)	51,613	SF
PERCENT IMPERVIOUS AREA: (% of gross lot area)	39.4	%
PROPOSED PERVIOUS AREA: (landscape, turf area, & pond including plant storage areas)	79,301	SF
PERCENT PERVIOUS AREA: (% of gross lot area)	60.6	%
AREA OF DISTURBANCE:	2.4	AC

EROSION CONTROL QUANTITIES

ITEM:	QUANTITY	UNIT
ROCK ENTRANCE	2	EA
SILT FENCE	1,080	LF
WOOD FIBER LOG	330	LF
EROSION BLANKET CAT. 20	2,580	SY
EROSION BLANKET CAT. 25	330	SY
INLET PROTECTION	3	EA



GRAPHIC SCALE IN FEET

SURVEY DATA

SURVEY INFORMATION PROVIDED BY:
MEYER ROHLIN LAND SERVICES
708 1st AVENUE NE
BUFFALO, MN 55313

DATED: JUNE 20, 2014

BENCHMARK:
MNDOT GEODETIC MONUMENT "STER MNDT" AT NORTHWEST QUADRANT OF CR144 AND HEATHER RIDGE DRIVE. ELEV.=912.505
DATUM: NAVD88

LEGEND:

- EXISTING BITUMINOUS EDGE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER SERVICE
- EXISTING WATER SERVICE
- PROPOSED CURB AND GUTTER
- PROPOSED WATER SERVICE
- PROPOSED STORM SEWER
- PROPOSED SILT FENCE
- PROPOSED FIBER LOGS
- PROPOSED INLET PROTECTION
- PROPOSED EROSION BLANKET CAT. 20
- PROPOSED EROSION BLANKET CAT. 25

CROW RIVER, IMPAIRED WATER WITHIN 1 MILE RADIUS OF PROJECT

PROJECT LOCATION

PART OF THE E½ of the NW¼, SECTION 14 TOWNSHIP 120, RANGE 23, HENNEPIN COUNTY, MINNESOTA.

LEGAL DESCRIPTION

LOT 2, BLOCK 2,
REMUS INDUSTRIAL PARK SECOND ADDITION,
HENNEPIN COUNTY.

LOCATION OF SWPPP REQUIREMENTS IN PLANS

DESCRIPTION	LOCATION
STANDARD BMP DETAILS	DETAILS ON SHEET C6
STORMWATER CALCULATIONS	DRAINAGE REPORT
SITE MAP	DRAINAGE REPORT
SITE GRADING	GRADING PLAN SHEET C2
SUMP MANHOLE	STORM SEWER SHEET C3
SOILS DATA	DRAINAGE REPORT

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CLIENT:

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Rogers, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard
Rogers, MN

STORM WATER POLLUTION PREVENTION PLAN

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

Scott Dahlke
Reg. No. 24348
Date: 03/17/25

PREPARED BY: CIVIL ENGINEERING & SITE DESIGN, Inc.
118 East Broadway St.
PO Box 685
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FILE NO. 00495

C4

Storm Water Pollution Prevention Plan

PROJECT LOCATION

PART OF THE E½ of the NW¼,
SECTION 14 TOWNSHIP 120, RANGE 23,
HENNEPIN COUNTY, MINNESOTA.

LEGAL DESCRIPTION

LOT 2, BLOCK 2,
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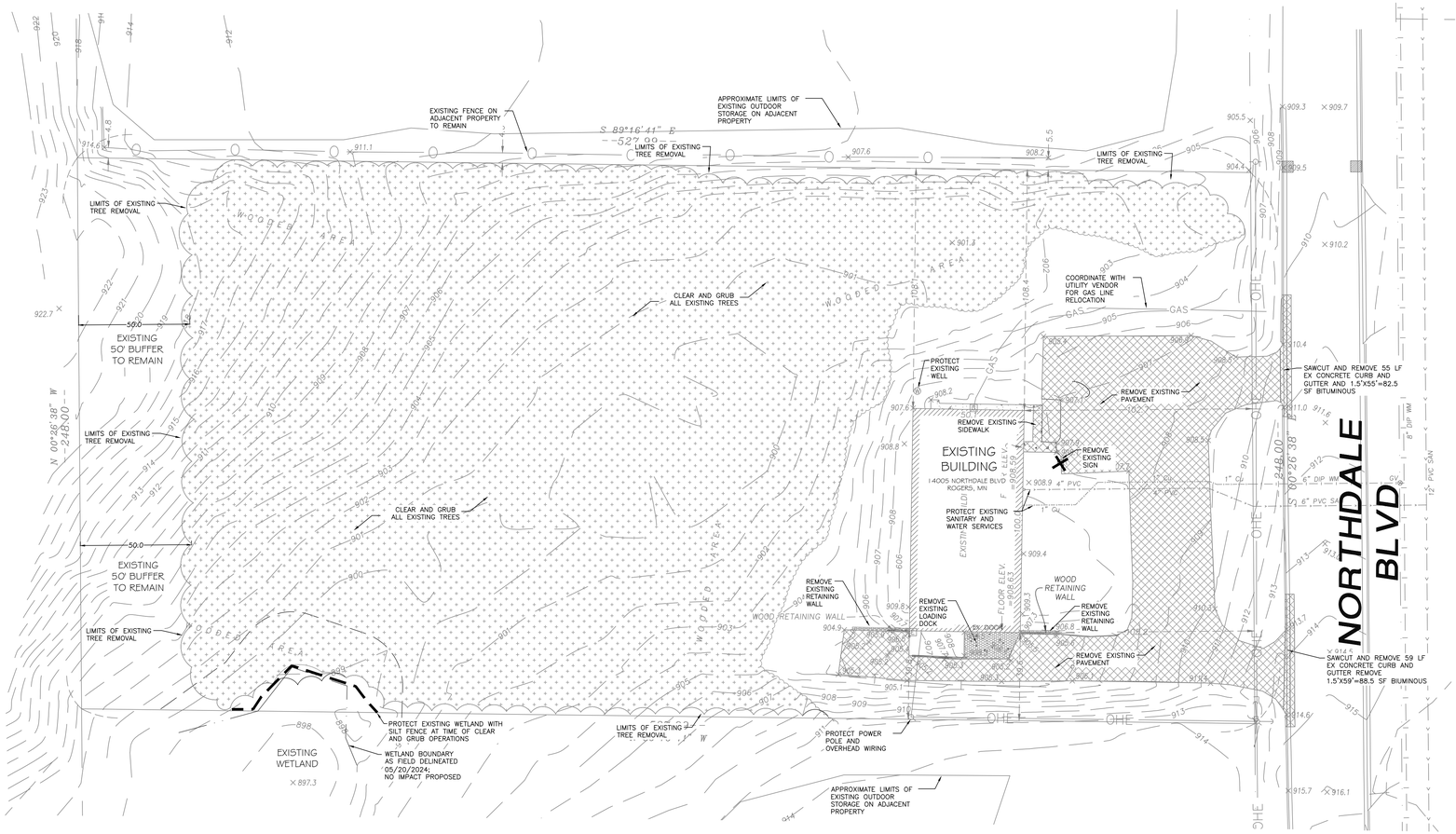
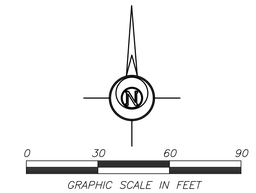
HENNEPIN COUNTY.





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LEGEND:

- EXISTING BITUMINOUS EDGE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER SERVICE
- EXISTING WATER SERVICE

DEMOLITION NOTES

1. Install perimeter sediment controls as soon as possible during clear and grub operations. See Storm Water Pollution Prevention Plan.
2. Provide air quality control measures at the request of the Engineer or City Representatives. Take necessary measures to keep dust levels to a minimum. Provide sweeping of adjacent paving as needed, or as required by the City Engineer.
3. Locate and protect all utility lines prior to and during demolition. Utility locations shown are based on best available information and are not guaranteed. Contact private utility service for disconnection and removal.
4. Remove or relocate all existing site features that interfere with the proposed construction.
5. Protect existing site features that are to remain during construction. Replace anything damaged with new construction.
6. Pavement shall be saw cut at limits of removal unless noted otherwise. Do not impede existing traffic circulation to adjacent businesses or streets.
7. Sufficient topsoil shall be stockpiled to allow for the replacement of 6" of topsoil in disturbed areas to be re-vegitated.
8. All construction and post-construction parking shall be on-site. At no time shall parking, loading, or unloading be allowed on public streets.
9. Storage of materials or equipment shall not be allowed within public Right-of-Way and shall be maintained on site within project boundaries.

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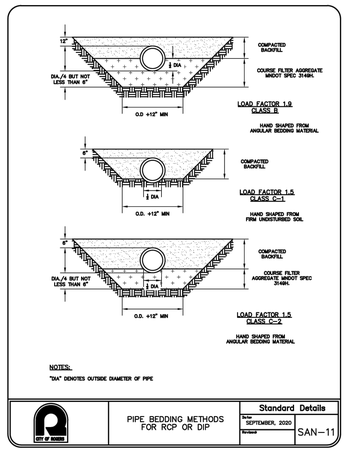
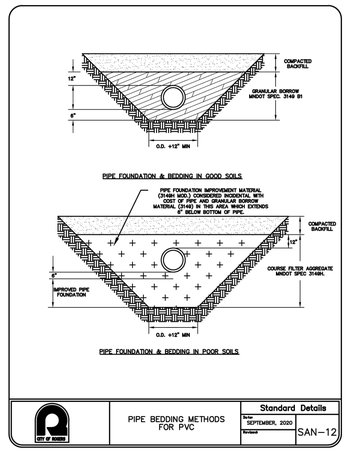
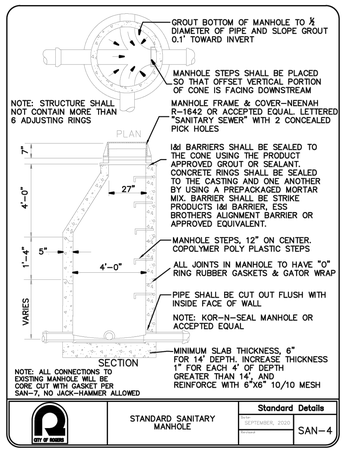
C5
Existing Conditions and Removals Plan



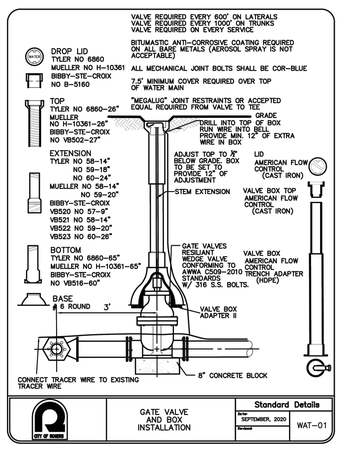
CITY OF ROGERS	PIPE BEDDING METHODS FOR RCP OR CPP	Standard Details Date: SEPTEMBER, 2020 Revised	SAN-11



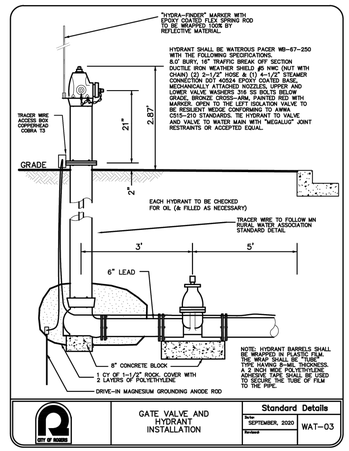
CITY OF ROGERS	PIPE BEDDING METHODS FOR PVC	Standard Details Date: SEPTEMBER, 2020 Revised	SAN-12



CITY OF ROGERS	STANDARD SANITARY MANHOLE	Standard Details Date: SEPTEMBER, 2020 Revised	SAN-4



CITY OF ROGERS	GATE VALVE AND BOX INSTALLATION	Standard Details Date: SEPTEMBER, 2020 Revised	WAT–01



CITY OF ROGERS	GATE VALVE AND HYDRANT INSTALLATION	Standard Details Date: SEPTEMBER, 2020 Revised	WAT–03

TRACER WIRE

TRACER WIRE SHALL BE COPPERHEAD #12 AWG CCS COMPLYING WITH ASTM–D–1248, 30 VOLT RATING, COLOR CODED FOR SEWER SERVICES AND FORCEMAIN AND SELECTED FOR WATER MAIN
- #12304S HIGH STRENGTH FOR OPEN CUT.
- #12456SHS EXTRA HIGH STRENGTH FOR HORIZONTAL DIRECTIONAL DRILLING AND JACK/BORING
- SPLICING 2 WIRES, SPLICING KING & BLUE
- SPLICING 3 OR MORE, DRYCONN DIRECT BURY LUG YELLOW

ALL NEW WATER MAIN INSTALLATIONS SHALL BE LOCATED USING TYPICAL LOW FREQUENCY (512 HZ) LINE TRACING EQUIPMENT, WITNESSED BY THE CONTRACTOR, ENGINEER AND FACILITY OWNER AS APPLICABLE, PRIOR TO ACCEPTANCE OF OWNERSHIP.

NOTE: TRACER WIRE ACCESSES SHALL NOT EXCEED 500–FT

POLYVINYL CHLORIDE PIPE (PVC) – C900

PVC WATER DISTRIBUTION PIPE AND JOINTS SHALL CONFORM TO: AWWA C–900 (DR) ASTM D3139

DUCTILE IRON PIPE

DIP WATER DISTRIBUTION PIPE SHALL BE PRESSURE CLASS 350 AWWA C150/151.

PLASTIC FILM WRAP FOR DIP

WATER DISTRIBUTION PIPE, RISER PIPE, AND HYDRANT BARRELS SHALL BE WRAPPED IN PLASTIC FILM. THE WRAP SHALL BE TUBE–TYPE HAVING 8–MIL THICKNESS. A 2 INCH WIDE POLYETHYLENE ADHESIVE TAPE SHALL BE USED TO SECURE THE TUBE OF FILM TO THE PIPE.

DUCTILE IRON FITTINGS

WATER MAIN FITTINGS SHALL CONFORM TO ANSI A21.53, A21.11 & A21.4. FITTINGS SHALL BE COATED WITH 8 – 9 MM MINIMUM THICKNESS FUSION BONDED EPOXY CONFORMING TO ANSI/AWWA C550 AND C116/A21.16.

THRUST RESTRAINT

ALL WATER MAIN, VALVES, SERVICES, FITTINGS, STUBS, EXTENSIONS, BLIND FLANGES, AND PLUGS USED FOR RETAINING WATER PRESSURE MUST BE TIED WITH "MEGALUG" JOINT RESTRAINTS OR ACCEPTED EQUAL BASED ON A 150 PSI TEST PRESSURE AND 3.5' COVER. THE FOLLOWING TABLE SHALL BE USED AS A GUIDE FOR THE EXTENT OF A FITTING TO BE RESTRAINED. JOINT RESTRAINTS TO BE EPOXY COATED AS REQUIRED ON WATER MAIN FITTINGS.

PIPE DIAMETER	DEAD END OR 90°BEND	TEE BRANCH 45°BEND	22–1/2°BEND
4" (SERVICE)	22 LF	5 LF	5 LF
6"	33 LF	7 LF	6 LF
8"	38 LF	10 LF	8 LF
12"	50 LF	14 LF	8 LF
16"	60 LF	18 LF	9 LF

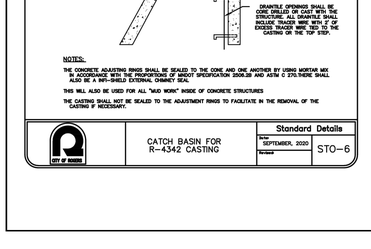
ALL TEES WITH A VALVE IMMEDIATELY AFTER A TEE BRANCH SHOULD BE TREATED AS A 90 DEGREE BEND.

WHERE RESTRAINED JOINTS ARE REQUIRED AND THE PIPE IS IN A CASING NEAR THE FITTING TO BE RESTRAINED, THE LENGTH OF PIPE IN THE CASING SHALL NOT BE INCLUDED IN THE LENGTH OF PIPE NECESSARY TO DEVELOP SUFFICIENT SOIL FRICTION TO OVERCOME THRUST.

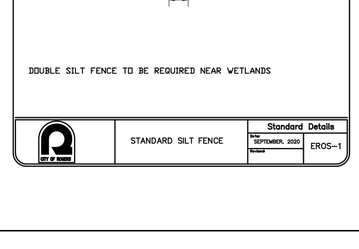
ALL BARE METAL SHALL HAVE TWO COATS OF BITUMASTIC OR ACCEPTED EQUAL (AEROSOL SPRAY IS NOT ACCEPTABLE). ALL MECHANICAL JOINT BOLTS SHALL BE COR–BLUE.

ALL JOINT TIE RODS AND NUTS SHALL BE 316 STAINLESS STEEL.

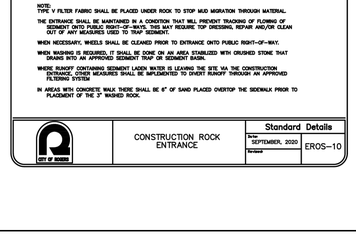
CITY OF ROGERS	WATER MAIN DETAILS AND TIE SCHEDULE TABLE	Standard Details Date: SEPTEMBER, 2020 Revised	WAT–10



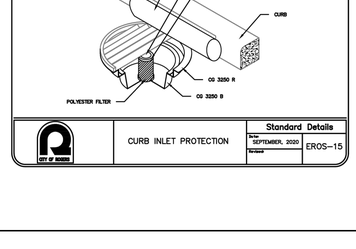
CITY OF ROGERS	COMMERCIAL WATER SERVICE TESTING DETAIL	Standard Details Date: SEPTEMBER, 2020 Revised: OCTOBER, 2021	WAT–12



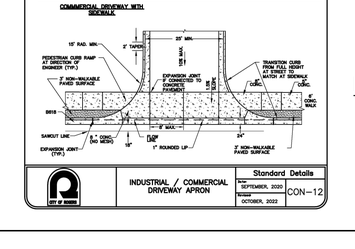
CITY OF ROGERS	STORM SEWER MANHOLE	Standard Details Date: SEPTEMBER, 2020 Revised	STO–1



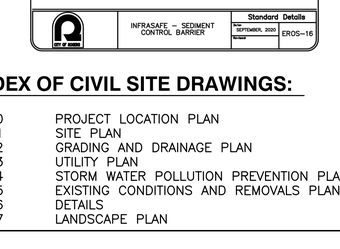
CITY OF ROGERS	STORM SEWER JUNCTION MANHOLE	Standard Details Date: JUNE, 2021 Revised	STO–2



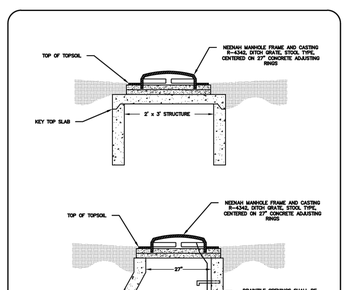
CITY OF ROGERS	CB ADJUSTMENT AND CB PLACEMENT IN CONCRETE CURB AND GUTTER	Standard Details Date: SEPTEMBER, 2020 Revised	STO–5



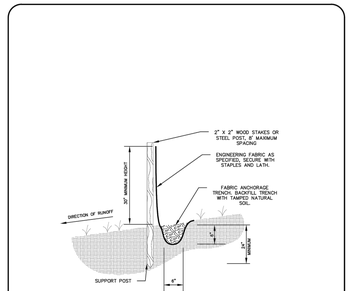
CITY OF ROGERS	RIPRAP AT OUTLETS	Standard Details Date: SEPTEMBER, 2020 Revised	STO–10



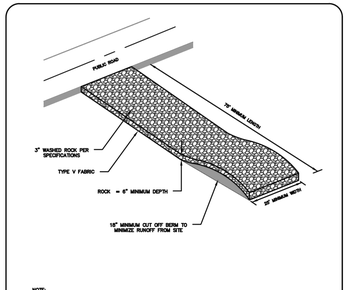
CITY OF ROGERS	STANDARD MANHOLE WITH SUMP	Standard Details Date: SEPTEMBER, 2020 Revised	STO–3



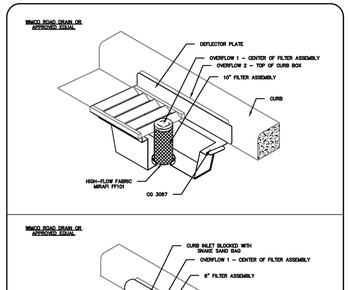
CITY OF ROGERS	CATCH BASIN FOR R–4342 CASTING	Standard Details Date: SEPTEMBER, 2020 Revised	STO–6



CITY OF ROGERS	STANDARD SILT FENCE	Standard Details Date: SEPTEMBER, 2020 Revised	EROS–1



CITY OF ROGERS	CONSTRUCTION ROCK ENTRANCE	Standard Details Date: SEPTEMBER, 2020 Revised	EROS–10



CITY OF ROGERS	CURB INLET PROTECTION	Standard Details Date: SEPTEMBER, 2020 Revised	EROS–15

Wetland Buffer

No mowing, yard waste, structures or similar impacts allowed

Violators subject to enforcement action.

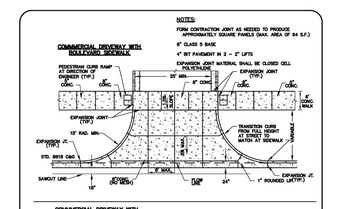
SPECIFICATIONS:

MONUMENT
CONSISTS OF A POST AND A WETLAND BUFFER SIGN

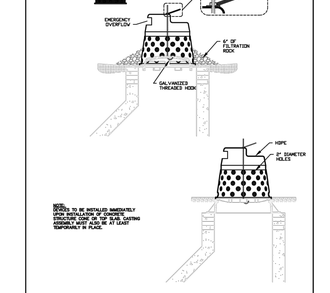
WETLAND BUFFER SIGNS
MOUNTED FLUSH WITH THE TOP OF THE POSTS
FASTENED WITH NON–REMOVABLE SCREWS OR RIVETS
SIGN SHALL HIGH 3M HIGH INTENSITY REFLECTIVE SHEETING

POST MATERIALS
GALVANIZED STEEL POST

POST INSTALLATION
MOUNTED TO A HEIGHT OF FOUR FEET ABOVE GRADE
SET AT LEAST 42 INCHES IN THE GROUND
INSTALLED AT EACH LOT LINE WHERE IT CROSSES A WETLAND BUFFER, WITH A MAXIMUM SPACING OF 200 FEET BETWEEN SIGNS
PLACE ADDITIONAL POSTS AS NECESSARY TO FOLLOW CONSERVATION EASEMENT LINE



CITY OF ROGERS	INDUSTRIAL / COMMERCIAL DRIVEWAY APRON	Standard Details Date: SEPTEMBER, 2020 Revised: OCTOBER, 2022	CON–12



CITY OF ROGERS	INFRASAFE – SEDIMENT CONTROL BARRIER	Standard Details Date: SEPTEMBER, 2020 Revised	EROS–16

INDEX OF CIVIL SITE DRAWINGS:

C0	PROJECT LOCATION PLAN
C1	SITE PLAN
C2	GRADING AND DRAINAGE PLAN
C3	UTILITY PLAN
C4	STORM WATER POLLUTION PREVENTION PLAN
C5	EXISTING CONDITIONS AND REMOVALS PLAN
C6	DETAILS
C7	LANDSCAPE PLAN

CLIENT:

CREATIVE LAWN & LANDSCAPES, Inc.
CREATIVE IDEAS FOR YOUR OUTDOOR LIFESTYLE

14005 Northdale Blvd
Rogers, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard Rogers, MN

DETAILS

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

Date: 03/17/25 Reg. No. 24348

PREPARED BY: CIVIL ENGINEERING & SITE DESIGN

118 East Broadway St.
PO Box 1665
Monticello, MN 55362
Phone: 763–314–0929
www.civilesd.com

REVISIONS
05/18/15 REVISE POND & GRADING
10/20/15 UPDATED STORM WATER DESIGN
01/22/25 UPDATED CITY SUBMITTAL
03/17/25 CITY COMMENTS

DATE	DRAWN BY	DESIGNED BY	CHECKED BY
07/09/14	SD	SD	SD

VERTICAL SCALE 1" inch = ____ feet

HORIZONTAL SCALE 1" inch = ____ feet (FULL SIZE SHEET 24 x 36)

FILE NO. 00495

C6

Details

PROJECT LOCATION

PART OF THE E½ of the NW¼,
SECTION 14 TOWNSHIP 120, RANGE 23,
HENNEPIN COUNTY, MINNESOTA.

LEGAL DESCRIPTION

LOT 2, BLOCK 2,
REMUS INDUSTRIAL PARK SECOND ADDITION,
HENNEPIN COUNTY.

PLANT LIST:

QTY	KEY	COMMON NAME	SIZE/ROOT
TREES			
3	MFFS	Maple, Fall Fiesta Sugar	2.5 Inch
2	LIS	Lilac, Ivory Silk	2.5 Inch
SHRUBS, EVERGREEN CONIFER			
2	YT	Yew, Taunton	20 Gallon
SHRUBS, DECIDUOUS			
9	HB	Hydrangea, Bonbshell	20 Gallon
32	SDG	Spirea, Dakota Goldcharm	20 Gallon
9	SG	Spirea, Goldflame	20 Gallon
FLOWER, PERENNIAL			
6	HSD	Hemerocallis, Stella D'oro	Each
6	HCBGP	Heuchera, Coral Bells Georgia Peach	Each

LEGEND:

- EXISTING BITUMINOUS EDGE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER SERVICE
- EXISTING WATER SERVICE
- PROPOSED CURB AND GUTTER
- PROPOSED EROSION BLANKET CAT. 20
- PROPOSED EROSION BLANKET CAT. 25

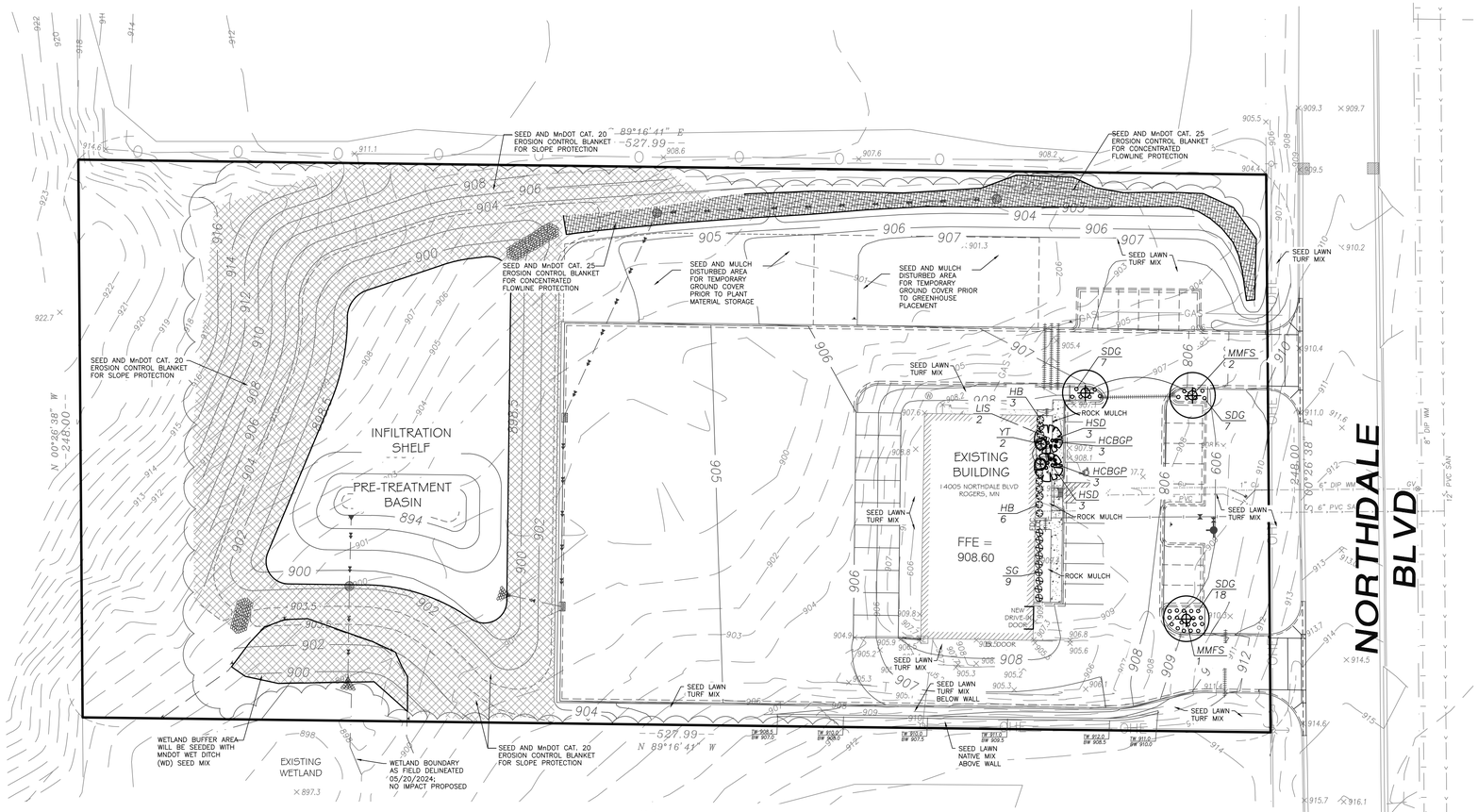
0 30 60 90
GRAPHIC SCALE IN FEET

SURVEY DATA

SURVEY INFORMATION PROVIDED BY:
MEYER ROHLIN LAND SERVICES
708 1st AVENUE NE
BUFFALO, MN 55313

DATED: JUNE 20, 2014

BENCHMARK:
MNDOT GEODETIC MONUMENT "STER MNDT" AT
NORTHWEST QUADRANT OF CR144 AND
HEATHER RIDGE DRIVE. ELEV.=912.505
DATUM: NAVD88



GENERAL NOTES:

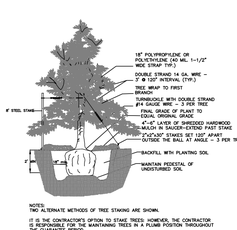
1. Contractor shall provide one year guarantee of all plant materials. The guarantee begins on the date of the General Contractor written acceptance of the date determined as substantially complete by owner. Replacement materials shall also have a one year guarantee upon planting.
2. Landscape contractor shall inspect the site and become familiar with existing conditions relating to the nature and scope of work. If any discrepancies are found, the General Contractor shall be notified prior to construction. The base information including contours, trails, utilities, curbs, and building locations were provided by others. All discrepancies must be resolved prior to construction.
3. Landscape contractor shall verify plan layout and bring to the attention of the General Contractor discrepancies which may compromise the design or intent of the layout.
4. Landscape contractor shall assure compliance with codes and regulations governing the work and materials supplied.
5. Landscape contractor shall protect all existing roads, curbs/gutters, trails, trees, lawns, and site elements during construction. Damage to the same shall be repaired at no cost to the Owner.
6. Landscape contractor shall verify the location of all utilities above and below grade prior to any soil disruption or installation. Provide necessary protection for same before construction begins.
7. Landscape contractor shall coordinate each phase of installation with General Contractor.
8. Landscape contractor shall be responsible for ongoing maintenance of all installed materials until time of substantial completion. Repair and/or replace all damaged materials due to construction or acts of vandalism at no cost to the Owner.
9. Landscape contractor shall verify that all plant placement will not negatively affect the plant's survival or warranty. Undesirable site conditions shall be brought to the attention of the General Contractor prior to construction.

PLANTING NOTES:

1. All plants to be Minnesota grown and hardy. Plants to be installed as per standard AAN planting practices. Nursery stock shall comply with the current edition of the American Standard for Nursery Stock, ANSI Z60.1.
2. No planting will occur until final grading has been completed.
3. All tree and shrub beds shall be staked and approved prior to installation.
4. No substitutions will be accepted unless approval is granted by the General Contractor prior to submission of the bid.
5. Location adjustments may be needed in the field. General Contrator or Owner must approve.
6. Plants to be installed as per planting details.
7. Plants shall be fertilized upon installation with dried bone meal. Other approved fertilizers mixed in with the planting soil as per the manufacturer's instructions may be applied. Summer and fall installations shall have an application of granular 10–0–5, 12oz. per 2.5"cal. tree and 6oz. per shrub. An additional application of 10–10–10 the following spring in the tree saucer.
8. Areas receiving ground covers, perennials, or garden space shall receive a minimum of 18 inches of planting soil consisting of 4 parts topsoil, 4 parts screened compost, and 1 part sand.
9. All deciduous trees shall be wrapped in the fall prior to Dec.1 and removed after April 15. Tree wrap shall be asphalt impregnated crepe, wrapped from base of trunk flare to first branches.
10. Edging shall be professional grade poly material. Edging horizontal layout to be uniform with smooth transitions. Edging vertical placement to be below typical mower deck cutting height.
11. Wood mulch, (Shredded Dark Brown Hardwood) shall be placed a minimum of 4 inches deep. Mulch strip shall have weed barrier fabric under rock and edged with commercial edging.
12. Weed barrier shall be 4oz. woven needle punch, black. Overlapping seams.
13. Mulch tree rings shall be 6 feet in diameter and be a minimum of 4 inch deep double shredded dark brown hardwood. Mulch shall not come in contact with tree trunks.
14. All deciduous plantings shall occur between spring thaw and June 15, or between fall's first frost and the first snow or Nov. 15, which every comes first. Coniferous plantings must be prior to Oct. 1.
15. Landscape contractor shall be responsible for determining appropriate planting conditions. Warranties shall be enforced regardless of weather and planting conditioned.
16. No excess materials or debris will be on site. All hard surfaces will be swept and washed clean.

TURF NOTES:

1. Owner to select seed mix for all turf areas.
2. Seed shall be installed as per the distributor's requirements for proper coverage and germination.
3. Permanent turf ground cover shall include all disturbed areas be covered with a minimum 6" topsoil and sodded or seeded as allowed by City. If not otherwise specified, turf seed to be MnDOT mix Southern Boulevard (SB) applied at 160 lbs/ac. MnDOT Type 3 mulch shall be applied at 2 tons/ac and disc anchored in areas not covered by sod or erosion blanket.



NOTES:
TWO ALTERNATE METHODS OF TREE STAKING ARE SHOWN.

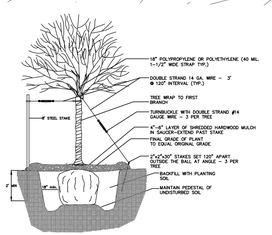
IT IS THE CONTRACTOR'S OPTION TO STAKE TREES. HOWEVER, THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTAINING TREES IN A PLUMB POSITION THROUGHOUT THE GUARANTEE PERIOD.

SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING.

CENTER TO HAVE SHREDDED HARDWOOD MULCH UNLESS OTHERWISE NOTED.

NO MULCH TO BE IN CONTACT WITH TRUNK.

CONIFEROUS TREE PLANTING DETAIL



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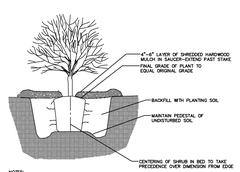
SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING.

DECIDUOUS TREE PLANTING DETAIL



NOTES:
HAND LOOSEN ROOTS OF CONTAINERIZED MATERIAL (TYP.).

SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING.

SHRUB PLANTING DETAIL

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Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT
14005 Northdale Boulevard
Rogers, MN

LANDSCAPE PLAN

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Signature: Sara Dahl
Date: 03/17/25 Reg. No. 24348

PREPARED BY: CIVIL ENGINEERING & SITE DESIGN
118 East Broadway St.
PO Box 1565
Monticello, MN 55362
Phone: 763-314-0929
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REVISIONS
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03/17/25 CITY COMMENTS

VERTICAL SCALE
1 inch = ____ feet

HORIZONTAL SCALE
1 inch = ____ feet
(FULL SIZE SHEET 24 x 36)

DATE	DRAWN BY	DESIGNED BY	CHECKED BY
07/09/14	SD	SD	SD

FILE NO. 00495

C7

Landscape Plan

Creative Lawn and Landscapes Site Improvement Project

14005 Northdale Blvd.

Rogers, MN

DRAINAGE ANALYSIS

Prepared for:

Creative Lawn and Landscapes
Attn: Mr. Jordan Roberdeau
14005 Northdale Blvd.
Rogers, MN 55374
Phone: (763)389-2227
jordan@creativelnl.com

Prepared by:

Civil Engineering Site Design
Attn: Scott Dahlke
PO Box 566
118 East Broadway Street
Monticello, MN 55362
Phone: (763) 314-0929
sdahlke@civilesd.com

Revised October 20, 2015
Revised January 22, 2025
Revised March 17, 2025

CESD Project # 00495

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- Requirements
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- Proposed Site Conditions
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- Summary
- Certification

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- DA 1 – Existing Conditions Drainage Area Plan
- 2 yr Rainfall Event HydroCAD Calculation
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- 100 yr Rainfall Event HydroCAD Calculation

Appendix B - Proposed Conditions Analysis
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- 10 yr Rainfall Event HydroCAD Calculation
- 100 yr Rainfall Event HydroCAD Calculation

Appendix C – Soils Data
- Existing Soils data from Haugo Geotechnical Services

Appendix D – Water Quantity – Basin Volume Calculations
- Infiltration Worksheet

NARRATIVE

PROPOSED PROJECT:

The project proposes re-development of a vacant industrial property for business operations and outdoor storage of a landscape supply and landscape construction business. The site is proposed to be improved with site grading, parking lot construction, bituminous surfacing, and storm water management. Future improvements are proposed for the site including additional parking areas and future greenhouse. Future improvements are incorporated in the drainage analysis and calculations of this report. The project will provide site improvements as required by the City of Rogers.

The project proposes to collect surface water runoff and convey to a storm water management basin with a controlled outlet to an existing wetland area. Adjustments of surface elevations are proposed in an effort to provide reasonable grades and slopes in the outdoor storage area.

SITE LOCATION:

The site is located on the west side of Northdale Boulevard, south of Hennepin County Road 144 (141st Avenue) in Rogers, MN. The site address is 14005 Northdale Boulevard, Rogers, MN 55374.

The project is in the E ½ of the NW ¼ of Section 14, Township 120, Range 23, Hennepin County, MN. Access to the site can be achieved from Northdale Boulevard.

REQUIREMENTS:

Stormwater management design for the project is subject to review by the City of Rogers and the Elm Creek Watershed Management Commission (ECWMC).

Elm Creek Watershed Management Commission (ECWMC) requirements for storm water management are defined in ECWMC Management Plan Rule D. The significant requirements are runoff rates and water quality treatment in accordance with the National Pollutant Discharge Elimination System (NPDES) and ECWMC Management Plan Rule D.

The attached storm water runoff and ponding calculations are based on the Soil Conservation Service Synthetic Unit Hydrograph Method incorporated into the software program HydroCad 10.00. Calculations use NOAA Atlas 14 rainfall depths and NRCS MSE 3 rainfall distribution.

EXISTING SITE CONDITIONS:

The existing site has an existing building and paved parking areas on the easterly portion of the property adjacent to Northdale Blvd. The larger portion of the property westerly of the existing building is undeveloped. Existing industrial properties abut the site to the south, east, and north. Existing residential development abuts the site to the west.

Significant areas of off-site drainage flow through the site. Properties adjacent to the north, adjacent to the south, and the westerly half of existing Northdale Blvd in the immediate area, all route storm water runoff to this property that then flows to the existing wetland area adjacent to the southwest of this property. A small portion of the existing wetland extends onto this property from the larger wetland complex to the southwest.

The existing topography elevation change of the property is moderate. The topography predominantly slopes in sheet fashion to the middle of the site with higher elevations on the easterly portion of the site and higher elevations on the west boundary of the site. Lower elevations are found in the middle of the site and lowest are found in the southwest area of the site at the existing wetland area. A majority of existing surface slopes range from 2.0% to 10.0%.

The existing site has no improved ponding or detention/retention or storm sewer. The existing site does have a small natural depression in the middle of the site approximately 6,933 sf in size and approximately 0.5 ft in depth. A majority of storm water runoff from the adjacent property to the north and storm water runoff from Northdale Blvd is routed through the natural depression. Based on visual evidence on site, the natural depression appears to provide a limited function of water quality benefit by providing a small volume of sediment control.

Existing Conditions Drainage Area Map DA1 and associated HydroCAD calculation model printouts can be found in attached Appendix A.

PROPOSED SITE CONDITIONS:

The proposed project site drainage routing incorporates site grading and surface drainage to a storm water management basin to be located on the southwesterly portion of the site, just north of the existing wetland. The storm water management basin will be constructed with a controlled outlet structure that will provide rate control and water quality functions and will outlet to the existing wetland in the southwest area of the site.

The site is proposed to be improved with site grading, parking lot construction, bituminous surfacing, and storm water management. Future improvements are proposed for the site including additional parking areas and a future greenhouse. Future improvements are incorporated in the drainage analysis and calculations of this report.

The existing drainage flows from off-site properties are to be perpetuated through the site. Storm water runoff from the adjacent property to the north is to be collected into storm sewer piping that will route runoff to the proposed storm water management basin which will outlet to the existing wetland in the southwest area of the site.

Proposed Conditions Drainage Area Map DA2 and associated HydroCAD calculation model printouts can be found in attached Appendix B.

SOILS DATA:

Soils for this analysis are understood to be hydrologic Group B soils. Group B soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission. Infiltration rate used in calculations is 0.45 in/hr and is consistent with recommended rates identified in the Minnesota Stormwater Manual. Soils data for the project site has been obtained by field investigation completed by Haugo Geotechnical Services, and information can be found in attached Appendix C.

RATE AND VOLUME CALCULATIONS:

Calculations have been generated using HydroCAD 10.0 for runoff rate and runoff volume analysis. Refer to attachments of Appendix A and Appendix B for drainage area plans and hydrographs for the 2-year (2.86") storm event, 10-year (4.26") storm event, and 100-year (7.32") storm event.

The total site combined runoff rates and volumes are calculated in the HydroCAD model. Results indicate the proposed condition runoff rates and volumes are less than existing condition runoff rates and volumes.

The following table summarizes the calculation model results for comparison of storm water runoff rate comparison and storm water runoff volume comparison of existing conditions to proposed conditions.

RUNOFF RATE CALCULATION SUMMARY

Item	Sub-catchment Area	2-yr (2.86") Runoff Rate (cfs)	10-yr (4.26") Runoff Rate (cfs)	100-yr (7.32") Runoff Rate (cfs)
Existing Condition	**R1 Total Runoff**	**17.12**	**32.12**	**66.15**
Proposed Condition	**R1 Total Runoff**	**8.03**	**16.93**	**33.07**

WATER QUALITY CALCULATIONS:

According to the ECWMC Management Plan Rule D, stormwater runoff volume must be infiltrated/abstracted onsite. Per Rule D.3.e.i, full infiltration of 1.1 inches of runoff from all impervious surfaces will satisfy (e) "There shall be *no net increase in total phosphorus (TP) or total suspended solids (TSS)* from pre-development land cover to post-development land cover."

Pretreatment of the storm water before entering onto the infiltration basin shelf is provided by a sump manhole and pretreatment basin. The impervious surface and basin volume calculations can be found in attached Appendix D. Calculation results indicate the proposed storm water management pond satisfies water quality treatment requirements.

The following table summarizes the calculations:

Item	Applicable New Impervious Surface Area (sf)	1.1" Runoff Volume Required (cf)	48 hr Discharge Capacity (cf)	Basin Storage Provided (cf)
Basin 1P	46,500	4,263	11,340	6,305

SUMMARY:

The project improvements and drainage analysis propose to satisfy the City of Rogers and Elm Creek Watershed requirements for storm water management.

CERTIFICATION:

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Scott Dahlke

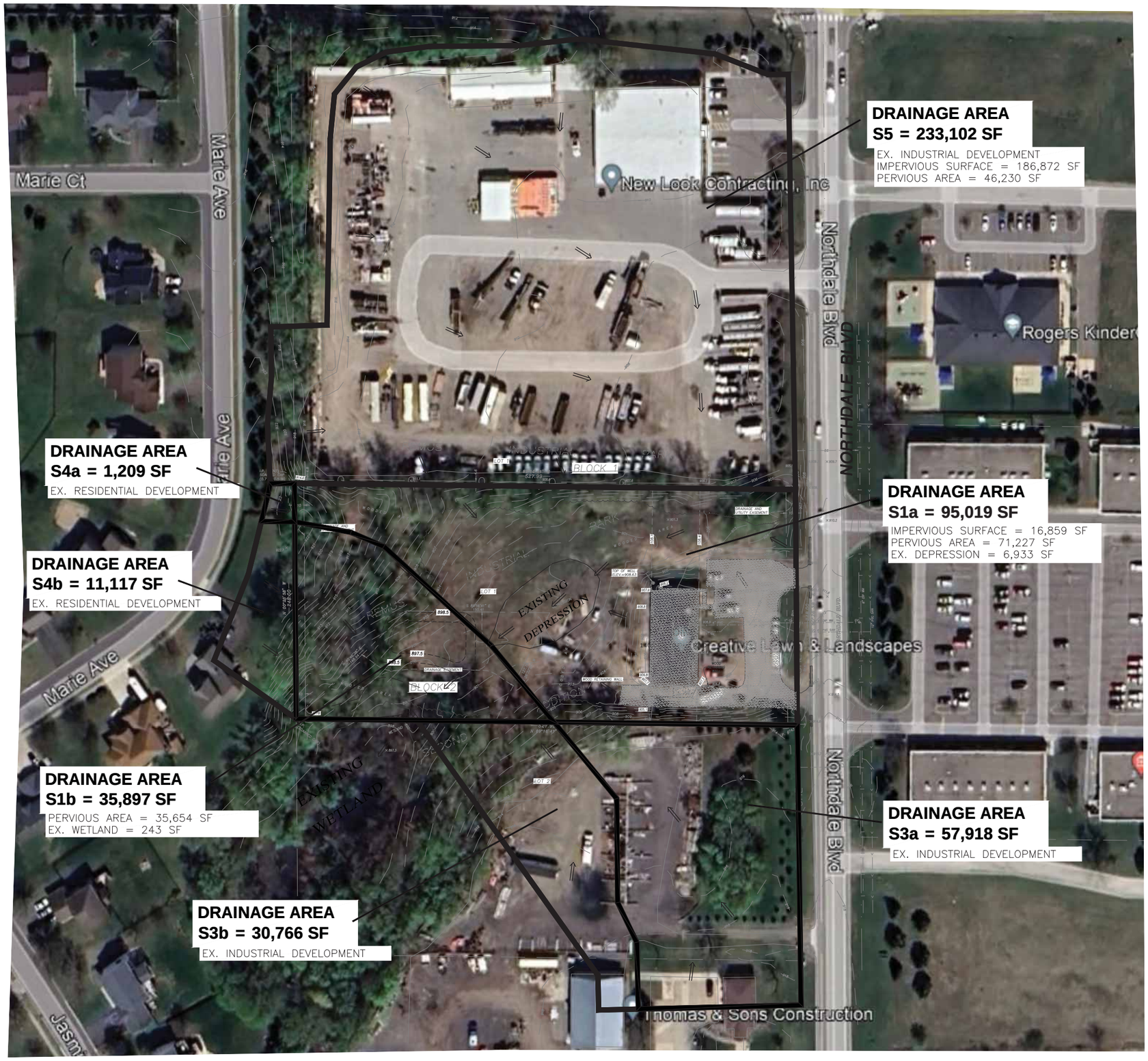
03/17/2025

Scott Dahlke, P.E.
Reg. No. 24348

Date

APPENDIX A

Existing Conditions Analysis



0 50 100 150
GRAPHIC SCALE IN FEET

LEGEND:

- DRAINAGE AREA BOUNDARY
- EXISTING HARD SURFACE
- EXISTING WETLAND

CLIENT:

CREATIVE LAWN & LANDSCAPES

30083 149th St NW
Princeton, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard
Rogers, MN

EXISTING CONDITION DRAINAGE AREAS PLAN

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

Date: _____ Reg. No. _____

PREPARED BY: CIVIL ENGINEERING SITE DESIGN
118 East Broadway St.
PO Box 566
Monticello, Mn 55362
Phone: 763-314-0929
www.civilesd.com

REVISIONS
10/20/15 INCORPORATE EX. DEPRESSION
01/08/25 UPDATED CITY SUBMITTAL

VERTICAL SCALE 1 inch = ____ feet

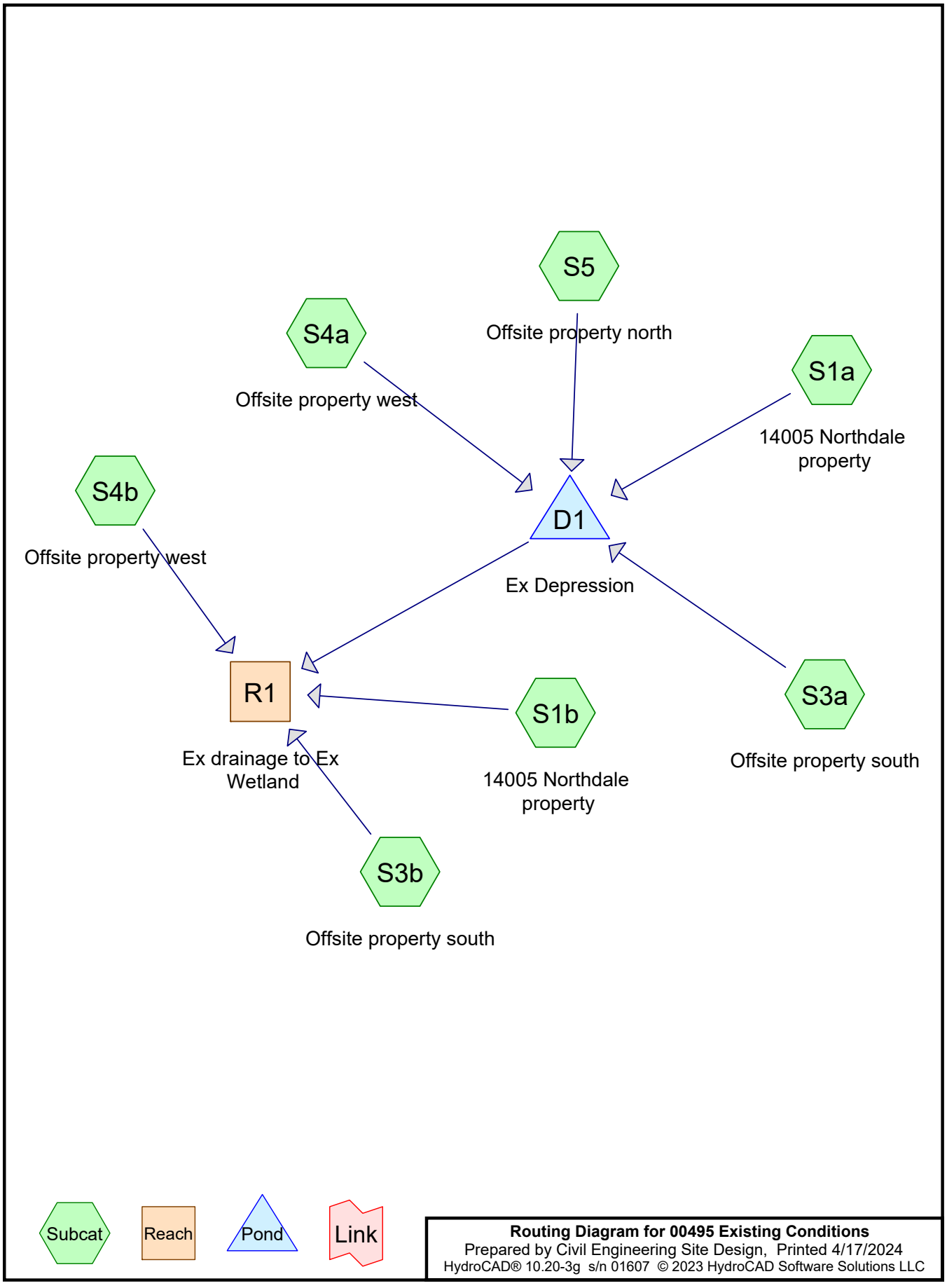
HORIZONTAL SCALE 1 inch = 50 feet (FULL SIZE SHEET 24 x 36)

DATE 07/09/14
DRAWN BY SD
DESIGNED BY SD
CHECKED BY SD

FILE NO. 00495

DA1

Existing Condition Drainage Areas Plan



Routing Diagram for 00495 Existing Conditions
Prepared by Civil Engineering Site Design, Printed 4/17/2024
HydroCAD® 10.20-3g s/n 01607 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment S1a: 14005 Northdale property

Runoff = 0.90 cfs @ 12.30 hrs, Volume= 3,512 cf, Depth= 0.44"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

	Area (sf)	CN	Description
	16,859	98	Paved parking, HSG B
	71,227	58	Woods/grass comb., Good, HSG B
*	6,933	55	Ex Depression, Good, HSG B
	95,019	65	Weighted Average
	78,160		82.26% Pervious Area
	16,859		17.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0250	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.4	240	0.0080	0.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	340	Total			

Summary for Subcatchment S1b: 14005 Northdale property

Runoff = 0.11 cfs @ 12.35 hrs, Volume= 689 cf, Depth= 0.23"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

	Area (sf)	CN	Description
	35,654	58	Woods/grass comb., Good, HSG B
*	243	98	Ex Wetland, 0% imp, HSG B
	35,897	58	Weighted Average
	35,897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0900	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.4	140	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	240	Total			

Summary for Subcatchment S3a: Offsite property south

Runoff = 3.37 cfs @ 12.18 hrs, Volume= 8,177 cf, Depth= 1.69"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
57,918	88	Urban industrial, 72% imp, HSG B
16,217		28.00% Pervious Area
41,701		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
1.2	160	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	30	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	290	Total			

Summary for Subcatchment S3b: Offsite property south

Runoff = 1.80 cfs @ 12.18 hrs, Volume= 4,344 cf, Depth= 1.69"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
30,766	88	Urban industrial, 72% imp, HSG B
8,614		28.00% Pervious Area
22,152		72.00% Impervious Area

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

Summary for Subcatchment S4a: Offsite property west

Runoff = 0.01 cfs @ 12.22 hrs, Volume= 32 cf, Depth= 0.31"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
1,209	61	>75% Grass cover, Good, HSG B
1,209		100.00% Pervious Area

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

Summary for Subcatchment S4b: Offsite property west

Runoff = 0.07 cfs @ 12.22 hrs, Volume= 290 cf, Depth= 0.31"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
11,117	61	>75% Grass cover, Good, HSG B
11,117		100.00% Pervious Area

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

Summary for Subcatchment S5: Offsite property north

Runoff = 13.68 cfs @ 12.18 hrs, Volume= 32,912 cf, Depth= 1.69"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
233,102	88	Urban industrial, 72% imp, HSG B
65,269		28.00% Pervious Area
167,833		72.00% Impervious Area

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

Summary for Reach R1: Ex drainage to Ex Wetland

Inflow Area = 465,028 sf, 53.45% Impervious, Inflow Depth = 1.15" for 2-Year event
Inflow = 17.12 cfs @ 12.23 hrs, Volume= 44,444 cf
Outflow = 17.12 cfs @ 12.23 hrs, Volume= 44,444 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond D1: Ex Depression

Inflow Area = 387,248 sf, 58.46% Impervious, Inflow Depth = 1.38" for 2-Year event
Inflow = 17.58 cfs @ 12.18 hrs, Volume= 44,633 cf
Outflow = 15.55 cfs @ 12.23 hrs, Volume= 44,633 cf, Atten= 12%, Lag= 3.2 min
Discarded = 0.12 cfs @ 12.23 hrs, Volume= 5,512 cf
Primary = 15.43 cfs @ 12.23 hrs, Volume= 39,121 cf
Routed to Reach R1 : Ex drainage to Ex Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 900.45' @ 12.23 hrs Surf.Area= 11,492 sf Storage= 5,840 cf

Plug-Flow detention time= 47.0 min calculated for 44,602 cf (100% of inflow)
Center-of-Mass det. time= 47.5 min (855.0 - 807.5)

Volume	Invert	Avail.Storage	Storage Description
#1	899.50'	15,637 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
899.50	0	0	0
900.00	6,933	1,733	1,733
901.00	17,159	12,046	13,779
901.10	20,000	1,858	15,637

Device	Routing	Invert	Outlet Devices
#1	Primary	900.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	899.50'	**0.450 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 12.23 hrs HW=900.44' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=15.18 cfs @ 12.23 hrs HW=900.44' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 15.18 cfs @ 1.72 fps)

Summary for Subcatchment S1a: 14005 Northdale property

Runoff = 2.99 cfs @ 12.27 hrs, Volume= 9,364 cf, Depth= 1.18"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
	16,859	98	Paved parking, HSG B
	71,227	58	Woods/grass comb., Good, HSG B
*	6,933	55	Ex Depression, Good, HSG B
	95,019	65	Weighted Average
	78,160		82.26% Pervious Area
	16,859		17.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0250	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.4	240	0.0080	0.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	340	Total			

Summary for Subcatchment S1b: 14005 Northdale property

Runoff = 0.71 cfs @ 12.26 hrs, Volume= 2,352 cf, Depth= 0.79"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
	35,654	58	Woods/grass comb., Good, HSG B
*	243	98	Ex Wetland, 0% imp, HSG B
	35,897	58	Weighted Average
	35,897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0900	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.4	140	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	240	Total			

Summary for Subcatchment S3a: Offsite property south

Runoff = 5.78 cfs @ 12.18 hrs, Volume= 14,340 cf, Depth= 2.97"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
57,918	88	Urban industrial, 72% imp, HSG B
16,217		28.00% Pervious Area
41,701		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
1.2	160	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	30	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	290	Total			

Summary for Subcatchment S3b: Offsite property south

Runoff = 3.11 cfs @ 12.17 hrs, Volume= 7,618 cf, Depth= 2.97"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
30,766	88	Urban industrial, 72% imp, HSG B
8,614		28.00% Pervious Area
22,152		72.00% Impervious Area

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

Summary for Subcatchment S4a: Offsite property west

Runoff = 0.04 cfs @ 12.20 hrs, Volume= 96 cf, Depth= 0.95"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
1,209	61	>75% Grass cover, Good, HSG B
1,209		100.00% Pervious Area

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

Summary for Subcatchment S4b: Offsite property west

Runoff = 0.33 cfs @ 12.20 hrs, Volume= 878 cf, Depth= 0.95"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
11,117	61	>75% Grass cover, Good, HSG B
11,117		100.00% Pervious Area

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

Summary for Subcatchment S5: Offsite property north

Runoff = 23.57 cfs @ 12.17 hrs, Volume= 57,715 cf, Depth= 2.97"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
233,102	88	Urban industrial, 72% imp, HSG B
65,269		28.00% Pervious Area
167,833		72.00% Impervious Area

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

Summary for Reach R1: Ex drainage to Ex Wetland

Inflow Area = 465,028 sf, 53.45% Impervious, Inflow Depth = 2.23" for 10-Year event
Inflow = 32.12 cfs @ 12.22 hrs, Volume= 86,298 cf
Outflow = 32.12 cfs @ 12.22 hrs, Volume= 86,298 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond D1: Ex Depression

Inflow Area = 387,248 sf, 58.46% Impervious, Inflow Depth = 2.53" for 10-Year event
Inflow = 31.60 cfs @ 12.18 hrs, Volume= 81,515 cf
Outflow = 28.40 cfs @ 12.23 hrs, Volume= 81,515 cf, Atten= 10%, Lag= 2.9 min
Discarded = 0.14 cfs @ 12.23 hrs, Volume= 6,065 cf
Primary = 28.25 cfs @ 12.23 hrs, Volume= 75,450 cf
Routed to Reach R1 : Ex drainage to Ex Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 900.65' @ 12.23 hrs Surf.Area= 13,577 sf Storage= 8,396 cf

Plug-Flow detention time= 30.3 min calculated for 81,515 cf (100% of inflow)
Center-of-Mass det. time= 30.2 min (827.1 - 796.9)

Volume	Invert	Avail.Storage	Storage Description
#1	899.50'	15,637 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
899.50	0	0	0
900.00	6,933	1,733	1,733
901.00	17,159	12,046	13,779
901.10	20,000	1,858	15,637

Device	Routing	Invert	Outlet Devices
#1	Primary	900.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	899.50'	**0.450 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 12.23 hrs HW=900.64' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=27.79 cfs @ 12.23 hrs HW=900.64' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 27.79 cfs @ 2.16 fps)

Summary for Subcatchment S1a: 14005 Northdale property

Runoff = 9.07 cfs @ 12.25 hrs, Volume= 26,542 cf, Depth= 3.35"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

	Area (sf)	CN	Description
	16,859	98	Paved parking, HSG B
	71,227	58	Woods/grass comb., Good, HSG B
*	6,933	55	Ex Depression, Good, HSG B
	95,019	65	Weighted Average
	78,160		82.26% Pervious Area
	16,859		17.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0250	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.4	240	0.0080	0.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	340	Total			

Summary for Subcatchment S1b: 14005 Northdale property

Runoff = 2.81 cfs @ 12.23 hrs, Volume= 7,865 cf, Depth= 2.63"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

	Area (sf)	CN	Description
	35,654	58	Woods/grass comb., Good, HSG B
*	243	98	Ex Wetland, 0% imp, HSG B
	35,897	58	Weighted Average
	35,897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0900	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.4	140	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	240	Total			

Summary for Subcatchment S3a: Offsite property south

Runoff = 11.07 cfs @ 12.18 hrs, Volume= 28,499 cf, Depth= 5.90"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
57,918	88	Urban industrial, 72% imp, HSG B
16,217		28.00% Pervious Area
41,701		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
1.2	160	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	30	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	290	Total			

Summary for Subcatchment S3b: Offsite property south

Runoff = 5.96 cfs @ 12.17 hrs, Volume= 15,139 cf, Depth= 5.90"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
30,766	88	Urban industrial, 72% imp, HSG B
8,614		28.00% Pervious Area
22,152		72.00% Impervious Area

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

Summary for Subcatchment S4a: Offsite property west

Runoff = 0.12 cfs @ 12.18 hrs, Volume= 296 cf, Depth= 2.94"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
1,209	61	>75% Grass cover, Good, HSG B
1,209		100.00% Pervious Area

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

Summary for Subcatchment S4b: Offsite property west

Runoff = 1.13 cfs @ 12.18 hrs, Volume= 2,719 cf, Depth= 2.94"
Routed to Reach R1 : Ex drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
11,117	61	>75% Grass cover, Good, HSG B
11,117		100.00% Pervious Area

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

Summary for Subcatchment S5: Offsite property north

Runoff = 45.14 cfs @ 12.17 hrs, Volume= 114,700 cf, Depth= 5.90"
Routed to Pond D1 : Ex Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
233,102	88	Urban industrial, 72% imp, HSG B
65,269		28.00% Pervious Area
167,833		72.00% Impervious Area

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

Summary for Reach R1: Ex drainage to Ex Wetland

Inflow Area = 465,028 sf, 53.45% Impervious, Inflow Depth = 4.87" for 100-Year event
Inflow = 66.15 cfs @ 12.22 hrs, Volume= 188,782 cf
Outflow = 66.15 cfs @ 12.22 hrs, Volume= 188,782 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond D1: Ex Depression

Inflow Area = 387,248 sf, 58.46% Impervious, Inflow Depth = 5.27" for 100-Year event
Inflow = 63.71 cfs @ 12.18 hrs, Volume= 170,037 cf
Outflow = 57.11 cfs @ 12.23 hrs, Volume= 170,037 cf, Atten= 10%, Lag= 3.0 min
Discarded = 0.19 cfs @ 12.23 hrs, Volume= 6,978 cf
Primary = 56.92 cfs @ 12.23 hrs, Volume= 163,059 cf
Routed to Reach R1 : Ex drainage to Ex Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 901.04' @ 12.23 hrs Surf.Area= 18,317 sf Storage= 14,502 cf

Plug-Flow detention time= 18.0 min calculated for 169,919 cf (100% of inflow)
Center-of-Mass det. time= 18.4 min (802.5 - 784.1)

Volume	Invert	Avail.Storage	Storage Description
#1	899.50'	15,637 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
899.50	0	0	0
900.00	6,933	1,733	1,733
901.00	17,159	12,046	13,779
901.10	20,000	1,858	15,637

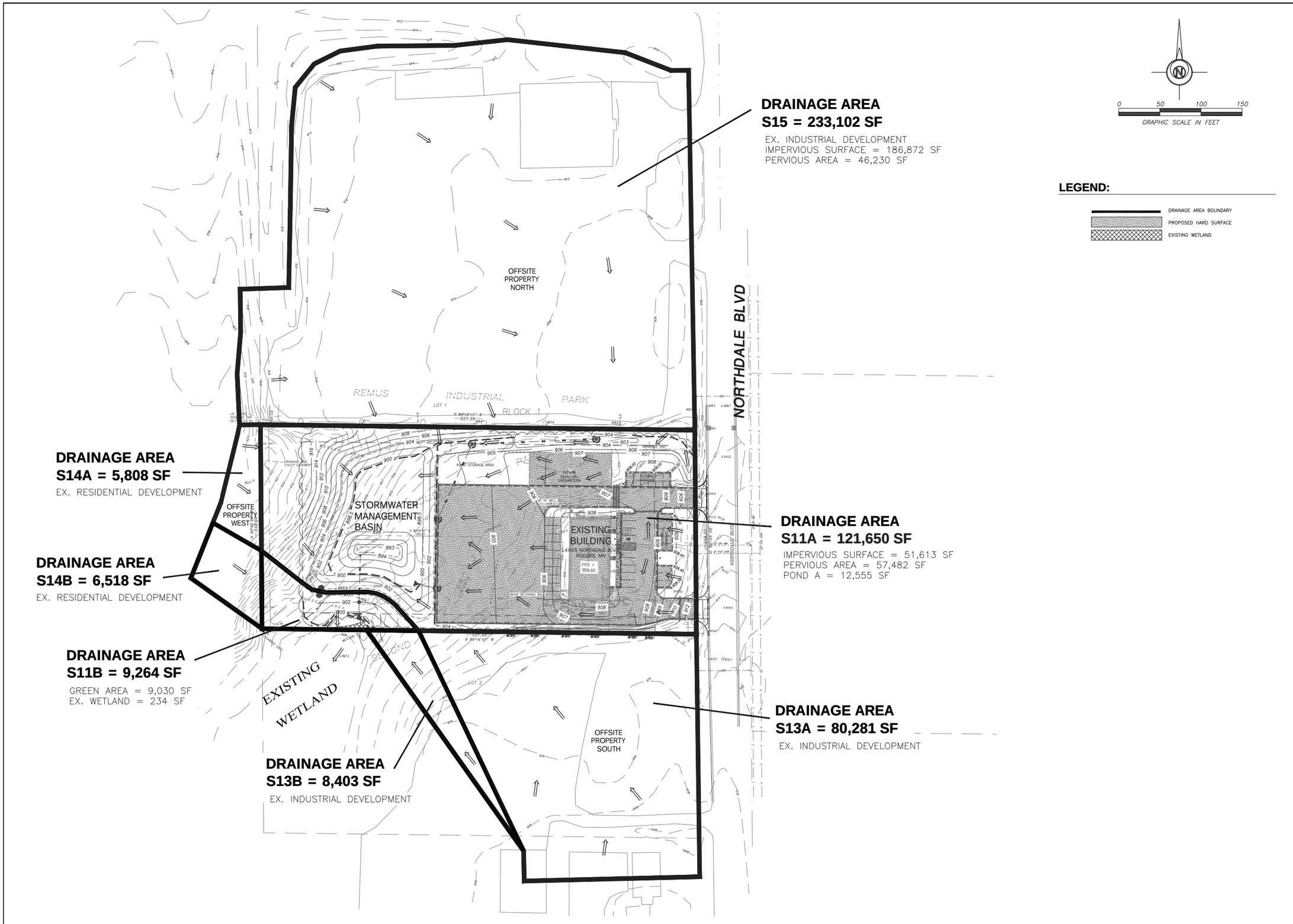
Device	Routing	Invert	Outlet Devices
#1	Primary	900.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	899.50'	**0.450 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 12.23 hrs HW=901.03' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=56.05 cfs @ 12.23 hrs HW=901.03' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 56.05 cfs @ 2.72 fps)

APPENDIX B

Proposed Conditions Analysis



CLIENT:

CREATIVE LAWN & LANDSCAPES

30083 149th St NW
Princeton, MN

Jordan Roberdeau
763-389-2227
jordan@creativelnl.com

SITE IMPROVEMENT PROJECT

14005 Northdale Boulevard
Rogers, MN

PROPOSED CONDITION DRAINAGE AREAS PLAN

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

Date: _____ Reg. No. _____

PREPARED BY: CIVIL ENGINEERING SITE DESIGN
118 East Broadway St.
PO Box 566
Monticello, Mn 55362
Phone: 763-314-0929
www.civilesd.com

REVISIONS
10/20/15 UPDATE DRAINAGE DESIGN
01/22/25 UPDATED CITY SUBMITTAL
03/17/25 WATERSHED COMMENTS

VERTICAL SCALE 1 inch = ____ feet

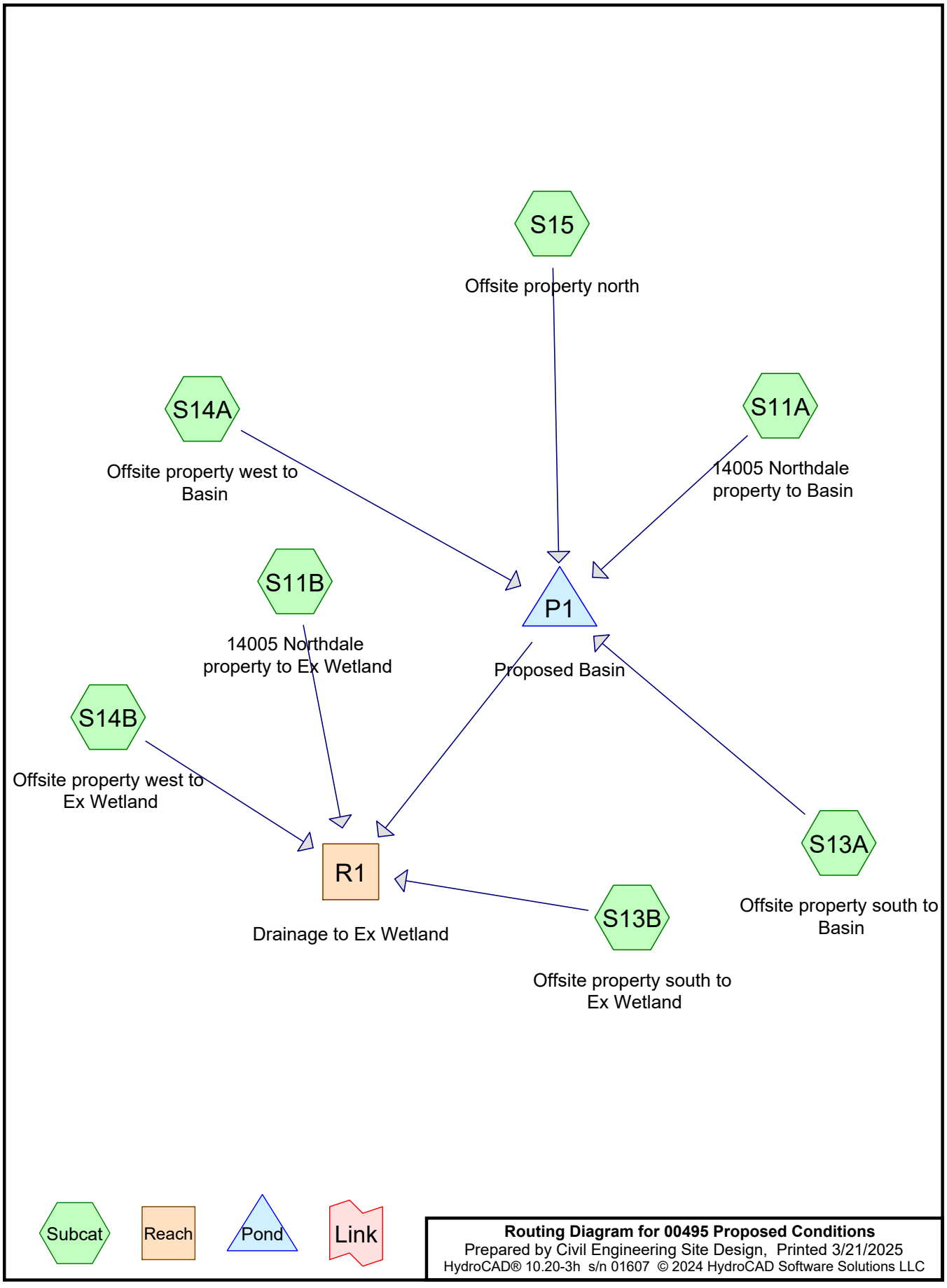
HORIZONTAL SCALE 1 inch = 50 feet (FULL SIZE SHEET 24 X 36)

DATE 07/09/14
DRAWN BY SD
DESIGNED BY SD
CHECKED BY SD

FILE NO. 00495

DA2

Proposed Condition Drainage Areas Plan


S15
Offsite property north
S14A
Offsite property west to Basin
S11A
14005 Northdale property to Basin
S11B
14005 Northdale property to Ex Wetland
P1
Proposed Basin
S14B
Offsite property west to Ex Wetland
R1
Drainage to Ex Wetland
S13A
Offsite property south to Basin
S13B
Offsite property south to Ex Wetland
Subcat
Reach
Pond
Link
Routing Diagram for 00495 Proposed Conditions
Prepared by Civil Engineering Site Design, Printed 3/21/2025
HydroCAD® 10.20-3h s/n 01607 © 2024 HydroCAD Software Solutions LLC

Summary for Subcatchment S11A: 14005 Northdale property to Basin

Runoff = 4.14 cfs @ 12.22 hrs, Volume= 11,021 cf, Depth= 1.09"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

	Area (sf)	CN	Description
	51,613	98	Paved parking, HSG B
	63,737	61	>75% Grass cover, Good, HSG B
*	6,300	98	Pond A, 0% imp, HSG B
	121,650	79	Weighted Average
	70,037		57.57% Pervious Area
	51,613		42.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	30	0.0300	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.4	250	0.0040	0.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	280	Total			

Summary for Subcatchment S11B: 14005 Northdale property to Ex Wetland

Runoff = 0.04 cfs @ 12.31 hrs, Volume= 198 cf, Depth= 0.26"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

	Area (sf)	CN	Description
	9,030	58	Woods/grass comb., Good, HSG B
*	234	98	Ex Wetland, HSG B
	9,264	59	Weighted Average
	9,030		97.47% Pervious Area
	234		2.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0900	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.3	50	0.1800	2.97		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.9	150	Total			

Summary for Subcatchment S13A: Offsite property south to Basin

Runoff = 4.66 cfs @ 12.18 hrs, Volume= 11,335 cf, Depth= 1.69"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
80,281	88	Urban industrial, 72% imp, HSG B
22,479		28.00% Pervious Area
57,802		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
1.2	160	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	30	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	290	Total			

Summary for Subcatchment S13B: Offsite property south to Ex Wetland

Runoff = 0.49 cfs @ 12.18 hrs, Volume= 1,186 cf, Depth= 1.69"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
8,403	88	Urban industrial, 72% imp, HSG B
2,353		28.00% Pervious Area
6,050		72.00% Impervious Area

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

Summary for Subcatchment S14A: Offsite property west to Basin

Runoff = 0.04 cfs @ 12.22 hrs, Volume= 152 cf, Depth= 0.31"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
5,808	61	>75% Grass cover, Good, HSG B
5,808		100.00% Pervious Area

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

Summary for Subcatchment S14B: Offsite property west to Ex Wetland

Runoff = 0.04 cfs @ 12.22 hrs, Volume= 170 cf, Depth= 0.31"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
6,518	61	>75% Grass cover, Good, HSG B
6,518		100.00% Pervious Area

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

Summary for Subcatchment S15: Offsite property north

Runoff = 13.68 cfs @ 12.18 hrs, Volume= 32,912 cf, Depth= 1.69"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.86"

Area (sf)	CN	Description
233,102	88	Urban industrial, 72% imp, HSG B
65,269		28.00% Pervious Area
167,833		72.00% Impervious Area

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

Summary for Reach R1: Drainage to Ex Wetland

Inflow Area = 465,026 sf, 60.97% Impervious, Inflow Depth > 1.46" for 2-Year event
Inflow = 8.03 cfs @ 12.42 hrs, Volume= 56,677 cf
Outflow = 8.03 cfs @ 12.42 hrs, Volume= 56,677 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond P1: Proposed Basin

Inflow Area = 440,841 sf, 62.89% Impervious, Inflow Depth = 1.51" for 2-Year event
Inflow = 22.29 cfs @ 12.18 hrs, Volume= 55,420 cf
Outflow = 7.81 cfs @ 12.43 hrs, Volume= 55,122 cf, Atten= 65%, Lag= 14.8 min
Primary = 7.81 cfs @ 12.43 hrs, Volume= 55,122 cf
Routed to Reach R1 : Drainage to Ex Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 899.00' Surf.Area= 13,080 sf Storage= 17,977 cf
Peak Elev= 900.48' @ 12.43 hrs Surf.Area= 16,459 sf Storage= 39,799 cf (21,822 cf above start)

Plug-Flow detention time= 262.6 min calculated for 37,120 cf (67% of inflow)
Center-of-Mass det. time= 106.2 min (913.4 - 807.2)

Volume	Invert	Avail.Storage	Storage Description
#1	893.00'	99,989 cf	**Pond A (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.00	410	0	0
897.50	2,830	7,290	7,290
898.49	5,840	4,292	11,582
898.50	12,140	90	11,672
899.00	13,080	6,305	17,977
903.50	23,370	82,013	99,989

Device	Routing	Invert	Outlet Devices
#1	Primary	899.00'	**27.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 899.00' / 898.90' S= 0.0024 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.98 sf
#2	Device 1	895.00'	**24.0" Round Intake Culvert** L= 32.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 895.00' S= -0.0313 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#3	Device 1	901.50'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	903.00'	**6.0' long + 4.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=7.79 cfs @ 12.43 hrs HW=900.48' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 7.79 cfs @ 4.00 fps)
  - **2=Intake Culvert** (Passes 7.79 cfs of 18.38 cfs potential flow)
  - **3=Grate** (Controls 0.00 cfs)
- **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment S11A: 14005 Northdale property to Basin

Runoff = 8.41 cfs @ 12.21 hrs, Volume= 22,065 cf, Depth= 2.18"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
	51,613	98	Paved parking, HSG B
	63,737	61	>75% Grass cover, Good, HSG B
*	6,300	98	Pond A, 0% imp, HSG B
	121,650	79	Weighted Average
	70,037		57.57% Pervious Area
	51,613		42.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	30	0.0300	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.4	250	0.0040	0.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	280	Total			

Summary for Subcatchment S11B: 14005 Northdale property to Ex Wetland

Runoff = 0.21 cfs @ 12.24 hrs, Volume= 648 cf, Depth= 0.84"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
	9,030	58	Woods/grass comb., Good, HSG B
*	234	98	Ex Wetland, HSG B
	9,264	59	Weighted Average
	9,030		97.47% Pervious Area
	234		2.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0900	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.3	50	0.1800	2.97		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.9	150	Total			

Summary for Subcatchment S13A: Offsite property south to Basin

Runoff = 8.01 cfs @ 12.18 hrs, Volume= 19,877 cf, Depth= 2.97"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
80,281	88	Urban industrial, 72% imp, HSG B
22,479		28.00% Pervious Area
57,802		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
1.2	160	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	30	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	290	Total			

Summary for Subcatchment S13B: Offsite property south to Ex Wetland

Runoff = 0.85 cfs @ 12.17 hrs, Volume= 2,081 cf, Depth= 2.97"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,403	88	Urban industrial, 72% imp, HSG B
2,353		28.00% Pervious Area
6,050		72.00% Impervious Area

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

Summary for Subcatchment S14A: Offsite property west to Basin

Runoff = 0.17 cfs @ 12.20 hrs, Volume= 459 cf, Depth= 0.95"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
5,808	61	>75% Grass cover, Good, HSG B
5,808		100.00% Pervious Area

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

Summary for Subcatchment S14B: Offsite property west to Ex Wetland

Runoff = 0.19 cfs @ 12.20 hrs, Volume= 515 cf, Depth= 0.95"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
6,518	61	>75% Grass cover, Good, HSG B
6,518		100.00% Pervious Area

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

Summary for Subcatchment S15: Offsite property north

Runoff = 23.57 cfs @ 12.17 hrs, Volume= 57,715 cf, Depth= 2.97"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
233,102	88	Urban industrial, 72% imp, HSG B
65,269		28.00% Pervious Area
167,833		72.00% Impervious Area

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

Summary for Reach R1: Drainage to Ex Wetland

Inflow Area = 465,026 sf, 60.97% Impervious, Inflow Depth = 2.66" for 10-Year event
Inflow = 16.93 cfs @ 12.37 hrs, Volume= 103,058 cf
Outflow = 16.93 cfs @ 12.37 hrs, Volume= 103,058 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond P1: Proposed Basin

Inflow Area = 440,841 sf, 62.89% Impervious, Inflow Depth = 2.73" for 10-Year event
Inflow = 39.71 cfs @ 12.18 hrs, Volume= 100,116 cf
Outflow = 16.35 cfs @ 12.38 hrs, Volume= 99,815 cf, Atten= 59%, Lag= 12.1 min
Primary = 16.35 cfs @ 12.38 hrs, Volume= 99,815 cf
Routed to Reach R1 : Drainage to Ex Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 899.00' Surf.Area= 13,080 sf Storage= 17,977 cf
Peak Elev= 901.33' @ 12.38 hrs Surf.Area= 18,397 sf Storage= 54,575 cf (36,598 cf above start)

Plug-Flow detention time= 170.7 min calculated for 81,781 cf (82% of inflow)
Center-of-Mass det. time= 79.9 min (875.7 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1	893.00'	99,989 cf	**Pond A (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.00	410	0	0
897.50	2,830	7,290	7,290
898.49	5,840	4,292	11,582
898.50	12,140	90	11,672
899.00	13,080	6,305	17,977
903.50	23,370	82,013	99,989

Device	Routing	Invert	Outlet Devices
#1	Primary	899.00'	**27.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 899.00' / 898.90' S= 0.0024 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.98 sf
#2	Device 1	895.00'	**24.0" Round Intake Culvert** L= 32.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 895.00' S= -0.0313 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#3	Device 1	901.50'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	903.00'	**6.0' long + 4.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=16.32 cfs @ 12.38 hrs HW=901.32' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 16.32 cfs @ 4.94 fps)
  - **2=Intake Culvert** (Passes 16.32 cfs of 23.05 cfs potential flow)
  - **3=Grate** (Controls 0.00 cfs)
- **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment S11A: 14005 Northdale property to Basin

Runoff = 18.57 cfs @ 12.21 hrs, Volume= 49,452 cf, Depth= 4.88"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

	Area (sf)	CN	Description
	51,613	98	Paved parking, HSG B
	63,737	61	>75% Grass cover, Good, HSG B
*	6,300	98	Pond A, 0% imp, HSG B
	121,650	79	Weighted Average
	70,037		57.57% Pervious Area
	51,613		42.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	30	0.0300	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.4	250	0.0040	0.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.8	280	Total			

Summary for Subcatchment S11B: 14005 Northdale property to Ex Wetland

Runoff = 0.79 cfs @ 12.22 hrs, Volume= 2,108 cf, Depth= 2.73"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

	Area (sf)	CN	Description
	9,030	58	Woods/grass comb., Good, HSG B
*	234	98	Ex Wetland, HSG B
	9,264	59	Weighted Average
	9,030		97.47% Pervious Area
	234		2.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0900	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.3	50	0.1800	2.97		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.9	150	Total			

Summary for Subcatchment S13A: Offsite property south to Basin

Runoff = 15.34 cfs @ 12.18 hrs, Volume= 39,503 cf, Depth= 5.90"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
80,281	88	Urban industrial, 72% imp, HSG B
22,479		28.00% Pervious Area
57,802		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
1.2	160	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	30	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	290	Total			

Summary for Subcatchment S13B: Offsite property south to Ex Wetland

Runoff = 1.63 cfs @ 12.17 hrs, Volume= 4,135 cf, Depth= 5.90"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
8,403	88	Urban industrial, 72% imp, HSG B
2,353		28.00% Pervious Area
6,050		72.00% Impervious Area

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

Summary for Subcatchment S14A: Offsite property west to Basin

Runoff = 0.59 cfs @ 12.18 hrs, Volume= 1,421 cf, Depth= 2.94"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
5,808	61	>75% Grass cover, Good, HSG B
5,808		100.00% Pervious Area

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

Summary for Subcatchment S14B: Offsite property west to Ex Wetland

Runoff = 0.66 cfs @ 12.18 hrs, Volume= 1,594 cf, Depth= 2.94"
Routed to Reach R1 : Drainage to Ex Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
6,518	61	>75% Grass cover, Good, HSG B
6,518		100.00% Pervious Area

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

Summary for Subcatchment S15: Offsite property north

Runoff = 45.14 cfs @ 12.17 hrs, Volume= 114,700 cf, Depth= 5.90"
Routed to Pond P1 : Proposed Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
233,102	88	Urban industrial, 72% imp, HSG B
65,269		28.00% Pervious Area
167,833		72.00% Impervious Area

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

Summary for Reach R1: Drainage to Ex Wetland

Inflow Area = 465,026 sf, 60.97% Impervious, Inflow Depth = 5.49" for 100-Year event
Inflow = 33.07 cfs @ 12.36 hrs, Volume= 212,607 cf
Outflow = 33.07 cfs @ 12.36 hrs, Volume= 212,607 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond P1: Proposed Basin

Inflow Area = 440,841 sf, 62.89% Impervious, Inflow Depth = 5.58" for 100-Year event
Inflow = 78.77 cfs @ 12.18 hrs, Volume= 205,076 cf
Outflow = 31.67 cfs @ 12.38 hrs, Volume= 204,770 cf, Atten= 60%, Lag= 12.2 min
Primary = 31.67 cfs @ 12.38 hrs, Volume= 204,770 cf
Routed to Reach R1 : Drainage to Ex Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 899.00' Surf.Area= 13,080 sf Storage= 17,977 cf
Peak Elev= 903.00' @ 12.38 hrs Surf.Area= 22,233 sf Storage= 88,653 cf (70,676 cf above start)

Plug-Flow detention time= 117.0 min calculated for 186,794 cf (91% of inflow)
Center-of-Mass det. time= 61.7 min (843.8 - 782.1)

Volume	Invert	Avail.Storage	Storage Description
#1	893.00'	99,989 cf	**Pond A (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
893.00	410	0	0
897.50	2,830	7,290	7,290
898.49	5,840	4,292	11,582
898.50	12,140	90	11,672
899.00	13,080	6,305	17,977
903.50	23,370	82,013	99,989

Device	Routing	Invert	Outlet Devices
#1	Primary	899.00'	**27.0" Round Culvert** L= 42.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 899.00' / 898.90' S= 0.0024 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.98 sf
#2	Device 1	895.00'	**24.0" Round Intake Culvert** L= 32.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 894.00' / 895.00' S= -0.0313 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#3	Device 1	901.50'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	903.00'	**6.0' long + 4.0 '/' SideZ x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=31.62 cfs @ 12.38 hrs HW=903.00' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 31.62 cfs @ 7.95 fps)
  - **2=Intake Culvert** (Passes < 30.24 cfs potential flow)
  - **3=Grate** (Passes < 74.04 cfs potential flow)
- **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

APPENDIX C

SOILS DATA

July 10, 2014 Project Number: 14-448

Mr. Scott Dahlke
Civil Engineering Site Design
118 East Broadway Street
Monticello, MN 55362

Re: Geotechnical Exploration Summary, Parking Lot Expansion
14005 Northdale Blvd, Rogers, MN

Dear Mr. Dahlke:

We have completed the geotechnical exploration for the proposed parking lot expansion west of the existing building at 14005 Northdale Blvd in Rogers MN. Our services were performed as authorized by you in conversations with Mr. Joe Westphal, Haugo GeoTechnical Services (HGTS). The purpose of this geotechnical exploration was to characterize subsurface soil and groundwater conditions and provide recommendations for pavement design and construction. The following paragraphs present specific details regarding our procedures, results and recommendations.

INTRODUCTION

Project Description

Civil Engineering Site Design (CESD) is preparing plans to add a parking lot and plant storage area west of the existing building at 14005 Northdale Blvd in Rogers, MN. We understand that the proposed parking lot and plant storage area will be graded flat and level and will be gravel surfaced (MN/DOT Class 5 or similar) but may be bituminous paved in the future. Improvement plans also appear to include adding/constructing a "Green House" and a storm water retention pond.

Currently, the proposed lot expansion is a low lying heavily wooded area, with the existing surface elevations ranging from about 899 to 908 feet MSL. Two areas within the wooded are identified as Wetlands on the provided plans.

Documents Provided

We were initially provided a copy of the "Plot Plan for Sketch Layout" prepared by Civil Engineering Site Design, dated May 19, 2014. The Plan includes a layout of the proposed improvements superimposed over an aerial photograph of the site. The plan also included existing contour lines of the property. We were also provided with a "Grading and Drainage Plan" prepared by CESD, and dated July 9th, 2014.

Locations and Elevations

The soil boring locations were selected by HGTS based on the proposed improvements and site access. The ground surface elevation at the eastern boring location (B-1) was obtained by HGTS using GPS measuring equipment. The GPS measurement was based on the MN County Coordinate System (Hennepin County) in US Survey Feet using the GEOID09 (Conus) model. Elevations at soil boring locations B-2 and B-3 were measured by HGTS using conventional transit equipment because tree cover blocked the satellite signal for the GPS equipment.

The approximate location of the soil borings are shown on Figure 1, "Soil Boring Location Sketch", attached.

RESULTS

Soil Conditions

Three hand auger borings were completed for this project. Soil boring B-1 encountered about 1 foot topsoil fill at the surface underlain by about 4 feet of silty sand or sandy lean clay fill that extended to a depth of about 5 feet below the ground surface. Below the fill the boring encountered about 2 feet of dark brown poorly graded sand with silt that may be fill. The soil was therefore identified as "Possible Fill". The boring terminated in possible fill at a depth of about 7 feet.

Soil borings B-2 and B-3 encountered about 7 feet and 5 feet, respectively of topsoil and buried topsoil underlain by native silty sand or clayey sand soils that extended to the termination depth of the borings.

Since the soil borings were completed with hand equipment, standard penetration resistance values (N-values) were not obtained.

Groundwater Conditions

Groundwater was not encountered in the soil boring. It appears to be below the depths explored.

It should be noted that the borings were completed in clayey soils. In clayey soils it may take several hours or days for groundwater to reach its hydrostatic level in an open borehole. Therefore the groundwater levels observed in the borings may be lower than the hydrostatic groundwater levels.

DISCUSSION & RECOMMENDATIONS

Discussion

The project will include adding plant storage areas, landscaping storage bins and a parking lot for equipment staging and loading west of the existing building as well as a retention pond. Based on correspondence with Mr. Scott Dahlke we understand finished grades across the lot and storage area will range from about elevation 906 near the existing building to about elevation 903 ½ at the west end of the storage area. With existing ground surface elevations ranging from about 904 ½ near the building to about 899 near the proposed west end of the storage area we anticipate that about 4 ½ feet, or more, of fill will be required to reach design grades.

Most of the parking lot expansion area is wooded but lowlands and wetlands were identified within some of the area. The topsoil was about 5 to 7 feet thick through the existing lowland and wetland areas.

We anticipate that about 4 feet, or more, of fill will be required to reach design grades in the vicinity of soil borings B-2 and B-3. We recommend removing the vegetation, root zone, tree stumps, and organic surface soils prior to placing additional fill. Due to the depth of fill to be placed, it is our opinion that most of the topsoil can remain provided there is a minimum of 3 feet of non-organic mineral soil between the base of the aggregate base and the underlying topsoil. However, the exposed topsoil should be evaluated at the time of construction; removal of soils deemed to be highly organic will be required. Stripping of the organic soils at the surface is recommended for paved and non-paved areas of the storage lot to reduce potential settlements.

We understand there is a potential to add 17 parking stalls to the east parking lot. If/when the future parking stalls are added, we assume the east parking lot may be reconstructed. Soil borings were not requested on the east side of the building but recommendations for lot expansions are included in the Pavement Recommendations section.

Groundwater was not encountered in our borings. We do not anticipate groundwater will be encountered during construction and do not anticipate that dewatering will be required. It appears the surrounding areas drain to the lowland/wetland areas of the site and heavy rains during construction could present a flash flooding situation.

Grading Recommendations

We recommend removing all topsoil and soft or loose soils or other unsuitable materials from within 3 feet of the pavement subgrade elevation. In area where that require over 3 feet of fill to attain proposed subgrade, only the organic soils and root zone near the surface and any stumps or roots need to be removed. We estimate stripping 1 to 1 ½ feet of the topsoil material prior to fill placement.

Fill placed to attain pavement subgrade elevation can consist of any mineral soil provided it is free of organic material or other deleterious materials. Granular fill classified as SP or SP-SM should be placed within 65 percent to 105 percent of its optimum moisture content as determined by the standard Proctor. Remaining fill soils (on-site clays) should be placed

within 3 percentage points above and 1 percentage point below its optimum moisture content as determined by the standard Proctor.

We recommend that fill placed to attain site grades be compacted to a minimum of 95 percent of its standard Proctor density (ASTM D 698), except the upper 3 feet of pavement areas, where the compaction level should be increased to a minimum of 100 percent. All fill should be placed in thin lifts and be compacted with a large self-propelled vibratory compactor operating in vibratory mode.

Pavement Recommendations

Based on the information provided, we anticipate light duty pavements may be required to accommodate customer and employee parking on the east side of the building and heavy duty pavements will be required to accommodate truck deliveries and equipment on the west side of the building and associated access drive lanes. We assume heavy duty pavements will be subjected to Equivalent Single Axel Loads (ESAL's) ranging from about 50,000 to 100,000 over a 20 year design life. Light duty pavements are anticipated to be subjected to less than 50,000 ESAL's over a 20 year design life.

Prior to placing the aggregate base (Class 5) we recommend proof rolling the pavement subgrade to identify soft, weak, loose or unstable areas that may require additional subcuts.

The type of soil that will be imported and used as fill or backfill to reach design grades is not known at this time. Pavement thickness depends, in part, on the subgrade soil type(s) and the associated R-Value, both of which can vary greatly.

For preliminary design purposes and assuming the subgrade soil will consist of sandy lean clay corresponding to the ASTM classification CL, it is our opinion that and R-Value of 10 can be used for pavement design.

Assuming an R-Value of 10, we recommend a light duty pavement section consisting of a minimum of 3½ inches of bituminous, and 8 inches of aggregate base. For heavy duty pavements we recommend a minimum of 4 inches of bituminous and 12 inches of aggregate base.

We recommend aggregate base meeting MN/DOT specification 3138 for Class 5 aggregate base. We recommend the aggregate base be compacted to 100 percent of its maximum standard Proctor.

We recommend that the bituminous wear and base courses meet the requirement of MN/DOT specification 2360. We recommend the bituminous pavements be compacted to at least 92% of the maximum theoretical density.

We recommend specifying concrete that has a minimum 28 day compressive strength of 3,900 psi. We recommend specifying 5 to 8 percent entrained air for exposed concrete to provide resistance to freeze-thaw deterioration. We recommend slump, air content and compressive strength test of Portland cement concrete.

GENERAL

The soils encountered in the borings were visually and manually classified in general accordance with ASTM Test Method D 2488. A chart explaining the classification system is attached. Haugo GeoTechnical Services does not practice in the field of surveying; therefore the locations and elevations referenced on the boring logs should be considered approximate.

The strata changes were inferred from the changes in the samples and auger cuttings. The depths shown as changes between strata are only approximate. The changes are likely transitions, variations can occur beyond the location of the boring.

We made water level measurements in the borings at the times and under the conditions stated on the boring logs. The data was interpreted in the text of this report. The period of observation was relatively short and fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw, drainage, and other seasonal and annual factors not evident at the time the observations were made. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

Haugo GeoTechnical Services does not practice in the field of surveying therefore the locations and elevations referenced or described above should be considered approximate.

Haugo GeoTechnical Services has used the degree of skill and care ordinarily exercised under similar circumstance by members of the profession currently practicing in this locality. No warranty expressed or implied is made.

Thank you for the opportunity to assist you on this project. If you have any questions or need additional information please contact Paul Gionfriddo at 763-954-1101 or Joe Westphal at 612-269-4027.

Sincerely,

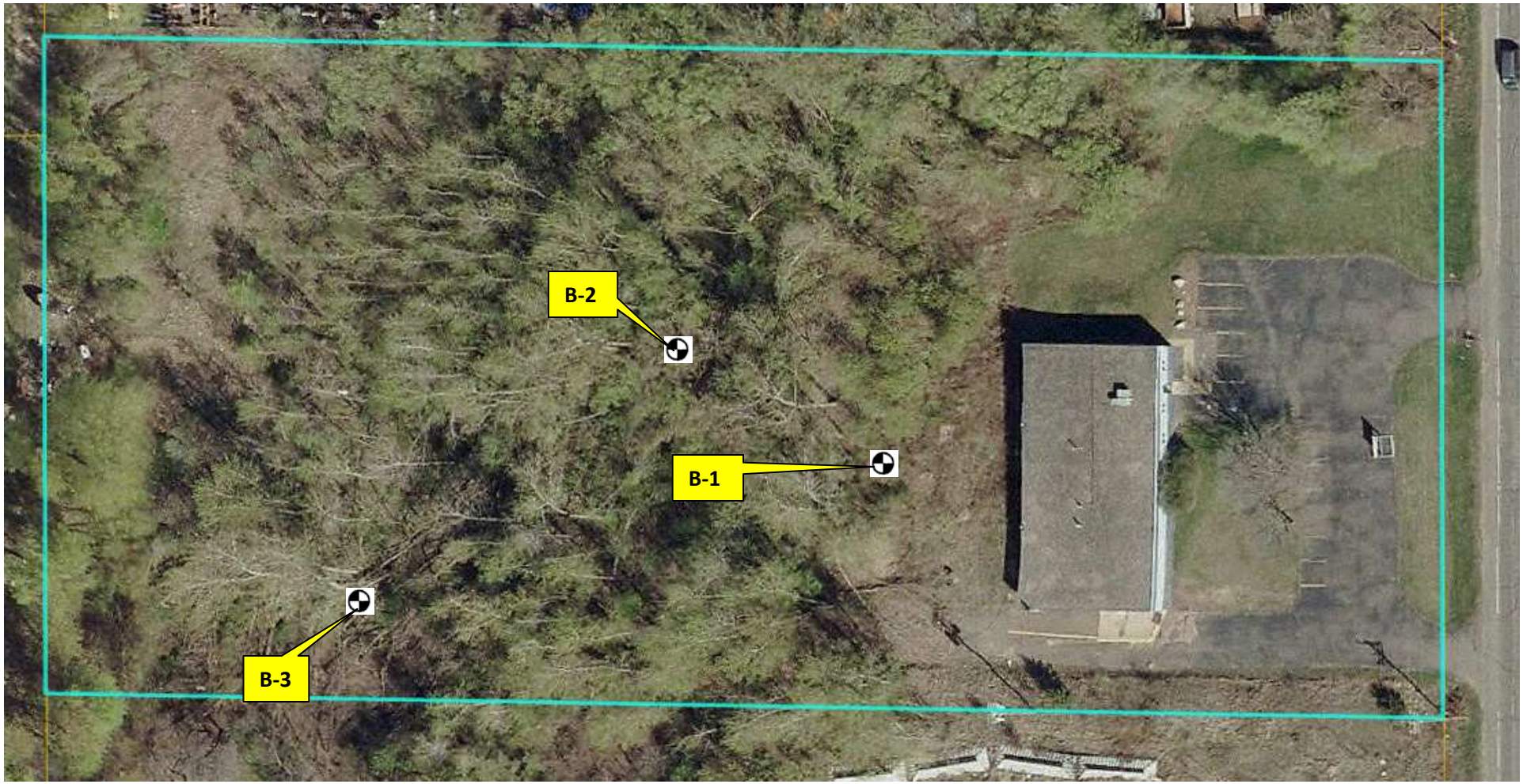
Haugo GeoTechnical Services, LLC

Paul S. Gionfriddo P.E.
Consulting Engineer

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Joe Westphal, P.E.
Project Engineer
License Number 49833
Expires June 2016

Attachments: Figure 1 - Soil Boring Location Sketch
Soil Boring Logs B-1 thru B-3
Terminology of Soil Characteristics



= Approximate Boring Location

Haugo GeoTechnical Services.
13570 Grove Drive #278
Maple Grove, MN

Soil Boring Location Sketch
Proposed Parking Lot Expansion
14005 Northdale Blvd
Rogers, Minnesota

N
W E
S

Figure #: 1
Drawn By: MJS
Date: 7/2/14
Scale: None
HGTS Project #: 14-448

Haugo GeoTechnical Services, LLC
13570 Grove Drive, #278
Maple Grove, Minnesota 55311

BORING NUMBER B-1

CLIENT Civil Engineering Site Design
PROJECT NAME 14005 Northdale Blvd
PROJECT NUMBER 14-448
PROJECT LOCATION Rogers, Minnesota
DATE STARTED 7/1/14 **COMPLETED** 7/1/14
GROUND ELEVATION 904.4 ft MSL **HOLE SIZE** 3 inches
DRILLING CONTRACTOR HGTS
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Probe
AT TIME OF DRILLING --- Not Encountered
LOGGED BY CP **CHECKED BY** JLW
AT END OF DRILLING --- Not Encountered
NOTES 41' W of Existing Building
AFTER DRILLING --- Not Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0	AU		Silty Sand, with roots and fibers, black, moist. (Topsoil/FILL)	
	AU			
	AU		0.9	903.5
	AU		Silty Sand, dark brown, moist. (FILL)	
	AU			
2.5	AU			
	AU			
	AU			
	AU		4.0	900.4
	AU		Sandy Lean Clay, trace Gravel, brown, wet. (FILL)	
5.0	AU		5.0	899.4
	AU		Poorly Graded Sand with Silt, dark brown, moist. (Possible FILL)	
	AU			
	AU			
	AU		7.0	897.4

Bottom of borehole at 7.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/9/14 15:25 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\14-448 NORTHDALE BLVD HAP.GPJ

BORING NUMBER B-2

Haugo GeoTechnical Services, LLC
13570 Grove Drive, #278
Maple Grove, Minnesota 55311

CLIENT Civil Engineering Site Design
PROJECT NAME 14005 Northdale Blvd
PROJECT NUMBER 14-448
PROJECT LOCATION Rogers, Minnesota
DATE STARTED 7/1/14 **COMPLETED** 7/1/14
GROUND ELEVATION 899.3 ft MSL **HOLE SIZE** 3 inches
DRILLING CONTRACTOR HGTS
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Probe
AT TIME OF DRILLING --- Not Encountered
LOGGED BY CP **CHECKED BY** JLW
AT END OF DRILLING --- Not Encountered
NOTES 103' W of Existing Building
AFTER DRILLING --- Not Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0	AU			Silty Sand, dark brown to black, moist. (Topsoil)	
	AU				
	AU				
	AU				
2.0					897.3
2.5	AU	CL-ML		(CL-ML) Silty Lean Clay, black, moist. (Buried Topsoil)	
	AU				
	AU				
	AU				
	AU				
5.0	AU				
	AU				
	AU				
	AU				
7.0					892.3
7.5	AU	SC-SM		(SC-SM) Clayey Sand with Silt, dark brown, moist. (Alluvium)	
	AU				
	AU				
	AU				
	AU				
10.0	AU				
10.0					889.3

Bottom of borehole at 10.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/9/14 15:25 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\14-448 NORTHDALE BLVD HAP.GPJ

BORING NUMBER B-3

Haugo GeoTechnical Services, LLC
13570 Grove Drive, #278
Maple Grove, Minnesota 55311

CLIENT Civil Engineering Site Design
PROJECT NAME 14005 Northdale Blvd
PROJECT NUMBER 14-448
PROJECT LOCATION Rogers, Minnesota
DATE STARTED 7/1/14 **COMPLETED** 7/1/14
GROUND ELEVATION 900.1 ft MSL **HOLE SIZE** 3 inches
DRILLING CONTRACTOR HGTS
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Probe
AT TIME OF DRILLING --- Not Encountered
LOGGED BY CP **CHECKED BY** JLW
AT END OF DRILLING --- Not Encountered
NOTES 200' W of Existing Building
AFTER DRILLING --- Not Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0	AU			Silty Sand, with roots and fibers, black, moist. (Topsoil)	
	AU				
				1.0	899.1
	AU			Silty Lean Clay, black, moist. (Buried Topsoil)	
	AU				
2.5	AU				
	AU				
	AU				
	AU				
	AU				
5.0	AU				
				5.0	895.1
	AU	SM		(SM) Silty Sand, grey, moist. (Alluvium)	
	AU				
	AU				
	AU				
				7.0	893.1

Bottom of borehole at 7.0 feet.

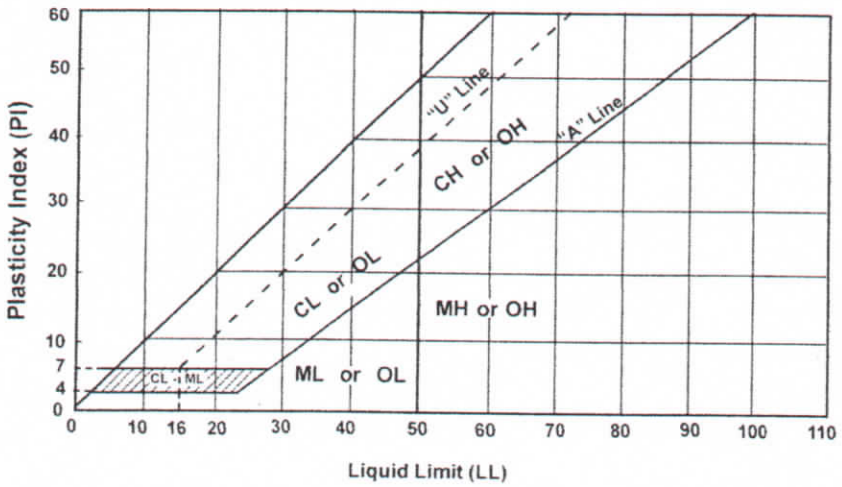
GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 7/9/14 15:25 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\14-448 NORTHDALE BLVD HAP.GPJ

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soils Classification	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels 5% or less fines [e]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [c]	GW	Well-graded gravel [d]
			$C_u < 4$ and/or $1 > C_c > 3$ [c]	GP	Poorly graded gravel [d]
		Gravels with Fines More than 12% fines [e]	Fines classify as ML or MH	GM	Silty gravel [d,f,g]
			Fines classify as CL or CH	GC	Clayey gravel [d,f,g]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands 5% or less fines [i]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [c]	SW	Well-graded sand [h]
			$C_u < 6$ and/or $1 > C_c > 3$ [c]	SP	Poorly graded sand [h]
		Sands with Fines More than 12% [i]	Fines classify as ML or MH	SM	Silty sand [f,g,h]
			Fines classify as CL or CH	SC	Clayey sand [f,g,h]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k,l,m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k,l,m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k,l,m,n] / Organic silt [k,l,m,o]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k,l,m]
			PI plots below "A" line	MH	Elastic silt [k,l,m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k,l,m,p] / Organic silt [k,l,m,q]
Highly Organic Soils		Primarily organic matter, dark in color and organic odor		PT	Peat

a. Based on the material passing the 3-in (75mm) sieve
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines" to group name.
h. If soil contains ≥ 15% gravel, add "with gravel" to group name.
i. Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 10 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	OC	Organic content, %
WD	Wet density, pcf	S	Percent of saturation, %
MC	Natural moisture content, %	SG	Specific gravity
LL	Liquid limit, %	C	Cohesion, psf
PL	Plastic limit, %	∅	Angle of internal friction
PI	Plasticity index, %	qu	Unconfined compressive strength, psf
P200	% passing 200 sieve	qp	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	< No. 200, PI < 4 or below "A" line
Clay	< No. 200, PI ≥ 4 and on or above "A" line

Relative Density of Cohesionless Soils

Very loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 BPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of Cohesive Soils

Very soft	0 to 1 BPF
Soft	2 to 3 BPF
Rather soft	4 to 5 BPF
Medium	6 to 8 BPF
Rather stiff	9 to 12 BPF
Stiff	13 to 16 BPF
Very stiff	17 to 30 BPF
Hard	over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

Power auger borings were advanced by 4" or 6" diameter continuous-flight, solid-stem augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface and are, therefore, somewhat approximate. Power auger borings are designated by the prefix "B."

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn. Hand auger borings are indicated by the prefix "H."

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

TW indicates thin-walled (undisturbed) tube sample.

Note: All tests were run in general accordance with applicable ASTM standards.

APPENDIX D

Basin Water Quality Volume Calculations

CREATIVE LAWN – CITY OF ROGERS
SITE IMPROVEMENT PROJECT
INFILTRATION WORKSHEET

Requirements:

Infiltration of runoff generated from a 1.1" rainfall over the applicable new impervious surface within 48 hours.

Step 1: Determine areas of impervious surfaces area and effective infiltration area.

Net increase of new impervious surface = 46,500 sf

Effective Infiltration Area = 6,300 sf
Effective Infiltration Area equals infiltration shelf footprint area of 898.5 contour.

Step 2: Calculate water quality volume from increase of impervious surface generated by 1.0" runoff.

46,500 sf Net Increased Impervious Surface Area	x	1.0 Coefficient	x	1.1 inch Rainfall	x	1ft/12inch	=	**4,263 cf** Volume Required to be Treated

Step 3: Calculate volume capacity of being infiltrated on site in 48 hours. Use infiltration rate for Type B soils = 0.45 in/hr.

6,300 sf Effective Infiltration Area	x	0.45 in/hr Infiltration Rate	x	48 hrs	x	1ft/12inch	=	**11,340 cf** Volume Capacity in 48 Hours

Step 4: Compare volume capacity to volume required to be treated.

11,340 cf Volume Capacity in 48 Hours	**>**	**6,305 cf** Volume of Basin Storage	**>**	**4,263 cf** Volume Required to be Treated

Basin storage = 6,305 cf basin volume below outlet invert to top of soil infiltration shelf (see custom stage data)

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.12

Subject: Authorization to Advertise for Bids for Construction of Territorial Park
Prepared By: Mike Bauer, Parks & Recreation Director

Recommended Council Action

Overview / Background / Analysis
In 2021, at the recommendation of the Parks and Recreation Advisory, the City Council approved a master plan for Territorial Park between the Skye Meadows and Harvest View Neighborhoods. The 2025 Capital Improvement Plan includes the park's construction in this year's budget. The funding for the Park will come from the Park Dedication fund, which is supplied by the developer's fees to build out parks in the community. In 2024, the final design and construction services professional services agreement was assigned to Anderson Engineering.

After the review of the Site Plan and playground concepts last month, over 200 residents(all occupied homes within 300 feet of the park) were mailed and the City of Rogers Facebook page was asked for comments and suggestions for a piece of playground equipment.

The March meeting was advertised for public comment on the park project. While this is not a public hearing, and a mailing was not required, the Parks and Recreation Advisory Commission welcomed public input on the project. Joe Lucht, the Landscape Architect with Anderson Engineering and Staff, reviewed the Site Plan and answered questions from the Commission and the public in attendance.

After the meeting, public input was utilized, and the plans were updated (See attached). Joe Lucht and Tim Solomonson, the Project Manager for Midwest Play Scapes, the playground supplier, reviewed the plans with the Parks and Recreation Advisory Commission at the April 10th meeting. The commission recommended going out to bid for the park's construction and to purchase the playground separately using cooperative purchasing through Sourcewell. Splitting these items will save the City of Rogers the markup from the general contractor and a discount of 10% from the manufacturer.

The design estimate for the first phase of the park build is $1,283,360, with an alternative to complete all the trails for $237,550. These estimates include the cost of the playground equipment to show the whole financial picture. The design estimates are attached..

The attached park's current design conforms to the City of Rogers Parks, Trails, and Open Space Plan. After public comments drove the addition of trees to the east of the playground container to act as a screen for the neighbors, a swale was maintained to drain water away from the eastern neighbors, and the picnic shade structure was moved to the west to increase the distance from the homes.

Next Steps:

City Council Meeting (design, estimated costs, and approval of bid letting) **April 22 Pending Approval**
Ad for Bid **April 29, May 6, and May 13**
Bid Opening **Tuesday, May 20**
City Council Meeting (Evaluation of Bids), **Thursday, June 12**
Award Construction Contract (NTP), **Monday, June 30**
Construction Complete **Wednesday, November 19**

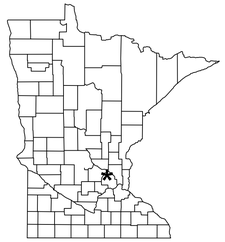
Staff Recommendation
Move to authorize Anderson Engineering to advertise for bids for the construction of Territorial Park.

Financial Impact: $1,283,360 to $1,596,955

Source Fund: 404-Park Ded

Budgeted? Yes

Supporting Documentation
A. Territorial Park75% Plan Set
B. Territorial Park Design Estimate
C. Territorial Park Renders Pending Color Update from 4/10 PRAC



CONSTRUCTION DOCUMENTS

FOR

Tterritorial park

ROGERS, MN

OWNER/CONTACT

CITY OF ROGERS
MIKE BAUER
PARKS AND RECREATION DIRECTOR
22350 S. DIAMOND LAKE RD.
ROGERS, MN 55374

SURVEY / ENGINEER

ANDERSON ENGINEERING OF MN, LLC
13605 1ST AVENUE NORTH, SUITE 100
PLYMOUTH, MN 55441

1 SITE LOCATION MAP
SCALE:N.T.S.

2 VICINITY MAP
SCALE:N.T.S.

SHEET INDEX

SHEET	DESCRIPTION
C001	COVER SHEET
C100	EXISTING CONDITIONS & DEMOLITION PLAN
C101	SITE PLAN
C102	GRADING, EROSION CONTROL & DRAINAGE PLAN
C103	STORMWATER POLLUTION PREVENTION PLAN
C104	STORMWATER POLLUTION PREVENTION PLAN
C105	LANDSCAPE PLAN
C106	DETAILS
C107	DETAILS
C108	DETAILS

GENERAL NOTES

1. UNTIL THE REVISION BLOCK INDICATES "ISSUED FOR CONSTRUCTION," THE PLAN SET IS NOT CERTIFIED FOR CONSTRUCTION, AND THE CONTRACTOR ASSUMES ALL RISKS ASSOCIATED WITH BUILDING.
2. BASED ON AN EXISTING CONDITIONS SURVEY CONDUCTED BY ANDERSON ENGINEERING IN SEPTEMBER 2024, THE EXISTING CONDITIONS PRESENTED ARE SUBJECT TO VARIATION. THE CONTRACTOR MUST VERIFY SITE CONDITIONS AND PROMPTLY COMMUNICATE ANY DISPARITIES IN WRITING TO THE ENGINEER.
3. UTILITY QUALITY LEVEL C IS APPLIED TO THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN, DETERMINED ACCORDING TO CI/ASCE 38-2 GUIDELINES. THE PRECISE LOCATION AND DEPTH OF SUBSURFACE UTILITIES, INCLUDING GAS, TELEPHONE, FIBER OPTIC, SEWER, WATER, PIPELINES, ELECTRICAL, AND CABLE TV, ARE UNKNOWN, AND THE INFORMATION SHOULD NOT BE RELIED UPON AS EXACT OR COMPLETE.
4. PRIOR TO STARTING WORK, THE CONTRACTOR MUST CONTACT GOPHER STATE ONE CALL (1-800-252-1166) AT LEAST 48 HOURS IN ADVANCE (EXCLUDING HOLIDAYS AND WEEKENDS) TO DETERMINE THE LOCATIONS OF UNDERGROUND UTILITIES.
5. PRIVATE UTILITY CONFLICTS SHOULD BE ANTICIPATED BY THE CONTRACTOR IN PROJECT SUBCUT AND TRENCH AREAS. THE CONTRACTOR MUST COORDINATE WITH UTILITY OWNERS FOR RELOCATION OR PROTECTION OF EXISTING UTILITIES, OR INSTALLATION OF NEW UTILITIES, WITH ALL ASSOCIATED COSTS BEING THE CONTRACTOR'S RESPONSIBILITY AND INCURRED WITH NO ADDITIONAL COST TO THE OWNER.
6. QUANTITIES ARE APPROXIMATE AND MAY VARY TO ENSURE SUCCESSFUL COMPLETION OF THE WORK.
7. COMPLIANCE WITH CITY, COUNTY, STATE, AND FEDERAL (INCLUDING OSHA) REGULATIONS AND CODES IS MANDATORY FOR ALL WORK AND MATERIALS.
8. COORDINATION OF WORK WITH OTHER CONTRACTORS OPERATING AT OR NEAR THE SITE IS THE RESPONSIBILITY OF THE CONTRACTOR.
9. THROUGHOUT CONSTRUCTION, THE CONTRACTOR MUST COORDINATE AND MAINTAIN ACCESS TO ADJACENT PROPERTIES.
10. THE CONTRACTOR IS TASKED WITH COORDINATING AND MAINTAINING MAIL, GARBAGE, AND RECYCLING SERVICES TO PROPERTIES DURING CONSTRUCTION.
11. RESPONSIBILITY FOR COORDINATING AND MAINTAINING STORMWATER DRAINAGE CONVEYANCE THROUGHOUT CONSTRUCTION, BOTH PIPED AND OVERLAND FLOW, LIES WITH THE CONTRACTOR.
12. COORDINATION AND MAINTENANCE OF WATER AND SANITARY FLOW TO AND FROM PROPERTIES ARE THE CONTRACTOR'S RESPONSIBILITY.
13. THE CONTRACTOR MUST COORDINATE AND MAINTAIN UTILITY SERVICES TO ADJACENT PROPERTIES AT ALL TIMES. UTILITY SERVICE INTERRUPTION IS PERMITTED ONLY WITH APPROVAL FROM THE OWNER, CITY, AND ADJACENT PROPERTIES.
14. COORDINATION WITH UTILITY SERVICES FOR SMALL UTILITY INSTALLATION FALLS UNDER THE CONTRACTOR'S RESPONSIBILITIES.
15. UNLESS SHOWN OR NOTED OTHERWISE, CONSTRUCTION LIMITS EXTEND TO THE PROPERTY LINE. CONSTRUCTION ACTIVITIES MUST BE RESTRICTED TO DESIGNATED AREAS AS INDICATED ON THE PLANS.
16. PRESERVATION AND PROTECTION OF EXISTING PAVEMENT, SITE FEATURES, UTILITIES, TREES, ETC., IS THE CONTRACTOR'S RESPONSIBILITY UNLESS OTHERWISE INDICATED.
17. THE CONTRACTOR MUST DOCUMENT EXISTING CONDITIONS THROUGH PHOTOS OR VIDEOS BEFORE CONSTRUCTION BEGINS. THIS INCLUDES ITEMS DESIGNATED TO REMAIN THAT MIGHT BE MISCONSTRUED AS DAMAGE CAUSED BY CONSTRUCTION OPERATIONS. ADEQUATELY DETAILED PHOTOGRAPHS OR VIDEO RECORDINGS, ALONG WITH PLANS AND NOTATIONS, MUST BE SUBMITTED TO THE ENGINEER AND OWNER BEFORE CONSTRUCTION BEGINS. ANY DAMAGE TO EXISTING PAVEMENT, CURBING, STRIPING, OR OTHER SITE FEATURES MUST BE REPLACED BY THE CONTRACTOR TO THE OWNER'S SATISFACTION, AT NO ADDITIONAL COST TO THE OWNER.
18. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR TAKING ALL NECESSARY PRECAUTIONS TO AVOID PROPERTY DAMAGE TO ADJACENT PROPERTIES DURING CONSTRUCTION.
19. BEFORE COMMENCING WORK, THE CONTRACTOR MUST NOTIFY THE OWNER AND ENGINEER IN WRITING OF ANY DISCREPANCIES OR CONFLICTS IN THE CONTRACT DOCUMENTS. NO FIELD CHANGES OR DEVIATIONS ARE PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER. FAILURE TO NOTIFY THE OWNER AND ENGINEER OF IDENTIFIABLE CONFLICTS BEFORE INSTALLATION RELIEVES THE OWNER AND ENGINEER OF ANY OBLIGATION TO PAY FOR A RELATED CHANGE ORDER.
20. ONE COPY OF EACH REQUIRED CONSTRUCTION PERMIT AND THE MOST CURRENT AND COMPLETE SET OF CONSTRUCTION DOCUMENTS, INCLUDING PLANS, SPECIFICATIONS, GEOTECHNICAL REPORT, SPECIAL CONDITIONS AND PROVISIONS, ETC., MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES.
21. FULLY IMPLEMENTING AND ENFORCING SAFE WORK PRACTICES, INCLUDING BUT NOT LIMITED TO PERSONNEL MONITORING, USE OF TRENCHING, SHEETING, AND SHORING, SCAFFOLDING, MATERIALS HANDLING AND DRILLING, OPERATION OF EQUIPMENT, AND ENSURING PUBLIC SAFETY DURING WORK PROGRESS, IS THE CONTRACTOR'S RESPONSIBILITY.
22. PLANNING FOR AND ENSURING PERSONNEL COMPLY WITH OSHA SAFETY AND HEALTH STANDARDS (29 CFR 1910) AND GENERAL CONSTRUCTION STANDARDS (29 CFR 1926) IS PART OF THE CONTRACTOR'S RESPONSIBILITIES.
23. INITIATING, MAINTAINING, AND SUPERVISING SAFETY PRECAUTIONS AND PROGRAMS THROUGHOUT THE WORK PROJECT IS THE CONTRACTOR'S RESPONSIBILITY. ENSURING THE SAFETY OF EMPLOYEES ON THE PROJECT SITE AND OTHER AFFECTED PERSONS AND ORGANIZATIONS IS CRITICAL FOR THE CONTRACTOR. SAFETY DUTIES AND RESPONSIBILITIES EXTEND UNTIL ALL WORK IS COMPLETE, AND THE ENGINEER ISSUES NOTICE THAT THE WORK IS FINISHED.
24. HAZARDOUS MATERIALS, SUCH AS OIL, GASOLINE, PAINT, AND OTHER HAZARDOUS SUBSTANCES, MUST BE PROPERLY STORED BY THE CONTRACTOR. THIS INCLUDES SECONDARY CONTAINMENTS TO PREVENT SPILLS, LEAKS, OR OTHER DISCHARGES. ACCESS TO STORAGE AREAS MUST BE RESTRICTED TO PREVENT VANDALISM. HAZARDOUS WASTE STORAGE AND DISPOSAL MUST COMPLY WITH MPCA REGULATIONS. IMMEDIATE REMOVAL OF SPILLS OF FUELS, OILS, OR OTHER CHEMICALS UPON DETECTION IS THE CONTRACTOR'S RESPONSIBILITY.

ANDERSON
13605 1st Avenue N. #100
Plymouth, MN 55441 | ae-mn.com
P 763.412.4000 | F 763.412.4090
Anderson Engineering of Minnesota, LLC

TERRITORIAL PARK

ASHBURY DRIVE
ROGERS, MN 55374

CITY OF ROGERS

95% CONSTRUCTION DOCUMENTS

NOT FOR CONSTRUCTION

REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

APRIL 2, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ST	ST	JL

DRAWING TITLE

COVER SHEET

DRAWING NO.

C001

PLOTTED:	COMM. NO.
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Apr 02, 2025 - 4:57pm stuffy
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ADD ALTERNATE 1
16" WILLOW
18" ASH
16" BOX ELDER
12" BOX ELDER
48" OAK
36" OAK
40" OAK
42" OAK
32" BASSWOOD
30" BOX ELDER
20" BOX ELDER
18" BOX ELDER
14" BOX ELDER
12" BOX ELDER
10" BOX ELDER
8" BOX ELDER
6" BOX ELDER
16" ASH
14" ASH
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8" ASH
6" ASH
4" ASH
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12" BASSWOOD
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8" BASSWOOD
6" BASSWOOD
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6" ELM
16" MAPLE
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6" MAPLE
12" POPLAR
10" POPLAR
8" POPLAR
6" BLACK CHERRY
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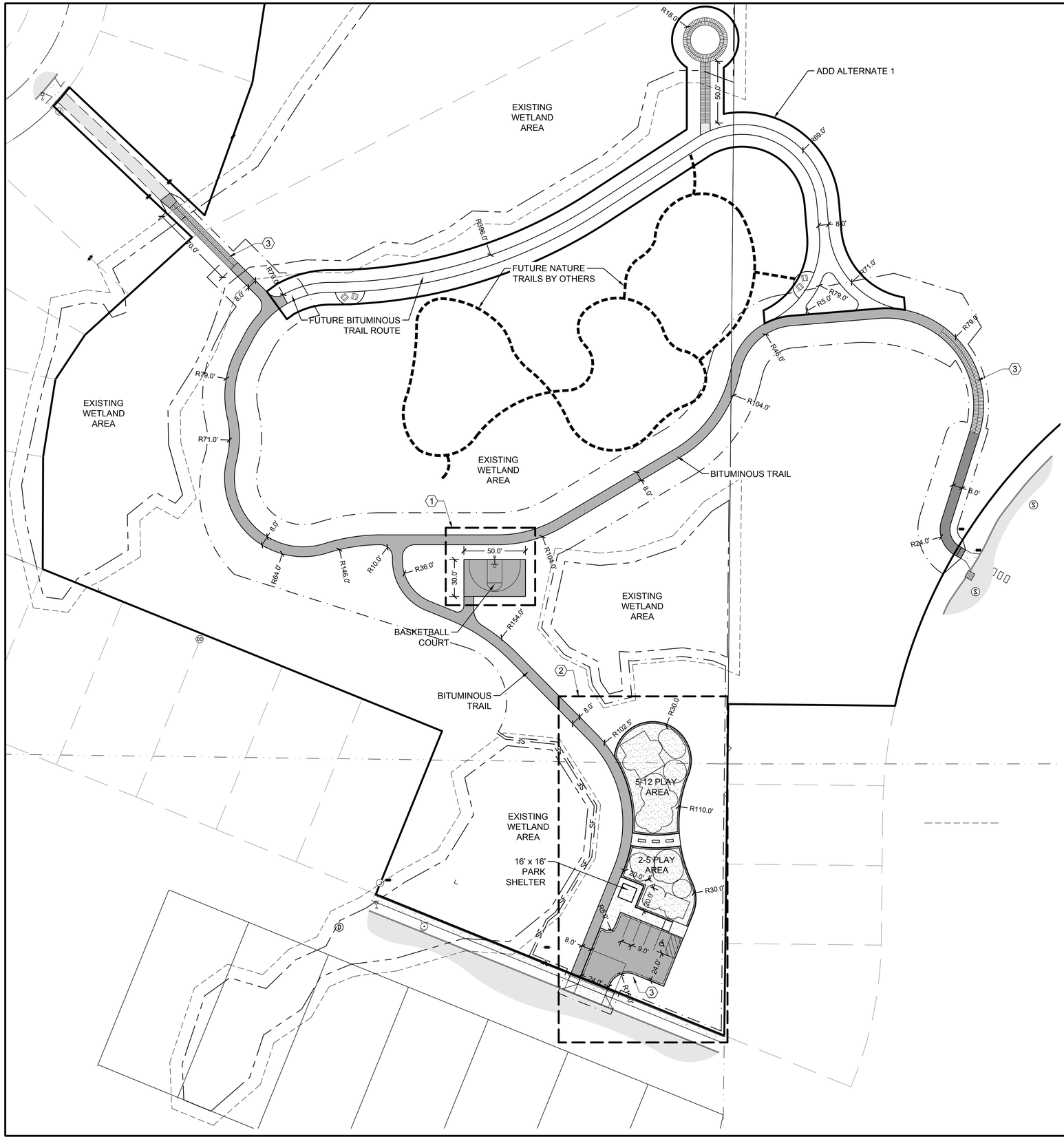
EXISTING WETLAND AREA
ADD ALTERNATE 1
FUTURE NATURE TRAILS BY OTHERS
FUTURE BITUMINOUS TRAIL ROUTE
EXISTING WETLAND AREA
EXISTING WETLAND AREA
BITUMINOUS TRAIL
EXISTING WETLAND AREA
BASKETBALL COURT
BITUMINOUS TRAIL
EXISTING WETLAND AREA
5-12 PLAY AREA
2-5 PLAY AREA
16' x 16' PARK SHELTER
R18.0'
50.0'
R69.0'
8.0'
R71.0'
R79.0'
R5.0'
R79.0'
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EXISTING WETLAND AREA

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EXISTING WETLAND AREA

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EG 946.0
945.93
946.90
TC 948.43
TC 948.56
TC 949.01
TC 948.62
949.32
949.00
948.84
949.48
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FES
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RCP @ 1.0%
EG 950.8
EG 950.8
EG 950.6
EG 950.9
EG 950.9
EG 950.6
CB-1
RIM=948.10
INV.(W)=943.70

0 40' 80'

NORTH

GRADING NOTES

1. THE CONTRACTOR MUST CONSTRUCT/GRADE SIDEWALKS AND ACCESSIBLE ROUTES, INCLUDING CROSSING DRIVEWAYS, IN ACCORDANCE WITH CURRENT ADA STATE AND NATIONAL STANDARDS. IMMEDIATE WRITTEN NOTIFICATION TO THE ENGINEER IS REQUIRED IF ADA CRITERIA CANNOT BE MET AT ANY LOCATION.
2. IMPORTED SUITABLE FILL MATERIAL NEEDED MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER BEFORE BRINGING IT ON THE SITE.
3. THE CONTRACTOR MUST COORDINATE REQUIRED SOIL TESTS AND INSPECTIONS WITH THE GEOTECHNICAL ENGINEER.
4. THE CONTRACTOR IS RESPONSIBLE FOR EXCAVATING AND DISPOSING OF UNSUITABLE OR CONTAMINATED SOILS DISCOVERED ONSITE IN ACCORDANCE WITH APPLICABLE REGULATIONS AND AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
5. EXISTING TOPSOIL ON-SITE VARIES IN DEPTH. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SURFACE VEGETATION, TOPSOIL, AND OTHER UNSUITABLE MATERIAL FROM IMPERVIOUS AREAS AND OTHER DESIGNATED AREAS BEFORE PLACING SUITABLE FILL MATERIAL, AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
6. EXCAVATE, COMPACT EMBANKMENT/SUITABLE FILL, AND BACKFILL IN ACCORDANCE WITH MN/DOT SPEC 2106 SPECIFIED DENSITY METHOD. THE CONTRACTOR MUST MEET MOISTURE CONTENT/CONTROL REQUIREMENTS IN ACCORDANCE WITH MN/DOT 2106 AND SITE TESTING REQUIREMENTS.
7. ONSITE EMBANKMENT MATERIAL FREE OF ORGANIC SOIL AND DEBRIS MAY BE CONSIDERED FOR REUSE AS SUITABLE FILL MATERIAL IN PERVIOUS AREAS BUT MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER.
8. THE CONTRACTOR SHOULD PROMPTLY BACKFILL SUBGRADE AND TRENCH EXCAVATIONS AFTER EXCAVATION.
9. THE CONTRACTOR IS RESPONSIBLE FOR QUANTIFYING SOIL IMPORT OR EXPORT AND CONDUCTING THEIR OWN QUANTITY TAKEOFFS FROM THE DRAWINGS. ADDITIONAL ON-SITE EXCAVATION OR OFF-SITE IMPORT MAY BE NECESSARY TO ACHIEVE FINAL GRADES, AND THE CONTRACTOR MUST COORDINATE THESE ACTIONS WITH THE OWNER AND ENGINEER. THE SUITABILITY OF OFFSITE IMPORT MATERIAL MUST BE VERIFIED BY THE GEOTECHNICAL ENGINEER. ANY EXCESS MATERIAL, UNLESS NOTED OTHERWISE, BELONGS TO THE CONTRACTOR AND SHOULD BE MOVED AND DISPOSED OF OFFSITE IN ACCORDANCE WITH APPLICABLE LAWS.
10. GRADING DISCREPANCIES IN EXISTING OR PROPOSED GRADES MUST BE REPORTED IN WRITING TO THE ENGINEER BEFORE PLACING PAVEMENT. THE CONTRACTOR SHOULD OBSERVE PAVEMENT AREAS FOR EVIDENCE OF PONDING BEFORE PLACEMENT TO ENSURE ADEQUATE DRAINAGE.
11. EXISTING SPOT ELEVATIONS AT MATCH POINTS ARE BASED ON SITE SURVEY DATA. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING CONNECTION POINTS BEFORE INSTALLATION OF IMPROVEMENTS AND MUST NOTIFY THE ENGINEER IN WRITING OF ANY FIELD DISCREPANCIES. THE CONTRACTOR IS RESPONSIBLE FOR REWORK OF ANY DISCREPANCIES THAT ARE NOT COMMUNICATED TO THE ENGINEER IN WRITING AT NO ADDITIONAL COST TO THE OWNER.
12. THE PROPOSED CONTOURS PERTAIN TO THE FINISHED SURFACE GRADE, UNLESS OTHERWISE INDICATED.
13. THE CONTRACTOR IS RESPONSIBLE FOR MEETING GRADING/COMPACTION REQUIREMENTS OUTLINED IN THE GEOTECHNICAL REPORT AND SPECIFICATIONS FOR THE PROJECT.
14. IMPORTED SUITABLE FILL MATERIAL MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER BEFORE BRINGING IT ON THE SITE.
15. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING DEWATERING MEASURES AS REQUIRED OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
16. COMPACTION TESTING SHALL FOLLOW THE FREQUENCY OUTLINED IN THE GEOTECHNICAL REPORT OR MNDOT SCHEDULE OF MATERIALS CONTROL. WHERE NO FREQUENCY IS PROVIDED, CONSULT THE ENGINEER FOR MINIMUM REQUIREMENTS.
17. GRADING ELEVATIONS SHALL CONFORM TO MNDOT SPEC 2106.3.I.

LEGEND

- PROPERTY LIMITS
- CONSTRUCTION LIMITS
- 958 EXISTING MINOR CONTOUR
- 960 EXISTING MAJOR CONTOUR
- 958 PROPOSED MINOR CONTOUR
- 960 PROPOSED MAJOR CONTOUR
- × 954.2 EXISTING SPOT ELEVATION
- DRAINAGE ARROW
- PROPOSED CONCRETE C&G

STRUCTURE SCHEDULE		
STRUCTURE NUMBER	STRUCTURE SIZE	CASTING (NEENAH OR APPROVED EQUAL)
CB–1	3' X 2' – BOX	R–3067–V

1 PARKING LOT ENLARGEMENT
SCALE: 1" = 10'

0 10' 20'

NORTH

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Anderson Engineering of Minnesota, LLC

TERRITORIAL PARK

ASHBURY DRIVE
ROGERS, MN 55374

CITY OF ROGERS

95% CONSTRUCTION DOCUMENTS

NOT FOR CONSTRUCTION

REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

APRIL 2, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ST	ST	JL

DRAWING TITLE

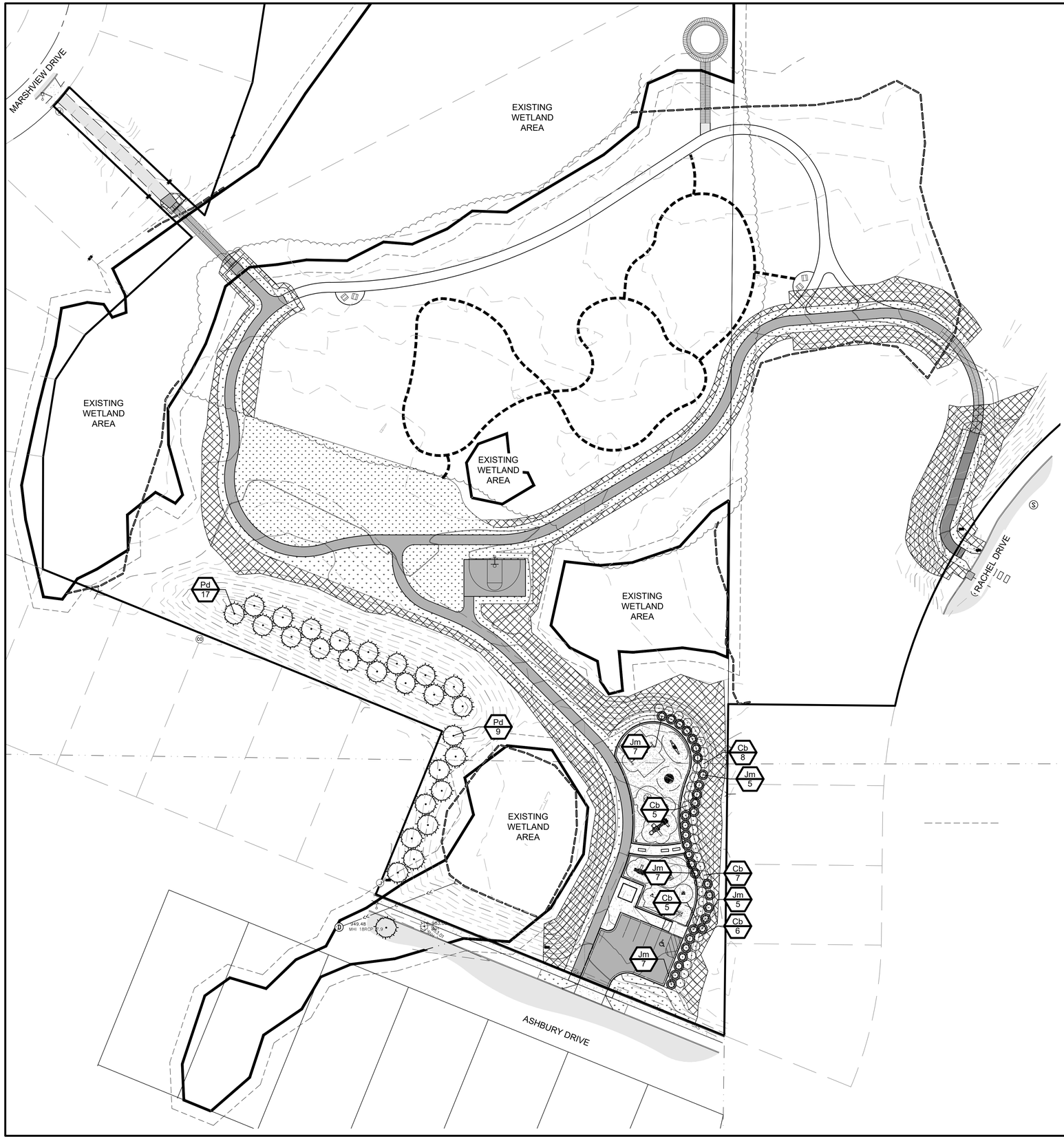
GRADING, EROSION CONTROL, AND DRAINAGE PLAN

DRAWING NO.

C102

PLOTTED:	COMM. NO.
----	18445

Apr 02, 2025 - 4:38pm stuffy Y:\18400\18445 CITY OF ROGERS TERRITORIAL PARK ROGERS MN_ 07 Civil_ 01 CAD files_ 01 SHEETS\18445_ C_ GRADING.dwg
Xref Filename: \ 18445_ TerritorialPark_ TitleBlock \ 18445_ c_ base \ 18445 - 7501_ s_ base_ civil \ 18445_ tl_ base \



LEGEND

- PROPERTY LIMITS
- 966 EXISTING MINOR CONTOUR
- 965 EXISTING MAJOR CONTOUR
- 966 PROPOSED MINOR CONTOUR
- 965 PROPOSED MAJOR CONTOUR
- NATIVE SEED MIX
- SOD

KEY NOTES

1. ROCK MULCH OVER LANDSCAPE FABRIC
2. POLY LANDSCAPE EDGER, SEE DETAIL 1/L500

NOTES

1. PER CITY OF ROGERS CODE, IRRIGATION IS NOT REQUIRED.

CITY OF ROGERS LANDSCAPE REQUIREMENTS

REQUIREMENTS

ALL PROPERTIES WITHIN THE CITY SHALL:

1. BE LANDSCAPED UTILIZING A COMBINATION OF STREET TREES, GRASS, GROUND COVER AND SHRUBBERY.
2. UNDEVELOPED AREAS INTERIOR TO THE SITE SHALL BE SEEDED WITH APPROPRIATE GRASSES AND MAINTAINED NEAT AND ORDERLY TO CONTROL DUST.

PROVIDED

43 PROPOSED TREES
10 PROPOSED SHRUBS & PERENNIALS

PLANT SCHEDULE

SYMBOL	CODE	QTY	COMMON / BOTANICAL NAME	CONT.	SIZE
TREES					
	Jm	31	MEDORA JUNIPER JUNIPERUS SCOPULORUM 'MEDORA'	CONT.	6` HT.
	Pd	22	BLACK HILLS WHITE SPRUCE PICEA GLAUCA 'DENSATA'	B&B	8` HT.
SYMBOL	CODE	QTY	COMMON / BOTANICAL NAME	CONT	SIZE
SHRUBS					
	Cb	31	BAYLEY'S RED TWIG DOGWOOD CORNUS SERICEA 'BAILEYI'	B&B	5 GAL.

NORTH

0 40' 80'

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TERRITORIAL PARK

ASHBURY DRIVE
ROGERS, MN 55374

CITY OF ROGERS

95% CONSTRUCTION DOCUMENTS

NOT FOR CONSTRUCTION

REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

APRIL 2, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ST	ST	JL

DRAWING TITLE

LANDSCAPE PLAN

DRAWING NO.

C105

PLOTTED:	COMM. NO.
----	18445

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STORM WATER POLLUTION PREVENTION PLAN NARRATIVE - PAGE 1 OF 2

PROJECT DESCRIPTION/LOCATION

TERRITORIAL PARK IS LOCATED IN THE CITY OF ROGERS IN HENNEPIN COUNTY BOUNDED ON ASHBURY DRIVE TO THE SOUTH, RACHAEL DRIVE TO THE EAST, AND HARVEST VIEW SECOND ADDITION TO THE NORTHWEST. THE PROPERTY EXTENDS BETWEEN THESE BOUNDARIES AND ANY WETLANDS LOCATED WITHIN THE PROPERTY LIMITS, LOCATED IN THE CROW RIVER WATERSHED. THE PROPOSED SITE ENCOMPASSES 11.1 ACRES.

THE PLANNED SCOPE OF THE PROJECT INCLUDES:

- THE INSTALLATION OF EROSION CONTROL MEASURES AS REQUIRED FOR THE MASS GRADING OF THE SITE FOR THE CONSTRUCTION OF TERRITORIAL PARK AND ANY RELATED ACCOUTREMENTS.
- GRADING AS REQUIRED FOR THE INSTALLATION OF THE STRUCTURES, ROADS, AND PARKING LOTS.
- INSTALLATION OF STORM SEWER.
- PLACEMENT OF CONCRETE AS REQUIRED TO ESTABLISH CURB, GUTTER, PARKING, AND PAVILION.
- CONSTRUCTION OF SHELTER, PLAY AREAS, AND BASKETBALL COURT.

RECEIVING WATERS

THESE WATERS ARE LOCATED WITHIN ONE MILE (AERIAL RADIUS) OF THE PROJECT LIMITS AND RECEIVE RUNOFF FROM THE PROJECT SITE. DUE TO THE PROXIMITY OF THE RECEIVING WATERS, THE BMPS DESCRIBED IN APPENDIX A OF THE NPDES PERMIT MAY APPLY TO ALL AREAS OF THE SITE.

WATERS WITHIN ONE MILE OF THE PROJECT LIMITS CONSIST OF UNNAMED RESIDENTIAL STORM PONDS SOME OF WHICH ARE CLASSIFIED IN THE NATIONAL WETLAND INVENTORY, WITH THE CLOSEST BEING WITHIN THE PROPERTY LIMITS. THESE WETLANDS ARE TO BE PROTECTED THROUGH ADHERENCE TO ALL POLLUTION/EROSION CONTROL MEASURES LISTED WITHIN THE STORM WATER POLLUTION PREVENTION PLAN.

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SOIL TYPES

SOIL TYPES TYPICALLY FOUND ON THIS PROJECT RANGE FROM [SOIL TYPE] TO [SOIL TYPE]. PER SOIL BORINGS TAKEN BY TERRACON DATED [XX/XX/XXXX], [GEOTECHNICAL COMPANY] REPORT IS TO BE KEPT ON SITE AS PART OF THE SWPPP AND IS TO BE MADE AVAILABLE UPON REQUEST.

LONG TERM MAINTENANCE AND OPERATION

LONG TERM MAINTENANCE AND OPERATION IS TO BE MANAGED BY OWNER.

PROJECT PERSONNEL AND TRAINING

THIS SWPPP WAS PREPARED BY PERSONNEL THAT ARE CERTIFIED IN THE DESIGN OF CONSTRUCTION SWPPP. COPIES OF THE CERTIFICATIONS ARE ON FILE WITH THE ENGINEER.

PROVIDE A CERTIFIED EROSION CONTROL SUPERVISOR IN GOOD STANDING WHO IS KNOWLEDGEABLE AND EXPERIENCED IN THE APPLICATION OF EROSION PREVENTION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES. THE EROSION CONTROL SUPERVISOR WILL WORK WITH THE PROJECT ENGINEER / SWPPP DESIGNER TO OVERSEE THE IMPLEMENTATION OF THE SWPPP AND THE INSTALLATION, INSPECTION, AND MAINTENANCE OF THE EROSION PREVENTION AND SEDIMENT CONTROL BMPS BEFORE, DURING, AND AFTER CONSTRUCTION UNTIL THE NOTICE OF TERMINATION (NOT) HAS BEEN FILED WITH THE MPCA. PROVIDE PROOF OF CERTIFICATION AT THE PRECONSTRUCTION MEETING. WORK WILL NOT BE ALLOWED TO COMMENCE UNTIL PROOF OF CERTIFICATION HAS BEEN PROVIDED TO THE PROJECT ENGINEER.

PROVIDE AT LEAST ONE CERTIFIED INSTALLER FOR EACH CONTRACTOR OR SUBCONTRACTOR THAT INSTALLS THE PRODUCTS LISTED IN MNDOT SPECIFICATION SECTION 2573.3.A.2 CERTIFIED INSTALLERS. PROVIDE PROOF OF CERTIFICATION AT THE PRECONSTRUCTION MEETING. WORK WILL NOT BE ALLOWED TO COMMENCE UNTIL PROOF OF CERTIFICATION HAS BEEN PROVIDED TO THE PROJECT ENGINEER.

CHAIN OF RESPONSIBILITY

THE OWNER AND CONTRACTOR ARE CO-PERMITTEES FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CONSTRUCTION PERMIT. THE CONTRACTOR IS RESPONSIBLE TO COMPLY WITH ALL ASPECTS OF THE NPDES CONSTRUCTION PERMIT AT ALL TIMES UNTIL THE NOTICE OF TERMINATION (NOT) HAS BEEN FILED WITH THE MPCA THE CONTRACTOR WILL DEVELOP A CHAIN OF COMMAND WITH ALL OPERATORS ON THE SITE TO ENSURE THAT THE SWPPP WILL BE IMPLEMENTED AND STAY IN EFFECT UNTIL THE CONSTRUCTION PROJECT IS COMPLETE, THE ENTIRE SITE HAS UNDERGONE FINAL STABILIZATION, AND A NOTICE OF TERMINATION (NOT) HAS BEEN SUBMITTED TO THE MPCA.

PROJECT CONTACTS

THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION OF THE SWPPP AND INSTALLATION, INSPECTION, AND MAINTENANCE OF THE EROSION PREVENTION AND SEDIMENT CONTROL BMPS BEFORE, DURING, AND AFTER CONSTRUCTION UNTIL THE NOTICE OF TERMINATION (NOT) HAS BEEN FILED.

CONTACT INFORMATION		
ORGANIZATION	CONTACT NAME	PHONE
CITY OF ROGERS	MIKE BAUER	763-428-0974
ANDERSON ENGINEERING (SWPPP DESIGN)	[SWPPP DESIGNER]*	763-412-4000
[CONTRACTOR]	[CONTRACTOR NAME]	[#]

*CERTIFIED FOR DESIGN OF CONSTRUCTION SWPPP BY UNIVERSITY OF MINNESOTA, EXPIRES X/XX/XX

MPCA DUTY OFFICER 24 HOUR EMERGENCY NOTIFICATION:
651-649-5451 OR 800-422-0798

SITE INSPECTION AND MAINTENANCE

CONTRACTOR SHALL PROVIDE NAME, CONTACT INFO, AND TRAINING DOCUMENTATION FOR THE PERSON RESPONSIBLE FOR SWPPP IMPLEMENTATION AND INSPECTION/MAINTENANCE OF BMPS.

INSPECT THE ENTIRE CONSTRUCTION SITE A MINIMUM OF ONCE EVERY SEVEN DAYS DURING ACTIVE CONSTRUCTION AND WITHIN 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 0.5 INCHES WITHIN A 24 HOUR TIME FRAME. INSPECT ALL TEMPORARY AND PERMANENT WATER QUALITY MANAGEMENT, EROSION PREVENTION AND SEDIMENT CONTROL BMPS UNTIL THE SITE HAS UNDERGONE FINAL STABILIZATION AND THE N.O.T. HAS BEEN SUBMITTED. INSPECT SURFACE WATER INCLUDING DRAINAGE DITCHES FOR SIGNS OF EROSION AND SEDIMENT DEPOSITION. INSPECT CONSTRUCTION SITE VEHICLE EXIT LOCATIONS FOR EVIDENCE OF TRACKING ONTO PAVED SURFACES. INSPECT SURROUNDING PROPERTIES FOR EVIDENCE OF OFF SITE SEDIMENT ACCUMULATION.

RECORD ALL INSPECTIONS AND MAINTENANCE ACTIVITIES IN WRITING WITHIN 24 HOURS. SUBMIT INSPECTION REPORTS IN A FORMAT THAT IS ACCEPTABLE TO THE PROJECT ENGINEER.

FOR PROJECTS THAT DISCHARGE TO PROHIBITED WATERS, CONDUCT ROUTINE SITE INSPECTIONS AT A MINIMUM OF ONCE EVERY 72 HOURS (3 DAYS).

INCLUDE THE FOLLOWING IN THE RECORDS OF EACH INSPECTION AND MAINTENANCE ACTIVITY:

A. DATE AND TIME OF INSPECTIONS
B. NAME OF PERSONS CONDUCTING INSPECTIONS
C. FINDINGS OF INSPECTIONS, INCLUDING RECOMMENDATIONS FOR CORRECTIVE ACTIONS
D. CORRECTIVE ACTION TAKEN, INCLUDING DATES, TIMES, AND PARTY COMPLETING MAINTENANCE ACTIVITIES
E. DATE AND AMOUNT OF ALL RAINFALL EVENTS GREATER THAN 0.5 INCH IN 24 HOURS
F. DOCUMENTS AND CHANGES MADE TO THE SWPPP

REPLACE, REPAIR OR SUPPLEMENT ALL NONFUNCTIONAL BMPS IN THE TIME PROVIDED BELOW:

A. REPAIR, REPLACE, OR SUPPLEMENT PERIMETER CONTROL DEVICES WHEN IT BECOMES NONFUNCTIONAL OR SEDIMENT REACHES ½ THE HEIGHT OF THE DEVICE. COMPLETE REPAIRS BY THE END OF THE NEXT BUSINESS DAY FOLLOWING DISCOVERY.
B. REPAIR OR REPLACE INLET PROTECTION DEVICES WHEN THEY BECOME NONFUNCTIONAL OR SEDIMENT REACHES ½ THE HEIGHT AND/OR DEPTH OF THE DEVICE. COMPLETE REPAIRS BY THE END OF THE NEXT BUSINESS DAY FOLLOWING DISCOVERY.
C. DRAIN AND REMOVE SEDIMENT FROM TEMPORARY AND PERMANENT SEDIMENT BASINS ONCE THE SEDIMENT HAS REACHED ½ THE STORAGE VOLUME. COMPLETE WORK WITHIN 72 HOURS OF DISCOVERY.
D. REMOVE ALL DELTAS AND SEDIMENT DEPOSITED IN SURFACE WATER INCLUDING DRAINAGE WAYS, CATCH BASINS, AND OTHER DRAINAGE SYSTEMS. RESTABILIZE ANY AREAS THAT ARE DISTURBED BY SEDIMENT REMOVAL OPERATION. SEDIMENT REMOVAL AND STABILIZATION MUST BE COMPLETED WITHIN 7 DAYS OF DISCOVERY. PREPARE AND SUBMIT A SITE MANAGEMENT PLAN FOR WORKING IN SURFACE WATERS.
E. REMOVE TRACKED SEDIMENT FROM PAVED SURFACES BOTH ON AND OFF SITE WITHIN 24 HOURS OF DISCOVERY. STREET SWEEPING MAY HAVE TO OCCUR MORE OFTEN TO MINIMIZE OFF SITE IMPACTS. LIGHTLY WET THE PAVEMENT PRIOR TO SWEEPING.
F. MAINTAIN ALL BMPS UNTIL WORK HAS BEEN COMPLETED, SITE HAS GONE UNDER FINAL STABILIZATION, AND THE NOTICE OF TERMINATION (NOT) HAS BEEN SUBMITTED TO THE MPCA.

AREA SUMMARY

ACREAGE SUMMARY	
AREA	ACRES
PROPERTY	11.1
DISTURBED	[#]
IMP. PRE-CONSTRUCTION	0.04
IMP. POST-CONSTRUCTION	0.68
NEW IMP.	0.64
PERVIOUS AT COMPLETION	10.46

SPECIAL SITE NOTES

IF SITE REQUIRES PERMANENT STORMWATER MANAGEMENT, HYDROLOGIC AND WATER QUALITY MODELING DATA IS AVAILABLE UPON REQUEST.

THE SWPPP COORDINATOR MUST BE AVAILABLE FOR AN ONSITE INSPECTION WITHIN 72 HOURS UPON REQUEST BY THE MPCA AND SHALL BE RESPONSIBLE FOR THE FOLLOWING:

- SUBMIT THE NPDES PERMIT APPLICATION AND COMPLY WITH ALL REQUIREMENTS.
- IMPLEMENT THE SWPPP.
- OVERSEE INSTALLATION AND MAINTENANCE PRACTICES AND REPAIRS IDENTIFIED IN THE SWPPP.
- IMPLEMENT AND OVERSEE EMPLOYEE TRAINING AND RECORD IN OR WITH THE SWPPP.
- CONDUCT OR PROVIDE FOR INSPECTION AND MONITORING ACTIVITIES AND MAINTAIN LOGS AS PERMIT REQUIRES.
- IDENTIFY OTHER POTENTIAL POLLUTANT SOURCES NOT LISTED IN THE SWPPP AND ADD THEM.
- IDENTIFY ANY DEFICIENCIES IN THE SWPPP AND CORRECT THEM.
- ENSURE THAT CHANGES TO CONSTRUCTION PLANS ARE ADDRESSED IN THE SWPPP.
- FILE THE NOTICE OF TERMINATION UPON PROJECT COMPLETION.

AFTER THE NOTICE OF TERMINATION HAS BEEN FILED, THE OWNER SHALL BE RESPONSIBLE FOR ASSIGNING RESPONSIBILITY FOR PERMANENT MAINTENANCE MEASURES.

PERMITS

THE FOLLOWING PERMITS APPLY TO THIS PROJECT:

AGENCY	TYPE OF PERMIT	PERMIT # AND DATES
MINNESOTA POLLUTION CONTROL AGENCY (MPCA)	NPDES CONSTRUCTION PERMIT	
CITY OF ROGERS	GRADING PERMIT	

IF THE 10' BUFFERS ARE MAINTAINED FROM THE WETLANDS, ADDITIONAL PERMITS MAY NOT BE REQUIRED.

LOCATION OF SWPPP REQUIREMENTS

THE REQUIRED SWPPP ELEMENTS MAY BE LOCATED IN MANY PLACES WITHIN THE PLAN SET.

SWPPP AMENDMENTS

A QUALIFIED INDIVIDUAL MUST COMPLETE ALL SWPPP CHANGES. CHANGES INVOLVING THE USE OF A LESS STRINGENT BMP MUST INCLUDE A JUSTIFICATION DESCRIBING HOW THE REPLACEMENT BMP IS EFFECTIVE FOR THE SITE CHARACTERISTICS.

PERMITTEES MUST AMEND THE SWPPP TO INCLUDE ADDITIONAL OR MODIFIED BMPS AS NECESSARY TO CORRECT PROBLEMS IDENTIFIED OR ADDRESS SITUATIONS WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION OPERATION, MAINTENANCE, WEATHER, OR SEASONAL CONDITIONS HAVING A SIGNIFICANT EFFECT ON THE DISCHARGE OF POLLUTANTS TO SURFACE WATERS OR GROUNDWATER.

PERMITTEES MUST AMEND THE SWPPP TO INCLUDE ADDITIONAL OR MODIFIED BMPS AS NECESSARY TO CORRECT PROBLEMS IDENTIFIED OR ADDRESS SITUATIONS WHENEVER INSPECTIONS OR INVESTIGATIONS BY THE SITE OWNER OR OPERATOR, USEPA OR MPCA OFFICIALS INDICATE THE SWPPP IS NOT EFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING THE DISCHARGE OF POLLUTANTS TO SURFACE WATERS OR GROUNDWATER OR THE DISCHARGES ARE CAUSING WATER QUALITY STANDARD EXCEEDANCES OR THE SWPPP IS NOT CONSISTENT WITH THE OBJECTIVES OF A USEPA APPROVED TMDL.

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CITY OF ROGERS

95% CONSTRUCTION DOCUMENTS

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REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

APRIL 2, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ST	ST	JL

DRAWING TITLE

SWPPP

DRAWING NO.

C106

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STORM WATER POLLUTION PREVENTION PLAN NARRATIVE - PAGE 2 OR 2

STABILIZATION TIME FRAMES

ALL AREAS DISTURBED BY CONSTRUCTION WILL RECEIVE SEED OR SOD ACCORDING TO THE PLANS AND SPECIFICATIONS AND WITHIN THE SPECIFIED VEGETATIVE TIME SCHEDULE. FINAL STABILIZATION WILL OCCUR WHEN THE SITE HAS A UNIFORM VEGETATIVE COVER WITH A DENSITY OF 70% OVER THE ENTIRE DISTURBED AREA COMPARED TO EXISTING CONDITIONS. ALL TEMPORARY SYNTHETIC EROSION PREVENTION AND SEDIMENT CONTROL BMPS MUST BE REMOVED AS PART OF THE SITE FINAL STABILIZATION. ALL SEDIMENT MUST BE CLEANED OUT OF CONVEYANCES AND TEMPORARY SEDIMENTATION BASINS IF APPLICABLE.

AREA	TIME FRAME	NOTES
LAST 200 LINEAL FEET OF DRAINAGE DITCH OR SWALE	WITHIN 24 HOURS OF CONNECTION TO SURFACE WATER OR PROPERTY EDGE	1, 2, 3
REMAINING PORTIONS OF DRAINAGE DITCH OR SWALE	7 DAYS	1, 3
PIPE AND CULVERT OUTLETS	24 HOURS	
STOCKPILES	7 DAYS	1

1. INITIATE INLET STABILIZATION IMMEDIATELY WHEN CONSTRUCTION HAS TEMPORARILY OR PERMANENTLY CEASED ON ANY PORTION OF THE SITE. COMPLETE STABILIZATION WITHIN THE TIME FRAME LISTED. IN MANY INSTANCES THIS WILL REQUIRE STABILIZATION TO OCCUR MORE THAN ONCE DURING THE COURSE OF THE PROJECT. TEMPORARY SOIL STOCKPILES WITHOUT SIGNIFICANT CLAY OR SILT AND STOCKPILED AND CONSTRUCTED ROAD BASE ARE NOT APPROPRIATE AND THEREFORE EXEMPT FROM THE STABILIZATION REQUIREMENT.

2. APPLICATION OF MULCH, HYDROMULCH, TACKIFIER AND POLYACRYLAMIDE ARE NOT ACCEPTABLE STABILIZATION METHODS IN THESE AREAS.

3. STABILIZE ALL AREAS OF THE SITE PRIOR TO THE ONSET OF WINTER, ANY WORK STILL BEING PERFORMED WILL BE SNOW MULCHED, SEEDED, AND BLANKETED WITHIN THE TIME FRAMES IN THE NPDES PERMIT.

4. TOPSOIL BERMS MUST BE STABILIZED IN ORDER TO BE CONSIDERED PERIMETER CONTROL BMPS. USE RAPID STABILIZATION METHOD 2, 3, OR 4 AS DIRECTED BY THE ENGINEER. THE SEED MIX USED IN THE RAPID STABILIZATION MAY BE SUBSTITUTED AS FOLLOWS:

   A. SINGLE YEAR CONSTRUCTION BETWEEN MAY 1 & AUG. 1 — SEED WITH OATS (O)
   B. SINGLE YEAR CONSTRUCTION BETWEEN AUG. 1 & OCT. 31 — SEED WITH WINTER WHEAT (WW)
   C. MULTI YEAR CONSTRUCTION — SEED WITH TWO-YEAR COVER CROP (TCC)

5. KEEP DITCHES AND EXPOSED SOILS IN AN EVEN ROUGH GRADED CONDITION IN ORDER TO BE ABLE TO APPLY EROSION CONTROL MULCHES, HYDROMULCHES AND BLANKETS.

GENERAL SWPPP NOTES FOR CONSTRUCTION ACTIVITY

1. CONTRACTOR SHALL AMEND THE SWPPP AND DOCUMENT ANY AND ALL CHANGES TO THE SWPPP AND ASSOCIATED PLAN SHEETS WITHIN 7 DAYS UPON IMPLEMENTATION. STORE THE SWPPP AND ALL AMENDMENTS ON SITE AT ALL TIMES.
2. PREPARE AND SUBMIT A SITE MANAGEMENT PLAN FOR THE ENGINEER'S ACCEPTANCE FOR CONCRETE MANAGEMENT, CONCRETE SLURRY APPLICATION AREAS, WORK IN AND NEAR AREAS OF ENVIRONMENTAL SENSITIVITY, AREAS IDENTIFIED IN THE PLANS AS "SITE MANAGEMENT PLAN AREA", ANY WORK THAT WILL REQUIRE DEWATERING, AND AS REQUESTED BY THE ENGINEER. SUBMIT ALL SITE MANAGEMENT PLANS TO THE ENGINEER IN WRITING. ALLOW A MINIMUM OF 7 DAYS FOR THE ENGINEER TO REVIEW AND ACCEPT SITE MANAGEMENT PLAN SUBMITTALS. WORK WILL NOT BE ALLOWED TO COMMENCE IF A SITE MANAGEMENT PLAN IS REQUIRED UNTIL ACCEPTANCE HAS BEEN GRANTED BY THE ENGINEER. THERE WILL BE NO EXTRA TIME ADDED TO THE CONTRACT DUE TO THE UNTIMELY SUBMITTAL.
3. IT IS THE DESIGNER'S INTENT THAT THE CONTRACTOR BUILD PONDS AND INSTALL EROSION CONTROL BMPS BEFORE PUTTING THEM INTO ACTIVE SERVICE TO THE MAXIMUM EXTENT PRACTICABLE.
4. BURNING OF ANY MATERIAL IS NOT ALLOWED WITHIN PROJECT BOUNDARY.
5. DO NOT DISTURB AREAS OUTSIDE OF THE CONSTRUCTION LIMITS. DELINEATE AREAS NOT TO BE DISTURBED PRIOR TO STARTING GROUND DISTURBING ACTIVITIES. IF IT BECOMES NECESSARY TO DISTURB AREAS OUTSIDE OF THE CONSTRUCTION LIMITS, OBTAIN WRITTEN PERMISSION FROM THE PROJECT ENGINEER PRIOR TO PROCEEDING. PRESERVE ALL NATURAL BUFFERS SHOWN ON THE PLANS.
6. ROUTE STORMWATER AROUND UNSTABILIZED AREAS OF THE SITE WHENEVER FEASIBLE. PROVIDE EROSION CONTROL AND VELOCITY DISSIPATION DEVICES AS NEEDED TO KEEP CHANNELS FROM ERODING AND TO PREVENT NUISANCE CONDITIONS AT THE OUTLET.
7. DIRECT DISCHARGES FROM BMPS TO VEGETATED AREA WHENEVER FEASIBLE. PROVIDE VELOCITY DISSIPATION DEVICES AS NEEDED TO PREVENT EROSION.
8. THE EROSION PREVENTION AND SEDIMENT CONTROL BMPS SHALL BE PLACED AS NECESSARY TO MINIMIZE EROSION FROM DISTURBED SURFACES AND TO CAPTURE SEDIMENT ON SITE. ALL EROSION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO COMMENCEMENT OF ANY REMOVAL WORK AND/OR GROUND DISTURBING ACTIVITIES COMMENCE.
9. ESTABLISH SEDIMENT CONTROL DEVICES ON ALL DOWN GRADIENT PERIMETERS AND UP GRADIENT OF ANY BUFFER ZONES BEFORE UP GRADIENT LAND DISTURBING ACTIVITIES BEGIN. MAINTAIN SEDIMENT CONTROL DEVICES UNTIL CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
10. LOCATE PERIMETER CONTROL ON THE CONTOUR TO CAPTURE OVERLAND, LOW-VELOCITY SHEET FLOWS DOWN GRADIENT OF ALL EXPOSED SOILS AND PRIOR TO DISCHARGING TO SURFACE WATERS. PLACE J-HOOKS AT A MAXIMUM OF 100 FOOT INTERVALS.
11. PROVIDE PERIMETER CONTROL AROUND ALL STOCKPILES. PLACE BMP A MINIMUM 5 FEET FROM THE TOE OF SLOPE WHERE FEASIBLE. DO NOT PLACE STOCKPILES IN NATURAL BUFFER AREAS, SURFACE WATERS OR STORMWATER CONVEYANCES.
12. FLOATING SILT CURTAIN IS ALLOWED AS PERIMETER CONTROL FOR IN WATER WORK ONLY. INSTALL THE FLOATING SILT CURTAIN AS CLOSE TO SHORE AS POSSIBLE. PLACE PERIMETER CONTROL BMP ON LAND IMMEDIATELY AFTER THE IN WATER WORK IS COMPLETED.
13. DITCH CHECKS WILL BE PLACED AS INDICATED ON THE PLANS DURING ALL PHASES OF CONSTRUCTION.
14. PLACE CONSTRUCTION EXITS, AS NECESSARY, TO PREVENT TRACKING OF SEDIMENT ONTO PAVED SURFACES BOTH ON AND OFF THE PROJECT SITE. PROVIDE CONSTRUCTION EXITS OF SUFFICIENT SIZE TO PREVENT TRACK OUT. MAINTAIN CONSTRUCTION EXITS WHEN EVIDENCE OF TRACKING IS DISCOVERED. REGULAR STREET SWEEPING IS NOT AN ACCEPTABLE ALTERNATIVE TO PROPER CONSTRUCTION EXIT INSTALLATION AND MAINTENANCE. CONSTRUCTION EXITS ARE INCIDENTAL.
15. DISCHARGE TURBID OR SEDIMENT LADEN WATER TO TEMPORARY SEDIMENT BASINS WHENEVER FEASIBLE. IN THE EVENT THAT IT IS NOT FEASIBLE TO DISCHARGE THE SEDIMENT LADEN WATER TO A TEMPORARY SEDIMENT BASIN, THE WATER MUST BE TREATED SO THAT IT DOES NOT CAUSE A NUISANCE CONDITION IN THE RECEIVING WATERS OR TO DOWNSTREAM LANDOWNERS. CLEAN OUT ALL PERMANENT STORMWATER BASINS REGARDLESS OF WHETHER USED AS TEMPORARY SEDIMENT BASINS OR TEMPORARY SEDIMENT TRAPS TO THE DESIGN CAPACITY AFTER ALL UP GRADIENT LAND DISTURBING ACTIVITY IS COMPLETED.
16. PROVIDE SCOUR PROTECTION AT ANY OUTFALL OF DEWATERING ACTIVITIES.
17. PROVIDE STABILIZATION IN ANY TRENCHES CUT FOR DEWATERING OR SITE DRAINING PURPOSES.

POLLUTION PREVENTION

1. PROVIDE A SPILL KIT AT EACH WORK LOCATION ON THE SITE.
2. STORE ALL BUILDING MATERIALS THAT HAVE THE POTENTIAL TO LEACH POLLUTANTS, PESTICIDES, HERBICIDES, INSECTICIDES, FERTILIZERS, TREATMENT CHEMICALS, AND LANDSCAPE MATERIALS UNDER COVER WITH SECONDARY CONTAINMENT.
3. PROVIDE A SECURE STORAGE AREA WITH RESTRICTED ACCESS FOR ALL HAZARDOUS MATERIALS AND TOXIC WASTE. RETURN ALL HAZARDOUS MATERIALS AND TOXIC WASTE TO THE DESIGNATED STORAGE AREA AT THE END OF THE BUSINESS DAY UNLESS INFEASIBLE. STORE ALL HAZARDOUS MATERIALS AND TOXIC WASTE (INCLUDING BUT NOT LIMITED TO OIL, DIESEL FUEL, GASOLINE, HYDRAULIC FLUIDS, PAINT, PETROLEUM BASED PRODUCTS, WOOD PRESERVATIVES, ADDITIVES, CURING COMPOUNDS, AND ACIDS) IN SEALED CONTAINERS WITH SECONDARY CONTAINMENT. CLEAN UP SPILLS IMMEDIATELY.
4. STORE, COLLECT AND DISPOSE OF ALL SOLID WASTE.
5. POSITION ALL PORTABLE TOILETS SO THAT THEY ARE SECURE AND CANNOT BE TIPPED OR KNOCKED OVER. PROPERLY DISPOSE OF ALL SANITARY WASTE.
6. FUEL AND MAINTAIN VEHICLES IN A DESIGNATED CONTAINED AREA WHENEVER FEASIBLE. USE DRIP PANS OR ABSORBENT MATERIALS TO PREVENT SPILLS OR LEAKED CHEMICALS FROM DISCHARGING TO SURFACE WATER OR STORMWATER CONVEYANCES. PROVIDE A SPILL KIT AT EACH LOCATION THAT VEHICLES AND EQUIPMENT ARE FUELED OR MAINTAINED AT.
7. LIMIT VEHICLE AND EQUIPMENT WASHING TO A DEFINED AREA OF THE SITE. CONTAIN RUNOFF FROM THE WASHING AREA TO A TEMPORARY SEDIMENT BASIN OR OTHER EFFECTIVE CONTROL. PROPERLY DISPOSE OF ALL WASTE GENERATED BY VEHICLE AND EQUIPMENT WASHING. ENGINE DEGREASING IS NOT ALLOWED ON THE SITE.
8. PROVIDE EFFECTIVE CONTAINMENT FOR ALL LIQUID AND SOLID WASTES GENERATED BY WASHOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS. LIQUID AND SOLID WASHOUT WASTES MUST NOT CONTACT THE GROUND. DESIGN THE CONTAINMENT SO THAT IT DOES NOT RESULT IN RUNOFF FROM THE WASHOUT OPERATIONS OR CONTAINMENT AREA.
9. CREATE AND FOLLOW A WRITTEN DISPOSAL PLAN FOR ALL WASTE MATERIALS. INCLUDE IN THE PLAN HOW THE MATERIAL WILL BE DISPOSED OF AND THE LOCATION OF THE DISPOSAL SITE. SUBMIT PLAN TO THE ENGINEER.
10. USE METHODS AND OPERATIONAL PROCEDURES THAT PREVENT DISCHARGE OR PLACEMENT OF BITUMINOUS GRINDINGS, CUTTING, MILLINGS, AND OTHER BITUMINOUS WASTES FROM AREAS OF EXISTING OR FUTURE VEGETATED SOILS AND FROM ALL WATER CONVEYANCE SYSTEMS, INCLUDING INLETS, DITCHES AND CURB FLOW LINES.
11. USE METHODS AND OPERATIONAL PROCEDURES THAT PREVENT CONCRETE DUST, PARTICLES, CONCRETE WASH OUT, AND OTHER CONCRETE WASTES FROM LEAVING SITE, DEPOSITING IN EXISTING OR FUTURE VEGETATED AREAS, AND FROM ENTERING STORMWATER CONVEYANCE SYSTEMS, INCLUDING INLETS, DITCHES AND CURB FLOW LINES. USE METHODS AND OPERATIONAL PROCEDURES THAT PREVENT SAW CUT SLURRY AND PLANING WASTE FROM LEAVING SITE AND FROM ENTERING STORMWATER CONVEYANCE SYSTEMS INCLUDING DITCHES AND CULVERTS.

RECORD RETENTION

THE SWPPP, ALL CHANGES TO IT AND INSPECTION AND MAINTENANCE RECORDS MUST BE KEPT ON-SITE DURING CONSTRUCTION. THE OWNER MUST RETAIN A COPY OF THE SWPPP ALONG WITH THE FOLLOWING RECORDS FOR THREE (3) YEARS AFTER SUBMITTAL OF THE NOTICE OF TERMINATION (NOT):

1. ANY OTHER PERMITS REQUIRED FOR THE PROJECT.
2. RECORDS OF ALL INSPECTION AND MAINTENANCE CONDUCTED DURING CONSTRUCTION
3. ALL PERMANENT OPERATIONS AND MAINTENANCE AGREEMENTS THAT HAVE BEEN IMPLEMENTED INCLUDING ALL RIGHT OF WAY, CONTRACTS, COVENANTS AND OTHER BINDING REQUIREMENTS REGARDING PERPETUAL MAINTENANCE; AND
4. ALL REQUIRED CALCULATIONS FOR DESIGN OF THE TEMPORARY AND PERMANENT STORMWATER MANAGEMENT SYSTEMS.

SWPPP SCHEDULE OF INSTALLATION & MAINTENANCE

ITEM	INSTALLATION	INSPECTION & MAINTENANCE	REMOVAL
SILT FENCE	PRIOR TO COMMENCEMENT OF EARTHWORK OPERATIONS.	INSPECT & MAINT. AFTER EACH RUN-OFF EVENT. REMOVE SEDIMENTS AS REQUIRED.	AFTER TRIBUTARY DRAINAGE AREA IS RESTORED.
ROCK CONST. ENTRANCE	PRIOR TO COMMENCEMENT OF EARTHWORK OPERATIONS.	INSPECT REGULARLY. MAINTAIN AS NEEDED.	PRIOR TO PAVING.
OUTLET SKIMMER STRUCTURE	AFTER POND GRADING IS COMPLETED.	INSPECT REGULARLY. MAINTAIN AS NEEDED.	PERMANENT.
RIP-RAP & FILTER	UPON COMPLETION OF POND GRADING, CONC. SWALE CONST. AND OUTLET INSTALLATION.	INSPECT & MAINTAIN AT LEAST ANNUALLY AND AFTER HEAVY RAINFALL EVENT.	PERMANENT.
DETENTION POND	DURING EARTHWORK OPERATIONS.	AFTER HEAVY RAINFALL EVENTS. REMOVE SEDIMENTS AS NEEDED.	PERMANENT.
SEED & MULCH	AFTER POND GRADING IS COMPLETED.	INSPECT & MAINTAIN AFTER HEAVY RAINS. REPLACE WASH-OUT AREAS IMMEDIATELY	NO REMOVAL NECESSARY.
INLET PROTECTION	UPON INLET CONSTRUCTING	WHEN 1/3 CAPACITY OF BMP IS REACHED	AFTER TRIBUTARY AREAS ARE FULLY RESTORED

SITE CONSTRAINTS

DELINEATED WETLANDS EXIST ON SITE (PROVIDED BY OWNER). NO REPORT WAS PROVIDED TO THE AE. IT IS ASSUMED THAT THE EXISTING WETLANDS ARE NOT HIGH VALUE, AND A 10' BUFFER IS PROVIDED.

ESTIMATED BMPS QUANTITIES

BMP	ORIGINAL ESTIMATE	MODIFICATION	DATE
ENERGY DISSIPATER			
TEMP. DIVERSION DIKES			
CHECK DAMS			
TEMP SEEDING			
PERMANENT SEEDING			
PERMANENT SODDING			
MULCHES (SPECIFY TYPES)			
CAT 3 EROSION CONTROL BLANKET			
SOIL TACKIFIERS			
SILT FENCING			
EROSION CONTROL MATS			
STORM DRAIN INLET PROTECTION			
TEMPORARY OR PERMANENT SEDIMENTATION BASINS			
CONSTRUCTION ENTRANCE			
DEWATERING (TREATMENT LOCATION, SCHEMATIC, & SAMPLING PLAN REQUIRED			
CONCRETE TRUCK WASHOUT			

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TERRITORIAL PARK

ASHBURY DRIVE
ROGERS, MN 55374

CITY OF ROGERS

95% CONSTRUCTION DOCUMENTS

NOT FOR CONSTRUCTION

REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

APRIL 2, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ST	ST	JL

DRAWING TITLE

SWPPP

DRAWING NO.

C107

PLOTTED:	COMM. NO.
---	18445

Apr 02, 2025 - 4:58pm stuby
Xref Filename: \\18445__TerritorialPark__TitleBlock\
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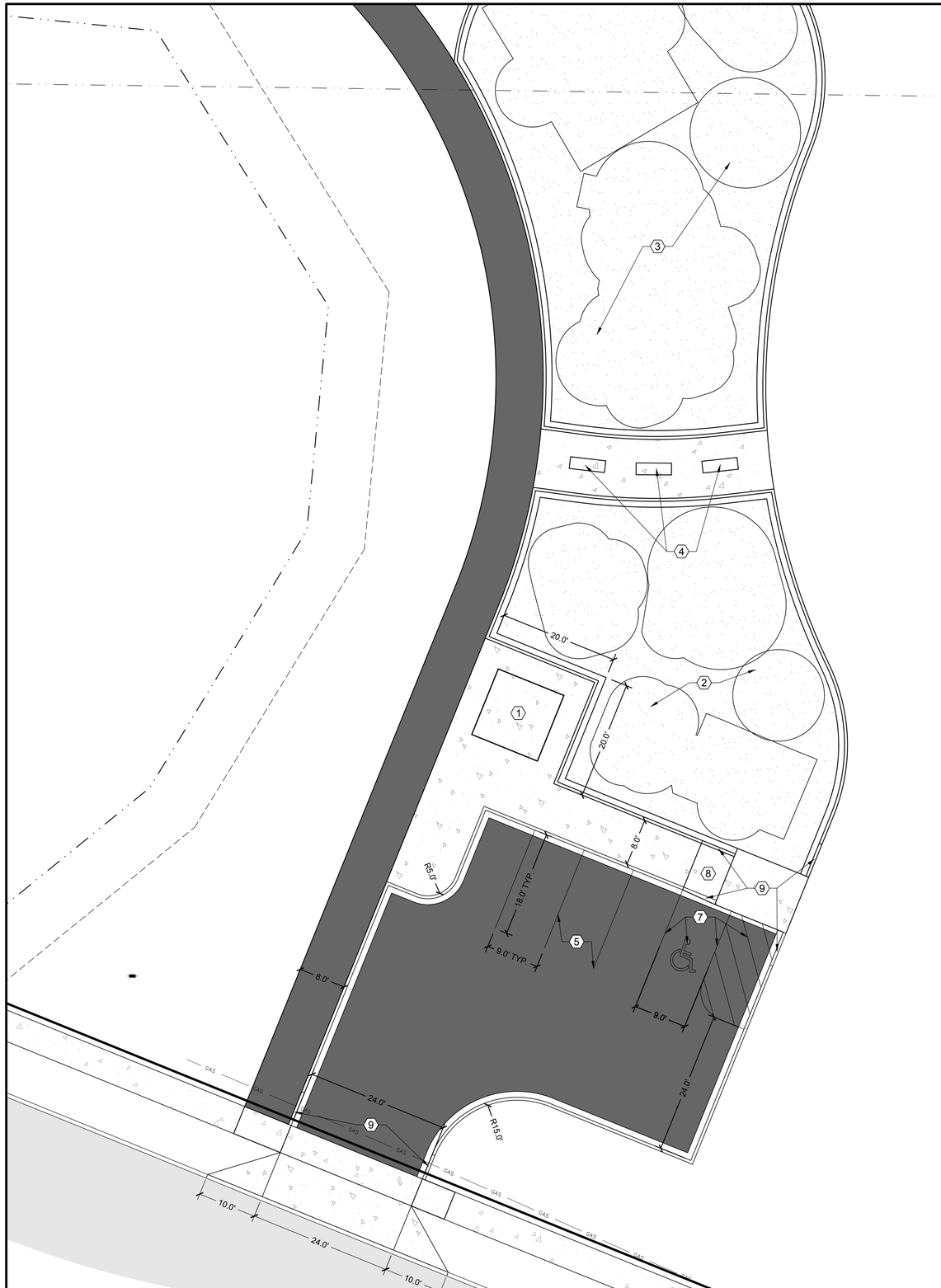
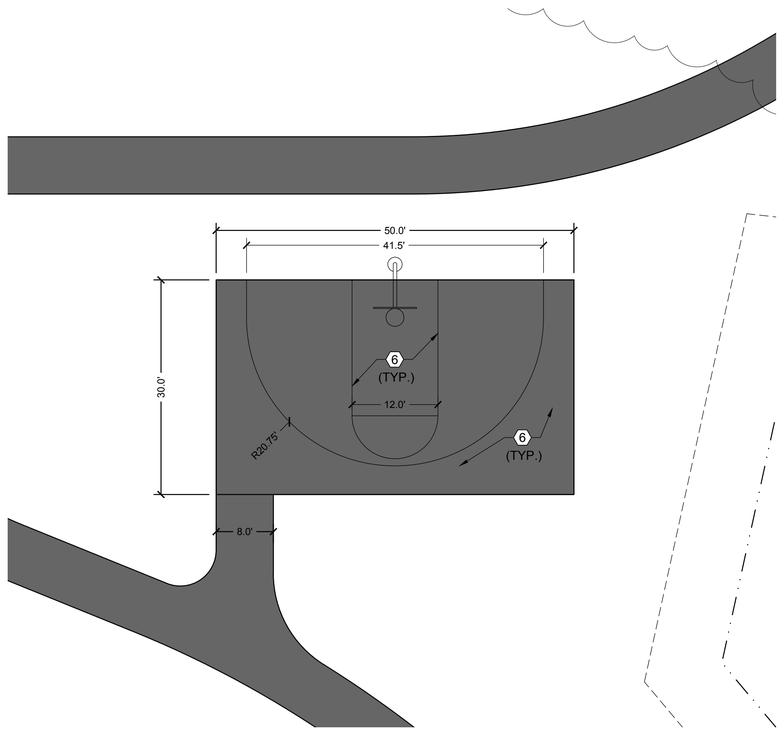


1 PLAYGROUND ENLARGEMENT
SCALE: 1" = 10'

0 10' 20'
NORTH



2 BASKETBALL COURT ENLARGEMENT
SCALE: 1" = 10'

0 10' 20'
NORTH

LEGEND

- PROPERTY LIMITS
- CONSTRUCTION LIMITS
- ADJACENT PROPERTY
- DELINEATED WETLAND (BY OWNER)
- WETLAND BUFFER
- PROPOSED CONCRETE C&G
- PROPOSED BITUMINOUS PAVEMENT
- PROPOSED CONCRETE PAVEMENT
- NO PARKING ZONE
- HANDICAP STALL DESIGNATION

KEYNOTES:

1. 16' X 16' PICNIC SHELTER
2. AGES 2 TO 5 PLAYGROUND
3. AGES 5 TO 12 PLAYGROUND
4. BENCH
5. 4" WHITE STRIPING
6. 2" WHITE STRIPING
7. 4" BLUE STRIPING
8. PEDESTRIAN RAMP
9. NOSE DOWN CURB

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DRAWING TITLE

DETAILS

DRAWING NO.

C108

PLOTTED:	COMM. NO.
----	18445

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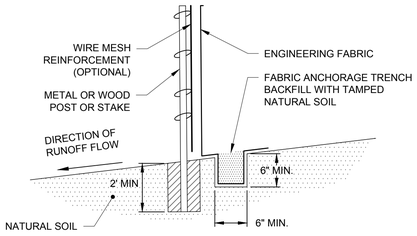
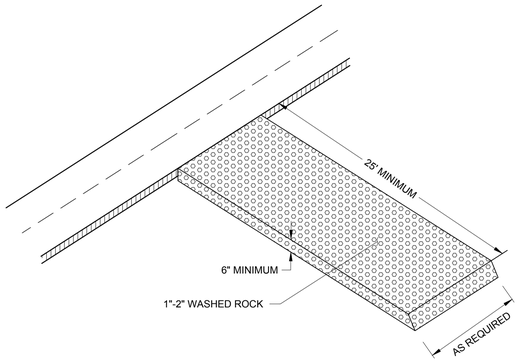


NOTE: DEPENDING UPON CONFIGURATION, ATTACH FABRIC TO WIRE MESH WITH HOG RINGS, STEEL POSTS WITH TIE WIRES, OR WOOD POSTS WITH STAPLES.

TYPICAL INSTALLATION

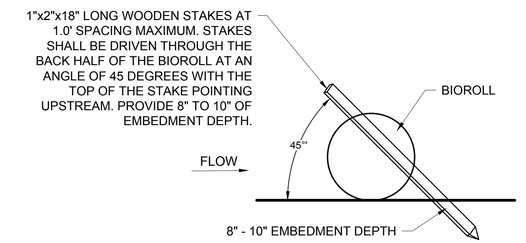
1 SILT FENCE

SCALE: NTS



2 ROCK CONSTRUCTION ENTRANCE

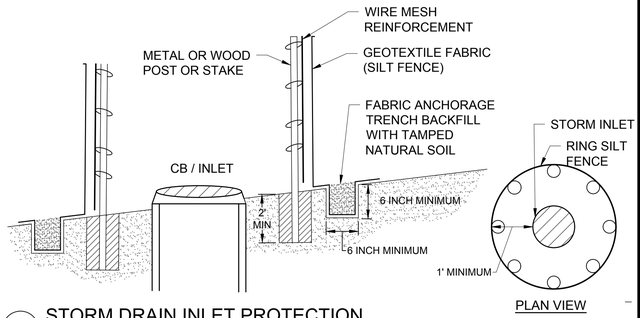
SCALE: NTS



3 BIOROLL INSTALLATION

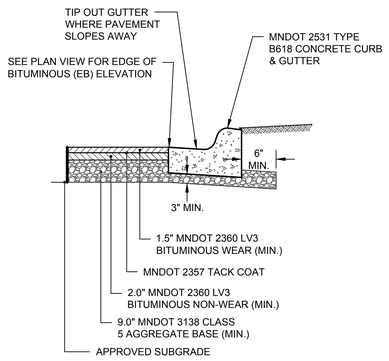
SCALE: NTS

NOTE: DEPENDING UPON CONFIGURATION, ATTACH FABRIC TO WIRE MESH WITH HOG RINGS, STEEL POSTS WITH TIE WIRES, OR WOOD POSTS WITH STAPLES.



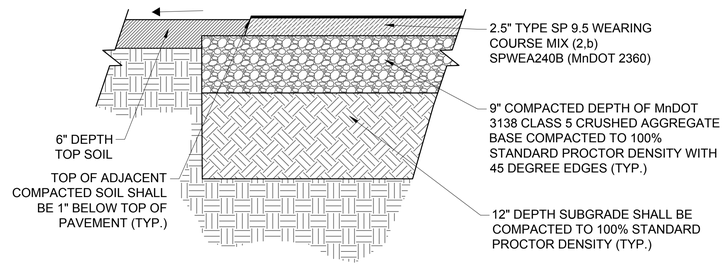
4 STORM DRAIN INLET PROTECTION

SCALE: NTS



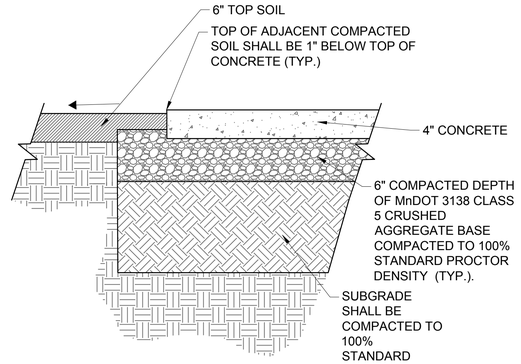
5 BITUMINOUS PAVEMENT

SCALE: NTS



6 BITUMINOUS TRAIL & BASKETBALL COURT PAVEMENT

SCALE: NTS

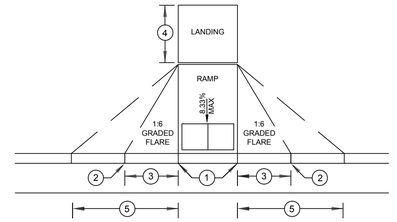


7 CONCRETE PAVEMENT

SCALE: NTS

NOTES:

1. 0' CURB HEIGHT.
2. FULL CURB HEIGHT
3. 3' FOR 6" HIGH CURB AT NON WALKABLE SURFACES ADJACENT TO RAMP
4. 4'X4' MINIMUM
5. 6' FOR 6" HIGH CURB AT WALKABLE SURFACES ADJACENT TO RAMP.



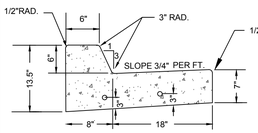
8 PEDESTRIAN RAMP

SCALE: NTS

INSTALL AT ALL TRENCHES CROSSINGS OF THE CURB, 2 #4 EPOXY COATED REINFORCING RODS 20' IN LENGTH AND SHALL BE PLACED IN THE LOWER PORTION OF THE CURB

2 # 4 EPOXY COATED REINFORCING RODS EXTENDING FROM BOTH SIDES OF CATCH BASINS NO LESS THEN 10' IN LENGTH

CONTROL JOINTS SHALL CONFORM WITH MNDOT SPEC. 2531.3C. (10' SPACING) CONTROL JOINTS SHALL EXTEND TO THE BACKS OF THE CURBS AND BE 2" DEEP.

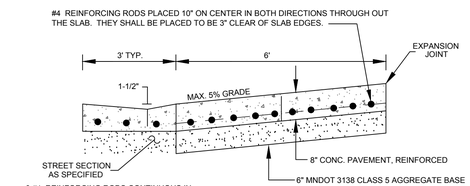


NOTE:
B618 CURB TO BE INSTALLED AT ALL INTERSECTION RADIUS, ALONG OUTLOTS, PARKS, PLAY LOTS, MAJOR ARTERIES, CATCH BASINS, AND SUSTAINED STRETCHES WITH NO DRIVEWAYS.

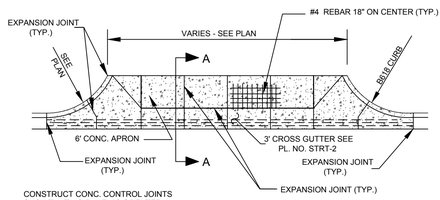
CURING COMPOUND SHALL BE APPLIED IMMEDIATELY AFTER FINISHING AND TO ALL EXPOSED SURFACES INCLUDING THE FRONT AND BACK OF THE CURBS. COVERAGE SHALL BE UNIFORM AND SHALL MATCH THE APPEARANCE OF A WHITE SHEET OF PAPER.

9 CONCRETE CURB AND GUTTER

SCALE: NTS



SECTION A-A



CONSTRUCT CONC. CONTROL JOINTS SUCH THAT NO PANEL IS GREATER THAN 100 SQ. FT.

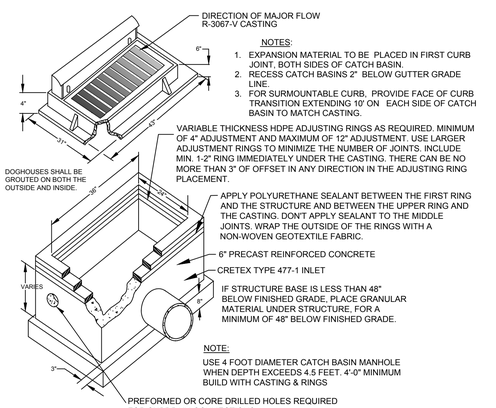
PLAN

NOTE:

1. DRIVEWAY SHALL BE CONSTRUCTED AS A MONOLITHIC POUR. CURB SHALL NOT BE RUN THROUGH THE DRIVE BUT STOPPED AT THE BEGIN AND END RADIUSES.
2. USE HIGH EARLY STRENGTH CONCRETE FOR APRONS. STAGE CONCRETE DRIVEWAY APRONS AS TO HAVE A MINIMUM OF 1 DRIVEWAY ACCESS OPEN AT ALL TIMES.

10 COMMERCIAL CONCRETE DRIVEWAY

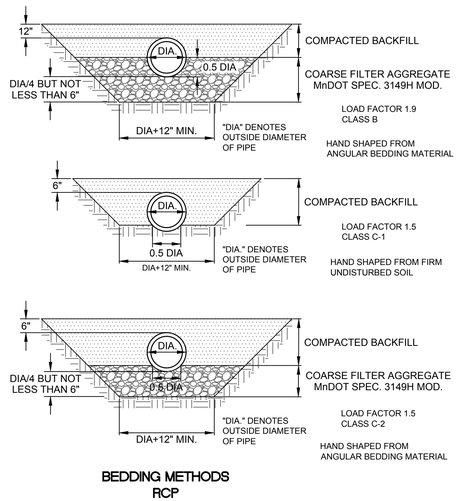
SCALE: NTS



NOTE:
USE 4 FOOT DIAMETER CATCH BASIN MANHOLE WHEN DEPTH EXCEEDS 4.5 FEET. 4'-0" MINIMUM BUILD WITH CASTING & RINGS

11 2' x 3' BOX CATCHBASIN

SCALE: NTS



BEDDING METHODS
RCP

12 RCP PIPE BEDDING

SCALE: NTS

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ASHBURY DRIVE
ROGERS, MN 55374

CITY OF ROGERS

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REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

APRIL 2, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ST	ST	JL

DRAWING TITLE

DETAILS

DRAWING NO.

C107

PLOTTED:	COMM. NO.
----	18445

Apr 02, 2025 - 4:59pm stuffy
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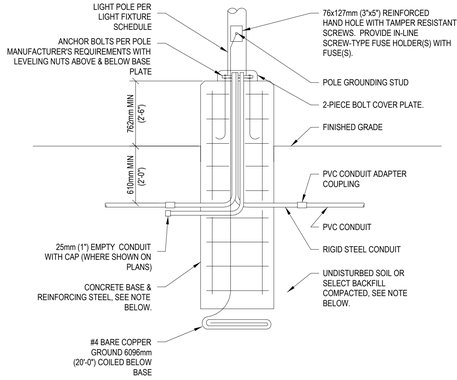


GENERAL NOTES:
1. BACKFILL, CONCRETE, REINFORCING STEEL, & ANCHOR BOLTS ARE SHOWN FOR REFERENCE ONLY. STRUCTURAL DESIGN IS SHOWN ON STRUCTURAL DRAWINGS.
2. REFER TO SPECIFICATION SECTION 26 56 00 FOR MOUNTING & LEVELING REQUIREMENTS.

1 POLE BASE DETAIL - 2'6"
1/2" = 1'-0"

LIGHTING FIXTURE SCHEDULE

TYPE	BOD MANUFACTURER	MODEL NUMBER	DESCRIPTION	LAMP/CCT/CRI	CONTROL	DELIVERED LUMENS	WATTS	VOLTS	EQUALS
SA	LITHONIA	DSX1-P3-40K-70CRI-T4M-MVOLT-RPA-PER7-HS-DDLXD	LED POLE MOUNTED LUMINAIRE, SINGLE HEAD, TYPE 4 DISTRIBUTION. PROVIDE 5 PIN RECEPTACLE WITH TWIST LOCK PHOTOCELL. HOUSE SIDE SHIELD. BLACK FINISH.	LED/70/4000K	PHOTOCELL	13,403	102	120-277	BEACON

Electrical Symbol Legend

- Pole/Area Lights
- Junction Box

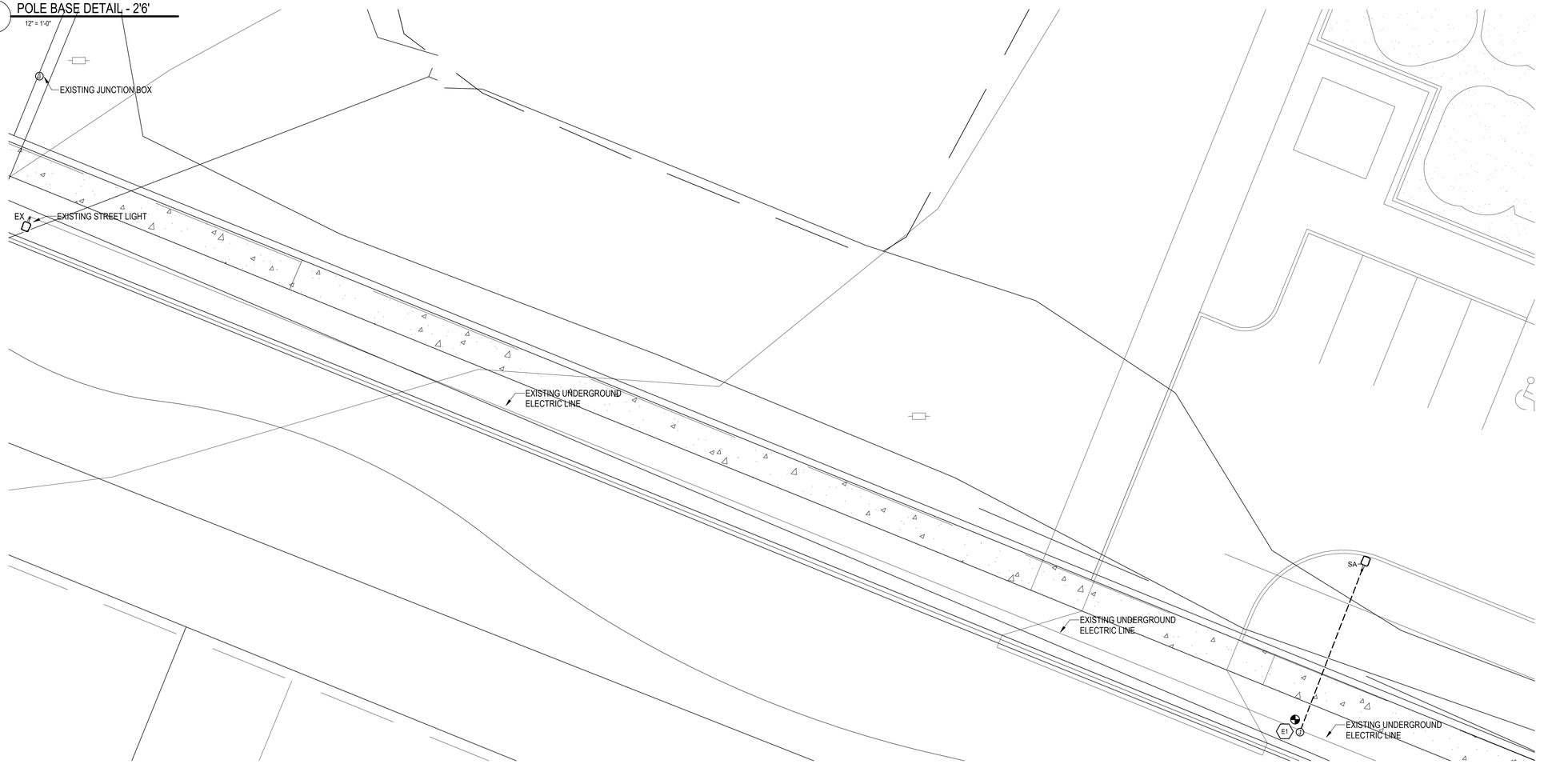
ELECTRICAL GENERAL NOTES

1. UTILITIES SHOWN ARE INDICATED SCHEMATICALLY. CONTRACTORS SHALL VERIFY ALL DEPTHS AND ALL LOCATIONS/DIMENSIONS PRIOR TO EXCAVATING. ALL UTILITIES MAY NOT BE SHOWN.
2. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION ON EXISTING AND NEW SITE CONDITIONS INCLUDING UTILITES.
3. ALL UNDERGROUND UTILITIES, PIPING, ETC. SHALL BE LOCATED EXACTLY BEFORE DIGGING.
4. ANY BACKFILL SHALL BE TAMPED AND COMPACTED TO PREVENT FUTURE SETTLING. ALL EXCESS DIRT SHALL BE CLEARED FROM THE AREA AND DISPOSED OF.
5. MECHANICAL AND ELECTRICAL CONTRACTORS SHALL REPAIR ALL DISTRUBED SURFACES SUCH AS SIDEWALKS, DRIVEWAYS, STREETS, GRASS, AND CONCRETE. REPLACED SURFACES SHALL MATCH EXISTING.
6. COORDINATE ALL EXTERIOR SITE LIGHTING FIXTURES WITH DESIGN TEAM PRIOR TO INSTALLATION.
7. CONTRACTOR IS RESPONSIBLE FOR DOING ALL WORK PER LOCAL RESPECTIVE UTILITY REQUIREMENTS.
8. VERIFY EXACT LOCATIONS OF UTILITY CONNECTIONS, PRIOR TO START OF WORK.

ELECTRICAL KEYED NOTES

E1 VERIFY LOCATION OF EXISTNG UNDERGROUND 277V ELECTRICAL LINE. DISCONNECT POWER, PROVIDE QUAZITE HAND HOLE TO SPLICE EXISTING CIRCUIT TO FEED TO LIGHT POLE.

E2



2 E101 ELECTRICAL PLAN
1/8" = 1'-0"

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CITY OF ROGERS

REVISION LOG

NO.	DATE	DESCRIPTION OF REVISIONS

MARCH 26, 2025

DESIGNED:	DRAWN:	CHECKED BY:
ATW	ATW	ATW

DRAWING TITLE

ELECTRICAL SITE PLAN

DRAWING NO.

E101

PLOTTED:	COMM. NO.

ANDERSON

Territorial Park
City of Rogers
Engineers Opinion of Costs
Schematic Design
4/8/2025

Line Item	Item Description	Unit of Measure	Quantity	Unit Price	Total
	Phase 1				
1	Mobilization	LS	1	$100,000.00	$100,000.00
2	Removals	LS	1	$75,000.00	$75,000.00
3	Erosion Control	LS	1	$40,000.00	$40,000.00
4	Bituminous Parking Lot	TON	70	$250.00	$17,500.00
5	Class 5 Aggregate Base	TON	160	$50.00	$8,000.00
6	Bituminous Sidewalk and Trails	TON	190	$250.00	$47,500.00
7	Class 5 Aggregate Base	TON	450	$50.00	$22,500.00
8	Remove, Stockpil and Respread Topsoil	Cy Yd	1000	$18.00	$18,000.00
9	Haul in Fill	Cu Yd	2000	$24.00	$48,000.00
10	Earthwork	LS	1	$75,000.00	$75,000.00
11	Concrete Curb & Gutter Parking	Ln Ft	225	$50.00	$11,250.00
12	Concrete Curb & Gutter Tot Lots	Ln Ft	500	$50.00	$25,000.00
13	Concrete Drive Apron and Parking Lot Sidewalk	Sq Yd	245	$70.00	$17,150.00
14	Class 4 Aggregate	TON	80	$50.00	$4,000.00
15	Storm Sewer	LF	40	$100.00	$4,000.00
16	Catch Basin	EA	1	$6,000.00	$6,000.00
17	Light Pole	LS	1	$15,000.00	$15,000.00
18	Sodding	Sq Yd	4880	$12.00	$58,560.00
19	Seeding	Sq Yd	8900	$1.50	$13,350.00
20	Trees	EA	22	$1,200.00	$26,400.00
21	Small Tree	EA	31	$500.00	$15,500.00
22	Shrubs	EA	31	$150.00	$4,650.00
23	Shelter / Pavilion	EA	1	$65,000.00	$65,000.00
24	Themed Play Areas: 2-5 yr. olds & 5-12 yr olds	EA	1	$425,000.00	$425,000.00
25	Picnic Tables	EA	1	$3,500.00	$3,500.00
26	Benches	EA	3	$2,500.00	$7,500.00
27	Basketball Court	LS	1	$35,000.00	$35,000.00
28	Northwest Boardwalk	LS	1	$40,000.00	$40,000.00
29	East Boardwalk	LS	1	$55,000.00	$55,000.00
				Base Bid Subtotal:	**$1,283,360.00**
	Add Alternate 1				
30	Removals	LS	1	$45,000.00	$45,000.00
31	Erosion Control	LS	1	$15,000.00	$15,000.00
32	Bituminous Trails	TON	90	$250.00	$22,500.00
33	Remove, Stockpil and Respread Topsoil	Cy Yd	100	$18.00	$1,800.00
34	Haul in Fill	Cy Yd	500	$24.00	$12,000.00
35	Class 5 Aggregate Base	TON	225	$50.00	$11,250.00
36	Earthwork	LS	1	$45,000.00	$45,000.00
37	Bench w/ Gravel Pad	EA	2	$5,000.00	$10,000.00
38	North Boardwalk	LS	1	$75,000.00	$75,000.00
				Add Alternate 1 Subtotal:	**$237,550.00**
				Subtotal	**$1,520,910.00**
				Contingency (5%)	**$76,045.50**
				Total Construction Cost	**$1,596,955.50**

Territorial Park

MIDWEST PLAYSCAPES

Territorial Park

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STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.13

Subject: Authorize Execution of Early Grading Agreement for Northview Preserve (Knapp Property, Preliminary Plat Approved).
Prepared By: Alec Henderson, City Planner

Recommended Council Action
Motion to authorize the execution of an early grading agreement for Northview Preserve contingent upon the receipt of financial guarantee and required grading permits.

Overview / Background / Analysis
Summergate Development received preliminary plat approval for the subdivision of the Knapp property for a 75-lot single-family residential development (Northview Preserve). The Council approved the preliminary plat by Resolution 2025-07 on February 11, 2025. The developer is requesting early grading authorization, which is permissable with an approved preliminary plat provided they execute an early grading agreement and provide a financial surety. Staff request City Council authorization for the city to enter into an early grading agreement for Northview Preserve.

The Final Plat application has been submitted, and the Council will see final construction plans in the near future.

Staff Recommendation
Staff recommends authorization of the agreement and allowing early grading upon receipt of financial guarantee for the grading work.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation
A. Northview Preserve Early Grading Agreement

AGREEMENT ALLOWING
EARLY DEVELOPMENT GRADING

This AGREEMENT ALLOWING EARLY DEVELOPMENT GRADING ("Agreement") is made this 22nd day of April, 2025 by and between the City of Rogers, a municipal corporation under the laws of Minnesota ("City"), and Summergate Development LLC, a Minnesota limited liability company ("Developer").

RECITALS

A. The Developer is proposing to construct a 75-unit residential housing subdivision development, called Northview Preserve, consisting of single-family homes ("Development"), located on one property (PIDs: 27-120-23-22-0004) ("Subject Property") between Territorial Road and Wood Lane.

B. The Preliminary Plat for the Development was approved by the City Council on February 11, 2025 per Resolution 2025-07 ("Preliminary Plat").

C. The Developer anticipates approval of the Final Plat for the Development and Developer shall enter one (1) or more agreements with the City governing the Development including, but not limited to, a Subdivision Agreement with each phase of the Development, which will set-forth certain requirements and obligations relating to the installation of certain public improvements, including, but not limited to, grading, streets and utilities, landscaping, trails and sidewalks.

D. Prior to entering any agreements governing the Development, the Developer has requested authorization to commence early grading ("Grading Work"), which shall include the mass grading of the development area that were a part of the preliminary plat.

In consideration of the mutual covenants and promises contained herein, the parties hereto agree and stipulate as follows:

AGREEMENT

1. **Permit.** Contemporaneous with the execution of this Agreement, Developer shall submit a grading permit application to the Public Works Department for review and approval and pay the appropriate permit fees, and Developer shall provide a copy of its National Pollutant Discharge Elimination System (NPDES) permit and watershed district approval authorizing the proposed grading activities. All grading activities shall be subject to, and completed in conformance with, the grading permit, NPDES permit, and watershed district approval. Approval is contingent upon receipt of a WCA approved wetland replacement plan.

2. **Security**. The Developer shall deposit with the City security, in the form of a cash deposit or letter of credit, ensuring that the Developer completes grading, erosion control and other related early improvements according to the applicable permits and approved plans for the Development. The security amount shall be 125% of the Engineer's Estimate (shown in Exhibit A) for the Grading Work as provided by the Developer and reviewed and approved by the City Engineer. If security is provided by Letter of Credit, said Letter shall conform to City policy and

shall be reviewed and approved by the Finance Director and City Attorney. The Letter of Credit Amount is shown in Exhibit B.

3. **Effect and Entire Agreement**. This Agreement contains the entire understanding of the parties regarding the Grading Work, but does not impact, amend or replace any Master Development Agreement, Subdivision Agreement, or any other agreement which may be entered with respect to the Development. Nothing herein constitutes an approval, or a promise or assurance of any other approval, related to the Development, including specific approval of any Final Plat thereof. No modifications to this Agreement shall be in effect unless reduced to writing and signed by the all of the parties.

4. **Miscellaneous**.

   a. The Developer shall pay all costs incurred by it, or the City, in conjunction with the grading of the Property, including but not limited to legal, planning, engineering, and inspection expenses incurred in connection with approval and acceptance of the work, review of plans and documents, and all costs and expenses incurred by the City in monitoring the grading of the Subject Property.

   b. The Developer will provide for construction inspection and material testing for the grading of the Property. The Developer shall instruct its engineer to provide full-time field inspection personnel in order for the Developer's engineer to be able to certify that the construction work meets the approved City standards as a condition of City acceptance. In addition, the City may, at the City's discretion and at the Developer's expense, have one or more City inspectors inspect the work on a full or part-time basis. The Developer, its contractors and subcontractors, shall follow all instructions received from the City's inspectors. The Developer and/or the Developer's engineer shall provide for on-site project management.

   c. The Developer shall hold harless the City and its officials, employees, and agents from claims made by themselves and third parties for damages sustained or costs incurred resulting from this grading approval. The Developer shall indemnify the City and its officials, employees, and agents for all costs, damages, or expenses which the City may pay or incur in consequence of such claims, including attorneys' fees.

   d. The Developer agrees to obtain and maintain until after completion of the work under this Agreement, public liability and property damage insurance coverage covering personal injury, including death, and claims for property damage which may arise out of the Developer’s work or the work of its contractors or subcontractors. Liability limits shall not be less than $1,500,000 for any number of claims arising out of a single occurrence. The City shall be named as an additional insured on the policy. The certificate of insurance shall provide that the City must be given the same advance written notice of the cancellation or nonrenewal of the insurance as is afforded to the Developer.

   e. The Developer shall reimburse the City for costs incurred in the enforcement of this Agreement, including reasonable engineering and attorneys' fees.

f. The Developer shall pay in full all bills submitted by the City for obligations incurred under this Agreement within 30 days after receipt. Upon request, the City will provide copies of detailed invoices of the work performed.

g. The Developer agrees to comply with all laws, ordinances, regulations, and directives of the State of Minnesota and the City applicable to the Subject Property. This Agreement shall be construed according to the laws of Minnesota.

h. In the event that any provision of this Agreement shall be held invalid, illegal, or unenforceable by any court of competent jurisdiction, such holding shall pertain only to such section and shall not invalidate or render unenforceable any other provision of this Agreement.

i. This Agreement may be executed simultaneously in any number of counterparts, each of which shall be an original and shall constitute one and the same Agreement

IN WITNESS OF THE ABOVE, the duly authorized representatives of the parties have caused this Agreement to be executed in duplicate on the date and year written above.

SUMMERGATE DEVELOPMENT, LLC

By_____
Casey Wollschlager,
Summergate Development, LLC
17505 Cedar Ave S, Lakeville, MN 55044
Ste 200
Its: Manager

CITY OF ROGERS

By_____
Shannon Klick

By_____
Stacie Brown
Its Clerk

THIS INSTRUMENT WAS DRAFTED BY:

City of Rogers
22350 South Diamond Lake Road
Rogers MN 55374
(763) 428-2253

EXHIBIT A

2/7/2025

Northern Lines CONTRACTING

11039 Lamont Ave NE
Hanover, MN 55341
Phone: 952-807-3322

COST ESTIMATE 2025

PROJECT NAME: NORTHVIEW PRESERVE
ENGINEER: WESTWOOD
OWNER: SUMMERGATE

	DESCRIPTION OF WORK	QUANTITY	UNIT	ADJ. PRICE	EXTENSION
	GRADING				
1	Clearing and Grubbing (P)	1	A.C.	$20,000.00	$20,000.00
2	Common Excavation (EV) (P)	29,846	C.Y.	$1.90	$56,707.40
3	Subgrade Excavation (EV) (P)	33,506	C.Y.	$1.90	$63,661.40
4	Subgrade Correction (EV)	19,006	C.Y.	$2.45	$46,564.70
5	Import Common Borrow for Controlled Fill (CV)	22,920	C.Y.	$4.00	$91,680.00
6	On-Site Borrow (EV)	9,503	C.Y.	$2.44	$23,187.32
7	Re-spread Topsoil (CV) (P)	4,322	C.Y.	$1.75	$7,563.50
	Subtotal Grading				**$309,364.32**
	EROSION CONTROL				
1	Rock Construction Entrance	2	EACH	$990.00	$1,980.00
2	Silt Fence (type regular)	7,947	L.F.	$1.90	$15,099.30
3	Seeding & Mulching MNDOT 25-141 (P)	3	ACRE	$895.00	$2,237.50
4	Erosion Control Blankets MnDOT 3885, Category 3, Type 2S (P)	9,065	S.Y.	$1.70	$15,410.50
5	Storm Inlet Protection in Turf Areas (silt fence, hay bales or InfraSafe®) Sediment Control Barriers as per detail)	8	EACH	$225.00	$1,800.00
6	Storm Inlet Protection in Curbs/Pavement (Complete, per detail: WIMCO or approved equal)	32	EACH	$225.00	$7,200.00
7	Boulevard restoration (4' blanket BOC)	8,922	L.F.	$0.75	$6,691.50
8	Erosion Control Supervisor	1	L.S.	$2,000.00	$2,000.00
	Subtotal Erosion Control				**$52,418.80**
	SANITARY SEWER				
1	Jack 10" Sanitary Sewer w/Casing Pipe (All Depths)	100	L.F.	$1,650.00	$165,000.00
2	Remove Plug & Connect to Existing Sanitary Sewer	1	EACH	$65,000.00	$65,000.00
3	8" DIP Class 52 Sanitary Sewer (0'-8' Depth)	100	L.F.	$91.00	$9,100.00
4	8" PVC SDR 35 Sanitary Sewer (12'-16' Depth)	2,408	L.F.	$46.00	$110,768.00
5	10" C-900 DR-18 PVC Sanitary Sewer (28'-32' Depth)	941	L.F.	$145.00	$136,445.00
6	10" C-900 DR-18 PVC Sanitary Sewer (32'-36' Depth)	811	L.F.	$145.00	$117,595.00
7	Standard 48" Diameter Manhole (0-8' Depth)	24	EACH	$4,555.00	$109,320.00
8	Outside Drop Section for Manholes (0-2')	5	EACH	$4,215.00	$21,075.00
9	Excess Drop Section Risers	98	V.F.	$109.00	$10,682.00
10	Extra Depth 48" Diameter Manhole	300	V.F.	$300.00	$90,000.00
11	4"x10" C-900 Wye - Per City Detail	18	EACH	$634.00	$11,412.00
12	4"x8" Schedule 40 PVC Wye - Per City Detail	57	EACH	$248.00	$14,136.00
13	4" C-900 DR-18 Riser Pipe	360	V.F.	$52.00	$18,720.00
14	4" PVC Schedule 40 Sanitary Sewer Service Pipe	3,000	L.F.	$25.00	$75,000.00
15	4" PVC Schedule 40 Bend	150	EACH	$24.00	$3,600.00
16	4" PVC schedule 40 Plug	75	EACH	$24.00	$1,800.00
17	Trench Stabilization Material/Aggregate (500#/L.F.)	1,090	TON	$0.01	$10.90
18	Televise Sanitary Sewer	4,360	L.F.	$2.35	$10,246.00
	Subtotal Sanitary Sewer				**$969,909.90**
	WATER MAIN				
1	8" C-900, DR-18 PVC Water Main Directional Drilled (All Depths)	100	L.F.	$163.00	$16,300.00
2	Remove Plug and Connect to Existing Water Main	2	EACH	$1,600.00	$3,200.00
3	6" DIP Class 52 Water Main (All Depths)	160	L.F.	$67.00	$10,720.00
4	8" C-900 DR-18 PVC Water Main (All Depths)	5,266	L.F.	$46.00	$242,236.00

GRADING ESTIMATE

	DESCRIPTION OF WORK	QUANTITY	UNIT	ADJ. PRICE	EXTENSION
5	Hydrant with Auxiliary Valve	14	EACH	$9,000.00	$126,000.00
6	8" Gate Valve & Box	20	EACH	$3,750.00	$75,000.00
7	Fittings (Ductile Iron)(AWWA C-153)	2,780	LB.	$14.85	$41,283.00
8	1" Corporation Stop with Saddle	75	EACH	$314.00	$23,550.00
9	1" IPS HDPE Water Service	3,000	L.F.	$20.00	$60,000.00
10	1" Curb Stop with Box	75	EACH	$405.00	$30,375.00
11	4" Thick Insulation - Allowance	200	SY	$50.00	$10,000.00
	Subtotal Water Main				**$638,664.00**
	STORM SEWER				
1	12" RC Pipe, Class V (all depths)	920	L.F.	$61.00	$56,120.00
2	15" RC Pipe, Class V (all depths)	1,841	L.F.	$67.00	$123,347.00
3	18" RC Pipe, Class V (all depths)	382	L.F.	$75.00	$28,650.00
4	21" RC Pipe, Class III (all depths)	235	L.F.	$101.00	$23,735.00
5	24" RC Pipe, Class III (all depths)	2,184	L.F.	$96.00	$209,664.00
6	27" RC Pipe, Class III (all depths)	47	L.F.	$125.00	$5,875.00
7	30" RC Pipe, Class III (all depths)	243	L.F.	$148.00	$35,964.00
8	2' x 3' Catch Basin	12	EACH	$3,050.00	$36,600.00
9	27" Shallow Depth CB	4	EACH	$2,000.00	$8,000.00
10	48" Diameter CBMH/STMH (0-8' Depth)	27	EACH	$4,450.00	$120,150.00
11	60" Diameter CBMH/STMH (0-8' Depth)	7	EACH	$7,000.00	$49,000.00
12	Outlet Control Structure (as per detail)	3	EACH	$12,000.00	$36,000.00
13	12" RC Flared End Section w/Trash guard	4	EACH	$1,825.00	$7,300.00
14	15" RC Flared End Section w/Trash guard	1	EACH	$2,020.00	$2,020.00
15	18" RC Flared End Section w/Trash guard	1	EACH	$2,180.00	$2,180.00
16	21" RC Flared End Section w/Trash guard	1	EACH	$2,730.00	$2,730.00
17	24" RC Flared End Section w/Trash guard	5	EACH	$3,200.00	$16,000.00
18	27" RC Flared End Section w/Trash guard	1	EACH	$3,675.00	$3,675.00
19	30" RC Flared End Section w/Trash guard	1	EACH	$6,000.00	$6,000.00
20	4" PE Perforated Draintile, including rock and fabric (all depths) - Street Subdrain	9,124	L.F.	$15.00	$136,860.00
21	6" PVC Non-Perforated Draintile(all depths) - Rear Yard Sump Pump Services	2,988	L.F.	$17.00	$50,796.00
22	6" PVC Perforated Draintile, including rock and fabric (all depths) - Filtration Bench	487	L.F.	$21.00	$10,227.00
23	Filtration Basin Media - MN Storm Water Manual Mix C - 87% Sand, 8% Fines, 5% MNDOT Grade 2 Compost (Compacted, In Place Volume)	983	C.Y.	$52.00	$51,116.00
24	4" Clean Out for Draintile (Inc. WYEs/bends)	47	EACH	$105.00	$4,935.00
25	6" Clean Out for Draintile (Inc. WYEs/bends)	89	EACH	$225.00	$20,025.00
26	Class 3 Rip Rap (Type Limestone)	44	C.Y.	$140.00	$6,160.00
27	Granular Filter	6	C.Y.	$30.00	$165.00
	Subtotal Storm Sewer				**$1,053,294.00**
	STREETS				
1	Subgrade Preparation (2' BOC) (P)	18,674	S.Y.	$1.10	$20,541.40
2	MNDOT Type V Geotextile Fabric (P)	18,674	S.Y.	$1.15	$21,475.10
3	18" MnDOT 3149 Select Granular Sand Subbase (P)	18,674	S.Y.	$11.60	$216,618.40
4	6" Thick, MnDOT 2211, Class 5 Agg. Base, 100% Crushed (0.5' BOC)	17,191	S.Y.	$8.00	$137,528.00
5	Utility Conduit Crossings (pipe supplied by others)	16	EACH	$315.00	$5,040.00
6	Concrete Curb & Gutter All Styles	8,922	L.F.	$20.60	$183,793.20
7	2 1/2" MnDOT SPNWB330C, Bit. Base Course (P)	14,348	S.Y.	$11.80	$169,306.40
8	Adjust Manhole Castings	28	EACH	$765.00	$21,420.00
9	Adjust Gate Valve Castings	20	EACH	$420.00	$8,400.00
10	Street Cleaning For Wear Course Installation	1	L.S.	$2,600.00	$2,600.00
11	MnDOT 2357 Tack Coat	934	GAL	$4.20	$3,921.54
12	1-1/2" MnDOT SPWEA340C, Bit. Wear Course	14,348	S.Y.	$7.80	$111,914.40
13	Bituminous Wedge	8,922	L.F.	$3.10	$27,658.20
14	5' Wide x 6" Thick MnDOT 2104, Conc. sidewalk inc. 4" Cl. 5, Agg Base	4,451	L.F.	$33.00	$146,883.00
15	Pedestrian Ramp (with Truncated Dome) Trail and Sidewalk	21	EACH	$945.00	$19,845.00
16	Furnish and Install Traffic Barricade	3	EACH	$630.00	$1,890.00
17	Traffic Control	1	L.S.	$785.00	$785.00
18	Traffic Signs	8	EACH	$368.00	$2,944.00
19	Street Name Sign (2 Blades), incl. Post & Hardware	7	EACH	$368.00	$2,576.00
	Subtotal Streets				**$1,105,139.64**
	STREETS - TURN LANES				
1	Subgrade Preparation (2.0' beyond edge of mat)	2,709	S.Y.	$2.00	$5,418.00
2	Remove Entire Depth Pavement Section	1,445	S.Y.	$3.25	$4,696.25
3	2" Mill Bituminous Surface	1,612	S.Y.	$5.15	$8,301.80
4	Saw Cut Existing Pavement - Includes Removal of Existing Fog Line Adjacent to Saw Cut	1,642	L.F.	$3.30	$5,418.60
5	15" Select Granular Compacted Sand Subgrade	2,709	S.Y.	$11.05	$29,934.45

	DESCRIPTION OF WORK	QUANTITY	UNIT	ADJ. PRICE	EXTENSION
	7" Thick MnDOT 2211, Class 5 Agg. Base, 100% Crushed - Includes Gravel				
6	Shouldering	2,521	S.Y.	$11.35	$28,613.35
7	4" Non-Wearing Course MnDOT 2360 SPNWB430C 9 (2-2" Lifts)	2,319	S.Y.	$25.20	$58,438.80
8	2" Wearing course SPWEA440C MnDOT2360 (First Lift)	2,319	S.Y.	$12.50	$28,987.50
9	2" Wearing course SPWEA440C MnDOT2360 (Second Lift)	3,931	S.Y.	$11.90	$46,778.90
10	MnDOT 2357 Tack Coat	135	GAL	$5.25	$708.75
11	Street Cleaning For Wear Course Installation	1	L.S.	$785.00	$785.00
12	Traffic Control	1	L.S.	$4,305.00	$4,305.00
13	Sign Panels, Type C, High Intensity	3	EACH	$475.00	$1,425.00
14	Remove, Salvage, and Reinstall Existing Signage	3	EACH	$315.00	$945.00
15	Remove Existing Centerline Lane Striping	2,386	L.F.	$0.85	$2,028.10
16	6" Wide Solid White Striping (Ground-In & Multi-Component) (Fog Line)	1,561	L.F.	$1.25	$1,951.25
17	4" Wide Solid White Striping (Ground-In & Multi-Component) (Lane Lines)	605	L.F.	$1.05	$635.25
18	4" Wide White Dotted Line Extensions (Ground-In & Multi-Component) (2' Stripe, 6' Gap)	180	L.F.	$1.05	$189.00
19	4" Wide Double Yellow Striping (Ground-In & Multi-Component)	3,402	L.F.	$2.10	$7,144.20
20	24" Wide Yellow Median Striping (Ground-In & Preform Thermoplastic)	161	L.F.	$24.15	$3,888.15
21	Pavement Message (Ground-In & Preform Thermoplastic)	4	EACH	$420.00	$1,680.00
	Subtotal Streets - Turn Lanes				**$242,272.35**
	SUMMARY				
	Subtotal Grading				**$309,364.32**
	Subtotal Erosion Control				**$52,418.80**
	Subtotal Sanitary Sewer				**$969,909.90**
	Subtotal Water Main				**$638,664.00**
	Subtotal Storm Sewer				**$1,053,294.00**
	Subtotal Streets				**$1,105,139.64**
	Subtotal Streets-Turn Lanes				**$242,272.35**
	TOTAL				**$4,371,063.01**

**********Standard Qualifications**********

This is a legal binding document.
This document shall be a part of any contractual agreements and it's qualifications shall take precedent over any and all project specifications, special provisions, plans or contractual agreements.
Bid is based upon preliminary plans and bid form provided at the time of the bid
Performance Bond & Cost is not included
Handling of buried /hazardous material is not included
Export of excess soils is not included
Removal / Restoration of Existing Holden way is not included - no bid items
Bituminous wedge removal is not included - no bid items
Grading for turn lane is not included - no bid items
Valve boxes, tracer wire or headwalls for drain tile not included - no bid items
Wetland buffer signs are not included - no bid item
Surveying is not included
Testing is not included
Street Lighting not included
Payment Terms - Invoices due upon receipt, 1.5 % interest on all monies not paid within 30 days of invoice date
5% Retainage is to be held
Dewatering is not included
Permits are not included
Restoration/Swppp/BMP is not included (seeding/sodding/inlet protection etc.) unless specific bid item exists
Bituminous wear course to be placed in 2026
Due to global supply issues for piping materials, ALL materials are subject to change based on the current price and availibility at the time of order
NLC reserves the right to seek additional compensation for increased fuel costs, Fuel is based on prices on the date of this bid

Respectfully submitted,
NORTHERN LINES CONTRACTING, INC.

Brady Enright — 2/7/2025

Brady Enright — *Date*
Estimator / Project Manager

EXHIBIT B
SECURITY AMOUNT

	ESTIMATE	SURETY
GRADING	$309,364.00	125%
EROSION CONTROL	$52,418.00	125%
TOTAL		**$452,277.50**

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.14

Subject: Approval of Ordinance 2025-02 Establishing City Plumbing Plan Review, Permitting, and Inspection Process
Prepared By: Brett Angell, Community Development Director

Recommended Council Action
Motion to approve Ordinance 2025-02 establishing the city's plumbing plan review and inspection process.

Overview / Background / Analysis
In the past, plumbing permits within the city were required to be submitted to the Department of Labor and Industry for both permit review, issuance, and approval. Recently, the City of Rogers hired a new Building Official who holds the required certifications and has the experience required for plumbing permits to be reviewed, issued, and inspected by the City of Rogers as compared to the State. The ability to review and issue plumbing permits in-house is a significant advantage for the City of Rogers due to the existing long review times for permits issued by the State.

Per the requirements of the state, in order for the city to implement plumbing permits and inspections being done by the city, an ordinance must be adopted covering this area of permitting. The proposed Ordinance 2025-02 amends Rogers City Code Chapter 125, Article II to include a new Section 24 related to plumbing. The proposed ordinance sets the general framework for plumbing plan review, inspections, and acceptance. The ordinance will go into effect upon publishing, although there may still be a short period of time when plumbing permits are through the state as the city's new Building Inspections Division is started.

Staff Recommendation
Staff recommends approval of Ordinance 2025-02 establishing the city's plumbing plan review and inspection process.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation
A. Ordinance 2025-02

ORDINANCE NO. 2025-02

CITY OF ROGERS
STATE OF MINNESOTA

AN ORDINANCE ESTABLISHING PLUMBING, PLANS AND SPECIFICATIONS, AND INSPECTIONS

The City of Rogers hereby ordains:

SECTION 1. Chapter 105, Article II State Building Code of the City Code is hereby amended by adding a new Section 105-24 as follows:

Sec. 105-24 Plumbing, plans and specifications, and inspections

(a) All plumbing on private property within the city must comply with the provisions of the state building code and this article.
(b) Plans and specifications. Prior to the installation of a system of plumbing other than for a single-family dwelling, complete plans and specifications, together with any additional information that the Building Official may require, must be submitted in duplicate and approved by the Building Official. Construction cannot proceed except in accordance with approved plans and specifications. Any alteration, extension, or repair of an existing system is subject to these same requirements, unless waived by the Building Official in accordance with Minn. Rules, part 1300.0215.
(c) Exceptions. Pursuant to Minn. Stat. § 326B.43, subd. 2(n), plumbing plans and specifications for the following projects must be submitted to the Minnesota Department of Labor and Industry for a full plan review:
    (1) State-licensed facilities as defined in Minn. Stat. § 36B.103, subd. 13;
    (2) Public buildings as defined in Minn. Stat. § 326B.103, subd. 11; and
    (3) Projects of a special nature for which department review is requested by either the municipality or the state.
(d) Inspections. New plumbing systems or parts of existing plumbing systems that have been altered, extended, or repaired shall be inspected, tested, and approved by the Building Official in accordance with Minn. Rules, part 1300.0215 before the plumbing system is put into use. The Building Official shall perform the final inspection and witness the test. The Building Official shall approve the plumbing system if the system complies with the requirements of this Code, any permit requirements, and the requirements of any approved plans and specification. Plumbing system tests shall comply with Minn. Rules, Chapter 4714.
(e) Covering of work. No building drainage or plumbing system or part thereof shall be covered until it has been inspected, tested, and approved as herein prescribed.

SECTION 2. EFFECTIVE DATE. This ordinance shall take effect following its passage and publication in accordance with state law.

Dated the 22nd day of April, 2025.

_____
Shannon Klick, Mayor

ATTEST:

_____
Stacie Brown, City Clerk

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.15

Subject: Approval of 2024 Year-End Closing Activity
Prepared By: Bridget Bruska, Finance Director

Recommended Council Action
Motion to authorize the 2024 transfers, budget carryovers, and closing of funds as identified in the memo as of 12/31/2024.

Overview / Background / Analysis
2024 Year-End General Fund Balance
While the finalization of the 2024 audit is still underway, the year-end 2024 General Fund budget variance is projected to be positive. A final fund balance increase of approximately $2,180,000 for 2024 is likely. This projection includes year-end activity, which is listed for approval below. Several key factors have contributed to this increase, including:

- A strong interest rate environment with positive market value adjustments,
- Higher than anticipated building permits and development, and
- Reimbursement for engineering staff time spent on private development and City projects in excess of budgeted amounts.

The General Fund - Fund Balance Policy requires the fund balance as a percentage of next year's budgeted expenditures to be a minimum of 45%. The City has historically maintained a Fund Balance percentage higher than the policy (57-67% since 2013). The projected ending Fund Balance for 2024 is estimated at 67% of next year's budgeted expenditures. The fund balance percentage has decreased in the last few years, and it is positive to see this increase, especially as expenditures continue to increase.

Many cities have a "balanced" budget, which means budgeted revenues equal budgeted expenses; there is no anticipated increase in fund balance. If expenditures continue to rise and the fund balance remains flat, fund balance as a percentage of next year's expenditures will decrease. Staff will continue to monitor this percentage. Maintaining a healthy Fund Balance is critical to the city's overall financial health and to retaining our AA+ Bond Rating.

The City Council routinely discusses the City's overall goals and finances. Additional conversation is expected.

While the information below presents largely routine accounting entries, it also provides useful current information and requires formal approval by the City Council.

Year-End Transfers
The following year-end transfers are recommended:

1. Transfer $10,000 of the unspent ADA improvement budget in the General Fund to the Pavement Management Program Fund for use in a future project.
2. Transfer $64,595 of bond proceeds from the WAC Fund to reimburse the Water Operational fund for water system-related improvements that qualify under the bond as project costs.

2024 Budget Carryovers
Upon year-end review of our budget to actual expenditures, the following City budget carryover is being requested by staff for 2024:

1. The Fire Department planned to spend $80,000 in 2024 to replace two warning sirens. Since the project wasn't finished in 2024, staff propose to carry over the budget of $80,000 to account 100-420-2500-44070-0000 so the work can be done in 2025.

2024 Close Funds
After the 2024 year-end analysis, it has been determined that the following funds can be closed:

Fund #206 American Rescue Plan – The American Rescue Plan Act (ARPA), passed in 2021, provided direct federal funding to local governments to help them recover from the economic impacts of the COVID-19 pandemic. It offered flexible support to address revenue losses, fund public health and safety efforts, support economic recovery, and invest in infrastructure such as water, sewer, and broadband. The goal was to stabilize communities, maintain essential services, and promote long-term resilience. Funds were required to be spent as of December 31, 2024, and this fund can be closed.

Staff Recommendation
Motion to authorize the 2024 transfers, budget carryovers, and closing of funds as identified in the memo as of 12/31/2024.

Financial Impact: N/A **Source Fund**: N/A

Budgeted? N/A

Supporting Documentation
None

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.16

Subject: Approve Resolution No. 2025-33, A Resolution Approving the Application to Fill Wetlands to Facilitate Northview Preserve Development
Prepared By: Mike Albers, Assistant City Engineer

Recommended Council Action
Motion to Approve Resolution No. 2025-33, A Resolution Approving the Application to Fill Wetlands to Facilitate Northview Preserve Development

Overview / Background / Analysis
The City of Rogers is the Local Government Unit (LGU) responsible for the implementation of the Minnesota Wetland Conservation Act (WCA) Rules (Chapter 8420) within the limits of the City. A wetland permit application and supporting documentation has been prepared and submitted by Westwood Professional Services on behalf of Summergate Development LLC for the Northview Preserve Development project.

The City of Rogers has determined, as the LGU, that the Joint Application form and supporting permit application submitted, meet and satisfy all WCA rules.

Staff Recommendation

Financial Impact: **Source Fund**:

Budgeted? N/A

Supporting Documentation
A. Resolution No. 2025-33

RESOLUTION NO. 2025–33

A RESOLUTION APPROVING THE APPLICATION TO IMPACT 0.13 ACRE OF WETLAND TO FACILITATE THE NORTHVIEW PRESERVE RESIDENTIAL DEVELOPMENT PROJECT

WHEREAS, That the City of Rogers is the Local Governmental Unit ("LGU") responsible for implementation of the Minnesota Wetland Conservation Act (WCA) Rules (Chapter 8420) within the limits of the City.; and

WHEREAS, That the City of Rogers, by and through its Council, sitting as the LGU, adopts the following findings regarding the Northview Preserve Wetland Replacement Plan Application:

a. That a complete Wetland Replacement Plan Application describing 0.13 acre of wetland impact provided by Westwood Professional Services (Westwood) was received January 30, 2025.

b. A meeting of the Technical Evaluation Panel (TEP) was conducted via Teams on February 24, 2025 to discuss the application. Additional information was requested by the TEP to clarify the proposed wetland impacts.

c. A supplemental addendum to the application was provided by Westwood on March 3, 2025.

d. The updated Wetland Replacement Plan Application describes wetland impacts of 0.13 acre and replacement via 0.26 acre of credits from Wetland Bank Account #1756 in Hennepin County, Major Watershed 20, Bank Service Area 7.

e. That TEP members reviewed the application and supplemental information during a TEP meeting via Teams on April 8, 2025 and unanimously agreed that the application satisfied WCA sequencing and replacement requirements and supported approval.

f. That the City of Rogers, as the LGU, has and will fully exercise its responsibilities to ensure compliance with the Minnesota WCA Rules for:
    i. Local Government Unit Duties and Procedures (MR 8420.0200)
    ii. Technical Evaluation Panel (TEP) Procedures (MR 8420.0240)
    iii. Local Government Unit Application and Decision Procedures (MR 8420.0255)

g. That the City of Rogers, as the LGU, has determined that the Replacement Plan Application submitted by Westwood on behalf of Summergate Development satisfies and will satisfy WCA rules and procedural guidelines for:
    i. General Application Requirements (MR 8420.0305)
    ii. Replacement Plan Applications (MR 8420.0330)
    iii. Wetland Replacement Purpose and Requirement (MR 8420.0500)
    iv. Sequencing (MR 8420.0520)
    v. Replacement Standards (MR 8420.0522)

WHEREAS, That the City of Rogers, by and through its City Council, sitting as the LGU for the WCA, approves the application to fill 0.13 acre of wetland to facilitate the Northview Preserve residential development project.

NOW THEREFORE BE IT RESOLVED, that the City Council of the City of Rogers, that the above referenced wetland application and replacement plan meet the standards of Minnesota WCA Rules.

Moved by Councilmember , seconded by Councilmember

The following voted in favor of said resolution:

The following voted against said resolution:

The following abstained:

Whereupon said resolution was declared duly passed and adopted, and was signed by the Mayor, and attested by the Clerk dated this 22nd day of April, 2025.

_____
Shannon Klick, Mayor

ATTEST:

_____
Stacie Brown, City Clerk

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 5.17

Subject: Approve AIA Document A133-2019, Standard Form of Agreement Between the City of Rogers and RJM Construction as Construction Manager and Constructor
Prepared By: Doran Cote, Public Works Director/City Engineer

Recommended Council Action
Motion to Approve AIA Document A133-2019, Standard Form of Agreement Between the City of Rogers and RJM Construction as Construction Manager and Constructor

Overview / Background / Analysis
The expansion of the Rogers Activity Center (RAC) has been in the planning stages for almost four years. The attached Term Sheet with Rogers Youth Hockey Association (RYHA) describes the history of the facility along with information on the planning and pre-design work completed to date.

A Request for Proposals for Architectural and Engineering Services for the RAC expansion was issued in August, 2024. The City Council approved a Professional Services Agreement (PSA) with HTG Architects in September, 2024. According to the Term Sheet with RYHA, RYHA is responsible for depositing an escrow with the City to pay for engineering and architectural design costs. RYHA will be responsible for the design engineering costs and agreed to provide additional escrows as needed. Any unused escrow will be used for the project or returned to RYHA. To date RYHA has contributed $388,100 to the City to cover design costs. HTG's preliminary design work has progressed to a point at which a Construction Manager at Risk (CM@R) should be retained in order to develop detailed cost estimates for the expansion and to provide value engineering options and guidance.

It is not intended that the CM@R team and the Architect partner but that they provide independent services to the City and thereby offer checks and balances in the interest of maximizing facility improvement funds while retaining buildings of high quality. The approach to CM@R anticipated for this work include the following concepts:
• The CM@R offers a perspective on cost, quality, and value to provide the City with the best information possible in the development of building programs
• The CM@R acts as Owner’s agent in the field and contractually during construction

A Request for Proposals for CM@R for the RAC expansion was issued in March, 2024, to eight contractors, three of which are local contractors. Two of the local contractors declined to propose on the project as did one other contractor due to their current workload. The RFP directed the contractors to use an estimated construction cost of $15M for their proposal. Staff from Parks and Recreation and Public Works reviewed

the proposals and ranked them based on the following criteria; technical aspects of the proposal, credentials of the project team, responsiveness to the RFP, the proposed CM@R fee and other notable factors. These five criteria were ranked on a 10 point must system with the best response or lowest fee scoring 10 points. One point was added to each contractor's technical score for each ice rink that each contractor constructed or performed as the CM@R. The results of the scoring is as follows:

Scoring Results

Contractor	Technical Aspects	Credentials	Response to RFP	CM@R Fee	Other Factors	Rinks Noted	Final Score
Greystone	8	9	6	6	4	11	44
inBYLT (Apex)	6	6	5	9	5	5	36
RJM	10	10	10	10	10	17	67
Rochon	7	7	7	8	9	1	39
Terra	9	8	9	10	10	0	46

Some of the other factors worth noting in the proposals are RJM and Terra both proposed waiving their pre-construction fees ($44,163 and $45,064 respectively) and Rochon proposed waiving $15,000 of pre-construction fees. Terra also proposed a $50,000 contribution towards the ice rink construction should they be chosen as the CM@R. Terra suggested that there would be better coordination and could be cost savings in construction due to the fact that they and their subcontractors are already onsite constructing the Turf Facility. RJM pioneered a hybrid CM@R project delivery method in 2007 with the City of Eden Prairie. RJM was the contractor on the original RAC construction and is currently constructing the full-sheet rink expansion for the City of Maple Grove. Greystone proposed a $515,000 alternate for ammonia refrigeration. However, staff considered ammonia the base refrigerant.

Cost Results

Contractor	Predesign	General Conditions	Reimbursables	CM@R Fee	CM@R %
Greystone	$ 48,128	$ 426,712	$ 63,375	$ 342,825	3.0%
inBYLT (Apex)	$ 15,000	$ 490,860	$ 156,000	$ 240,000	1.6%
RJM	$ -	$ 417,534	$ 32,821	$ 225,000	1.5%
Rochon	$ 5,843	$ 349,147	$ 78,600	$ 360,000	2.4%
Terra	$ -	$ 489,948	$ 52,500	$ 225,000	1.5%

Staff then conducted interviews with the three highest-scoring contractors. The one-hour virtual interviews included 14 of the same questions and three contractor-specific questions, followed by time reserved for each contractor to persuade the city to select them as the preferred CM@R. Although staff is confident either of the top two contractors could perform the work, based on the proposal rankings, proposed cost of

service and the interviews, staff recommends entering into an AIA A133-2019, Standard Form of Agreement with RJM Construction as the CM@R for the RAC Expansion due primarily to their extensive experience in building ice rinks.

The cost of the CM@R is not covered by RYHA but rather will be included with the overall project costs. Exhibit B of the attached Term Sheet outlines the proposed cost sharing terms between the city and RYHA. At a previously assumed base construction cost of $11.0M there was likely a substantial funding gap depending on the bond interest rate. Recent cost estimates from three general contractors suggest the base construction costs to be between $13M and $16.5M. Since the RJM and Terra proposals waive pre-construction costs, the city will be able to enter the bidding phase with solid estimates in hand without incurring any additional costs.

Staff Recommendation
Motion to Approve AIA Document A133-2019, Standard Form of Agreement Between the City of Rogers and RJM Construction as Construction Manager and Constructor

Financial Impact: $675,355 **Source Fund**: 411, RYHA

Budgeted?

Supporting Documentation
A. RAC Expansion Term Sheet
B. AIA Document A133-2019 Standard Form of Agreement
C. Greystone Proposal
D. inBYLT Proposal
E. RJM Proposal
F. Rochon Proposal
G. Terra Proposal

TERM SHEET

This Term Sheet is executed as of this 28th day of May, 2024, by and between the Rogers Youth Hockey Association ("RYHA") and the City of Rogers (the "City"). It is intended to set forth the general terms upon which the parties hereto may be willing to enter into a Memorandum of Agreement to expand the current Rogers Activity Center (RAC) and construct a second sheet of ice ("RAC Expansion"). This Term Sheet shall not be deemed conclusive or legally binding upon either party, and neither party shall have any obligations regarding the property defined below unless and until a definitive Memorandum of Agreement is approved by the City and executed by both parties.

1. Property: 21080 141st Ave N, Rogers, MN 55374, PID 11-120-23-41-0004, Lot 2, Block 1, Rogers High School Addition, Hennepin County, Minnesota and 14160 James Road, PID 11-120-23-43-0007, Lot 2 Block 2, North Rogers Industrial Park, Hennepin County, Minnesota. The RAC Expansion site will generally be depicted in Exhibit A.

2. Recitals
    - The City and RHYA have established a positive relationship. The City constructed the RAC in 2006 for $6 million in construction costs. RYHA provided the City with a 20-year commitment at $65,000 per year, for a total contribution of $1.3 million. RYHA finished their commitment early.
    - The City has taken steps to prepare for the RAC Expansion. The current RAC land was purchased for $1.3 million, land for the anticipated RAC Expansion and turf facility was purchased for $1.375 million, site preparation was completed for $1.8 million, and the City will provide and maintain parking for the RAC Expansion.
    - The City and RYHA agree there is a need for the RAC Expansion. The City's short-term financial plan does not contemplate this expansion; therefore, the City has limited resources to dedicate to the project.
    - A preliminary financial analysis for the project has been prepared and defined in Exhibit B. The financial analysis is based on several estimates, including the anticipated project cost of $11 million, contributions from other organizations, and financing assumptions. Given the City's limited resources available for this project, it is expected that RYHA would be responsible for funding any variances that result from refining Exhibit B assumptions.

3. City Obligations:
    a. Provide the prepared land next to the existing ice arena to construct the RAC Expansion.
    b. Contribute $1,500,000 to an ice plant to service both ice sheets. The City will make this contribution upon commissioning of the ice plant.
    c. Continue the current RAC levy at $475,000 per year for the life of the bond, or as long as necessary, allowing the City to contribute $120,000 per year towards capital debt (total of $2,400,000 over the life of the debt) for the RAC Expansion.
    d. Any RAC Expansion operational income exceeding the annual goal of $120,000 and capital expenditures/reserves will be split 50/50 between the City and RYHA until the point where the debt is fully repaid. RYHA's share will offset RYHA's annual contributions for the RAC Expansion. The City's share may be used to offset annual capital debt costs for the RAC Expansion or to reduce the RAC levy. Revenue sharing will commence following the City's recuperation of any operating deficits incurred during the initial years of operation.

e. Enter into a contract for naming rights for the entire facility, including the current RAC, the RAC Expansion, and the anticipated turf facility. The proportionate share of the naming rights for the RAC portion of the buildings will be contributed towards the project. The City reasonably anticipates this amount to be $1,100,000; The City will contribute the actual amount received from naming rights at the start of the project.
f. The City will be responsible for the construction of the "Wedge" connecting the RAC Expansion and the anticipated turf facility as depicted in Exhibit A.
g. The City will own, operate, and maintain the second ice sheet.

4. RYHA Obligations:
    a. RYHA will provide funding for the RAC Expansion beyond what the City has agreed to contribute in Section 3. RYHA will be responsible for costs above the estimated $11 million construction costs or shortfalls in other projected revenue sources.
    b. Provide the City with:
        i. The final Fundraising Feasibility Report prepared by Fox Advancement.
        ii. Financial statements and projections that support RYHA financial contributions as depicted in Exhibit B.
        iii. Ongoing fundraising progress reports and contracts substantiating financial commitments and collections.
    c. Deposit an escrow with the City to pay for engineering and architectural design costs. RYHA will be responsible for the design engineering costs and agree to provide additional escrows as needed. Any unused escrow will be used for the project or returned to RYHA.
    d. A cash contribution of $3,000,000 (less the escrowed amount) is due upon awarding the construction contract. Annual contributions of $300,000 for 20 years will be due by December 31st of each year after contract acceptance.

5. RAC Expansion:
    a. The City and RYHA will form a committee to steer design activities and will jointly fund the feasibility and design phases as follows:
        i. The RAC Expansion will be designed to a standard to match or exceed the operational efficiency and lifespan of the original building.
        ii. RYHA will furnish the City with a roster of fundamental design requirements before soliciting engineering design firms. This list will be presented as Exhibit C. The City will review these requirements but ultimately reserves the right to determine their inclusion.
        iii. RYHA will provide the City with the design cost through the design development phase.
        iv. At the end of the design development phase the estimated project cost will be submitted to each party for review and approval. The City will make the determination, in its sole discretion, whether to proceed.
    b. The City will retain and contract with all consultants and contractors for the RAC Expansion, including but not limited to architects, engineers, construction manager, and construction contractor(s), in accordance with the requirements of the Minnesota Uniform Municipal Contracting Law, Minn. Stat. Â§ 471.345. The City and RYHA will have equal access and rights to any of the contracted consultant design information and/or data.

6. Miscellaneous
    a. The City will make every effort to design the anticipated turf facility to exist in unison with the RAC Expansion, including parking for the second sheet of ice.
    b. The City anticipates having the turf facility under construction by the end of 2024, and design development for the RAC Expansion must also be completed by this time.
    c. The City and RYHA will determine policies, fees, and scheduling during the times assigned to each of them under a separate agreement. The City anticipates the agreement to be consistent with the current ice allocation policy.

IN WITNESS WHEREOF, the parties have executed this Term Sheet as of the date first set forth above.

ROGERS YOUTH HOCKEY ASSOCIATION

By: _____

Its: President

CITY OF ROGERS

By: _____

Its: Mayor

EXHIBIT A

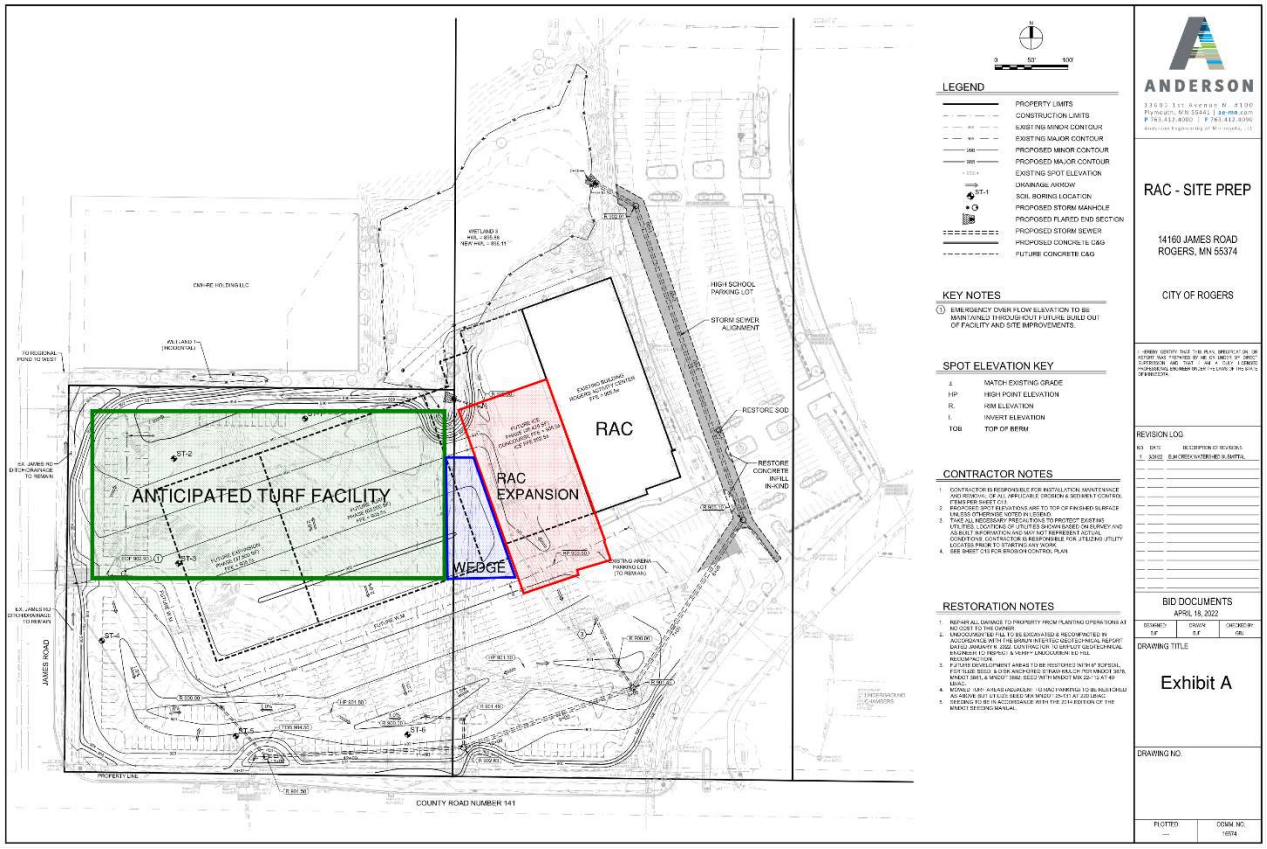
ANTICIPATED TURF FACILITY
RAC
RAC EXPANSION
WEDGE
HIGH SCHOOL PARKING LOT
STORM SEWER ALIGNMENT
RESTORE SOD
RESTORE CONCRETE INFILL IN-KIND
JAMES ROAD
COUNTY ROAD NUMBER 141
LEGEND
PROPERTY LIMITS
CONSTRUCTION LIMITS
EXISTING MINOR CONTOUR
EXISTING MAJOR CONTOUR
PROPOSED MINOR CONTOUR
PROPOSED MAJOR CONTOUR
EXISTING SPOT ELEVATION
DRAINAGE ARROW
SOIL BORING LOCATION
PROPOSED STORM MANHOLE
PROPOSED FLARED END SECTION
PROPOSED STORM SEWER
PROPOSED CONCRETE C&G
FUTURE CONCRETE C&G
KEY NOTES
1 EMERGENCY OVER FLOW ELEVATION TO BE MAINTAINED THROUGHOUT FUTURE BUILD OUT OF FACILITY AND SITE IMPROVEMENTS.
SPOT ELEVATION KEY
MATCH EXISTING GRADE
HIGH POINT ELEVATION
RIM ELEVATION
INVERT ELEVATION
TOP OF BERM
CONTRACTOR NOTES
RESTORATION NOTES
ANDERSON
RAC - SITE PREP
14160 JAMES ROAD
ROGERS, MN 55374
CITY OF ROGERS
REVISION LOG
BID DOCUMENTS
APRIL 18, 2022
DRAWING TITLE
Exhibit A
DRAWING NO.

EXHIBIT B

City of Rogers
RAC Second Sheet of Ice

	4% Interest Rate	5% Interest Rate	6% Interest Rate
Inputs			
Total Project Costs*			
Estimated Year of Build	2025	2025	2025
Annual Inflation Rate	5%	5%	5%
Estimated Cost	11,000,000	11,000,000	11,000,000
Financing Costs			
Bonding Amount	5,950,000	5,950,000	5,950,000
Bond Term	20	20	20
Financing Costs	2%	2%	2%
Interest Rate	4%	5%	6%
Annual Payment	446,568	486,992	529,123
Estimated Project Costs			
Construction Costs (Inflated)	11,550,000	11,550,000	11,550,000
Interest and Financing Costs	2,981,353	3,789,845	4,632,462
Total Estimated Project Costs	14,531,353	15,339,845	16,182,462
Projected Revenue Sources			
City Funding			
Ice Plant	1,500,000	1,500,000	1,500,000
Naming Rights	1,100,000	1,100,000	1,100,000
Operating Income ($120,000/year)*	2,400,000	2,400,000	2,400,000
Rogers Youth Hockey Association			
Capital Contribution/Down Payment	3,000,000	3,000,000	3,000,000
Annual Contributions (20 Years @ $300,000/yr)	6,000,000	6,000,000	6,000,000
Other Sources			
Hennepin County Youth Sports Equipment Grant	300,000	300,000	300,000
Total Projected Revenue Sources	14,300,000	14,300,000	14,300,000
Funding Gap - Total	**231,353**	**1,039,845**	**1,882,462**
Funding Gap - Annual	**11,568**	**51,992**	**94,123**
Cash on Hand Required to Fill Gap	**154,126**	**635,234**	**1,058,416**

* Project costs include architects, engineers, construction managers, construction contractors, etc.

Exhibit C

RYHA RAC Expansion Fundamental Design Requirements

- 4 locker rooms to be used for the RAC Expansion
- Off-ice/dryland space for RYHA for training, shooting and drills
- Seating for 200-300 people
- Possible inclusion of locker rooms for ISD 728

AIA® Document A133™ – 2019

Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price

AGREEMENT made as of the _____ day of _____ in the year _____
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

and the Construction Manager:
(Name, legal status, address, and other information)

for the following Project:
(Name, location, and detailed description)

The Architect:
(Name, legal status, address, and other information)

The Owner and Construction Manager agree as follows.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Sample

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ARTICLE 1 INITIAL INFORMATION

§ 1.1 This Agreement is based on the Initial Information set forth in this Section 1.1.
(For each item in this section, insert the information or a statement such as "not applicable" or "unknown at time of execution.")

§ 1.1.1 The Owner's program for the Project, as described in Section 4.1.1:
(Insert the Owner's program, identify documentation that establishes the Owner's program, or state the manner in which the program will be developed.)

§ 1.1.2 The Project's physical characteristics:
(Identify or describe pertinent information about the Project's physical characteristics, such as size; location; dimensions; geotechnical reports; site boundaries; topographic surveys; traffic and utility studies; availability of public and private utilities and services; legal description of the site, etc.)

Sample

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§ 1.1.3 The Owner's budget for the Guaranteed Maximum Price, as defined in Article 6:
(Provide total and, if known, a line item breakdown.)

§ 1.1.4 The Owner's anticipated design and construction milestone dates:

.1 Design phase milestone dates, if any:

.2 Construction commencement date:

.3 Substantial Completion date or dates:

.4 Other milestone dates:

§ 1.1.5 The Owner's requirements for accelerated or fast-track scheduling, or phased construction, are set forth below:
(Identify any requirements for fast-track scheduling or phased construction.)

§ 1.1.6 The Owner's anticipated Sustainable Objective for the Project:
(Identify and describe the Owner's Sustainable Objective for the Project, if any.)

§ 1.1.6.1 If the Owner identifies a Sustainable Objective, the Owner and Construction Manager shall complete and incorporate AIA Document E234™–2019, Sustainable Projects Exhibit, Construction Manager as Constructor Edition, into this Agreement to define the terms, conditions and services related to the Owner's Sustainable Objective. If E234–2019 is incorporated into this agreement, the Owner and Construction Manager shall incorporate the completed E234–2019 into the agreements with the consultants and contractors performing services or Work in any way associated with the Sustainable Objective.

§ 1.1.7 Other Project information:
(Identify special characteristics or needs of the Project not provided elsewhere.)

§ 1.1.8 The Owner identifies the following representative in accordance with Section 4.2:
(List name, address, and other contact information.)

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§ 1.1.9 The persons or entities, in addition to the Owner's representative, who are required to review the Construction Manager's submittals to the Owner are as follows:
(List name, address and other contact information.)

§ 1.1.10 The Owner shall retain the following consultants and contractors:
(List name, legal status, address, and other contact information.)

.1 Geotechnical Engineer:

.2 Civil Engineer:

.3 Other, if any:
(List any other consultants retained by the Owner, such as a Project or Program Manager.)

§ 1.1.11 The Architect's representative:
(List name, address, and other contact information.)

§ 1.1.12 The Construction Manager identifies the following representative in accordance with Article 3:
(List name, address, and other contact information.)

§ 1.1.13 The Owner's requirements for the Construction Manager's staffing plan for Preconstruction Services, as required under Section 3.1.9:
(List any Owner-specific requirements to be included in the staffing plan.)

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§ 1.1.14 The Owner's requirements for subcontractor procurement for the performance of the Work:
(List any Owner-specific requirements for subcontractor procurement.)

§ 1.1.15 Other Initial Information on which this Agreement is based:

§ 1.2 The Owner and Construction Manager may rely on the Initial Information. Both parties, however, recognize that such information may materially change and, in that event, the Owner and the Construction Manager shall appropriately adjust the Project schedule, the Construction Manager's services, and the Construction Manager's compensation. The Owner shall adjust the Owner's budget for the Guaranteed Maximum Price and the Owner's anticipated design and construction milestones, as necessary, to accommodate material changes in the Initial Information.

§ 1.3 Neither the Owner's nor the Construction Manager's representative shall be changed without ten days' prior notice to the other party.

ARTICLE 2 GENERAL PROVISIONS

§ 2.1 The Contract Documents

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract and are as fully a part of the Contract as if attached to this Agreement or repeated herein. Upon the Owner's acceptance of the Construction Manager's Guaranteed Maximum Price proposal, the Contract Documents will also include the documents described in Section 3.2.3 and identified in the Guaranteed Maximum Price Amendment and revisions prepared by the Architect and furnished by the Owner as described in Section 3.2.8. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. If anything in the other Contract Documents, other than a Modification, is inconsistent with this Agreement, this Agreement shall govern. An enumeration of the Contract Documents, other than a Modification, appears in Article 15.

§ 2.2 Relationship of the Parties

The Construction Manager accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Construction Manager's skill and judgment in furthering the interests of the Owner to furnish efficient construction administration, management services, and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish or approve, in a timely manner, information required by the Construction Manager and to make payments to the Construction Manager in accordance with the requirements of the Contract Documents.

§ 2.3 General Conditions

§ 2.3.1 For the Preconstruction Phase, AIA Document A201™–2017, General Conditions of the Contract for Construction, shall apply as follows: Section 1.5, Ownership and Use of Documents; Section 1.7, Digital Data Use and Transmission; Section 1.8, Building Information Model Use and Reliance; Section 2.2.4, Confidential Information; Section 3.12.10, Professional Services; Section 10.3, Hazardous Materials; Section 13.1, Governing Law. The term "Contractor" as used in A201–2017 shall mean the Construction Manager.

§ 2.3.2 For the Construction Phase, the general conditions of the contract shall be as set forth in A201–2017, which document is incorporated herein by reference. The term "Contractor" as used in A201–2017 shall mean the Construction Manager.

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ARTICLE 3 CONSTRUCTION MANAGER'S RESPONSIBILITIES

The Construction Manager's Preconstruction Phase responsibilities are set forth in Sections 3.1 and 3.2, and in the applicable provisions of A201-2017 referenced in Section 2.3.1. The Construction Manager's Construction Phase responsibilities are set forth in Section 3.3. The Owner and Construction Manager may agree, in consultation with the Architect, for the Construction Phase to commence prior to completion of the Preconstruction Phase, in which case, both phases will proceed concurrently. The Construction Manager shall identify a representative authorized to act on behalf of the Construction Manager with respect to the Project.

§ 3.1 Preconstruction Phase

§ 3.1.1 Extent of Responsibility

The Construction Manager shall exercise reasonable care in performing its Preconstruction Services. The Owner and Architect shall be entitled to rely on, and shall not be responsible for, the accuracy, completeness, and timeliness of services and information furnished by the Construction Manager. The Construction Manager, however, does not warrant or guarantee estimates and schedules except as may be included as part of the Guaranteed Maximum Price. The Construction Manager is not required to ascertain that the Drawings and Specifications are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Construction Manager shall promptly report to the Architect and Owner any nonconformity discovered by or made known to the Construction Manager as a request for information in such form as the Architect may require.

§ 3.1.2 The Construction Manager shall provide a preliminary evaluation of the Owner's program, schedule and construction budget requirements, each in terms of the other.

§ 3.1.3 Consultation

§ 3.1.3.1 The Construction Manager shall schedule and conduct meetings with the Architect and Owner to discuss such matters as procedures, progress, coordination, and scheduling of the Work.

§ 3.1.3.2 The Construction Manager shall advise the Owner and Architect on proposed site use and improvements, selection of materials, building systems, and equipment. The Construction Manager shall also provide recommendations to the Owner and Architect, consistent with the Project requirements, on constructability; availability of materials and labor; time requirements for procurement, installation and construction; prefabrication; and factors related to construction cost including, but not limited to, costs of alternative designs or materials, preliminary budgets, life-cycle data, and possible cost reductions. The Construction Manager shall consult with the Architect regarding professional services to be provided by the Construction Manager during the Construction Phase.

§ 3.1.3.3 The Construction Manager shall assist the Owner and Architect in establishing building information modeling and digital data protocols for the Project, using AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 3.1.4 Project Schedule

When Project requirements in Section 4.1.1 have been sufficiently identified, the Construction Manager shall prepare and periodically update a Project schedule for the Architect's review and the Owner's acceptance. The Construction Manager shall obtain the Architect's approval for the portion of the Project schedule relating to the performance of the Architect's services. The Project schedule shall coordinate and integrate the Construction Manager's services, the Architect's services, other Owner consultants' services, and the Owner's responsibilities; and identify items that affect the Project's timely completion. The updated Project schedule shall include the following: submission of the Guaranteed Maximum Price proposal; components of the Work; times of commencement and completion required of each Subcontractor; ordering and delivery of products, including those that must be ordered in advance of construction; and the occupancy requirements of the Owner.

§ 3.1.5 Phased Construction

The Construction Manager, in consultation with the Architect, shall provide recommendations with regard to accelerated or fast-track scheduling, procurement, and sequencing for phased construction. The Construction Manager shall take into consideration cost reductions, cost information, constructability, provisions for temporary facilities, and procurement and construction scheduling issues.

§ 3.1.6 Cost Estimates

§ 3.1.6.1 Based on the preliminary design and other design criteria prepared by the Architect, the Construction Manager shall prepare, for the Architect's review and the Owner's approval, preliminary estimates of the Cost of the Work or the

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cost of program requirements using area, volume, or similar conceptual estimating techniques. If the Architect or Construction Manager suggests alternative materials and systems, the Construction Manager shall provide cost evaluations of those alternative materials and systems.

§ 3.1.6.2 As the Architect progresses with the preparation of the Schematic Design, Design Development and Construction Documents, the Construction Manager shall prepare and update, at appropriate intervals agreed to by the Owner, Construction Manager and Architect, an estimate of the Cost of the Work with increasing detail and refinement. The Construction Manager shall include in the estimate those costs to allow for the further development of the design, price escalation, and market conditions, until such time as the Owner and Construction Manager agree on a Guaranteed Maximum Price for the Work. The estimate shall be provided for the Architect's review and the Owner's approval. The Construction Manager shall inform the Owner and Architect in the event that the estimate of the Cost of the Work exceeds the latest approved Project budget, and make recommendations for corrective action.

§ 3.1.6.3 If the Architect is providing cost estimating services as a Supplemental Service, and a discrepancy exists between the Construction Manager's cost estimates and the Architect's cost estimates, the Construction Manager and the Architect shall work together to reconcile the cost estimates.

§ 3.1.7 As the Architect progresses with the preparation of the Schematic Design, Design Development and Construction Documents, the Construction Manager shall consult with the Owner and Architect and make recommendations regarding constructability and schedules, for the Architect's review and the Owner's approval.

§ 3.1.8 The Construction Manager shall provide recommendations and information to the Owner and Architect regarding equipment, materials, services, and temporary Project facilities.

§ 3.1.9 The Construction Manager shall provide a staffing plan for Preconstruction Phase services for the Owner's review and approval.

§ 3.1.10 If the Owner identified a Sustainable Objective in Article 1, the Construction Manager shall fulfill its Preconstruction Phase responsibilities as required in AIA Document E234™–2019, Sustainable Projects Exhibit, Construction Manager as Constructor Edition, attached to this Agreement.

§ 3.1.11 Subcontractors and Suppliers

§ 3.1.11.1 If the Owner has provided requirements for subcontractor procurement in section 1.1.14, the Construction Manager shall provide a subcontracting plan, addressing the Owner's requirements, for the Owner's review and approval.

§ 3.1.11.2 The Construction Manager shall develop bidders' interest in the Project.

§ 3.1.11.3 The processes described in Article 9 shall apply if bid packages will be issued during the Preconstruction Phase.

§ 3.1.12 Procurement

The Construction Manager shall prepare, for the Architect's review and the Owner's acceptance, a procurement schedule for items that must be ordered in advance of construction. The Construction Manager shall expedite and coordinate the ordering and delivery of materials that must be ordered in advance of construction. If the Owner agrees to procure any items prior to the establishment of the Guaranteed Maximum Price, the Owner shall procure the items on terms and conditions acceptable to the Construction Manager. Upon the establishment of the Guaranteed Maximum Price, the Owner shall assign all contracts for these items to the Construction Manager and the Construction Manager shall thereafter accept responsibility for them.

§ 3.1.13 Compliance with Laws

The Construction Manager shall comply with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to its performance under this Contract, and with equal employment opportunity programs, and other programs as may be required by governmental and quasi-governmental authorities.

§ 3.1.14 Other Preconstruction Services

Insert a description of any other Preconstruction Phase services to be provided by the Construction Manager, or reference an exhibit attached to this document

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(Describe any other Preconstruction Phase services, such as providing cash flow projections, development of a project information management system, early selection or procurement of subcontractors, etc.)

§ 3.2 Guaranteed Maximum Price Proposal

§ 3.2.1 At a time to be mutually agreed upon by the Owner and the Construction Manager, the Construction Manager shall prepare a Guaranteed Maximum Price proposal for the Owner's and Architect's review, and the Owner's acceptance. The Guaranteed Maximum Price in the proposal shall be the sum of the Construction Manager's estimate of the Cost of the Work, the Construction Manager's contingency described in Section 3.2.4, and the Construction Manager's Fee described in Section 6.1.2.

§ 3.2.2 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.

§ 3.2.3 The Construction Manager shall include with the Guaranteed Maximum Price proposal a written statement of its basis, which shall include the following:

.1 A list of the Drawings and Specifications, including all Addenda thereto, and the Conditions of the Contract;

.2 A list of the clarifications and assumptions made by the Construction Manager in the preparation of the Guaranteed Maximum Price proposal, including assumptions under Section 3.2.2;

.3 A statement of the proposed Guaranteed Maximum Price, including a statement of the estimated Cost of the Work organized by trade categories or systems, including allowances; the Construction Manager's contingency set forth in Section 3.2.4; and the Construction Manager's Fee;

.4 The anticipated date of Substantial Completion upon which the proposed Guaranteed Maximum Price is based; and

.5 A date by which the Owner must accept the Guaranteed Maximum Price.

§ 3.2.4 In preparing the Construction Manager's Guaranteed Maximum Price proposal, the Construction Manager shall include a contingency for the Construction Manager's exclusive use to cover those costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order.

§ 3.2.5 The Construction Manager shall meet with the Owner and Architect to review the Guaranteed Maximum Price proposal. In the event that the Owner or Architect discover any inconsistencies or inaccuracies in the information presented, they shall promptly notify the Construction Manager, who shall make appropriate adjustments to the Guaranteed Maximum Price proposal, its basis, or both.

§ 3.2.6 If the Owner notifies the Construction Manager that the Owner has accepted the Guaranteed Maximum Price proposal in writing before the date specified in the Guaranteed Maximum Price proposal, the Guaranteed Maximum Price proposal shall be deemed effective without further acceptance from the Construction Manager. Following acceptance of a Guaranteed Maximum Price, the Owner and Construction Manager shall execute the Guaranteed Maximum Price Amendment amending this Agreement, a copy of which the Owner shall provide to the Architect. The Guaranteed Maximum Price Amendment shall set forth the agreed upon Guaranteed Maximum Price with the information and assumptions upon which it is based.

§ 3.2.7 The Construction Manager shall not incur any cost to be reimbursed as part of the Cost of the Work prior to the execution of the Guaranteed Maximum Price Amendment, unless the Owner provides prior written authorization for such costs.

§ 3.2.8 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions and clarifications contained in the Guaranteed Maximum Price Amendment. The Owner shall promptly furnish such revised Contract Documents to the Construction Manager. The Construction Manager shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions and clarifications contained in the Guaranteed Maximum Price Amendment and the revised Contract Documents.

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§ 3.2.9 The Construction Manager shall include in the Guaranteed Maximum Price all sales, consumer, use and similar taxes for the Work provided by the Construction Manager that are legally enacted, whether or not yet effective, at the time the Guaranteed Maximum Price Amendment is executed.

§ 3.3 Construction Phase

§ 3.3.1 General

§ 3.3.1.1 For purposes of Section 8.1.2 of A201–2017, the date of commencement of the Work shall mean the date of commencement of the Construction Phase.

§ 3.3.1.2 The Construction Phase shall commence upon the Owner's execution of the Guaranteed Maximum Price Amendment or, prior to acceptance of the Guaranteed Maximum Price proposal, by written agreement of the parties. The written agreement shall set forth a description of the Work to be performed by the Construction Manager, and any insurance and bond requirements for Work performed prior to execution of the Guaranteed Maximum Price Amendment.

§ 3.3.2 Administration

§ 3.3.2.1 The Construction Manager shall schedule and conduct meetings to discuss such matters as procedures, progress, coordination, scheduling, and status of the Work. The Construction Manager shall prepare and promptly distribute minutes of the meetings to the Owner and Architect.

§ 3.3.2.2 Upon the execution of the Guaranteed Maximum Price Amendment, the Construction Manager shall prepare and submit to the Owner and Architect a construction schedule for the Work and a submittal schedule in accordance with Section 3.10 of A201–2017.

§ 3.3.2.3 Monthly Report

The Construction Manager shall record the progress of the Project. On a monthly basis, or otherwise as agreed to by the Owner, the Construction Manager shall submit written progress reports to the Owner and Architect, showing percentages of completion and other information required by the Owner.

§ 3.3.2.4 Daily Logs

The Construction Manager shall keep, and make available to the Owner and Architect, a daily log containing a record for each day of weather, portions of the Work in progress, number of workers on site, identification of equipment on site, problems that might affect progress of the work, accidents, injuries, and other information required by the Owner.

§ 3.3.2.5 Cost Control

The Construction Manager shall develop a system of cost control for the Work, including regular monitoring of actual costs for activities in progress and estimates for uncompleted tasks and proposed changes. The Construction Manager shall identify variances between actual and estimated costs and report the variances to the Owner and Architect, and shall provide this information in its monthly reports to the Owner and Architect, in accordance with Section 3.3.2.3 above.

ARTICLE 4 OWNER'S RESPONSIBILITIES

§ 4.1 Information and Services Required of the Owner

§ 4.1.1 The Owner shall provide information with reasonable promptness, regarding requirements for and limitations on the Project, including a written program which shall set forth the Owner's objectives, constraints, and criteria, including schedule, space requirements and relationships, flexibility and expandability, special equipment, systems, sustainability and site requirements.

§ 4.1.2 Prior to the execution of the Guaranteed Maximum Price Amendment, the Construction Manager may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. After execution of the Guaranteed Maximum Price Amendment, the Construction Manager may request such information as set forth in A201-2017 Section 2.2.

§ 4.1.3 The Owner shall establish and periodically update the Owner's budget for the Project, including (1) the budget for the Cost of the Work as defined in Article 7, (2) the Owner's other costs, and (3) reasonable contingencies related to all of these costs. If the Owner significantly increases or decreases the Owner's budget for the Cost of the Work, the Owner shall notify the Construction Manager and Architect. The Owner and the Architect, in consultation with the Construction Manager, shall thereafter agree to a corresponding change in the Project's scope and quality.

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§ 4.1.4 Structural and Environmental Tests, Surveys and Reports. During the Preconstruction Phase, the Owner shall furnish the following information or services with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Construction Manager's performance of the Work with reasonable promptness after receiving the Construction Manager's written request for such information or services. The Construction Manager shall be entitled to rely on the accuracy of information and services furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 4.1.4.1 The Owner shall furnish tests, inspections, and reports, required by law and as otherwise agreed to by the parties, such as structural, mechanical, and chemical tests, tests for air and water pollution, and tests for hazardous materials.

§ 4.1.4.2 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a written legal description of the site. The surveys and legal information shall include, as applicable, grades and lines of streets, alleys, pavements and adjoining property and structures; designated wetlands; adjacent drainage; rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, boundaries and contours of the site; locations, dimensions and other necessary data with respect to existing buildings, other improvements and trees; and information concerning available utility services and lines, both public and private, above and below grade, including inverts and depths. All the information on the survey shall be referenced to a Project benchmark.

§ 4.1.4.3 The Owner, when such services are requested, shall furnish services of geotechnical engineers, which may include test borings, test pits, determinations of soil bearing values, percolation tests, evaluations of hazardous materials, seismic evaluation, ground corrosion tests and resistivity tests, including necessary operations for anticipating subsoil conditions, with written reports and appropriate recommendations.

§ 4.1.5 During the Construction Phase, the Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Construction Manager's performance of the Work with reasonable promptness after receiving the Construction Manager's written request for such information or services.

§ 4.1.6 If the Owner identified a Sustainable Objective in Article 1, the Owner shall fulfill its responsibilities as required in AIA Document E234™–2019, Sustainable Projects Exhibit, Construction Manager as Constructor Edition, attached to this Agreement.

§ 4.2 Owner's Designated Representative

The Owner shall identify a representative authorized to act on behalf of the Owner with respect to the Project. The Owner's representative shall render decisions promptly and furnish information expeditiously, so as to avoid unreasonable delay in the services or Work of the Construction Manager. Except as otherwise provided in Section 4.2.1 of A201–2017, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 4.2.1 Legal Requirements. The Owner shall furnish all legal, insurance and accounting services, including auditing services, that may be reasonably necessary at any time for the Project to meet the Owner's needs and interests.

§ 4.3 Architect

The Owner shall retain an Architect to provide services, duties and responsibilities as described in AIA Document B133™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Constructor Edition, including any additional services requested by the Construction Manager that are necessary for the Preconstruction and Construction Phase services under this Agreement. The Owner shall provide the Construction Manager with a copy of the scope of services in the executed agreement between the Owner and the Architect, and any further modifications to the Architect's scope of services in the agreement.

ARTICLE 5 COMPENSATION AND PAYMENTS FOR PRECONSTRUCTION PHASE SERVICES

§ 5.1 Compensation

§ 5.1.1 For the Construction Manager's Preconstruction Phase services described in Sections 3.1 and 3.2, the Owner shall compensate the Construction Manager as follows:

(Insert amount of, or basis for, compensation and include a list of reimbursable cost items, as applicable.)

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§ 5.1.2 The hourly billing rates for Preconstruction Phase services of the Construction Manager and the Construction Manager's Consultants and Subcontractors, if any, are set forth below.
(If applicable, attach an exhibit of hourly billing rates or insert them below.)

Individual or Position	Rate

§ 5.1.2.1 Hourly billing rates for Preconstruction Phase services include all costs to be paid or incurred by the Construction Manager, as required by law or collective bargaining agreements, for taxes, insurance, contributions, assessments and benefits and, for personnel not covered by collective bargaining agreements, customary benefits such as sick leave, medical and health benefits, holidays, vacations and pensions, and shall remain unchanged unless the parties execute a Modification.

§ 5.1.3 If the Preconstruction Phase services covered by this Agreement have not been completed within _____ (___) months of the date of this Agreement, through no fault of the Construction Manager, the Construction Manager's compensation for Preconstruction Phase services shall be equitably adjusted.

§ 5.2 Payments
§ 5.2.1 Unless otherwise agreed, payments for services shall be made monthly in proportion to services performed.

§ 5.2.2 Payments are due and payable upon presentation of the Construction Manager's invoice. Amounts unpaid _____ (___) days after the invoice date shall bear interest at the rate entered below, or in the absence thereof at the legal rate prevailing from time to time at the principal place of business of the Construction Manager.
(Insert rate of monthly or annual interest agreed upon.)

_____ % _____

ARTICLE 6 COMPENSATION FOR CONSTRUCTION PHASE SERVICES
§ 6.1 Contract Sum
§ 6.1.1 The Owner shall pay the Construction Manager the Contract Sum in current funds for the Construction Manager's performance of the Contract after execution of the Guaranteed Maximum Price Amendment. The Contract Sum is the Cost of the Work as defined in Article 7 plus the Construction Manager's Fee.

§ 6.1.2 The Construction Manager's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Construction Manager's Fee.)

§ 6.1.3 The method of adjustment of the Construction Manager's Fee for changes in the Work:

§ 6.1.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

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§ 6.1.5 Rental rates for Construction Manager-owned equipment shall not exceed _____ percent (_____ %) of the standard rental rate paid at the place of the Project.

§ 6.1.6 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

§ 6.1.7 Other:
(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)

§ 6.2 Guaranteed Maximum Price

The Construction Manager guarantees that the Contract Sum shall not exceed the Guaranteed Maximum Price set forth in the Guaranteed Maximum Price Amendment, subject to additions and deductions by Change Order as provided in the Contract Documents. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Construction Manager without reimbursement by the Owner.

§ 6.3 Changes in the Work

§ 6.3.1 The Owner may, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions. The Owner shall issue such changes in writing. The Construction Manager may be entitled to an equitable adjustment in the Contract Time as a result of changes in the Work.

§ 6.3.1.1 The Architect may order minor changes in the Work as provided in Article 7 of AIA Document A201–2017, General Conditions of the Contract for Construction.

§ 6.3.2 Adjustments to the Guaranteed Maximum Price on account of changes in the Work subsequent to the execution of the Guaranteed Maximum Price Amendment may be determined by any of the methods listed in Article 7 of AIA Document A201–2017, General Conditions of the Contract for Construction.

§ 6.3.3 Adjustments to subcontracts awarded on the basis of a stipulated sum shall be determined in accordance with Article 7 of A201–2017, as they refer to "cost" and "fee," and not by Articles 6 and 7 of this Agreement. Adjustments to subcontracts awarded with the Owner's prior written consent on the basis of cost plus a fee shall be calculated in accordance with the terms of those subcontracts.

§ 6.3.4 In calculating adjustments to the Guaranteed Maximum Price, the terms "cost" and "costs" as used in Article 7 of AIA Document A201–2017 shall mean the Cost of the Work as defined in Article 7 of this Agreement and the term "fee" shall mean the Construction Manager's Fee as defined in Section 6.1.2 of this Agreement.

§ 6.3.5 If no specific provision is made in Section 6.1.3 for adjustment of the Construction Manager's Fee in the case of changes in the Work, or if the extent of such changes is such, in the aggregate, that application of the adjustment provisions of Section 6.1.3 will cause substantial inequity to the Owner or Construction Manager, the Construction Manager's Fee shall be equitably adjusted on the same basis that was used to establish the Fee for the original Work, and the Guaranteed Maximum Price shall be adjusted accordingly.

ARTICLE 7 COST OF THE WORK FOR CONSTRUCTION PHASE

§ 7.1 Costs to Be Reimbursed

§ 7.1.1 The term Cost of the Work shall mean costs necessarily incurred by the Construction Manager in the proper performance of the Work. The Cost of the Work shall include only the items set forth in Sections 7.1 through 7.7.

§ 7.1.2 Where, pursuant to the Contract Documents, any cost is subject to the Owner's prior approval, the Construction Manager shall obtain such approval in writing prior to incurring the cost.

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§ 7.1.3 Costs shall be at rates not higher than the standard rates paid at the place of the Project, except with prior approval of the Owner.

§ 7.2 Labor Costs

§ 7.2.1 Wages or salaries of construction workers directly employed by the Construction Manager to perform the construction of the Work at the site or, with the Owner's prior approval, at off-site workshops.

§ 7.2.2 Wages or salaries of the Construction Manager's supervisory and administrative personnel when stationed at the site and performing Work, with the Owner's prior approval.

§ 7.2.2.1 Wages or salaries of the Construction Manager's supervisory and administrative personnel when performing Work and stationed at a location other than the site, but only for that portion of time required for the Work, and limited to the personnel and activities listed below:
(Identify the personnel, type of activity and, if applicable, any agreed upon percentage of time to be devoted to the Work.)

§ 7.2.3 Wages and salaries of the Construction Manager's supervisory or administrative personnel engaged at factories, workshops or while traveling, in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of their time required for the Work.

§ 7.2.4 Costs paid or incurred by the Construction Manager, as required by law or collective bargaining agreements, for taxes, insurance, contributions, assessments and benefits and, for personnel not covered by collective bargaining agreements, customary benefits such as sick leave, medical and health benefits, holidays, vacations and pensions, provided such costs are based on wages and salaries included in the Cost of the Work under Sections 7.2.1 through 7.2.3.

§ 7.2.5 If agreed rates for labor costs, in lieu of actual costs, are provided in this Agreement, the rates shall remain unchanged throughout the duration of this Agreement, unless the parties execute a Modification.

§ 7.3 Subcontract Costs

Payments made by the Construction Manager to Subcontractors in accordance with the requirements of the subcontracts and this Agreement.

§ 7.4 Costs of Materials and Equipment Incorporated in the Completed Construction

§ 7.4.1 Costs, including transportation and storage at the site, of materials and equipment incorporated, or to be incorporated, in the completed construction.

§ 7.4.2 Costs of materials described in the preceding Section 7.4.1 in excess of those actually installed to allow for reasonable waste and spoilage. Unused excess materials, if any, shall become the Owner's property at the completion of the Work or, at the Owner's option, shall be sold by the Construction Manager. Any amounts realized from such sales shall be credited to the Owner as a deduction from the Cost of the Work.

§ 7.5 Costs of Other Materials and Equipment, Temporary Facilities and Related Items

§ 7.5.1 Costs of transportation, storage, installation, dismantling, maintenance, and removal of materials, supplies, temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers that are provided by the Construction Manager at the site and fully consumed in the performance of the Work. Costs of materials, supplies, temporary facilities, machinery, equipment, and tools, that are not fully consumed, shall be based on the cost or value of the item at the time it is first used on the Project site less the value of the item when it is no longer used at the Project site. Costs for items not fully consumed by the Construction Manager shall mean fair market value.

§ 7.5.2 Rental charges for temporary facilities, machinery, equipment, and hand tools not customarily owned by construction workers that are provided by the Construction Manager at the site, and the costs of transportation, installation, dismantling, minor repairs, and removal of such temporary facilities, machinery, equipment, and hand tools. Rates and quantities of equipment owned by the Construction Manager, or a related party as defined in Section 7.8,

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shall be subject to the Owner's prior approval. The total rental cost of any such equipment may not exceed the purchase price of any comparable item.

§ 7.5.3 Costs of removal of debris from the site of the Work and its proper and legal disposal.

§ 7.5.4 Costs of the Construction Manager's site office, including general office equipment and supplies.

§ 7.5.5 Costs of materials and equipment suitably stored off the site at a mutually acceptable location, subject to the Owner's prior approval.

§ 7.6 Miscellaneous Costs

§ 7.6.1 Premiums for that portion of insurance and bonds required by the Contract Documents that can be directly attributed to this Contract.

§ 7.6.1.1 Costs for self-insurance, for either full or partial amounts of the coverages required by the Contract Documents, with the Owner's prior approval.

§ 7.6.1.2 Costs for insurance through a captive insurer owned or controlled by the Construction Manager, with the Owner's prior approval.

§ 7.6.2 Sales, use, or similar taxes, imposed by a governmental authority, that are related to the Work and for which the Construction Manager is liable.

§ 7.6.3 Fees and assessments for the building permit, and for other permits, licenses, and inspections, for which the Construction Manager is required by the Contract Documents to pay.

§ 7.6.4 Fees of laboratories for tests required by the Contract Documents; except those related to defective or nonconforming Work for which reimbursement is excluded under Article 13 of AIA Document A201–2017 or by other provisions of the Contract Documents, and which do not fall within the scope of Section 7.7.3.

§ 7.6.5 Royalties and license fees paid for the use of a particular design, process, or product, required by the Contract Documents.

§ 7.6.5.1 The cost of defending suits or claims for infringement of patent rights arising from requirements of the Contract Documents, payments made in accordance with legal judgments against the Construction Manager resulting from such suits or claims, and payments of settlements made with the Owner's consent, unless the Construction Manager had reason to believe that the required design, process, or product was an infringement of a copyright or a patent, and the Construction Manager failed to promptly furnish such information to the Architect as required by Article 3 of AIA Document A201–2017. The costs of legal defenses, judgments, and settlements shall not be included in the Cost of the Work used to calculate the Construction Manager's Fee or subject to the Guaranteed Maximum Price.

§ 7.6.6 Costs for communications services, electronic equipment, and software, directly related to the Work and located at the site, with the Owner's prior approval.

§ 7.6.7 Costs of document reproductions and delivery charges.

§ 7.6.8 Deposits lost for causes other than the Construction Manager's negligence or failure to fulfill a specific responsibility in the Contract Documents.

§ 7.6.9 Legal, mediation and arbitration costs, including attorneys' fees, other than those arising from disputes between the Owner and Construction Manager, reasonably incurred by the Construction Manager after the execution of this Agreement in the performance of the Work and with the Owner's prior approval, which shall not be unreasonably withheld.

§ 7.6.10 Expenses incurred in accordance with the Construction Manager's standard written personnel policy for relocation and temporary living allowances of the Construction Manager's personnel required for the Work, with the Owner's prior approval.

§ 7.6.11 That portion of the reasonable expenses of the Construction Manager's supervisory or administrative personnel incurred while traveling in discharge of duties connected with the Work.

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§ 7.7 Other Costs and Emergencies

§ 7.7.1 Other costs incurred in the performance of the Work, with the Owner's prior approval.

§ 7.7.2 Costs incurred in taking action to prevent threatened damage, injury, or loss, in case of an emergency affecting the safety of persons and property, as provided in Article 10 of AIA Document A201–2017.

§ 7.7.3 Costs of repairing or correcting damaged or nonconforming Work executed by the Construction Manager, Subcontractors, or suppliers, provided that such damaged or nonconforming Work was not caused by the negligence of, or failure to fulfill a specific responsibility by, the Construction Manager, and only to the extent that the cost of repair or correction is not recovered by the Construction Manager from insurance, sureties, Subcontractors, suppliers, or others.

§ 7.7.4 The costs described in Sections 7.1 through 7.7 shall be included in the Cost of the Work, notwithstanding any provision of AIA Document A201–2017 or other Conditions of the Contract which may require the Construction Manager to pay such costs, unless such costs are excluded by the provisions of Section 7.9.

§ 7.8 Related Party Transactions

§ 7.8.1 For purposes of this Section 7.8, the term "related party" shall mean (1) a parent, subsidiary, affiliate, or other entity having common ownership of, or sharing common management with, the Construction Manager; (2) any entity in which any stockholder in, or management employee of, the Construction Manager holds an equity interest in excess of ten percent in the aggregate; (3) any entity which has the right to control the business or affairs of the Construction Manager; or (4) any person, or any member of the immediate family of any person, who has the right to control the business or affairs of the Construction Manager.

§ 7.8.2 If any of the costs to be reimbursed arise from a transaction between the Construction Manager and a related party, the Construction Manager shall notify the Owner of the specific nature of the contemplated transaction, including the identity of the related party and the anticipated cost to be incurred, before any such transaction is consummated or cost incurred. If the Owner, after such notification, authorizes the proposed transaction in writing, then the cost incurred shall be included as a cost to be reimbursed, and the Construction Manager shall procure the Work, equipment, goods, or service, from the related party, as a Subcontractor, according to the terms of Article 9. If the Owner fails to authorize the transaction in writing, the Construction Manager shall procure the Work, equipment, goods, or service from some person or entity other than a related party according to the terms of Article 9.

§ 7.9 Costs Not To Be Reimbursed

§ 7.9.1 The Cost of the Work shall not include the items listed below:

.1 Salaries and other compensation of the Construction Manager's personnel stationed at the Construction Manager's principal office or offices other than the site office, except as specifically provided in Section 7.2, or as may be provided in Article 14;

.2 Bonuses, profit sharing, incentive compensation, and any other discretionary payments, paid to anyone hired by the Construction Manager or paid to any Subcontractor or vendor, unless the Owner has provided prior approval;

.3 Expenses of the Construction Manager's principal office and offices other than the site office;

.4 Overhead and general expenses, except as may be expressly included in Sections 7.1 to 7.7;

.5 The Construction Manager's capital expenses, including interest on the Construction Manager's capital employed for the Work;

.6 Except as provided in Section 7.7.3 of this Agreement, costs due to the negligence of, or failure to fulfill a specific responsibility of the Contract by, the Construction Manager, Subcontractors, and suppliers, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable;

.7 Any cost not specifically and expressly described in Sections 7.1 to 7.7;

.8 Costs, other than costs included in Change Orders approved by the Owner, that would cause the Guaranteed Maximum Price to be exceeded; and

.9 Costs for services incurred during the Preconstruction Phase.

ARTICLE 8 DISCOUNTS, REBATES, AND REFUNDS

§ 8.1 Cash discounts obtained on payments made by the Construction Manager shall accrue to the Owner if (1) before making the payment, the Construction Manager included the amount to be paid, less such discount, in an Application for Payment and received payment from the Owner, or (2) the Owner has deposited funds with the Construction Manager with which to make payments; otherwise, cash discounts shall accrue to the Construction Manager. Trade discounts, rebates, refunds, and amounts received from sales of surplus materials and equipment shall accrue to the Owner, and the Construction Manager shall make provisions so that they can be obtained.

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§ 8.2 Amounts that accrue to the Owner in accordance with the provisions of Section 8.1 shall be credited to the Owner as a deduction from the Cost of the Work.

ARTICLE 9 SUBCONTRACTS AND OTHER AGREEMENTS

§ 9.1 Those portions of the Work that the Construction Manager does not customarily perform with the Construction Manager's own personnel shall be performed under subcontracts or other appropriate agreements with the Construction Manager. The Owner may designate specific persons from whom, or entities from which, the Construction Manager shall obtain bids. The Construction Manager shall obtain bids from Subcontractors, and from suppliers of materials or equipment fabricated especially for the Work, who are qualified to perform that portion of the Work in accordance with the requirements of the Contract Documents. The Construction Manager shall deliver such bids to the Architect and Owner with an indication as to which bids the Construction Manager intends to accept. The Owner then has the right to review the Construction Manager's list of proposed subcontractors and suppliers in consultation with the Architect and, subject to Section 9.1.1, to object to any subcontractor or supplier. Any advice of the Architect, or approval or objection by the Owner, shall not relieve the Construction Manager of its responsibility to perform the Work in accordance with the Contract Documents. The Construction Manager shall not be required to contract with anyone to whom the Construction Manager has reasonable objection.

§ 9.1.1 When a specific subcontractor or supplier (1) is recommended to the Owner by the Construction Manager; (2) is qualified to perform that portion of the Work; and (3) has submitted a bid that conforms to the requirements of the Contract Documents without reservations or exceptions, but the Owner requires that another bid be accepted, then the Construction Manager may require that a Change Order be issued to adjust the Guaranteed Maximum Price by the difference between the bid of the person or entity recommended to the Owner by the Construction Manager and the amount of the subcontract or other agreement actually signed with the person or entity designated by the Owner.

§ 9.2 Subcontracts or other agreements shall conform to the applicable payment provisions of this Agreement, and shall not be awarded on the basis of cost plus a fee without the Owner's prior written approval. If a subcontract is awarded on the basis of cost plus a fee, the Construction Manager shall provide in the subcontract for the Owner to receive the same audit rights with regard to the Subcontractor as the Owner receives with regard to the Construction Manager in Article 10.

ARTICLE 10 ACCOUNTING RECORDS

The Construction Manager shall keep full and detailed records and accounts related to the Cost of the Work, and exercise such controls, as may be necessary for proper financial management under this Contract and to substantiate all costs incurred. The accounting and control systems shall be satisfactory to the Owner. The Owner and the Owner's auditors shall, during regular business hours and upon reasonable notice, be afforded access to, and shall be permitted to audit and copy, the Construction Manager's records and accounts, including complete documentation supporting accounting entries, books, job cost reports, correspondence, instructions, drawings, receipts, subcontracts, Subcontractor's proposals, Subcontractor's invoices, purchase orders, vouchers, memoranda, and other data relating to this Contract. The Construction Manager shall preserve these records for a period of three years after final payment, or for such longer period as may be required by law.

ARTICLE 11 PAYMENTS FOR CONSTRUCTION PHASE SERVICES

§ 11.1 Progress Payments

§ 11.1.1 Based upon Applications for Payment submitted to the Architect by the Construction Manager, and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum, to the Construction Manager, as provided below and elsewhere in the Contract Documents.

§ 11.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 11.1.3 Provided that an Application for Payment is received by the Architect not later than the _____ day of a month, the Owner shall make payment of the amount certified to the Construction Manager not later than the _____ day of the _____ month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than _____ (___) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

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§ 11.1.4 With each Application for Payment, the Construction Manager shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner or Architect to demonstrate that payments already made by the Construction Manager on account of the Cost of the Work equal or exceed progress payments already received by the Construction Manager, plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Construction Manager's Fee.

§ 11.1.5 Each Application for Payment shall be based on the most recent schedule of values submitted by the Construction Manager in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Construction Manager's Fee.

§ 11.1.5.1 The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. The schedule of values shall be used as a basis for reviewing the Construction Manager's Applications for Payment.

§ 11.1.5.2 The allocation of the Guaranteed Maximum Price under this Section 11.1.5 shall not constitute a separate guaranteed maximum price for the Cost of the Work of each individual line item in the schedule of values.

§ 11.1.5.3 When the Construction Manager allocates costs from a contingency to another line item in the schedule of values, the Construction Manager shall submit supporting documentation to the Architect.

§ 11.1.6 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed, or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Construction Manager on account of that portion of the Work and for which the Construction Manager has made payment or intends to make payment prior to the next Application for Payment, by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

§ 11.1.7 In accordance with AIA Document A201–2017 and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 11.1.7.1 The amount of each progress payment shall first include:

.1 That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;

.2 That portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction or, if approved in writing in advance by the Owner, suitably stored off the site at a location agreed upon in writing;

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and

.4 The Construction Manager's Fee, computed upon the Cost of the Work described in the preceding Sections 11.1.7.1.1 and 11.1.7.1.2 at the rate stated in Section 6.1.2 or, if the Construction Manager's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work included in Sections 11.1.7.1.1 and 11.1.7.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

§ 11.1.7.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Construction Manager does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Construction Manager intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017;

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.5 The shortfall, if any, indicated by the Construction Manager in the documentation required by Section 11.1.4 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.6 Retainage withheld pursuant to Section 11.1.8.

§ 11.1.8 Retainage

§ 11.1.8.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 11.1.8.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 11.1.8.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 11.1.8.1 is to be modified prior to Substantial Completion of the entire Work, insert provisions for such modification.)

§ 11.1.8.3 Except as set forth in this Section 11.1.8.3, upon Substantial Completion of the Work, the Construction Manager may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 11.1.8. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage, such as upon completion of the Owner's audit and reconciliation, upon Substantial Completion.)

§ 11.1.9 If final completion of the Work is materially delayed through no fault of the Construction Manager, the Owner shall pay the Construction Manager any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 11.1.10 Except with the Owner's prior written approval, the Construction Manager shall not make advance payments to suppliers for materials or equipment which have not been delivered and suitably stored at the site.

§ 11.1.11 The Owner and the Construction Manager shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors, and the percentage of retainage held on Subcontracts, and the Construction Manager shall execute subcontracts in accordance with those agreements.

§ 11.1.12 In taking action on the Construction Manager's Applications for Payment the Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Construction Manager, and such action shall not be deemed to be a representation that (1) the Architect has made a detailed examination, audit, or arithmetic verification, of the documentation submitted in accordance with Section 11.1.4 or other supporting data; (2) that the Architect has made exhaustive or continuous on-site inspections; or (3) that the Architect has made examinations to ascertain how or for what purposes the Construction Manager has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

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§ 11.2 Final Payment

§ 11.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Construction Manager when

.1 the Construction Manager has fully performed the Contract, except for the Construction Manager's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Construction Manager has submitted a final accounting for the Cost of the Work and a final Application for Payment; and

.3 a final Certificate for Payment has been issued by the Architect in accordance with Section 11.2.2.2.

§ 11.2.2 Within 30 days of the Owner's receipt of the Construction Manager's final accounting for the Cost of the Work, the Owner shall conduct an audit of the Cost of the Work or notify the Architect that it will not conduct an audit.

§ 11.2.2.1 If the Owner conducts an audit of the Cost of the Work, the Owner shall, within 10 days after completion of the audit, submit a written report based upon the auditors' findings to the Architect.

§ 11.2.2.2 Within seven days after receipt of the written report described in Section 11.2.2.1, or receipt of notice that the Owner will not conduct an audit, and provided that the other conditions of Section 11.2.1 have been met, the Architect will either issue to the Owner a final Certificate for Payment with a copy to the Construction Manager, or notify the Construction Manager and Owner in writing of the Architect's reasons for withholding a certificate as provided in Article 9 of AIA Document A201–2017. The time periods stated in this Section 11.2.2 supersede those stated in Article 9 of AIA Document A201–2017. The Architect is not responsible for verifying the accuracy of the Construction Manager's final accounting.

§ 11.2.2.3 If the Owner's auditors' report concludes that the Cost of the Work, as substantiated by the Construction Manager's final accounting, is less than claimed by the Construction Manager, the Construction Manager shall be entitled to request mediation of the disputed amount without seeking an initial decision pursuant to Article 15 of AIA Document A201–2017. A request for mediation shall be made by the Construction Manager within 30 days after the Construction Manager's receipt of a copy of the Architect's final Certificate for Payment. Failure to request mediation within this 30-day period shall result in the substantiated amount reported by the Owner's auditors becoming binding on the Construction Manager. Pending a final resolution of the disputed amount, the Owner shall pay the Construction Manager the amount certified in the Architect's final Certificate for Payment.

§ 11.2.3 The Owner's final payment to the Construction Manager shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 11.2.4 If, subsequent to final payment, and at the Owner's request, the Construction Manager incurs costs, described in Sections 7.1 through 7.7, and not excluded by Section 7.9, to correct defective or nonconforming Work, the Owner shall reimburse the Construction Manager for such costs, and the Construction Manager's Fee applicable thereto, on the same basis as if such costs had been incurred prior to final payment, but not in excess of the Guaranteed Maximum Price. If adjustments to the Contract Sum are provided for in Section 6.1.7, the amount of those adjustments shall be recalculated, taking into account any reimbursements made pursuant to this Section 11.2.4 in determining the net amount to be paid by the Owner to the Construction Manager.

§ 11.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

_____ % _____

ARTICLE 12 DISPUTE RESOLUTION

§ 12.1 Initial Decision Maker

§ 12.1.1 Any Claim between the Owner and Construction Manager shall be resolved in accordance with the provisions set forth in this Article 12 and Article 15 of A201–2017. However, for Claims arising from or relating to the

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Construction Manager's Preconstruction Phase services, no decision by the Initial Decision Maker shall be required as a condition precedent to mediation or binding dispute resolution, and Section 12.1.2 of this Agreement shall not apply.

§ 12.1.2 The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017 for Claims arising from or relating to the Construction Manager's Construction Phase services, unless the parties appoint below another individual, not a party to the Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 12.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Article 15 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other: *(Specify)*

If the Owner and Construction Manager do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 13 TERMINATION OR SUSPENSION

§ 13.1 Termination Prior to Execution of the Guaranteed Maximum Price Amendment

§ 13.1.1 If the Owner and the Construction Manager do not reach an agreement on the Guaranteed Maximum Price, the Owner may terminate this Agreement upon not less than seven days' written notice to the Construction Manager, and the Construction Manager may terminate this Agreement, upon not less than seven days' written notice to the Owner.

§ 13.1.2 In the event of termination of this Agreement pursuant to Section 13.1.1, the Construction Manager shall be compensated for Preconstruction Phase services and Work performed prior to receipt of a notice of termination, in accordance with the terms of this Agreement. In no event shall the Construction Manager's compensation under this Section exceed the compensation set forth in Section 5.1.

§ 13.1.3 Prior to the execution of the Guaranteed Maximum Price Amendment, the Owner may terminate this Agreement upon not less than seven days' written notice to the Construction Manager for the Owner's convenience and without cause, and the Construction Manager may terminate this Agreement, upon not less than seven days' written notice to the Owner, for the reasons set forth in Article 14 of A201–2017.

§ 13.1.4 In the event of termination of this Agreement pursuant to Section 13.1.3, the Construction Manager shall be equitably compensated for Preconstruction Phase services and Work performed prior to receipt of a notice of termination. In no event shall the Construction Manager's compensation under this Section exceed the compensation set forth in Section 5.1.

§ 13.1.5 If the Owner terminates the Contract pursuant to Section 13.1.3 after the commencement of the Construction Phase but prior to the execution of the Guaranteed Maximum Price Amendment, the Owner shall pay to the Construction Manager an amount calculated as follows, which amount shall be in addition to any compensation paid to the Construction Manager under Section 13.1.4:

.1 Take the Cost of the Work incurred by the Construction Manager to the date of termination;

Sample

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.2 Add the Construction Manager's Fee computed upon the Cost of the Work to the date of termination at the rate stated in Section 6.1 or, if the Construction Manager's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion; and

.3 Subtract the aggregate of previous payments made by the Owner for Construction Phase services.

§ 13.1.6 The Owner shall also pay the Construction Manager fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Construction Manager that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 13.1.5.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Construction Manager shall, as a condition of receiving the payments referred to in this Article 13, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Construction Manager, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Construction Manager under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Construction Manager will contain provisions allowing for assignment to the Owner as described above.

§ 13.1.6.1 If the Owner accepts assignment of subcontracts, purchase orders or rental agreements as described above, the Owner will reimburse or indemnify the Construction Manager for all costs arising under the subcontract, purchase order or rental agreement, if those costs would have been reimbursable as Cost of the Work if the contract had not been terminated. If the Owner chooses not to accept assignment of any subcontract, purchase order or rental agreement that would have constituted a Cost of the Work had this agreement not been terminated, the Construction Manager will terminate the subcontract, purchase order or rental agreement and the Owner will pay the Construction Manager the costs necessarily incurred by the Construction Manager because of such termination.

§ 13.2 Termination or Suspension Following Execution of the Guaranteed Maximum Price Amendment

§ 13.2.1 Termination

The Contract may be terminated by the Owner or the Construction Manager as provided in Article 14 of AIA Document A201–2017.

§ 13.2.2 Termination by the Owner for Cause

§ 13.2.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A201–2017, the amount, if any, to be paid to the Construction Manager under Article 14 of AIA Document A201–2017 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed an amount calculated as follows:

.1 Take the Cost of the Work incurred by the Construction Manager to the date of termination;

.2 Add the Construction Manager's Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 6.1 or, if the Construction Manager' Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A201–2017.

§ 13.2.2.2 The Owner shall also pay the Construction Manager fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Construction Manager that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 13.2.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Construction Manager shall, as a condition of receiving the payments referred to in this Article 13, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Construction Manager, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Construction Manager under such subcontracts or purchase orders.

§ 13.2.3 Termination by the Owner for Convenience

If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Construction Manager a termination fee as follows:

(Insert the amount of or method for determining the fee, if any, payable to the Construction Manager following a termination for the Owner's convenience.)

Sample

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§ 13.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017; in such case, the Guaranteed Maximum Price and Contract Time shall be increased as provided in Article 14 of AIA Document A201–2017, except that the term "profit" shall be understood to mean the Construction Manager's Fee as described in Sections 6.1 and 6.3.5 of this Agreement.

ARTICLE 14 MISCELLANEOUS PROVISIONS

§ 14.1 Terms in this Agreement shall have the same meaning as those in A201–2017. Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 14.2 Successors and Assigns

§ 14.2.1 The Owner and Construction Manager, respectively, bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 14.2.2 of this Agreement, and in Section 13.2.2 of A201–2017, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 14.2.2 The Owner may, without consent of the Construction Manager, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Construction Manager shall execute all consents reasonably required to facilitate the assignment.

§ 14.3 Insurance and Bonds

§ 14.3.1 Preconstruction Phase

The Construction Manager shall maintain the following insurance for the duration of the Preconstruction Services performed under this Agreement. If any of the requirements set forth below exceed the types and limits the Construction Manager normally maintains, the Owner shall reimburse the Construction Manager for any additional cost.

§ 14.3.1.1 Commercial General Liability with policy limits of not less than _____ ($ ___) for each occurrence and _____ ($ ___) in the aggregate for bodily injury and property damage.

§ 14.3.1.2 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Construction Manager with policy limits of not less than _____ ($ ___) per accident for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles, along with any other statutorily required automobile coverage.

§ 14.3.1.3 The Construction Manager may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided that such primary and excess or umbrella liability insurance policies result in the same or greater coverage as the coverages required under Sections 14.3.1.1 and 14.3.1.2, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 14.3.1.4 Workers' Compensation at statutory limits and Employers Liability with policy limits not less than _____ ($ ___) each accident, _____ ($ ___) each employee, and _____ ($ ___) policy limit.

§ 14.3.1.5 Professional Liability covering negligent acts, errors and omissions in the performance of professional services, with policy limits of not less than _____ ($ ___) per claim and _____ ($ ___) in the aggregate

§ 14.3.1.6 Other Insurance

(List below any other insurance coverage to be provided by the Construction Manager and any applicable limits.)

Coverage	Limits

Sample

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§ 14.3.1.7 Additional Insured Obligations. To the fullest extent permitted by law, the Construction Manager shall cause the primary and excess or umbrella polices for Commercial General Liability and Automobile Liability to include the Owner as an additional insured for claims caused in whole or in part by the Construction Manager's negligent acts or omissions. The additional insured coverage shall be primary and non-contributory to any of the Owner's insurance policies and shall apply to both ongoing and completed operations.

§ 14.3.1.8 The Construction Manager shall provide certificates of insurance to the Owner that evidence compliance with the requirements in this Section 14.3.1.

§ 14.3.2 Construction Phase
After execution of the Guaranteed Maximum Price Amendment, the Owner and the Construction Manager shall purchase and maintain insurance as set forth in AIA Document A133™–2019, Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price, Exhibit B, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 14.3.2.1 The Construction Manager shall provide bonds as set forth in AIA Document A133™–2019 Exhibit B, and elsewhere in the Contract Documents.

§ 14.4 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 14.5 Other provisions:

ARTICLE 15 SCOPE OF THE AGREEMENT
§ 15.1 This Agreement represents the entire and integrated agreement between the Owner and the Construction Manager and supersedes all prior negotiations, representations or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both Owner and Construction Manager.

§ 15.2 The following documents comprise the Agreement:

.1 AIA Document A133™–2019, Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price

.2 AIA Document A133™–2019, Exhibit A, Guaranteed Maximum Price Amendment, if executed

.3 AIA Document A133™–2019, Exhibit B, Insurance and Bonds

.4 AIA Document A201™–2017, General Conditions of the Contract for Construction

.5 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.6 Other Exhibits:
(Check all boxes that apply.)

[ ] AIA Document E234™–2019, Sustainable Projects Exhibit, Construction Manager as Constructor Edition, dated as indicated below:
(Insert the date of the E234-2019 incorporated into this Agreement.)

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[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.7 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Construction Manager's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

Sample

This Agreement is entered into as of the day and year first written above.

OWNER *(Signature)*	CONSTRUCTION MANAGER *(Signature)*
(Printed name and title)	*(Printed name and title)*

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YOUR VISION - OUR TEAM - GREAT PROJECTS

Proposal

prepared for

Construction Management at Risk Services For

Rogers Activity Center Expansion

Prepared by

GREYSTONE
CONSTRUCTION

2995 Winners Circle Drive, Ste 200
Shakopee, MN 55379

Contact
David Hartman
Preconstruction Manager
(612) 282-5607
DHartman@GreystoneConstruction.com

March 28, 2025

Letter of Interest & Qualifications
Rogers Activity Center Expansion

To Doran, Mike, and the Project Team,

Thank you for the opportunity to submit a proposal to provide CM@R services for the Rogers Activity Center Expansion.

The Greystone Construction team is uniquely qualified and prepared to successfully complete your project.

Greystone Construction is a versatile general contractor serving municipal, industrial, agribusiness, and commercial markets across the United States. Together our team has established a reputation for safety, integrity, and construction excellence. Greystone's headquarters are located in Shakopee, Minnesota, with offices in Georgetown, Texas; Bismarck, North Dakota; and Spirit Lake, Iowa.

Greystone's capabilities and experience are detailed throughout this proposal. The following will set us apart:

1. Safety is a top priority on our jobsites.
2. We have worked with HTG Architects on multiple projects, including the Pagel II Ice Arena Addition in Minnetonka, Minn.
3. We've built over a dozen ice arenas across Minnesota. This deep familiarity with rink systems, specialized coordination, and community expectations uniquely positions us to deliver the new arena with confidence and efficiency.
4. Greystone has 37 years of experience in municipal, industrial, agribusiness, and commercial construction.
5. Greystone will provide an experienced project team from design through construction with a proven track record.
6. Greystone will provide value engineering in a collaborative process with you, the owner.
7. While we know the selected CM@R will not be allowed to self-perform any work on the project, out ability to self-perform various trades and our intimate knowledge of construction techniques makes us better project managers.

Ultimately, we understand that you are looking for a valued partner that you can trust to complete your project on-time and on-budget with a level of quality that will provide a return on your investment for years to come. What we provide is a team that is focused on what is best for your project. Clients have described us as "Salt of the Earth People." We provide great worth and reliability that you can count on. We will do what we say we are going to do.

We look forward to further discussing a partnership. Please reach out with any questions. Thank you.

Sincerely,

Kevin O'Brien
CEO
& Principal

Gordie Schmitz
President
& Principal

Eric Bender
VP of Construction Operations
& Principal

Colin O'Brien
VP of Business Development
& Principal

Brian Kreuser
VP of Construction Execution
& Principal

B. Business Organization and History

Firm Name: Greystone Construction Company

Headquarters: 2995 Winners Circle Drive #200 Shakopee, MN 55379
Additional offices located in Bismarck, North Dakota, and Spirit Lake, Iowa

Type of Org.: Corporation | General Contractor

Date of Incorporation: April 21, 1987 in Minnesota

Years Contracting: 37

Officers:

- ***Kevin O'Brien, CEO / Principal***
  - 40+ years of industry experience; Founded Greystone in 1987
- ***Gordie Schmitz, President / Principal***
  - 30+ years at Greystone
- ***Eric Bender, VP of Construction Operations / Principal***
  - 30+ years at Greystone
- ***Colin O'Brien, VP of Business Development / Principal***
  - 20+ years at Greystone
- ***Brian Kreuser, VP of Construction Execution / Principal***
  - 25+ years at Greystone

Brief History:

Greystone Construction has been building careers and communities since 1987. With a focus on high-quality craftsmanship, safety, integrity, and relationships, Greystone has grown from a start-up focusing on the construction of airplane hangars and waste treatment facilities to a well-established and versatile general contractor serving senior housing, commercial, industrial, and agribusiness clients in 39 states and counting.

Consistently delivering quality has provided Greystone the opportunity to partner with some of the best companies in the markets they serve. Greystone credits its success to its talented and dedicated team members, many of which have been with Greystone for 10, 20, and even 30+ years.

Number and Types of Professionals Employed:

138 – Our team includes experienced project managers, project engineers, superintendents, estimators, safety personnel, business development, administrative staff, and craft professionals.

Safety:

Greystone values safety of its team members above all else. Our Experience Modification Rate of 0.68 is excellent and reflects our effective proactive safety policies and programs. We are a

MNOSHA Partner. We have achieved a Diamond STEP level through ABC – jobsites managed by companies with this level are 645% safer than the industry average.

Other Construction Services:

Our services emphasize a collaborative, transparent process with a strong commitment to representing the Owner's best interests throughout every phase of the project.

- **Project Planning & Preconstruction Support**: We assist the Owner in managing the overall planning process, contributing constructability insights, logistics strategies, and phasing plans that help align design decisions with cost, schedule, and operational constraints.

- **Cost Estimating & Budget Control**: We develop detailed cost estimates at each phase, proactively identify value engineering opportunities, and track costs against budgets to ensure financial alignment.

- **Scheduling**: We create and regularly update comprehensive project schedules that reflect phasing, lead times, and coordination of multiple bid packages. Our team brings experience in managing complex sequencing and occupancy planning, especially critical in active, occupied facilities like the Activity Center.

- **Procurement Support**: We manage the competitive bidding process for all scopes of work, advertise bid opportunities, analyze results, and provide recommendations for award — enabling the inclusion of qualified local contractors while maintaining transparency and fairness.

- **Construction Phase Oversight**: We provide full-time, on-site supervision and project management. Our team manages day-to-day field coordination, quality assurance, safety enforcement, contract administration, and change management.

- **Communication & Documentation**: We facilitate regular project meetings with clear agendas and timely meeting minutes. We maintain close communication with both the design team and the Owner to ensure alignment and responsiveness throughout the project.

- **Security & Safety Management**: With the Activity Center remaining operational, we prioritize site security and public safety. Our phasing and site logistics plans are developed with input from City stakeholders to ensure minimal disruption to the community and facility users.

- **Closeout & Turnover**: We manage final inspections, punch lists, and turnover documentation, including warranties and final completion reporting, to ensure a smooth transition to occupancy and long-term facility operation.

With these services, we offer the City both the financial and contractual advantages of CMAR and the proactive project stewardship typical of agency construction management.

C. Team Identification

Our team has been carefully assembled to ensure the successful delivery of the Rogers Activity Center Expansion, with a focus on collaboration, cost control, and quality. We understand the complexities of working in occupied, active facilities and are well-prepared to manage the project's phased schedule, maintain site security, and uphold community access throughout construction. Our team will act as a trusted extension of the City, proactively managing risks, coordinating closely with the design team, and guiding the project from early planning through final completion. The City of Rogers can have full confidence in our ability to deliver a high-performing facility that reflects the community's vision and priorities.

All proposed team members have the capacity to support the Rogers Activity Center Expansion project, with no anticipated conflicts.

The team members highlighted in grey will be the core team to bring this project to life.

	Name	Role/Title
	David Hartman	**Preconstruction Manager**
	Jim Bystrzycki	**Senior Project Manager**
	Kelly Petersen	**Project Superintendent**
	Nick Gleason	**Project Executive / Director of Construction**
	Ben Britz	**General Superintendent**
	Kevin Frey	**Safety Director**
	Gordie Schmitz	**President / Principal**
	Eric Bender	**VP of Construction Operations / Principal**
	Brian Kreuser	**VP of Construction Operations / Principal**

David Hartman

Preconstruction Manager

Industry Experience

With 19 years of experience in the construction industry, David is a highly skilled Preconstruction Manager known for exceptional attention to detail and precision in cost analysis. His expertise spans industrial and commercial facilities, including large commodity storage buildings, multi-dwelling senior housing and apartment complexes, and more. Beyond estimating, David brings strong project management skills, ensuring projects are executed efficiently, on budget, and to the highest quality standards. His ability to analyze complex scopes, anticipate challenges, and deliver accurate estimates makes him an invaluable asset to every project.

Education & Certifications

Bachelor of Science in Construction Management
Minnesota State University, Mankato

Responsibilities

Project Management, Estimating, Contract Administration, Project Scheduling, Business Development

Major Projects

- OMRY Luxury 55+ Apartments – 147 units
- Pillars of Mankato, Mankato, MN – 118 unit senior housing
- Global Pointe, Golden Valley, MN – 99 unit senior housing
- Henderson Senior Living, Shakopee, MN
  51 unit independent living *Award Winner*
- Pillars of Lakeville Senior Housing – *Under Construction*
- Koda Fuel Delivery System, Shakopee, MN *Award Winner*
- By the Yard Manufacturing Plant and Show Room, Jordan, MN
- General Mills Load Out Facility, Fridley, MN
- Q-Carriers Fire Damage Re-Build, Shakopee, MN
- BASF Tenant Improvement Phase I, Shakopee, MN
- Cargill Salt Bulk Storage Fabric Building, Savage, MN
- South Dakota Wheat Growers, Tulare, SD
- Holy Family Catholic School Theater Renovation, Victoria, MN
- Valleyfair Haunt Building, Shakopee, MN
- Valleyfair Admin Phase III, Shakopee, MN

Client References

Stacy Cook
Koda Energy

Randy Quiring
Q-Carriers

Deb Anderson
By the Yard

Joe Hughes
Oppidan Investment Company

Jim Bystrzcki

Senior Project Manager

Industry Experience

With over 25 years of experience in the construction industry—23 of those in project management—Jim brings proven expertise across a wide range of delivery methods, including Construction Manager at Risk (CM@R). He has successfully led projects across the commercial sector, from complex renovations and remodels to large-scale new construction.

As a parent of two hockey-playing boys, Jim spends a significant amount of time in ice arenas and understands firsthand the functionality, flow, and operational needs of these facilities. His professional experience, paired with personal insight, brings valuable perspective to ice arena projects.

Responsibilities

Project Management, Estimating, Contract Administration, Project Scheduling, Business Development

Major Projects

- Sandhill Shores Senior Living, Stillwater, MN
- Stonebridge Lofts, 12-Story Condominium, Minneapolis, MN
- Shamrock Development - 5th Avenue Lofts, Minneapolis, MN
- Central Community Housing Trust (17 properties)
- Trinity Catholic High School, Dickinson, ND
- St. Therese Catholic School Addition & Remodel, Deephaven, MN
- Holy Family Catholic High School, Victoria, MN
- Williston High School, ND
- Minneapolis Public Schools, Multiple Remodels
- School District of Holmen, WI, Multiple Projects
- Royalton Public Schools, MN, Multiple Projects
- Pequot Lakes Public Schools, MN, Multiple Projects
- East Central Public Schools, Askov, MN
- Big Fork Schools, Big Fork, MN
- Faribault Public Schools, Multiple Elementary Schools
- St. Clair Public School Addition & Remodeling, St. Clair, MN
- Life Time Fitness, 110,000 SF Office Building
- Life Time Fitness Health Club, Multiple throughout Midwest & Northwest
- Minnesota Zoo, Multiple Projects
- Killdeer Aquatics Indoor Pool and Fitness Center, Killdeer, ND
- Honeywell, Multiple Projects
- Dickinson Public Safety Center, ND
- University of Minnesota Ruttan Hall Plaza Upgrades
- Crate & Barrel Store, Minneapolis, MN
- Sportsman's Warehouse, Woodbury, MN
- Mississippi Market, St. Paul, MN
- Target Corporation, Dozens of New Stores and Remodels
- Kohl's, Dozens of Renovations

Education & Certifications

- Bachelor of Construction Management, University of Minnesota
- Bachelor of Architecture, University of Minnesota
- LEED Accredited Professional
- OSHA 30-hour
- CPR & First Aid
- International Code Council (ICC) Certification – General Contractor A License
- International Code Council Certification – General Contractor - Bellevue

Kelly Petersen

Senior Project Superintendent

Industry Experience

Kelly brings 30 years of experience in commercial and industrial construction, including serving as the superintendent on the Page Ice Arena project. Known for his clear communication, collaborative approach, and leadership on-site, Kelly is highly respected by owners, subcontractors, and project teams alike. His strengths include an unwavering commitment to jobsite safety, deep expertise in concrete construction and excavation/elevations, and a solid track record in both remodels and new construction. Kelly's ability to maintain schedule, uphold quality, and foster strong team dynamics makes him an invaluable asset on complex projects like ice arenas.

Responsibilities

Project supervision, project and equipment scheduling, coordination of subcontractors, job site safety including weekly safety meetings, maintain construction documents and project quality control, coordinating and tracking contract completion progress.

Major Projects

- Pagel Ice Arena Addition, Minnetoanka, MN
- Starting Gate Multi-Tenant Retail, Shakopee, MN
- Next Steps Learning Center, Shakopee, MN
- Badger Hill Brewery & Taproom, Shakopee, MN
- Bravi's Craft Mexication Kitchen, Shakopee, MN
- Greystone Construction Multi-Tenant Office Building, Shakopee, MN
- JC Penney Redevelopment, Coon Rapids, Minnesota
- Holy Family Catholic School Theater Renovation, Victoria, MN
- Cities Edge Motor Sports, Shakopee, MN
- By the Yard Manufacturing Addition, Jordan, Minnesota
- Sanimax Boiler Building Addition, St. Paul, MN
- General Mills Load Out Facility, Fridley, MN
- BASF Tenant Improvement Phase I, Shakopee, MN
- Valleyfair Admin Phase III, Shakopee, MN
- Cargill AgHorizons MCC Buildings, Savage, MN
- MGK North Vestibule, Golden Valley, MN
- PraxAir Driver Building Remodel, Inver Grove Heights, MN
- Par Nuclear Mezzanine, Shoreview, MN
- MnDOT Salt Storage, Ada, MN

Nick Gleason

Director of Construction

Industry Experience

Nick has 18 years as an experienced leader with a diverse and extensive background in Real Estate, Development and Construction Management. Led, managed, and successfully delivered on a wide range of greenfield (new development) and capex commercial projects of various sizes throughout the continental United States to include large scale Commercial Development, Tenant Improvement, Retail, QSR, and Office Projects. Strong ability to multitask and communicate across disciplines managing interactions with architects, contractors, government officials and key stakeholders. Expert in contract negotiations, code interpretation and implementation, conceptual design review and ensuring projects are completed on time and on budget.

Education & Certifications

- Bachelor of Science in Business Management – St. Cloud State University
- OSHA 30 Certification

Responsibilities

Nick serves as team leader of the Commercial, Industrial, and Multifamily project management teams. In his role, Nick oversees all aspects of construction projects, including budgeting, scheduling, vendor management, quality control, safety, compliance, and communication with clients.

Major Projects

- Life Time Fitness (Tenant Improvement), Ardmore, PA
- Life Time Fitness (New Construction), Brookfield, WI
- Life Time Fitness (New Construction), Missouri City, TX
- Mangini Ranch Elementary School (New Construction), Folsom, CA
- Flying Cloud Airport Hanger (Multiple Clients), Eden Prairie, MN
- Mister Car Wash – Greenfield – Multiple locations throughout:
    - Minnesota
    - Iowa
    - Michigan
    - Wisconsin
- Go Car Wash – Greenfield – Multiple locations throughout:
    - California
    - Kansas
    - Nebraska
    - New York
    - Texas

References

Nick Koros, *Chief Development Officer*
Primrose Schools

David Chansilp, *Vice President of Development & Construction*
Primrose Schools

Pat Pauly, *Senior Vice President of Construction*
DDK Construction Inc.

Patrick Finn, *Director of Operations*
Timco Construction

Cole Van Winkle, *Director of Construction - West*
Mister Car Wash

John Studer, *Project Executive*
Ryan Companies US, Inc.

Matt Fornasiere, *Construction Manager*
Oppidan Investment Co.

Paul Rascher, *Owner / CEO*
Northern Mechanical Contractors

Chad Almjeld, *Owner / CEO*
Trucker Logistics

Ben Britz

General Superintendent

Responsibilities

Project management, project supervision, project and equipment scheduling, coordination of subcontractors, job site safety including weekly safety meetings, maintain construction documents and project quality control, coordinating and tracking contract completion progress and change order administration

Experience

- 25+ years commercial construction
- 13 years as project superintendent
- 10 years as a carpentry and metal building foreman

Major Projects

- Brentwood Terrace Senior Living
- Rahr Corporate Office Addition
- Prime Therapeutics Office Renovation
- TE Connectivity Tenant Improvement
- By the Yard Manufacturing & Retail Facility
- Koda Energy Fuel Delivery System,
- Dem-Con
- Chart Industries, Building #22
- Rainbow Play Systems
- Rahr Malting Technology Center
- Lakeville Self-Storage .
- HomeTown Bank Multi-Office Building
- SuperValu
- United Sugars
- Matt Saxe Chevrolet
- Vickerman Companies
- Cargill Deicing Salt

Client References

Kim Gibson Prime Therapeutics

Jesse Theis Rahr Malting

Deb & Roger Anderson By the Yard

Stacy Cook Koda Energy

Mark Paul Dem-Con

Randy Schuster Vickerman Companies

Matt Saxe Matt Saxe Chevrolet

Architect References

Jennifer McMaster HGA

Gene Dwyer LS Engineers

Bradley Mueller KOMA

Gordie Schmitz

President & Principal

Industry Experience

A seasoned construction executive with over 30 years of experience in industrial and commercial construction, specializing in pre-construction planning, estimating, project management, scheduling, sales, and design-build construction. As President and Principal of Greystone Construction, Gordie Schmitz provides strategic leadership, ensuring operational excellence and business growth. His expertise in navigating complex projects and fostering strong industry relationships has been instrumental in the company's success.

Responsibilities

Executive Leadership & Strategy, Pre-Construction Planning, Project & Operations Management, Estimating & Budget Oversight, Client & Stakeholder Relations, Industry Engagement & Advocacy

Major Projects

- Hawk's Point Senior Living
- Gaughan Companies, Shakopee Flats Apartments
- Pillars of Mankato Senior Living
- The Henderson Senior Living Residence
- Global Pointe Senior Living
- Rahr Malting Technology Center & Pilot Brewery
- Rahr Malting Corporate Office/Bier Stube
- Chaska Town Course Club House ★*Award Winner*
- Southern Hills Golf Course Club House
- Lakeville Liquor Galaxie ★*Award Winner*
- Pagel Ice Arena Addition
- Village Commerce Office Building ★*Award Winner*
- Voyager Office Building ★*Award Winner*
- Chart Office Building
- Second Pointe Office Building
- Waconia Dodge ★*Award Winner*
- TRIO Wolf Creek Learning Center
- Spring Lake Township Hall/ Community Center
- Holy Cross Catholic School
- Mt. Olive Lutheran Church and Classrooms
- Southbridge Crossings Office Building
- Parkview Medical Clinic
- Chart Industries LNG Facility
- Minnesota River Valley Special Education
- Microtel Inn & Suites
- Carver County Public Works Facility

Associations

- Associated Builders and Contractors
- Construction Management Association

Education & Training

- B.S. Degree in Construction Management, *Minnesota State University, Mankato*

Client References

Roger & Deb Anderson
By the Yard

Jesse Theis
Rahr Malting

Mark Pahl
Dem-Con Companies

Pat Barrett/ Joe Hughes
Oppidan

Matt Saxe
Matt Saxe Chevrolet Buick

Architect / Engineer References

Brian Gjerde
ISG

Andrew Krenik/Gary Tushie
Tushie Montgomery

Gene Dwyer
LS Engineers

Dean Beeninga
ATS&R

Steve Iaria
KOMA

Eric Bender

Vice President of Construction Operations and Principal

Industry Experience

Experienced and results-driven construction executive with 30 years of leadership in general contracting, construction management, and field operations. As Vice President of Construction Operations and a principal, Eric plays a pivotal role in overseeing complex commercial, industrial, and agribusiness projects. His expertise spans project management, concrete and masonry construction, personnel leadership, and strategic business development.

- 30 years experience at Greystone Construction
- 7 years experience as director of field operations
- 19 years experience in general construction management, concrete and masonry management
- 5 years field experience

Client References

Kim Gibson
Prime Therapeutics

Jesse Theis
Rahr Malting

Stacy Cook
Koda Energy

Steve Grinnell
Cargill Protein

Mike O'Brien
Valleyfair

Jim Rick
ADC

Architect References

Jennifer McMaster
HGA

Jeff Pflipsen
HTG

Gene Dwyer
LS Engineers

Ron Betcher
Oertel Architects

Keith Jacobson
VAA

Brady Mueller
KOMA

Responsibilities

Executive Leadership & Operations, Project & Field Management, Business Development & Client Relations, Workforce & Equipment Management, Estimating & Contract Administration, Industry Engagement & Advocacy

Associations

- Active Member of Local Chambers of Commerce, including:
  - Round Rock, TX Chamber of Commerce
  - Taylor, TX Chamber of Commerce
  - Georgetown, TX Chamber of Commerce
- ABC Workforce Development Committee Chairperson
- ABC Continuing Education Foundation – Board of Trustees
- Shakopee & Mankato Fire Departments – Retired Firefighter
- Construction Management Association of MN

Major Clients & Projects

- Prime Therapeutics
- Nutrien Ag Solutions
- Avant Energy
- Koda Energy Fuel Delivery System ★*Award Winner*
- SMCS Organics Recycling Facility
- Chart Industries ★*Award Winner*
- Rainbow Play Systems ★*Award Winner*
- Rahr Corporation
- Cargill Kitchen Solutions – Food Manufacturing
- Pennant Foods
- Par Nuclear
- Glacial Plains Coop
- United Sugars

D. Key Qualifications and Approach

ii. Related experience

Ice Arenas

Breckenridge Outdoor Ice Rink
Breckenridge, CO Award Winner

Cambridge Isanti Ice Arena - Isanti, MN

Chisago Lakes Arena - Chisago, MN

Eagan Civic Arena Addition - Eagan, MN

Forest Lake Hockey Arena - Forest Lake, MN

Fogerty Arena - Blaine, MN *Award Winner*

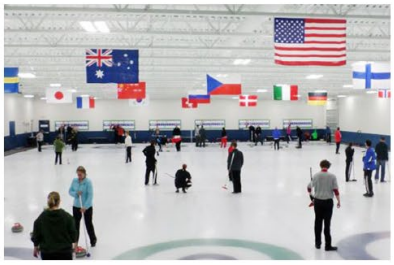
Fogerty Arena Curling Club - Blaine, MN

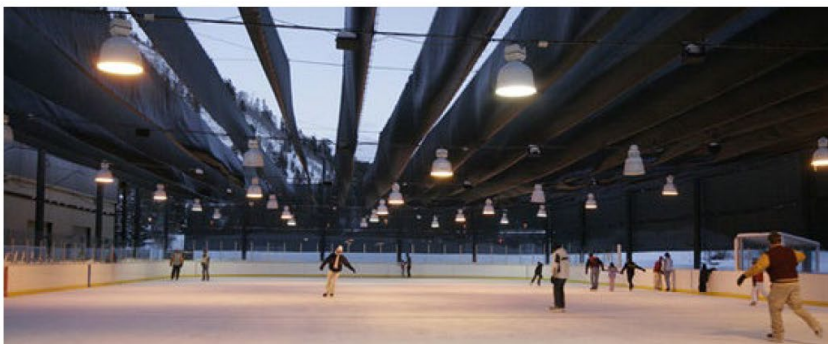
Minneapolis Edison / Northeast Ice Arena
Minneapolis, MN

Pagel II Ice Arena - Minnetonka, MN

Shakopee Ice Arena - Shakopee, MN

Tartan Ice Arena - Oakdale, MN



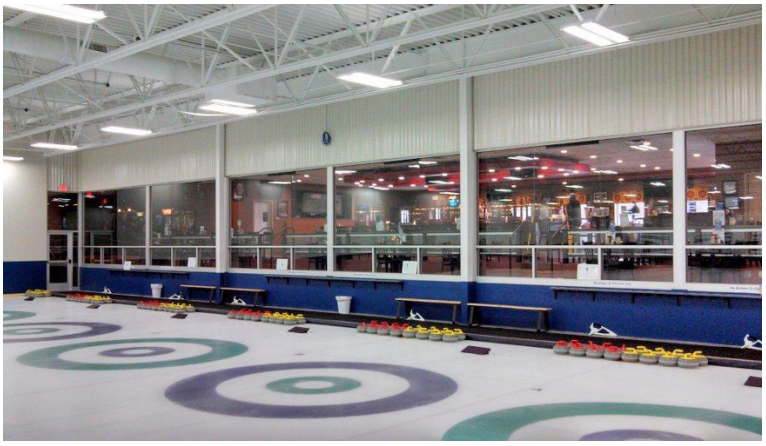


Pagel II Ice Arena Addition

- Location: Minnetonka High School, 18313 Hwy 7, Minnetonka, Minnesota
- Description: 1 NHL ice sheet addition with locker rooms, training facilities, storage, public lobby and meeting spaces. Built on a hillside, the only available land on the High School Campus.
- SF: Main level 35,536 SF; Mezzanine level 8,087 SF
- Cost: $7,500,000
- Contact: Minnesota Youth Hockey Association, Jim Van Bergen, 952-470-4099
- Owner's Agent: Oppidan, Pat Barrett, 952-294-0353
- Architect: HTG Architects, Tom Moorse, 952-278-8880

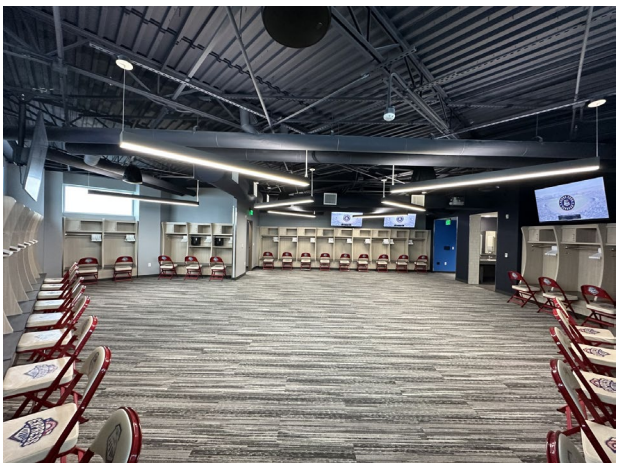
Fogerty Arena Curling Club

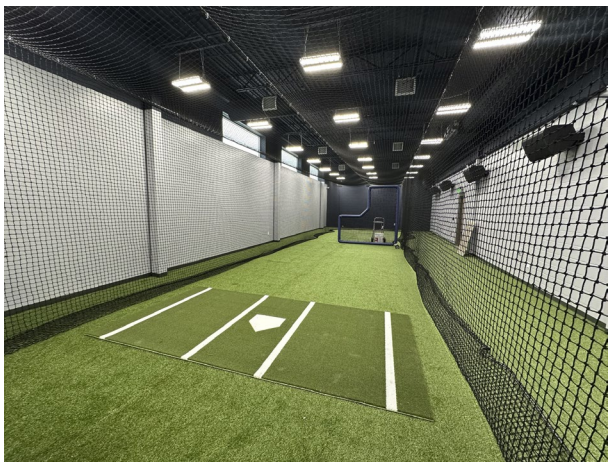
- Location: 9250 Lincoln St. NE, Blaine, Minnesota
- Description: Rink with six curling ice sheets, each 15 feet wide, and a large club room with a bar and food service. Spectator areas on three sides of the rink, including from a second-story mezzanine.
- SF: 28,000 SF
- Cost: $2,376,206 (Built in 2013)
- Contact: At the time of construction, Mark Clasen was the General Manager - (763) 780-3328
- Architect: David Linner Architects, David Linner, 952-884-6455, dlinner@linnerarchitects.com



Dell Diamond Visitor's Clubhouse

- Location: Dell Diamond, 3400 E Palm Valley Blvd, Round Rock, TX 78665
- Description: New clubhouse for visiting teams in order to meet new requirements put in place by Major League Baseball. Project involved demolition of existing pool and recreation spaces to make way for new facility to provide team locker rooms, batting tunnel, conditioning and training rooms, office space, equipment storage, and common areas for visiting teams. Also included a new secondary entrance with additional stairs and ramp leading to field.
- Cost: $4,305,749 (Completed 2025)
- Contact: Hayden Schiller, City of Round Rock, pschiller@roundrocktexas.gov
    - Chris Almendarez, President, Round Rock Express, 512-238-2214





Canterbury Park Horse Barn Redevelopment & Backside Improvements

- Location: Canterbury Park, 1100 Canterbury Rd, Shakopee, Minn.
- Description: This landmark investment in Minnesota's horse racing industry enhanced facilities for 1,000 horsepersons and 1,100 racehorses who call Canterbury home each summer. Canterbury Park partnered with Greystone to demolish outdated barns, reconfigure the practice track, construct three state-of-the-art horse barns totaling 115,200 SF, modern trainer facilities, a new stable gate entrance, and upgraded roadways. Greystone's Fabric Building and Facility Solutions divisions showcased exceptional self-perform capabilities. Collaborating with ISG, Bolton & Menk, and the City of Shakopee, the team expertly navigated SWPPP challenges, complex phasing, and utility transitions, ensuring minimal disruption while setting the stage for Canterbury's exciting future growth.
- SF: 115,200
- Cost: $14,700,000 (Completed 2024)
- Owner: Randy Sampson, Chairm and CEO, Canterbury Park, 952-496-6429

CANTERBURY PARK SHAKOPEE, MINN

September 26, 2024

RE: Canterbury Park Horse Barn Project
Shakopee, MN

To whom it may concern,

As Canterbury Park is set to complete it's 30th year of live thoroughbred and quarter horse racing, we continue to invest in and prioritize the Minnesota horse racing industry. Racing at Canterbury is an important part of the state's sports and entertainment landscape, and our loyal fanbase and facility continues to make it one of the most exciting venues for live racing in the country. The nearly 1,000 horsepersons working on the backstretch caring for and riding the 1,100 racehorses that stable there have enjoyed several improvements this season including three new 120' x 320', 103-stall horse barns.

Canterbury Park has a long-standing relationship with Greystone Construction through real estate and other construction needs at the track making them top of mind when selecting a general contractor for this racing infrastructure improvement plan. Greystone has a deep knowledge and understanding of BriteSpan. In the spring of 2024, we completed construction on these new custom fabric buildings. The state-of-the-art structures have enhanced natural light, ventilation and overall comfort for the horses and the horsepersons calling Canterbury Park home each summer, and have been a transformative investment for Canterbury.

This was a tricky project with a critical timeline, complicated phasing and entitlements, all while causing the least disruption to the equine community arriving in early May. There were no safety incidents to horses, horsepersons, or construction personnel for the project which is a testament to Greystone Construction's commitment to safety on all of their projects. Kevin O'Brien and his team were instrumental in providing cost estimating and decision making tools in the design-build process, serving as shepherds for the design professionals, engineers, horsepersons, and horse operations in the recapitalization of the backstretch. This project required extra-ordinary approvals and entailed several neighboring projects, with a bevy of stakeholders involved.

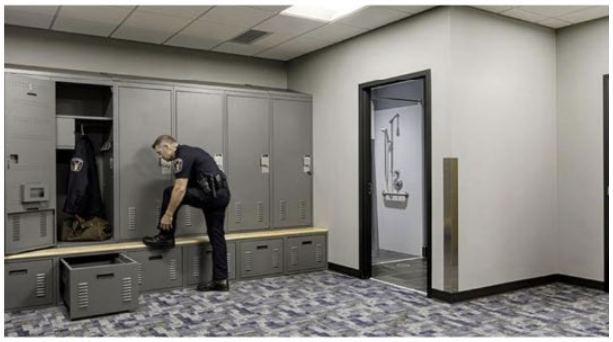
Greystone delivered exceptional skills and service, with the kind of timeliness and open communication we've come to appreciate. We greatly appreciate the professionalism and approach to this one-of-a-kind project, and look forward to the probable phases to come.

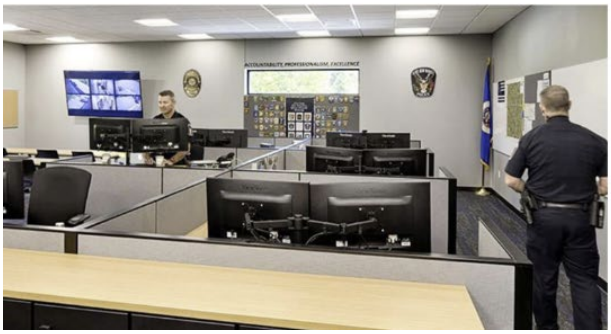
Sincerely,

Randy Sampson
Chairman and CEO, Canterbury Park

Elko New Market Police Station Addition

- Location: 601 Main Street, Elko New Market, Minnesota
- Description: Addition to existing facility including garage, evidence intake room, interview room, locker room, armory, and offices.
- SF: 6,400
- Cost: $1,933,665 (Completed 2020)
- Contact: Brady Juell, Chief of Police, 952-882-2608





Police Department | 6000 McColl Drive, Savage, MN 55378
Direct | 952-882-2600 Fax | 952-882-2615

December 12th, 2024

RE: Greystone Construction Reference Letter

To whom it may concern,

I am writing to offer my strongest recommendation for Greystone Construction as the ideal company to build the Belle Plaine Police Department. In 2020, I had the privilege of working with Greystone Construction as the Chief of Police for the Elko New Market Police Department during the development and construction of our new facility. Throughout the entire process, Greystone's expertise in building police departments was evident at every step.

Having worked with numerous construction companies over the years, I can confidently say that Greystone stands out as the best I have had the pleasure of collaborating with. Their ability to anticipate potential design and implementation challenges is unparalleled. Not only do they quickly identify issues, but they also present multiple effective solutions and work with all stakeholders to determine the best approach to resolve them. This proactive problem-solving is a key reason I trust them to handle complex and high-stakes projects like police department construction.

Beyond their technical expertise, the professionalism and positive attitude of every Greystone employee, from top management to the workers on-site, make them a pleasure to work with. They foster a cooperative and respectful environment, ensuring smooth communication and a productive working relationship throughout the entire project.

Another significant advantage of working with Greystone is their strong ties to the community. As a local company with deep connections to the southwest metro area, they bring invaluable insight and commitment to the region, which ensures a high level of accountability and local support for the project.

Without reservation, I highly recommend Greystone Construction for the building of the Belle Plaine Police Department, or any other project they may undertake. Their unmatched expertise, professionalism, and community focus make them an exceptional choice.

Please feel free to contact me if you have any questions or require further information.

Sincerely,

Chief Brady Juell
Savage Police Department
6000 McColl Drive
Savage, MN 55378

ii. Why City of Rogers should partner with the Greystone team

The City of Rogers should partner with our team because we offer a rare combination of relevant experience, hands-on leadership, and a collaborative, client-first approach tailored to community-focused projects like the Rogers Activity Center Expansion.

We bring deep expertise in ice arena construction, having built over a dozen facilities across Minnesota and beyond during a major surge in demand — experience that translates directly to the specialized systems, sequencing, and stakeholder coordination required for this project.

Importantly, we also have a successful working history with HTG Architects, including our collaboration on the Pagel II Ice Arena Addition in Minnetonka, Minnesota, among other projects. This existing relationship strengthens the foundation for seamless communication, aligned expectations, and efficient project execution from day one.

Our senior leadership team, including our President and Vice Presidents, remains actively involved and accessible throughout the project, providing steady oversight, accountability, and strategic guidance. This level of engagement is a clear differentiator and ensures the City has the full support of a deeply experienced team.

We understand the complexity of working in occupied public facilities and will prioritize safety, security, and clear communication at every step. Our team excels in managing multiple bid packages, engaging local contractors, and adapting schedules to minimize disruption while maintaining quality and efficiency.

Finally, we approach every project as a long-term partnership. Our role is more than just delivering a building — it’s helping the City of Rogers maximize its investment, strengthen community infrastructure, and deliver a space that residents can take pride in for years to come.

iii. Brief description of project administration

Our approach to administering the Rogers Activity Center Expansion project is grounded in clear communication, proactive planning, and strong on-site leadership.

We will assign a dedicated Senior Project Manager who will lead the day-to-day administration of the project, supported by a full-time site superintendent and our in-house project management team. This team will oversee all aspects of construction, including coordination of trade contractors, schedule management, cost control, quality assurance, and safety compliance.

We will implement a structured communication process that includes regular progress meetings, timely and thorough meeting minutes, and transparent reporting on budget, schedule, and any emerging issues. Our team will collaborate closely with the City and the architect, maintaining open lines of communication to support timely decision-making and alignment.

Our senior leadership will remain engaged throughout the project, offering oversight, resolving challenges quickly, and ensuring the project stays on track and true to the City's vision.

This disciplined, hands-on approach ensures accountability, responsiveness, and a high-quality result the Rogers community can be proud of.

E. Supplemental Information

Our team brings a combination of technical expertise, collaborative spirit, and client-focused service that adds meaningful value to the Rogers Activity Center Expansion project. Key value-added attributes include:

- **Extensive Ice Arena Experience:** When the Mighty Ducks movie franchise sparked a surge in hockey and skating programs in the 1990s, Greystone was on the front lines—building over a dozen ice arenas across Minnesota and even as far as Breckenridge, Colorado. That legacy of specialized facility construction continues today, and we bring a deep understanding of the unique planning, systems, and coordination required for successful ice arena delivery.

- **Client-Centered Approach:** We treat every project as a true partnership, working as a trusted advisor to help clients make informed decisions that balance quality, budget, and long-term performance.

- **Established Relationship with HTG Architects**: We've successfully partnered with HTG Architects on multiple projects, including the Pagel II Ice Arena Addition in Minnetonka. This existing working relationship provides a strong foundation of mutual trust, efficient communication, and aligned expectations—positioning the project team for immediate collaboration and project momentum.

- **Senior Leadership Involvement:** This project will benefit from the direct support and oversight of our Executive / Ownership team, who collectively bring a combined 125+ years of construction experience. Their involvement ensures the project stays aligned with client goals, maintains accountability across all phases, and draws on a deep well of industry knowledge. In addition to the day-to-day leadership of our Senior Project Manager, our executive team remains actively engaged and accessible, offering another layer of support to the City and helping navigate any challenges that arise with confidence and clarity.

- **Experience in Occupied Facilities:** We understand the challenges of construction in active community spaces and are well-versed in maintaining safety, access, and security while keeping projects on track.

- **Collaborative Tech Advantage:** We provide access to Procore and Bluebeam Studio to streamline communication, enhance collaboration, and centralize project documentation. These cloud-based tools allow team members to submit, review, and edit documents in real time, ensuring faster turnaround, improved coordination, and clear accountability. With instant access to reports, permits, test results, and meeting records, our platform promotes transparency, responsiveness, and consistent quality control throughout the project—from design through closeout.

- **Commitment to Local Participation:** We will actively seek to engage qualified local contractors and suppliers, supporting the local economy while maintaining competitive pricing.

- **Flexible, Scalable Team Structure:** Our team is built to efficiently manage complex logistics, multiple bid packages, and evolving project needs from preconstruction through closeout.

These strengths—combined with our deep community experience and long-standing track record in recreation facility construction—position us to deliver an outstanding result for the City of Rogers.

F. Cost Proposal

DIVISION	DESCRIPTION	COSTS	COMMENTS
01	DESIGN AND ENGINEERING TOTAL	$0.00	See scope checklist
01	PERMITS & FEES TOTAL	$1,500.00	See scope checklist
01	INSURANCE & BONDS TOTAL	$71,400.00	See scope checklist
01	TESTING & SPECIAL INSPECTIONS TOTAL	$30,000.00	See scope checklist
01	SPECIAL CONDITIONS	$60,000.00	See scope checklist
02	EXISTING CONDITIONS	$30,000.00	See scope checklist
03	CONCRETE	$2,224,576.00	See scope checklist
04	MASONRY	$0.00	See scope checklist
05	METALS	$776,920.00	See scope checklist
06	WOOD, PLASTICS, & COMPOSITES	$56,800.00	See scope checklist
07	THERMAL & MOISTURE PROTECTION	$616,220.00	See scope checklist
08	OPENINGS	$343,556.00	See scope checklist
09	FINISHES	$644,530.00	See scope checklist
10	SPECIALTIES	$214,300.00	See scope checklist
11	EQUIPMENT	$0.00	See scope checklist
12	FURNISHINGS	$71,000.00	See scope checklist
13	SPECIAL CONSTRUCTION	$3,355,680.00	See scope checklist
14	CONVEYING EQUIPMENT	$0.00	See scope checklist
21	FIRE SUPPRESSION	$103,249.00	See scope checklist
22	PLUMBING	$528,000.00	See scope checklist
23	HEATING, VENTILATING, & AIR CONDITIONING (HVAC)	$950,000.00	See scope checklist
25	INTEGRATED AUTOMATION	$0.00	See scope checklist
26	ELECTRICAL	$537,000.00	See scope checklist
27	COMMUNICATIONS	$0.00	See scope checklist
28	ELECTRONIC SAFETY & SECURITY	$0.00	See scope checklist
31	EARTHWORK	$178,800.00	See scope checklist
32	EXTERIOR IMPROVEMENTS	$0.00	See scope checklist
33	UTILITIES	$45,735.00	See scope checklist
	Construction Subtotal	$10,839,266.00	
Supplements			
	General Conditions - Construction	$426,712.00	Includes 40hr/week on site project supervision
	Reimbursables - Construction	$63,375.00	
	Preconstruction/Bidding Services	$48,128.00	
	Winter Conditions	$50,000.00	Allowance
	Construction Contingency - **4%**	$457,099.00	
	Contractors Fee - **3%**	$342,825.00	
	Total Project Budget Range	**$11,950,000 - $12,650,000**	
	Alternates		
	Alt #1: Ammonia Refrigeration System In Lieu of 513A Refrigeration	**$515,000**	**ADD**

GREYSTONE CONSTRUCTION

Budget Clarifications
prepared for

Rogers Ice Arena
Rogers, Minnesota

Based on plans HTG plans dated 3/12/25

Inclusions & Exclusions

Date: 3/28/25

			Notes
DESIGN AND ENGINEERING	**Included**	**Excluded**	
Architectural Design		X	
Structural Engineering		X	
Civil Engineering		X	
Architectural / Structural Reimbursables		X	
Grading Utility As-Built		X	
Preliminary / Final Platting		X	
Landscape Design		X	
Plumbing Design		X	
HVAC Design		X	
Fire Protection Design		X	
Electrical Design		X	
Interior Design/Decorating		X	
PERMITS AND FEES	**Included**	**Excluded**	
Building Permit / Plan Review Fee		X	
(SAC) Sewer Access Charge		X	
(WAC) Water Access Charge		X	
Park Dedication Fees		X	
Conditional Use/Planned Unit Development Permit Fees		X	
Landscape Bond / Escrow		X	
Food Service Plan Review / Permit		X	
Electrical Service Hook-Up Cost		X	
Gas Service Hook-Up Cost		X	
Lock Box	X		
Fire Department Signage	X		
Stormwater Management Permit		X	
State Plumbing Permit		X	
INSURANCE & BONDS	**Included**	**Excluded**	
Payment & Performance Bond	X		
Builders Risk Insurance	X		
TESTING & SPECIAL INSPECTIONS	**Included**	**Excluded**	
Soil Borings		X	
Concrete / Soil Testing, Special Inspections	X		
WINTER CONDITIONS	**Included**	**Excluded**	
General Winter Conditions	X		Allowance
SPECIAL CONDITIONS	**Included**	**Excluded**	
Surveying	X		
Temporary Service/Generator		X	
Temporary Dehumidification		X	
Temporary Utilities		X	Existing site. Usage costs by owner
Temporary Fencing	X		
General Clean Up	X		
Final Cleaning	X		
Jobsite security monitoring	X		
Street Sweeping	X		As needed

PRE-CON SERVICES	Included	Excluded	
Pre-Construction Services	X		
GENERAL CONDITIONS	**Included**	**Excluded**	
Project Management	X		
Assistant PM	X		
Project Supervision	X		
Safety Director	X		
REIMBURSABLES	**Included**	**Excluded**	
Procore Project Management	X		
Project Office	X		
Project Office Equipment	X		
Hotel/Lodging		X	
Mobilization / Demobilization	X		
Safety Requirements (Supplies)	X		
Project Identification (Construction Signs)	X		
Dumpsters	X		
Project Vehicles	X		
Misc. Supplies	X		
Drawing Reproduction	X		
Shipping, Freight & Potage	X		
Portable Toilets	X		
EXISTING CONDITIONS	**Included**	**Excluded**	
Building Demolition	X		As needed for building tie in
CONCRETE	**Included**	**Excluded**	
Cast-in-Place Concrete	X		
Poured Concrete Foundation Walls		X	Precast stem walls down to footing
Slab on Grade	X		
Rink Slab on Grade	X		
Precast Walls/Hollowcore	X		Architectural walls/hollowcore mezzanine floor
Exterior Insulated Panels	X		
Interior Non-Insulated Panels	X		
Hollowcore Plank	X		Mezzanine Floor
MASONRY	**Included**	**Excluded**	
Block		X	No masonry on plans
Brick Veneer		X	
Stone Veneer		X	
METALS	**Included**	**Excluded**	
Structural & Misc. Steel Supply & Erection	X		
Trash Gate	X		
Ships Ladder	X		
Bollards	X		
WOOD, PLASTICS, & COMPOSITES	**Included**	**Excluded**	
Rough Carpentry	X		
Finish Carpentry	X		
THERMAL & MOISTURE PROTECTION	**Included**	**Excluded**	
Thermal Insulation	X		As a part of precast wall system
Foundation Waterproofing		X	
Foundation Insulation	X		As a part of precast wall system
Sprayed Insulation	X		Allowance
Siding		X	
Membrane Roofing	X		Fully adhered EPDM
Standing Seam Metal Roofing		X	
Gutters and Downspouts		X	
Soffit		X	
Sheet Metal Flashing and Trim	X		
Applied Fireproofing		X	
Joint Sealants (Caulking)	X		Allowance

OPENINGS	Included	Excluded	
Hollow Metal, Wood Doors, Frames & Hardware	X		
Overhead Door(s)	X		
Aluminum Entrances & Storefronts	X		
Mirrors	X		
Automatic Door Operators	X		Handicap entrance only
FINISHES	**Included**	**Excluded**	
Gypsum Board & Taping	X		
Steel Stud Framing	X		
Tiling (Ceramic, Quarry, Porcelain)	X		
Acoustical Ceilings	X		
Carpeting (& Resilient Flooring)	X		CPT-1; M1: RF-1; RF-2 & VB-1
Polished Concrete Floors	X		PC-1
Painting	X		
Wallcovering		X	
SPECIALTIES	**Included**	**Excluded**	
Interior Signs	X		
Exterior Signs		X	Custom logo by owner
Monument Sign		X	
Parking Lot Signs	X		
Fire Dept. Signage	X		
Toilet Compartments / Partitions	X		
Toilet Accessories	X		
Fire Extinguishers & Cabinets	X		
Varsity Lockers	X		
Locker Room Benches	X		
Awnings		X	
EQUIPMENT	**Included**	**Excluded**	
Residential Appliances		X	
Commercial Foodservice Equipment		X	
FURNISHINGS	**Included**	**Excluded**	
Window Treatments		X	
Casework		X	
Countertops		X	
Window Sills		X	
SPECIAL CONSTRUCTION	**Included**	**Excluded**	
Rink System	X		
Refrigeration Mains	X		
Sub-floor Heating System	X		
Fine Grading	X		
Rink Floor Insulation	X		
Vapor Barrier	X		
Reinforcing Steel	X		
Rink Floor System	X		
Mesh	X		
Rink Concrete Slab	X		
Expansion Joint	X		
Refrigeration System	X		513A refrigeration system (see alternates for ammonia system)
Electrical	X		From MCC to refrigeration system
Dasher Boards/Glass	X		
Benches/Penalty Boxes	X		
Bleachers	X		Covered aluminum plank (3) row

CONVEYING EQUIPMENT	Included	Excluded	
Elevator(s)		X	
Trash Chute(s)		X	
FIRE SUPPRESSION	**Included**	**Excluded**	
Wet-Pipe Sprinkler systems	X		
Dry-Pipe Sprinkler systems		X	
PLUMBING	**Included**	**Excluded**	
Plumbing	X		
Plumbing Permit	X		
Plumbing Design		X	
Main Level Men's & Women's	X		
Family Single Restroom	X		
Locker/Shower	X		
Mezz Men's & Women's	X		
Refrigeration Plant Room	X		
Sprinkler Room	X		
Laundry Room	X		
Roof Drains	X		
HEATING, VENTILATING, & AIR CONDITIC	**Included**	**Excluded**	
HVAC	X		
HVAC Permit	X		
HVAC Design		X	
Desiccant Rotor	X		
RTU's	X		
Unit Heaters	X		
Radiant Heaters	X		
MUA's	X		
GRD's	X		
Electric Heaters	X		
EF's	X		
Duct Distribution	X		
Gas Piping	X		
ELECTRICAL	**Included**	**Excluded**	
Electrical	X		
Electric Permit	X		
Power Distribution	X		
Light Fixtures	X		
Voice & Data Wiring	X		Conduit rough in ONLY
Security System		X	
Fire Alarm System	X		
Set MCC Cabinet for Refrigeration System	X		
Emergency Responder Communication Enhancement System		X	
Emergency Stand-by Generator		X	
EARTHWORK	**Included**	**Excluded**	
Earthwork	X		Excavation/backfill for rink building footprint ONLY
Temp. Roads / Staging		X	
Rock Excavation		X	
Soil Corrections		X	
Aggregate Piers		X	
EXTERIOR IMPROVEMENTS	**Included**	**Excluded**	
Asphalt Paving		X	
Concrete Paving		X	
Curb & Gutter		X	
Sidewalks	X		To only the extent immediately around the ice rink building
Fencing		X	
Retaining Walls		X	
Site Furnishings (Racks, Benches, Trash)		X	
Landscaping & Irrigation		X	

UTILITIES	Included	Excluded	
Sanitary Sewer	X		Assumed utilities are brought within 5'-10' of building by others
Domestic Water Service	X		Assumed utilities are brought within 5'-10' of building by others
Fire Protection Water Service	X		Assumed utilities are brought within 5'-10' of building by others
Storm Sewer Service / Structures		X	
Retention Pond		X	
CONTRACTOR CONTINGENCY	**Included**	**Excluded**	
Contractor Contingency	X		
WAGE REQUIREMENTS	**Included**	**Excluded**	
Prevailing Wage		X	Assumed NO prevailing wages
Specific Scope Items			
Base BID/BUDGET/ROM:			
Base BUDGET	***SEE BUDGET BREAKDOWN***		
Standard Exclusions			
Appraisal Costs, Asbestos Abatement, Bedrock Excavation & Backfill, Building Permit (unless noted in General Conditions), Closing Costs, Contaminated Soil Cleanup & Disposal, Dewatering, Environmental Investigation & Remediation, Frost Ripping, Furniture, Fixtures & Equipment, Lead Based Paint Removal, Liquidated Damages, Methane Gas Monitoring, Perc Tests, Private Underground Utility Locates, Site Surveys, Subsurface Investigation, Telephone Systems, Unforeseen Subsurface Conditions			
Market Provisions			
Greystone is committed to being your trusted team partner on your project. We are asking all of our clients recognize the volatility of our markets and understand we are providing current pricing for budgeting purposes with the need to adjust final project pricing based on the markets at the actual time of the order. It's important to provide you with the best value for your project, and we do no want to speculate where the actual market rates will be at the time of procurement and/or delivery			
Pricing is based on current market conditions and does not include the impact of **any current or other future tariffs**, surcharges, price escalation, or fees. (i.e., many wholesalers and manufacturers are not committing to pre-determined pricing for pre-ordered materials. These materials are priced at the time of the delivery.) Due to extremely volatile markets, pricing shall be re-evaluated at time of procurement and/or delivery. Any savings or additional cost would be communicated with Owner prior to procurement and/or delivery			
Price increases will be assigned as contingency. Unless Greystone specifically outlines a contingency value in our proposal or scope of work, it is recommended that the Owner carry a contingency			
Construction schedule may be affected by material shortages or lead times beyond our control. Any shortages or lead time issues will be communicated with the owner. Evaluation of alternatives will be reviewed, and the contract schedule or costs may be adjusted accordingly			
Unless noted otherwise proposal pricing is valid for 30 days			

CONSTRUCTION MANAGER AT RISK

City of Rogers
MidAmerican Energy Company Rec Plex Expansion

Prepared by:

Marco Hunt
Sr. Business Development Executive & QA-QC

3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448
Phone: 612.270.5428
Email: MarcoH@inBYLT.com
Web: www.inBYLT.com

Proposal issued:
March 28, 2025

City of Rogers- Construction Management at Risk Services-For Rogers Activity Center Expansion

inBYLT, LLC is honored to submit our response to the City of Rogers Request for Proposal for the Construction Management at Risk Services-For Rogers Activity Center Expansion. We are pleased to present the enclosed information about our team, including our experienced professionals, our proven collaborative approach, our understanding of the critical elements of this project, and the value we will bring to the City of Rogers.

inBYLT is a leading construction management and design firm specializing in delivering high-quality projects with a focus on efficiency and innovation. Our expertise extends beyond traditional construction management to include energy efficiency solutions, allowing us to provide comprehensive support for projects like this one. We take a strategic approach to integrating construction and operational considerations, ensuring long-term value for our clients. Additionally, we help municipalities and organizations navigate external funding opportunities, such as rebates, grants, and tax credits. With the passage of the Inflation Reduction Act, cities like Rogers can now access significant tax credits for energy-related projects, and inBYLT has developed proprietary technology and processes to maximize these opportunities.

We are confident that our team is uniquely positioned to deliver a successful outcome for the Rogers Activity Center Expansion project due to three key reasons:

Understanding Rogers: The City of Rogers is a dynamic and growing community dedicated to enhancing recreational opportunities and fostering a high quality of life for its residents. As the city continues to expand, so does the need for modern, efficient, and accessible facilities that serve both current and future generations. The Rogers Activity Center Expansion reflects the city's commitment to providing premier recreational space that supports local athletics, community engagement, and overall well-being.

- inBYLT is uniquely positioned to align with the City of Rogers' vision for this project. With a deep understanding of municipal facility construction and a proven track record in managing complex recreational developments, inBYLT brings expertise in delivering high-quality, cost-effective solutions tailored to community needs. Our approach prioritizes collaboration, sustainability, and efficiency, ensuring that the Rogers Activity Center Expansion is executed seamlessly—from planning through completion.

- By partnering with the City of Rogers, inBYLT is committed to upholding the city's goals of delivering a state-of-the-art facility that enhances community engagement, supports economic development, and provides long-term value for residents.

Proven Expertise in Municipal Ice Arena Construction: inBYLT has an extensive track record of successfully managing municipal construction projects. Whether constructing new facilities or rehabilitating existing ones, our focus on quality, efficiency, and innovation ensures outstanding results.

Leadership in Sustainability and Energy Efficiency: Over the past decade, we have completed numerous projects emphasizing sustainability, energy efficiency, and carbon footprint reduction. We have guided several facilities to achieve energy neutrality, reflecting our leadership in integrating environmentally responsible solutions.

We are excited about the opportunity to collaborate with the City of Rogers, Rogers Activity Center Expansion Project. By applying our knowledge, experience, and commitment to excellence, we aim to deliver a project that exceeds expectations and contributes meaningfully to the Rogers community.

Sincerely,

Marco Hunt

Marco Hunt
Sr. Business Development Executive/QA-QC

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ABOUT US

Founded in 2012, inBYLT (Formerly Apex Facility Solutions, LLC) is a limited liability corporation employing 29 professionals. Founders, Mark Rasmussen and Greg Ackerson set out to establish a new standard in the construction industry by listening to our clients. Our mission is to redefine how construction projects are developed, designed, and delivered — focusing on community centers and ice arenas — while also making a difference in the world.

Privately owned and led by Mark and Greg, our mission and purpose have not changed as we always strive to construct each project with the highest-quality workmanship, completed on time and on budget. We also contribute to a better world with our inBYLT Foundation, which gives back 10% of our annual profit each year to charities in the communities in which we live and work.

inBYLT is a trusted Construction Management firm with extensive experience in building and renovating ice arenas across the Midwest as shown in Section C of our response. We take pride in not only delivering high-quality facilities but also incorporating value-enhancing features that improve long-term maintenance and operational efficiency. Our expertise ensures that facilities managed by inBYLT operate at a superior level compared to others in the industry.

As pioneers in refrigeration control sequences, we have helped develop industry standards that optimize performance and energy efficiency. Additionally, we prioritize accessibility and operational functionality, resulting in a safer working environment and reduced ongoing operational costs.

Beyond Construction Management, inBYLT offers a wide range of specialized services, including:

- Project delivery under multiple methods, including CMAR, CMA, Design-Build, and Energy Contracts
- Mechanical Engineering Services
- Commissioning and Recommissioning Services
- Energy Engineering Services
- Expertise in energy conservation and renewable energy solutions (geothermal & solar)
- Assistance with Grants, Rebates, and Tax Incentives
- Water Treatment Solutions, including Leachate Treatment and PFAS Removal

WE BUILD MEANINGFUL WORKING RELATIONSHIPS WITH OUR CLIENTS!

We pride ourselves in building long-term relationships with our clients by always keeping their vision and goals at the forefront of each project. The quantity of long-standing relationships we have is a testament to our reputation and the high quality of service and construction we bring.

OFFICE LOCATIONS

Coon Rapids Office 3495 Northdale Blvd. NW, Suite 230 Coon Rapids, MN 55448

Phone: 612-270-5428

Website: www.inBYLT.com

Brooklyn Park Office

8475 Xerxes Ave N
Brooklyn Park, MN 55444

Financial Stability

inBYLT has strong financial stability with adequate bonding capacity through a nationally recognized surety provider, ensuring full compliance with performance and payment bond requirements. With a current backlog of $76 million in projects, our proven project management approach allows us to efficiently allocate resources, maintaining high-quality execution and schedule adherence across all projects.

OUR TEAM

AMAZING PEOPLE WORKING AS A TEAM

MARK RASMUSSEN P.E., LEED AP

Chief Operating Officer

Phone: 612.581.0219
Email: MarkR@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Mark is one of two founding partners of inBYLT. He has worked extensively with municipalities including the design and development of numerous projects at police, fire, community centers, parks, public works, city centers, water treatment, and wastewater treatment plants. In addition, Mark has worked in projects including industrial manufacturing, power production and renewables. He has brought to his work a focus on energy efficiency balanced with cost controls which has made his projects some of the most efficient facility solutions around.

KEN SEILER (PRIMARY CONSTRUCTION CONTACT)

Sr. Project Manager

Phone: 763.276.8142
Email: KenS@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Ken brings 35+ years of construction management experience, overseeing projects from minor service work to full-scale buildings. He has worked with national corporations, retail chains, charter schools, churches, universities, counties, and small business owners. As project manager, Ken leads every phase, ensuring schedules, budgets, and quality standards are met. He closely monitors daily performance, keeping the project team aligned with overall goals while maintaining clear communication with the owner and design team throughout.

MARCO HUNT (PRIMARY RFQ CONTACT)

Sr. Business Development Executive/QA-QC

Phone: 612-270-5428
Email: MarcoH@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Marco will serve as a key point of contact for the City of Rogers to ensure a seamless partnership from project inception to completion. He works to understand the City's needs, align company resources, and deliver tailored solutions that add value and drive project success. Additionally, he facilitates communication, provides strategic insights, and ensures the City's objectives are met through innovative and cost-effective construction management approaches.

OUR TEAM

AMAZING PEOPLE WORKING AS A TEAM

RICK BROWN

Site Superintendent

Phone: 612.750.6312
Email: RickB@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Rick's robust skill set encompasses a wide range of responsibilities and expertise within the construction and engineering sectors, which is a testament to his dedication and his ability to adapt and thrive in various roles. Rick is instrumental in implementing innovative solutions, ensuring projects are completed on time, within budget, and to the highest quality standards. His valuable leadership and technical knowledge help the team drive projects forward with precision and efficiency

ROB KRUKOSKI, P.E.

Sr. Mechanical Manager

Phone: 763-218-9572
Email: RobK@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Rob entered the industry in 2005, starting as a mechanical engineer with an energy service company focused on energy efficiency upgrades and HVAC replacements. Rob is now a key inBYLT team member working as a senior project development engineer on a variety of projects. He excels in developing energy-efficient HVAC systems as well as other facility improvements.

BOB WILLIAMS

Safety Director

Phone: 763.417.9599
Email: Bob@OECScomply.com

Address: 1000 Shelard Pkwy., Suite 140
St. Louis Park, MN 55426

Bob's expertise in safety management is critical in reducing workplace incidents and enhancing the overall safety culture. His proactive approach ensures that safety protocols are adhered to, understood, and embraced by all team members. Bob communicates complex safety concepts in a simplified way, making him a vital asset for companies enhancing safety standards. His commitment to continuous improvement and education keeps him at the forefront of safety innovations and best practices.

OUR TEAM

AMAZING PEOPLE WORKING AS A TEAM

Jeff Johnson

Estimator

Phone:763-44-1046
Email: JeffJ@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Jeff's robust skill set encompasses a wide range of responsibilities and expertise within the construction and engineering sectors, which is a testament to his dedication and his ability to adapt and thrive in various roles. Jeff is instrumental in implementing innovative solutions, ensuring projects are completed on time, within budget, and to the highest quality standards. His valuable leadership and technical knowledge help the team drive projects forward with precision and efficiency

Nick Miller

Assistant Project Manager

Phone: 904-864-6937
Email: NickM@inBYLT.com

Address: 3495 Northdale Blvd. NW, Suite 230
Coon Rapids, MN 55448

Nick entered the industry in 2017, starting as a Project Manager. Nick is now key to the inBYLT team member working as a Assistant project manager on a variety of projects. He excels as an Assistant Project manager he closely monitors schedules, budgets, so that quality standards are met .He also monitors daily performance, keeping the project team aligned with overall goals while maintaining clear communication.

MARK **RASMUSSEN**

FOUNDING PARTNER, CHIEF OPERATING OFFICER & PROJECT EXECUTIVE

WORK EXPERIENCE

2012-Present, inBYLT
CHIEF OPERATING OFFICER

2009-2012, McKinstry
PROJECT DIRECTOR

1999-2009, Newmech
MANAGING DIRECTOR

1995-1999, Bonestroo and Assoc.
CIVIL ENGINEER

EDUCATION

Bachelor of Science - Business Management

Bachelor of Science - Geological Engineering

UNIVERSITY OF MINNESOTA

PROFILE

Mark is one of two founding partners of inBYLT. He has worked extensively with municipalities including the design and development of numerous projects at police, fire, community centers, parks, public works, city centers, water treatment, and wastewater treatment plants. In addition, Mark has worked in projects including industrial manufacturing, power production and renewables. He has brought to his work a focus on energy efficiency balanced with cost controls which has made his projects some of the most efficient facility solutions around.

CONTACT

MarkR@inBYLT.com
612-581-0219
www.inBYLT.com

PROJECT EXPERIENCE

City of Brooklyn Park, MN, City of St. Cloud, MN, City of Alexandria, MN, City of Lakeville, MN
Anoka Area Ice Arena, MN,
Freeborn County, MN
City of Elk River, MN, Rockford Park District, IL, City of Woodbury, MN, City of Maple Grove, MN, City of Albert Lea, MN, City of Chisholm, MN, City of Hastings, MN, City of Delano, MN

DUTIES

In his role Mark will guide the team through the pre-construction phase and oversee the construction process alongside our senior project manager and the project team. Mark will bring his knowledge of operations and energy efficiency to help develop and build a highly functional and efficient building.

RICK **BROWN**

SR. SITE SUPERINTENDENT

WORK EXPERIENCE

2023-Present, Apex
SR. SITE SUPERINTENDENT

2022-2023, Associated Mechanical
PROJECT MANAGER

2016-2022, Absolute Mechanical
FIELD SUPERVISOR AND PROJECT MANAGER

EDUCATION

Associated Builders & Contractors

CONSTRUCTION EDUCATION/MANAGEMENT INSTITUTE

PROFILE

With 34 years of experience in commercial construction, Rick brings a wealth of expertise to his role as Site Superintendent for this project. His extensive background spans various sectors, including municipal, arena, commercial, healthcare, and education projects. Over the course of his career, Rick has served in diverse roles such as field supervisor, lead foreman, and project manager, affording him a comprehensive understanding of project management from various perspectives. He recognizes the significance of collaborating closely with engineers, architects, and owners to ensure successful project outcomes.

CONTACT

RickB@inBYLT.com
(612) 750-6312
www.inBYLT.com

PROJECT EXPERIENCE

City of Mankato, MN
City of St. Peter, MN
City of New Ulm, MN
Mayo Clinic Health System - Mankato, MN
New Ulm Medical Center, MN
Mankato EMR & Clinics, MN
Minnesota State University - Mankato, MN
Bethany Lutheran College, MN
Gustavus Adolphus College, MN

DUTIES

- Contract negotiations
- Developing project budgets
- Implementation of safety programs
- Project quality control
- Developing and maintaining project schedule
- Manage subcontractors
- Manage field operations
- Project close out

ROB KRUKOSKI, P.E.

SENIOR MECHANICAL ENGINEER

WORK EXPERIENCE

2015-Present, inBYLT
SENIOR PROJECT DEVELOPMENT ENGINEER
2009-2015, Ameresco
SENIOR PROJECT DEVELOPMENT ENGINEER
2004-2009, Johnson Controls
PROJECT DEVELOPER

EDUCATION

Bachelor of Science - Mechanical Engineering
UNIVERSITY OF KENTUCKY
Masters of Science - Management of Technology
UNIVERSITY OF MINNESOTA

PROFILE

Rob entered the industry in 2005 starting as a mechanical engineer working for an energy service company focused on energy efficiency upgrades and HVAC replacements.

Rob has since become a key inBYLT team member working as a senior project development engineer on a variety of projects. He has been working in the industry for 16 years and has gained a strong skill set for the development of energy efficient HVAC systems as well as other facility improvements.

CONTACT

RobK@inBYLT.com
763-218-9572
www.inBYLT.com

PROJECT EXPERIENCE

City of Brooklyn Park, MN
City of St. Cloud, MN
City of Alexandria, MN
Forest Lake Area School District, MN
Freeborn County, MN
City of Maple Grove, MN
City of Eden Prairie, MN
Fulda Public Schools, MN
Fridley Public Schools, MN
City of Lakeville, MN
Rockford Park District, IL
City of Woodbury, MN
City of Coon Rapids, MN
Shattuck-St. Mary's Prep School, MMN

DUTIES

In his role, Rob will provide engineering review and energy engineering in the pre-design and the design phases of the project. Rob will also be involved in technical review during construction and commission phases of the project.

KEN SEILER

PROJECT MANAGER

WORK EXPERIENCE

2021-Present, inBYLT
SENIOR PROJECT MANAGER
2011-2020, Adolfson & Peterson Constr.
SENIOR PROJECT MANAGER
2008-2011, Crawford Merz Construction
SENIOR PROJECT MANAGER
1997-2008, McGough Construction
PROJECT MANAGER

EDUCATION

Bachelor of Arts - Business Administration
ST. JOHN'S UNIVERSITY

PROFILE

Ken brings over 35 years of construction management experience to inBYLT, managing projects from minor service work to large-scale construction. His diverse background includes community centers, ice arenas, and projects for municipalities and national corporations. As a leader, Ken oversees each project from preconstruction to closeout, ensuring adherence to schedules, budgets, and quality standards while promoting collaboration. His proactive leadership fosters seamless communication among owners, design teams, and stakeholders, driving successful project outcomes and delivering quality and value throughout.

CONTACT

KenS@inBYLT.com
763-276-8142
www.inBYLT.com

PROJECT EXPERIENCE

Mankato Civic Center and Arena, MN
Rockford Park District, IL
Forest Lake Area School District, MN
City of St. Cloud, MN – MAC
University of Minnesota, MN
Freeborn County, MN
City of Lakeville, MN
North Branch Youth Hockey Assoc, MN
Fridley Public School District, MN
Ramsey County Maplewood Library, MN
Ecolab Research and Dev Facility, MN

DUTIES

Ken's role in the project includes estimating, scheduling, and value engineering during preconstruction for a strategic, cost-effective approach. He defines and verifies bid package scopes to align with project goals. Throughout construction, he ensures financial efficiency and accountability through cost estimating and control oversight. Ken also fosters collaborative relationships with subcontractors, vendors, and team members to ensure seamless coordination and project success.

MARCO HUNT

SR. BUSINESS DEVELOPMENT EXECUTIVE/QA-QC

WORK EXPERIENCE

2020-Present, inBYLT
Business development executive

2019-2020, Gartner Refrigeration
Director of marketing & business development

2014-2017, Harris Companies
Maintenance sales rep team leader

2017-2019, McKinstry, WA
Energy Account Executive

2011-2014, Trane/Ingersoll-Rand
Account manager, comprehensive solutions

EDUCATION

Bachelor of Science - Marketing
Minor in Mathematics
Bemidji state university, MN

PROFILE

Marco drives inBYLT Ice Arena Market. A lifetime in the hockey world as a player, coach and referee fuels Marco's passion in this world. Marco plays a key role in the strategic development of all construction projects for ice arenas. Marco is an exceptional communicator with award winning account management skills, above and beyond problem-solving abilities, and a keen client needs assessment aptitude. Marco's tenacity, innovation, organization drive and strong work ethic make him a integral part of the inBYLT team.

CONTACT

MarcoH@inbylt.com
612-270-5428
www.inBYLT.com

PROJECT EXPERIENCE

Forest Lake Area School District, MN
City of Lakeville, MN
Rockford Park District, IL
Anoka Area Ice Arena, MN
City of Woodbury, MN
Larson Ice Center, SD
Rochester Recreations Center, MN
Shattuck-St. Mary's Prep School, MN

DUTIES

Marco will oversee the project deliverable and be responsible for verifying that the project is meeting the client's expectations throughout both the design and the construction phases. Marco will also be responsible for ensuring that all project goals are being met, including the predetermined design and construction timelines. Marco will also assist in the quality assurance and quality control of the project by reviewing the design documents for accuracy.

BOB WILLIAMS

SAFETY

WORK EXPERIENCE

Present, OECS - OSHA Environmental Compliance Systems
SAFETY CONSULTANT

2015-2021, Adolfson & Peterson Construction
SAFETY DIRECTOR

2012-2015, Collins Electrical Construction
SAFETY DIRECTOR

201-2012, Adolfson & Peterson Construction
PROJECT SAFETY COORDINATOR - UNIVERSITY OF TEXAS AT EL PASO

PROFILE

Bob's expertise in safety management has been instrumental in reducing workplace incidents and enhancing overall safety culture. He is known for his proactive approach, ensuring that safety protocols are not only adhered to but also understood and embraced by all team members. Bob's ability to communicate complex safety concepts in an accessible way makes him an invaluable resource for companies looking to improve their safety standards. His commitment to continuous improvement and education keeps him at the forefront of safety innovations and best practices.

CONTACT

Bob@OECScomply.com
763-417-9599
www.oecscomply.com

EDUCATION

Construction Management & Supervision
DUNWOODY COLLEGE OF TECHNOLOGY

Construction Health & Safety Technician (CHST)
BOARD OF CERTIFIED SAFETY PROFESSIONALS

Safety Trained Supervisor Construction (STSC)
BOARD OF CERTIFIED SAFETY PROFESSIONALS

RELEVANT AWARDS

MNSHARP:

- 3 projects earned MNSHARP, 4 projects in the Pre-MNSHARP Process
- "The Nic on Fifth" Project
- "Folkstone on Promenade" project

NICK MILLER

ASSISTANT PROJECT MANAGER

WORK EXPERIENCE

2024-Present, inBYLT
Assistant Project Manager

2022-2024 Evans General Contractor
Assistant Project Manager

2020-2022 WW Gay Mechanical
Assistant Project Manger

2017-2020 ShayCore
Assistant Project Manager/ Estimator

EDUCATION

Computer Science
Hudson Valley Community College

PROFILE

Nick entered the industry in 2017, starting as a Project Manager. Nick is now key to the inBYLT team member working as a Assistant project manager on a variety of projects. He excels as an Assistant Project manager he closely monitors schedules, budgets, so that quality standards are met .He also monitors daily performance, keeping the project team aligned with overall goals while maintaining clear communication.

CONTACT

NickM@inbylt.com
904-864-6937
www.inBYLT.com

PROJECT EXPERIENCE

Albert Lea City Arena, MN

Delano Ice Arena, MN

Hastings Civic Arena, MN

St Cloud - Municipal Athletic Center, MN

Tesla Motors Fremont, CA

DUTIES

Nick role in the project includes estimating, scheduling, and value engineering during preconstruction for a strategic, cost-effective approach. He defines and verifies bid package scopes to align with project goals. Throughout construction, he ensures financial efficiency and accountability through cost estimating and control oversight.

JEFF JOHNSON

ESTIMATOR

WORK EXPERIENCE

2022-Present, inBYLT
senior project manager

2019-2020, Armor Mechanical
senior project manager

2013-2019, Egan Company
sr project manager & constr manager

2009-2013, Corval Group
senior project manager, construction

2005-2009, NewMech Company
project manager, industrial

EDUCATION

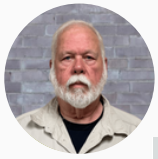
Auto Machinist, Auto Mechanic, US Navy Nuclear Submarine Repair, Machinery Repair, Leadership Management, QA/QC, E
vocational schooling & us navy

PROFILE

Nick entered the industry in 2017, starting as a Project Manager. Nick is now key to the inBYLT team member working as a Assistant project manager on a variety of projects. He excels as an Assistant Project manager he closely monitors schedules, budgets, so that quality standards are met .He also monitors daily performance, keeping the project team aligned with overall goals while maintaining clear communication.

CONTACT

JeffJ@inbylt.com
763-344-1046
www.inBYLT.com



PROJECT EXPERIENCE

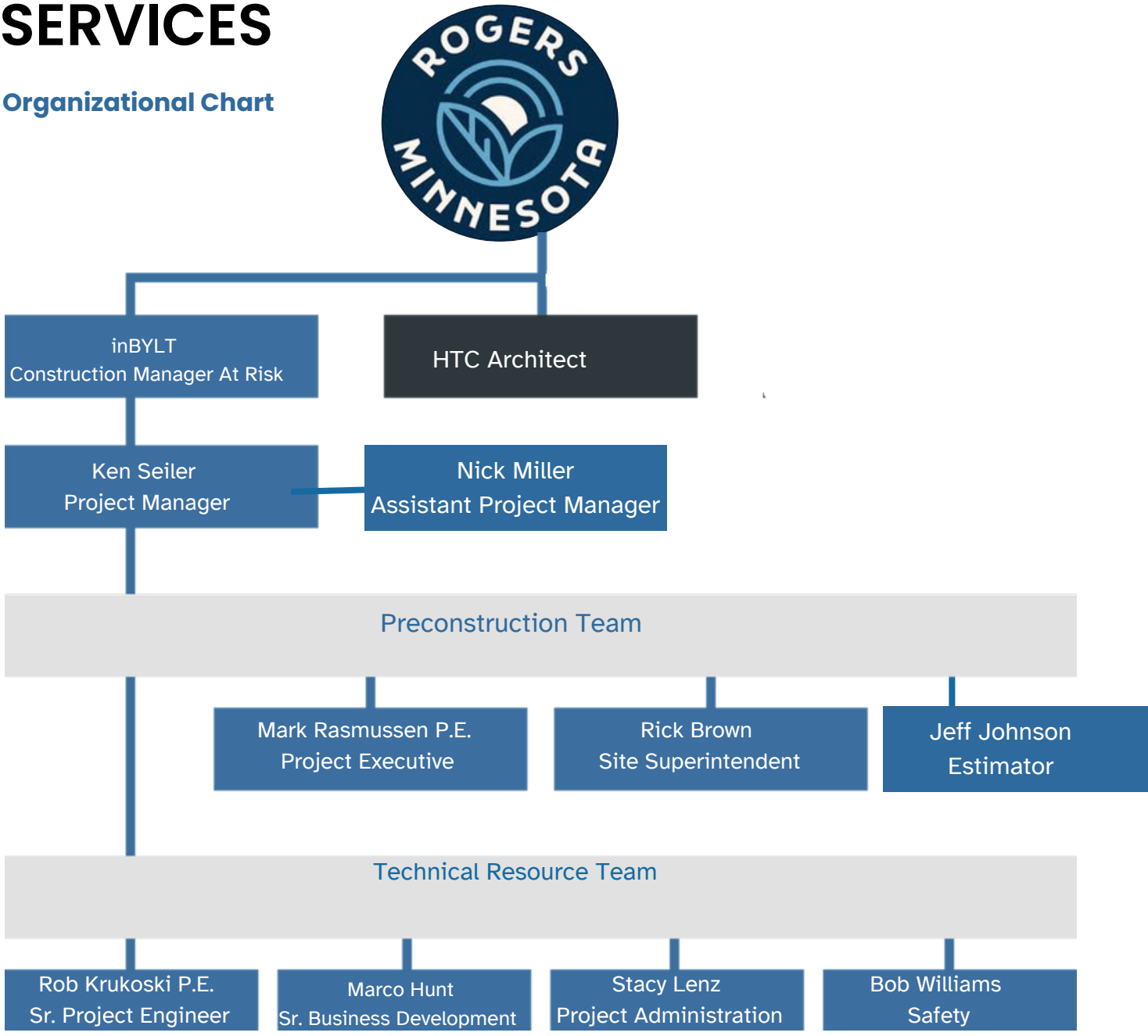
46 years experience in the machining, fabrication, maintenance & construction industry. 18 years as a project manager. 6 years as a manager. 12 years as a supervisor. 22 years of shop and field experience.

DUTIES

- Contract negotiations
- Developing project budgets
- Implementation of safety programs
- Project quality control
- Developing and maintaining project schedule
- Manage subcontractors
- Manage field operations
- Project close out

PRE-CONSTRUCTION & CMAR SERVICES

Organizational Chart



YOUR PROJECT

THE INBYLT APPROACH

inBYLT is a highly experienced and specialized company with expertise in ice arena projects. We have completed numerous projects over the last 15 years, including various aspects such as refrigeration systems, floors, dasher boards, new constructions, and renovations. inBYLT offers services in several different ways including as a Construction Manager @ Risk (CMAR).

One of our most notable achievements is our innovative geothermal design, which utilized City water for the refrigeration condenser. This design was used by the engineers of the 2018 Winter Olympics in South Korea, showcasing inBYLT's capability to create efficient and cutting-edge solutions.

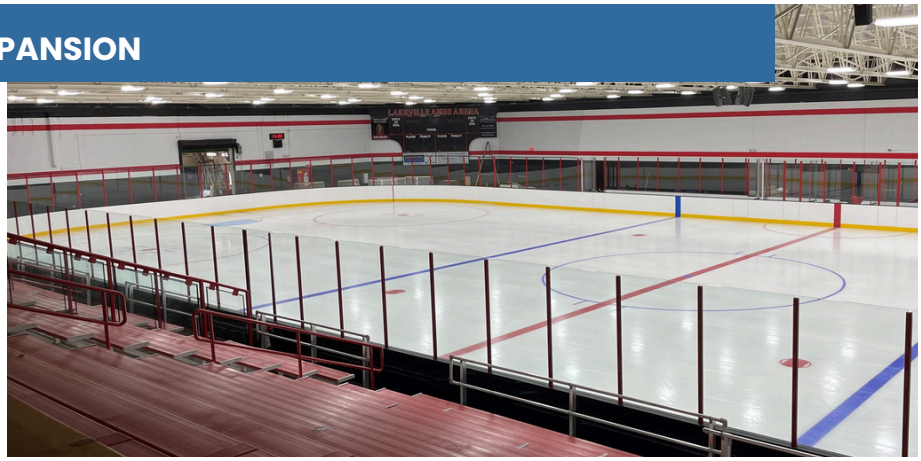
inBYLT specializes in various fields related to ice arenas and construction, including renewables (solar and geothermal), municipal projects, education institutions, energy efficiency, design, construction management, grants, rebates, incentives, and energy auditing.

As CMAR for the City of Rogers we will take responsibility for overseeing all construction-related activities, providing clients with a single point of contact for a simplified and streamlined construction process. Our track record of consistently delivering superior projects on schedule as well as keeping the arena functioning as close to normal during the construction, is a testament to our commitment to excellence and efficiency.

As CMAR for this renovation project, you can expect to benefit from their extensive experience and expertise in the field.

CASE STUDY: CITY OF LAKEVILLE

RENOVATION + EXPANSION



Year of Project: 2023-2024
Contact: Joe Bergquist
Arenas Manager
jbergquist@lakevillemn.gov

Phone: 952-985-2181
Address: 20195 Holyoke Ave.
Lakeville, MN 55044
Cost: $16.1M

CHALLENGES

The City of Lakeville worked with inBYLT to successfully pass a referendum to remodel 40,000 square feet of Lakeville North's home athletic facility. The project also included a new addition to the facility and a complete tear-out and replacement of the mechanical systems. The second phase of this project included a new 20,000-square-foot addition at Lakeville South's home athletic facility. The second phase of this project included a new 20,000-square-foot addition at Lakeville South's home athletic facility. Another testament to the inBYLT Culture, this project had three phases and the City contracted inBYLT for each of the phases.

SOLUTIONS

inBYLT, working in collaboration with the City and our design professionals from JLG Architects, completed the design for the project and selected contractors for implementation. inBYLT then acted as the construction manager, overseeing all site construction activities, site safety, quality assurance, project administration, and startup.

BENEFITS

The City of Lakeville and its many user groups are pleased with the upgrades made to both facilities. In addition to receiving new amenities for its user groups, the project is also producing over $75,000 in annual utility savings for the city.

PROJECT HIGHLIGHTS

- New state-of-the-art ammonia refrigeration system
- New floors at Ames Arena, including a new NHL standard-sized rink
- New efficient LED lighting throughout both facilities Upgraded building envelope solutions
- New HVAC systems and building automation
- Low emissivity ceilings at both facilities
- Building addition to house the new refrigeration system
- New dasher board system at Ames Arena
- Boiler plant and dehumidification unit replacements

KEY PROJECT STAFF

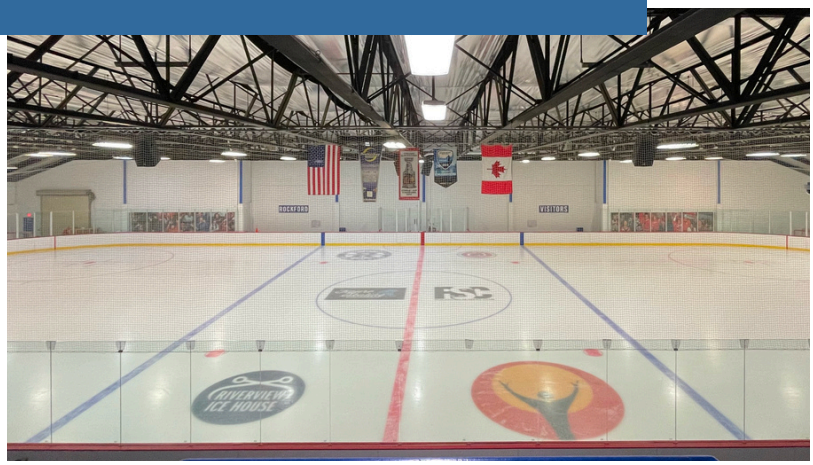
- Project Executive - Mark Rasmussen
- QA/QC - Marco Hunt
- Estimator - Ken Seiler
- Project Manager - Kurt Schoenecker
- Project Coordinator- Stacy Lenz
- MEP Engineer - Rob Krukoski

Ice Rink Contractor/Designer

- Ice Rink Contractor: Rink-Tec International
- Ice Rink Designer: B32 Engineering

CASE STUDY: RIVERVIEW ICE HOUSE

REMODEL + RENOVATION



Year of Project: 2022-23 **Contact:**
Dan Jacobson
Superintendent of Operations
danjacobson@rockfordparkdistrict.org

Phone: 779-200-2177
Address: R401 S Main Street
Rockford, IL 61101
Cost: $11.1 M

The Project

The Rockford Park District's Riverview Ice House, built in 1974, was in need of several improvements to keep the building open for thousands of kids that use the facility each year. The ice making equipment for the NHL sized main rink, and the 1/2 sized studio rink was at the end of its lifespan. The R-22 refrigerant system, which utilized 2 types of systems. The main floor had a glycol loop freezing the sand floor and the studio rink utilized a direct refrigerant system to cool that sand surface. Constant breakdowns and large capital expenditures were forcing the RPD to make a tough decision to invest in a complete renovation of the Ice House.

The Riverview Ice House project included the renovation of the entire facility. inBYLT replaced two ice rink floors, installed a new ammonia refrigeration system, renovated the lobby and locker rooms. This was a Design-Build project, with inBYLT overseeing all design, site construction activities, site safety, quality assurance, project administration, and startup; delivering a turnkey project.

PROJECT HIGHLIGHTS

- New Ammonia Refrigeration System
- Two New Refrigerated Floors
- Dehumidification Upgrades
- Locker Room Addition
- Lobby and Meeting Room Remodel
- New Dasher board Replacement Electrical Service Upgrade

KEY PROJECT STAFF

- Project Executive - Mark Rasmussen, PE
- Senior Project Manager - Ken Seiler Project Coordinator - Stacy Lenz
- Project Administrator - Marco Hunt
- MEP Engineer - Rob Krukoski, PE

Ice Rink Contractor/Designer

- Ice Rink Contractor: Rink-Tec International
- Ice Rink Designer: B32 Engineering

CASE STUDY: FOREST LAKE SPORTS CENTER

RINK 2 EXPANSION

Year of Project: 2023-34
Contact: Mike Elam
Arena Manager
melam@flaschools.org

Phone: 651-982-8160
Address: 5530 206th Street N.
Forest Lake, MN 55025
Cost: $10.2M

CHALLENGES

Forest Lake Area School District was looking to replace its fabric cover over Rink 2 at the Forest Lake Sports Center with a permanent structure. The fabric cover was past its life expectancy and did not provide the facility the flexibility required to support the variable demands for ice activities year-round. In addition, the HVAC equipment and refrigeration system were at the end of their useful lives and needed replacement. In yet another example of clients choosing to do continued business with inBYLT, the Forest Lake Area School district has done multiple projects with inBYLT including the rink addition and refrigeration replacement, natatorium renovation, district wide solar arrays, and district wide HVAC renovations.

SOLUTIONS

inBYLT worked with the Forest Lake School District providing preconstruction services that enabled the district to select the delivery methods and scope of work that would enable them to achieve their goals. During the design process, inBYLT continued to work with the project team to ensure scope and project costs fit the district's goals and budget. inBYLT is currently acting as the construction manager overseeing all site construction activities, site safety, quality assurance, project administration, and startup.

PROJECT HIGHLIGHTS

- Replacement of Dome with Precast Structure
- New Refrigeration System
- New HVAC in Existing Facility
- Upgraded HVAC and Refrigeration
- Controls Relocation of Utilities

KEY PROJECT STAFF

- Project Executive - Mark Rasmussen, PE
- Estimator - Ken Seiler
- Project Coordinator - Stacy Lenz
- Project Manager - Kurt Schoenecker
- QCM - Cody Capra
- MEP Engineer - Rob Krukoski, PE

Ice Rink Contractor/Designer

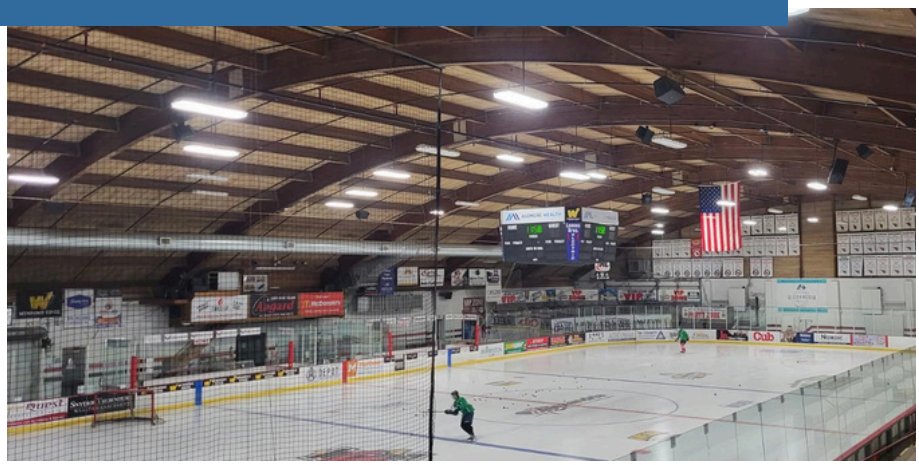
- Ice Rink Contractor: Rink-Tec International
- Ice Rink Designer: B32 Engineering

CASE STUDY: RUNESTONE COMMUNITY CENTER

RENOVATION

Year of Project: 2017
Contact: Martin Schultz
City Administrator
mshultz@alexandriamn.city

Phone: 320-759-3629
Address: 701 Broadway
Alexandria, MN 56308
Cost: $5.7M



CHALLENGES

The City of Alexandria's ice arena — inside the Runestone Community Center — needed major improvements. The facility had an inefficient R-22 refrigeration system, limited facility building automation, poor and inefficient lighting, a leaky roof, dehumidification issues, and a poorly operating rink floor. The City had limited funds to improve the facility. Similar with our other project examples, this was one of multiple projects the City has contracted inBYLT to manage and complete.

SOLUTIONS

In partnership with the City, inBYLT developed the needed infrastructure improvements and other cost- saving improvements. The savings resulting from the improvements implemented allowed the city to offset the majority of the costs. This resulted in $5.7 million dollars of improvements, with only a $1.9 million dollar impact over 20 years to the taxpayers. Energy and operational savings resulting from the project totaled more than $200,000 in savings each year.

PROJECT HIGHLIGHTS

- New Two Rink Ammonia Refrigeration System High-Efficient Building Automation
- New Dehumidification System
- New Rink Floor
- New Dasher Board System
- Building Addition
- Complete Facility Roof Replacement
- Electrical Service Replacement and Upgrade
- LED Lighting Upgrades
- Building Envelope Upgrades
- New Snow Melt Pit

KEY PROJECT STAFF

- Project Executive - Mark Rasmussen, PE Project Coordinator - Stacy Lenz
- QCM - Cody Capra
- MEP Engineer - Rob Krukoski, PE

Ice Rink Contractor/Designer

- Ice Rink Contractor: Commercial Refrigeration
- Ice Rink Designer: B32 Engineering

CASE STUDY: Hastings Civic Arena

RENOVATION

Year of Project: 2024-25
Contact: Chris Jenkins
Parks and Recreation Director
cjenkins@hastings.gov

Phone: 651-480-6167
Address: 2810 Red Wing Blvd, Hastings, MN 55033
Cost: $10.1M

CHALLENGES

The Hastings Civic Arena was in need of replacing its refrigeration system from and outdated R-22 refrigerant to a new, high efficient ammonia plant to run the 2 ice rink floors. The project also included the expansion and updates to the refrigeration room and a new roof on the West Rink.

SOLUTIONS

In partnership with the City, inBYLT developed the needed infrastructure improvements and other cost- saving improvements. The savings resulting from the improvements implemented allowed the city to offset the majority of the costs. This resulted in $5.7 million dollars of improvements, with only a $1.9 million dollar impact over 20 years to the taxpayers. Energy and operational savings resulting from the project totaled more than $200,000 in savings each year.

PROJECT HIGHLIGHTS

- New Ammonia Refrigeration System
- Expansion and Modification of Refrigeration Room
- New roofing system and drainage improvements
- Dehumidification Upgrades
- Electrical Service Upgrade
- Locker Room Addition

KEY PROJECT STAFF

- Project Executive - Mark Rasmussen, PE
- Senior Project Manager-Ken Seiler
- Project Coordinator - Stacy Lenz
- Project Administrator- Marco Hunt
- MEP Engineer - Rob Krukoski, PE

Ice Rink Contractor/Designer

- Ice Rink Contractor: Commercial Refrigeration
- Ice Rink Designer: B32 Engineering

The **inBYLT** Difference

Expertise in Ice Arena Construction

inBYLT brings unparalleled experience in ice arena construction and renovation, offering the City of Rogers a deep understanding of cost, quality, and value. Our extensive portfolio of similar projects provides us with an up-to-date perspective on industry trends, costs, and best practices. We have our finger on the pulse of the industry, ensuring that Rogers receives the most accurate and comprehensive information possible to guide decision-making throughout the project.

Acting as the City's Agent

As the Construction Manager at Risk (CMAR), inBYLT will act as the City's agent both in the field and contractually throughout the construction process. Our role ensures that the City's interests are protected at every stage, from design and procurement to execution and closeout. Our proactive approach to project management fosters seamless coordination between all stakeholders, ensuring that expectations are met and exceeded.

Commitment to Local Contractors

We recognize the importance of community engagement and economic development. inBYLT is committed to utilizing local contractors whenever possible, fostering economic growth within Rogers and ensuring that the project benefits the local workforce. Our extensive network of trade partners enables us to secure competitive pricing while maintaining high-quality standards.

Experience with Multi-Bid Package Projects

Our team is well-versed in managing projects with multiple bid packages, ensuring efficient implementation and oversight. By structuring the project into well-defined bid packages, we maximize cost control, minimize risks, and maintain flexibility throughout the procurement process. This approach allows us to optimize trade contractor participation, securing the best value for the City.

Proactive Management of Long Lead Items

inBYLT's experience in the ice arena industry provides us with insight into identifying and procuring long lead items such as the Motor Control Center (MCC) and Switch Gear. Early identification and procurement strategies help mitigate potential delays and cost escalations, ensuring that the project remains on schedule and within budget. Our industry expertise allows us to navigate these challenges effectively, providing the City with the best value for its investment.

The inBYLT Difference

Budget and Schedule Control

Our extensive experience in ice arena projects allows us to retain primary responsibility for budget management and project delivery schedules. We take a proactive approach to cost control during the design process, ensuring that all expenditures align with the City's financial parameters. Our team provides detailed cost estimates and budgets for all project phases, tracking real-time costs against projections.

We will actively assist in managing team meetings with the City and HTG, ensuring clear communication and accountability. Additionally, we will develop a comprehensive project schedule, including site logistics and phasing strategies, to ensure the smooth progression of construction activities with minimal disruption.

Comprehensive Project Planning and Execution

Minimizing Disruptions During Construction

Our approach to keeping the Rogers Activity Center operational during expansion includes:

1. **Comprehensive Phasing Plan:**
   - We will implement a detailed construction phasing plan that segments the work to avoid unnecessary disruptions to the existing rink and facility operations.
   - Strategic sequencing of major construction activities ensures safety and accessibility while maintaining key facility functions.
2. **Proactive Scheduling & Communication:**
   - Regular coordination meetings with city officials, facility operators, and user groups will ensure alignment on construction impacts.
   - Advance notice of construction activities will be provided to stakeholders to allow for schedule adjustments.
3. **Safety & Accessibility Measures:**
   - Clearly defined and well-marked construction zones will be established to separate active work areas from operational spaces.
   - Temporary barriers and wayfinding signage will be used to guide patrons safely through the facility.
   - Alternative access points will be created when necessary to ensure seamless entry and exit.
4. **Maintaining Ice Quality & Facility Systems:**
   - We will work closely with refrigeration and HVAC specialists to prevent any disruptions to the existing rink's ice quality.
   - Noise and vibration mitigation strategies will be implemented to minimize impacts on ongoing activities.
5. **Flexible Problem-Solving Approach:**
   - Our team is adept at adjusting plans in real-time based on evolving construction conditions while keeping facility operations in focus.
   - Close collaboration with facility management will allow us to develop creative solutions to any unforeseen challenges.

inBYLT's expertise extends beyond construction management; we excel in overall project planning and execution. Our team is adept at:

- Providing detailed cost estimates and budgets at all project phases.
- Tracking costs versus budgets in real-time to ensure financial oversight.
- Assisting and managing team meetings with stakeholders.
- Preparing and maintaining a detailed project schedule, including phasing strategies.
- Implementing risk management strategies to mitigate potential challenges.

Our proven track record in the ice arena industry ensures that the Rogers Activity Center Expansion will be managed with the highest level of professionalism, efficiency, and attention to detail.

Conclusion

By choosing inBYLT as the CMAR, the City of Rogers gains a trusted partner with extensive experience in ice arena projects. Our industry knowledge, commitment to local contractors, proactive management of long lead items, and expertise in budget and schedule control make us the ideal choice for the Rogers Activity Center Expansion. We are ready to deliver a successful project that meets the City's goals while maintaining the highest standards of quality and efficiency.

The inBYLT Approach

inBYLT's management foundation is based on our team's Culture of Curiosity. On every project we push for better ways to improve facilities, deliver superior designs, and build better projects.

Projects such as yours have many intricacies and require a development team that knows and understands the needs of the facility. The inBYLT team includes design and construction professionals highly experienced in development and construction of ice arenas.

inBYLT will work closely with the city, design team engineers, and key stakeholders, to ensure the goals for this project are achieved in a timely and cost-effective manner. Our management strategy for the Rogers Activity Center Expansion project is as follows:

Upon award of the project, a kick-off meeting will be scheduled. Attendees for the meeting will be inBYLT, the project engineering firm, The City of Rogers and the RAC stakeholders. The purpose of the meeting is to confirm the scope of the project, timeline, critical dates for reviews, approvals, and referendum vote if necessary. A plan will be set forth which identifies the responsibilities for each member of the project team.

For specifics as to how inBYLT approaches managing projects, please review the following:

Design Collaboration

Collaboration is crucial for the successful planning and execution of construction projects. Below is a list of the methods we have used to collaborate with other design teams to support and benefit other projects.

1. **Value Engineering**: inBYLT works closely with the design team to identify cost-effective design alternatives without compromising quality. This can help the school City save money while still achieving Its project goals.

1. **Constructability** Review: Early collaboration allows inBYLT to review the design plans for constructability. They can provide feedback on potential construction challenges and suggest design modifications to simplify construction processes and reduce potential changes during the construction phase of the project.

2. **Budget Management**: inBYLT can provide cost estimates at various design stages to ensure that the project remains within the budget. If the design team proposes changes that would impact costs, inBYLT can assess the impact and work with the team to find solutions that align with the school City's financial goals.

3. **Schedule Development:** Collaborating on the project schedule is essential. inBYLT can work with the design team to establish realistic timelines, ensuring that construction aligns with the academic calendar to minimize disruptions to school operations.

5**.Value-Added Input**: inBYLT can offer insights into materials, construction methods, and technologies that can enhance the long-term sustainability and energy efficiency of the school buildings, aligning with the City's goals for green building practices.

6.**Risk Assessment**: Together with the design team, inBYLT can identify potential risks and develop mitigation strategies. This proactive approach can prevent costly delays and disruptions during construction.

7.**Bid Process Support:** inBYLT can assist in the selection of contractors and subcontractors through the pre-qualification process, ensuring that only qualified and reputable firms are considered. This helps maintain quality and accountability throughout the construction phase.

8.**Quality Control:** inBYLT can work with the design team to establish clear quality standards and inspections to guarantee a high-quality final product.

9.**Communication and Documentation**: Effective communication and documentation are vital. inBYLT can facilitate regular meetings between the design team, contractors, and school City representatives to keep everyone informed of progress, changes, and challenges.

10.**Change Order Management:** When design changes are necessary, inBYLT can help assess the impact on cost and schedule and facilitate a transparent change order process to ensure all parties are on the same page.

11.**Safety and Compliance**: inBYLT can collaborate with the design team to ensure that the plans comply with all safety regulations and codes. They can also work together to develop safety protocols during construction to protect students, staff, and the community.

12.**Sustainability**: inBYLT will collaborate with the design team to identify potential environmentally friendly features into the project and assist in the procurement of any potential incentives available for those potential improvements.

By fostering a strong collaboration between inBYLT and the design team, the City can optimize its construction projects in terms of cost, quality, timeline, and sustainability; ultimately benefiting the educational community it serves. The following discussion provides more specific information regarding our approach.

Quality Control Approach

Quality starts in the planning phase of the project. Time needs to be built into the preconstruction phase to allow review of project documents at several key points in the development. The review point is at the end of schematic design. At this point, inBYLT, the design team, and the City would agree on the major systems to be used in the project based on the benefits and drawbacks of each potential option.

During the design development, following schematic design, regular project design meetings will be held to review documents and verify that the design continues to be in alignment with the goals for the project.

Construction documents will be reviewed by our field staff and our in-house engineers to make sure the documents are of high quality before being issued for final pricing. This high quality of documentation will result in lower contractor pricing and fewer issues in the field once construction activities begin.

Cost Estimation

As the engineering documents and design work progresses, inBYLT will create a project cost model that will be assembled and reviewed by the City. inBYLT, as construction manager, is well equipped for generating and updating cost estimates. This cost model will be maintained to ensure accurate cost information allowing for better decisions as the project development progresses. inBYLT utilizes a database that we have created, along with subcontractor input, to create this cost model. inBYLT has created this cost model with input from key subcontractors and will utilize this during this cost estimation

The inBYLT Approach

Scheduling

To minimize disruptions to the facility, it is critical that a schedule be created, during the design phase, that is highly detailed to assist with identifying lead time issues and important benchmark dates. During the design phase, we will prepare this detailed schedule to identify the critical activities. Microsoft Project software will be utilized for the development and maintenance of the project schedule. Subcontractors and suppliers will be contacted to provide input for material and equipment lead times to ensure we have an accurate schedule.

This schedule will be reviewed and refined by the project team, with input from the City, to ensure that the work will not interfere with the operation of the facility. Having worked in many ice rink/community centers, we understand the issues of coordinating with the facility staff and schedules.

Value Engineering

From its inception, inBYLT has been steadfast in its commitment, even deeming it a requirement, to integrate energy savings, renewables, and operational efficiency into our projects. A significant number of our projects are guaranteed savings initiatives, leveraging energy savings to finance the undertaking. This approach has cultivated a culture of curiosity within our organization, fostering a continual quest for improved methods to reduce project life cycle costs and construct superior projects.

To us, value engineering transcends the industry norm of solely seeking the lowest initial cost solution. While the initial cost is undeniably crucial, we place equal emphasis on the life cycle cost. Our commitment extends to providing clients with comprehensive information, empowering them to make informed decisions that strike a balance between quality, sustainability, and cost-effectiveness. We actively explore opportunities to leverage diverse designs, tapping into external incentives that can yield superior projects at lower initial costs. Collaborating closely with the City and the design team, we are dedicated to incorporating facility enhancements aligned with the City's goals. Some common ideas we frequently present to our clients include:

- Renewable upgrades resulting in no increased project costs.
- Controls sequences resulting in lower power consumption.
- Equipment options resulting in lower maintenance and power costs.
- Value added input on conceptual designs.

These are just a few categories that we will consider when looking at your project during the design phase.

Incentives

An additional service our team provides is working with your staff to obtain and receive any incentives or grants that the project may qualify for such as IRA tax credits, grants, or utility rebates. Many incentives require pre-approvals during the design phase and inBYLT will work hand in hand to make sure these steps are completed to maximize the financial benefit to the City.

Construction Phase

One of the keys to a successful construction project is good communication between project members. This is achieved in several ways. The following are the major practices that will be used to coordinate construction activities.

- Regularly planned construction project meetings, starting with a project construction kickoff meeting, will be used to ensure communication between parties is seamless.
- A subcontractors meeting will be conducted weekly to cover schedule, safety, and any other project critical activities for the week. These meetings are critical to onsite planning and collaboration between trades working on the site.

inBYLT uses two-week look ahead schedules to help coordinate work activities and make sure our subcontractors are working efficiently and meeting project requirements

The inBYLT Approach

- inBYLT utilizes Procore construction software for managing our construction projects. This software allows digital access of project documents and correspondence to the City, design team, and our subcontractors.
- We will have on-site supervision as required for construction activities. Schedule, safety, work sequencing and coordination with city staff will be managed by the site supervisor.

Dispute Resolution

inBYLT takes pride in fostering a collaborative team dynamic with our clients, design professionals, and subcontractors. While we typically operate on collaborative sites, occasional conflicts may arise, necessitating resolution. Several key considerations should be integral to addressing any conflict effectively.

Documentation

Effective documentation maintenance plays a crucial role in resolving disputes, as a thorough review of documentation history often suffices to remind involved parties of prior agreements. Additionally, it proves valuable in pinpointing responsible parties for better clarity and resolution.

Procore

Our project management software improves documentation and provides a great framework for requests for information, change orders, and other project administration. This framework helps in the collection of information that can be used when conflicts arise.

Our philosophy for conflict resolution is to protect our clients' interest while being fair to all parties involved. We believe that the responsible party must be held accountable, however in cases where there is no clear responsible party, then a fair compromise must be found. We have found this approach works well with reasonable parties. In cases where a responsible party is not being reasonable, we will rely on the construction documents and procedures to move to a resolution that, in the worst case, can result in the replacement of a subcontractor.

Self-Performed Work

inBYLT does not self-perform any work and therefore has no conflicts of interest with other potential subcontractors that would be performing trade work on the project. We prefer working with local contractors to help support the local economy and to work with people who are familiar with the facility. These local businesses are most heavily invested in the project and likely have children in the City.

Construction Site Safety

One of the most important priorities on a job site is maintaining a safe working environment for everyone on the site. inBYLT will provide safety audits throughout the project to ensure the site remains safe. We require all our employees to have OSHA 10 training and our field personnel to have OSHA 40 training.

Project Schedule Control

After the pre-construction phase schedule has been completed, and we move into the construction phase of the project, subcontractors and suppliers will be contacted to include their input for material and equipment lead times to generate a detailed construction schedule.

The inBYLT Approach

Below, we have included an example schedule for the project. This schedule is preliminary as the scope is not fully defined and will have significant impacts on the schedule. Some project specific considerations that will need to be incorporated into the final schedule are:

- Identification of long lead equipment.
- Coordination of the conversion of the heating plant away from steam and equipment that requires steam to operate properly.
- Access to areas and coordination with school year and class schedules.
- Potential interruptions to service and impact on the facility.

Closeout

Even with flawless project development and construction, the absence of proper startup and training can lead to a project failing to meet your requirements. InBYLT is committed to collaborating with the project team to generate punch lists and coordinating with contractors to address and resolve all work closeout issues.

After all project activities are complete, InBYLT will assemble closeout documents for your records. These documents typically include:

- Record Drawings (Redlines provided to Architect for creation)
- Operations & Maintenance Manuals (both digital and hard copies)
- Certificate of Occupancy
- IC-134 Documentation
- Rebate Applications
- Other Incentive documentation
- Any other project related information required by the City.

Some additional services that can be provided include:

- 3D digital model of the finished project
- Digital interactive O&M manual

Supplemental Information

inBYLT brings unmatched expertise and specialized knowledge to the Rogers Activity Center Expansion Project as a dedicated Construction Manager at Risk (CM@R) firm with a decade of experience exclusively focused on ice arena construction and renovation. Our extensive portfolio of successful projects across the country ensures that we bring proven best practices, innovative solutions, and industry-leading efficiency to the expansion of the Rogers Activity Center.

Key value-added benefits of choosing inBYLT include:

- **Specialized Ice Arena Expertise**: Unlike most Construction Management Companies and general contractors, we specialize in ice arena construction, giving us an unparalleled understanding of mechanical systems, refrigeration, dehumidification, dasher boards, and operational efficiency—all critical elements to a successful second sheet of ice.
- **Cost and Schedule Certainty:** Our expertise in CM@R services allows us to identify cost-saving opportunities while maintaining strict quality control and schedule adherence, ensuring a seamless construction process with minimal disruption.
- **Industry Connections & Best Practices:** We have our finger on the pulse of the ice sports industry, continuously implementing the latest arena design innovations, operational enhancements, and sustainability strategies to optimize long-term functionality and efficiency.
- **Proven Track Record with Municipal Clients:** inBYLT understands the unique needs of municipal ice facilities, ensuring compliance with public funding requirements, stakeholder engagement, and community-focused design.
- **Direct Payment Tax Credit Expertise**: With $ Millions available thru this tax law, inBYLT will explore every opportunity to increase the City's overall budget.

The City of Rogers needs an experienced CM@R partner who understands the intricacies of ice arena construction. With inBYLT, you gain a trusted, highly specialized team that will deliver a high-performance, cost-effective, and future-ready second sheet of ice at the Rogers Activity Center.

F. Cost Proposal City of Rogers Activity Center CM Services

Planning & Preconstruction Services				
Description	Quantity	Unit	Rate	Total
Lump Sum		LS	$ 15,000.00	$ 15,000
			Subtotal Fee:	$ 15,000

Construction Services Not To Exceed - Labor				
Description	Quantity	Unit	Rate	Total
Labor - Project Coordinator	192	HR	$ 80.00	$ 15,360
Labor - Commissioning		HR	$ 150.00	$
Labor - Estimator	24	HR	$ 125.00	$ 3,000
Labor - QA/QC	24	HR	$ 140.00	$ 3,360
Labor - Project Engineer	440	HR	$ 110.00	$ 48,400
Labor - Senior Project Manager	360	HR	$ 150.00	$ 54,000
Labor - Project Executive	44	HR	$ 190.00	$ 8,360
Labor - Site Superintendent	1980	HR	$ 181.00	$ 358,380
			Subtotal Fee:	$ 490,860

Construction Services - Other Reimbursibles				
Description	Quantity	Unit	Rate	Total
Performance/Payment Bond		LS	1.00%	TBD
Builders Risk		LS	At Cost	TBD
Safety		LS	$ 6,000.00	$ 6,000.00

Fees				
Description			Rate	Total
CM Fee			1.600%	TBD

1.Assumes Permits, Filing Fees, SAC, WAC are pass through and not included in the above costs.

2.Assumed construction duration of 9 months full time site supervision with an average of 55 hours per week on site supervision.

3.Assumes fences, dust control, temp office, toilets, storage etc. will be included in construction scopes and is not included above.

CITY OF ROGERS
ACTIVITY CENTER EXPANSION

Request for Proposal
Construction Manager at Risk
March 28, 2025

RJM CONSTRUCTION

830 Boone Avenue North
Golden Valley, Minnesota 55427

CONTACT
Brad Barickman
Vice President Community
952-837-8614
brad.barickman@rjmconstruction.com

CONSTRUCTION

March 28, 2025

Doran Cote, Public Works Director/City Engineer
City of Rogers | 22350 South Diamond Lake Road, Rogers, MN 55374

RE: Construction Management At Risk (CMAR) Rogers Activity Center Expansion

Dear Doran-

Thank you for considering RJM Construction, LLC for Construction Management Services for the Rogers Activity Center Expansion project. We welcome the opportunity to work with your team and the architect to bring your vision to fruition for the entire Rogers community.

We are confident that RJM Construction is well-equipped to surpass the goals set by the project team, as evidenced by the following strengths:

MUNICIPAL CM EXPERTS

RJM Construction has a rich history of successful collaborations with over 50 municipalities on construction management projects. Our innovative "hybrid" CM at Risk delivery model, pioneered with the City of Eden Prairie in 2007, exemplifies our commitment to excellence. Beyond mere construction, we excel in efficiently managing purchases through state contracts, guiding city staff through council approvals, and navigating the intricacies of CM Advisor and CM at Risk frameworks. With RJM, you gain a dependable construction management partner dedicated to your project's success.

ICE ARENA EXPERTISE

Our proposed team boasts over 20 consecutive years of experience in developing ice arenas, including team members directly involved in the original Rogers Ice Arena project. Through our collaborative approach, RJM Construction possesses the flexibility to tailor our services to align seamlessly with your project's unique requirements. As your trusted partner, our team of experts will ensure that your project remains true to your vision, collaborating closely with the entire team to create a modernized facility that reflects your community's culture and mission.

COLLABORATION AND CREATIVITY

We recognize the challenges faced by city staff in delivering high-quality, cost-effective facilities that satisfy city council and constituents alike. At RJM, we understand that creativity and collaboration are essential for achieving a successful outcome. Our recent experience in the recreational sector, particularly on projects like the Maple Grove Community Center Expansion, Bloomington Ice Gardens Improvements, Furniture and Things Arena - Elk River, and the original Rogers Ice Arena, positions us to immediately contribute value and innovative solutions to your team. We approach projects with transparency and work closely with all stakeholders to identify cost-saving opportunities and implement creative solutions.

RJM's team is ready to engage immediately, and we sincerely appreciate the opportunity to be considered for this project. We eagerly anticipate the next steps and invite you to reach out to me directly at 952-837-8614 with any questions or further discussion.

Sincerely,

Brad Barickman | Vice President Community | 952-837-8614 | brad.barickman@rjmconstruction.com

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RJM CONSTRUCTION

FIRM DESCRIPTION AND EXPERIENCE

MISSION
Striving to set the standard of excellence

1997
Year Established

25+
Ice Facilities

20+
Community Centers

50+
Minnesota communities served

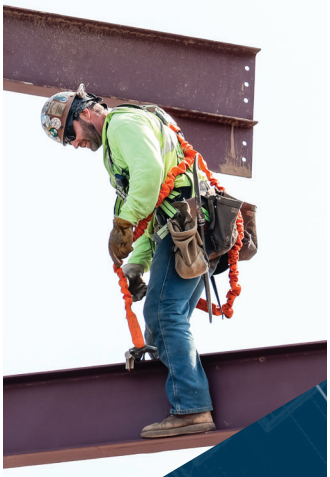
BUSINESS ORGANIZATION AND HISTORY

Since our inception in 1997, RJM Construction LLC has grown into one of Minnesota's premier contractors, known for our reliability and industry expertise. Headquartered in Golden Valley, Minnesota, and founded by Bob Jossart and Joe Maddy, RJM is now led by seasoned industry veterans President Ted Beckman and CEO/COO Brian Recker, both of whom have been pivotal leaders at RJM for nearly two decades.

With an annual construction volume of approximately $250 million, RJM Construction employs 121 people, including office and staff personnel. Our dedicated professionals specialize in community, corporate, healthcare, and multi-housing projects. We offer a comprehensive range of services, including general contracting, construction management, design/build, and preconstruction, all tailored to meet the unique needs of our clients.

RJM Construction has effectively delivered various construction contracts for private and public entities and non-profit organizations. We pioneered the Construction Manager at Risk approach with the City of Eden Prairie in 2007 and have since employed this method across several other cities in Minnesota. Combining extensive experience in creating detailed bid packages with innovative strategies, we ensure your projects proceed promptly and efficiently. Our proactive approach and deep expertise enable us to anticipate and overcome challenges, keeping projects on track and aligned with our clients' vision and goals.

Our commitment to client needs drives us to create extraordinary spaces through innovative, tailored, and cost-effective solutions. From preconstruction to project closeout, our meticulous management and unparalleled service ensure that each detail is thoughtfully handled. We are dedicated to nurturing a spirit of collaboration, ensuring that the spaces we create together enable our clients' businesses and communities to thrive.



THE RJM DIFFERENCE

There is no substitute for experience when providing construction services. RJM has a deep portfolio of parks and recreation and ice arena construction projects. We understand how to collaborate with all stakeholders to plan and execute the project requirements effectively. This experience assures the City of Rogers that RJM is a reliable, qualified partner. We will work as an extension of your staff, taking care of all construction details- so you can take care of your community.

SCOPE OF SERVICES

PRECONSTRUCTION

- Estimating
- Constructability reviews
- Value Engineering
- Scheduling
- MEP coordination
- BIM Modeling

CONSTRUCTION

- Purchasing and subcontractor management
- Cost control
- Quality control
- Construction site safety
- Start-up, testing, and occupancy coordination

PROJECT TEAM

STAFF	WEEKLY AVAILABILITY %
Brad Barickman	15%
Dave Larson	100%
Ryan Potocnik	75%
Brian Recker	15%

BRAD BARICKMAN

MARKET SECTOR LEADER

952-837-8614 brad.barickman@rjmconstruction.com

EDUCATION

Bachelor of Science
Construction Engineering
Iowa State University

AWARDS

LEED AP

REFERENCES

Mr. Dan Beckering
Southwest Christian High School
952-556-0040

Mr. Chuck Stifter
City of Maple Grove
763-494-6000

Ms. Renae Clark
City of Bloomington
952-563-8890

Mr. Tom Betti
JLG Architects
651-767-3773

Ms. Nancy Blankfard
HGA Architects
612-758-4390

Mr. Todd LaVold
Leo A. Daly
612-359-4656

RJM CONSTRUCTION

ROLE DESCRIPTION

Brad has been in the construction industry for more than 20 years. With his diverse background, he brings multiple perspectives to the project team, ensuring that we meet and exceed client goals. Brad draws heavily on experience to anticipate project needs and will delegate the proper resources to complete the requirements efficiently. From complex community ground-up facilities and renovation projects, to healthcare and corporate work, his proven dedication to budget control, value analysis, construction sequencing, and disruption avoidance is always evident in the quality of the finished product.

As Vice President Community, Brad exemplifies leadership, providing strategic direction and management within the respective market sector. He bears ultimate responsibility for establishing profitable projects and upholding a superior level of client satisfaction.

While Brad's highly motivated and task-oriented approach sets a standard for everyone on the team, he is also focused on creating and maintaining long-term relationships with clients, understanding their needs and challenges, and helping them make their project vision come to life.

RELEVANT EXPERIENCE

PROJECT	LOCATION
City of Andover Ice Arena and Community Center Expansion	Andover, MN
City of Maple Grove Community Center	Maple Grove, MN
Furniture and Things Community Event Center and Ice Arena	Elk River, MN
City of St. Louis Park ROC	St. Louis Park, MN
City of Hopkins Ice Arena	Hopkins, MN
City of Shakopee Community Center and Ice Arena	Shakopee, MN
City of Plymouth Community Center	Plymouth, MN
City of Alexandria Runestone Community Center	Alexandria, MN

DAVE LARSON

SUPERINTENDENT

612-202-0824 david.larson@rjmconstruction.com

EDUCATION

Erosion and Storm Water Management
University of Minnesota

REFERENCES

Mr. Chuck Stifter
City of Maple Grove
763-494-6000

Mr. Jim Dickinson
(Former) City of Andover
763-324-4700

Ms. Jennifer Levitt
City of Cottage Grove
651-458-2890

Mr. Jonathan Saucke
Baker Associates
612-330-0400

ROLE DESCRIPTION

Dave started his career working in 1982 as an apprentice carpenter, progressing to carpenter, and currently superintendent. Dave has worked on a variety of projects, including recreational facilities, tenant buildouts (12 years of experience), lab spaces, and more. Dave has more than 20 years of experience running the day-to-day operations on large construction sites with more than 140 contractors, including the 40 story, Crown Plaza in St. Paul. He will work closely with the project manager, monitoring the project schedule to achieve project success.

Key Responsibilities:

- Direct all field personnel and manage subcontractor activities
- Ensure that quality control standards and safety protocols are upheld at all times
- Maintain construction schedule and proactively identify and resolve any disruptions
- Order materials, schedule inspections as necessary
- Maintain regular communications and positive relationships with clients, contractors, vendors, and team members
- Maintain an efficient, organized, safe, and clean job site

RELEVANT EXPERIENCE

PROJECT	LOCATION
City of Maple Grove Community Center - Rink 3	Maple Grove, MN
City of Plymouth Community Center	Plymouth, MN
Hmong College Prep Academy Phase IV	St. Paul, MN
City of Andover Community Center Expansion	Andover, MN
Gleason Fields Athletic Complex	Maple Grove, MN
City of Andover Public Works	Andover, MN
HERO Center	Cottage Grove, MN
Coon Rapids Chrysler	Coon Rapids, MN

RJM CONSTRUCTION

RYAN POTOCNIK

PROJECT MANAGER II

612-356-9833 ryan.potocnik@rjmconstruction.com

EDUCATION

Bachelor of Science
Construction Management
University of Minnesota

TRAINING & CERTS

OSHA 30

REFERENCES

Mr. Troy Gray
Daikin Applied
954-862-8500

Mr. Mike Van Klei
Tegra
651-755-3860

Mr. Heath VonEye
City of Watertown
605-882-6202

Mr. Rick Mack
JLG Architects
612-746-4260

ROLE DESCRIPTION

Ryan brings 11 years of valuable expertise to the project team with his well-rounded history including community and education projects varying in size and complexity.

Key Responsibilities:

- Plan project workflow including schedule, materials, and workforce
- Assist estimating team during preconstruction including final bidding
- Proactively reassess project scope based on new information and analysis
- Closely monitor schedule, budget, and quality to ensure project vision is achieved
- Work with superintendent and consultants to drive efficiencies
- Recommend course of action based on client needs and requirements

With Ryan's strong attention to detail, he helps to facilitate the successful delivery of cost, schedule, and quality on every project to which he is assigned. Ryan has worked diligently to hone the necessary skills to handle each project's unique set of challenges with efficiency and tact, never losing sight of the client's goals. With a driven personality and client-focused approach, Ryan is a critical part of the team, helping to deliver a successful project, on time and within budget.

RELEVANT EXPERIENCE

PROJECT	LOCATION
City of Maple Grove Community Center - Rink 3	Maple Grove, MN
Prairie Lakes Ice Arena	Watertown, SD
Daikin Applied Owatonna Office Upgrades	Owatonna, MN
Haven Homes Senior Health and Living	Maple Plain, MN

RJM CONSTRUCTION

BRIAN RECKER

PROJECT PRINCIPAL

612-919-3538 brian.recker@rjmconstruction.com

EDUCATION

Bachelor of Science
Civil Engineering
University of Minnesota

Masters in Business Administration
UMN - Carlson School of Management

REFERENCES

Mr. Cal Portner
City of Elk River
763-635-1001

Mr. Chuck Stifter
City of Maple Grove
763-494-6501

Mr. Jay Lotthammer
(Former) City of Eden Prairie
952-949-8440

Mr. Victor Pechaty
Gensler Architects
617-619-5853

Mr. Tom Betti
JLG Architects
612-767-3773

Ms. Nancy Blankfard
HGA Architects
612-758-4000

RJM CONSTRUCTION

ROLE DESCRIPTION

Brian Recker has been in the commercial construction industry for over 30 years. Throughout his career he has held various positions including project manager, estimator, senior vice president, and his current role as CEO. In his 20+ years with RJM, Brian has managed a variety of municipal projects including community and public works facilities, ice arenas, aquatic facilities, fitness centers, and outdoor spaces, as well as healthcare and corporate work.

In his role as Project Principal, Brian will oversee contract administration, manage project budgets, and ensure that the project stays on schedule. His leadership ensures the seamless flow of information across the team, fostering strong team relationships and clear communication. Brian's proactive approach in maintaining real-time decision-making enhances project efficiency, streamlining day-to-day activities while upholding the highest standards of quality. With his proven track record of managing large headquarters and multifaceted projects, Brian is committed to delivering exceptional results for this community center and ensuring long-term client satisfaction.

RELEVANT EXPERIENCE

PROJECT	LOCATION
City of Rogers Activity Center and Ice Arena	Rogers, MN
City of Andover Ice Arena and Community Center Expansion	Andover, MN
City of Maple Grove Community Center	Maple Grove, MN
Furniture and Things Community Event Center and Ice Arena	Elk River, MN
City of St. Louis Park ROC	St. Louis Park, MN
City of Hopkins Ice Arena	Hopkins, MN
City of Shakopee Community Center and Ice Arena	Shakopee, MN
City of Plymouth Community Center	Plymouth, MN
City of Alexandria Runestone Community Center	Alexandria, MN

SUPPORT TEAM

CHRIS LIEDMAN
MEP DIRECTOR

chris.liedman@rjmconstruction.com

As RJM's Director of Mechanical Electrical and Plumbing Design and Coordination, Chris will provide MEP expertise from design through occupancy and optimized facility operations. Chris has a reputation for understanding the client's goals, digging into details and using a collaborative approach to achieve project objectives. He has dedicated his career to expertise in facility infrastructure and systems, optimizing occupant comfort, code compliance, energy efficiency, and total cost of ownership.

KALE FISCHER
SAFETY DIRECTOR

kale.fischer@rjmconstruction.com

As Safety Director, Kale provides oversight directly in relation to the safety aspects of every project. He analyzes the proposed safety plan and offers guidance to the team for continual improvement. Kale leads subcontractors through the RJM safety orientation prior to the start of project work. Combining his hands-on experience with his keen attention to detail and communication skills, Kale ensures that safety is held to the highest standard to ensure project success and client satisfaction.

MIKE JOHNSON
DIRECTOR OF QUALITY CONTROL

mike.johnson@rjmconstruction.com

As Director of Quality Control, Mike is responsible for providing insight and guidance to project teams ensuring that the RJM Construction quality control procedures are in place and all tasks are implemented and carried out. He makes certain that projects are in compliance and processes are upheld through every phase, from start up to close out. His proven leadership, superior work ethic and detailed execution ensures that quality is at the forefront of every project.

MAPLE GROVE ICE ARENA EXPANSION

MAPLE GROVE, MINNESOTA

RJM Construction has been appointed as the Construction Manager of the Maple Grove Community Center's extensive two-phase expansion and renovation. This $110 million project is set to modernize the facility and introduce new amenities, addressing the needs of the growing Maple Grove community.

Phase 1 focuses on substantial upgrades to the ice arena, which serves the Osseo Maple Grove Hockey Association (OMGHA), the second-largest youth hockey association in the U.S. Major enhancements include a new lobby entrance, significant renovations to the existing two rinks with updated refrigeration systems, and the addition of a third sheet of ice in a newly constructed, dedicated building that will be integrated with the main rink. The phase also includes creating team rooms, installing one-sided seating, and modernizing restroom finishes and fixtures. Additionally, site improvements will expand parking and upgrade the Lions Pavilion and play area.

The first phase is scheduled to be completed and open to the public by October 2025.

PROJECT INFO

CLIENT
CITY OF MAPLE GROVE

DELIVERY METHOD
CM AT RISK

SQUARE FEET
65,000 SF

ARCHITECT
JLG ARCHITECTS

FINAL CONSTRUCTION VALUE
$40,157,932

Chuck Stifter
Parks and Recreation Director
763-494-6501

CITY OF ANDOVER COMMUNITY CENTER EXPANSION

ANDOVER, MINNESOTA

RJM Construction led the significant renovations and expansion of the Andover Community Center and its sports complex, a two-phase project spanning over 80,000 square feet. This comprehensive project included the installation of a new sheet of ice, a walking track, offices, meeting spaces, and a multipurpose field house. Additionally, the project featured the construction of a new building entrance and lobby, extensions of the east and west parking lots, and the installation of modern curtain wall systems.

The expanded sports complex now boasts two ice arenas, a five-court field house, an indoor aquatic park with two pools, an upper-level fitness center, exercise studios, and a kid's gymnasium. These enhancements provide the community with a versatile and state-of-the-art facility for a wide range of activities and events.

To achieve this, RJM utilized pre-cast concrete, masonry, exposed wood structures, and advanced curtain wall systems, ensuring both durability and aesthetic appeal. The Andover Community Center and Ice Arena now stands as a premier destination for sports, fitness, and recreation, fostering community engagement and activity.

PROJECT INFO

CLIENT
CITY OF ANDOVER

DELIVERY METHOD
CM AGENCY

SQUARE FEET
80,065 SF

ARCHITECT
JLG ARCHITECTS

FINAL CONSTRUCTION VALUE
$23,212,305

Jim Dickinson
(Former City Administrator)
763-324-4700

FURNITURE AND THINGS ICE ARENA

ELK RIVER, MINNESOTA

RJM Construction proudly built the Furniture and Things Community Event Center and Ice Arena, a state-of-the-art facility designed to serve the diverse needs of the Elk River community. Key features include two sheets of ice, a walking track, a senior center, community rooms, a turf field house, two new softball fields, a pavilion, a concessions building, and expanded parking.

Our team worked closely with JLG Architects to enhance constructability and cost-effectiveness for proposed design changes. RJM's proactive recommendations significantly contributed to the building's performance longevity and the durability of exterior spaces.

This facility is a vital asset to the community, accommodating a wide range of activities from small gatherings and youth and adult athletics to large-scale events with up to 1,600 attendees. The innovative design and construction of the Furniture and Things Community Event Center and Ice Arena ensure it will be a hub of community engagement and activity for years to come.

PROJECT INFO

CLIENT
CITY OF ELK RIVER

DELIVERY METHOD
CM AT RISK

SQUARE FEET
101,000 SF

ARCHITECT
JLG ARCHITECTS

FINAL CONSTRUCTION VALUE
$36,206,157

Cal Portner
City Administrator
763-635-1001

ST. LOUIS PARK ROC

ST. LOUIS PARK, MINNESOTA

RJM CONSTRUCTION

RJM Construction was hired by the City of St. Louis Park to oversee construction of a multi-use recreational outdoor facility at The Rec Center.

The project includes an NHL-size refrigerated outdoor ice rink. In the spring and summer months this space is converted into a turf field for soccer and other sports. The spectator area includes bleachers and an outdoor plaza with a fire pit. The project also includes team locker rooms and a covered walkway that leads visitors through the plaza.

The roof structure was built with glue-laminated beams, tensile fabric and steel cabling support. Working with two out-of-state contractors, RJM used Revit technology to model the roof design. By utilizing this software it mitigated risk and minimized challenges.

PROJECT INFO

CLIENT
CITY OF ST. LOUIS PARK

DELIVERY METHOD
CM AGENCY

SQUARE FEET
34,000 SF

ARCHITECT
RSP ARCHITECTS

FINAL CONSTRUCTION VALUE
$11,299,130

Cindy Walsh
Deputy City Manager
952-924-2541

HOPKINS PAVILION

HOPKINS, MINNESOTA

RJM Construction was hired by the City of Hopkins as the Construction Manager at Risk to oversee the expansion of the Hopkins Pavilion. This project added 7,600-square-feet to the warming house, enhancing its capacity and functionality. Key upgrades included the installation of a new refrigeration plant, a new roof, and upgraded electronic sensing systems.

The expansion also featured an expanded parking area and modern finishes throughout the facility, improving both accessibility and aesthetics. The Hopkins Pavilion is a year-round venue that offers space for a wide range of sports activities and events, making these upgrades essential for accommodating the community's needs.

RJM worked closely with the City of Hopkins to ensure that the project was completed on time and within budget, delivering a high-quality facility that serves as a hub for community engagement and recreation.

PROJECT INFO

CLIENT
CITY OF HOPKINS

DELIVERY METHOD
CM AT RISK

SQUARE FEET
50,000 SF

ARCHITECT
JLG ARCHITECTS

FINAL CONSTRUCTION VALUE
$7,080,408

Mike Mornson
City Manager
952-548-6301

ICE EXPERIENCE

PROJECT	RENOVATION	ADDITION	PHASED	NEW
City of Maple Grove Community Center and Ice Arena	X	X	X	
City of Andover Community Center and Ice Arena	X	X	X	
Furniture and Things Community Event Center and Ice Arena	X	X	X	
City of St. Louis Park Recreation Outdoor Center and Ice Arena	X	X	X	
City of Hopkins Pavilion Ice Arena Floor Replacement and Improvement	X	X	X	
City of Rogers Ice Arena				X
City of Shakopee Communtiy Center and Ice Arena	X	X	X	
Treasure Island Center - Tria Rink & Minnesota Wild Practice Facility	X	X		
City of Eden Prairie Community Center and Ice Arena	X	X	X	
City of Coon Rapids Ice Arena				X
City of Edina Braemar Outdoor Ice Arena	X	X		
City of Plymouth Ice Center	X	X		
St. Thomas Academy Ice Arena				X
City of Red Wing Ice Arena				X
City of Watertown Prairie Lakes Ice Arena				X
NHL Arizona Coyotes Ice Den				X
City of Maple Grove Central Park				X

KEY QUALIFICATIONS AND APPROACH
THE RJM DIFFERENCE

BRAND
Driven by your vision

DIVERSE AND GROUNDED EXPERIENCE

RJM Construction is dedicated to working with communities and non-profit organizations in constructing ice arenas, community centers, municipal facilities, recreational facilities, public works buildings, higher education facilities, and charter schools.

Our community work comprises 40% of our yearly business, with projects ranging from renovations to new buildings, serving the communities for years to come.

STRENGTHENING THE PROCESS

We work as an extension of your staff, analyzing all project details to achieve the best value. We understand there is extensive planning involved in getting a community project off the ground. Whether your project requires council approvals, public funds, or private investors, RJM will act as your advocate. In tandem with approvals, our construction process includes assembling a project schedule and budget, considering every detail such as design milestones, permitting, and material procurement. Our experience and resources will guide the team to make well-informed, timely decisions. RJM takes pride in ownership of every project, managing risk from start to finish.

CUSTOMIZED APPROACH

RJM Construction is a diverse builder, allowing us to effectively deliver all types of construction contracts for public institutions and non-profit organizations. In addition to traditional general contracting and design-build partnerships, our team has provided construction management services to local municipalities for more than 25 years. Forward-thinking communities have recognized that construction management offers a better alternative to the traditional design-bid-build method, giving organizations more control and confidence in project decisions.

LOCAL OUTREACH

Local participation is of utmost importance to RJM. We will develop bid and quote packages sized appropriately for the capacity and skillset of the local market. We initially reached out to the Builders Associations with those projects and have had great success in establishing relationships with many of the local trades. RJM will

immediately connect with The Lake Region Builder's Association. In addition, RJM's extensive experience in the municipal/community market gives us a diverse list of subcontracting partners we can carefully analyze and then tailor the bid and quote packages to meet the needs of the City of Rogers.

RJM takes pride in local participation as well as active interest from the subcontracting community.

Recently, RJM has had two of the most active projects on the Builder's Exchange, in the City of Maple Grove Community Center Expansion and the Plymouth Creek Center.

We will reach out to qualified subcontractors by means of electronic notification and personal phone calls to generate as much interest as possible to increase the number of received bids and to ensure the lowest possible price on bid day. RJM has also developed a bidding strategy that allows for more local contractor participation for smaller project work scopes through the county's quote process.

The new state statute provides great flexibility in hiring the most qualified contractors. By breaking larger bid packages into smaller, more manageable ones, we can often generate more interest from local contractors who may not have the capabilities to perform the entire large scope of work. This essentially serves two purposes: encouraging local participation and driving the overall project costs down. When we come into new communities, we hold an open house for subcontractors to attend. This outreach increases the project interest and prepares them for a process that some companies may not have experienced before.

SIMILAR RELEVANT EXPERIENCE

The RJM team takes the time to understand your program. Our team regularly spends time in ice arenas to better understand what is important to players, coaches, and fans. We understand what it takes for a facility to be successful and make an impact on the community. We've recently completed similar projects with the City of Andover, City of Maple Grove, City of Elk River, and City of Alexandria. This experience ensures the City of Rogers receives a cost-effective project, maximized program, efficient schedule, and a facility built with quality and durability to endure the extensive use for years to come.

EFFICIENT SCHEDULE & COST

With the current challenges the construction industry is facing for material availability and cost increases, RJM will be ready with solutions to issues that may arise. These recent challenges in the industry are not new to RJM. When the market had more stability, RJM still made recommendations to our clients to help reduce costs and expedite the construction schedule.

We recommend that our design partners and clients select materials that we have confidence in terms of function, durability, cost, and readily available for installation. RJM will initially make a recommendation for multiple design bid packages. We will want to make an early purchase on precast wall panels and structural steel as a team. We have a system in place to procure engineering of these items and hold a production spot for a minimal cost to not put the City at risk of owning products before the full project value is understood. This process expedites the overall schedule and allows the design team time to finish other areas of design and programming.

ADDITION LOCATION

Our clients have welcomed our input when considering the most cost-effective solution for the location of their new building additions. We worked hand in hand with JLG and the City of Elk River and the City of Andover to achieve the most cost-effective additions to their facilities.

We saved over a million dollars each with the Cities of Andover and Elk River, locating the additions in the most effective area of the site and existing building. The savings are realized with shared enclosure, reduced snow load design, reduced site work, ability to utilize some existing conditions and equipment. We understand a location for the addition has been selected, we can assist the team with efficiencies on exactly how this addition will tie into the 2 existing structures to achieve the most efficient project possible.

Our virtual design team will work with the design team to establish the most cost-effective and program-efficient location for your addition. This service will allow your team to virtually tour the building before it's constructed. We are confident we can help you maximize your program and budget.

TAX-EXEMPT

RJM has successfully utilized a tax-exempt strategy with other municipalities. If the City of Rogers is interested, RJM will solicit separate labor and material bids from select subcontractors to take advantage of tax savings on large material purchases. The bid documents specify that only the lowest combined labor and material bids will be awarded as the lowest combined bid. If approved by the City of Rogers, this strategy can save the City approximately $250,000 or more.

KEY QUALIFICATIONS AND APPROACH
PRECONSTRUCTION AND DESIGN

MAKE EVERY INTERACTION ENJOYABLE

At RJM Construction, our work begins long before a project starts. We design our preconstruction to anticipate challenges and develop efficient solutions to ensure successful project delivery. Our team will add value by creating a feasible project vision, providing solutions to building challenges, and identifying ways to create value for the investment.

ESTIMATING TECHNIQUES

At the core of RJM's preconstruction team are six full-time estimators. This team ensures estimates are accurate and completed on time without the daily distractions of project management. Our team has an extensive database, comprehensive procedures, and the experience to produce accurate and timely estimates.

RJM's estimating team utilizes various technological resources to develop a cost model. Materials are quantified with precision in On-Screen Takeoff and paired with our unit cost database, which is maintained via Sage Estimating. We also rely on virtual building models (BIM) to ensure estimating accuracy.

RJM's cost estimating process is entirely open book. We provide detailed information supporting our numbers in an open forum with the project team. An estimate summary will highlight the major categories of work and associated costs. In addition, RJM provides a detailed estimate, showing all cost categories by the specification section. These resources will allow the team to make educated decisions. As the design progresses, we provide continuous, real-time cost evaluation so that we immediately realize the cost impact to design choices. Being proactive in this process saves critical time and cost, helping HTG understand budget impacts before designs are complete.

RJM's extensive experience with recreation and community center projects gives us a diverse list of subcontracting partners we can carefully analyze and then tailor the bid and quote packages to meet the City's needs.

RJM'S DESIGN PROCESS KEY STEPS:

CONCEPTUAL PHASE:

This estimate is completed by reviewing the general project scope and utilizing gross square footage estimates. Key elements such as soil corrections, utilities, and unique features are accounted for as well as the more standard features of the project. ***Assuming this is already complete, per current status of the design.***

SCHEMATIC DESIGN PHASE:

At the start, SD estimates are applied to more detailed square footages. At this point, we are beginning to lock in on the overall layout of the building and can start to develop costs based on the desired finish. By the completion of this phase, the estimate will be supported with actual quantities of construction systems. This analysis will save design team resources and allow you to look at multiple scenarios for structure, enclosure, interiors, etc. ***Assuming this is already complete, per current status of the design.***

DESIGN DEVELOPMENT PHASE:

As the estimate moves through this phase, unit quantities will be available to produce a very detailed estimate. The project's budget will develop its final details at the end of this phase. This estimate will be fully supported by subcontractor feedback to gain valuable market insight.

THE RJM DIFFERENCE

Our team provides a final estimate at **95% completion** of the design. This is different from other construction managers. The intent of this final estimate is to confirm the 95% drawings and specifications align with the budget and that we have 100% subcontractor support to prove it. This final confirmation allows us to accurately track the expected final bid amounts when received. Allowing one last opportunity to make slight adjustments to the plans prior to bidding assures the project will be delivered on budget. ***RJM's unique process will bring immediate value to the City of Rogers given the current status of the design is near completion. If hired, RJM will recommend this be the first step in the process before finalizing bid documents.***

VALUE ENGINEERING

Value engineering is an essential process during design. RJM's job is to provide the team with cost-saving ideas available for the team's review and subsequent implementation. Drawing from similar project experience, our team understands how to reduce costs without sacrificing the building's function or design intent. RJM believes that the most effective way to increase value is to look for it at every design stage. RJM reviews multiple systems related to foundations, structures, enclosures, roofs, and mechanical and electrical to ensure the most effective installation and the utilization of materials that will last.

CONSTRUCTABILITY REVIEWS

RJM's constructability reviews are continuous during design. Our team provides suggestions before the design progresses, protecting the overall budget and schedule. Additionally, RJM's Director of Quality Control, Mike Johnson, closely reviews design documents at each phase.

MEP COORDINATION

Mechanical, electrical, and plumbing systems require close attention. RJM's team can virtually design building models before construction, providing value in constructability reviews. RJM's Director of MEP Design and Coordination, Chris Liedman, will analyze the mechanical and electrical designs. A licensed engineer, Chris fully understands detailed MEP scopes and can guide prefabrication and installation plans. Combined, these unique resources enable the project team to make informed decisions, resulting in the best solution at maximum value. ***Construction managers that lack experience in ice arena construction will often significantly underestimate the cost of HVAC. This misunderstanding will lead owners down an unfortunate path and create significant budget challenges on bid day.*** With RJM's experienced MEP staff paired with ice arena construction experience, owners can confidently rely on preliminary estimates.

STATE STATUTE CM AT RISK BIDDING REQUIREMENTS

As noted previously, RJM pioneered the CM at Risk delivery method with municipalities with the City of Eden Prairie in 2007. In 2023 the state of Minnesota passed legislation officially declaring CM at Risk a legal procurement method for Minnesota cities. RJM has essentially had a "head start" over the competition over the last 15 plus years, having developed a transparent and equity-based program for bidding that has benefited a number of Minnesota municipalities. It starts with a broad sweep of the market during the Request for Qualifications (RFQ) process. This ensures all contractors capable of performing work on your project have an equal opportunity to become prequalified. After prequalification's are received the Request for Bid (RFB) is issued to all preapproved contractors. The bids are reviewed with the City staff and the design team. Contractors are then selected, and the Guaranteed Maximum Price (GMP) is set with the City Council.

KEY QUALIFICATIONS AND APPROACH
CONSTRUCTION

SERVE THE COMMUNITY

PROJECT MANAGEMENT

In addition to managing the overall schedule, the RJM project manager is the primary point of contact. They will handle all forms of documentation and information flow during construction. Key responsibilities include contract administration, budget management, and the project schedule. In addition, we will issue meeting minutes, coordinate Request for Information (RFIs), and maintain daily coordination of all on-site construction. We will coordinate subcontractors, material deliveries, and the site labor force to exceed expectations for quality, safety, cost control, and schedule.

SCHEDULE MANAGEMENT

RJM supports the project team with a comprehensive schedule, considering all critical milestones. This partnership ensures realistic expectations within efficient work sequences. RJM's assigned project manager will review all contracts for scheduling needs and critical timelines. They will identify long-lead-time items and critical path milestones, ensure all are in alignment, and then prepare and issue master schedules. Once construction begins, they will offer analysis and variance reports. At RJM, we incorporate efficient, lean construction principles into the project approach to gain efficiencies and monitor workforce needs, ultimately protecting the project schedule.

RJM's experience in arena construction ensures finishes in the arena to start/complete sooner than our competitors, resulting in a shorter overall project duration.

PROJECT SPECIFIC SCHEDULE/APPROACH

PRELIMINARY DRAFT

Hire Construction Manager	April 2025
Evaluate Current Budget (95% estimate)	April/May 2025
Complete Construction Documents	May 2025
Review long lead material procurement strategy	May 2025
Request for Qualifications (RFQ) Subcontractors	June 2025
Request for Bids (RFB) Subcontractors	July 2025
Mobilization	September 2025
Footings/Foundations	September – October 2025
Precast Wall Panels	December 2025
Structural Steel	January 2026
Roofing/Enclosure	February – March 2026
Rink Construction	April – August 2026
Finishes ***RJM's experience in arena construction ensures finishes in the arena to start/complete sooner than our competitors, resulting in a shorter overall project duration*	July – August 2026
Landscaping/Site Finishes	July/August 2026
Commissioning	August – September 2026
Cleanup	September 2026
Final Inspections/Closeout	September 2026
Rink Floor Cool Down	September 2026
Flood Rink/Make Ice	End of September 2026
Occupancy	October 2026

PROJECT COMMUNICATION

RJM will coordinate all project communications: scheduling, attending, participating in, and recording regular meetings. By leading this process, we can better monitor the project's advancement while keeping important construction milestone dates in mind. Meeting minutes will be distributed to the project team within 48 hours, with team assignments clearly outlined. Additionally, RJM will provide regular updates for the team to share with their extended teams.

RJM leverages Procore, a comprehensive project management platform, to ensure successful outcomes for all project stakeholders. Procore's customizable suite of internal and external applications keeps all stakeholders informed of progress and enables convenient access to project data at all times. Our internal use of Procore's tools includes tracking all communications and action plan checklists, ensuring all necessary project tasks are completed throughout the project's lifecycle. Additionally, we have integrated quality and safety assessments into Procore, making it a centralized repository for project information.

Externally, all project-related documentation is available to necessary team members, including submittals, Requests for Information (RFI), approved changes, meeting minutes, schedules, updated plans and specifications, and correspondences between parties. A submittal register is delivered, which tracks all items incorporated into the project and their lead times and assigns responsibility for reviews. The submittal register also identifies items that may have long lead times, which could impact the schedule, allowing the team to prioritize items to reduce any on-site impacts.

Procore's RFI workflow process is a robust system that allows for submitting and tracking responses across the project lifecycle. Seamless integration extends to the change management tool, submittals, and drawings tools, ensuring precise tracking of all financial impacts associated with RFIs, submittals involving revisions to proposed or specified project elements, and updates to drawings throughout the construction phase. This interconnected approach within the Procore platform enhances efficiency, transparency, and accuracy in monitoring and managing the financial aspects of project changes.

The drawings tool has an innovative feature that enables RFIs, photos, and field markups to be seamlessly integrated directly into the public project drawing set. The set is maintained in the project document history and serves as reliable cloud storage for critical documents in the future.

All meeting agendas, minutes, and supporting documents that are reviewed in weekly construction meetings are issued and stored long-term in Procore for access by all stakeholders. Even throughout the closeout process, RJM utilizes Procore to track completion and punch lists, identify non-conforming work, and assign responsibility and deadlines for the completion of these items, ensuring all work is completed on time.

Our experience in understanding the submittal timeline and historical cost information on sustainable building products and systems will add value and ensure the project remains on schedule from design to closeout.

EXPEDITING WORK OF SUBCONTRACTORS AND MATERIAL SUPPLIERS

Maintaining strong and positive relationships with the subcontractor market protects the project's integrity and keeps everyone working as a team. RJM has been proud to receive the Minnesota Subcontractors Association TOPS Award (Teamwork, Opportunities, and Partnering with Subcontractors) for several years, emphasizing our firm but fair approach. By valuing and maintaining that strong relationship, RJM can solicit quality partners to bid projects and push the envelope regarding delivery dates or expedited project schedules.

RJM has been proud to receive the Minnesota Subcontractors Association TOPs Award (Teamwork, Opportunities, and Partnering with Subcontractors) for several consecutive years, emphasizing our firm but fair approach.

COORDINATION OF TRADES AND SUPPORTING DISCIPLINES

When working with subcontractors, our philosophy is to be firm but fair, respectful but demanding. The project's success relies heavily on the success of the subcontractors to complete their work in a quality manner by the schedule. We are committed to providing clear communication and building long-term partnerships with subcontractors, just as we are with our clients.

CHANGE ORDER PROCESS

RJM scrutinizes any change order requests before being presented to the client. We work with subcontractors in the field to develop options for resolution, often eliminating the proposed change request. Most changes are avoided by focusing on proactive project management and developing alternative solutions with the project team.

Should the City of Rogers request enhancements to the project, RJM will work with the project team to clarify these requested changes and provide guidance on the most cost-effective way to complete the work.

QUALITY CONTROL

At RJM, we hold ourselves to the highest quality standards regarding each project's materials and installation procedures. To ensure that we meet these standards, we have appointed a dedicated quality control director whose primary responsibility is to rigorously review the critical details of the project. Our quality control director actively participates in preconstruction meetings to review design specifications and subsequently reviews the installation of these critical components. The superintendent works closely with the quality control manager and utilizes a daily

checklist to ensure that contractors adhere to the specifications outlined for the project.

Before work commences, we hold pre-installation conferences with contractors to review expectations. During these meetings, we present approved submittals, analyze mock-up systems, and discuss critical plan details to confirm work sequencing. These proactive meetings mitigate issues before they arise, ensuring the project proceeds smoothly.

We take exceptional care to hire only the most qualified contractors for critical project areas. We understand that a poorly performing contractor can jeopardize the budget, schedule, and long-term performance of vital systems. Therefore, we conduct rigorous due diligence in our selection process to ensure we bring on board contractors with the necessary experience and expertise.

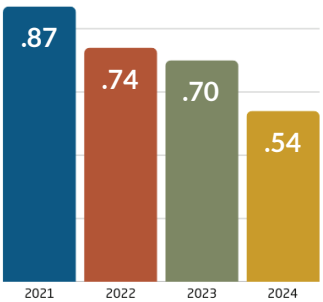
We believe that our comprehensive quality control process, which includes pre-installation conferences, daily checklists, and stringent contractor selection criteria, is essential to delivering a successful project that meets or exceeds our client's expectations.

SAFETY PROGRAM

Safety is integral to our business. We believe that safety, quality, and productivity are interrelated, and we have adopted a comprehensive program to carry out that philosophy. Our policy is to provide required safety training for all employees, utilize high-performing safety equipment, and set clear expectations and standards for subcontractors. RJM's Director of Safety, Kale Fischer, provides leadership and oversight to the safety aspects of every project and will work closely with our project team to develop a site security plan that complies with all temporary egress, fire, and life safety requirements. Our safety manual is segmented and accessible through QR codes posted on-site, providing instant access to information in the field. This approach ensures that the content is readily available at all times and allows for real-time updates and improvements to our processes. Directives accompanying our toolbox talks are modified to communicate these changes promptly, fostering a dynamic and responsive safety communication system within our organization.

Ensuring a safe working environment is our utmost priority on every project. Our superintendent diligently oversees daily operations, ensuring strict adherence to safety protocols by all contractors. Maintaining an impeccable safety record, free from violations, is paramount to us. On this project, RJM would incorporate a secured site program to ensure employee access is restricted from the construction area and that persons unfamiliar with construction hazards are not exposed to potential threats. Within the construction site, RJM strictly enforces all OSHA requirements, including, but not limited to, PPE, Lock-out/Tag-out procedures, and temporary fire and life-safety measures. RJM does NOT permit any work on live electrical systems. We require all hot work to be coordinated with building management and hot work permits to be obtained before any welding, brazing, or flammable work functions occur. Throughout construction, the RJM superintendent will make daily site safety assessments in conjunction with the project manager, who will complete

RJM EMR



weekly site safety assessments to ensure that all team members uphold the highest level of safety and security.

The following set of metrics provides a comprehensive overview of our unwavering commitment to safety and our outstanding track record over the past seven years. These metrics encapsulate the array of safety protocols and measures we have implemented and upheld, guaranteeing the safety and well-being of our employees, customers, and stakeholders. They stand as a testament to our dedication to fostering a safe and secure environment across all our operations and processes.

RJM Construction has earned recognition from esteemed bodies such as the Minnesota Department of Labor and Industry and the AGC of Minnesota as a Construction Health and Safety Excellence (CHASE) partner. The CHASE partnership charter underscores the significance of creating a safe, healthful work environment in construction and seeks to foster a relationship built on mutual trust and respect among all parties involved in the construction process, including project owners and construction workers. Since 2015, RJM has been an active participant in the CHASE program, with our inaugural Level 3 project, the HERO Center, completed in 2018. Presently, we are engaged in our eighth CHASE project.

Our enduring partnership with the Associated General Contractors (AGC) and the Occupational Safety and Health Administration (OSHA) is deeply valued. It has empowered us to continuously enhance and embed safety standards into our company culture while aiding us in mitigating risks to our employees, subcontractors, and visitors.

PUNCH-LIST PROCESS AND CLOSE-OUT

RJM efficiently completes punch lists, assembles warranty information, and promptly collects contractual contractor closeout documents. Before the official punch-list with the project team, RJM performs a pre-punch list with our internal team to identify, record, and complete any outstanding items. Additionally, RJM and the City's project team will conduct a post-occupancy inspection approximately 11 months after completion.

SUPPLEMENTAL INFORMATION

BUILD RELATIONSHIPS

RJM CONSTRUCTION - PROVEN TEAM

THE RJM DIFFERENCE

There is no substitute for experience when providing construction services. RJM has a deep portfolio of parks and recreation and ice arena construction projects. We understand how to work in collaboration with all stakeholders to effectively plan and execute the project requirements. This experience gives the City of Rogers the assurance that RJM is a reliable, qualified partner. We will work as an extension of your staff, taking care of all construction details- so you can take care of your community.

HISTORY

RJM built the original Rogers Ice Arena and has a deep understanding of ice arena facilities. Our team of professionals understands the timing and process of working with municipal clients and ice arena design teams and will bring leadership and provide value-based solutions whenever needed. Our experienced staff anticipates what lies ahead and strives to protect your interests, and we keep the project moving forward and true to your vision.

UNDERSTANDING CURRENT MARKET CONDITIONS

This project is being completed during a unique time in history. The construction market is seeing all-time highs in material costs, and the high demand for materials has significantly impacted the supply chain and project schedules.

As your construction manager, RJM will use our expertise to help the City determine the best time to bid the project to achieve the best value and shortest overall project duration.

We understand the market conditions and the appropriate escalation amounts to hold in a project budget. We will make recommendations to possibly bid portions of the project earlier or procure in a unique manner to take advantage of material pricing and lead times to put the project in a position to succeed. Although the project will go through a public process and will adhere to the State of Minnesota Public Bidding laws, it is still valuable to have subcontractor feedback during design and

Consistently RJM demonstrates a high degree of professionalism in all phases of the construction process. RJM staff always provide the City with accurate, well thought out cost estimates, construction timelines and communication models.

Alan Madsen
City of Maple Grove

budget phases. We take pride in our relationships with local subcontractors, and during the budget stages of the project, their input and knowledge of their specific markets are invaluable.

CITY COUNCIL OPTIONS

The most successful projects are when our team provides the City Council with the appropriate number of options. This starts with options during the design phase. The design team at HTG is hired to maximizing program and design, so budget will surely be at the threshold. However, with an experienced ice arena construction team, the project can become a reality within budget by developing options for the stakeholder team's consideration. Those options can consist of clear communication for timing to accept alternates, allowances to include in the GMP, or stages of completion (shell, finish, complete) for specific areas. A great example is after the design is complete, bid day alternate material selections or scope revisions that can be made after bids are in hand. If the project bids are favorable to the overall budget, items such as future long term scope options can be added back in. If the project bids are unfavorable to the overall budget, items can be eliminated. This is a very important tool and even more so given today's current market conditions.

With RJM Construction's proven expertise and strategic approach, the City of Rogers can confidently move forward with a project that is not only timely and cost-effective but also aligned with the community's vision and needs.

EXHIBIT A
COST PROPOSAL

Rogers Activity Center
RJM Construction - Construction Management Fee Proposal
March 28, 2025

Preconstruction & Bidding Phase

Description	Quantity	Unit	Unit Cost	Total
Project Executive	60	HRS	$ 200.00	$ 12,000
Project Manager	60	HRS	$ 145.00	$ 8,700
Estimator	144	HRS	$ 130.00	$ 18,720
Assistant Estimator	12	HRS	$ 115.00	$ 1,380
MEP Coordinator	12	HRS	$ 165.00	$ 1,980
Virtual Design	6	HRS	$ 134.00	$ 804
Risk Manager	3	HRS	$ 193.00	$ 579
Document Quality Control Team	0	HRS	$ 135.45	$ -
	Subtotal Preconstruction & Bidding			**~~$ 44,163~~**
	Discounted Pre-Construction Fee			**$ -**

****assume project is ready to bid in June 2025**

Construction Manager Staffing

Description	Quantity	Unit	Unit Cost	Total
Project Executive	235	HRS	$ 200.00	included
Project Management	1128	HRS	$ 145.00	$ 163,560
Project Engineer	0	HRS	$ 115.00	$ -
General Superintendent	47	HRS	$ 155.00	$ 7,285
Superintendent	1626	HRS	$ 140.00	$ 227,668
Assistant Superintendent	0	HRS	$ 119.00	$ -
Safety Director	47	HRS	$ 155.00	$ 7,285
Project Coordinator	94	HRS	$ 80.00	included
Project Accountant	0	HRS	$ 77.00	$ -
Truck	1720	HRS	$ 4.50	$ 7,741
Fuel	47	WK	$ 85.00	$ 3,995
	Subtotal Reimbursable Expenses			**$ 417,534**

Construction Manager Reimbursables

Description	Quantity	Unit	Unit Cost	Total
Project Technology	47	WK	$ 325.00	$ 15,275
Cell Phone	47	WK	$ 50.00	$ 2,350
Blue Prints	11	MO	$ 50.00	$ 543
Postage & Delivery	11	MO	$ 50.00	$ 543
Temporary Toilets (bid item)	11	MO	$ -	$ -
Office Equipment	11	MO	$ 350.00	$ 3,799
Site Trailer	11	MO	$ 950.00	$ 10,312
Progress Cleanup (bid item)	0	HR	$ 93.15	$ -
	Subtotal General Conditions			**$ 32,821**

Construction Management Fee

Proposed Const. Management Fee	1	LS	1.50%	**$ 225,000**
CM Fee Based on a Project Value of:	$ 15,000,000			

* The staffing and hours outlined above are an estimate of anticipated services for the noted duration. Once an agreed upon schedule is finalized, the hours may adjust up or down accordingly.

Total Cost of Services	$ 675,355

PROPOSAL FOR CONSTRUCTION MANAGER AT RISK SERVICES

ROGERS ACTIVITY CENTER EXPANSION

RFP Contact

Chris Rear
O: (763) 559-9393
C: (763) 331-4094
F: (763) 559-8101
crear@rochoncorp.com

HTG architects

Rochon

28 2nd Street NW
Ste. 200
Osseo, MN 55369

MARCH 28, 2025

March 28, 2025

Mr. Doran Cote
Public Works Director/City Engineer
City of Rogers
22350 South Diamond Lake Road
Rogers, MN 55374

RE: Request for Proposal for CM at Risk Services for Rogers Activity Center Expansion

Dear Mr. Cote and Members of the Selection Committee,

On behalf of the entire Rochon Corp. team, thank you for the opportunity to submit our proposal for Construction Manager at Risk services for the **City of Rogers Activity Center Expansion**. Rochon is proud to serve as a **Trusted Construction Partner** and will act as an extension of the City, facilitating open, honest dialogue - what we call **"Tough Conversations"** - to help the City and the **Rogers Youth Hockey Association (RYHA)** make informed, forward-thinking decisions at every phase of the project.

We're particularly excited about this opportunity because we recognize the lasting impact that an expanded activity center will have on the **Rogers** community. Our experience with municipal and community-driven projects, combined with Shared Values around **Transparency**, **Accountability**, and **Community Investment**, makes us uniquely positioned to lead this work.

If selected, our team will provide the project with the following key advantages:

A True Collaborative Partner: Projects of this scale require more than coordination - they demand seamless integration. Rochon brings a proactive, solutions-driven approach to collaboration, ensuring clear communication, real-time updates, and full transparency from preconstruction through completion. We'll support the City's processes, keep **HTG** aligned with constructability and cost realities, and ensure **RYHA** - the primary end user - is engaged and informed throughout.

Stewards of Your Investment: Every dollar matters, and Rochon is committed to delivering maximum value. We will relentlessly pursue cost-effective solutions, prioritize long-term durability, and manage every aspect of the project with fiscal responsibility and discipline.

Delivering a successful project of this importance requires more than a contractor - it requires a **Responsible**, **Accountable** partner who understands the broader impact of the work. Rochon is ready to lead with **Purpose**, **Integrity**, and a hands-on approach that reflects our deep commitment to building community-centered spaces.

Thank you again for the opportunity to partner with the City of Rogers, **RYHA**, and **HTG** on this important initiative. We look forward to the opportunity to discuss next steps.

Sincerely,

Christopher Rear
Director of Construction Management
(763) 331-4094 | crear@rochoncorp.com

Business Organization & History

Firm Name
Rochon Corp.

Corporate Structure
Rochon is an S-Corporation

Location
28 2nd Street NW
Suite 200
Osseo, MN 55369

RFP Contact
Chris Rear, Director of Construction Management
O: (763) 559-9393
C: (763) 331-4094
crear@rochoncorp.com

Officers
Nick Reynolds, Partner/CEO
Paul Braton, Partner/President
Jeff Buckley, Partner/Executive VP

Contact Information
Tel: (763) 559-9393
Fax: (763) 559-8101
www.rochoncorp.com

History

Founded in 1985, Rochon has spent the last 40 years forging a reputation as a trusted industry leader, built on a foundation of honest communication, personal accountability, and community responsibility. We don't just construct buildings - we invest in the communities we serve by creating spaces of lasting value. Led by three senior level principles with integrated expertise and leadership, our team leads every project with a balance of critical and creative thinking, continuous collaboration, and expert oversight to deliver projects that stand the test of time.

Services

Preconstruction - Rochon's preconstruction services lay the foundation for successful project delivery. We provide detailed cost estimating, value engineering, constructability reviews, schedule development, logistics planning, and early risk identification. Working closely with owners, architects, and engineers, we ensure design decisions align with budget, scope, and timeline from day one. Our proactive approach

during preconstruction helps eliminate surprises down the road and sets the stage for a smooth and efficient construction phase.

Construction Management - Rochon provides comprehensive construction management services tailored to meet the unique needs of each project. Our expertise includes Construction Management at Risk (CMaR), where we take on cost and schedule responsibility, and Construction Manager as Advisor (CMa), where we serve as an independent advocate for the owner throughout all project phases. Acting as an agency construction manager, we oversee planning, design coordination, procurement, and construction execution - ensuring quality, managing risk, controlling costs, and keeping schedules on track. With a hands-on, collaborative approach, we guide projects from concept through completion with transparency, precision, and accountability.

Design Build - Rochon offers streamlined design-build services that integrate design, budgeting, and construction into a single, accountable process. By serving as the single point of contact, we simplify communication, accelerate timelines, and reduce risk for owners. Our team collaborates closely with design partners to ensure constructability, cost efficiency, and alignment with the owner's vision from the outset. The result is a cohesive, transparent process that delivers high-quality outcomes with greater speed and certainty.

General Contracting - As a trusted general contractor, Rochon delivers high-quality construction through disciplined project execution, strong subcontractor relationships, and a commitment to safety and schedule. We manage all aspects of construction - from sitework to final finishes - ensuring quality control, budget adherence, and timely delivery. Whether working from completed design documents or collaborating early in the process, our team brings hands-on expertise, clear communication, and a results-driven mindset to every project.

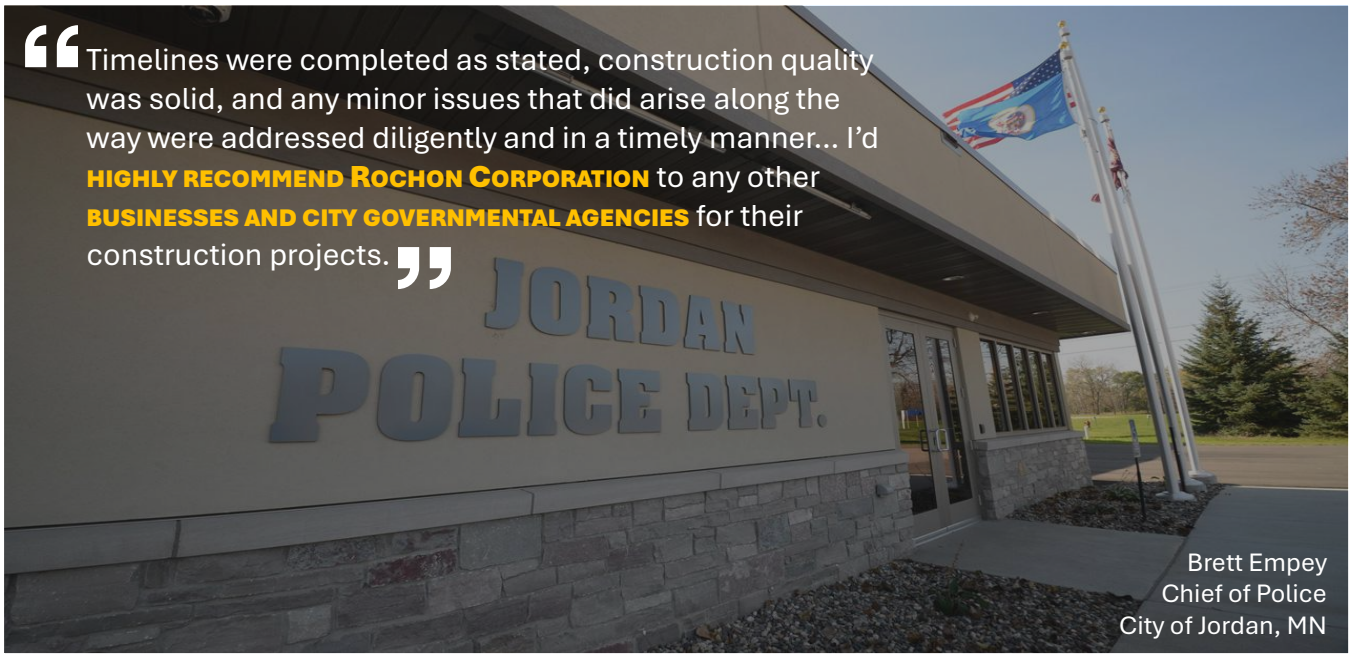
Why We Do What We Do

What We Do - We are a General Contracting and Construction Management firm, leading and guiding the entire construction process from start to finish. We don't just manage - we own the outcome of every project we take on. We provide clients with cost and schedule certainty, proactively mitigating risks while ensuring every dollar is maximized for impact.

We specialize in projects that serve entire communities for generations. Whether it's a new school that fosters learning, a fire station that keeps people safe, or a community center that brings people together, our focus is on delivering projects that have real and lasting meaning.

How We Do What We Do - We believe that the best projects are achieved when responsibility is clear, communication is open, and accountability is built into every step. That's why we take a proactive, collaborative approach. We work with owners, design teams, and trade partners from the earliest design phases to optimize projects for constructability, efficiency, and long-term value. We plan relentlessly, solve problems before they happen, and never leave our clients (or construction partners) guessing.

As a CMaR firm, we own the risks - we commit to a Guaranteed Maximum Price (GMP) and stand behind our numbers, our work, and our word. No excuses. No surprises. Just a relentless commitment to delivering the best possible outcome for our clients and the communities they serve.



Why We Do What We Do - At our core, we do what we do because we believe the spaces we construct shape lives, define communities, and leave legacies that outlast us. For us, construction isn’t just about putting up walls or laying down concrete - it’s about creating spaces where people can learn, work, gather, and grow.

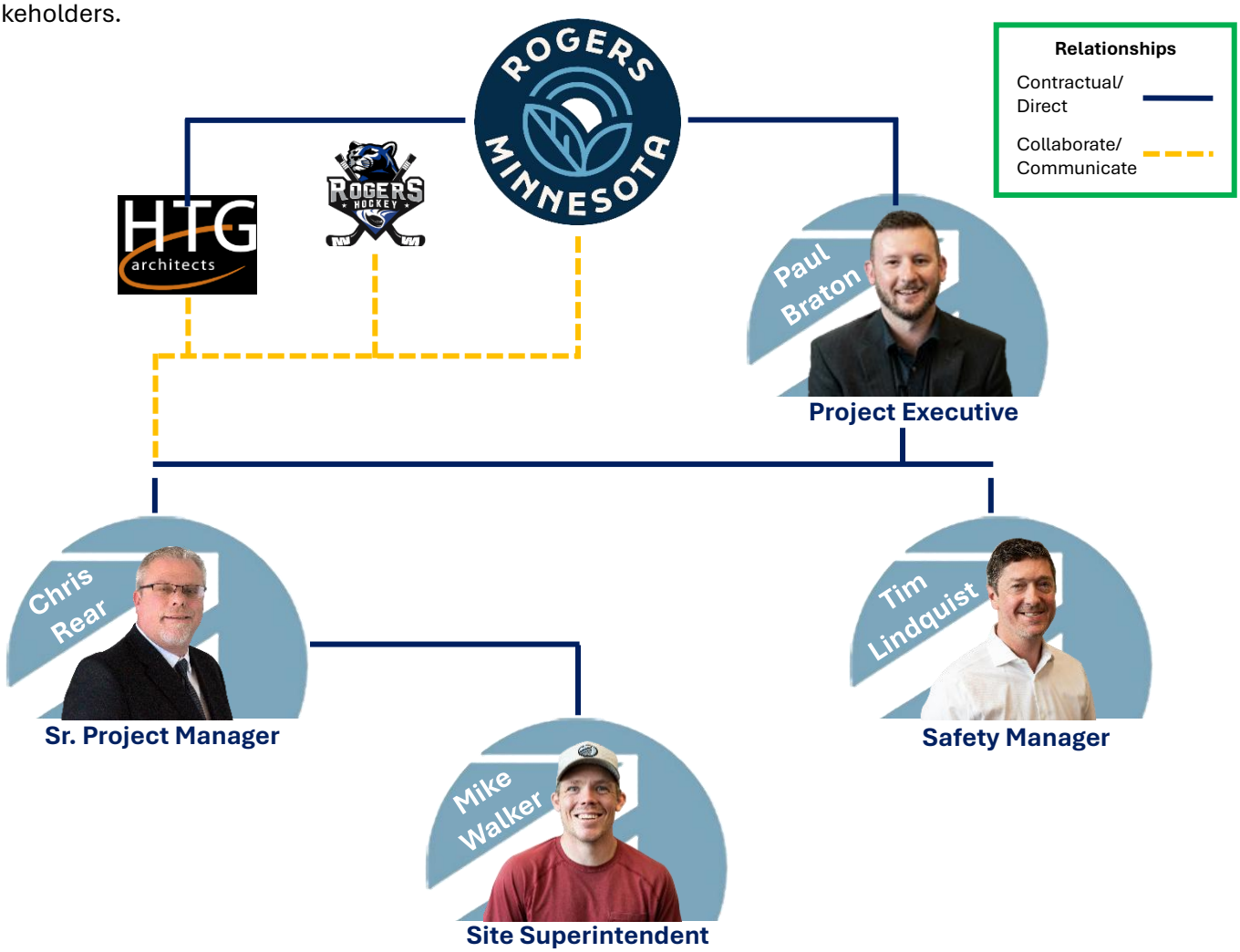
We’ve seen firsthand how the right building, built the right way, changes lives. A well-designed school isn’t just another building - it’s where the next generation of writers, musicians, scientists, and leaders find their inspiration. A modern municipal building isn’t just some structure - it’s where friends and family come together, where the disenfranchised find safety and security, and where communities plan their futures.

We take on the risk, the responsibility, and the leadership of these projects because we know what’s at stake! Every decision we make, every challenge we solve, every dollar we help our clients invest wisely - it all contributes to something bigger than us. It’s about making sure that the projects we build don’t just stand up....but stand for something. **CONSTRUCTION** is what we do; **COMMUNICATION**, **ACCOUNTABILITY**, and **RESPONSIBILITY** are how we do what we do; **PEOPLE** are **WHY** we do what we do.

Team Identification

Collaborative Team

Most critical to the success and delivery of any project is the team of exceptional people with whom you will work. We have assembled this team based on their proven track records of success on recent municipal projects, effective communication styles, and ability to collaboratively work with multiple stakeholders.



WHY THIS TEAM?

- **Transparent**, **Team-Oriented** approach, keeping all stakeholders **Informed** and **Aligned** throughout the project
- Proactive **Risk Mitigation** and strong **Financial Oversight**, ensuring the project stays on **Budget** and on **Schedule**
- Rigorous **Safety Standards** and a focus on **High Quality** construction
- Extensive experience working with **Municipal Clients**, including work under **GMP** contracts, and is knowledgeable of the municipal approval process and reporting requirements

Paul Braton

Project Executive

As a resident of ISD 728, Paul brings a personal investment in the success of the **Rogers Activity Center Expansion**. He will provide executive oversight throughout the project, ensuring it is fully staffed, well-supported, and aligned with the expectations of both the **City of Rogers** and **RYHA**. Paul's commitment to hands-on leadership means he will remain actively engaged and readily accessible to the project team and all stakeholders from start to finish.

Education, Training, & Affiliations

Rochon President
22 years tenure with Rochon

B.S. Construction Management
MSU Moorhead

OSHA 30 Certification
CPR Certification
Associated General Contractors of MN (AGC)
Minnesota Construction Association
Minnesota Builders Exchange

Relevant Project Experience

Spero Academy | $10.1M (2017)
Blaine HS Adds & Renos | $7.6M (2018)
Zimmerman/Livonia Fire Station | $4.7M (2021)
Lindstrom Fire Station | $4.6M (2022)
New Brighton Public Works | $4.9M (2023)

> "Paul with Rochon did a great job for us with our new building in Mendota heights. Rochon was a **True Partner** from day one. The company was always open to changes and finding the best materials with the least expense possible. If we ever have the opportunity to work on another project for our company, I know my first call will be to Paul Braton with Rochon."
>
> Bryce Methven
> Owner, Vice President
> Gemini Medical Office

Chris Rear

Senior Project Manager

As a resident of ISD 728, Chris will personally lead the **Rogers Activity Center Expansion** from preconstruction through closeout - this project will not be handed off to another project manager. His collaborative, hands-on approach fosters clear goals, team alignment, and strong owner engagement from day one. With a proven track record in leading design teams and managing complex budgets, Chris delivers accurate estimates that reflect real-world market conditions and project-specific risks. During construction, he will oversee the on-site team, manage cost control, administer contracts and payment applications, and lead subcontractor negotiations. His deep experience with municipal projects and GMP delivery - combined with a direct, transparent communication style - ensures the entire team and all stakeholders, including **RYHA**, stay informed and on track every step of the way.

Education, Training, & Affiliations

Rochon Director of Construction Management
6 mos. tenure with Rochon
25+ years industry tenure

B.S. Business Administration
Western Governors University

OSHA 30 Certification
CPR Certification
SafeLand Certification
TWIC Certification
Associated General Contractors of MN (AGC)
Minnesota Construction Association

Relevant Project Experience

Delano HS Diving Well Addition* | $11M (2018)
Princeton HS Pool Upgrades* | $1.5M (2019)
Rice Lake Elementary Add & Renos* | $7.5M (2021)
Watertown Mayer HS Pool Upgrades* | $2.8M (2022)

* with another firm

> Chris Rear is the real deal, and I appreciate the **Clear Communication**. He came into a project that was over-whelming to others and things got missed, but Chris took charge and **Looked After Us**.

Eric Olsen
Superintendent
Monticello Public Schools

Tim Lindquist

Safety Manager

Tim has an extensive background in the construction industry and has actively sought diverse experience. He will be responsible for overall site safety of the **Rogers Activity Center Expansion**, ensuring that all parties - from material vendors to project owners - adhere to Rochon's rigorous safety standards.

Education, Training, Affiliations

Rochon Sr. Project Manager & Safety Manager
26 years tenure with Rochon
32 years industry tenure

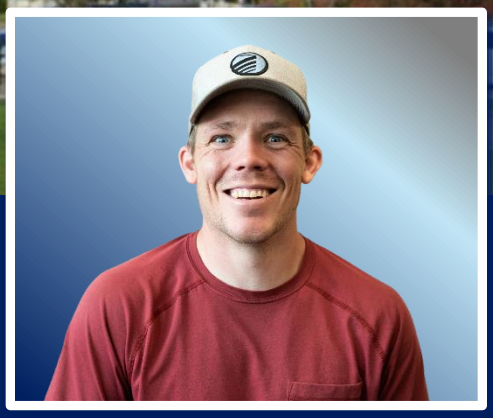
B.S. Construction Management
Mankato State University

OSHA 30 Certification
OSHA 10 Certification
CPR Certification
Associated General Contractors of MN (AGC)
Minnesota Construction Association
Minnesota Builders Exchange

Relevant Project Experience

Eagle Ridge Academy | $4.5M (2017)
Friendly Hills Middle School | $9.9M (2019)
Watertown Mayer HS Pool Upgrades | $2.8M (2022)
North High School Renovations | $23.6M (2023)

> "What I appreciated most about Rochon is that they **Understood** our project, especially charter schools. We are each unique in so many ways and Rochon allowed our personalities to shine forth. Rochon has a specialty in working with schools that have **High Expectations**... I will only work Rochon."
>
> Lynn G. Peterson, Ed. S
> Executive Director
> Cologne Academy



Mike Walker

Site Superintendent

Mike is one of Rochon's most experienced superintendents, with a proven track record of delivering complex projects on time while ensuring customer expectations are met. During the preconstruction phase of the **Rogers Activity Center Expansion**, he will actively participate in constructability reviews to help identify the most efficient and cost-effective solutions. Once construction begins, Mike will take charge of the site, overseeing trade partners, coordinating field forces, managing the schedule, and enforcing the site-specific safety plan.

Education, Training, Affiliations

Rochon Corp. Site Superintendent
6 years tenure with Rochon
20+ years industry tenure

OSHA 30 Certification
CPR Certification
Erosion & Stormwater Management Cert.
Associated General Contractors of MN (AGC)
Minnesota Construction Association
Minnesota Builders Exchange

Relevant Project Experience

Somerset Elementary | $14.9M (2019)
Hope Academy | $13.6M (2020)
Lindstrom Fire Station | $4.6M (2022)
Community School of Excellence | $18M (2023)

> "Over the 28 months of the project, the relationship between Rochon and Spero Academy became more than a contractual agreement; Rochon became our **Partner** and **Friend** as they developed a keen understanding of the needs of our unique student population."
>
> Chip Windham
> Executive Director
> Spero Academy

Key Qualifications & Approach

Why Rochon?

Rochon is the right partner for the **City of Rogers** because we don't just manage construction - we build lasting value for the communities we serve. With four decades of experience, our team brings deep expertise in Construction Management at Risk, Construction Manager as Advisor, and traditional General Contracting delivery methods. We understand how to lead public projects with transparency, accountability, and precision, and we're known for our hands-on approach, proactive problem-solving, and clear communication.

What sets us apart is our purpose: we believe in creating spaces that serve - not just stand. Our work on municipal and community-focused projects is rooted in a deep respect for how people use space, and a drive to optimize function, safety, and efficiency. For the **Rogers Activity Center Expansion**, we offer more than project oversight - we offer stewardship. From preconstruction through completion, we'll ensure the design aligns with your goals, budget, and long-term vision. Our preconstruction services include detailed cost estimating, constructability reviews, logistics planning, and early risk management - all designed to eliminate surprises and deliver a smooth, on-time build.

Choosing Rochon means choosing a partner who understands that this isn't just another project - this is a place where the community will gather, grow, and thrive. We're ready to lead it with the same commitment and pride we bring to every project that bears our name.

Approach

To successfully complete the **Rogers Activity Center Expansion** within budget and scope, our firm will implement a structured approach emphasizing cost control, efficiency, and quality assurance. Key tasks include:

Establish a Detailed Estimate

Rochon will work with the **City** and **HTG** to confirm the target budget for the project. Rochon will perform a detailed estimate using information from our project cost history for similar building types and spaces. This estimate will inform our target values for the project budget and will facilitate informed decision- making going forward. We will then work with the **City** and **HTG** to provide the best value in materials and schedule, and we will also test the project budget as often as necessary via detailed estimates to ensure the **City** receives the absolute best value for every dollar spent.

Value Management & Constructability

Value Management is most effective when it is performed **Collaboratively**. Rochon's team will provide **Real-Time Cost-Saving** opportunities during the final design meetings so the **City** can make informed decisions. These options will provide the team with different pathways for project savings of schedule impacts to stay within the overall project budget and schedule.

Safety

Rochon considers a safe working environment for everyone to be the highest priority. Rochon's Safety Manager, **Tim Lindquist**, provides leadership and oversight regarding the safety aspects of every project. **Mr. Lindquist** will work closely with **Chris Rear** and **Mike Walker** to develop a Site Specific Safety Plan for the **Rogers Activity Center Expansion**. Further, before any contractor can begin their work, they are required to review and acknowledge Rochon's Site Specific Safety Plan and sign an agreement stating they will abide by Rochon's safety protocols. If contractors do not comply, the Rochon team will immediately take the appropriate action to resolve the issue. Rochon also employs a third-party safety auditor to periodicallly perform jobiste safety audits and document any hazards or near-mises. Rochon does not compromise safety over budgets or schedules.

Project Management

Chris Rear will be the primary point of contact for the **City**. He will manage all forms of documentation and information flow during construction. Key responsibilities include contract administration, budget management, and the project schedule. In addition, we will issue meeting minutes, coordinate RFI's, and maintain daily coordination of all on-site construction.

On-Site Management

Mike Walker, Rochon Site Superintendent, owns the construction site and will provide daily on-site supervision, including coordination of all contractors and daily schedule management. He will work closely with the **Chris Rear**, the **City**, and **HTG** to effectively manage and sequence the work, and will also monitor the quality of construction and conformance with the contract documents. **Mike** will provide documentation of all site activities with pictures, daily field reports, and safety audits.

Progress Meetings

Rochon will hold weekly or bi-weekly progress meetings during the construction phase, which will include all subcontractors onsite, the **City**, **HTG**, and all applicable sub-consultants. Each meeting will cover safety, design issues, owner issues, contractor issues, progress-to-date, and upcoming progress, including a three-week look ahead schedule. Meeting minutes will be documented by Rochon and issued to all involved parties within 48 hours of every meeting. In addition, **Mike Walker** will document all site activities with daily field reports and safety audits. All documentation will be controlled and housed using our online project management software, Procore.

Schedule Management

Chris Rear will utilize the comprehensive schedule developed during the design phase, which also identifies long-lead items and critical path milestones, to ensure ongoing schedule compliance. Throughout the construction project, **Chris Rear** will provide analysis and variance reporting, and will issue contractor non-conformance notifications when necessary.

Budget Management

Rochon will utilize its extensive experience with Municipal projects to aggressively manage the budget. We will compare all construction activity to the contract documents and the individual scopes of work, and scrutinzie any change request prior to being authorization. We will also work with contractors in the field to find options for resolution, often eliminating the proposed change request altogether. By focusing on proactive project management and developing alternative solutions with the project team, most changes can be avoided.

Start-Up, Testing, & Occupancy

Throughout the construction phase, Rochon will continually work with the Authorities Having Jurisdiction, contractors, the **City**, and the design team to coordinate ongoing testing and inspections. Our primary tracking mechanism for all required testing and inspections is to incorporate the dates of these activities into the continually updated master CPM schedule, so all parties can be aware.

Prior to any start-up procedures being allowed, Rochon will verify all prerequiste activites have been completed. Once once verificaiton has been completed, Rochon will coordinate with contractors, the **City**, and the design team to schedule start-ups and gather all necessary documenation for closeout.

After Substantial Completion of the project, Rochon will coordinate the training of **City** and **RYHA** personnel on the operation and maintenance of the major building systems. We secure and transmit required guarantees, affidavits, releases, bonds and waivers, operating manuals, records, and as-built drawings to all Key Stakeholders, and this information will be provided in both hard copy and electronic form. We will coordinate an 11-month walkthrough with the **City** maintenance personnel, and we will coordinate and facilitate any needed corrections with the responsible contractors.

Project closeout is of the utmost importance. To ensure project closeout is done right, Rochon utilizes Procore, our cloud base project management software, to track closeout progress.

Punchlist

Rochon utilizes the punchlist feature in Procore to document all punchlist items, in real-time, and assign them to the responsible parties. Prior to the 'Official' punchlist performed by the design team, Rochon will perform a pre-punchlist with our internal team to identify any incomplete work.

After Rochon's pre-punchlist, an official punchlist will be performed by Rochon, **City** staff, and the design team, and issued to subcontractors via Procore. Once punchlist items are addressed, Procore notifes Rochon and the design team, and completed items can either be accepted and closed, or rejected and returned to the contractor.

FOREST LAKE SPORTS CENTER FIELDHOUSE REMODEL

Forest Lake, MN

The Forest Lake Sports Center fieldhouse construction project involved demo of the “dome” over the existing ice rink (the ice rink remained in place) and construction of a new super structure to enclose the ice rink. The project also included all new mechanical system throughout.

COST
$6,265,000

SCHEDULE
Apr 2023 - Aug 2023

PROJECT TEAM
Paul Braton - Project Executive
Tim Lindquist - Project Manager

CLIENT CONTACT
Chrissy Eide, Dir. of Business Svcs
6100 North 210th St.
Forest Lake, MN 55025
(651) 982-8125

An indoor ice arena at the Forest Lake sports complex will serve as home to Forest Lake Rangers varsity hockey, Forest Lake youth hockey and a wide variety of skating activities. An adjacent field house will feature refrigerated ice five months of the year and a turf field for seven months. — File graphic

DELIVERY	TYPE	SQ. FT.	ARCHITECT
Design-Bid-Build	Renovation	25,500	292 Design

ZIMMERMAN-LIVONIA FIRE HALL & EVENT CENTER

Zimmerman, MN

The Zimmerman-Livonia Fire Hall combines the functions of both an event center and a fire hall into a single facility but allows for the fire hall to remain secured and fully operational when a large event occurs in the adjacent space. A dedicated public entry allows access to both the event center and the fire hall. There is also a separate fire station entry for volunteer firefighters to quickly enter and respond to calls.

COST
$4,740,000

SCHEDULE
Jun 2020 - May 2021

PROJECT TEAM
Nick Reynolds – Project Executive
Paul Braton – Project Manager
Mike Walker - Superintendent

CLIENT CONTACT
Kary Tillman, City Clerk
13028 Fremont Ave
Zimmerman, MN 55398
(763) 856-2280

DELIVERY	TYPE	SQ. FT.	ARCHITECT
CM@Risk	New Construction	26,500	Kodet Architectural

DELANO PUBLIC SCHOOLS

Delano, MN

The extensive work at Delano Public Schools included a mix of ground-up construction, additions, and major renovations addressing critical district needs. Working year-round, in occupied-adjacent spaces, construction was separated into 5 overlapping projects.

COST
$65,000,000

SCHEDULE
Jun 2016 - Nov 2020

PROJECT TEAM
Chris Rear –
Project Executive/Project Manager
Jason Johnson - Superintendent

CLIENT CONTACT
Matt Schoen, Superintendent
700 Elm Ave East
Delano, MN 55328
(763) 972-3365

Early collaboration provided insights into existing conditions, phasing, constructability, and system options - setting the stage for a cost-effective design that met program goals, maximized budget, and allowed the district to prioritize and implement additional scope items. Through early engagement, Rochon helped align the budget from a variety of funding-sources, including bonds and maintenance funds, and identify cost-saving opportunities. Projects included:

Additions
- 50,000sf (656 seat) Performing Arts Center
- 3,200sf Diving Well
- 10,600 Cafeteria & Commons
- 5-stop elevator

New Construction
- 75,000sf Intermediate School

Renovations
- 130,000sf of HS renos
- 6,000sf of District Office renos
- 45,000sf of Comm. Ed. renos
- 73,000sf of ES renos

DELIVERY	TYPE	SQ. FT.	ARCHITECT
CM Advisor	New Construction, Additions, Renovations	300,000+	Wold

COST PROPOSAL

DESIGN PHASE		Start:	April 8, 2025	
		Completion:	June 1, 2025	
	2	8.66	43	344
	Months	Weeks	Days	Hours
Description	**Quantity**	**UOM**	**Unit Cost**	**Total**
Project Executive	17	HRS	$ 150	IN FEE
Senior Project Manager	139	HRS	$ 137	$ 19,043
Safety Manager	2	HRS	$ 137	IN FEE
Project Manager	0	HRS	$ 130	$ -
Estimator	9	HRS	$ 135	$ 1,215
General Superintendent	2	HRS	$ 130	IN FEE
Document Control Coordinator	2	HRS	$ 68	IN FEE
Project Coordinator	9	HRS	$ 65	$ 585
Project Accountant	4	HRS	$ 68	IN FEE
Subtotal Design Phase	184			~~$ 20,843~~
			Precon Discount	$ (15,000)
TOTAL DESIGN PHASE STAFF				**$ 5,843**

BIDDING PHASE		Start:	May 26, 2025	
		Completion:	June 24, 2025	
	1	4.33	22	176
	Months	Weeks	Days	Hours
Description	**Quantity**	**UOM**	**Unit Cost**	**Total**
Project Executive	4	HRS	$ 150	IN FEE
Senior Project Manager	35	HRS	$ 137	IN FEE
Project Manager	9	HRS	$ 130	IN FEE
Document Control Coordinator	4	HRS	$ 68	IN FEE
Project Coordinator	9	HRS	$ 65	IN FEE
Project Accountant	4	HRS	$ 68	IN FEE
Subtotal Bidding Phase	65			$ -
TOTAL BIDDING PHASE STAFF				**$ -**

CONSTRUCTION PHASE		Start:	July 1, 2025	
		Completion:	April 3, 2026	
	9	38.97	195	1560
	Months	Weeks	Days	Hours
Description	**Quantity**	**UOM**	**Unit Cost**	**Total**
Project Executive	78	HRS	$ 150	IN FEE
Senior Project Manager	935	HRS	$ 137	$ 128,095
Safety Manager	78	HRS	$ 137	$ 10,686
General Superintendent	78	HRS	$ 130	$ 10,140
Site Superintendent	1560	HRS	$ 120	$ 187,200
Document Control Coordinator	78	HRS	$ 68	$ 5,304
Project Coordinator	78	HRS	$ 65	$ 5,070
Project Accountant	39	HRS	$ 68	$ 2,652
Subtotal Construction Phase	2924			$ 349,147
TOTAL CONSTRUCTION PHASE STAFF				**$ 349,147**

CONSTRUCTION CLOSEOUT PHASE

		Start:	April 3, 2026	
		Completion:	July 3, 2026	
	3	13	65	520
	Months	Weeks	Days	Hours

Description	Quantity	UOM	Unit Cost	Total
Project Executive	26	HRS	$ 150	IN FEE
Senior Project Manager	208	HRS	$ 137	IN FEE
Project Manager	52	HRS	$ 130	IN FEE
Site Superintendent	160	HRS	$ 120	IN FEE
Document Control Coordinator	26	HRS	$ 68	IN FEE
Project Coordinator	26	HRS	$ 65	IN FEE
Project Accountant	26	HRS	$ 68	IN FEE
Subtotal Construction Closeout Phase	524			$ -
TOTAL CONSTRUCTION CLOSEOUT PHASE STAFF				**$ -**

WARRANTY PHASE

		Start:	April 3, 2026	
		Completion:	April 3, 2027	
	12	52	260	2080
	Months	Weeks	Days	Hours

Description	Quantity	UOM	Unit Cost	Total
Project Executive	26	HRS	$ 150	IN FEE
Senior Project Manager	52	HRS	$ 137	IN FEE
Project Manager	52	HRS	$ 130	IN FEE
Project Coordinator	26	HRS	$ 65	IN FEE
Subtotal Warranty Phase	156			$ -
TOTAL WARRANTY PHASE STAFF				**$ -**

REIMBURSABLES

		Start:	July 1, 2025	
		Completion:	April 3, 2026	
	9	38.97	195	1560
	Months	Weeks	Days	Hours

Description	Quantity	UOM	Unit Cost	Total
Site Trailer	9	MO	$ 1,800	$ 16,200
Temporary Toilets (x3)	9	MO	$ 1,200	$ 10,800
Superintendent Truck	9	MO	$ 1,500	$ 13,500
Pre-Construction Mileage	3	MO	$ 300	$ 900
Construction Mileage	9	MO	$ 1,200	$ 10,800
Office Supplies / Equipment	9	MO	$ 350	$ 3,150
Phones / Internet / Technology	9	MO	$ 1,200	$ 10,800
Printing	9	MO	$ 250	$ 2,250
Safety Supplies and Signage	9	MO	$ 300	$ 2,700
Project Management Software	1	LS	$ 5,000	$ 5,000
Photography	1	LS	$ 2,500	$ 2,500
TOTAL REIMBURSABLES				**$ 78,600**

CONSTRUCTION MANAGEMENT FEE

Description	Value	CM Fee %	Total
Estimated Construction Value	$ 15,000,000	2.4%	$ 360,000
TOTAL CONSTRUCTION MANAGEMENT FEE			**$ 360,000**

TOTALS

Description	SubTotal
TOTAL STAFF	$ 354,990
TOTAL REIMBURSABLES (DIRING CONSTRUCTION)	$ 78,600
TOTAL CONSTRUCTION MANAGEMENT FEE	$ 360,000
TOTAL FEE	**$ 793,590**
Percentage of Construction Value	**8.54%**

CITY OF ROGERS

ROGERS ACTIVITY CENTER EXPANSION

MARCH 28, 2025

Terra CONSTRUCTION

Serving those who serve others™

PROPOSAL

FOR CONSTRUCTION MANAGEMENT AT RISK SERVICES

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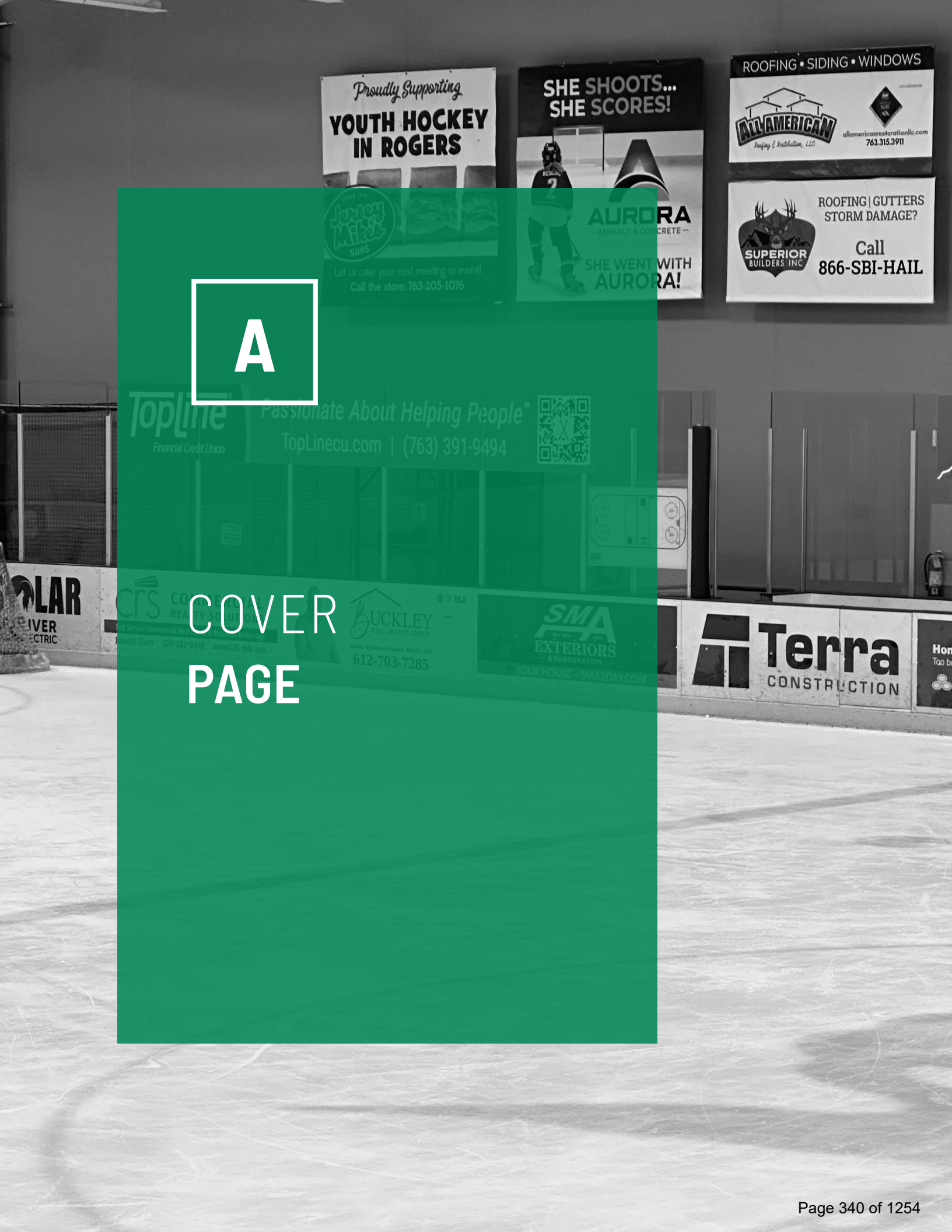
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A

COVER PAGE

763.463.0220
877.604.2118

info@terragc.com
terragc.com

March 28, 2025

Doran Cote
Public Works Director/City Engineer
City of Rogers
22350 South Diamond Lake Road
Rogers, MN 55374

RE: Request for Proposal for Construction Management at Risk Services
Rogers Activity Center Expansion

Dear Doran and Project Team,

Expanding the Rogers Activity Center is more than just adding square footage — it's about enhancing a community gathering space that plays a vital role in the lives of Rogers residents. Thoughtful renovation and expansion of the Activity Center can strengthen the City's investment in recreation, delivering a modernized facility that supports youth athletics, public events, and community well-being.

With more than 20 projects completed in Rogers — including five projects for the City, we bring deep insight into the City's priorities, processes, and commitment to serving the community. Our team understands that maintaining ongoing operations during construction will be critical to the success of this project. With a strong portfolio of athletic and recreational projects, and a proven phased construction approach, we are ready to deliver a seamless transition from existing to expanded spaces while minimizing disruptions.

We are more than a builder — we are a collaborative partner invested in the Rogers community. Our long-standing sponsorship of the Rogers Activity Center is a testament to our commitment to supporting the spaces that bring people together. Combined with our track record of delivering CM projects within 2% of GMP, we offer the City confidence in our ability to deliver this project on time, on budget, and with the quality the community deserves.

We look forward to the opportunity to help the City of Rogers create a renewed Activity Center that will serve the community for generations to come.

Respectfully submitted,

Jason Whiting, Vice President
jwhiting@terragc.com | 763.463.0244

B

BUSINESS ORGANIZATION **AND HISTORY**

BUSINESS ORGANIZATION & HISTORY

Main Office / Office Locations

Terra Construction
21025 Commerce Blvd, Suite 1000
Rogers, MN 55374
763.463.0220
info@terragc.com
www.terragc.com

Brief History of the Firm

2007

Corporate Structure/ Ownership Type

Limited Liability Company

Number of Years Providing Similar CMAR Services

18 Years

Other Services Provided

Design-Build
Design-Bid-Build

Construction Services Provided

Cost Estimating
Lean Construction
Virtual Design / BIM Modeling

Principal Officers

Tom Brown
President
763.463.0289
tbrown@terragc.com

Ben Newlin
Vice President
763.463.0243
bnewlin@terragc.com

Jason Whiting
Vice President
763.463.0244
jwhiting@terragc.com

Serving those who serve others™

C

TEAM
IDENTIFICATION

HTG architects

ROGERS MINNESOTA

Terra CONSTRUCTION

We have evaluated our proposed team's workloads and **ensured we have the resources available to perform the work** from the preconstruction phase through construction completion.

CORE PROJECT TEAM

Tom Brown
President

Jason Whiting
Project Executive

Jake Dahlheimer
Project Manager

Braden Koeppe
Superintendent

Cody Kolb
Assistant
Project Manager

Trey Frederickson
Field Engineer

EXTENDED PROJECT TEAM

Kory Reiners
Preconstruction Manager / Cost Estimator

Jake Anderson
Virtual Design & Construction

CONSULTANTS

Ryan Ring
Lean Construction Consultant
Ring Property Services

John Bestman
Construction Safety Consultant
Marsh McLennan Agency

Tom Brown

President

Tom has been in the commercial construction industry for more than three decades. He has overseen projects in a variety of industries including higher education, municipal, healthcare and industrial projects.

Responsibilities

Provide leadership and support project team in delivering high-quality results

Select Experience

- Rogers Activity Center Site Improvements — Rogers, MN
- 21st Century Bank Event Center — Rogers, MN
- Rogers Lions Park Splash Pad & Shelter — Rogers, MN
- Mississippi Crossings — Champlin, MN
- ISD 728 Rogers High School Performing Arts Center — Rogers, MN
- ISD 728 Rogers High School 3rd Wing Addition — Rogers, MN
- Cargill GEOS Pilot Plant — Savage, MN

Education
B.S. in Building Construction Management - University of Wisconsin-Platteville

Jason Whiting

Project Executive

Jason's commitment to excellence has earned him a reputation for delivering projects on time and within budget. He has recent experience collaborating with the City of Rogers and brings leadership and an ability to effectively communicate — making him an exceptional leader, who ensures seamless collaboration with team members and stakeholders.

Responsibilities

Executive oversight on team performance, staffing, risk management, quality control, client satisfaction and MEP coordination throughout design and construction working with the design team and MEP subcontractors

Select Experience

- Rogers Indoor Turf Facility — Rogers, MN
- Mississippi Crossings — Champlin, MN
- Elk River Public Safety Building Renovation & Expansion — Elk River, MN
- Elk River Fire Station #3 — Elk River, MN
- 21st Century Bank Event Center — Rogers, MN
- ISD 728 Rogers High School Performing Arts Center — Rogers, MN
- ISD 728 Rogers High School 3rd Wing Addition — Rogers, MN

Education
B.S. in Construction Management; Minor in Business Administration - North Dakota State University

Jake Dahlheimer

Project Manager

Jake's dedication and expertise continuously drive our projects to success. He navigates through complex projects and ensures smooth coordination among all stakeholders to deliver outstanding results and exceed client expectations.

Education
B.S. in Project Management w/ Emphasis in Construction & Facilities Management - Bemidji State University

Responsibilities

Project management from the beginning of construction through closeout and warranty, coordination of subcontractors, continuous updating and management of CPM schedule, management of submittal phase to ensure procurement of long lead items and review of pay applications and change order requests

Select Experience

- Rogers Indoor Turf Facility — Rogers, MN
- Rogers South Community Park Warming House & Heated Storage — Rogers, MN
- Elk River Public Safety Building Renovation & Expansion — Elk River, MN
- Elk River Fire Station #3 — Elk River, MN
- ISD 728 Lincoln Elementary Renovations — Elk River, MN

Braden Koeppe

Superintendent

Braden is a talented and dedicated professional with a passion for excellence. He truly understands what it takes to deliver successful projects. As a Superintendent, Braden constantly surpasses expectations and leads his team with outstanding leadership skills. His deep knowledge of construction processes, coupled with his strong attention to detail, ensures that every project under his supervision is completed flawlessly.

Education
B.S. in Construction Management - Minnesota State University, Moorhead

Responsibilities

On-site supervision, construction coordination and monitoring of all work/activities, coordination of owner-related activities, progress reviews, safety monitoring and daily field documentation of activities

Select Experience

- Minnesota Army National Guard Readiness Center — New Ulm, MN
- Elk River Public Safety Building Renovation & Expansion — Elk River, MN
- Elk River Fire Station #3 — Elk River, MN
- Cargill GEOS Pilot Plant — Savage, MN
- Ramsey County Lions Park Restroom & Shelter — New Brighton, MN

Education
B.S. in Project Management w/ Emphasis in Construction & Facilities Management - Bemidji State University

Cody Kolb

Assistant Project Manager

Cody is a dynamic and dedicated Assistant Project Manager. As a detail-oriented individual, he thrives in a fast-paced environment, ensuring projects are completed on time and within budget. With his impressive communication skills, Cody effortlessly connects and collaborates with team members and stakeholders, ensuring a seamless flow of information.

Responsibilities

Project assistance and support throughout entire project, issue RFIs, shop drawings and both weekly and monthly reports

Select Experience

- Rogers Indoor Turf Facility — Rogers, MN
- Hamline University East Hall Collaboration Classroom — St. Paul, MN
- House of Hope Presbyterian Church Utility Improvements — St. Paul, MN
- University of Minnesota Ecology Building Waterproofing — St. Paul, MN

Education
B.S. in Project Management w/ Emphasis in Construction & Facilities Management - Bemidji State University

Trey Frederickson

Field Engineer

Trey is a dedicated Field Engineer committed to hard work, exceptional customer care, and efficient time management. He values working smart, fostering strong relationships, and ensuring projects run smoothly through thoughtful planning and execution. His approach emphasizes both technical expertise and a people-first mindset to deliver quality results.

Responsibilities

Oversee site activities, ensure compliance with plans and specifications, coordinate subcontractors, manage documentation, and support quality control and safety compliance

Select Experience

- ISD 728 Lincoln Elementary Renovations — Elk River, MN
- ISD 728 Handke Center Renovations — Elk River, MN
- ISD 728 Rogers Elementary School 2025 Renovations — Rogers, MN

Education
B.S. in Construction Management - North Dakota State University

Kory Reiners, LEED® Green Associate™

Preconstruction Manager / Cost Estimator

Kory's dedication to client satisfaction and exceptional project outcomes is evident in every aspect of his work. He consistently goes above and beyond to ensure project success. Kory's clear communication skills play a crucial role in fostering strong relationships with clients and stakeholders.

Responsibilities

Managing the pre-construction phase to include scheduling, logistics plan development, bid package creation, management of the entire bidding process and overall construction procurement; Providing detailed and accurate construction estimates throughout the design phase including early SD budget estimates, establishment of the detailed GMP and CD price checks

Select Experience

- Rogers Indoor Turf Facility — Rogers, MN
- Rogers Activity Center Site Improvements — Rogers, MN
- Rogers Lions Park Splash Pad & Shelter — Rogers, MN
- ISD 728 Rogers Middle School 2025 Renovations — Rogers, MN

Education
B.S. in Mathematics; Minor in Physics - Augsburg College; M.S. in Mechanical Engineering - University of Minnesota

Jake Anderson

Virtual Design & Construction

Jake's expertise in virtual design solutions provides stakeholders with clear visual representations of the project and the construction site. He effectively communicates with team members and user groups, fostering strong relationships and implementing innovative solutions.

Responsibilities

Utilizing virtual design, Jake collaborates with all parties on modeling, site logistics, staging, drone, photography and video coverage

Select Experience

- Rogers Indoor Turf Facility — Rogers, MN
- Rogers Lions Park Splash Pad & Shelter — Rogers, MN
- Rogers South Community Park — Rogers, MN
- ISD 728 Rogers High School Stadium — Rogers, MN
- ISD 728 Rogers High School Tennis Courts — Rogers, MN
- St. Catherine University Tennis Courts & Playground — St. Paul, MN

Ryan Ring

Lean Construction Consultant

Ryan is an experienced Last Planner System® coach with a proven track record of developing teams implementing the Last Planner System® and lean construction principles.

Responsibilities

Optimize project delivery by implementing lean principles to reduce waste, improve efficiency and enhance collaboration; facilitate planning sessions and coach team to drive continuous improvement and maximize value of project

Select Experience

- ISD 728 Handke Center — Elk River, MN
- ISD 728 Lincoln Elementary Renovations — Elk River, MN
- Apple Valley Family Aquatic Center — Apple Valley, MN
- Apple Valley Fire Station #2 —Apple Valley, MN
- Bloomington Fire Station #4 — Bloomington, MN
- National Guard Readiness Center — New Ulm, MN

John Bestman

3rd Party Construction Safety Consultant

With 25 years of experience, John's goals are to increase awareness and recognition of common workplace risk factors while building relationships and creating a safety culture with client organizations.

Responsibilities

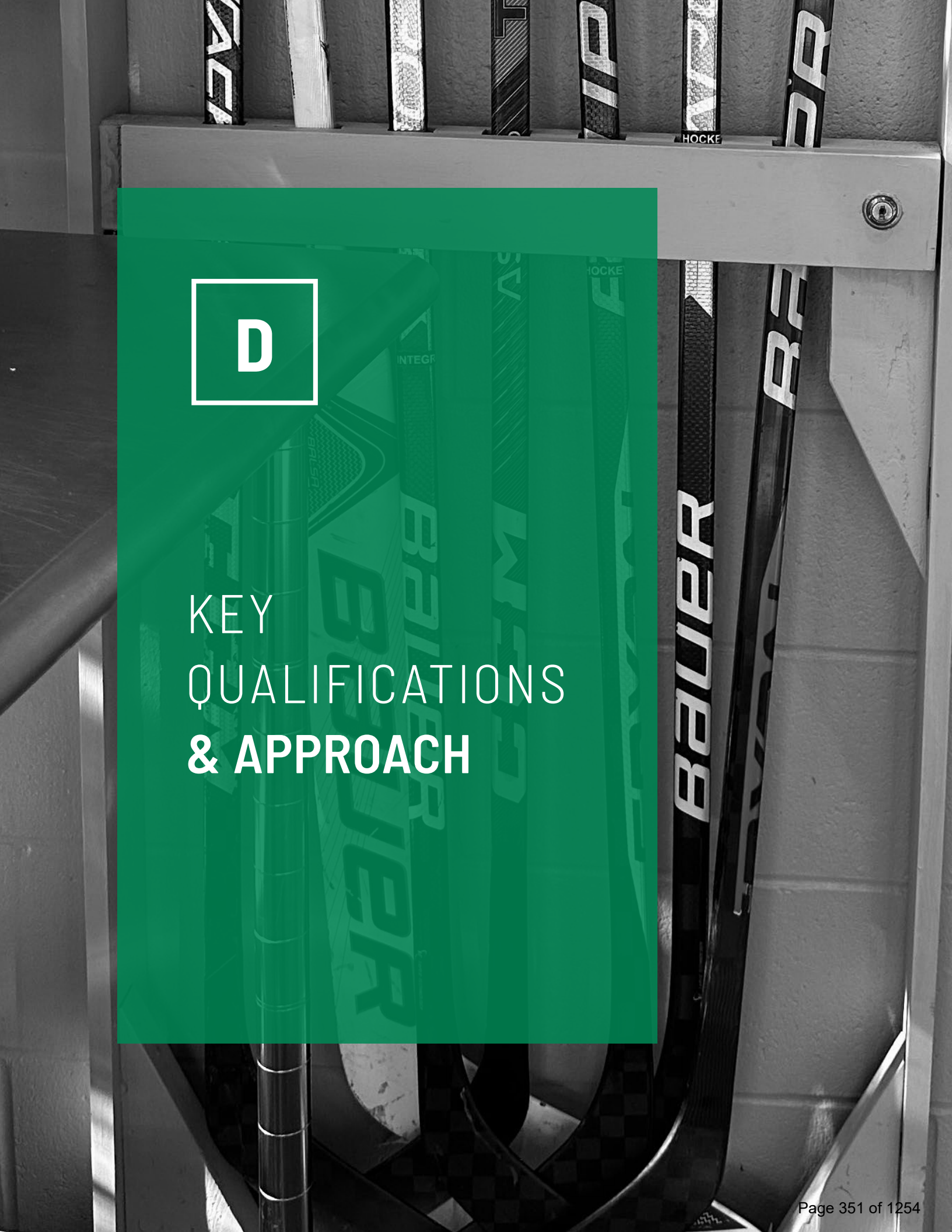
Evaluate hazardous exposures while assesses a client's needs and creates customized recommendations and programs that align with short and long-term safety goals unique to the project

Select Experience

- 21st Century Bank Event Center — Rogers, MN
- ISD 728 Handke Center — Elk River, MN
- ISD 728 Lincoln Elementary Renovations — Elk River, MN
- Apple Valley Fire Station #2 —Apple Valley, MN
- Bloomington Fire Station #4 — Bloomington, MN
- National Guard Readiness Center — New Ulm, MN

Education

B.S. in Environmental Technology - University of Wisconsin-River Falls



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KEY QUALIFICATIONS **& APPROACH**

CURRENT / PRIOR **EXPERIENCE**

WITH MUNICIPAL + PARKS & REC PROJECTS

	Municipal Project	Parks + Rec Component	CM Delivery Method	Completed On-Time	Delivered Under Budget
City of Apple Valley Community Center / Senior Center	✓	✓	CM	*	*
City of Apple Valley Family Aquatic Center	✓	✓	CM	*	*
City of Apple Valley Hayes Park Youth Baseball / Softball Complex	✓	✓	CM	✓	$
City of Bloomington Aquatic Center Bathhouse	✓	✓		✓	$
City of Brooklyn Park River Park Restroom	✓	✓		✓	$
City of Champlin Mississippi Crossings	✓	✓	CM	✓	$
City of Mahtomedi Park Facility	✓	✓		✓	$
City of Rogers Indoor Turf Facility	✓	✓	CM	*	*
City of Rogers Lions Park Splash Pad & Shelter	✓	✓	CM	✓	$
City of Rogers South Community Park	✓	✓	CM	✓	$
City of Stillwater Main Street Pedestrian Walkway Restrooms	✓	✓		✓	$
College of Saint Benedict Athletic Complex		✓		✓	$
ISD 279 Park Center Sports Dome		✓		✓	$
ISD 728 Rogers High School Stadium Improvements		✓	CM	✓	$
ISD 728 Rogers High School Tennis Courts		✓		✓	$
Landscape Arboretum Home Demonstration Garden Arbor & Fence		✓		✓	$
Landscape Arboretum Three-Mile Drive Rest Stops		✓		✓	$
Ramsey County Battle Creek Waterworks	✓	✓		*	*
Ramsey County Lions Park Restroom & Shelter	✓	✓	CM	✓	$
Sherburne National Wildlife Refuge Oak Savanna Amphitheater		✓		✓	$
St. Catherine University Tennis Courts & Playground		✓		✓	$

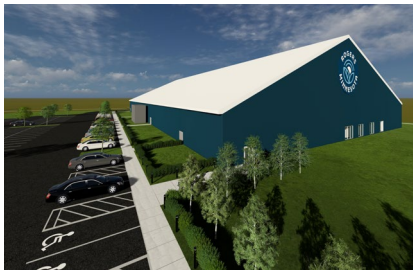
**In Progress*

Rogers Indoor Turf Facility

Rogers, MN

Relevance

- Completing for City of Rogers
- Adjacent to RAC
- Parks+Rec facility
- CMAR delivery



Project Description

This project involves the construction of an 80,359 sf, multi-purpose indoor facility that will be utilized for various sports including lacrosse, baseball, soccer, and football. Additional amenities include a walking track, an indoor playground, batting cages, and a dedicated spot for the Thumbs Up after-school program. Work includes a 100-yard National Federation of State High School Associations soccer field under a pre-engineered stretched fabric structure.

PROJECT TYPE
New Construction

SQUARE FOOTAGE
80,359

ESTIMATED COST
$13,536,668

DELIVERY METHOD
CMAR

CLIENT REFERENCE
City of Rogers
Doran Cote
763.428.2253
dcote@rogersmn.gov

College of Saint Benedict Athletic Complex

St. Joseph, MN

Relevance

- Parks+Rec facility
- Precast dugouts

Project Description

The project resided on a 40 acre site and included three intramural/ multi-use fields, two soccer fields and two softball fields. In addition, this project included construction of a 20,000 sf Alumni Center to house locker rooms, restrooms, concessions, training facilities, alumni lounges and a press box. This creation of the new athletic center will bring a competitive advantage in recruitment and offer modern features to the student athletes.

PROJECT TYPE
New Construction

SQUARE FOOTAGE
37,345

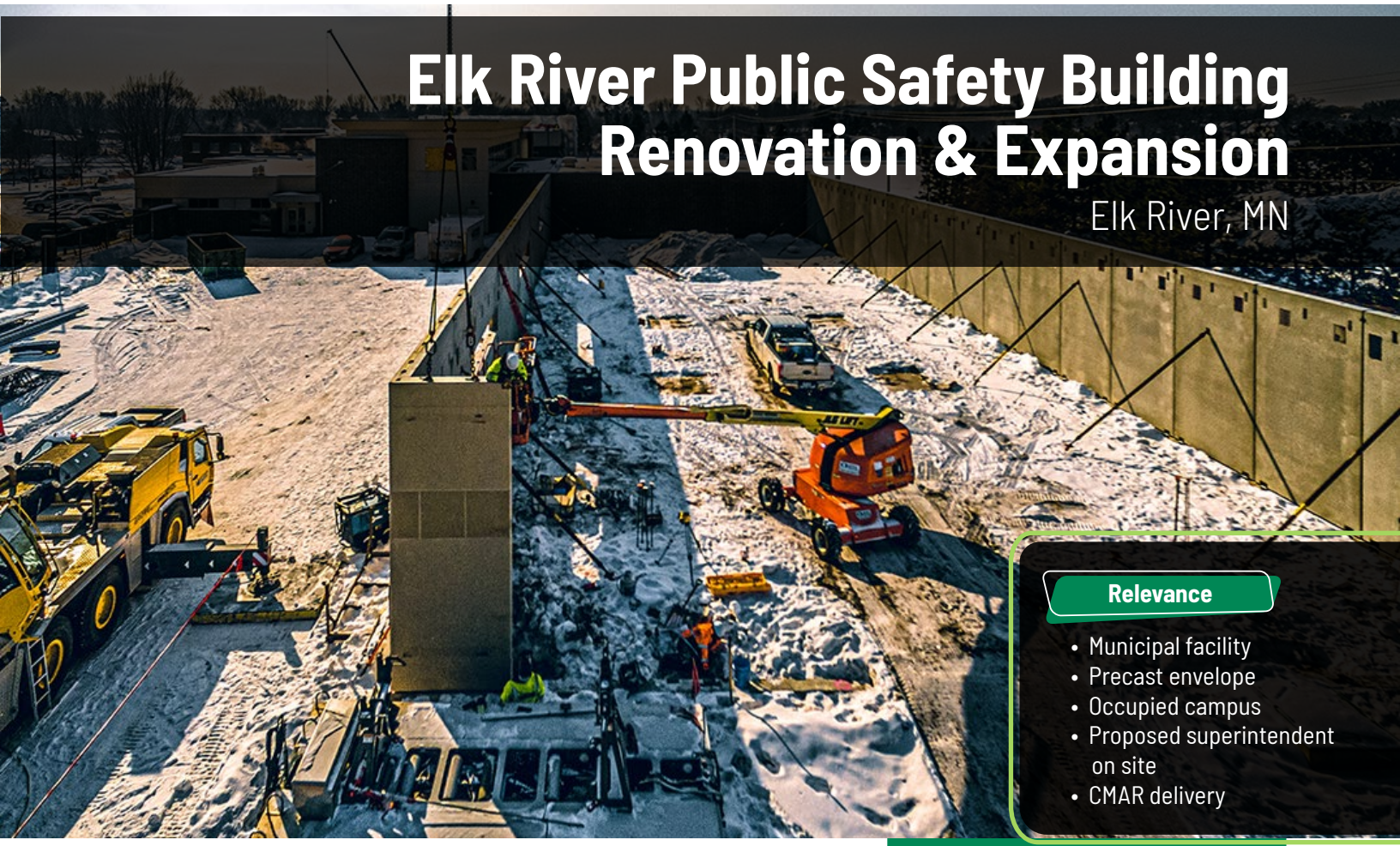
FINAL COST
$5,650,858

DELIVERY METHOD
Design-Bid-Build

CLIENT REFERENCE
College of Saint Benedict
Glen Werner
320.406.7618
gwerner@ent.com

Elk River Public Safety Building Renovation & Expansion

Elk River, MN



Relevance

- Municipal facility
- Precast envelope
- Occupied campus
- Proposed superintendent on site
- CMAR delivery

Project Description

This project included renovations and an expansion to Elk River's Public Safety Building which included Fire Station #2 and the Police Department. The fire station scope included a 3,800 sf expansion to include two apparatus bays as well as a 4,000 sf renovation of the existing apparatus bays and supports spaces including a turnout gear storage room, decontamination areas, locker rooms, showers, kitchen and dayroom. The police department scope included a 12,200 sf interior renovation to improve security and workspace efficiency as well as the buildout of a 4,000 sf second floor shell space.

PROJECT TYPE
Renovation/Expansion

SQUARE FOOTAGE
24,000

FINAL COST
$6,368,984

DELIVERY METHOD
CMAR

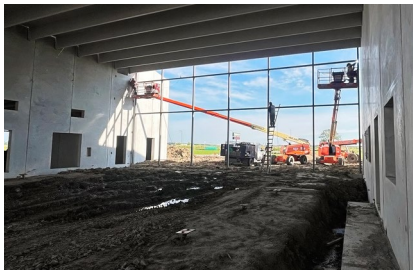
CLIENT REFERENCE
City of Elk River
Mark Dickinson
763.350.0769
mdickinson@elkrivermn.gov

Minnesota Army National Guard Readiness Center

New Ulm, MN

Relevance

- Precast envelope
- Same Superintendent



Project Description

This project involves the construction of a new 40,374 sf Readiness Center for the Minnesota Army National Guard. The scope includes an assembly hall, battalion headquarters, classrooms, conference rooms, fitness center, offices, kitchen, locker rooms, vault, restrooms and parking. Additionally, a 3,200 sf unconditioned storage building will be constructed to support the facility. A geothermal heat pump system with 154 wells (each 200 feet deep) will be installed with complete building energy usage metering on electrical, gas and geothermal systems.

PROJECT TYPE
New Construction

SQUARE FOOTAGE
43,574

FINAL COST
$21,723,300

DELIVERY METHOD
Design-Bid-Build

CLIENT REFERENCE
Department of Military Affairs
Russ Ekholm
320.616.6073
russell.a.ekholm.nfg@army.mil

ISD 728 Rogers High School Stadium

Rogers, MN

Relevance

- Parks+Rec facility
- Located in Rogers

Project Description

This project included the construction of three new buildings at the Rogers High School Stadium. The first building was a 3,496 sf facility to house a food preparation area, concessions, ticket sales, officials' office, public restrooms and storage. The remaining two buildings were identical 2,577 sf facilities built to include storage and locker rooms - one building for the home team, the other for visitors. These updated athletic/activity spaces were completed to meet State and District standards.

PROJECT TYPE
New Construction / Renovation

SQUARE FOOTAGE
8,650

FINAL COST
$6,752,280

DELIVERY METHOD
CMAA

CLIENT REFERENCE
ISD 728
Tom Baranick
612.490.1408
thomas.baranick@isd728.org

WHAT WE BRING

1

We bring a current local presence.

We are working on the Rogers Indoor Turf facility adjacent to this project right now.

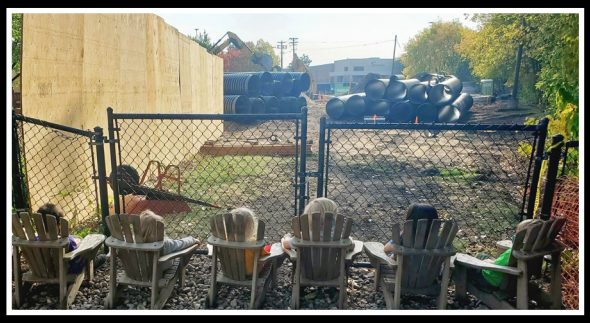
There may be potential savings related to timeline overlaps of these projects.

See fee sheet on page 34.

2

We bring occupied campus construction experience.

We have completed numerous projects on occupied campuses with lots of activity, including facilities where our neighbors were schools and daycares.



3

We bring a background in precast construction and success managing logistical challenges.

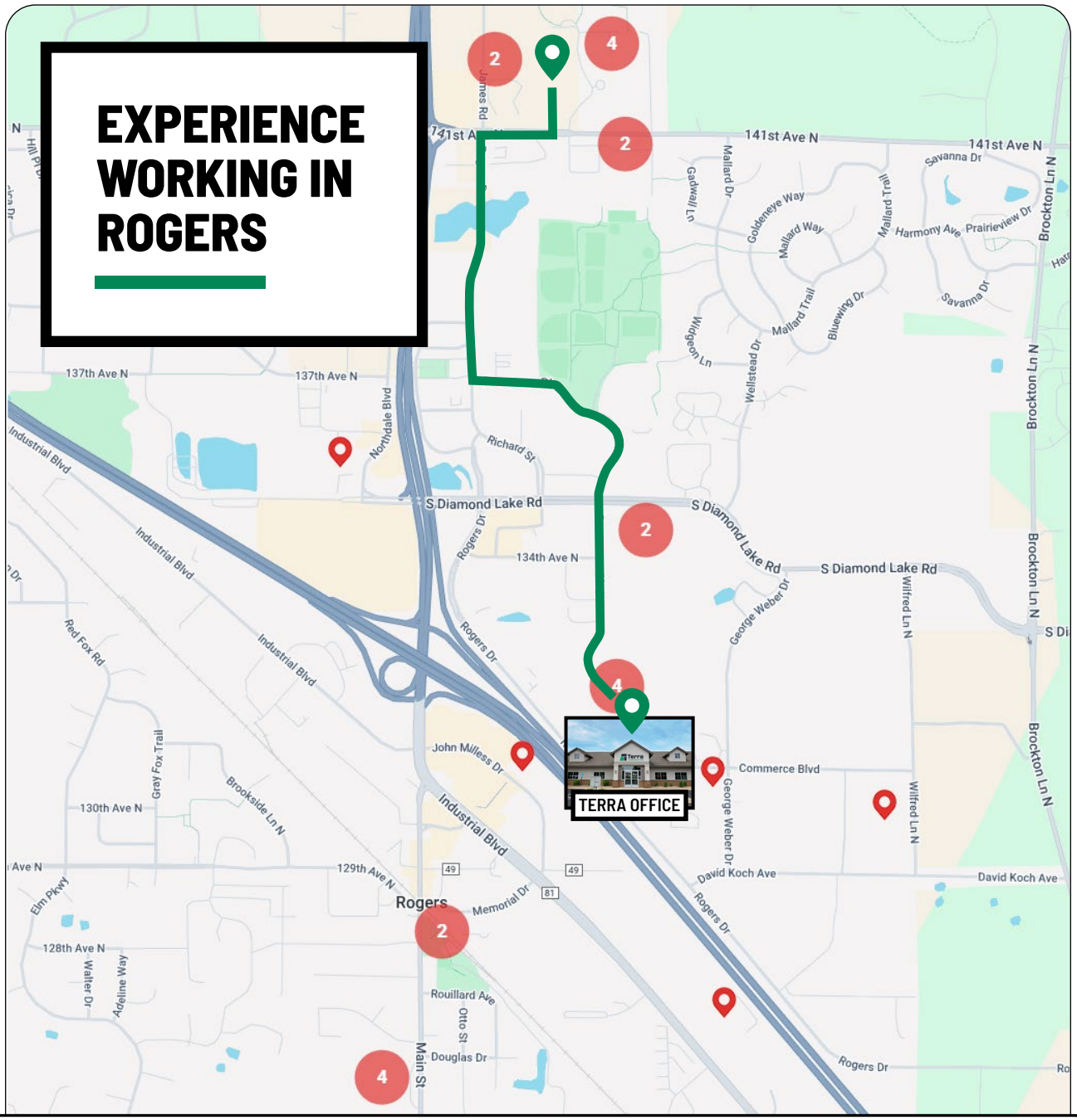
Our team has constructed numerous precast facilities such as the proposed expansion — both locally and throughout the state.

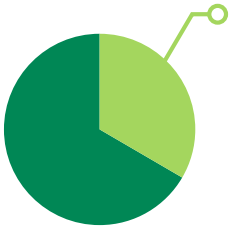
4

We bring strong experience with complex mechanical systems.

Our extensive expertise in managing large-scale MEP projects. Our recent work with Cargill (food processing facilities), Carleton College (geothermal systems), and House of Hope Presbyterian Church (modernizing a 100-year-old infrastructure) showcases our ability to navigate complex mechanical and electrical challenges. This depth of experience enables us to efficiently manage and implement the MEP infrastructure required for this project.

EXPERIENCE WORKING IN ROGERS





LOCAL TEAM

36%
OF STAFF LIVE IN SURROUNDING COMMUNITIES

● Elk River ● Nowthen ● Otsego ● Rogers ● St. Michael

Our team has a personal interest in the successful completion of this local project.

Our construction management approach focuses on comprehensive planning, clear communication, and innovative problem-solving to address key challenges throughout a project's lifecycle.

Project Staging to Minimize Disruptions

1

Detailed Planning

We create a thorough project staging plan that integrates with existing operations, allowing us to understand potential impact points and develop strategies to minimize disruptions.

2

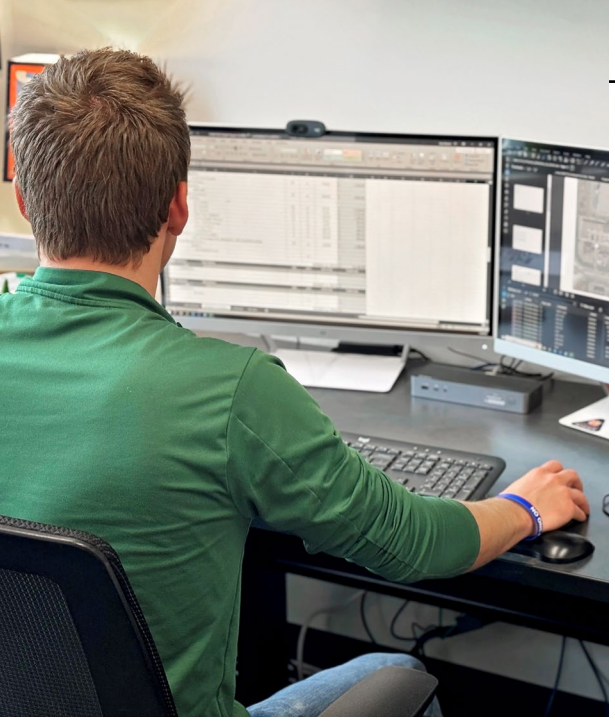
Phased Construction

By breaking down the construction process into smaller, manageable phases, we can maintain essential services and operations. This allows us to isolate construction activities from ongoing operations, reducing interference.

3

Communication with Stakeholders

Regular meetings with stakeholders, including operations managers and staff, ensure everyone is aware of the construction schedule, anticipated disruptions, and mitigation plans.



Cost Estimating & Cost Control

Terra will create a cost format from the current design documents that HTG has available. This format will be utilized to determine if the current design is within the project budget. We will utilize our Revit® construction design software, Bluebeam, CMiC, Terra's cost database and recent historical cost comparisons in establishing our detailed estimates.

During Design

Cost control will begin during design with systematic document review and accurate cost estimates.

Document Review

Thorough review of the documents throughout the entire design phase of the project. This will not only allow us to better perform a constructability review, but also identify any discrepancies amongst drawings and specifications, or conflicts between trades. This approach will also help eliminate future change orders after construction begins.

Very detailed and thorough cost estimates throughout design

During the Design Development (DD) phase

At the end of the DD phase, Terra will establish and present a Guaranteed Maximum Price (GMP) to the City of Rogers that includes a contingency for those items yet to be defined or designed. Terra will continue to evaluate and test the design in comparison to the DD estimate to confirm that the project stays on budget through the Construction Document (CD) phase. This process will ensure a successful bid opening, which has been the case on all of our CM projects.

Throughout the design phase and while establishing the estimates, Terra will work closely with the City and the design team in developing a project contingency that is appropriate and specific to the project. This contingency can be allocated for unforeseen conditions or potential unknown conditions during the design period. Terra will issue the City an updated contingency log weekly and only use such contingency items after receiving approval.

During Construction

Once construction begins, cost control would come through our aggressive, but fair, change order negotiations with the awarded trade contractors. Our knowledge of material costs, means, methods and current cost trends will be a valuable resource to the project.

Terra will maintain an overall construction budget and will continually monitor and update the budget as changes occur.

The reports we provide as part of our overall budget tracking system include:

- Total Project Budget Summary
- Contract Summary Log
- Subcontractor Contract Summary Log
- Change Log
- Contingency Log
- Invoice/Cost Tracking Log

Value Engineering

Value engineering is one of the most misrepresented and incorrectly performed activities in the design phase. Value engineering does not compromise the design solution, cost-cutting and scope reduction do. The goal of value engineering is to develop the best return on the investment and white still achieving the goals that were set out to accomplish from the beginning. It has been our experience that significant savings can be achieved by properly implementing a value engineering process. **When it is conducted correctly, the results of value engineering are cost effective solutions that meet the owner's expectations of quality, function and budget.** In addition, the City/users gain significant insights into the options which are available in the marketplace.

The goal of value engineering is to develop the best return on investment while still achieving the goals that were set out to accomplish from the beginning.

Every system from the structure, mechanical and electrical systems to the building envelope and interior finishes, should be included in this assessment. **To be the most effective, we recommend that the first value-engineering session be held during the schematic design phase when preliminary system evaluations are being made and for the process to continue through project completion.**

Pre-Construction Phase Services

Our pre-construction phase services will include:

- Develop and update the design schedule including specific milestones and bidding dates
- Identify long lead items and determine if need for early bid packages
- Constructability reviews and clash detection
- Value engineering and life cycle cost analysis
- Budget analysis and updates
- Develop comprehensive construction cost estimates
- Develop and price a list of alternates
- Perform a series of Q/A document reviews
- Coordinate permit and plan reviews with City
- Bid package and scope development
- Develop the critical path construction schedule
- Develop construction phasing/site logistics plans
- Bid package and scope development
- Provide local contractor / supplier outreach
- Solicit and receive bids, prepare a analysis and make recommendations
- Coordinate tax exempt purchasing agreements

CONSTRUCTABILITY REVIEW EXAMPLE
MASONRY WALL MOCK-UP

Pre-Construction Scheduling

During pre-construction, Terra will coordinate a scheduling meeting with HTG to plan the design milestones including the Design Development (DD) completion, estimating milestones, Construction Document (CD) duration and key CD milestones. This schedule will outline various design and user group meetings or "committee workshops" with specific agenda items. Our involvement throughout the design phase will allow the entire team to collaborate on key design, bidding and construction milestones to be included and updated in the Critical Path Method (CPM) schedule. We will review early bid packages and incorporate them into the overall schedule. Terra utilizes Microsoft Project scheduling software to create the master CPM project schedule and includes this schedule with the bidding documents.

Constructability Review

Terra conducts constructability reviews to identify potential problems and offer solutions, aiding in scheduling key milestones, identifying cost savings, and reducing conflicts or changes during construction. Pre-installation meetings and mock-ups resolve issues before construction begins.

Early Bid Packages

Terra procures long-lead items and materials through early bid packages to enhance project delivery by ensuring timely delivery and installation readiness.

Construction Scheduling

Utilizing the Schedule

We will use the master CPM Schedule as a baseline against the current status of construction to identify if the project is ahead or behind schedule. Our team will update and maintain the schedule throughout the entire construction period. It, along with short interval planning, are tools that we will use to help everyone understand what is expected of them.

1 To track the progress and provide a baseline against the current status of the project

2 To assist in coordinating critical construction activities with the appropriate contractors

3 As a resource that can be utilized by all the team members

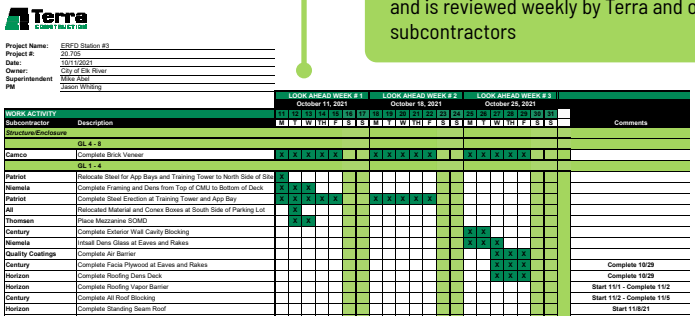
Weekly Look Ahead Schedules

Terra will provide a detailed 3-week look ahead schedule on a weekly basis to the City of Rogers, HTG and all subcontractors. This 3-week look ahead schedule will identify specific daily tasks and activities. It is reviewed and discussed by Terra and our subcontractors during the weekly safety and scheduling meeting that we hold separate from the weekly progress meeting with the owner and design team. These safety and scheduling meetings cover specific detailed discussions with subcontractors and suppliers on delivery dates, scheduled installations, weather-related impacts, means and methods and upcoming milestones.

At the end of every week, Terra will issue to the project team a "Weekly Report" that outlines subcontractors on site, major activities taking place that week and the upcoming scheduled work for the following week. It will also include photos documenting these construction activities.

Example 3-Week Look Ahead Schedule

Identifies specific daily tasks and activities and is reviewed weekly by Terra and our subcontractors



Terra CONSTRUCTION

Project Name:	ERFD Station #3
Project #:	20.705
Date:	10/11/2021
Owner:	City of Elk River
Superintendent	Mike Abel
PM	Jason Whiting

WORK ACTIVITY		LOOK AHEAD WEEK # 1 October 11, 2021							LOOK AHEAD WEEK # 2 October 18, 2021							LOOK AHEAD WEEK # 3 October 25, 2021							
		11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Subcontractor	Description	M	T	W	TH	F	S	S	M	T	W	TH	F	S	S	M	T	W	TH	F	S	S	Comments
Structure/Enclosure																							
	GL 4 - 5																						
Camco	Complete Brick Veneer	X	X	X	X	X			X	X	X	X	X	X		X	X	X	X	X			
	GL 1 - 4																						
Patriot	Relocate Steel for App Bays and Training Tower to North Side of Site	X																					
Niemela	Complete Framing and Dens from Top of CMU to Bottom of Deck	X	X	X																			
Patriot	Complete Steel Erection at Training Tower and App Bay	X	X	X	X	X			X	X	X	X	X	X									
All	Relocated Material and Conex Boxes at South Side of Parking Lot		X																				
Thomsen	Place Mezzanine SOMD		X	X																			
Century	Complete Exterior Wall Cavity Blocking															X	X						
Niemela	Intsall Dens Glass at Eaves and Rakes															X	X	X					
Quality Coatings	Complete Air Barrier																	X	X	X			
Century	Complete Facia Plywood at Eaves and Rakes																	X	X	X			Complete 10/29
Horizon	Complete Roofing Dens Deck																	X	X	X			Complete 10/29
Horizon	Complete Roofing Vapor Barrier																						Start 11/1 - Complete 11/2
Century	Complete All Roof Blocking																						Start 11/2 - Complete 11/5
Horizon	Complete Standing Seam Roof																						Start 11/8/21

PROJECT TIMELINE

Preconstruction

Bidding & Contracts: 6-8 weeks ✓
Critical Path Shop Drawings: 4-6 weeks ✓

Structure

- ✓ **Precast Fabrication Lead Time:** 14 weeks
- ✓ **Precast Erection:** November 2025
- ✓ **Roofing Completion:** January 2026
- ✓ **Interior Work:** July 2026

Ice Plant & Rink Construction

Majority of work begins after roofing is complete

Underground Supply/Return Mains Install (Refrigeration Plant to Rink): 10 days ✓
Rink Floor Build-Out: 4-6 weeks ✓
Concrete Cure Time (Before Ice Install): 28 days ✓
Dasher Board Install (After Concrete Cures): 14 days ✓
Refrigeration Plant Build-Out: 4-6 weeks ✓

Existing Rink Connection + Ice Shutdown Strategy

Phased approach to minimize downtime for existing rink

- ✓ **Phase 1 — Prep Work (Before New Rink SOG is Poured)**
  - Demo a small portion of the existing slab-on-grade (SOG) to stub new supply/return mains into the existing system
  - Pour temporary SOG patch inside the existing building to maintain operations
- ✓ **Phase 2 — Complete Ice Rink Build-Out in New Building**
  - Install all rink components, including refrigeration plant and infrastructure
- ✓ **Phase 3 —Existing Ice Rink Integration & Ice Shutdown (Approximately 10-14 Days)**
  - Demo SOG inside the existing rink to run new supply/return mains and connect to the existing system
  - Decommission existing ice
  - Pour back SOG in the existing rink
- ✓ **Phase 4 — Start-Up & Ice Making**
  - Commission the new refrigeration plant
  - Begin making ice in both the new and existing rinks

Target Start for Ice Production
August 2026

PULL PLANNING SESSION
NATIONAL GUARD READINESS CENTER

Terra will also utilize task scheduling to achieve dates of substantial completion. Our task scheduling includes a variety of tools that support not only the lines of communication but also enhance the overall collaboration of the team.

These tools include

- **Critical Path Scheduling**
- **Pull Planning**
- **Milestone Development/Tracking**
- **Material Lead Time Development/ Tracking**
- **Fabrication Date Monitoring**
- **Ship Date Checklist and Tracking**
- **Phasing Schedules**
- **Facility Schedules**
- **3-Week Look Ahead Schedules**

Change Order Procedure

We provide aggressive and fair change order negotiations with the trade contractors. We will review all costs submitted for any change and require trade contractors to break down the costs in itemized material and labor hours. We use this to determine if the costs submitted are consistent with the scope of work identified in the change. We have a thorough understanding of means, methods, material costs, labor costs and current cost trends. We will provide you with the expertise and ability to challenge or negotiate costs in a fair and professional manner.

Terra will coordinate with the City for system start-up and testing, continual inspections, verifications and training of staff. During construction, these processes will occur from start to finish. Terra will provide all the critical communication and scheduling to ensure this project receives a high level of service.

Public Bidding Methods

Bid Phase Administration

Prior to bidding, Terra will identify specific work scopes and bid packages that best fit the requirements of this project. These proposed bid packages will be reviewed by the team prior to finalizing the bid packages. We will also develop a realistic schedule that can ultimately be used during bidding. This will allow all trade contractors to be aware of the expectations prior to bidding and eliminate any discussions related to schedule during construction.

Role in preparing project manual

Our role in preparing the project manual will primarily be focused on the front-end (Divisions 0 and 1).

1. First, we will outline the requirements of construction and prepare a detailed scope of work and a schedule (by bid package) confirming all work and responsibilities are accounted for.
2. Then we will prepare bid forms for each bid package and incorporate the form of contract.
3. Finally, we will integrate the specific insurance and bonding requirements by bid package.
4. Terra will work closely with the City of Rogers and HTG throughout this process to ensure consistent, thorough and detailed construction bids.

Transparency

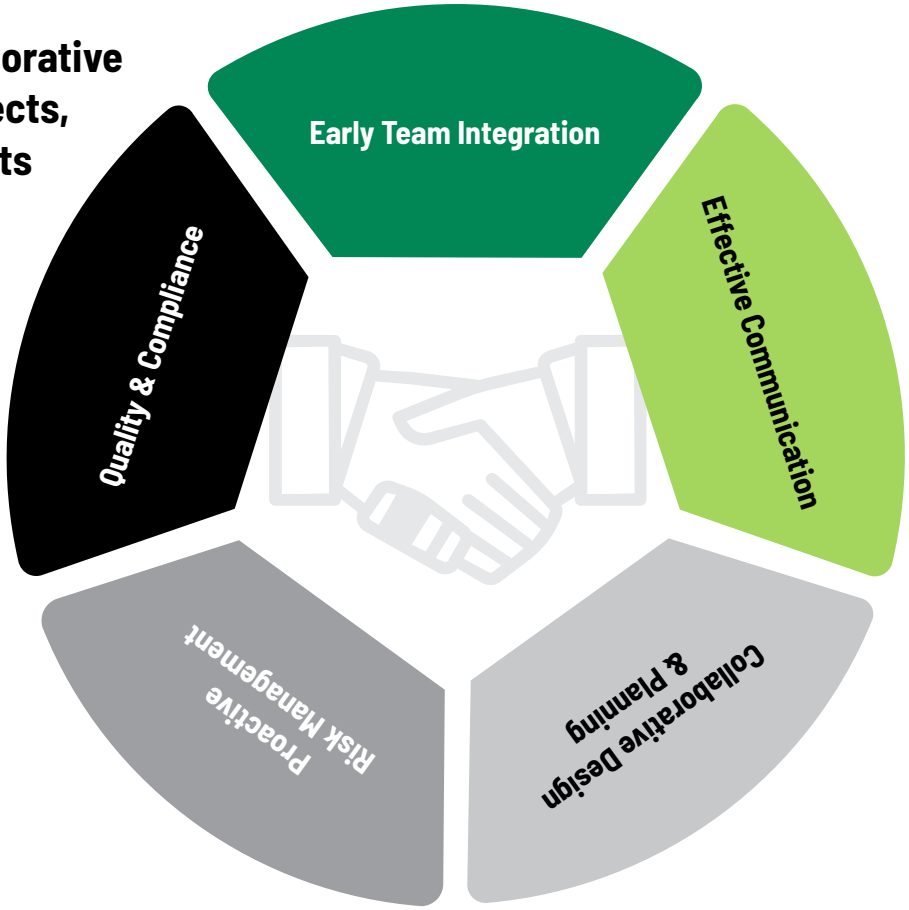
Terra's approach and philosophy on construction management projects ensures transparency and is defensible. For every bid package, of the bids received from the qualified bidders, the lowest responsible and responsive bidder will be awarded the contract for the scope of work defined. Terra's entire bid process is completely transparent from the bid advertisement to the opening of bids. Terra will ensure that all bidders receive the notice to bid, have an equal amount of time to bid and confirm that all bidders have received addendums when they are issued. Furthermore, Terra will publicly open and read aloud all bids by bid category. The City, HTG and all trade contractors are welcome to attend this bid opening.

Terra's entire bid process is completely transparent from the bid advertisement to the opening of bids.

After securing bids, Terra will

1. Review bids / confirm compliance.
2. Perform bid qualifications process.
3. Review findings with owner.
4. Recommend and award contracts.

Our firm uses a collaborative approach with architects, engineers, and consultants to ensure high-quality project delivery.



Early Team Integration

- Engage early in the preconstruction phase for a unified understanding and planning
- Conduct workshops to foster teamwork, share ideas, and address issues collaboratively

Effective Communication

- Use digital tools for centralized project information, providing coordination
- Hold regular meetings for updates and issue resolution

Proactive Risk Management

- Perform joint risk assessments to preemptively tackle potential issues
- Conduct value engineering to optimize project value without sacrificing quality

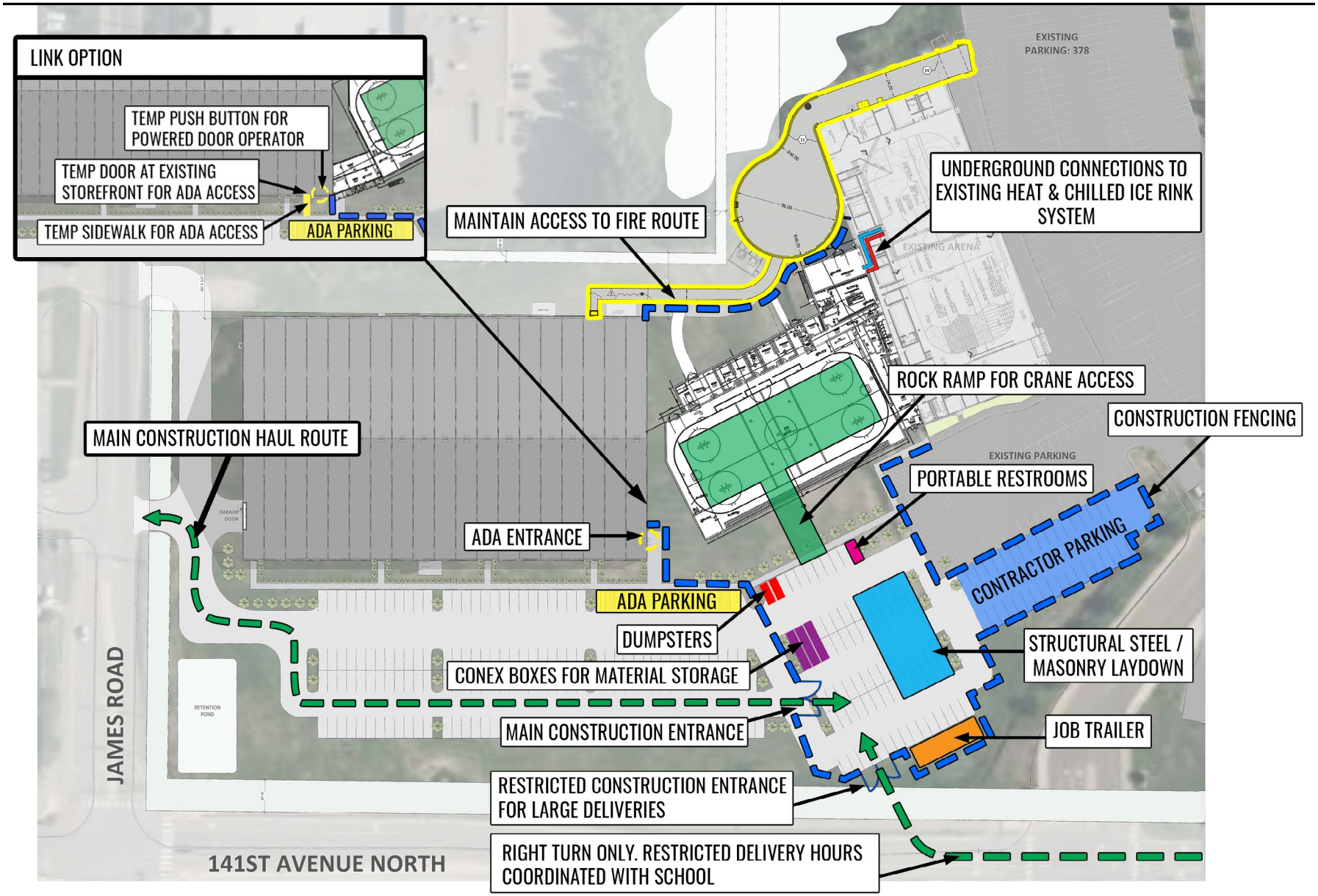
Collaborative Design & Planning

- Provide design-assist services, integrating construction insights with design
- Utilize BIM and technology for efficient planning and execution

Quality & Compliance

- Implement quality control plans ensuring construction meets all standards
- Guide compliance with regulations through expert consultancy

SITE UTILIZATION PLAN
ROGERS ACTIVITY CENTER EXPANSION

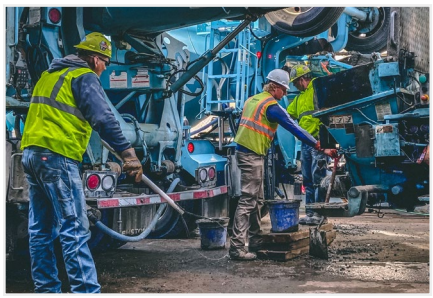


SAFETY PROGRAM

Terra's safety program follows our written safety manual and OSHA guidelines.

Terra works with Marsh McLennan Agency (MMA) to manage our safety and training programs. We also intend to participate in a voluntary OSHA inspection program.

We will use our safety program and policies to enforce all aspects of construction — both for the workers and everyone coming in contact with the project. Our site superintendent, Braden, will conduct a weekly safety meeting. He will cover site specific safety items and provide Toolbox Topics — information on specific safety topics ranging from earthwork to electrical. Terra will require all subcontractors submit their written safety plan prior to the start of work and that these safety plans are project specific and include all Safety Data Sheets (SDS) for the materials they will be working with. Copies of all safety manuals will be kept on site.

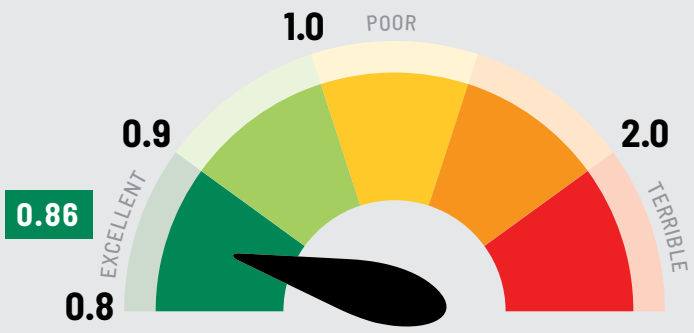


- We participate in a voluntary OSHA inspection program.
- We work with Marsh McLennan Agency to manage our safety and training programs.
- Every subcontractor must complete "First Day First Hour" training.
- Superintendents all carry/have a Trauma Kit in the vehicle, and have received CPR AED and First Aid training.

Current

EMR RATING

Experience Modification Rating (EMR)



First Day, First Hour Training required for all subcontractors

This training must be required prior to any subcontractor personnel stepping on site. Focuses include everything from PPE requirements and proper use, to silica exposure control, lockout/tagout procedures, fall protection and site access.

CONSTRUCTION SITE SAFETY

Terra provides OSHA 30 training to our entire staff. The company has a safety culture whether you are working on site or within the office. Safety starts the second you wake up in the morning and doesn't end until you go to bed in the evening.

Terra's superintendents all carry/have a Trauma Kit in the vehicle or on their project sites. All employees have received CPR, AED and First Aid training and have been trained in the use of the Trauma Kit, which contains an AED. They communicate to all project participants where it is while they are on the project.

◀ ***Safety signage communicating important information which must be followed by anyone entering the site.***

Final Start-Up, Testing and Occupancy

Our team has extensive experience in final start-up, testing, and occupancy for a variety of projects. This is the most important aspect of the project and is rarely done properly. The best process for ensuring that the start-up and testing process goes smoothly is to have an inspection and receive verification that all systems were designed, installed and tested properly and the City is properly trained.

These processes need to occur throughout the project and require a great amount of teamwork to be successful. A project that has good communication and teamwork throughout will help make this a reality. We focus our attention during this phase of the project on good communication. Terra schedules and conducts all final start-up procedures, which will not begin until all prerequisite activities have been completed. We will coordinate and work with your staff and contractors to perform training sessions on all mechanical and electrical components of the building.

Project Closeout

Terra considers the closeout of a project to be very important. We have developed a process that starts during the submittal phase. We secure some of the closeout documents at this time to better facilitate closeout at the end of the project. Our relationships throughout the project duration help us to secure the closeout packages from our subcontractors and suppliers. From warranties to final lien waivers, we will quickly compile the hard copies and electronic copies in a digital package for your project. Terra will confirm what the City expects on the project.

Punch Lists

Punch lists on Terra's projects are usually shorter than other contractors due to our pre-punch list efforts. We work closely with our subcontractors and complete a pre-punch walkthrough that allows us to correct most items that would come up during the architects and engineers punch list.

Warranty Administration

The warranty administration will be handled by the same personnel who worked on the project, eliminating the education process for someone who hasn't been to the facility previously.

What our clients are saying ...

"They took the time to understand exactly what our goals were for the project through open communication that was always honest and respectful."

MARK DICKINSON
ELK RIVER FIRE CHIEF

"While it may not be common for a Building Official to send a communication such as this, I just wanted to let you know that your team made this complicated project... an enjoyable project that produced what we believe is an exceptional product."

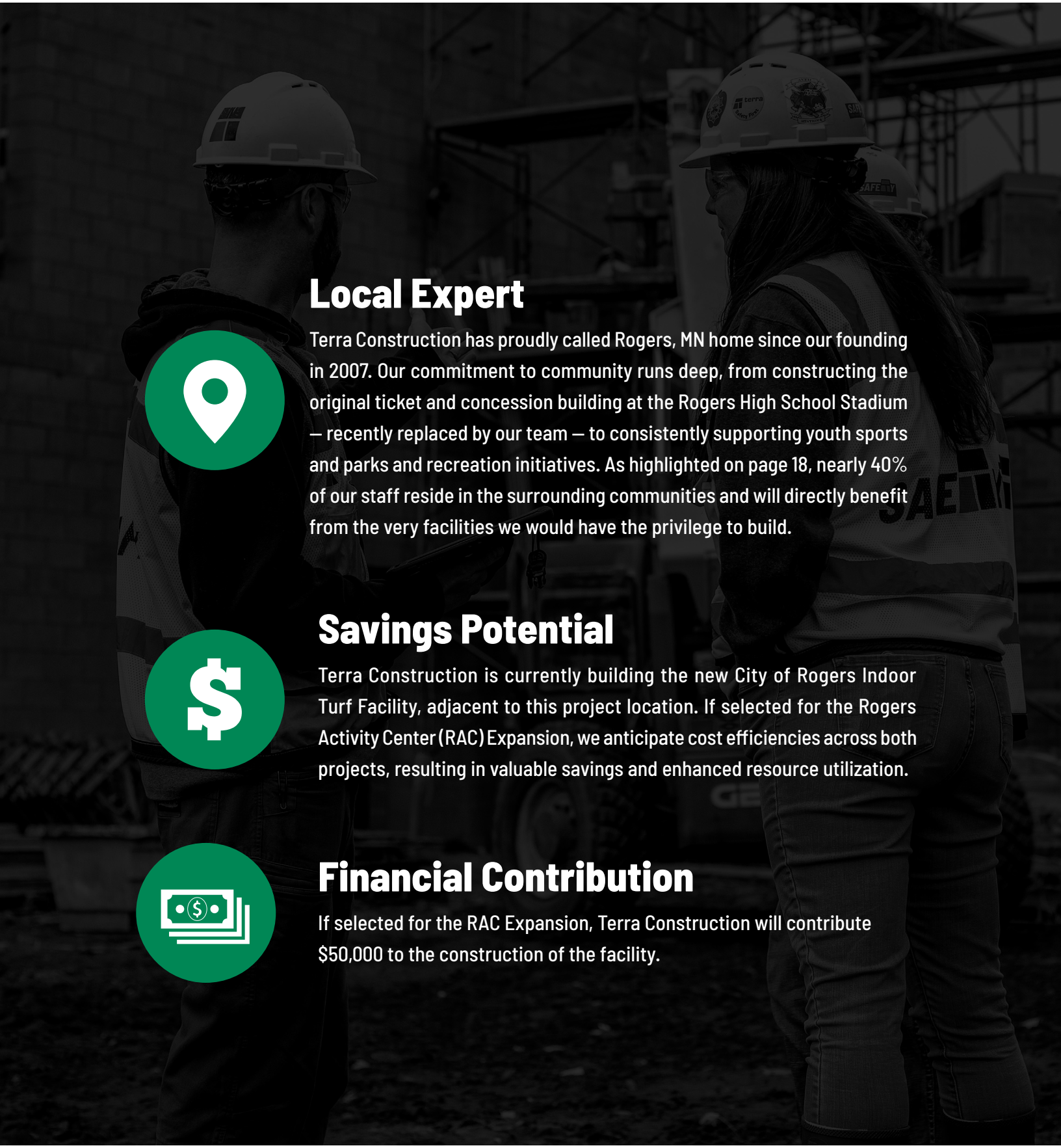
BRYAN KERBY
BEMIDJI BUILDING OFFICIAL

"It's been such a joy and honor to work with such a great and high-performing group of talented professionals! It sure makes my role in the project so much easier to be working with such a skilled and hard-working group.."

CHARLES GRAWE
APPLE VALLEY CITY ADMINISTRATOR

E

SUPPLEMENTAL **INFORMATION**



Local Expert

Terra Construction has proudly called Rogers, MN home since our founding in 2007. Our commitment to community runs deep, from constructing the original ticket and concession building at the Rogers High School Stadium — recently replaced by our team — to consistently supporting youth sports and parks and recreation initiatives. As highlighted on page 18, nearly 40% of our staff reside in the surrounding communities and will directly benefit from the very facilities we would have the privilege to build.

Savings Potential

Terra Construction is currently building the new City of Rogers Indoor Turf Facility, adjacent to this project location. If selected for the Rogers Activity Center (RAC) Expansion, we anticipate cost efficiencies across both projects, resulting in valuable savings and enhanced resource utilization.

Financial Contribution

If selected for the RAC Expansion, Terra Construction will contribute $50,000 to the construction of the facility.

F

COST PROPOSAL

Rogers Activity Center Expansion
Construction Manager @ Risk - Cost Proposal
Contract to be AIA 133-2019

1) Preconstruction & Bidding Services

	4 Months	17 Weeks	86 Days	
Description	**Quantity**	**Unit**	**Unit Cost**	**Total**
Project Executive	34	HRS	In Fee	In Fee
Pre-Construction Lead	103	HRS	In Fee	In Fee
Preconstruction Manager / Estimator	206	HRS	135	$ 27,864.00
Project Manager	138	HRS	125	$ 17,200.00
MEP Coordinator	0	HRS	125	In Fee
			Subtotal:	$ 45,064.00
Preconstruction Discount - Our Commitment to the City of Rogers				*$ (45,064.00)*
			Subtotal:	**No Cost**

2) Construction & Post Construction Staffing

	12 Months	52 Weeks	258 Days	
Description	**Quantity**	**Unit**	**Unit Cost**	**Total**
Project Executive	103	HRS	In Fee	In Fee
Project Manager	1,032	HRS	125	$ 129,000.00
Assistant Project Manager	1,032	HRS	90	$ 92,880.00
Superintendent - (onsite full time)	2,064	HRS	120	$ 247,680.00
MEP Coordinator	103	HRS	125	In Fee
QAQC Manager	103	HRS	125	In Fee
Safety Director	12	MO	525	$ 6,300.00
Lean Construction Specialist	12	MO	400	$ 4,800.00
Project Administration	103	HRS	90	$ 9,288.00
			Subtotal:	**$ 489,948.00**

3) Construction & Post Construction Reimbursables

	12 Months	52 Weeks	258 Days	
Description	**Quantity**	**Unit**	**Unit Cost**	**Total**
Site Technology	12	MO	325	$ 3,900.00
Site Consumables	12	MO	425	$ 5,100.00
Printing, Postage & Delivery	12	MO	250	$ 3,000.00
Temporary Toilets	12	MO	450	$ 5,400.00
Jobsite Field Office	12	MO	1725	$ 20,700.00
Superintendent Truck & Fuel	12	MO	1200	$ 14,400.00
Project Management Software	12	MO	0	Included
			Subtotal:	**$ 52,500.00**

4) General Liability & Builder's Risk Insurance

Insurance	**Lump Sum:**	**$ 155,000.00**

5) Construction Manager Fee

Construction Manager Fee	**Lump Sum:**	**$ 225,000.00**

Summary Total for Construction Management Services		
1) Preconstruction & Bidding Services	**Not To Exceed**	No Cost
2) Construction & Post Construction Staffing	**Not To Exceed**	$ 489,948.00
3) Construction & Post Construction Reimbursables	**Not To Exceed**	$ 52,500.00
4) General Liability & Builder's Risk Insurance	**Lump Sum**	$ 155,000.00
5) Construction Manager Fee	**Lump Sum**	$ 225,000.00
	TOTAL	**$ 922,448.00**

Clarifications:

We will provide preconstruction services through bidding at no cost. This will allow for the City to fully understand the actual costs prior to spending additional funds.

We have provided a Not To Exceed project staff and reimbursables cost for the anticipated 12-month construction period. However, if the project begins in July, we anticipate lower overall costs due to the ability to efficiently manage resources. Our proposed team, currently engaged in the Rogers Indoor Turf project, will allow for streamlined staffing and cost efficiencies.

Jason Whiting
Print Name

Signature

3/28/2025
Date

terra
Safety First
Terra
CONSTRUCTION

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 7.1

Subject: Consider Naming Rights Contract for the Rogers Activity Center
Prepared By: Mike Bauer, Parks & Recreation Director

Recommended Council Action
Move to authorize the Mayor to sign the Naming Rights Agreement for the Rogers Activity Center with TruStone Financial.

Overview / Background / Analysis
Staff and our naming rights consultant, Chris Potenza, with Front Burner Sports and Entertainment, are pleased to present a naming rights contract for your consideration that marks an exciting milestone in the evolution of the Rogers Activity Center. This proposal reflects months of thoughtful collaboration between City Staff, the Arena Commission, Rogers Youth Hockey Association, and Front Burner Sports and Entertainment. This partnership has brought forward a sponsorship agreement that aligns with our shared vision of enhancing the Rogers community.

We are proud to announce that TruStone Financial Credit Union, a respected Minnesota institution for over 86 years and now the second-largest credit union in the state, is poised to become the primary naming sponsor of the Rogers Activity Center. TruStone's longstanding legacy of community support makes them a fitting and enthusiastic partner in this endeavor.

The Rogers Activity Center remains a dynamic hub in our community. The facility is a recreation and civic engagement hub hosting everything from ice sports and meetings to local events. Soon, the Activity Center will expand to include a new indoor turf field, providing opportunities for: indoor walking, field sports, an indoor playground, batting cages, and a teen resource center with Thumbs Up. This exciting development enhances our commitment to serving residents of all ages and abilities year-round.

Partnership Details:

The naming rights agreement with TruStone Financial will bring significant investment into the facility over a 20-year term. TruStone will receive exclusive naming rights and branding opportunities throughout the facility. At the same time, the City retains control of operations and the ability to seek secondary sponsorships for individual spaces within the center. The agreement is for $1,500,000 over twenty years, beginning with a down payment this fall.

This agreement allocates $75,000 from the funds to signage and branding costs, with

TruStone covering expenses beyond that amount. The first branding efforts will include Rink 1, the Fieldhouse, and a future monument sign. It was carefully negotiated to ensure mutual benefit and long-term sustainability.

We are profoundly grateful for the continued support of the Rogers Youth Hockey Association, whose partnership has been instrumental in the success and vibrancy of the Rogers Activity Center; we look to continue this partnership as the facility rebrands and expands under the TruStone name.

Next Steps:

We look forward to unveiling the new name and celebrating the official grand opening of the expanded facility this fall. Details about the event will be shared in the coming months.

Staff Recommendation
Staff recommends that the City Council approve the Naming Rights Agreement with TruStone Financial Credit Union as outlined in the attached agreement.

Financial Impact: $1,500,000 **Source Fund**: 205-RAC Capital Reserves

Budgeted? N/A

Supporting Documentation
A. Naming Rights Agreement - Rogers Activity Center - TruStone final

ROGERS ACTIVITY CENTER
NAMING RIGHTS AGREEMENT

THIS NAMING RIGHTS AGREEMENT ("Agreement") is made as of this ____ day of _____, 2025 (the "Effective Date"), by and between the **CITY OF ROGERS**, a Minnesota municipal corporation ("City"), and **TRUSTONE FINANCIAL CREDIT UNION**, a Minnesota Corporation ("Primary Sponsor"). The following recitals form the basis for this Agreement and are made a part hereof.

RECITALS

A. The City of Rogers owns the Rogers Activity Center ("Facility") with a street address of 21080 141st Avenue N, Rogers, MN 55374.

B. Primary Sponsor is a Financial Institution with headquarters located at _____ with the intent of attaining exclusive naming rights to the Facility.

C. The City and Primary Sponsor enter into this Agreement whereby in exchange for Primary Sponsor's agreement to make initial and annually recurring Contributions (as hereinafter defined) to the City for deposit to the Facility fund, the City agrees to grant to Primary Sponsor the naming rights for the Facility, as set forth and agreed to in this Agreement.

D. Other than the naming rights set forth and agreed to in this Agreement, the City is not giving Primary Sponsor anything of value for the Contributions.

AGREEMENT

NOW, THEREFORE, IN CONSIDERATION OF THE FOREGOING RECITALS, THE MUTUAL PROMISES AND CONSIDERATIONS SET FORTH BELOW, AND OTHER GOOD AND VALUABLE CONSIDERATION, THE RECEIPT AND SUFFICIENCY OF WHICH ARE HEREBY ACKNOWLEDGED, THE CITY AND PRIMARY SPONSOR AGREE AS FOLLOWS:

Article I
Facility Name and Naming Rights

1. **Facility**. The City grants to Primary Sponsor exclusive naming rights for the Facility.

2. **Facility Name and Logo**. The City and Primary Sponsor will work together to create a name and logo for the Facility that showcases Primary Sponsor's business.

   a. The name and logo will be agreed on by the parties and approved by the Rogers City Council.

   b. The City will work to have the name and logo represented in all digital mapping programs and other online wayfinding programs.

3. **Facility Signage and Related Naming Rights Assets**.

a. Primary Sponsor will be permitted Facility signage as listed and depicted in **Exhibit A**, which is attached hereto and incorporated herein.

b. In addition to signage, Primary Sponsor is granted the related naming rights assets enumerated and depicted in **Exhibit A**.

c. The City will fabricate and install the signage and related naming rights assets and will own, maintain, and replace (if required due to normal wear and tear or other damage) during the term of this Agreement.

d. The City and Primary Sponsor will work jointly to develop a signage package and a budget for the signage and additional naming rights assets. The City will pay the first $75,000 in costs for the initial fabrication and installation of the signage and additional naming rights assets. Primary Sponsor will be responsible for any costs in excess of $75,000.

e. Primary Sponsor will also be responsible for any future costs for signage or other naming rights assets related to a request by Primary Sponsor to modify or change the name or logo of the Facility.

Article II
Exclusivity

1. **Exclusivity**. Primary Sponsor will have category exclusivity for all advertising, branding and sponsorship within the Facility. The City will not make marketing, branding or sponsorship agreements with any Sponsor "Competitor." "Competitor" is defined as a retail business engaged exclusively or primarily in financial services, including checking and savings accounts, credit card, loans, and financial planning, by way of example, this would include, but not be limited to, businesses such as US Bank, Blaze Credit Union, Wings Financial Credit Union, Edward Jones, etc. Competitors do not include businesses such as Target, Walmart, Menards, etc., that may offer credit cards, but are not engaged exclusively or primarily in financial services.

2. **Secondary Sponsors**. The City reserves the right to sell advertising and entitlements to secondary sponsors, excluding Competitors ("Secondary Sponsors"), as set forth herein for naming of other current or future physical spaces within the Facility, including the two ice rinks, the turf facility, locker rooms, conference rooms, the second level event center, and such other areas as may be delineated or added in the future. The City also reserves the right to sell entitlement to Secondary Sponsors for naming of other Facility assets including, but not limited to, dasher board signs, Zamboni wraps, etc.

Article III
Contribution

Primary Sponsor hereby agrees to make an initial contribution ("Contribution") to the City of Forty-Two Thousand Five Hundred and 00/100 dollars ($42,500.00) payable in full on or before August 1, 2026. Thereafter, on or before August 1st, each year during the term of this Agreement,

Primary Sponsor shall make an annual contribution of Seventy-Six Thousand Seven Hundred Ten and 53/100 dollars ($76,710.53).

Article IV
Relationship of Parties; No Property Interest

1. **Relationship of the Parties**. Under this Agreement, the parties shall at all times be acting and performing as independent contractors. Nothing contained in this Agreement shall be construed to create a joint venture, principal and agent, or any similar legal or equitable relationship between the parties. Neither party shall have or exercise any control or direction over the methods by which the other party provides services contemplated by this Agreement. Nothing in this Agreement shall be construed to give Primary Sponsor any control over or responsibility for operation of the Facility.

2. **No Property Interest**. Nothing in this Agreement shall be construed as granting to Primary Sponsor any property interest in any City-owned property. The City maintains all of its rights as the fee owner of the Facility and all improvements thereon on behalf of itself and the public.

Article V
Term and Termination

1. **Fixed Term**. The Term of this Agreement shall commence on September 1, 2025 and remain in effect for a period of twenty (20) years.

2. **Early Termination**.

   a. **Early Termination for Cause**. Either party may terminate this Agreement for good cause shown. The terminating party shall give a written "Notice of Intent to Terminate" the Agreement. The Notice of Intent to Terminate the Agreement shall set forth the reason(s) for termination of the Agreement, and shall allow for a "Cure Period" during which time the non-terminating party shall have the opportunity to cure the purported breach or default. If either party fails to cure and Good Cause continues to exist following the applicable cure period, the other party shall be entitled to terminate the Agreement or seek specific performance, and in any event, may sue for damages. In any action for damages under this Agreement, neither party shall be liable or responsible under any circumstances for consequential, incidental, indirect lost profit, or punitive damages of any kind.

   b. "Good cause" for the City to terminate includes, but is not limited to, the following:

      i. Any material breach of the terms, conditions, and obligations of this Agreement by Primary Sponsor;

      ii. Failure by Primary Sponsor to deliver contributions provided for in Article III hereof. ;

iii. Any crime by Primary Sponsor that causes Primary Sponsor to come into disrepute in the greater Rogers Area;

iv. Occurrence of insolvency or bankruptcy of Primary Sponsor, or upon the general assignment by Primary Sponsor for the benefit of creditors, or upon the consent of Primary Sponsor to the appointment of a receiver, trustee, or liquidator of all or substantially all of its property; or

v. Occurrence of a Transfer Event which the City has not consented to, as provided in Article VII of this Agreement.

c. "Good cause" for Primary Sponsor to terminate includes, but is not limited to, the following:

i. Any material breach of the terms, conditions, and obligations of this Agreement by the City;

3. **Removal of Signs, Logos, and Marks**. Upon termination or expiration of this Agreement, City shall have the right to remove all signs, logos, and marks in all locations throughout the Facility.

4. **First Right of Renewal.**

a. Primary Sponsor shall have the first right to renew this Agreement beyond the Expiration Date by delivering written notice of its desire to do so at least one year before the Expiration Date.

b. If Primary Sponsor provides notice of its desire to renew the Agreement, the parties will enter into a good faith negotiation to renew the Agreement on terms acceptable to both parties. All of the terms of the Agreement shall be subject to negotiation.

c. If terms to a new Agreement are not agreed to six (6) months before the Expiration Date, the parties may, at their option, continue negotiations, but the City shall have the right to negotiate with third parties for a new Naming Rights Agreement and doing so will not constitute bad faith.

d. This First Right of Renewal does not obligate either party to agree to a renewed agreement, nor to agree to any particular terms of a new agreement. The intent of this Article V, Section 4 is simply to provide a minimum six-month (6-month) period during which Primary Sponsor shall have the exclusive right to negotiate with City to renew this Agreement.

Article VI
Indemnification; Insurance

1. **Indemnification**. Without a waiver of the City's statutory immunities pursuant to Minnesota Statutes Chapter 466 or other applicable law, each party agrees to defend, hold harmless and indemnify the other Party against any and all claims, liabilities, damages, judgments, costs,

and expenses (including reasonable attorneys' fees and costs) asserted against, imposed upon, or incurred by the other Party that arises out of, or in connection with, the Party's default under or failure to perform any contractual or other obligations, commitment, or undertaking under this Agreement. Each Party further agrees that it shall be responsible for its own acts and results thereof to the extent authorized by law and shall not be responsible for the acts of the other Party and results thereof. The provision of this Article shall survive the termination of the Agreement with respect to any claim, action, or proceeding that relates to acts or omissions during the term of this Agreement.

2. **Insurance**. The City shall maintain such insurance as is customarily maintained by owners of comparable facilities.

Article VII
Assignment

1. The City shall be free to assign any of its rights or obligations under this Agreement to any successor in interest to the City-owned property.

2. In the event Primary Sponsor shall propose to undergo a change in control, sell, assign, merge, or otherwise dispose of its business (any of the foregoing being a "Transfer Event"), Primary Sponsor shall notify the City of such fact within thirty (30) days prior to such proposed Transfer Event. The notice shall state whether the Transfer Event will or could affect the exercise of Primary Sponsor's rights hereunder or whether it could result at any point in the renaming of the Facility and, if so, the new name proposed by Primary Sponsor or its successor.

   a. If a new name and/or logo for the Facility is proposed in connection with a Transfer Event, the new name and logo must be agreed to by the City and approved by the City Council in its sole discretion.

3. If, as a result of the Transfer Event, Primary Sponsor would not be the holder of rights under this Agreement, or Primary Sponsor is not the successor in the Transfer Event, then the City's written consent to the Transfer Event shall be required. If the City consents, the successor in the Transfer Event shall assume all of the obligations of Primary Sponsor under this Agreement and shall have all of the rights and obligations of Primary Sponsor under this Agreement.

4. In the event that a proposed Transfer Event will result in the renaming of the Facility to a company whose business conflicts with a naming rights or other agreement the City has with respect to the Facility, or a company whose business practices could be detrimental to the public image or reputation of the City or the Facility, in the sole discretion of the City, then the City shall have the right to terminate this Agreement by written notification within sixty (60) days after receiving notice of such proposed Transfer Event. In the event of such termination, Primary Sponsor shall be obligated to pay all funds contemplated by this Agreement to be due and payable through the Expiration Date.

5. No Transfer Event shall relieve Primary Sponsor and any successor entity from being jointly and severally liable for payment and performance of all obligations of Primary Sponsor under this Agreement if the City does not exercise its right of termination as provided in Section VII(4).

Article VIII
Notices

All notices hereunder by either Party to the other shall be in writing. All notices, demands, or requests shall be deemed given when mailed, postage prepaid, registered or certified mail, return receipt requested.

If to the City:

City Administrator
City of Rogers
22350 S. Diamond Lake Road
Rogers, MN 55374

If to Primary Sponsor:

TruStone Financial Credit Union
_____
_____

Article IX
General Provisions

1. **Amendments**. Neither this Agreement nor any term or provision hereof may be changed, waived, discharged or terminated, except by a written instrument signed by the Parties hereto.

2. **Interpretation of Agreement**. The captions preceding the articles and sections of this Agreement have been inserted for convenience of reference only and such captions shall in no way define or limit the scope of intent of any provision of this Agreement. Unless otherwise provided herein, whenever the consent of the City is required to be obtained, the City may give or withhold such consent in its sole and absolute discretion.

3. **Severability**. If any provision of this Agreement or the application thereof to any person, entity, or circumstance shall, to any extent, be invalid or unenforceable, the remainder of this Agreement shall not be affected thereby, and each other provision of this Agreement shall be valid and be enforceable to the fullest extent permitted by law.

4. **Attorneys' Fees**. In the event of a dispute regarding any provision of this Agreement, the Party not prevailing in such dispute shall pay any and all costs and expenses incurred by the other Party in enforcing or establishing its rights hereunder (whether or not such action is prosecuted to judgment), including without limitation, court costs and attorneys' fees.

5. **Time of Essence**. Time is of the essence with respect to all provisions of this Agreement in which a definite time for performance is specified including, but not limited to, the expiration of the term.

6. **Cumulative Remedies**. All rights and remedies of either party hereto set forth in this Agreement shall be cumulative, except as may otherwise be provided herein.

7. **Survival of Indemnities**. Termination of this Agreement shall not affect the right of the City or Primary Sponsor to enforce any and all indemnities and representations and warranties given or made to the other Party under this Agreement, nor shall it affect any provision of this Agreement that expressly states it shall survive termination hereof.

8. **Entire Agreement; Exhibits**. This Agreement, including exhibits, shall constitute the entire agreement of the Parties. Any and all prior agreements or understandings of the Parties shall, upon execution of this Agreement, be null and void.

9. **Waiver**.

a. Any term or condition of this Agreement may be waived at any time by the Party entitled to the benefit thereof. The waiver of any term or condition shall not be construed as a waiver of any other term or condition of this Agreement.

b. The failure of either Party to give notice or demand strict performance by the other of any of the terms, obligations, covenants or conditions set forth herein shall not be construed as a waiver or relinquishment of the other Party's right to seek a remedy for or demand strict performance of said terms, obligations, covenants and conditions.

c. The failure to terminate this Agreement for default shall not constitute a waiver of any remedies the non-defaulting Party would otherwise be entitled to demand.

d. Any waivers shall be done in writing to be valid.

10. **Force Majeure**. If the performance by any Party of any obligation set forth in this Agreement (other than the payment of money) is prevented by an act of God, force majeure or similar contingency or unexpected event beyond the control of any Party, such occurrence shall be considered a valid excuse for non-performance or delay in the performance of the obligations hereunder.

11. **Compliance with Laws**. In performing its obligations under this Agreement, each Party will comply with all local ordinances, state and federal statutes, orders, by-laws, regulations, and other laws of any applicable governmental entity or agency.

12. **Costs and Expenses**. Each Party must pay its own legal costs and expenses for the negotiation, preparation, and execution of this Agreement.

13. **Governing Law and Jurisdiction**. Any and all matters in dispute between the Parties arising from or relating to this Agreement shall be governed by, construed, and enforced in accordance with the laws of the State of Minnesota and the exclusive jurisdiction for any claim or action arising out of or relating to this Agreement shall be the state or federal courts located in Sherburne County, State of Minnesota.

14. **Section Headings**. Section headings are for reference purposes only and are not intended to create substantive rights or obligations.

IN WITNESS WHEREOF, the parties have executed this agreement to be effective on the Effective Date noted above.

City of Rogers	Primary Sponsor
By _____	By _____
_____	_____
By _____	By _____
_____	_____

Exhibit A

Naming Rights Signage and Assets

Exterior Signage

- One large sign placement on the east corner of the Facility (Facing Rogers High School). Maximum square footage of sign to be as allowed by the City's Sign Code or as approved via sign package by the Rogers City Council. Sign to be backlit.

- One large sign placement on the west corner of the Facility (Facing TH-101). Maximum square footage of sign to be as allowed by the City's Sign Code or as approved via sign package by the Roger City Council. Sign to be backlit.

- Branding on flags hung from lamp posts throughout facility parking lot.

- Branding integration in monument signage located at corner of 141st Avenue and James Road.

Internal Signage

- Integration into one artistic wall scape that will be prominently featured in the main lobby of facility.

- Inclusion of logo and brand messaging on the Facility-wide IPTV system.

- Integration into all interior directional signage and ancillary messaging found in the Facility.

- Opportunities to display marketing material on all Facility brochure racks and message boards.

- Logo placement on Facility staff uniforms or clothing.

- Facility logo printed at center ice in each ice rink. (will be installed summer of 2026 due to ice maintenance schedule).

- Four three-foot by eight-foot dasherboards strategically placed for maximum visibility in the corners of each ice rink.

- One large wall banner facing the seating area of each ice rink.

- Logo inclusion on a step and repeat graphic strategically placed on the rink glass of each rink.

- Signage adjacent to scoreboards in each arena.

- Inclusion in one wall mural in the Indoor Fieldhouse lobby.
- Two (2) logos featured on the Indoor Fieldhouse side walls.
- One (1) oversized banner hung from the Indoor Fieldhouse end wall.
- Opportunity to display and distribute marketing materials in the Indoor Fieldhouse lobby.

On-Site Activation

- The opportunity to activate at up to twelve (12) building's events annually. Activation dates and details to be mutually agreed upon by both parties.
- Use of all or part of the Facility for up to twelve (12) hours for private events annually. Dates subject to availability and standard facility booking procedures.

Digital Activation

- Inclusion of the Primary Sponsor's name and Facility logo on the City's official website pages and social media pages related to the Facility.
- Inclusion of the Primary Sponsor's name and Facility logo in the Facility's official Snapchat Filter.
- Inclusion of the Primary Sponsor's name and Facility logo in social media posts related to the Facility on the City's social media channels (the City shall endeavor to make at least twenty (20) such social media posts per year).
- Inclusion of the Primary Sponsor's name and Facility logo in City e-newsletters and other digital communication providing announcements or messaging related to the Facility.

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 7.2

Subject: Consideration of a Site Plan and Variance Request by T5 Rogers, LLC for the Property Located at 13510 Rogers Drive.
Prepared By: Brett Angell, Community Development Director

Recommended Council Action
Motion to approve Resolution 2025-27 granting site plan and variance approval for T5 Rogers, LLC for the property located at 13510 Rogers Drive, subject to the conditions as listed in the resolution.

Overview / Background / Analysis
T5 Rogers, LLC ("Applicant") has submitted site plan and variance requests to the city pertaining to the property located at 13510 Rogers Drive ("Subject Property"). The Applicant is seeking to add a small addition to the existing building, expansion of the existing parking lot, and re-purposing of the existing building for new commercial users. The Applicant currently has the property under contract and would be the owner-operator of a Take 5 Oil Change facility at this location, which is the proposed addition to the building. The proposed variance request pertains to code requirements for parking lot setbacks and impervious surface requirements.

Property Details
The Subject Property is 1.07 acres in size and consists of an approximately 4,300-square-foot freestanding building which was previously a financial institution with an attached 1,000-square-foot canopy that was previously used for drive-through banking purposes. The existing building was built in 2002 and was occupied by Wells Fargo until they made the decision to close this branch location in early 2024. The building has been vacant for the past year as Wells Fargo has sought a buyer for the property. The Subject Property is zoned as RC and guided as commercial within the 2040 Comprehensive Plan. The proposed use as presented in the applications is consistent with the zoning and the guidance for the property.

Site Plan
The proposed site plan includes the expansion of the existing building by approximately 1,600 square feet extending to the south. The proposed addition would house Take 5 Oil Change, which is a drive-through style limited service auto repairs. The existing building is planned to be converted into a quick-service restaurant and one additional retail user. Said restaurant would have the ability to utilize the existing drive-through canopy area for their service. Additionally, the Applicant and existing property owner have an agreement in which the existing Wells Fargo ATM will be maintained at this location.

The Take 5 addition operates as a drive-in oil change facility. So, as a consumer enters, they stay within the vehicle as the service is performed. The proposed addition would accommodate a two-bay oil change facility. Outside the entrance doors, there would be space for four additional cars to wait. Per the Applicant, who operates numerous Take 5 locations in the metro, they do not typically experience large waits or stacking of customers. Per staff review comments, two adjacent parking stalls shall be signed for overflow parking and the stacking area shall be properly marked on the pavement.

Traffic would enter the site from the north and extend south throughout the property. On the west and south sides of the property, it would allow for two-way vehicle access. The east side would be restricted to one-way traffic moving north.

Access and Parking

The proposed access to the property will remain the same as currently exists for the property. Both the access points are shared with the Dairy Queen property to the north. On the east side of the Subject Property there is a right-in access point. To exit the development, there is an access road that wraps around the east and west sides of the Dairy Queen property and connects back to Rogers Drive.

Currently, there are a total of 31 parking spaces (including 2 of which are ADA-accessible). The Applicant is proposing to expand the parking area to increase the total number of stalls on site to 45. The primary area which new stalls would be created is on the west side of the property along Rogers Drive,

Stormwater

The subject property is currently served by a regional stormwater system that is adjacent to the site. Said regional system has the capacity for the proposed site improvements. No on-site stormwater pounding is required.

Landscaping

Through the removals and landscaping plan, the Applicant is proposing to directly replace the existing number of trees being removed. Currently, the property includes two Ash trees and five Crabapple trees. The proposed Landscaping Plan includes two Honey Locust trees and five lilac trees. The Applicant is also proposing 19 additional shrubs and 26 additional perennials.

Architecture

The proposed addition would be a combination of brick, glass, and fiber cement siding. The proposed architecture was designed in an effort to match the existing structure on site and appear consistent with that structure. The proposed architecture meets City Code requirements.

Fire Review Comments

Per review by the Rogers Fire Department, with the proposed addition and new uses

being introduced to the existing building, both the addition and existing structure will require fire sprinklers to be installed. Fire also expressed some concern related to if the oil change facility hit very busy times and the stacking extended past its identified area as shown on the plans.

Variance Request

The Applicant is seeking a variance from City Code Section 125-57 related to parking setbacks and impervious surface requirements. Per City Code, properties within the RC district (within a defined Corridor area) are required to have a 20 ft parking setback and are limited to 65% impervious surface. The Applicant is requesting a 0' parking setback from Rogers Drive and an allowance for impervious surface to equal 86%.

The existing conditions at the Subject Property include a 0' parking setback. A variance request was required due to the expansion of the parking area in that location. Additionally, the Subject Property is currently above the allowable maximum impervious percentage allowed by code. While the property is seen as legally non-conforming currently for both of these items, the proposed variance request will bring the property up to requirements.

Criteria for Granting Variances

The Planning Commission must make findings of fact that the proposed variance is pursuant to, but not limited to, the following considerations:

1. Variances shall only be permitted when they are in harmony with the general purpose and intent of the City Code and consistent with the Comprehensive Plan;
2. Variances may only be permitted when the application establishes that there are non-economic practical difficulties in complying with the zoning ordinance, meaning the property owner proposes to use the lot or parcel reasonably permitted by the zoning code;
3. The plight of the property owner must be due to circumstances that are unique to the lot or parcel and that are not created by the property owner;
4. The variances must not alter the essential character of the locality, including all zoning district and overlay district provisions.

The Rogers code also includes the following variance standards (beyond state statute):

1. Under the circumstances, the public interest underlying the proposed variance outweighs the public interest underlying the particular regulation for which the variance is granted; and
2. The granting of a variance will not be injurious to other properties and will not prevent the orderly subdivision of other property in the area, in accordance with these regulations.

Each variance request is processed and evaluated on its own merits. The City Council

should consider if the request meets the variance criteria as listed above. The following should be considered when determining the request. The State Statute specifically notes that economic conditions alone cannot create practical difficulties.

- Does the proposal put the property to use reasonably?
- Are there unique circumstances regarding the property not created by the landowner?
- Will the variance, if granted, alter the essential character of the area?

Planning Commission Review

This item was reviewed at the April 7th Planning Commission meeting. A public hearing was held at this meeting which did not have any individuals speak. Following the public hearing, the Planning Commission unanimously recommended approval of the variance and site plan request with the conditions as listed in the resolution.

Staff Recommendation

Staff recommends approval of Resolution 2025-27 granting site plan and variance approval for T5 Rogers, LLC for the property located at 13510 Rogers Drive, subject to the conditions as listed in the resolution.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation

A. Resolution No. 2025-27 Take 5 Site Plan and Variance
B. Narrative
C. Variance Worksheet
D. Location Map
E. Civil Plans and Renderings

RESOLUTION NO. 2025-27

APPROVING A SITE PLAN AND VARIANCES RELATED TO TAKE 5 OIL CHANGE FOR THE PROPERTY LOCATED AT 13510 ROGERS DRIVE

WHEREAS, T5 Rogers, LLC ("Applicant") have submitted applications to the City of Rogers ("City"), requesting approval of a Site Plan and Variances for alterations to the property located at 13510 Rogers Drive – former bank building. The proposed development includes a 1,600 square foot addition to the building, expansion of the parking lot, and change of uses for the building. The proposed variances are related to parking setbacks and impervious surface requirements.; and

WHEREAS, the property is 1.07 acres and zoned Regional Employment Center (RC), located at 13510 Rogers Drive and legally described in Exhibit A ("Subject Property") (PID: 14-120-23-42-0006); and

WHEREAS, section 125-27 – Site Plan governs the procedures around site plan review processes, and subsection (b) states: "the Planning Commission shall evaluate the effects of the proposed site plans. This review shall be based upon, but not be limited to, compliance with the City's Comprehensive Plan and provisions of this Ordinance"; and

WHEREAS, the proposed use at the Subject Property for a multi-tenant commercial building comprised of an oil change business, restaurant, and retail use are permitted uses in the RC zoning district (§125-50 Table 4E); and

WHEREAS, the proposed development includes a parking plan of 45 total spaces allocated via City Code 125-86 Parking consisting of 5 spaces dedicated to the oil change use, 6 spaces for the retail use, 34 space for the restaurant use; and

WHEREAS, pursuant to Minnesota Statute §462.357, the Planning Commission ("Commission") held a Public Hearing ("Hearing") on April 7, 2025 to consider and receive public comment on the variance requests; and

WHEREAS, notice of the Hearing was posted, published in the City's official newspaper, mailed to any and all owners of affected properties, as required by State Statute; and,

WHEREAS, on April 7, 2025, the Commission reviewed the request and voted unanimously to recommend approval to the City Council of the Site Plan Review, with the following conditions:

a. Applicant entering into all required agreements with the City prior to issuance of a building permit.
b. All engineering comments shall be satisfied prior to construction.
c. Any necessary Elm Creek Watershed Permitting and Requirements shall be met prior to construction.
d. SAC Determination shall be submitted to the Metropolitan Council and all building and connection fees paid prior to issuance of the building permit.

e. The existing building and addition shall include sprinklers pursuant to the review and approval by the Fire Department.
f. The queuing area for the Take 5 Oil change shall be properly striped and displayed as a waiting area to limit additional queuing.
g. The applicant shall mark at least 2 parking stalls adjacent to the Take 5 queuing area as overflow parking to limit impacts to the drive aisle.
h. Applicant shall work with staff on the proposed location of the ordering/menu board for the restaurant use. Staff request the order board be shifted further to the north or for that line to be mobile order pick-up only and not a full drive through.

WHEREAS, following the Hearing, the Commission recommended approval of the variance requests for the parking setback and impervious surface requirements provided based on the following findings of fact:

1. The subject property is legally described as found in Exhibit A; and
2. The Applicant has applied to the City for variances to City Code 125-57 related to the required 20 foot parking setback and impervious surface limitations of 65%; and
3. The proposal would vary from the Code requirement via providing a 0-foot parking setback and the property would be at 86% impervious surface; and
4. Following a public hearing on the application, the Rogers Planning Commission has recommended approval of the variance on April 7, 2025; and
5. The City Council of the City of Rogers reviewed the requested variance at its April 22nd, 2025meeting; and
6. Variances are guided by applicable State Statute Section 462.357 Subd. 6 and City Ordinance Section 125-42(c); and
7. The Applicant is conforming with the existing conditions of the property due to the existing conditions already including a 0-foot parking setback and above the impervious surface limits; and
8. The Property has an effective 20-foot setback from back of curb to the property line due to the public right-of-way adjacent to this location;
9. The property is bound by roads and a wetland and other structuring of the development would not be possible;
10. The Property is served by regional stormwater systems which have the capacity to handle the excess impervious surface.
11. The Variance is in harmony with the general purpose and intent of City Code, and is consistent with the character of other uses in the zoning district.
12. There are non-economic practical difficulties in complying with the zoning ordinance, and the Variance is the result of circumstances caused by the City Code requirements related to the development.

NOW THEREFORE, BE IT RESOLVED, BY THE CITY COUNCIL OF THE CITY OF ROGERS, MINNESOTA, the Site Plan Review and Variance requests from T5 Rogers, LLC are hereby approved for the addition and site plan changes to 13510 Rogers Drive, and variances from City Code 125-57 related to the reduction of the parking setback from 20 feet to 0 feet and allowance to have 86% impervious surface compared to the code maximum of 65%, based on the conditions found in this resolution.

Moved by Councilmember , seconded by Councilmember

The following voted in favor of said resolution:

The following voted against the same:

The following abstained:

Whereupon said resolution was declared duly passed and adopted, and was signed by the Mayor, and attested by the City Clerk dated this 22nd day of April, 2025.

_____
Shannon Klick, Mayor

ATTEST:

_____
Stacie Brown, City Clerk

EXHIBIT A

LEGAL DESCRIPTION

Subject Property

LOT 2, BLOCK 1, WALTER DEHN COMMERCE CENTER 2ND ADDITION, HENNEPIN COUNTY, MINNESOTA

Abstract Property

PID #14-120-23-42-0006

WRITTEN STATEMENT FOR TAKE 5 OIL – ROGERS, MN

Land Use Submittal

The redevelopment of the previous Wells Fargo site is aimed at increasing the efficiency of a premium site in the City of Rogers, MN and to add valuable amenities and services to the community. The site is zoned as a Regional Employment Center (RC), which the city states is intended to promote the redevelopment of sites into the corridor into high intensity commercial use amongst other uses. The city encourages efficient use of land, and the proposed site plan addresses this intention by expanding the site from a single user to four users.

The major changes to the site include expanding the current footprint of the building by approximately 1,600 sq ft to add a Take 5 Oil Change business and expanding the parking field to accommodate a national, quick service restaurant (QSR), an ATM and a 1,500 sq ft retail space for a fourth user. The local developer currently owns and operates five other Take 5 Oil Change locations, which makes this an owner-occupied development. The goal of the building expansion is to match the look and feel of the current building while freshening up the exterior.

While the site would undergo significant changes, the overall compatibility of the new users would fit within the community feel of the site. Adding a restaurant to the site provides another amenity to the local community as well as those traveling through on the highways. An oil change facility adds another essential service to a growing community and having an ATM onsite preserves the financial service of the previous user. The fourth user is not currently identified but the developer desires to offer this space to a local business.

Adding these businesses increases the number of jobs available in the local community and offers additional amenities and services to its residents. From the beginning, the developer sought advice and input from the Planning and Development team at the city. Their input and encouragement were invaluable in putting together the proposed site plan.

VARIANCE WORKSHEET

1. Detail specifically the deviation(s) from code proposed (e.g. code requires X ft setback, requesting X ft setback).

Code requires 20' front parking setback on west and south. Requesting 0' setback on west and 12' setback on south.
Code requires 65% impervious area. Requesting 86.6%.

2. Describe how the request is in harmony with the general purpose and intent of zoning for the property.

This property is zoned RC (Regional Employment Center), which is intended to promote the redevelopment of the corridor into high intensity commercial and other uses. The city is encouraging land use efficiency in this district. The proposed redevelopment changes this site from a single use to four uses that will add additional amenities and services to the surrounding community.

3. Describe how the request is consistent with the Comprehensive Plan.

In the 2040 Comprehensive Plan for the city, there is an emphasis on job creation (p. 39) and redevelopment of existing sites to make more efficient use of land (p. 47). With this redevelopment, we plan to redevelop the site from one user (a financial institution) into four users (QSR, quick lube oil change, ATM and a retail space). Given the proximity to the highway and residential areas, a restaurant will draw traffic from both the city and highway users, the ATM will continue to support financial users and the oil change will provide a necessary service to the community.

4. Describe why the proposed use is reasonable.

This site is in a premium location within the city and was underutilized as a financial institution. The variance request to encroach into easement areas will allow additional parking for the new users. The site already has parking spaces on the west side on the property line. The request is to build additional parking spaces on the west side along the same line as the existing spaces and to add parking spaces into a utility easement on the south side of the property. The only interference with utility lines would be asphalt that could easily be torn up and replaced in the event that a utility line needed to be replaced.

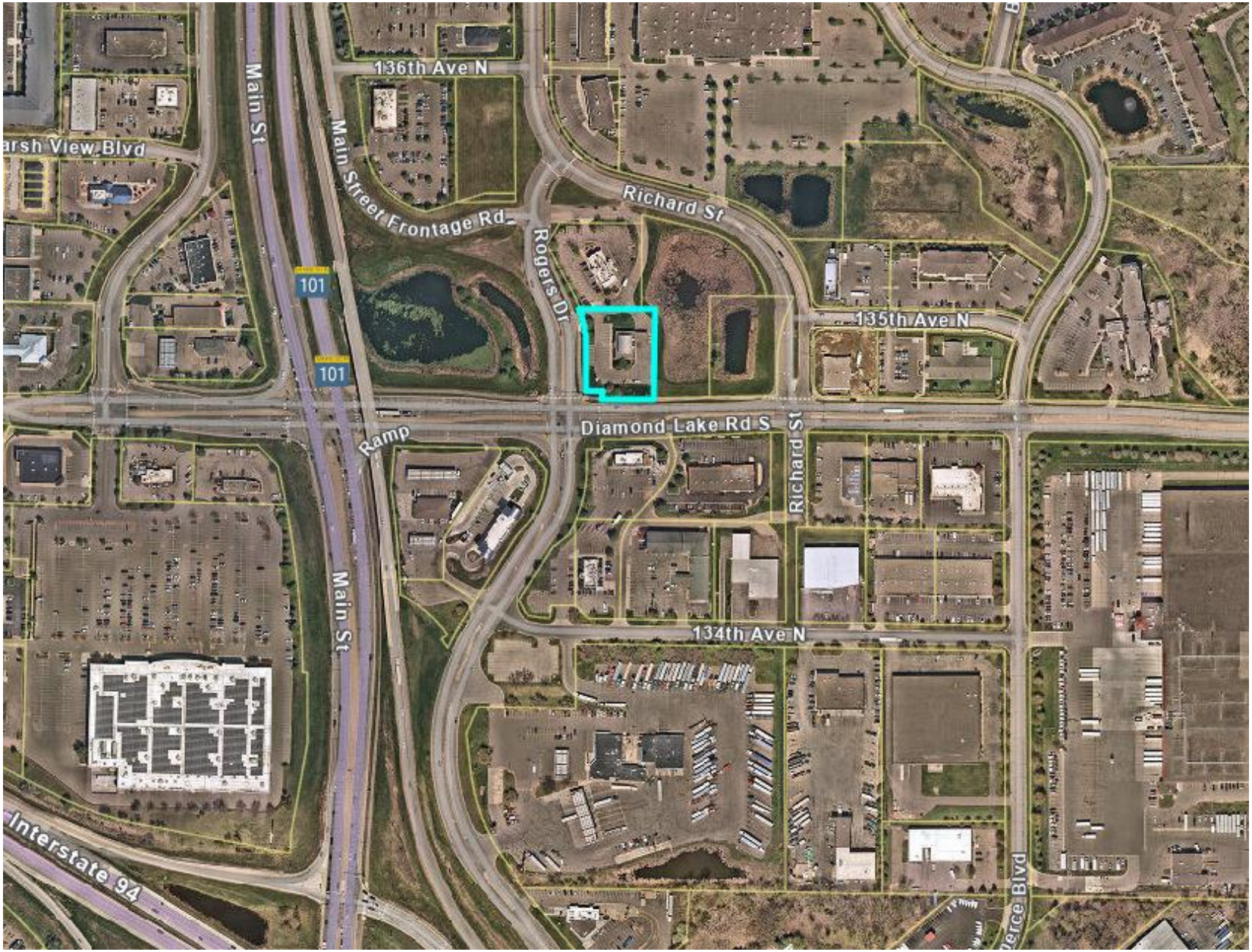
5. Describe the following: *circumstances unique to the property, why the need for the variance was not created by the property owner, and why the need is not solely based on economic considerations.*

This property has large easement areas given that it is at an intersection on Diamond Lake Road. It is a premium location within the community with the highest traffic counts at the intersection. Given the location, there is an opportunity to bring more amenities and essential services to the community. It will also create many more jobs than the previous use, which closed in 2024.

6. Describe why the variance would not alter the essential character of the neighborhood.

The redevelopment project would add approximately 1,600 sq ft to the existing building and remodel the financial institution into a restaurant. The changes apart from adding additional parking would be minimal and shouldn't change the look and feel of the neighborhood.

LOCATION MAP



Take 5 Oil- Rogers

13510 Rogers Dr.
Rogers, MN 55374

Project Number: 025001.00

Abbreviations

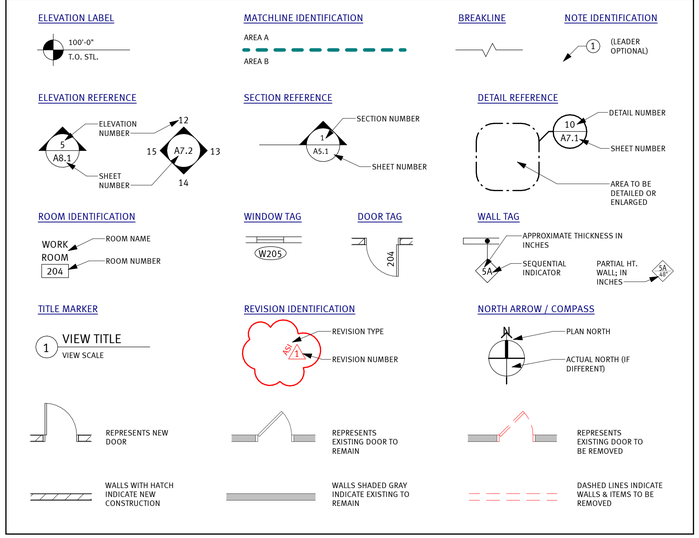
ADA	AMERICANS WITH DISABILITIES ACT
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
APPROX	APPROXIMATE
ARCH	ARCHITECT
B.O. / BO	BOTTOM OF
B.SPLASH	BACKSPLASH
BLDG	BUILDING
BLKG	BLOCKING
BRG	BEARING
C-TOP	COUNTERTOP
CG	CORNER GUARD
CJ	CONTROL JOINT
CL	CENTERLINE
CLG	CEILING
CLR	CLEAR(ANCE)
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINOUS
CPT	CARPET
CT	CERAMIC / PORCELAIN TILE
D	DEEP
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION
DISP	DISPENSER
DN	DOWN
DS	DOWNSPOUT
DW	DISHWASHER
DWG	DRAWING
EA	EACH
EIFS	EXTERIOR INSULATION & FINISH SYSTEM
EJ	EXPANSION JOINT
ELEC	ELECTRICAL
EPDM	ETHYLENE PROPYLENE DIENE TERPOLYMER ROOFING
EQ	EQUAL (EQUALLY)
EQUIP / EQPT.	EQUIPMENT
EXST / EX. / EXIST.	EXISTING
EXT	EXTERIOR
F.T.	FIRE TREATED
F.V.	FIELD VERIFY
FD	FLOOR DRAIN
FDN	FOUNDATION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FFGB	FIBERGLASS FACED GYPSUM BOARD
FLR	FLOOR
FRP	FIBERGLASS REINFORCED PANEL
FTG	FOOTING
FUR	FURRING
GALV	GALVANIZED
GB	GRAB BAR
GLAZ	GLAZING
GYP. BD / G.BD / GBD	GYPSUM BOARD
H	HIGH
HC	HANDICAPPED
HM	HOLLOW METAL
HT	HEIGHT
ICF	INSULATED (OR INSULATING) CONCRETE FORM
INSUL	INSULATION
INT	INTERIOR
JST	JOIST
LAM	LAMINATE
LVT	LUXURY VINYL TILE
MANUF	MANUFACTURER
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MIN	MINIMUM
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MTL	METAL
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NOM	NOMINAL
NTS	NOT TO SCALE
OC / O.C.	ON CENTER
OFD	OVERFLOW DRAIN
OH	OVERHEAD
P.T.	PRESSURE TREATED
PC	PRECAST
PL	PLATE
PLAM / P.LAM.	PLASTIC LAMINATE
PLY / PLYWD	PLYWOOD
PNT	PAINT
PREFIN	PREFINISHED
PTD	PAPER TOWEL DISPENSER
QT	QUARRY TILE
QTY	QUANTITY
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
REF	REFRIGERATOR
REINF	REINFORCED
REQD	REQUIRED
RPF STRIP	REINFORCED PERIMETER FASTENING STRIP
RTU	ROOF TOP UNIT (MECH.)
RWL	RAIN WATER LEADER
S.SPLASH	SIDESPLASH
SACT	SUSPENDED ACOUSTICAL CEILING TILE
SCHED	SCHEDULE
SD	SOAP DISPENSER
SEAL	SEALANT (SEALED)
SF	SQUARE FOOT (FEET)
SIM	SIMILAR
SIP	STRUCTURAL INSULATED (OR INSULATING) PANEL
SND	SANITARY NAPKIN DISPOSAL
SPEC	SPECIFICATION
SS	STAINLESS STEEL
SSM	SOLID SURFACE MATERIAL
STL	STEEL
STND	STANDARD
STRUCT	STRUCTURAL CONSULTANT
SV	SHEET VINYL
T.O.	TOP OF
TBB	TILE BACKER BOARD
TEMP	TEMPERED
TPD	TOILET PAPER DISPENSER
TRTD	TREATED
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VB	VINYL BASE
VCT	VINYL COMPOSITION TILE
VIF	VERIFY IN FIELD
VWC	VINYL WALL COVERING
W	WIDE
W/	WITH
W/O	WITHOUT
WD	WOOD
WRB	WEATHER RESISTIVE BARRIER
#	NUMBER (OR POUND)
&	AND
@	AT

Perspective View

Architectural General Notes

1. General Notes apply to all drawing sheets.
2. Review the Construction Documents prior to start of construction. Notify Architect upon encountering any unforeseen conditions, discrepancies, errors, or inconsistencies.
3. Work shall be done in accordance with all rules and regulations of all applicable safety and building codes. The General Contractor is responsible for securing and paying for all permits required and for the scheduling of all required inspections during the course of the project.
4. The General Contractor shall take precautions and be responsible for the safety of all building occupants from construction procedures during construction to minimize disturbances to adjacent spaces and /or structures and their occupants, property, public thoroughfares, etc. Maintain all required exits during construction.
5. All materials and systems shall be installed as per manufacturer's specifications and all construction shall be of industry standard or better.
6. Do not scale drawings. Verify all dimensions in the field for accuracy prior to construction. No extra charge or compensation shall be allowed because of difference between actual dimensions and those indicated on the drawings, unless they contribute to a change in the scope of work.
7. In the event of conflict between data shown on drawings and data shown in the Specification, the Work of greater quality or quantity shall be provided, in accordance with the Architect's interpretation, and no change in the Contract Sum will be permitted. Detail drawings take precedent over drawings of larger scope. Notify Architect if at any time an error or discrepancy is discovered.
8. Immediately notify Architect of any long lead items that will affect the completion date
9. All wood in contact with concrete or concrete block to be pressure treated - typical.
10. Provide metal backing and / or treated wood blocking for all wall mounted equipment (grab bars, toilet room accessories, TV mounts, headwalls, equipment rails, etc.) Verify height and length with actual equipment.
11. Patch all disturbed fireproofing as required to maintain rating. Repair and install all fireproofing as required by code. Fireproof any new penetrations required by the work. Refer to code summary for ratings.
12. All exposed metal to receive paint unless otherwise noted
13. All adjacent dissimilar materials to receive caulking, including equipment mounted to walls

Graphic Symbols



Project Team

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Email: ben@calyxdesigngroup.com

Location Map

★ Star Indicates Project Location

Sheet Index

0-General Sheets	
G0.1	Cover Sheet
4-Architectural	
A2.1	Floor Plans
A5.1	Exterior Elevations
A5.2	Exterior Elevations

Materials

EARTH	RIGID INSULATION
COMPACT FILL/SAND	BATT INSULATION
POROUS FILL/GRAVEL	GYPSUM BOARD
MORTAR/PLASTER	PLYWOOD
SPRAY FOAM INSUL.	OSB SHEATHING
FACE BRICK	CONT. ROUGH WOOD
CMU	WOOD BLOCKING
CONCRETE	FINISHED WOOD
STUD WALL/METAL	BITUMINOUS

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www.dsgw.com

Take 5 Oil- Rogers

13510 Rogers Dr.
Rogers, MN 55374

project #: 025001.00
date: 3/5/2025 10:32:37 AM
drawn by: Author
checked by: Checker

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Architect under the laws of the state of Minnesota.

signature:
printed name: John E. Erickson, NCARB, LEED AP
reg. #: 24199
sign date: Issue Date

PRELIMINARY NOT FOR CONSTRUCTION
3/5/2025 10:32:37 AM

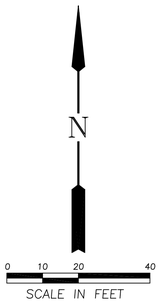
revision / issue	*no.*	*date*

sheet title: Cover Sheet
sheet number: G0.1

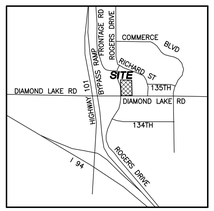
ALTA/NSPS Land Title Survey for:

T5 ROGERS LLC

at 13510 Rogers Drive, Rogers MN



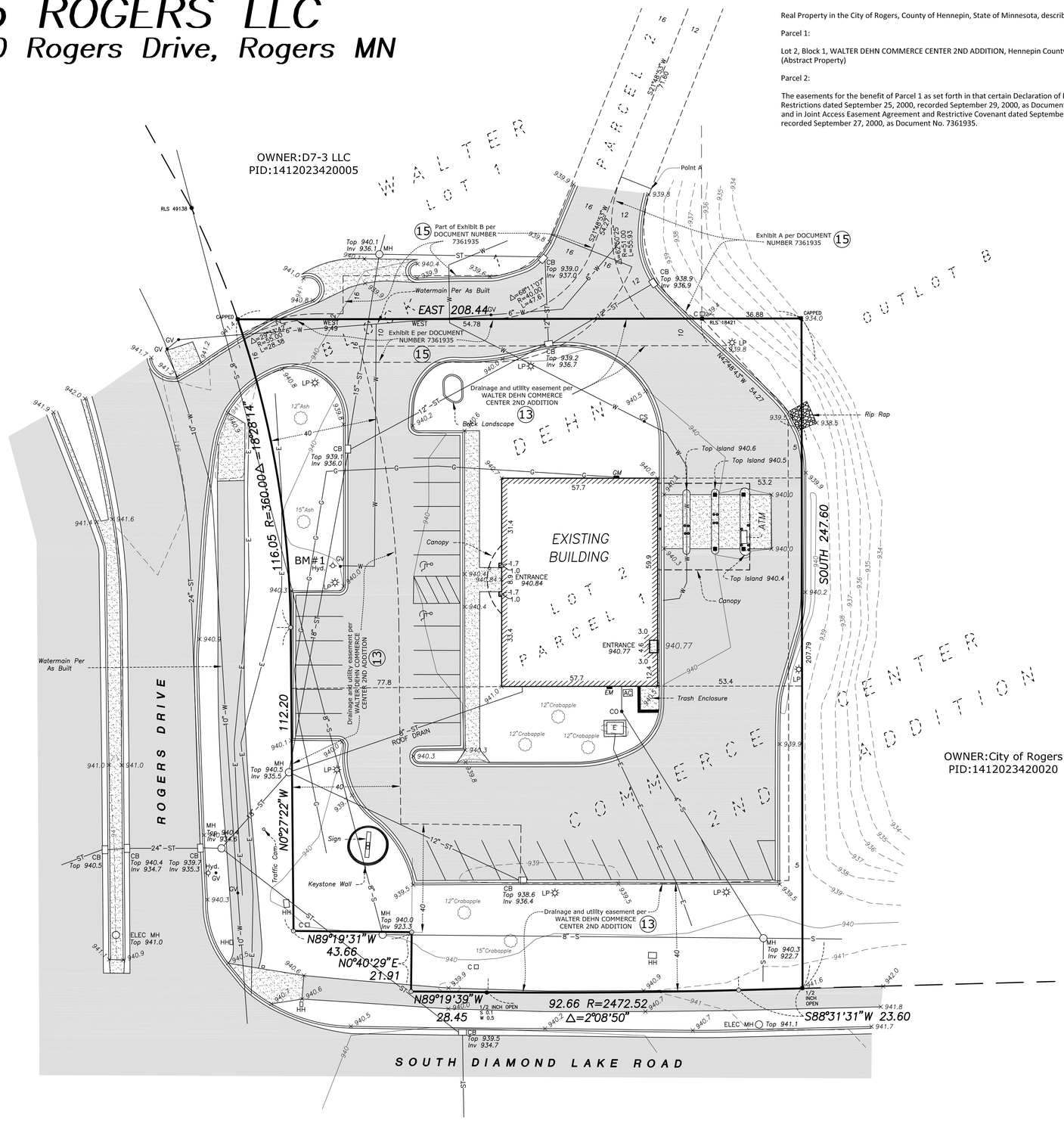
VICINITY MAP



Section 14, Township 120, Range 23
Not to Scale

LEGEND

- Found 1/2" Open Iron Monument, unless otherwise noted
- Iron Monument Set
- S — Sanitary Sewer
- ST — Storm Sewer
- W — Watermain
- Hyd. — Hydrant
- GV — Gate Valve
- MH — Manhole
- CB — Catch Basin
- CO — Cleanout
- Guard Post
- Column
- LP — Light Pole
- AC — Air Conditioner
- HH — Handhole
- C — Communications Pedestal
- Concrete Surface
- Bituminous Surface
- GM — Gas Meter
- EM — Electric Meter
- CS — Curb Stop



PROPERTY DESCRIPTION

Real Property in the City of Rogers, County of Hennepin, State of Minnesota, described as follows:

Parcel 1:

Lot 2, Block 1, WALTER DEHN COMMERCE CENTER 2ND ADDITION, Hennepin County, Minnesota. (Abstract Property)

Parcel 2:

The easements for the benefit of Parcel 1 as set forth in that certain Declaration of Easement and Restrictions dated September 25, 2000, recorded September 29, 2000, as Document No. 7361934, and in Joint Access Easement Agreement and Restrictive Covenant dated September 25, 2000, recorded September 27, 2000, as Document No. 7361935.

NOTES CORRESPONDING TO SCHEDULE B, PART II - EXCEPTIONS

The following were provided in First American Title Insurance Company National Commercial Services, File Number NCS-1244502-SC, Commitment Date: December 8, 2024 at 7:30 a.m. The items referenced correspond to the items defined in the Title Commitment's Schedule B, Part II - Exceptions. They are followed by comments made by Rehder & Associates, Inc. addressing the Item and are referenced on survey map by item number, if applicable.

(1) Indicates corresponding Schedule B, Part II exception number.

Items 1, 2 (except encroachments) and 3 - 12 are not survey related and therefore are not addressed on this survey.

Item 13 - Drainage and utility easements disclosed by the plat of Walter Dehn Commerce Center 2nd Addition, recorded September 27, 2000, as Document No. 7360785. SHOWN ON SURVEY

Item 14 - Terms, conditions, covenants, restrictions, obligations, provisions and easements as contained in the Declaration of Easement and Restrictions, dated September 25, 2000, recorded September 29, 2000, as Document No. 7361934. NOT SHOWN ON SURVEY - DOES NOT ENCROACH ON THE SUBJECT PROPERTY

Item 15 - Terms, conditions, covenants, restrictions, obligations, provisions and easements as contained in the Joint Access Agreement and Restrictive Covenant, dated September 25, 2000, recorded September 29, 2000, as Document No. 7361935. SHOWN ON SURVEY

TABLE A ITEMS

Item 1 - Monuments found and/or set on subject property during performance of survey are as shown on survey map.

Item 2 - The address of the subject property is: 13510 Rogers Drive, Rogers, Minnesota 55104.

Item 3 - The subject property lies within Zone X of the Flood Insurance Rate Map, Panel No. 27053C0033F, dated November 4, 2016 and is not in a Special Flood Hazard Area. Zone X is defined as area of minimal flooding. Field surveying was not performed to determine this zone.

Item 4 - The area of the subject property as surveyed is 46,697 square feet or approximately 1.07 Acres of land.

Item 5 - Vertical Datum: NAVD 88. Contours are shown with 1 foot intervals.

Item 6 (a) - Zoning information shown hereon is per the City of Rogers website. Rehder & Associates does not certify to accuracy of this designation, as no Zoning letter was provided to the surveyor. For additional information contact the City of Rogers.

ZONING: The subject property is Zoned RC, Regional Employment Center

Item 7 (b) - The square footage of the exterior building footprint at ground level is approximately 4,427 sq. ft.

Item 8 - Observable features on date of field work are as shown on survey map.

Item 9 - Total number of regular parking spaces = 29. Total number of disabled parking spaces = 2. The striping locations of clearly identifiable parking spaces on date of survey are shown on the survey map.

Item 11 - As shown on this survey map, underground utility lines and structures are shown in an approximate way only, according to information provided by others. Excavations were not made during the process of this survey to locate underground utilities and/or structures. A request that utilities be marked/located for this survey was made through Gopher State One Call (Ticket No. 250060977) and the City of Rogers. The underground utility lines and structures shown on this map represent the information provided to Rehder & Associates as a result of that request. The surveyor does not guarantee that the information provided was either complete or accurate or that there are no other underground utility lines and structures, active or abandoned, on or adjacent to the subject property.

Item 13 - The ownership and tax parcel information shown hereon was taken from County's Web Based Public GIS mapping. Rehder & Associates, Inc. did not determine ownership of adjacent land.

SURVEYOR NOTES

1. Fee Simple ownership as to Parcel 1 and Easement as to Parcel 2 is vested in Marquette Bank, N.A., per the above described title commitment.
2. Subject property (Parcel 1) is Abstract property.
3. The boundary for the subject property as shown on this survey map was established based on the descriptions and exceptions as provided in referenced Title Commitment and found monuments called for on recorded plats or adjoining descriptions.
4. Orientation of the bearing system used for this survey is based on WALTER DEHN COMMERCE CENTER 2ND ADDITION, according to the recorded plat thereof, Ramsey County, Minnesota. Vertical Datum: NAVD88.
5. Benchmark: Top of top nut of fire hydrant located ±60 feet west of front entrance of existing building Elev.=942.77

CERTIFICATION

To T5 Rogers LLC, D/B/A Take 5 Oil Change, Marquette Bank, N.A., and First American Title Insurance Company National Commercial Services:

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2021 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes Items 1, 2, 3, 4, 5, 6(a), 7(a), 7(b), 8, 9, 11, and 13 of Table A thereof. The fieldwork was completed on January 7th, 2025.

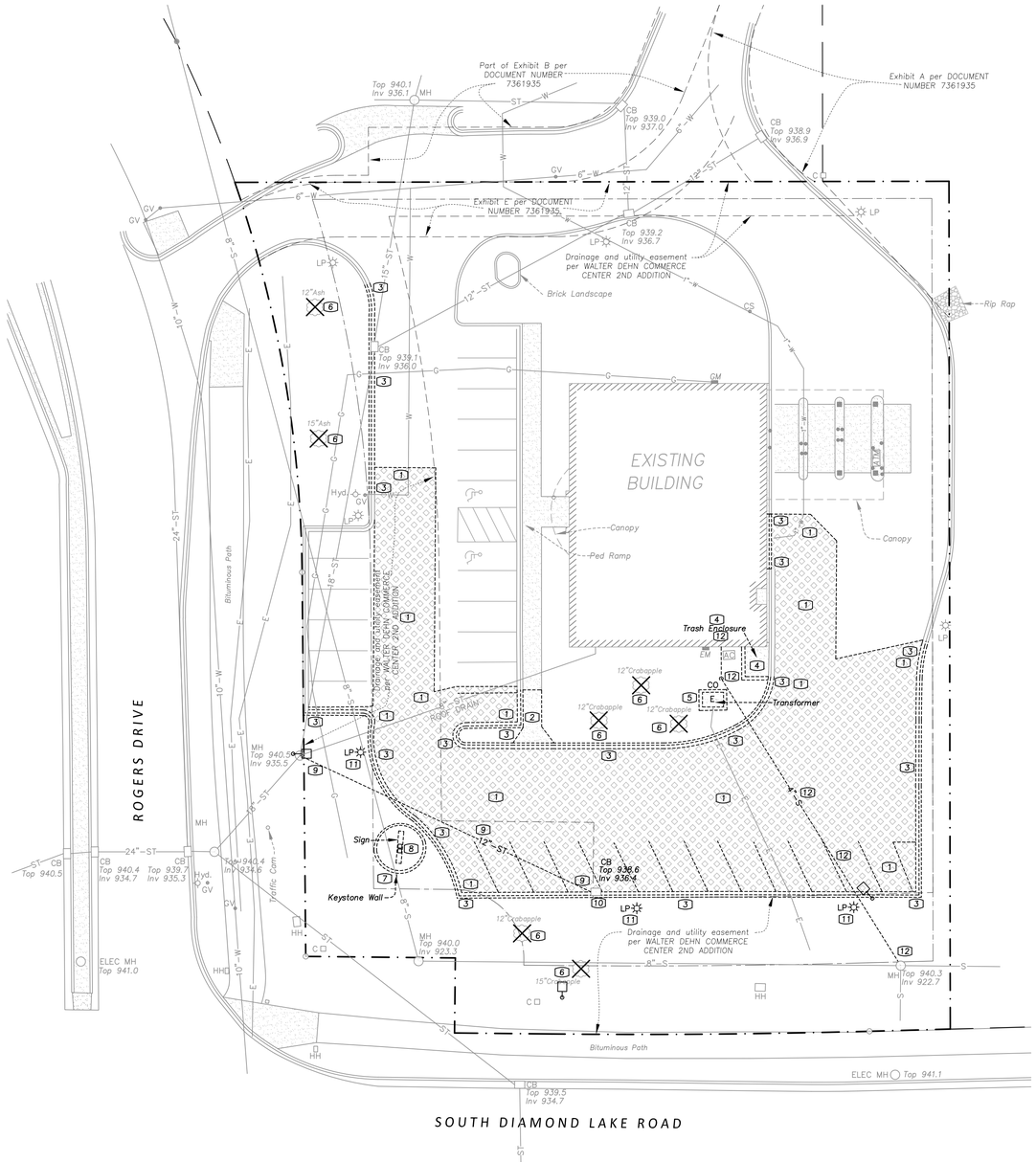
Dated this 14th day of March, 2025
REHDER & ASSOCIATES, INC.

Matthew D. Thiel, Land Surveyor
Minnesota License No. 63458

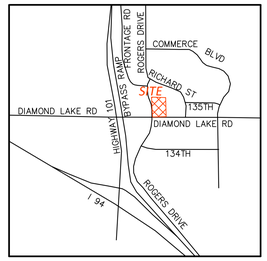
MATTHEW D. THIEL
LICENSED LAND SURVEYOR
63458
STATE OF MINNESOTA

REHDER & ASSOCIATES, INC.
Civil Engineers & Land Surveyors
3440 Federal Drive, Suite 110
Eagan, MN 55122
Telephone: 651-452-5051
www.rehder.com

JOB: 224-3452.013



VICINITY MAP



Section 14, Township 120, Range 23
Not to Scale

NOTE: SEE UTILITY PLAN FOR PROPOSED CONNECTION OF STORM AND SANITARY SEWER TO EXISTING MANHOLES TO REMAIN.

DEMOLITION NOTES

1 – Remove bituminous pavement
2 – Remove concrete sidewalk
3 – Remove curb & gutter
4 – Remove trash enclosure
5 – Remove, salvage & relocate transformer
6 – Remove tree(s)
7 – Remove modular block retaining wall
8 – Remove, salvage & relocate sign
9 – Remove storm sewer pipe
10 – Remove catch basin structure
11 – Remove, salvage & relocate light pole
12 – Remove sanitary sewer pipe

LEGEND

- EXISTING BITUMINOUS TO BE REMOVED
- EXISTING CONCRETE TO BE REMOVED
- BOUNDARY/ROW/BLOCK LINE
- EASEMENT
- BUILDING/PARKING SETBACK LINE
- W — EXISTING WATERMAIN
- S — EXISTING SANITARY SEWER
- ST — EXISTING STORM SEWER
- G — EXISTING BURIED GAS LINE
- E — EXISTING BURIED ELECTRIC LINE
- 980 — EXISTING CONTOUR
- x 995.50 EXISTING ELEVATION

N

0 10 20 40 60
Scale in Feet

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PROJECT NO.: 251-1989.052
DRAWING FILE: 1989052.DWG

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TAKE 5 OIL-ROGERS

13510 ROGERS DRIVE
ROGERS, MN 55374

project #: 025001.00
date: 04/10/2025
drawn by: BJQ
checked by: NPA

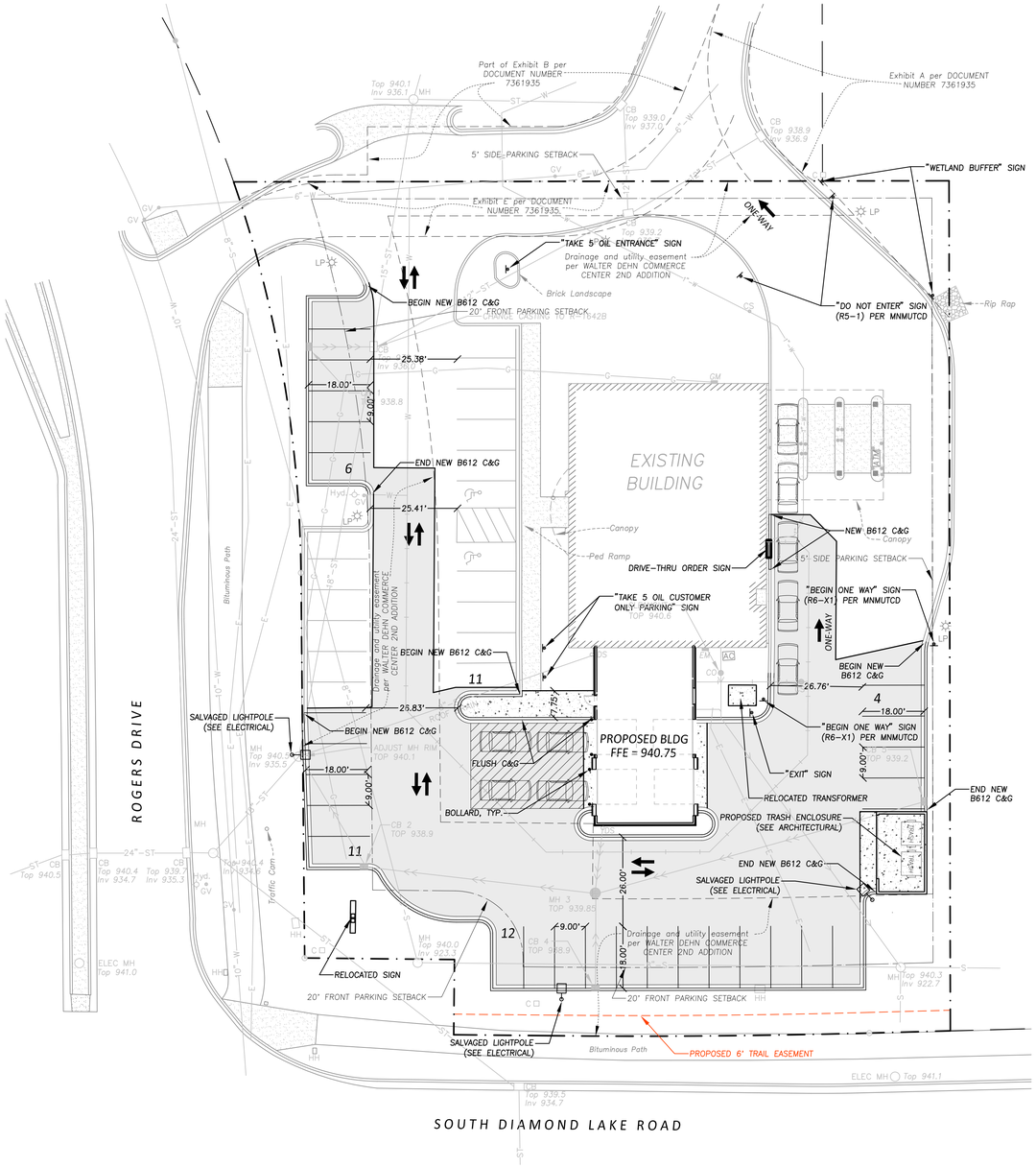
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

printed name: NICHOLAS P. ADAM
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION
04/10/2025

revision / issue	no.	date

sheet title: SITE DEMOLITION PLAN
sheet number: C1.0



CODE COMPLIANCE:

1. WORK SHALL BE IN ACCORDANCE WITH APPLICABLE LAWS, CODES & REQUIREMENTS OF REGULATORY AGENCIES HAVING JURISDICTION.
2. NOTIFY THE OWNER'S ENGINEER OF DISCREPANCIES BETWEEN THE WORK AND APPLICABLE CODES. DO NOT WORK IN AN AFFECTED AREA UNTIL THE DISCREPANCY HAS BEEN RESOLVED.
3. VERIFY CODES IN EFFECT AT THE TIME OF THE NOTICE TO PROCEED AND STAY CURRENT WITH CODE CHANGES WHICH AFFECT THE WORK UNTIL SUBSTANTIAL COMPLETION.

SITE SUMMARY

SITE AREA = 1.07 ACRES
DISTURBED AREA = 0.37 ACRES
EXISTING IMPERVIOUS AREA = 0.68 ACRES
POST CONSTRUCTION IMPERVIOUS AREA = 0.82 ACRES (86.6%)

SITE NOTES

1. – All dimensions between curbing and to radius points are to face of curb.
2. – All dimensions abutting curbs are to back of curb.
3. – All curb and gutter on private property shall be type B-612 unless otherwise noted.
4. – All parking stall striping width is 9.00' unless otherwise noted.

PARKING STALLS PROVIDED

STANDARD STALLS	ACCESSIBLE STALLS	TOTAL
43	2	45

LEGEND

- BOUNDARY/ROW/BLOCK LINE
- EASEMENT
- BUILDING/PARKING SETBACK LINE
- PROPOSED CONCRETE
- PROPOSED BITUMINOUS

N

0 10 20 40 60
Scale in Feet

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PROJECT NO.: 251-1989.052
DRAWING FILE: 1989052.DWG

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ROGERS, MN 55374

project #: 025001.00
date: 04/10/2025
drawn by: BJQ
checked by: NPA

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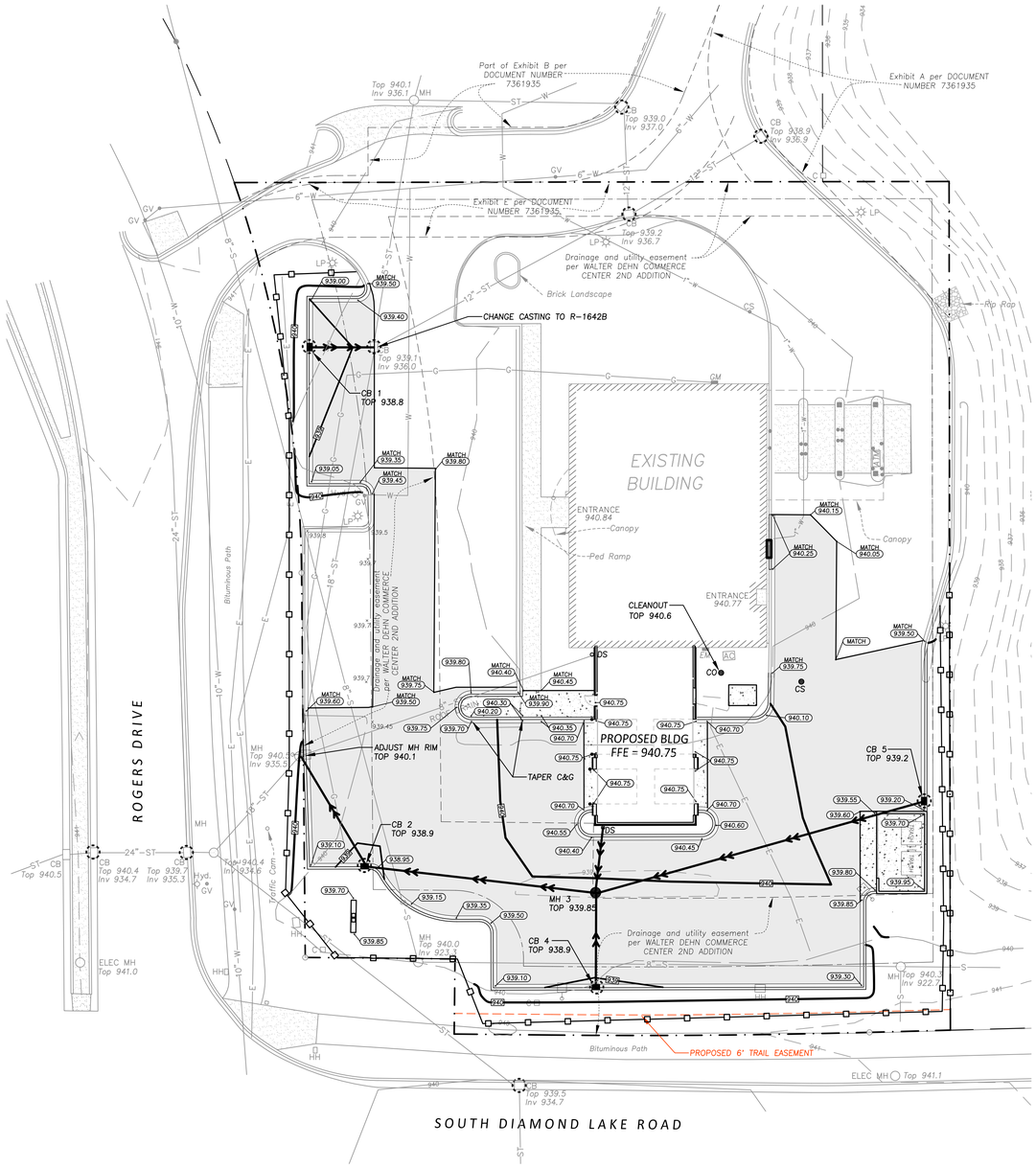
printed name: NICHOLAS P. ADAM
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION 04/10/2025

revision / issue	no.	date

sheet title: SITE DIMENSION PLAN
sheet number: C2.0



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3. VERIFY CODES IN EFFECT AT THE TIME OF THE NOTICE TO PROCEED AND STAY CURRENT WITH CODE CHANGES WHICH AFFECT THE WORK UNTIL SUBSTANTIAL COMPLETION.

GRADING NOTES

1 – All elevations shown are to final surfaces.
2 – Contractor is responsible for obtaining a National Pollutant Discharge Elimination System (NPDES) General Storm Water Permit for Construction Activity before construction begins.

EROSION CONTROL NOTES

1 – Contractor is responsible for all notifications and inspections required by General Storm Water Permit.
2 – All erosion control measures shown shall be installed prior to grading operations and maintained until all areas disturbed have been restored.
3 – Sweep paved public streets as necessary where construction sediment has been deposited.
4 – Each area disturbed by construction shall be restored per the specifications within 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.
5 – Temporary soil stockpiles must have silt fence around them and cannot be placed in surface waters, including storm water conveyances such as curb and gutter systems, or conduits and ditches.
6 – All pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours of connection to a surface water.
7 – Excess concrete/water from concrete trucks shall be disposed of in portable washout concrete basin or disposed of in a contained area.
8 – Erosion control measures must be installed at the initial stage of site grading operations.
9 – Upon completion of construction and restoration of disturbed areas, the contractor is responsible for the removal of all erosion control measures installed throughout the construction site.

LEGEND

- PROPOSED MANHOLE
- PROPOSED CLEAN OUT
- PROPOSED CORP. STOP
- PROPOSED CATCH BASIN
- PROPOSED STORM SEWER
- PROPOSED CONCRETE
- PROPOSED BITUMINOUS
- PROPOSED CONTOUR
- PROPOSED ELEVATION
- SILT FENCE
- INLET PROTECTION DEVICE
- BOUNDARY/ROW/BLOCK LINE
- EASEMENT
- DRAINAGE ARROW
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING BURIED GAS LINE
- EXISTING BURIED ELECTRIC LINE
- EXISTING CONTOUR
- EXISTING ELEVATION

N

0 10 20 40 60
Scale in Feet

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printed name: NICHOLAS P. ADAM
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION
04/10/2025

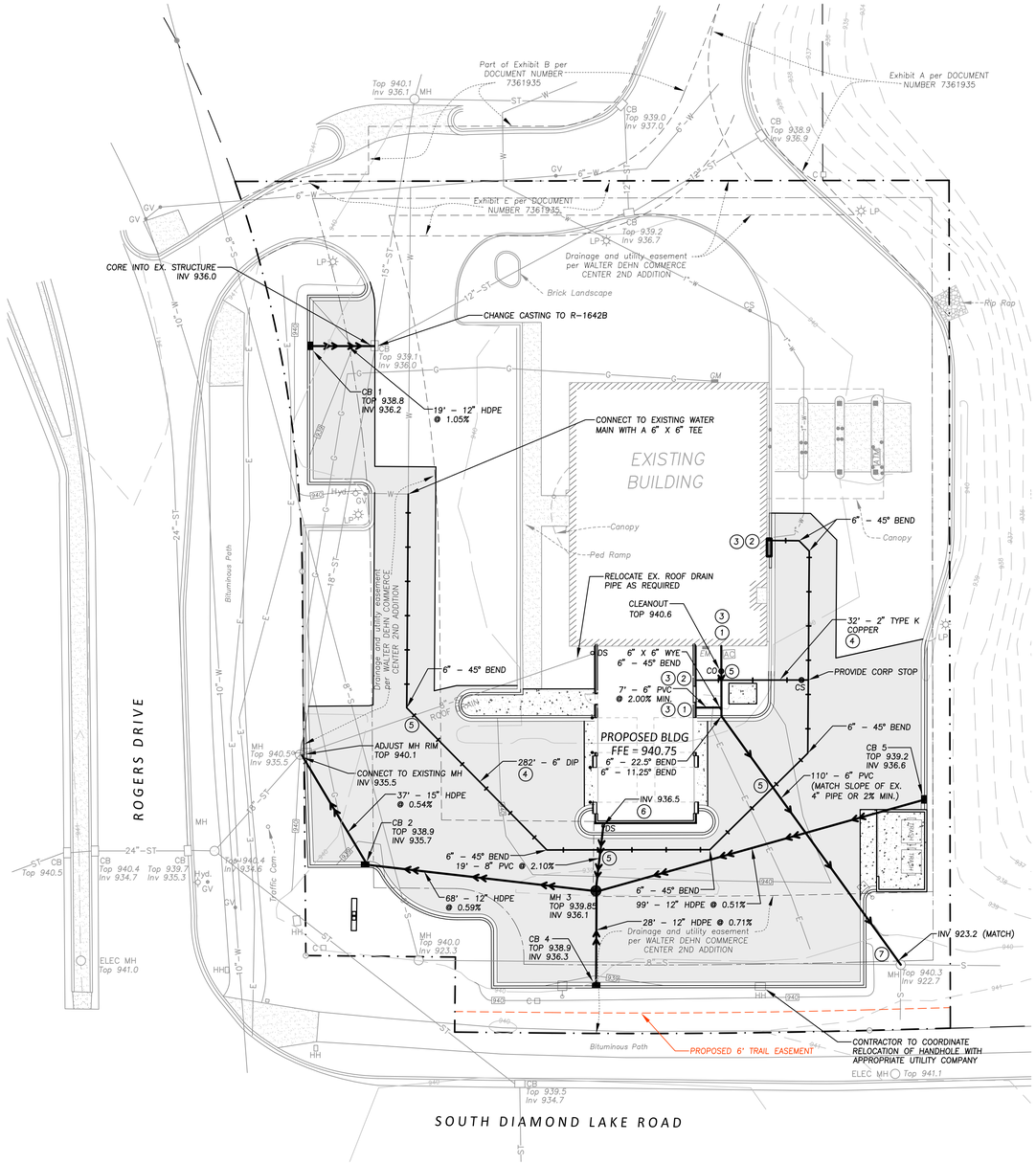
revision / issue	no.	date

GRADING, DRAINAGE & EROSION CONTROL PLAN

sheet title

sheet number

C3.0



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UTILITY NOTES

(1) – All sewer services to extend to a point 5' from proposed building.
(2) – Bring water main into proposed building and cap at the floor.
(3) – Verify all service locations and inverts with mechanical engineer before construction.
(4) – All watermain to have a minimum of 7.5' of cover.
(5) – Maintain a minimum of 18" vertical separation between watermain and sewer.
(6) – Downspout connection per detail 11/C5.
(7) – Salvage casting and replace rings per City Detail San–14.

NOTE: SEE SITE DEMOLITION PLAN FOR THE REMOVAL OF EXISTING STORM AND SANITARY SEWER PIPE.

CATCH BASIN/MANHOLE SCHEDULE

STRUCTURE NO.	BARREL SIZE	NEENAH CASTING NO.
CB 1	24" X 36"	R–3067V
CB 2	48"	R–3067V
MH 3	48"	R–1642B
CB 4	24" X 36"	R–3067V
CB 5	24" X 36"	R–3067V

LEGEND

- PROPOSED MANHOLE
- PROPOSED CLEAN OUT
- PROPOSED CORP. STOP
- PROPOSED CATCH BASIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED CONCRETE
- PROPOSED STD. DUTY BITUMINOUS
- BOUNDARY/ROW/BLOCK LINE
- EASEMENT
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING BURIED GAS LINE
- EXISTING BURIED ELECTRIC LINE

N

0 10 20 40 60
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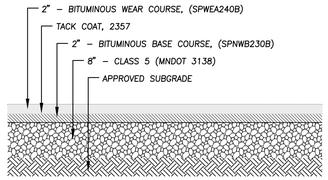
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION 04/10/2025

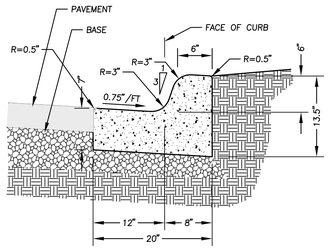
revision / issue	no.	date

sheet title: UTILITY PLAN
sheet number: C4.0



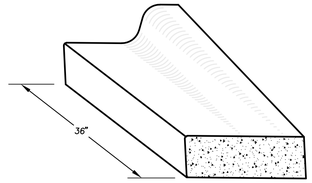
NOTE: VERIFY ADEQUACY OF PAVEMENT SECTION WITH ENGINEER AFTER SUBGRADE SOILS ARE EXPOSED AND BEFORE BITUMINOUS PAVEMENT IS PLACED

1 C5 STANDARD DUTY PAVEMENT SECTION
NO SCALE



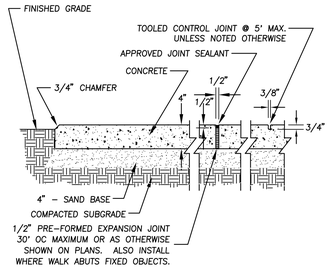
Note: Where contours indicate, ignore 0.75"/ft slope indicated above and match adjoining pavement slope to prevent gutter from "ponding".

2 C5 B612 CONCRETE CURB & GUTTER
NO SCALE

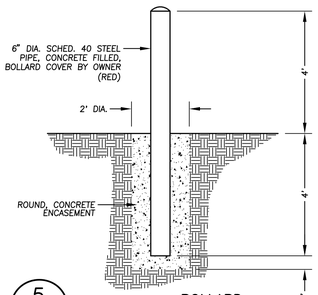


Note: Curb type B612 shown; similar for other curb types.

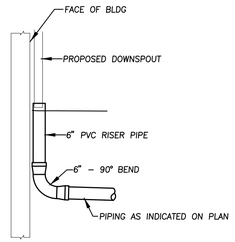
3 C5 CURB & GUTTER BEAVERTAIL
NO SCALE



4 C5 CONCRETE SIDEWALK
NO SCALE



5 C5 BOLLARD
NO SCALE



6 C5 CONNECTION AT DOWNSPOUT
NO SCALE

SPECIFICATIONS

GENERAL

I. GENERAL

A. Before construction begins, the Contractor will contact all utility companies, both public and private and have them locate all utilities within the construction limits.
B. The Contractor shall be responsible for arranging all required inspections with the governing authority that has jurisdiction over the work that is to be performed.
C. The Contractor shall stay within the construction limits unless approved otherwise by the Owner and or Engineer. Construction limits are defined by the property boundary unless shown different on the plan.
D. The Contractor shall be responsible for protecting all existing structures, utilities, trees, etc. from damage during construction.
E. The Contractor shall be responsible for correcting any damage (at Contractor's expense).
F. Any discrepancies found on the site that affect the proposed work shall be reported to the Owner and/or Engineer before the completion of any additional work.
G. Existing Topography and Boundary Survey provided by Rehder & Associates, Inc.

SITE CLEARING

H. GENERAL

A. Remove trees, shrubs, grass, and other vegetation or obstructions, as required, to permit installation of improvements shown on the Plans.

II. EXECUTION

A. Trees and stumps shall be hauled from the site. Burial on-site or burning of trees and stumps will not be allowed.
B. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
C. Topsoil shall be stripped from disturbed areas and stockpiled in piles not exceeding 8-feet in depth.
D. Remove all back dirt and unsuitable material from under drives and roadways within 3-feet of final pavement subgrade.
E. Remove all waste materials and unsuitable or excess topsoil from Owner's property.

GRADING, EROSION CONTROL, AND TURF ESTABLISHMENT

I. GENERAL

A. All grading, erosion control and turf establishment shall be according to the materials, workmanship, and other applicable requirements of the Minnesota Department of Transportation "Standard Specifications for Construction", latest edition, unless otherwise specified.
B. All erosion control measures shown on the plans must be installed prior to commencement of grading operations and maintained until all areas altered on the site have been restored.
C. All areas disturbed by construction shall be restored with seed and disked mulch, sod, wood fiber blanket, or be hard surfaced within two weeks of substantial completion of construction.
D. Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations. Remove all excess and unsatisfactory material from the site.
E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
F. Compaction shall not be less than the following percentages of maximum dry density according to ASTM D 698:
   i. Under structures, building slabs, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 100 percent maximum dry density.
   ii. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 100 percent maximum dry density.
   iii. Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
G. Grades as shown on the plan are to finished grade.
H. Backfill trenches involving utilities under building slabs to be designed by Others (per their requirements).

II. PRODUCTS

A. Satisfactory soils include ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2-inches in any dimension, debris waste, frozen materials, vegetation and other deleterious matter.
B. Unsatisfactory soils include ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
C. All backfill and fill materials must be satisfactory soil materials.
D. Topsoil shall be per ASTM D 5268, free of stones 1" or larger.
E. Subbase and base material must be a naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand meeting MNDOT Specifications for Class 5 gravel.
F. Spring/Summer temporary turf establishment: seed shall be MNDOT Mixture 110 @ 100 lbs/acre and mulch shall be MNDOT Type 1.
G. Winter temporary turf establishment: seed shall be MNDOT Mixture 100 @ 100 lbs/acre and mulch shall be MNDOT Type 1.
H. See Landscape Plan and Specifications for permanent establishment.

III.EXECUTION

A. Fill under buildings shall be compacted to meet Soil Engineer's recommendations.
B. Place 6-inches of topsoil over all areas to be re-established with turf.
C. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
D. Place inlet protection devices in catch basins and maintain until all areas disturbed have been restored.
E. Wherever construction vehicle access routes intersect paved public roads, provisions must be made to minimize the transport of sediment (mud) by runoff or vehicles tracking onto the paved road surface. Where sediment is transported onto a public road surface, the roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed by shoveling or sweeping and be transported to a sediment controlled disposal area. Street washing shall be allowed only after sediment is removed in this manner.

BITUMINOUS PAVEMENT

I. GENERAL

A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the Minnesota Department of Transportation "Standard Specifications for Construction", latest edition, unless otherwise specified
B. Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.

II. PRODUCTS

A. Use coarse and fine aggregate materials and gradations that have performed satisfactorily in previous installations.
B. Provide a base and wear course as indicated on the plan unless otherwise specified.
C. Provide a tack coat as indicated on the plan unless otherwise specified.

III.EXECUTION

A. Verify that the subgrade is dry and in suitable condition to support paving and imposed loads.
B. The Contractor shall furnish a tandem truck loaded with a minimum of 14-tons to check the completed subgrade and/or aggregate base for soft spots prior to placement.
C. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness, when compacted.
D. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement.
E. Provide an average density of 96 percent of reference laboratory density according to ASTM D 1559, but not less than 94 percent nor greater than 100 percent
F. Tolerances: Base course thickness shall be plus or minus 0.5-inches and surface course shall be plus or minus 0.25-inches.

PORTLAND CEMENT CONCRETE PAVEMENT

I. GENERAL

A. Provide Portland cement concrete pavement for roads, curbs, walks and exterior slabs according to the materials, workmanship, and other applicable requirements of the Minnesota Department of Transportation "Standard Specifications for Construction", latest edition, unless otherwise specified.

II. PRODUCTS

A. Portland cement concrete for curb and gutter and sidewalk shall be 4000 psi, 28-day compressive strength, 5.0% air entrainment, and 3-inch slump.
B. Provide Grade-60 reinforcing bars and tie bars where indicated.
C. Curing compound shall be solvent-borne, liquid membrane-forming ASTM C309, Type I or approved equal.

III. EXECUTION

A. The Contractor shall furnish a tandem truck loaded with a minimum of 14-tons to check the completed subgrade and/or aggregate base for soft spots prior to pavement placement.
B. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
C. Comply with the Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.
D. Preformed expansion joints using 0.5-inch thickness shall be placed at each end of curb radius, at intersections, and approximately every 200-feet.
E. Contraction joints shall be placed at minimum 10-foot intervals in the curb and gutter and at 5-foot for walks.
F. Provide a medium to fine broom finish perpendicular to traffic flow.
G. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures using moisture curing, moisture-retaining-cover curing, curing compound or a combination of these.

STORM SEWER

I. GENERAL

A. Storm sewer shall comply with all local regulations pertaining to storm sewer systems including materials, installation, and testing. If no regulations exist, comply with "Standard Utilities Specifications" by the City Engineers Association of Minnesota, latest edition.

II. PRODUCTS

A. Storm sewer indicated on the plan as HDPE shall be dual wall corrugated polyethylene pipe with soil tight fittings per the Corrugated Polyethylene Pipe Association (CPPA) standard specification 100-97.
B. Storm sewer catch basins and manholes shall be precast structures with at least two and at the most five adjusting rings.
C. Storm sewer castings indicated on the plan shall be from the Neenah Foundry or approved equal.

III.EXECUTION

A. The plans indicate the general location and arrangement of underground storm sewer systems. Location and arrangement of piping take into account many design considerations. Install piping as indicated on the plans, to the extent practical.
B. Contractor should verify locations of utility connections at the building the architectural and mechanical plans.
C. HDPE sewer pipe shall be bedded in accordance with ASTM F 2306, "Standard Specification for 12 to 60 in. Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications".

SANITARY SEWER

I. GENERAL

A. Sanitary sewer shall comply with all local regulations pertaining to sanitary sewer systems including materials, installation, and testing. If no regulations exist, comply with "Standard Utilities Specifications" by the City Engineers Association of Minnesota, latest edition.

II. PRODUCTS

A. Sanitary sewer pipe indicated on the plan as PVC shall be polyvinyl chloride pipe, ASTM D 3034, SDR 35, for solvent-cemented or gasket joints.

III.EXECUTION

A. The plans indicate the general location and arrangement of underground sanitary sewer systems. Location and arrangement of piping take into account many design considerations. Install piping as indicated on the plans, to the extent practical.
B. Contractor should verify locations of utility connections at the building the architectural and mechanical plans.
C. PVC sewer pipe shall be bedded in accordance with ASTM D 2321, "Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe".
D. Sanitary sewer services shall be extended to within 5-feet of the building. Plug ends and mark by installing a 2" x 2" wood board from the plugged end to 4 feet out of the ground.

WATER MAIN

I. GENERAL

A. Water main shall comply with all local regulations pertaining to water main systems including materials, installation, and testing. If no local regulations exist, comply with "Standard Utilities Specifications" by the City Engineers Association of Minnesota, latest edition.

II. PRODUCTS

A. Water main, indicated on the plan as DIP, shall be ductile iron pipe, Class 52, with push on joints and shall provide electrical conductivity across each joint.
B. All fittings shall be mechanical joint fittings.
C. Water service pipe, indicated on the plans as copper, shall be ASTM B 88, Type K copper tube, with copper fittings and soldered joints.
D. Valves shall meet all local and municipality requirements.

III.EXECUTION

A. The plans indicate the general location and arrangement of underground water main systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, to the extent practical.
B. Bury all water main with a depth of cover of at least 7.5-feet or with the top at least 12-inches below frost penetration, which ever is greater.
C. All bends, stubs, and hydrants shall be rodded to the water main using 0.75-inch tie rods.
D. Tap water main with size and in location as indicated according to the requirements of the local water utility. The Contractor shall pay water utility fee.
E. Test all installed piping as required by the local water utility.

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PROJECT NO.: 251-1989.052
DRAWING FILE: 1989052.DWG

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TAKE 5 OIL-ROGERS

13510 ROGERS DRIVE
ROGERS, MN 55374

project #: 025001.00
date: 04/10/2025
drawn by: BJQ
checked by: NPA

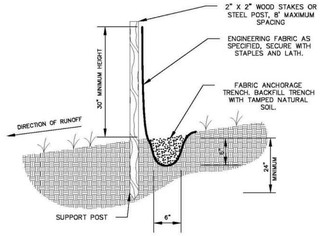
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

printed name: NICHOLAS P. ADAM
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION
04/10/2025

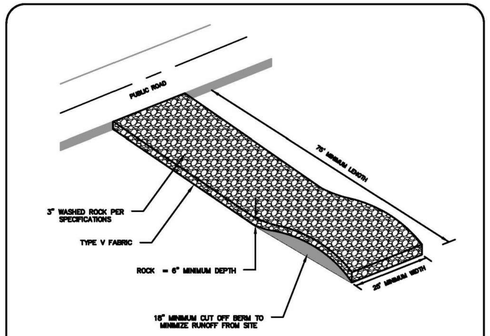
revision / issue	no.	date

sheet title: DETAILS
sheet number: C5.0



DOUBLE SILT FENCE TO BE REQUIRED NEAR WETLANDS

		Standard Details	
CITY OF ROGERS	STANDARD SILT FENCE	Date: SEPTEMBER, 2020	EROS–1
		Revised:	



NOTE:
TYPE V FILTER FABRIC SHALL BE PLACED UNDER ROCK TO STOP MUD MIGRATION THROUGH MATERIAL.

THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHT–OF–WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.

WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT–OF–WAY.

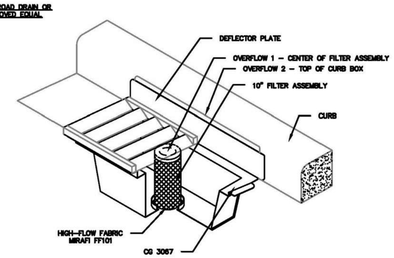
WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

WHERE RUNOFF CONTAINING SEDIMENT LADEN WATER IS LEAVING THE SITE VIA THE CONSTRUCTION ENTRANCE, OTHER MEASURES SHALL BE IMPLEMENTED TO DIVERT RUNOFF THROUGH AN APPROVED FILTERING SYSTEM

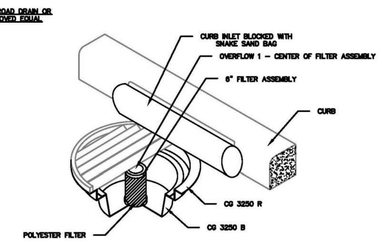
IN AREAS WITH CONCRETE WALK THERE SHALL BE 6" OF SAND PLACED OVERTOP THE SIDEWALK PRIOR TO PLACEMENT OF THE 3" WASHED ROCK.

		Standard Details	
CITY OF ROGERS	CONSTRUCTION ROCK ENTRANCE	Date: SEPTEMBER, 2020	EROS–10
		Revised:	

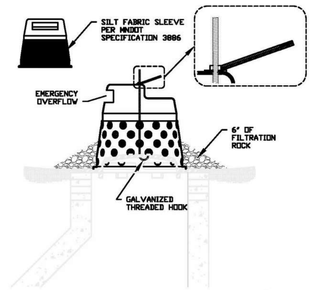
WINCO ROAD DRAIN OR APPROVED EQUAL

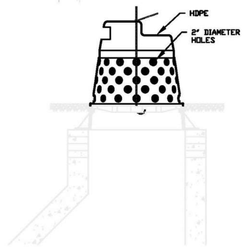


WINCO ROAD DRAIN OR APPROVED EQUAL



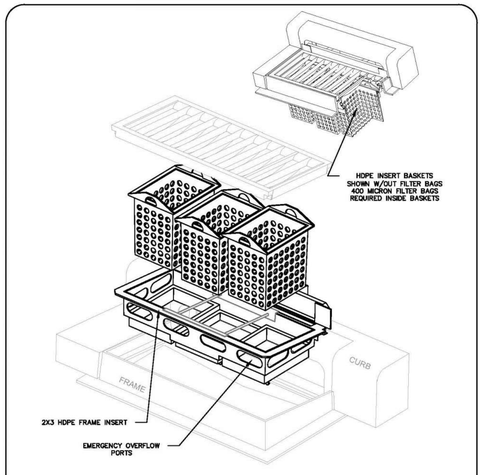
		Standard Details	
CITY OF ROGERS	CURB INLET PROTECTION	Date: SEPTEMBER, 2020	EROS–15
		Revised:	





NOTE:
DEVICES TO BE INSTALLED IMMEDIATELY UPON INSTALLATION OF CONCRETE STRUCTURE CONE OR TOP SLAB. CASTING ASSEMBLY MUST ALSO BE AT LEAST TEMPORARILY IN PLACE.

		Standard Details	
CITY OF ROGERS	INFRASAFE – SEDIMENT CONTROL BARRIER	Date: SEPTEMBER, 2020	EROS–16
		Revised:	



MANUFACTURED BY ROYAL ENVIRONMENTAL SYSTEMS

		Standard Details	
CITY OF ROGERS	INFRASAFE – 2'X3' DEBRIS COLLECTION DEVICE	Date: SEPTEMBER, 2020	EROS–17
		Revised:	

VALVE REQUIRED EVERY 600' ON LATERALS
VALVE REQUIRED EVERY 1000' ON TRUNKS
VALVE REQUIRED ON EVERY SERVICE

BITUMASTIC ANTI–CORROSIVE COATING REQUIRED ON ALL BARE METALS (AEROSOL SPRAY IS NOT ACCEPTABLE)

ALL MECHANICAL JOINT BOLTS SHALL BE COR–BLUE

7.5' MINIMUM COVER REQUIRED OVER TOP OF WATER MAIN

"MEGALUG" JOINT RESTRAINTS OR ACCEPTED EQUAL REQUIRED FROM VALVE TO TEE

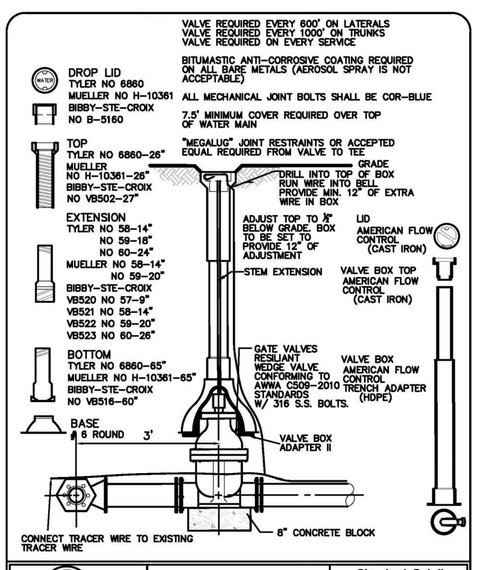
DROP LID
TYLER NO 6860
MUELLER NO H–10361
BIBBY–STE–CROIX NO B–5160

TOP
TYLER NO 6860–26"
MUELLER NO H–10361–26"
BIBBY–STE–CROIX NO VB502–27"

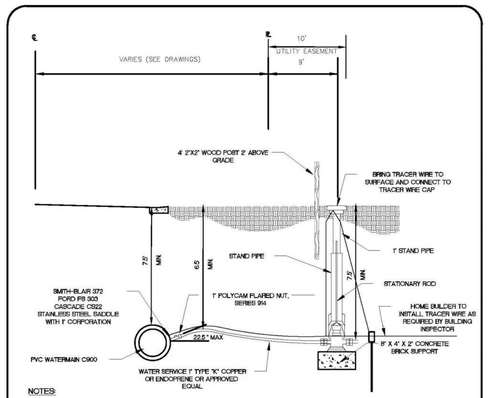
EXTENSION
TYLER NO 58–14"
NO 59–18"
NO 60–24"
MUELLER NO 58–14"
NO 59–20"
BIBBY–STE–CROIX VB520 NO 57–9"
VB521 NO 58–14"
VB522 NO 59–20"
VB523 NO 60–26"

BOTTOM
TYLER NO 6860–65"
MUELLER NO H–10361–65"
BIBBY–STE–CROIX NO VB516–60"

BASE
6 ROUND 3'



		Standard Details	
CITY OF ROGERS	GATE VALVE AND BOX INSTALLATION	Date: SEPTEMBER, 2020	WAT–01
		Revised:	



NOTES:

ANY CURB STOP LOCATED IN BLACKTOP OR CONCRETE DRIVEWAY OR SIDEWALK SHALL BE COVERED WITH A 10" O.V. BOX TOP SECTION OR MOVED OUT OF THE DRIVEWAY IF POSSIBLE.

SERVICE PIPE SHALL BE TYPE "K" COPPER OR "ENDOPURE" HDPE (BY ENDOT) WITH MAC–PAK FITTINGS (BY AY MCDONALD). CORPORATION STOP SHALL BE PLACED AS CLOSE AS POSSIBLE TO THE CURB STOP.

SNAKE BITE TRACER WIRE CONNECTORS OR APPROVED EQUAL SHALL BE USED TO SPLICE TRACER WIRE. CORPORATION SHALL BE A FORD 3/4"–F19500, AY MCDONALD 4709 B, MUELLER B–25000 OR OWNER APPROVED ALTERNATE.

CURB STOP AND BOX SHALL BE F FORD B22–444–W WITH FORD EM2–75–57, AY MCDONALD 6104–1 WITH AY MCDONALD 56144, MUELLER B–25154 WITH MUELLER H–10300 OR OWNER APPROVED EQUIVALENT.

STIFFENERS REQUIRED ON ALL FLEXIBLE PLASTIC CONNECTIONS.

WATER SERVICE MUST BE CONTINUOUS WITH NO JOINTS.

SANITARY AND WATER SERVICE LINES SHALL BE INSTALLED IN THE SAME TRENCH WITH 3 FEET OF SEPARATION. WATER SERVICE ON UPSTREAM SIDE OF SANITARY SERVICE.

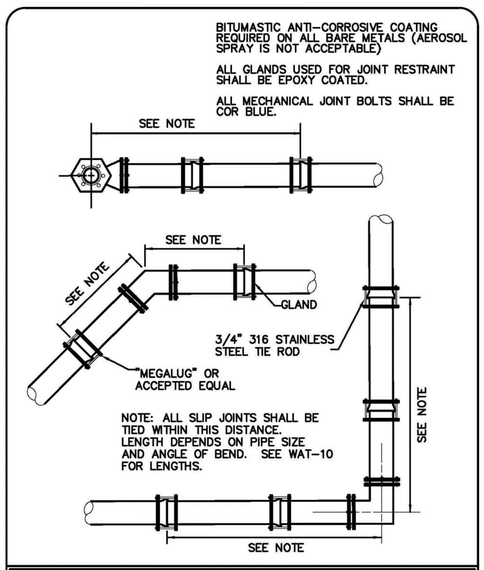
CURB BOXES INSTALLED IN AREAS WHERE THE BOULEVARD IS TO BE CUT AT A LATER DATE, TOP OF CURB BOX SHALL BE SAME ELEVATION AS TOP OF CURB.

		Standard Details	
CITY OF ROGERS	1" WATER SERVICE WITH PVC WATERMAIN	Date: JUNE, 2021	WAT–05
		Revised: OCTOBER, 2021	

BITUMASTIC ANTI–CORROSIVE COATING REQUIRED ON ALL BARE METALS (AEROSOL SPRAY IS NOT ACCEPTABLE)

ALL GLANDS USED FOR JOINT RESTRAINT SHALL BE EPOXY COATED.

ALL MECHANICAL JOINT BOLTS SHALL BE COR BLUE.



NOTE: ALL SLIP JOINTS SHALL BE TIED WITHIN THIS DISTANCE. LENGTH DEPENDS ON PIPE SIZE AND ANGLE OF BEND. SEE WAT–10 FOR LENGTHS.

		Standard Details	
CITY OF ROGERS	WATERMAIN TYING DETAIL	Date: SEPTEMBER, 2020	WAT–09
		Revised:	

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PROJECT NO.: 251–1989.052
DRAWING FILE: 1989052.DWG

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TAKE 5 OIL-ROGERS

13510 ROGERS DRIVE
ROGERS, MN 55374

project #: 025001.00
date: 04/10/2025
drawn by: BJQ
checked by: NPA

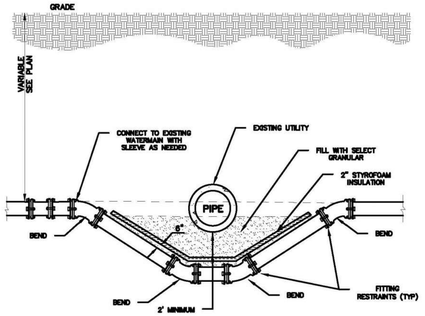
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

printed name: NICHOLAS P. ADAM
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION
04/10/2025

revision / issue	no.	date

sheet title: CITY DETAILS
sheet number: C5.1



NOTES:

PREFERRED METHOD OF OFFSET WATERMAIN IS OVER DEPTH EXCAVATION.

PLACE 6" COMPACTED SAND BELOW INSULATION

SEE STANDARD PLATE WAT-9 & WAT-10 TO DETERMINE THE REQUIRED RESTRAINT REQUIREMENTS ALL NUTS AND BOLTS TO BE 316 STAINLESS STEEL

MAINTAIN A 2.0' MINIMUM CLEAR ZONE SEPARATION BETWEEN CONFLICTING UTILITIES

ON NEW WATERMAIN DIVE WATERMAIN UNDER CONFLICTING PIPE

CITY OF ROGERS	OFFSET WATERMAIN	Standard Details	
		Date: SEPTEMBER, 2020	WAT-07
		Revised:	

TRACER WIRE

TRACER WIRE SHALL BE COPPERHEAD #12 AWG CCS COMPLYING WITH ASTM-D-1248, 30 VOLT RATING,GREEN FOR SEWER SERVICES AND FORCEMAIN AND BLUE FOR WATER MAIN

- #1230HS HIGH STRENGTH FOR OPEN CUT
- #1245EHS EXTRA HIGH STRENGTH FOR HORIZONTAL DIRECTIONAL DRILLING AND JACK/BORING
- SPLICING 2 WIRES, DRYCONN KING & BLUE
- SPLICING 3 OR MORE, DRYCONN DIRECT BURY LUG YELLOW
- WIRE SPLICING WILL BE ALLOWED WHEN APPROVED ONLY

ALL NEW TRACER WIRE INSTALLATIONS SHALL BE LOCATED USING TYPICAL LOW FREQUENCY (512 HZ) LINE TRACING EQUIPMENT, WITNESSED BY THE CONTRACTOR, ENGINEER AND FACILITY OWNER AS APPLICABLE, PRIOR TO ACCEPTANCE OF OWNERSHIP.

POLYVINYL CHLORIDE PIPE (PVC) – C900

PVC WATER DISTRIBUTION PIPE AND JOINTS SHALL CONFORM TO:
AWWA C-900 (DR)
ASTM D3139

NOTE: TRACER WIRE ACCESSES SHALL NOT EXCEED 500-FT

DUCTILE IRON PIPE

DIP WATER DISTRIBUTION PIPE SHALL BE PRESSURE CLASS 350 AWWA C150/151.

PLASTIC FILM WRAP FOR DIP

WATER DISTRIBUTION PIPE, RISER PIPE, AND HYDRANT BARRELS SHALL BE WRAPPED IN PLASTIC FILM. THE WRAP SHALL BE "TUBE" TYPE HAVING 8-MIL THICKNESS. A 2 INCH WIDE POLYETHYLENE ADHESIVE TAPE SHALL BE USED TO SECURE THE TUBE OF FILM TO THE PIPE.

DUCTILE IRON FITTINGS

WATER MAIN FITTINGS SHALL CONFORM TO ANSI A21.53, A21.11 & A21.4. FITTINGS SHALL BE COATED WITH 6 – 8 MM MINIMUM THICKNESS FUSION BONDED EPOXY CONFORMING TO ANSI/AWWA C550 AND C116/A21.16.

THRUST RESTRAINT

ALL WATER MAIN, VALVES, SERVICES, FITTINGS, STUBS, EXTENSIONS, BLIND FLANGES, AND PLUGS USED FOR RETAINING WATER PRESSURE MUST BE TIED WITH "MEGALUG" JOINT RESTRAINTS OR ACCEPTED EQUAL BASED UPON A 150 PSI TEST PRESSURE AND 7.5' COVER. THE FOLLOWING SHOWS THE MINIMUM LENGTH OF PIPE EACH WAY OF A FITTING TO BE RESTRAINED. JOINT RESTRAINTS TO BE EPOXY COATED AS REQUIRED ON WATER MAIN FITTINGS.

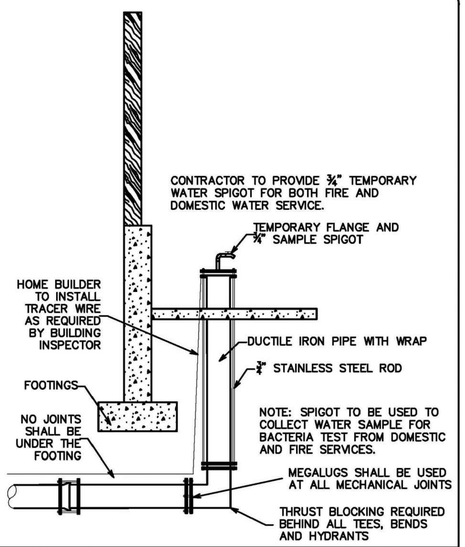
PIPE DIAMETER	DEAD END OR TEE BRANCH 90°BEND	45°BEND	22-1/2°BEND
4" (SERVICE)	22 LF	5 LF	2 LF
6"	23 LF	7 LF	3 LF
8"	30 LF	10 LF	5 LF
10"	38 LF	12 LF	5 LF
12"	50 LF	16 LF	5 LF

ALL TEES WITH A VALVE IMMEDIATELY AFTER A TEE BRANCH SHOULD BE TREATED AS A 90 DEGREE BEND.

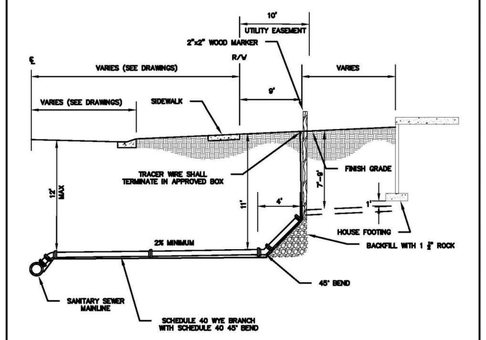
WHERE RESTRAINED JOINTS ARE REQUIRED AND THE PIPE IS IN A CASING NEAR THE FITTING TO BE RESTRAINED, THE LENGTH OF PIPE IN THE CASING SHALL NOT BE INCLUDED IN THE LENGTH OF PIPE NECESSARY TO DEVELOP SUFFICIENT SOIL FRICTION TO OVERCOME THRUST.

ALL BARE METALS SHALL HAVE TWO COATS OF BITUMASTIC OR ACCEPTED EQUAL (AEROSOL SPRAY IS NOT ACCEPTABLE) ALL MECHANICAL JOINT BOLTS SHALL BE COR-BLUE.
ALL JOINT TIE RODS AND NUTS SHALL BE 316 STAINLESS STEEL.

CITY OF ROGERS	WATER MAIN DETAILS AND TIE SCHEDULE TABLE	Standard Details	
		Date: SEPTEMBER, 2020	WAT-10
		Revised:	



CITY OF ROGERS	COMMERCIAL WATER SERVICE TESTING DETAIL	Standard Details	
		Date: SEPTEMBER, 2020	WAT-12
		Revised: OCTOBER, 2021	



NOTES:

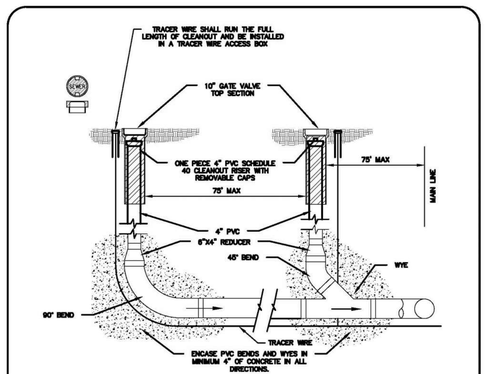
SEWER SERVICE, PVC SCHEDULE 40 4" OR 6" AS SPECIFIED

2% MINIMUM SLOPE OR 12% MAXIMUM SLOPE, ¼" PER FOOT

ALL PIPE SHALL BE BEDDED IN GRANULAR BORROW 3140 B.1 OR COURSE FILTER AGGREGATE 3149H

END OF SERVICE SHALL BE 7' TO 9' DEEP AT END OF SERVICE. THE END SHALL BE A FACTORY JOINT WITH PLUG, USING A FACTORY MANUFACTURED ADAPTOR WHERE NECESSARY AND SHALL BE WITHIN 2'VERTICALLY OF THE WATER SERVICE.

CITY OF ROGERS	SANITARY SEWER SERVICE	Standard Details	
		Date: SEPTEMBER, 2020	SAN-1
		Revised: APRIL, 2022	



END OF LINE CLEANOUT IN LINE CLEANOUT

NOTES:

10" GATE VALVE BOX TOP SECTION WITH DROP LID (SEWER) SHALL BE INSTALLED WITH ALL CLEANOUTS. 1" BELOW FINISHED GRADE.

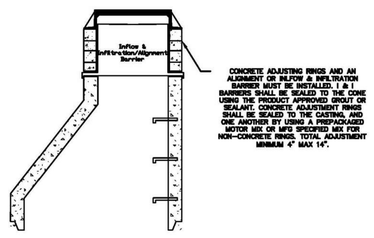
4" PVC SCHEDULE 40 CLEANOUT RISER WITH REMOVABLE CAP 4"-6" BELOW FINISH GRADE.

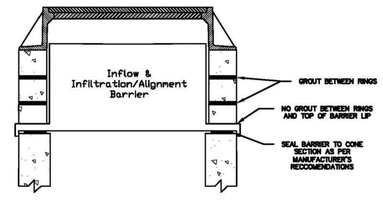
ENCLOSE LONG SWEEP BEND OR COMBINATION WYE IN 4" CONCRETE AS SHOWN

CITY OF ROGERS	SANITARY SEWER CLEANOUT	Standard Details	
		Date: SEPTEMBER, 2020	SAN-3
		Revised:	

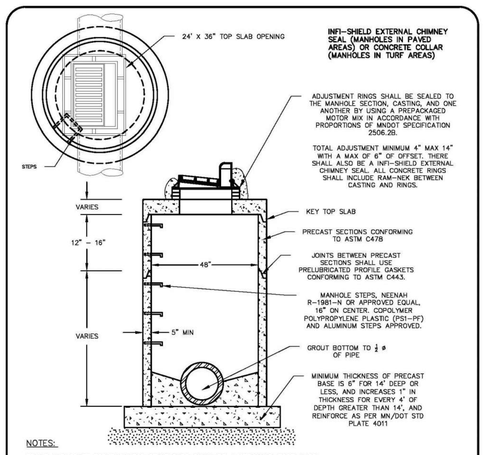
Notes

Barrier shall be Strike Products I&I Barrier, Ess Brothers Alignment Barrier or approved equivalent.





CITY OF ROGERS	PIPE TO NEW MANHOLE CONNECTION	Standard Details	
		Date: SEPTEMBER, 2020	SAN-14
		Revised:	



NOTES:

FRAME AND GRATE FOR BULKHEAD STYLE CURB SHALL BE A NEENAH R-3067-V OR NEENAH R-3067-VB

FRAME AND GRATE FOR SURMOUNTABLE STYLE CURB OR DRIVEWAYS SHALL BE A NEENAH R-3501-TR OR R-3501-TL LOW POINTS 3501-TB

FRAME AND GRATE FOR OFF ROAD LOCATION (DITCH GRATE, STOOL TYPE) R-4342

ALL MANHOLES WITH FRAME AND LID IN A PAVED AREA SHALL USE A NEENAH R-1642 WITH SOLID B LID WITH 2 CONCEALED PICK HOLES OR APPROVED EQUAL. LID SHALL BE LETTERED "STORM SEWER" WITH 2" RAISED LETTERS

DOG HOUSES SHALL BE GROUTED ON BOTH THE OUTSIDE AND INSIDE OF THE STRUCTURE

DRAINTILE OPENING MUST BE CORE-DRILLED OR PRECAST AND GROUTED INSIDE AND OUTSIDE OF THE STRUCTURE.

CITY OF ROGERS	STORM SEWER MANHOLE	Standard Details	
		Date: SEPTEMBER, 2020	STO-1
		Revised:	

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PROJECT NO.: 251-1989.052
DRAWING FILE: 1989052.DWG

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TAKE 5 OIL-ROGERS

13510 ROGERS DRIVE
ROGERS, MN 55374

project #: 025001.00
date: 04/10/2025
drawn by: BJQ
checked by: NPA

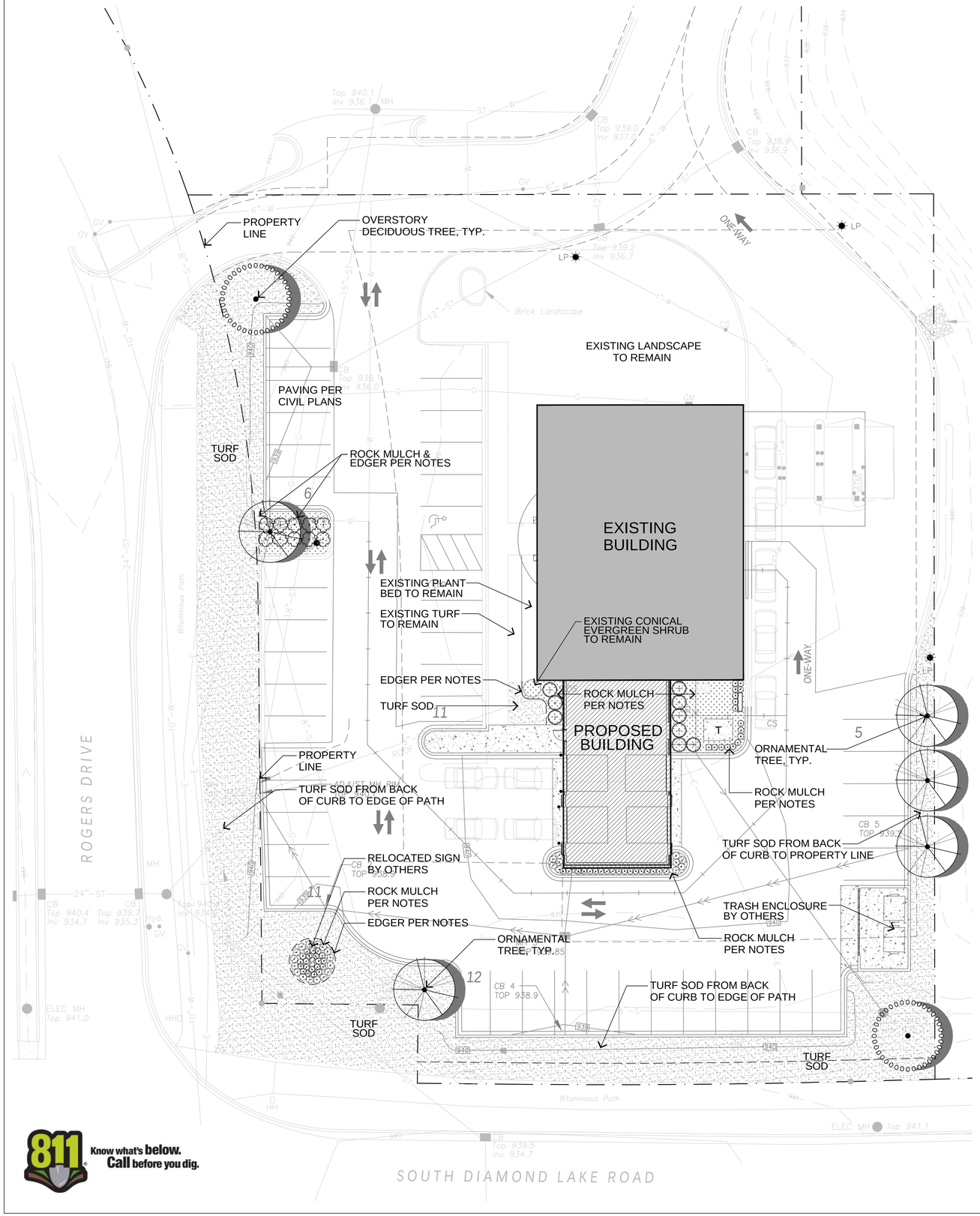
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

printed name: NICHOLAS P. ADAM
reg. #: 43856
sign date:

PRELIMINARY NOT FOR CONSTRUCTION
04/10/2025

revision / issue	no.	date

sheet title: CITY DETAILS
sheet number: C5.2



811 Know what's below. Call before you dig.

General Notes:

1. Landscape contractor to provide a new irrigation layout plan for the property. See Landscape Notes.
2. See Civil Engineer's plans for grading layout and requirements
3. Contractor to coordinate any work in the right-of-way with City of Rogers Public Works Department.
4. Sod all disturbed areas except plant beds and areas noted to receive mulch.
5. Place a minimum of 4" topsoil, with not more than 35% sand content. Topsoil inspection is required prior to installing sod and trees.
6. See Sheet L2.1 for Landscape Details, Notes, and Schedules.
7. Landscape contractor is responsible for verification of soils and graded condition prior to mobilization and shall notify the General Contractor if earthwork is not acceptable. Landscape contractor is responsible for fine grading, or grade to within 1" of final set elevation.
8. Any landscape disturbance beyond the property line shall be restored to existing conditions.

Landscape Requirements:

Minimum Plant Sizes
Overstory Shade Trees: 2.5" caliper
Ornamental Understory Trees: 1.5" caliper
Evergreen Trees: 4' - 6' Hgt.
Tall Shrubs & Hedges: 3' - 4' Hgt.
Low Shrubs: 5 gallon pot

Parking Lot Islands
(1) Tree per parking lot island

Existing Trees to be Removed: 07
- Overstory Trees: 2
- Ornamental Trees: 5

New Trees Proposed: 07
- Overstory Trees: 2
- Ornamental Trees: 5

Landscape Legend:

New Turf Sod

New Rock Mulch

PLANT SCHEDULE

SYMBOL	CODE	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	QTY	REMARKS
OVERSTORY TREE							
	GD	Gleditsia triacanthos inermis 'Draves' TM	Street Keeper Honey Locust	2.5" Cal.	B&B	2	
UNDERSTORY TREE							
	SI	Syringa reticulata `Ivory Silk`	Ivory Silk Japanese Tree Lilac	1.5" Cal.	B&B	5	
SHRUBS							
	Am	Aronia melanocarpa `Morton` TM	Iroquis Beauty Black Chokeberry	5 gal. (Min. 24" Hgt.)	Pot	9	
	Ra	Rhus aromatica 'Gro Low'	Gro Low Sumac	5 gal. (Min. 24" Hgt.)	Pot	10	
ANNUALS/PERENNIALS							
	Nr	Nepeta racemosa `Walker`s Low`	Catmint	1 gal.	Pot	26	
GRASSES							
	Ck	Calamagrostis x acutiflora `Karl Foerster`	Feather Reed Grass	1 gal.	Pot	54	

SCALE: 1" = 15'-0" NORTH

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CALYX DESIGN GROUP
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Saint Paul, MN 55104
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www.calyxdesigngroup.com

Take 5 Oil-Rogers

13510 Rogers Dr.
Rogers, MN 55374

project #: 025001.00
date: 3/05/2025
drawn by: HL
checked by: BH

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Landscape Architect under the laws of the State of Minnesota.

signature:
printed name: Benjamin Hartberg, PLA
reg. #: 48084
sign date: XX-XX-XXXX

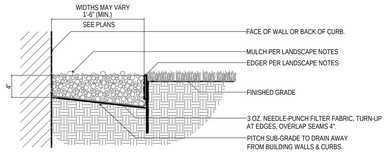
Preliminary Not For Construction

revision / issue	no.	date

sheet title: Landscape Plan
sheet number: L1.1

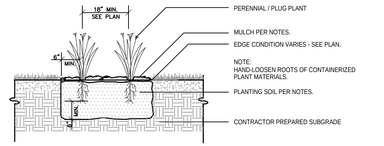
Landscape Notes & Requirements:

1. Tree saucer mulch to be four inches (4") depth natural single-shred hardwood mulch for trees outside of a plant bed. Install per tree planting detail, including PVC trunk guards.
2. Refer to civil plan sheets for grading, drainage, site dimensions, survey, proposed utilities & erosion control.
3. All plant material shall comply with the latest edition of the American Standard for Nursery Stock, American Association of Nurserymen. Unless noted otherwise, deciduous shrubs shall have at least 5 canes at the specified shrub height. Plant material shall be delivered as specified. Deciduous tree diameter is measured at breast-height (40" above final grade), in accordance with National Forestry and ANSI standards. Coniferous tree height is measured following planting installation, and is measured from final grade to the tip of the central leader. Bidders submitting pricing accept the above measurement conditions.
4. Plan takes precedence over plant schedule if discrepancies in quantities exist.
5. All proposed plants shall be located and staked as shown.
6. The project landscape contractor shall be held responsible for watering and properly handling all plant materials brought on the site both before and after installation. Schedule plant deliveries to coincide with expected installation time within 36 hours.
7. All plant materials shall be fertilized upon installation as specified.
8. The landscape contractor shall provide the owner with a watering schedule appropriate to the project site conditions and to plant material growth requirements.
9. If the landscape contractor is concerned or perceives any deficiencies in the plant selections, soil conditions, drainage or any other site condition that might negatively affect plant establishment, survival or guarantee, they must bring these deficiencies to the attention of the landscape architect & client prior to bid submission. Plant bed drainage concerns during plant installation shall be brought to the attention of the Owner and General Contractor immediately.
10. Contractor shall establish to their satisfaction that soil and compaction conditions are adequate to allow for proper drainage at and around the building site.
11. Contractor is responsible for ongoing maintenance of all newly installed material until time of owner acceptance. Any acts of vandalism or damage which may occur prior to owner acceptance shall be the responsibility of the contractor. Contractor shall provide the owner with a maintenance program including, but not limited to, pruning, fertilization and disease/pest control.
12. The contractor shall guarantee newly planted material through ONE calendar years from the date of passing the City landscape inspection. Plants that exhibit more than 20% die-back damage shall be replaced at no additional cost to the owner. The contractor shall provide PVC tree trunk guards for all deciduous trees. Landscape contractor shall provide additional deer browse fencing protection measures for the plantings during the warranty period, as needed.
13. This layout plan constitutes our understanding of the landscape requirements listed in the ordinance. Changes and modifications may be requested by the city based on applicant information, public input, council decisions, etc.
14. The landscape contractor shall be responsible for obtaining any permits and coordinating inspections as required throughout the work process.
15. Both plant species substitutions and plan changes to plant locations will require approval of the City of Rogers prior to installation. Landscape contractor is required to document approved changes.
16. Irrigation: It is unknown whether there is an existing irrigation system on site. If an existing system is present, the landscape contractor shall provide a proposal to repair and modify the existing system to cover the new landscape areas shown. If no existing system in present, the landscape contractor shall provide the Owner with a cost for a high efficiency irrigation system to provide full coverage of all landscape areas on property. Include an Irrigation Layout Plan for head-to-head coverage of all tree, turf and shrub planting areas on property. Use commercial-grade irrigation equipment and provide product cut-sheets and (4) copies of the proposed layout plan to the Owner for review and approval. Coordinate irrigation connection point, controller, back-flow, rain sensor, sleeving, and valve locations with the general contractor. All irrigation systems must include a rain sensor and utilize water efficient technology, such as a weather-smart controller, moisture sensor, etc.
17. All edger shall be black polyvinyl landscape edging to match existing, field verify. Submit sample.
18. Landscape Contractor is responsible for coordination with the General Contractor, to protect the new improvements on and off-site during landscape work activities. Report any damage to the General Contractor immediately.
19. Rock Mulch: Where noted per plan, rock mulch areas shall receive 4" depth of locally available 1" dia granite chips to match existing, field verify. Install over fabric weed mat, per detail. Submit mulch sample for Owner approval. Do not install weed mat under perennials, with the exception of ornamental grasses.
20. Ensure topsoil inspection is scheduled with the City of Rogers no less than 5 days before planting is scheduled to occur. Corrections required by the city must be made & approved by the city prior to the start of landscape work.
21. All planting, seeding, and sodded areas shall be prepared prior to installation activities with a harley power box rake or equal to provide a firm planting bed free of stones, sticks, construction debris, etc.
22. Turf installation activity shall conform to all rules and regulations as established in the MnDOT Seeding Manual, 2014 edition, for turf bed preparation, installation, maintenance, and warranty.
23. The Landscape Contractor shall furnish samples of all landscape materials for approval prior to installation.
24. The Landscape Contractor shall clear and grub the underbrush from within the work limits to remove dead branches, leaves, trash, weeds and foreign materials. Remove trees where noted on the plan, including the stump to 30" below grade.
25. The landscape contractor shall contact Gopher State One Call no less than 48 hours before digging for field utility locations.
26. The landscape contractor shall be responsible for the removal of erosion control measures once vegetation has been established to the satisfaction of the municipal staff. This includes silt curtain fencing and sediment logs placed in the landscape.
27. The landscape contractor shall be responsible for visiting the site to become familiar with the conditions prior to bidding and installation. Coordinate with the general contractors on matters such as fine grading, landscaped area conditions, staging areas, irrigation connection to building, etc.
28. See Site and Civil plans for grading, utilities, and additional information regarding the project.
29. Landscape contractor must prove the open sub-grade of all planting areas after their excavation is capable of infiltrating a minimum requirement of 1/4-inch of water per hour prior to installation of plant materials, topsoil, irrigation, weed mat, and mulch. Planting areas not capable of meeting this requirement shall have 4" diameter X 48" depth holes augured every 36" on-center and filled with MnDOT Free-Draining Coarse Filter Aggregate. Re-test sub-grade percolation for compliance to infiltration minimum requirement.



NOTES: SEE PLAN FOR CROSS SLOPE DIRECTION.
PLANT BED WIDTH VARIES, SEE PLAN.
SUBMIT MULCH, EDGER, AND FABRIC SAMPLES FOR APPROVAL.

1 L2.1 **TYP. MULCH DETAIL**
NOT TO SCALE



2 L2.1 **TYP. PERENNIAL PLANTING DETAIL**
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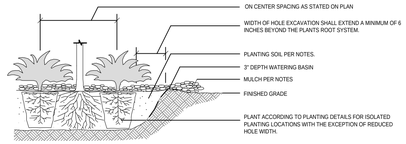
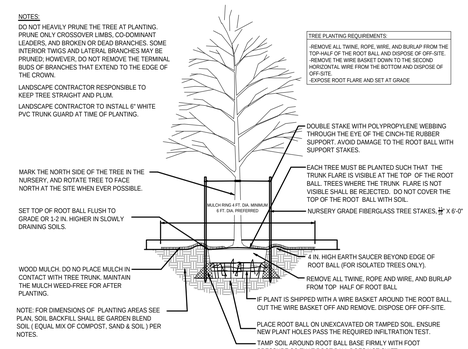


3 L2.1 **TYP. SHRUB PLANTING - SECTION**
NOT TO SCALE

NOTES:
DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.

LANDSCAPE CONTRACTOR RESPONSIBLE TO KEEP TREE STRAIGHT AND PLUM.

LANDSCAPE CONTRACTOR TO INSTALL 6" WHITE PVC TRUNK GUARD AT TIME OF PLANTING.



4 L2.1 **DECIDUOUS TREE PLANTING - SECTION**
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Take 5 Oil-Rogers

13510 Rogers Dr.
Rogers, MN 55374

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date: 3/05/2025
drawn by: HL
checked by: BH

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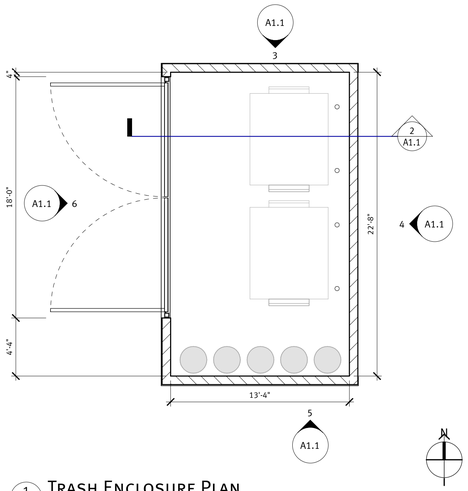
signature:
printed name: Benjamin Hartberg, PLA
reg. #: 48084
sign date: XX-XX-XXXX

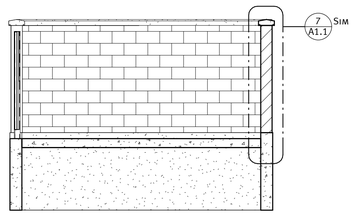
Preliminary Not For Construction

revision / issue	no.	date

sheet title: Landscape Details
sheet number: L2.1



1 A1.1 Trash Enclosure Plan
3/16" = 1'-0"



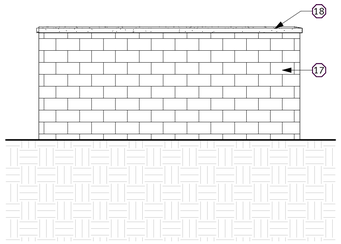
2 A1.1 Trash Enclosure Section
1/4" = 1'-0"

Trash Enclosure Notes

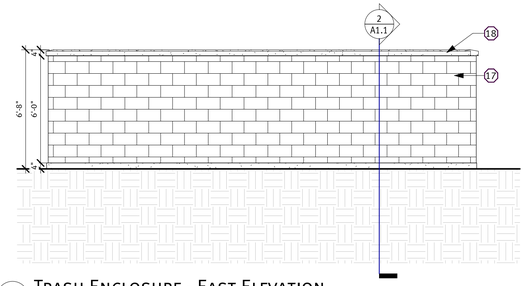
1. ALL HARDWARE AND STEEL TO BE GALVANIZED, U.N.O.
2. ALL STEEL POSTS AND GATE FRAME TO BE PRIMED AND PAINTED W/ 2 COATS EACH. COLOR TO BE DARK BRONZE - SW6076.
3. ALL STEEL MEMBERS TO BE SHOP WELDED. PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION. ALL STEEL TO BE PAINTED DARK BRONZE - SW6076.
4. ALL METAL FRAMING, POST AND HARDWARE TO BE PRIMED AND PAINTED W/ MIN. 1 COAT PRIMER, AND 2 COATS FINISH. PAINT TO BE OIL BASED AND COLOR TO BE DARK BRONZE - SW6076.
5. CMU BLOCK FLASHING TO BE BLOCKFLASH "FORMERLY BLOK-FLASH" BY MORTAR NET SOLUTIONS OR APPROVED EQUAL.
6. STAINLESS STEEL FLASHING TO BE YORK MULTI-FLASH SS OR APPROVED EQUAL.

Exterior Elevation Notes

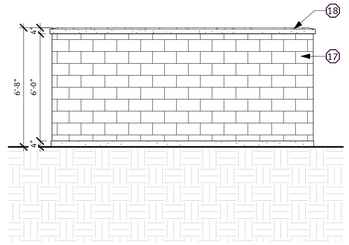
1	Fiber Cement Panel Siding	Match SW Color #7693, Stonebriar
2	Fiber Cement Panel Siding	Match SW color #7678, cottage cream
3	Brick	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
4	Prefinished mtl coping & flashing	Firestone "Matte black" Finish to be kynar 500 prefinished
5	Brick soldier course band	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
6	Concrete filled steel bollard. Bollard cover by Owner. See Civil for detail	Positive red bollard cover.
7	Stone wainscotting band	Color - Taupe. Stone to be by cultured stone or approved equal.
8	Brick wainscott	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
9	Scupper and downsprout; jog surfaces from elevation to brick	Finish to be "Black".
10	Light fixture see elec.	Firestone "Matte black" Finish to be kynar 500 prefinished
11	Overhead door - By others under separate contract	Firestone "Matte black" Finish to be kynar 500 prefinished
12	Signage - By others under separate contract	By others under separate contract
13	Fiber Cement Panel Siding	Match SW Color #6871, Positive red
14	Pre-manufactured aluminum canopy	General Awnings - Imperial Marquee Awning w/ Lattice Tubes. "Black" Finish. 72" long x 36" deep.
15	HM Man Door	Firestone "Matte black" Finish to be kynar 500 prefinished
17	Rock-face CMU	To Match Brick on Building
18	Precast Stone Cap	To Match Cultured Stone Band on Building
19	Enclosure Gate - Architectural Board Paneling	Color and Texture - TBD



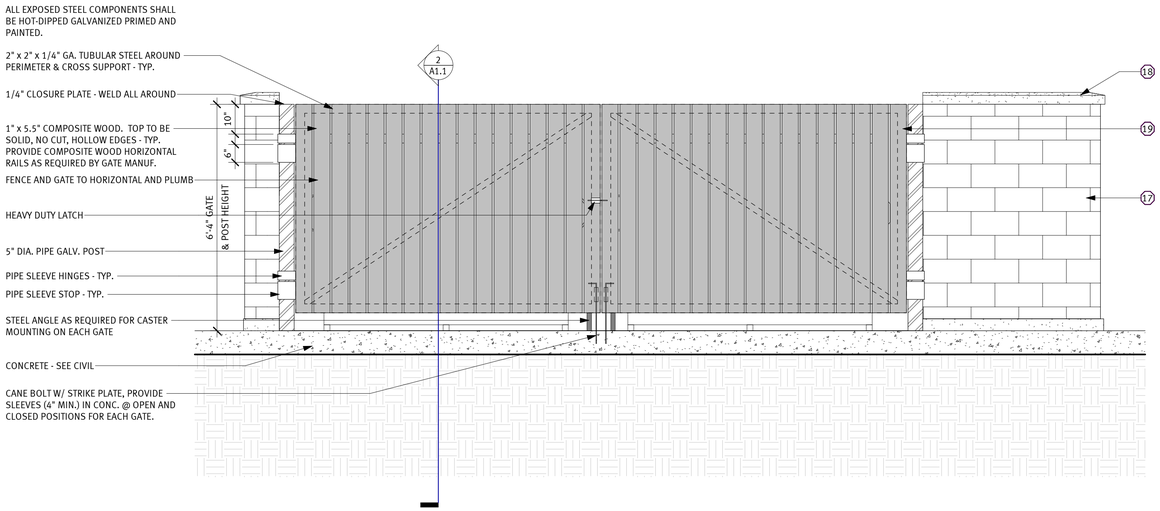
3 A1.1 Trash Enclosure - North Elevation
1/4" = 1'-0"



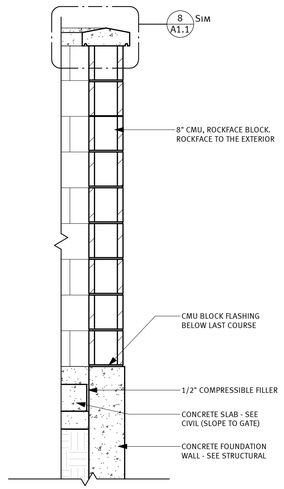
4 A1.1 Trash Enclosure - East Elevation
1/4" = 1'-0"



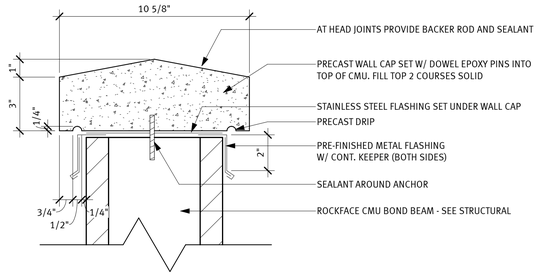
5 A1.1 Trash Enclosure - South Elevation
1/4" = 1'-0"



6 A1.1 Trash Enclosure - West Elevation
1/2" = 1'-0"



7 A1.1 Trash Enclosure Wall Section
3/4" = 1'-0"



8 A1.1 Wall Cap Detail
3" = 1'-0"

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13510 Rogers Dr.
Rogers, MN 55374

project #: 025001.00
date: 4/10/2025 9:17:59 AM
drawn by: Author
checked by: Checker

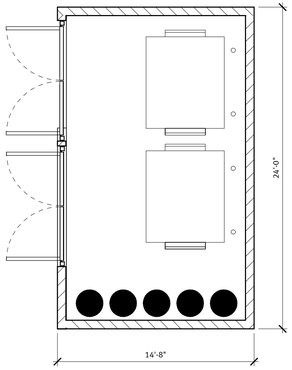
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Architect under the laws of the state of Minnesota.

signature:
printed name: John E. Erickson, NCARB, LEED AP
reg. #: 24199
sign date: Issue Date

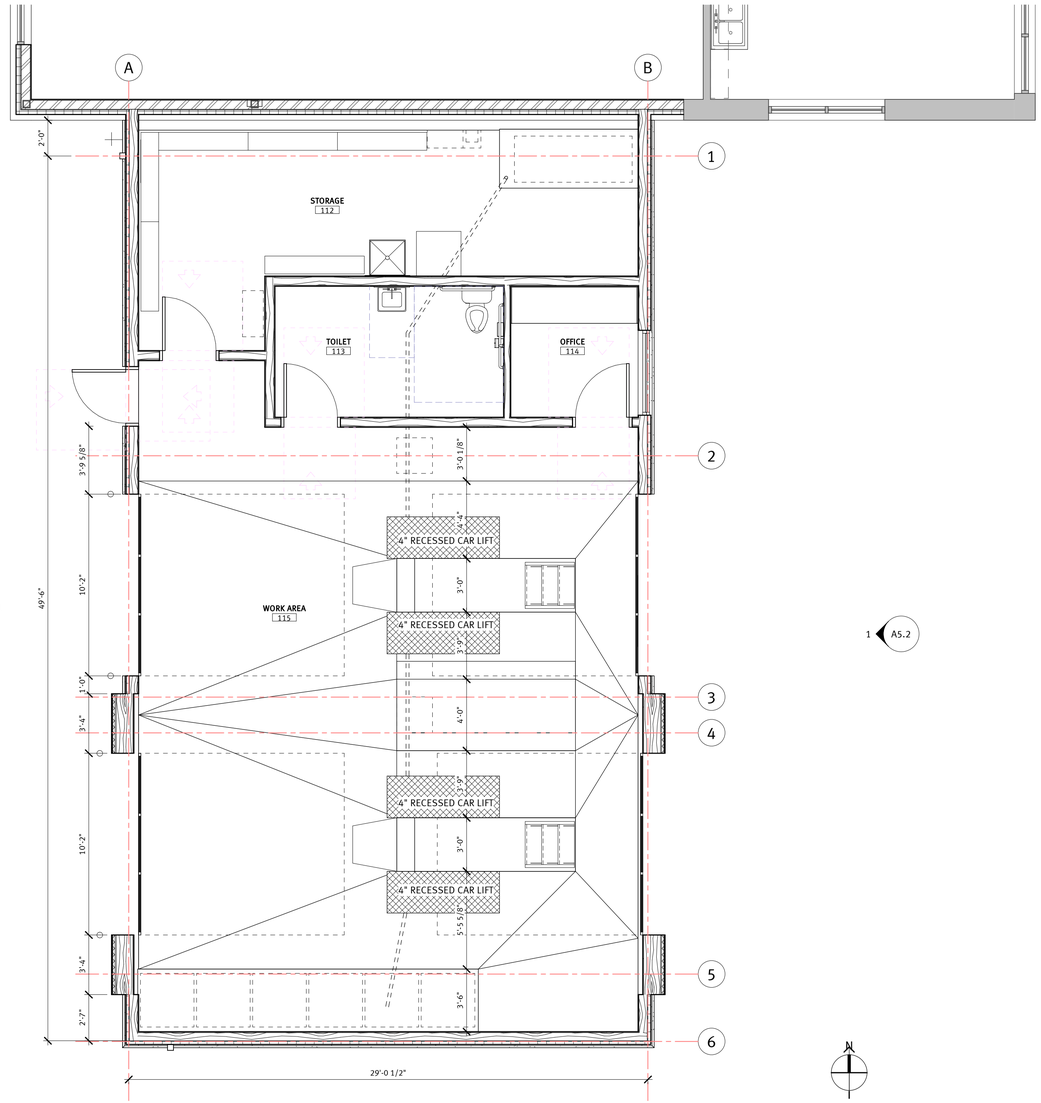
Preliminary Not For Construction
4/10/2025 9:17:59 AM

revision / issue	*no.*	*date*

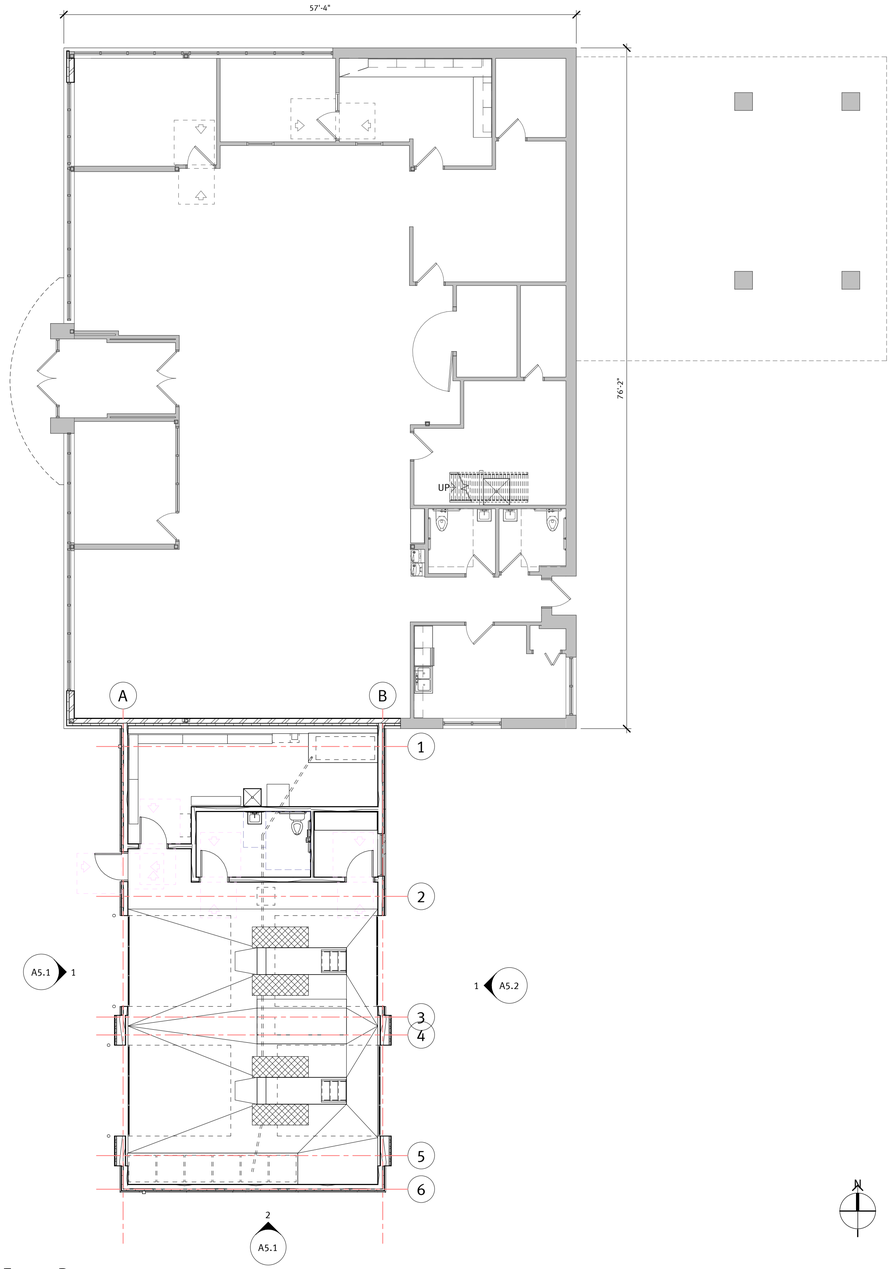
sheet title: Trash Enclosure Details
sheet number: A1.1



2 A2.1 **Trash Enclosure Plan**
3/16" = 1'-0"



1 A2.1 **Enlarged Floor Plan**
1/4" = 1'-0"



3 A2.1 **Floor Plan**
1/8" = 1'-0"

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13510 Rogers Dr.
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project #: 025001.00
date: 3/5/2025 10:28:16 AM
drawn by: Author
checked by: Checker

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signature:
printed name: John E. Erickson, NCARB, LEED AP
reg. #: 24199
sign date: Issue Date

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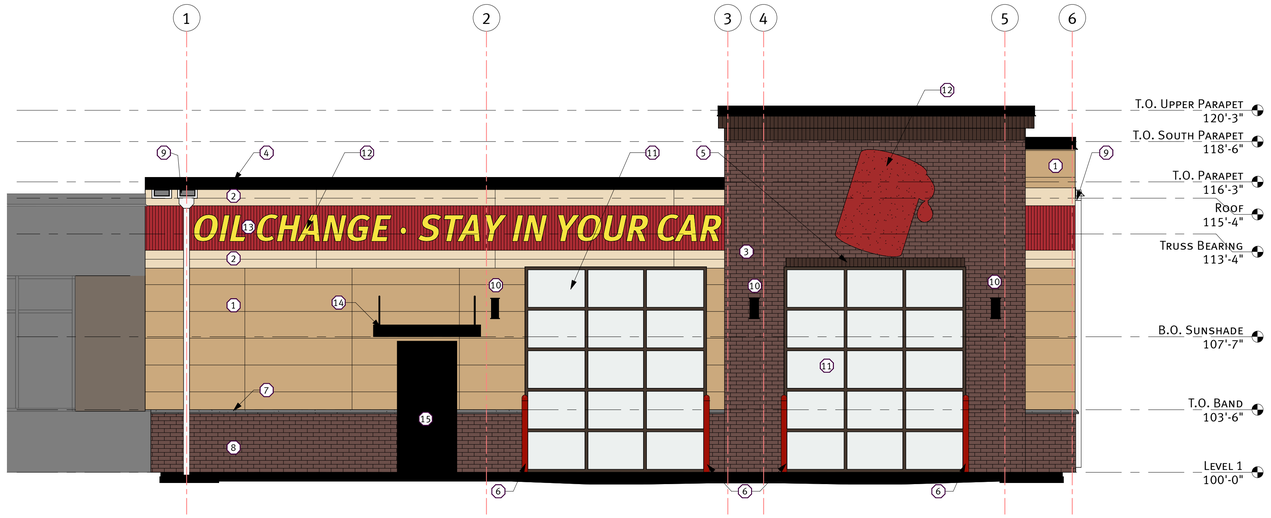
3/5/2025 10:28:16 AM

revision / issue	*no.*	*date*

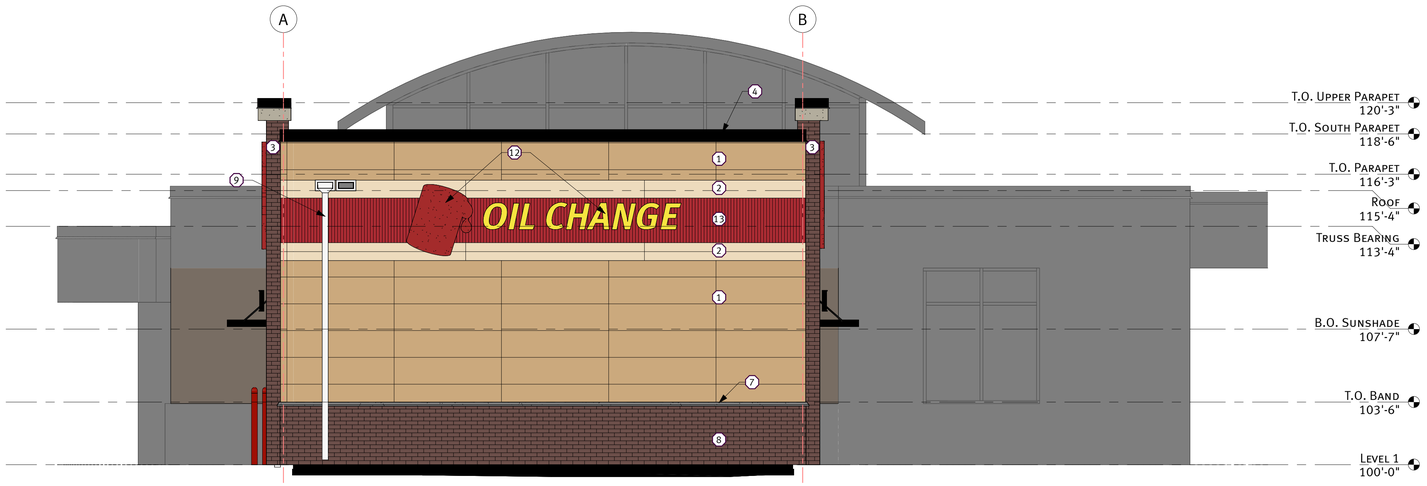
sheet title: Floor Plans
sheet number: A2.1

Exterior Elevation Notes

1	Fiber Cement Panel Siding	Match SW Color #7693, Stonebriar
2	Fiber Cement Panel Siding	Match SW color #7678, cottage cream
3	Brick	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
4	Prefinished mtl coping & flashing	Firestone "Matte black" Finish to be kynar 500 prefinished
5	Brick soldier course band	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
6	Concrete filled steel bollard. Bollard cover by Owner. See Civil for detail	Positive red bollard cover.
7	Stone wainscotting band	Color - Taupe. Stone to be by cultured stone or approved equal.
8	Brick wainscott	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
9	Scupper and downspout; jog surfaces from elevation to brick	Finish to be "Black".
10	Light fixture see elec.	Firestone "Matte black" Finish to be kynar 500 prefinished
11	Overhead door - By others under separate contract	Firestone "Matte black" Finish to be kynar 500 prefinished
12	Signage - By others under separate contract	By others under separate contract
13	Fiber Cement Panel Siding	Match SW Color #6871, Positive red
14	Pre-manufactured aluminum canopy	General Awnings - Imperial Marquee Awning w/ Lattice Tubes. "Black" Finish. 72" long x 36" deep.
15	HM Man Door	Firestone "Matte black" Finish to be kynar 500 prefinished



1 A5.1 **West Elevation**
1/4" = 1'-0"



2 A5.1 **South Elevation**
1/4" = 1'-0"

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3/5/2025 10:28:17 AM

revision / issue	*no.*	*date*

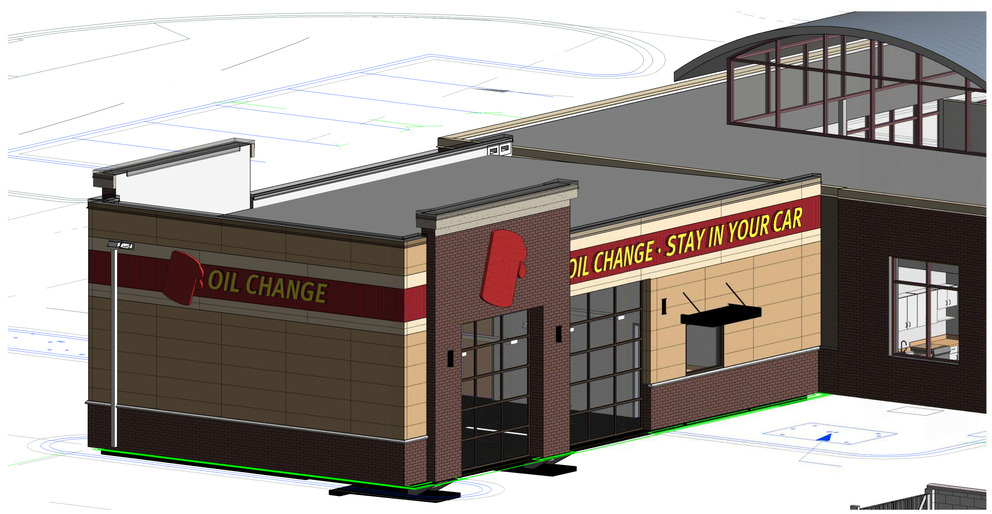
sheet title: Exterior Elevations
sheet number: A5.1

1 A5.2 East Elevation

1/4" = 1'-0"

Exterior Elevation Notes

1	Fiber Cement Panel Siding	Match SW Color #7693, Stonebriar
2	Fiber Cement Panel Siding	Match SW color #7678, cottage cream
3	Brick	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
4	Prefinished mtl coping & flashing	Firestone "Matte black" Finish to be kynar 500 prefinished
5	Brick soldier course band	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
6	Concrete filled steel bollard. Bollard cover by Owner. See Civil for detail	Positive red bollard cover.
7	Stone wainscotting band	Color - Taupe. Stone to be by cultured stone or approved equal.
8	Brick wainscott	Endicott "Dark velour" or approved equal. Modular thin veneer size, mortar, raked joint. Joint to be buff in color.
9	Scupper and downsprout; jog surfaces from elevation to brick	Finish to be "Black".
10	Light fixture see elec.	Firestone "Matte black" Finish to be kynar 500 prefinished
11	Overhead door - By others under separate contract	Firestone "Matte black" Finish to be kynar 500 prefinished
12	Signage - By others under separate contract	By others under separate contract
13	Fiber Cement Panel Siding	Match SW Color #6871, Positive red
14	Pre-manufactured aluminum canopy	General Awnings - Imperial Marquee Awning w/ Lattice Tubes. "Black" Finish. 72" long x 36" deep.
15	HM Man Door	Firestone "Matte black" Finish to be kynar 500 prefinished



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Take 5 Oil-Rogers

13510 Rogers Dr.
Rogers, MN 55374

project #: 025001.00
date: 3/5/2025 10:28:19 AM
drawn by: Author
checked by: Checker

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Architect under the laws of the state of Minnesota.

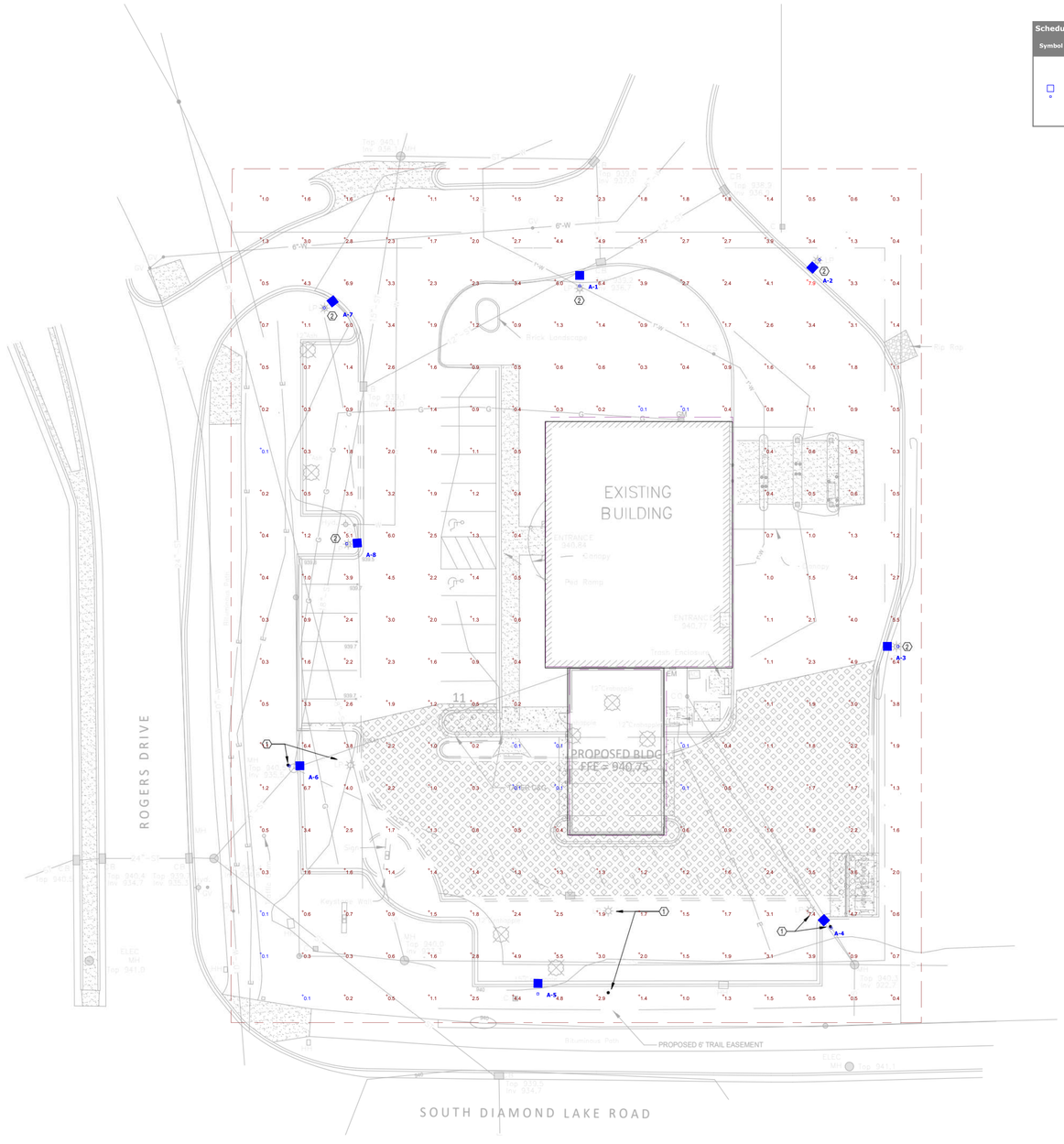
signature:
printed name: John E. Erickson, NCARB, LEED AP
reg. #: 24199
sign date: Issue Date

Preliminary Not For Construction
3/5/2025 10:28:19 AM

revision / issue	*no.*	*date*

sheet title: Exterior Elevations

sheet number: A5.2



1 E102 ELECTRICAL SITE PLAN
1/16" = 1'-0"

Plan View
Scale - 1" = 20ft

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3/4/2025 1:59:58 PM

KEYNOTES

1 UTILIZE EXISTING LIGHTPOLES AND CIRCUITRY.
REMOVE (3) LIGHT POLES TO ACCOMMODATE NEW PARKING SPACES.
INSTALL (3) NEW CONCRETE BASES IN THE GREEN SPACE AND REINSTALL POLES.
2 NO WORK. EXISTING LIGHT POLE TO REMAIN.

Schedule

Symbol	Label	Image	QTY	Catalog Number	Description	Lamp	Number Lamps	Lumens per Lamp	LLF	Wattage	Polar Plot
▫	A		8	RSX1 LED P4 40K R4	RSX Area Fixture Size 1 P4 Lumen Package 4000K CCT Type R4 Distribution		1	16573	0.93	133.14	Max: 9774cd

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Site Lighting	+	1.8 fc	7.9 fc	0.1 fc	79.0:1	18.0:1

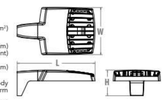
Note

1. Poles to be relocated w/new heads
2.
3.

RSX1 LED
Area Luminaire

Specifications

EPA (ft²/80°):	0.57 ft² (0.05 m²)
Length:	21.8" (55.4 cm) (SPA mount)
Width:	13.3" (33.8 cm)
Height:	3.0" (7.6 cm) Main Body 7.2" (18.4 cm) Arm
Weight: (SPA mount):	22.0 lbs (10.0 kg)



Introduction

The new RSX LED Area family delivers maximum value by providing significant energy savings, long life and outstanding photometric performance at an affordable price. The RSX1 delivers 7,000 to 17,000 lumens allowing it to replace 70W to 400W HID luminaires.

The RSX features an integral universal mounting mechanism that allows the luminaire to be mounted on most existing drill hole patterns. This "no-drill" solution provides significant labor savings. An easy-access door on the bottom of mounting arm allows for wiring without opening the electrical compartment. A mast arm adaptor, adjustable integral slipfitter and other mounting configurations are available.

design select

Items marked by a shaded background qualify for the Design Select program and ship in 15 days or less. To learn more about Design Select, visit www.acuitybrands.com/designselect.
*See ordering tree for details

Design Select options indicated by this color background.

Ordering Information **EXAMPLE:** RSX1 LED P4 40K R3 MVOLT SPA DDBXD

RSX1 LED

Series	Performance Package	Color Temperature	Distribution	Voltage	Mounting
RSX1 LED	P1 Performance Package 1 (P1) P2 Performance Package 2 (P2) P3 Performance Package 3 (P3) P4 Performance Package 4 (P4)	30K 3000K 40K 4000K 50K 5000K	R2 Type 2 Wide R3 Type 3 Wide R3S Type 3 Short R4 Type 4 Wide R4S Type 4 Short R5 Type 5 Wide [1] R5S Type 5 Short [1] AFR Automotive Front Row AFRRHO Automotive Front Row Right Rotated AFRLHO Automotive Front Row Left Rotated	MVOLT (120V-277V) [2] HVOLT (347V-480V) [2] XVOLT (277V-480V) [3] Use specific voltage for options as noted) 120 [4] 277 [4] 208 [4] 347 [4] 240 [4] 480 [4]	SPA Square pole mounting (3.0" min. SQ pole for 1 at 90°, 3.5" min. SQ pole for 2, 3, 4 at 90°) RPA Round pole mounting (3.2" min. dia. RND pole for 2, 3, 4 at 90°, 3.0" min. dia. RND pole for 1 at 90°, 2 at 180°, 3 at 120°) MA Mast arm adapter (fits 2-3/8" OD horizontal tenon) PS Adjustable slipfitter (fits 2-3/8" OD tenons) [4] WBA Wall bracket [4] WBASC Wall bracket with surface-conduit box AASP Adjustable tilt arm square pole mounting [4] AARP Adjustable tilt arm round pole mounting [4] AAWB Adjustable tilt arm with wall bracket [4] AAWSC Adjustable tilt arm wall bracket and surface-conduit box [4]

Options		Finish	
Shipped Installed			
HS House-side shield [5]	Shipped Installed	DDBXD Dark Bronze	
PE Photocontrol, button style [6]	*Standalone and Networked Sensors/Controls (factory default settings, see table page 9)	DBLXD Black	
PER7 Seven-wire twist-lock receptacle only (no controls) [3,6,7]	NLTAIR2 PIRHN nLight AIR generation 2, with Networked, Bi-Level motion/ambient sensor [8,9,10,11]	DNAXD Natural Aluminum	
SF Single fuse (120, 277, 347) [1]	BAA Buy American Act and/or Build America Buy America Qualified	DWHXD White	
DF Double fuse (208, 240, 480) [1]	CCE Coastal Construction [12]	DDBTXD Textured Dark Bronze	
SPD20KV 20kV Surge pack (10kV standard)	*Note: NLTAIR2 PIRHN with nLight Air can be used as a standalone or networked solution. Sensor coverage pattern is affected when luminaire is tilted.	DBLBXD Textured Black	
FAO Field adjustable output [4]	Shipped Separately (requires some field assembly)	DNATXD Textured Natural Aluminum	
DMG 0-10V dimming extend out back of housing for external control (control ordered separate) [4]	EGS External glare shield [5]	DWHGXD Textured White	
	EGFV External glare full visor (360° around light aperture) [5]		
	BS Bird spikes [4]		

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Lithonia RSX1 Area LED
Rev. 01/28/25
Page 1 of 9

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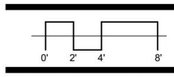


NO	DATE	REVISION
1	03/04/2024	PERMIT SET

PROJECT NAME:
TAKE 5 - ROGERS

ROGERS, MN

DRAWING TITLE:
ELECTRICAL SITE PLAN

DRAWN BY: Author
CHECKED BY: Checker
PROJ. NO: Project Number
DRAWING NO: **E102**

Muska Electric

Take 5 Oil - Rogers

Designer
Date 03/04/2025
Scale Not to Scale
Drawing No.
Summary

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 7.3

Subject: Approval of Hire of Kaari Grandlund Nelson for the Position of Fire Inspector/Educator
Prepared By: Patrick Farrens, Fire Chief

Recommended Council Action
Approve the hiring of Kaari Grandlund Nelson for the position of Fire Inspector/Educator with a start date of April 24th.

Overview / Background / Analysis
Through the 2025 budget process, the council approved hiring a Full-Time Fire Inspector/Educator for the Rogers Fire Department. Eleven applications were received for this position, 5 offers to interview were extended, and 3 candidates completed interviews. Through the interview process, Kaari Grandlund Nelson was selected unanimously by both interview panels, consisting of an administrative panel (internal and external), and a fire prevention/firefighter panel (internal and external). As part of the interview process, a mock 8-minute presentation to fourth grade students was required. The panel found Kaari's presentation to be thoughtful, well-planned and age appropriate for a class of fourth grade students.

Kaari has been a resident of Rogers since third grade and attended Rogers public schools, giving her a unique perspective on the fire prevention education needs of the district. After high school, Kaari attended Bemidji State University, where she obtained a bachelor's degree in exercise science with a minor in business administration. In 2022, Kaari joined the Rogers Fire Department and has been a role model and high-performing firefighter ever since.

Kaari has shown an interest in this position long before it was created. She has consistently assisted with pub ed events, shadowed inspectors/educators and is working toward a fire investigation certification. Kaari has all the necessary certifications for this position, including Inspector 1, Fire Apparatus Operator, Blue Card Incident Management and more.

Kaari has met all of her pre-employment conditions.

Staff Recommendation
Approve the hiring of Kaari Grandlund Nelson for the Fire Inspector/Educator position.

Financial Impact: **Source Fund**:

Budgeted? Yes

Supporting Documentation
None

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 7.4

Subject: Approval of Hire for Tessa Knutson as Paid-on-Call Firefighter
Prepared By: Patrick Farrens, Fire Chief

Recommended Council Action
Approve the hiring of probationary paid-on-call firefighter Tessa Knutson.

Overview / Background / Analysis
The Rogers Fire Department is authorized to have 45 firefighters and is currently staffed with 39 paid-on-call firefighters.
Tessa has completed all necessary steps to be hired as a paid-on-call firefighter, including a criminal background check, medical exam, psychological exam, panel interview, and physical agility assessment. She has also completed her Firefighter 1/2, Hazmat Operations, and EMT courses. Tessa must complete her Fire Apparatus Operator training and certificate in the summer of 2025.

Staff Recommendation
Approve the hiring of probationary paid-on-call firefighter Tessa Knutson.

Financial Impact: **Source Fund**:

Budgeted? Yes

Supporting Documentation
None

STAFF REPORT **Meeting Date**: April 22, 2025

ROGERS CITY COUNCIL **Agenda Item**: 7.5

Subject: Consider Applications by Rachel Development for Preliminary Plat and Planned Unit Development for Cowley Lake Preserve (169-lot subdivision)
Prepared By: Alec Henderson, City Planner

Recommended Council Action

Motion to approve Ordinance 2025-03, Approving a Rezoning from R2 to PUD for Cowley Lake Preserve.

Motion to approve Resolution 2025-32, Authorizing Summary Publication of Ordinance No. 2025-03.

Motion to approve Resolution 2025-30, Approving the Preliminary Plat and Master Development Plan for the Cowley Lake Preserve Subdivision.

Overview / Background / Analysis

Rachel Development has applied for Preliminary Plat and Planned Unit Development for a residential subdivision consisting of 169 lots. The development proposes a range of detached single-family home styles. The development is within the shoreland overlay district and proposes the Alternative Development Standards framework as outlined in the Shoreland ordinance. The Applicant also requests a Planned Unit Development Rezoning deviating from the Standard R2 Zoning Performance standards.

Concept Plan

The developer previously went through concept plan review and multiple meetings over a year ago preceding the recent Shoreland updates which were codified in early 2025. The Concept Plan initially showed 182 units with fewer lots meeting 10 ft setbacks. The feedback provided by the city included: reduction in units, increased setbacks and more consideration of the shoreline in regards to buffering and open space. The developer has since reworked the plan to increase setbacks for the majority of the lots to 10 ft side setbacks. A block of the development does differ more greatly from the standard R2 requirements with 42 ft wide lots with 6 ft side yard setbacks for a smaller single-family home product. The developer has increased the shoreland buffer area compared to the concept plan above which what is required in Code.

Rachel Development submitted their application on February 24, 2025. Preliminary Plats follow a 120-day timeline per state statute and the PUD is tied to the preliminary plat plans. The applications have a mandatory deadline of June 24, 2025.

Primary Issues to Consider

1. Land Use & Zoning
2. Development Plan

3. Conservation Easement

Analysis of Primary Issues

Land Use & Zoning

The development consists of two existing parcels (Scherber Trust 2112023240005 and Casco Ventures LLC 2112023130004) and a portion of a third parcel (Weber LP2112023110003). The subject area falls within the Low Density Residential (LDR) land use designation. The LDR designation permits **2-5 units per acre** and allows for single-family development.

Comprehensive Plan Goals

The Comprehensive Plan also contains goals beyond just simply meeting land use density thresholds. The Cowley Lake Preserve development is consistent with the Rogers 2040 Comprehensive Plan and advances City goals in the following ways:

Housing Diversity & Livability

- Provides three distinct lot types and housing sizes to serve a range of household sizes, income levels, and life stages, including first-time buyers, families, and seniors. [Chapter 5 – Housing, p. 66; Chapter 11 – Implementation, p. 175]
- Supports lifecycle housing and reinvestment through design flexibility and coordinated infrastructure that aligns with the City's housing strategy. [Chapter 10 – Resiliency, p. 165]

Natural Resource Protection & Stewardship

- Preserves approximately 19 acres of wetlands, buffers, and conservation easements in accordance with the updated Shoreland Ordinance and impaired water body protections. [Chapter 8 – Water Resources, p. 105–109]
- Integrates stormwater BMPs and open space as functional and aesthetic design elements. [Chapter 10 – Resiliency, p. 164–165]

Transportation & Infrastructure Connectivity

- Extends Edgewater Parkway towards Territorial Road, supporting long-range transportation connectivity and circulation goals. [Chapter 9 – Transportation, p. 136–137]
- Prepares a logical and phased expansion of utilities and roads, maximizing efficiency of municipal infrastructure investments. [Chapter 11 – Implementation, p. 179–180]
- Plans for internal pedestrian routes and trail linkages to connect residents to adjacent neighborhoods and open spaces. [Chapter 11 – Implementation, p. 181]

Sustainable and Efficient Growth

- Employs compact, clustered lot design to balance density with environmental preservation and reduce land consumption while achieving density targets. [Chapter 10 – Resiliency, p. 164; Chapter 3 – Vision, p. 31]
- Promotes smart growth principles in a greenfield context by aligning development with existing and planned infrastructure corridors. [Chapter 11 – Implementation, p. 180]

Existing Zoning

The subject area currently falls within the R2 district which permits, by right (meaning without additional land use approvals), 10,000 square foot lots (65 ft wide minimum), 10 ft side setbacks, 25 ft front and corner setbacks and 20 ft rear setbacks. Additionally, the area falls within the Shoreland Overlay district which applies additional development restrictions related to shoreland protection. Traditional R2 development can *generally* reach around, or slightly above 2 units an acre based upon lot requirements in the code. Anything above the minimum density of 2 units/acre – depending on the existing conditions – generally would require Planned Unit Development approvals. A PUD provides a new zoning district specific to a development plan. The unique properties of the parcels involved in this development make it unlikely that the site area would be able to meet the minimum density requirements of the R2 district (parcel shape and environmental constraints). The Developer proposes a Planned Unit Development to deviate from the R2 standards which allows for the development to reach the required density range.

Proposed Zoning

The developer is requesting a Planned Unit Development (PUD) to deviate from the R2 zoning requirements for their development area. PUDs can be requested and reviewed by the City. PUDs are typically an exchange where the developer proposes different performance standards and the city reviews the particulars of the development and how it would be in the public interest (or what the benefit is) to approve deviations. The benefits can be development specific, are usually related to comprehensive plan goals, and can include offsite improvements. The theory behind PUDs is that the benefits proposed by the developer outweigh the benefits of keeping to the by right zoning district standards. PUDs effectively rezoning property to allow different standards. Because PUDs rezoning the property, this is a legislative or policy decision for the council with high discretion. PUDs have previously been approved for other residential developments within the community including Skye Meadows, Grass Lake Preserve, and Laurel Creek.

The applicant is requesting PUD approval to deviate from R-2 standards in accordance with Section 125-29 of the Rogers Zoning Code. The PUD request could be justified for the following reasons:

- Better Design Outcome – The PUD enables clustering of lots and preservation of key natural resources that could not be achieved under strict R-2 compliance.
- Consistency with Comprehensive Plan – The project achieves the Low Density Residential net density range (2.32 units/acre) and reflects goals for housing variety, natural resource stewardship, and infrastructure efficiency.
- Public Benefit – The PUD facilitates key infrastructure extensions (Edgewater Parkway and trunk utilities) and includes wetland preservation, stormwater basins, and public trail connectivity.

- No Detriment to Surrounding Properties – The development provides appropriate transitions to adjacent uses, maintains tree buffers, and supports regional planning objectives without creating adverse impacts.

PUD Deviations

The proposed PUD includes three lot standards for four different single-family product types: a 70 ft wide lot (8,750 sq ft minimum) with 10 ft side setbacks; a 60 ft wide line (7,500 sq ft minimum) with 10 ft side setbacks for a standard single-family home and a villa style home; and a 42 ft wide lot (5,460 sq ft minimum) with 6 ft side setbacks. All other setbacks are proposed to meet the minimum required (25 ft front/corner, 20 ft rear).

- 59 lots are proposed to be 70 ft-wide lots with standard single-family homes.
- 74 lots are proposed to be 60 ft-wide lots.
    1. 48 lots are proposed to be 60 ft wide lots with standard single-family homes.
    2. 26 lots are proposed to be 60 ft-wide lots with villa-style homes.
- 36 lots are proposed to be 42 ft wide lots with carriage-style homes.

All lots are proposed to deviate from the R2 minimum lot size (59 exceed the lot width minimum but are shy of the 10,000 sq ft lot size by reason of depth). However, 133 lots would meet the required R2 setbacks. The 74 proposed 60-ft-wide lots are under the 65 ft R2 minimum.

PUD Benefits

The narrative includes additional information regarding the proposed products and their identified benefits.

Developer Identified Benefits:

- Preservation of wetland and natural drainage features
- Ensuring a smooth transition to adjacent [planned] higher-density properties – [The land use plan shows higher density land uses to the southeast of the subject property]
- Offer a variety of home types to serve diverse household sizes and price points

City Analysis of benefits

The development does preserve natural drainage features and wetlands. However, existing wetland regulations already accomplish much of the wetland protection. That being said there are a number of benefits that could be argued that the developer is providing through this development.

- The shoreland ordinance Alternative Development Standards requires a 75 ft shoreline buffer to be dedicated to the city. The developer is proposing on average double the buffer which increases shoreland protection (ranges from 122 ft to 536 ft). This is identified as a benefit.
- The shoreland ordinance would require 22.8 acres of open space for the development. The developer proposes 32.86 acres. This exceeds the Alternative Development standards and is identified as a benefit.

- Trail and boardwalk within the buffer area, and pedestrian connections through the site are proposed for the development that would be usable by the public.
- The developer proposes the extension of trunk utilities to Willandale Rd through the development, which is a public benefit.
- The developer proposes turn lane improvements within Territorial Road, which is a public benefit.

Shoreland Overlay

When within the shoreland overlay district, properties may be developed in two ways: traditional shoreland development, or Alternative Development Standards (ADS). Traditional shoreland development requires much larger minimum lot sizes – 20,000 to 40,000 square feet depending on the DNR-designated type of lake – and allows new riparian lot creation (meaning lots which touch the shoreland). Traditional shoreland development would not permit a development to reach the minimum density required by the Comprehensive Plan for LDR.

The Alternative Development Standards (as proposed in this application) would permit the lots created to match the underlying zoning in exchange for dedication of shoreland buffer land, decreased impervious surface, open space, and more stringent stormwater management requirements. The Alternative Shoreland Development Standards do permit Planned Unit Development which alters the underlying zoning provided the deviations requested only impact the performance standards of the zoning district and not the requirements of the shoreland overlay (e.g. open space requirements must be met, impervious surface limitations, shoreland setbacks, etc.). All shoreland protection measures required by the Alternative Development Standards are being met as proposed by the developer: the site is under 25% impervious surface, open spaces have been provided, the shoreland buffer zone provided exceeds the minimum, the shoreline setbacks are met, and the stormwater management plan meets the increased standards required by the ADS.

The plans are consistent with the comprehensive plan, and shoreland ordinance. Planned Unit Developments are processes identified in ordinance which require Council authorization and approval. Assuming a PUD is approved, the plan would be consistent with land use and zoning requirements.

2. Development Plan

Transportation

The development plan includes the extension of Edgewater Parkway within the project boundary (two-lane divided by a median), and the extension of 133rd Ave to the west and South to Willandale. Three additional offshoots of the proposed roadways end in cul-de-sacs. The plan also includes turn lane improvements on Territorial Road (left turn lane for east-bound traffic on Territorial and right turn lane for west-bound traffic). No turn lanes are proposed for Willandale Road. The Transportation Study did not identify additional roadway improvements. County permitting and review is ongoing.

It should be noted that Street F proposed a 50 ft right of way as a public street. The City standard is 60 ft. This is a deviation from the code and included in the deviations. The roadway as constructed

would match what is required for public streets but the overall right-of-way would be less than standard.

Utilities

The Plan includes the construction of water, sewer, and stormwater facilities consistent with the Comprehensive Plan goals. Sewer and water are planned to go through a conservation easement through an established easement identified as a street and utility corridor within the easement. All public infrastructure proposed is planned within right of way and drainage and utility easements. The utility plans are under review by the Engineer and will require approval prior to final plat application and ultimately construction. The stormwater plans indicate that pre-construction and post-construction stormwater runoff rates and filtration are the same or improved as compared to the existing conditions. Additionally, the Elm Creek Watershed Management Commission reviews the development plans to ensure compliance with watershed rules.

Park and Trails

Trails are planned or accounted for through the construction or creation of Trail easement. A park search area is not in the subject property and lies generally to the south the east of the development area nearer to 129th Avenue. Park dedication is expected through fees in lieu of land dedication.

The Development adequately plans for utility and infrastructure delivery consistent with the needs of the development and meets the goals of the Comprehensive Plan.

3. Conservation Easement

A conservation easement exists within the Casco Ventures Property. The plan identifies the extension of road and utilities through a corridor which is allowed for by the easement. However, some construction activities and stormwater infrastructure are shown outside identified areas. The Developer and City are working with Hennepin County (owners of the Easement) on reviewing impacts and determining if these improvements meet the terms of the easement or if modifications to the easement are warranted. Continued coordination is required of the developer. If the County is not willing to amend terms, some revisions to the stormwater plan will be required. A condition of approval related to this item is included in the proposed motions.

4. Miscellaneous

<u>Homeowners Association (HOA)</u>

The villas and carriage homes will be under an HOA. HOA documentation will be required to be submitted with future final plats.

<u>Eagle Nest</u>

An eagle nest is within the site boundary but not within the construction area. Meaning no direct impacts are expected. However, disturbance from construction will need review by the US Fish and Wildlife. The Developer is in contact and coordination with the Wildlife Service and is in the process of gaining any required permits prior to construction activity. The permits include review if the nest,

buffer requirements, review of mating season timing, and monitoring of the nest.

Planning Commission Review and Hearing

The Planning Commission reviewed the applications and held a public hearing on April 7th, 2025. Ultimately, the items were recommended for approval with staff conditions with a 5-2 vote.

Commission in recommending approval identified the following:

- The development goes beyond code requirements for shoreland and wetland protection that wouldn't otherwise be possible through standard zoning.
- The development may not be able to meet minimum density requirements without a PUD (some 1.6 units/acre due to constraints with conservation easement, parcel shape, and shoreland).
- The multiple product types available may not be possible with standard zoning and the PUD proposes multiple products that have lower entry points than would otherwise be possible.
- The extension of utilities through this area is important for long-range plans.
- A few items came up regarding the development from the residents attending the hearing as well.

Concerns communicated by residents:

- Concerns with eagles nest and wildlife impact (pre-construction vs post-construction).
- Concerns about traffic (existing Territorial RD traffic is bad and increased development will impact Territorial and adjacent streets).
- Desire for additional park land.
- Off-site drainage concerns.
- Impacts to schools.
- Xcel electrical capacity concerns.
- Drain Tiles through the property should be maintained.
- Taxes too high
- Too much development

The Commission did also forward to the council recommendations (separate from the items' motion) to continue to review concerns related stormwater in adjacent neighborhoods, review traffic safety concerns on adjacent roadways, and to possibly explore acquiring additional park land nearby.

Staff have been in contact with Xcel Energy related to concerns voiced regarding the electrical grid which they are currently planning for upgrades in the coming years. Staff also continue to discuss population trends with the school district to ensure they have the resources needed to adequately plan for their facility needs, as the school district would be the entity to decide if and when an additional school would be needed.

Staff Recommendation

Planning Commission recommended approval of the PUD and Preliminary Plat applications. The following motions are recommended:

Motion to Approve Ordinance 2025-03, Approving a Rezoning from R2 to PUD for Cowley Lake Preserve.

Motion to approve Resolution 2025-32, Authorizing Summary Publication of Ordinance No. 2025-03.

Motion to Approve Resolution 2025-30, Approval of the Preliminary Plat and Master Development Plan for the Cowley Lake Preserve Subdivision.

The following are recommended conditions by staff and the commission and are found in the resolution.

1. The Applicant shall revise the preliminary plans (the development, civil plans, and preliminary plat) to the satisfaction of the Public Works Department, City Engineer, and City Planner.
2. The Applicant shall receive approval for the Stormwater Management Plan from Elm Creek Watershed Management Commission, and shall address and conform to all requirements of the Elm Creek Watershed Management Commission, including but not limited to the requisite wetland approvals and delineations, and other conditions as established.
3. The Applicant shall continue to work with Hennepin County's Natural Resources Department regarding impacts to the Conservation Easement and ensuring the development meets the terms of the Conservation Easement. Revisions to the plan may be required to satisfy the requirements of Hennepin County.
4. The Applicant shall be responsible for constructing turn lane improvements at Territorial Road at their cost. The Applicant shall meet the requirements of the Hennepin County Transportation Department and improvements shall be permitted prior to construction.
5. The Applicant shall construct the proposed trail and boardwalk improvements within the shoreland buffer and conservation easement, and construct the public improvements as shown on the plans.
6. The Shoreland Buffer shall be dedicated to the City when the public improvements are accepted by the City.
7. The Applicant shall be responsible for constructing trunk utilities through the development to Willandale Road and shall continue to review options to extend water main to the east for potential watermain looping.
8. The Applicant shall ensure the public benefits outlined in the resolution are provided.
9. A Lot Split shall be processed prior to Final Plat approval for the approximate north 20 acres of PID 21-120-23-11-0003.
10. A vacation request shall be processed prior to the plat including the existing half right of way of Hawkins Drive within the subject property.
11. The Development shall conform to the PUD rezoning, Ord. No. 2025-03, as approved by Council on April 22, 2025.
12. The Applicant shall continue to work with the City to resolve issues related to Drain Tiles, and adequately maintain Drain Tile drainage through the site to the satisfaction of the City Engineer so as to not adversely impact drainage conditions of properties downstream of the development.
13. The Applicant shall submit current title work for the Preliminary Plat and shall conform to any requirements resulting from City staff and the City Attorney's review of the title work and plat opinion.
14. The Applicant shall form a Homeowner's Association to manage and maintain shared amenities and common areas, in a form satisfactory to both City staff and the City Attorney. Said Homeowner's Association and Protective Covenants must be provided prior to the first phase Final Plan and shall be recorded with Hennepin County.
15. The applicant shall enter into a Stormwater Maintenance Agreement for the development that shall identify the terms and conditions of the Development.
16. The applicant shall enter into and execute a Subdivision Development Agreement with the

City governing each phase of development in conjunction with final plat approval, of which said Subdivision Development Agreement shall outline the terms and conditions and financial obligations of the Applicant for each phase of development.

17. The Applicant shall pay to the City all applicable fees and expenses incurred by the City as related to the development.
18. Except as otherwise expressly authorized by City resolution or ordinance, all aspects of the development shall comply with all applicable state laws, city codes, ordinances, and regulations.

Financial Impact: Not applicable. **Source Fund**: Not applicable.

Budgeted? N/A

Supporting Documentation

A. Ordinance 2025-03 Rezoning Cowley Lake Preserve to PUD
B. Resolution 2025-32 Authorizing Summary Publication of Ordinance 2025-03
C. Resolution No. 2025-30_Preliminary Plat_Cowley Lake Preserve
D. Rachel Development - Cowley Lake Preserve Preliminary Plat-PUD Narrative_FINAL
E. 23970s-BDRY-A
F. Cowley Lake Preserve - Preliminary Plan Set 04-15-2025
G. Cowley Lake Preserve - Preliminary Turn Lanes - Territorial Road 02-24-2025
H. 25122 Cowley Lake Preserve Prelim Landscape Plan Set 02-21-2025
I. Cowley - Stormwater Mgmt Plan 04-15-2025
J. Draft_ScherberPropertyDevelopment_TrafficStudy
K. Cowley Lake Preserve - Preliminary Plat - Outlot ownership plan

ORDINANCE NO. 2025 - 03

AN ORDINANCE AMENDING THE ZONING MAP OF THE CITY OF ROGERS; REZONING THE SUBJECT PROPERTIES FROM SINGLE-FAMILY RESIDENTIAL (R2) TO PLANNED UNIT DEVELOPMENT (PUD) FOR THE COWLEY LAKE PRESERVE DEVELOPMENT

The City Council hereby ordains as follows:

Section 1. Zoning Map Amendment

The official zoning map of the City of Rogers is hereby amended as follows:

The Subject Properties legally described in Exhibit A are hereby rezoned from Single Family Residential (R2) to Planned Unit Development (PUD).

Section 2. Permitted Uses

Pursuant to the Planned Unit Development (PUD) zoning of the Subject Properties legally described in Exhibit A, the permitted uses shall be as follows:

Permitted Uses

Single-Family Detached Residential Dwellings

Section 3. PUD District Standards

Pursuant to the Planned Unit Development (PUD) zoning of the Subject Properties legally described in Exhibit A, the following standards shall be applicable (shown in Exhibit B):

70’ Single Family Residential

Lot Standards					
Housing Type: Single-Family Residential					
Lots: Blocks 1-4 & 13					
	Setbacks (Min)				
	Front Yard	Rear Yard	Side Yard	Corner Yard	Height (Max)
70’ Minimum	25 ft	20 ft	10 ft	25 ft	35 ft
Lot Area	Minimum of 8,750 square feet				
Impervious Surface	50% maximum				

60’ Single Family Residential

Lot Dimensions
Housing Type: Single-Family Residential
Lots: Blocks 5, 6, 8, & 12 & Lots 21, 23, Block 9

	Lot			
	Front Yard	Rear Yard	Side Yard	Corner Yard
60’ Minimum	25 ft	20 ft	10 ft	25 ft
Lot Area	Minimum of 7,500 square feet			
Impervious Surface	50% maximum			

Lot Dimensions				
Housing Type: Single-Family Residential (Villa Lots)				
Lots: Blocks 7 & 11				
	Lot			
	Front Yard	Rear Yard	Side Yard	Corner Yard
60’ Minimum	25 ft	20 ft	10 ft	25 ft
Lot Area	Minimum of 7,500 square feet			
Impervious Surface	50% maximum			

42’ Single-Family Residential

Lot Standards					
Housing Type: Single-Family Residential (Carriage Lots)					
Lots: Block 10, & Lots 1-20, Block 9					
	Setbacks (Min)				
	Front Yard	Rear Yard	Side Yard	Corner Yard	Height (Max)
65’ Minimum	25 ft	20 ft	6 ft	20 ft	35 ft
Lot Area	Minimum of 5,460 square feet				
Impervious Surface	50% maximum				

All lots within the Cowley Lake Preserve development area shall remain subject to the Shoreland Overlay District requirements per Section 125-100, Shoreland Management as may be amended from time to time. The development has adequately shown the development is meeting the Residential Alternative Development Standards and shall be labeled as such on the zoning map.

Section 4. Effective

The City Clerk is directed to revise the official zoning map consistent with this ordinance. This ordinance shall have full force effect upon its passage and publication as required by law.

Passed by the City Council of the City of Rogers, Hennepin County, Minnesota, this 22nd day of April, 2025.

Shannon Klick, Mayor

ATTEST:

Stacie Brown, City Clerk

EXHIBIT A

COWLEY LAKE PRESERVE
LEGAL DESCRIPTIONS

Existing Legal Descriptions

Scherber Parcel (PID 21-120-23-24-0005)

Legal Description:

Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning.
Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

Casco Parcel (PID 21-120-23-13-0004)

Legal Description:

That part of Government Lot 2 in Section 21, Township 120, Range 23, described as commencing at the Southwest corner thereof, thence South 89 degrees 48 minutes 24 seconds East, assumed bearing along the South line of Government Lot 2, a distance of 438.00 feet to the point of beginning; thence North 00 degrees 13 minutes 06 seconds East parallel to the West line of Government Lot 2, a distance of 874.50 feet; thence South 89 degrees 48 minutes 24 seconds East a distance of 57.00 feet; thence North 0 degrees 13 minutes 06 seconds East a distance of 891.00 feet, more or less, to the shore of Cowley Lake; thence Northeasterly along said shoreline a distance of 1043.00 feet, more or less, to the East line of Government Lot 2; thence South 00 degrees 20 minutes 20 seconds West along said East line to a point which is 1604.32 feet North of the Southeast corner of Government Lot 2; thence North 89 degrees 39 minutes 40 seconds West a distance of 154.63 feet; thence South 22 degrees 32 minutes 57 seconds West a distance of 930.19 feet; thence South 00 degrees 13 minutes 06 seconds West distance 744.43 feet to the South line of Government Lot 2; thence North 89 degrees 48 minutes 24 seconds West along said South line a distance of 387.00 feet to the point of beginning, Hennepin County, Minnesota.

Weber Parcel (PID 21-120-23-11-0003)

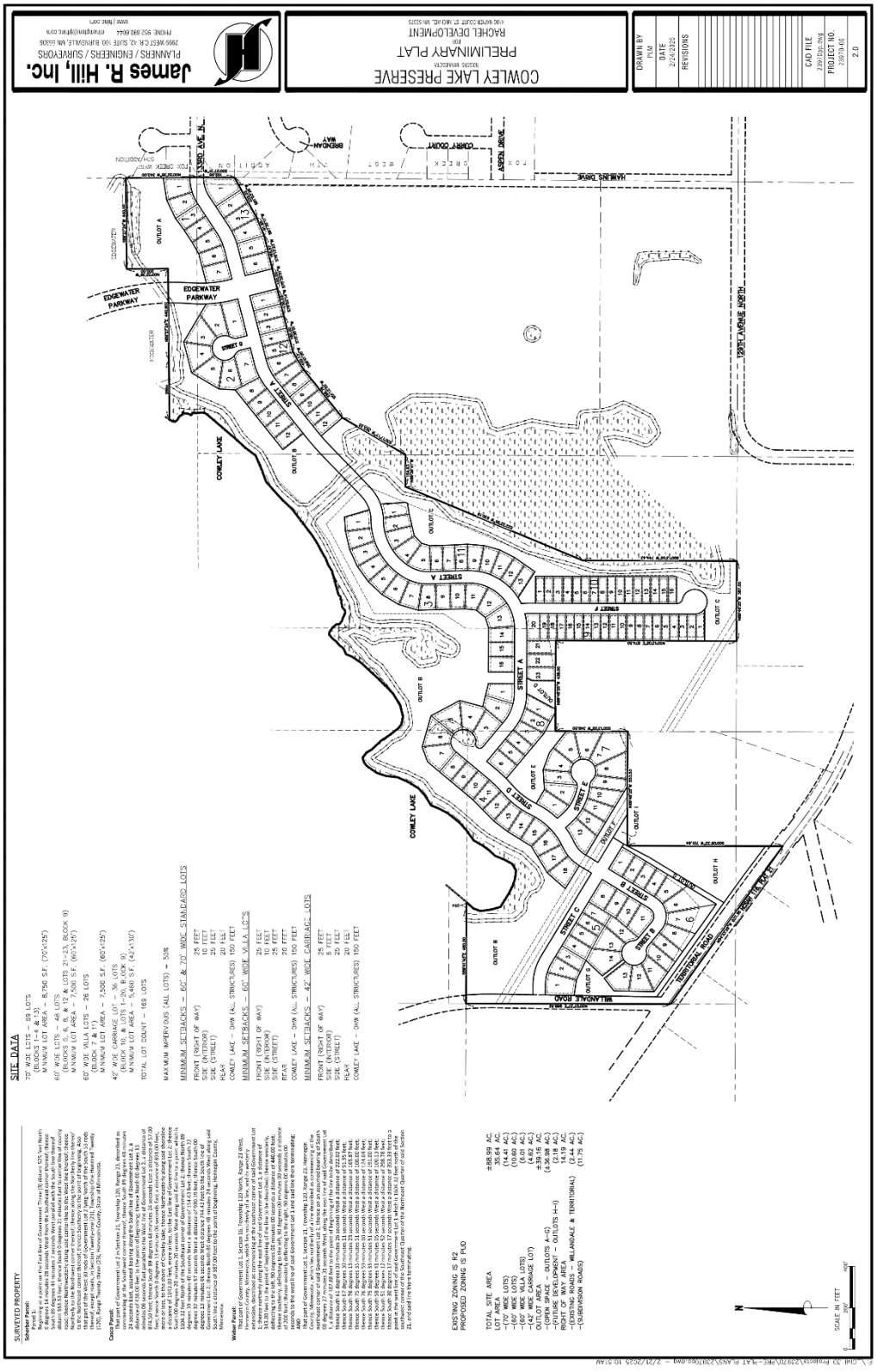
Legal Description:

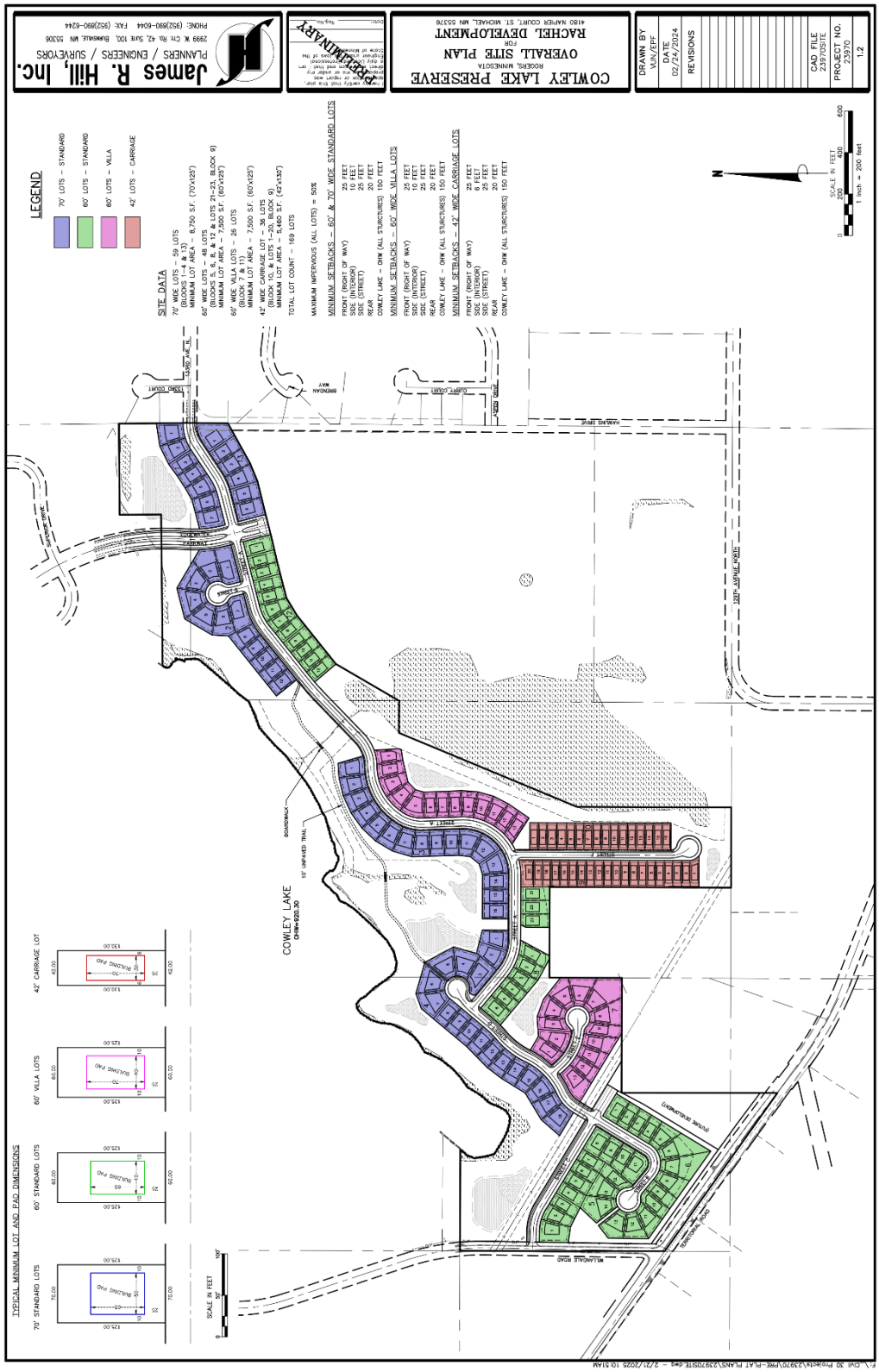
That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies southerly of a line, and its westerly extension, described as commencing at the

southeast corner of said Government Lot 1; thence northerly along the east line of said Government Lot 1, a distance of 343.00 feet to the point of beginning of the line to be described; thence westerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 440.00 feet; thence southerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 200 feet; thence westerly deflecting to the right, 90 degrees 00 minutes 00 seconds to the west line of said Government Lot 1 and said line there terminating;
AND
That part of Government Lot 1, Section 21, Township 120, Range 23, Hennepin County, Minnesota, which lies northerly of a line described as commencing at the northeast corner of said Government Lot 1; thence on an assumed bearing of South 00 degrees 27 minutes 31 seconds West, along the east line of said Government Lot 1, a distance of 182.88 feet to the point of beginning of the line to be described; thence South 61 degrees 03 minutes 26 seconds West a distance of 222.02 feet; thence South 67 degrees 30 minutes 11 seconds West a distance of 91.95 feet; thence South 76 degrees 13 minutes 23 seconds West a distance of 165.87 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 100.00 feet; thence South 76 degrees 59 minutes 00 seconds West a distance of 124.04 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 191.00 feet; thence South 58 degrees 41 minutes 05 seconds West a distance of 100.13 feet; thence South 51 degrees 12 minutes 52 seconds West a distance of 298.78 feet; thence South 30 degrees 17 minutes 17 seconds West a distance of 353.33 feet to a point in the west line of said Government Lot 1 which is 1604.32 feet north of the southwest corner thereof, and said line there terminating.

EXHIBIT B

COWLEY LAKE PRESERVE
MASTER DEVELOPMENT PLAN


James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2905 WEST CR. 42, SUITE 100, BURNSVILLE, MN 55306
PHONE: 952.890.0444 PHHILL@HILLINC.COM
WWW.HILLINC.COM
COWLEY LAKE PRESERVE
MASTER
PRELIMINARY PLAT
RACHEL DEVELOPMENT
6100 MEADOW COURT ST. MICHAEL, MN 55376
DRAWN BY
ITLM
DATE
2/24/2025
REVISIONS
CAD FILE
239100p.dwg
PROJECT NO.
239100
2.0
SURVEYED PROPERTY
Schreiber Parcel:
That part of a point on the East Line of Government Tract (3) distant 535 feet North of the Southeast corner thereof; thence North 0 degrees 14 minutes 28 seconds West on said East line 1,320 feet; thence South 89 degrees 45 minutes 32 seconds West parallel with the South line of said Government Tract (3) a distance of 1,320 feet; thence South 0 degrees 14 minutes 28 seconds East parallel with said East line 1,320 feet to the South line of said Government Tract (3); thence North 89 degrees 45 minutes 32 seconds East on said South line 1,320 feet to the point of beginning, Hennepin County, Minnesota.
Cocca Parcel:
That part of Government Lot 2 in Section 21, Township 120, Range 23, described as beginning at the northeast corner of said Government Lot 2; thence South 0 degrees 24 seconds East, assumed bearing along the East line of Government Lot 2, a distance of 1,320.00 feet; thence South 89 degrees 13 minutes 06 seconds West parallel with the North line of said Government Lot 2, a distance of 1,320.00 feet; thence North 0 degrees 24 seconds West parallel with said East line of Government Lot 2, a distance of 1,320.00 feet to the North line of said Government Lot 2; thence North 89 degrees 13 minutes 06 seconds East along said North line of Government Lot 2, a distance of 1,320.00 feet to the point of beginning, Hennepin County, Minnesota.
Weber Parcel:
That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies northerly of a line described as commencing at the southeast corner of said Government Lot 1; thence on an assumed bearing of North 89 degrees 27 minutes 13 seconds West along the south line of said Government Lot 1 a distance of 1,313.48 feet; thence North 0 degrees 32 minutes 47 seconds East a distance of 343.00 feet to the point of beginning of the line to be described; thence easterly, northeasterly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 20.00 feet; thence northerly, deflecting to the right, 90 degrees 00 minutes 00 seconds a distance of 20.00 feet; thence


COWLEY LAKE PRESERVE
OVERALL SITE PLAN
RACHEL DEVELOPMENT
4180 VAPIER COURT, ST. MICHAEL, MN 55376
James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
LEGEND
70' LOTS - STANDARD
60' LOTS - STANDARD
60' LOTS - VILLA
42' LOTS - CARRIAGE
SITE DATA
MINIMUM SETBACKS — 60' & 70' WIDE STANDARD LOTS
MINIMUM SETBACKS — 60' WIDE VILLA LOTS
MINIMUM SETBACKS — 42' WIDE CARRIAGE LOTS
TYPICAL MINIMUM LOT AND PAD DIMENSIONS
COWLEY LAKE
SCALE IN FEET

RESOLUTION 2025-32

A RESOLUTION AUTHORIZING SUMMARY PUBLICATION OF ORDINANCE NO. 2025-03

WHEREAS, the City Council of the City of Rogers adopted Ordinance No. 2025-03 titled "AN ORDINANCE AMENDING THE ZONING MAP OF THE CITY OF ROGERS; REZONING THE SUBJECT PROPERTIES FROM SINGLE-FAMILY RESIDENTIAL (R2) TO PLANNED UNIT DEVELOPMENT (PUD) FOR THE COWLEY LAKE PRESERVE DEVELOPMENT", and

WHEREAS, in the case of lengthy ordinances or those containing charts or maps, Minnesota state law allows the City Council to approve, by a four-fifths vote, the publication of an Ordinance by title and summary only; and

WHEREAS, the expense to publish the complete text of Ordinance No. 2025-03 is not justified; and

WHEREAS, the following summary clearly informs the public of the intent and effect of the ordinance.

NOW THEREFORE, IT IS HEREBY RESOLVED, by the City Council of the City of Rogers, Hennepin County, Minnesota, that the following summary is hereby approved for official publication:

Summary of Ordinance 2025-03

AN ORDINANCE OF THE CITY OF ROGERS, MINNESOTA, REZONING PROPERTY FROM R2 TO PUD

On the 122nd day of April, 2025, the Rogers City Council passed Ordinance No. 2025-03, An Ordinance of the City of Rogers, Minnesota Amending the Zoning Map for the City of Rogers; Rezoning the Subject Properties from Single-Family Residential (R2) to Planned Unit Development (PUD) for the Cowley Lake Preserve Development. The ordinance clarifies approves deviations from the R2 district for Cowley Lake Preserve and establishes single-family lot performance standards specific to the 169-lot single-family subdivision proposed by Rachel Development.

The full text of the Ordinance and figures may be reviewed at City Hall, located at 22350 South Diamond Lake Road, Rogers, MN 55374. The ordinance can also be viewed online at our website http://rogersmn.gov.

Moved by Councilmember , seconded by Councilmember ;

The following voted in favor of said resolution:

The following voted against the same:

The following abstained:

Whereupon said resolution was declared duly passed and adopted, and was signed by the Mayor, and attested by the City Clerk dated this 22nd day of April, 2025.

ATTEST:

_____
Shannon Klick, Mayor

_____
Stacie Brown, City Clerk

RESOLUTION NO. 2025 - 30

A RESOLUTION GRANTING APPROVAL OF THE PRELIMINARY PLAT AND MASTER DEVELOPMENT PLAN FOR THE COWLEY LAKE PRESERVE SUBDIVISION

WHEREAS, Rachel Development ("Applicant"), has submitted application to the City of Rogers ("City"), requesting Preliminary Plat ("Plat") approval and Planned Unit Development for Cowley Lake Preserve ("Development"); and,

WHEREAS, the Development is a 169-lot residential development, located on three (3) properties (PIDs: 21-120-23-24-0005, 21-120-23-13-0004, and approximately 20 acres of 21-120-23-11-0003) ("Subject Property) north and east of Territorial Road and east of Willandale Road legally described in Exhibit A; and,

WHEREAS, the Rogers 2040 Comprehensive Plan ("2040 Plan") guides the Subject Property as Low Density Residential with a required residential density of 2.0 to 5.0 units per net acre; and,

WHEREAS, the Development proposes a residential density of 2.3 units per net acre; and,

WHEREAS, the Development proposes a Planned Unit Development ("PUD") to deviate from its current zoning of R2, single-family residential; and,

WHEREAS, PUDs are regulated by Section 125-29, Planned Unit Developments; and,

WHEREAS, pursuant to Minnesota Statute §462.357 the Planning Commission ("Commission") held a Public Hearing ("Hearing") on April 7, 2025 to consider and receive public comment regarding the proposed Plat and PUD; and,

WHEREAS, notice of the Hearing was posted, published in the City's official newspaper, and mailed to any and all owners of affected properties, as required by State Statute; and,

WHEREAS, verbal comment was received and considered by the Commission regarding traffic, stormwater, parks, lot sizes and development density; and recommended approval of the Plat and Development's PUD request with conditions outlined by staff and directed staff to forward the recommendation to Council; and,

WHEREAS, the Council reviewed the Plat and Development at its April 22, 2025 meeting; and,

WHEREAS, on April 22, 2020, the City Council also considered Ordinance No. 2025-03, Rezoning the Subject Property from Single Family Residential (R2) to Planned Unit Development (PUD) establishing the master development plan (attached as Exhibit B) and PUD district standards for the Development, thereby making the Plat consistent with the Comprehensive Plan and Zoning and make the following findings related to the Plat and Development:

i. The PUD enables clustering of lots and preservation of key natural resources (wetlands and natural drainage features) that could not be achieved under strict R-2 compliance. The Development also includes wetland buffers, shoreland buffers, and shoreland open which exceed code requirements.

ii. The project achieves the Low-Density Residential net density range (2.32 units/acre) and reflects goals for housing variety, natural resource stewardship, and infrastructure efficiency.
iii. The PUD facilitates key infrastructure extensions/improvements (Territorial Road intersection improvements, Edgewater Parkway and trunk utilities extensions) and includes wetland preservation, stormwater basins, and public trail connectivity.
iv. The development provides appropriate transitions to adjacent uses, maintains tree buffers, and supports regional planning objectives without creating adverse impacts; and,

WHEREAS, the City Council concludes that the Cowley Lake Preserve Preliminary Plat and Planned Unit Development are consistent with the goals and policies of the Rogers 2040 Comprehensive Plan and meet the intent and criteria of Section 125-29 of the Zoning Code, the Subdivision Code, and Shoreland Management Ordinance of the City, and the development area shall be labeled as ADS on the zoning map per Section 125-100, Shoreland Management (per Ord 2024-10).

NOW THEREFORE, BE IT RESOLVED, BY THE CITY COUNCIL OF THE CITY OF ROGERS, MINNESOTA, that the Preliminary Plat and Master Development Plan for Cowley Lake Preserve is hereby approved with the following conditions:

1. The Applicant shall revise the preliminary plans (the development, civil plans, and preliminary plat) to the satisfaction of the Public Works Department, City Engineer, and City Planner.
2. The Applicant shall receive approval for the Stormwater Management Plan from Elm Creek Watershed Management Commission, and shall address and conform to all requirements of the Elm Creek Watershed Management Commission, including but not limited to the requisite wetland approvals and delineations, and other conditions as established.
3. The Applicant shall continue to work with Hennepin County's Natural Resources Department regarding impacts to the Conservation Easement and ensuring the development meets the terms of the Conservation Easement. Revisions to the plan may be required to satisfy the requirements of Hennepin County.
4. The Applicant shall be responsible for constructing turn lane improvements at Territorial Road at their cost. The Applicant shall meet the requirements of the Hennepin County Transportation Department and improvements shall be permitted prior to construction.
5. The Applicant shall construct the proposed trail and boardwalk improvements within the shoreland buffer and conservation easement, and construct the public improvements as shown on the plans.
6. The Shoreland Buffer shall be dedicated to the City when the public improvements are accepted by the City.
7. The Applicant shall be responsible for constructing trunk utilities through the development to Willandale Road and shall continue to review options to extend water main to the east for potential watermain looping.
8. The Applicant shall ensure the public benefits outlined in the resolution are provided.
9. A Lot Split shall be processed prior to Final Plat approval for the approximate north 20 acres of PID 21-120-23-11-0003.
10. A vacation request shall be processed prior to the plat including the existing half right of way of Hawkins Drive within the subject property.
11. The Development shall conform to the PUD rezoning, Ord. No. 2025-03, as approved by Council on April 22, 2025.

12. The Applicant shall continue to work with the City to resolve issues related to Drain Tiles, and adequately maintain Drain Tile drainage through the site to the satisfaction of the City Engineer so as to not adversely impact drainage conditions of properties downstream of the development.
13. The Applicant shall submit current title work for the Preliminary Plat and shall conform to any requirements resulting from City staff and the City Attorney's review of the title work and plat opinion.
14. The Applicant shall form a Homeowner's Association to manage and maintain shared amenities and common areas, in a form satisfactory to both City staff and the City Attorney. Said Homeowner's Association and Protective Covenants must be provided prior to the first phase Final Plan and shall be recorded with Hennepin County.
15. The applicant shall enter into a Stormwater Maintenance Agreement for the development that shall identify the terms and conditions of the Development.
16. The applicant shall enter into and execute a Subdivision Development Agreement with the City governing each phase of development in conjunction with final plat approval, of which said Subdivision Development Agreement shall outline the terms and conditions and financial obligations of the Applicant for each phase of development.
17. The Applicant shall pay to the City all applicable fees and expenses incurred by the City as related to the development.
18. Except as otherwise expressly authorized by City resolution or ordinance, all aspects of the development shall comply with all applicable state laws, city codes, ordinances, and regulations.

BE IT FURTHER RESOLVED, the City Council authorizes City staff and City consultants to take any appropriate action necessary and convenient in order to accomplish the intent of this Resolution, and to prepare any appropriate documents to facilitate the directives of the City Council as set forth in this Resolution.

Moved by Councilmember , seconded by Councilmember

The following voted in favor of said resolution:

The following voted against the same:

The following abstained:

Whereupon said resolution was declared duly passed and adopted, and was signed by the Mayor, and attested by the Clerk dated this 22nd day of April, 2025.

_____
Shannon Klick, Mayor

ATTEST:

_____
Stacie Brown, City Clerk

EXHIBIT A

COWLEY LAKE PRESERVE
LEGAL DESCRIPTIONS

Existing Legal Descriptions

Scherber Parcel (PID 21-120-23-24-0005)

Legal Description:

Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning. Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

Casco Parcel (PID 21-120-23-13-0004)

Legal Description:

That part of Government Lot 2 in Section 21, Township 120, Range 23, described as commencing at the Southwest corner thereof, thence South 89 degrees 48 minutes 24 seconds East, assumed bearing along the South line of Government Lot 2, a distance of 438.00 feet to the point of beginning; thence North 00 degrees 13 minutes 06 seconds East parallel to the West line of Government Lot 2, a distance of 874.50 feet; thence South 89 degrees 48 minutes 24 seconds East a distance of 57.00 feet; thence North 0 degrees 13 minutes 06 seconds East a distance of 891.00 feet, more or less, to the shore of Cowley Lake; thence Northeasterly along said shoreline a distance of 1043.00 feet, more or less, to the East line of Government Lot 2; thence South 00 degrees 20 minutes 20 seconds West along said East line to a point which is 1604.32 feet North of the Southeast corner of Government Lot 2; thence North 89 degrees 39 minutes 40 seconds West a distance of 154.63 feet; thence South 22 degrees 32 minutes 57 seconds West a distance of 930.19 feet; thence South 00 degrees 13 minutes 06 seconds West distance 744.43 feet to the South line of Government Lot 2; thence North 89 degrees 48 minutes 24 seconds West along said South line a distance of 387.00 feet to the point of beginning, Hennepin County, Minnesota.

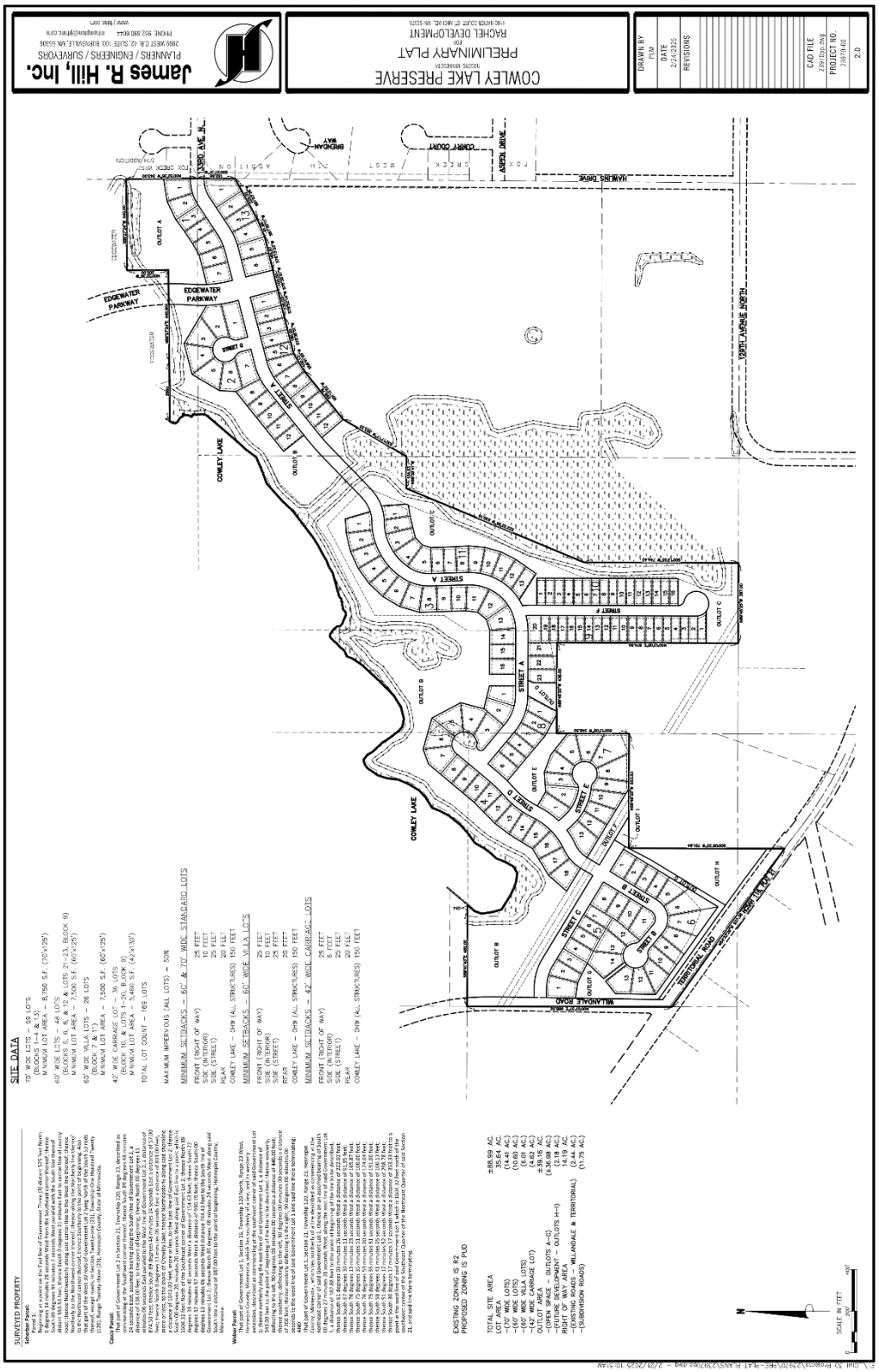
Weber Parcel (PID 21-120-23-11-0003)

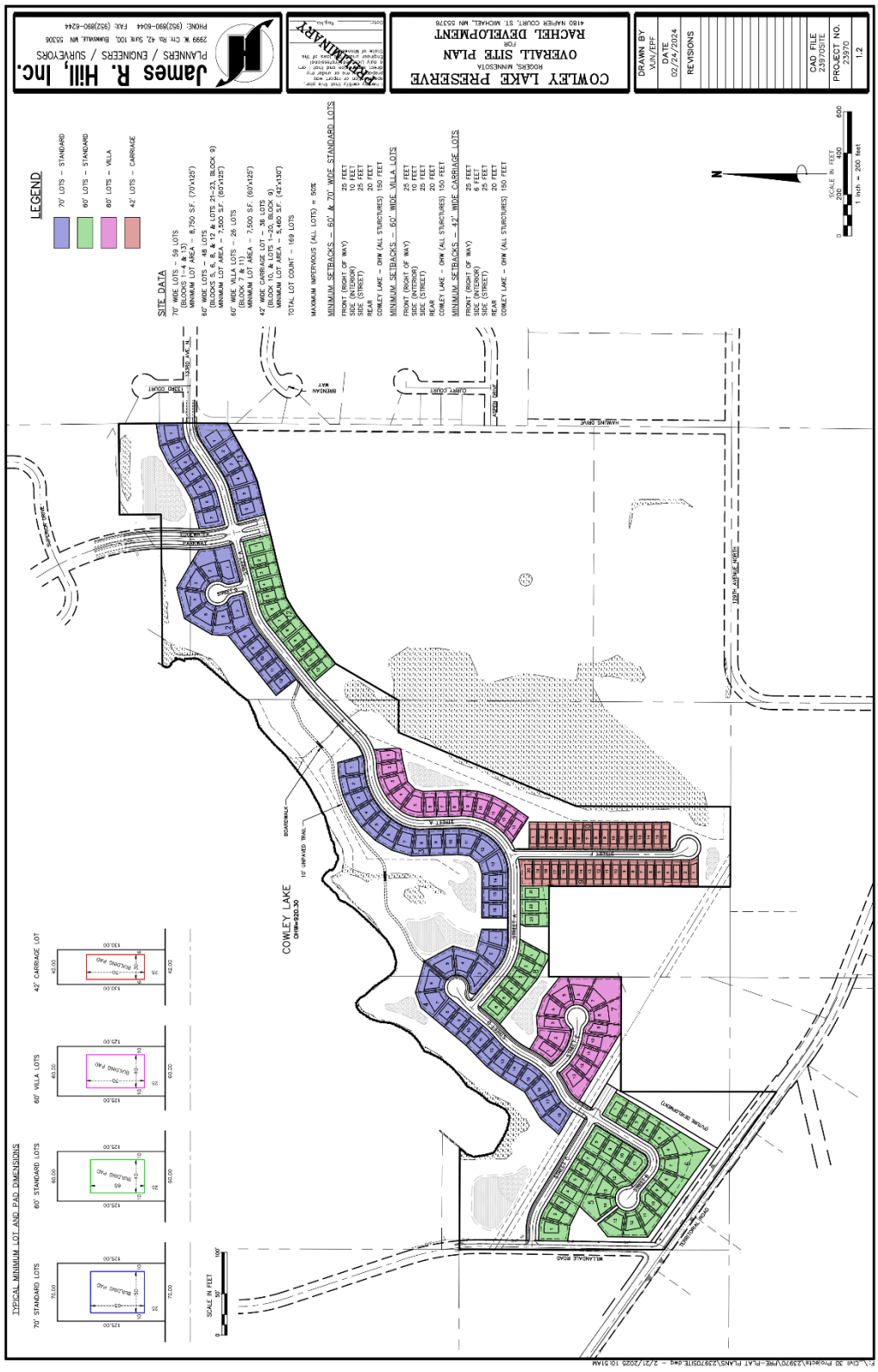
Legal Description:

That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies southerly of a line, and its westerly extension, described as commencing at the southeast corner of said Government Lot 1; thence northerly along the east line of said Government Lot 1, a distance of 343.00 feet to the point of beginning of the line to be described; thence westerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 440.00 feet; thence southerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 200 feet; thence westerly deflecting to the right, 90 degrees 00 minutes 00 seconds to the west line of said Government Lot 1 and said line there terminating;
AND
That part of Government Lot 1, Section 21, Township 120, Range 23, Hennepin County, Minnesota, which lies northerly of a line described as commencing at the northeast corner of said Government Lot 1; thence on an assumed bearing of South 00 degrees 27 minutes 31 seconds West, along the east line of said Government Lot 1, a distance of 182.88 feet to the point of beginning of the line to be described; thence South 61 degrees 03 minutes 26 seconds West a distance of 222.02 feet; thence South 67 degrees 30 minutes 11 seconds West a distance of 91.95 feet; thence South 76 degrees 13 minutes 23 seconds West a distance of 165.87 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 100.00 feet; thence South 76 degrees 59 minutes 00 seconds West a distance of 124.04 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 191.00 feet; thence South 58 degrees 41 minutes 05 seconds West a distance of 100.13 feet; thence South 51 degrees 12 minutes 52 seconds West a distance of 298.78 feet; thence South 30 degrees 17 minutes 17 seconds West a distance of 353.33 feet to a point in the west line of said Government Lot 1 which is 1604.32 feet north of the southwest corner thereof, and said line there terminating.

EXHIBIT B

COWLEY LAKE PRESERVE
MASTER DEVELOPMENT PLAN




COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
RACHEL DEVELOPMENT
OVERALL SITE PLAN
4160 VANDER COURT, ST. MICHAEL, MN 55376
PRELIMINARY
James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. City Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244
DRAWN BY
JAM
DATE
02/24/2024
REVISIONS
CAD FILE
23970SITE
PROJECT NO.
23970
1-2
LEGEND
70' LOTS - STANDARD
60' LOTS - STANDARD
60' LOTS - VILLA
42' LOTS - CARRIAGE
SITE DATA
70' WIDE LOTS - 59 LOTS
(BLOCK 1, LOTS 1-13)
MINIMUM LOT AREA - 8,750 S.F. (70'x125')
65' WIDE LOTS - 48 LOTS
(BLOCKS 5, 6, 8, & 12 & LOTS 21-23, BLOCK 9)
MINIMUM LOT AREA - 7,500 S.F. (60'x125')
60' WIDE VILLA LOTS - 26 LOTS
(BLOCK 10, & LOTS 1-20, BLOCK 9)
MINIMUM LOT AREA - 7,500 S.F. (60'x125')
42' WIDE CARRIAGE LOT - 36 LOTS
(BLOCK 10, & LOTS 1-20, BLOCK 9)
MINIMUM LOT AREA = 5,460 S.F. (42'x130')
TOTAL LOT COUNT - 169 LOTS
MAXIMUM IMPERVIOUS (ALL LOTS) = 50%
MINIMUM SETBACKS - 60' & 70' WIDE STANDARD LOTS
FRONT (RIGHT OF WAY) 25 FEET
SIDE (INTERIOR) 10 FEET
SIDE (STREET) 25 FEET
REAR 20 FEET
COWLEY LAKE - OHW (ALL STRUCTURES) 150 FEET
MINIMUM SETBACKS - 60' WIDE VILLA LOTS
FRONT (RIGHT OF WAY) 25 FEET
SIDE (INTERIOR) 10 FEET
SIDE (STREET) 25 FEET
REAR 20 FEET
COWLEY LAKE - OHW (ALL STRUCTURES) 150 FEET
MINIMUM SETBACKS - 42' WIDE CARRIAGE LOTS
FRONT (RIGHT OF WAY) 25 FEET
SIDE (INTERIOR) 6 FEET
SIDE (STREET) 25 FEET
REAR 20 FEET
COWLEY LAKE - OHW (ALL STRUCTURES) 150 FEET
SCALE IN FEET
1 inch = 200 feet
TYPICAL MINIMUM LOT AND PAD DIMENSIONS
70' STANDARD LOTS
60' STANDARD LOTS
60' VILLA LOTS
42' CARRIAGE LOT
BUILDING PAD
COWLEY LAKE
OHW=920.30
10' UNPAVED TRAIL
BOARDWALK
STREET A
STREET B
STREET C
STREET D
HAMLINE DRIVE
139TH AVENUE NORTH
BRENDAN WAY
ODEY COURT
TERRO COURT
ARDO DRIVE
WILLOW DALE ROAD
(FUTURE ALIGNMENT)
SCALE IN FEET

Rachel Development is pleased to submit the enclosed preliminary plat and Planned Unit Development (PUD) application for Cowley Lake Preserve for the City of Rogers' consideration. Additionally, we are requesting a simple subdivision of Hennepin County PID 2112023110003 to separate the project portion owned by Keith and Jody Weber ahead of the final platting process, which will occur in the coming months.

Project Overview

The subject property is located in the northeast quadrant of Willandale and Territorial Roads, extending northeasterly to the current termination of Edgewater Parkway, along the southern shore of Cowley Lake within the City of Rogers. The site encompasses approximately 87 acres, including 19 acres of delineated wetlands, wetland buffers, and conservation easements. A gas pipeline easement crosses the site from Willandale Road, running southeasterly.

The property comprises three ownership parcels:

- **Parcel 1 - PID 2112023240005:** 42 acres (owned by Marlene Scherber)
- **Parcel 2 - PID 2112023130004:** 26 acres (owned by Casco Ventures)
- **Parcel 3 - PID 2112023110003:** 19 acres- to be split (owned by Keith and Jody Weber)

Hennepin County GIS aerial maps of these parcels are included with this submission.

Background & Planning Process

The development of this property has been under discussion for several years. In March and April 2023, City staff and Rachel Development reviewed a concept development plan with the Planning Commission and City Council, featuring a range of lot sizes and single-family housing styles. The plan received positive feedback and formed the foundation for this preliminary plat/PUD application.

A key consideration in our planning process was the City's Shoreland Ordinance, which required updates to better align with the DNR's model shoreland code and the City's Comprehensive Guide Plan. As the Planning Commission and Council well know, City staff worked tirelessly with the DNR to produce an updated shoreland ordinance. The revised ordinance was approved in January 2025, and Cowley Lake Preserve complies fully with these new regulations.

Zoning & Land Use Compliance

The subject property is designated for low-density residential use in the City's 2040 Comprehensive Guide Plan, with a residential density requirement of 2 to 6 dwelling units per net acre. The property, currently used for agricultural purposes, is zoned R-2, which mandates:

- **Minimum lot width:** 65 feet

- **Minimum lot size:** 10,000 sq. ft.
- **Setbacks:** 25 ft (front), 20 ft (rear), 10 ft (side)

During the concept review discussions with Planning Commission and City Council we discussed many of the unique characteristics of the subject property that create challenges and limitations for developing the site under strict R-2 zoning standards. Strict adherence to R-2 zoning does not allow the project to meet the City's minimum density of 2 units per net acre. Through PUD flexibilities, we have designed a better-planned neighborhood that aligns with the City's goals while preserving site characteristics.

PUD Flexibilities & Benefits

Our PUD request includes provisions to:

- **Preserve wetlands and natural drainage features**
- **Ensure a smooth transition** to adjacent higher-density properties
- **Offer a variety of home types** to serve diverse household sizes and price points

A table containing our requested PUD flexibility is included with this narrative and in our project submittal. Our proposed development will also effectively serve the City's goals for obtaining a public water and sewer trunk connection from the existing termination of Edgewater Parkway through our project and connecting with Territorial Road.

Development Plan

Cowley Lake Preserve consists of 169 single-family residential lots, achieving a density of 2.32 dwelling units per net acre, consistent with low-density residential guidance. The neighborhood offers three distinct lot sizes to serve a variety of market segments:

1. **Standard Single-Family Lots (59 lots, 70' wide, 10' side yard setbacks)**
    - Larger rambler and two-story style home
    - Home sizes: 2,500+ sq. ft.
    - Price range: Upper $600Ks+
    - Product Line: M/I Homes "Prestige Series"
    - Due to impervious surface and open space requirements under the new shoreland ordinance, lot sizes are slightly below the 10,000 square foot size minimum in the R-2 district.

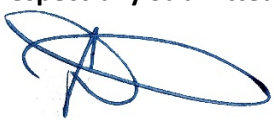
- Rachel has a project in the southeastern area of Delano called Legacy Woods that includes this home product.

2. **Medium Single-Family Lots (74 lots, 60' wide, 10' side yard setbacks, Avg. 7,500 SF)**
    - Villa homes as well as rambler and two-story style homes
    - Home sizes: 1,700–2,600 sq. ft.
    - Price range: Upper $400Ks – Mid $700Ks
    - Product Line: M/I Homes “Smart Series” & Hans Hagen Patio & Villa Homes
    - Currently being sold in numerous areas throughout the Twin Cities metro area
3. **Small Single-Family Lots (36 lots, 42' wide, 5' side yard setbacks)**
    - One and two-level homes
    - Home sizes: 1,600–2,200 sq. ft.
    - Price range: Upper $300Ks – Low $500Ks
    - Product Line: M/I Homes “Carriage Series”
    - Empty nesters as well as smaller families and single homeowners
    - These homes are well-received in neighborhoods throughout the Twin Cities.

Conclusion

We are excited to present Cowley Lake Preserve for the City Council’s review. This thoughtfully designed neighborhood balances preservation, transition, and diversity while ensuring key infrastructure connections for future development. We appreciate the City’s consideration and look forward to working together to bring this project to fruition.

Respectfully Submitted,

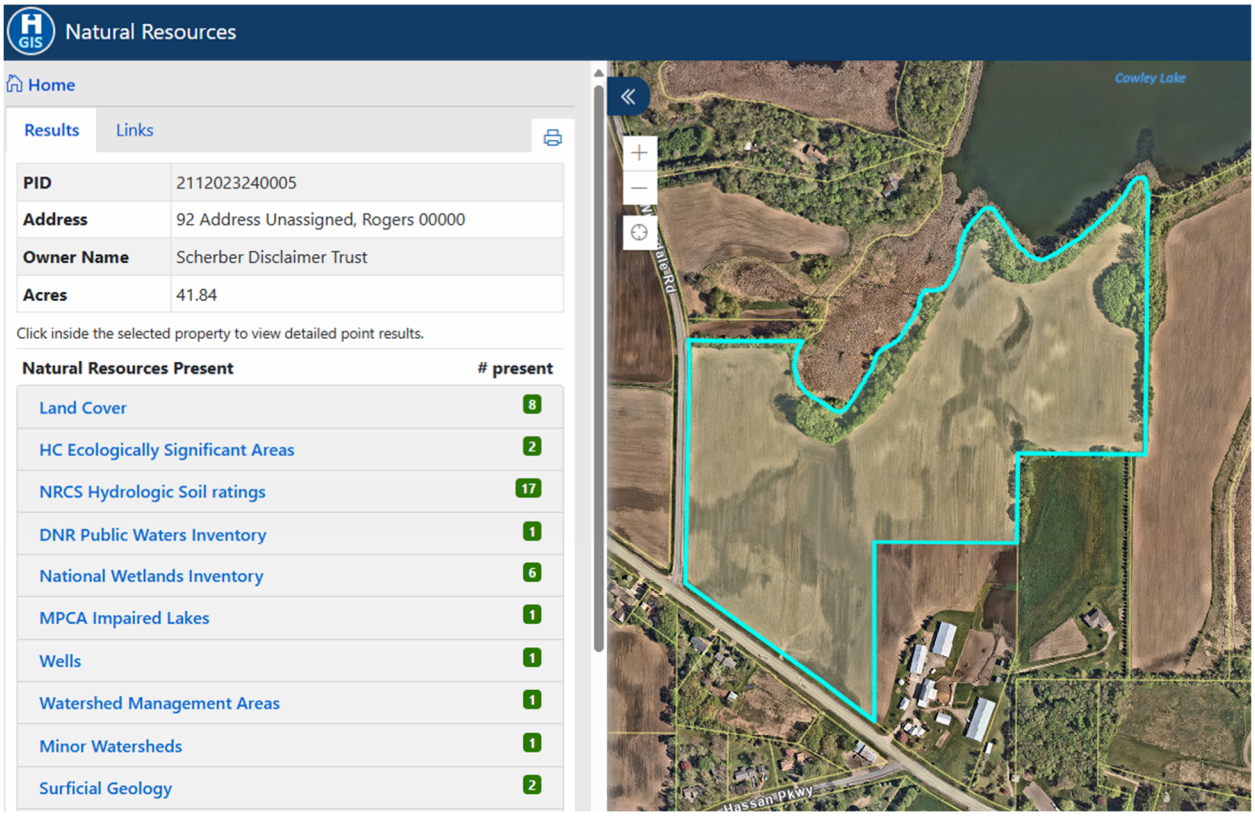


_____

Rachel Development, Inc.
David Stradtman
Vice President of Development

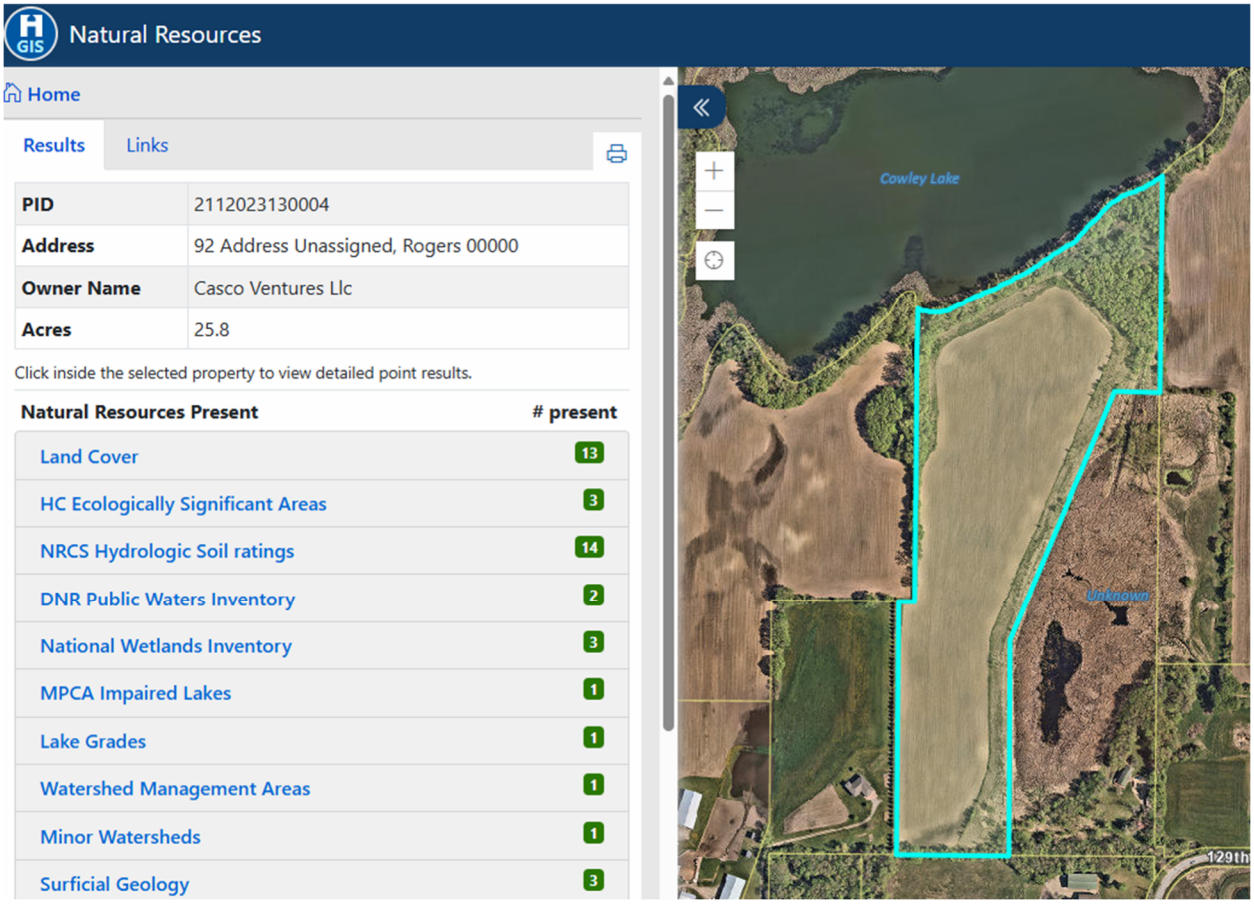
Parcel 1:

PID 2112023240005: 42 acres (owned by Marlene Scherber)



Parcel 2:

PID 2112023130004: 26 acres (owned by Casco Ventures)



Parcel 3:

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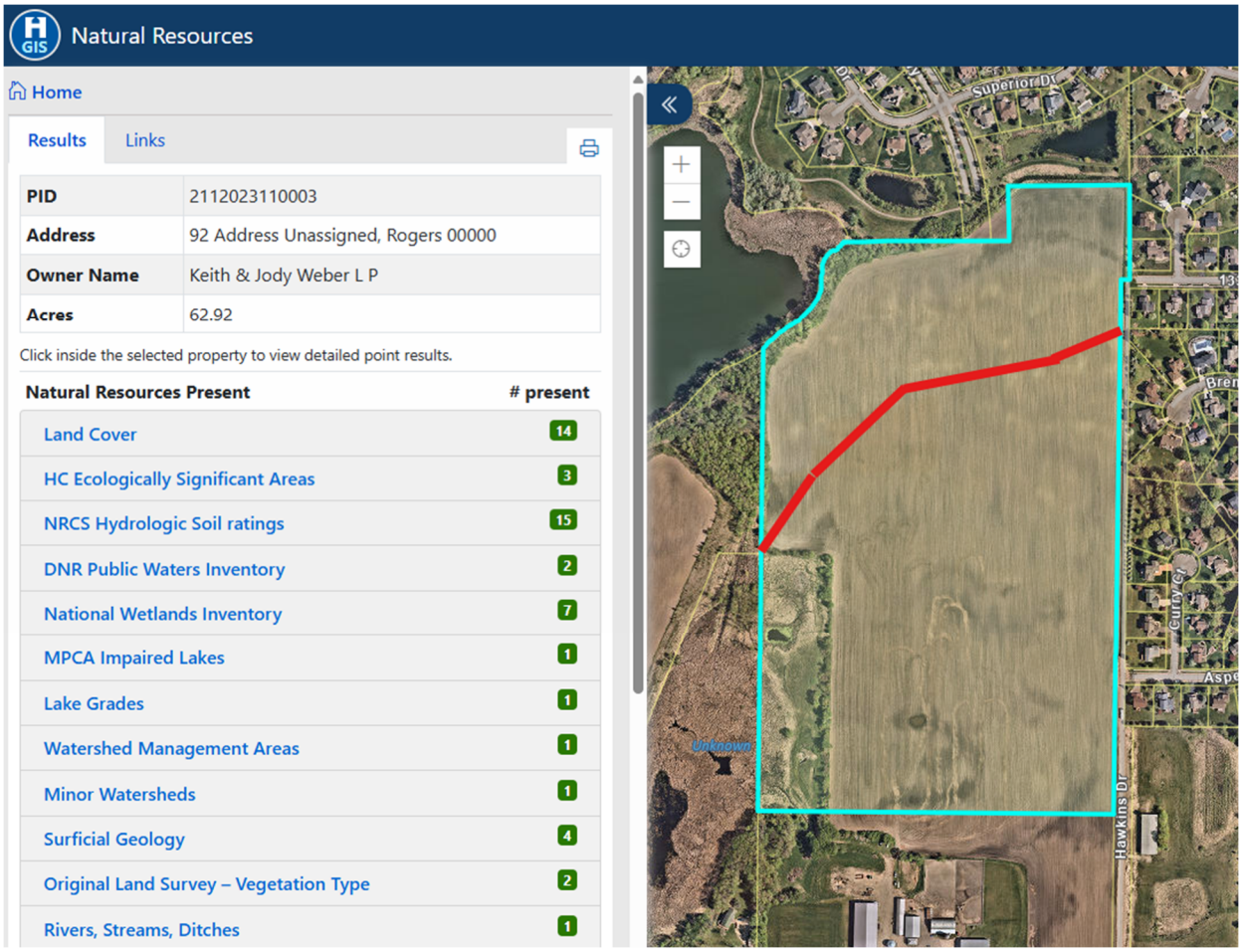


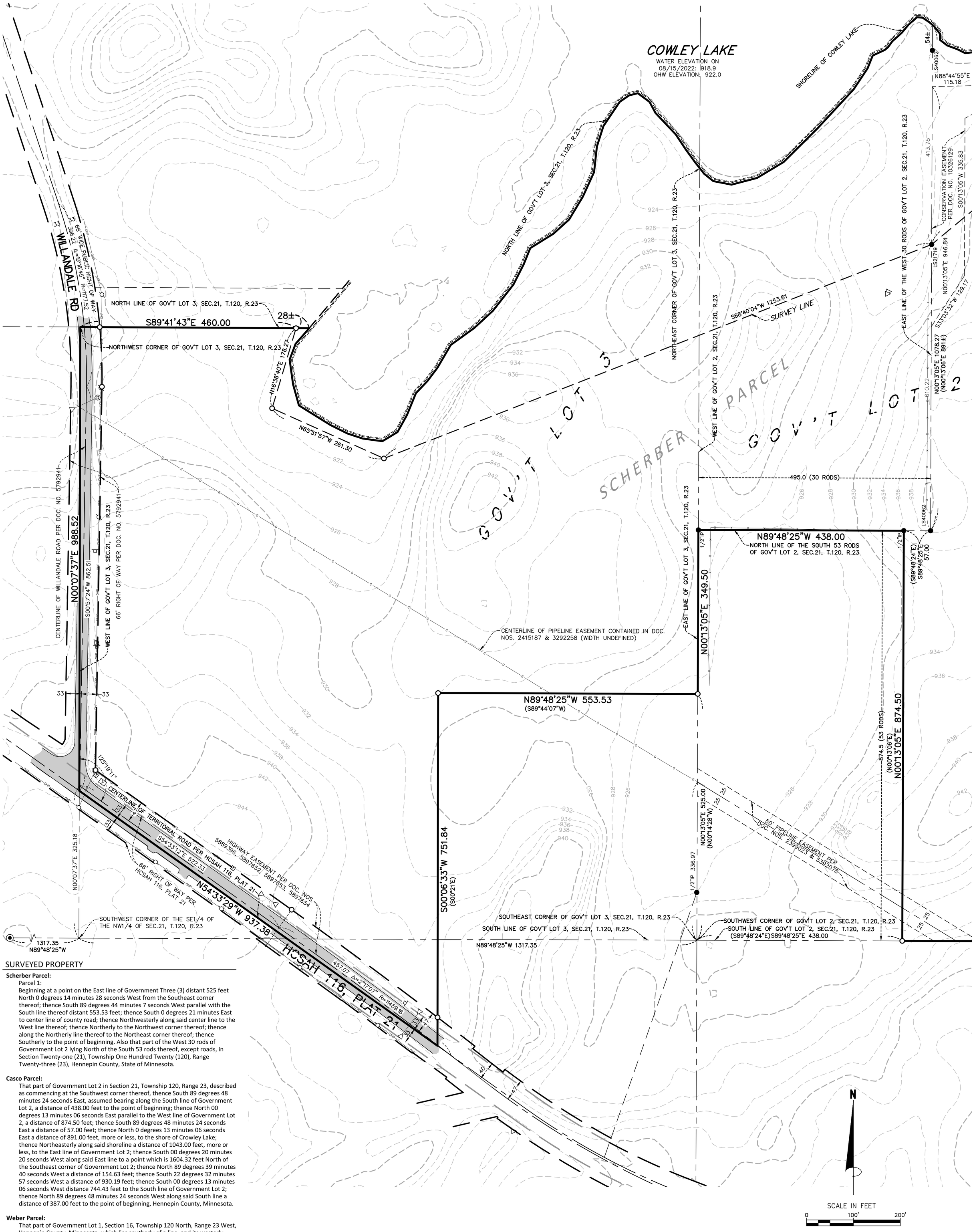
Proposed PUD Standards:

COWLEY LAKE PRESERVE

PROPOSED PUD STANDARDS

(SHORELAND ALTERNATIVE DEVELOPMENT STANDARDS, WITHIN 1000' OVERLAY AREA, ARE APPLIED)

	ROGERS R2 ZONING	70-FT WIDE LOTS 59 LOTS	60-FOOT WIDE LOTS 48 LOTS	60-FOOT WIDE LOTS 26 LOTS	42-FOOT WIDE LOTS 36 LOTS
MIN LOT WIDTH	65 FT	70 FT	60 FT	60 FT	42 FT
MIN LOT AREA	10,000 SF	8,750 SF	7,500 SF	7,500 SF	5,460 SF
FRONT SB	25 FT	25 FT	25 FT	25 FT	25 FT
SIDE YARD SB - INT	10 FT	10 FT	10 FT	10 FT	6 FT
SIDE YARD SB - COR	25 FT	25 FT	25 FT	25 FT	25 FT
REAR YARD SB	20 FT	20 FT	20 FT	20 FT	20 FT
SB TO COUNTY ROW	50 FT	50 FT	50 FT	50 FT	50 FT
MAX HARD COVER	75%	50%	50%	50%	50%
DENSITY	2.0 TO 6.0 UNITS PER ACRE	AVE DENSITY = 2.32 UNITS PER ACRE			
MAX BUILDING HT	35 FT	35 FT	35 FT	35 FT	35 FT



SURVEYED PROPERTY

Scherber Parcel:

Parcel 1:
Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning. Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

Casco Parcel:

That part of Government Lot 2 in Section 21, Township 120, Range 23, described as commencing at the Southwest corner thereof, thence South 89 degrees 48 minutes 24 seconds East, assumed bearing along the South line of Government Lot 2, a distance of 438.00 feet to the point of beginning; thence North 00 degrees 13 minutes 06 seconds East parallel to the West line of Government Lot 2, a distance of 874.50 feet; thence South 89 degrees 48 minutes 24 seconds East a distance of 57.00 feet; thence North 0 degrees 13 minutes 06 seconds East a distance of 891.00 feet, more or less, to the shore of Crowley Lake; thence Northeasterly along said shoreline a distance of 1043.00 feet, more or less, to the East line of Government Lot 2; thence South 00 degrees 20 minutes 20 seconds West along said East line to a point which is 1604.32 feet North of the Southeast corner of Government Lot 2; thence North 89 degrees 39 minutes 40 seconds West a distance of 154.63 feet; thence South 22 degrees 32 minutes 57 seconds West a distance of 930.19 feet; thence South 00 degrees 13 minutes 06 seconds West distance 744.43 feet to the South line of Government Lot 2; thence North 89 degrees 48 minutes 24 seconds West along said South line a distance of 387.00 feet to the point of beginning, Hennepin County, Minnesota.

Weber Parcel:

That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies southerly of a line, and its westerly extension, described as commencing at the southeast comer of said Government Lot 1; thence northerly along the east line of said Government Lot 1, a distance of 343.00 feet to the point of beginning of the line to be described; thence westerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 440.00 feet; thence southerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 200 feet; thence westerly deflecting to the right, 90 degrees 00 minutes 00 seconds to the west line of said Government Lot 1 and said line there terminating;
AND
That part of Government Lot 1, Section 21, Township 120, Range 23, Hennepin County, Minnesota , which lies northerly of a line described as commencing at the northeast corner of said Government Lot 1; thence on an assumed bearing of South 00 degrees 27 minutes 31 seconds West, along the east line of said Government Lot 1, a distance of 182.88 feet to the point of beginning of the line to be described; thence South 61 degrees 03 minutes 26 seconds West a distance of 222.02 feet; thence South 67 degrees 30 minutes 11 seconds West a distance of 91.95 feet; thence South 76 degrees 13 minutes 23 seconds West a distance of 165.87 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 100.00 feet; thence South 76 degrees 59 minutes 00 seconds West a distance of 124.04 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 191.00 feet; thence South 58 degrees 41 minutes 05 seconds West a distance of 100.13 feet; thence South 51 degrees 12 minutes 52 seconds West a distance of 298.78 feet; thence South 30 degrees 17 minutes 17 seconds West a distance of 353.33 feet to a point in the west line of said Government Lot 1 which is 1604.32 feet north of the southwest corner thereof, and said line there terminating.

LEGEND

- FOUND CIM
- FOUND IRON PIPE
- SET IRON PIPE
- SIGN
- TRANSFORMER
- POWER POLE
- TELEPHONE BOX
- VAULT
- CATCH BASIN
- FLARED END SECTION
- GATE VALVE
- HYDRANT
- STORM MANHOLE
- OHU — OVERHEAD UTILITY
- G — UNDERGROUND GAS
- ST — UNDERGROUND STORM
- UFO — UNDERGROUND FIBER OPTIC
- X — FENCE
- BITUMINOUS SURFACE
- GRAVEL SURFACE

VICINITY MAP & SHEET INDEX

NOT TO SCALE

SURVEY NOTES

1. The bearing system is based on the Hennepin County Coordinate System.
2. This survey is based upon Title Commitment Nos. 54769, Revision 2 (Scherber), 56284 (Casco), and 56535 (Weber), all prepared by CHB Title, LLC as agent for Old Republic National Title Insurance Company.
3. Subject property's addresses are unassigned. Its property identification numbers are 21.120.23.24.0005 (Scherber), 21.120.23.13.0004 (Casco), and 21.120.23.11.0003 (Weber).
4. Vertical relief shown hereon was obtained from the Minnesota Department of Natural Resources mapping application, MnTOPO.
5. Field work was completed 08/15/2022.
6. The gross area of the subject property is ±89 acres or ±3,876,300 sq.ft.
7. Benchmark: Top nut of hydrant at end of 133rd Ave N: 930.85 (NAVD88)

SURVEYOR'S CERTIFICATE

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota. That this survey does not purport to show all improvements, easements or encroachments, to the property except as shown thereon.

Signed this 16th day of August, 2022

Marcus F. Hampton MN Lic. No. 47481

DRAWN BY	CAD FILE	REVISIONS
MFH	23970s.dwg	A. 01/23/25: Weber Parcel Boundary
DATE	PROJECT NO.	
08/16/2022	23970-00	
SHEET 1 OF 3	FILE NO.	
	1-22-053	

SCHERBER PROPERTY

ROGERS, MINNESOTA

BOUNDARY SURVEY

FOR

RACHEL DEVELOPMENT

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 WEST C.R. 42, SUITE 100, BURNSVILLE, MN 55306
PHONE: 952.890.6044 mhampton@jrhinc.com
www.jrhinc.com

F:_Civil 3D Projects\23970\23970s.dwg – 1/23/2025 11:08AM

LEGEND

- FOUND CIM
- FOUND IRON PIPE
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- SIGN
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N

SCALE IN FEET
0 100' 200'

COWLEY LAKE
WATER ELEVATION ON
08/15/2022: 918.9
OHW ELEVATION: 922.0

SHORELINE OF COWLEY LAKE

54±
S40062
N88°44'55"E
115.18

CONSERVATION EASEMENT
PER DOC. NO. 10306709
N64°05'09"E 333.21
S61°55'10"W 490.38
N55°06'06"E 211.70
N44°00'55"E 175.92
N64°44'04"E 144.31
152±
1/2"IP
734±
581.73
SURVEY LINE
WEST LINE OF GOV'T LOT 1, SEC.21, T.120, R.23
CONSERVATION EASEMENT
PER DOC. NO. 10326129
APPROXIMATE LOCATION
OF 60' WIDE "BAND FOR
ROAD AND EASEMENT
PER DOC. NO. 1032619
N45°41'27"W 261.70
S50°19'08"W 1093.92
S30°17'17"W 353.33
LS7439
LS7439
154.63
N89°39'41"W
(N89°39'40"W)

NORTH LINE OF GOV'T LOT 3, SEC.21, T.120, R.23
NORTHEAST CORNER OF GOV'T LOT 3, SEC.21, T.120, R.23
S68°40'04"W 1253.61'
SURVEY LINE
WEST LINE OF GOV'T LOT 2, SEC.21, T.120, R.23
EAST LINE OF THE WEST 30 RODS OF GOV'T LOT 2, SEC.21, T.120, R.23
413.75
CONSERVATION EASEMENT
PER DOC. NO. 10326129
S00°13'05"W 335.83
LS21719
N00°13'05"E 946.84
S33°03'32"W 129.17
N00°13'05"E 1078.27
(N00°13'06"E 891±)
610.22
LS40062
SCHERBER PARCEL
GOV'T LOT 3
GOV'T LOT 2
CASCO PARCEL
495.0 (30 RODS)
N89°48'25"W 438.00
NORTH LINE OF THE SOUTH 53 RODS
OF GOV'T LOT 2, SEC.21, T.120, R.23
1/2"IP
(S89°48'24"E)
S89°48'25"E
57.00
EAST LINE OF GOV'T LOT 3, SEC.21, T.120, R.23
N00°13'05"E 349.50
CENTERLINE OF PIPELINE EASEMENT CONTAINED IN DOC.
NOS. 2415187 & 3292258 (WIDTH UNDEFINED)
N89°48'25"W 553.53
(S89°44'07"W)
874.5 (53 RODS)
(N00°13'06"E)
N00°13'05"E 874.50
N00°13'05"E 525.00
(N00°14'28"W)
25 25
50' PIPELINE EASEMENT PER
DOC. NOS. 2399025 & 5392078
1/2"IP 336.97
N00°13'05"E 449.60
CONSERVATION EASEMENT
PER DOC. NO. 10326129
N21°38'44"E 237.88
N00°13'05"E
54.26
N89°48'25"W 156.82
S00°13'05"W 744.43
(S00°13'06"W)
LS7439
LS7439
LS40062
1604.32
939.32
EAST LINE OF GOV'T LOT 2, SEC.21, T.120, R.23
SOUTHWEST CORNER OF GOV'T LOT 1, SEC.21, T.120, R.23
S22°32'56"W 930.19
(S22°32'57"W)
N22°32'56"E 1130.94
SOUTHEAST CORNER OF GOV'T LOT 3, SEC.21, T.120, R.23
SOUTH LINE OF GOV'T LOT 3, SEC.21, T.120, R.23
N89°48'25"W 1317.35
SOUTHWEST CORNER OF GOV'T LOT 2, SEC.21, T.120, R.23
(S89°48'24"E)S89°48'25"E 438.00
SOUTH LINE OF GOV'T LOT 2, SEC.21, T.120, R.23
387.00
N89°48'25"W
SOUTHEAST CORNER OF GOV'T LOT 2, SEC.21, T.120, R.23
504.68
33 33 33
INGRESS & EGRESS EASEMENT
PER DOC. NO. 8727188
75 75
129TH AVE N
33 33

SURVEYED PROPERTY

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Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning. Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

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SURVEYED PROPERTY CONTINUED

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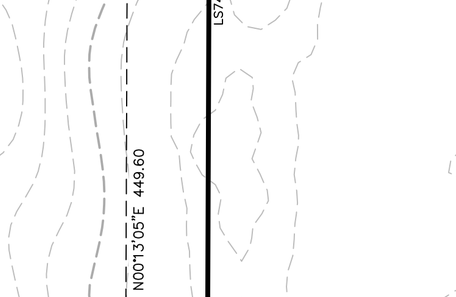
VICINITY MAP

NOT TO SCALE



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7. Benchmark: Top nut of hydrant at end of 133rd Ave N: 930.85 (NAVD88)

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SHEET 2 OF 3	FILE NO.	
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SCHERBER PROPERTY
ROGERS, MINNESOTA
BOUNDARY SURVEY
FOR
RACHEL DEVELOPMENT

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 WEST C.R. 42, SUITE 100, BURNSVILLE, MN 55306
PHONE: 952.890.6044 mhampton@jrhinc.com
www.jrhinc.com

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LEGEND

- FOUND CIM
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- FENCE
- BITUMINOUS SURFACE
- GRAVEL SURFACE

N

SCALE IN FEET
0 100' 200'

EDGEWATER

EDGEWATER PKWY
100' WIDE PUBLIC RIGHT OF WAY
50 50

S89°27'24"W 440.00
1/2"IP 1/2"IP
90° 90°
N00°32'36"W 200.00
288±
N89°27'24"E 440.90
90° 90°

EAST LINE OF GOV'T LOT 1, SEC.16, T.120, R.23
N00°32'36"W 343.00

FOX CREEK WEST 5TH ADDITION
133RD CT
30 30

GOV'T LOT 1, SEC. 15

SOUTHEAST CORNER OF GOV'T LOT 1, SEC.16, T.120, R.23
930.85 BM TNH
NORTH LINE OF GOV'T LOT 1, SEC.21, T.120, R.23
NORTHEAST CORNER OF GOV'T LOT 1, SEC.21, T.120, R.23
133RD AVE N
33 33

182.88 S00°27'31"W

WEST LINE OF GOV'T LOT 1, SEC.16, T.120, R.23
COWLEY LAKE
WATER ELEVATION ON 08/15/2022: 918.9
OHW ELEVATION: 922.0
SHORELINE OF COWLEY LAKE

S39°00'00"W 723.86
SURVEY LINE

WEBER PARCEL

GOV'T LOT 1, SEC. 21

HAWKINS DRIVE RIGHT OF WAY PER DOC. NO. 5792941

222.02 S61°03'26"W
91.95 S67°30'11"W
165.87 S76°13'23"W
100.00 S75°35'51"W
124.04 S76°59'00"W
191.00 S75°35'51"W
100.13 S58°41'05"W
S51°12'52"W 298.78
S30°17'17"W 353.33

N64°44'04"E 144.31
152±
1/2"IP
N44°00'55"E 175.92
N55°06'06"E 211.70
CONSERVATION EASEMENT PER DOC. NO. 10326129
734±
WEST LINE OF GOV'T LOT 1, SEC.21, T.120, R.23
N45°41'27"W 261.70
APPROXIMATE LOCATION OF 60' WIDE "BAND FOR ROAD AND EASEMENT" PER DOC. NO. 1032619
581.73

LS7439 LS7439
154.63
N89°39'41"W
(N89°39'40"W)

N22°32'56"E 1130.94
S22°32'56"W 930.19
(S22°32'57"W)

EAST LINE OF GOV'T LOT 2, SEC.21, T.120, R.23
939.32
1604.32
LS40062

SOUTH LINE OF GOV'T LOT 1, SEC.21, T.120, R.23
LS40062

HAWKINS DRIVE RIGHT OF WAY PER FOX CREEK WEST 7TH ADDITION
EAST LINE OF GOV'T LOT 1, SEC.21, T.120, R.23
33' WIDE PUBLIC RIGHT OF WAY
HAWKINS DRIVE (UNIMPROVED)

FOX CREEK WEST 7TH ADDITION
BRENDAN WAY
CURRY COURT
ASPEN DRIVE
30 30
33 33

SURVEYED PROPERTY

Scherber Parcel:

Parcel 1:
Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning. Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

Casco Parcel:

That part of Government Lot 2 in Section 21, Township 120, Range 23, described as commencing at the Southwest corner thereof, thence South 89 degrees 48 minutes 24 seconds East, assumed bearing along the South line of Government Lot 2, a distance of 438.00 feet to the point of beginning; thence North 00 degrees 13 minutes 06 seconds East parallel to the West line of Government Lot 2, a distance of 874.50 feet; thence South 89 degrees 48 minutes 24 seconds East a distance of 57.00 feet; thence North 0 degrees 13 minutes 06 seconds East a distance of 891.00 feet, more or less, to the shore of Crowley Lake; thence Northeasterly along said shoreline a distance of 1043.00 feet, more or less, to the East line of Government Lot 2; thence South 00 degrees 20 minutes 20 seconds West along said East line to a point which is 1604.32 feet North of the Southeast corner of Government Lot 2; thence North 89 degrees 39 minutes 40 seconds West a distance of 154.63 feet; thence South 22 degrees 32 minutes 57 seconds West a distance of 930.19 feet; thence South 00 degrees 13 minutes 06 seconds West distance 744.43 feet to the South line of Government Lot 2; thence North 89 degrees 48 minutes 24 seconds West along said South line a distance of 387.00 feet to the point of beginning, Hennepin County, Minnesota.

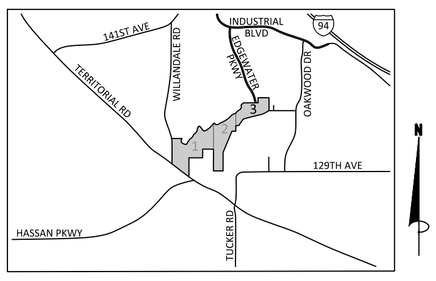
SURVEYED PROPERTY CONTINUED

Weber Parcel:

That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies southerly of a line, and its westerly extension, described as commencing at the southeast comer of said Government Lot 1; thence northerly along the east line of said Government Lot 1, a distance of 343.00 feet to the point of beginning of the line to be described; thence westerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 440.00 feet; thence southerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 200 feet; thence westerly deflecting to the right, 90 degrees 00 minutes 00 seconds to the west line of said Government Lot 1 and said line there terminating;
AND
That part of Government Lot 1, Section 21, Township 120, Range 23, Hennepin County, Minnesota , which lies northerly of a line described as commencing at the northeast corner of said Government Lot 1; thence on an assumed bearing of South 00 degrees 27 minutes 31 seconds West, along the east line of said Government Lot 1, a distance of 182.88 feet to the point of beginning of the line to be described; thence South 61 degrees 03 minutes 26 seconds West a distance of 222.02 feet; thence South 67 degrees 30 minutes 11 seconds West a distance of 91.95 feet; thence South 76 degrees 13 minutes 23 seconds West a distance of 165.87 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 100.00 feet; thence South 76 degrees 59 minutes 00 seconds West a distance of 124.04 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 191.00 feet; thence South 58 degrees 41 minutes 05 seconds West a distance of 100.13 feet; thence South 51 degrees 12 minutes 52 seconds West a distance of 298.78 feet; thence South 30 degrees 17 minutes 17 seconds West a distance of 353.33 feet to a point in the west line of said Government Lot 1 which is 1604.32 feet north of the southwest corner thereof, and said line there terminating.

VICINITY MAP

NOT TO SCALE



SURVEY NOTES

1. The bearing system is based on the Hennepin County Coordinate System.
2. This survey is based upon Title Commitment Nos. 54769, Revision 2 (Scherber), 56284 (Casco), and 56535 (Weber), all prepared by CHB Title, LLC as agent for Old Republic National Title Insurance Company.
3. Subject property's addresses are unassigned. Its property identification numbers are 21.120.23.24.0005 (Scherber), 21.120.23.13.0004 (Casco), and 21.120.23.11.0003 (Weber).
4. Vertical relief shown hereon was obtained from the Minnesota Department of Natural Resources mapping application, MnTOPO.
5. Field work was completed 08/15/2022.
6. The gross area of the subject property is ±89 acres or ±3,876,300 sq.ft.
7. Benchmark: Top nut of hydrant at end of 133rd Ave N: 930.85 (NAVD88)

DRAWN BY	CAD FILE	REVISIONS
MFH	23970s.dwg	A. 01/23/25: Weber Parcel Boundary
DATE	PROJECT NO.	
08/16/2022	23970-00	
SHEET 3 OF 3	FILE NO.	
	1-22-053	

SCHERBER PROPERTY

ROGERS, MINNESOTA

BOUNDARY SURVEY

FOR

RACHEL DEVELOPMENT

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 WEST C.R. 42, SUITE 100, BURNSVILLE, MN 55306
PHONE: 952.890.6044 mhampton@jrhinc.com
www.jrhinc.com

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BENCHMARKS

#1 TOP NUT HYDRANT EAST PROPERTY LINE, NORTH SIDE OF 133RD AVE N ELEV=930.85

COWLEY LAKE PRESERVE

ROGERS, MINNESOTA

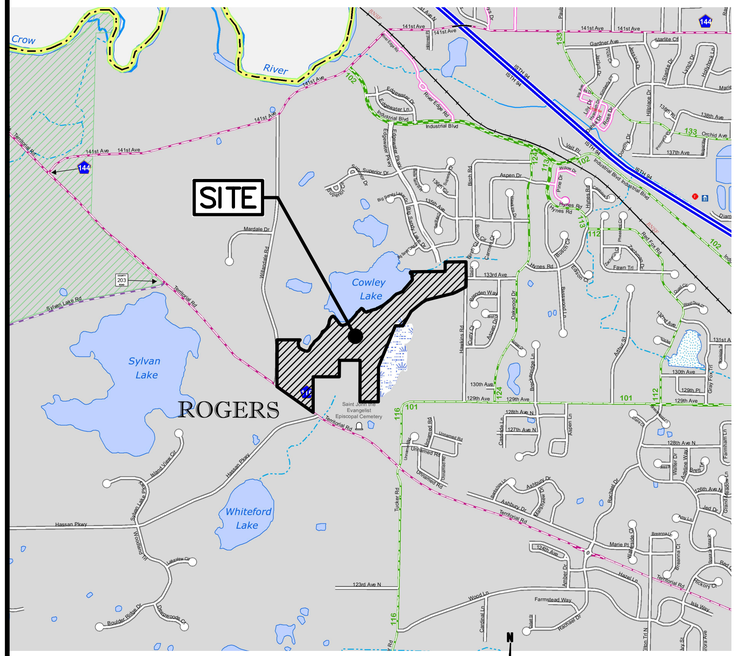
PRELIMINARY PLAT EXHIBITS

FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

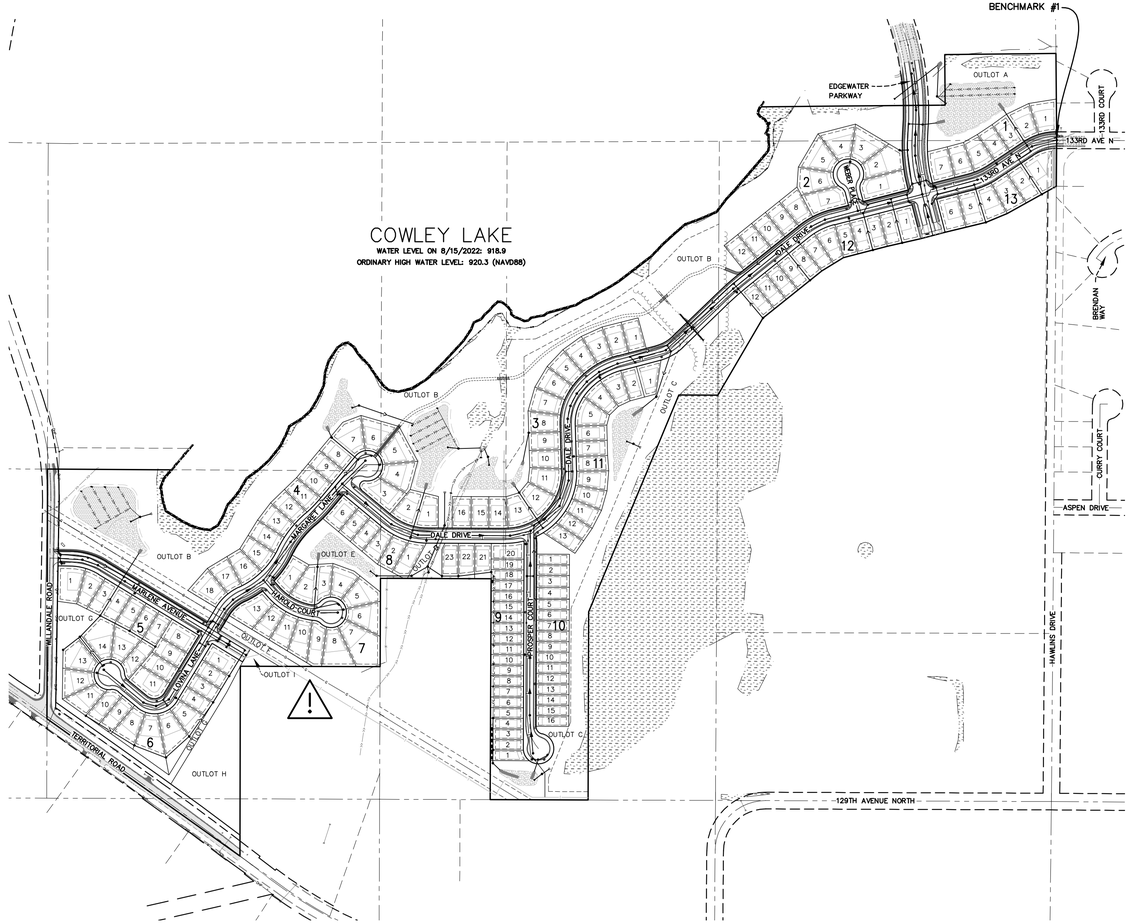
PHONE: (763) 424-1525



LOCATION MAP

1" = 1600'

PROJECT COORDINATES
N 45° 11' 30"
W 93° 35' 40"



INDEX

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LEGEND

EXISTING WATERMAIN
EXISTING SANITARY SEWER
EXISTING SANITARY FORCEMAIN
EXISTING STORM SEWER
EXISTING UNDERGROUND GAS
EXISTING UNDERGROUND ELECTRIC
EXISTING UNDERGROUND TELEPHONE
EXISTING UNDERGROUND FIBER OPTIC
EXISTING OVERHEAD POWER LINE
EXISTING ELECTRIC OUTLET POST
EXISTING GUY WIRE
EXISTING LIGHT POLE
EXISTING MANHOLE (WATER)
EXISTING SIGN
EXISTING TRANSFORMER
EXISTING TELEPHONE PEDESTAL
EXISTING TV PEDESTAL
EXISTING VAULT
EXISTING CURB & GUTTER
EXISTING RETAINING WALL
EXISTING FENCE
EXISTING CONTOUR
EXISTING WETLAND EDGE
EXISTING SOIL BORING LOCATION
EXISTING TREELINE/TREES
EXISTING ASPHALT
EXISTING CONCRETE
EXISTING GRAVEL
EXISTING WETLAND
PROPOSED WATERMAIN
PROPOSED SANITARY SEWER
PROPOSED SANITARY SERVICE
PROPOSED WATER SERVICE
PROPOSED STORM SEWER
PROPOSED CURB & GUTTER
PROPOSED CONCRETE
PROPOSED ASPHALT SURFACE
PROPOSED SEDIMENT BASIN

SITE DATA

70' WIDE LOTS – 59 LOTS
(BLOCKS 1–4 & 13)
MINIMUM LOT AREA – 8,750 S.F. (70'x125')

60' WIDE LOTS – 48 LOTS
(BLOCKS 5, 6, 8, & 12 & LOTS 21–23, BLOCK 9)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

60' WIDE VILLA LOTS – 26 LOTS
(BLOCK 7 & 11)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

42' WIDE CARRIAGE LOT – 36 LOTS
(BLOCK 10, & LOTS 1–20, BLOCK 9)
MINIMUM LOT AREA – 5,460 S.F. (42'x130')

TOTAL LOT COUNT – 169 LOTS

MAXIMUM IMPERVIOUS (ALL LOTS) = 50%

EXISTING ZONING IS R2
PROPOSED ZONING IS PUD

TOTAL SITE AREA	±88.99 AC.
LOT AREA	35.64 AC.
–(70' WIDE LOTS)	(14.41 AC.)
–(60' WIDE LOTS)	(10.60 AC.)
–(60' WIDE VILLA LOTS)	(6.01 AC.)
–(42' WIDE CARRIAGE LOT)	(4.62 AC.)
OUTLOT AREA	±39.16 AC.
–(OPEN SPACE – OUTLOTS A–G)	(±36.98 AC.)
–(FUTURE DEVELOPMENT – OUTLOTS H–I)	(2.18 AC.)
RIGHT OF WAY AREA	14.19 AC.
–(EXISTING ROADS – WILLANDALE & TERRITORIAL)	(2.44 AC.)
–(SUBDIVISION ROADS)	(11.75 AC.)

MINIMUM SETBACKS – 60' & 70' WIDE STANDARD LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

MINIMUM SETBACKS – 60' WIDE VILLA LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

MINIMUM SETBACKS – 42' WIDE CARRIAGE LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	6 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

WARNING!
UNDERGROUND HIGH PRESSURE PIPELINE CONTACT ENERGY TRANSFER REPRESENTATIVE AT 1–800–753–5531 PRIOR TO PERFORMING WORK WITHIN THE PIPELINE EASEMENT

PROJECT CONTACTS

PROJECT ENGINEER:	RICK L. OSBERG, P.E. – JAMES R. HILL, INC.	952–890–6044 (O)
DEVELOPER:	DAVID STRADTMAN – RACHEL DEVELOPMENT	763–424–1525 (O)
CITY ENGINEER:	DORAN COTE	763–428–8580 (O)
NPDES OFFICER:	JOSH NORMAN – MPCA	651–757–2389 (O)
GENERAL CONTRACTOR REPRESENTATIVE:	TBD	

Know what's **below.** **Call** before you dig.

N

SCALE IN FEET
0 300 600 900
1 inch = 300 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
TITLE SHEET
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/JSO

DATE
02/24/2025

REVISIONS
03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970TS

PROJECT NO.
23970

1.0

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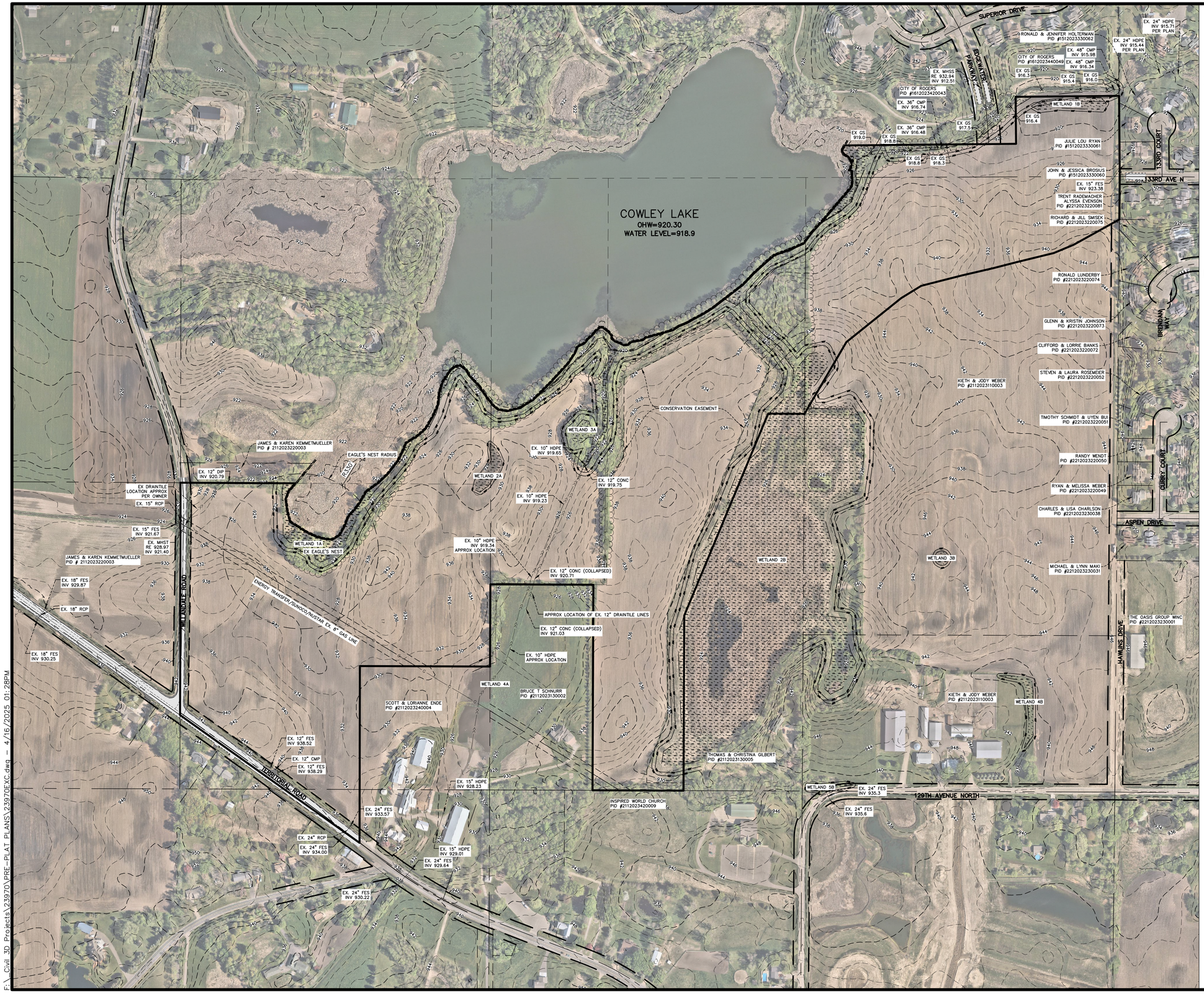

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING OVERHEAD POWER LINE
- EXISTING LIGHT POLE
- EXISTING TRANSFORMER
- EXISTING TELEPHONE PEDESTAL
- EXISTING TV PEDESTAL
- EXISTING CURB & GUTTER
- EXISTING FENCE
- EXISTING CONTOUR
- EXISTING WETLAND EDGE
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- EXISTING WETLAND

NOTE

1. DRAINTILE LOCATIONS ARE APPROXIMATE AND SHOWN PER FIELD LOCATES AND/OR OWNER TESTIMONY.

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
EXISTING CONDITIONS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	VUN
DATE	02/24/2025
REVISIONS	
03/19/2025 MPCA REVIEW SUBMITTAL	
04/04/2025 PARTIAL CITY COMMENTS	
04/15/2025 WATERSHED COMMENTS	
CAD FILE	23970EXC
PROJECT NO.	23970
	1.1

Know what's **below.** **Call** before you dig.

N

SCALE IN FEET
0 200 400 600
1 inch = 200 feet

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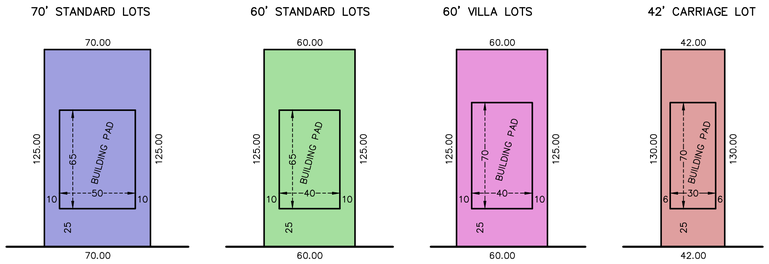
TYPICAL MINIMUM LOT AND PAD DIMENSIONS



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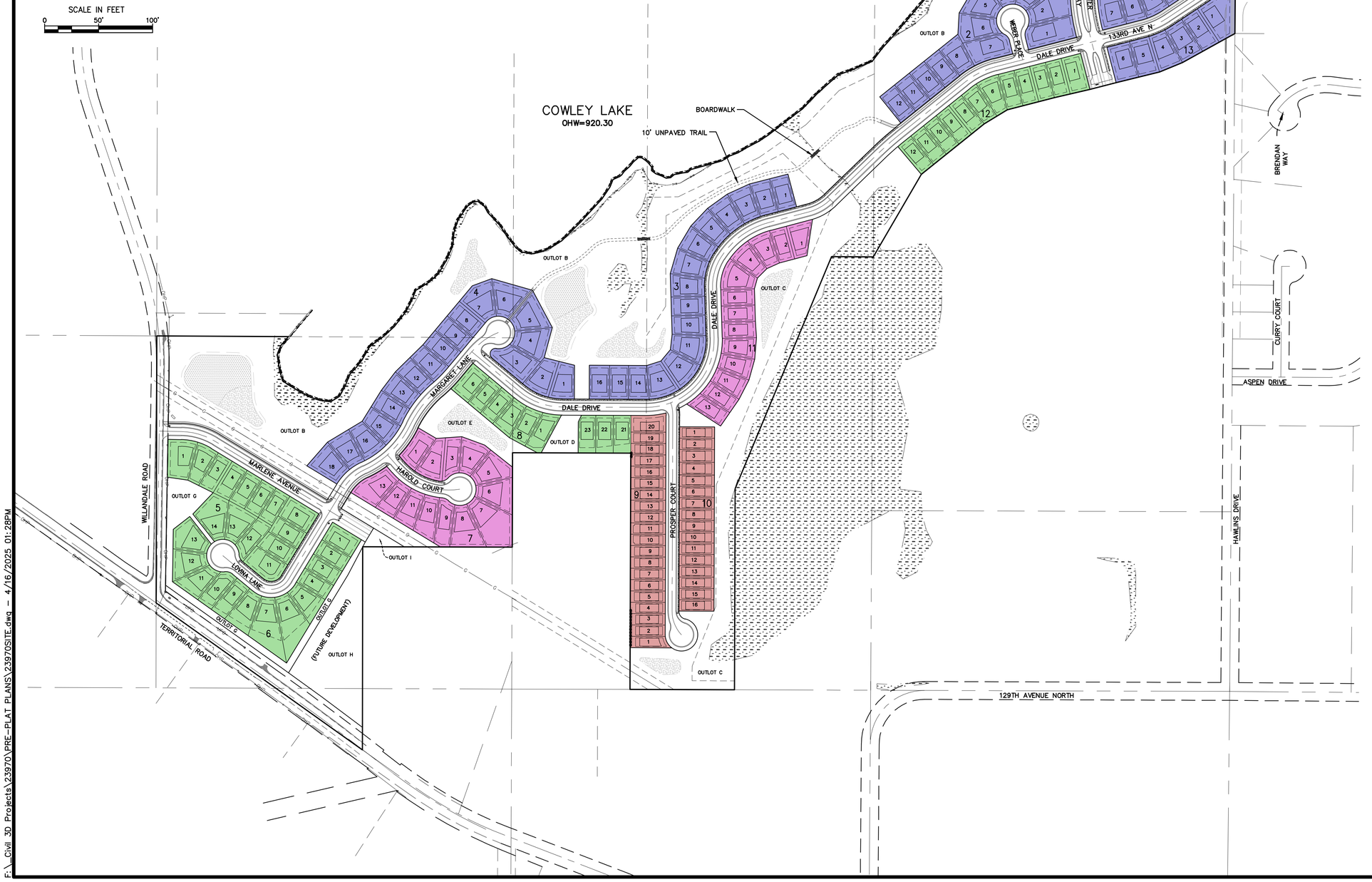

LEGEND

- 70' LOTS – STANDARD
- 60' LOTS – STANDARD
- 60' LOTS – VILLA
- 42' LOTS – CARRIAGE

SITE DATA

70' WIDE LOTS – 59 LOTS
(BLOCKS 1–4 & 13)
MINIMUM LOT AREA – 8,750 S.F. (70'x125')

60' WIDE LOTS – 48 LOTS
(BLOCKS 5, 6, 8, & 12 & LOTS 21–23, BLOCK 9)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

60' WIDE VILLA LOTS – 26 LOTS
(BLOCK 7 & 11)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

42' WIDE CARRIAGE LOT – 36 LOTS
(BLOCK 10, & LOTS 1–20, BLOCK 9)
MINIMUM LOT AREA – 5,460 S.F. (42'x130')

TOTAL LOT COUNT – 169 LOTS

MAXIMUM IMPERVIOUS (ALL LOTS) = 50%

MINIMUM SETBACKS – 60' & 70' WIDE STANDARD LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STURCTURES)	150 FEET

MINIMUM SETBACKS – 60' WIDE VILLA LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STURCTURES)	150 FEET

MINIMUM SETBACKS – 42' WIDE CARRIAGE LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	6 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STURCTURES)	150 FEET

N

SCALE IN FEET
0 200 400 600
1 inch = 200 feet

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Date: Reg.No.
PRELIMINARY

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
OVERALL SITE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF

DATE
02/24/2025

REVISIONS
03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970SITE

PROJECT NO.
23970

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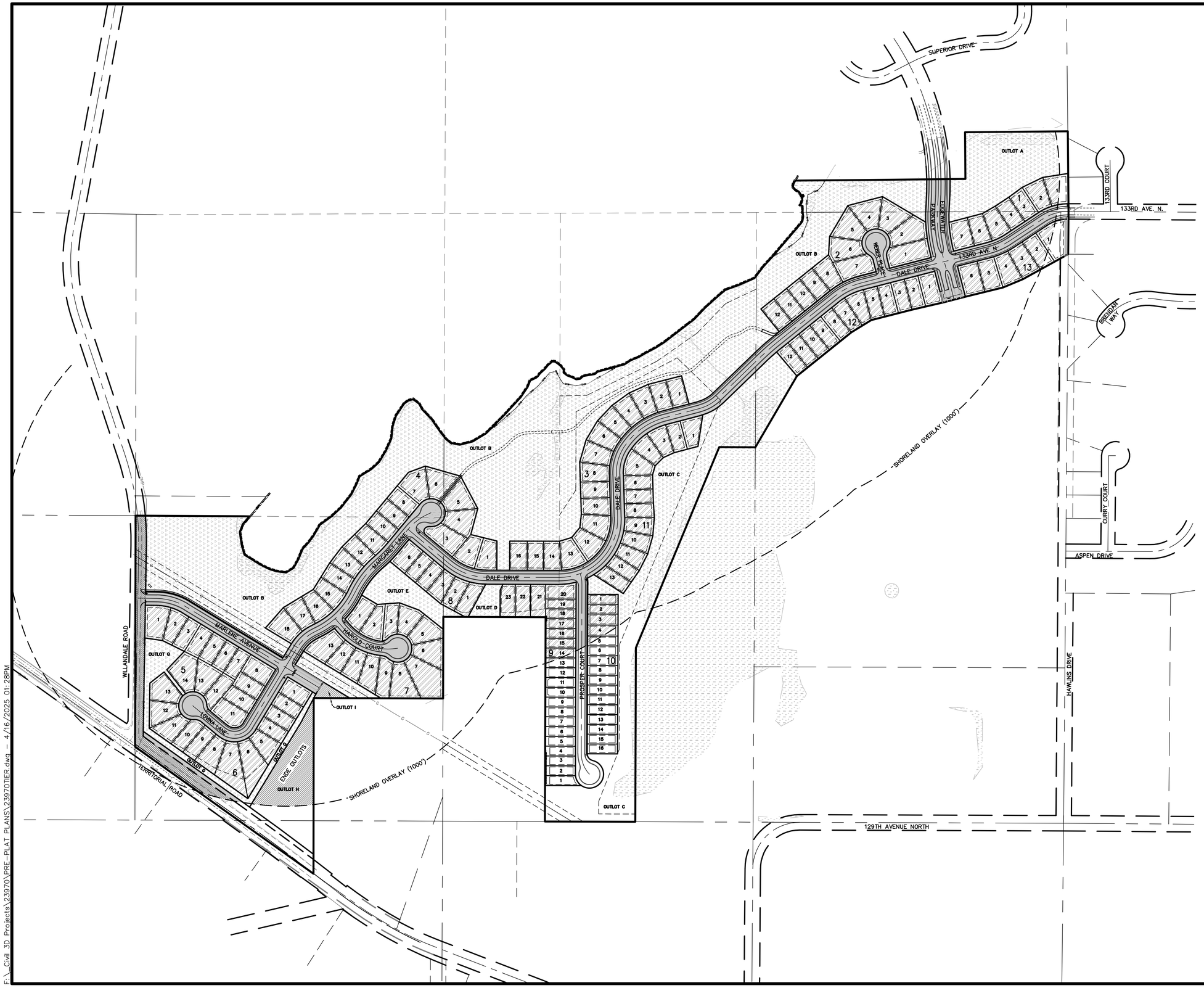

LEGEND

- DELINEATED WETLAND
- RIGHT-OF-WAY (TERRITORIAL/WILLANDALE)
- ENDE OUTLOTS
- OPEN SPACE
- PROPOSED RIGHT-OF-WAY
- PROPOSED LOT AREA

PROJECT AREA SUMMARY

COMPUTE NET PROJECT AREA	
GROSS AREA (AREA WITHIN 1000 FT OF OHW AND HAVING AN ELEVATION ABOVE OT OHW.)	79.19 AC
SUBTRACT EXISTING ROW (WILLANDALE & TERRITORIAL)	-1.44 AC
SUBTRACT PROPOSED ROW	-11.04 AC
SUBTRACT OUTLOTS TO BE DEEDED TO ENDE	-1.51 AC
NET PROJECT AREA	65.20 AC

COMPUTE PROJECT IMPERVIOUS	
PROPOSED LOT AREA	32.01 AC
PROPOSED IMPERVIOUS (50% OF LOT AREA = 32.01 X 0.5)	16.01 AC
% IMPERVIOUS (IMPERVIOUS AREA / NET PROJECT AREA = 16.01/65.20)	24.6 %
MAXIMUM IMPERVIOUS ALLOWABLE	25.0 %

COMPUTE OPEN SPACE	
PROPOSED OPEN SPACE (NET PROJECT AREA - LOT AREA)	33.17 AC
% OPEN SPACE (OPEN SPACE AREA / NET PROJECT AREA = 33.17/65.20)	50.9 %
MINIMUM OPEN SPACE REQUIRED	35.0 %

N

SCALE IN FEET
0 200 400 600
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PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
SHORELAND OVERLAY EXHIBIT
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970TIER

PROJECT NO.
23970

1.3

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SURVEYED PROPERTY

Scherber Parcel:

Parcel 1:
Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning. Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

Casco Parcel:

That part of Government Lot 2 in Section 21, Township 120, Range 23, described as commencing at the Southwest corner thereof, thence South 89 degrees 48 minutes 24 seconds East, assumed bearing along the South line of Government Lot 2, a distance of 438.00 feet to the point of beginning; thence North 00 degrees 13 minutes 06 seconds East parallel to the West line of Government Lot 2, a distance of 874.50 feet; thence South 89 degrees 48 minutes 24 seconds East a distance of 57.00 feet; thence North 0 degrees 13 minutes 06 seconds East a distance of 891.00 feet, more or less, to the shore of Crowley Lake; thence Northeasterly along said shoreline a distance of 1043.00 feet, more or less, to the East line of Government Lot 2; thence South 00 degrees 20 minutes 20 seconds West along said East line to a point which is 1604.32 feet North of the Southeast corner of Government Lot 2; thence North 89 degrees 39 minutes 40 seconds West a distance of 154.63 feet; thence South 22 degrees 32 minutes 57 seconds West a distance of 930.19 feet; thence South 00 degrees 13 minutes 06 seconds West distance 744.43 feet to the South line of Government Lot 2; thence North 89 degrees 48 minutes 24 seconds West along said South line a distance of 387.00 feet to the point of beginning, Hennepin County, Minnesota.

Weber Parcel:

That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies southerly of a line, and its westerly extension, described as commencing at the southeast comer of said Government Lot 1; thence northerly along the east line of said Government Lot 1, a distance of 343.00 feet to the point of beginning of the line to be described; thence westerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 440.00 feet; thence southerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 200 feet; thence westerly deflecting to the right, 90 degrees 00 minutes 00 seconds to the west line of said Government Lot 1 and said line there terminating; AND
That part of Government Lot 1, Section 21, Township 120, Range 23, Hennepin County, Minnesota , which lies northerly of a line described as commencing at the northeast corner of said Government Lot 1; thence on an assumed bearing of South 00 degrees 27 minutes 31 seconds West, along the east line of said Government Lot 1, a distance of 182.88 feet to the point of beginning of the line to be described; thence South 61 degrees 03 minutes 26 seconds West a distance of 222.02 feet; thence South 67 degrees 30 minutes 11 seconds West a distance of 91.95 feet; thence South 76 degrees 13 minutes 23 seconds West a distance of 165.87 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 100.00 feet; thence South 76 degrees 59 minutes 00 seconds West a distance of 124.04 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 191.00 feet; thence South 58 degrees 41 minutes 05 seconds West a distance of 100.13 feet; thence South 51 degrees 12 minutes 52 seconds West a distance of 298.78 feet; thence South 30 degrees 17 minutes 17 seconds West a distance of 353.33 feet to a point in the west line of said Government Lot 1 which is 1604.32 feet north of the southwest corner of the Southeast Quarter of the Northeast Quarter of said Section 21, and said line there terminating.

EXISTING ZONING IS R2
PROPOSED ZONING IS PUD

TOTAL SITE AREA	±88.99 AC.
LOT AREA	35.59 AC.
–(70' WIDE LOTS)	(14.37 AC.)
–(60' WIDE LOTS)	(10.60 AC.)
–(60' WIDE VILLA LOTS)	(6.00 AC.)
–(42' WIDE CARRIAGE LOT)	(4.62 AC.)
OUTLOT AREA	±39.22 AC.
–(OPEN SPACE – OUTLOTS A–G)	(±37.04 AC.)
–(FUTURE DEVELOPMENT – OUTLOTS H–I)	(2.18 AC.)
RIGHT OF WAY AREA	14.18 AC.
–(EXISTING ROADS – WILLANDALE & TERRITORIAL)	(2.44 AC.)
–(SUBDIVISION ROADS)	(11.74 AC.)

SITE DATA

70' WIDE LOTS – 59 LOTS
(BLOCKS 1–4 & 13)
MINIMUM LOT AREA – 8,750 S.F. (70'x125')

60' WIDE LOTS – 48 LOTS
(BLOCKS 5, 6, 8, & 12 & LOTS 21–23, BLOCK 9)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

60' WIDE VILLA LOTS – 26 LOTS
(BLOCK 7 & 11)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

42' WIDE CARRIAGE LOT – 36 LOTS
(BLOCK 10, & LOTS 1–20, BLOCK 9)
MINIMUM LOT AREA – 5,460 S.F. (42'x130')

TOTAL LOT COUNT – 169 LOTS

MAXIMUM IMPERVIOUS (ALL LOTS) = 50%

MINIMUM SETBACKS – 60' & 70' WIDE STANDARD LOTS

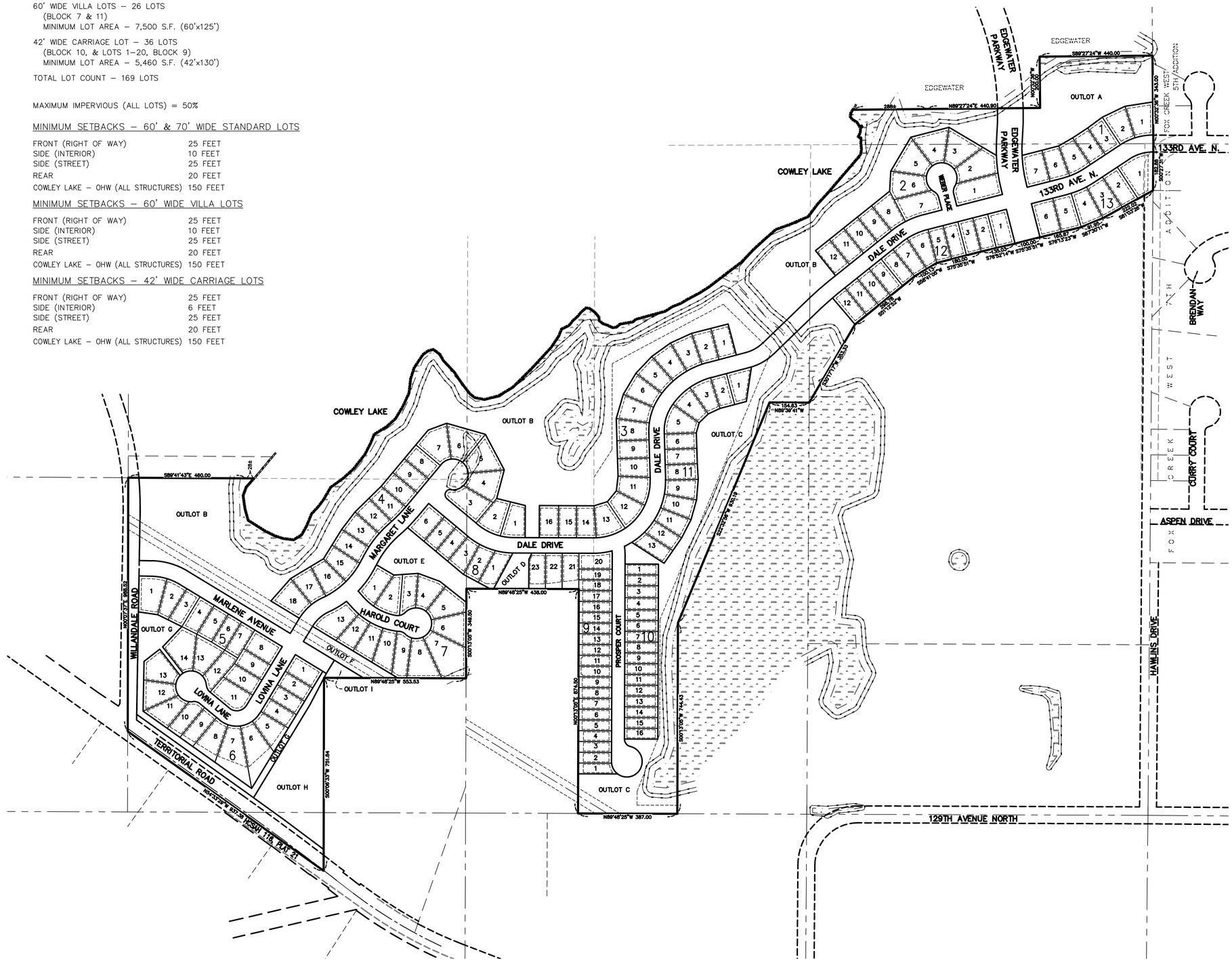
FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

MINIMUM SETBACKS – 60' WIDE VILLA LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

MINIMUM SETBACKS – 42' WIDE CARRIAGE LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	6 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET



N

SCALE IN FEET
0 200' 400'

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 WEST C.R. 42, SUITE 100, BURNSVILLE, MN 55306
PHONE: 952.890.6044 mhampton@jrhinc.com
www.jrhinc.com

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
PRELIMINARY PLAT
FOR
RACHEL DEVELOPMENT
4180 NAPPER COURT, ST. MICHAEL, MN 55376

DRAWN BY
PLM
DATE
2/24/2025
REVISIONS
A 04/04/25: STREET NAMES
CAD FILE
23970pp.dwg
PROJECT NO.
23970-00
2.0

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EDGEWATER

EDGEWATER PARKWAY

EDGEWATER

S89°27'24"W 440.00

N00°32'36"W 200.00

OUTLOT A
128094 S.F.

180.78

N00°32'36"W 343.00

FOX CREEK WEST 5TH ADDITION

288±

N89°27'24"E 440.90

275.00

50.00 50.00 65.90

50 50 50

107.94

R=1125.00
112.32 Δ=5°43'13"

116.70

50 50

75.66

68.01

EDGEWATER PARKWAY

R=69.00
69.27 Δ=58°25'40"

COWLEY LAKE

153.44 153.44 214.71

140.28 140.28 140.28

4
12778 S.F.

3
12778 S.F.

5
12778 S.F.

2
14342 S.F.

47.17 47.17

69.95

78.51

6
12488 S.F.

60.00 60.00

WEBER PLACE

1
15473 S.F.

7
13644 S.F.

10.35 31.82 85.0 48.59 183.71 15.59

69.54

37.63 90.76 135.80 96.17 173.55

8
9939 S.F.

75.73

30 30 30

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COWLEY LAKE PRESERVE
ROGERS, MINNESOTA

PRELIMINARY PLAT
FOR
RACHEL DEVELOPMENT
4160 NAPPER COURT, ST. MICHAEL, MN 55376

DRAWN BY	PLM
DATE	2/24/2025
REVISIONS	A 04/04/25: STREET NAMES
CAD FILE	23970pp-2.dwg
PROJECT NO.	23970-00
	2.2

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COWLEY LAKE

OUTLOT B
±1008269

OUTLOT C
343025 S.F.

OUTLOT D
14079 S.F.

OUTLOT E
43412 S.F.

DALE DRIVE
311.46

MARGARET LANE

PROSPER COURT

N89°39'41"W 154.63

N89°48'25"W 438.00

S22°32'56"W 930.19

SCALE IN FEET
0 50' 100'

James R. Hill, Inc.
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COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
FOR
RACHEL DEVELOPMENT
4180 WAPPEN COURT, ST. MICHAEL, MN 55376

PRELIMINARY PLAT

DRAWN BY
PLM

DATE
2/24/2025

REVISIONS
A 04/04/25: STREET NAMES

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PROJECT NO.
23970-00

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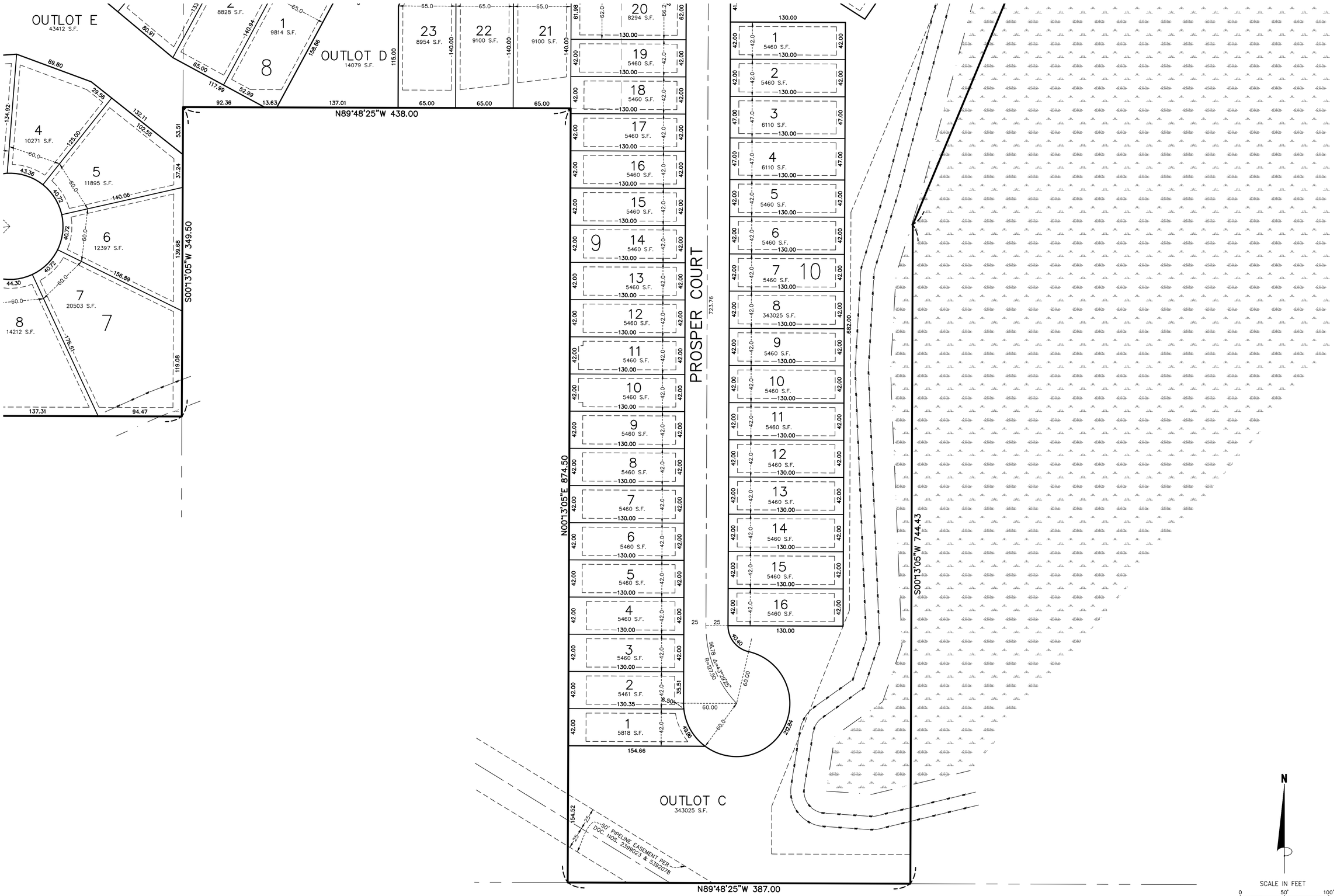

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COWLEY LAKE PRESERVE

ROGERS, MINNESOTA

PRELIMINARY PLAT

FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

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PROJECT NO.	23970-00
	2.4

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COWLEY LAKE

OUTLOT B
±1008269

S89°41'43"E 460.00
418.44

28±

WILLANDALE ROAD
N00°07'37"E 988.52
625.85
851.69
399.66

WILLANDALE ROAD

MARLENE AVENUE

MARGARET LANE

MARGARET LANE

HAROLD COURT

LOVINA LANE

OUTLOT G
53602 S.F.

OUTLOT E
43412 S.F.

OUTLOT F
22977

OUTLOT I
5336 S.F.

OUTLOT G
53602 S.F.

OUTLOT H
89641 S.F.

PROPOSED GASLINE CONFINEMENT EASEMENT BY OTHERS

PROPOSED GASLINE CONFINEMENT EASEMENT BY OTHERS

N89°48'25"W 553.53

S00°13'05"W 349.50

SCALE IN FEET
0 50' 100'

N

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COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
PRELIMINARY PLAT
FOR
RACHEL DEVELOPMENT
4160 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	PLM
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	2.5

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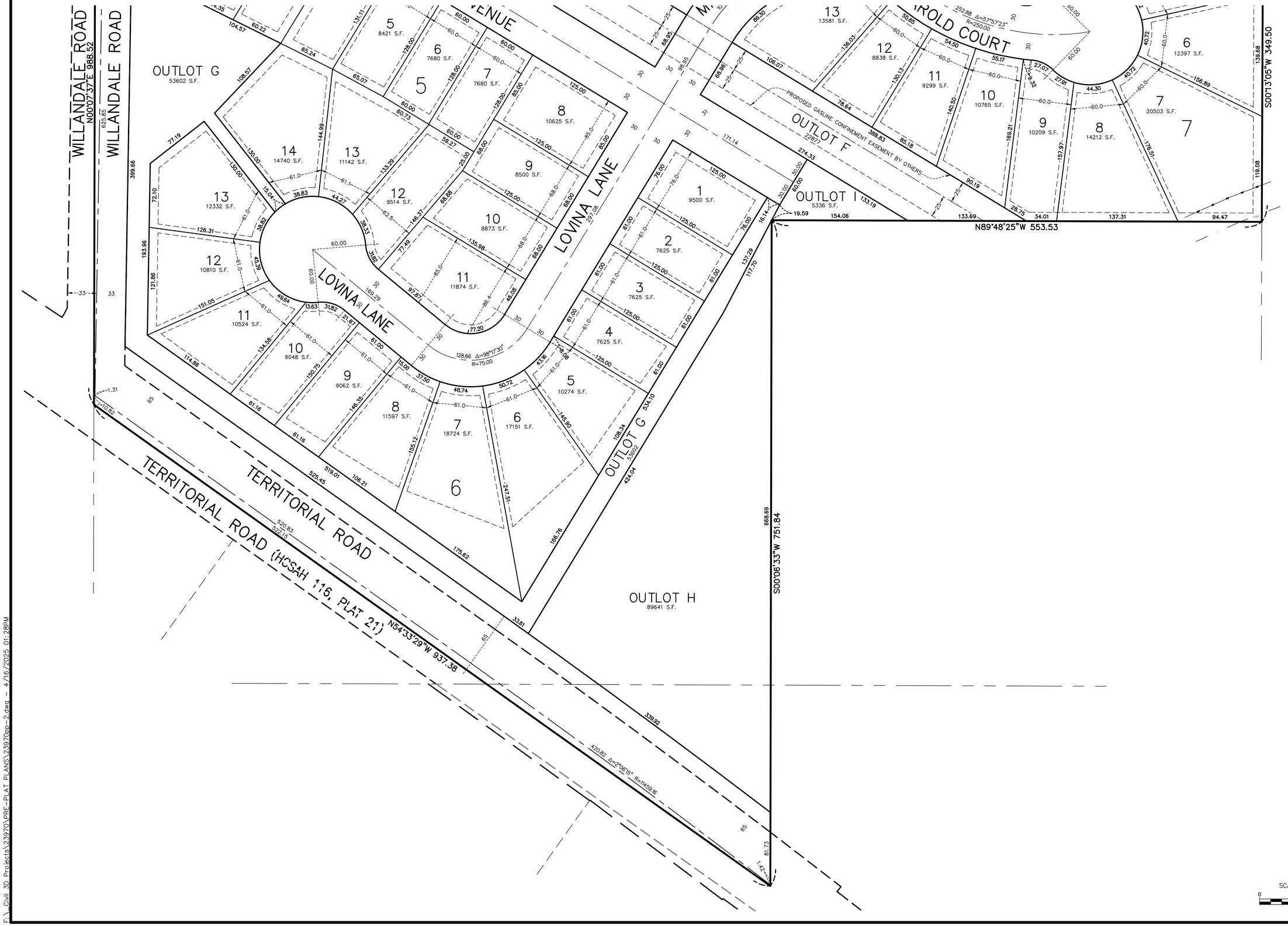

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COWLEY LAKE PRESERVE
ROGERS, MINNESOTA

PRELIMINARY PLAT
FOR
RACHEL DEVELOPMENT
4160 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	PLM
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PROJECT NO.	23970-00
	2.6

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LEGEND

- EXISTING WATERMAIN
- EXISTING RAW WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING OVERHEAD POWER LINE
- EXISTING ELECTRIC OUTLET POST
- EXISTING GUY WIRE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (WATER)
- EXISTING SIGN
- EXISTING TRANSFORMER
- EXISTING TELEPHONE PEDESTAL
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING CONTOUR
- EXISTING WETLAND EDGE
- EXISTING WETLAND BUFFER

- SB-1 EXISTING SOIL BORING LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- EXISTING WETLAND

- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONTOUR
- PROPOSED GRADING LIMITS
- PROPOSED EMERGENCY OVERFLOW

- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED INFILTRATION BASIN
- PROPOSED SILT FENCE
- PROPOSED SILT FENCE POST CONSTRUCTION
- PROPOSED WIMCO OR EQUAL POST STORM SEWER CONSTRUCTION
- PROPOSED YARD CB INLET PROTECTION POST STORM SEWER CONSTRUCTION
- PROPOSED DITCH CHECK – POST GRADING/UTILITY CONSTRUCTION
- PROPOSED TEMPORARY ROCK CONSTRUCTION ENTRANCE
- PROPOSED EROSION CONTROL BLANKET
- PROPOSED BWSR SEED MIX 33-261
- PROPOSED BWSR SEED MIX 32-231

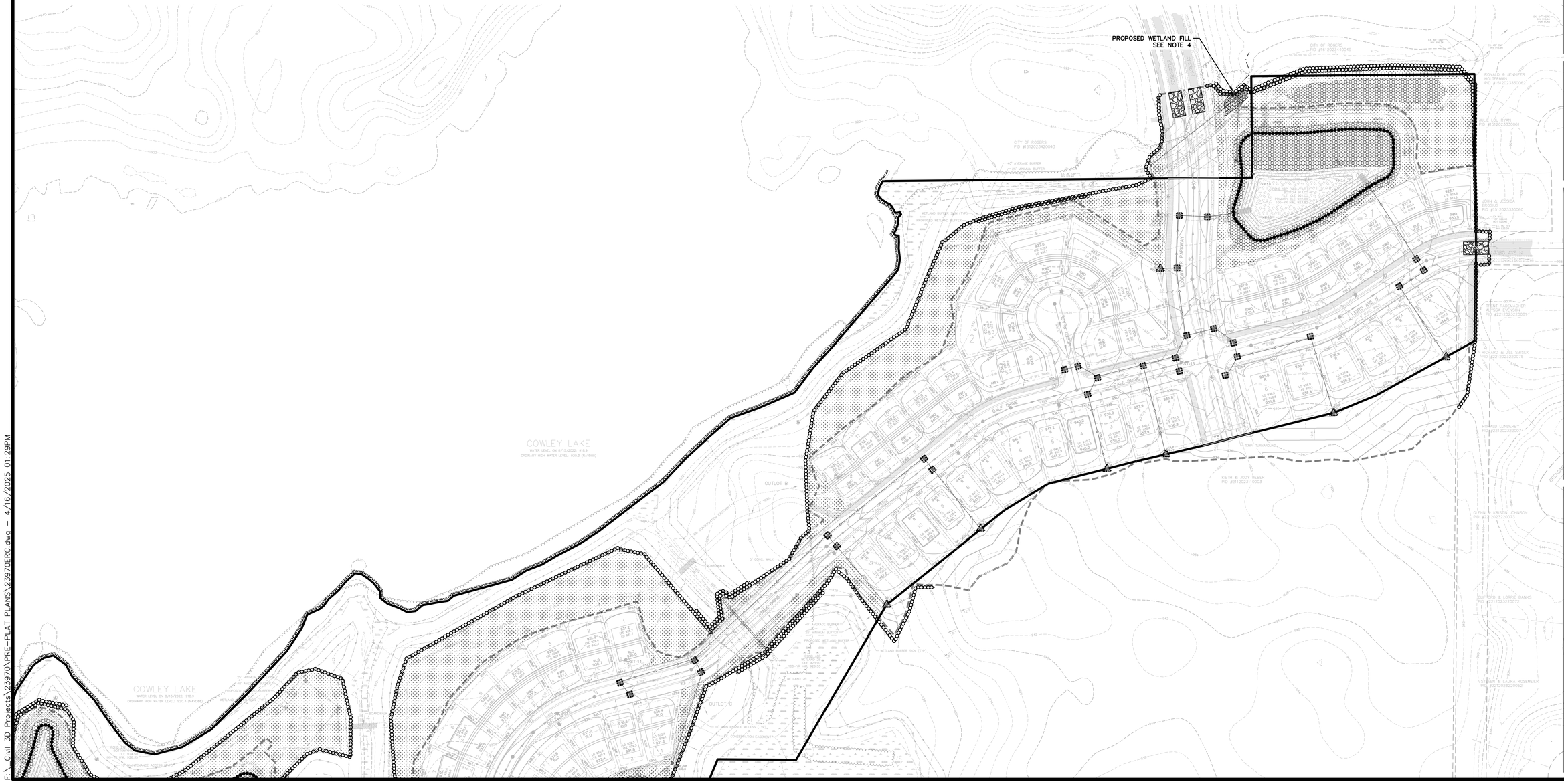
NOTES

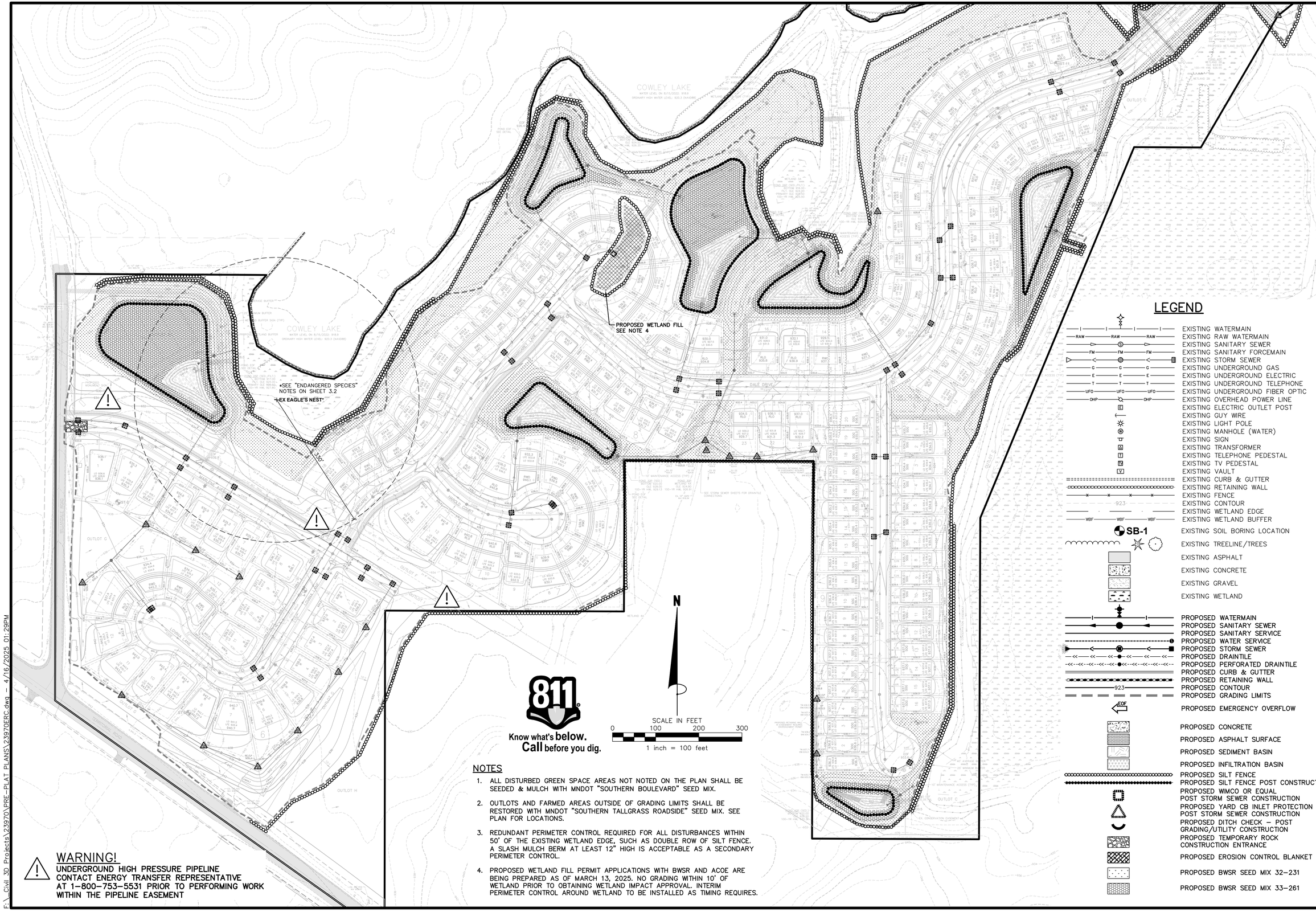
1. ALL DISTURBED GREEN SPACE AREAS NOT NOTED ON THE PLAN SHALL BE SEEDED & MULCH WITH MNDOT "SOUTHERN BOULEVARD" SEED MIX.
2. OUTLOTS AND FARMED AREAS OUTSIDE OF GRADING LIMITS SHALL BE RESTORED WITH MNDOT "SOUTHERN TALLGRASS ROADSIDE" SEED MIX. SEE PLAN FOR LOCATIONS.
3. REDUNDANT PERIMETER CONTROL REQUIRED FOR ALL DISTURBANCES WITHIN 50' OF THE EXISTING WETLAND EDGE, SUCH AS DOUBLE ROW OF SILT FENCE. A SLASH MULCH BERM AT LEAST 12" HIGH IS ACCEPTABLE AS A SECONDARY PERIMETER CONTROL.
4. PROPOSED WETLAND FILL PERMIT APPLICATIONS WITH BWSR AND ACOE ARE BEING PREPARED AS OF MARCH 13, 2025. NO GRADING WITHIN 10' OF WETLAND PRIOR TO OBTAINING WETLAND IMPACT APPROVAL. INTERIM PERIMETER CONTROL AROUND WETLAND TO BE INSTALLED AS TIMING REQUIRES.

Know what's **below.** **Call** before you dig. 811

N

SCALE IN FEET
0 100 200 300
1 inch = 100 feet





811 Know what's **below.** **Call** before you dig.

LEGEND

- EXISTING WATERMAIN
- EXISTING RAW WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
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- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING CONTOUR
- EXISTING WETLAND EDGE
- EXISTING WETLAND BUFFER
- EXISTING SOIL BORING LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- EXISTING WETLAND
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- PROPOSED STORM SEWER
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- PROPOSED SILT FENCE POST CONSTRUCTION
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- PROPOSED DITCH CHECK – POST GRADING/UTILITY CONSTRUCTION
- PROPOSED TEMPORARY ROCK CONSTRUCTION ENTRANCE
- PROPOSED EROSION CONTROL BLANKET
- PROPOSED BWSR SEED MIX 32–231
- PROPOSED BWSR SEED MIX 33–261

NOTES

1. ALL DISTURBED GREEN SPACE AREAS NOT NOTED ON THE PLAN SHALL BE SEEDED & MULCH WITH MNDOT "SOUTHERN BOULEVARD" SEED MIX.
2. OUTLOTS AND FARMED AREAS OUTSIDE OF GRADING LIMITS SHALL BE RESTORED WITH MNDOT "SOUTHERN TALLGRASS ROADSIDE" SEED MIX. SEE PLAN FOR LOCATIONS.
3. REDUNDANT PERIMETER CONTROL REQUIRED FOR ALL DISTURBANCES WITHIN 50' OF THE EXISTING WETLAND EDGE, SUCH AS DOUBLE ROW OF SILT FENCE. A SLASH MULCH BERM AT LEAST 12" HIGH IS ACCEPTABLE AS A SECONDARY PERIMETER CONTROL.
4. PROPOSED WETLAND FILL PERMIT APPLICATIONS WITH BWSR AND ACOE ARE BEING PREPARED AS OF MARCH 13, 2025. NO GRADING WITHIN 10' OF WETLAND PRIOR TO OBTAINING WETLAND IMPACT APPROVAL. INTERIM PERIMETER CONTROL AROUND WETLAND TO BE INSTALLED AS TIMING REQUIRES.

WARNING!
UNDERGROUND HIGH PRESSURE PIPELINE
CONTACT ENERGY TRANSFER REPRESENTATIVE AT 1–800–753–5531 PRIOR TO PERFORMING WORK WITHIN THE PIPELINE EASEMENT

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date:_____ Reg.No._____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
EROSION & SEDIMENT CONTROL PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970ERC

PROJECT NO.
23970

3.1

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COWLEY LAKE PRESERVE - ROGERS, MN
These plans shall be considered part of the project Storm Water Pollution Prevention Plan (SWPPP.) A copy of the SWPPP shall remain on site throughout active construction.

PROJECT SUMMARY
COWLEY LAKE PRESERVE is a single-family residential development project. The project includes construction of building pads, streets, utilities and stormwater management basins.

TYPE OF PROJECT: Platting and development of 169 Single-family Residential Lots

TYPE OF WORK: Clearing and grubbing, demolition of existing houses, mass grading, utility and street construction and installation of phone, communication, gas and electric utilities.

TOTAL SITE AREA: 88.32 AC

TOTAL DISTURBED AREA: 67.17 AC

EXISTING IMPERVIOUS AREA: 1.04 AC

PROPOSED (DESIGN) IMPERVIOUS AREA: 22.32 AC

IMPAIRED WATERS:
Cowley Lake has an EPA-approved impairment for: Nutrients.

Crow River has an EPA-approved impairment for: Benthic macroinvertebrates bioassessments; Fecal coliform; Fish bioassessments; Mercury in fish tissue; Nutrients; Turbidity.

These impairment(s) are considered to be construction related parameters and require the additional best management practices (BMPs) found in items 23.9 and 23.10 of the permit if the project has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired water.

23.9:
Permittees must immediately initiate stabilization of exposed soil areas, as described in item 8.4, and complete the stabilization within seven (7) calendar days after the construction activity in that portion of the site temporarily or permanently ceases.

23.10:
Permittees must provide a temporary sediment basin as described in Section 14 for common drainage locations that serve an area with five (5) or more acres disturbed at one time.

A mandatory Stormwater Pollution Prevention Plan (SWPPP) review is required by the MPCA if the project will disturb over 50 acres and has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired water. Owners must submit the application for coverage and the SWPPP at least 30-days before the construction start date. The SWPPP can be attached electronically when using the online application.

ENVIRONMENTAL REVIEW
No environmental reviews were performed for the site, nor were any required by the City of Rogers or for other agency approvals.

ENDANGERED SPECIES
Endangered species summary:
Bald Eagles: A single nest has been identified on-site. Clearing, external construction, and landscaping within 330 feet and up to 660 feet of the nest may be restricted. Construction activity allowed between August 15th and January 15th, or outside of breeding season. Removal of the nest and/or existing vegetation adjacent to the nest is not anticipated.

In the event any other endangered species are identified on-site, construction shall cease and the U.S. Fish and Wildlife Service shall be contacted to coordinate all necessary protection and mitigation measures.

CONSTRUCTION PHASING
Mass grading will be in multiple phases. Mass grading is anticipated to take 12 months, which will include the construction of the stormwater basins. The stie will generally be graded from east to west. Utility installation will immediately follow grading. Upon completion of utilities, street construction will take place. Final construction work prior to home construction includes installation of phone, cable, gas and electric utilities, as well as retaining wall construction.

MPCA STORMWATER PERMIT - RESPONSIBILITY
Rachel Development is the Owner for the development. The owner will apply for the Stormwater Permit and shall remain responsible for implementation of the SWPPP until final stabilization and filing of the N.O.T. or Subdivision Registration Form.

OWNER:
Rachel Development - David Stradtman - 763-424-1525

PERMITTEE:
Rachel Development - Steve Wolbeck - 763-248-0342

OPERATOR(S):
Rachel Contracting - Ron Fricke - 763-274-9599

ENGINEER:
Rick Osberg, PE, Proj. Mgr - James R. Hill, Inc. - 952-890-6044

LGU CONTACT:
Doran Cote - City of Rogers - 763-428-8580

MPCA COMPLIANCE:
Josh Norman - 651-757-2389

The Contractor shall follow the implementation sequence as described on these plans. Amendments shall be made as site conditions change. Amendments shall be reviewed by the engineer.

IMPLEMENTATION OF THE SWPPP
The GENERAL CONTRACTOR (GC) or their subcontractor is responsible for implementation of the SWPPP. Contractor has or will provide trained personnel responsible for inspection of erosion and sediment control BMPs. Either the Contractor or their subcontractor will provide trained personnel responsible for installing and maintaining erosion and sediment control BMPs.

Long term operation and maintenance of the permanent stormwater management system will the responsibility of City of Rogers.

DOCUMENTATION OF TRAINED INDIVIDUALS
Prior to start of construction, GC and/or their subcontractors shall ensure they have proper documentation for all individuals involved in implementing the SWPPP, as well as all involved individuals as described in section 21 of the General Stormwater Permit.

SWPPP Design: Rick Osberg, PE, training by University of Minnesota "Design of Construction SWPPP", expires 5/31/2026. Instructor: Online.

SWPPP Contact for Contractor: Steve Wolbeck, training by University of Minnesota "Construction Site Management", expires 5/31/2027.

Alternate SWPPP Contact for Contractor: Jeremy Rose, training by University of Minnesota "Construction Site Management", expires 5/31/2026.

REQUIREMENTS FOR NOTICE OF TERMINATION (NOT)
Before the submitting the NOT, the permittee must meet the following requirements:

1. All construction activity associated with the project must be completed.
2. All pervious surfaces must be stabilized with permanent vegetative cover having a growth density of 70% of the expected full growth density (unless a specific area of the site specifies no vegetation.)
3. The stormwater treatment system (basins, pipes, structures, ditches, swales, etc.) is cleaned, removing all accumulation of sediment and debris.
4. All synthetic erosion and sediment prevention BMPs have removed.

RECORD RETENTION
During construction, the Contractor must retain a copy of the SWPPP and any amendments thereto on site at all times (or on the portion of the site for which the Contractor has control.) The SWPPP may be kept in a designated repository, in the construction field office or in an on-site vehicle during normal working hours. Copies of all maintenance records, inspection reports shall also be retained on site with the SWPPP.

Upon completion of all construction and submittal of the NOT, the Owner shall retain the SWPPP documents for no less than three years, including the final SWPPP, other stormwater related permits, inspection and maintenance records, SWMP operational and maintenance agreements, and any other documents or binding agreements that relate to the operation and maintenance of the SWMP.

GC and/or their subcontractors shall ensure they have proper documentation for all individuals involved.

POTENTIONAL FOR EROSION AND DISCHARGE OF SEDIMENT
There is moderate potential for erosion to occur. Certain portions of the site have grades exceeding 5% and shall be closely managed to prevent erosion. Temporary sediment traps or basins shall be considered in the final SWPPP implementation. Redundant protection is required along all wetlands. Contractor shall be required to appropriately manage individual erosion-prone areas, using BMP's suitable for the particular application.

GENERAL CONSTRUCTION SEQUENCING
1. Install perimeter control. Install inlet protection on existing structures.
2. Perform any clearing, as needed.
3. Perform demolition and debris removal.
4. Place topsoil perimeter berms and stabilize with seed and mulch.
5. Grade stormwater basins. Perform mass grading. As sheet drainage patterns develop, place silt fence or filter dikes as necessary to dissipate sediment transfer.
6. Construct utilities and pavements.
7. Construct buildings and structures.
8. Install phone, cable, gas and electric utilities.
9. Stabilize basins and swales with final stabilization. Stabilize landscape areas with final permanent vegetation, landscaping or turf. Stabilize future development areas with temp seed and mulch until final site development stage.

GUIDANCE FOR TIMING OF BMP INSTALLATION
Prior to Start of Construction
1. Install all new perimeter control BMPs as specified on plans prior to start of construction. Ensure that all existing perimeter control BMPs are functional.
2. Install or establish stabilized construction entrance.
3. Install protection devices on existing ponds, outlets, storm sewer inlets, etc. prior to start of construction.
4. Install sediment control practices on down gradient site perimeters.

During Construction
1. Identify topsoil stockpile locations and stabilize with temporary seed and mulch.
2. Areas in which construction becomes inactive must have stabilization commence immediately and be completed no later than 7 days after construction activity in that area has either temporarily or permanently ceased.
3. Provide temporary or permanent energy dissipation at all pipe outlets within 24 hours of connection to a Surface Water.
4. Minimize active construction areas. Where possible, establish final grade and stabilize with permanent vegetation, particularly around stormwater basins, filter strips, berms, etc.
5. During grading construction, utilize street "hold down" areas for sediment trapping. Direct overland construction runoff towards stormwater basins to the fullest extent practicable.

6. After construction is completed and grades are certified in a particular area of the site, review that the area is ready for permanent vegetation or other permanent cover.
7. Identify locations where topsoil stockpiles will be placed for builders. Stabilize with temporary seed and mulch and install perimeter control around stockpile circumference. Stockpiles shall be located outside of natural buffers or surface waters, included stormwater conveyances, unless there is a bypass in place.

During Inactivity or After Construction
1. Areas in which construction becomes inactive must have stabilization commence immediately and be completed no later than **7 days** after construction activity in that area has either temporarily or permanently ceased.
2. Final stabilization cover types are shown on **Sheet 3.0** of the plan set. Final cover consists of vegetation, paved or gravel surfaces, sod, landscaping and buildings.
3. At the point where vegetated cover has achieved 70% of expected full growth density, vegetated areas can be considered fully stabilized. Removal of synthetic sediment control BMPs can be initiated.
4. Basins that have received sediment deposits shall be re excavated to plan grade, removing accumulated sediment. Verify final grade and basin capacities.
5. Inlet protection devices can be removed from structures as the attributing drainage area becomes fully stabilized.
6. Maintain street and drive sweeping activities until construction activities are fully completed.

EROSION CONTROL BMPs
The construction plans anticipate the use of, but are not limited to, the following Erosion Control BMPs:
1. Stabilized Construction Entrance
2. Temporary straw mulch as needed.
3. Seed and mulch
4. Erosion Control Blanket
5. Turf Reinforcement Mat (TRM)
6. Rip rap
7. Minimize active or disturbed work areas

SEDIMENT CONTROL BMPs
The construction plans anticipate the use of, but are not limited to, the following Sediment Control BMPs
1. Sediment traps constructed in street subcut or other strategic locations.
2. Rock filter dikes in street subcut.
3. Utilize permanent stormwater basins as Temporary Sediment Basins.
4. Silt fence at project perimeter or toe of slopes.
5. Inlet protection on existing catch basins.
6. Inlet protection on existing culverts.
7. Inlet protection after utility construction.
8. Rock checks or bio roll checks.
9. Linear control along back of new curb and gutter or concrete (bio-roll or silt fence).
10. Post construction silt fence along normal wetted perimeters of basins and filter strips.
11. Routine street sweeping adjacent to construction entrance.

Refer to plans for designated locations of BMPs, details and implementation notes.
All BMP's selected and implemented shall be appropriate for the time of year, the current site conditions and for the estimated duration of use.

Enhancing sedimentation with the use chemicals and chemical treatment systems is NOT anticipated for this project.

BASIN AND TRAP DEWATERING BMPs
Should the need arise for basin or trap dewatering, Contractor shall utilize a floating skimmer pump intake, such that the water is drawn from the surface of the basin. Pumped effluent shall be discharged, to the extent feasible, over well-vegetated upland areas. Effluent shall not be discharged into Surface Waters in a visually turbid state. Turbid effluent shall be filtered with mechanical devices, chemical filtering, or a combination thereof, until it is no longer visually turbid.

POLLUTION CONTROL BMPs
BMP's and good housekeeping should be implemented to prevent spills, pollutants or chemicals from entering the drainage system.

1. Fueling: A fixed fueling station is not anticipated. Contractor will be required to implement BMPs for onsite re-fueling of equipment.
2. Concrete Washout: Refer to MPCA's recommendation for concrete washouts. The developer has the ability to adjust location or to provide alternative washout containment.
3. There is not an anticipated need for storing chemicals, paints, solvents or other potentially toxic or hazardous materials on site. If at some point there is a need to store them on site, they must be stored in a receptacle or container capable of retaining spills. The container must be fenced and locked from unauthorized access.
4. Portable toilets shall be positioned and secured to prevent tipping over.

SEED & MULCH SPECIFICATIONS
Seed placed for permanent cover or final stabilization requires 6" minimum topsoil cover. Exception: Infiltration basins - see basin details for soil type). Multiple site visits will be required to accommodate permanent or temporary stabilization as required during the phases of construction. Refer to MnDOT Seeding Manual, Latest Edition or MnBWSR for more details.

1) Boulevards and Urban Roadsides:
A. Seed: Southern Boulevard (SB) at a rate of 160 lb/acre
B. Fertilizer: Type 1 20-10-20 NPK at a rate of 200 lb/acre
C. Mulch: MNDOT Type 1 at a rate of 2 tons/acre
2) Commercial/Residential Yards:
A. Seed: Residential Turfgrass (RT) at a rate of 200 lb/acre
B. Fertilizer: Type 1 20-10-20 NPK at a rate of 200 lb/acre
C. Mulch: MNDOT Type 1 at a rate of 2 tons/acre
3) Stormwater Basins/Wet Soils
A. Seed: Wet Ditch (WD) at a rate of 35 lb/acre
B. Fertilizer: Type 3 slow release 22-5-10 NPK at a rate of 200 lb/acre
C. Mulch: MNDOT Type 3 at a rate of 2 tons/acre
4) Tallgrass Native/Moderately Wet Soils/Wetland Buffers
A. Seed: Southern Tallgrass Roadside (STR) at a rate of 26 lb/acre
B. Fertilizer: Type 3 slow release 22-5-10 NPK at a rate of 350 lb/acre
C. Mulch: MNDOT Type 3 at a rate of 2 tons/acre
5) Shortgrass Native/Dryer Soils
A. Seed: Southern Shortgrass Roadside (SSR) at a rate of 26 lb/acre
B. Fertilizer: Type 3 slow release 22-5-10 NPK at a rate of 350 lb/acre
C. Mulch: MNDOT Type 3 at a rate of 2 tons/acre

INSPECTION AND MAINTENANCE OF BMPs
Routine Inspection
1. Rock Entrances - Inspect weekly. If rock becomes filled with sediment and tracked material to the extent the purpose ceases to function, remove the contaminated rock and replace with new rock.
2. Stabile Concrete Entrance - Inspect weekly. Remove dirt and debris and sweep regularly to control dust.
3. Silt fence - Inspect weekly, particularly for damaged sections, breaches, down-gradient areas, flow concentration points, scour areas and sections adjacent to sensitive areas. Where capacity is filled to more than 50% of depth, sediment shall be removed to restore capture capacity.
4. Sediment traps and basins - Inspect weekly. Where capacity is filled to more than 50% of depth, sediment shall be removed to restore capture capacity within 72 hours of discovery.
5. Inlet Protection - Inspect weekly or more frequently as needed after multiple rainfalls less than 0.5". Verify intake capacity is not compromised. Where capacity is filled to more than 50% of depth, sediment shall be removed to restore capture capacity.
6. Slope - inspect steep slopes for rills and gullies, often forming after placement of topsoil, seed and erosion control blanket. As a guide, repair and re stabilize eroded areas where rills exceed 6" in depth.
7. Inspect other site-specific BMP's on a weekly basis minimum.

Rain Event Inspection - Mandatory, within 24 hours after a rain event 0.5" or greater. Complete all items associated with Routine Inspection. Furthermore, inspect site for breaches, failures, scours and gullying. Take corrective actions as necessary to restore functionality to the BMP's. If a given situation is discovered to be prone to repetitive failure, advise the Engineer and Contractor for SWPPP and BMP amendments.

ADDITIONAL SWPPP NOTES
1. All Erosion and Sediment Control facilities shall be maintained by the Contractor during the construction operations. Any temporary facilities which are to be removed as called for on these plans and specifications shall be removed by the Contractor at the time directed by the engineer. The Contractor shall then restore the subsequently disturbed areas in accordance with these plans and specifications.
2. Wherever practical and feasible, the Contractor shall protect and preserve existing natural trees, grass and other vegetative cover in effort to provide natural buffering and filtering of runoff.
3. Contractor shall be adaptable in adjusting construction schedules in anticipation of weather forecasts of precipitation, in order to minimize risk of erosion and sediment transport.
4. It is the responsibility of the Contractor to keep public streets, travel ways, parking lots and trails utilized for ingress to and egress from the construction site free of dirt, sediment and debris, resulting from construction activity. Cost for this shall be considered incidental to the contract.
5. Adequate control of dust shall be maintained by the Contractor. Cost for dust control shall be considered incidental to the contract.
6. Perimeter controls shall not be removed until final stabilization of areas draining toward the control devices.
7. When temperatures do not exceed 40° F, areas that require seed and mulch stabilization shall be dormant seeded. Application rate shall be two times the normal rate. No dormant seeding shall be done on ice or snow greater than 2" in depth.
8. Any areas that were seeded that do not achieve 70% coverage shall be reseeded at the Contractor's expense, where coverage limitation is caused by lack of seed germination and growth.

STORMWATER BASIN MAINTENANCE
All stormwater basins within the project will be owned and maintained by the City. Suggested practices are as follows:

1. For the first three years after construction, basins should be inspected for obvious signs of erosion, such as gullies, rills or sediment plumes. Identify the cause and take corrective measures such that grades are restored and surfaces re-established with appropriate vegetation.

2. During the first year after final stabilization, mow the slopes of stormwater basins, approximately 30-day intervals, 6"-8" high. Over-seed any areas not fully established.
3. Inspect for sediment accumulation at the pipe outlets into the pond at the completion of sod installation of last lot in plat. Remove sediment. Re-inspect every 3-5 years.
4. Inspect inlets and outlets for blockage or debris buildup annually. Remove debris as necessary to allow for inlets and outlets to function as designed.
5. Verify basin design capacity after 15 to 20 years of service.

TURF AND VEGETATION MAINTENANCE

Boulevard Mixes and Salt-tolerant Sod (SB)
Planting Season:
Seed: April 1 - June 1 and July 20 - Sept 20; Sod: April 15 - June 10

Year 1:
1. Watch for germination in 1-2 weeks.
2. Initial seedling density should be at least 1 per square inch.
3. Water if rainfall is less than 1" per week, continue until established.
4. Mow when grass reaches 5" to 6" high, cut back to 3" to 4" height.
5. Re-seed any bare patches - plants do no spread quickly like bluegrass does.

Long Term Maintenance:
1. Mow 4-8 times per year, if turfgrass appearance is desired
2. Spot spray weeds only if necessary.
3. Re-seed any bare patches - plants do no spread quickly like bluegrass does.

Shortgrass Native (SSR), Tall Grass Native (STR) and Stormwater (WD)
Planting Season:
Seed: April 1 - June 1 and July 20 - Sept 20 (Some mixes can be planted April 15 - October 20)

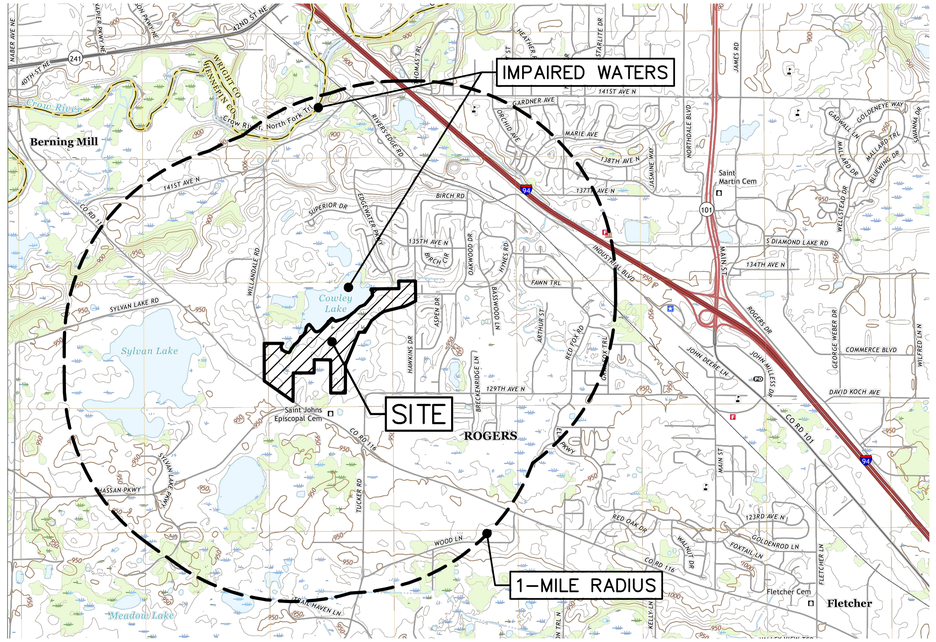
Year 1:
1. Watch for indicator species to emerge in 3-5 weeks.
2. Perennial seedling density should be 4-6 plants per square foot.
3. Water if conditions get very dry after germination.
4. Mow 2 to 3 times, when 18" high or before weeds flower. Cut to 6" to 10" height.

Year 2:
1. Look for at least 1 perennial plant per square foot.
2. Planted vegetation should cover 50% of soil surface by mid-summer.
3. Mow 1 to 2 times, before weeds flower. Cut to 8" to 12" height.
4. Spot spray perennial noxious weeds and birdsfoot trefoil.

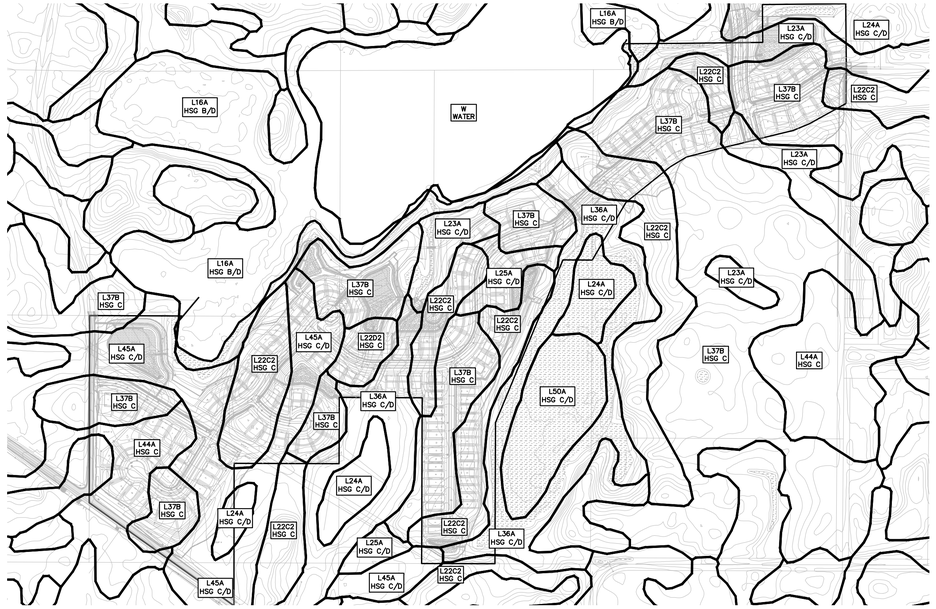
Long Term Maintenance:
1. Mow or burn every 3-5 years. Spot spray weeds and brush, as needed.

ESTIMATED EROSION AND SEDIMENT CONTROL QUANTITIES

CONSTRUCTION ROCK ENTRANCE	EA	4
STANDARD DUTY SILT FENCE	LF	17,100
STANDARD DUTY SILT FENCE - POST CONSTRUCTION	LF	5,800
BWSR SEED MIX 33-261 STORMWATER - 1.5X	AC	8.0
BWSR SEED MIX 32-231 MESIC TO DRY BUFFER SOUTH (OUTLOTS) - 1.5X	AC	19.0
MNDOT SEED MIX - SOUTHERN BOULEVARD (GENERAL MIX) - 1.5X	AC	50.0
REAR YARD INLET PROTECTION	EA	25
WIMCO OR APPROVED EQUAL INLET PROTECTION	EA	73



USGS MAP
1" = 2000'



USDA SOIL MAP
1" = 400'

GENERAL PERMIT NOTE
VISIT THE MPCA WEB SITE FOR THE LATEST INFORMATION ON THE CONSTRUCTION STORMWATER PERMIT:
https://www.pca.state.mn.us/business-with-us/construction-stormwater

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
PRELIMINARY
Date: ____ Reg.No. ____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
EROSION & SEDIMENT CONTROL DETAILS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
JSO
DATE
02/24/2025
REVISIONS
03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS
CAD FILE
23970ERD
PROJECT NO.
23970
3.2

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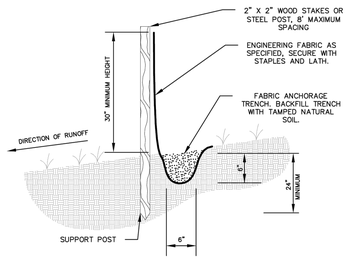
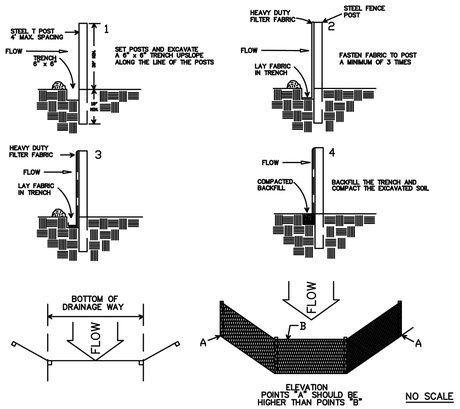


DOUBLE SILT FENCE TO BE REQUIRED NEAR WETLANDS

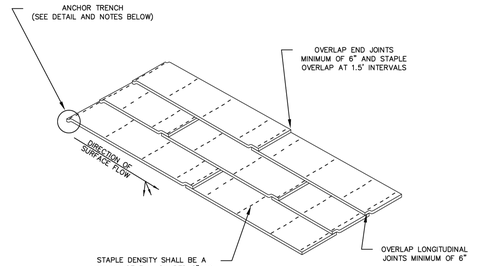
	STANDARD SILT FENCE	Standard Details	EROS–1
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	



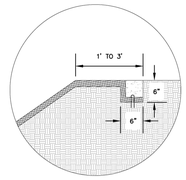
Maintenance

1. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SHOULD THE FABRIC DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USEABLE LIFE AND THE BARRIER STILL BE NECESSARY. THE FABRIC SHALL BE REPLACED PROMPTLY.
3. WETLANDS ARE TO BE PROTECTED BY TWO ROWS OF H.D. SILT FENCE. DOUBLE H.D. SILT FENCE IS REQUIRED AROUND WATER BODIES, STEEP SLOPES AND HIGHLY ERODIBLE SOILS.
3. SEDIMENT DEPOSITS MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY 1/3 HEIGHT OF THE BARRIER, OR AS DIRECTED BY THE ENGINEER.
4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED, SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.
6. ALL MATERIAL & INSTALLATION MUST CONFORM TO THE REQUIREMENTS OF THE CURRENT EDITION OF THE MNDOT CONSTRUCTION SPECIFICATIONS TABLE 3886-1.

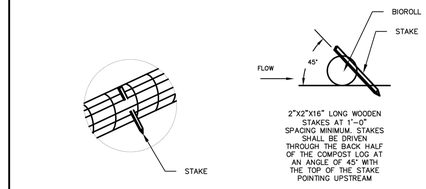
	SILT FENCE ALONG WETLAND	Standard Details	EROS–4
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	



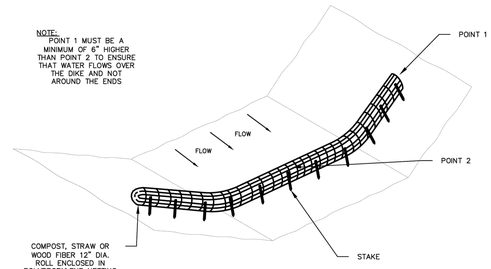
ANCHOR TRENCH
1. DIG 6" X 6" TRENCH
2. LAY BLANKET IN TRENCH
3. STAPLE AT 1.5' INTERVALS
4. BACKFILL WITH NATURAL SOIL AND COMPACT
5. BLANKET LENGTH SHALL NOT EXCEED 100' WITHOUT AN ANCHOR TRENCH



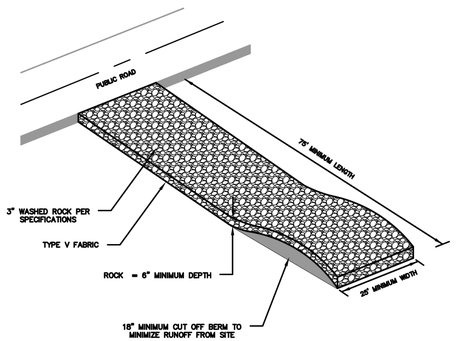
	EROSION CONTROL BLANKET INSTALLATION	Standard Details	EROS–5
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	



NOTE:
POINT 1 MUST BE A MINIMUM OF 6" HIGHER THAN POINT 2 TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS



	BIOLOG DITCH CHECK	Standard Details	EROS–8
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	



NOTE:
TYPE V FILTER FABRIC SHALL BE PLACED UNDER ROCK TO STOP MUD MIGRATION THROUGH MATERIAL.

THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.

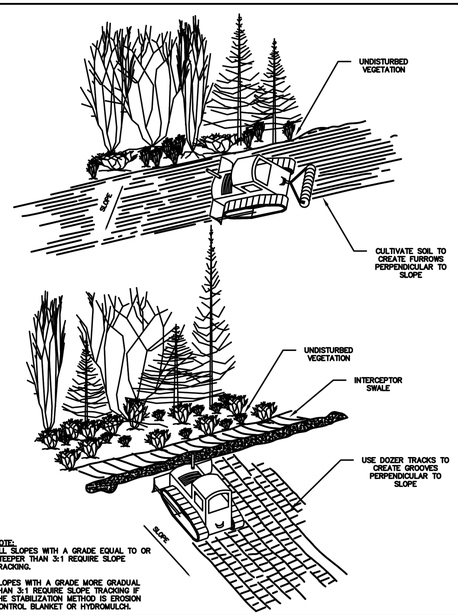
WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.

WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

WHERE RUNOFF CONTAINING SEDIMENT LADEN WATER IS LEAVING THE SITE VIA THE CONSTRUCTION ENTRANCE, OTHER MEASURES SHALL BE IMPLEMENTED TO DIVERT RUNOFF THROUGH AN APPROVED FILTERING SYSTEM

IN AREAS WITH CONCRETE WALK THERE SHALL BE 6" OF SAND PLACED OVERTOP THE SIDEWALK PRIOR TO PLACEMENT OF THE 3" WASHED ROCK.

	CONSTRUCTION ROCK ENTRANCE	Standard Details	EROS–10
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	

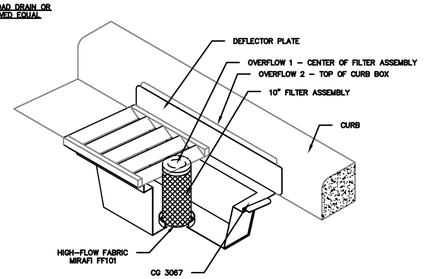


NOTE:
ALL SLOPES WITH A GRADE EQUAL TO OR STEEPER THAN 3:1 REQUIRE SLOPE TRACKING.

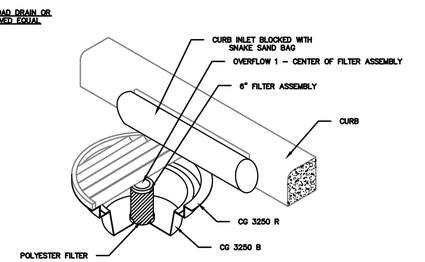
SLOPES WITH A GRADE MORE GRADUAL THAN 3:1 REQUIRE SLOPE TRACKING IF THE STABILIZATION METHOD IS EROSION CONTROL BLANKET OR HYDROMULCH.

	SLOPE TRACKING	Standard Details	EROS–12
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	

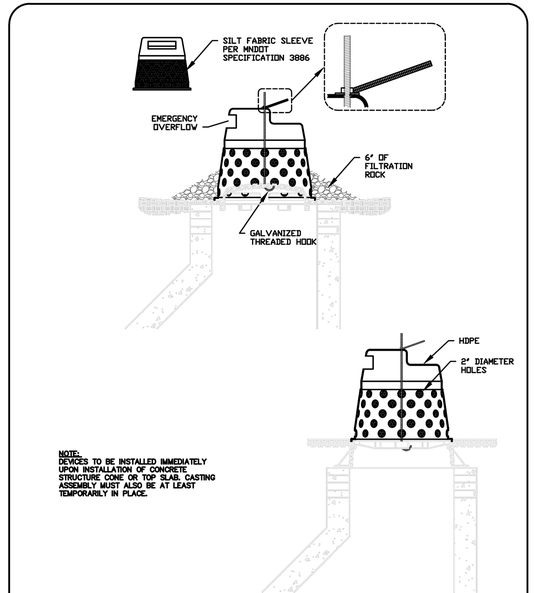
WIMCO ROAD DRAIN OR APPROVED EQUAL



WIMCO ROAD DRAIN OR APPROVED EQUAL



	CURB INLET PROTECTION	Standard Details	EROS–15
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	



NOTE:
DEVICES TO BE INSTALLED IMMEDIATELY UPON INSTALLATION OF CONCRETE STRUCTURE CONE OR TOP SLAB. CASTING ASSEMBLY MUST ALSO BE AT LEAST TEMPORARILY IN PLACE.

	INFRASAFE – SEDIMENT CONTROL BARRIER	Standard Details	EROS–16
CITY OF ROGERS		Date: SEPTEMBER, 2020 Revised:	

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PLANNERS / ENGINEERS / SURVEYORS
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PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
EROSION & SEDIMENT CONTROL DETAILS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
JSO

DATE
02/24/2025

REVISIONS

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CAD FILE
23970ERD

PROJECT NO.
23970

3.3

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NPDES REQUIREMENTS

1.1 Permit Coverage. [Minn. R. 7090]
1.2 This permit is required for construction activity that results in land disturbance of equal to or greater than one (1) acre or if a project is part of a common plan of development or sale that ultimately will disturb greater than one (1) acre, and authorizes, subject to the terms and conditions of this permit, the discharge of stormwater associated with construction activity. [Minn. R. 7090]
1.3 Construction activity covered by this permit cannot commence until coverage under this permit is effective as described in item 3.3 through 3.4 or, if applicable, until the Minnesota Pollution Control Agency (MPCA) has issued an individual National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) construction stormwater permit for the project. [Minn. R. 7090]
1.4 This permit covers all areas of the State of Minnesota except land wholly within the boundaries of a federally recognized Indian Reservation owned by a tribe or a tribal member or land held in trust by the federal government for a tribe or tribal member.[Minn. R. 7090]
1.5 Coverage under this permit is not required when all stormwater from construction activity is routed directly to and treated by a "treatment works," as defined in Minn. Stat. Section 115.01, subd. 21, operated under an individual NPDES/SDS permit with a Total Suspended Solids (TSS) effluent limit. [Minn. R. 7090]
1.6 This permit covers ongoing projects covered under any previous construction stormwater permit that are not complete on the issuance date of this permit. Permittees must either remain in compliance with the previous permit and terminate coverage within 18 months of the issuance date of this permit or comply with this permit, including updating the Stormwater Pollution Prevention Plan (SWPPP), within the 18-month period. Permittees of previously permitted projects are not required to incorporate any additional requirements regarding the permanent stormwater treatment system included in this reissued permit. [Minn. R. 7090]
1.7 Coverage for projects that extend beyond the expiration date of this permit remains effective for a grace period of 18 months. If Permittees cannot complete projects during the grace period, the MPCA will extend coverage under the next permit and permittees must comply with the requirements of the new permit including updating the SWPPP. Permittees are not required to follow changes to the permanent stormwater treatment section of the next permit. [Minn. R. 7090]
2.1 Prohibitions and Limitations of Coverage. [Minn. R. 7090]
2.2 The owner must develop a complete and accurate SWPPP that complies with item 5.2 prior to submitting the application for coverage and starting construction activity. Failure to prepare a SWPPP prior to submitting the application may result in permit revocation. [Minn. R. 7090]
2.3 This permit prohibits discharges of any material other than stormwater treated in compliance with this permit and discharges from dewatering or basin draining activities in accordance with Section 10. Prohibited discharges include, but are not limited to, wastewater from washout of concrete, stucco, paint, form release oils, curing compounds and other construction materials, fuels, lubricants, oils, or other pollutants used in vehicle and equipment operation and maintenance, soaps or solvents used in vehicle and equipment washing and maintenance, and other hazardous substances or wastes. [Minn. R. 7090]
2.4 This permit does not authorize stormwater discharges related to the placement of fill into waters of the state requiring local, state or federal authorizations (such as U.S. Army Corps of Engineers Section 404 permits, Minnesota Department of Natural Resources (DNR) Public Waters Work permits or local governmental unit (LGU) Wetland Conservation Act replacement plans or determinations). [Minn. R. 7090]
2.5 This permit does not authorize stormwater discharges associated with industrial activity except for construction activity. Permittees must obtain coverage for discharges associated with industrial activity under a separate NPDES/SDS permit once day-to-day operational activities commence even if construction is ongoing. [Minn. R. 7090]
2.6 This permit does not authorize discharges from non-point source agricultural and silvicultural activities excluded from NPDES permit requirements under 40 CFR pt. 122.3(e). [Minn. R. 7090]
2.7 This permit does not authorize stormwater discharges to Prohibited, Restricted, Special or Impaired waters unless permittees follow the additional stormwater requirements in Section 23. [Minn. R. 7090]
2.8 This permit does not replace or satisfy any environmental review requirements including those under the Minnesota Environmental Policy Act or the National Environmental Policy Act. The owner must verify completion of any environmental review required by law, including any required Environmental Assessment Work Sheets or Environmental Impact Statements, Federal or Minnesota review, or other required review prior to applying for coverage under this permit. If any part of your common plan of development or sale requires environmental review, coverage under this permit cannot be obtained until such environmental review is complete. [Minn. R. 7090]
2.9 This permit does not replace or satisfy any review requirements for discharges adversely impacting State or Federally designated endangered or threatened species or a designated critical habitat. The owner must comply with the National Historic Preservation Act and conduct all required review and coordination related to historic preservation, including significant anthropological sites and any burial sites, with the Minnesota Historic Preservation Officer. [Minn. R. 7090]
2.10 This permit does not authorize discharges to wetlands unless permittees comply with the requirements in Section 22. Coverage under this permit cannot be issued until the requirements for wetland permits, decisions, other determinations, or the mitigative sequence required in section 22 have been finalized and documented. [Minn. R. 7050.0186]
3.1 Application and Coverage Effective Date. [Minn. R. 7090]
3.2 The owner must complete and submit a complete and accurate on-line application with the appropriate fee to the MPCA for each project that disturbs one (1) or more acres of land or for a common plan of development or sale that will ultimately disturb one (1) or more acres. [Minn. R. 7090]
3.3 For projects or common plans of development or sale that disturb less than 50 acres or do not discharge stormwater within 1 mile (aerial radius measurement) of a special or impaired water, permittees do not need to submit the SWPPP with the application. Permit coverage for these projects is effective upon application and completing the payment process. [Minn. R. 7090]
3.4 For certain projects or common plans of development or sale disturbing 50 acres or more, the complete SWPPP must be included with the application and submitted at least 30 days before the start of construction activity. This applies if there is a point within one mile (aerial radius measurement) of the project's outermost perimeter that receives flows to a special water listed in item 23.3 through 23.6 or an impaired water as described in item 23.7. Permit coverage for these projects is effective upon submitting the application and complete SWPPP, completing the payment process and receiving a determination from the MPCA that the review of the SWPPP is complete. The determination may take longer than 30 days if the SWPPP is incomplete. If the MPCA fails to contact permittees within the 30 days of application receipt, coverage is effective 30 days after completing the payment process. [Minn. R. 7090]
3.5 The application requires listing all persons meeting the definition of owner and operator as permittees. The owner is responsible for compliance with all terms and conditions of this permit. The operator is responsible for compliance with Sections 3, 4, 5.2, 7.4 and applicable requirements for construction activity in Sections 8, 9, 10, 11 and 12. [Minn. R. 7090]
3.6 Permittees will receive coverage notification in a manner determined by the MPCA. [Minn. R. 7090]
3.7 For construction projects where the owner or operator changes (e.g., an original developer sells portions of the property to various homebuilders or sells the entire site to a new owner), the current owner and the new owner or operator must submit a complete permit termination form provided by the MPCA. The current owner and the new owner or operator must submit the form prior to the new owner or operator commencing construction activity or no later than 30 days after taking ownership of the property. [Minn. R. 7090]
3.8 For construction projects where the owner or operator changes, the current owner must provide a SWPPP to the new owner and operator that specifically addresses the remaining construction activity. The new owner or operator can implement the original SWPPP, modify the SWPPP, or develop a new SWPPP. Permittees must ensure their activities do not render another party's erosion prevention and sediment control BMPs ineffective. [Minn. R. 7090]
4.1 Termination of Coverage. [Minn. R. 7090]
4.2 Permittees must submit a NOT within 30 days after all termination conditions listed in Section 13 are complete.[Minn. R. 7090]
4.3 Permittees must submit a NOT within 30 days after selling or otherwise legally transferring the entire site, including permit responsibility for roads (e.g., street sweeping) and stormwater infrastructure final clean out, or transferring portions of a site to another party. The permittees' coverage under this permit terminates at midnight on the submission date of the NOT.[Minn. R. 7090]
4.4 Permittees may terminate permit coverage prior to completion of all construction activity if they meet all of the following conditions:
a. construction activity has ceased for at least 90 days; and
b. at least 90 percent (by area) of all originally proposed construction activity has been completed and permanent cover has been established on those areas; and
c. on areas where construction activity is not complete, permanent cover has been established; and
d. the site complies with item 13.3 through 13.7.
After permit coverage is terminated under this item, any subsequent development on the remaining portions of the site will require permit coverage if the subsequent development itself or as part of the remaining common plan of development or sale will result in land disturbing activities of one (1) or more acres in size. [Minn. R. 7090]
4.5 Permittees may submit the NOT or an MPCA approval after submitting information documenting the owner cancelled the project. [Minn. R. 7090]
5.1 Stormwater Pollution Prevention Plan (SWPPP) Content. [Minn. R. 7090]
5.2 The owner must develop and implement a SWPPP. The SWPPP must include items 5.3 through 5.26. [Minn. R. 7090]
5.3 The SWPPP must incorporate specific Best Management Practices (BMP) used to comply with the requirements of this permit. [Minn. R. 7090]
5.4 The SWPPP must include a narrative describing the timing for installation of all erosion prevention and sediment control BMPs and a description of the permanent stormwater treatment system. [Minn. R. 7090]
5.5 The SWPPP must include the location and type of all temporary and permanent erosion prevention and sediment control BMPs along with procedures used to establish additional temporary BMPs as necessary for the site conditions during construction. Standard details and/or specifications for BMPs must be included in the final plans and specifications for the project. [Minn. R. 7090]
5.6 The SWPPP must include the calculations and other information used for the design of temporary sediment basins and any of the permanent stormwater treatment systems required in Section 15. [Minn. R. 7090]
5.7 The SWPPP must include estimated quantities anticipated at the start of the project for the life of the project for all erosion prevention and sediment control BMPs (e.g., linear feet of silt fence or square feet of erosion control blanket). [Minn. R. 7090]
5.8 The SWPPP must include the number of acres of impervious surface for both pre- and post-construction. [Minn. R. 7090]
5.9 The SWPPP must include a site map with existing and final grades, including drainage area boundaries, directions of flow and all discharge points where stormwater is leaving the site or entering a surface water. The site map must indicate the areas of steep slopes. The site map must also include impervious surfaces, soil types and locations of potential pollutant-generating activities as identified in Section 12. [Minn. R. 7090]
5.10 The SWPPP must include a map of all surface waters, existing wetlands, and stormwater ponds or basins that can be identified on maps such as United States Geological Survey 7.5-minute quadrangle maps, the National Wetland Inventory map or aerial photographs that are within one mile (aerial radius measurement) from the project boundaries that will receive stormwater from the construction site, during or after construction. The SWPPP must identify if the surface waters are special or impaired waters. [Minn. R. 7090]
5.11 The SWPPP must include a site map showing construction activity areas that are adjacent to and drain to Public Waters for which the DNR has promulgated "work in water restrictions" during specified fish spawning time frames. [Minn. R. 7090]
5.12 Permittees must identify locations of 50' buffer zones as required in item 9.17 and 100' permanent buffer zones as required in item 23.11, on plan sheets in the SWPPP. [Minn. R. 7090]
5.13 If permittees cannot meet the full volume reduction requirement on-site, (e.g., the site has infiltration prohibitions, see item 16.14 through item 16.21) the permittee must document the reasons in the SWPPP. [Minn. R. 7090]
5.16 The SWPPP must include any stormwater mitigation measures proposed to be part of the final project in any environmental review document, endangered species review, archeological or other required local, state or federal review conducted for the project. For purposes of this permit, mitigation measures mean actions necessary to avoid, minimize, or mitigate for impacts related to erosion prevention, sediment control, the permanent stormwater treatment system, pollution prevention management measures and discharges associated with the project's construction activity. [Minn. R. 7090]
5.17 The SWPPP must describe the methods used for permanent cover of all exposed soil areas. [Minn. R. 7090]
5.18 Permittees must identify the locations of areas where construction will be phased to minimize the duration of exposed soil areas in the SWPPP. [Minn. R. 7090]
5.19 For projects with a discharge point on the project within one (1) mile (aerial radius measurement) of and which flows to an impaired water, permittees must identify the impaired water(s), and any Total Annual Environmental Protection Agency (USEPA)-approved Total Maximum Daily Load (TMDL) for the pollutant(s) or stressor(s) described in item 23.7. Permittees' identification must include those TMDLs approved at any time prior to permit application submittal and are still in effect. [Minn. R. 7090]
5.20 Permittees must document in the SWPPP, all trained individuals identified in item 21.2. Documentation must include:
a. names of personnel required to be trained; and
b. dates of training and name of instructor(s) and entity providing training; and
c. content of training course.
If permittees do not know the names of the individuals at the time of application, the permittees must ensure they document training before construction activity commences. [Minn. R. 7090]
5.21 The SWPPP must identify a person knowledgeable and experienced in the application of erosion prevention and sediment control BMPs who will coordinate with all contractors, subcontractors, and operators on-site to oversee the implementation of the SWPPP. [Minn. R. 7090]
5.22 The SWPPP must describe any specific chemicals and chemical treatment systems used for enhancing the sedimentation process and how it achieves compliance with item 9.19. [Minn. R. 7090]
5.23 The SWPPP must identify the person(s), organizations, or entities responsible for long-term operation and maintenance of permanent stormwater treatment systems. [Minn. R. 7090]
5.24 The SWPPP must describe methods to minimize soil compaction and preserve topsoil. Minimizing soil compaction is not required where the function of a specific area dictates compaction. [Minn. R. 7090]
5.25 The SWPPP must include any site assessments for groundwater or soil contamination required in item 16.15.[Minn. R. 7090]
5.26 The SWPPP must account for the following factors in designing temporary erosion prevention and sediment control BMPs:
a. the expected amount, frequency, intensity, and duration of precipitation; and
b. the nature of stormwater runoff and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features; and
c. the stormwater volume, velocity, and peak flowrates to minimize discharge of pollutants in stormwater and to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points; and
d. the range of soil particle sizes expected to be present. [Minn. R. 7090]
6.1 SWPPP Amendment. [Minn. R. 7090]
6.2 One of the individuals described in item 21.2.a or item 21.2.b or another qualified individual must complete all SWPPP changes. Changes involving the use of a less stringent BMP must include a justification describing how the replacement BMP is effective for the site characteristics. [Minn. R. 7090]
6.3 Permittees must amend the SWPPP within 7 days to include additional or modified BMPs whenever there is a change in design, construction, operation, maintenance, weather or seasonal conditions having a significant effect on the discharge of pollutants to surface waters or groundwater. [Minn. R. 7090]
6.4 Permittees must amend the SWPPP within 7 days to include additional or modified BMPs whenever inspections or investigations by the site owner or operator, USEPA or MPCA officials indicate the SWPPP is not effective in eliminating or significantly minimizing the discharge of pollutants to surface waters or groundwater or the discharges are causing water quality standard exceedances (e.g., nuisance conditions as defined in Minn. R. 7050.0210, subp. 2) or the SWPPP is not consistent with the objectives of a USEPA approved TMDL. [Minn. R. 7050.0210]
7.1 BMP Selection and Stormwater Management. [Minn. R. 7090]
7.2 Permittees must select, install, and maintain the BMPs identified in the SWPPP and in this permit in an appropriate and functional manner and in accordance with relevant manufacturer specifications and accepted engineering practices to minimize the discharge of pollutants in stormwater from construction activities. Examples of stormwater management practices for this section include but are not limited to wet sedimentation basins, temporary depressions to hold stormwater, stormwater routing, dikes, berms, pumping, and stormwater treatment BMPs. Permittees must phase and incorporate stormwater management principles as the construction progresses. Unless infeasible, temporary or permanent wet sedimentation basins (where required, see section 14 and 15) should be constructed as a first step in the process and stormwater routed to these. [Minn. R. 7090]
7.3 Permittees must not disturb more land (i.e., phasing) than can be effectively inspected and maintained in accordance with Section 11. [Minn. R. 7090]
7.4 If permittees are using some type of erosion control netting on the site as part of the soil stabilization techniques, permittees are encouraged to use products that have been shown to minimize impacts on wildlife. The U.S. Fish & Wildlife Service recommends using types of netting practices that are considered "wildlife friendly," including those that use natural fiber or 100 percent biodegradable materials and that use a loose weave with a non-welded, movable jointed netting. Products that do not use wildlife friendly include square plastic netting that are plastic netting (e.g., photodegradable, UV-degradable, oxo-degradable), netting made from polypropylene, nylon, polyethylene, or polyester. Other recommendations include removing the netting product when it is no longer needed. More information may be found at: https://www.fws.gov/initiative/protecting-wildlife/make-change-wildlife-friendly-erosion-control-products. There also may be State, Tribal, or local requirements about using wildlife friendly erosion control products. See Minnesota Department of Transportation requirements at: https://www.mndot.gov/environment/erosion/rolled-erosion-prevention-products.html. [Minn. R. 7050]
8.1 Erosion Prevention Practices. [Minn. R. 7090]
8.2 Before work begins, permittees must delineate the location of areas not to be disturbed. [Minn. R. 7090]
8.3 Permittees must minimize the need for disturbance of portions of the project with steep slopes. When steep slopes must be disturbed, permittees must use techniques such as phasing and stabilization practices designed for steep slopes (e.g., slope draining and terracing). [Minn. R. 7090]
8.4 Permittees must stabilize all exposed soil areas, including stockpiles. Stabilization must be initiated immediately to limit soil erosion when construction activity has permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days (7 days for sites discharging to special or impaired waters, see section 24). Stabilization must be completed no later than 14 calendar days after the construction activity has ceased. Stabilization is not required on constructed base components of roads, parking lots and similar surfaces. Stabilization is not required on temporary stockpiles without significant silt, clay or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) but permittees must provide sediment controls at the base of the stockpile. [Minn. R. 7090]
8.5 For Public Waters that the Minnesota DNR has promulgated "work in water restrictions" during specified fish spawning time frames, permittees must complete stabilization of all exposed soil areas within 200 feet of the water's edge, and that drain to these waters, within 24 hours during the restriction period. [Minn. R. 7090]
8.6 Permittees must stabilize the normal wetted perimeter of the last 200 linear feet of temporary or permanent drainage ditches or swales that discharge to surface waters or stormwater conveyance systems, at a minimum, before the end of each day, or equivalent practice as approved by the permittee. Permittees must complete stabilization of remaining portions of temporary or permanent ditches or swales within 14 calendar days (7 days for sites discharging to special or impaired waters, see section 24) after connecting to a surface water or property edge and construction in that portion of the ditch temporarily or permanently ceases. [Minn. R. 7090]
8.7 Temporary or permanent ditches or swales being used as a sediment containment system during construction (with properly designed rock-ditch checks, bio rolls, silt dikes, etc.) do not need to be stabilized. Permittees must stabilize these areas within 24 hours after their use as a sediment containment system ceases. [Minn. R. 7090]
8.8 Permittees must not use mulch, hydromulch, tackifier, polyacrylamide or similar erosion prevention practices within any portion of the normal wetted perimeter of a temporary or permanent drainage ditch or swale section with a continuous slope of greater than 2 percent. Examples of acceptable erosion prevention practices include blankets, poly, riprap, etc. [Minn. R. 7090]
8.9 Permittees must provide temporary or permanent energy dissipation at all pipe outlets within 24 hours after connection to a surface water or permanent stormwater treatment system. [Minn. R. 7090]
9.1 Sediment Control Practices. [Minn. R. 7090]
9.2 Permittees must establish sediment control BMPs on all downgradient perimeters of the site and downgradient areas of the site that drain to any surface water, including curb and gutter systems. Permittees must locate sediment control practices upgradient of any buffer zones. Permittees must establish sediment controls and must have them operational before land-disturbing activities begin and must keep the sediment control practices in place until they establish permanent cover. [Minn. R. 7090]
9.3 If downgradient sediment controls are overloaded, based on frequent failure or excessive maintenance requirements, permittees must install additional upgradient sediment control practices or both in addition to or in place of eliminate the overloading and amend the SWPPP to identify these additional practices as required in item 6.3. [Minn. R. 7090]
9.4 Temporary or permanent drainage ditches and sediment basins designed as part of a sediment containment system (e.g., ditches with rock-check dams) require sediment control practices only as appropriate for site conditions. [Minn. R. 7090]
9.5 A floating silt curtain placed in the water is not a sediment control BMP to satisfy Item 9.2 except when working on a shoreline or below the waterline. Immediately after the construction activity (e.g., installation of rip rap along the shoreline) in that area is complete, permittees must install an upland perimeter control practice if exposed soils still drain to a surface water. [Minn. R. 7090]
9.6 Permittees must re-install all sediment control practices adjusted or removed to accommodate short-term activities such as clearing or grubbing, or passage of vehicles, immediately after the short-term activity is completed. Permittees must re-install sediment control practices before the next precipitation event even if the short-term activity is not complete. [Minn. R. 7090]
9.7 Permittees must protect all storm drain inlets using appropriate BMPs during construction until they establish permanent cover on all areas with potential for discharging to the inlet. [Minn. R. 7090]
9.8 Permittees may remove inlet protection for a particular inlet if a specific safety concern (e.g. street flooding/freezing) is identified by the permittees or the jurisdictional authority (e.g., city/county/township/Minnesota Department of Transportation engineer). Permittees must document the need for removal in the SWPPP. [Minn. R. 7090]
9.9 Permittees must provide silt fence or other effective sediment controls at the base of stockpiles on the downgradient perimeter prior to the initiation of stockpiling. Sediment controls must be managed in accordance with section 9.6. [Minn. R. 7090]
9.10 Permittees must locate stockpiles outside of natural buffers or surface waters, including stormwater conveyances such as curb and gutter systems unless there is a bypass in place for the stormwater. [Minn. R. 7090]
9.11 Permittees must install a vehicle tracking BMP to minimize the track out of sediment from the construction site or onto paved roads within the site. [Minn. R. 7090]
9.12 Permittees must use street sweeping in addition to vehicle tracking BMPs if vehicle tracking BMPs alone are not adequate to prevent sediment tracking onto the street. [Minn. R. 7090]
9.13 Permittees must install temporary sediment basins as required in Section 14. [Minn. R. 7090]
9.14 In any areas of the site where final vegetative stabilization will occur, permittees must restrict vehicle and equipment use to minimize soil compaction. [Minn. R. 7090]
9.15 Permittees must preserve topsoil on the site, unless infeasible. [Minn. R. 7090]
9.16 Permittees must direct discharges from BMPs to vegetated areas unless infeasible. [Minn. R. 7090]
9.17 Permittees must preserve a 50-foot natural buffer or, if a buffer is infeasible on the site, provide redundant (double) perimeter sediment controls when a surface water is located within 50 feet of the project's earth disturbances and stormwater flows to the surface water. Permittees must install perimeter sediment controls at least 5 feet apart unless limited by lack of available space. Natural buffers are not required adjacent to road ditches, judicial ditches, county ditches, stormwater conveyance channels, storm drain inlets, and sediment basins. If preserving the buffer is infeasible, permittees must document the reasons in the SWPPP. Sheet piling and other impermeable barriers installed in a manner that retains all stormwater are considered redundant perimeter control. [Minn. R. 7090]
9.18 Any sediment control made of soil must be temporarily or permanently stabilized within 24 hours. [Minn. R. 7090]
9.19 Permittees must use polymers, flocculants, or other sedimentation treatment chemicals in accordance with accepted engineering practices, dosing specifications and sediment removal design specifications provided by the manufacturer or supplier. The permittees must use conventional erosion and sediment controls prior to chemical addition and must direct treated stormwater to a sediment control system for filtration or settlement of the floc prior to discharge. [Minn. R. 7090]
10.1 Dewatering and Basin Draining. [Minn. R. 7090]
10.2 Permittees must not cause nuisance conditions (see Minn. R. 7050.0210, subp. 2) in surface waters from dewatering and basin draining (e.g., pumped discharges, trench/ditch cuts for drainage) discharges. Permittees must discharge turbid or sediment-laden waters related to dewatering or basin draining to a sediment control (e.g. sediment trap or basin, filter bag) designed to prevent discharges with visual turbidity. To the extent possible, use well-vegetated (e.g., grassy or wooded), upland areas of the site to infiltrate dewatering water before discharge. Permittees are prohibited from using receiving waters as part of the treatment area. Permittees must visually check and photograph the discharge at the beginning and at least once every 24 hours of operation to ensure adequate treatment has been obtained and nuisance conditions will not result from the discharge. [Minn. R. 7050.0210]
10.3 If nuisance conditions result from the discharge, Permittees must cease dewatering immediately and corrective actions must occur before dewatering is resumed. Nuisance conditions includes, but is not limited to, a sediment plume in the discharge or the discharge appears cloudy, or opaque, or has a visible contrast, or has a visible oil film, or has aquatic habitat degradation that can be identified by an observer. [Minn. R. 7050.0210]
10.4 If permittees must discharge water containing oil or grease, they must use an oil-water separator or suitable filtration device (e.g., cartridge filters, absorbents pads) prior to discharge. [Minn. R. 7090]
10.5 Permittees must discharge all water from dewatering or basin-draining activities in a manner that does not cause erosion or scour in the immediate vicinity of discharge points or inundation of wetlands in the immediate vicinity of discharge points that causes significant adverse impact to the wetland. [Minn. R. 7090]
10.6 If permittees pump sediment-laden water, they must haul the backwash water away for disposal, return the backwash water to the beginning of the treatment process, or incorporate the backwash water into the site in a manner that does not cause erosion. [Minn. R. 7090]
11.1 Inspections and Maintenance. [Minn. R. 7090]
11.2 Permittees must ensure a trained person, as identified in item 21.2.b, will inspect the entire construction site at least once every seven (7) days during active construction and within 24 hours after a rainfall event greater than 1/2 inch in 24 hours. [Minn. R. 7090]
11.3 Permittees must inspect and maintain all permanent stormwater treatment BMPs. [Minn. R. 7090]
11.4 Permittees must inspect all erosion prevention and sediment control BMPs and Pollution Prevention Management Measures to ensure integrity and effectiveness. Permittees must repair, replace or supplement all nonfunctional BMPs with functional BMPs by the end of the next business day after discovery unless another time frame is specified in item 11.5 or 11.6. Permittees may take additional time if field conditions prevent access to the area. [Minn. R. 7090]
11.5 During each inspection, permittees must inspect areas adjacent to the project, surface waters, including drainage ditches and conveyance systems but not curb and gutter systems, for evidence of erosion and sediment deposition. Permittees must remove all deltas and sediment deposited in areas adjacent to the project, surface waters, including drainage ways, catch basins, and other drainage systems and restabilize the areas where sediment removal results in exposed soil. Permittees must complete removal and stabilization within seven (7) calendar days of discovery unless precluded by legal, regulatory, or physical access constraints. Permittees must use all reasonable efforts to obtain access. If precluded, removal and stabilization must take place within seven (7) days of obtaining access. Permittees are responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work in surface waters. [Minn. R. 7090]
11.6 Permittees must inspect construction site vehicle exit locations, streets and curb and gutter systems within and adjacent to the project for sedimentation from erosion or tracked sediment from vehicles. Permittees must remove sediment from all paved surfaces within one (1) calendar day of discovery or, if applicable, within a shorter time to avoid a safety hazard to users of public streets. [Minn. R. 7090]
11.7 Permittees must repair, replace or supplement all perimeter control devices when they become nonfunctional or the sediment reaches 1/2 of the height of the device. [Minn. R. 7090]
11.8 Permittees must drain temporary and permanent sedimentation basins and remove the sediment when the depth of sediment collected in the basin reaches 1/2 the storage volume within 72 hours of discovery. [Minn. R. 7090]
11.9 Permittee's must inspect and photograph dewatering discharges at the beginning and at least once every 24 hours during operation. Dewatering discharges that only last for minutes, as opposed to hours, and do not reach a surface water, do not require photographs or documentation. [Minn. R. 7090]
11.10 Permittees must ensure that at least one individual present on the site (or available to the project site in three (3) calendar days) is trained in the job duties described in item 21.2.b. [Minn. R. 7090]
11.11 Permittees may adjust the inspection schedule described in item 11.2 as follows:
a. inspections of areas with permanent cover can be reduced to once per month, even if construction activity continues on other portions of the site; or
b. where sites have permanent cover on all exposed soil and no construction activity is occurring anywhere on the site, inspections can be reduced to once per month and, after 12 months, may be suspended completely until construction activity resumes. Before each monthly inspection is conducted, determine if conditions warrant; or
c. where construction activity has been suspended due to frozen ground conditions, inspections may be suspended. Inspections must resume within 24 hours of runoff occurring, or upon resuming construction, whichever comes first.
d. for projects where a pollinator habitat or native prairie type vegetated cover is being established, inspections may be reduced to once per month after the vegetation has emerged and has temporarily met 70% temporary uniform cover. If after 24 months no significant erosion problems are observed, inspections may be suspended completely until the termination requirements in section 13 have been met. [Minn. R. 7090]
11.12 Permittees must complete inspection and maintenance activities within 24 hours of being conducted and these records must be retained with the SWPPP. These records must include:
a. date and time of inspections; and
b. name of persons conducting inspections; and
c. findings of inspections, including the specific location where corrective actions are needed; and
d. corrective actions taken (including dates, times, and party completing maintenance activities); and
e. date of all rainfall events greater than 1/2 inches in 24 hours, and the amount of rainfall for each event. Permittees must obtain rainfall amounts by either a properly maintained rain gauge installed on-site, a weather station that is within one (1) mile of your location, or a weather reporting system that provides site specific rainfall data from radar summaries; and
f. if permittees observe a discharge during the inspection, they must record and should photograph and describe the location of the discharge (i.e., color, odor, settled or suspended solids, oil sheen, and other obvious indicators of pollutants); and
g. any amendments to the SWPPP proposed as a result of the inspection must be documented as required in Section 6 within seven (7) calendar days; and
h. all photographs of dewatering activities and documentation of nuisance conditions resulting from dewatering activities as described in section 10. [Minn. R. 7090]
12.1 Pollution Prevention Management Measures. [Minn. R. 7090]
12.2 Permittees must place construction materials and landscape materials under cover (e.g., plastic sheeting or temporary days) or protect them by similarly effective means designed to minimize contact with stormwater. Permittees are not required to cover or protect products which are either not a source of contamination to stormwater or are designed to be exposed to stormwater. [Minn. R. 7090]
12.3 Permittees must place pesticides, fertilizers and treatment chemicals under cover (e.g., plastic sheeting or temporary roofs) or protect them by similarly effective means designed to minimize contact with stormwater. [Minn. R. 7090]
12.4 Permittees must store hazardous materials and toxic waste, (including oil, diesel fuel, gasoline, hydraulic fluids, paint solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids) in sealed containers to prevent spills, leaks or other discharge. Storage and disposal of hazardous waste materials must be in compliance with Minn. R. ch. 7045 including secondary containment as applicable. [Minn. R. 7090]
12.5 Permittees must properly store, collect and dispose solid waste in compliance with Minn. R. ch. 7035. [Minn. R. 7035]
12.6 Permittees must position portable toilets so they are secure and will not tip or be knocked over. Permittees must properly dispose sanitary waste in accordance with Minn. R. ch. 7041. [Minn. R. 7041]
12.7 Permittees must take reasonable steps to prevent the discharge of spilled or leaked chemicals, including fuel, from any area where chemicals or fuel will be loaded or unloaded including the use of drip pans or absorbents unless infeasible. Permittees must ensure adequate supplies are available at all times to clean up discharged materials and that an appropriate disposal method is available for recovered spilled materials. Permittees must report and clean up spills immediately as required by Minn. Stat. 115.061, using dry clean up measures where possible. [Minn. Stat. 115.061]
12.8 Permittees must properly operate and maintain all equipment and equipment to a defined area of the site. Permittees must contain runoff from the washing area in a sediment basin or other similarly effective controls and must dispose waste from the washing activity properly. Permittees must properly use and store soaps, detergents, or solvents. [Minn. R. 7090]
12.9 Permittees must provide effective containment for all liquid and solid wastes generated by washout operations (e.g., concrete, stucco, paint, form release oils, curing compounds and other construction materials) related to the construction activity. Permittees must prevent liquid and solid washout wastes from contacting the ground and must design the containment so it does not result in runoff from the washout operations or areas. Permittees must properly dispose liquid and solid wastes in compliance with MPCA rules. Permittees must install a sign indicating the location of the washout facility. [Minn. R. 7035, Minn. R. 7090]
13.1 Permit Termination Conditions. [Minn. R. 7090]
13.2 Permittees must complete all construction activity and must install permanent cover over all areas prior to submitting the NOT. Vegetative cover must consist of a uniform perennial vegetation with a density of 70 percent of its expected final growth vegetation is not required where the function of a specific area dictates no vegetation, such as impervious surfaces or the base of a sand filter. [Minn. R. 7090]
13.3 Permittees must clean the permanent stormwater treatment system of any accumulated sediment and must ensure the system meets all applicable requirements in Section 15 through 19 and is operating as designed. [Minn. R. 7090]
13.4 Permittees must remove all sediment from conveyance systems prior to submitting the NOT. [Minn. R. 7090]
13.5 Permittees must remove all temporary synthetic erosion prevention and sediment control BMPs prior to submitting the NOT. Permittees may leave BMPs designed to decompose on-site in place. [Minn. R. 7090]
13.6 For residential construction only, permittees must temporarily stabilize an individual lots if the lot is sold to the homeowner, structures are finished, and permanent cover has been established. For lots that are sold to the homeowner where permanent cover has not been established, coverage terminates if temporary erosion prevention and downgradient perimeter control is properly installed and the permittee distributes the MPCA's "Homeowner Fact Sheet" to the homeowner. [Minn. R. 7090]
13.7 For construction projects on agricultural land (e.g., pipelines across cropland), permittees must return the disturbed land to its preconstruction agricultural use prior to submitting the NOT. [Minn. R. 7090]
13.8 When submitting the NOT, Permittees must include either ground or aerial photographs showing the requirements of 13.2 have been met. Permittees must take photographs of every distinct part of the site, however in cases where site conditions are portrayed must be substantially similar to those areas that are not photographed. Photographs must be clear and in focus and must include the date the photo was taken. [Minn. R. 7090]
14.1 Temporary Sediment Basins. [Minn. R. 7090]
14.2 Where ten (10) or more acres of disturbed soil (5 acres for sites discharging to special or impaired waters, see section 24) drain to a common location, permittees must provide a temporary sediment basin to provide treatment of the runoff before it leaves the construction site or enters surface waters. Permittees may convert a temporary sediment basin to a permanent basin after construction is complete. The temporary basin is no longer required when permanent cover has reduced the rate of suspended soil to less than ten (10) acres draining to a common location. [Minn. R. 7090]
14.3 The temporary basin must provide live storage for a calculated volume of runoff from a two (2)-year, 24-hour storm from each acre drained to the basin or 1,800 cubic feet of live storage per acre drained, whichever is greater. [Minn. R. 7090]
14.4 Where permittees have not calculated the two (2)-year, 24-hour storm runoff amount, the temporary basin must provide 3,600 cubic feet of live storage per acre of the basins' drainage area. [Minn. R. 7090]
14.5 Permittees must design basin outlets to prevent short-circuiting and the discharge of floating debris. [Minn. R. 7090]
14.6 Permittees must design the outlet structure to withdraw water from the surface to minimize the discharge of pollutants. Permittees may temporarily suspend the use of a surface withdrawal system during frozen conditions. The basin must include a stabilized emergency overflow to prevent failure of pond integrity. [Minn. R. 7090]
14.7 Permittees must provide energy dissipation for the basin outlet within 24 hours after connection to a surface water. [Minn. R. 7090]
14.8 Permittees must locate temporary basins outside of surface waters and any buffer zone required in item 23.11.[Minn. R. 7090]
14.9 Permittees must construct the temporary basins prior to disturbing 10 or more acres of soil draining to a common location. [Minn. R. 7090]
14.10 Where a temporary sediment basin meeting the requirements of item 14.3 through 14.9 is infeasible, permittees must install effective sediment controls such as smaller sediment basins and/or sediment traps, silt fences, vegetative buffer strips or any appropriate combination of measures as dictated by individual site conditions. In determining whether installing a sediment basin is infeasible, permittees must consider public safety and may consider factors such as site soils, slope, and available area on-site. Permittees must document this determination of infeasibility in the SWPPP.[Minn. R. 7090]
15.1 Permanent Stormwater Treatment System. [Minn. R. 7090]
15.2 Permittees must design and implement the project so all stormwater discharged from the project during and after construction activities does not cause a violation of state water quality standards, including nuisance conditions, erosion in receiving channels or on downslope properties, or a significant adverse impact to wetlands caused by inundation or decrease of flow. [Minn. R. 7090]
15.3 Permittees must design and construct a permanent stormwater treatment system to treat the water quality volume if the project's ultimate development replaces vegetation and/or other pervious surfaces creating a net increase of one (1) or more acres of cumulative impervious surface. [Minn. R. 7090]
15.4 Permittees must calculate the water quality volume as one (1) inch times the net increase of impervious surfaces created by the project. [Minn. R. 7090]
15.5 Permittees must first consider volume reduction practices on-site (e.g., infiltration or other) when designing the permanent stormwater treatment system. If this permit prohibits infiltration as described in item 16.14 through item 16.21, permittees may consider a wet sedimentation basin, filtration basin or regional pond. This permit does not consider wet sedimentation basins and filtration systems to be volume reduction practices. [Minn. R. 7090]
15.6 For projects on-site where the full volume reduction requirement cannot be met on-site, (e.g., the site has infiltration prohibitions), permittees must document the reasons in the SWPPP. [Minn. R. 7090]
15.7 Permittees must discharge the water quality volume to a permanent stormwater treatment system prior to discharge to a surface water. For purposes of this item, surface waters do not include man-made drainage systems that convey stormwater to a permanent stormwater treatment system. [Minn. R. 7090]
15.8 Where the proximity to bedrock precludes the installation of any of the permanent stormwater treatment practices required by Sections 15 through 19, permittees must install other treatment such as grassed swales, smaller ponds, or grit chambers, prior to the discharge of stormwater to surface waters. [Minn. R. 7090]
15.9 For linear projects where permittees cannot treat the entire water quality volume within the existing right-of-way, permittees must make a reasonable attempt to obtain additional right-of-way, easement or other permission for stormwater treatment during the project planning process. Documentation of these attempts must be in the SWPPP. Permittees must still consider volume reduction practices first as described in item 15.5. If permittees cannot obtain addit

NOTES

1. SUBCATCHMENT 30S: REAR ROOF DRAINAGE FROM LOTS 11–23, BLOCK 9 WILL BE COLLECTED BY STORM SEWER. LOTS 5–7, BLOCK 7 AND LOTS 1–2, BLOCK 8 REAR ROOFS, FOR AN ESTIMATED TOTAL OF 9,550 SF (0.22 AC) IMPERVIOUS, ARE PROPOSED TO RUNOFF DIRECTLY TO ADJACENT LAND.

LEGEND

1P — POND AREA

1R — REACH

1S — DRAINAGE AREA (TOTAL DRAINAGE AREA / IMPERVIOUS AREA)

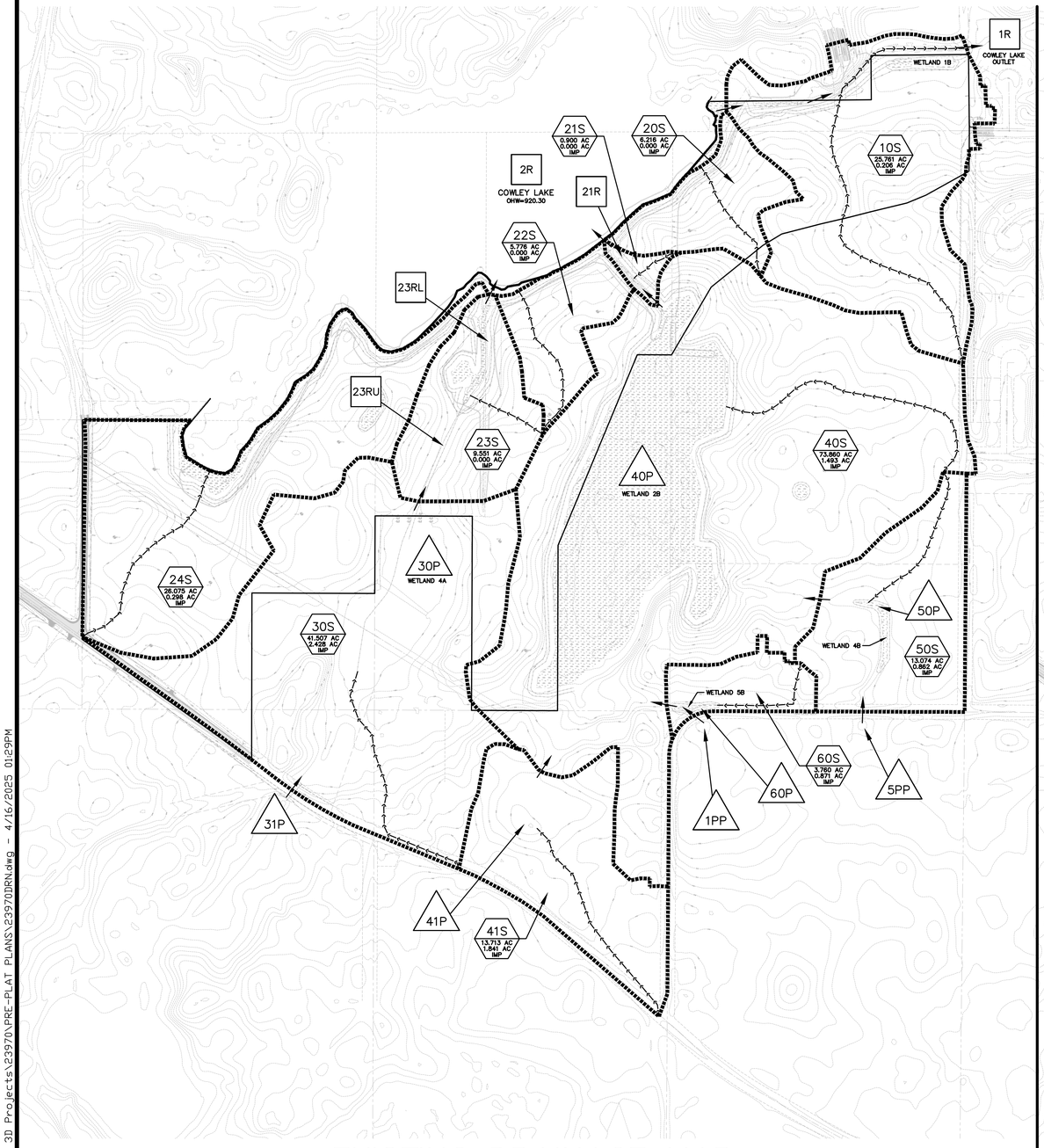
FLOW DIRECTION

ToC PATH

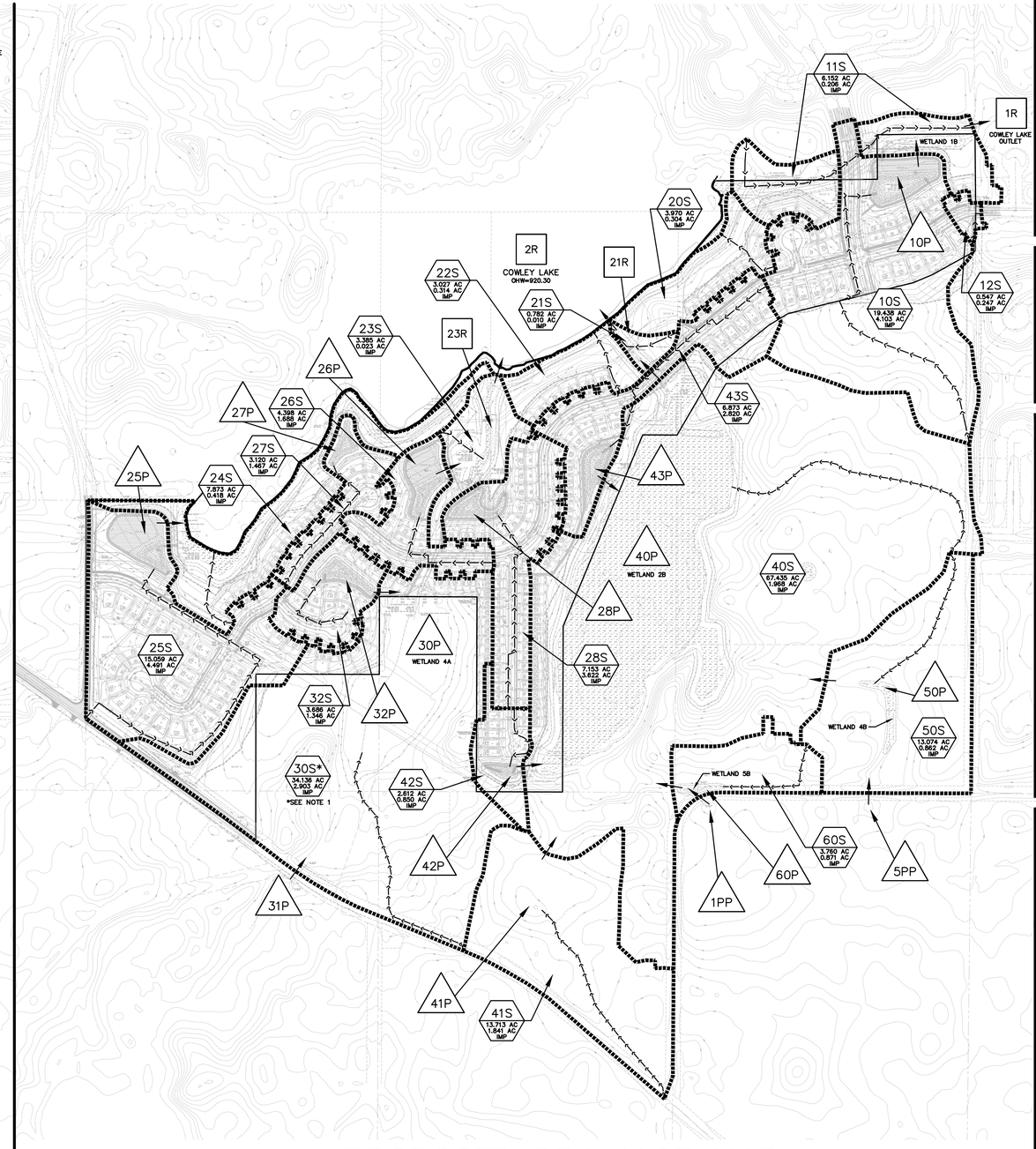
DRAINAGE BOUNDARY

SCALE IN FEET
0 300 600 900
1 inch = 300 feet

N



EXISTING DRAINAGE MAP



PROPOSED DRAINAGE MAP

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE

ROGERS, MINNESOTA

DRAINAGE MAPS

FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	JSO
DATE	02/24/2025
REVISIONS	
03/19/2025 MPCA REVIEW SUBMITTAL	
04/04/2025 PARTIAL CITY COMMENTS	
04/15/2025 WATERSHED COMMENTS	
CAD FILE	23970DRN
PROJECT NO.	23970
	3.5

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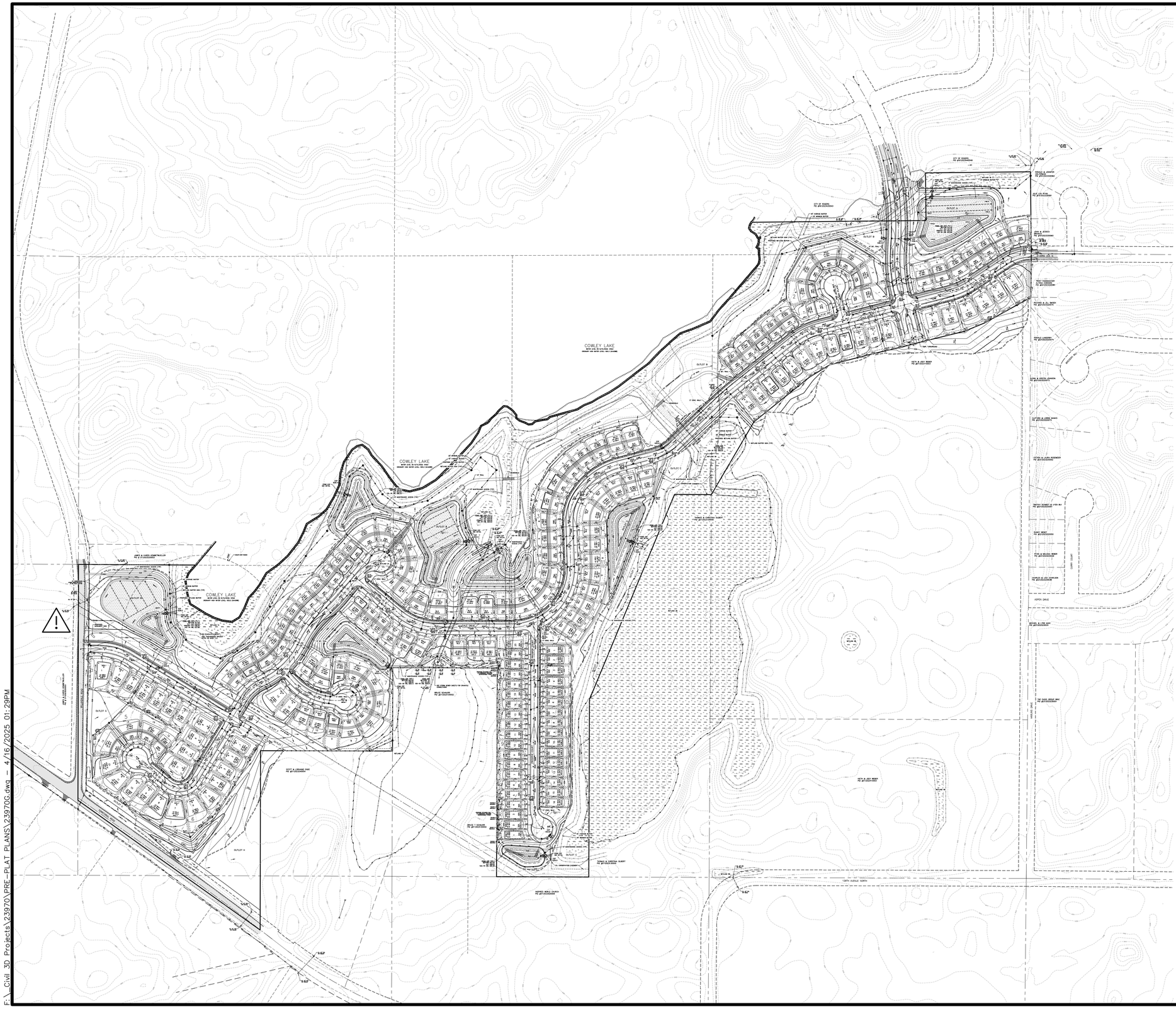
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CITY OF ROGERS
PID #1612023420043

RONALD & JENNIFER HOLTERMAN
PID #1512023330062

JULIE LOU RYAN
PID #1512023330061

JOHN & JESSICA BROSIUS
PID #1512023330060

TRENT RADEMACHER ALYSSA EVENSON
PID #2212023220081

RICHARD & JILL SMISEK
PID #2212023220075

RONALD LUNDERBY
PID #2212023220074

GLENN & KRISTIN JOHNSON
PID #2212023220073

KIETH & JODY WEBER
PID #2112023110003

EDGEWATER PARKWAY

WEBER PLACE

DALE DRIVE

133RD AVE N

OUTLOT A

OUTLOT B

POND EOF
SEE DETAIL
EOF
924.0

POND 10P (SED./FILT.)
BOTTOM 913.00
FILT. OLE 921.00
PRIMARY OLE 922.00
100-YR HWL 923.82

WETLAND 1B

10' MAINTENANCE ACCESS (TYP)

10' MINIMUM BUFFER

40' AVERAGE BUFFER

25' MINIMUM BUFFER

WETLAND BUFFER SIGN (TYP)

PROPOSED WETLAND BUFFER

10' BIT. TRAIL

S. CONC. WALK

FUTURE TRAIL. WIDTH OF TRAIL EASEMENT TO BE DETERMINED AT TIME OF FINAL PLAT. MIN. 20' WIDTH.

TEMP. TURNAROUND

EX. 48" CMP INV 916.34

EX. 48" CMP INV 915.98

EX. 36" CMP INV 916.48

EX. 36" CMP INV 916.74

EX. 15" FES INV 923.38

EX WALL TOP 926.40 BOT 925.46

ST-14

ST-13

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING OVERHEAD POWER LINE
- EXISTING LIGHT POLE
- EXISTING TRANSFORMER
- EXISTING TELEPHONE PEDESTAL
- EXISTING TV PEDESTAL
- EXISTING CURB & GUTTER
- EXISTING FENCE
- EXISTING CONTOUR
- EXISTING WETLAND EDGE
- EXISTING SOIL BORING LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- EXISTING WETLAND
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONTOUR
- PROPOSED GRADING LIMITS
- PROPOSED EMERGENCY OVERFLOW
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN
- PROPOSED MAINTENANCE ACCESS
- WETLAND BUFFER SIGN

PROPOSED CONTOUR — 922 — LOT NUMBER
SURFACE DRAINAGE — 6 — EXISTING CONTOUR
923.0 — FINISHED GRADE ELEVATION
LO 923.5 — LOWEST OPENING ELEVATION
LFE 919.5 — LOWEST FLOOR ELEVATION
PROPERTY LINE — RLO — RECOMMENDED HOUSE TYPE
SUGGESTED GARAGE SIDE — G 927.5 — DRAINAGE & UTILITY EASEMENT
FINISHED ELEVATION AT LOT CORNER — 926.0 925.5 — TYPICAL FRONT YARD SETBACK (HOUSE)
(925.50) — PVI ELEVATION AT VERTICAL CURVE
100' ℄ STATION
925.50 — FINISHED ℄ GRADE
CENTERLINE (℄)

TYPICAL LOT

Know what's below. Call before you dig.

N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE

PRELIMINARY GRADING & DRAINAGE PLAN

FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

ROGERS, MINNESOTA

DRAWN BY
VUN/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970G

PROJECT NO.
23970

4.1

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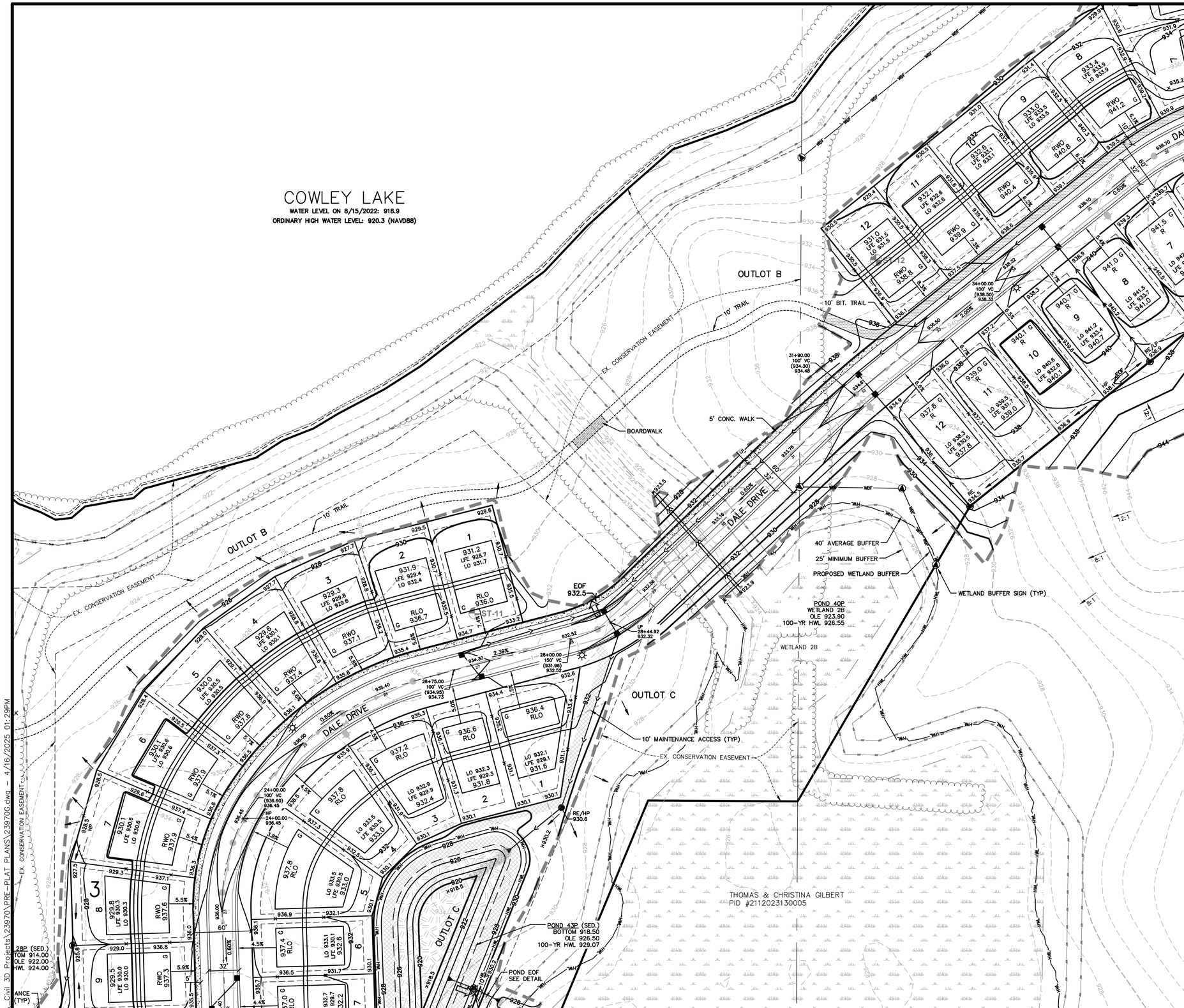

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
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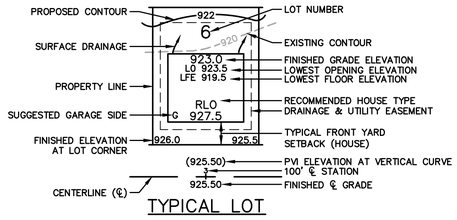
- EXISTING GRAVEL
- EXISTING WETLAND
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONTOUR
- PROPOSED GRADING LIMITS
- PROPOSED EMERGENCY OVERFLOW
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN
- PROPOSED MAINTENANCE ACCESS
- WETLAND BUFFER SIGN



TYPICAL LOT

811 Know what's below. Call before you dig.

N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
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ROGERS, MINNESOTA
PRELIMINARY GRADING & DRAINAGE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970G

PROJECT NO.
23970

4.2

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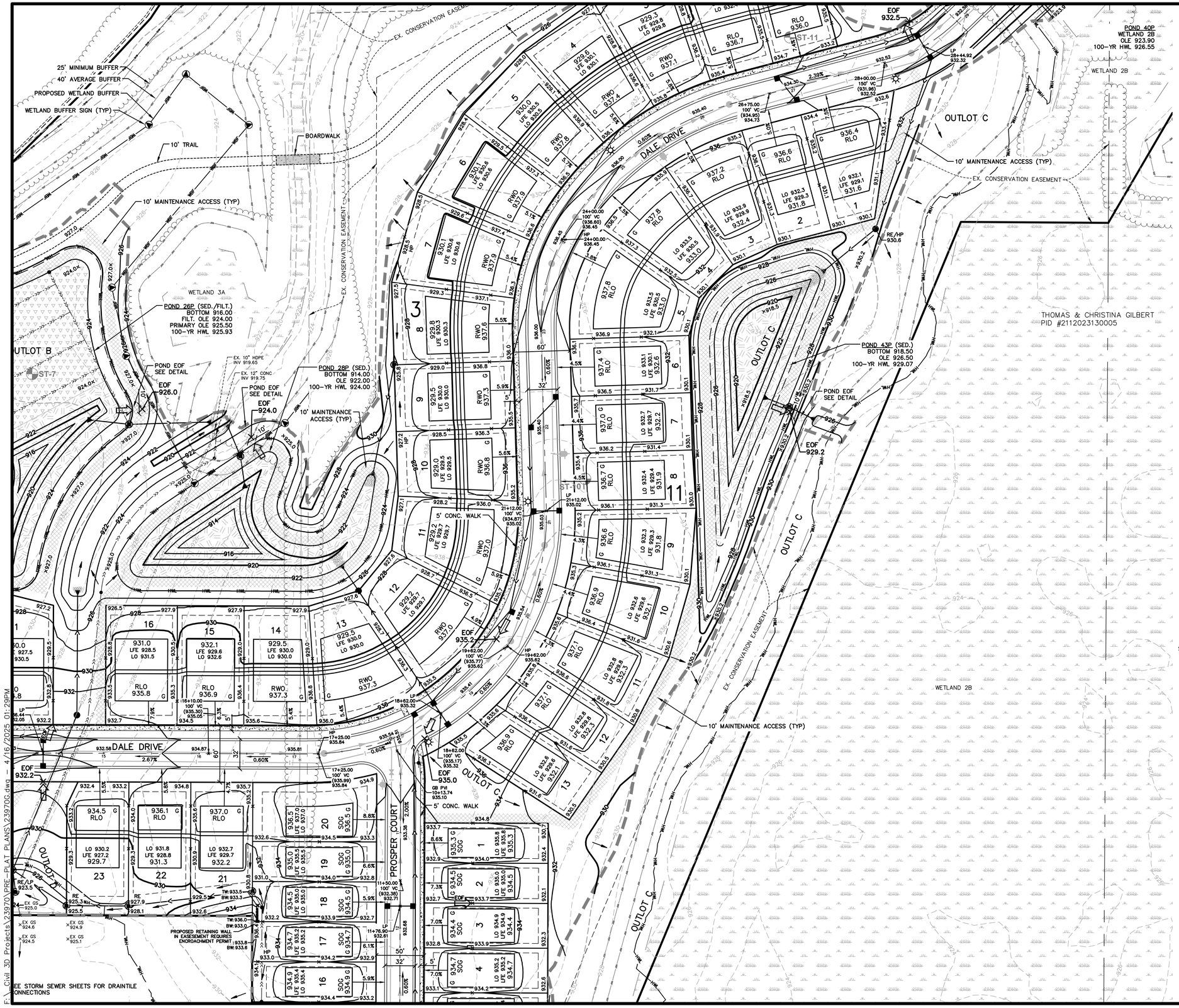

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING OVERHEAD POWER LINE
- EXISTING LIGHT POLE
- EXISTING TRANSFORMER
- EXISTING TELEPHONE PEDESTAL
- EXISTING TV PEDESTAL
- EXISTING CURB & GUTTER
- EXISTING FENCE
- EXISTING CONTOUR
- EXISTING WETLAND EDGE
- EXISTING SOIL BORING LOCATION
- EXISTING TREELINE/TREES
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- EXISTING CONCRETE
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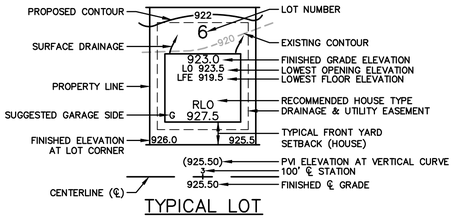
- PROPOSED FILTRATION BASIN
- PROPOSED MAINTENANCE ACCESS
- WETLAND BUFFER SIGN



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PRELIMINARY GRADING & DRAINAGE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
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CAD FILE
23970G

PROJECT NO.
23970

4.3

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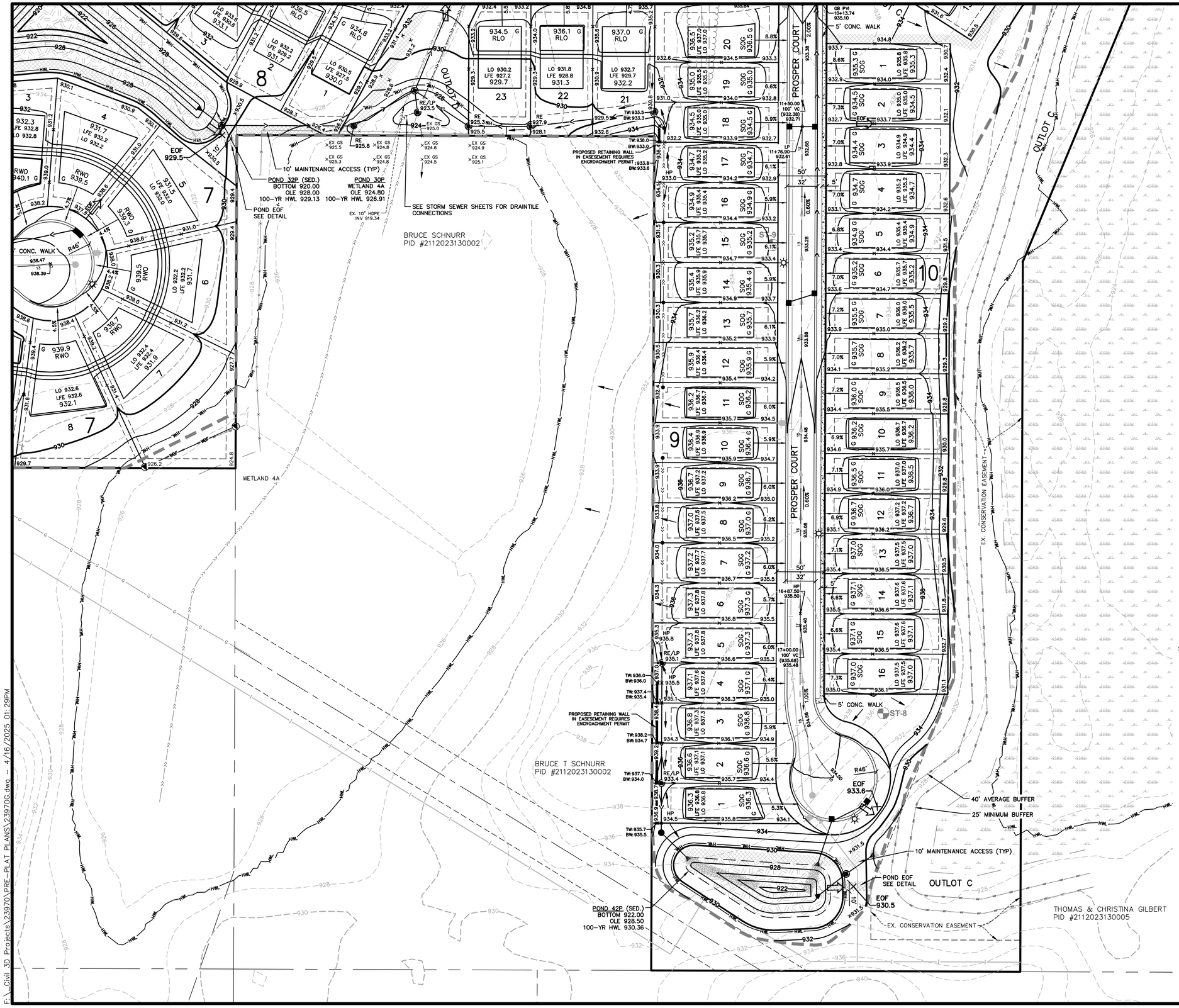

LEGEND

- EXISTING WATERMAIN
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- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
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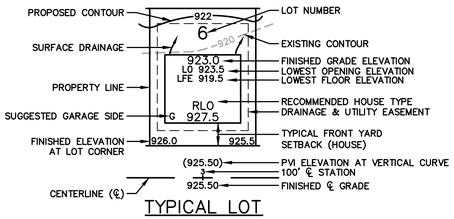
- PROPOSED FILTRATION BASIN
- PROPOSED MAINTENANCE ACCESS
- WETLAND BUFFER SIGN



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PRELIMINARY GRADING & DRAINAGE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY VUN/JSO
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03/19/2025 MPCA REVIEW SUBMITTAL
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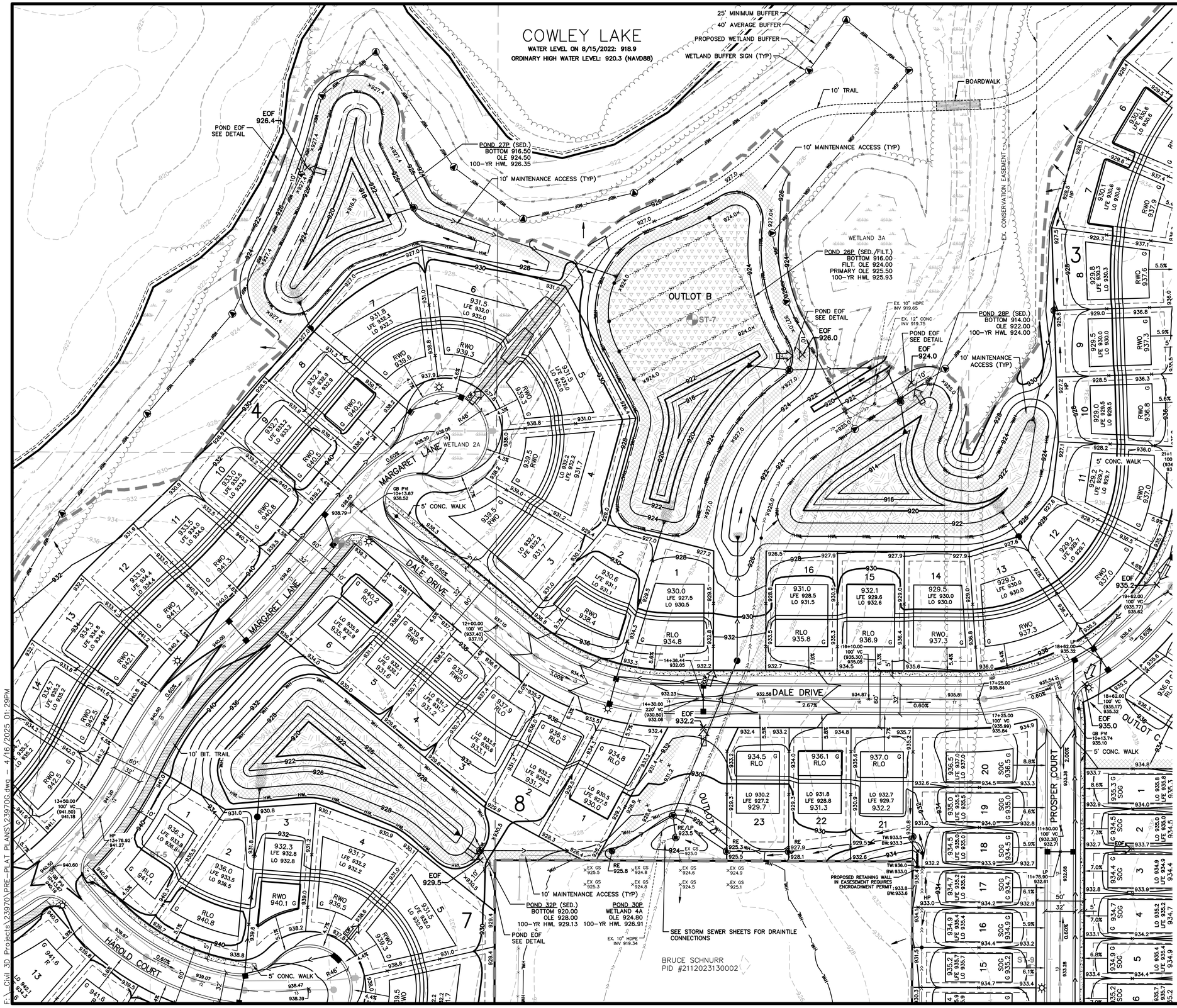
CAD FILE 23970G
PROJECT NO. 23970
4.4

F:_Civil 3D Projects\23970\PRE-PLAT PLANS\23970G.dwg - 4/16/2025 01:29PM



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- EXISTING WATERMAIN
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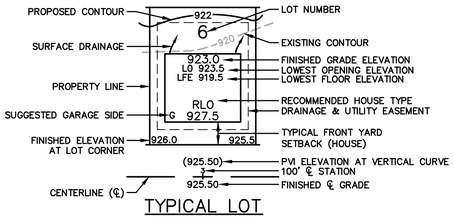

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FOR
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4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY VUN/JSO
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04/15/2025 WATERSHED COMMENTS
CAD FILE 23970G
PROJECT NO. 23970
4.5

F:_Civil 3D Projects\23970\PRE-PLAT PLANS\23970C.dwg - 4/16/2025 01:29PM

JAMES & KAREN KEMMETMUELLER
PID # 2112023220003

EX. 12" CMP
INV 920.79

10' MAINTENANCE ACCESS (TYP)

EX. UNDERGROUND STORM SEWER/DRAINTILE TO BE FIELD LOCATED

EX. MHST
RE 928.97
INV 921.40

EX. 15" RCP

EX. 15" FES
INV 921.67

OUTLOT B

PROPOSED MONUMENT SIGN

40' AVERAGE BUFFER

25' MINIMUM BUFFER

WETLAND BUFFER SIGN (TYP)

PROPOSED WETLAND BUFFER

COWLEY LAKE
WATER LEVEL ON 8/15/2022: 918.9
ORDINARY HIGH WATER LEVEL: 920.3 (NAVD88)

EOF
928.0

POND EOF
SEE DETAIL

POND 2SP (SED./FILT.)
BOTTOM 917.00
FILT. OLE 925.00
PRIMARY OLE 926.50
100-YR HWL 927.80

WETLAND 1A

EX EAGLE'S NEST*
*SEE "ENDANGERED SPECIES" NOTES ON SHEET 3.2

EAGLE'S NEST RADIUS

EOF
932.8

MARLENE AVENUE

WILLANDALE ROAD

OUTLOT G

LOVINA LANE

MARGARET LANE

HAROLD COURT

OUTLOT F

OUTLOT I

10' BIT. TRAIL

5' CONC. WALK

8' CONC. WALK

EX 8" GAS MAIN

JAMES & KAREN KEMMETMUELLER
PID # 2112023220003

SCOTT & LORIANNE ENDE
PID #2112023240004

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LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
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- EXISTING TRANSFORMER
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- PROPOSED MAINTENANCE ACCESS
- WETLAND BUFFER SIGN

PROPOSED CONTOUR — 922 — LOT NUMBER
SURFACE DRAINAGE — EXISTING CONTOUR
PROPERTY LINE — 923.0 FINISHED GRADE ELEVATION; LO 923.5 LOWEST OPENING ELEVATION; LFE 919.5 LOWEST FLOOR ELEVATION
SUGGESTED GARAGE SIDE — RLO RECOMMENDED HOUSE TYPE; G 927.5 DRAINAGE & UTILITY EASEMENT
FINISHED ELEVATION AT LOT CORNER — 926.0 / 925.5 — TYPICAL FRONT YARD SETBACK (HOUSE)
(925.50) PVI ELEVATION AT VERTICAL CURVE; 925.50 100' ℄ STATION; 925.50 FINISHED ℄ GRADE
CENTERLINE (℄)

TYPICAL LOT

WARNING!

UNDERGROUND HIGH PRESSURE PIPELINE
CONTACT ENERGY TRANSFER REPRESENTATIVE
AT 1-800-753-5531 PRIOR TO PERFORMING WORK
WITHIN THE PIPELINE EASEMENT

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N

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0 50 100 150
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4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/JSO

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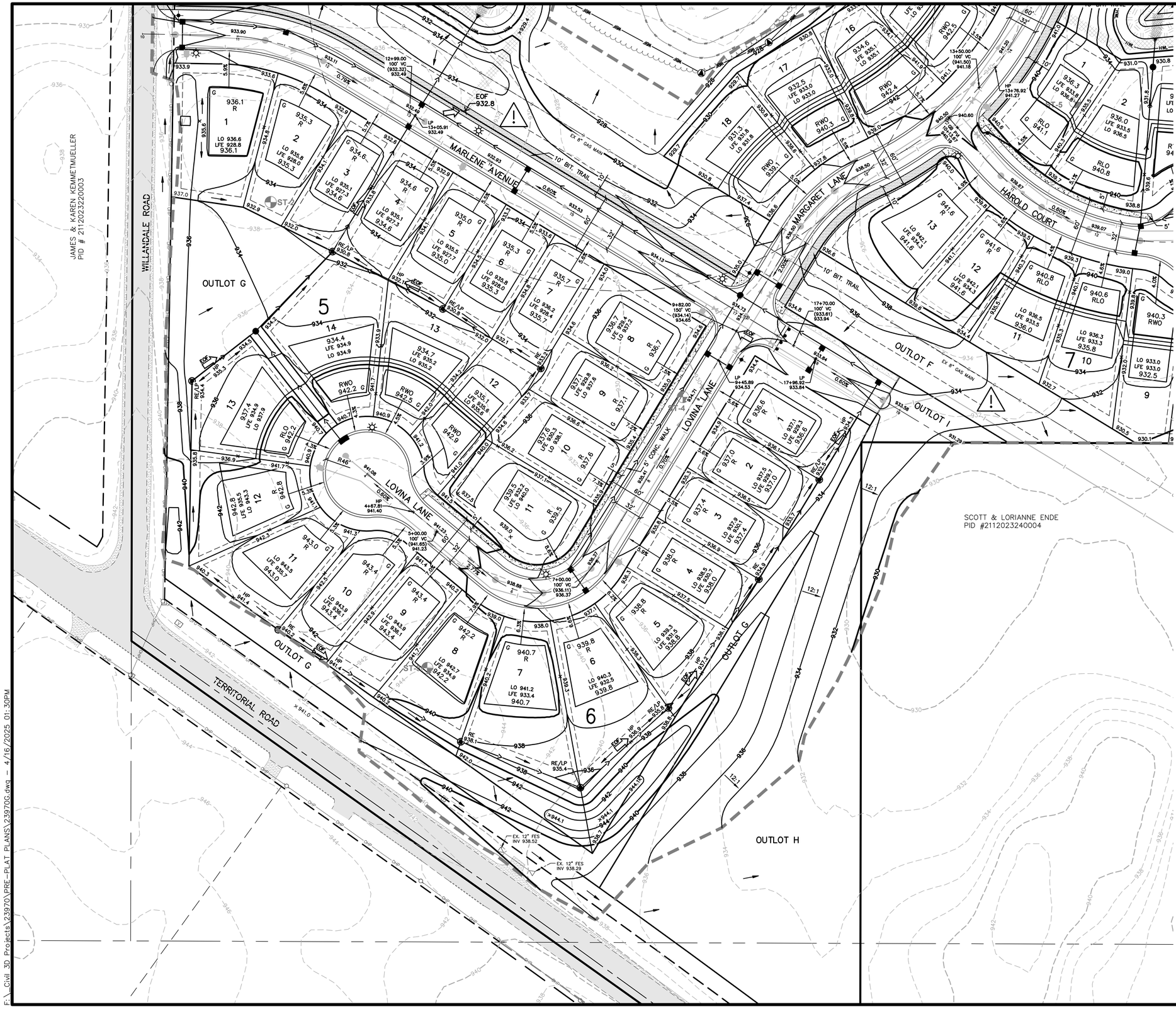
CAD FILE
23970G

PROJECT NO.
23970

4.6



LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
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- EXISTING TREELINE/TREES
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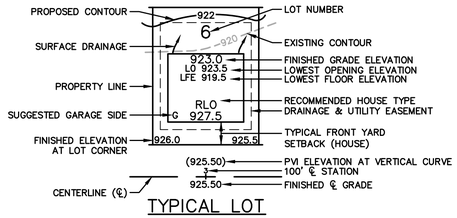

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ROGERS, MINNESOTA
4180 NAPIER COURT, ST. MICHAEL, MN 55376

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CAD FILE	23970G
PROJECT NO.	23970
	4.7

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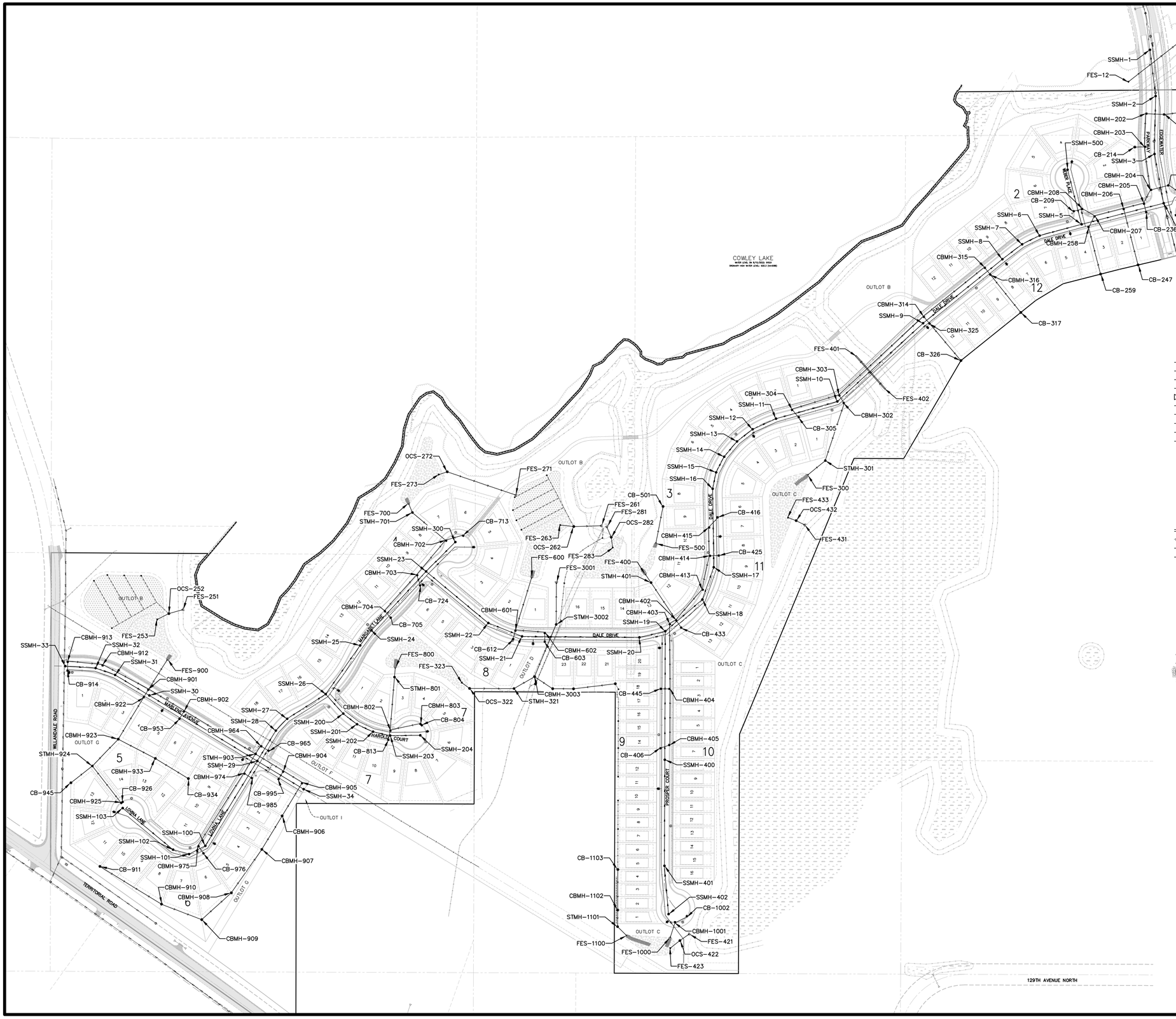

LEGEND

- EXISTING WATERMAIN
- EXISTING RAW WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING OVERHEAD POWER LINE
- EXISTING ELECTRIC OUTLET POST
- EXISTING GUY WIRE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (WATER)
- EXISTING SIGN
- EXISTING TRANSFORMER
- EXISTING TELEPHONE PEDESTAL
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING WETLAND EDGE
- SB-1 EXISTING SOIL BORING LOCATION
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- EXISTING WETLAND
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- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED CURB & GUTTER
- PROPOSED BITUMINOUS TRAIL
- PROPOSED CONCRETE
- PROPOSED WET SEDIMENTATION POND
- PROPOSED FILTRATION BASIN

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N

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COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
OVERALL UTILITY PLAN
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RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF/JSO

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02/24/2025

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03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
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CAD FILE
23970SS-PRE

PROJECT NO.
23970

5.0

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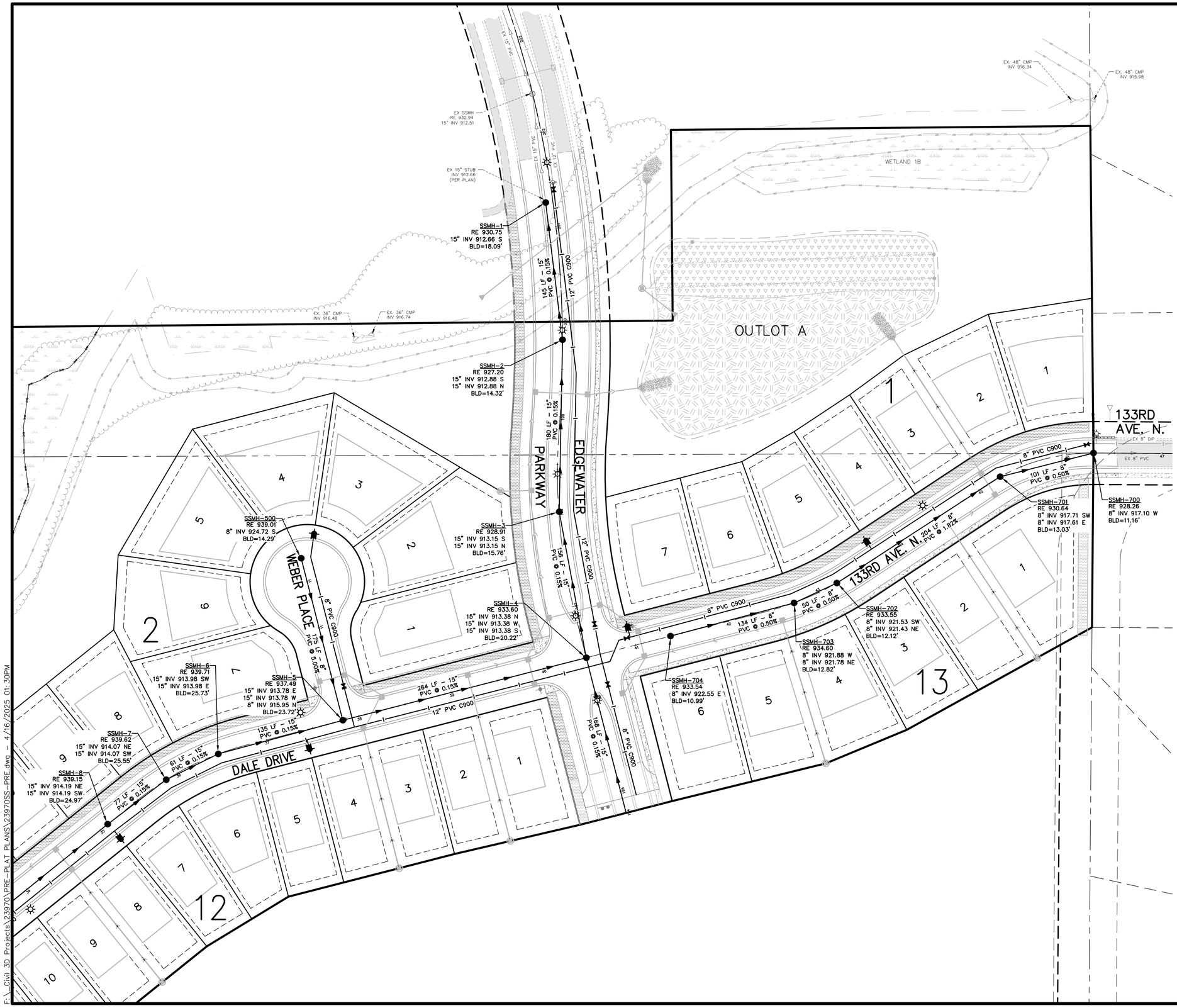

LEGEND

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- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
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- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN

Know what's **below.** **Call** before you dig.

N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
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PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
PRELIMINARY SANITARY SEWER & WATERMAIN PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	VUN/EPF/JSO
DATE	02/24/2025
REVISIONS	
03/19/2025 MPCA REVIEW SUBMITTAL	
04/04/2025 PARTIAL CITY COMMENTS	
04/15/2025 WATERSHED COMMENTS	
CAD FILE	23970SS-PRE
PROJECT NO.	23970
	5.1

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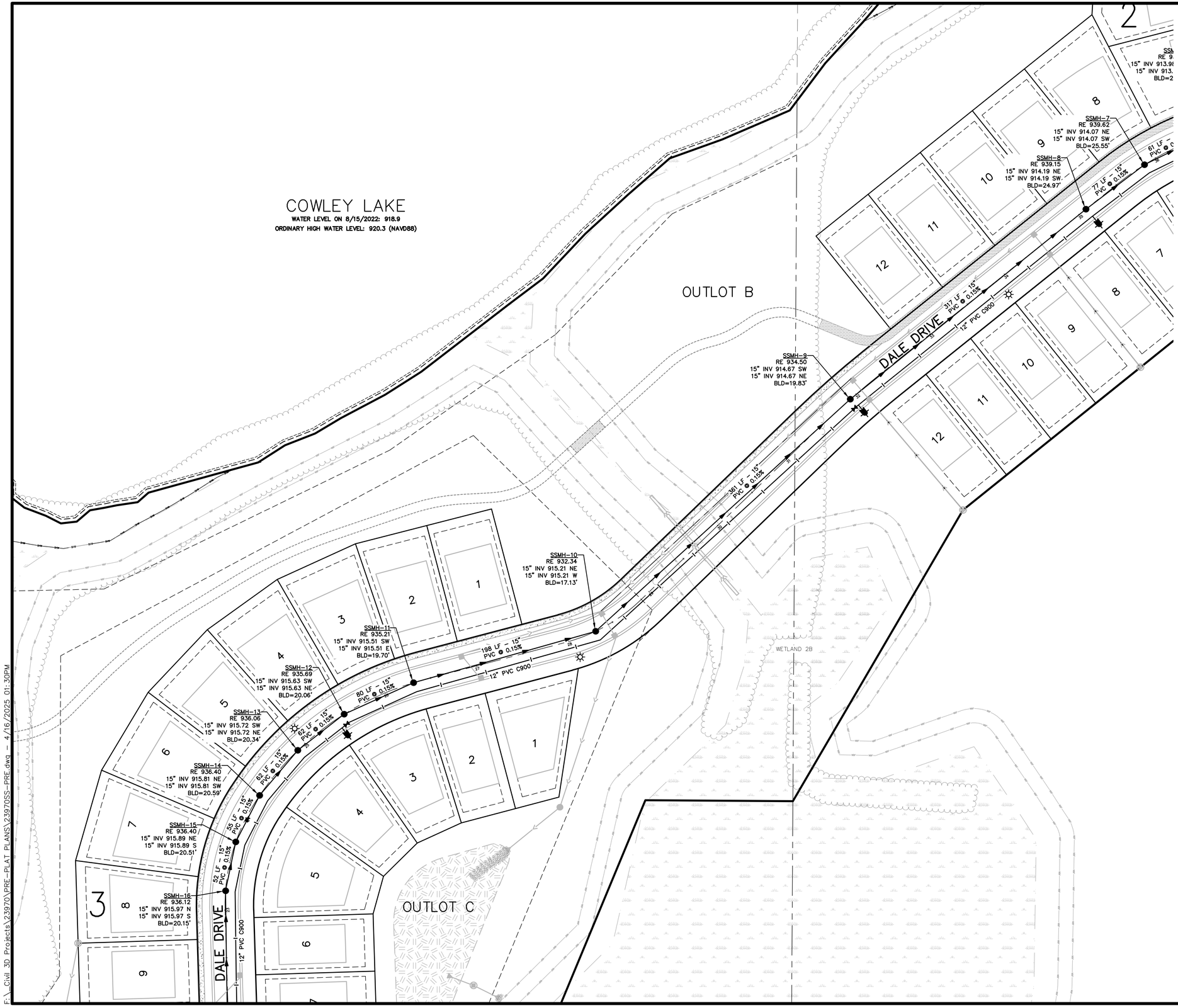

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING TRANSFORMER
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- SB-1 EXISTING SOIL BORING LOCATION
- TP-1 EXISTING TEST PIT LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
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4180 NAPIER COURT, ST. MICHAEL, MN 55376

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PROJECT NO.	23970
	5.2

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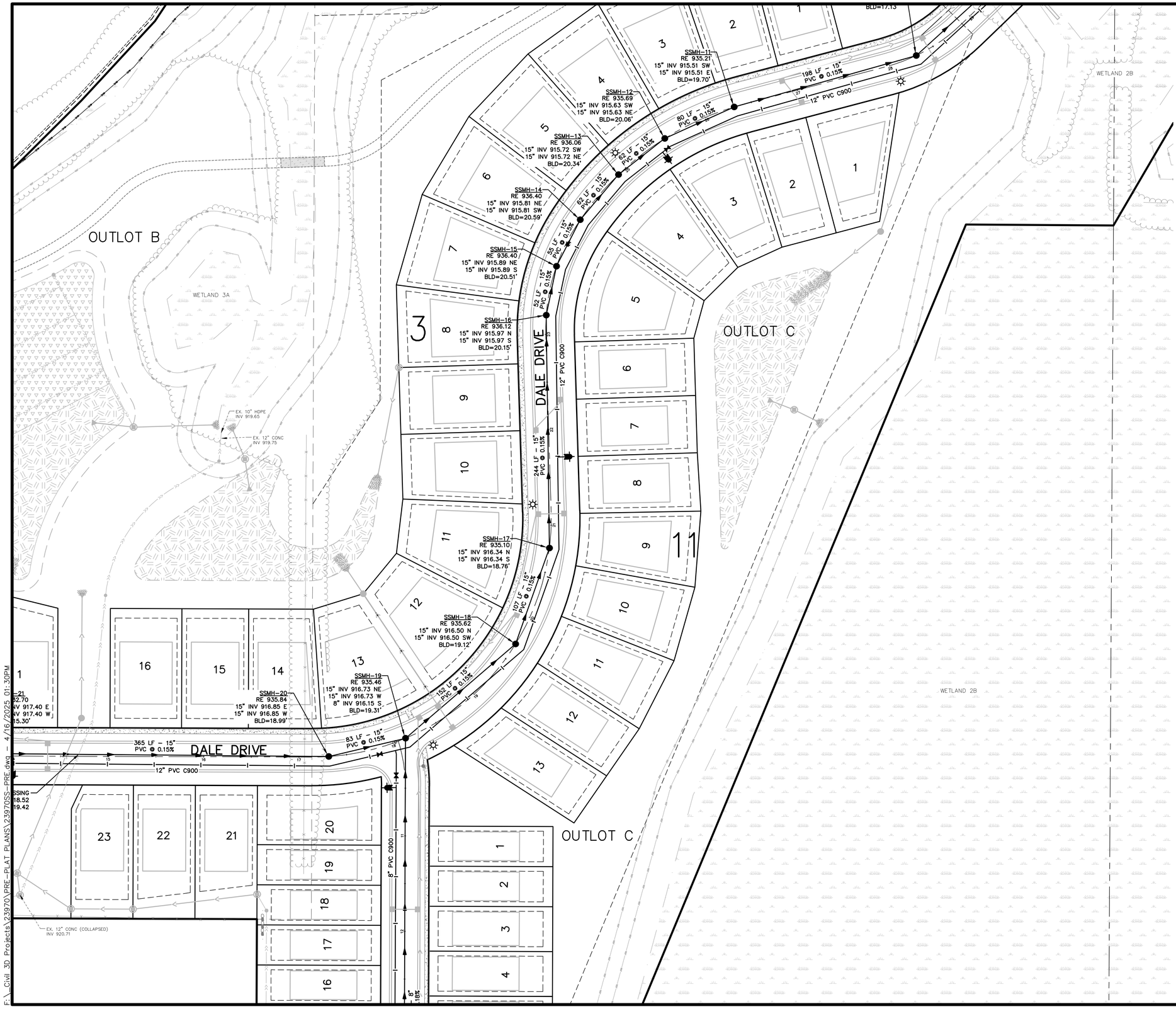

LEGEND

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- EXISTING STORM SEWER
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- EXISTING UNDERGROUND FIBER OPTIC
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4180 NAPIER COURT, ST. MICHAEL, MN 55376

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PROJECT NO.	23970
	5.3

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PROPOSED CROSSING
TOP OF 15" SAN PVC=918.52
DRAINTILE 12" INV=919.42

OUTLOT D

EX. 10" HDPE
INV 919.34

EX. 12" CONC (COLLAPSED)
INV 920.71

SSMH-204
RE 937.87
8" INV 926.87 W
BLD=11.00'

8"
0.50%

WETLAND 4A

17+25.00
935.84

8" PVC C900

400 LF - 8"
PVC @ 1.18%

PROSPER COURT

SSMH-400
RE 933.87
8" INV 920.89 N
8" INV 920.99 S
BLD=12.98'

330 LF - 8"
PVC @ 0.50%

8" PVC C900

SSMH-401
RE 935.37
8" INV 922.64 N
8" INV 922.74 S
BLD=12.73'

151 LF - 8"
PVC @ 0.50%

SSMH-402
RE 933.80
8" INV 923.50 N
BLD=10.30'

8" PVC C900

OUTLOT C

OUTLOT C

FUTURE WATERMAIN (FINAL SIZE AND LOCATION TBD)

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
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CAD FILE
23970SS-PRE

PROJECT NO.
23970

5.4

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OUTLOT B

WETLAND 3A

WETLAND 2A

EX. 10" HDPE INV 919.65

EX. 12" CONC INV 919.75

SSMH-300
RE 937.76
8" INV 926.55 SW
BLD=11.20'

129 LF – 8" PVC @ 5.00%

8" PVC C900

SSMH-23
RE 938.79
15" INV 917.95 SE
15" INV 917.95 SW
8" INV 920.11 NE
BLD=20.85'

250 LF – 15" PVC @ 0.15%

12" PVC C900

252 LF – 15" PVC @ 0.15%

SSMH-22
RE 935.85
15" INV 917.57 E
15" INV 917.57 NW
BLD=18.28'

SSMH-21
RE 932.70
15" INV 917.40 E
15" INV 917.40 W
BLD=15.30'

113 LF – 15" PVC @ 0.15%

SSMH-20
RE 935.84
15" INV 916.85 E
15" INV 916.85 W
BLD=18.99'

SSMH-18
RE 935.62
15" INV 916.50 N
15" INV 916.50 SW
BLD=19.12'

SSMH-19
RE 935.46
15" INV 916.73 NE
15" INV 916.73 W
8" INV 916.15 S
BLD=19.31'

152 LF – 15" PVC @ 0.15%

365 LF – 15" PVC @ 0.15%

DALE DRIVE

12" PVC C900

83 LF – 15" PVC @ 0.15%

MARGARET LANE

SSMH-24
RE 940.30
15" INV 918.33 NE
15" INV 918.33 SW
BLD=21.97'

59 LF – 15" PVC @ 0.15%

SSMH-25
RE 940.65
15" INV 918.42 NE
15" INV 918.42 SW
BLD=22.23'

PROPOSED CROSSING
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DRAINTILE 12" INV=919.42

OUTLOT D

EX. 10" HDPE INV 919.34

EX. 12" CONC (COLLAPSED) INV 920.71

8" PVC C900

400 LF – 8" PVC @ 1.18%

SSMH-400
RE 933.87
8" INV 920.89 N
8" INV 920.99 S
BLD=12.98'

COURT

SSMH-26
RE 940.60
15" INV 918.70 SW
8" INV 920.86 SE
15" INV 918.70 NE
BLD=21.90'

186 LF – 15" PVC @ 0.15%

12" PVC C900

82 LF – 8" PVC @ 5.00%

55 LF – 8" PVC @ 0.50%

8" PVC C900

54 LF – 8" PVC @ 0.50%

55 LF – 8" PVC @ 0.50%

94 LF – 8" PVC @ 0.50%

SSMH-200
RE 939.78
8" INV 924.95 NW
8" INV 925.05 SE
BLD=14.83'

SSMH-201
RE 939.45
8" INV 925.66 SE
8" INV 925.56 NW
BLD=13.89'

SSMH-202
RE 939.12
8" INV 926.02 E
8" INV 925.93 NW
BLD=13.19'

SSMH-203
RE 938.79
8" INV 926.30 W
8" INV 926.40 E
BLD=12.49'

SSMH-204
RE 937.87
8" INV 926.87 W
BLD=11.00'

HAROLD COURT

OUTLOT F

EX. 8" GAS MAIN

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LEGEND

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- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
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- EXISTING UNDERGROUND FIBER OPTIC
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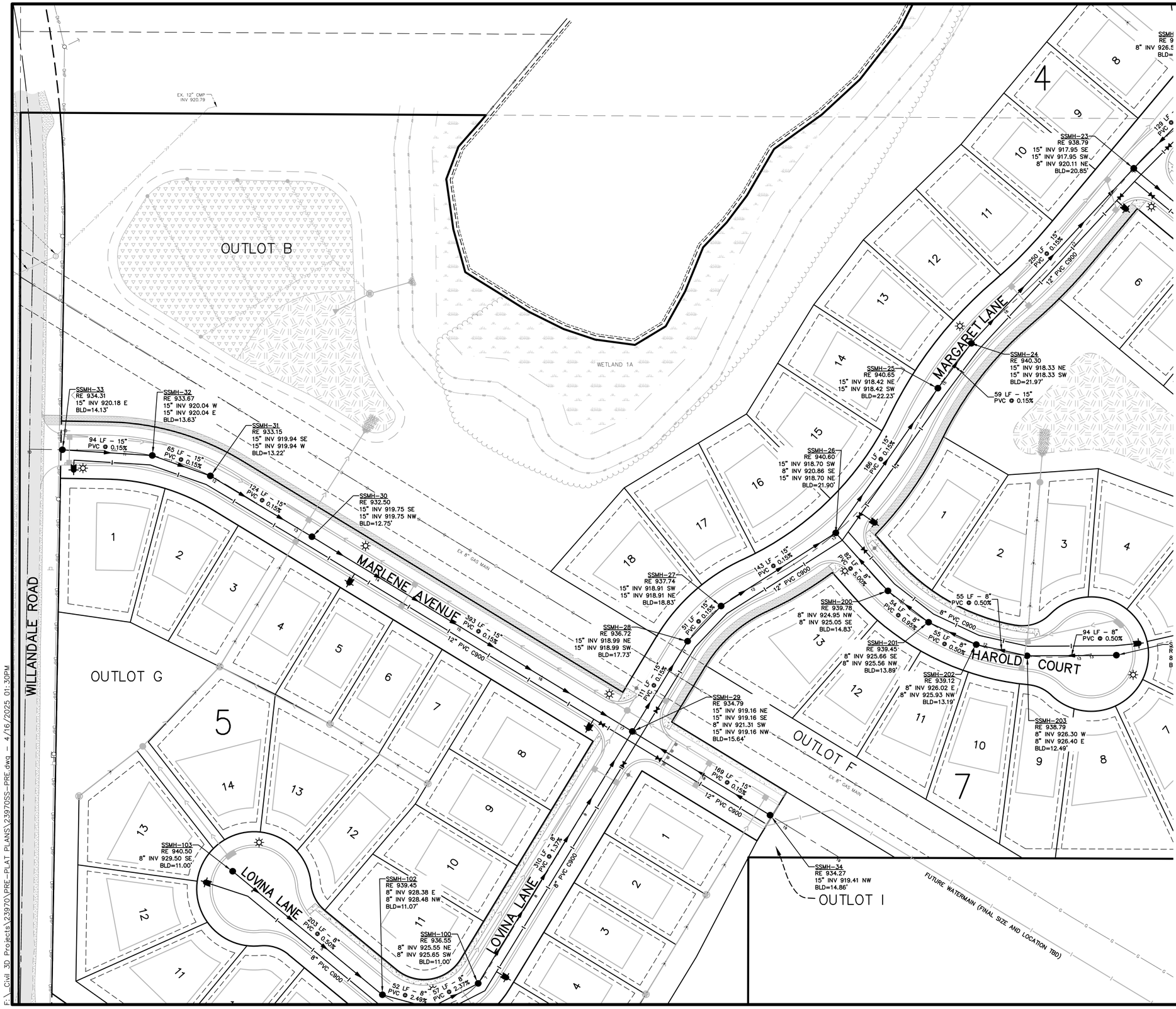

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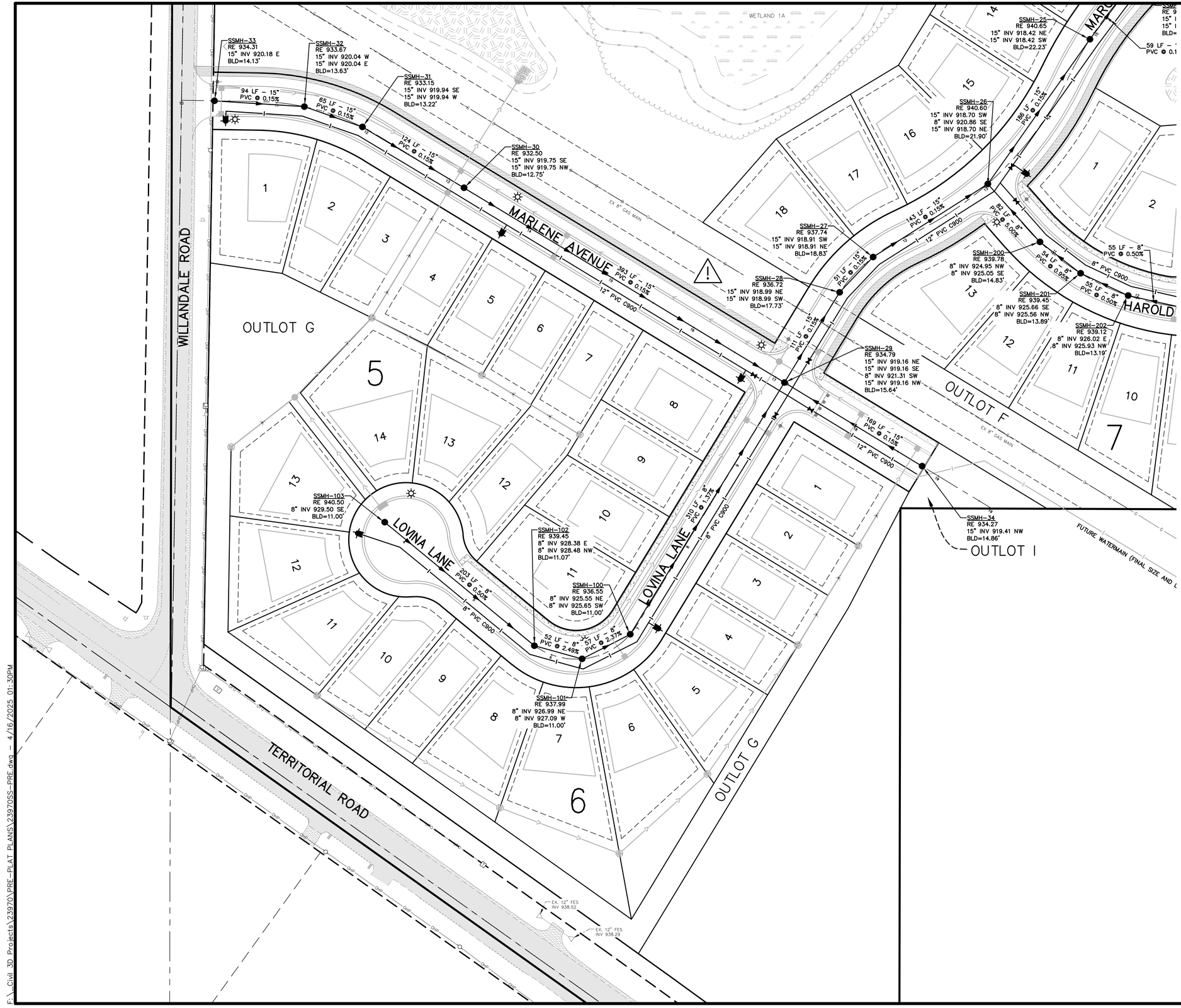
WETLAND 1A
WILLANDALE ROAD
MARLENE AVENUE
HAROLD
LOVINA LANE
LOVINA LANE
TERRITORIAL ROAD
OUTLOT G
OUTLOT F
OUTLOT I
OUTLOT G
SSMH-33
RE 934.31
15" INV 920.18 E
BLD=14.13'
SSMH-32
RE 933.67
15" INV 920.04 W
15" INV 920.04 E
BLD=13.63'
SSMH-31
RE 933.15
15" INV 919.94 SE
15" INV 919.94 W
BLD=13.22'
SSMH-30
RE 932.50
15" INV 919.75 SE
15" INV 919.75 NW
BLD=12.75'
SSMH-28
RE 936.72
15" INV 918.99 NE
15" INV 918.99 SW
BLD=17.73'
SSMH-29
RE 934.79
15" INV 919.16 NE
15" INV 919.16 SE
8" INV 921.31 SW
15" INV 919.16 NW
BLD=15.64'
SSMH-27
RE 937.74
15" INV 918.91 SW
15" INV 918.91 NE
BLD=18.83'
SSMH-26
RE 940.60
15" INV 918.70 SW
8" INV 920.86 SE
15" INV 918.70 NE
BLD=21.90'
SSMH-25
RE 940.65
15" INV 918.42 NE
15" INV 918.42 SW
BLD=22.23'
SSMH-200
RE 939.78
8" INV 924.95 NW
8" INV 925.05 SE
BLD=14.83'
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RE 939.45
8" INV 925.66 SE
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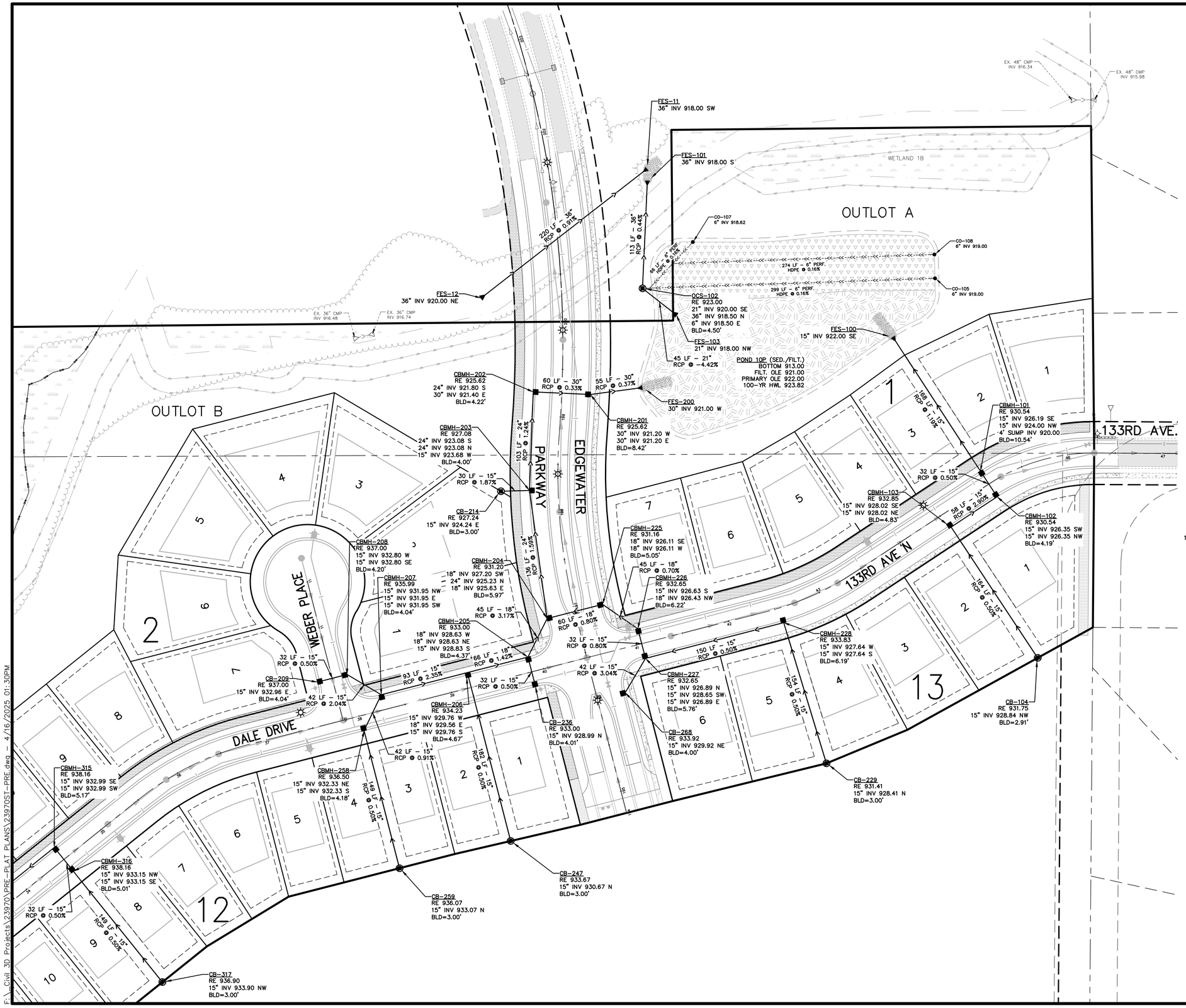
SSMH-202
RE 939.12
8" INV 926.02 E
8" INV 925.93 NW
BLD=13.19'
SSMH-103
RE 940.50
8" INV 929.50 SE
BLD=11.00'
SSMH-102
RE 939.45
8" INV 928.38 E
8" INV 928.48 NW
BLD=11.07'
SSMH-100
RE 936.55
8" INV 925.55 NE
8" INV 925.65 SW
BLD=11.00'
SSMH-101
RE 937.99
8" INV 926.99 NE
8" INV 927.09 W
BLD=11.00'
SSMH-34
RE 934.27
15" INV 919.41 NW
BLD=14.86'
94 LF - 15" PVC @ 0.15%
65 LF - 15" PVC @ 0.15%
124 LF - 15" PVC @ 0.15%
393 LF - 15" PVC @ 0.15%
12" PVC C900
111 LF - 15" PVC @ 0.15%
169 LF - 15" PVC @ 0.15%
12" PVC C900
51 LF - 15" PVC @ 0.15%
143 LF - 15" PVC @ 0.15%
12" PVC C900
186 LF - 15" PVC @ 0.15%
82 LF - 8" PVC @ 5.00%
54 LF - 8" PVC @ 0.50%
55 LF - 8" PVC @ 0.50%
8" PVC C900
55 LF - 8" PVC @ 0.50%
310 LF - 8" PVC @ 1.37%
8" PVC C900
203 LF - 8" PVC @ 0.50%
8" PVC C900
52 LF - 8" PVC @ 2.49%
57 LF - 8" PVC @ 2.37%
59 LF - 0.1
EX 8" GAS MAIN
EX 8" GAS MAIN
EX. 12" FES INV 938.52
EX. 12" FES INV 938.29
FUTURE WATERMAIN (FINAL SIZE AND L
DWP
DWP
DWP



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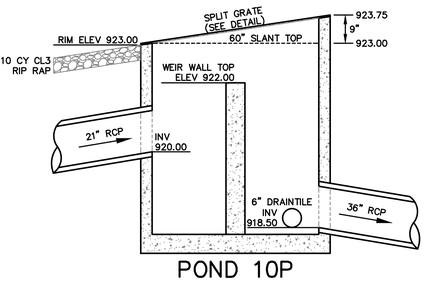
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN



POND 10P
OUTLET STRUCTURE 102 (OCS-102)
NOT TO SCALE

Know what's **below.** **Call** before you dig.

N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
PRELIMINARY STORM SEWER PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970ST-PRE

PROJECT NO.
23970

5.8

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COWLEY LAKE
WATER LEVEL ON 8/15/2022: 918.9
ORDINARY HIGH WATER LEVEL: 920.3 (NAVD88)

OUTLOT B

DALE DRIVE

CBMH-315
RE 938.16
15" INV 932.99 SE
15" INV 932.99 SW
BLD=5.17'

CBMH-316
RE 938.16
15" INV 933.15 NW
15" INV 933.15 SE
BLD=5.01'

244 LF – 15" RCP @ 1.23%

32 LF – 15" RCP @ 0.50%

149 LF – 15" RCP @ 0.50%

CB-317
RE 936.90
15" INV 933.90 NW
BLD=3.00'

CBMH-314
RE 934.08
15" INV 929.99 SE
21" INV 929.59 SW
15" INV 929.99 NE
BLD=4.49'

32 LF – 15" RCP @ 0.50%

CBMH-325
RE 934.08
15" INV 930.15 SE
15" INV 930.15 NW
BLD=3.93'

149 LF – 15" RCP @ 0.83%

CB-326
RE 934.53
15" INV 931.53 NW
BLD=3.00'

FES-401
36" INV 923.50 SE

138 LF – 5'Wx3'H BOX CULVERT @ 0.29%

359 LF – 21" RCP @ 0.58%

CBMH-303
RE 931.68
21" INV 927.83 NE
15" INV 928.23 W
24" INV 927.63 SE
BLD=4.05'

CBMH-304
RE 933.89
15" INV 929.45 SE
15" INV 929.45 E
BLD=4.44'

153 LF – 15" RCP @ 0.80%

35 LF – 15" RCP @ 0.50%

FES-402
36" INV 923.90 NW

POND 40P
WETLAND 2B
OLE 923.90
100-YR HWL 926.55

WETLAND 2B

CBMH-302
RE 931.68
24" INV 927.47 NW
27" INV 927.27 S
4' SUMP INV 923.27
BLD=8.41'

CB-305
RE 933.63
15" INV 929.63 NW
BLD=4.00'

187 LF – 27" RCP @ 0.30%

STMH-301
RE 930.60
27" INV 926.71 N
27" INV 926.71 SW
BLD=3.89'

71 LF – 27" RCP @ 0.30%

FES-300
27" INV 926.50 NE

OUTLOT C

29 LF – 18" RCP @ -3.51%

FES-433
18" INV 924.00 E

POND 43P (SED.)
BOTTOM 918.50
OLE 926.50
100-YR HWL 929.07

29 LF – 18" RCP @ 1.70%

OCS-432
RE 928.50
18" INV 926.50 SE
18" INV 925.00 W
BLD=3.50'

FES-431
18" INV 926.00 NW

CB-416
RE 934.95
15" INV 930.95 SW
BLD=4.00'

45 LF – 15" RCP @ 0.50%

CBMH-415
RE 934.76
15" INV 930.73 NE
15" INV 930.73 S
BLD=4.03'

88 LF – 15" RCP @ 0.58%

CB-425
RE 934.38
15" INV 930.38 W
BLD=4.00'

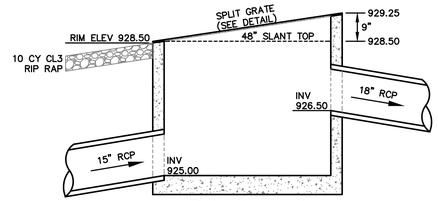
CBMH-414
RE 934.38
15" INV 930.22 E

22.78 S

0 N

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING TRANSFORMER
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- SB-1 EXISTING SOIL BORING LOCATION
- TP-1 EXISTING TEST PIT LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN



POND 43P
OUTLET STRUCTURE 432 (OCS-432)
NOT TO SCALE

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N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

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CAD FILE
23970ST-PRE

PROJECT NO.
23970

5.9

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OUTLOT B

WETLAND 3A

WETLAND 2A

DALE DRIVE

HAROLD COURT

PROSPER COURT

OUTLOT C

OUTLOT D

29 LF – 18" RCP @ -3.44%

OCS-272
RE 926.50
18" INV 923.00 W
18" INV 924.50 E
BLD=3.50'

POND 27P (SED.)
BOTTOM 916.50
OLE 924.50
100-YR HWL 926.35

FES-273
18" INV 922.00 E

225 LF – 18" RCP @ 0.22%

FES-271
18" INV 924.00 W

FES-700
18" INV 924.00 SE

31 LF – 18" RCP @ 0.80%

STMH-701
RE 928.56
15" INV 925.10 SE
18" INV 924.25 NW
BLD=4.32'

59 LF – 15" RCP @ 0.50%

134 LF – 15" RCP @ 5.63%

CB-713
RE 936.94
15" INV 932.94 W
BLD=4.00'

CBMH-702
RE 937.45
15" INV 932.65 E
15" INV 932.65 NW
15" INV 932.65 SW
4' SUMP INV 928.65
BLD=8.80'

146 LF – 15" RCP @ 2.14%

CBMH-703
RE 938.45
15" INV 934.24 SW
15" INV 934.24 NE
15" INV 934.24 S
BLD=4.21'

150 LF – 15" RCP @ 0.55%

37 LF – 15" RCP @ 0.50%

CB-724
RE 938.51
15" INV 934.43 N
BLD=4.08'

CB-705
RE 939.23
15" INV 935.23 NW
BLD=4.00'

32 LF – 15" RCP @ 0.50%

CO-268
6" INV 921.81

CO-2612
6" INV 922.00

CO-2611
6" INV 922.00

CO-2610
6" INV 922.00

CO-269
6" INV 922.00

120 LF – 6" PERF. HDPE @ 0.17%

144 LF – 6" PERF. HDPE @ 0.19%

148 LF – 6" PERF. HDPE @ 0.22%

149 LF – 6" PERF. HDPE @ 0.20%

113 LF – 6" HDPE

67 LF – 6" HDPE @ 0.17%

EX. 10" HDPE
INV 919.65

EX. 12" CONC
INV 919.75

DAYLIGHT PROPOSED 12" PVC OR HDPE DRAINTILE INV 919.60

FES-261
21" INV 921.00 W

86 LF – 21" RCP @ 0.58%

FES-281
24" INV 920.80 SE

35 LF – 24" RCP @ 0.56%

OCS-282
RE 923.25
21" INV 919.00 S
24" INV 921.00 NW
BLD=4.25'

FES-263
21" INV 920.00 E

44 LF – 21" RCP @ -4.59%

OCS-262
RE 925.96
21" INV 922.00 W
21" INV 921.50 E
6" INV 921.50 NW
BLD=4.46'

PROPOSED CLEANOUT

33 LF – 21" RCP @ -2.99%

FES-283
21" INV 918.00 N

POND 26P (SED./FILT.)
BOTTOM 916.00
FILT. OLE 924.00
PRIMARY OLE 925.50
100-YR HWL 925.93

PROPOSED 12" PVC OR HDPE DRAINTILE

FES-600
18" INV 924.00 S

PROPOSED CLEANOUT

FES-3001
36" INV 920.50 S

131 LF – 36" RCP @ 0.20%

171 LF – 18" RCP @ 1.00%

CBMH-601
RE 932.59
15" INV 928.43 S
18" INV 926.59 E
18" INV 925.71 N
4' SUMP INV 921.71
BLD=10.87'

CBMH-602
RE 931.41
18" INV 927.05 W
15" INV 927.25 S
BLD=4.36'

91 LF – 18" RCP @ 0.50%

32 LF – 15" RCP @ 0.50%

CB-612
RE 932.59
15" INV 928.59 N
BLD=4.00'

32 LF – 15" RCP @ 0.50%

CB-603
RE 931.41
15" INV 927.41 N
BLD=4.00'

176 LF – 36" RCP @ 0.20%

PROPOSED 12" PVC OR HDPE DRAINTILE

23 LF – 18" RCP @ 0.25%

CBMH-3004
RE 923.50
18" INV 921.17 N
12" INV 920.17 S
10" INV 919.34 W
12" INV 919.34 NE
3' SUMP INV 916.34
BLD=7.16'

68 LF – 12" HDPE @ 0.52%

65 LF – 12" HDPE @ 3.86%

131 LF – 12" HDPE @ 2.26%

CB-3007
RE 930.82
12" INV 927.82 W
8" INV 928.15 SE
BLD=3.00'

CBMH-3003
RE 926.00
36" INV 921.11 NE
18" INV 922.52 SW
18" INV 921.11 S
12" INV 922.00 SE
BLD=4.89'

74 LF – 18" RCP @ 0.25%

138 LF – 18" RCP @ 0.25%

31 LF – 21" RCP @ -3.21%

FES-323
21" INV 924.00 SE

POND 32P (SED.)
BOTTOM 920.00
OLE 928.00
100-YR HWL 929.13

FES-800
18" INV 928.00 S

30 LF – 18" RCP @ 0.50%

CBMH-801
RE 930.97
15" INV 927.35 S
15" INV 927.15 N
4' SUMP INV 922.82'

165 LF – 15" RCP @ 2.55%

CBMH-802
RE 938.10
15" INV 934.01 S
15" INV 932.56 E
15" INV 932.56 N
4' SUMP INV 928.56
BLD=9.54'

CBMH-803
RE 937.05
15" INV 933.05 W
15" INV 933.05 SE
BLD=4.00'

6 LF – 15" RCP @ 0.67%

98 LF – 15" RCP @ 0.50%

CB-804
RE 937.09
15" INV 933.09 NW
BLD=4.00'

OCS-322
RE 929.50
21" INV 925.00 NW
18" INV 923.05 E
BLD=6.45'

STMH-321
RE 925.80
18" INV 922.70 W
18" INV 922.70 NE
BLD=3.10'

EX. 10" HDPE
INV 919.34

EX. 12" CONC (COLLAPSED)
INV 920.71

IF FEASIBLE, CONNECT EX. 12" CONC DRAINTILE TO CBMH-3004

CONNECT EX 10" HDPE TO PROPOSED 10" HDPE AND CONNECT TO CBMH-3004

CBMH-3005
RE 925.35
12" INV 922.35 E
12" INV 922.35 NW
BLD=3.00'

CBMH-3006
RE 927.86
12" INV 924.86 E
12" INV 924.86 W
BLD=3.00'

POND 30P
WETLAND 4A
OLE 924.80
100-YR HWL 926.91

RIM ELEV 929.50

SPLIT GRADE (SEE DETAIL)

930.25

9"

929.50

60" SLANT TOP

10 CY CL3 RIP RAP

WEIR WALL TOP ELEV 928.00

21" RCP

INV 925.00

INV 923.05

18" RCP

POND 32P
OUTLET STRUCTURE 322 (OCS-322)
NOT TO SCALE

FES-400
27" INV 922.00 SE

32 LF – 27" RCP @ 0.50%

CBMH-414
RE 934.38
15" INV 930.22 E
15" INV 930.22 N
15" INV 930.02 S
BLD=4.36'

107 LF – 15" RCP @ 0.50%

CBMH-413
RE 934.91
15" INV 929.49 N
15" INV 929.49 SW
BLD=5.42'

STMH-401
RE 927.61
21" INV 924.21 SE
27" INV 922.16 NW
BLD=5.45'

129 LF – 27" RCP @ 1.40%

125 LF – 15" RCP @ 0.50%

23 LF – 21" RCP @ 0.50%

CBMH-402
RE 934.68
15" INV 928.87 NE
21" INV 926.27 NW
21" INV 926.27 SW
15" INV 930.52 SE
4' SUMP INV 922.27
BLD=12.41'

CBMH-403
RE 934.72
21" INV 926.39 S
21" INV 926.39 NE
BLD=8.33'

32 LF – 15" RCP @ 0.50%

CB-433
RE 934.68
15" INV 930.68 NW
BLD=4.00'

203 LF – 21" RCP @ 0.50%

175 LF – 18" RCP @ 0.59%

CB-3008
RE 932.15
8" INV 929.22

89 LF – 8" HDPE @ 0.50%

DRAINTILE TO COLLECT REAR ROOF DRAINS DETAILS SHALL BE PROVIDED ON FINAL PLANS

CO-3009
RE 933.30
8" INV 929.72

84 LF – 8" HDPE @ 0.50%

34 LF – 15" RCP @ 0.50%

CBMH-405
RE 932.95
15" INV 928.84 W
18" INV 928.64 N
BLD=4.31'

CO-3010
RE 932.14
8" INV 930.14

89 LF – 8" HDPE @ 2.21%

CB-406
RE 933.01
15" INV 929.01 E
BLD=4.00'

CO-3011
RE 934.11
8" INV 932.11

CB-501
RE 925.78
15" INV 922.78 S
BLD=3.00'

117 LF – 15" RCP @ 0.68%

CBMH-415
RE 934.76
15" INV 930.73 NE
15" INV 930.73 S
BLD=4.03'

45 LF – 15" RCP @ 0.50%

CB-416
RE 934.95
15" INV 930.95 SW
BLD=4.00'

88 LF – 15" RCP @ 0.58%

FES-500
15" INV 922.00 N

CB-425
RE 934.38
15" INV 930.38 W
BLD=4.00'

32 LF – 15" RCP @ 0.50%

CBMH-404
RE 931.97
18" INV 927.61 S
21" INV 927.41 N
15" INV 927.81 W
BLD=4.56'

CB-445
RE 931.97
15" INV 927.97 E
BLD=4.00'

32 LF – 15" RCP @ 0.50%

CBMH-406
RE 933.01
15" INV 929.01 E
BLD=4.00'

CBMH-407
RE 932.95
15" INV 928.84 W
18" INV 928.64 N
BLD=4.31'

POND 28P
OUTLET STRUCTURE 282 (OCS-282)
NOT TO SCALE

SPLIT GRADE (SEE DETAIL)

924.00

9"

923.25

60" SLANT TOP

RIM ELEV 923.25

10 CY CL3 RIP RAP

WEIR WALL TOP ELEV 922.00

INV 921.00

24" RCP

21" RCP

INV 919.00

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING TRANSFORMER
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- SB-1 EXISTING SOIL BORING LOCATION
- TP-1 EXISTING TEST PIT LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN

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N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

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PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE
PRELIMINARY STORM SEWER PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970ST-PRE

PROJECT NO.
23970

5.10

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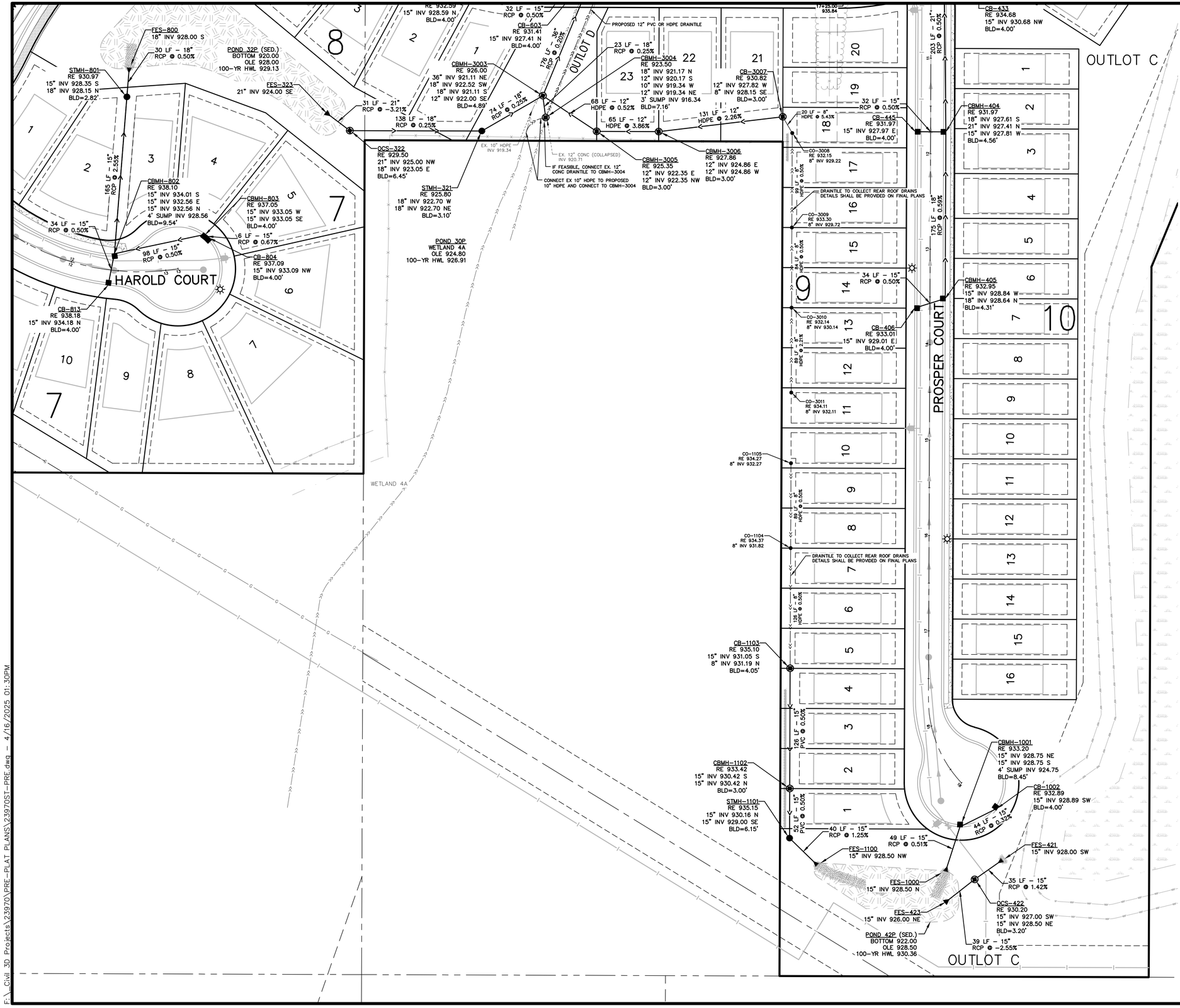

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ROGERS, MINNESOTA
PRELIMINARY STORM SEWER PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

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23970ST-PRE
PROJECT NO.
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5.11

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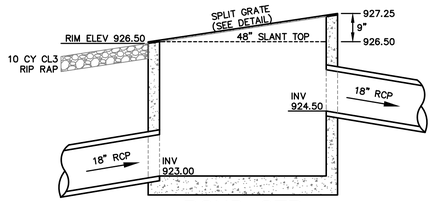


POND 27P

OUTLET STRUCTURE 272 (OCS-272)

NOT TO SCALE

COWLEY LAKE

WATER LEVEL ON 8/15/2022: 918.9

ORDINARY HIGH WATER LEVEL: 920.3 (NAVD88)

OUTLOT B

WETLAND 3A

WETLAND 2A

MARGARET LANE

DALE DRIVE

HAROLD COURT

OUTLOT D

29 LF – 18" RCP @ -3.44%

OCS-272
RE 926.50
18" INV 923.00 W
18" INV 924.50 E
BLD=3.50'

POND 27P (SED.)
BOTTOM 916.50
OLE 924.50
100-YR HWL 926.35

FES-273
18" INV 922.00 E

225 LF – 18" RCP @ 0.22%

FES-271
18" INV 924.00 W

FES-700
18" INV 924.00 SE

31 LF – 18" RCP @ 0.80%

STMH-701
RE 928.56
15" INV 925.10 SE
18" INV 924.25 NW
BLD=4.32'

59 LF – 15" RCP @ 0.50%

134 LF – 15" RCP @ 5.83%

CBMH-702
RE 937.45
15" INV 932.65 E
15" INV 932.65 NW
15" INV 932.65 SW
4' SUMP INV 928.65
BLD=8.80'

CB-713
RE 936.94
15" INV 932.94 W
BLD=4.00'

140 LF – 15" RCP @ 1.14%

CBMH-703
RE 938.45
15" INV 934.24 SW
15" INV 934.24 NE
15" INV 934.24 S
BLD=4.21'

37 LF – 15" RCP @ 0.50%

150 LF – 15" RCP @ 0.55%

CB-724
RE 938.51
15" INV 934.43 N
BLD=4.08'

CBMH-704
RE 939.23
15" INV 935.07 SE
15" INV 935.07 NE
BLD=4.16'

CB-705
RE 939.23
15" INV 935.23 NW
BLD=4.00'

32 LF – 15" RCP @ 0.50%

CO-268
6" INV 921.81

CO-2612
6" INV 922.00

CO-2611
6" INV 922.00

CO-2610
6" INV 922.00

CO-269
6" INV 922.00

120 LF – 6" PERF HDPE @ 0.17%

113 LF – 6" HDPE @ 0.17%

144 LF – 6" PERF HDPE @ 0.10%

140 LF – 6" PERF HDPE @ 0.22%

149 LF – 6" PERF HDPE @ 0.06%

67 LF – 6" HDPE @ 0.17%

EX. 10" HDPE
INV 919.65

EX. 12" CONC
INV 919.75

FES-261
21" INV 921.00 W

DAYLIGHT PROPOSED 12" PVC OR HDPE DRAINTILE INV 919.60

FES-281
24" INV 920.80 SE

86 LF – 21" RCP @ 0.58%

35 LF – 24" RCP @ 0.56%

FES-263
21" INV 920.00 E

44 LF – 21" RCP @ -4.59%

PROPOSED CLEANOUT

OCS-282
RE 923.25
21" INV 919.00 S
24" INV 921.00 NW
BLD=4.25'

OCS-262
RE 925.96
21" INV 922.00 W
21" INV 921.50 E
6" INV 921.50 NW
BLD=4.46'

POND 26P (SED./FILT.)
BOTTOM 916.00
FILT. OLE 924.00
PRIMARY OLE 925.50
100-YR HWL 925.93

33 LF – 21" RCP @ -2.99%

FES-283
21" INV 918.00 N

PROPOSED 12" PVC OR HDPE DRAINTILE

FES-600
18" INV 924.00 S

POND 28P (SED.)
BOTTOM 914.00
OLE 922.00
100-YR HWL 924.00

PROPOSED CLEANOUT

FES-3001
36" INV 920.50 S

171 LF – 18" RCP @ 1.00%

131 LF – 36" RCP @ 0.20%

STMH-401
RE 927.61
21" INV 924.21 SE
27" INV 922.16 NW
BLD=5.45'

CBMH-601
RE 932.59
15" INV 928.43 S
18" INV 926.59 E
18" INV 925.71 N
4' SUMP INV 921.71
BLD=10.87'

CBMH-602
RE 931.41
18" INV 927.05 W
15" INV 927.25 S
BLD=4.36'

STMH-3002
RE 932.57
36" INV 920.76 SW
36" INV 920.76 N
BLD=11.81'

91 LF – 18" RCP @ 0.50%

32 LF – 15" RCP @ 0.50%

CB-612
RE 932.59
15" INV 928.59 N
BLD=4.00'

CB-603
RE 931.41
15" INV 927.41 N
BLD=4.00'

FES-800
18" INV 928.00 S

30 LF – 18" RCP @ 0.50%

POND 32P (SED.)
BOTTOM 920.00
OLE 928.00
100-YR HWL 929.13

STMH-801
RE 930.97
15" INV 928.35 S
18" INV 928.15 N
BLD=2.82'

FES-323
21" INV 924.00 SE

31 LF – 21" RCP @ -3.21%

138 LF – 18" RCP @ 0.25%

74 LF – 18" RCP @ 0.25%

176 LF – 36" RCP @ 0.20%

PROPOSED 12" PVC OR HDPE DRAINTILE

23 LF – 18" RCP @ 0.25%

CBMH-3003
RE 926.00
36" INV 921.11 NE
18" INV 922.52 SW
18" INV 921.11 S
12" INV 922.00 SE
BLD=4.89'

CBMH-3004
RE 923.50
18" INV 921.17 N
12" INV 920.17 S
10" INV 919.34 W
12" INV 919.34 NE
3' SUMP INV 916.34
BLD=7.16'

CB-3007
RE 930.82
12" INV 927.82 W
8" INV 928.15 SE
BLD=3.00'

68 LF – 12" HDPE @ 0.52%

65 LF – 12" HDPE @ 3.86%

131 LF – 12" HDPE @ 2.26%

20 LF – 8" HDPE @ 5.43%

OCS-322
RE 929.50
21" INV 925.00 NW
18" INV 923.05 E
BLD=6.45'

EX. 10" HDPE
INV 919.34

EX. 12" CONC (COLLAPSED)
INV 920.71

IF FEASIBLE, CONNECT EX. 12" CONC DRAINTILE TO CBMH-3004

CONNECT EX 10" HDPE TO PROPOSED 10" HDPE AND CONNECT TO CBMH-3004

CBMH-3005
RE 925.35
12" INV 922.35 E
12" INV 922.35 NW
BLD=3.00'

CBMH-3006
RE 927.86
12" INV 924.86 E
12" INV 924.86 W
BLD=3.00'

STMH-321
RE 925.80
18" INV 922.70 W
18" INV 922.70 NE
BLD=3.10'

POND 30P
WETLAND 4A
OLE 924.80
100-YR HWL 926.91

CO-3008
RE 932.15
8" INV 929.22

CO-3009
RE 933.30
8" INV 929.72

CO-3010
RE 932.14
8" INV 930.14

165 LF – 15" RCP @ 2.55%

CBMH-802
RE 938.10
15" INV 934.01 S
15" INV 932.56 E
15" INV 932.56 N
4' SUMP INV 928.56
BLD=9.54'

CBMH-803
RE 937.05
15" INV 933.05 W
15" INV 933.05 SE
BLD=4.00'

34 LF – 15" RCP @ 0.50%

6 LF – 15" RCP @ 0.67%

98 LF – 15" RCP @ 0.50%

CB-804
RE 937.09
15" INV 933.09 NW
BLD=4.00'

32 LF – 15" RCP @ 0.50%

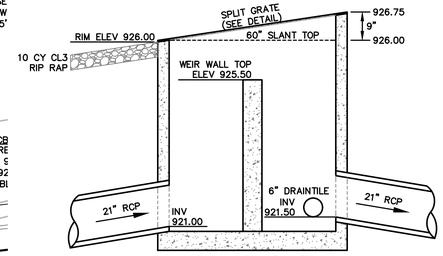
CB-965
RE 934.78
15" INV 930.78 NW
BLD=4.00'

CBMH-904
RE 933.20
18" INV 928.64 SE
18" INV 928.64 NW

CB-813
RE 938.18
15" INV 934.18 N
BLD=4.00'

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING TRANSFORMER
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- SB-1 EXISTING SOIL BORING LOCATION
- TP-1 EXISTING TEST PIT LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN



POND 26P

OUTLET STRUCTURE 262 (OCS-262)

NOT TO SCALE

Know what's below. Call before you dig.

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE

ROGERS, MINNESOTA

PRELIMINARY STORM SEWER PLAN

FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	VUN/EPF/JSO
DATE	02/24/2025
REVISIONS	
03/19/2025 MPCA REVIEW SUBMITTAL	
04/04/2025 PARTIAL CITY COMMENTS	
04/15/2025 WATERSHED COMMENTS	
CAD FILE	23970ST-PRE
PROJECT NO.	23970
	5.12

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COWLEY LAKE
WATER LEVEL ON 8/15/2022: 918.9
ORDINARY HIGH WATER LEVEL: 920.3 (NAVD88)

OUTLOT B

EX. 12" CMP
INV 920.79

CO-2511
6" INV 923.00

CO-2510
6" INV 923.00

CO-259
6" INV 923.00

CO-2512
6" INV 923.00

EX. MHST
RE 928.97
INV 921.40

EX. 15" RCP

EX. 15" FES
INV 921.67

46 LF – 21"
RCP @ 1.10%

FES-251
21" INV 922.00 W

FES-253
18" INV 921.00 NE

42 LF – 18"
RCP @ -2.40%

OCS-252
RE 927.40
18" INV 922.00 SW
21" INV 922.50 E
6" INV 922.50 NW
BLD=5.40'

CO-258
6" INV 922.83

POND 25P (SED./FILT.)
BOTTOM 917.00
FILT. OLE 925.00
PRIMARY OLE 926.50
100-YR HWL 927.80

WETLAND 1A

CBMH-913
RE 933.72
15" INV 929.56 S
15" INV 929.56 E
BLD=4.16'

CBMH-912
RE 932.88
15" INV 928.88 W
15" INV 928.88 SE
BLD=4.00'

110 LF – 15"
RCP @ 0.62%

32 LF – 15"
RCP @ 0.50%

FES-900
36" INV 925.00 SW

CBMH-901
RE 931.85
30" INV 925.72 SE
36" INV 925.32 NE
24" INV 926.12 SW
15" INV 927.85 NW
4' SUMP INV 921.32
BLD=10.53'

CBMH-902
RE 932.50
27" INV 926.42 SE
30" INV 926.22 NW
15" INV 928.34 SW
BLD=6.28'

CB-914
RE 933.72
15" INV 929.72 N
BLD=4.00'

32 LF – 24"
RCP @ 0.40%

CBMH-922
RE 931.85
24" INV 926.25 NE
24" INV 926.25 SW
BLD=5.60'

130 LF – 30"
RCP @ 0.38%

32 LF – 15"
RCP @ -3.78%

CB-953
RE 932.50
15" INV 927.13 NE
BLD=5.37'

CBMH-964
RE 934.76
15" INV 930.62 SE
15" INV 930.62 SW
BLD=4.14'

29 LF – 15"
RCP @ 0.75%

STMH-903
RE 934.64
15" INV 930.40 NE
27" INV 927.33 NW
15" INV 928.13 SW
18" INV 927.93 SE
BLD=7.31'

MARLENE AVENUE

CBMH-923
RE 930.84
15" INV 927.19 SW
15" INV 927.19 SE
24" INV 926.59 NE
BLD=4.25'

OUTLOT G

STMH-924
RE 934.49
15" INV 930.94 SE
15" INV 930.94 NE
15" INV 930.94 SW
BLD=3.55'

116 LF – 15"
HDPE @ 3.23%

130 LF
HDPE @ 15"
0.50%

CBMH-933
RE 930.84
15" INV 927.84 NW
15" INV 927.84 SE
BLD=3.00'

130 LF – 15"
HDPE @ 2.00%

85 LF – 15"
HDPE @ 0.50%

CB-945
RE 934.36
15" INV 931.36 NE
BLD=3.00'

144 LF – 15"
RCP @ 3.47%

CB-926
RE 939.96
15" INV 935.96 SW
BLD=4.00'

6 LF – 15"
RCP @ 0.67%

CBMH-925
RE 939.92
15" INV 935.92 NW
15" INV 935.92 NE
BLD=4.00'

LOVINA LANE

CB-934
RE 933.24
15" INV 930.24 NW
BLD=3.00'

CBMH-974
RE 933.89
15" INV 929.73 SW
15" INV 929.73 NE
15" INV 929.73 SE
BLD=4.16'

71 LF – 15"
RCP @ 2.25%

102 LF – 15"
RCP @ 0.10%

32 LF – 15"
RCP @ 0.50%

CB-985
RE 933.89
15" INV 929.89 NW
BLD=4.00'

68 LF – 18"
RCP @ 0.40%

CBMH-905
RE 933.55
18" INV 928.92 SW
18" INV 928.92 NW
BLD=4.63'

CB-995
RE 933.20
15" INV 929.20 NE
BLD=4.00'

122 LF – 18"
RCP @ 0.30%

OUTLOT I

CBMH-906
RE 932.49
15" INV 929.49 SW
18" INV 929.29 NE
BLD=3.20'

167 LF – 15"
RCP @ 0.90%

CBMH-975
RE 936.30

OUTLOT F

CBMH-904
RE 933.20
18" INV 928.64 SE
18" INV 928.64 NW
15" INV 929.04 SW
BLD=4.56'

32 LF – 15"
RCP @ 0.50%

CB-965
RE 934.78
15" INV 930.78 NW
BLD=4.00'

CB-813
RE 938.18
15" INV 934.18 N
BLD=4.00'

CBMH-704
RE 939.23
15" INV 935.07 SE
15" INV 935.07 NE
BLD=4.16'

MARGARET LANE

STMH-801
RE 930.97
15" INV 928.35 S
18" INV 928.15 N
BLD=2.82'

34 LF – 15"
RCP @ 0.50%

165 LF – 15"
RCP @ 2.55%

WILLANDALE ROAD

EX. 8" GAS MAIN

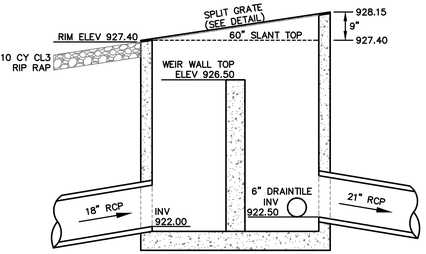
31 I
RCP

32
RC

15" INV
15" INV
15" INV

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING TRANSFORMER
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- SB-1 EXISTING SOIL BORING LOCATION
- TP-1 EXISTING TEST PIT LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN



POND 25P
OUTLET STRUCTURE 252 (OCS-252)
NOT TO SCALE

WARNING!
UNDERGROUND HIGH PRESSURE PIPELINE
CONTACT ENERGY TRANSFER REPRESENTATIVE
AT 1-800-753-5531 PRIOR TO PERFORMING WORK
WITHIN THE PLINELINE EASEMENT

Know what's **below.**
Call before you dig.

N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
PRELIMINARY STORM SEWER PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970ST-PRE

PROJECT NO.
23970

5.13

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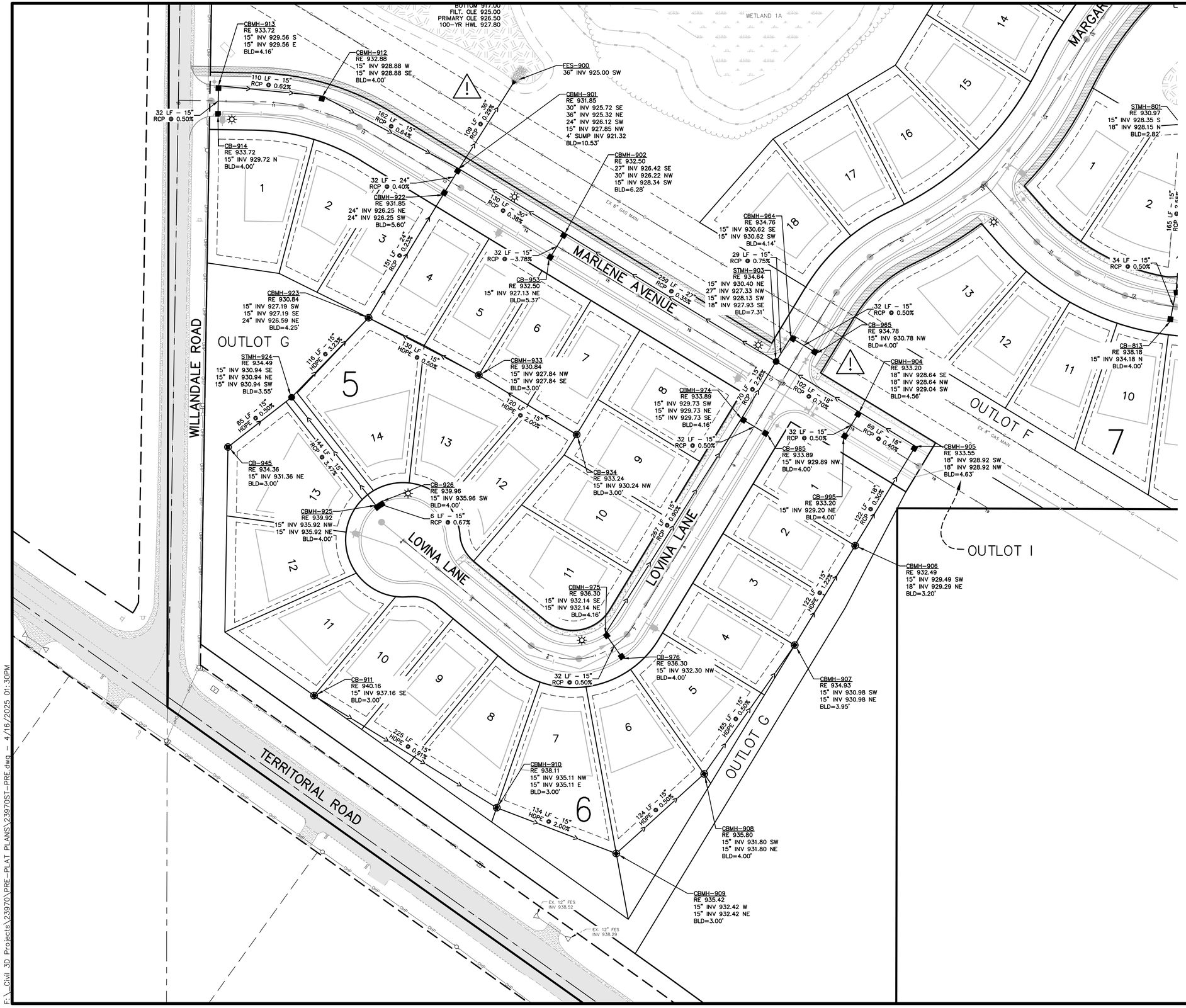

LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING UNDERGROUND GAS
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS VALVE
- EXISTING GUY WIRE
- EXISTING HANDHOLE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (ELECTRIC)
- EXISTING MANHOLE (WATER)
- EXISTING SEMAPHORE
- EXISTING SIGN
- EXISTING TELEPHONE PEDESTAL
- EXISTING TRANSFORMER
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING RETAINING WALL
- EXISTING FENCE
- SB-1 EXISTING SOIL BORING LOCATION
- TP-1 EXISTING TEST PIT LOCATION
- EXISTING TREELINE/TREES
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED DRAINTILE
- PROPOSED PERFORATED DRAINTILE
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- PROPOSED CONCRETE
- PROPOSED ASPHALT SURFACE
- PROPOSED SEDIMENT BASIN
- PROPOSED FILTRATION BASIN

WARNING!
UNDERGROUND HIGH PRESSURE PIPELINE
CONTACT ENERGY TRANSFER REPRESENTATIVE
AT 1-800-753-5531 PRIOR TO PERFORMING WORK
WITHIN THE PIPELINE EASEMENT

Know what's **below.** **Call** before you dig.

N

SCALE IN FEET
0 50 100 150
1 inch = 50 feet

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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Date: Reg.No.

PRELIMINARY

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
PRELIMINARY STORM SEWER PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
VUN/EPF/JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970ST-PRE

PROJECT NO.
23970

5.14

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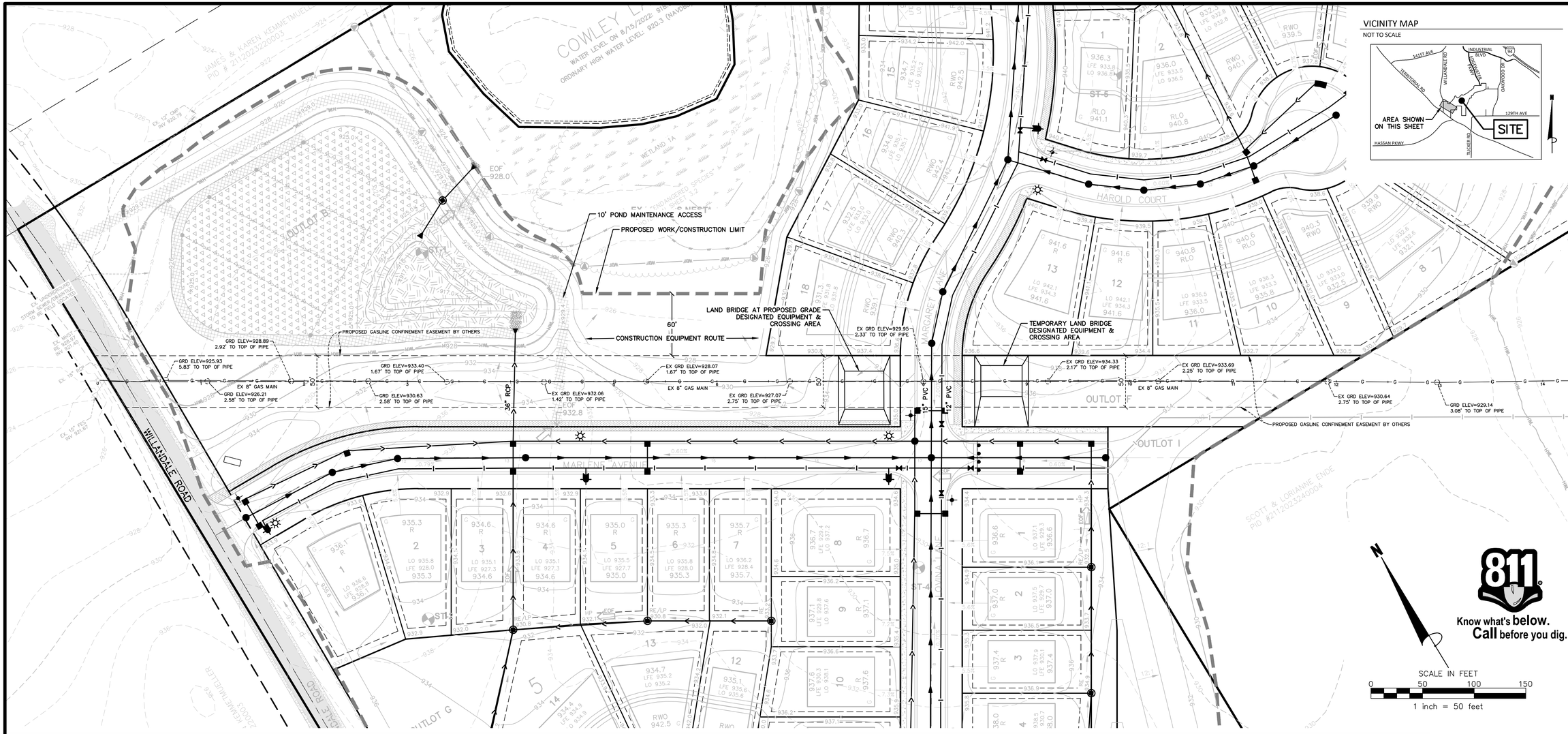

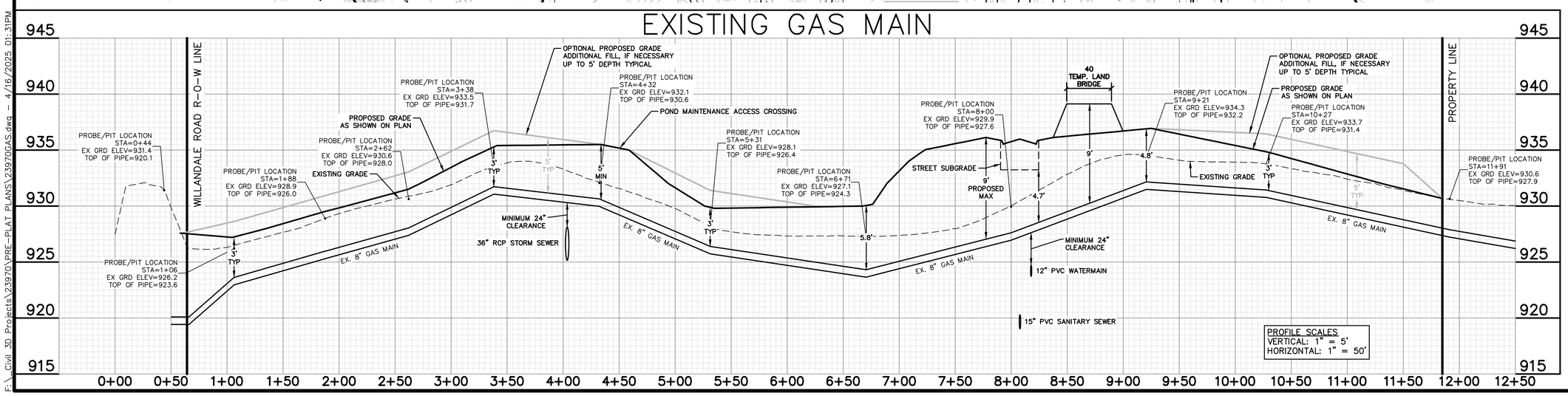

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PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
EXISTING GAS MAIN EXHIBIT
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
JSO

DATE
02/24/2025

REVISIONS
03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970GAS

PROJECT NO.
23970

5.15

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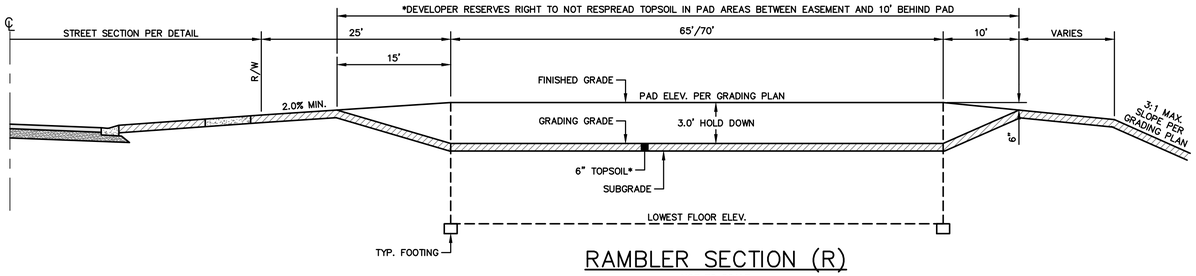
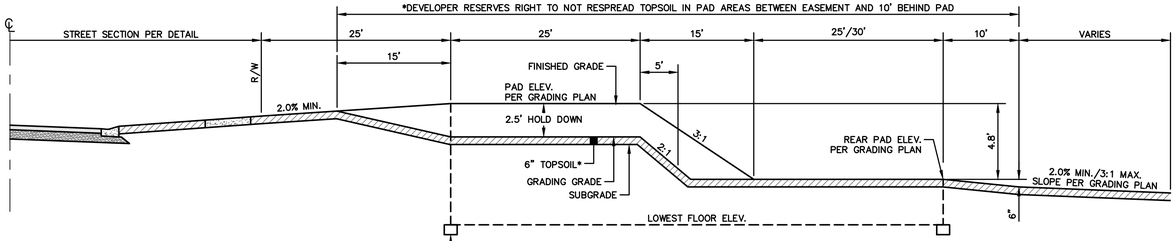
65' DEPTH STANDARD/70' DEPTH VILLA LOT HOLD DOWNS



RAMBLER SECTION (R)

NOT TO SCALE



RAMBLER LOOKOUT SECTION (RLO)

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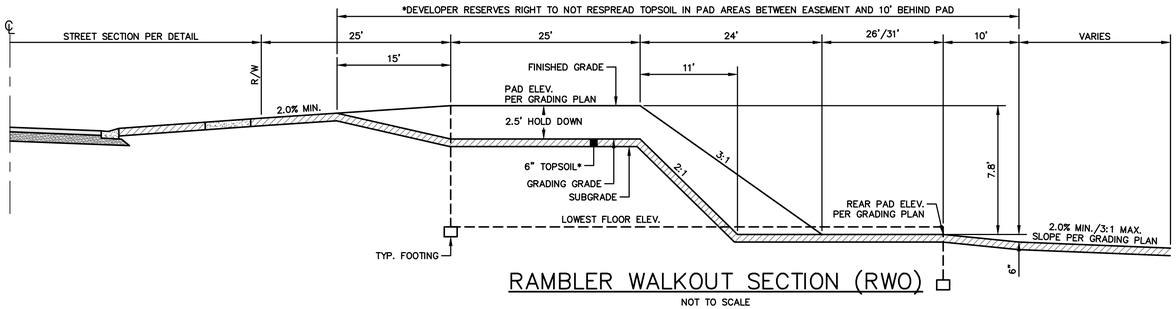
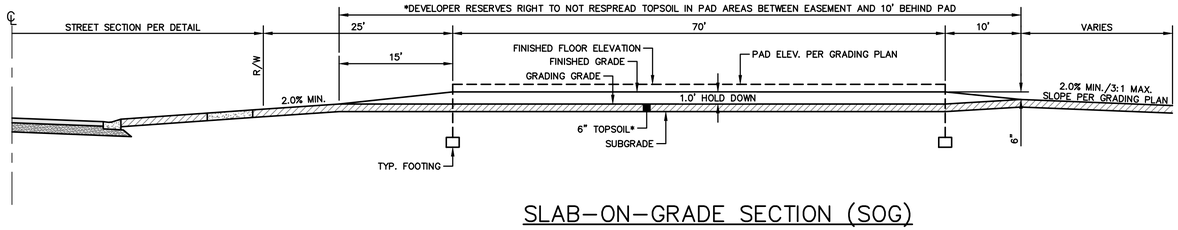


RAMBLER WALKOUT SECTION (RWO)

NOT TO SCALE

CARRIAGE LOTS



SLAB-ON-GRADE SECTION (SOG)

NOT TO SCALE

RECOMMENDED HOUSE TYPES

SOG	SLAB ON GRADE LOT – ELEVATION IS THE SAME AT THE FRONT AND REAR OF THE HOUSE. LOT CAN ACCOMODATE A SLAB ON GRADE HOME. LOWEST FLOOR ELEVATION/OPENING IS 0.5' ABOVE FINISHED GROUND ELEVATION SHOWN.
R	STANDARD LOT – FINISHED GROUND ELEVATION IS THE SAME AT THE FRONT AND REAR OF HOUSE. LOT CAN ACCOMMODATE RAMBLER, SPLIT ENTRY OR TWO STORY HOME. BASEMENT FLOOR ELEVATION IS 7.3' LOWER THAN FINISHED GROUND ELEVATION SHOWN AT FRONT OF HOUSE.
RLO	LOOKOUT LOT – FINISHED GROUND ELEVATION FOR LOOKOUT IS 4.8' LOWER THAN FINISHED GROUND ELEVATION SHOWN AT FRONT OF HOUSE. WINDOW OPENINGS ARE 0.5' ABOVE FINISHED GROUND ELEVATION SHOWN AT LOOKOUT.
RWO	WALKOUT LOT – FINISHED GROUND ELEVATION FOR WALKOUT IS 7.8' LOWER THAN FINISHED GROUND ELEVATION SHOWN AT FRONT OF HOUSE. BASEMENT FLOOR ELEVATION/OPENING IS 0.5' ABOVE FINISHED GROUND ELEVATION SHOWN AT WALKOUT.

NOTE: FOR ALL RECOMMENDED HOUSE TYPES, GARAGE FLOOR ELEVATION IS 0.3' ABOVE FINISHED GROUND ELEVATION SHOWN AT FRONT OF HOUSE. TOP OF BLOCK ELEVATION IS 0.7' ABOVE FINISHED GROUND ELEVATION SHOWN AT FRONT OF HOUSE.

STANDARD GRADING NOTES:

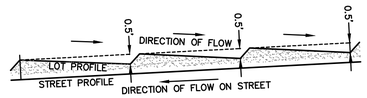
1. SPECIFICATIONS WHICH APPLY ARE THE MOST RECENT EDITIONS OF THE MUNICIPALITY IN WHICH THE WORK IS LOCATED AND THE MINNESOTA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS FOR HIGHWAY CONSTRUCTION UNLESS MODIFIED HEREIN ON THESE CONTRACT DOCUMENTS.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UTILIZE THE "GOPHER STATE ONE CALL" EXCAVATION NOTICE SYSTEM AS REQUIRED UNDER MINNESOTA STATUTE CHAPTER 216D. CALL 811 OR SUBMIT A TICKET AT gopherstateonecall.org AT LEAST 48 HOURS PRIOR TO PERFORMING ANY EXCAVATION.
3. GRADING CONTRACTOR SHALL VERIFY LOCATIONS AND ELEVATIONS OF ALL UNDERGROUND UTILITIES WITH THE RESPECTIVE UTILITY COMPANIES PRIOR TO CONSTRUCTION.
4. ALL CONSTRUCTION AS CALLED FOR ON THESE CONTRACT DOCUMENTS SHALL BE PERFORMED IN ACCORDANCE WITH ALL OSHA REQUIREMENTS.
5. ALL LOT AND EASEMENT DIMENSIONS ARE SUBJECT TO FINAL PLAT.
6. IT IS THE RESPONSIBILITY OF THE GRADING CONTRACTOR TO DISPOSE OFF-SITE ALL TREES, STUMPS, BRUSH, OR OTHER DEBRIS THAT EXISTS WITHIN THE CONSTRUCTION AREAS. TREES TO REMAIN SHALL BE DESIGNATED BY THE ENGINEER.
7. THE GRADING CONTRACTOR SHALL SCHEDULE THE SOILS ENGINEER SO THAT CERTIFICATION OF ALL CONTROLLED FILLS CAN BE FURNISHED TO THE OWNER DURING AND UPON COMPLETION OF THE PROJECT.

MINIMUM DENSITY REQUIREMENTS NOTES 8-10 (REFER TO GEOTECHNICAL REPORT FOR DENSITY RECOMMENDATIONS)

8. DENSITY TESTS SHALL BE TAKEN TO EVALUATE THE COMPACTION WITHIN THE STREETS, TRAVEL WAYS OR PARKING LOTS, WITHIN THE UPPER 3 FEET OF STREET, TRAVEL WAYS OR PARKING LOT SUBGRADE, THE CONTRACTOR SHALL INSURE THAT ALL SOILS BE NOT MORE THAN ONE PERCENTAGE POINT OVER THE SOIL'S STANDARD PROCTOR OPTIMUM MOISTURE CONTENT, AND THAT COMPACTION TO A MINIMUM OF 100% OF STANDARD PROCTOR DENSITY BE PROVIDED. IN AREAS BELOW THE UPPER THREE FEET OF SUBGRADE OF THE STREETS, TRAVEL WAYS OR PARKING LOTS, THE CONTRACTOR SHALL INSURE THAT ALL SOILS BE NOT MORE THAN THREE PERCENTAGE POINTS OVER THE SOIL'S STANDARD PROCTOR OPTIMUM MOISTURE CONTENT, AND THAT COMPACTION TO A MINIMUM OF 95% OF STANDARD PROCTOR DENSITY BE PROVIDED. THE GRADING TOLERANCE FOR THESE AREAS SHALL BE WITHIN 0.1'±.
9. LOT GRADING AND/OR THE PREPARATION OF BUILDING PADS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE GRADING TOLERANCE SHALL BE 0.30'±. ALL EARTHWORK OPERATIONS SHALL BE PERFORMED IN ACCORDANCE WITH THE HUD-FHA DATA SHEET 79G "LAND DEVELOPMENT WITH CONTROLLED EARTHWORK", PROVIDING FOR A MINIMUM OF 95% STANDARD DENSITY, OR AS OTHERWISE SPECIFIED BY THE GEOTECHNICAL ENGINEER.
10. IN AREAS WHERE RETAINING WALLS ARE PROPOSED ON CONTROLLED FILL AREAS, A MINIMUM 95% STANDARD DENSITY NEEDS TO BE ATTAINED WHERE FILL THICKNESS EXCEEDS 10' BELOW WALL FOUNDATION ELEVATIONS, A HIGHER MINIMUM OF 98% SHALL BE ATTAINED
11. BUILDING PADS SHOWN ON EACH LOT ARE TYPICAL ONLY. THE DEPTH OF THE PAD FROM FRONT TO BACK SHALL BE GRADED THROUGHOUT THE FULL WIDTH OF THE LOT OR AS NECESSARY TO ALLOW FOR CONSTRUCTION OF A BUILDING AT THE MINIMUM SIDE YARD SETBACKS. (REFER TO THE PLANS FOR SPECIFIC SETBACK DISTANCES.) IF UNSUITABLE SOIL CONDITIONS ARE ENCOUNTERED WITHIN A PROPOSED BUILDING PAD THAT CANNOT BE CORRECTED OR REMOVED, IT IS THE RESPSONSIBILITY OF THE CONTRACTOR TO NOTIFY THE ENGINEER OF THE CONDITIONS AND TO LOCATE THE LIMITS OF THE UNSUITABLE AREAS.
12. THE SITE GRADING TOLERANCE FOR THE SITE SHOULD BE ±0.1' FOR STREETS AND ±0.30' FOR LANDSCAPED/OPEN AREAS.
13. TOPSOIL SHALL BE RE-SPREAD AT A MINIMUM DEPTH OF 6" ON ALL DISTURBED AREAS TO BE VEGETATED.

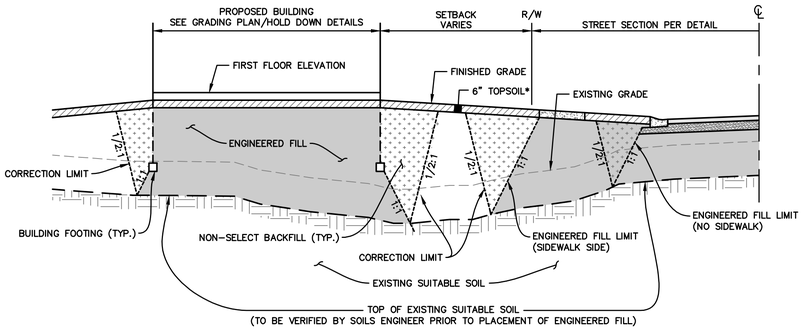
SPECIFIC GRADING NOTES:

1. THE EXISTING TOPOGRAPHY AND CONTOUR ELEVATIONS ON THE PLANS WERE PROVIDED BY MNTOPO LIDAR, AND SUPPLEMENTED WITH FIELD ELEVATIONS AND OBTAINED BY JAMES R. HILL FROM 6/7/2022 TO 12/17/2024. THE DEGREE OF ACCURACY OF THE EXISTING CONTOURS SHOWN ON THE PLAN IS EQUAL TO ± ONE HALF THE CONTOUR INTERVAL.



LOT BENCHING DETAIL

NOT TO SCALE



SUBGRADE CORRECTION DETAIL

NOT TO SCALE

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
CONSTRUCTION DETAILS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970D

PROJECT NO.
23970

6.0

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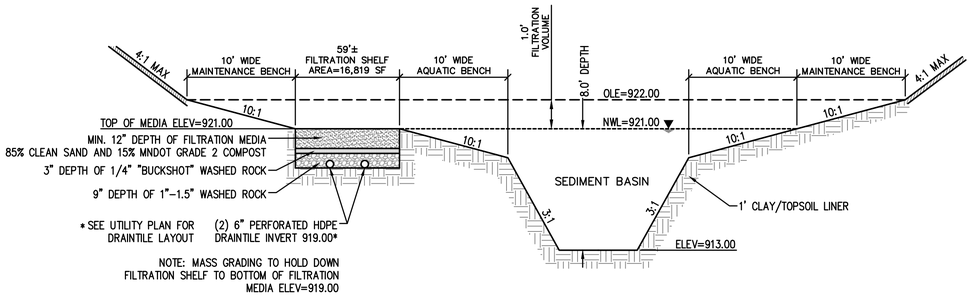

POND 10P W/ FILTRATION SHELF CROSS SECTION

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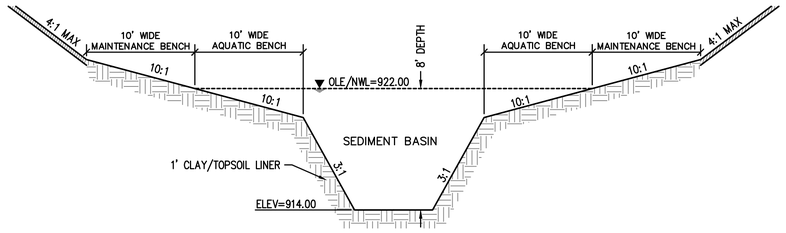

POND 28P CROSS SECTION

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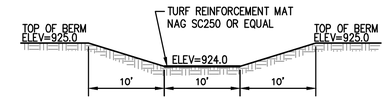

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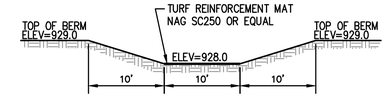

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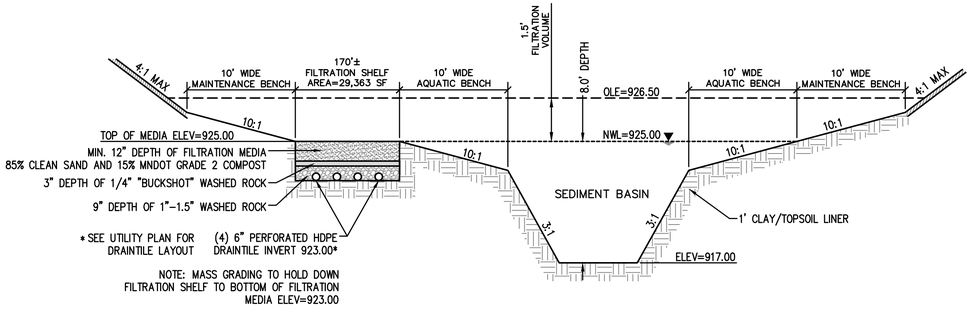

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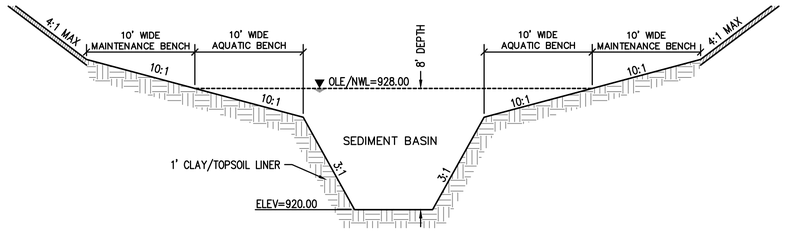

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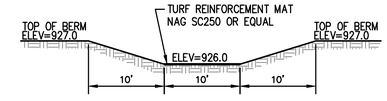

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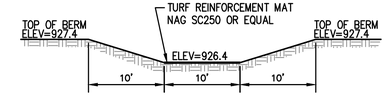

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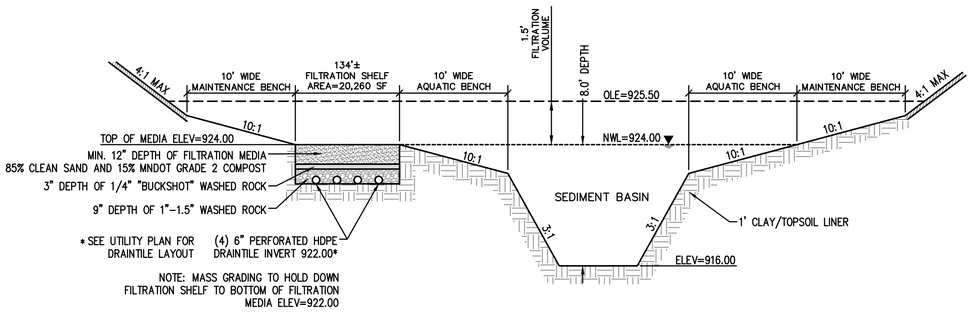

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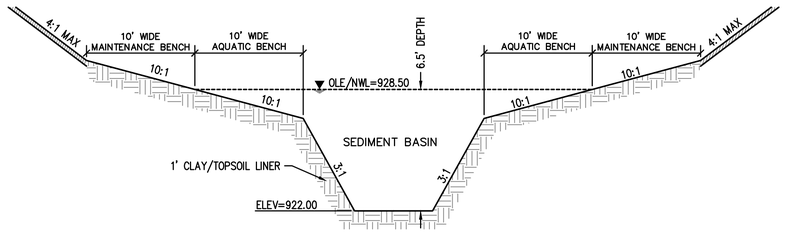

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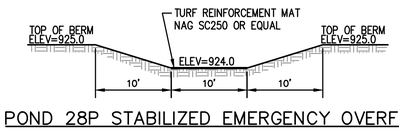

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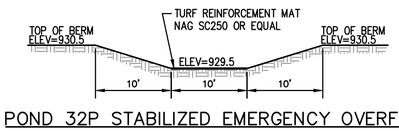

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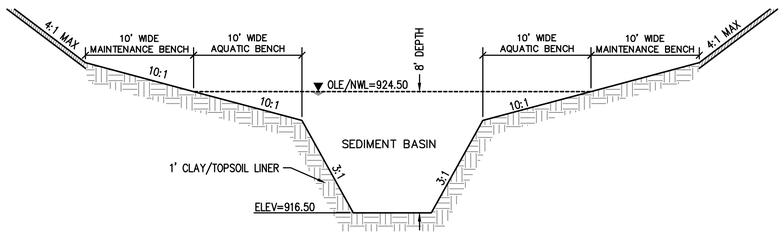

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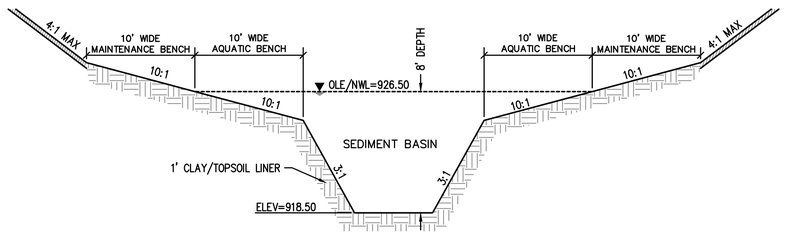

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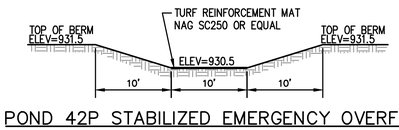

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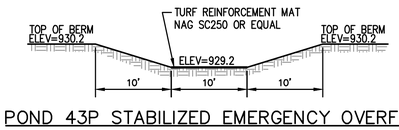

POND 43P STABILIZED EMERGENCY OVERFLOW

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date:_____ Reg.No._____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
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CAD FILE
23970D

PROJECT NO.
23970

6.1

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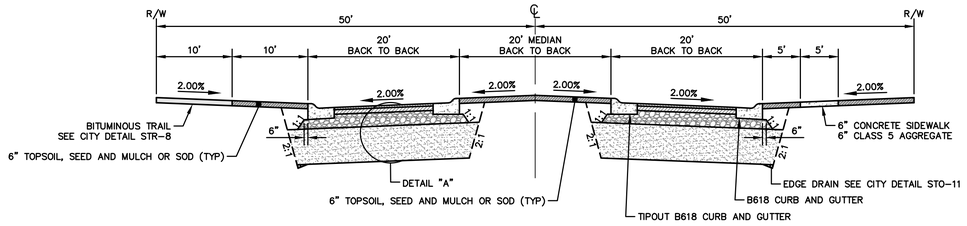
100' R-O-W EDGEWATER PARKWAY STREET SECTION

NOT TO SCALE

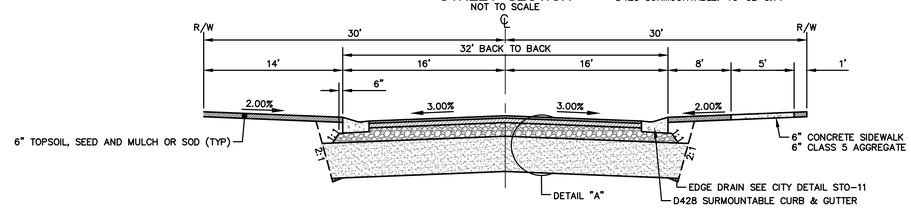
TYPICAL EQUATION
OUTER B618 CURB: TC=CL-0.64'
MEDIAN TIPOUT B618 CURB: TC=CL-0.20'



60' R-O-W RESIDENTIAL STREET SECTION

NOT TO SCALE

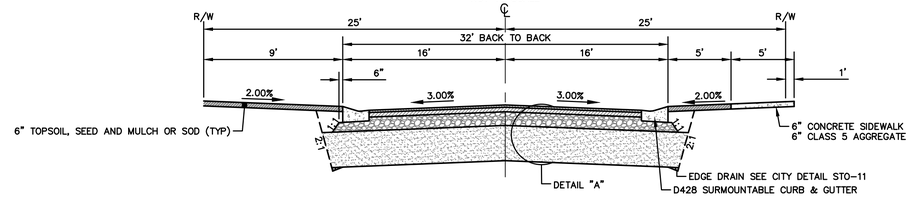
TYPICAL EQUATION
D428 SURMOUNTABLE: TC=CL-0.14'

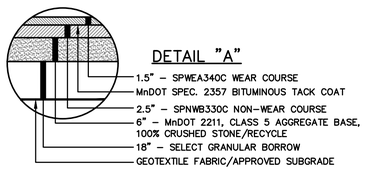


50' R-O-W RESIDENTIAL STREET SECTION

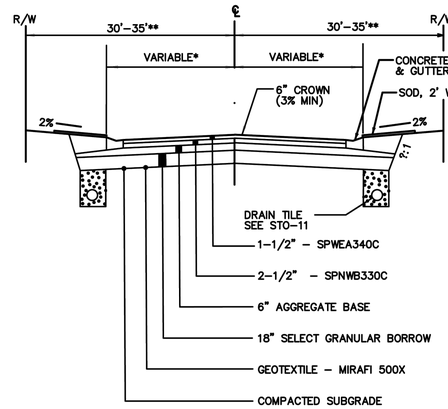
NOT TO SCALE

TYPICAL EQUATION
D428 SURMOUNTABLE: TC=CL-0.14'





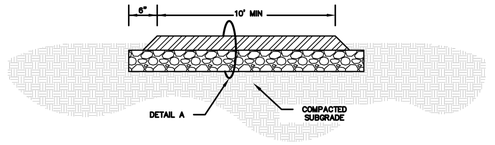
NOTE: ALL ORGANIC OR OTHER UNSUITABLE MATERIAL SHALL BE REMOVED FROM BENEATH THE ROADWAY.

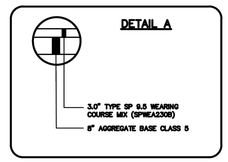


* 16' FOR RESIDENTIAL URBAN
19.5' FOR LOW VOLUME MINOR COLLECTOR
21' FOR HIGH VOLUME MINOR COLLECTOR
** 30' FOR RESIDENTIAL URBAN
35' FOR MINOR COLLECTORS
*** SURMOUNTABLE FOR RESIDENTIAL URBAN
B618 OR SURMOUNTABLE FOR MINOR COLLECTORS

BITUMINOUS STREET WITH CONCRETE CURB AND GUTTER

CITY OF ROGERS	TYPICAL SECTION FOR COLLECTOR & RESIDENTIAL STREETS –URBAN SECTION	Standard Details Date: SEPTEMBER, 2019 Revised	STR-7A





NOTES:

PLACE ALL ASPHALT IN ONE LIFT TO PROVIDE A MINIMUM OF 3.0" COMPACTED DEPTH.

PROVIDE A MINIMUM BASE OF 8" COMPACTED AGGREGATE. IMPORT ADDITIONAL MATERIALS IF MILLING FAILS TO PRODUCE ADEQUATE BASE MATERIAL.

TAMP ALL TRAIL EDGES AT A 45° BEVEL.

CONTRACTOR IS RESPONSIBLE FOR ROUGH GRADING EDGES OF TRAIL CORRIDOR WITH ON-SITE MATERIAL. HOLD GRADES 3" LOWER THAN FINISHED TRAIL SURFACE TO ALLOW FOR ADDITIONAL TOPSOIL PLACEMENT AND SEED.

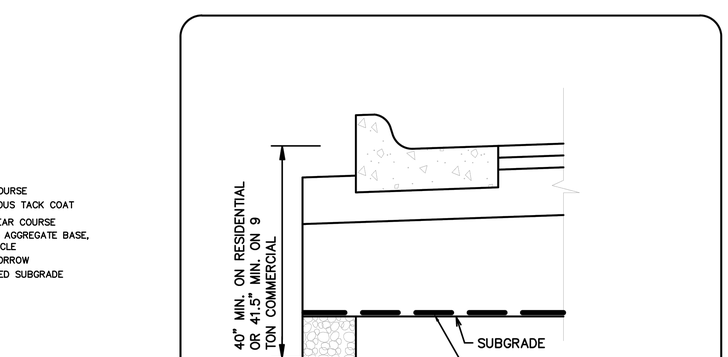
SLOPE OF BITUMINOUS TRAIL SHALL BE A MINIMUM OF 1% TO A MAXIMUM OF 2% TO THE DOWNHILL EDGE.

SIDEWALKS OR TRAIL CROSSING COMMERCIAL OR INDUSTRIAL DRIVEWAYS SHALL BE CONSTRUCTED TO DRIVEWAY REQUIREMENTS.

SUBGRADE MUST BE APPROVED BY THE ENGINEER.

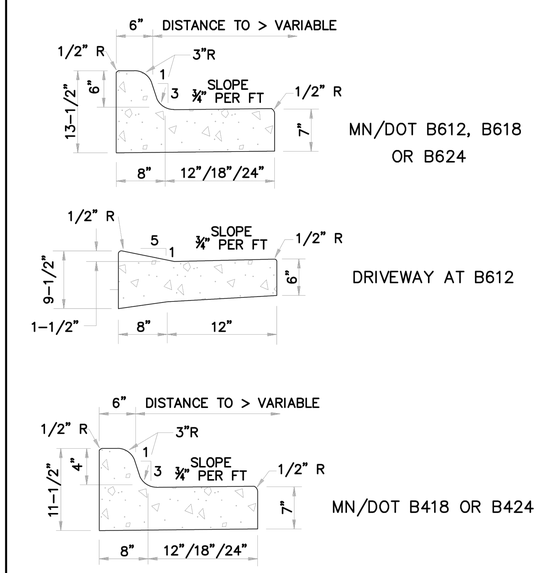
SUBCUT WHERE UNSUITABLE MATERIALS EXIST AS DIRECTED BY THE ENGINEER IN THE FIELD. SUBCUT AREAS SHALL BE BACKFILLED WITH SUITABLE MATERIAL AS DETERMINED BY THE ENGINEER.

CITY OF ROGERS	BITUMINOUS TRAIL TYPICAL SECTION	Standard Details Date: SEPTEMBER, 2020 Revised	STR-8

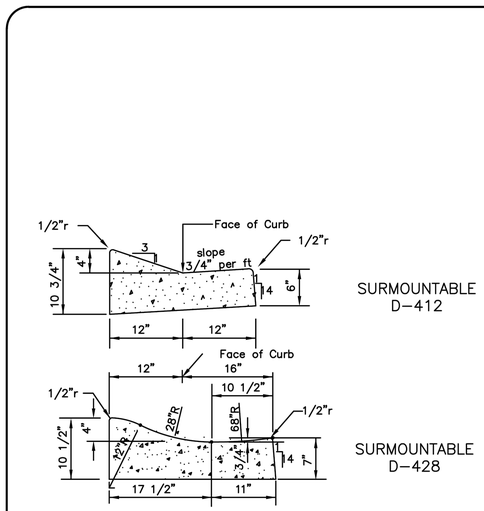


** COURSE FILTER AGGREGATE INCIDENTAL TO 4" CORRUGATED POLYETHYLENE PIPE

CITY OF ROGERS	POLYETHYLENE PERFORATED PIPE	Standard Details Date: SEPTEMBER, 2020 Revised	STO-11



CITY OF ROGERS	CURB SECTIONS	Standard Details Date: SEPTEMBER, 2020 Revised	CON-1



CITY OF ROGERS	CURB RADIUS	Standard Details Date: SEPTEMBER, 2020 Revised	CON-1A

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
CONSTRUCTION DETAILS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
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23970

6.2

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GENERAL UTILITY CONSTRUCTION NOTES:

1. SPECIFICATIONS: THE WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF ROGERS GENERAL SPECIFICATIONS AND STANDARD DETAIL PLATES FOR STREET AND UTILITY CONSTRUCTION.

2. EXISTING FACILITIES: IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE LOCATION OF ALL EXISTING UTILITIES BEFORE STARTING CONSTRUCTION. THIS INCLUDES, BUT IS NOT LIMITED TO SANITARY AND STORM SEWER, WATERMAIN, NATURAL GAS, ELECTRIC, TELEPHONE AND CABLE TELEVISION SERVICES.

   THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY CONFLICT BETWEEN THE EXISTING UTILITIES AND THE PROPOSED CONSTRUCTION. THE ENGINEER IN COOPERATION WITH THE UTILITY COMPANIES, SHALL DETERMINE THE NECESSITY FOR ANY RELOCATION OF THESE FACILITIES.

   THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES AND FACILITIES SO THAT THEY WILL CONTINUE TO FUNCTION IN THEIR PROPER MANNER BOTH DURING CONSTRUCTION AND IN THE FUTURE. ANY SUPPORTING STRUCTURE THAT MAY BE REQUIRED BECAUSE OF THE CONTRACTOR'S OPERATION SHALL BE PROVIDED BY THE CONTRACTOR.

   THE CONTRACTOR SHALL BRING TO THE ATTENTION OF THE ENGINEER ANY CONDITIONS SUCH AS SAND IN MANHOLES OR VALVE BOXES EXISTING PRIOR TO THE CONTRACTOR'S EXCAVATION. ONCE EXCAVATION HAS COMMENCED, IT WILL BE ASSUMED THAT ALL DAMAGE TO UNDERGROUND UTILITIES HAS BEEN CAUSED BY THE CONTRACTOR'S OPERATIONS AND IT WILL BE HIS RESPONSIBILITY TO MAKE THE NECESSARY REPAIRS.

3. CONTRACTOR RESPONSIBILITIES:
   THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR RECEIVING WATER FROM PUBLIC OR PRIVATE SOURCES AND SECURE NECESSARY PERMITS AND PAY REGULAR CHARGES. ALL CITY WATER SHALL BE METERED. DISPOSAL OF ANY WASTEWATER OR ANY TEST WATER INTO THE CITY SANITARY SEWER SYSTEM IS SUBJECT TO CITY CHARGE. CONTRACTORS ARE NOT TO OPERATE GATE VALVES OR HYDRANTS ON CITY WATER SUPPLY.

   THE CITY ENGINEER AND THE ENGINEER SHALL BE NOTIFIED 48 HOURS PRIOR TO COMMENCING WORK. CONTRACTORS SHALL BE SUBJECT TO SHUT DOWN IF PROPER NOTIFICATION IS NOT GIVEN TO THE ENGINEER.

   CITY STREETS THAT ARE UTILIZED FOR INGRESS TO OR EGRESS FROM THE CONSTRUCTION SITE SHALL BE KEPT FREE OF DIRT AND OTHER DEBRIS RESULTING FROM SAID CONSTRUCTION. COST FOR THIS SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.

   THE CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN ADEQUATE STORM DRAINAGE PROTECTION OF THE SITE IN ORDER TO PREVENT EROSION AND SILTING OF ON-SITE AND OFF-SITE AREAS. THIS SHALL BE ACCOMPLISHED BY PLACEMENT OF HAY BALES OR FILTER FABRIC FENCE AROUND THE DRAINAGE INLETS AND OUTLETS AND BY CONSTRUCTION OF DITCHES, BERMS, DEBRIS BASINS, FILTER FABRIC FENCING AND BY ANY OTHER ON-SITE PROTECTION AS DETERMINED BY THE ENGINEER. UNLESS SPECIFICALLY CALLED OUT AS A BID ITEM ON THE BID FORM, ANY TEMPORARY DITCHING, CULVERTS, HAY BALES, AND FILTER FABRIC FENCE NECESSARY TO ACCOMPLISH THIS SHALL BE AT THE CONTRACTOR'S EXPENSE.

   IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT AND LEAVE UNDISTURBED THOSE MARKERS OR MONUMENTS SET FOR THE SUBDIVISION OF LAND.

   IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UTILIZE THE "GOPHER STATE ONE CALL" EXCAVATION NOTICE SYSTEM AS REQUIRED UNDER MINNESOTA STATUTE CHAPTER 216D. CALL 811 OR SUBMIT A TICKET AT gopherstateonecall.org AT LEAST 48 HOURS PRIOR TO PERFORMING ANY EXCAVATION.

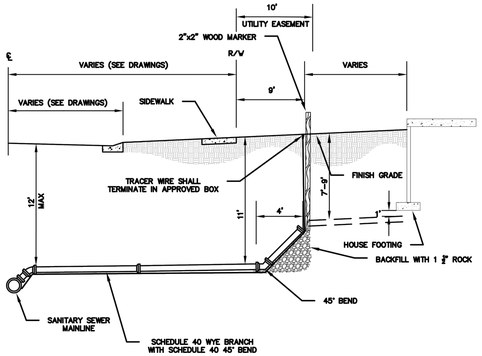
2. COMPACTION: DENSITY TESTS SHALL BE TAKEN ON ALL TRENCHES WITHIN THE STREET CROSS SECTION AND THE PAD AREAS TO EVALUATE THE COMPACTION ACHIEVED DURING UTILITY CONSTRUCTION. WITHIN THE UPPER 3 FEET OF STREET SUBGRADE THE CONTRACTOR SHALL INSURE THAT ALL SOILS BE NOT MORE THAN ONE PERCENTAGE POINT OVER THE SOIL'S STANDARD PROCTOR OPTIMUM MOISTURE CONTENT, AND THAT COMPACTION TO A MINIMUM OF 100% OF STANDARD PROCTOR DENSITY (AASHTO T-99) BE PROVIDED. WITHIN UTILITY TRENCHES IN OPEN SPACE AREAS (PAD AREAS) AND AREAS BELOW THE UPPER 3 FEET OF STREET SUBGRADE, THE CONTRACTOR SHALL INSURE THAT ALL SOILS BE NOT MORE THAN THREE PERCENTAGE POINTS OVER THE SOIL'S STANDARD PROCTOR OPTIMUM MOISTURE CONTENT, AND THAT COMPACTION TO A MINIMUM OF 95% OF STANDARD PROCTOR DENSITY BE PROVIDED. THE SURFACE OF ALL UTILITY TRENCHES SHALL BE FINISHED GRADED TO THE ELEVATIONS AS STAKED BY THE ENGINEER TO WITHIN A TOLERANCE OF ±0.3' IN OPEN SPACE AREAS AND ± 0.1' WITHIN STREET RIGHT OF WAYS. THE DENSITY WILL BE TESTED BY AN APPROVED TESTING LABORATORY. AN APPROVED TESTING METHOD WHICH UTILIZES A NUCLEAR DENSITY METER MAY BE USED FOR THE DENSITY TESTS. THE LOCATION OF THE TESTS WILL BE AT THE DIRECTION OF THE ENGINEER.

   THE OWNER SHALL BEAR ALL COSTS OF THE TESTING. FAILURE TO MEET THE COMPACTION REQUIREMENTS OUTLINED IN THIS SECTION SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. ALL COSTS FOR ANY RE-TESTING ASSOCIATED WITH ANY CORRECTIVE WORK SHALL BE AT THE EXPENSE OF THE CONTRACTOR.

3. ALL PVC WATERMAIN TO BE INSTALLED WITH 8.5' MINIMUM COVER. ALL DIP WATERMAIN TO BE INSTALLED WITH 7.5' MINIMUM COVER.

4. ALL 8" WATERMAIN TO BE CONSTRUCTED OF CLASS C900 PVC W/ TRACER WIRE.

5. SANITARY SEWER PIPE TYPE & CLASS AS FOLLOWS:
   a. 0' – 18' DEEP = PVC SDR 35
   b. 18' – 28' DEEP = PVC SDR 26
   c. 28' – 32' DEEP = PVC SDR 18, AWWA C900
   d. 32' + DEEP = POLYBOND LINED DIP, ASTM A746



NOTES:

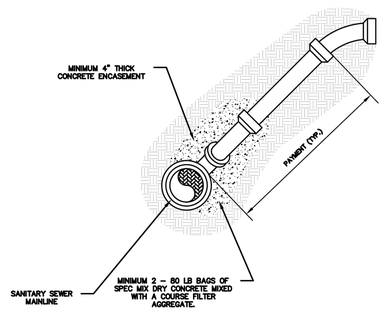
SEWER SERVICE, PVC SCHEDULE 40 4" OR 6" AS SPECIFIED

2% MINIMUM SLOPE OR 12% MAXIMUM SLOPE, ½" PER FOOT

ALL PIPE SHALL BE BEDDED IN GRANULAR BORROW 3149 B.1 OR COURSE FILTER AGGREGATE 3149H

END OF SERVICE SHALL BE 7' TO 8' DEEP AT END OF SERVICE. THE END SHALL BE A FACTORY JOINT WITH PLUG, USING A FACTORY MANUFACTURED ADAPTOR WHERE NECESSARY

CITY OF ROGERS	SANITARY SEWER SERVICE	Standard Details	SAN-1
		Date: SEPTEMBER, 2020	
		Revised:	



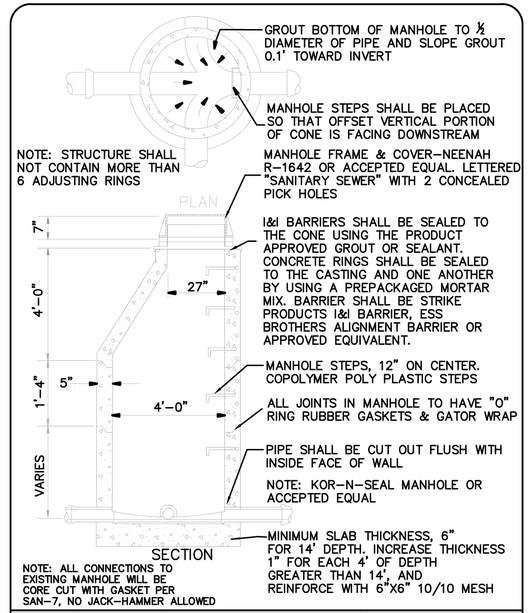
NOTES:

SERVICE CONNECTION TO BE AT 2:00 OR 10:00 WITH APPROVED FACTORY INSTALLED SCHEDULE 40 WYE.

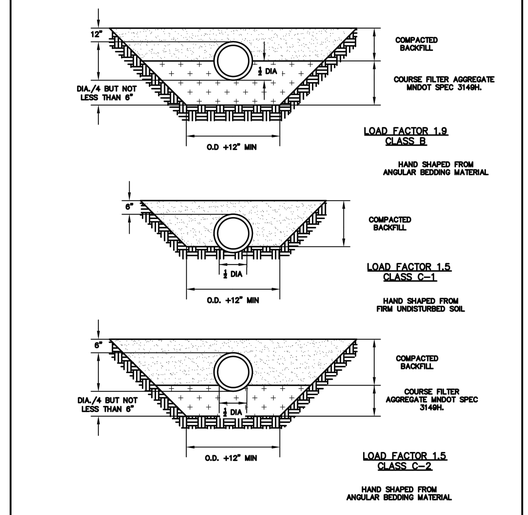
4" OR 6" SANITARY SEWER SERVICE RISER SUPPORT ON TRENCH SLOPE 1:1 MAX

SCHEDULE 40 PVC SERVICES

CITY OF ROGERS	SANITARY SEWER SERVICE RISER	Standard Details	SAN-2
		Date: SEPTEMBER, 2020	
		Revised:	



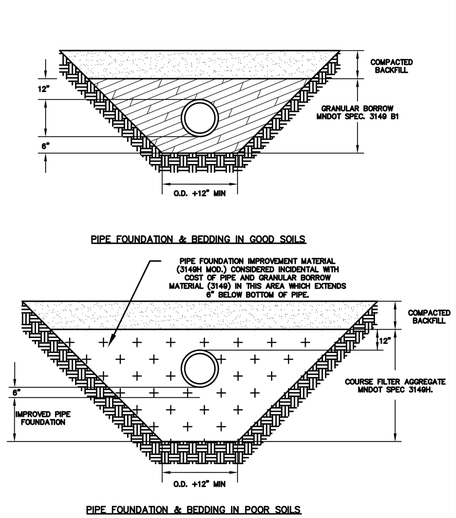
CITY OF ROGERS	STANDARD SANITARY MANHOLE	Standard Details	SAN-4
		Date: SEPTEMBER, 2020	
		Revised:	



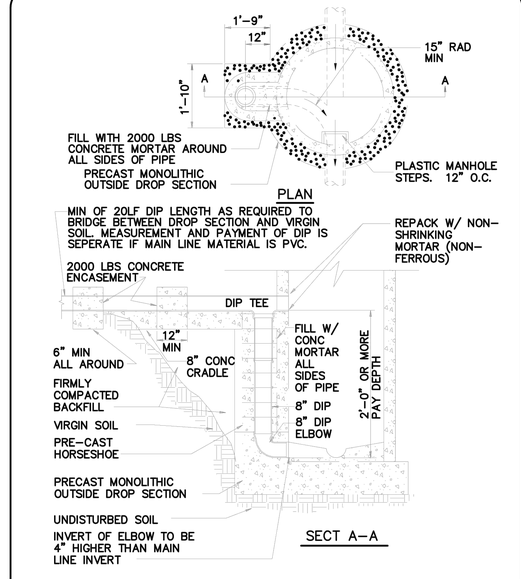
NOTES:

"DIA" DENOTES OUTSIDE DIAMETER OF PIPE

CITY OF ROGERS	PIPE BEDDING METHODS FOR RCP OR DIP	Standard Details	SAN-11
		Date: SEPTEMBER, 2020	
		Revised:	



CITY OF ROGERS	PIPE BEDDING METHODS FOR PVC	Standard Details	SAN-12
		Date: SEPTEMBER, 2020	
		Revised:	



CITY OF ROGERS	SANITARY MANHOLE OUTSIDE DROP SECTION	Standard Details	SAN-13
		Date: SEPTEMBER, 2020	
		Revised:	

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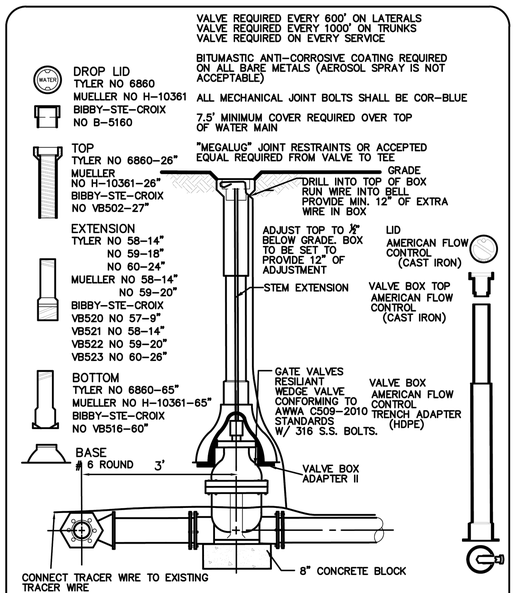
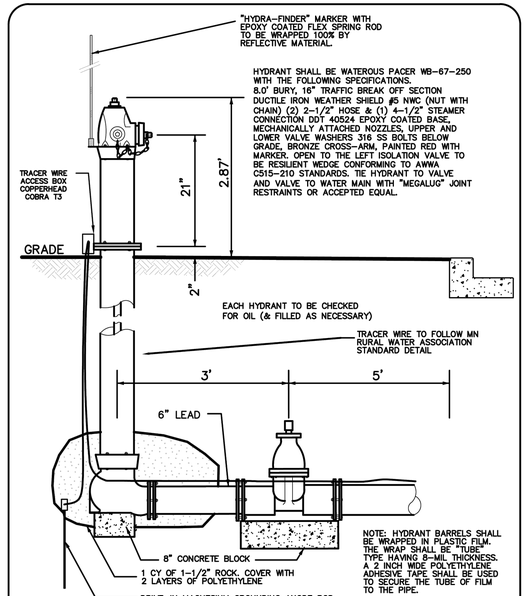


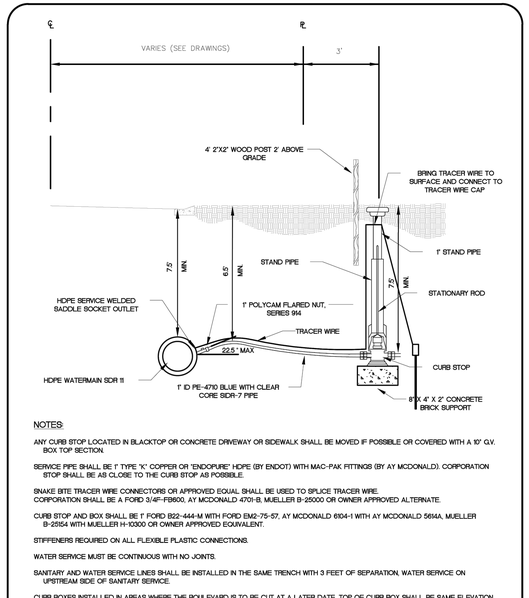
GATE VALVE AND BOX INSTALLATION

Standard Details — Date: SEPTEMBER, 2020 — Revised: — WAT-01



GATE VALVE AND HYDRANT INSTALLATION

Standard Details — Date: SEPTEMBER, 2020 — Revised: — WAT-03



NOTES:

ANY CURB STOP LOCATED IN BLACKTOP OR CONCRETE DRIVEWAY OR SIDEWALK SHALL BE MOVED IF POSSIBLE OR COVERED WITH A 10" G.V. BOX TOP SECTION.

SERVICE PIPE SHALL BE 1" TYPE "K" COPPER OR "ENDOPURE" HDPE (BY ENDOT) WITH MAC-PAK FITTINGS (BY AY MCDONALD). CORPORATION STOP SHALL BE AS CLOSE TO THE CURB STOP AS POSSIBLE.

SNAKE BITE TRACER WIRE CONNECTORS OR APPROVED EQUAL SHALL BE USED TO SPLICE TRACER WIRE. CORPORATION SHALL BE A FORD 3/4F-FB600, AY MCDONALD 4701-B, MUELLER B-25000 OR OWNER APPROVED ALTERNATE.

CURB STOP AND BOX SHALL BE 1" FORD B22-444-M WITH FORD EM2-75-57, AY MCDONALD 6104-1 WITH AY MCDONALD 569A, MUELLER B-20254 WITH MUELLER H-10300 OR OWNER APPROVED EQUIVALENT.

STIFFENERS REQUIRED ON ALL FLEXIBLE PLASTIC CONNECTIONS.

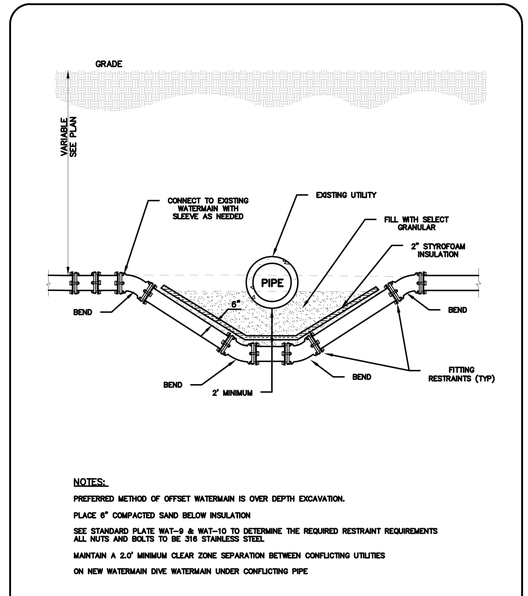
WATER SERVICE MUST BE CONTINUOUS WITH NO JOINTS.

SANITARY AND WATER SERVICE LINES SHALL BE INSTALLED IN THE SAME TRENCH WITH 3 FEET OF SEPARATION. WATER SERVICE ON UPSTREAM SIDE OF SANITARY SERVICE.

CURB BOXES INSTALLED IN AREAS WHERE THE BOULEVARD IS TO BE CUT AT A LATER DATE, TOP OF CURB BOX SHALL BE SAME ELEVATION AS TOP OF CURB.

1" WATER SERVICE WITH HDPE WATERMAIN

Standard Details — Date: JUNE, 2021 — Revised: — WAT-06



NOTES:

PREFERRED METHOD OF OFFSET WATERMAIN IS OVER DEPTH EXCAVATION.

PLACE 6" COMPACTED SAND BELOW INSULATION

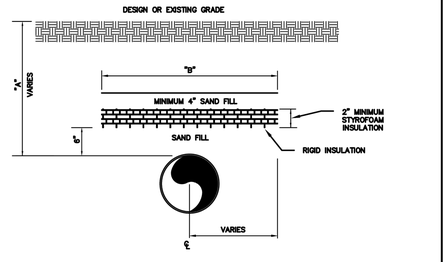
SEE STANDARD PLATE WAT-9 & WAT-10 TO DETERMINE THE REQUIRED RESTRAINT REQUIREMENTS
ALL NUTS AND BOLTS TO BE 316 STAINLESS STEEL.

MAINTAIN A 2.0' MINIMUM CLEAR ZONE SEPARATION BETWEEN CONFLICTING UTILITIES

ON NEW WATERMAIN DIVE WATERMAIN UNDER CONFLICTING PIPE

OFFSET WATERMAIN

Standard Details — Date: SEPTEMBER, 2020 — Revised: — WAT-07



NOTES:

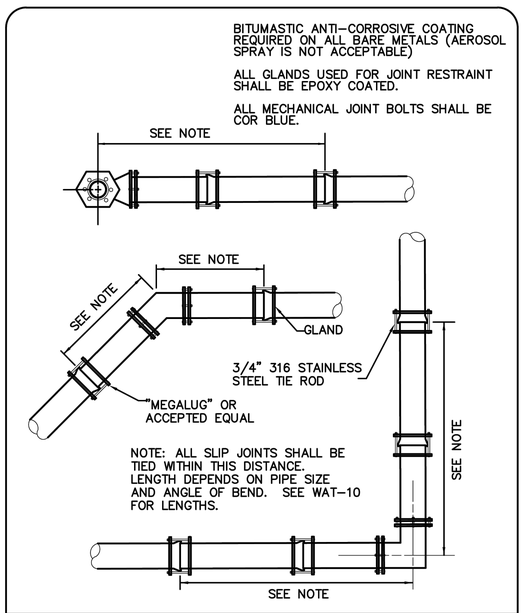
PIPE SHALL BE CENTERED UNDER INSULATION UNLESS OTHERWISE SPECIFIED

COVER OVER PIPE - "A"	WIDTH OF INSULATION BOARD - "B"
4'-5'	12'
5'-6'	15'
6'-7'	18'

2" OF INSULATION = 2' OF COVER

INSULATION DETAIL

Standard Details — Date: SEPTEMBER, 2020 — Revised: — WAT-08



WATERMAIN TYING DETAIL

Standard Details — Date: SEPTEMBER, 2020 — Revised: — WAT-09

TRACER WIRE

TRACER WIRE SHALL BE COPPERHEAD #12 AWG CCS COMPLYING WITH ASTM-D-1248, 30 VOLT RATING,GREEN FOR SEWER SERVICES AND FORCEMAIN AND BLUE FOR WATER MAIN
- #1230HS HIGH STRENGTH FOR OPEN CUT
- #1245EHS EXTRA HIGH STRENGTH FOR HORIZONTAL DIRECTIONAL DRILLING AND JACK/BORING.
- SPLICING 2 WIRES, DRYCONN KING 6 BLUE
- SPLICING 3 OR MORE, DRYCONN DIRECT BURY LUG YELLOW
- WIRE SPLICING WILL BE ALLOWED WHEN APPROVED ONLY

ALL NEW TRACER WIRE INSTALLATIONS SHALL BE LOCATED USING TYPICAL LOW FREQUENCY (512 HZ) LINE TRACING EQUIPMENT, WITNESSED BY THE CONTRACTOR, ENGINEER AND FACILITY OWNER AS APPLICABLE, PRIOR TO ACCEPTANCE OF OWNERSHIP.

POLYVINYL CHLORIDE PIPE (PVC) - C900

PVC WATER DISTRIBUTION PIPE AND JOINTS SHALL CONFORM TO:
AWWA C-900 (DR)
ASTM D3139

NOTE: TRACER WIRE ACCESSES SHALL NOT EXCEED 500-FT

DUCTILE IRON PIPE

DIP WATER DISTRIBUTION PIPE SHALL BE PRESSURE CLASS 350 AWWA C150/151.

PLASTIC FILM WRAP FOR DIP

WATER DISTRIBUTION PIPE, RISER PIPE, AND HYDRANT BARRELS SHALL BE WRAPPED IN PLASTIC FILM. THE WRAP SHALL BE "TUBE" TYPE HAVING 8-MIL THICKNESS. A 2 INCH WIDE POLYETHYLENE ADHESIVE TAPE SHALL BE USED TO SECURE THE TUBE OF FILM TO THE PIPE.

DUCTILE IRON FITTINGS

WATER MAIN FITTINGS SHALL CONFORM TO ANSI A21.53, A21.11 & A21.4. FITTINGS SHALL BE COATED WITH 6 - 8 MM MINIMUM THICKNESS FUSION BONDED EPOXY CONFORMING TO ANSI/AWWA C550 AND C116/A21.16.

THRUST RESTRAINT

ALL WATER MAIN, VALVES, SERVICES, FITTINGS, STUBS, EXTENSIONS, BLIND FLANGES, AND PLUGS USED FOR RETAINING WATER PRESSURE MUST BE TIED WITH "MEGALUG" JOINT RESTRAINTS OR ACCEPTED EQUAL, BASED UPON A 150 PSI TEST PRESSURE AND 7.5' COVER, THE FOLLOWING SHOWS THE MINIMUM LENGTH OF PIPE EACH WAY OF A FITTING TO BE RESTRAINED. JOINT RESTRAINTS TO BE EPOXY COATED AS REQUIRED ON WATER MAIN FITTINGS.

PIPE DIAMETER	DEAD END OR 90^BEND	TEE BRANCH 45^BEND	TEE BRANCH 22-1/2^BEND
4" (SERVICE)	22 LF	5 LF	2 LF
6"	23 LF	7 LF	3 LF
8"	30 LF	10 LF	5 LF
10"	38 LF	12 LF	5 LF
12"	50 LF	16 LF	5 LF

ALL TEES WITH A VALVE IMMEDIATELY AFTER A TEE BRANCH SHOULD BE TREATED AS A 90 DEGREE BEND.

WHERE RESTRAINED JOINTS ARE REQUIRED AND THE PIPE IS IN A CASING NEAR THE FITTING TO BE RESTRAINED, THE LENGTH OF PIPE IN THE CASING SHALL NOT BE INCLUDED IN THE LENGTH OF PIPE NECESSARY TO DEVELOP SUFFICIENT SOIL FRICTION TO OVERCOME THRUST.

ALL BARE METALS SHALL HAVE TWO COATS OF BITUMASTIC OR ACCEPTED EQUAL. (AEROSOL SPRAY IS NOT ACCEPTABLE) ALL MECHANICAL JOINT BOLTS SHALL BE COR-BLUE.
ALL JOINT TIE RODS AND NUTS SHALL BE 316 STAINLESS STEEL.

WATER MAIN DETAILS AND TIE SCHEDULE TABLE

Standard Details — Date: SEPTEMBER, 2020 — Revised: — WAT-10

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CAD FILE
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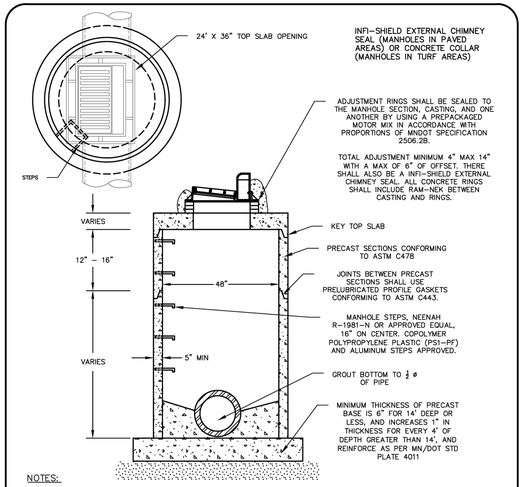


NOTES:

FRAME AND GRATE FOR BULKHEAD STYLE CURB SHALL BE A NEENAH R-3067-V OR NEENAH R-3067-VB

FRAME AND GRATE FOR SURMOUNTABLE STYLE CURB OR DRIVEWAYS SHALL BE A NEENAH R-3501-TR OR R-3501-TL LOW POINTS 3501-TB

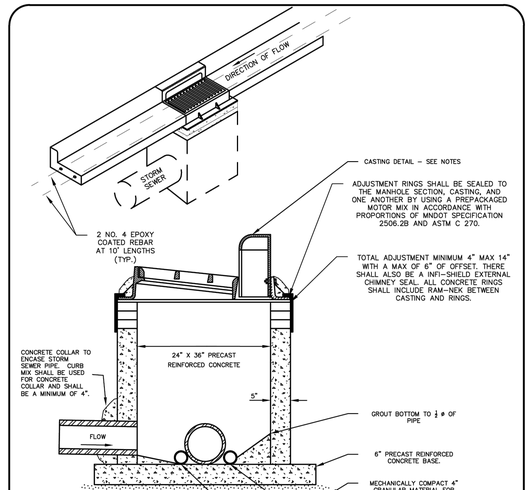
FRAME AND GRATE FOR OFF ROAD LOCATION (DITCH GRATE, STOOL TYPE) R-4342

ALL MANHOLES WITH FRAME AND LID IN A PAVED AREA SHALL USE A NEENAH R-1642 WITH SOLID B LID WITH 2 CONCEALED PICK HOLES OR APPROVED EQUAL. LID SHALL BE LETTERED "STORM SEWER" WITH 2" RAISED LETTERS

DOG HOUSES SHALL BE GROUTED ON BOTH THE OUTSIDE AND INSIDE OF THE STRUCTURE

DRAINTILE OPENING MUST BE CORE-DRILLED OR PRECAST AND GROUTED INSIDE AND OUTSIDE OF THE STRUCTURE.

CITY OF ROGERS	STORM SEWER MANHOLE	Standard Details	STO-1
		Date: SEPTEMBER, 2020	
		Revised:	



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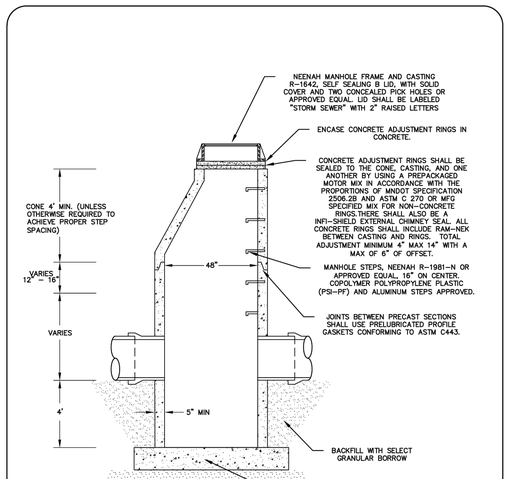
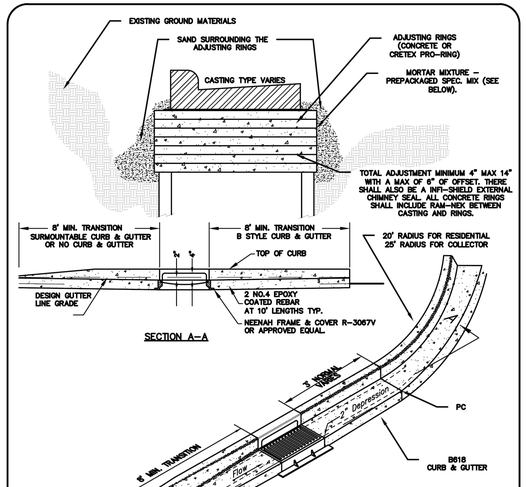
FRAME AND GRATE FOR OFF ROAD LOCATION (DITCH GRATE, STOOL TYPE) R-4342

DOG HOUSES AND RINGS SHALL BE GROUTED ON BOTH THE OUTSIDE AND INSIDE OF THE STRUCTURE

CITY OF ROGERS	STORM SEWER JUNCTION MANHOLE	Standard Details	STO-2
		Date: JUNE, 2021	
		Revised:	



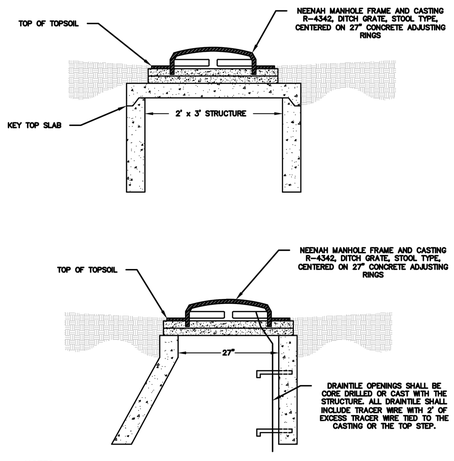
CITY OF ROGERS	STANDARD MANHOLE WITH SUMP	Standard Details	STO-3
		Date: SEPTEMBER, 2020	
		Revised:	



NOTES:

THE CONCRETE ADJUSTMENT RINGS SHALL BE SEALED TO THE CONE, CASTING AND ONE ANOTHER BY USING A PREPACKAGED MORTAR MIX IN ACCORDANCE WITH PROPORTIONS OF MNDOT SPECIFICATION 2506.2B AND ASTM C 270. THIS WILL ALSO BE USED FOR ALL "MUD WORK" INSIDE OF CONCRETE STRUCTURES

CITY OF ROGERS	CB ADJUSTMENT AND CB PLACEMENT IN CONCRETE CURB AND GUTTER	Standard Details	STO-5
		Date: SEPTEMBER, 2020	
		Revised:	



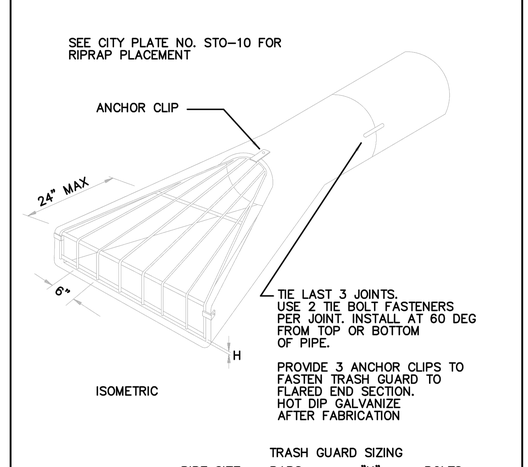
NOTES:

THE CONCRETE ADJUSTING RINGS SHALL BE SEALED TO THE CONE AND ONE ANOTHER BY USING MORTAR MIX IN ACCORDANCE WITH THE PROPORTIONS OF MNDOT SPECIFICATION 2506.2B AND ASTM C 270.THERE SHALL ALSO BE A INFI-SHIELD EXTERNAL CHIMNEY SEAL

THIS WILL ALSO BE USED FOR ALL "MUD WORK" INSIDE OF CONCRETE STRUCTURES

THE CASTING SHALL NOT BE SEALED TO THE ADJUSTMENT RINGS TO FACILITATE IN THE REMOVAL OF THE CASTING IF NECESSARY.

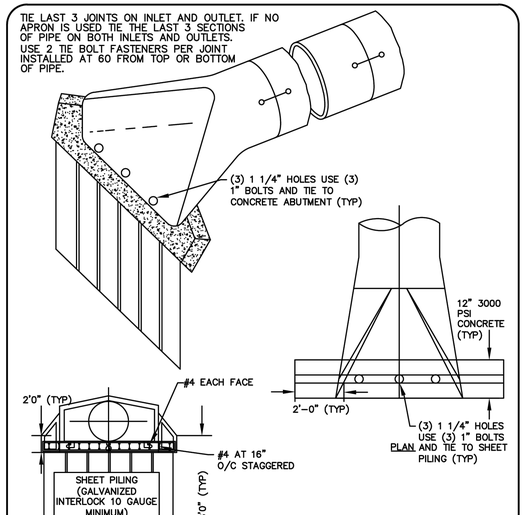
CITY OF ROGERS	CATCH BASIN FOR R-4342 CASTING	Standard Details	STO-6
		Date: SEPTEMBER, 2020	
		Revised:	



TRASH GUARD SIZING

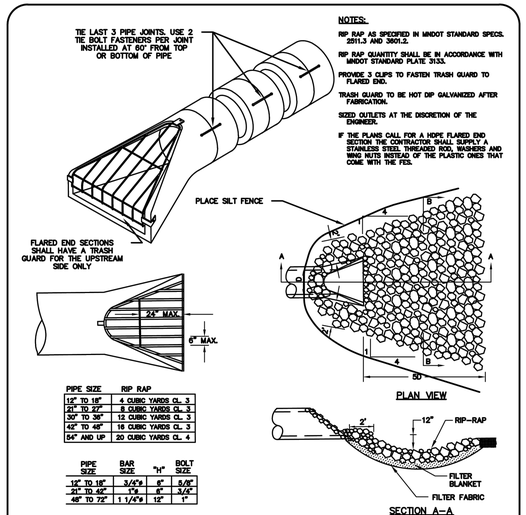
PIPE SIZE	BARS	"H"	BOLTS
12"-18"	3/4" DIA	4"	5/8"
21"-42"	1" DIA	6"	3/4"
48"-72"	1-1/4" DIA	12"	1"

CITY OF ROGERS	FLARED END SECTION AND TRASH GUARD	Standard Details	STO-7
		Date: SEPTEMBER, 2020	
		Revised:	



NOTE:
THIS DRAWING IS TYPICAL FOR ALL FLARED END SECTIONS 30 INCHES IN DIAMETER OR LARGER.

CITY OF ROGERS	OUTLET SHEET PILING	Standard Details	STO-9
		Date: SEPTEMBER, 2020	
		Revised:	



PIPE SIZE	RIP RAP
12" TO 18"	4 CUBIC YARDS CL. 3
21" TO 27"	8 CUBIC YARDS CL. 3
30" TO 36"	12 CUBIC YARDS CL. 3
42" TO 48"	16 CUBIC YARDS CL. 3
54" AND UP	20 CUBIC YARDS CL. 4

PIPE SIZE	BAR SIZE	"H"	BOLT SIZE
12" TO 18"	3/4"ø	6"	5/8"
21" TO 42"	1"ø	6"	3/4"
48" TO 72"	1 1/4"ø	12"	1"

CITY OF ROGERS	RIPRAP AT OUTLETS	Standard Details	STO-10
		Date: SEPTEMBER, 2020	
		Revised:	

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
CONSTRUCTION DETAILS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
JSO

DATE
02/24/2025

REVISIONS

03/19/2025 MPCA REVIEW SUBMITTAL
04/04/2025 PARTIAL CITY COMMENTS
04/15/2025 WATERSHED COMMENTS

CAD FILE
23970D

PROJECT NO.
23970

6.5

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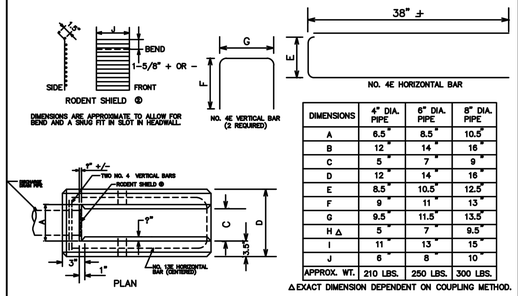


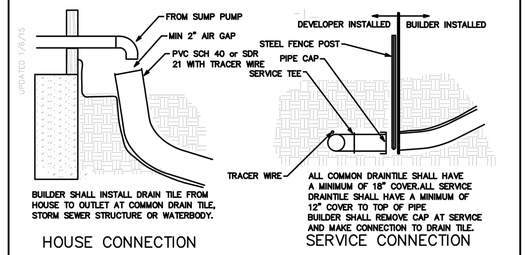
DIMENSIONS	4" DIA. PIPE	6" DIA. PIPE	8" DIA. PIPE
A	6.5"	8.5"	10.5"
B	12"	14"	16"
C	5"	7"	9"
D	12"	14"	16"
E	8.5"	10.5"	12.5"
F	9"	11"	13"
G	9.5"	11.5"	13.5"
H △	5"	7"	9.5"
I	11"	13"	15"
J	6"	8"	10"
APPROX. WT.	210 LBS.	250 LBS.	300 LBS.

△ EXACT DIMENSION DEPENDENT ON COUPLING METHOD.

NOTES:

1. ALL CONCRETE MATERIALS SHALL BE MN/DOT MIX DESIGNATION 3W46 AND/OR OTHER MIX AS APPROVED BY THE STATE MATERIALS ENGINEER. HEADWALLS SHALL NOT BE SHIPPED UNTIL CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF 5000 PSI. THE EPOXY BARS SHALL BE SECURELY RETAINED SO THEY ARE NOT DISPLACED DURING CONCRETE PLACEMENT. TIE WIRE SHALL BE EPOXY COATED. WELDING WILL NOT BE PERMITTED. THE FABRICATOR SHALL PROVIDE A QUALITY CONTROL PROGRAM APPROVED BY THE MATERIALS ENGINEER.
2. THE RODENT SHIELD SHALL BE FABRICATED FROM CARBON STEEL FLATTENED EXPANDED METAL, STYLE 4" NO 4F. IT SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION. ACTUAL SCREEN DIMENSIONS SHALL BE SUCH AS WILL SNUGLY FIT THE PROVIDED SLOT (TAPERED IF NECESSARY), WITH THE SCREEN LIP FITTING FLUSH WITH THE CASTING TOP AND THE BOTTOM FITTING TIGHT TO THE FLOW LINE.
3. THE MANUFACTURER'S NAME AND DATE OF PRODUCTION (MONTH AND YEAR) SHALL BE CLEARLY CAST (NOT INK STAMPED) INTO EITHER THE BOTTOM OF EACH HEADWALL OR NEAR THE BOTTOM OF THE LARGE END. IF A MANUFACTURER HAS MORE THAN ONE PLANT, THEY SHALL BE APPROPRIATELY CODED.

		Standard Details	
CITY OF ROGERS	PRECAST CONCRETE HEADWALL FOR SUBSURFACE DRAINS	Date: SEPTEMBER, 2020 Revised:	STO–13



		Standard Details	
CITY OF ROGERS	SUMP PUMP DISCHARGE REQUIREMENTS	Date: SEPTEMBER, 2020 Revised:	STO–14

CITY OF ROGERS MINIMUM DRAIN TILE REQUIREMENTS

(REQUIREMENTS FOR ALL NEW HOMES AS OF JANUARY, 2016)

- PIPE SIZE – 4" PVC
- TYPE OF PIPE – SCH 40 OR ASTM 1785, OR SDR 21
- DEPTH OF PIPE – 12" TO TOP OF PIPE FROM FINISH GRADE
- TRACER WIRE – MINIMUM GAUGE #12 COPPERHEAD COPPER CLAD STEEL TRACER WIRE, GREEN IN COLOR.

NOTE: ALL STORM SEWER PIPE CROSSINGS THAT PENETRATE THE TYPICAL SECTION SHALL INCLUDE DRAINTILE THAT RUNS PARALLEL TO THE CROSSING. THIS DRAINTILE SHALL TIE INTO BOTH DRAINAGE STRUCTURES AND BE PLACED AT THE BOTTOM OF THE PIPE TRENCH.

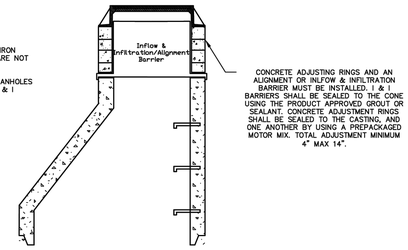
NOTE: CORRECT FITTINGS MUST BE USED WITH ALL PIPE, NO TAPING OR SPLICING WILL BE ACCEPTED. A TRACER WIRE SHALL BE INSTALLED ALONG WITH THE PIPE, THIS WIRE MUST BE COPPERHEAD #12 AWG CCS #1230HS COMPLYING WITH ASTM–D–1248, 30 VOLT RATING BE EXPOSED A MINIMUM LENGTH OF 12 INCHES AT THE HOUSE AND SHALL DEAD END AT THE CONNECTION OR TILE DISCHARGE. NO WIRE SHALL BE ACCEPTED EXCEPT AS SPECIFIED ABOVE.

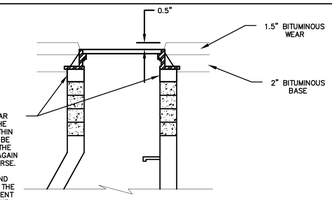
NOTE: THE TRENCH MUST BE LEFT OPEN AT ALL CONNECTIONS FOR INSPECTION PURPOSES. IF A TILE LINE IS TO DEAD END INTO A POND OR WET LAND A FENCE POST SHALL CLEARLY MARK ITS END. ALL INSPECTIONS SHALL REQUIRE A 24 HOUR NOTICE. ALL TRENCHES MUST BE BACK FILLED WITHIN 24 HOURS. IT IS RECOMMENDED THAT A REPRESENTATIVE OF THE BUILDER BE PRESENT AT ALL INSPECTIONS.

		Standard Details	
CITY OF ROGERS	SUMP PUMP DISCHARGE REQUIREMENTS	Date: SEPTEMBER, 2020 Revised:	STO–14A

Notes

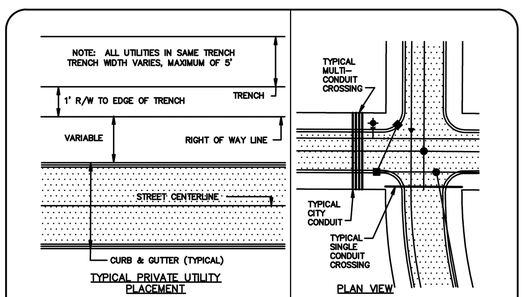
Barrier shall be Strike Products I&I Barrier, Ess Brothers Alignment Barrier or approved equivalent.



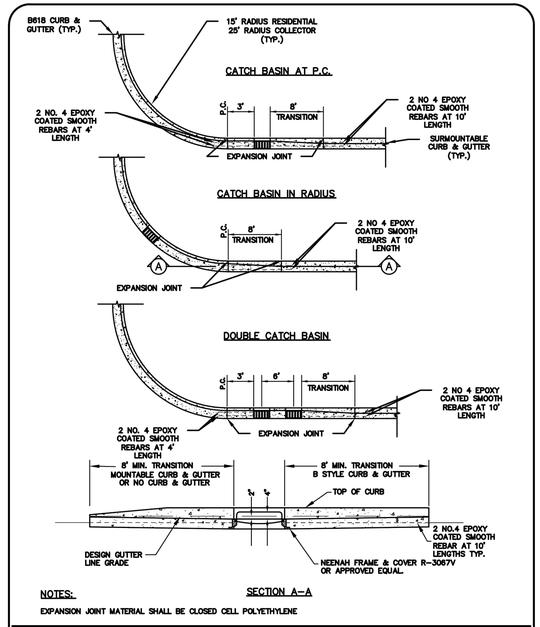


BITUMINOUS WEAR COURSE ADJUSTMENT DETAIL

		Standard Details	
CITY OF ROGERS	MANHOLE CASTING ADJUSTMENT DETAIL	Date: SEPTEMBER, 2020 Revised:	STR–10



		Standard Details	
CITY OF ROGERS	PRIVATE UTILITY CONDUIT CROSSING	Date: SEPTEMBER, 2020 Revised:	STR–11



NOTES:

EXPANSION JOINT MATERIAL SHALL BE CLOSED CELL POLYETHYLENE

		Standard Details	
CITY OF ROGERS	CURB RADIUS	Date: SEPTEMBER, 2020 Revised:	CON–2

James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890–6044 FAX: (952)890–6244

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

PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
CONSTRUCTION DETAILS
FOR
RACHEL DEVELOPMENT
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CAD FILE
23970D

PROJECT NO.
23970

6.6

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NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION. THE TOP LANDING SHALL BE LOCATED AT THE TOP OF EACH RAMP RUN AND SHALL BE AT LEAST AS WIDE AS THE RAMP RUN LEADING TO IT. SHALL BE NO LESS THAN 5.0'L. INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN BY FROM THE BACK OF CURB. SHALL BE NO LESS THAN 4.0'L. SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL RUNNING SLOPE OF THE PAR EXCEEDS 5.0%.

CONSTRUCTION JOINTS SHALL BE LOCATED AT A MINIMUM OF 10'-0" INTERVALS BOTH DIRECTIONS. JOINTS SHALL BE EDGED OR SCORED TO A DEPTH OF 1/4" OF THE PAR SURFACE. ALL SLOPE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL. BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH.

TO ENSURE RAMPS AND LANDINGS ARE PROPERLY CONSTRUCTED ALL INITIAL LANDINGS AT THE TOP OF A RAMP SHALL BE CONSTRUCTED AND INSPECTED PRIOR TO PLACEMENT OF THE RAMP. SEE SPECIAL PROVISION SECTION OF PLANS FOR ADDITIONAL INFORMATION AND PAYMENT DETAILS ON SHEET 6 OF 6. FOR ALL SEPARATELY POURED RAMPS, LANDINGS, AND SIDEWALK FLOW ENCROACHMENT DETAILS ON SHEET 6 OF 6.

WHEN SIDEWALK IS AT BACK OF CURB, TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE. MAINTAIN POSITIVE BOULEVARD DRAINAGE TO TOP OF CURB.

ALL RAMP TYPES SHOULD HAVE A MINIMUM 5'LONG RAMP LENGTH.

A MINIMUM WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS DETECTABLE WARNING SHALL CONSIST OF TRUNCATED DOMES AND SHALL BE BUILT IN ACCORDANCE WITH MNDOT SPEC 2521 WITH THE EXCEPTION IT IS MAXIMUM ON EACH OUTSIDE CURB RAMP TRANSITION PLANE. DETECTABLE WARNING SHALL BE LOCATED SO THAT THE EDGE NEAREST THE STREET IS 6" BEHIND THE BACK OF CURB.

WHEN DESIGNING OR ORDERING RECTANGULAR DETECTABLE WARNING SURFACES SHOULD BE 6', LESS THAN 2' IS NOT RECOMMENDED. DETECTABLE WARNINGS SHALL NOT BE GREATER THAN 8' IN LENGTH.

RECTANGULAR DETECTABLE WARNINGS SHALL BE SETBACK 9" FROM THE BACK OF CURB. RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 9" FROM THE BACK OF CURB. SEE NOTES ⑤ & ⑥ FOR INFORMATION REGARDING RECTANGULAR DETECTABLE WARNING PLACEMENT.

① MATCH FULL CURB HEIGHT.
② 6" HIGH CURB WHEN USING A 3'LONG RAMP.
③ 9" HIGH CURB WHEN USING 2 - 3'LONG RAMP.
④ 3" MINIMUM CURB HEIGHT AND MAX DISTANCE REQUIRED BETWEEN DOMED DETECTABLE WARNING AND THE BACK OF CURB.
⑤ THE "RAMP" IN BETWEEN THE RAMP3 SHOULD NOT BE IN THE PATH OF TRAVEL FOR COMBINED DIRECTIONAL RAMPS IT SHOULD BE LOCATED AT THE RAMP FLOW LINE TRANSITION POINT TO A DEPRESSED CURB.
⑥ WHEN USING CONCRETE PAVERS FLARE IN THE OUTSIDE OF DIRECTIONAL RAMPS, AND ADJACENT TO A WALKABLE SURFACE, DIRECTIONAL RAMP FLARE SHALL BE USED. SEE THE DETAIL ON THIS SHEET.
⑦ ENSURE THAT THE RAMP SURFACE AT THE BACK OF CURB IS FLUSH WITH THE GUTTER PAN. A MAXIMUM OF 1/4" VERTICAL OFFSET IS ALLOWED. ANY GREATER OFFSET SHOULD BE BEVELED.
⑧ MAX SLOPE 10% IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.
⑨ A 1' MIN TOP RADIUS GRADE BREAK IS REQUIRED TO BE CONSTRUCTIBLE.
⑩ PAVE FULL WALK WIDTH.
⑪ 12" SLOPES ON FANS SHALL ONLY BE USED WHEN ALL OTHER FEASIBLE OPTIONS HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL.
⑫ INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10S TO A MINIMUM 3 INCH CURB HEIGHT, INCREASE CURB TAPER LENGTH AT LESS THAN OR EQUAL TO 8-10S AS NECESSARY TO MATCH BOULEVARD SLOPES FROM THE TOP BACK OF CURB TO THE PAR.

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT(S) AT SITE CONDITIONS WARRANT, ADDITIONAL SLOPES UP TO 5.0% OR FLATTER ARE ALLOWED.

① INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

② INDICATES PEDESTRIAN LANDING AREA - 4'-0" OR GREATER THAN 5.0% AND LESS THAN 8.3% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4'-0" X 4'-0"MIN, 5'-0" X 5'-0"MIN PREFERRED DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS, LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

④ 6" CURB HEIGHT

LEAD EXPERT OFFICE	JEFFREY PERKINS OPERATIONS DIVISION	PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	STANDARD PLAN 5-297.250	1 OF 6
	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	TOTAL SHEETS	
		TRUNK HWY.			

NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION. THE TOP LANDING SHALL BE LOCATED AT THE TOP OF EACH RAMP RUN AND SHALL BE AT LEAST AS WIDE AS THE RAMP RUN LEADING TO IT. SHALL BE NO LESS THAN 5.0'L. INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN BY FROM THE BACK OF CURB. SHALL BE NO LESS THAN 4.0'L. SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL RUNNING SLOPE OF THE PAR EXCEEDS 5.0%.

CONSTRUCTION JOINTS SHALL BE LOCATED AT A MINIMUM OF 10'-0" INTERVALS BOTH DIRECTIONS. JOINTS SHALL BE EDGED OR SCORED TO A DEPTH OF 1/4" OF THE PAR SURFACE. ALL SLOPE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL. BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH.

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WHEN DESIGNING OR ORDERING RECTANGULAR DETECTABLE WARNING SURFACES SHOULD BE 6', LESS THAN 2' IS NOT RECOMMENDED. DETECTABLE WARNINGS SHALL NOT BE GREATER THAN 8' IN LENGTH.

RECTANGULAR DETECTABLE WARNINGS SHALL BE SETBACK 9" FROM THE BACK OF CURB. RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 3'- 9" MINIMUM FROM THE BACK OF CURB. SEE NOTES ⑤ & ⑥ FOR INFORMATION REGARDING RECTANGULAR DETECTABLE WARNING PLACEMENT.

① MATCH FULL CURB HEIGHT.
② 6" HIGH CURB WHEN USING A 3'LONG RAMP.
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⑧ MAX SLOPE 10% IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.
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⑩ PAVE FULL WALK WIDTH.
⑪ 12" SLOPES ON FANS SHALL ONLY BE USED WHEN ALL OTHER FEASIBLE OPTIONS HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL.
⑫ INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10S TO A MINIMUM 3' CURB HEIGHT, INCREASE CURB TAPER LENGTH AT LESS THAN OR EQUAL TO 8-10S AS NECESSARY TO MATCH BOULEVARD SLOPES FROM THE TOP BACK OF CURB TO THE PAR.

LEGEND

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② INDICATES PEDESTRIAN LANDING AREA - SLOPE SHALL BE GREATER THAN 5.0% AND LESS THAN 8.3% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4'-0" X 4'-0"MIN, 5'-0" X 5'-0"MIN PREFERRED DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS, LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

④ 6" CURB HEIGHT

LEAD EXPERT OFFICE	JEFFREY PERKINS OPERATIONS DIVISION	PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	STANDARD PLAN 5-297.250	2 OF 6
	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	TOTAL SHEETS	
		TRUNK HWY.			

NOTES:

POSITIVE FLOW LINE DRAINAGE SHALL BE MAINTAINED THROUGH THE PEDESTRIAN ACCESS ROUTE (PAR) AT A 2S MAXIMUM. NO PONDING SHALL BE PRESENT IN THE PAR.

CROSS SLOPE AT LIP THAT OCCURS AT THE FLOW LINE SHALL NOT BE GREATER THAN 1/4 INCH.

FOR CURB RAMP TYPES WHERE THE PEDESTRIAN'S PATH OF TRAVEL IS ASSUMED NON-PERPENDICULAR TO THE GUTTER FLOW LINE, RAMP TYPES INCLUDED FAN & DEPRESSED CORNERS.

① BEGIN SLOPE TRANSITION OUTSIDE OF ALL CURB RAMPS.
② THERE SHALL BE NO VERTICAL DISCONTINUITIES GREATER THAN 1/4".
③ CONSTRUCT CURB RAMPS WITH THE SAME WIDTH AS THE THROAT OF GUTTER.
④ CONSTRUCT CURB RAMPS WITH THE SAME WIDTH AS THE EXISTING ROADWAY.
⑤ VARIABLE WIDTH FOR COMBINED APPLICATIONS, SEE SHEET 2 FOR DIRECTIONAL CURB SLOPE REQUIREMENTS.
⑥ TOP FRONT OF GUTTER SHALL BE CONSTRUCTED FLUSH WITH PROPOSED ADJACENT PAVEMENT ELEVATION. TOP 1.25" OF THE GUTTER PAN MUST BE A FORMED EDGE, PAN GUTTER SHALL NOT BE OVERLAID.
⑦ SHOULD BE USED AT VERTICALLY CONSTRAINED AREAS WHEN AT A DRAINAGE HIGH POINT OR SUPER ELEVATED ROADWAY SEGMENTS.
⑧ EQUATES TO A 4" CURB FACE CROSS-CUTTER 18" LONG TIE BARS AT 30" CENTER TO CENTER IN EXISTING CONCRETE PAVEMENT WINDOW FROM ALL JOINTS.
⑨ HELPS PROVIDE TWO SEPARATE RAMPS, REDUCES THE DOME SETBACK LENGTH AND WIDENESS DIRECTIONAL CURB. THIS REDUCES DESIGN CLOSELY FOLLOWS THE TURNING VEHICLE PATH WHILE SHORTENING CURB RAMP LENGTH.
⑩ CURB EXTENSIONS SHOULD BE USED IN VERTICALLY CONSTRAINED AREAS,USUALLY IN DOWNTOWN ROADWAY SECTIONS WHERE ON-STREET PARKING IS AVAILABLE.CURB EXTENSIONS SHOULD BE CONSIDERED FOR APPLICATIONS WHERE ADEQUATE SIGHT LINES ARE LIMITED.
PUSH BUTTONS MUST MEET APS CRITERIA AS DESCRIBED IN THE PUSH BUTTON LOCATION DETAIL SHEET.

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT(S) AT SITE CONDITIONS WARRANT, ADDITIONAL SLOPES UP TO 5.0% OR FLATTER ARE ALLOWED.

① INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

② INDICATES PEDESTRIAN LANDING AREA - SLOPE SHALL BE GREATER THAN 0.0S AND LESS THAN 5.0S IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4'-0" X 4'-0"MIN, 5'-0" X 5'-0"MIN PREFERRED DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS, LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

④ 6" CURB HEIGHT

LEAD EXPERT OFFICE	JEFFREY PERKINS OPERATIONS DIVISION	PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	STANDARD PLAN 5-297.250	3 OF 6
	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	TOTAL SHEETS	
		TRUNK HWY.			

NOTES:

INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10S TO A MINIMUM 3 INCH CURB HEIGHT, INCREASE CURB TAPER LENGTH AT LESS THAN OR EQUAL TO 8-10S AS NECESSARY TO MATCH BOULEVARD SLOPES FROM THE TOP BACK OF CURB TO THE PAR.

SEE STANDARD PLATE 7038 AND THIS SHEET FOR ADDITIONAL DETAILS ON DETECTABLE WARNING.

A WALKABLE SURFACE IS DEFINED AS A PAVED SURFACE ADJACENT TO A CURB RAMP WITHOUT RAISED OBSTACLES THAT COULD MISTAKENLY BE TRAVERSED BY A USER WHO IS VISUALLY IMPAIRED. CONCRETE FLARE LENGTHS ADJACENT TO NON-WALKABLE SURFACES SHOULD BE LESS THAN 8'LONG MEASURED ALONG THE BACK OF CURB OR EDGE OF ROAD.

① 0" CURB HEIGHT,SEE INSET A ON SHEET 3 OF 6.
② FULL CURB HEIGHT.
③ SIDE TREATMENTS ARE APPLICABLE TO ALL RAMP TYPES AND SHOULD BE IMPLEMENTED AS NEEDED AS FIELD CONDITIONS DICTATE.THE ENGINEER SHALL DETERMINE THE RAMP SIDE TREATMENTS BASED ON MAINTENANCE OF BOTH ROADWAY AND SIDEWALK,ADJACENT PROPERTY CONSIDERATIONS, AND MITIGATING CONSTRUCTION IMPACTS.
④ TYPICALLY USED FOR medians AND ISLANDS.
⑤ WHEN NO CONCRETE FLARES ARE PROPOSED, THE CONCRETE WALK SHALL BE FORMED AND CONSTRUCTED TO THE EDGE OF BITUMINOUS ROADWAY AND/OR BITUMINOUS SHARED-USE PATH TO PROVIDE VISUAL CONTRAST.
⑥ IN RURAL SECTIONS, DETECTABLE WARNINGS SHALL BE PLACED 24" MIN AND 60" MAX FROM THE EDGE OF BITUMINOUS ROADWAY AND/OR BITUMINOUS SHARED-USE PATH TO PROVIDE VISUAL CONTRAST.
⑦ ALL CONSTRUCTED CURBS MUST HAVE A CONTINUOUS DETECTABLE EDGE FOR THE VISUALLY IMPAIRED.THIS DETECTABLE EDGE REQUIRES DETECTABLE WARNINGS WHEREVER THERE IS ZERO-INCH HIGH CURB.CURB TAPERS ARE CONSIDERED A DETECTABLE EDGE AND THEREFORE IS NOT COMPLIANT WITH ACCESSIBILITY STANDARDS. CURB HEIGHTS THAT TAPER FROM 0 TO 3-INCH MINIMUM CURB HEIGHT, AND CURB TAPER LENGTHS THAT ARE LESS THAN 3 INCHES OR HEIGHT IS NOT CONSIDERED A DETECTABLE EDGE AND THEREFORE IS NOT COMPLIANT WITH ACCESSIBILITY STANDARDS.
⑧ DRILL AND EPOXY 1 - NO. 4 12" LONG REINFORCEMENT BARS EPOXY EMBEDDED 4" INTO CONCRETE, 2 INCHES EXPOSED FOR CONNECTION TO CONCRETE PAVEMENT.
⑨ DRILL AND EPOXY 2 - NO. 4 12" LONG REINFORCEMENT BARS EPOXY EMBEDDED 4" INTO CONCRETE, ONE BENT BARS ARE NOT NEEDED IF THE APPROACH NOSE IS POURED INTEGRAL WITH THE CURB AND GUTTER.
⑩ SIDE TREATMENT EXAMPLES SHOWN ARE WHEN THE DETAIL LANDING IS APPROXIMATELY LEVEL WITH THE FULL HEIGHT CURB AND GUTTER AND THE SIDEWALK IS CONSTRUCTED AT THE BACK OF CURB. WHEN THE FULL HEIGHT CURB FACE IS TAPERED TO 3-INCH HEIGHT THE CURB TAPER AND LANDING PLACEMENT WILL VARY. THE DETECTABLE WARNING THAT TAPERS AT 0"-2" AT 8-10S,THEN LESS THAN 6" FROM 2" TO FULL CURB HEIGHT.
⑪ NEAREST EDGE OF DETECTABLE WARNING SURFACES SHALL BE PLACED 13' MINIMUM TO 15' MAXIMUM FROM THE NEAREST RAIL OF THE RAILROAD TRACK. THE DETECTABLE WARNING SHALL BE CLOSEST TIME OF MEASURED PERPENDICULAR TO THE NEAREST RAIL.
⑫ WHEN PEDESTRIAN GATES ARE PROVIDED,DETECTABLE WARNING SURFACES SHALL BE PLACED ON THE SIDE OF THE GATES OPPOSITE THE RAIL,2' FROM THE APPROACHING SIDE OF THE GATE ARM.THIS CRITERIA OVERRIDING OVER NOTE ⑪.
⑬ CROSSING SURFACE SHALL EXTEND 2' MINIMUM PAST THE OUTSIDE EDGE OF WALK OR SHARED-USE PATH.
⑭ 3' FOR medians AND SPLITTER ISLANDS, NOSE CAN BE REDUCED TO 2' ON FREE RIGHT ISLANDS.
⑮ SIDEWALK TO BE PLACED 8.75' MIN. FROM THE FACE OF CURB/PROJECTED FACE OF CURB.THIS ENSURES MIN CLEARANCE BETWEEN THE SIDEWALK AND GATE ARM COUNTERWEIGHT SUPPORTS.
⑯ CONSTRUCT WITH EXPANSION MATERIAL PER MNDOT SPECIFICATION 3150 TYPES A-C.
REPRESENTATIVE MATERIAL SHALL MATCH FULL HEIGHT OF ADJACENT CONCRETE.

LEAD EXPERT OFFICE	JEFFREY PERKINS OPERATIONS DIVISION	PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	STANDARD PLAN 5-297.250	4 OF 6
	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	TOTAL SHEETS	
		TRUNK HWY.			

NOTES:

A WALKABLE FLARE IS AN 8-10S CONCRETE FLARE THAT IS REQUIRED WHEN THE FLARE IS ADJACENT TO A WALKABLE SURFACE,OR WHEN THE PEDESTRIAN PATH OF TRAVEL OF A PUSH BUTTON STATION IS DIRECTED.

ALL V CURB CONTRACTION JOINTS SHALL MATCH CONCRETE WALK JOINTS.

ALL V CURB ADJACENT TO A PAVED SURFACE SHALL SHOULD BE MONOLITHICALLY ADJACENT GUTTER PAN OR SLOPING ADJACENT PAVEMENT IS PREFERRED.

V CURB SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS.

V CURB NEXT TO BUILDING SHALL BE SET BACK 6" MINIMUM AND SHALL MATCH PREVIOUS TOP OF SIDEWALK ELEVATIONS.

① END TAPERS AT TRANSITION SECTION SHALL MATCH INPLACE SIDEWALK GRADES.
② ALL V CURB SHALL MATCH BOTTOM OF ADJACENT WALK.
③ CONSTRUCT USING APPROVED CONCRETE MATERIAL AND CONSTRUCT TYPE A EXPANSION. LEAVE A MINIMUM 1/2" TOP GAP AND SEAL WITH MNDOT APPROVED SEALING PER MANUFACTURER.
④ THE MAX RATE OF CROSS SLOPE TRANSITION IS 1-INCH PER FOOT OF PANEL LENGTH PER HALF PERCENT CROSS SLOPE, MORE THAN WIDTH IS GREATER THAN 6' THE RUNNING SLOPE IS GREATER THAN 5.0S, THIS SHALL BE CONSIDERED TRANSITIONAL.
⑤ TRANSITION PANELS ARE TO ONLY BE USED AFTER THE RAMP,OR IF NEEDED, LANDING ARE TO THE EXTENT POSSIBLE WITHIN THE PAR.
⑥ EXISTING CROSS SLOPE GREATER THAN 2.0S.

LEGEND

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LANDING AREA - 4'-0" X 4'-0"MIN, 5'-0" X 5'-0"MIN PREFERRED DIMENSIONS AND MAX 2.0S SLOPE IN ALL DIRECTIONS,LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

③ TRANSITION PANELS(S) TO BE USED FOR TRANSITIONING THE CROSS-SLOPE OF A RAMP/LANDING TO MATCH THE GRADE OF THE ROAD. SEE DETAIL ON THIS SHEET FOR PUSH BUTTON POST / LINEAR POST OF WALK.SEE THIS SHEET FOR ADDITIONAL INFORMATION.

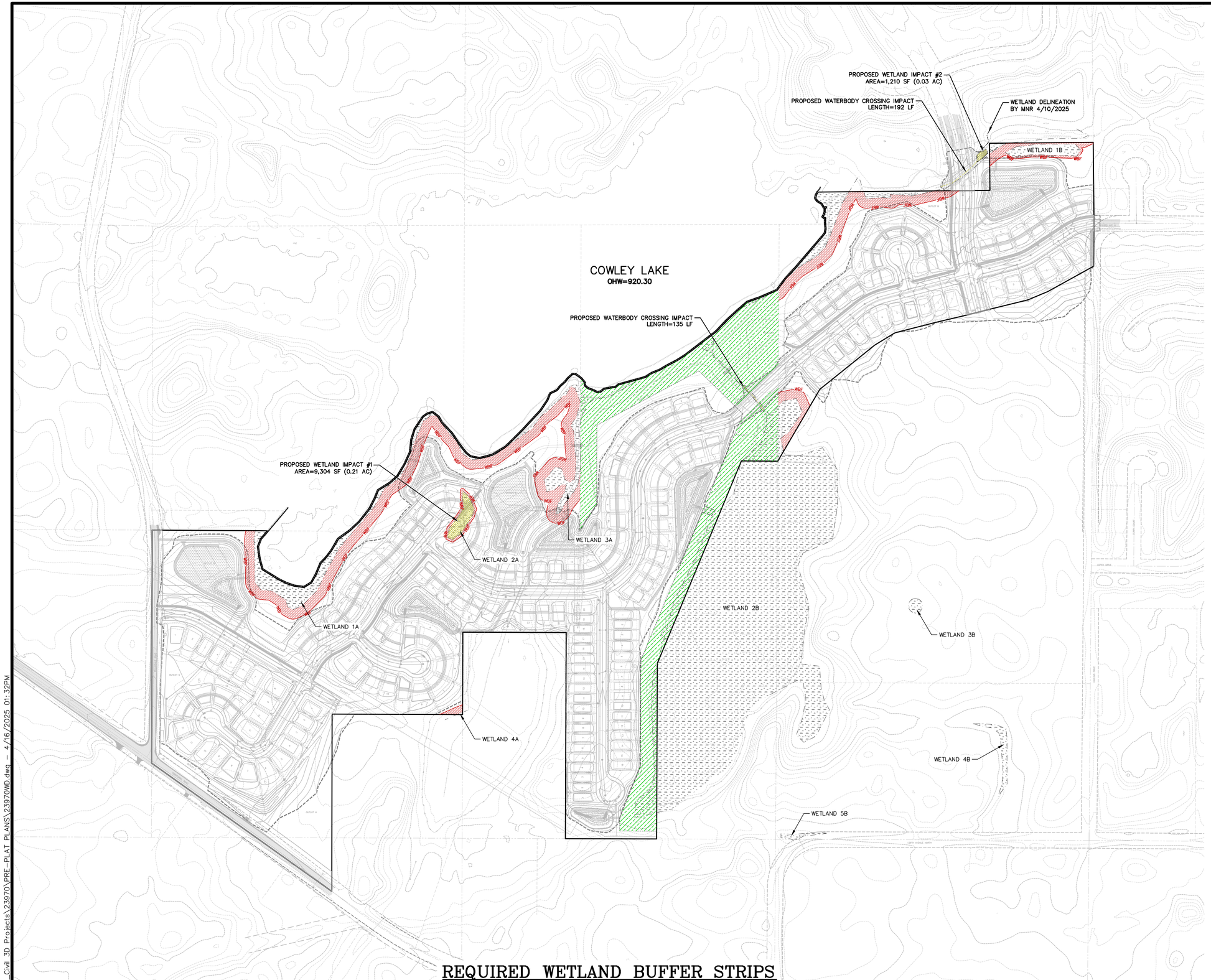
LEAD EXPERT OFFICE	JEFFREY PERKINS OPERATIONS DIVISION	PEDESTRIAN CURB RAMP DETAILS	APPROVED: 11-04-2021 REVISED:	STANDARD PLAN 5-297.250	5 OF 6
	STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	TOTAL SHEETS	
		TRUNK HWY.			

GENERAL NOTES:

*TURN/BOT.2" DIFFERENTIALS MEANS MAINTAINING LESS THAN 2% CROSS SLOPE WITHIN A DESIGNATED AREA WHEN A ROADWAY IS ON A STEEP OR YIELD CONDITION AND THE PROJECT SCOPE ALLOWS.

RECONSTRUCTION PROJECTS ON FULL PAVEMENT REPLACEMENT PROJECTS *TAPERING* OF ENTIRE CROSSWALK SHALL OCCUR WHEN FEASIBLE.

MILL & OVERLAY PROJECTS *TAPERING* OF FLOW LINES IN FRONT OF THE PEDESTRIAN RAMP IS REQUIRED WHEN THE EX



REQUIRED WETLAND BUFFER STRIPS

LEGEND

- EXISTING WETLAND
- EXISTING CONSERVATION EASEMENT
- PROPOSED WETLAND FILL
- REQUIRED WETLAND BUFFER
- PROPOSED WETLAND BUFFER

WETLAND SUMMARY

TOTAL PROPOSED WETLAND IMPACT AREA	10,514 SF (0.24 AC)
TOTAL PROPOSED WATERBODY CROSSING IMPACT	327 LF
REQUIRED BUFFER AREA	194,755 SF (4.47 AC)
PROPOSED BUFFER AREA	254,103 SF (5.83 AC)

NOTES

1. REQUIRED WETLAND BUFFER STRIPS PER CITY OF ROGERS IS 40 FEET AVERAGE WIDTH, 25 FEET MINIMUM FOR HIGH QUALITY WETLAND AND 10 FEET MINIMUM FOR ALL OTHER WETLANDS.
2. WETLANDS 1A, 3A AND 2B ARE CONSIDERED HIGH QUALITY.
3. WETLANDS 1A THRU 4A DELINEATED BY MIDWEST NATURAL RESOURCES, INC., REPORT DATED 6/27/2022.
4. WETLANDS 1B THRU 5B DELINEATED BY ANDERSON ENGINEERING OF MINNESOTA, REPORT DATED 11/10/2021.
5. BUFFER STRIPS WITHIN THE EXISTING CONSERVATION EASEMENT AREA EXCLUDED FROM THE CALCULATIONS.
6. REQUIRED BUFFER AREA EXCLUDES WETLAND 2A.

Know what's **below.** **Call** before you dig.

N

SCALE IN FEET
0 200 400 600
1 inch = 200 feet

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PLANNERS / ENGINEERS / SURVEYORS
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PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
WETLAND IMPACTS AND BUFFERS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	JSO
DATE	02/24/2025
REVISIONS	
03/19/2025 MPCA REVIEW SUBMITTAL	
04/04/2025 PARTIAL CITY COMMENTS	
04/15/2025 WATERSHED COMMENTS	
CAD FILE	23970WD
PROJECT NO.	23970
	7.0

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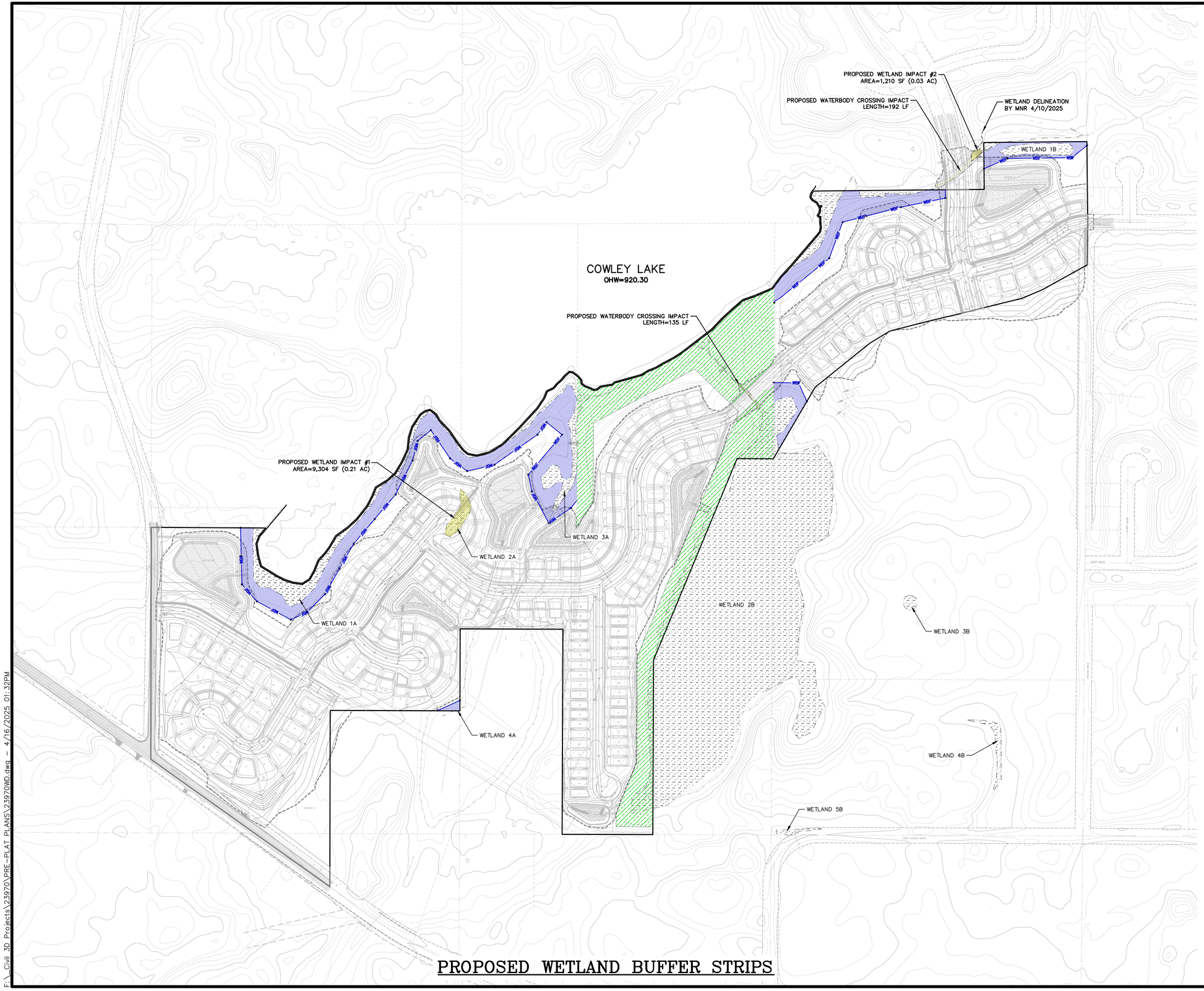

PROPOSED WETLAND BUFFER STRIPS

LEGEND

- EXISTING WETLAND
- EXISTING CONSERVATION EASEMENT
- PROPOSED WETLAND FILL
- REQUIRED WETLAND BUFFER
- PROPOSED WETLAND BUFFER

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ROGERS, MINNESOTA
WETLAND IMPACTS AND BUFFERS
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

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CAD FILE	23970WD
PROJECT NO.	23970
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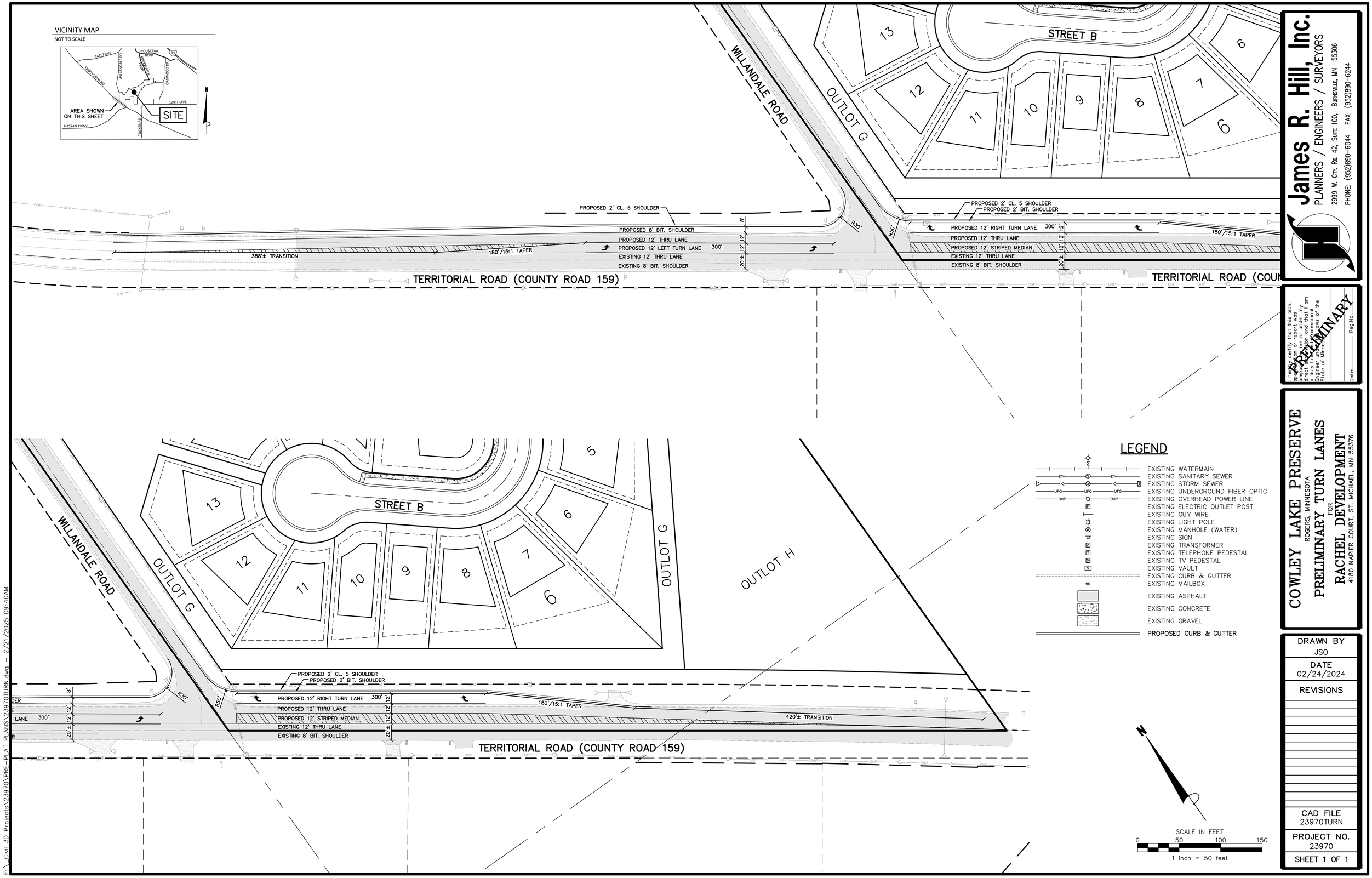
VICINITY MAP

NOT TO SCALE



LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING OVERHEAD POWER LINE
- EXISTING ELECTRIC OUTLET POST
- EXISTING GUY WIRE
- EXISTING LIGHT POLE
- EXISTING MANHOLE (WATER)
- EXISTING SIGN
- EXISTING TRANSFORMER
- EXISTING TELEPHONE PEDESTAL
- EXISTING TV PEDESTAL
- EXISTING VAULT
- EXISTING CURB & GUTTER
- EXISTING MAILBOX
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING GRAVEL
- PROPOSED CURB & GUTTER

SCALE IN FEET

0 50 100 150

1 inch = 50 feet

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PRELIMINARY

Date: Reg.No.

COWLEY LAKE PRESERVE

ROGERS, MINNESOTA

PRELIMINARY TURN LANES

FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
JSO

DATE
02/24/2024

REVISIONS

CAD FILE
23970TURN

PROJECT NO.
23970

SHEET 1 OF 1

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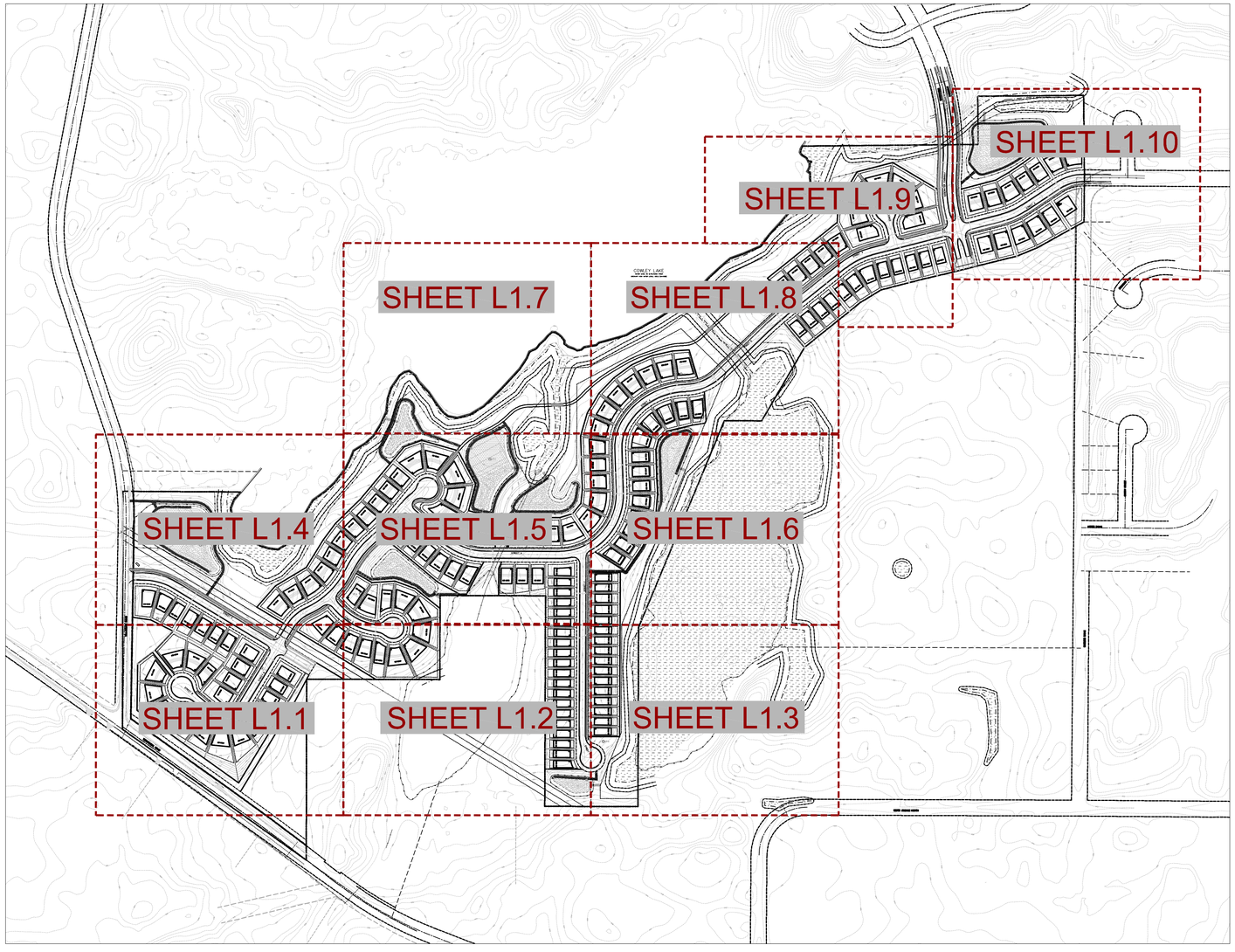
COWLEY LAKE PRESERVE

PRELIMINARY LANDSCAPE PLANS



Landscape Sheet Index:

L1.0	Title Page
L1.1	Landscape Plan
L1.2	Landscape Plan
L1.3	Landscape Plan
L1.4	Landscape Plan
L1.5	Landscape Plan
L1.6	Landscape Plan
L1.7	Landscape Plan
L1.8	Landscape Plan
L1.9	Landscape Plan
L1.10	Landscape Plan
L1.11	Details + Schedules Sheet

Surveyor + Civil Engineer:

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PHONE: (952)890-6044 FAX: (952)890-6244

Landscape Calculations:

Total No. of Single Family Dwelling Units: 169

Total Front Yard Trees Required: 169
Total Rear Yard Trees Required: 169

Total Lot Trees Required: 338
Total Lot Trees Shown: 338
Buffer Trees Shown: 250
Buffer Shrubs Shown: 343

CITY OF ROGERS LANDSCAPE REQUIREMENTS:

EACH STANDARD SINGLE FAMILY LOT SHALL HAVE A MINIMUM OF TWO TREES AND CORNER LOTS SHALL HAVE 4 TREES.

SOD SHALL BE PLACED IN THE FRONT YARD; AND

THE SIDE YARDS AND REAR YARD SHALL BE SODDED OR SEEDED.

OVERALL LANDSCAPE PLAN:

NORTH

General Notes:

1. Actual locations of trees may vary, depending on final location of driveways and utilities.
2. See Civil Engineer's plans for grading layout and requirements
3. Contractor to coordinate all work in the city right-of-way with City of Rogers Public Works Department.
4. Sod all disturbed areas except plant beds and areas noted to receive seed.
5. Place a minimum of 6" topsoil or slope dressing on all areas disturbed by construction, including right-of-way boulevards, unless specified otherwise.
6. See Sheet L1.11 for Landscape Details & Plant Schedule.

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475 Cleveland Ave. N | Suite 101A
Saint Paul, MN 55104
651.788.9018 | www.calyxdesigngroup.com

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I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Landscape Architect under the laws of the State of MINNESOTA.

PRELIMINARY

Print Name: Benjamin Hoag, PLA
Signature:
Date: License No. 49084

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
LANDSCAPE TITLE SHEET
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

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23970–L
PROJECT NO.
23970
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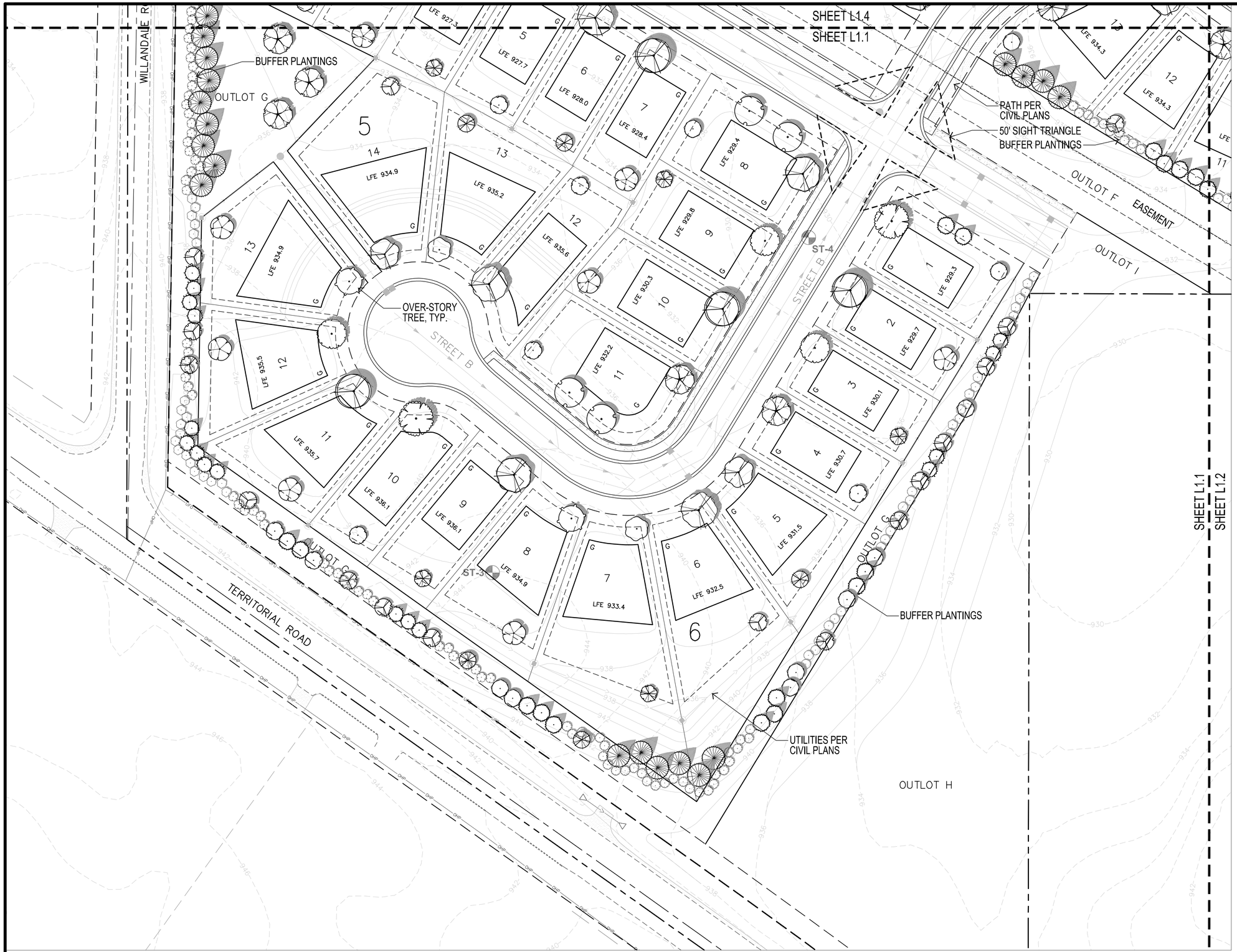

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N

SCALE IN FEET
0 40 80
1 inch = 40 feet

LANDSCAPE LAYOUT PLAN:

See Sheet L1.11 for Planting Details, Notes, and Requirements

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PRELIMINARY

Print Name: Brian Hoffman, PLA
Signature:
Date:
License No. 48084

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
LANDSCAPE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

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PROJECT NO.	23970
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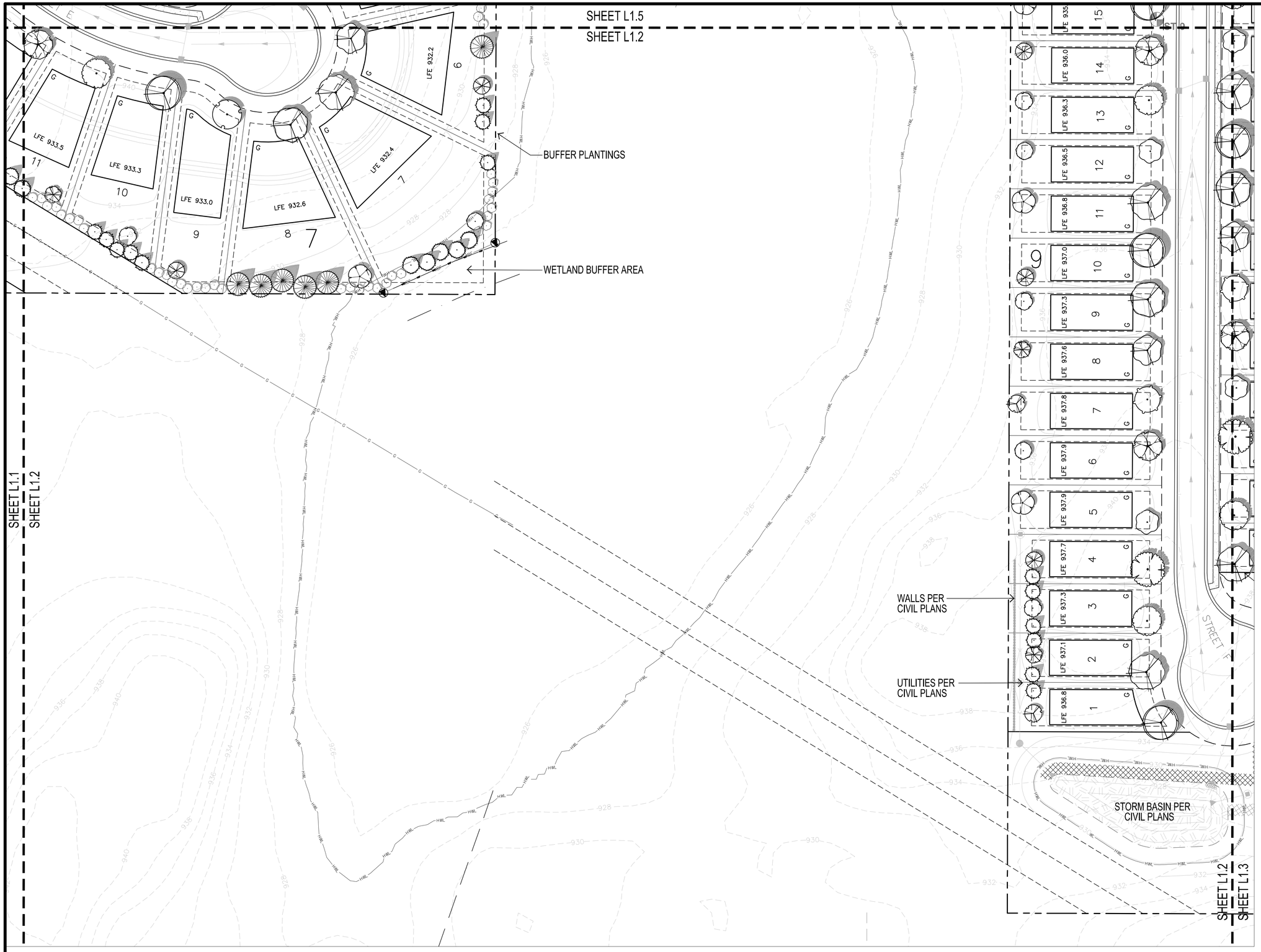

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Print Name: Benjamin Hill, Jr., P.L.A.
Signature:
Date: License No. 48084

PRELIMINARY

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
LANDSCAPE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

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PROJECT NO.	23970
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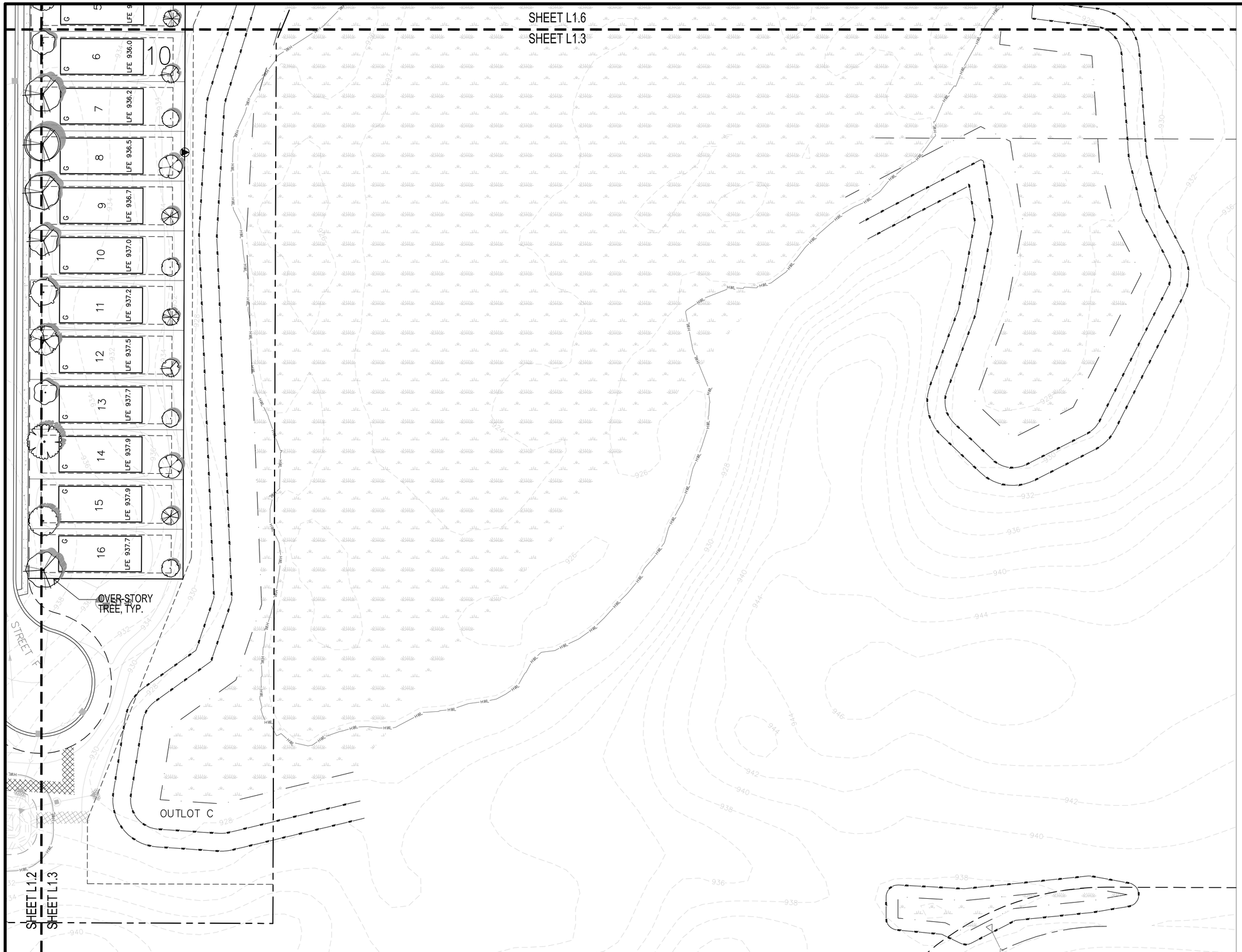

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1 inch = 40 feet

LANDSCAPE LAYOUT PLAN:

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2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Landscape Architect under the laws of the State of MINNESOTA.

PRELIMINARY

Print Name: Bethany Hill, Lic. Land. Plan. Signature:

Date: License No. 48084

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
LANDSCAPE PLAN
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY
BH

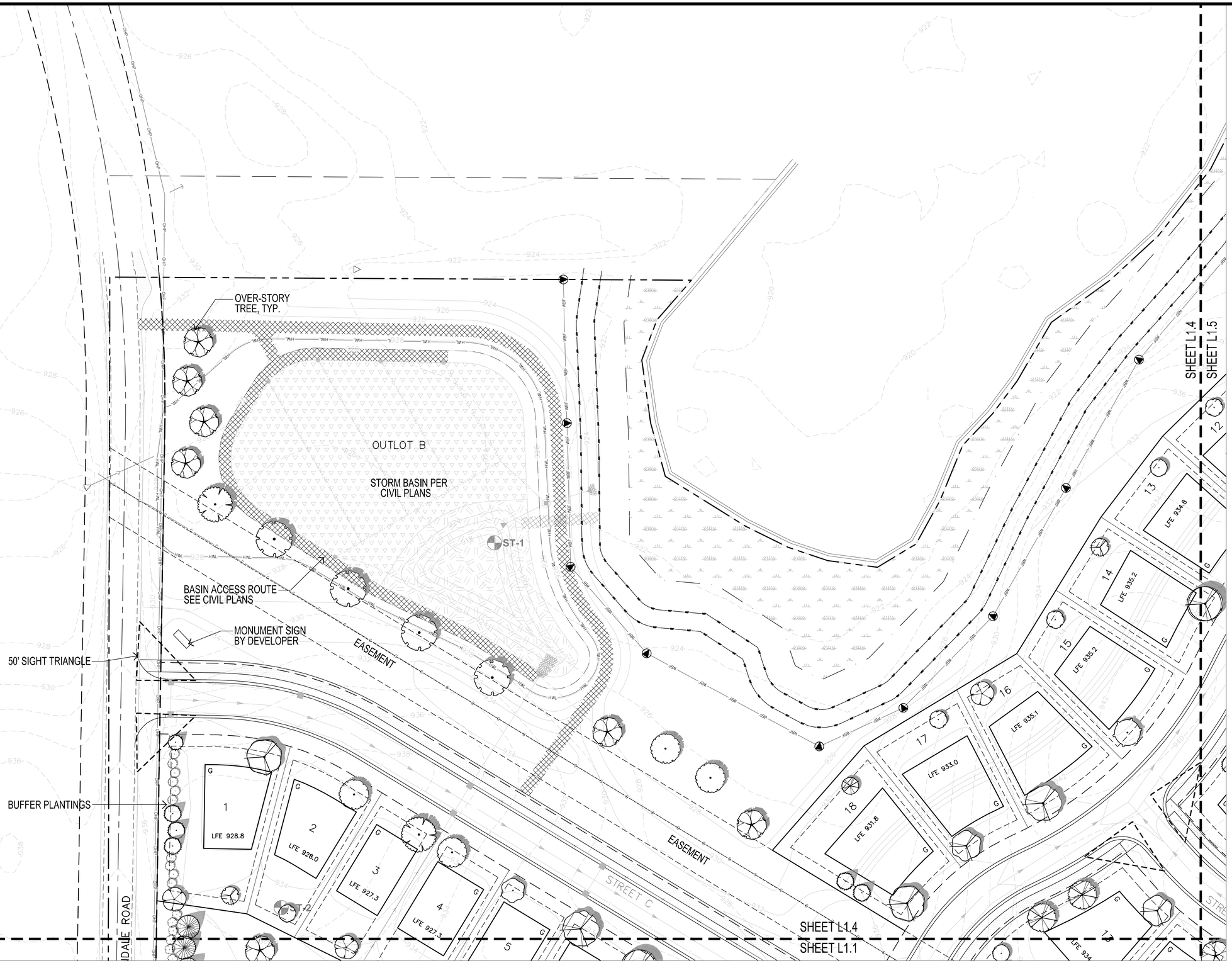
DATE
2/20/25

REVISIONS

CAD FILE
23970–L

PROJECT NO.
23970

L1.3



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4. Sod all disturbed areas except plant beds and areas noted to receive seed.
5. Place a minimum of 6" topsoil or slope dressing on all areas disturbed by construction, including right-of-way boulevards, unless specified otherwise.
6. See Sheet L1.11 for Landscape Details & Plant Schedule.

N

SCALE IN FEET
0 40 80
1 inch = 40 feet

LANDSCAPE LAYOUT PLAN:

See Sheet L1.11 for Planting Details, Notes, and Requirements

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Signature:
Date: License No. 49894

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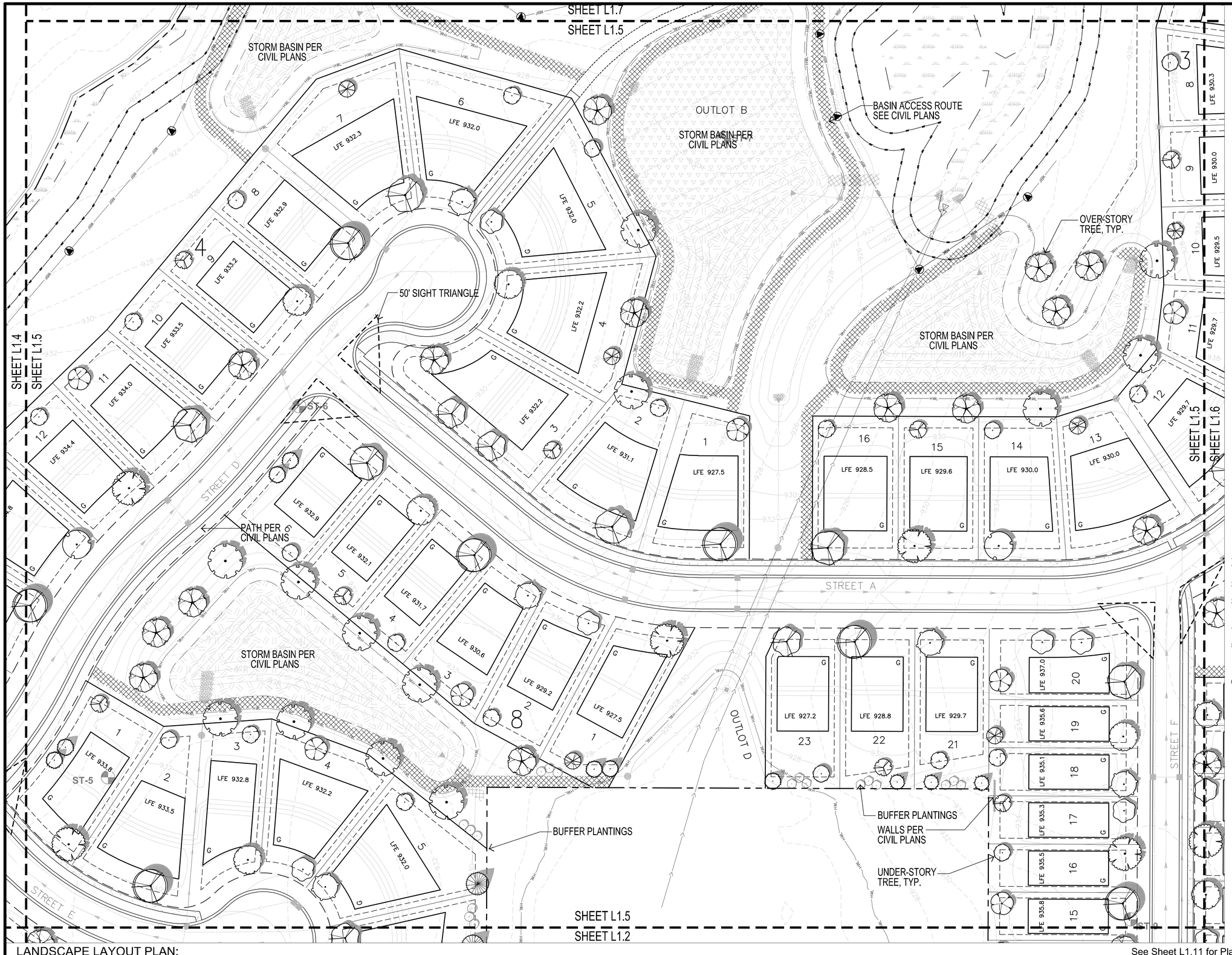
PROJECT NO.: 23970
L1.4



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DATE: 2/20/25
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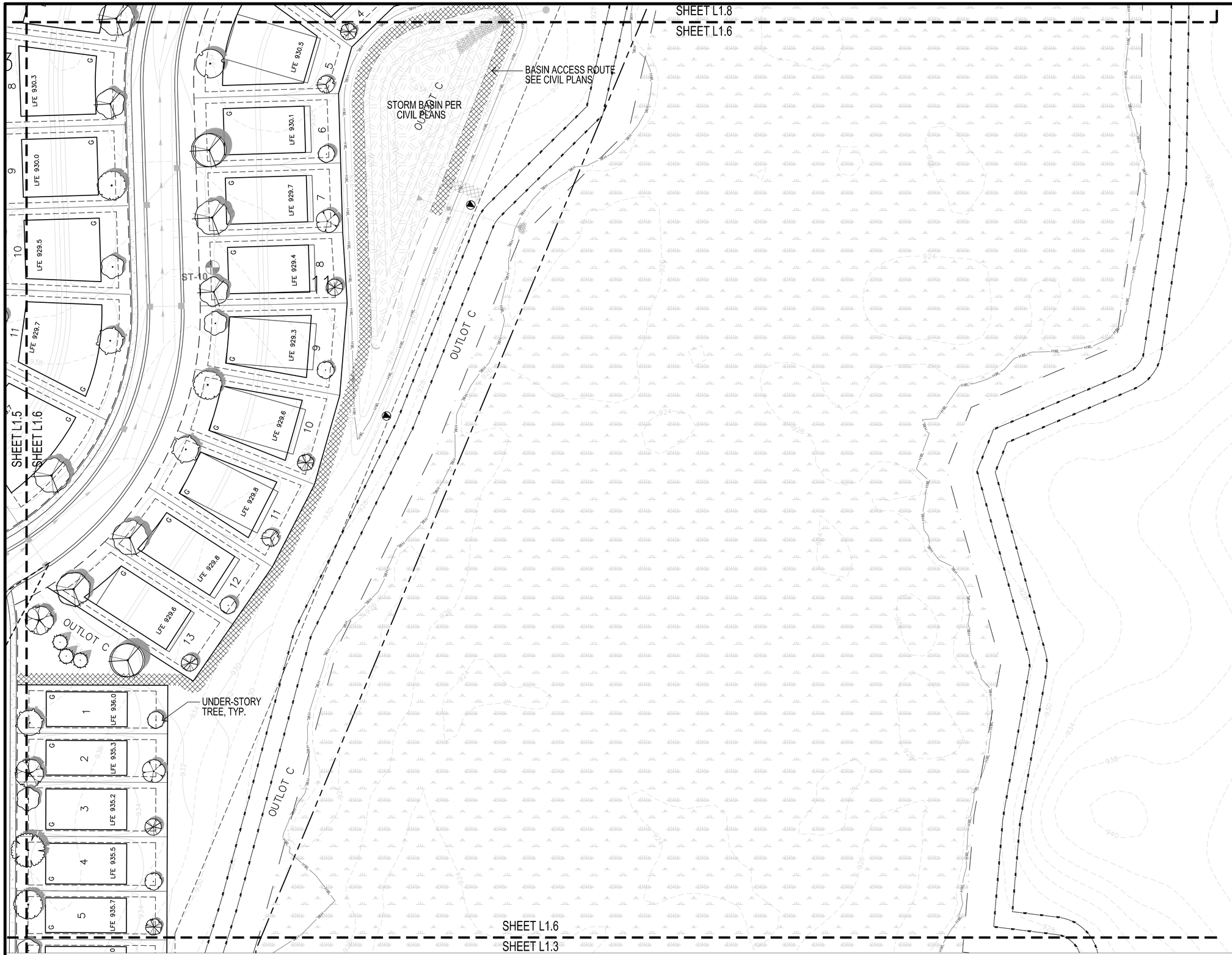
CAD FILE: 23970–L
PROJECT NO.: 23970
L1.5



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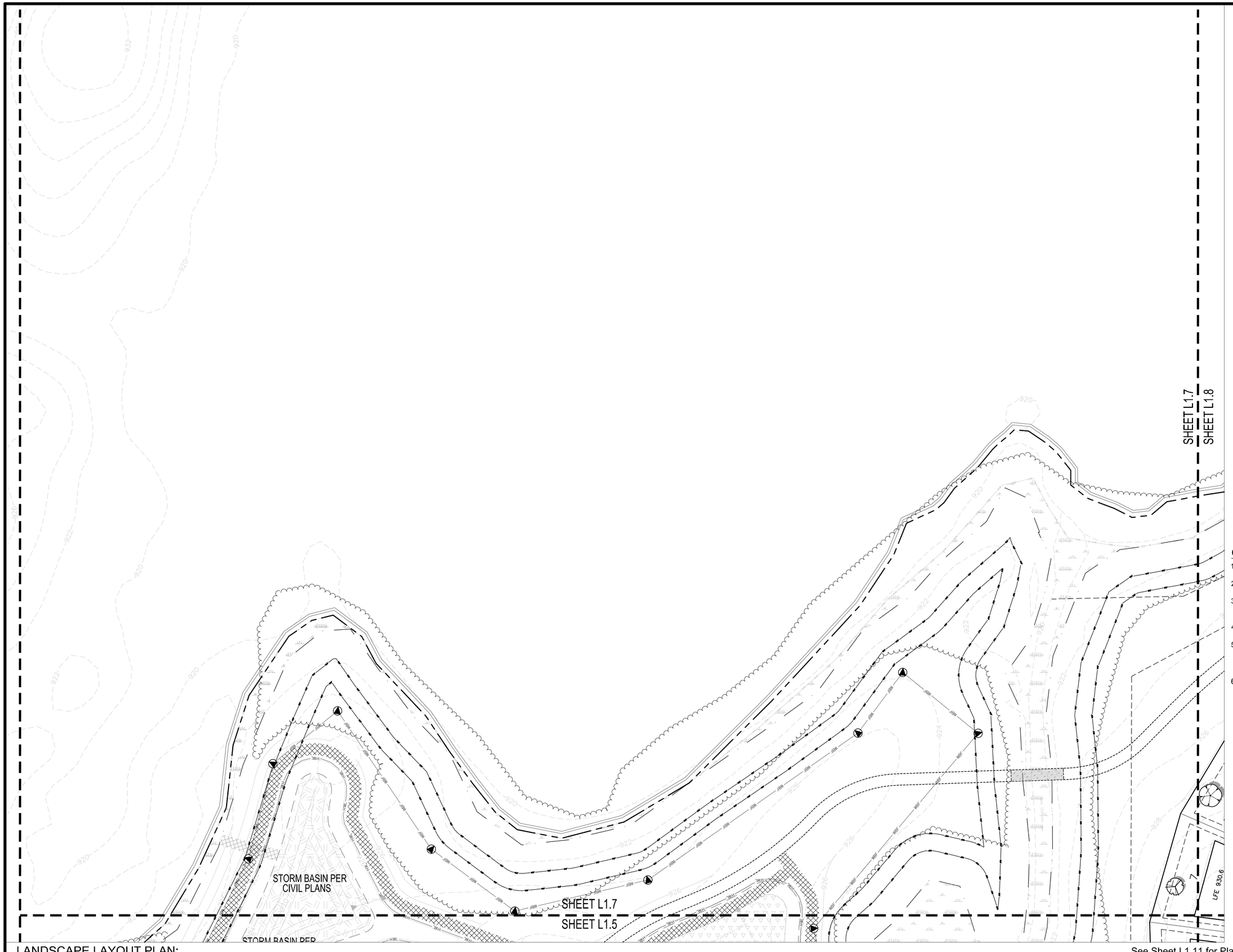

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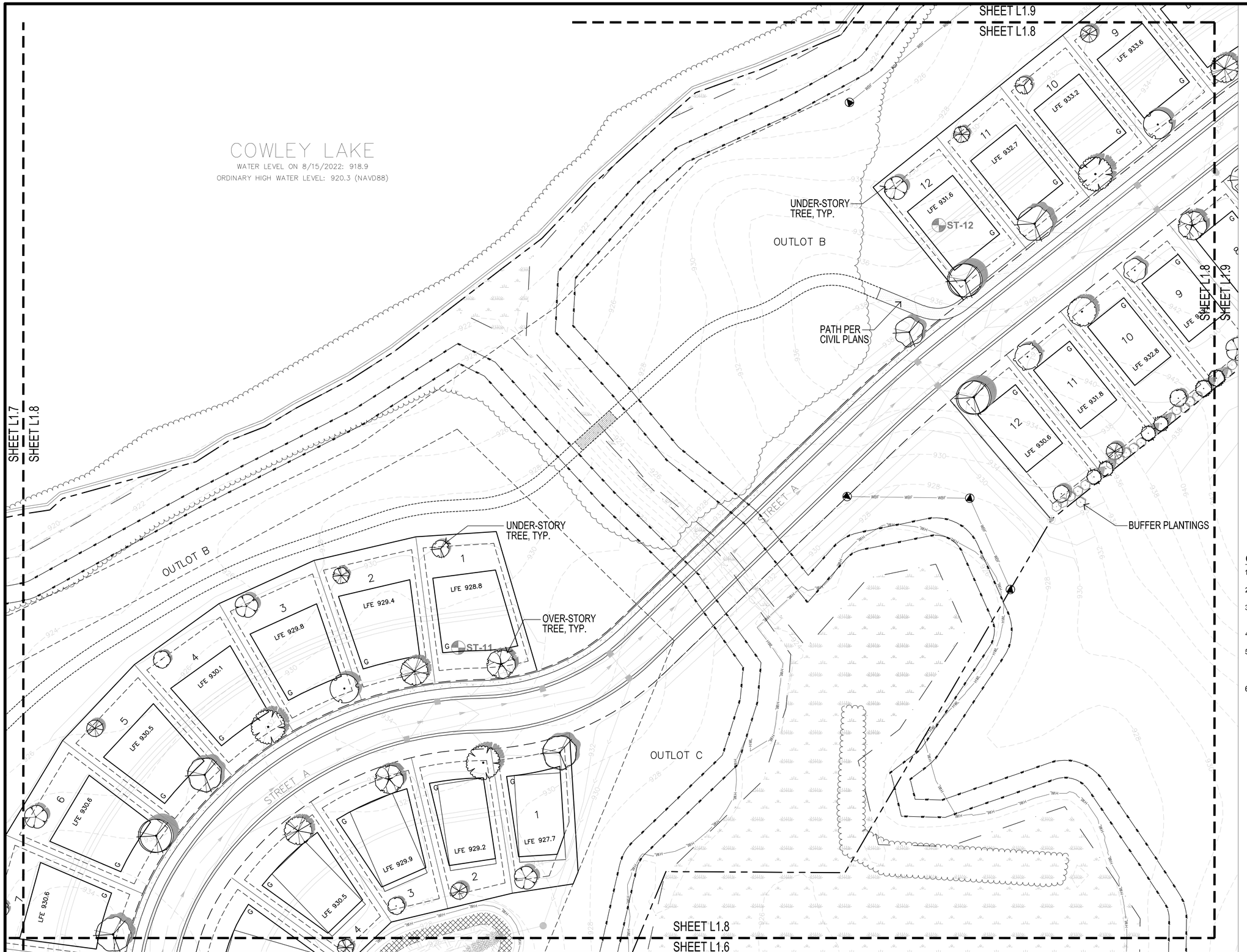

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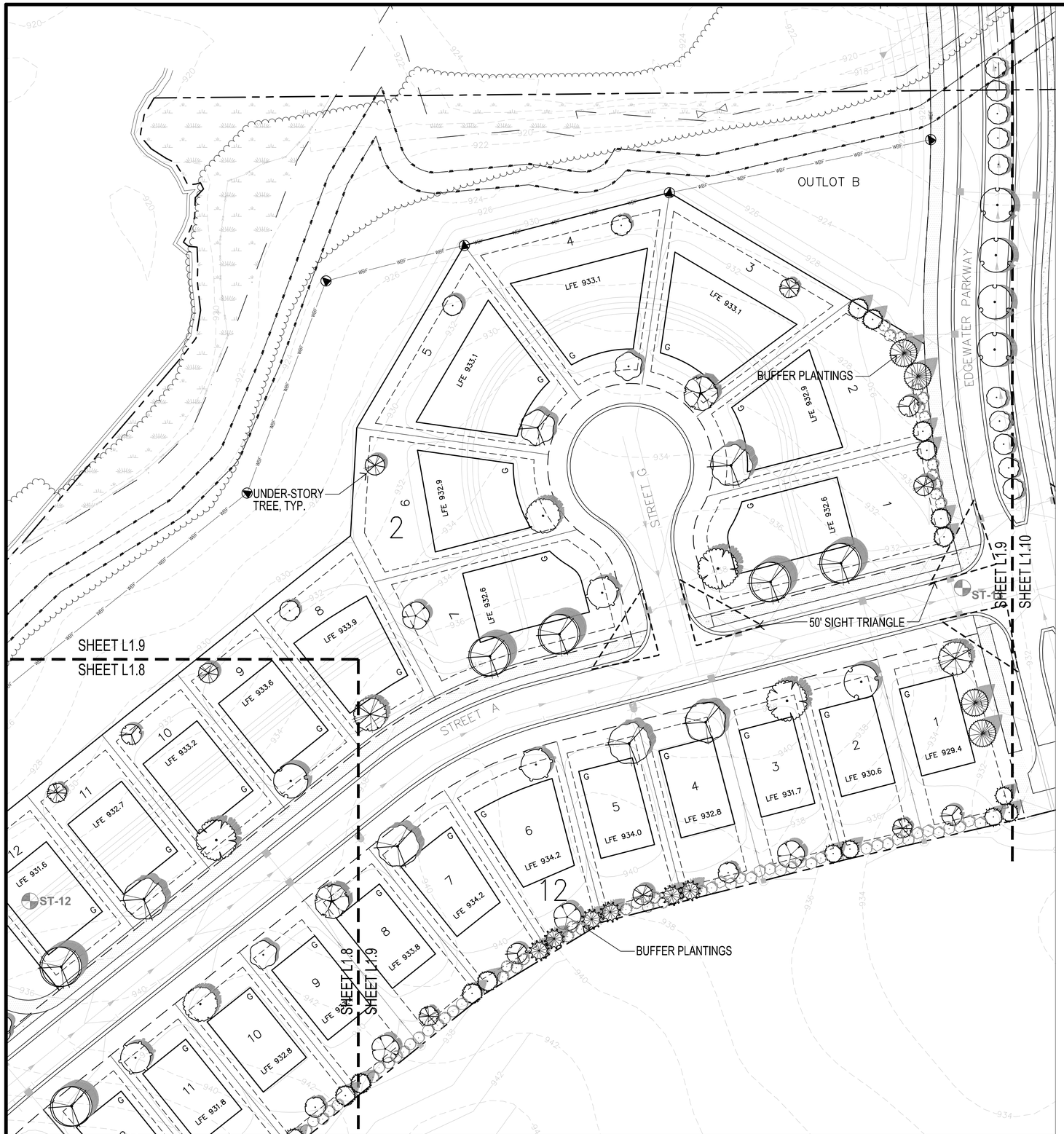

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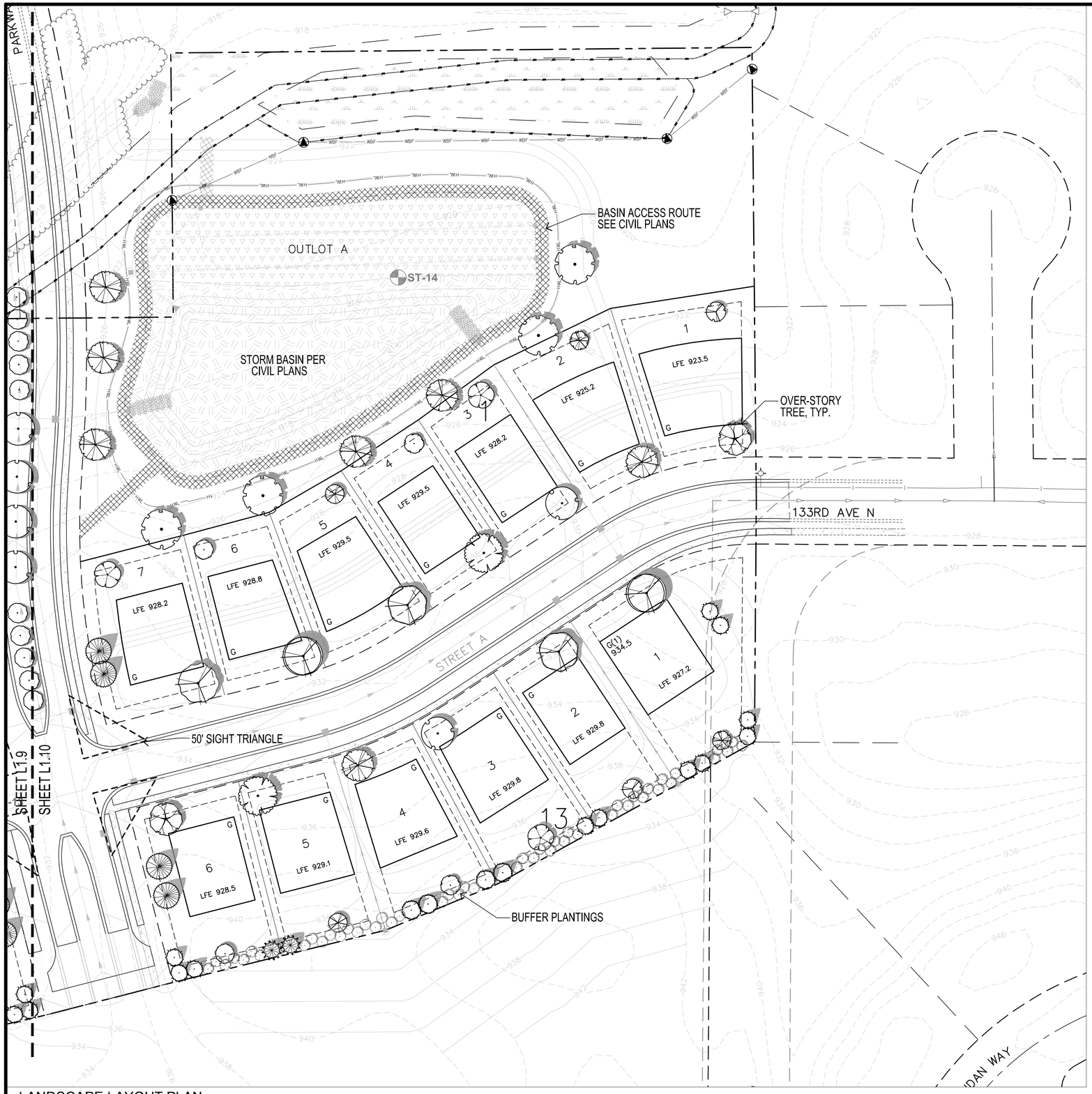

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L1.10

Landscape Notes:

1. Tree saucer mulch to be four inches (4") depth natural single-shred hardwood mulch for trees outside of a plant bed. Install per tree planting detail.

2. Refer to civil plan sheets for grading, drainage, site dimensions, survey, tree removal, proposed utilities & erosion control.

3. All plant material shall comply with the latest edition of the American Standard for Nursery Stock, American Association of Nurserymen. Unless noted otherwise, deciduous shrubs shall have at least 5 canes at the specified shrub height. Plant material shall be delivered as specified.

4. Plan takes precedence over plant schedule if discrepancies in quantities exist.

5. All proposed plants shall be located and staked as shown.

6. Adjustment in location of proposed plant material may be needed in field. Should an adjustment be required, the client will provide field approval. Significant changes may require city review and approval.

7. The project landscape contractor shall be held responsible for watering and properly handling all plant materials brought on the site both before and after installation. Schedule plant deliveries to coincide with expected installation time within 36 hours.

8. All plant materials shall be fertilized upon installation as specified.

9. The landscape contractor shall provide the owner with a watering schedule appropriate to the project site conditions and to plant material growth requirements.

10. If the landscape contractor is concerned or perceives any deficiencies in the plant selections, soil conditions, drainage or any other site condition that might negatively affect plant establishment, survival or guarantee, they must bring these deficiencies to the attention of the landscape architect & client prior to bid submission. Plant bed drainage concerns during plant installation shall be brought to the attention of the Owner and General Contractor immediately.

11. Contractor shall establish to his/ her satisfaction that soil and compaction conditions are adequate to allow for proper drainage at and around the building site.

12. Contractor is responsible for ongoing maintenance of all newly installed material until time of owner acceptance. Any acts of vandalism or damage which may occur prior to owner acceptance shall be the responsibility of the contractor. Contractor shall provide the owner with a maintenance program including, but not limited to, pruning, fertilization and disease/pest control.

13. The contractor shall guarantee newly planted material through one calendar year from the date of written owner acceptance. Plants that exhibit more than 10% die-back damage shall be replaced at no additional cost to the owner. The contractor shall also provide adequate tree wrap and deer/rodent protection measures for the plantings during the warranty period.

14. This layout plan constitutes our understanding of the landscape requirements listed in the ordinance. Changes and modifications may be requested by the city based on applicant information, public input, council decisions, etc.

15. The landscape contractor shall be responsible for obtaining any permits and coordinating inspections as required throughout the work process.

16. Plant size & species substitutions must be approved in writing prior to acceptance in the field.

17. The landscape contractor shall furnish an Irrigation Layout Plan for head-to-head coverage of all tree, turf and shrub planting areas. Use commercial-grade irrigation equipment and provide product cut-sheets and (4) copies of the proposed layout plan to the landscape architect for review and approval. Coordinate irrigation connection point, controller, back-flow and valve locations with the architect & general contractor. Irrigation system shall be zoned such that plants over building structure are separate.

18. Landscape Contractor is responsible for coordination with the General Contractor, to protect the new improvements on and off-site during landscape work activities. Report any damage to the General Contractor immediately.

19. All planting, seeding, and sodded areas shall be prepared prior to installation activities with a harley power box rake or equal to provide a firm planting bed free of stones, sticks, construction debris, etc.

20. Turf installation activity shall conform to all rules and regulations as established in the MnDOT Seeding Manual, 2014 edition, for turf bed preparation, installation, maintenance, and warranty.

21. The Landscape Contractor shall furnish samples of all landscape materials for approval prior to installation.

22. The Landscape Contractor shall clear and grub the underbrush from within the work limits to remove dead branches, leaves, trash, weeds and foreign materials. Remove trees where noted on the plan, including the stump to 30" below grade.

23. The landscape contractor shall contact Gopher State One Call no less than 48 hours before digging for field utility locations.

24. The landscape contractor shall be responsible for the removal of erosion control measures once vegetation has been established to the satisfaction of the municipal staff. This includes silt curtain fencing and sediment logs placed in the landscape.

25. The landscape contractor shall be responsible for visiting the site to become familiar with the conditions prior to bidding and installation. Coordinate with the general contractors on matters such as fine grading, landscaped area conditions, staging areas, irrigation connection to building, etc.

26. See Site and Civil plans for grading, utilities, and additional information regarding the project.

27. All sub-cut areas of the site that are designated on the site plan as open space for landscape shall have no less than 4" of imported, pulverized topsoil. Place 16" of topsoil in tree pits. Always slope away from building.

28. Landscape contractor must prove the open sub-grade of all planting areas after their excavation is capable of infiltrating a minimum requirement of 1/4-inch of water per hour prior to installation of plant materials, topsoil, irrigation, weed mat, and mulch. Planting areas not capable of meeting this requirement shall have 4" diameter X 48" depth holes augured every 36" on-center and filled with MnDOT Free-Draining Coarse Filter Aggregate. Re-test sub-grade percolation for compliance to infiltration minimum requirement.

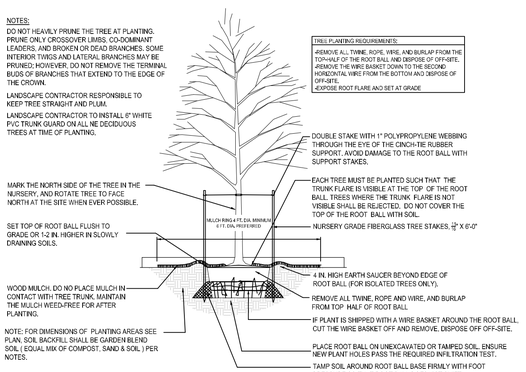
29. Fencing (if noted) per Architect's Plans and Specifications.

30. Landscape contractor shall coordinate tree removal activities (if required) and ensure all trees designated for removal are gone before start of landscape installation. Grind stump to 30" below grade and back-fill with topsoil.

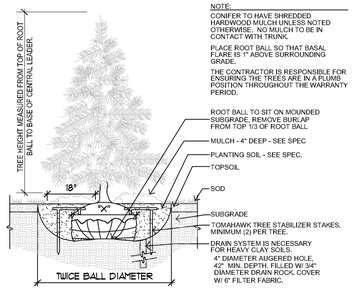
31. All disturbed areas are to receive turf sod or seed to establish final vegetation.

32. Retaining walls and stairs require structural engineering by others. Unless otherwise specified, retaining walls to be County Material 'County Block' straight face units, gray color with matching cap units.

33. Native Seed Areas (if called for on plans): Prairie seeding contractor is required to include a 3 year warranty with maintenance in base bid. Prairie contractor shall provide the Owner with a proposal for (2) additional years of prairie maintenance, in addition to the (3) year warranty. It shall be the Owner's option to continue maintenance of the native prairie areas after the 1 year warranty expires. Maintain under warranty per MnDOT Seeding Manual, 2014 edition. Warranty includes seeding contractor on-site maintenance visits for mowing, weeding, spot-spraying invasives, garbage removal, and re-seeding bare areas larger than 6"X6". Ensure cover crop achieves 80% germination and erosion is not evident. Maintenance requires no less than 4 visits for warranty work per year. An acceptable stand of seeding is full, lush, and free of invasive plants & weeds.



1 L1.8 DECIDUOUS TREE PLANTING - SECTION
NOT TO SCALE



2 L1.8 CONIFEROUS TREE PLANTING - SECTION
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PLANT SCHEDULE

SYMBOL	CODE	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	QTY
EVERGREEN TREES						
	AB	Abies balsamea	Balsam Fir	6` Hgt.	B&B	8
	JE	Juniperus virginiana	Eastern Redcedar	6` Hgt.	B&B	57
	PD	Picea glauca `Densata`	Black Hills Spruce	6` Hgt.	B&B	48
	PR	Pinus resinosa	Red Pine	6` Hgt.	B&B	34
ORNAMENTAL TREES						
	AO	Aesculus glabra	Ohio Buckeye	1.5" Cal.	B&B	35
	CC	Crataegus laevigata `Crimson Cloud`	Crimson Cloud Hawthorn	1.5" Cal.	B&B	37
	MA	Maackia amurensis	Amur Maackia	1.5" Cal.	B&B	32
	MS	Malus x `Spring Snow`	Spring Snow Crab Apple	1.5" Cal.	B&B	20
	MP	Malus x 'Pink Spires'	Pink Spires Crabapple	1.5" Cal.	B&B	10
	OV	Ostrya virginiana	American Hophornbeam	1.5" Cal.	B&B	40
	SI	Syringa reticulata `Ivory Silk`	Ivory Silk Japanese Tree Lilac	1.5" Cal.	B&B	30
OVERSTORY TREE						
	Ar	Acer rubrum	Red Maple	2.5" Cal.	B&B	13
	AJ	Acer saccharum 'JFS-KW8' TM	Autumn Fest Sugar Maple	2.5" Cal.	B&B	14
	AS	Acer x freemanii `Sienna`	Sienna Glen Maple	2.5" Cal.	B&B	26
	BR	Betula nigra	River Birch	2.5" Cal.	B&B	17
	CO	Celtis occidentalis	Common Hackberry	2.5" Cal.	B&B	19
	GI2	Gymnocladus dioica `McKBranched` TM	Kentucky Coffeetree	2.5" Cal.	B&B	17
	PT	Populus tremuloides	Quaking Aspen	2.5" Cal.	B&B	18
	QA	Quercus alba	White Oak	2.5" Cal.	B&B	21
	QE	Quercus ellipsoidalis	Northern Pin Oak	2.5" Cal.	B&B	37
	QM	Quercus macrocarpa	Burr Oak	2.5" Cal.	B&B	21
	QR	Quercus rubra	Northern Red Oak	2.5" Cal.	B&B	20
	UN	Ulmus americana 'New Horizon'	New Horizon Elm	2.5" Cal.	B&B	16
BUFFER PLANT						
	Cg	Cornus racemosa	Gray Dogwood	5 gal. (Min. 24" Hgt.)	Pot	70
	CI	Cotoneaster lucidus	Cotoneaster	5 gal. (Min. 24" Hgt.)	Pot	85
	Sv	Syringa vulgaris	Common Lilac	5 gal. (Min. 24" Hgt.)	Pot	95
	Vl	Viburnum lentago	Nannyberry	5 gal. (Min. 24" Hgt.)	Pot	77

LANDSCAPE DETAILS, NOTES, AND SCHEDULES:

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COWLEY LAKE PRESERVE

ROGERS, MN

STORMWATER MANGEMENT PLAN NARRATIVE AND SUMMARY

February 20, 2025
Revised April 16, 2025

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.

Signature: _____

Rick L. Osberg, PE
License No. 22709

Developer/Owner:

Rachel Development
4180 Napier Court NE
St. Michael, MN 55376

JAMES R. HILL, INC.
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2999 WEST COUNTY ROAD 42, SUITE 100
BURNSVILLE, MINNESOTA 55306
PH. (952) 890-6044 FAX (952) 890-6244

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4. Cowley Lake Preserve – Design Impervious Surface Summary Worksheet
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7. NRCS Soils Report
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I. Project Introduction

A. Overview, land characteristics, special information

Cowley Lake Preserve is a proposed single-family shoreland PUD development. The project is located generally along the south shore of Cowley Lake, situated between the intersection of Territorial Road - Willandale Road (westerly limits) and the westerly terminus of 133rd Avenue North (easterly limits). The preliminary plat consists of three parcels, generally referred to as the Scherber parcel (west), the Casco parcel (central) and the Weber parcel (east). The three parcels comprise 89.0 acres.

FIGURE 1 – Site Proximity Map and Adjacent Landowners

All three parcels are used for agriculture and are tilled annually for growing crops. A gas main, operated by NuStar/Sunoco, diagonally bisects the Scherber property, running from east to west. The present and past land use is represented in Figures 2 and 3. Refer also to the Existing Conditions sheets of the Cowley Lake Preserve preliminary plat plans.

FIGURE 1 – 2024 Aerial image of site and vicinity – Hennepin County GIS

FIGURE 2 - 1957 Aerial image of site and vicinity – Hennepin County GIS

B. Existing Terrain and Soil Type

The existing terrain is gently rolling, generally ranging in elevation of 944 to 920. There are several mild depressions and drainage courses within the site. A wetland delineation was conducted and several wetlands were identified. Runoff from all portions of the site eventually discharge into Cowley Lake.

The on-site soils fall into classifications that are Hydrologic C and D type soils. The geotechnical investigation also indicates the presence of lean clay throughout the site. The on-site soils are prone to having low permeability and thus do not promote the practice of infiltration.

C. Existing Drainage

The drainage area for Cowley Lake is depicted in Figure 4. The site lies within the Elm Creek Watershed District boundary. Cowley Lake receives runoff from directly around itself and is also fed by a channel outlet from Whiteford Lake and a wetland complex located south of Territorial Road. The wetlands drain to a channel, leading to a 24-inch diameter culvert beneath Territorial Road, which discharges onto the Ende Property. A second 24-inch diameter culvert drains another tributary area, again beneath Territorial Road and toward the Ende property.

Additional runoff flows from south of 129th Avenue N./Tucker Road, into the large wetland on the Gilbert property, through a channel and to Cowley Lake.

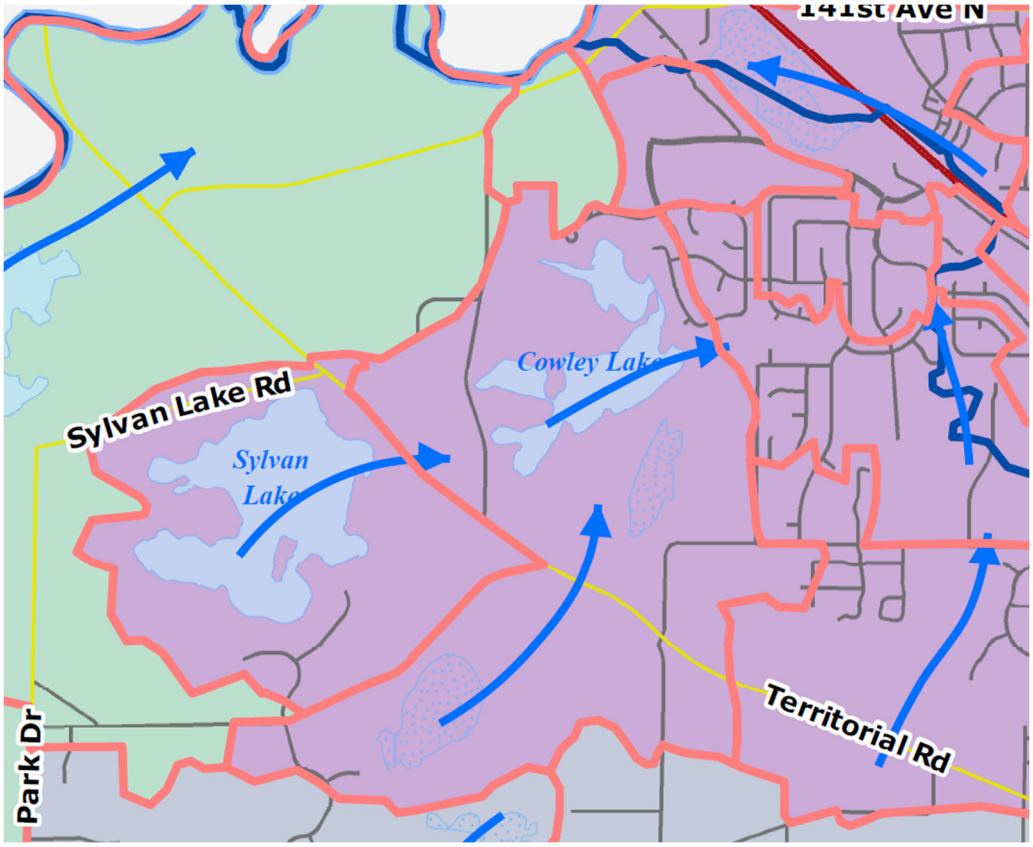


Figure 4 - Cowley Lake Drainage Boundary – from Figure 8.1, Rogers Comprehensive Plan

The low-lying area of the Ende and Schnurr properties receive the runoff from South of Territorial Road, as previously described. This area apparently is drained via a private draintile.

The privately installed draintile line was discovered within the project boundary, which crosses the easterly portion of the Scherber parcel, originating from the south on the Schnurr property and terminating in a drainage channel leading to Cowley Lake. From discussion with the adjacent landowners, it was learned that two tiles exist. At some point, the original tile line became compromised or damaged. A second line was installed, generally parallel to the original line. Based upon interviews with the land owners, it is believed the tile lines originate on the Ende property, continue through the wetland on the Schnurr property and continue across the Scherber property.

The outfalls of the draintile lines were located and surveyed. Another location further south was potholed and an invert was obtained. From the information gathered, it appears the draintile has an inverse grade, as the elevation at the pothole location was found to be approximately 0.4 feet lower than the elevation at the outfall. Despite the inverse grade, the tile line reportedly provides drawdown of the runoff that remains impounded on the Schnurr and Ende properties to a level deemed adequate.

The 1957 aerial photo in Figure 2 indicates a diagonal feature following the path of the draintile lines, suggesting some type of drainage feature existed at that time, whether buried or as a surface ditch. Figure 5 contains two photos portraying the current condition of the draintile outfall.

Figure 5 - Outfall of twin draintile lines – November 14, 2024

D. Receiving waters

The Cowley Lake outlet channel varies in elevation from 918.2 to 919.3. An existing 36-inch culvert located in the channel west of Edgewater Parkway was found partially submerged, having an invert of 917.5. At the location of the old Hawkins Drive, there is another 48-inch.

After leaving the project boundary, Cowley Lake discharges easterly through a series of channels, ponds and pipes, eventually discharging into the Crow River. See Figure 6.

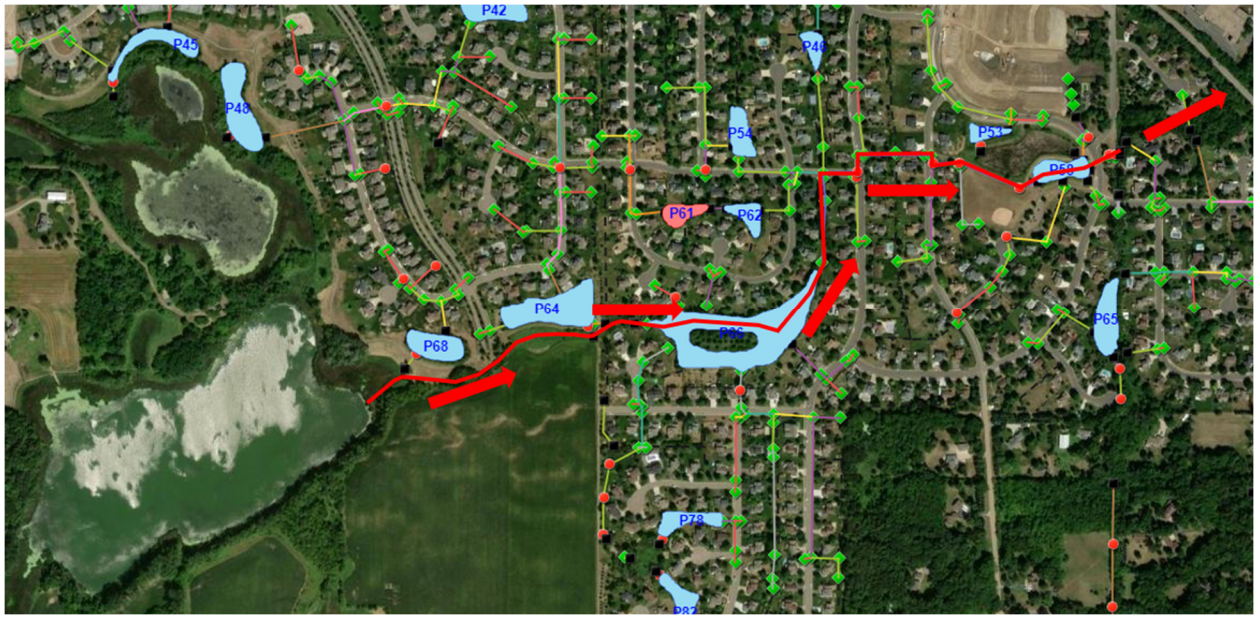


Figure 6 – Cowley Lake Outlet

E. Impaired and Special Waters

A search was conducted using the MPCA Construction Stormwater Special Waters Search tool. Three special waters were identified: Crow River, Cowley Lake and Sylvan Lake. However, no runoff from the project drains to Sylvan Lake. Specific construction and SWPPP requirements are listed in Attachment 2.

II. Proposed Conditions and Design Development

A. Description of proposed grading and terrain changes

The site will likely be mass-graded in two phases. Work will commence on the east side of the project, coinciding with the first addition final platting. The balance of the site will be graded in the second phase.
Final street grades are not anticipated to exceed four percent. Permanent slopes have a maximum slope of 4H:1V with slope distances rarely exceeding 50 feet. Proposed tree removal has been minimized. Proposed drainage patterns will remain consistent with existing drainage patterns.

B. Description of collection system, basins, treatment methods

Eight stormwater management basins are proposed. Three of the basins will incorporate filtration. Runoff received from offsite will generally be routed through the project, bypassing newly constructed ponds or filtration cells.

The two existing draintile lines extending from Schnurr property will be intercepted at a junction manhole, within Outlot D. From the junction manhole, a new draintile will be constructed on a new alignment, and will discharge at the same location and elevation as the existing tiles outlet. All existing draintile north of the junction will be removed. The junction manhole will not have any other incoming storm pipe connections other than the existing draintile.

Additionally, a secondary outlet will be connected to the junction manhole, but at a higher elevation, which will allow for runoff from larger storm events to enter the new storm sewer routed through Outlot D.

Storm sewer and draintile lines will be constructed within the rear yards of the lots in block 9, abutting the Schnurr property. Draintiles are to be connected to roof downspouts and sump pumps but will not collect surface runoff. The rear yard storm sewers will collect surface runoff, sump pumps and downspouts, reducing the fugitive flow into the Schnurr property.

The site design achieves the goal of maintaining pass-through drainage routes for runoff that flows into the site from offsite, together with the independent conveyance of the draintile flows.

III. Modeling and Design Results

A. Rate Control

The peak runoff rates for proposed conditions must not be greater than the existing peak rates for the site, per the meet City of Rogers requirements for the 2-yr, 10-yr and 100-yr rainfall events.

The peak flows are being analyzed at two points: Reach 1R is a discharge point at the northeast corner of the site at the Cowley Lake Outlet and Reach 2R is the central drainage channel, into which the draintile discharges. Reach 2R also receives the runoff from the more-than 300 acres south of Territorial Road.

In order to simulate an approximate flow of what may pass through the 24-inch culvert under Territorial Road, an approximate model of the offsite drainage area was included in the HydroCAD model. Given the capacity constraint of the 24-inch culvert, the flow from offsite is attenuated in the model to produce reasonable anticipated peak flows for the modeled storm events.

The HydroCAD modeling results demonstrate these criteria has been met and is summarized in the following table:

Storm Event	1R Ex. (cfs)	1R Prop. (cfs)	2R Ex. (cfs)	2R Prop (cfs)	FUGITIVE (cfs)
2-Year	39.59	11.02	111.83	62.32	1.51
10-Year	68.61	20.37	198.51	102.35	2.54
100-Year	128.35	65.25	387.66	184.21	4.71

The fugitive runoff shown in the above table represents a small drainage area that drains to the existing 133rd Avenue N. storm sewer system from the proposed condition and is considered negligible.

B. Volume Control (abstraction)

Unless impractical or unfeasible, new developments shall capture and retain on site 1.1 inches of runoff from net new impervious surfaces. Infiltration on this site is infeasible due to the presence of Hydrologic C & D soils. Therefore, the alternative of infiltration has been incorporated into the design. Furthermore, because the Residential Alternative Development Standards are being applied to the site design under the Shoreland Ordinance, the required abstraction volume must be increased by 55% (multiplied by 1.82). The COWLEY LAKE PRESERVE – DESIGN IMPERVIOUS SURFACE SUMMARY demonstrates the calculations, which are supported by the HydroCAD outputs. The Volume Control requirement has been met and is summarized below:

Computed Required Abstraction Volume	2.046 ac-ft
Required Volume multiplied by 1.82	*3.724 ac-ft*
Abstraction Volume Provided	4.328 ac-ft

C. Water Quality

New developments shall have no increase in TSS and TP. The P8 pollutant model was utilized to predict pre- and post-development TSS and TP. The modeling results indicate the proposed stormwater management system meets the requirement of no net increase. A summary of the overall computation is as follows:

	TSS	TP
Existing Condition	13,468 lb/yr	63.2 lb/yr
Proposed Condition	7,360 lb/yr	55.9 lb/yr

IV. Conclusion

The combined effect of the flow routing design and the construction of the eight stormwater management basins demonstrate the stormwater rate, volume and quality requirements of the City of Rogers are satisfied.

NOTES

1. SUBCATCHMENT 30S: REAR ROOF DRAINAGE FROM LOTS 11–23, BLOCK 9 WILL BE COLLECTED BY STORM SEWER. LOTS 5–7, BLOCK 7 AND LOTS 1–2, BLOCK 8 REAR ROOFS, FOR AN ESTIMATED TOTAL OF 9,550 SF (0.22 AC) IMPERVIOUS, ARE PROPOSED TO RUNOFF DIRECTLY TO ADJACENT LAND.

LEGEND

1P — POND AREA

1R — REACH

1S — DRAINAGE AREA (TOTAL DRAINAGE AREA / IMPERVIOUS AREA)

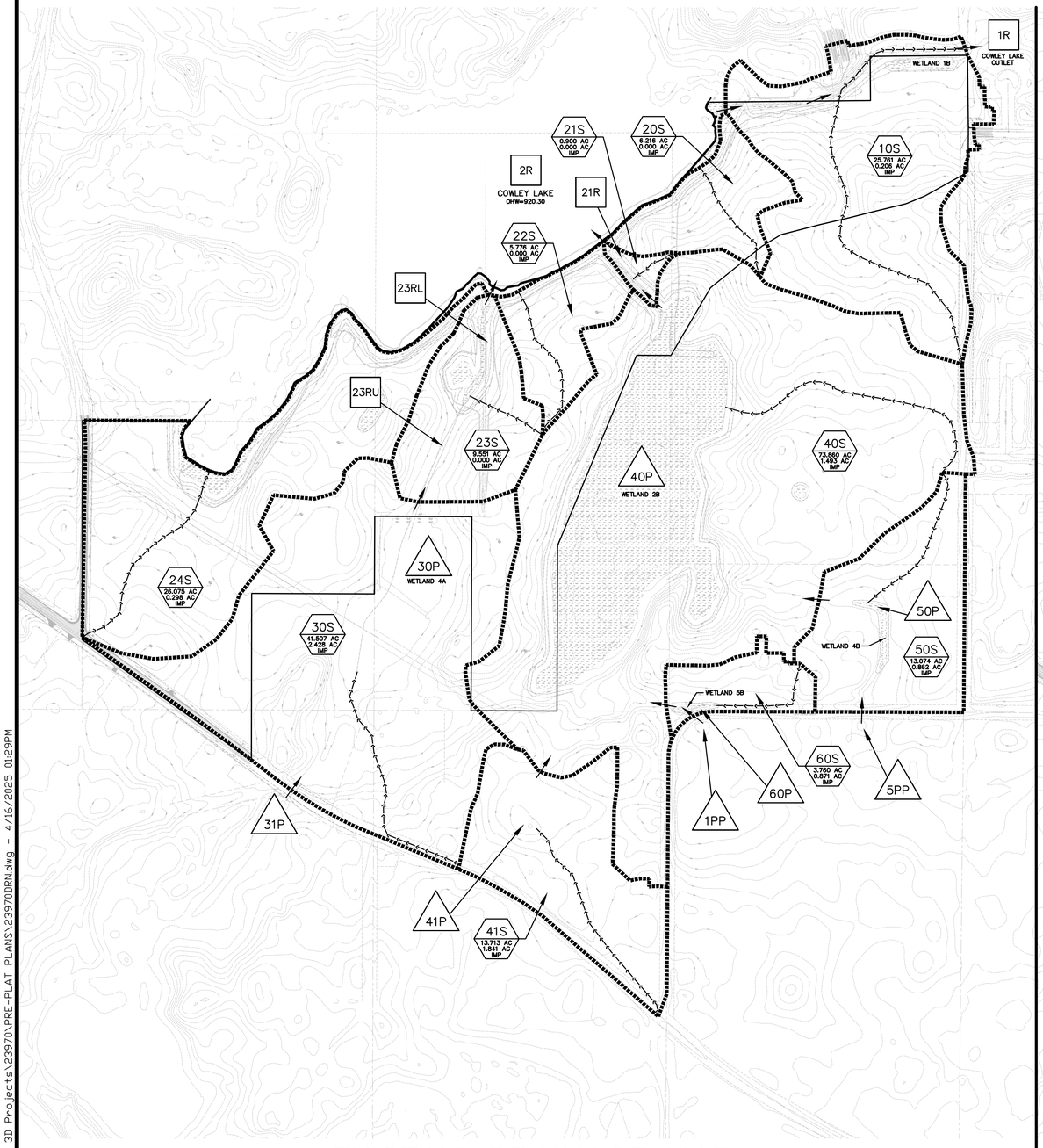
FLOW DIRECTION

ToC PATH

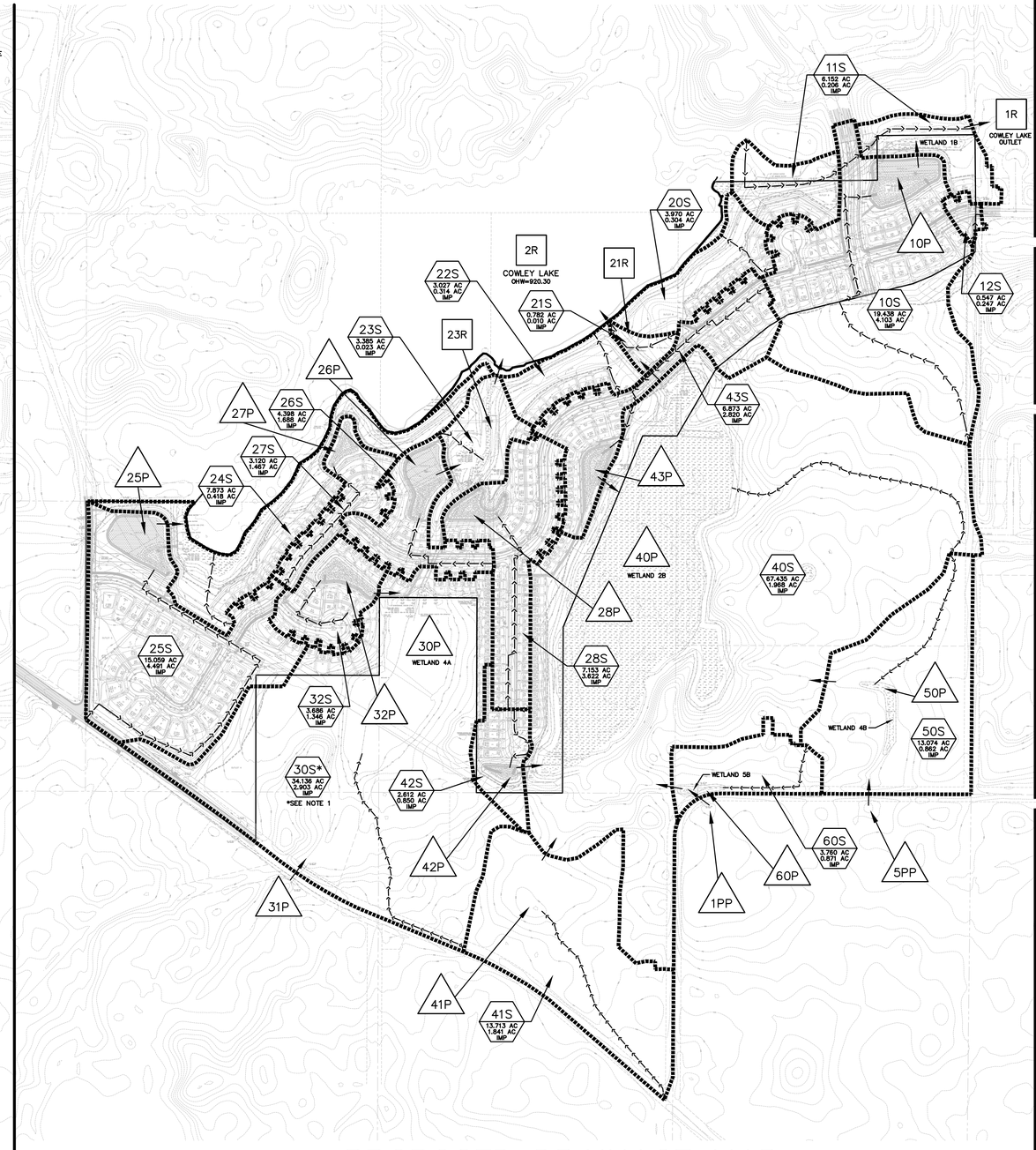
DRAINAGE BOUNDARY

SCALE IN FEET
0 300 600 900
1 inch = 300 feet

N



EXISTING DRAINAGE MAP



PROPOSED DRAINAGE MAP

James R. Hill, Inc.
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2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE

ROGERS, MINNESOTA

DRAINAGE MAPS

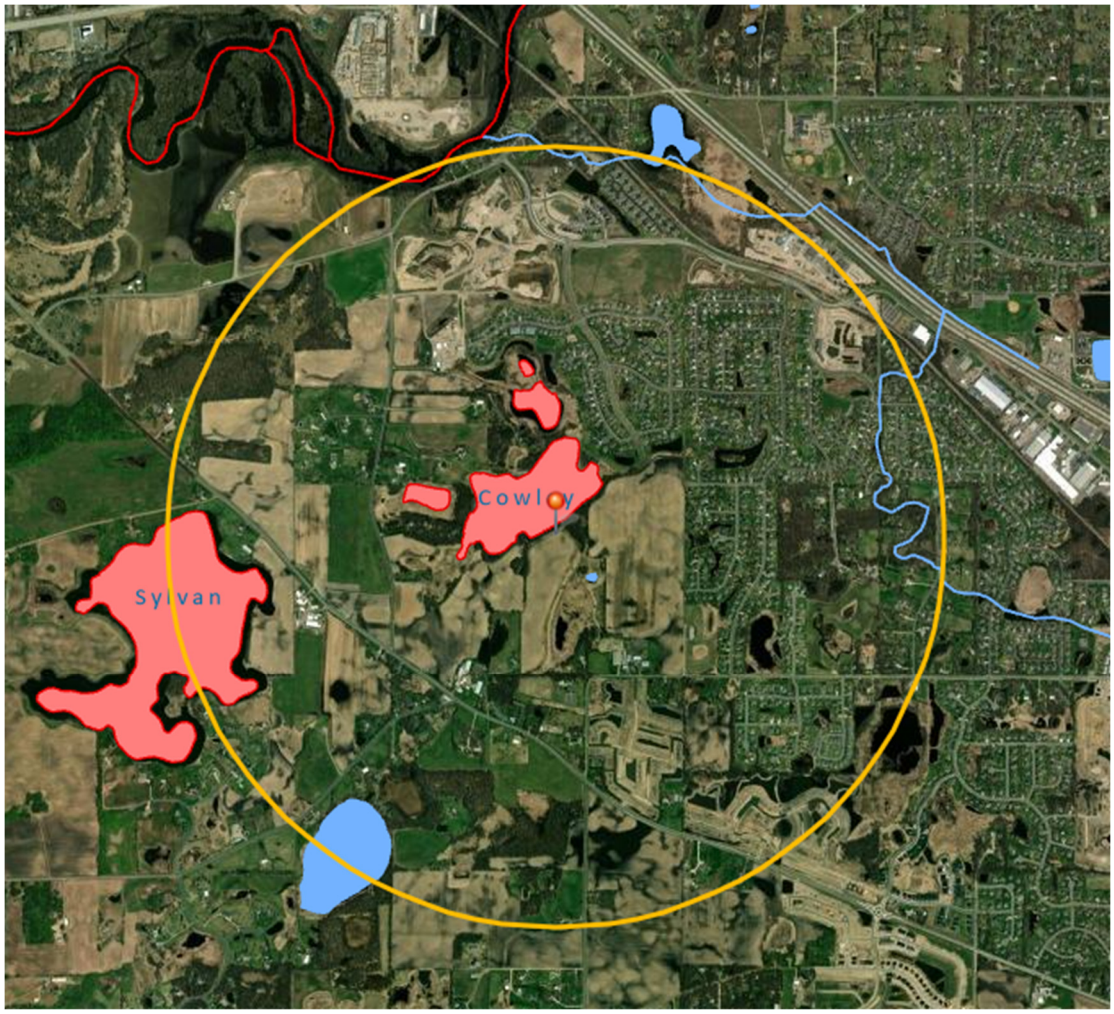
FOR

RACHEL DEVELOPMENT

4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	JSO
DATE	02/24/2025
REVISIONS	
03/19/2025 MPCA REVIEW SUBMITTAL	
04/04/2025 PARTIAL CITY COMMENTS	
04/15/2025 WATERSHED COMMENTS	
CAD FILE	23970DRN
PROJECT NO.	23970
	3.5

F:_Civil 3D Projects\23970\PRE-PLAT PLANS\23970DRN.dwg - 4/16/2025 01:29PM



Crow River

This river segment has an EPA-approved impairment for: Benthic macroinvertebrates bioassessments; Fecal coliform; Fish bioassessments; Mercury in fish tissue; Nutrients; Turbidity.

These impairment(s) are considered to be construction related parameters and require the additional best management practices (BMPs) found in items 23.9 and 23.10 of the permit if the project has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired stream.

23.9:

Permittees must immediately initiate stabilization of exposed soil areas, as described in item 8.4, and complete the stabilization within seven (7) calendar days after the construction activity in that portion of the site temporarily or permanently ceases.

23.10:

Permittees must provide a temporary sediment basin as described in Section 14 for common drainage locations that serve an area with five (5) or more acres disturbed at one time.

Also, a mandatory Stormwater Pollution Prevention Plan (SWPPP) review is required by the MPCA if the project will disturb over 50 acres and has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired water. Owners must submit the application for coverage and the Storm Water Pollution Prevention Plan at least 30-days before the construction start date. The SWPPP can be attached electronically when using the online application.

Cowley Lake

This lake has an EPA-approved impairment for: Nutrients.

These impairment(s) are considered to be construction related parameters and require the additional best management practices (BMPs) found in items 23.9 and 23.10 of the permit if the project has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired water.

23.9:

Permittees must immediately initiate stabilization of exposed soil areas, as described in item 8.4, and complete the stabilization within seven (7) calendar days after the construction activity in that portion of the site temporarily or permanently ceases.

23.10:

Permittees must provide a temporary sediment basin as described in Section 14 for common drainage locations that serve an area with five (5) or more acres disturbed at one time.

Also, a mandatory Stormwater Pollution Prevention Plan (SWPPP) review is required by the MPCA if the project will disturb over 50 acres and has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired water. Owners must submit the application for coverage and the SWPPP at least 30-days before the construction start date. The SWPPP can be attached electronically when using the online application.

Sylvan Lake

This lake has an EPA-approved impairment for: Nutrients.

These impairment(s) are considered to be construction related parameters and require the additional best management practices (BMPs) found in items 23.9 and 23.10 of the permit if the project has a discharge point on the project within 1 mile (aerial radius measurement) of, and flows to the impaired water.

23.9:

Permittees must immediately initiate stabilization of exposed soil areas, as described in item 8.4, and complete the stabilization within seven (7) calendar days after the construction activity in that portion of the site temporarily or permanently ceases.

23.10:

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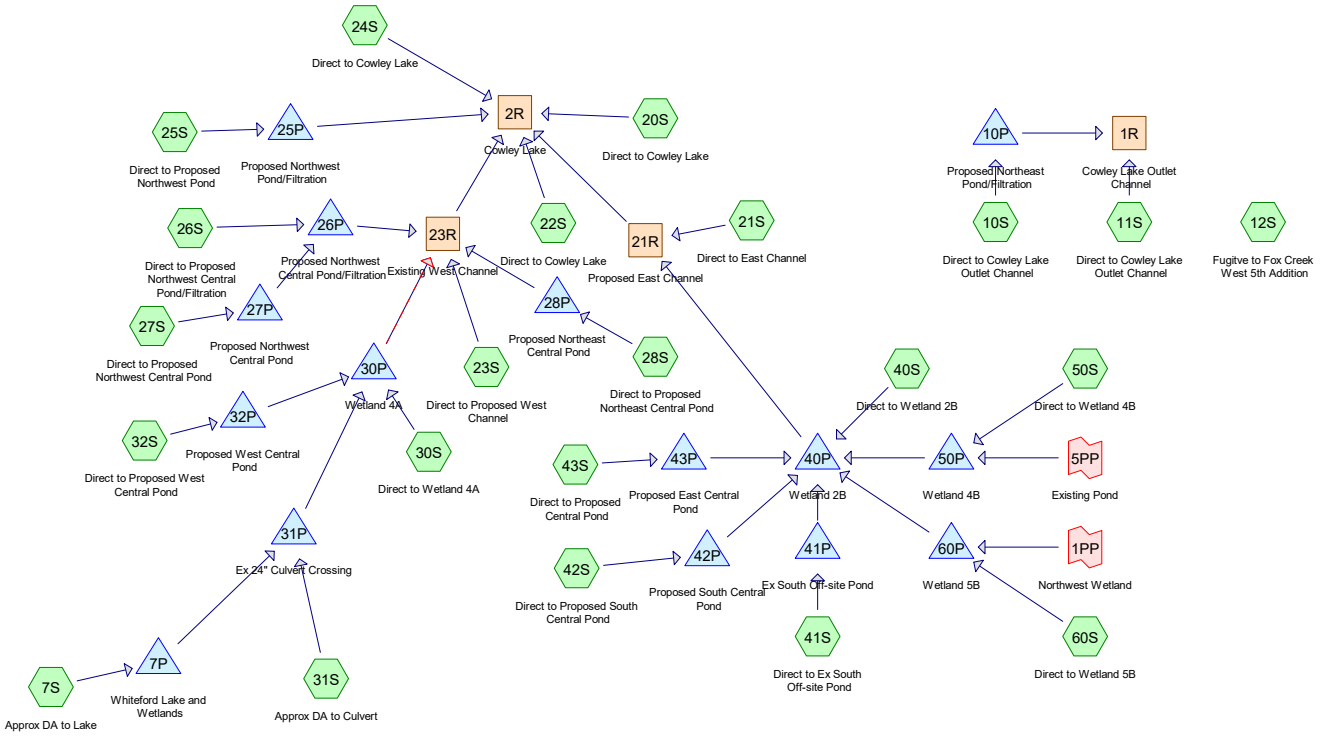


Subcat Reach Pond Link

Routing Diagram for COWLEY LAKE PRESERVE - PROPOSED Rev 1
Prepared by James R. Hill, Inc., Printed 4/16/2025
HydroCAD® 10.00-25 s/n 00744 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
20.000	77	2 acre lots, 12% imp, HSG C (31S)
71.456	80	>75% Grass cover, Good, HSG D (10S, 11S, 12S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 32S, 40S, 41S, 42S, 43S, 50S, 60S)
2.902	96	Gravel surface, HSG D (25S, 30S, 40S, 41S, 50S, 60S)
22.912	78	Meadow, non-grazed, HSG D (10S, 11S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 32S, 40S, 41S, 42S, 43S)
2.775	89	Pasture/grassland/range, Poor, HSG D (30S, 40S, 50S)
4.074	98	Paved parking, HSG D (10S, 12S, 25S, 26S, 27S, 28S, 32S, 42S, 43S)
6.670	98	Paved roads w/curbs & sewers, HSG D (10S, 12S, 25S, 26S, 27S, 28S, 32S, 42S, 43S)
2.509	98	Roofs, HSG D (10S, 12S, 25S, 26S, 27S, 28S, 32S, 42S, 43S)
51.253	89	Row crops, straight row, Good, HSG D (10S, 25S, 30S, 40S, 43S, 50S)
6.931	98	Unconnected pavement, HSG D (10S, 11S, 12S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 32S, 40S, 41S, 42S, 43S, 50S, 60S)
10.168	98	Unconnected roofs, HSG D (10S, 11S, 12S, 20S, 22S, 24S, 25S, 26S, 27S, 28S, 30S, 32S, 40S, 41S, 42S, 43S, 50S, 60S)
23.478	98	Water Surface, 0% imp, HSG D (10S, 11S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 32S, 40S, 41S, 42S, 43S, 50S, 60S)
15.065	77	Woods, Good, HSG D (11S, 20S, 21S, 22S, 23S, 24S, 28S, 30S, 40S, 42S, 60S)
300.000	72	Woods/grass comb., Good, HSG C (7S)
540.193	**78**	**TOTAL AREA**

Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=0.73"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=185.67 cfs 18.153 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=19.438 ac 21.11% Impervious Runoff Depth=1.77"
Flow Length=1,602' Tc=23.6 min CN=86/98 Runoff=34.17 cfs 2.871 af

Subcatchment 11S: Direct to Cowley Lake Runoff Area=6.152 ac 3.35% Impervious Runoff Depth=1.38"
Flow Length=1,308' Tc=15.2 min CN=83/98 Runoff=10.71 cfs 0.706 af

Subcatchment 12S: Fugitve to Fox Creek Runoff Area=0.547 ac 45.16% Impervious Runoff Depth=1.82"
Flow Length=165' Tc=8.1 min CN=80/98 Runoff=1.51 cfs 0.083 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=3.970 ac 7.66% Impervious Runoff Depth=1.21"
Flow Length=310' Tc=10.9 min CN=79/98 Runoff=6.85 cfs 0.399 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.782 ac 1.28% Impervious Runoff Depth=1.11"
Flow Length=392' Tc=17.3 min CN=79/98 Runoff=1.02 cfs 0.072 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=3.027 ac 10.37% Impervious Runoff Depth=1.25"
Flow Length=309' Tc=17.0 min CN=79/98 Runoff=4.39 cfs 0.315 af

Subcatchment 23S: Direct to Proposed Runoff Area=3.385 ac 0.68% Impervious Runoff Depth=1.22"
Flow Length=243' Tc=13.3 min CN=81/98 Runoff=5.55 cfs 0.343 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=7.873 ac 5.31% Impervious Runoff Depth=1.28"
Flow Length=407' Tc=11.1 min CN=81/98 Runoff=14.54 cfs 0.841 af

Subcatchment 25S: Direct to Proposed Runoff Area=15.059 ac 29.82% Impervious Runoff Depth=1.63"
Flow Length=1,817' Tc=17.1 min CN=81/98 Runoff=27.99 cfs 2.047 af

Subcatchment 26S: Direct to Proposed Runoff Area=4.398 ac 38.38% Impervious Runoff Depth=1.75"
Flow Length=621' Tc=8.6 min CN=81/98 Runoff=11.60 cfs 0.642 af

Subcatchment 27S: Direct to Proposed Runoff Area=3.120 ac 47.02% Impervious Runoff Depth=1.94"
Flow Length=621' Tc=8.6 min CN=83/98 Runoff=9.07 cfs 0.505 af

Subcatchment 28S: Direct to Proposed Runoff Area=7.153 ac 50.64% Impervious Runoff Depth=1.96"
Flow Length=1,013' Tc=14.4 min CN=82/98 Runoff=17.02 cfs 1.167 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=34.136 ac 8.50% Impervious Runoff Depth=1.39"
Flow Length=1,249' Tc=23.4 min CN=82/98 Runoff=47.41 cfs 3.941 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=1.04"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=14.22 cfs 1.729 af

Subcatchment 32S: Direct to Proposed Runoff Area=3.686 ac 36.52% Impervious Runoff Depth=1.81"
Flow Length=440' Slope=0.0200 '/' Tc=7.1 min CN=83/98 Runoff=10.74 cfs 0.555 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=67.435 ac 2.92% Impervious Runoff Depth=1.72"
Flow Length=1,354' Tc=23.6 min CN=88/98 Runoff=118.16 cfs 9.674 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=1.35"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=26.82 cfs 1.537 af

Subcatchment 42S: Direct to Proposed Runoff Area=2.612 ac 32.54% Impervious Runoff Depth=1.63"
Flow Length=422' Tc=10.2 min CN=80/98 Runoff=5.99 cfs 0.354 af

Subcatchment 43S: Direct to Proposed Runoff Area=6.873 ac 41.00% Impervious Runoff Depth=1.83"
Flow Length=1,173' Tc=14.8 min CN=82/98 Runoff=15.17 cfs 1.046 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=1.68"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=20.94 cfs 1.835 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=1.58"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=10.21 cfs 0.496 af

Reach 1R: Cowley Lake Outlet Channel Inflow=11.02 cfs 3.577 af
Outflow=11.02 cfs 3.577 af

Reach 2R: Cowley Lake Inflow=62.32 cfs 28.667 af
Outflow=62.32 cfs 28.667 af

Reach 21R: Proposed East Channel Avg. Flow Depth=0.75' Max Vel=4.82 fps Inflow=19.13 cfs 16.186 af
n=0.022 L=264.0' S=0.0125 '/' Capacity=149.23 cfs Outflow=19.13 cfs 16.186 af

Reach 23R: Existing West Channel Avg. Flow Depth=1.00' Max Vel=3.23 fps Inflow=32.28 cfs 8.880 af
n=0.022 L=251.0' S=0.0037 '/' Capacity=321.50 cfs Outflow=32.22 cfs 8.880 af

Pond 7P: Whiteford Lake and Wetlands Peak Elev=930.30' Storage=18.153 af Inflow=185.67 cfs 18.153 af
Outflow=0.00 cfs 0.000 af

Pond 10P: Proposed Northeast Peak Elev=922.35' Storage=4.697 af Inflow=34.17 cfs 2.871 af
Outflow=4.30 cfs 2.871 af

Pond 25P: Proposed Northwest Peak Elev=926.22' Storage=2.622 af Inflow=27.99 cfs 2.047 af
Outflow=0.54 cfs 2.047 af

Pond 26P: Proposed Northwest Central Peak Elev=924.81' Storage=1.573 af Inflow=12.53 cfs 1.145 af
Outflow=0.37 cfs 1.145 af

Pond 27P: Proposed Northwest Central Peak Elev=925.29' Storage=0.996 af Inflow=9.07 cfs 0.505 af
Outflow=1.70 cfs 0.502 af

Pond 28P: Proposed Northeast Central Peak Elev=922.71' Storage=1.359 af Inflow=17.02 cfs 1.167 af
Outflow=9.47 cfs 1.167 af

Pond 30P: Wetland 4A Peak Elev=925.77' Storage=1.671 af Inflow=61.25 cfs 6.225 af
Primary=16.70 cfs 4.022 af Secondary=3.04 cfs 2.203 af Outflow=19.74 cfs 6.225 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=932.25' Storage=0.018 af Inflow=14.22 cfs 1.729 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=13.72 cfs 1.729 af

Pond 32P: Proposed West Central Pond Peak Elev=928.42' Storage=1.393 af Inflow=10.74 cfs 0.555 af
Outflow=4.39 cfs 0.555 af

Pond 40P: Wetland 2B Peak Elev=925.13' Storage=6.361 af Inflow=129.76 cfs 16.114 af
60.0" x 36.0" Box Culvert n=0.013 L=138.0' S=0.0029 '/' Outflow=19.04 cfs 16.114 af

Pond 41P: Ex South Off-site Pond Peak Elev=939.36' Storage=1.537 af Inflow=26.82 cfs 1.537 af
Outflow=0.00 cfs 0.000 af

Pond 42P: Proposed South Central Pond Peak Elev=929.23' Storage=0.445 af Inflow=5.99 cfs 0.354 af
Outflow=2.17 cfs 0.354 af

Pond 43P: Proposed East Central Pond Peak Elev=927.51' Storage=1.806 af Inflow=15.17 cfs 1.046 af
Outflow=4.30 cfs 1.044 af

Pond 50P: Wetland 4B Peak Elev=940.27' Storage=94,258 cf Inflow=21.86 cfs 2.164 af
Outflow=0.00 cfs 0.000 af

Pond 60P: Wetland 5B Peak Elev=938.67' Storage=11,075 cf Inflow=12.04 cfs 5.255 af
Outflow=7.32 cfs 5.041 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=5.22 cfs 4.759 af
Primary=5.22 cfs 4.759 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=1.61 cfs 0.329 af
Area= 26.390 ac 15.63% Imperv. Primary=1.61 cfs 0.329 af

Total Runoff Area = 540.193 ac Runoff Volume = 49.313 af Average Runoff Depth = 1.10"
93.94% Pervious = 507.441 ac 6.06% Impervious = 32.752 ac

Summary for Subcatchment 7S: Approx DA to Lake

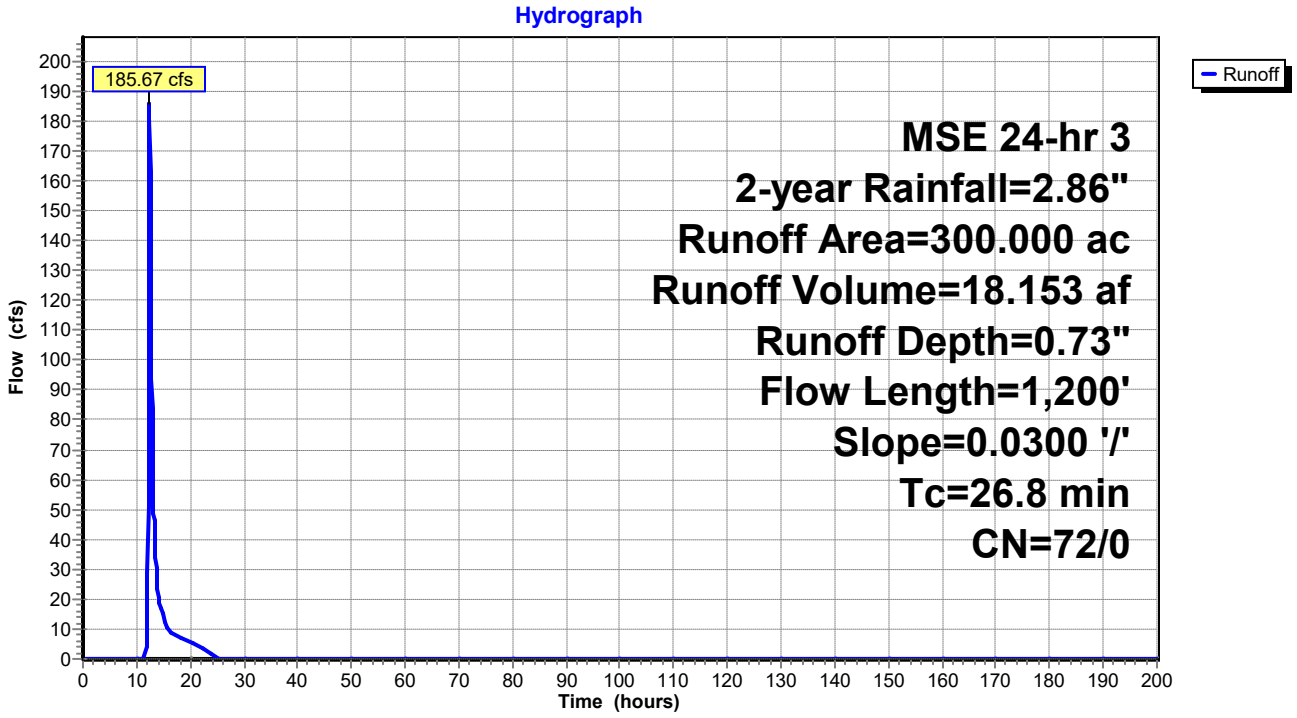
Runoff = 185.67 cfs @ 12.43 hrs, Volume= 18.153 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

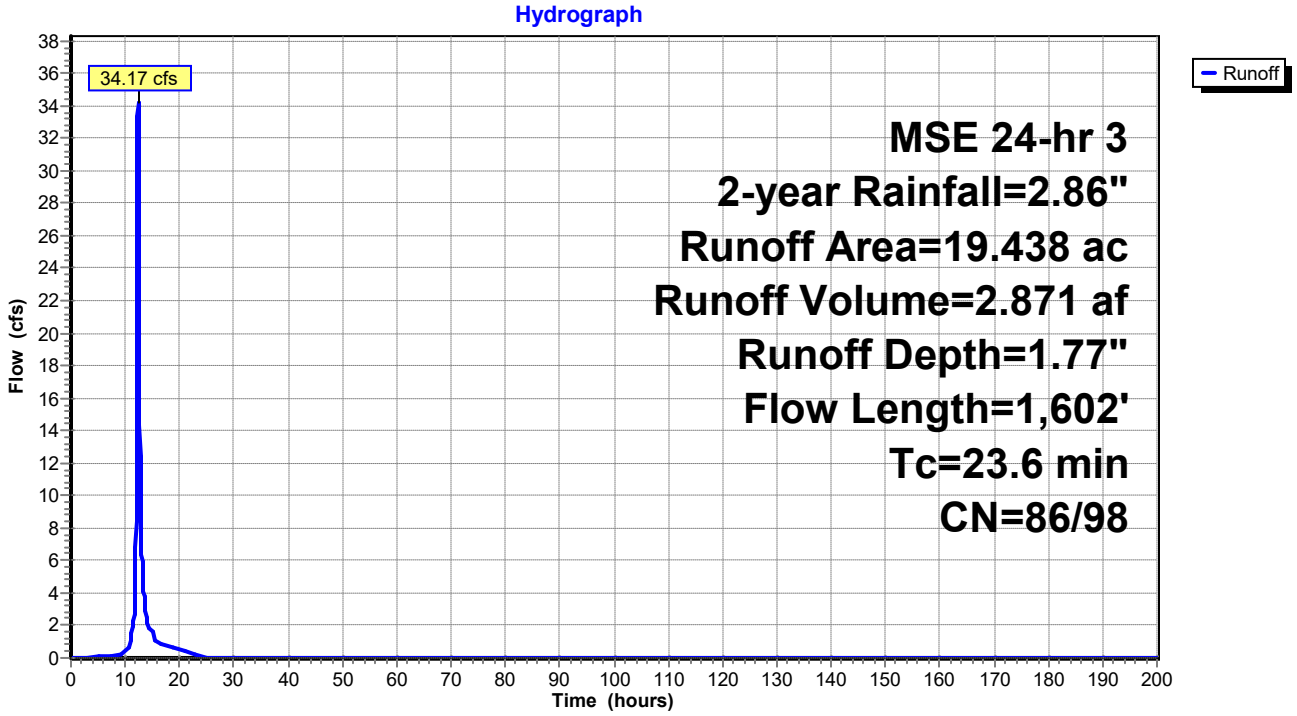
Runoff = 34.17 cfs @ 12.34 hrs, Volume= 2.871 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.399	98	Unconnected pavement, HSG D
1.088	98	Unconnected roofs, HSG D
1.617	98	Paved roads w/curbs & sewers, HSG D
0.606	98	Paved parking, HSG D
0.393	98	Roofs, HSG D
0.699	98	Water Surface, 0% imp, HSG D
8.527	89	Row crops, straight row, Good, HSG D
4.972	80	>75% Grass cover, Good, HSG D
1.137	78	Meadow, non-grazed, HSG D
19.438	88	Weighted Average
15.335	86	78.89% Pervious Area
4.103	98	21.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
14.6	842	0.0114	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.7	660		3.00		**Direct Entry, Pipe flow @ 3 fps**
23.6	1,602	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 11S: Direct to Cowley Lake Outlet Channel

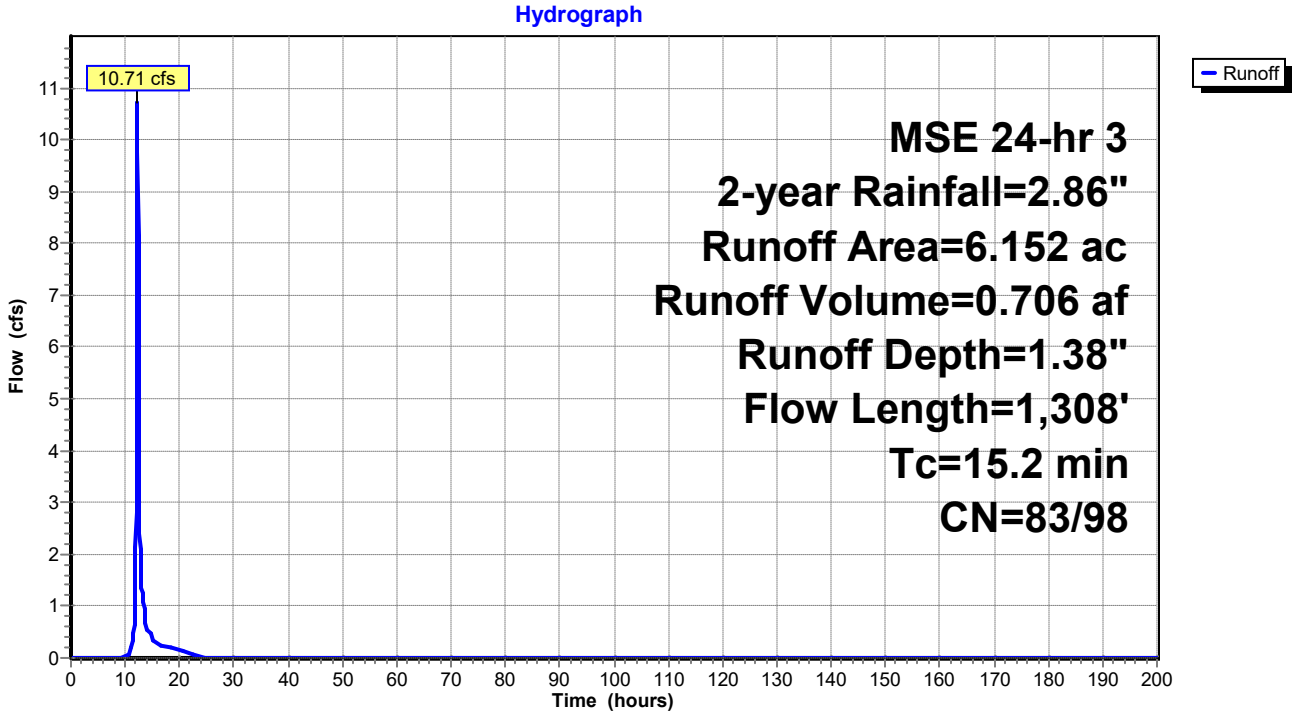
Runoff = 10.71 cfs @ 12.24 hrs, Volume= 0.706 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.024	98	Unconnected pavement, HSG D
0.182	98	Unconnected roofs, HSG D
1.316	98	Water Surface, 0% imp, HSG D
1.199	80	>75% Grass cover, Good, HSG D
2.901	78	Meadow, non-grazed, HSG D
0.530	77	Woods, Good, HSG D
6.152	83	Weighted Average
5.946	83	96.65% Pervious Area
0.206	98	3.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.8	114	0.0263	2.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	1,094	0.0024	3.27	46.64	**Trap/Vee/Rect Channel Flow,** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
15.2	1,308	Total			

Subcatchment 11S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 12S: Fugitve to Fox Creek West 5th Addition

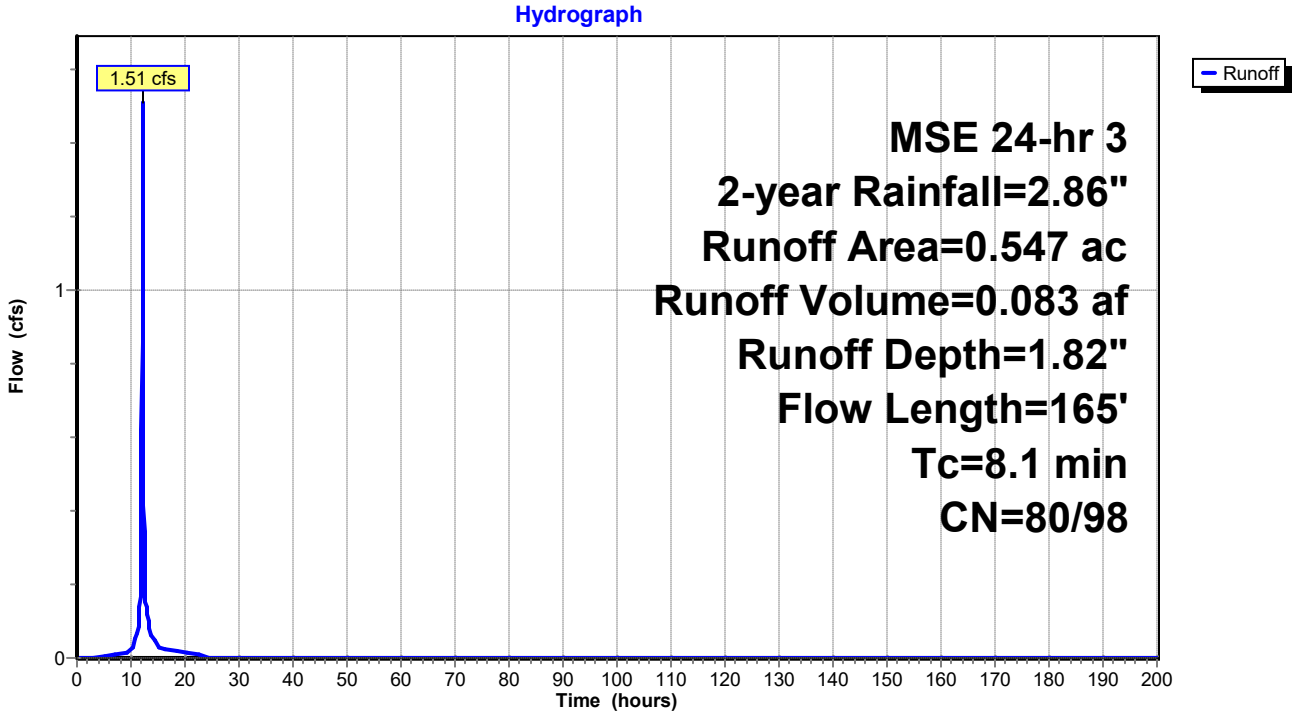
Runoff = 1.51 cfs @ 12.15 hrs, Volume= 0.083 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.015	98	Unconnected pavement, HSG D
0.043	98	Unconnected roofs, HSG D
0.104	98	Paved roads w/curbs & sewers, HSG D
0.051	98	Paved parking, HSG D
0.034	98	Roofs, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.547	88	Weighted Average
0.300	80	54.84% Pervious Area
0.247	98	45.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.3	40	0.0250	2.37		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.1	165	Total			

Subcatchment 12S: Fugitve to Fox Creek West 5th Addition



Summary for Subcatchment 20S: Direct to Cowley Lake

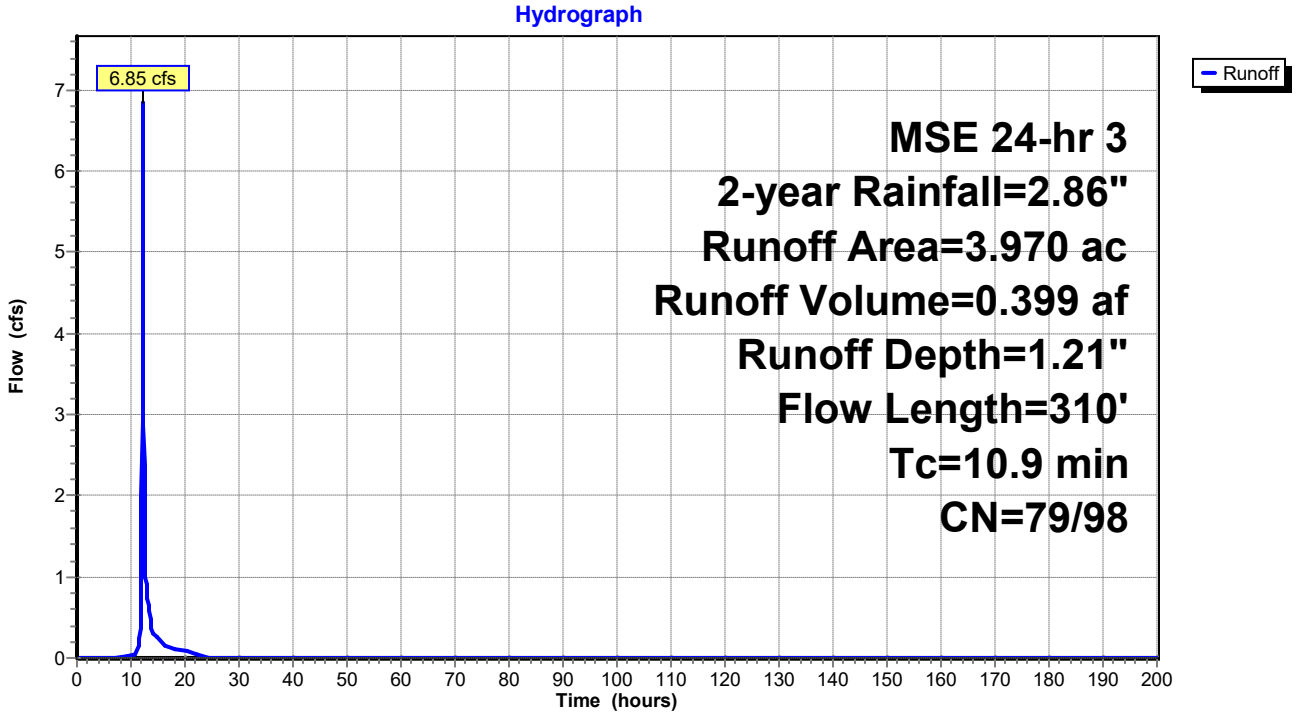
Runoff = 6.85 cfs @ 12.19 hrs, Volume= 0.399 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.046	98	Unconnected pavement, HSG D
0.258	98	Unconnected roofs, HSG D
0.122	98	Water Surface, 0% imp, HSG D
0.949	80	>75% Grass cover, Good, HSG D
1.018	78	Meadow, non-grazed, HSG D
1.577	77	Woods, Good, HSG D
3.970	80	Weighted Average
3.666	79	92.34% Pervious Area
0.304	98	7.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0270	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	72	0.0347	2.79		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	138	0.0667	1.81		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.9	310	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

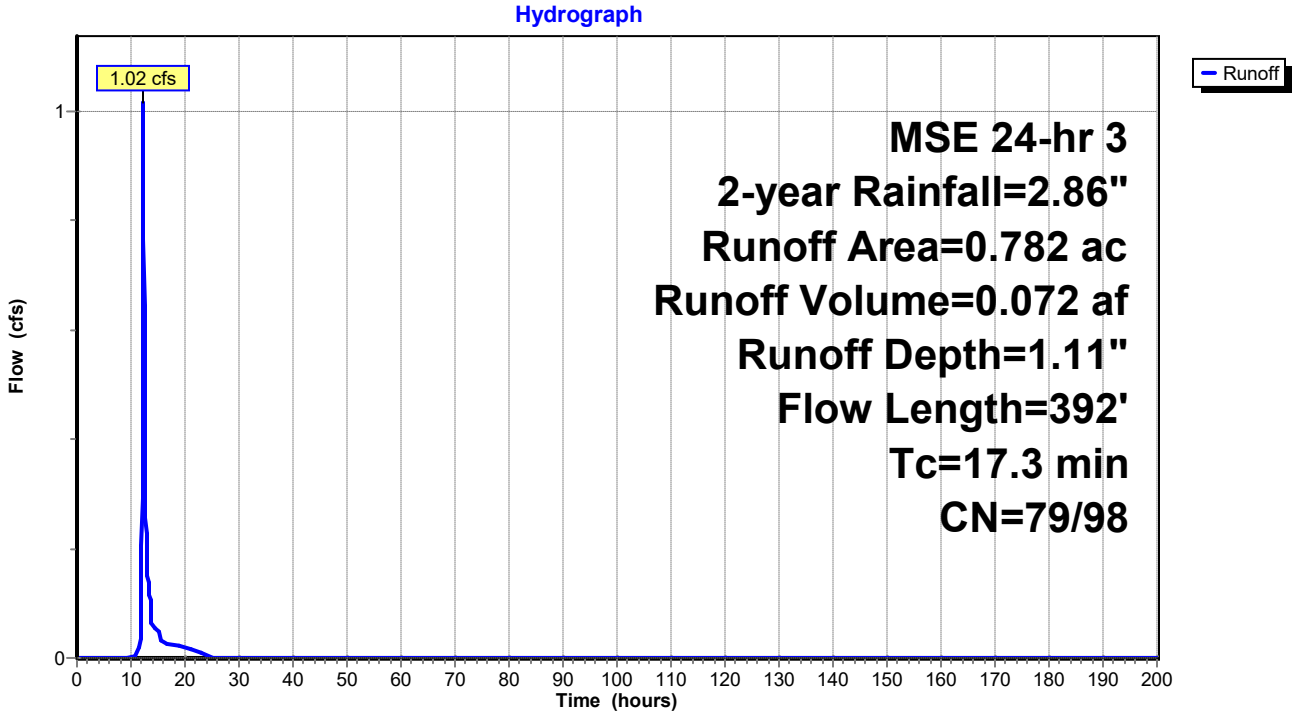
Runoff = 1.02 cfs @ 12.27 hrs, Volume= 0.072 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.010	98	Unconnected pavement, HSG D
0.054	98	Water Surface, 0% imp, HSG D
0.016	80	>75% Grass cover, Good, HSG D
0.162	78	Meadow, non-grazed, HSG D
0.540	77	Woods, Good, HSG D
0.782	79	Weighted Average
0.772	79	98.72% Pervious Area
0.010	98	1.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0590	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
2.3	146	0.0452	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	146	0.0164	10.55	221.46	**Channel Flow,** Area= 21.0 sf Perim= 15.6' r= 1.35' n= 0.022 Earth, clean & straight
17.3	392	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

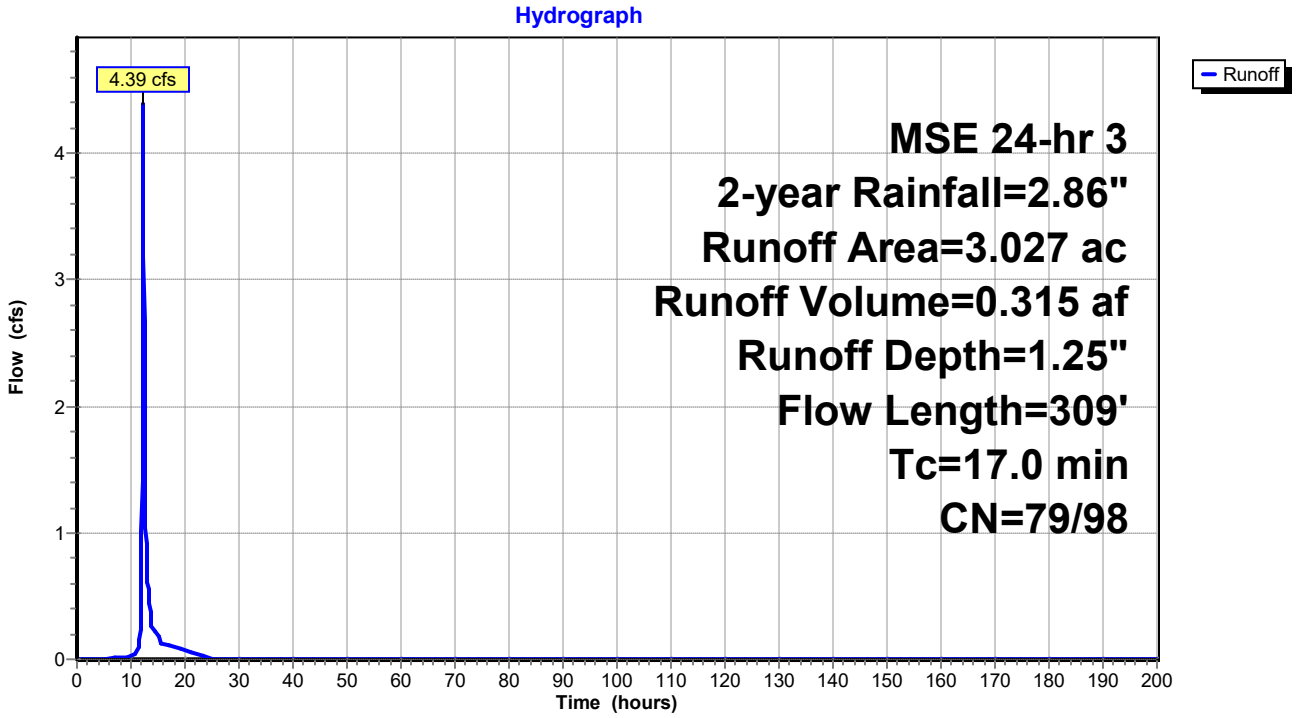
Runoff = 4.39 cfs @ 12.27 hrs, Volume= 0.315 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.125	98	Unconnected pavement, HSG D
0.189	98	Unconnected roofs, HSG D
0.031	98	Water Surface, 0% imp, HSG D
0.779	80	>75% Grass cover, Good, HSG D
1.348	78	Meadow, non-grazed, HSG D
0.555	77	Woods, Good, HSG D
3.027	81	Weighted Average
2.713	79	89.63% Pervious Area
0.314	98	10.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	100	0.0220	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
2.4	209	0.0445	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	309	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Proposed West Channel

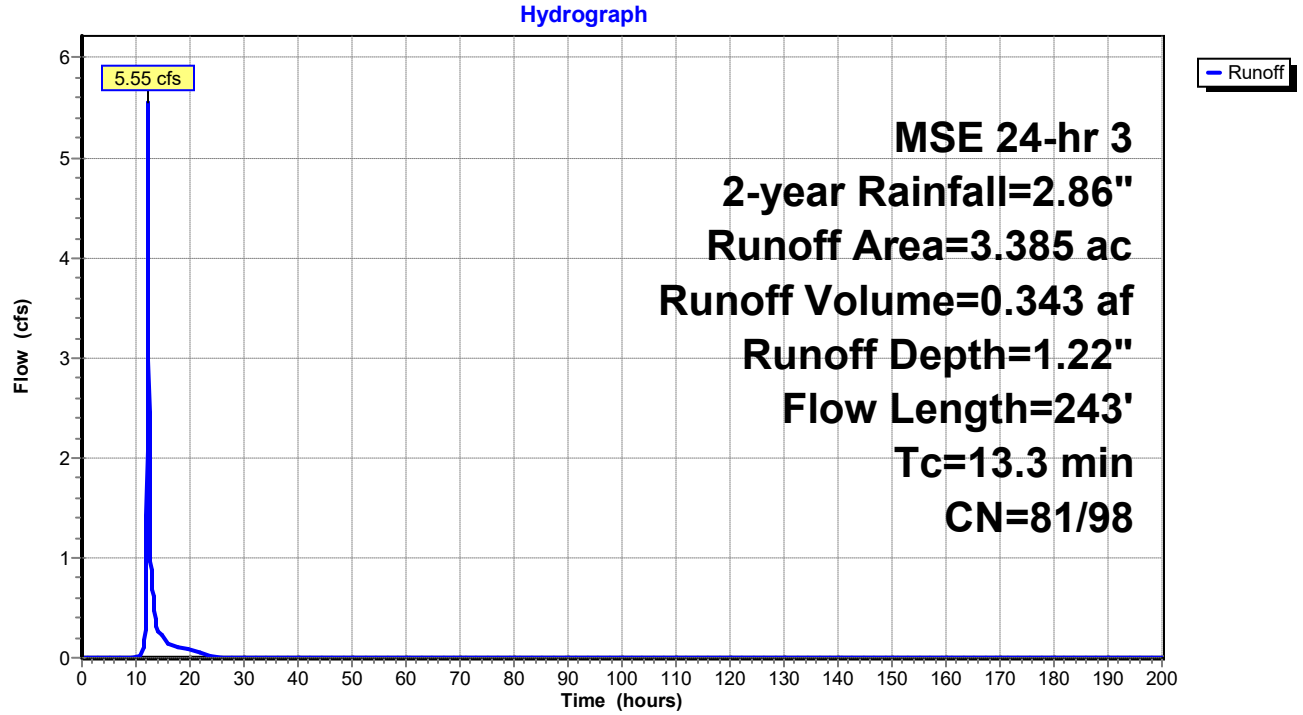
Runoff = 5.55 cfs @ 12.22 hrs, Volume= 0.343 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.023	98	Unconnected pavement, HSG D
0.467	98	Water Surface, 0% imp, HSG D
0.253	80	>75% Grass cover, Good, HSG D
1.225	78	Meadow, non-grazed, HSG D
1.417	77	Woods, Good, HSG D
3.385	81	Weighted Average
3.362	81	99.32% Pervious Area
0.023	98	0.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0520	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
3.0	143	0.0259	0.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.3	243	Total			

Subcatchment 23S: Direct to Proposed West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

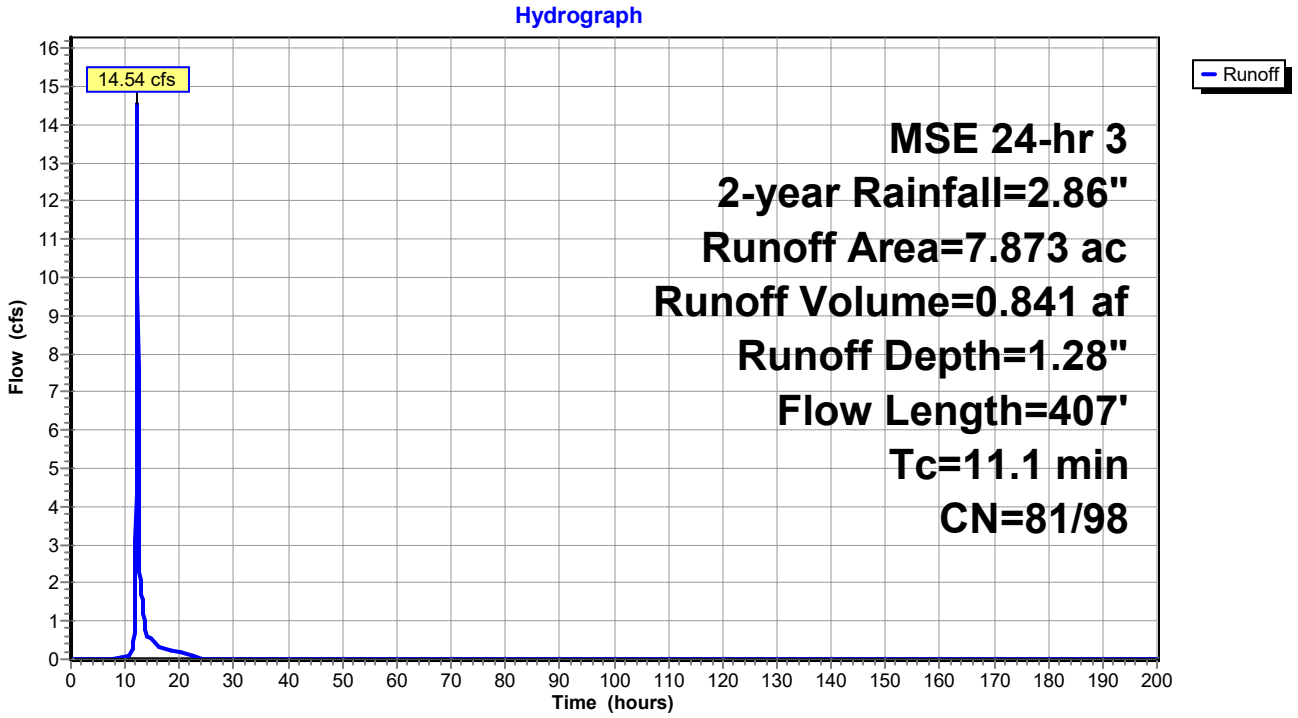
Runoff = 14.54 cfs @ 12.20 hrs, Volume= 0.841 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.379	98	Unconnected roofs, HSG D
0.980	98	Water Surface, 0% imp, HSG D
1.643	80	>75% Grass cover, Good, HSG D
2.538	78	Meadow, non-grazed, HSG D
2.294	77	Woods, Good, HSG D
7.873	82	Weighted Average
7.455	81	94.69% Pervious Area
0.418	98	5.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.0600	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
4.4	307	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	407	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 25S: Direct to Proposed Northwest Pond

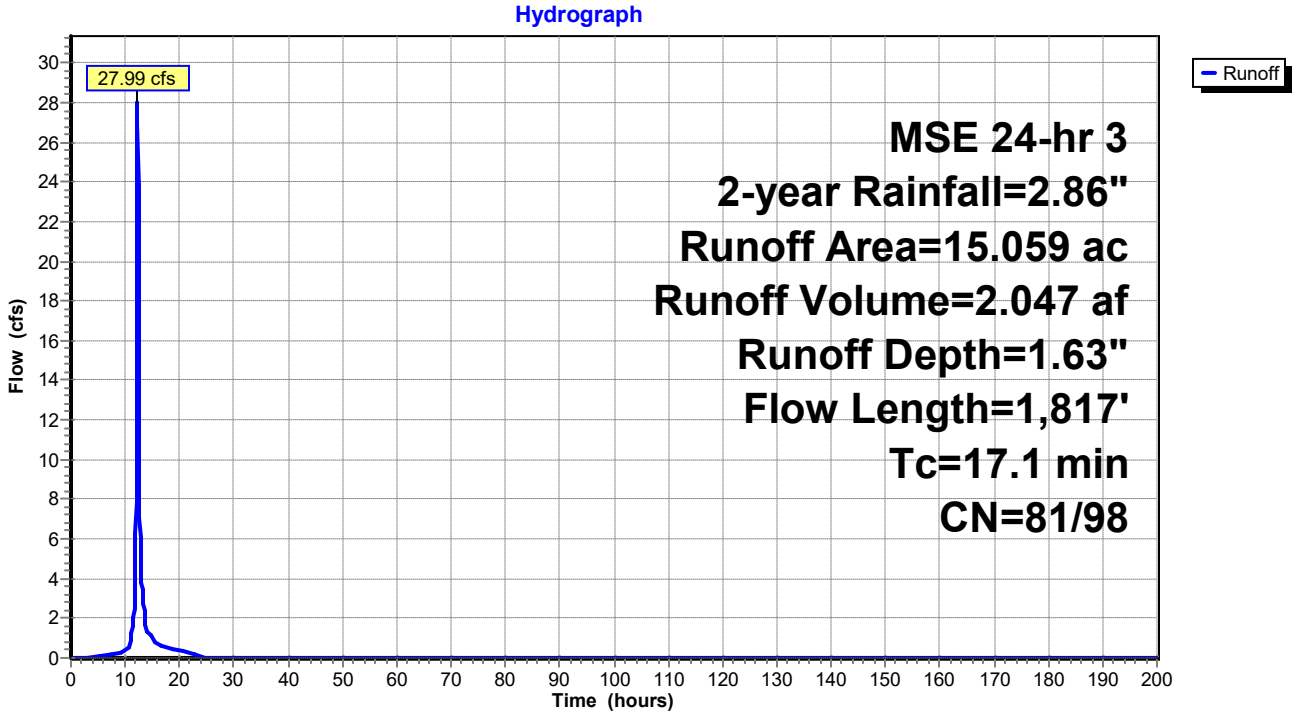
Runoff = 27.99 cfs @ 12.26 hrs, Volume= 2.047 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.652	98	Unconnected pavement, HSG D
1.214	98	Unconnected roofs, HSG D
1.443	98	Paved roads w/curbs & sewers, HSG D
0.758	98	Paved parking, HSG D
0.424	98	Roofs, HSG D
0.322	98	Water Surface, 0% imp, HSG D
0.084	96	Gravel surface, HSG D
0.179	89	Row crops, straight row, Good, HSG D
8.582	80	>75% Grass cover, Good, HSG D
1.401	78	Meadow, non-grazed, HSG D
15.059	86	Weighted Average
10.568	81	70.18% Pervious Area
4.491	98	29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	90	0.0378	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	57	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.3	1,670		3.00		**Direct Entry, Pipe flow @ 3 fps**
17.1	1,817	Total			

Subcatchment 25S: Direct to Proposed Northwest Pond



Summary for Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration

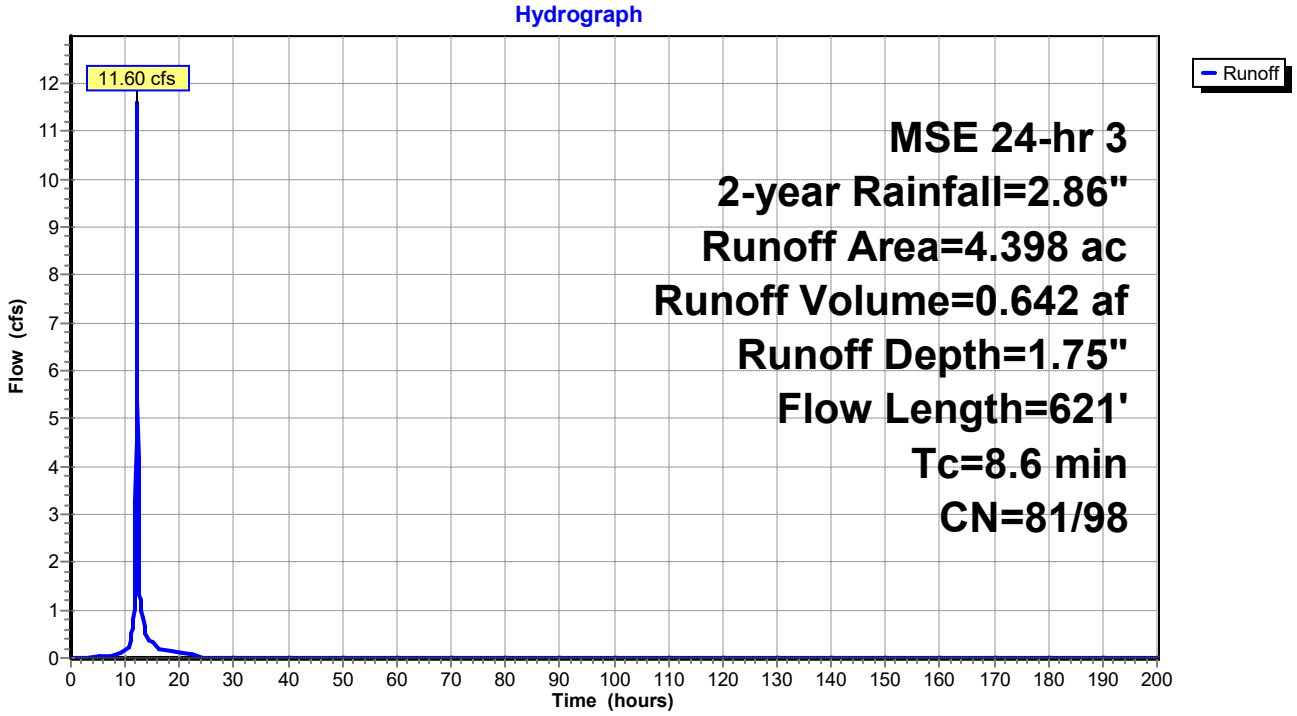
Runoff = 11.60 cfs @ 12.16 hrs, Volume= 0.642 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.170	98	Unconnected pavement, HSG D
0.393	98	Unconnected roofs, HSG D
0.551	98	Paved roads w/curbs & sewers, HSG D
0.354	98	Paved parking, HSG D
0.220	98	Roofs, HSG D
0.318	98	Water Surface, 0% imp, HSG D
1.487	80	>75% Grass cover, Good, HSG D
0.905	78	Meadow, non-grazed, HSG D
4.398	88	Weighted Average
2.710	81	61.62% Pervious Area
1.688	98	38.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration



Summary for Subcatchment 27S: Direct to Proposed Northwest Central Pond

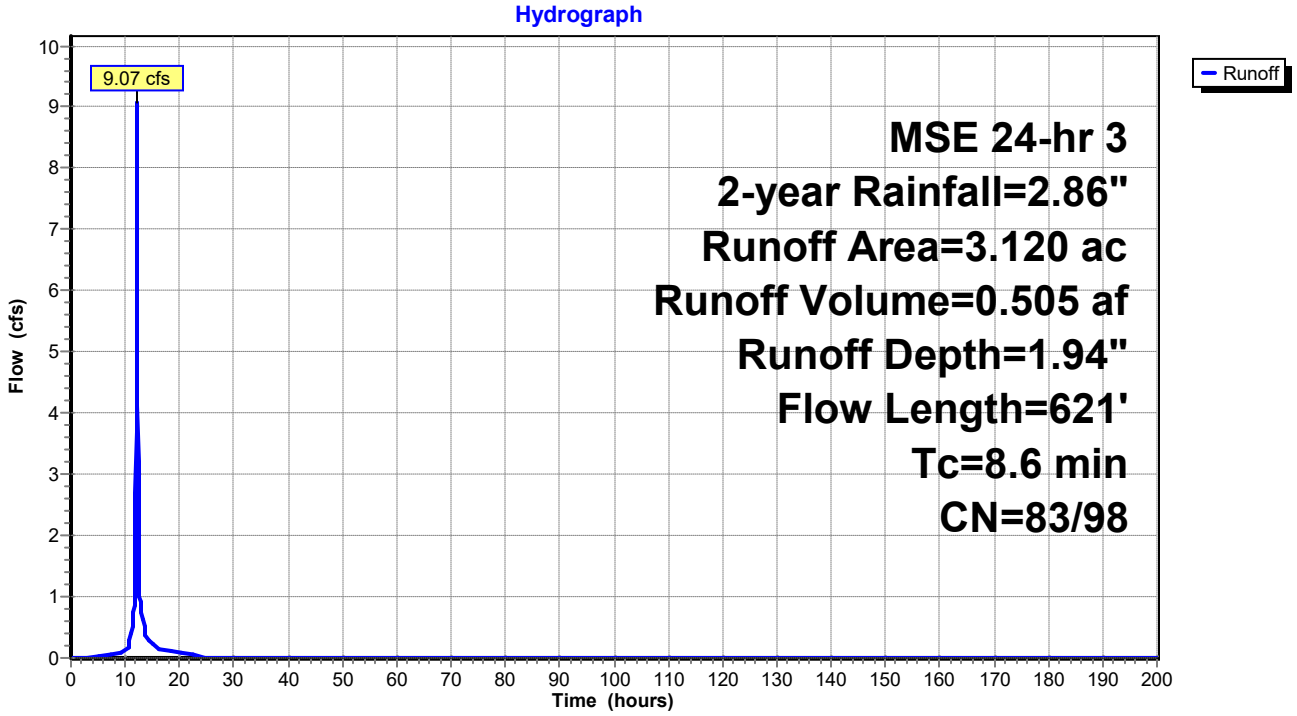
Runoff = 9.07 cfs @ 12.16 hrs, Volume= 0.505 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.134	98	Unconnected pavement, HSG D
0.275	98	Unconnected roofs, HSG D
0.506	98	Paved roads w/curbs & sewers, HSG D
0.328	98	Paved parking, HSG D
0.224	98	Roofs, HSG D
0.278	98	Water Surface, 0% imp, HSG D
0.979	80	>75% Grass cover, Good, HSG D
0.396	78	Meadow, non-grazed, HSG D
3.120	90	Weighted Average
1.653	83	52.98% Pervious Area
1.467	98	47.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 27S: Direct to Proposed Northwest Central Pond



Summary for Subcatchment 28S: Direct to Proposed Northeast Central Pond

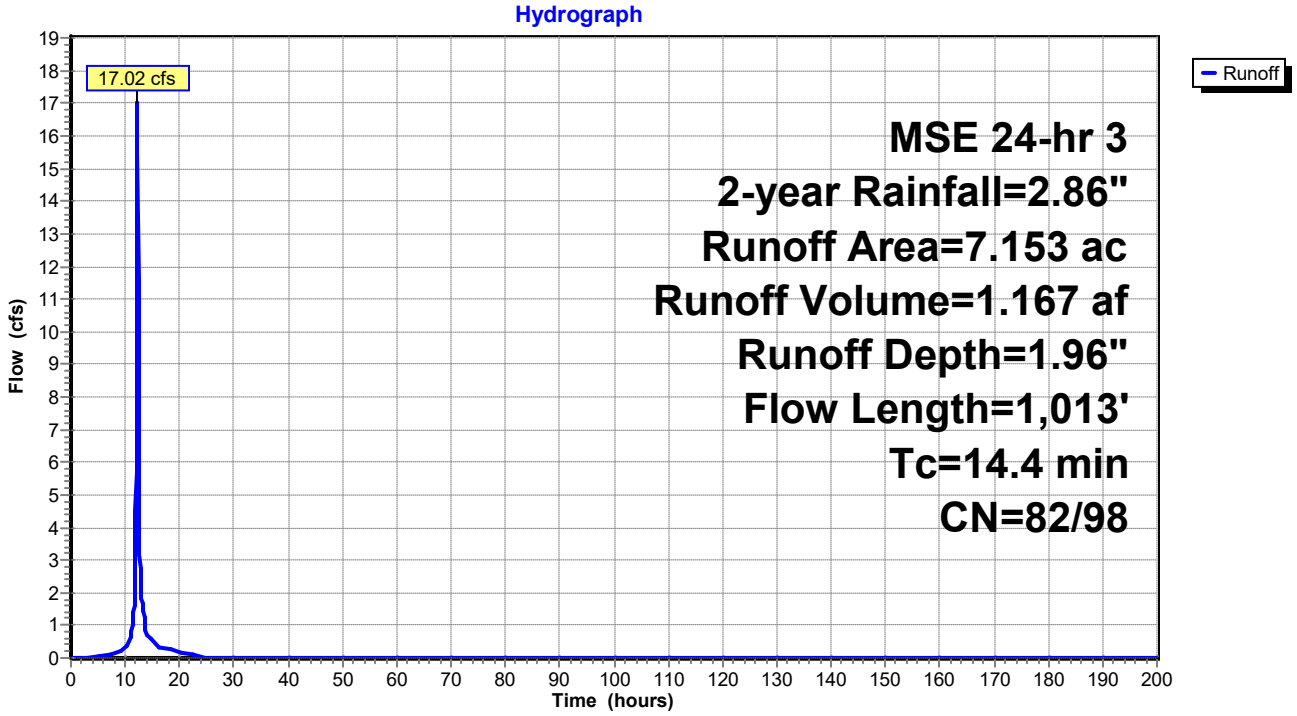
Runoff = 17.02 cfs @ 12.22 hrs, Volume= 1.167 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.152	98	Unconnected pavement, HSG D
0.932	98	Unconnected roofs, HSG D
0.930	98	Paved roads w/curbs & sewers, HSG D
1.004	98	Paved parking, HSG D
0.604	98	Roofs, HSG D
0.380	98	Water Surface, 0% imp, HSG D
2.416	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
0.051	77	Woods, Good, HSG D
7.153	90	Weighted Average
3.531	82	49.36% Pervious Area
3.622	98	50.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	71	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.6	242	0.0060	1.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.9	700		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.4	1,013	Total			

Subcatchment 28S: Direct to Proposed Northeast Central Pond



Summary for Subcatchment 30S: Direct to Wetland 4A

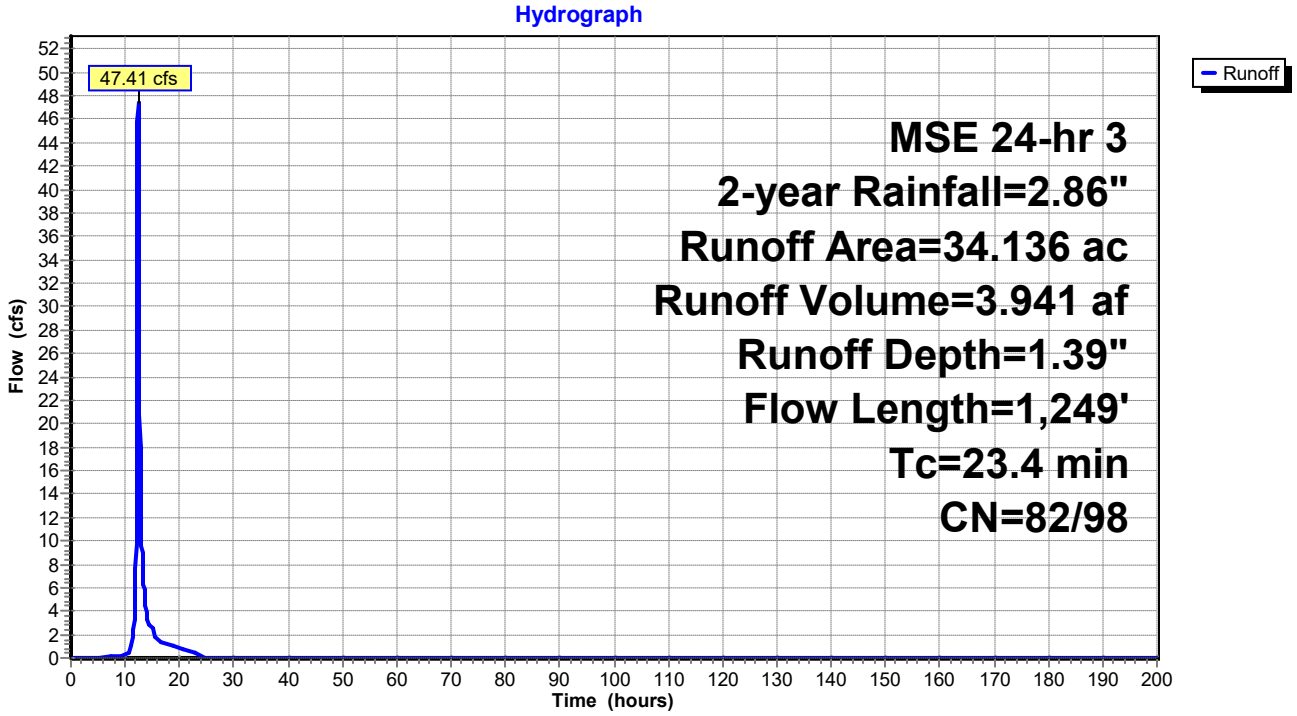
Runoff = 47.41 cfs @ 12.35 hrs, Volume= 3.941 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
1.401	98	Unconnected pavement, HSG D
1.502	98	Unconnected roofs, HSG D
0.939	96	Gravel surface, HSG D
6.512	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
18.400	80	>75% Grass cover, Good, HSG D
3.773	77	Woods, Good, HSG D
34.136	84	Weighted Average
31.233	82	91.50% Pervious Area
2.903	98	8.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

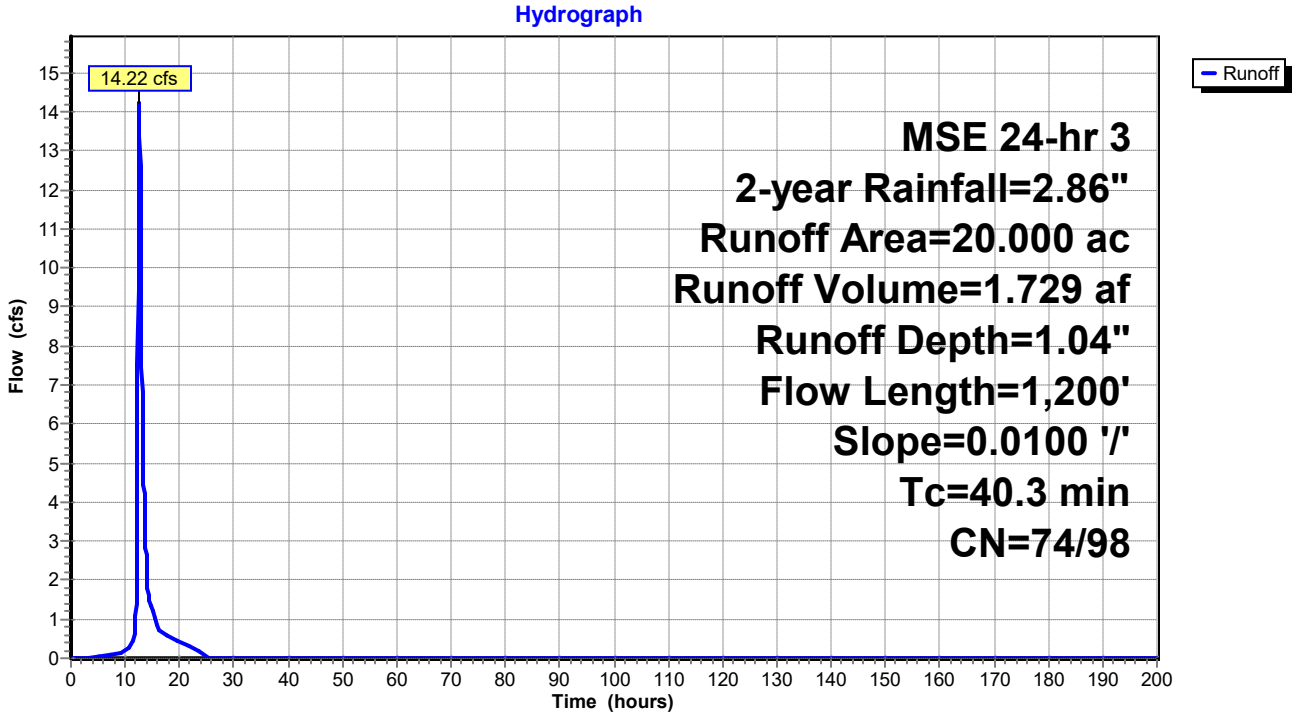
Runoff = 14.22 cfs @ 12.59 hrs, Volume= 1.729 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 32S: Direct to Proposed West Central Pond

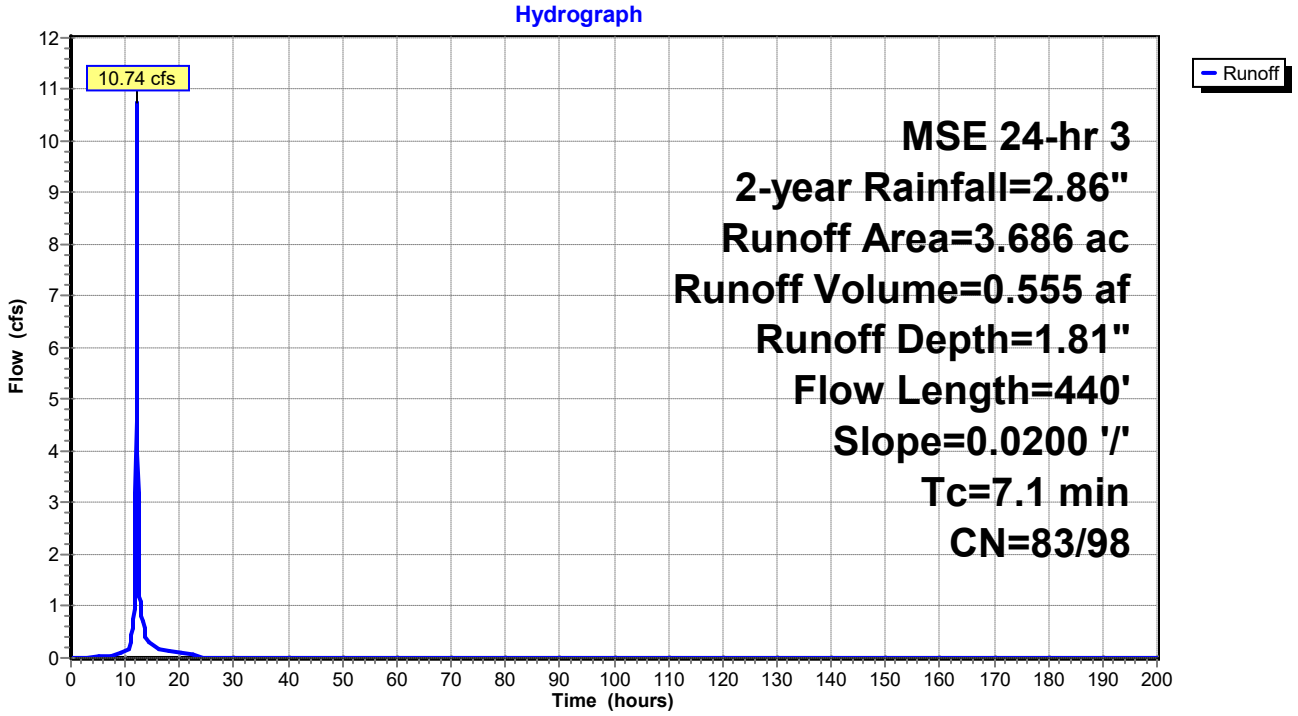
Runoff = 10.74 cfs @ 12.14 hrs, Volume= 0.555 af, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.438	98	Unconnected roofs, HSG D
0.377	98	Paved roads w/curbs & sewers, HSG D
0.298	98	Paved parking, HSG D
0.194	98	Roofs, HSG D
0.395	98	Water Surface, 0% imp, HSG D
1.443	80	>75% Grass cover, Good, HSG D
0.502	78	Meadow, non-grazed, HSG D
3.686	88	Weighted Average
2.340	83	63.48% Pervious Area
1.346	98	36.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.2	401		3.00		**Direct Entry,**
7.1	440	Total			

Subcatchment 32S: Direct to Proposed West Central Pond



Summary for Subcatchment 40S: Direct to Wetland 2B

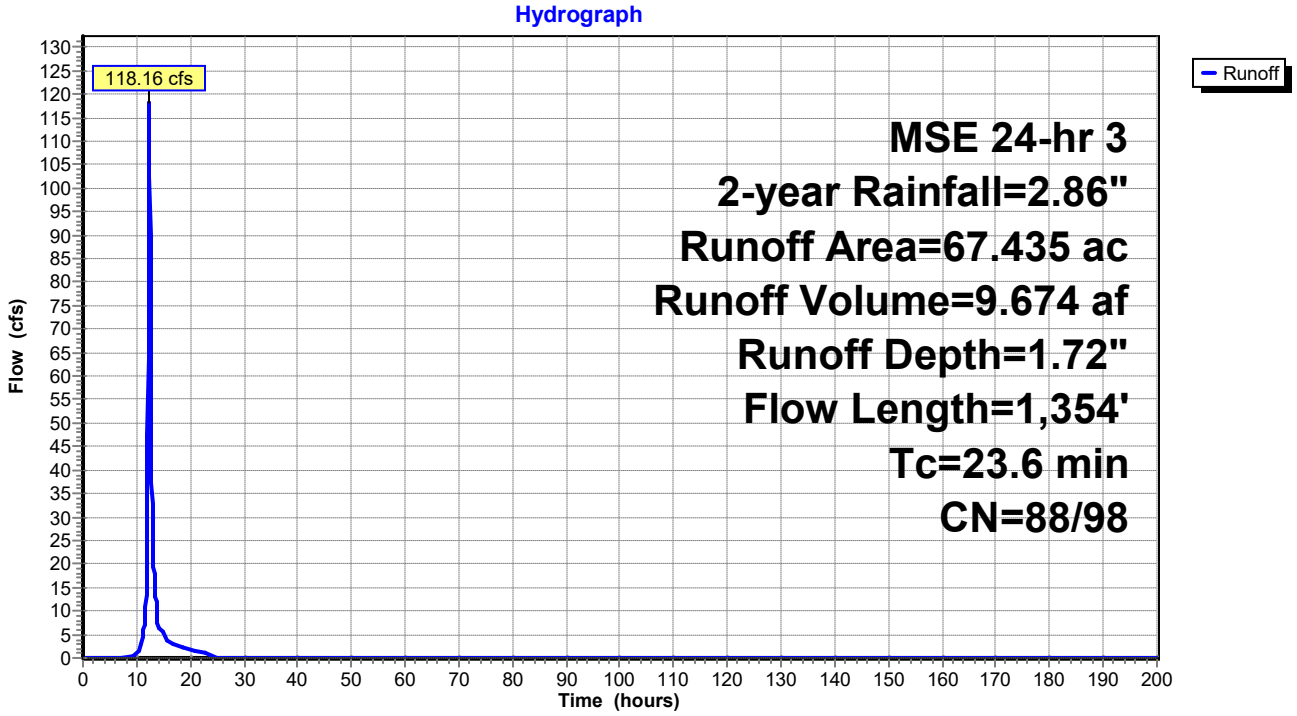
Runoff = 118.16 cfs @ 12.34 hrs, Volume= 9.674 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
1.003	98	Unconnected roofs, HSG D
17.214	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
27.306	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
9.713	80	>75% Grass cover, Good, HSG D
6.057	78	Meadow, non-grazed, HSG D
3.720	77	Woods, Good, HSG D
67.435	89	Weighted Average
65.467	88	97.08% Pervious Area
1.968	98	2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

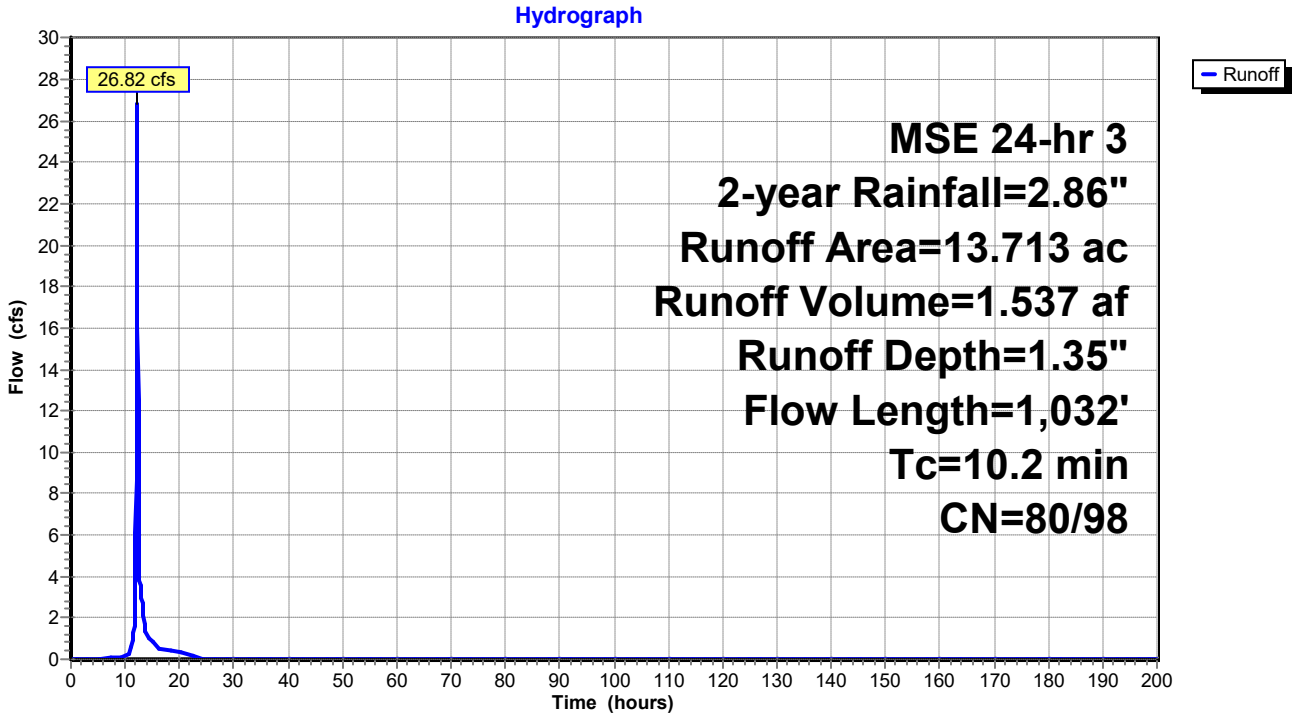
Runoff = 26.82 cfs @ 12.18 hrs, Volume= 1.537 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 42S: Direct to Proposed South Central Pond

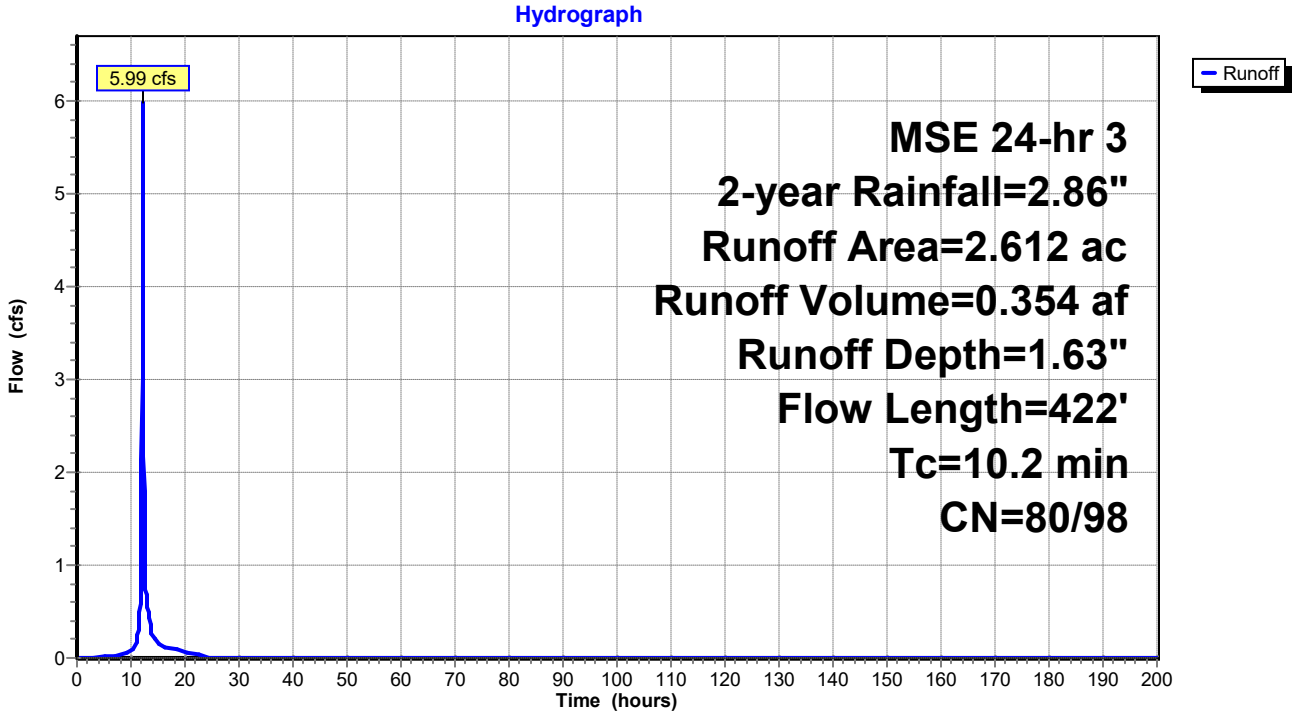
Runoff = 5.99 cfs @ 12.18 hrs, Volume= 0.354 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.013	98	Unconnected pavement, HSG D
0.362	98	Unconnected roofs, HSG D
0.246	98	Paved roads w/curbs & sewers, HSG D
0.145	98	Paved parking, HSG D
0.084	98	Roofs, HSG D
0.154	98	Water Surface, 0% imp, HSG D
0.600	80	>75% Grass cover, Good, HSG D
0.811	78	Meadow, non-grazed, HSG D
0.197	77	Woods, Good, HSG D
2.612	86	Weighted Average
1.762	80	67.46% Pervious Area
0.850	98	32.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
1.7	235	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	117		3.00		**Direct Entry, Pipe flow @ 3 fps**
10.2	422	Total			

Subcatchment 42S: Direct to Proposed South Central Pond



Summary for Subcatchment 43S: Direct to Proposed Central Pond

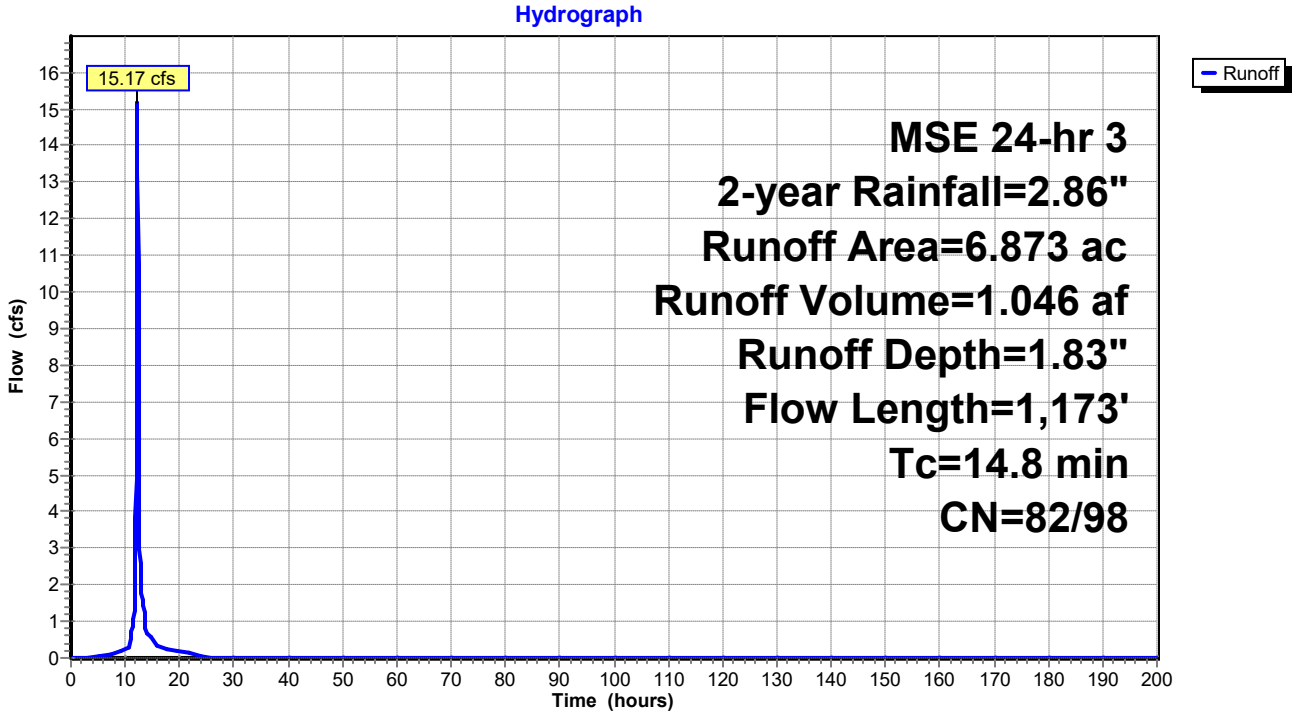
Runoff = 15.17 cfs @ 12.23 hrs, Volume= 1.046 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.205	98	Unconnected pavement, HSG D
0.855	98	Unconnected roofs, HSG D
0.896	98	Paved roads w/curbs & sewers, HSG D
0.530	98	Paved parking, HSG D
0.332	98	Roofs, HSG D
0.402	98	Water Surface, 0% imp, HSG D
0.383	89	Row crops, straight row, Good, HSG D
2.711	80	>75% Grass cover, Good, HSG D
0.559	78	Meadow, non-grazed, HSG D
6.873	89	Weighted Average
4.055	82	59.00% Pervious Area
2.818	98	41.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.5	286	0.0088	1.90		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	817		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.8	1,173	Total			

Subcatchment 43S: Direct to Proposed Central Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

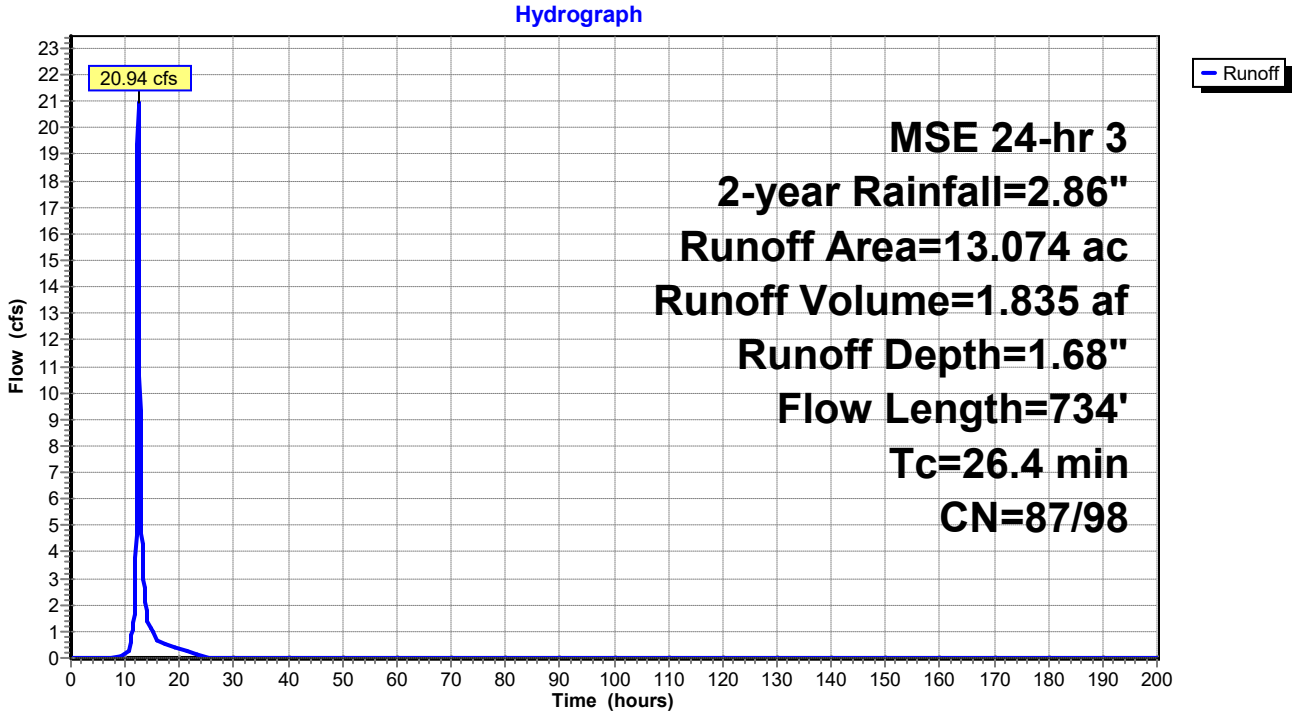
Runoff = 20.94 cfs @ 12.38 hrs, Volume= 1.835 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

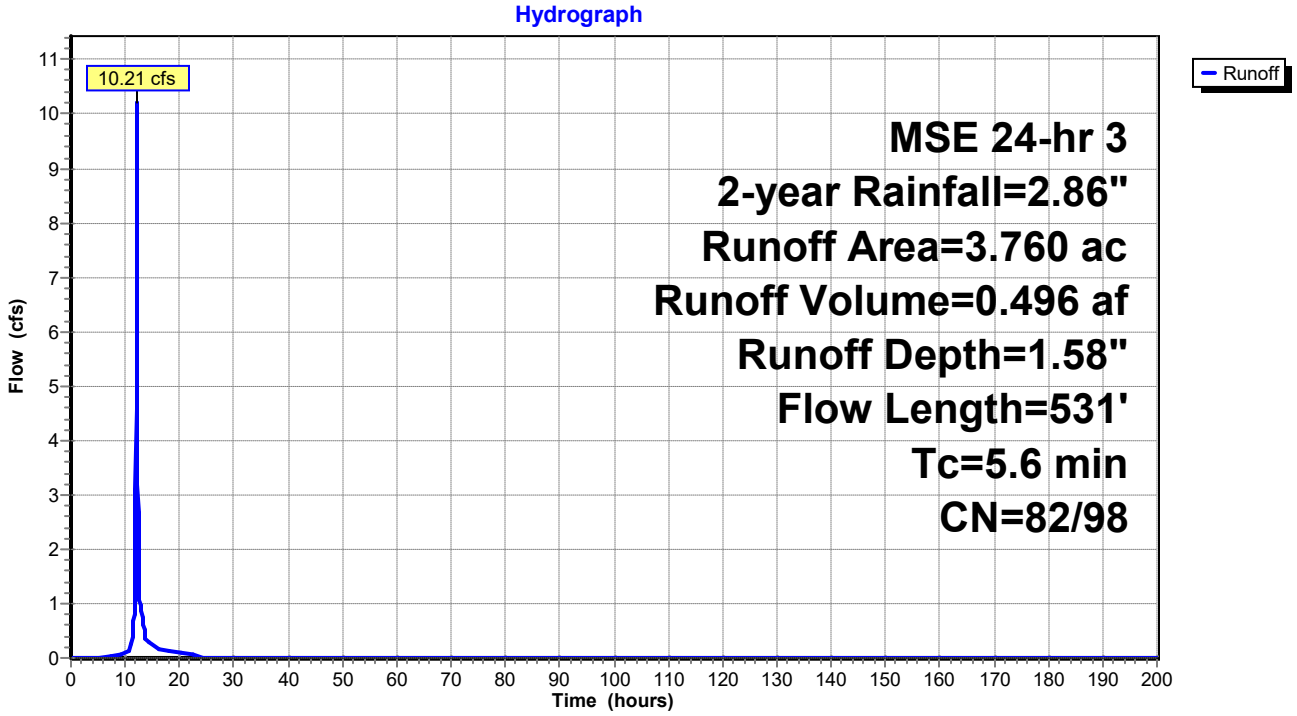
Runoff = 10.21 cfs @ 12.13 hrs, Volume= 0.496 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



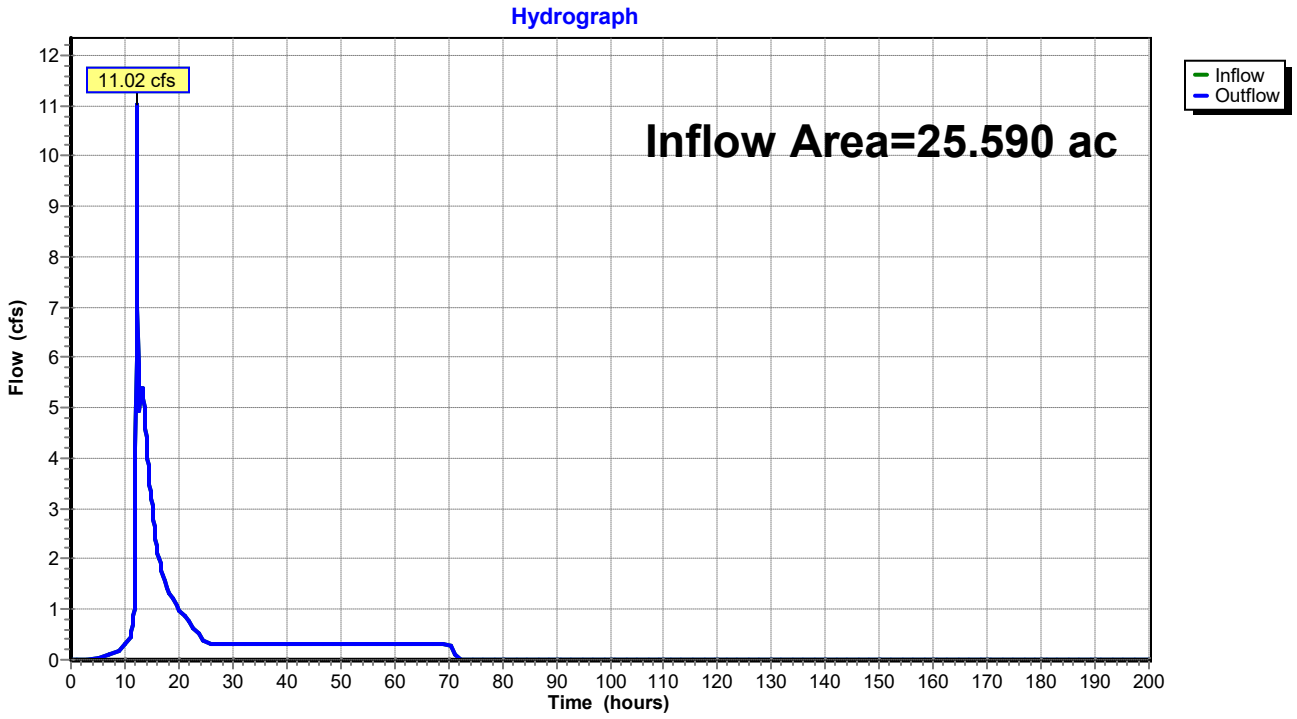
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.590 ac, 16.84% Impervious, Inflow Depth = 1.68" for 2-year event
Inflow = 11.02 cfs @ 12.24 hrs, Volume= 3.577 af
Outflow = 11.02 cfs @ 12.24 hrs, Volume= 3.577 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



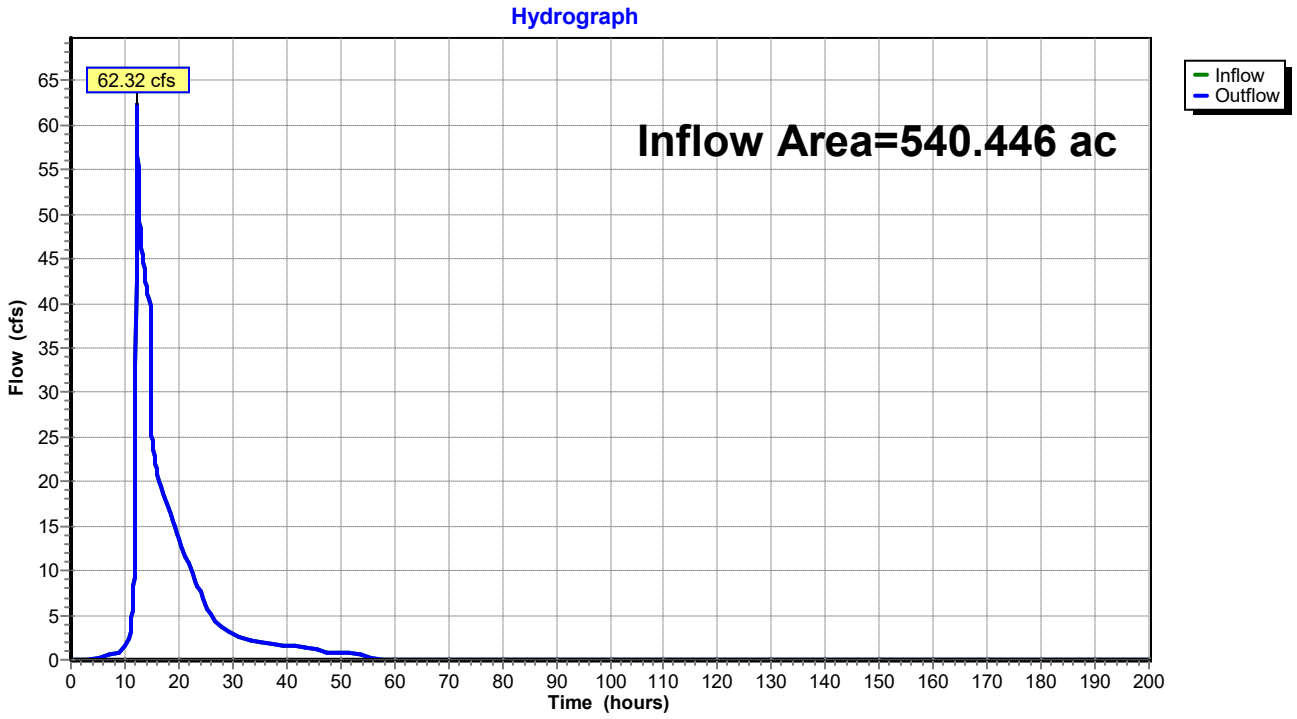
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.446 ac, 5.98% Impervious, Inflow Depth = 0.64" for 2-year event
Inflow = 62.32 cfs @ 12.24 hrs, Volume= 28.667 af
Outflow = 62.32 cfs @ 12.24 hrs, Volume= 28.667 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



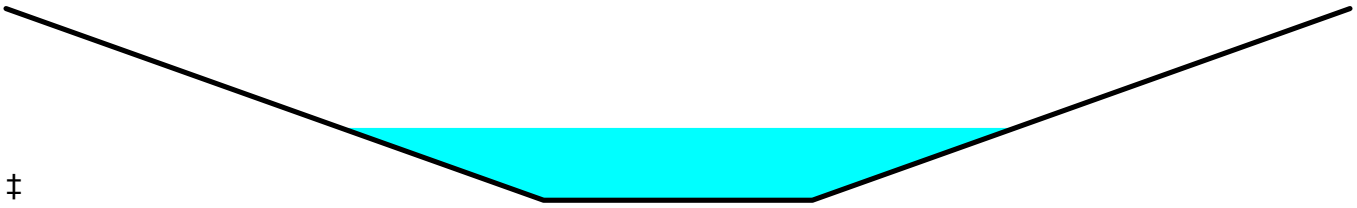
Summary for Reach 21R: Proposed East Channel

Inflow Area = 134.639 ac, 9.91% Impervious, Inflow Depth > 1.44" for 2-year event
Inflow = 19.13 cfs @ 13.63 hrs, Volume= 16.186 af
Outflow = 19.13 cfs @ 13.64 hrs, Volume= 16.186 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 4.4 min

Peak Storage= 1,047 cf @ 13.64 hrs
Average Depth at Peak Storage= 0.75'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 149.23 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 264.0' Slope= 0.0125 '/'
Inlet Invert= 923.50', Outlet Invert= 920.20'



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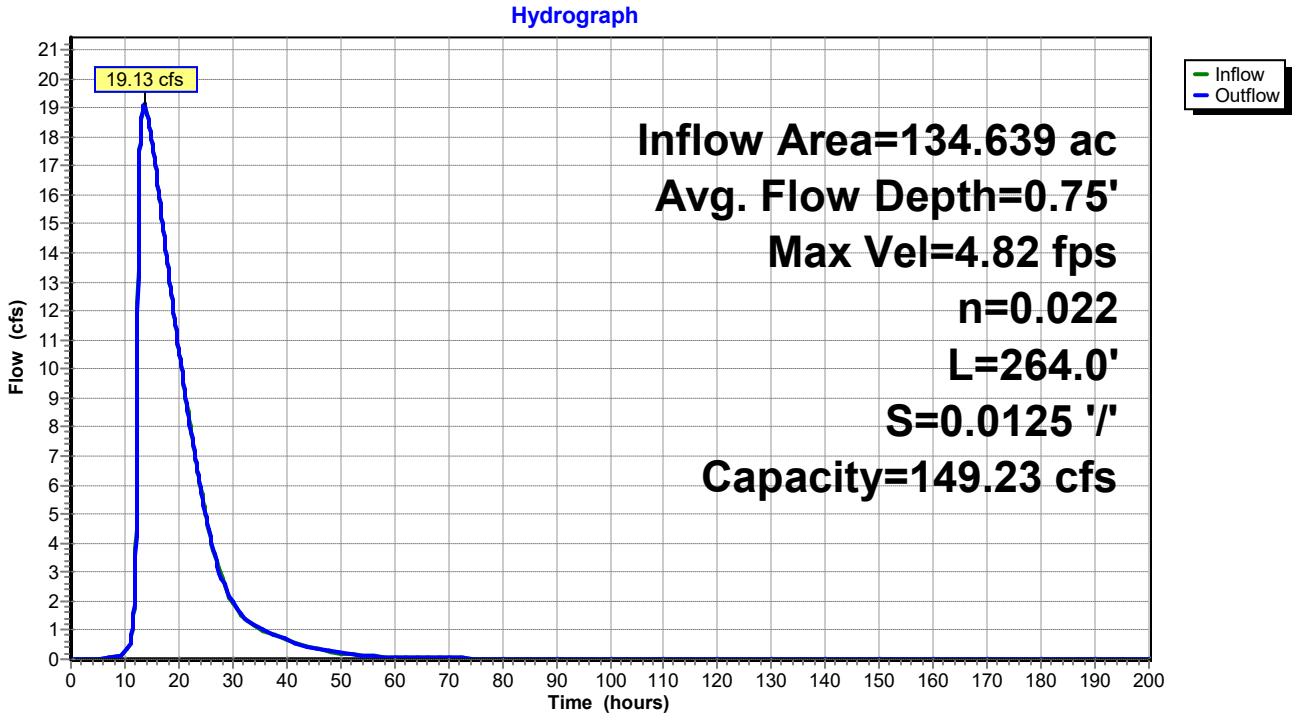
Reach 21R: Proposed East Channel



Summary for Reach 23R: Existing West Channel

Inflow Area = 375.878 ac, 3.58% Impervious, Inflow Depth = 0.28" for 2-year event
Inflow = 32.28 cfs @ 12.32 hrs, Volume= 8.880 af
Outflow = 32.22 cfs @ 12.34 hrs, Volume= 8.880 af, Atten= 0%, Lag= 1.1 min

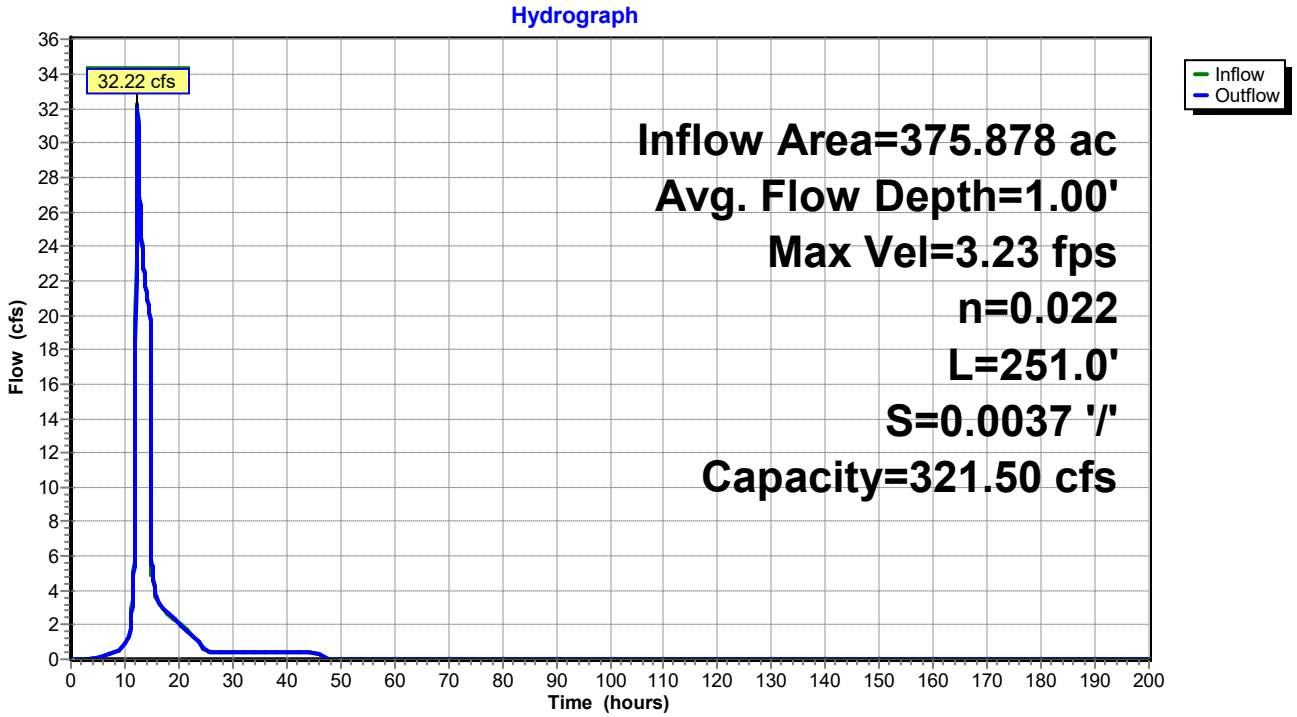
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.23 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 7.8 min

Peak Storage= 2,505 cf @ 12.34 hrs
Average Depth at Peak Storage= 1.00'
Bank-Full Depth= 3.00' Flow Area= 54.0 sf, Capacity= 321.50 cfs

6.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 '/' Top Width= 30.00'
Length= 251.0' Slope= 0.0037 '/'
Inlet Invert= 920.50', Outlet Invert= 919.58'

‡

Reach 23R: Existing West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 0.73" for 2-year event
Inflow = 185.67 cfs @ 12.43 hrs, Volume= 18.153 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 930.30' @ 25.55 hrs Surf.Area= 60.901 ac Storage= 18.153 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

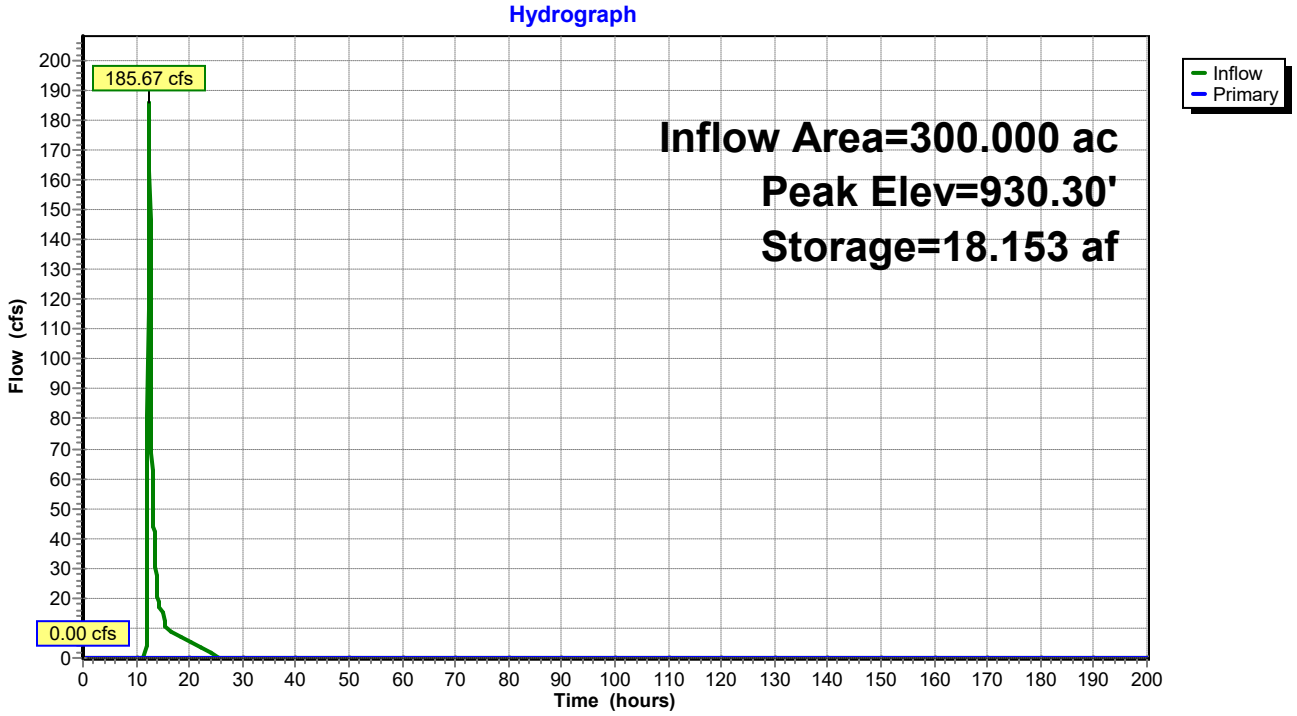
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=930.00' TW=930.22' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 10P: Proposed Northeast Pond/Filtration

[58] Hint: Peaked 0.35' above defined flood level

Inflow Area = 19.438 ac, 21.11% Impervious, Inflow Depth = 1.77" for 2-year event
Inflow = 34.17 cfs @ 12.34 hrs, Volume= 2.871 af
Outflow = 4.30 cfs @ 13.39 hrs, Volume= 2.871 af, Atten= 87%, Lag= 62.9 min
Primary = 4.30 cfs @ 13.39 hrs, Volume= 2.871 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 921.00' Surf.Area= 0.662 ac Storage= 2.955 af
Peak Elev= 922.35' @ 13.39 hrs Surf.Area= 1.411 ac Storage= 4.697 af (1.742 af above start)
Flood Elev= 922.00' Surf.Area= 1.255 ac Storage= 4.104 af (1.149 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 941.7 min (1,745.9 - 804.3)

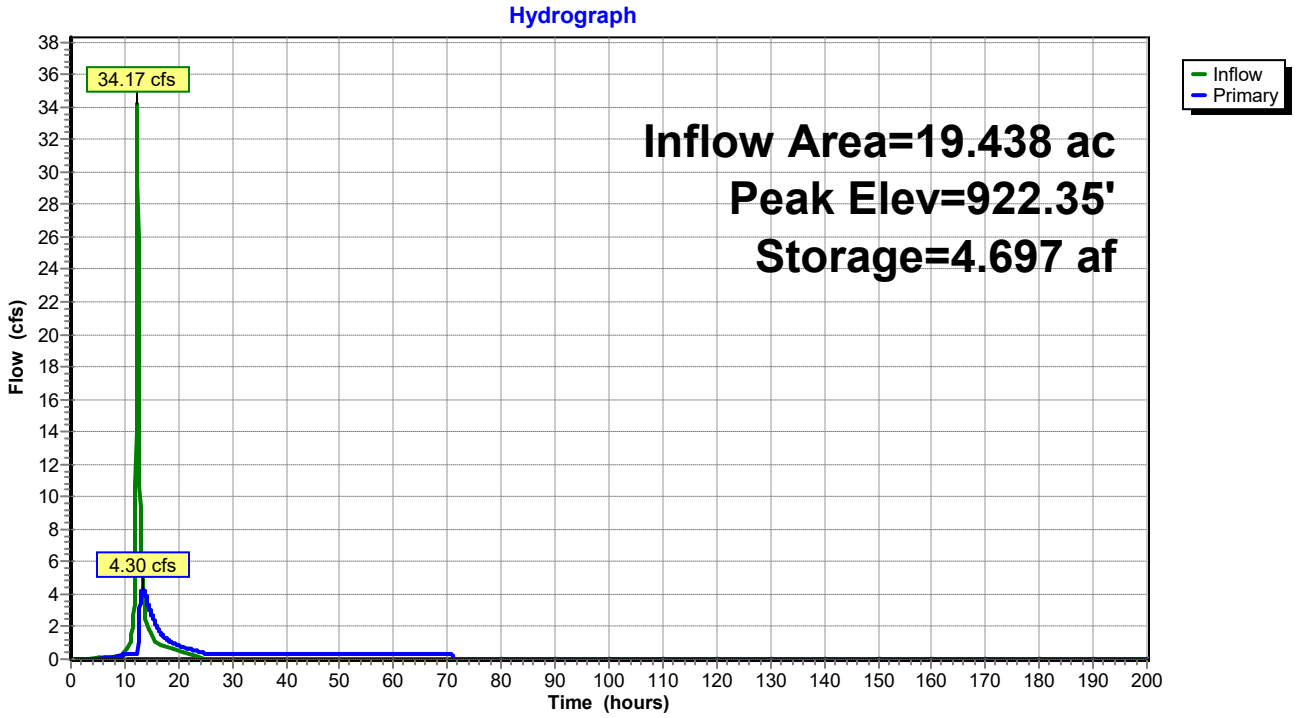
Volume	Invert	Avail.Storage	Storage Description
#1	913.00'	9.359 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
913.00	0.209	0.000	0.000
914.00	0.242	0.226	0.226
916.00	0.314	0.556	0.781
918.00	0.396	0.710	1.491
920.00	0.491	0.887	2.378
921.00	0.662	0.576	2.955
921.01	1.049	0.009	2.964
922.00	1.255	1.140	4.104
924.00	2.149	3.404	7.508
925.00	1.553	1.851	9.359

Device	Routing	Invert	Outlet Devices
#1	Primary	918.50'	**36.0" Round Culvert** L= 113.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.50' / 918.00' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	922.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	923.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	920.00'	**21.0" Round Culvert** L= 45.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 920.00' S= -0.0444 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	921.00'	**0.31 cfs Exfiltration when above 921.00'** Phase-In= 0.01'

Primary OutFlow Max=4.30 cfs @ 13.39 hrs HW=922.35' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.30 cfs of 45.69 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.99 cfs @ 1.93 fps)
  │ └─**4=Culvert** (Passes 3.99 cfs of 6.84 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.31 cfs)

Pond 10P: Proposed Northeast Pond/Filtration



Summary for Pond 25P: Proposed Northwest Pond/Filtration

Inflow Area = 15.059 ac, 29.82% Impervious, Inflow Depth = 1.63" for 2-year event
Inflow = 27.99 cfs @ 12.26 hrs, Volume= 2.047 af
Outflow = 0.54 cfs @ 10.90 hrs, Volume= 2.047 af, Atten= 98%, Lag= 0.0 min
Primary = 0.54 cfs @ 10.90 hrs, Volume= 2.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 925.00' Surf.Area= 0.322 ac Storage= 1.156 af
Peak Elev= 926.22' @ 17.82 hrs Surf.Area= 1.328 ac Storage= 2.622 af (1.466 af above start)
Flood Elev= 926.50' Surf.Area= 1.369 ac Storage= 3.002 af (1.846 af above start)

Plug-Flow detention time= 1,970.1 min calculated for 0.890 af (44% of inflow)
Center-of-Mass det. time= 1,092.8 min (1,889.2 - 796.4)

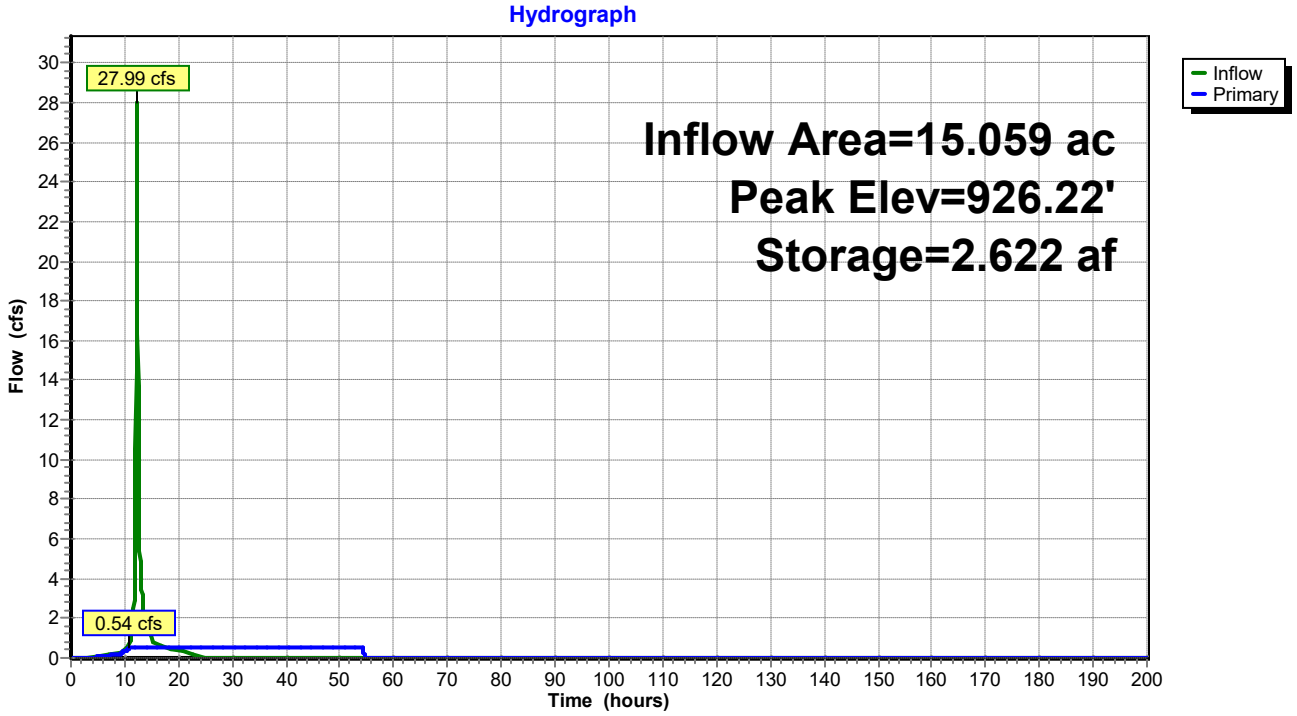
Volume	Invert	Avail.Storage	Storage Description
#1	917.00'	5.216 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
917.00	0.052	0.000	0.000
918.00	0.069	0.061	0.061
920.00	0.110	0.179	0.239
922.00	0.160	0.270	0.509
924.00	0.217	0.377	0.887
925.00	0.322	0.269	1.156
925.01	1.071	0.007	1.163
926.00	1.297	1.172	2.335
928.00	1.584	2.881	5.216

Device	Routing	Invert	Outlet Devices
#1	Primary	922.50'	**21.0" Round Culvert** L= 46.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.50' / 922.00' S= 0.0109 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	926.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	927.40'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	922.00'	**18.0" Round Culvert** L= 42.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 921.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#5	Device 1	925.00'	**0.54 cfs Exfiltration when above 925.00'** Phase-In= 0.01'

Primary OutFlow Max=0.54 cfs @ 10.90 hrs HW=925.01' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.54 cfs of 14.66 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  │ └─**4=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.54 cfs)

Pond 25P: Proposed Northwest Pond/Filtration



Summary for Pond 26P: Proposed Northwest Central Pond/Filtration

Inflow Area = 7.518 ac, 41.97% Impervious, Inflow Depth = 1.83" for 2-year event
Inflow = 12.53 cfs @ 12.16 hrs, Volume= 1.145 af
Outflow = 0.37 cfs @ 11.15 hrs, Volume= 1.145 af, Atten= 97%, Lag= 0.0 min
Primary = 0.37 cfs @ 11.15 hrs, Volume= 1.145 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.00' Surf.Area= 0.318 ac Storage= 0.894 af
Peak Elev= 924.81' @ 17.71 hrs Surf.Area= 0.899 ac Storage= 1.573 af (0.679 af above start)
Flood Elev= 925.50' Surf.Area= 0.997 ac Storage= 2.227 af (1.333 af above start)

Plug-Flow detention time= 2,015.1 min calculated for 0.251 af (22% of inflow)
Center-of-Mass det. time= 762.3 min (1,716.4 - 954.1)

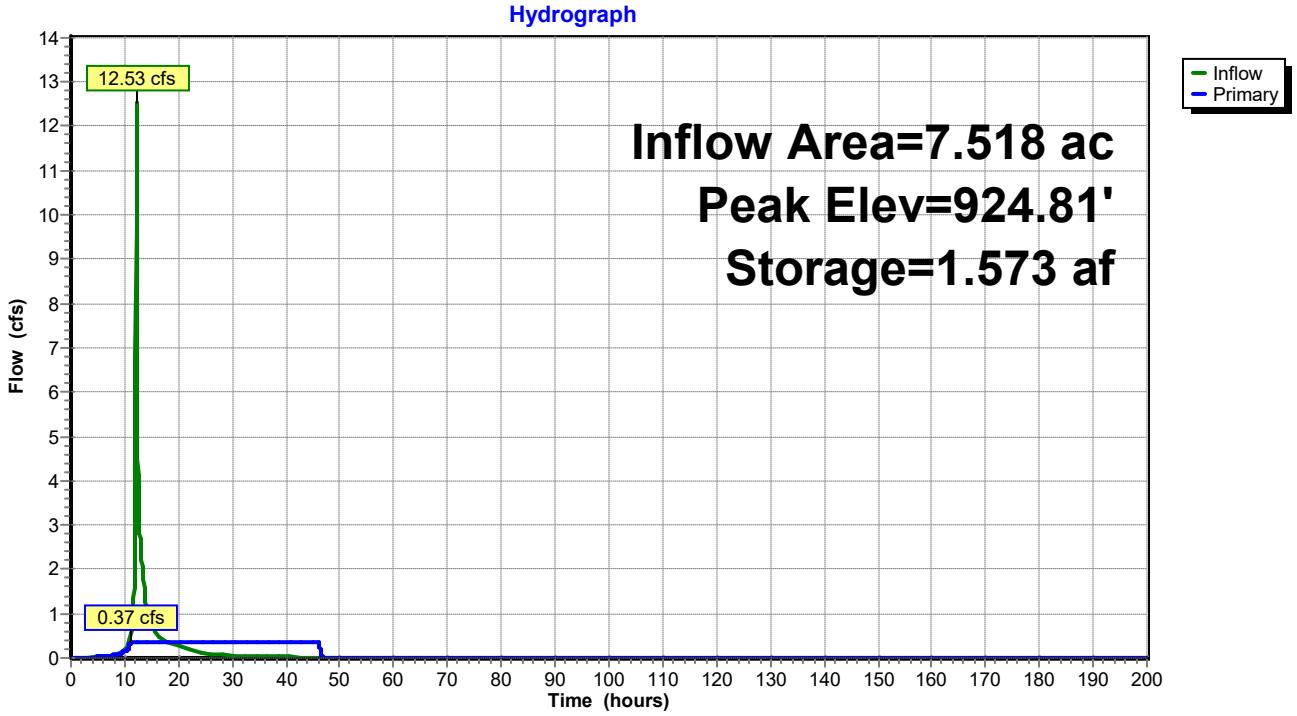
Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	3.855 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.00	0.009	0.000	0.000
918.00	0.045	0.054	0.054
920.00	0.099	0.144	0.198
922.00	0.162	0.261	0.459
923.00	0.195	0.179	0.637
924.00	0.318	0.256	0.894
924.01	0.784	0.006	0.900
926.00	1.069	1.844	2.743
927.00	1.155	1.112	3.855

Device	Routing	Invert	Outlet Devices
#1	Primary	921.50'	**21.0" Round Culvert** L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.50' / 921.00' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	925.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	926.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	921.00'	**21.0" Round Culvert** L= 44.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 920.00' / 921.00' S= -0.0227 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	924.00'	**0.37 cfs Exfiltration when above 924.00'** Phase-In= 0.01'

Primary OutFlow Max=0.37 cfs @ 11.15 hrs HW=924.01' TW=920.74' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.37 cfs of 13.00 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
    - **4=Culvert** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Exfiltration** (Exfiltration Controls 0.37 cfs)

Pond 26P: Proposed Northwest Central Pond/Filtration



Summary for Pond 27P: Proposed Northwest Central Pond

Inflow Area = 3.120 ac, 47.02% Impervious, Inflow Depth = 1.94" for 2-year event
Inflow = 9.07 cfs @ 12.16 hrs, Volume= 0.505 af
Outflow = 1.70 cfs @ 12.52 hrs, Volume= 0.502 af, Atten= 81%, Lag= 22.0 min
Primary = 1.70 cfs @ 12.52 hrs, Volume= 0.502 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.50' Surf.Area= 0.278 ac Storage= 0.732 af
Peak Elev= 925.29' @ 12.52 hrs Surf.Area= 0.391 ac Storage= 0.996 af (0.265 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 396.3 min (1,173.3 - 777.1)

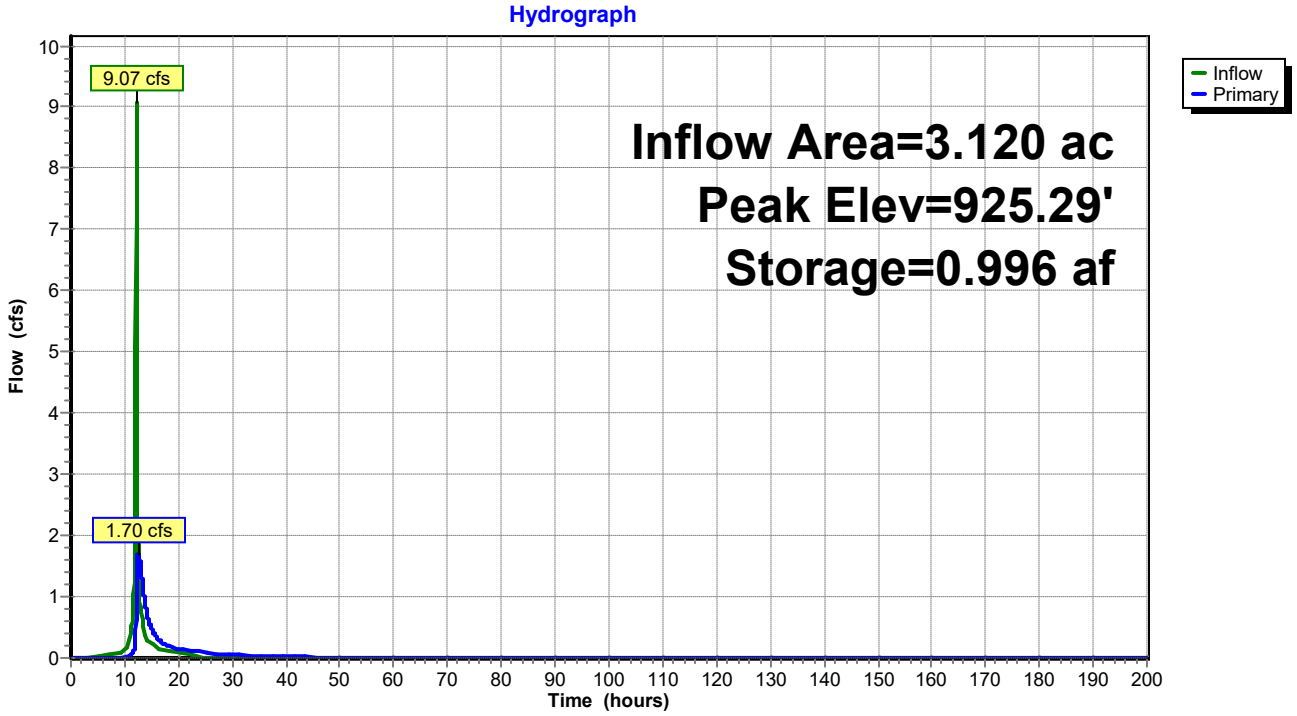
Volume	Invert	Avail.Storage	Storage Description
#1	916.50'	1.797 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.50	0.015	0.000	0.000
917.00	0.019	0.008	0.008
918.00	0.031	0.025	0.033
920.00	0.063	0.094	0.128
922.00	0.114	0.177	0.304
923.50	0.162	0.207	0.512
924.50	0.278	0.220	0.732
925.50	0.420	0.349	1.081
926.00	0.459	0.220	1.300
927.00	0.535	0.497	1.797

Device	Routing	Invert	Outlet Devices
#1	Primary	924.50'	**18.0" Round Culvert** L= 225.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.50' / 924.00' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	926.50'	**48.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	923.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 923.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=1.70 cfs @ 12.52 hrs HW=925.29' TW=924.47' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.70 cfs @ 2.61 fps)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 1.70 cfs of 7.57 cfs potential flow)

Pond 27P: Proposed Northwest Central Pond



Summary for Pond 28P: Proposed Northeast Central Pond

Inflow Area = 7.153 ac, 50.64% Impervious, Inflow Depth = 1.96" for 2-year event
Inflow = 17.02 cfs @ 12.22 hrs, Volume= 1.167 af
Outflow = 9.47 cfs @ 12.40 hrs, Volume= 1.167 af, Atten= 44%, Lag= 10.6 min
Primary = 9.47 cfs @ 12.40 hrs, Volume= 1.167 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 922.00' Surf.Area= 0.380 ac Storage= 1.043 af
Peak Elev= 922.71' @ 12.40 hrs Surf.Area= 0.511 ac Storage= 1.359 af (0.316 af above start)

Plug-Flow detention time= 681.3 min calculated for 0.124 af (11% of inflow)
Center-of-Mass det. time= 41.5 min (822.2 - 780.7)

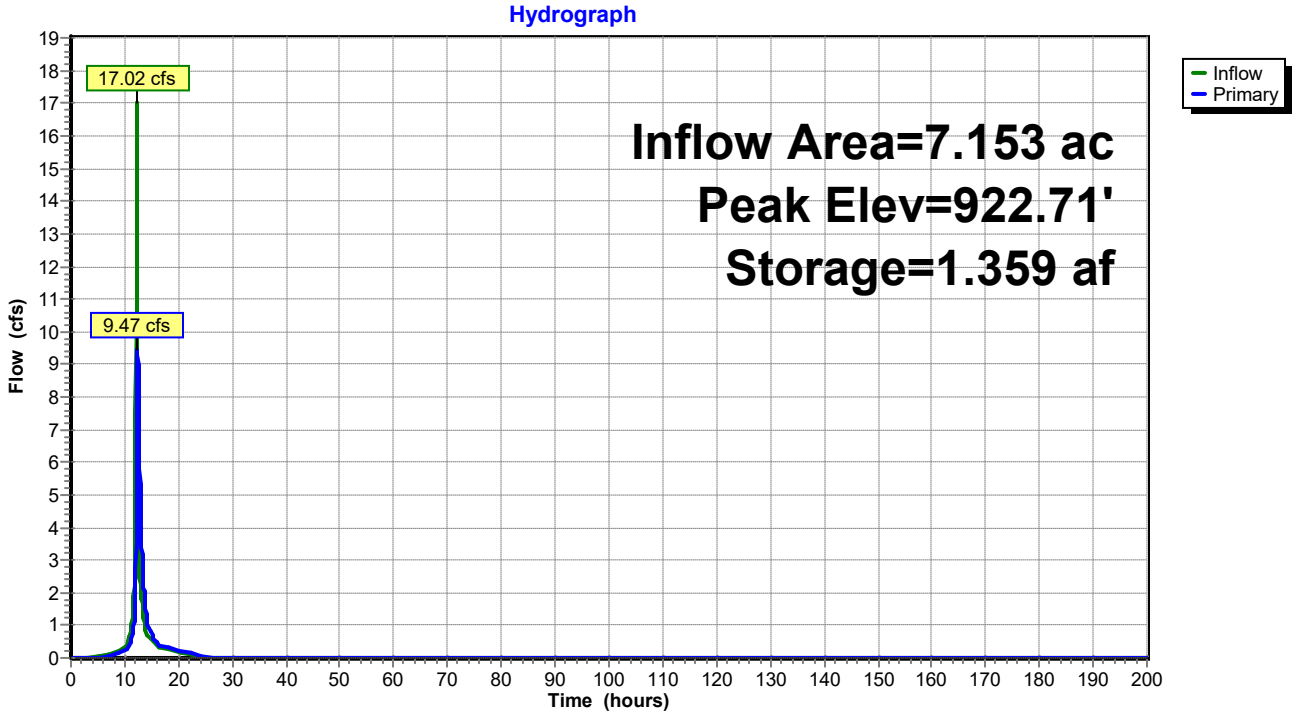
Volume	Invert	Avail.Storage	Storage Description
#1	914.00'	2.802 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
914.00	0.034	0.000	0.000
916.00	0.065	0.099	0.099
918.00	0.109	0.174	0.273
920.00	0.172	0.281	0.554
921.00	0.213	0.192	0.746
922.00	0.380	0.297	1.043
923.00	0.565	0.472	1.515
924.00	0.642	0.603	2.119
925.00	0.724	0.683	2.802

Device	Routing	Invert	Outlet Devices
#1	Primary	921.00'	**24.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.00' / 920.80' S= 0.0057 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	923.25'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	922.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 3	919.00'	**21.0" Round Culvert** L= 33.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 919.00' S= -0.0303 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=9.47 cfs @ 12.40 hrs HW=922.71' TW=921.49' (Dynamic Tailwater)
- **1=Culvert** (Passes 9.47 cfs of 9.89 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Sharp-Crested Rectangular Weir** (Weir Controls 9.47 cfs @ 2.75 fps)
    - **4=Culvert** (Passes 9.47 cfs of 9.75 cfs potential flow)

Pond 28P: Proposed Northeast Central Pond



Summary for Pond 30P: Wetland 4A

[44] Hint: Outlet device #5 is below defined storage

Inflow Area = 357.822 ac, 1.86% Impervious, Inflow Depth = 0.21" for 2-year event
Inflow = 61.25 cfs @ 12.37 hrs, Volume= 6.225 af
Outflow = 19.74 cfs @ 13.05 hrs, Volume= 6.225 af, Atten= 68%, Lag= 40.5 min
Primary = 16.70 cfs @ 13.02 hrs, Volume= 4.022 af
Secondary = 3.04 cfs @ 13.22 hrs, Volume= 2.203 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 925.77' @ 13.02 hrs Surf.Area= 4.135 ac Storage= 1.671 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 26.9 min (854.4 - 827.5)

Volume	Invert	Avail.Storage	Storage Description
#1	923.50'	15.942 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

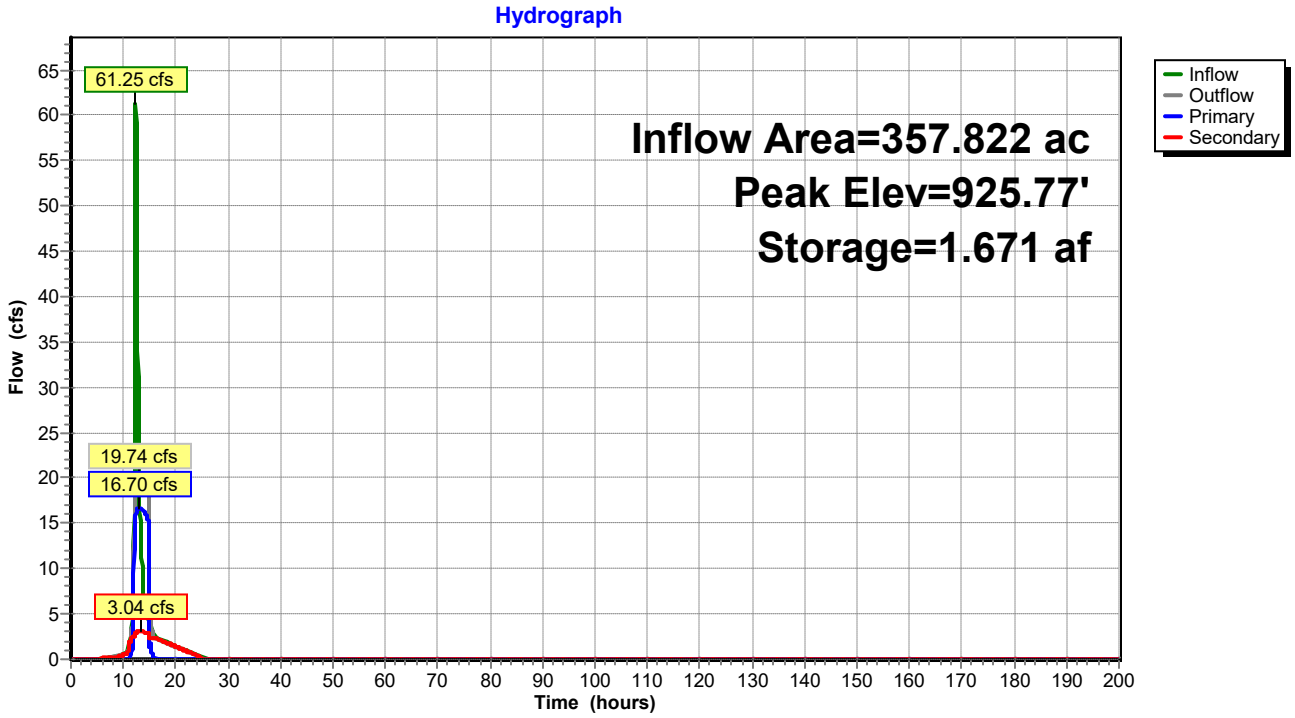
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.50	0.011	0.000	0.000
924.00	0.027	0.009	0.009
925.00	0.058	0.042	0.052
926.00	5.338	2.698	2.750
927.00	6.566	5.952	8.702
928.00	7.914	7.240	15.942

Device	Routing	Invert	Outlet Devices
#1	Primary	921.11'	**36.0" Round 36" RCP** L= 307.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.11' / 920.50' S= 0.0020 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 7.07 sf
#2	Device 1	926.00'	**60.0" Horiz. CBMH-3003** C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.17'	**18.0" Round 18" RCP** L= 23.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 921.17' / 921.11' S= 0.0026 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#4	Device 3	923.50'	**48.0" Horiz. CBMH-3004** C= 0.600 Limited to weir flow at low heads
#5	Secondary	919.60'	**12.0" Round 12" Draintile** L= 553.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.34' / 919.60' S= -0.0005 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=16.70 cfs @ 13.02 hrs HW=925.77' TW=921.38' (Dynamic Tailwater)
└─**1=36" RCP** (Passes 16.70 cfs of 44.28 cfs potential flow)
  └─**2=CBMH-3003** (Controls 0.00 cfs)
  └─**3=18" RCP** (Inlet Controls 16.70 cfs @ 9.45 fps)
    └─**4=CBMH-3004** (Passes 16.70 cfs of 91.20 cfs potential flow)

Secondary OutFlow Max=3.05 cfs @ 13.22 hrs HW=925.76' TW=921.36' (Dynamic Tailwater)
└─**5=12" Draintile** (Outlet Controls 3.05 cfs @ 3.88 fps)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[80] Warning: Exceeded Pond 7P by 2.14' @ 12.65 hrs (149.57 cfs 7.851 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth = 0.06" for 2-year event
Inflow = 14.22 cfs @ 12.59 hrs, Volume= 1.729 af
Outflow = 13.72 cfs @ 12.67 hrs, Volume= 1.729 af, Atten= 4%, Lag= 4.9 min
Primary = 13.72 cfs @ 12.67 hrs, Volume= 1.729 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 932.25' @ 12.67 hrs Surf.Area= 0.101 ac Storage= 0.018 af

Plug-Flow detention time= 0.3 min calculated for 1.729 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (841.7 - 841.4)

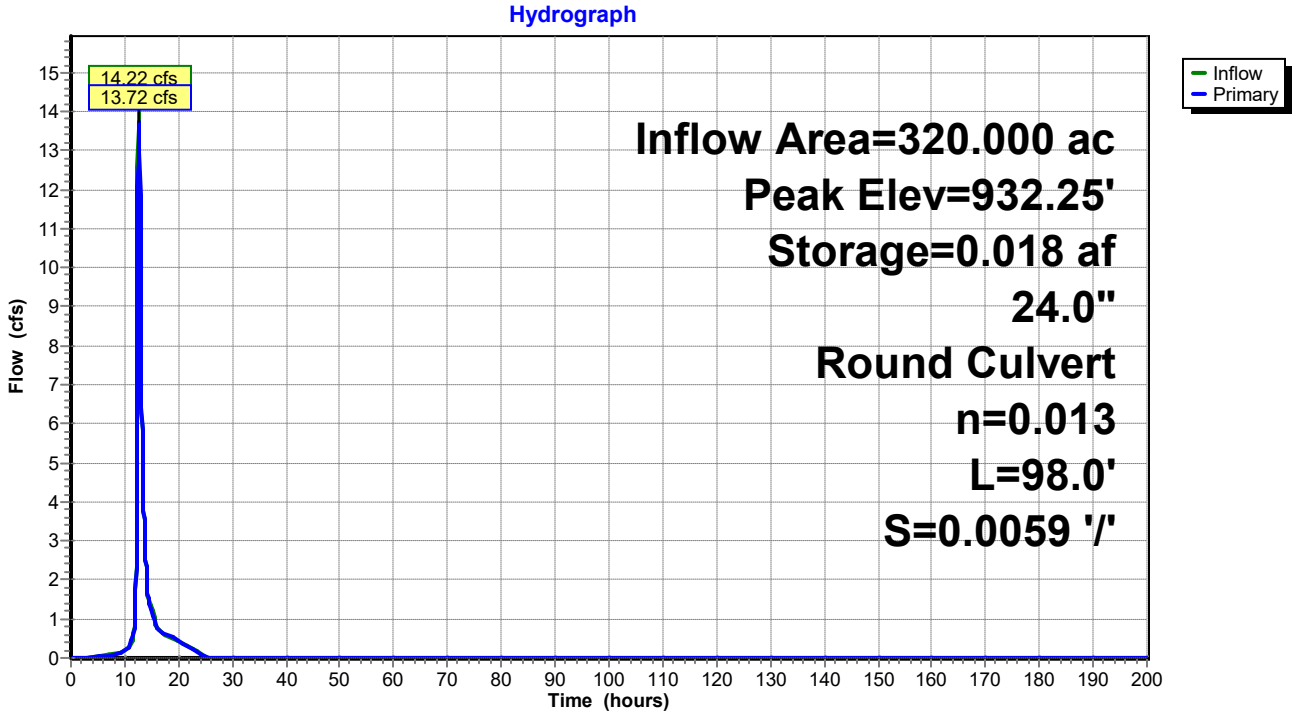
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=13.70 cfs @ 12.67 hrs HW=932.25' TW=925.71' (Dynamic Tailwater)
1=Culvert (Barrel Controls 13.70 cfs @ 5.35 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 32P: Proposed West Central Pond

Inflow Area = 3.686 ac, 36.52% Impervious, Inflow Depth = 1.81" for 2-year event
Inflow = 10.74 cfs @ 12.14 hrs, Volume= 0.555 af
Outflow = 4.39 cfs @ 12.29 hrs, Volume= 0.555 af, Atten= 59%, Lag= 8.8 min
Primary = 4.39 cfs @ 12.29 hrs, Volume= 0.555 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.00' Surf.Area= 0.395 ac Storage= 1.213 af
Peak Elev= 928.42' @ 12.29 hrs Surf.Area= 0.462 ac Storage= 1.393 af (0.180 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 54.0 min (835.7 - 781.7)

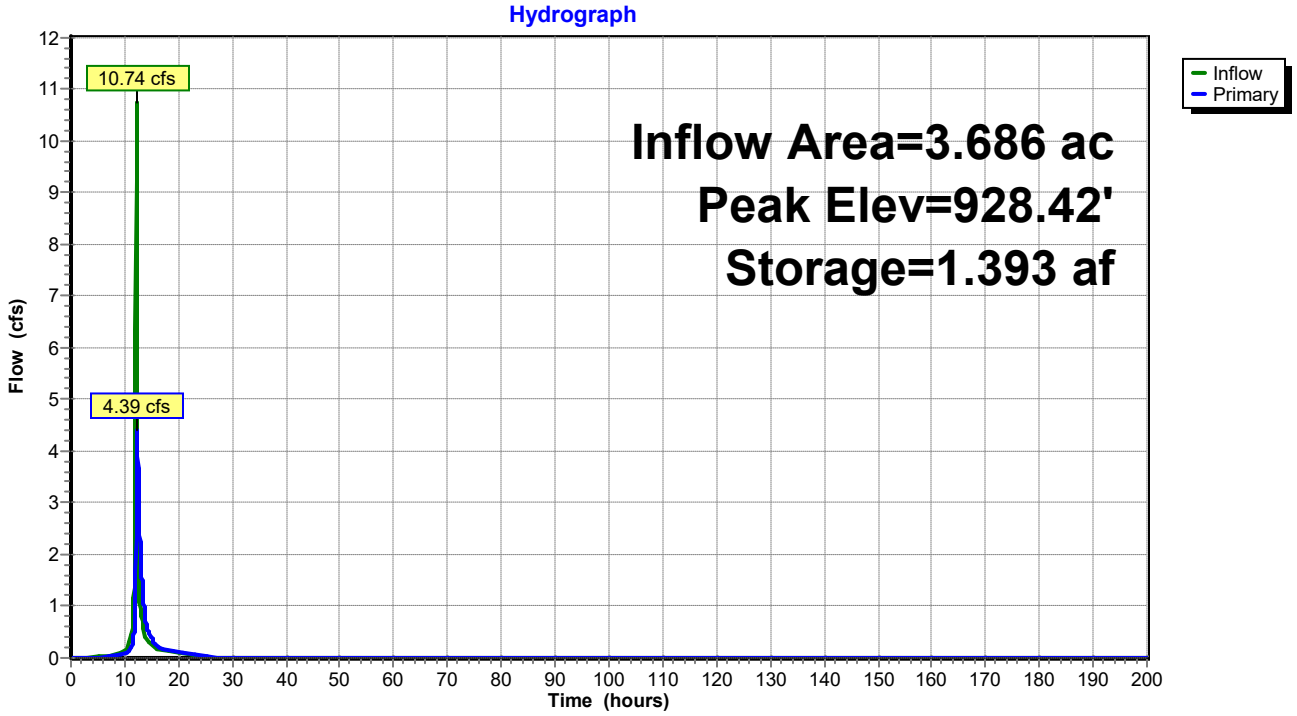
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2.284 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
920.00	0.034	0.000	0.000
922.00	0.073	0.107	0.107
924.00	0.134	0.207	0.314
926.00	0.211	0.345	0.659
927.00	0.251	0.231	0.890
928.00	0.395	0.323	1.213
929.00	0.554	0.475	1.687
930.00	0.638	0.596	2.284

Device	Routing	Invert	Outlet Devices
#1	Primary	923.05'	**18.0" Round Culvert** L= 212.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.05' / 922.52' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	929.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	925.00'	**21.0" Round Culvert** L= 20.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0500 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=4.38 cfs @ 12.29 hrs HW=928.42' TW=925.33' (Dynamic Tailwater)
- **1=Culvert** (Passes 4.38 cfs of 10.75 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Weir Controls 4.38 cfs @ 2.12 fps)
    - **4=Culvert** (Passes 4.38 cfs of 7.51 cfs potential flow)
  - **3=Orifice/Grate** (Controls 0.00 cfs)

Pond 32P: Proposed West Central Pond



Summary for Pond 40P: Wetland 2B

Inflow Area = 133.857 ac, 9.96% Impervious, Inflow Depth = 1.44" for 2-year event
Inflow = 129.76 cfs @ 12.34 hrs, Volume= 16.114 af
Outflow = 19.04 cfs @ 13.67 hrs, Volume= 16.114 af, Atten= 85%, Lag= 79.7 min
Primary = 19.04 cfs @ 13.67 hrs, Volume= 16.114 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 925.13' @ 13.67 hrs Surf.Area= 8.976 ac Storage= 6.361 af

Plug-Flow detention time= 222.8 min calculated for 16.110 af (100% of inflow)
Center-of-Mass det. time= 222.7 min (1,226.8 - 1,004.1)

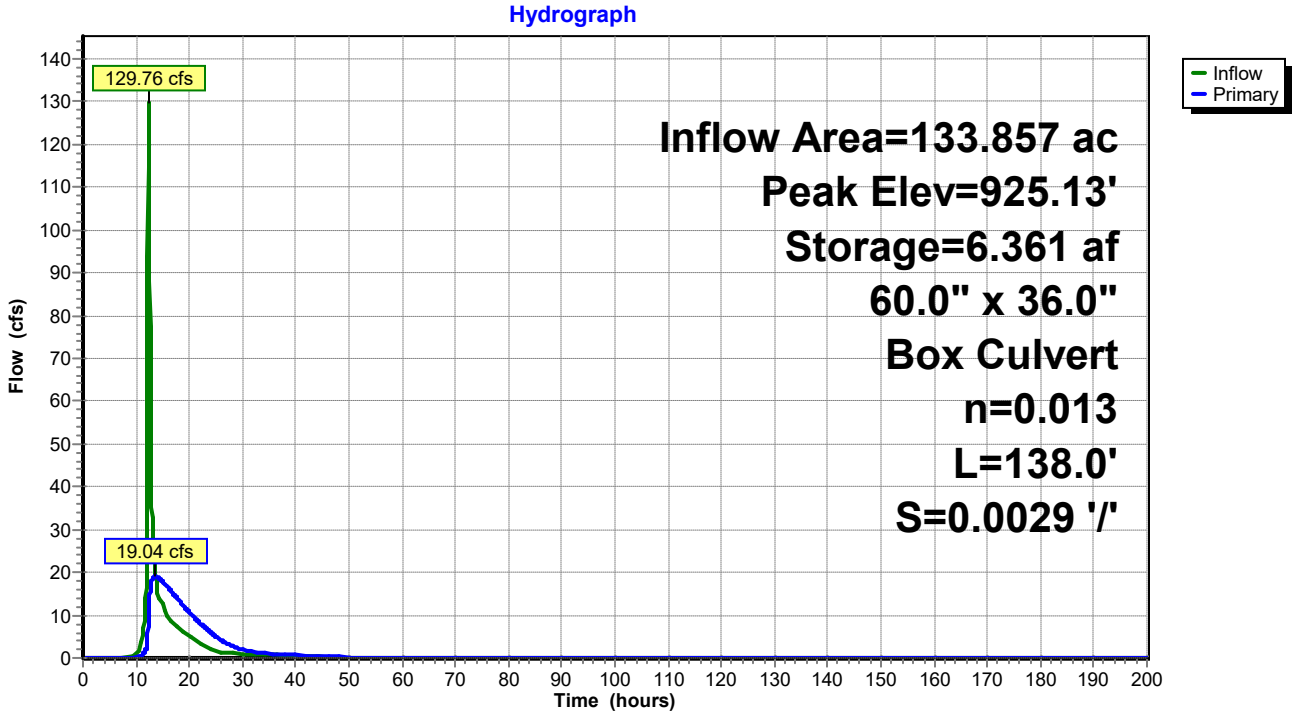
Volume	Invert	Avail.Storage	Storage Description
#1	923.90'	52.747 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.90	0.000	0.000	0.000
924.00	2.123	0.106	0.106
926.00	14.283	16.406	16.512
928.00	21.952	36.235	52.747

Device	Routing	Invert	Outlet Devices
#1	Primary	923.90'	**60.0" W x 36.0" H Box Culvert** L= 138.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.90' / 923.50' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 15.00 sf

Primary OutFlow Max=19.04 cfs @ 13.67 hrs HW=925.13' TW=924.25' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 19.04 cfs @ 4.14 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 1.35" for 2-year event
Inflow = 26.82 cfs @ 12.18 hrs, Volume= 1.537 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 939.36' @ 24.60 hrs Surf.Area= 1.420 ac Storage= 1.537 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

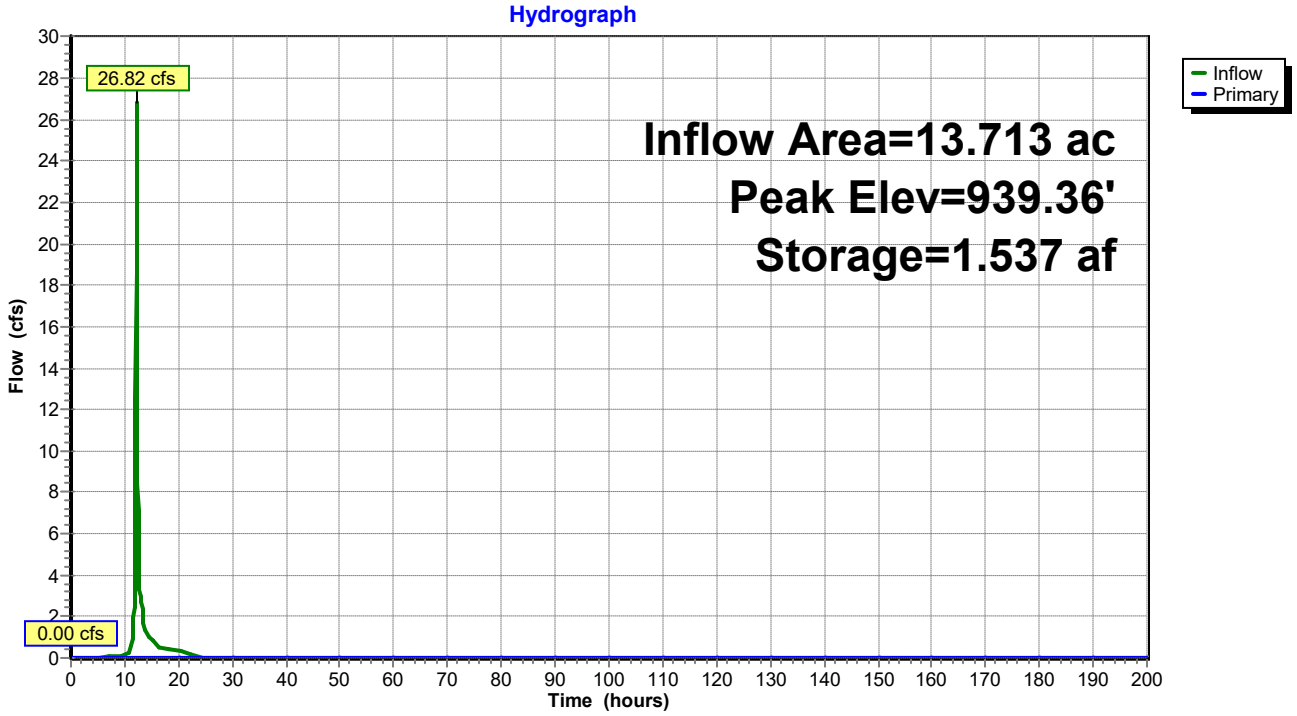
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=936.00' TW=923.90' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 41P: Ex South Off-site Pond



Summary for Pond 42P: Proposed South Central Pond

Inflow Area = 2.612 ac, 32.54% Impervious, Inflow Depth = 1.63" for 2-year event
Inflow = 5.99 cfs @ 12.18 hrs, Volume= 0.354 af
Outflow = 2.17 cfs @ 12.41 hrs, Volume= 0.354 af, Atten= 64%, Lag= 13.6 min
Primary = 2.17 cfs @ 12.41 hrs, Volume= 0.354 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.50' Surf.Area= 0.154 ac Storage= 0.309 af
Peak Elev= 929.23' @ 12.41 hrs Surf.Area= 0.220 ac Storage= 0.445 af (0.136 af above start)

Plug-Flow detention time= 935.9 min calculated for 0.045 af (13% of inflow)
Center-of-Mass det. time= 115.7 min (904.1 - 788.4)

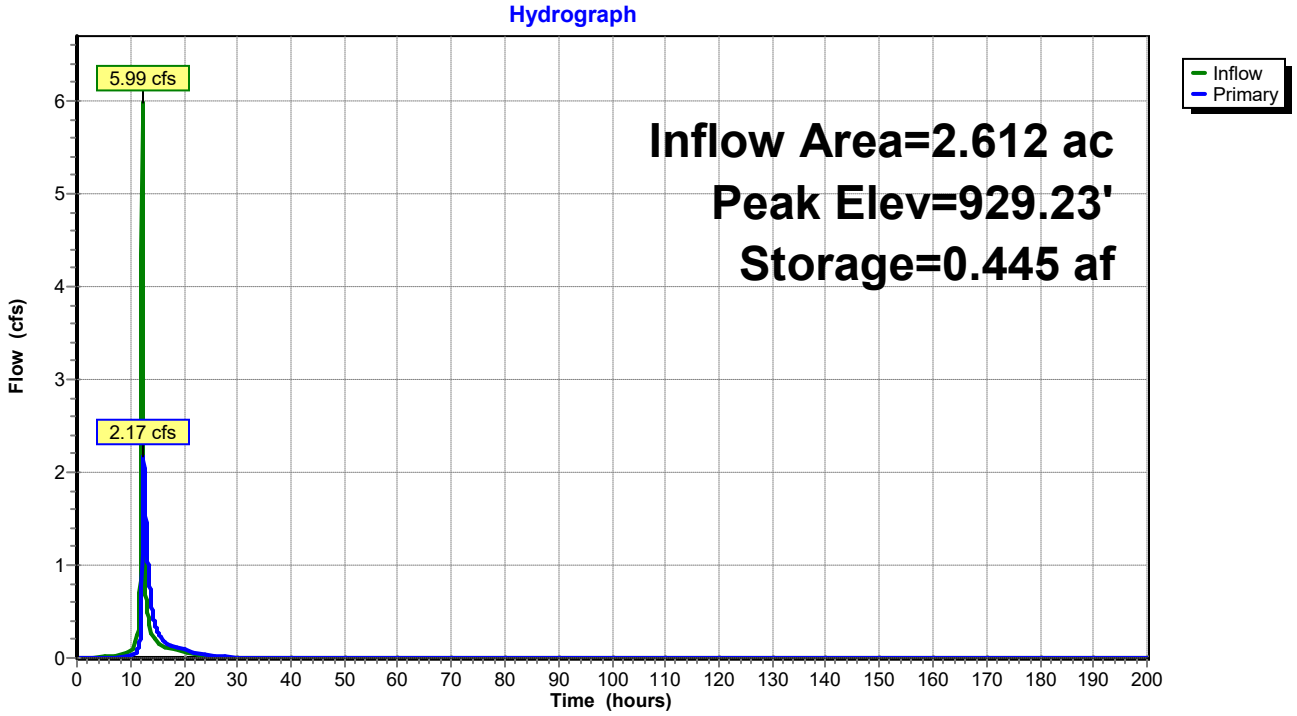
Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	1.122 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
922.00	0.004	0.000	0.000
924.00	0.022	0.026	0.026
926.00	0.050	0.072	0.098
927.50	0.078	0.096	0.194
928.00	0.114	0.048	0.242
928.50	0.154	0.067	0.309
929.50	0.244	0.199	0.508
930.00	0.274	0.130	0.637
931.50	0.372	0.484	1.122

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	**15.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 928.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	930.20'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	927.00'	**15.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.00' / 927.00' S= -0.0256 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=2.16 cfs @ 12.41 hrs HW=929.23' TW=924.77' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 2.16 cfs @ 2.91 fps)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Culvert** (Passes 2.16 cfs of 5.05 cfs potential flow)

Pond 42P: Proposed South Central Pond



Summary for Pond 43P: Proposed East Central Pond

Inflow Area = 6.873 ac, 41.00% Impervious, Inflow Depth = 1.83" for 2-year event
Inflow = 15.17 cfs @ 12.23 hrs, Volume= 1.046 af
Outflow = 4.30 cfs @ 12.59 hrs, Volume= 1.044 af, Atten= 72%, Lag= 21.7 min
Primary = 4.30 cfs @ 12.59 hrs, Volume= 1.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 926.50' Surf.Area= 0.401 ac Storage= 1.319 af
Peak Elev= 927.51' @ 12.59 hrs Surf.Area= 0.567 ac Storage= 1.806 af (0.486 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 183.2 min (969.7 - 786.5)

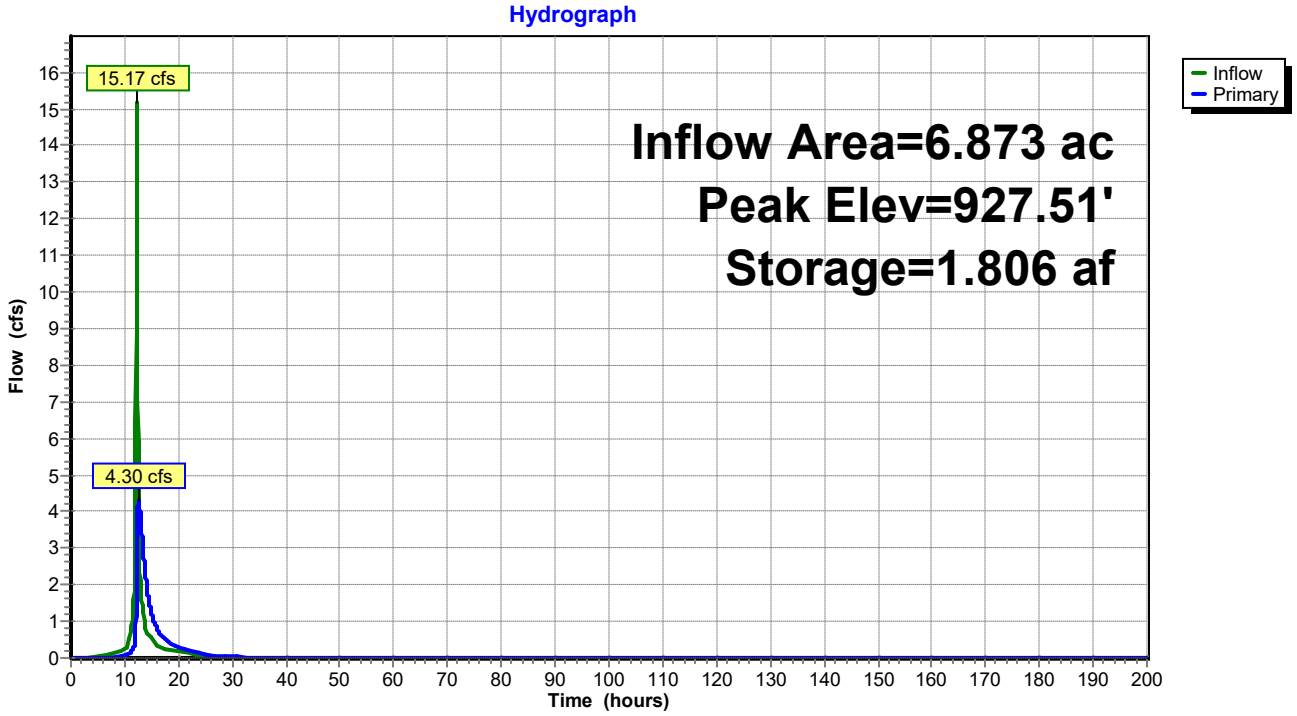
Volume	Invert	Avail.Storage	Storage Description
#1	918.50'	3.505 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
918.50	0.053	0.000	0.000
920.00	0.083	0.102	0.102
922.00	0.135	0.218	0.320
924.00	0.199	0.334	0.654
925.50	0.254	0.340	0.994
926.00	0.324	0.144	1.138
926.50	0.401	0.181	1.319
927.50	0.566	0.484	1.803
928.00	0.619	0.296	2.099
930.00	0.787	1.406	3.505

Device	Routing	Invert	Outlet Devices
#1	Primary	926.50'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.50' / 926.00' S= 0.0172 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	925.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=4.30 cfs @ 12.59 hrs HW=927.50' TW=924.96' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.30 cfs @ 3.41 fps)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 4.30 cfs of 8.53 cfs potential flow)

Pond 43P: Proposed East Central Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 0.66" for 2-year event
Inflow = 21.86 cfs @ 12.39 hrs, Volume= 2.164 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 940.27' @ 200.00 hrs Surf.Area= 80,972 sf Storage= 94,258 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

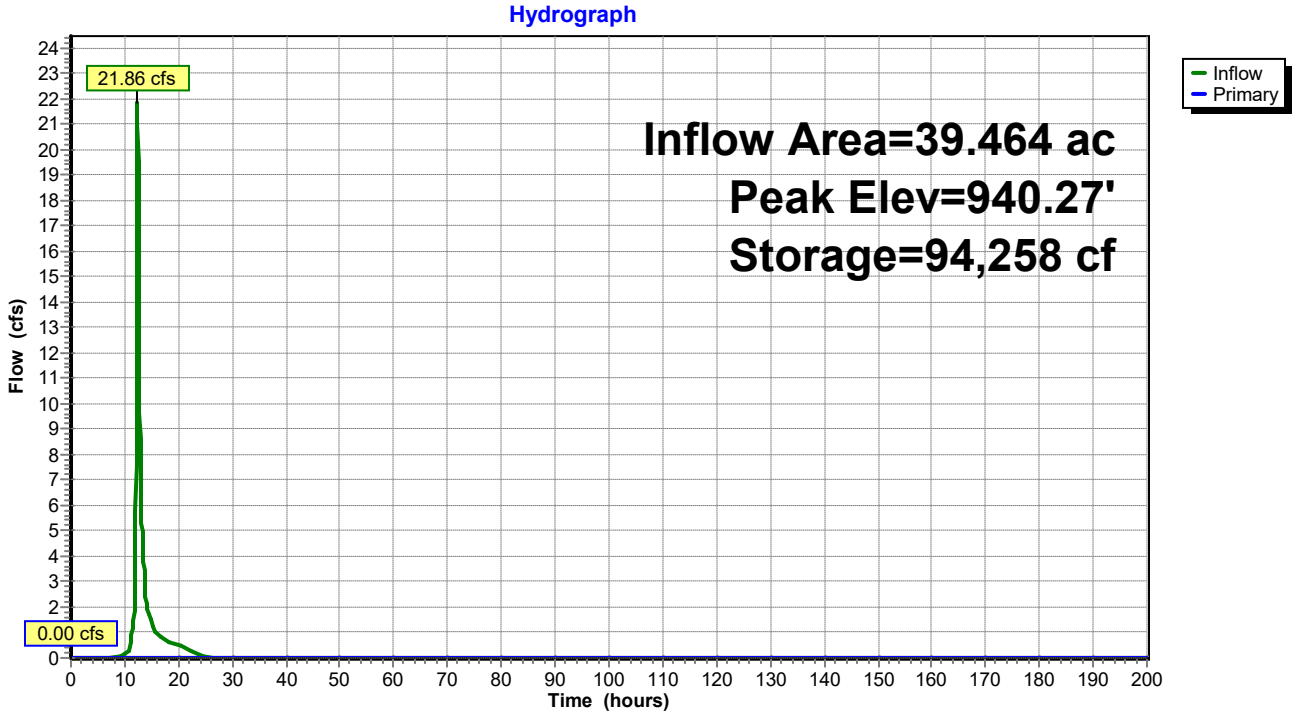
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	303,458 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
938.00	4,444	0	0
940.00	69,653	74,097	74,097
941.00	111,935	90,794	164,891
942.00	165,198	138,567	303,458

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=938.00' TW=923.90' (Dynamic Tailwater)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 16.77" for 2-year event
Inflow = 12.04 cfs @ 12.13 hrs, Volume= 5.255 af
Outflow = 7.32 cfs @ 12.25 hrs, Volume= 5.041 af, Atten= 39%, Lag= 6.8 min
Primary = 7.32 cfs @ 12.25 hrs, Volume= 5.041 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 938.67' @ 12.25 hrs Surf.Area= 11,311 sf Storage= 11,075 cf

Plug-Flow detention time= 163.1 min calculated for 5.040 af (96% of inflow)
Center-of-Mass det. time= 34.3 min (1,386.0 - 1,351.7)

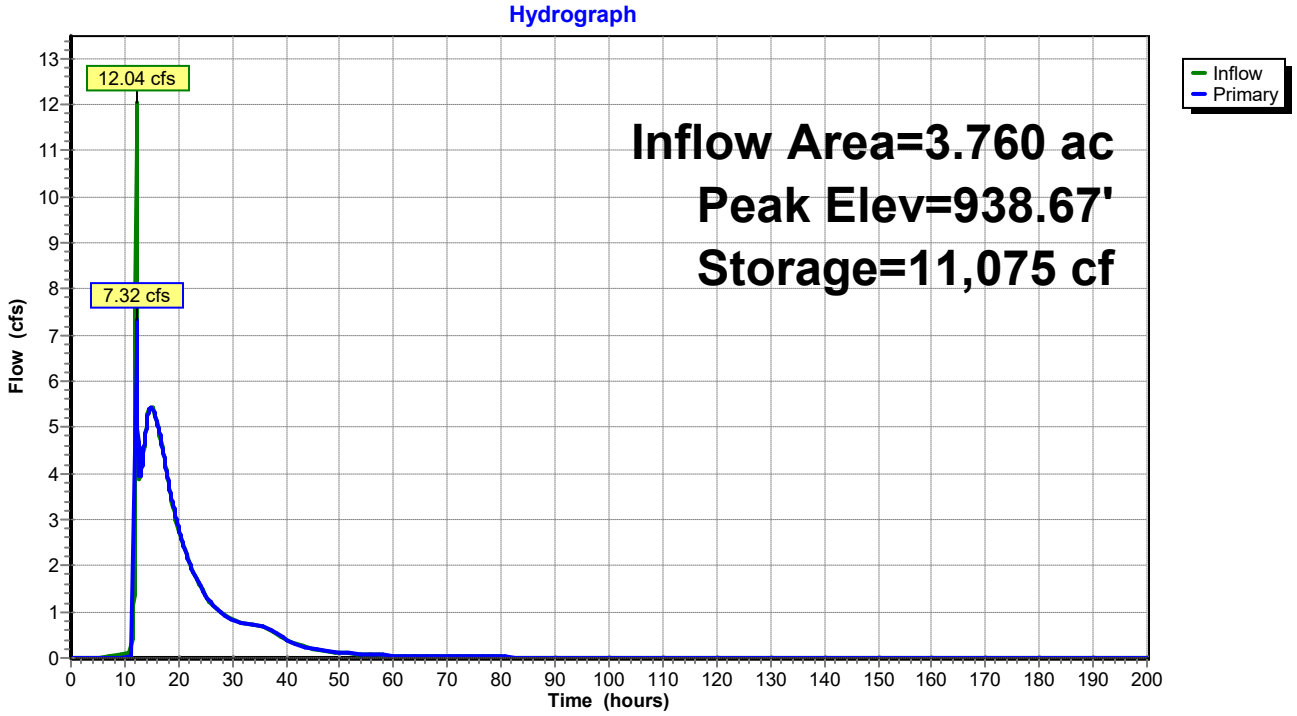
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	15,364 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
936.00	178	0	0
938.00	5,354	5,532	5,532
939.00	14,309	9,832	15,364

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=7.29 cfs @ 12.25 hrs HW=938.66' TW=924.52' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 7.29 cfs @ 1.30 fps)

Pond 60P: Wetland 5B



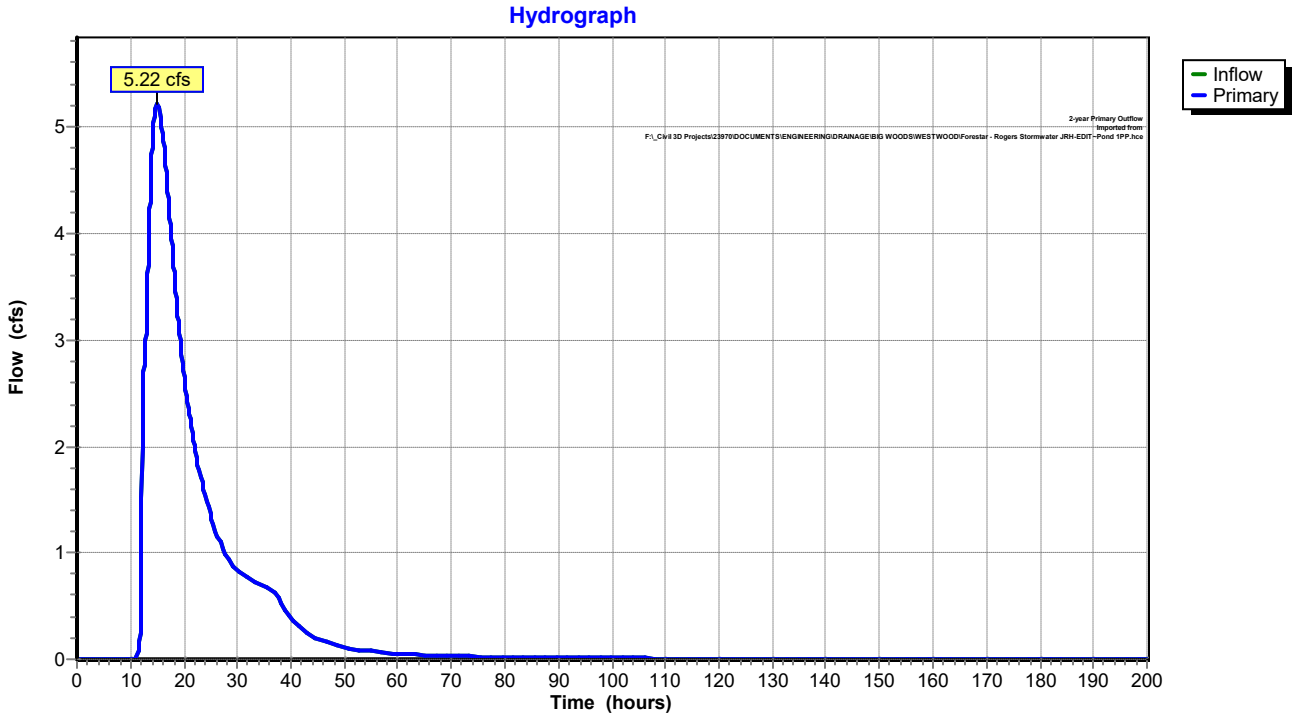
Summary for Link 1PP: Northwest Wetland

Inflow = 5.22 cfs @ 15.04 hrs, Volume= 4.759 af
Primary = 5.22 cfs @ 15.04 hrs, Volume= 4.759 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

2-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 1PP: Northwest Wetland



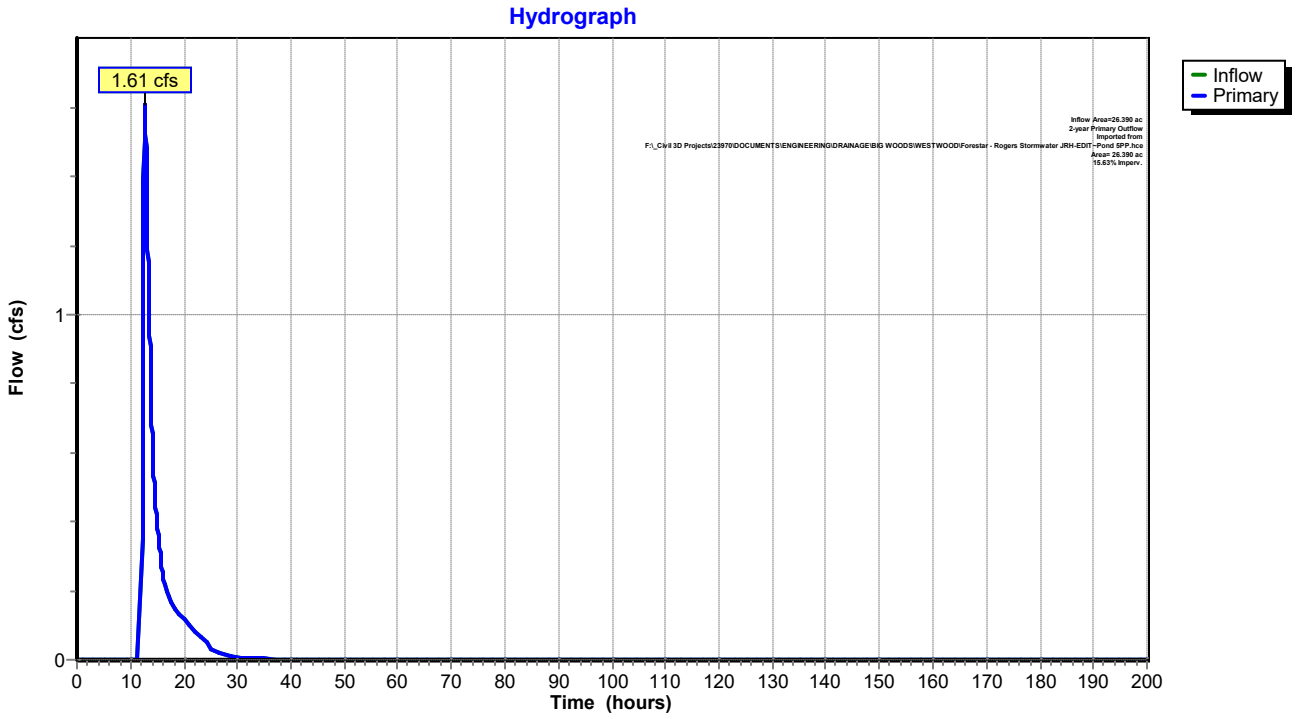
Summary for Link 5PP: Existing Pond

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 0.15" for 2-year event
Inflow = 1.61 cfs @ 12.68 hrs, Volume= 0.329 af
Primary = 1.61 cfs @ 12.68 hrs, Volume= 0.329 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

2-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 5PP: Existing Pond



Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=1.65"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=458.46 cfs 41.126 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=19.438 ac 21.11% Impervious Runoff Depth=3.05"
Flow Length=1,602' Tc=23.6 min CN=86/98 Runoff=58.41 cfs 4.932 af

Subcatchment 11S: Direct to Cowley Lake Runoff Area=6.152 ac 3.35% Impervious Runoff Depth=2.56"
Flow Length=1,308' Tc=15.2 min CN=83/98 Runoff=19.94 cfs 1.314 af

Subcatchment 12S: Fugitve to Fox Creek Runoff Area=0.547 ac 45.16% Impervious Runoff Depth=3.06"
Flow Length=165' Tc=8.1 min CN=80/98 Runoff=2.54 cfs 0.139 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=3.970 ac 7.66% Impervious Runoff Depth=2.32"
Flow Length=310' Tc=10.9 min CN=79/98 Runoff=13.33 cfs 0.767 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.782 ac 1.28% Impervious Runoff Depth=2.20"
Flow Length=392' Tc=17.3 min CN=79/98 Runoff=2.06 cfs 0.143 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=3.027 ac 10.37% Impervious Runoff Depth=2.37"
Flow Length=309' Tc=17.0 min CN=79/98 Runoff=8.50 cfs 0.597 af

Subcatchment 23S: Direct to Proposed Runoff Area=3.385 ac 0.68% Impervious Runoff Depth=2.35"
Flow Length=243' Tc=13.3 min CN=81/98 Runoff=10.81 cfs 0.664 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=7.873 ac 5.31% Impervious Runoff Depth=2.43"
Flow Length=407' Tc=11.1 min CN=81/98 Runoff=27.67 cfs 1.595 af

Subcatchment 25S: Direct to Proposed Runoff Area=15.059 ac 29.82% Impervious Runoff Depth=2.84"
Flow Length=1,817' Tc=17.1 min CN=81/98 Runoff=49.08 cfs 3.569 af

Subcatchment 26S: Direct to Proposed Runoff Area=4.398 ac 38.38% Impervious Runoff Depth=2.99"
Flow Length=621' Tc=8.6 min CN=81/98 Runoff=19.77 cfs 1.095 af

Subcatchment 27S: Direct to Proposed Runoff Area=3.120 ac 47.02% Impervious Runoff Depth=3.22"
Flow Length=621' Tc=8.6 min CN=83/98 Runoff=14.95 cfs 0.838 af

Subcatchment 28S: Direct to Proposed Runoff Area=7.153 ac 50.64% Impervious Runoff Depth=3.24"
Flow Length=1,013' Tc=14.4 min CN=82/98 Runoff=28.04 cfs 1.929 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=34.136 ac 8.50% Impervious Runoff Depth=2.56"
Flow Length=1,249' Tc=23.4 min CN=82/98 Runoff=88.46 cfs 7.290 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=2.06"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=29.68 cfs 3.430 af

Subcatchment 32S: Direct to Proposed Runoff Area=3.686 ac 36.52% Impervious Runoff Depth=3.07"
Flow Length=440' Slope=0.0200 '/' Tc=7.1 min CN=83/98 Runoff=18.09 cfs 0.942 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=67.435 ac 2.92% Impervious Runoff Depth=3.00"
Flow Length=1,354' Tc=23.6 min CN=88/98 Runoff=203.62 cfs 16.869 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=2.50"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=50.10 cfs 2.852 af

Subcatchment 42S: Direct to Proposed Runoff Area=2.612 ac 32.54% Impervious Runoff Depth=2.83"
Flow Length=422' Tc=10.2 min CN=80/98 Runoff=10.46 cfs 0.617 af

Subcatchment 43S: Direct to Proposed Runoff Area=6.873 ac 41.00% Impervious Runoff Depth=3.08"
Flow Length=1,173' Tc=14.8 min CN=82/98 Runoff=25.57 cfs 1.765 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=2.95"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=36.48 cfs 3.216 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=2.80"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=17.92 cfs 0.876 af

Reach 1R: Cowley Lake Outlet Channel Inflow=20.37 cfs 6.247 af
Outflow=20.37 cfs 6.247 af

Reach 2R: Cowley Lake Inflow=102.35 cfs 51.273 af
Outflow=102.35 cfs 51.273 af

Reach 21R: Proposed East Channel Avg. Flow Depth=0.97' Max Vel=5.52 fps Inflow=31.50 cfs 28.561 af
n=0.022 L=264.0' S=0.0125 '/' Capacity=149.23 cfs Outflow=31.50 cfs 28.561 af

Reach 23R: Existing West Channel Avg. Flow Depth=1.13' Max Vel=3.45 fps Inflow=40.88 cfs 16.184 af
n=0.022 L=251.0' S=0.0037 '/' Capacity=321.50 cfs Outflow=40.96 cfs 16.184 af

Pond 7P: Whiteford Lake and Wetlands Peak Elev=930.67' Storage=41.126 af Inflow=458.46 cfs 41.126 af
Outflow=0.00 cfs 0.000 af

Pond 10P: Proposed Northeast Peak Elev=922.92' Storage=5.677 af Inflow=58.41 cfs 4.932 af
Outflow=11.44 cfs 4.932 af

Pond 25P: Proposed Northwest Peak Elev=926.83' Storage=3.461 af Inflow=49.08 cfs 3.569 af
Outflow=3.59 cfs 3.569 af

Pond 26P: Proposed Northwest Central Peak Elev=925.37' Storage=2.103 af Inflow=21.83 cfs 1.930 af
Outflow=0.37 cfs 1.930 af

Pond 27P: Proposed Northwest Central Peak Elev=925.66' Storage=1.147 af Inflow=14.95 cfs 0.838 af
Outflow=3.32 cfs 0.835 af

Pond 28P: Proposed Northeast Central Peak Elev=923.13' Storage=1.589 af Inflow=28.04 cfs 1.929 af
Outflow=12.31 cfs 1.929 af

Pond 30P: Wetland 4A Peak Elev=926.28' Storage=4.311 af Inflow=111.13 cfs 11.661 af
Primary=25.52 cfs 8.706 af Secondary=3.17 cfs 2.955 af Outflow=28.68 cfs 11.661 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=933.39' Storage=0.381 af Inflow=29.68 cfs 3.430 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=20.21 cfs 3.430 af

Pond 32P: Proposed West Central Pond Peak Elev=928.64' Storage=1.500 af Inflow=18.09 cfs 0.942 af
Outflow=8.21 cfs 0.942 af

Pond 40P: Wetland 2B Peak Elev=925.64' Storage=11.791 af Inflow=224.73 cfs 28.418 af
60.0" x 36.0" Box Culvert n=0.013 L=138.0' S=0.0029 '/' Outflow=31.35 cfs 28.418 af

Pond 41P: Ex South Off-site Pond Peak Elev=940.11' Storage=2.852 af Inflow=50.10 cfs 2.852 af
Outflow=0.00 cfs 0.000 af

Pond 42P: Proposed South Central Pond Peak Elev=929.60' Storage=0.532 af Inflow=10.46 cfs 0.617 af
Outflow=4.06 cfs 0.616 af

Pond 43P: Proposed East Central Pond Peak Elev=928.01' Storage=2.107 af Inflow=25.57 cfs 1.765 af
Outflow=7.43 cfs 1.763 af

Pond 50P: Wetland 4B Peak Elev=941.05' Storage=170,853 cf Inflow=40.73 cfs 3.922 af
Outflow=0.00 cfs 0.000 af

Pond 60P: Wetland 5B Peak Elev=938.81' Storage=12,745 cf Inflow=21.34 cfs 9.384 af
Outflow=19.91 cfs 9.170 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=9.88 cfs 8.508 af
Primary=9.88 cfs 8.508 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=4.82 cfs 0.706 af
Area= 26.390 ac 15.63% Imperv. Primary=4.82 cfs 0.706 af

Total Runoff Area = 540.193 ac Runoff Volume = 96.566 af Average Runoff Depth = 2.15"
93.94% Pervious = 507.441 ac 6.06% Impervious = 32.752 ac

Summary for Subcatchment 7S: Approx DA to Lake

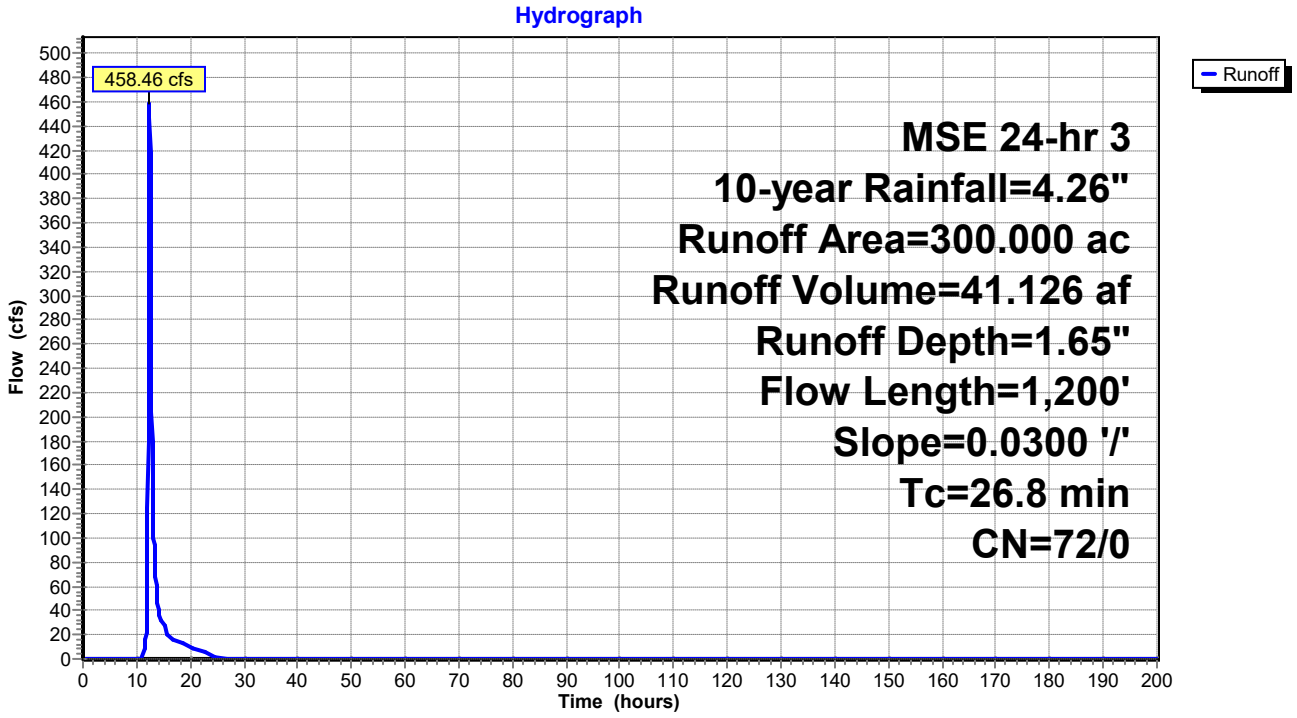
Runoff = 458.46 cfs @ 12.40 hrs, Volume= 41.126 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

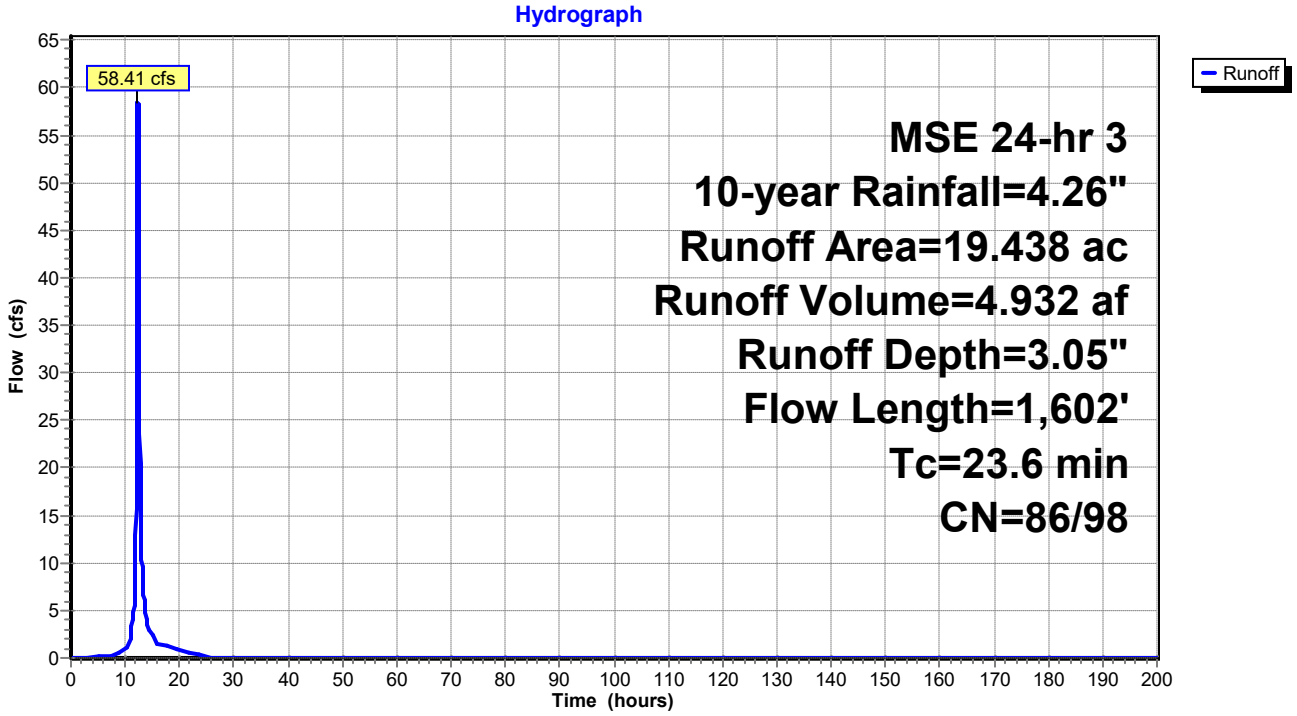
Runoff = 58.41 cfs @ 12.34 hrs, Volume= 4.932 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.399	98	Unconnected pavement, HSG D
1.088	98	Unconnected roofs, HSG D
1.617	98	Paved roads w/curbs & sewers, HSG D
0.606	98	Paved parking, HSG D
0.393	98	Roofs, HSG D
0.699	98	Water Surface, 0% imp, HSG D
8.527	89	Row crops, straight row, Good, HSG D
4.972	80	>75% Grass cover, Good, HSG D
1.137	78	Meadow, non-grazed, HSG D
19.438	88	Weighted Average
15.335	86	78.89% Pervious Area
4.103	98	21.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
14.6	842	0.0114	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.7	660		3.00		**Direct Entry, Pipe flow @ 3 fps**
23.6	1,602	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 11S: Direct to Cowley Lake Outlet Channel

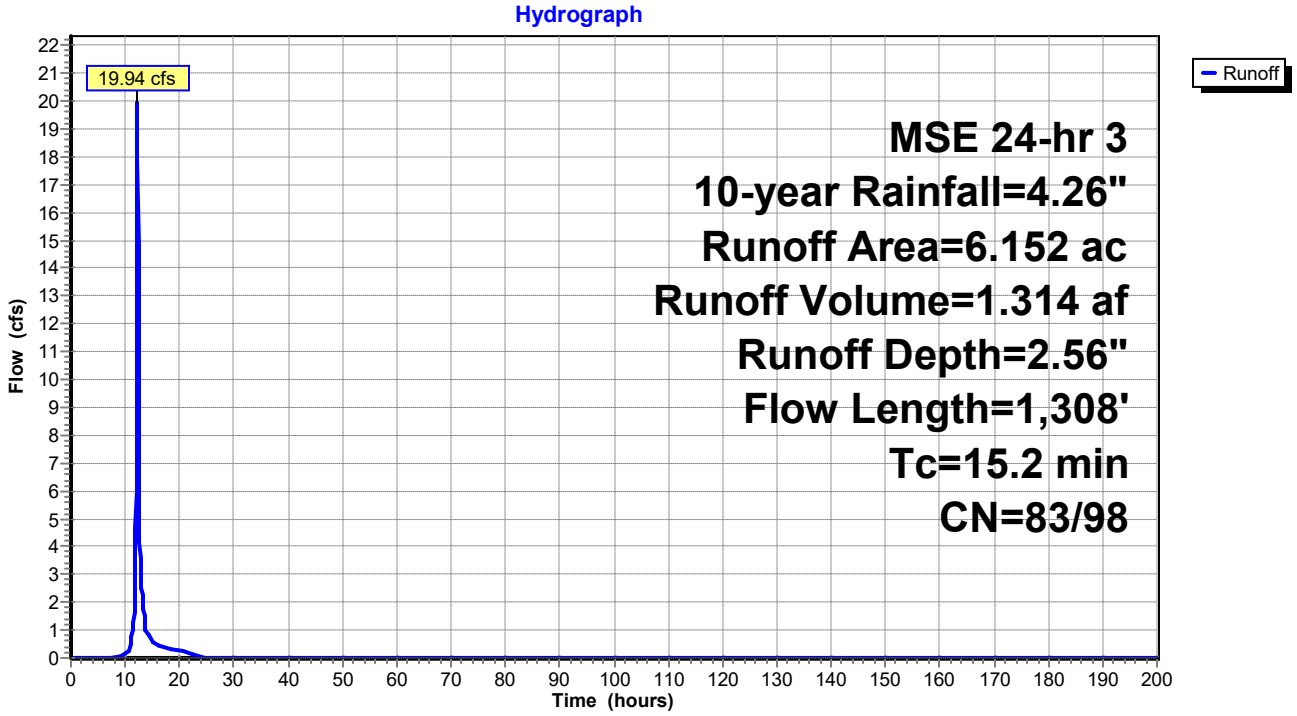
Runoff = 19.94 cfs @ 12.24 hrs, Volume= 1.314 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.024	98	Unconnected pavement, HSG D
0.182	98	Unconnected roofs, HSG D
1.316	98	Water Surface, 0% imp, HSG D
1.199	80	>75% Grass cover, Good, HSG D
2.901	78	Meadow, non-grazed, HSG D
0.530	77	Woods, Good, HSG D
6.152	83	Weighted Average
5.946	83	96.65% Pervious Area
0.206	98	3.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.8	114	0.0263	2.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	1,094	0.0024	3.27	46.64	**Trap/Vee/Rect Channel Flow,** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
15.2	1,308	Total			

Subcatchment 11S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 12S: Fugitve to Fox Creek West 5th Addition

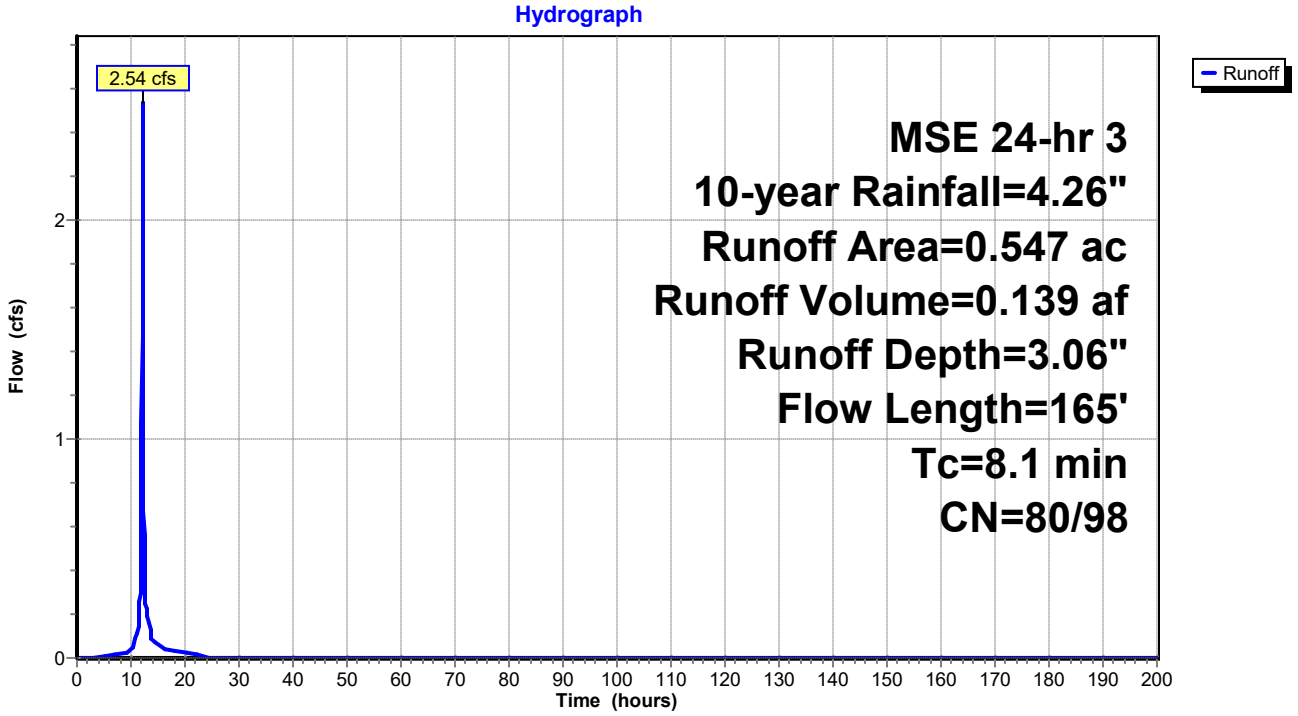
Runoff = 2.54 cfs @ 12.15 hrs, Volume= 0.139 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.015	98	Unconnected pavement, HSG D
0.043	98	Unconnected roofs, HSG D
0.104	98	Paved roads w/curbs & sewers, HSG D
0.051	98	Paved parking, HSG D
0.034	98	Roofs, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.547	88	Weighted Average
0.300	80	54.84% Pervious Area
0.247	98	45.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.3	40	0.0250	2.37		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.1	165	Total			

Subcatchment 12S: Fugitve to Fox Creek West 5th Addition



Summary for Subcatchment 20S: Direct to Cowley Lake

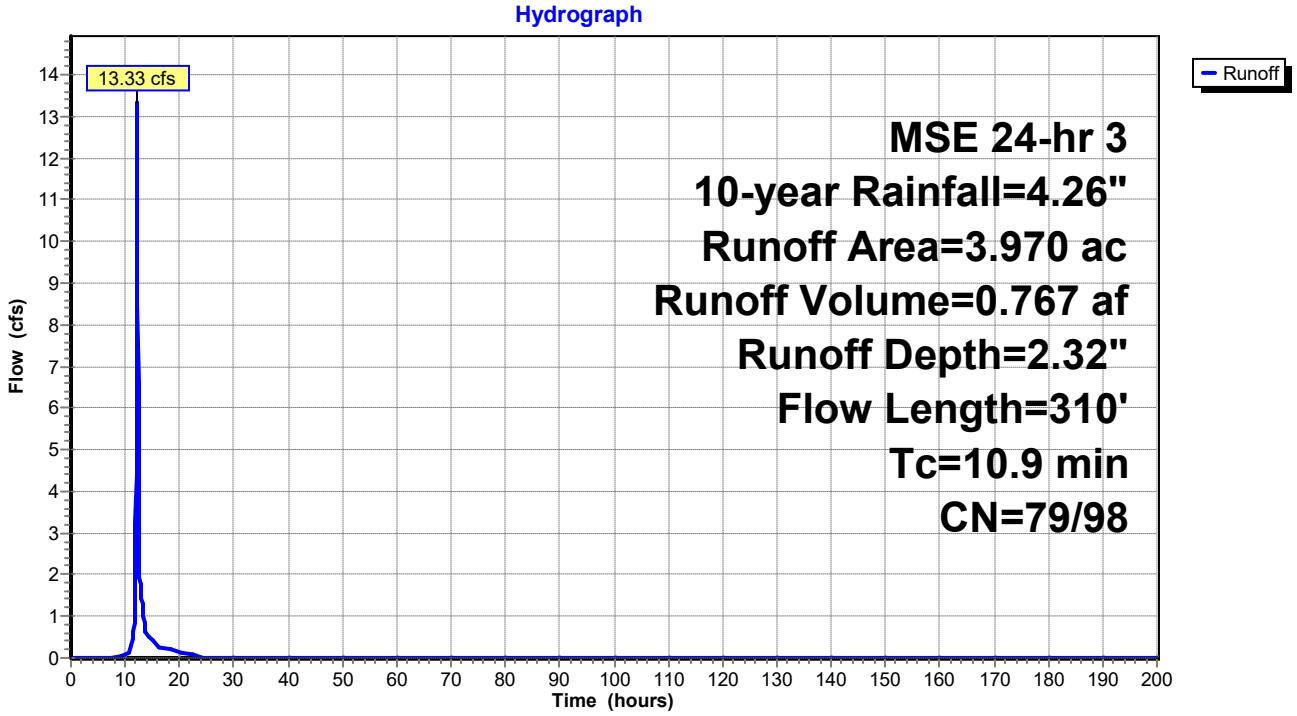
Runoff = 13.33 cfs @ 12.19 hrs, Volume= 0.767 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.046	98	Unconnected pavement, HSG D
0.258	98	Unconnected roofs, HSG D
0.122	98	Water Surface, 0% imp, HSG D
0.949	80	>75% Grass cover, Good, HSG D
1.018	78	Meadow, non-grazed, HSG D
1.577	77	Woods, Good, HSG D
3.970	80	Weighted Average
3.666	79	92.34% Pervious Area
0.304	98	7.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0270	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	72	0.0347	2.79		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	138	0.0667	1.81		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.9	310	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

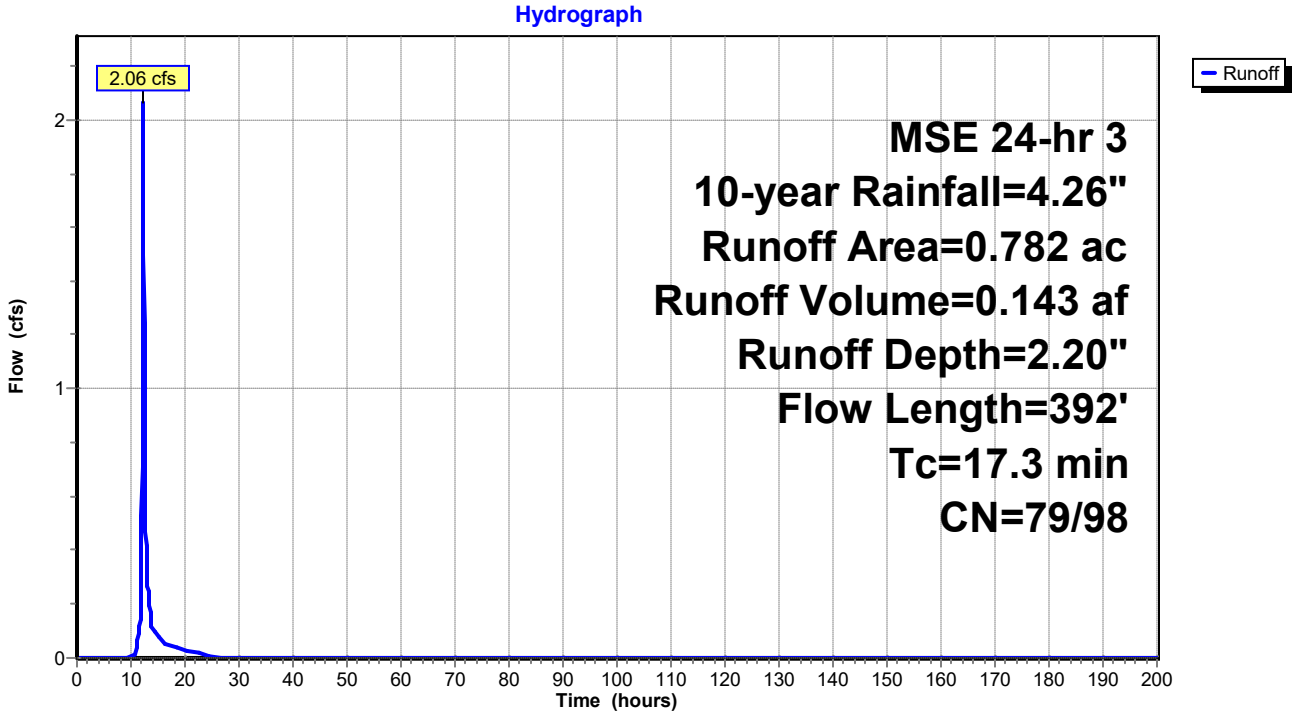
Runoff = 2.06 cfs @ 12.27 hrs, Volume= 0.143 af, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.010	98	Unconnected pavement, HSG D
0.054	98	Water Surface, 0% imp, HSG D
0.016	80	>75% Grass cover, Good, HSG D
0.162	78	Meadow, non-grazed, HSG D
0.540	77	Woods, Good, HSG D
0.782	79	Weighted Average
0.772	79	98.72% Pervious Area
0.010	98	1.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0590	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
2.3	146	0.0452	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	146	0.0164	10.55	221.46	**Channel Flow,** Area= 21.0 sf Perim= 15.6' r= 1.35' n= 0.022 Earth, clean & straight
17.3	392	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

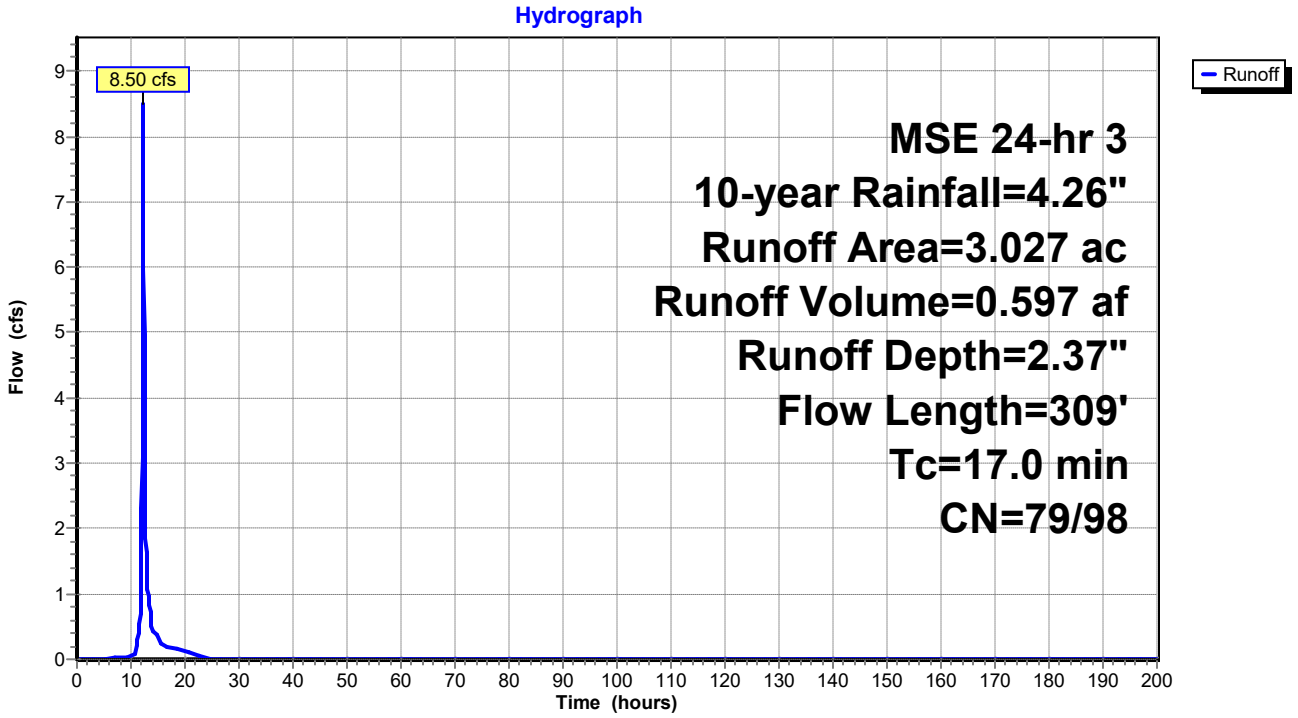
Runoff = 8.50 cfs @ 12.26 hrs, Volume= 0.597 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.125	98	Unconnected pavement, HSG D
0.189	98	Unconnected roofs, HSG D
0.031	98	Water Surface, 0% imp, HSG D
0.779	80	>75% Grass cover, Good, HSG D
1.348	78	Meadow, non-grazed, HSG D
0.555	77	Woods, Good, HSG D
3.027	81	Weighted Average
2.713	79	89.63% Pervious Area
0.314	98	10.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	100	0.0220	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
2.4	209	0.0445	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	309	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Proposed West Channel

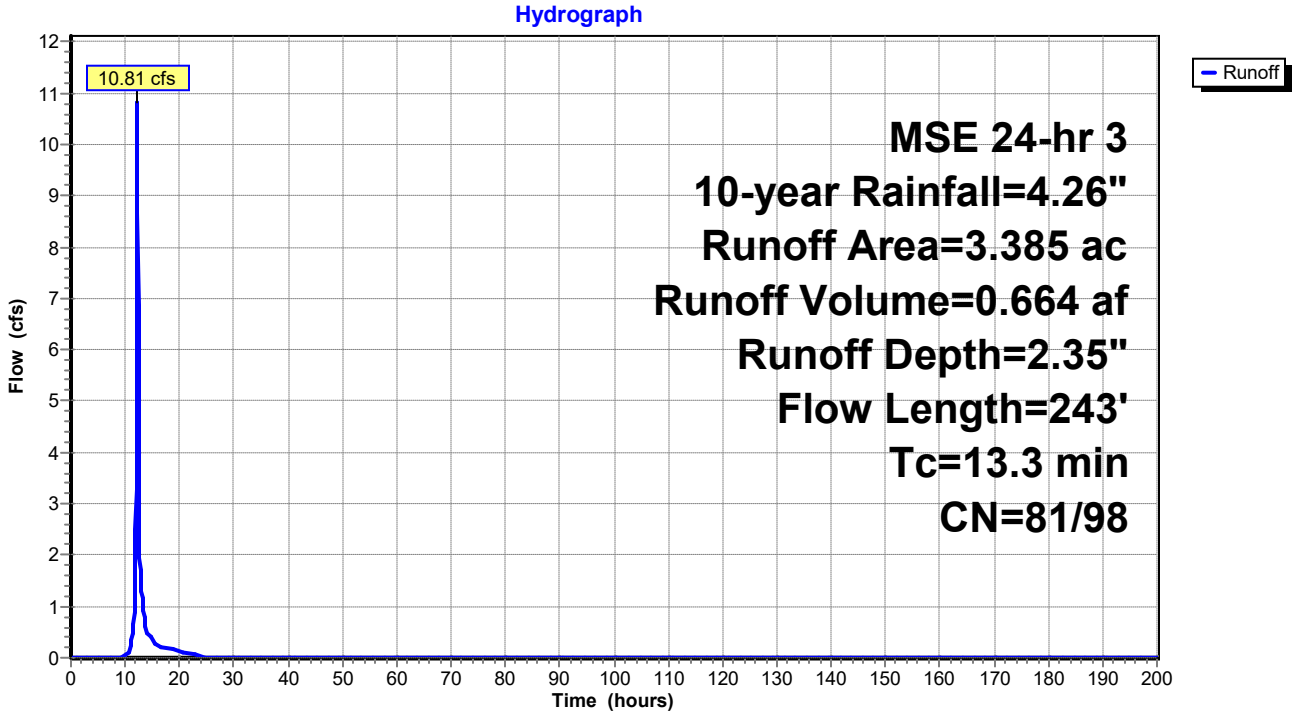
Runoff = 10.81 cfs @ 12.22 hrs, Volume= 0.664 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.023	98	Unconnected pavement, HSG D
0.467	98	Water Surface, 0% imp, HSG D
0.253	80	>75% Grass cover, Good, HSG D
1.225	78	Meadow, non-grazed, HSG D
1.417	77	Woods, Good, HSG D
3.385	81	Weighted Average
3.362	81	99.32% Pervious Area
0.023	98	0.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0520	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
3.0	143	0.0259	0.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.3	243	Total			

Subcatchment 23S: Direct to Proposed West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

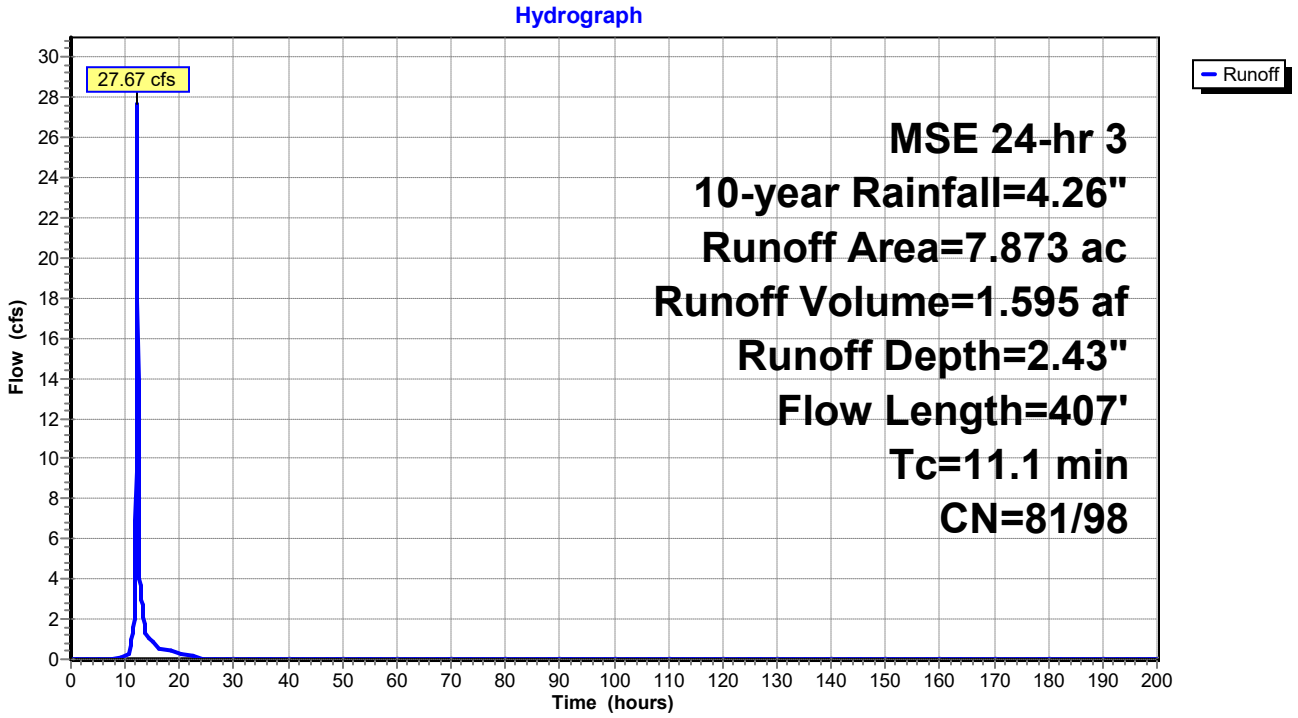
Runoff = 27.67 cfs @ 12.19 hrs, Volume= 1.595 af, Depth= 2.43"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.379	98	Unconnected roofs, HSG D
0.980	98	Water Surface, 0% imp, HSG D
1.643	80	>75% Grass cover, Good, HSG D
2.538	78	Meadow, non-grazed, HSG D
2.294	77	Woods, Good, HSG D
7.873	82	Weighted Average
7.455	81	94.69% Pervious Area
0.418	98	5.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.0600	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
4.4	307	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	407	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 25S: Direct to Proposed Northwest Pond

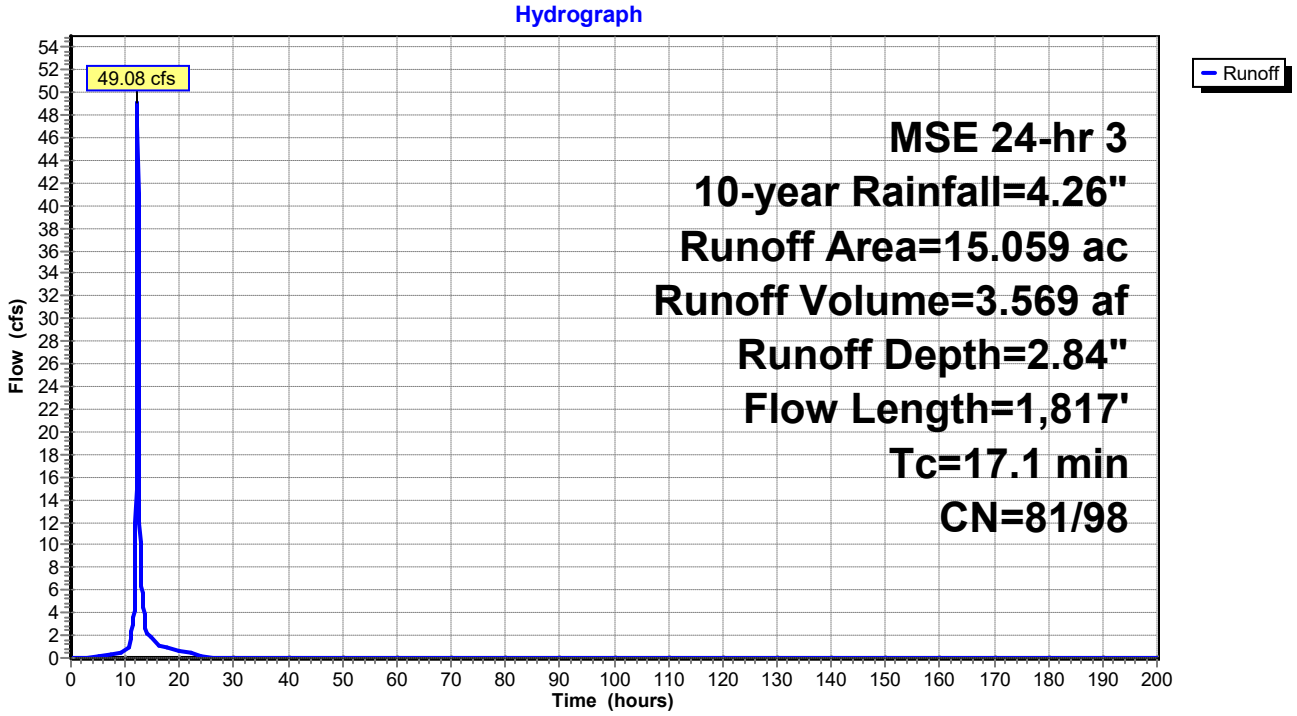
Runoff = 49.08 cfs @ 12.26 hrs, Volume= 3.569 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.652	98	Unconnected pavement, HSG D
1.214	98	Unconnected roofs, HSG D
1.443	98	Paved roads w/curbs & sewers, HSG D
0.758	98	Paved parking, HSG D
0.424	98	Roofs, HSG D
0.322	98	Water Surface, 0% imp, HSG D
0.084	96	Gravel surface, HSG D
0.179	89	Row crops, straight row, Good, HSG D
8.582	80	>75% Grass cover, Good, HSG D
1.401	78	Meadow, non-grazed, HSG D
15.059	86	Weighted Average
10.568	81	70.18% Pervious Area
4.491	98	29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	90	0.0378	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	57	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.3	1,670		3.00		**Direct Entry, Pipe flow @ 3 fps**
17.1	1,817	Total			

Subcatchment 25S: Direct to Proposed Northwest Pond



Summary for Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration

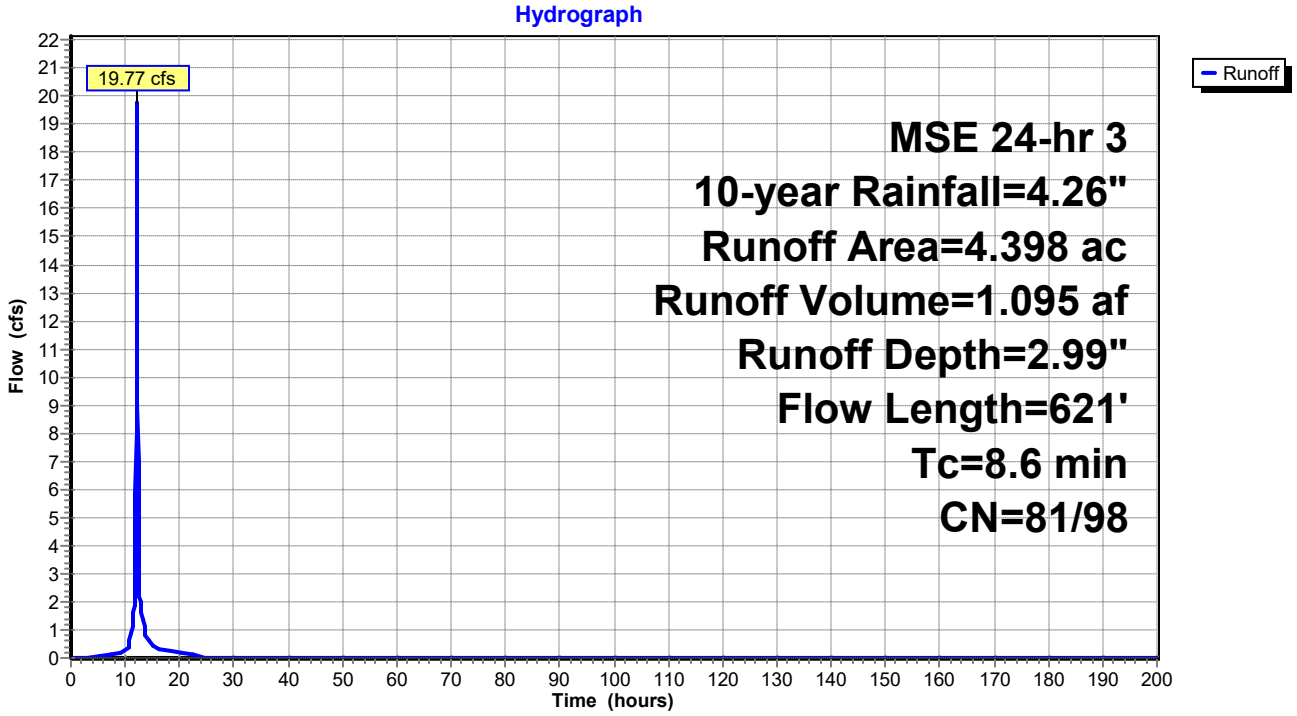
Runoff = 19.77 cfs @ 12.16 hrs, Volume= 1.095 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.170	98	Unconnected pavement, HSG D
0.393	98	Unconnected roofs, HSG D
0.551	98	Paved roads w/curbs & sewers, HSG D
0.354	98	Paved parking, HSG D
0.220	98	Roofs, HSG D
0.318	98	Water Surface, 0% imp, HSG D
1.487	80	>75% Grass cover, Good, HSG D
0.905	78	Meadow, non-grazed, HSG D
4.398	88	Weighted Average
2.710	81	61.62% Pervious Area
1.688	98	38.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration



Summary for Subcatchment 27S: Direct to Proposed Northwest Central Pond

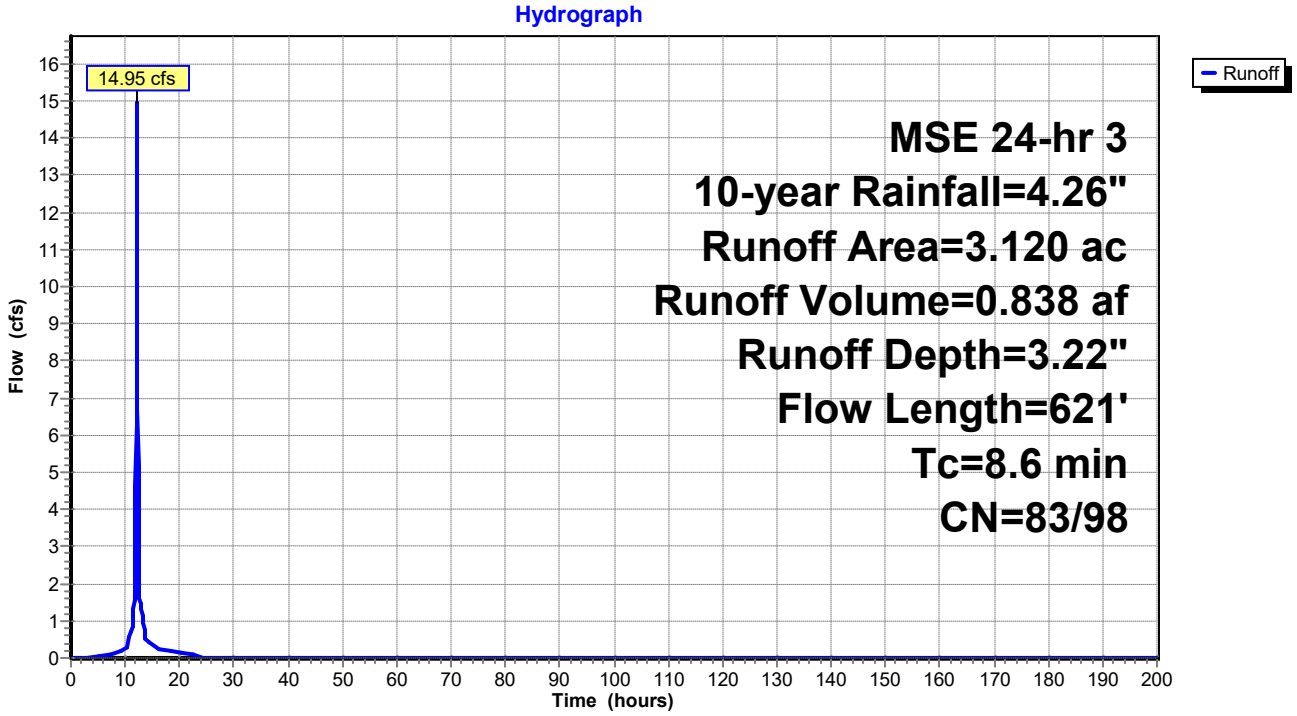
Runoff = 14.95 cfs @ 12.16 hrs, Volume= 0.838 af, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.134	98	Unconnected pavement, HSG D
0.275	98	Unconnected roofs, HSG D
0.506	98	Paved roads w/curbs & sewers, HSG D
0.328	98	Paved parking, HSG D
0.224	98	Roofs, HSG D
0.278	98	Water Surface, 0% imp, HSG D
0.979	80	>75% Grass cover, Good, HSG D
0.396	78	Meadow, non-grazed, HSG D
3.120	90	Weighted Average
1.653	83	52.98% Pervious Area
1.467	98	47.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 27S: Direct to Proposed Northwest Central Pond



Summary for Subcatchment 28S: Direct to Proposed Northeast Central Pond

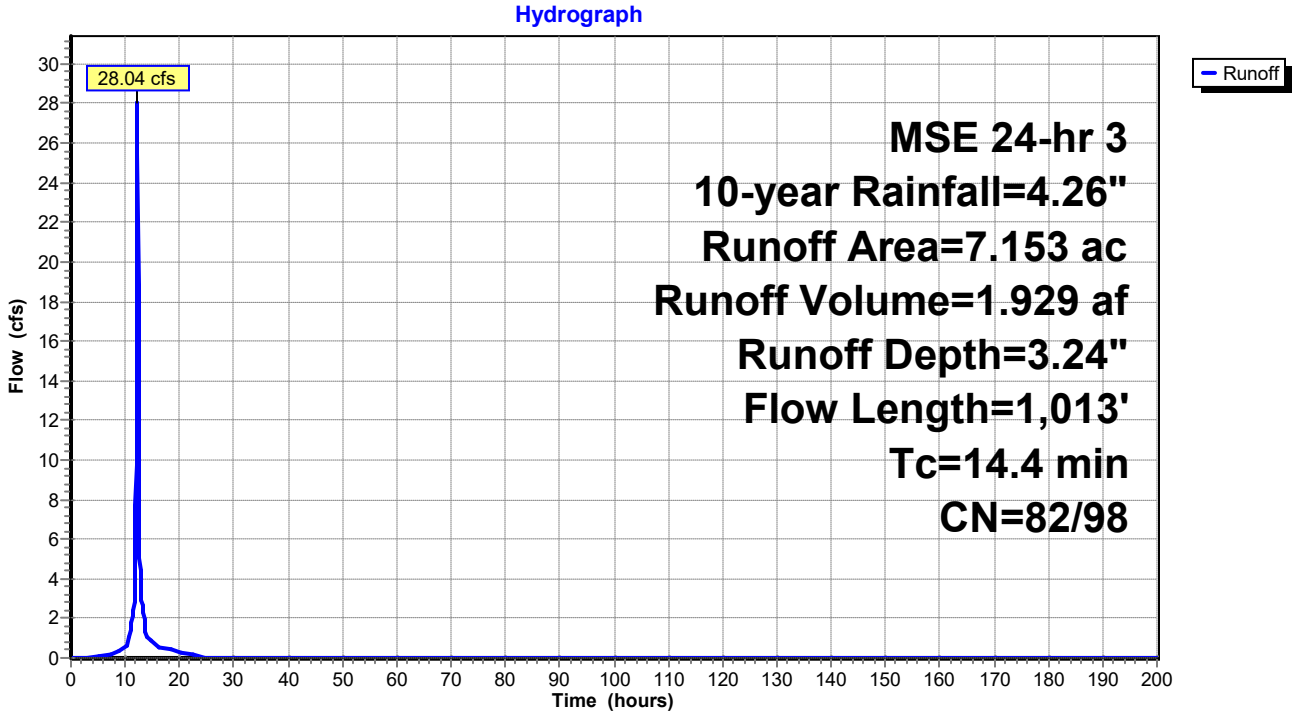
Runoff = 28.04 cfs @ 12.22 hrs, Volume= 1.929 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.152	98	Unconnected pavement, HSG D
0.932	98	Unconnected roofs, HSG D
0.930	98	Paved roads w/curbs & sewers, HSG D
1.004	98	Paved parking, HSG D
0.604	98	Roofs, HSG D
0.380	98	Water Surface, 0% imp, HSG D
2.416	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
0.051	77	Woods, Good, HSG D
7.153	90	Weighted Average
3.531	82	49.36% Pervious Area
3.622	98	50.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	71	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.6	242	0.0060	1.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.9	700		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.4	1,013	Total			

Subcatchment 28S: Direct to Proposed Northeast Central Pond



Summary for Subcatchment 30S: Direct to Wetland 4A

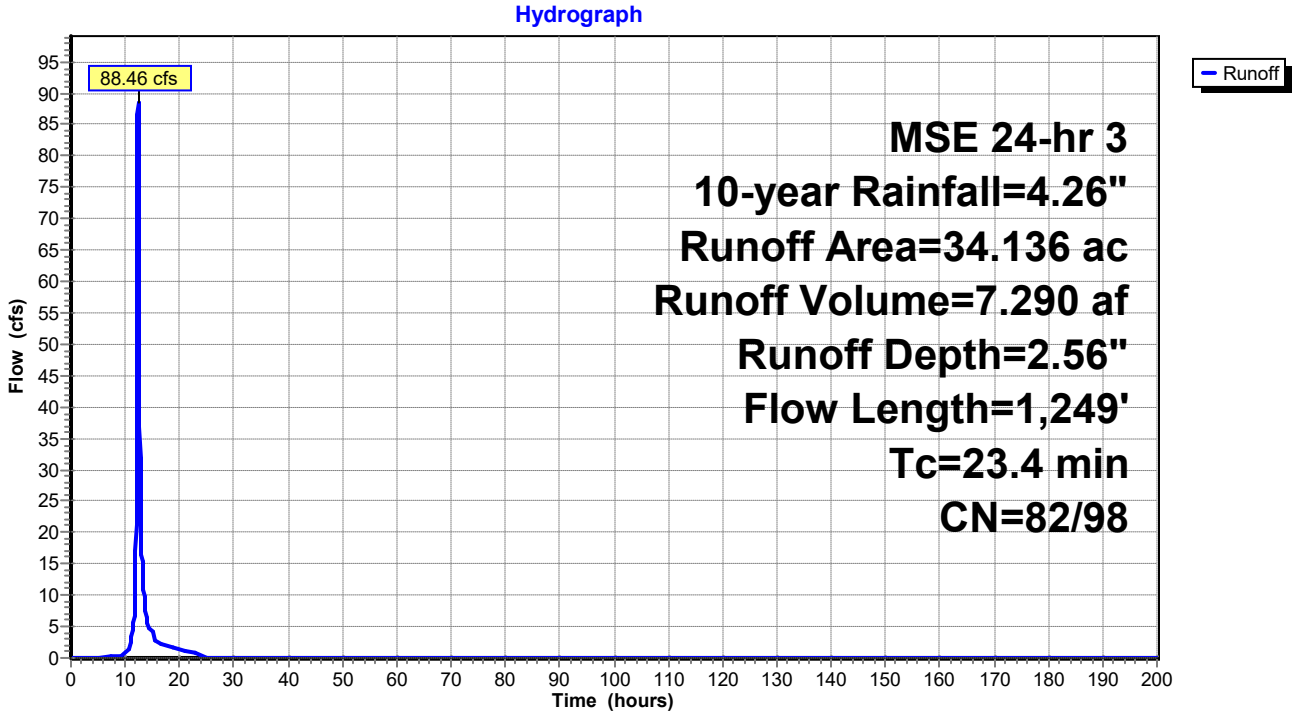
Runoff = 88.46 cfs @ 12.34 hrs, Volume= 7.290 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
1.401	98	Unconnected pavement, HSG D
1.502	98	Unconnected roofs, HSG D
0.939	96	Gravel surface, HSG D
6.512	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
18.400	80	>75% Grass cover, Good, HSG D
3.773	77	Woods, Good, HSG D
34.136	84	Weighted Average
31.233	82	91.50% Pervious Area
2.903	98	8.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

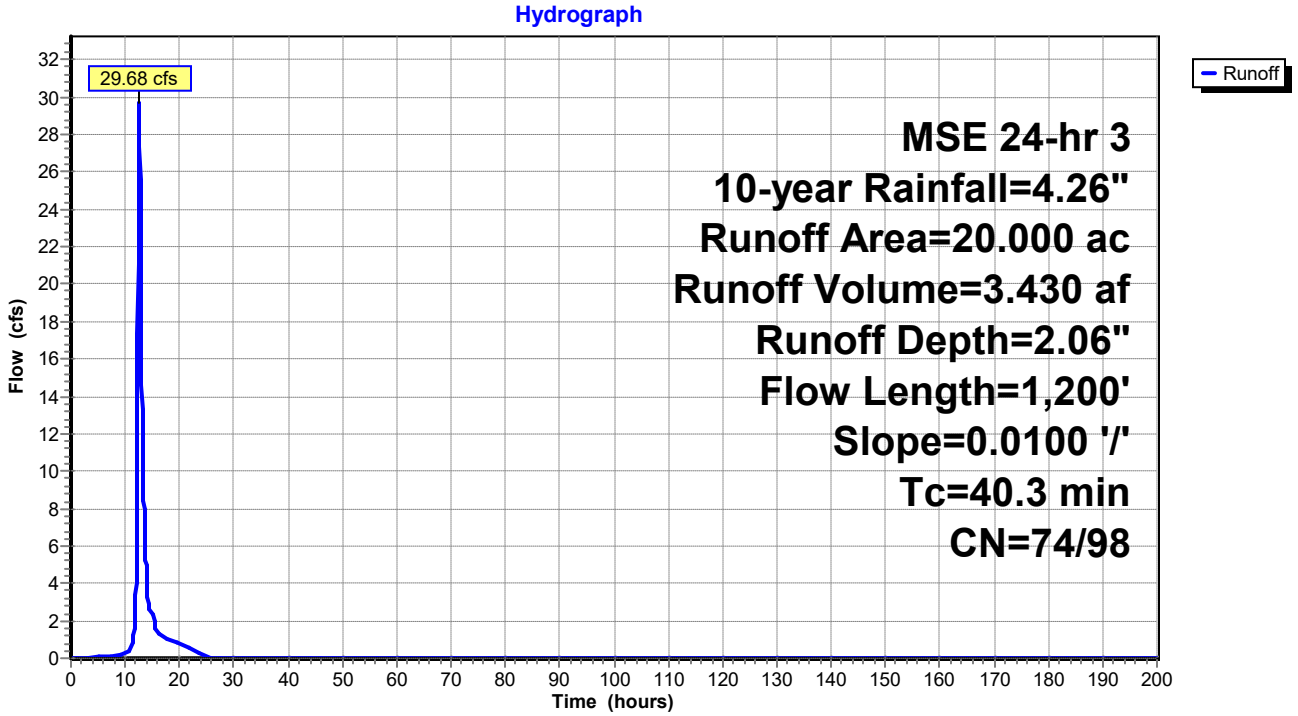
Runoff = 29.68 cfs @ 12.57 hrs, Volume= 3.430 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 32S: Direct to Proposed West Central Pond

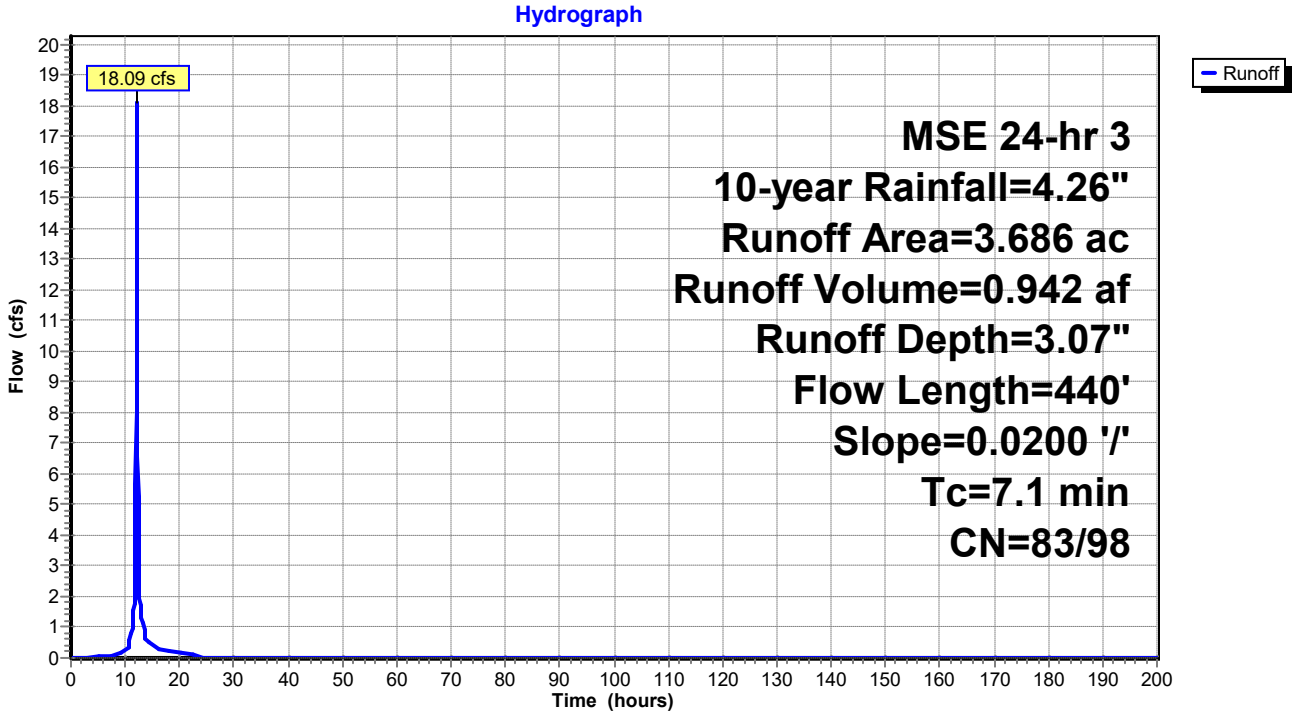
Runoff = 18.09 cfs @ 12.14 hrs, Volume= 0.942 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.438	98	Unconnected roofs, HSG D
0.377	98	Paved roads w/curbs & sewers, HSG D
0.298	98	Paved parking, HSG D
0.194	98	Roofs, HSG D
0.395	98	Water Surface, 0% imp, HSG D
1.443	80	>75% Grass cover, Good, HSG D
0.502	78	Meadow, non-grazed, HSG D
3.686	88	Weighted Average
2.340	83	63.48% Pervious Area
1.346	98	36.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.2	401		3.00		**Direct Entry,**
7.1	440	Total			

Subcatchment 32S: Direct to Proposed West Central Pond



Summary for Subcatchment 40S: Direct to Wetland 2B

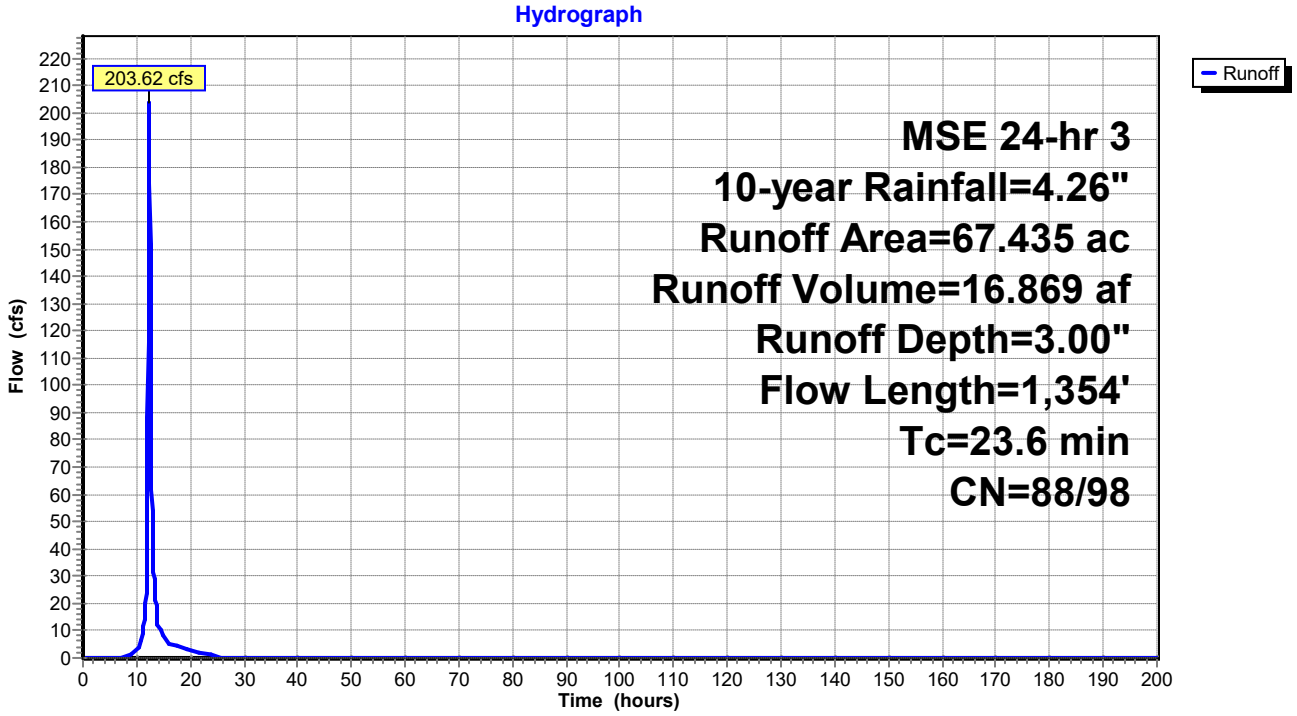
Runoff = 203.62 cfs @ 12.34 hrs, Volume= 16.869 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
1.003	98	Unconnected roofs, HSG D
17.214	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
27.306	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
9.713	80	>75% Grass cover, Good, HSG D
6.057	78	Meadow, non-grazed, HSG D
3.720	77	Woods, Good, HSG D
67.435	89	Weighted Average
65.467	88	97.08% Pervious Area
1.968	98	2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

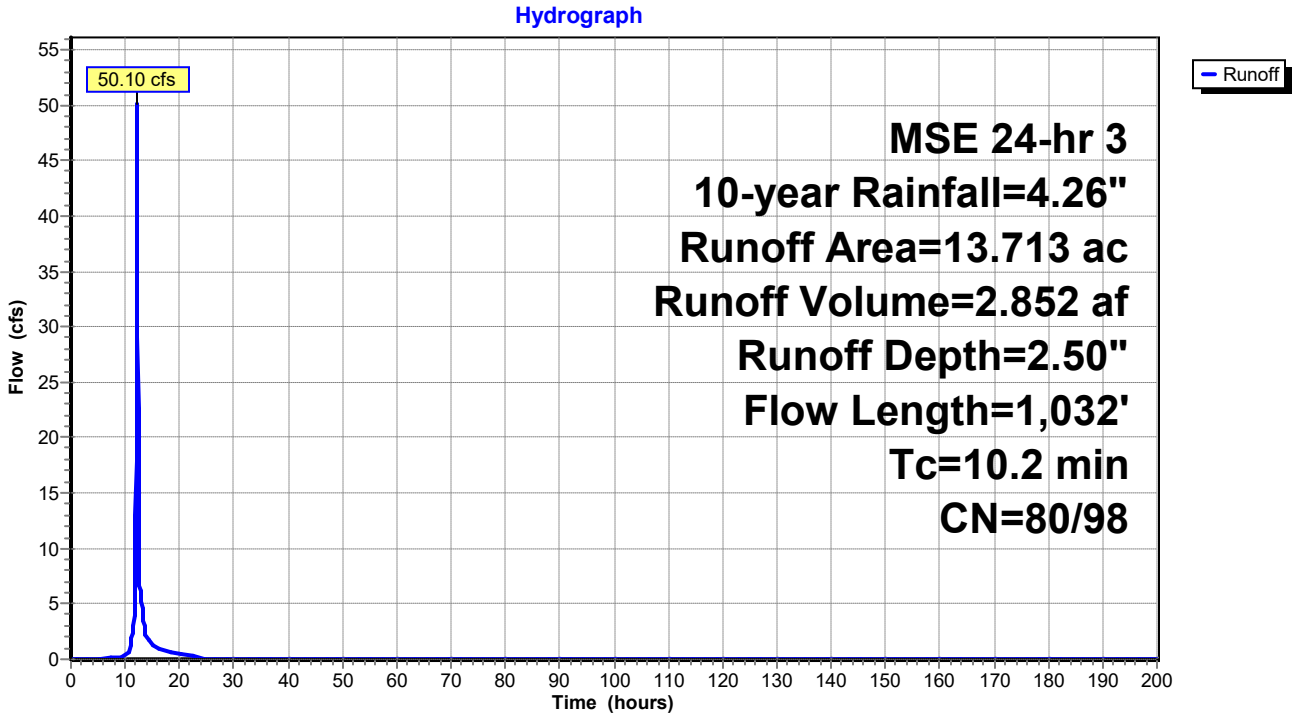
Runoff = 50.10 cfs @ 12.18 hrs, Volume= 2.852 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 42S: Direct to Proposed South Central Pond

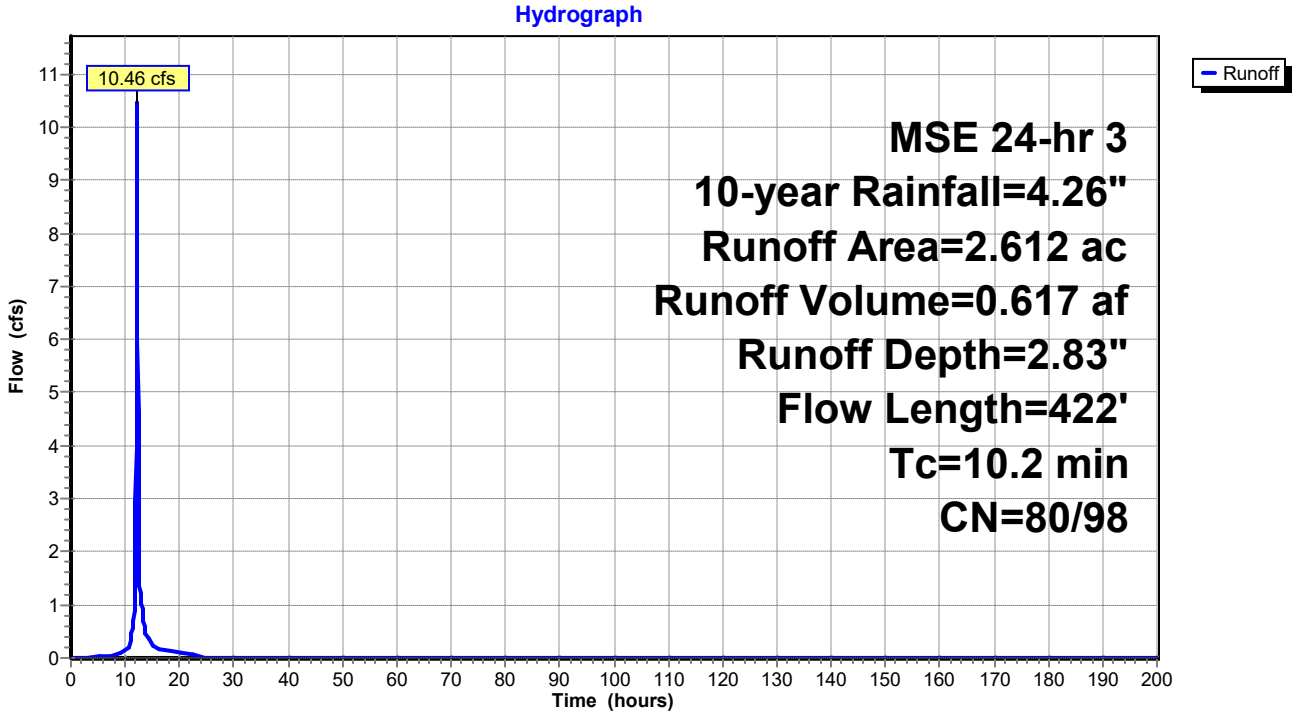
Runoff = 10.46 cfs @ 12.18 hrs, Volume= 0.617 af, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.013	98	Unconnected pavement, HSG D
0.362	98	Unconnected roofs, HSG D
0.246	98	Paved roads w/curbs & sewers, HSG D
0.145	98	Paved parking, HSG D
0.084	98	Roofs, HSG D
0.154	98	Water Surface, 0% imp, HSG D
0.600	80	>75% Grass cover, Good, HSG D
0.811	78	Meadow, non-grazed, HSG D
0.197	77	Woods, Good, HSG D
2.612	86	Weighted Average
1.762	80	67.46% Pervious Area
0.850	98	32.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
1.7	235	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	117		3.00		**Direct Entry, Pipe flow @ 3 fps**
10.2	422	Total			

Subcatchment 42S: Direct to Proposed South Central Pond



Summary for Subcatchment 43S: Direct to Proposed Central Pond

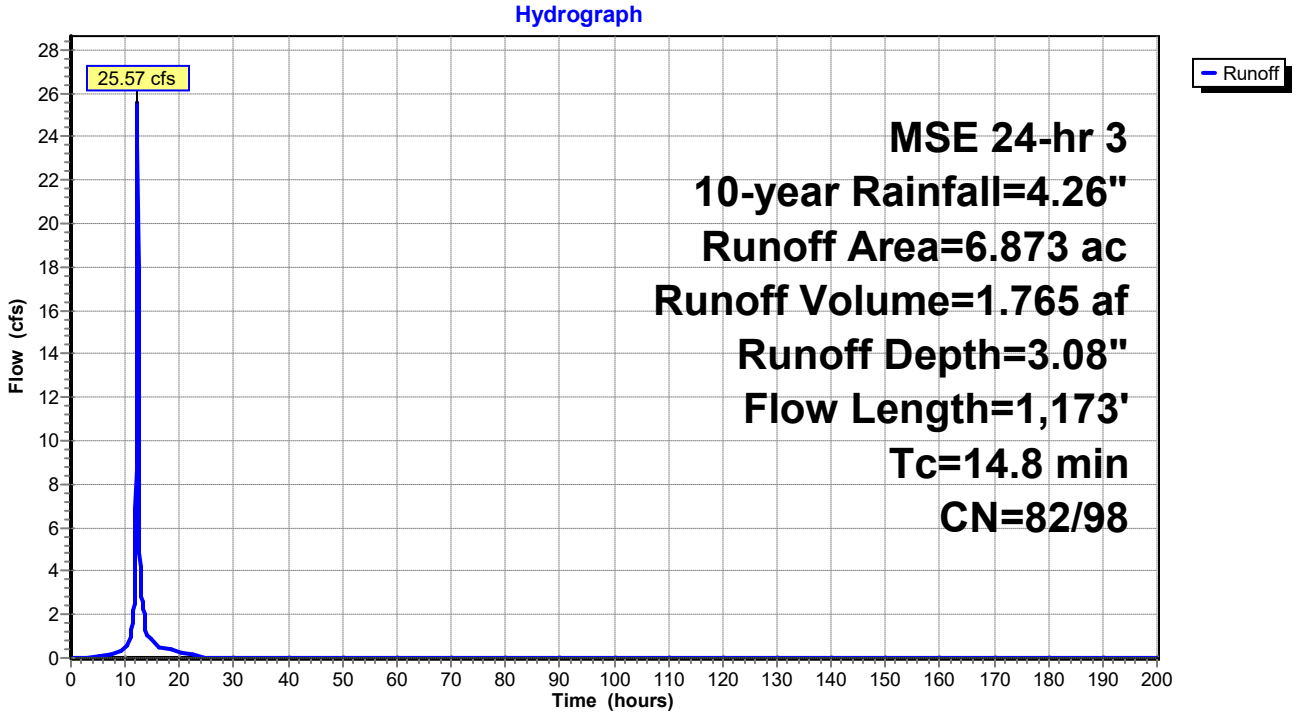
Runoff = 25.57 cfs @ 12.23 hrs, Volume= 1.765 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.205	98	Unconnected pavement, HSG D
0.855	98	Unconnected roofs, HSG D
0.896	98	Paved roads w/curbs & sewers, HSG D
0.530	98	Paved parking, HSG D
0.332	98	Roofs, HSG D
0.402	98	Water Surface, 0% imp, HSG D
0.383	89	Row crops, straight row, Good, HSG D
2.711	80	>75% Grass cover, Good, HSG D
0.559	78	Meadow, non-grazed, HSG D
6.873	89	Weighted Average
4.055	82	59.00% Pervious Area
2.818	98	41.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.5	286	0.0088	1.90		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	817		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.8	1,173	Total			

Subcatchment 43S: Direct to Proposed Central Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

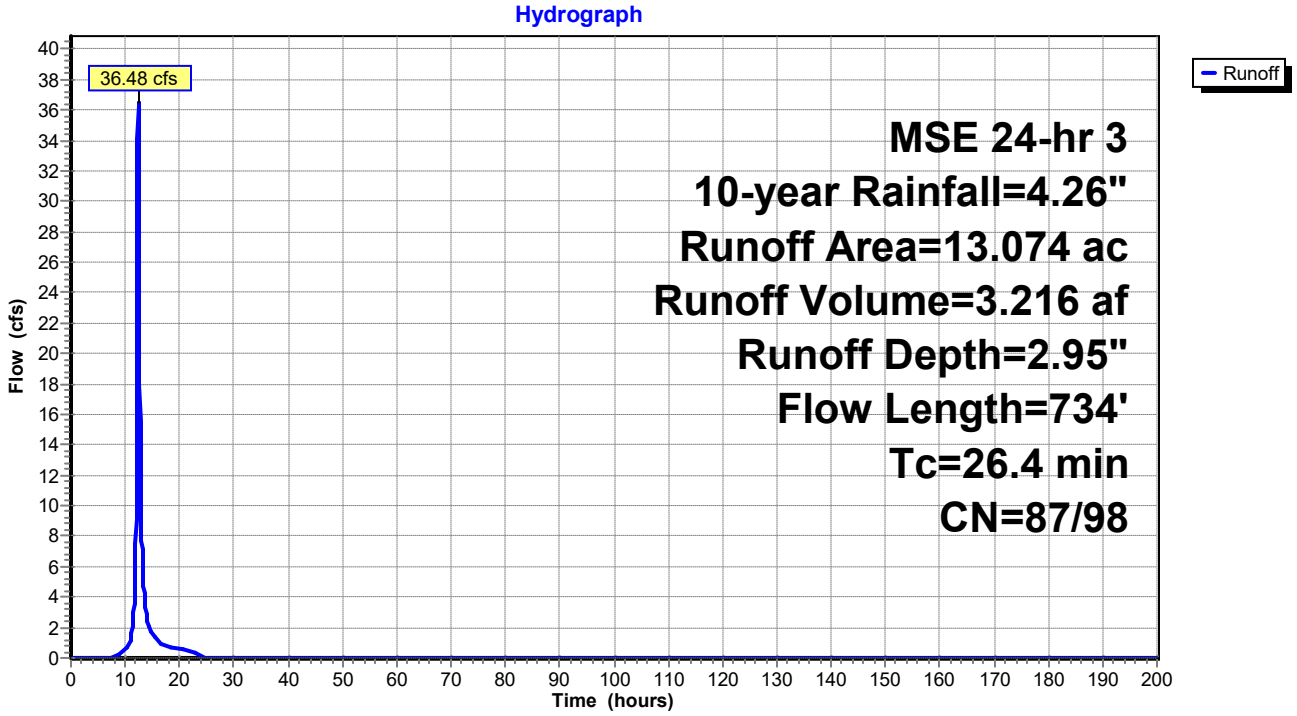
Runoff = 36.48 cfs @ 12.37 hrs, Volume= 3.216 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

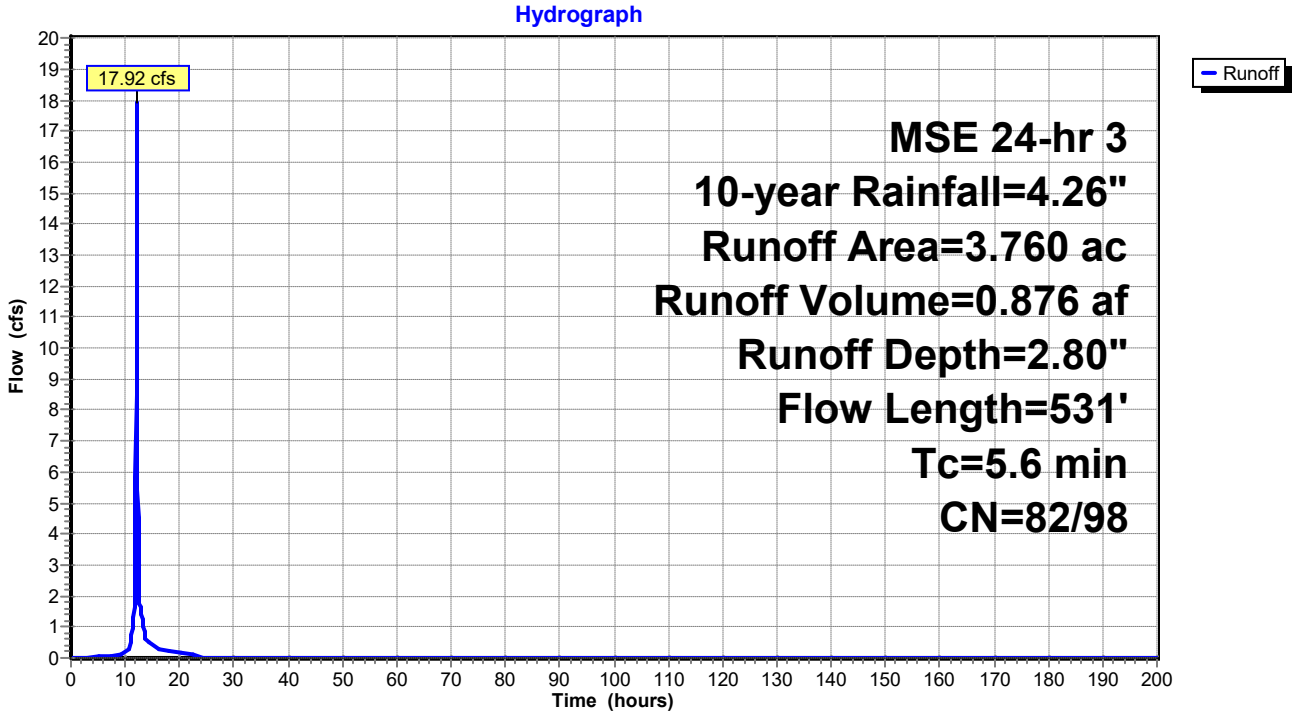
Runoff = 17.92 cfs @ 12.13 hrs, Volume= 0.876 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



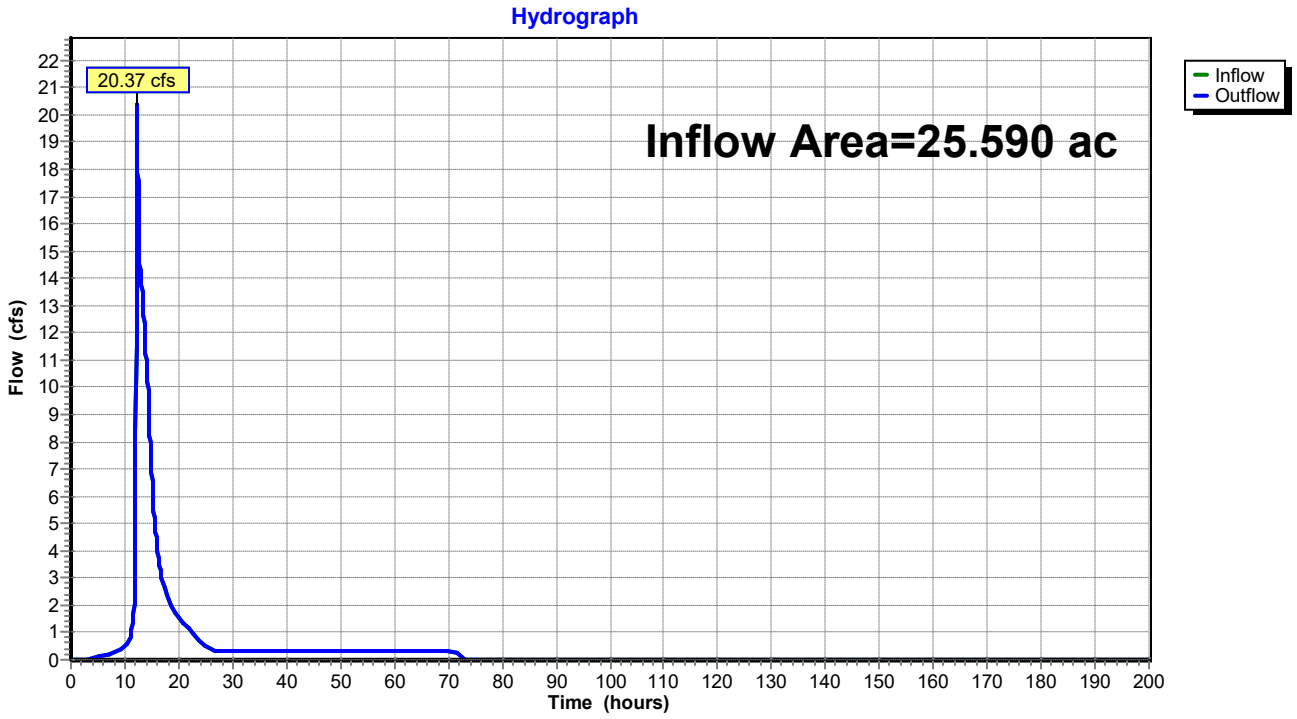
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.590 ac, 16.84% Impervious, Inflow Depth = 2.93" for 10-year event
Inflow = 20.37 cfs @ 12.25 hrs, Volume= 6.247 af
Outflow = 20.37 cfs @ 12.25 hrs, Volume= 6.247 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



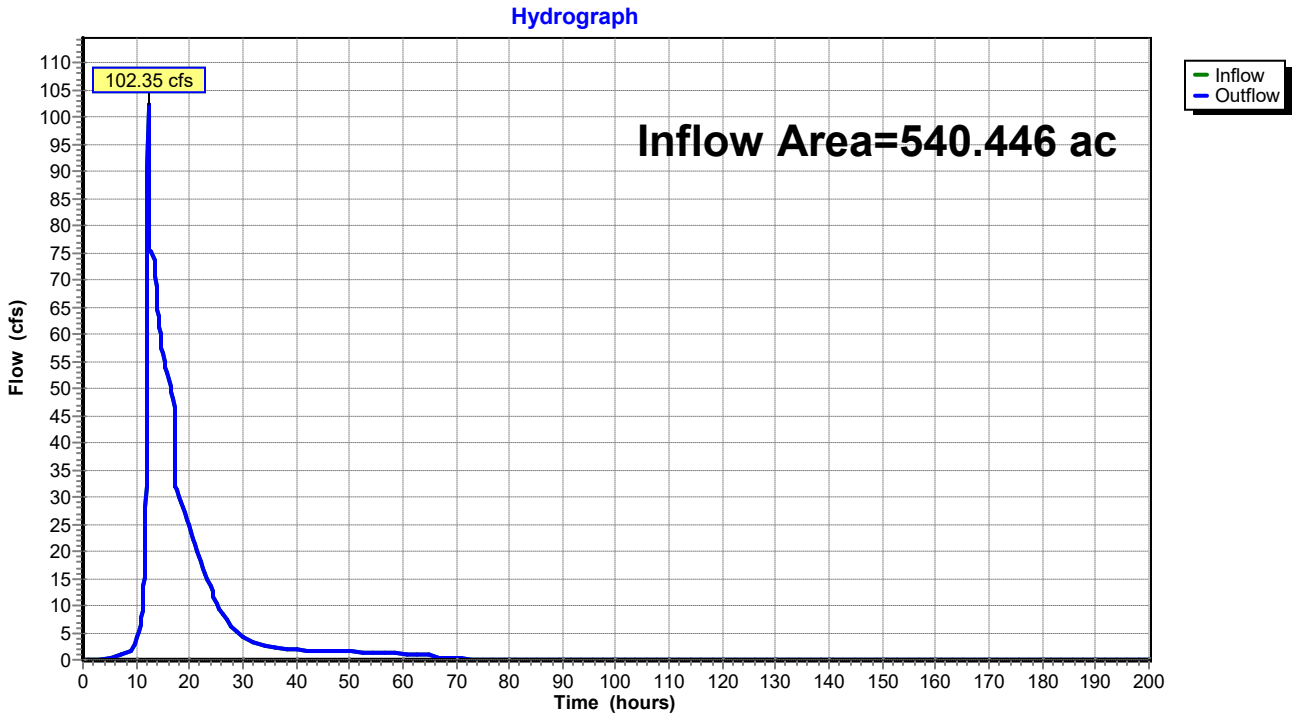
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.446 ac, 5.98% Impervious, Inflow Depth = 1.14" for 10-year event
Inflow = 102.35 cfs @ 12.22 hrs, Volume= 51.273 af
Outflow = 102.35 cfs @ 12.22 hrs, Volume= 51.273 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: Proposed East Channel

Inflow Area = 134.639 ac, 9.91% Impervious, Inflow Depth = 2.55" for 10-year event
Inflow = 31.50 cfs @ 13.66 hrs, Volume= 28.561 af
Outflow = 31.50 cfs @ 13.67 hrs, Volume= 28.561 af, Atten= 0%, Lag= 0.6 min

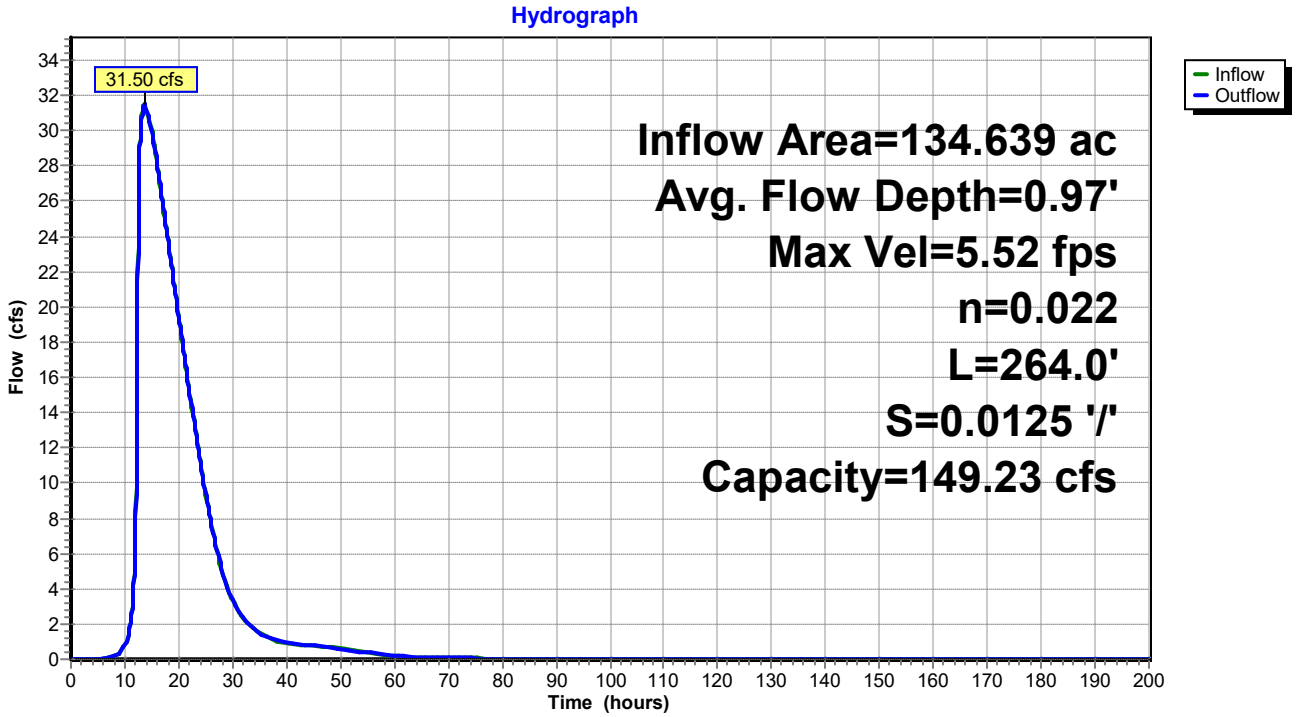
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.52 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.15 fps, Avg. Travel Time= 3.8 min

Peak Storage= 1,505 cf @ 13.67 hrs
Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 149.23 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 264.0' Slope= 0.0125 '/'
Inlet Invert= 923.50', Outlet Invert= 920.20'

‡

Reach 21R: Proposed East Channel



Summary for Reach 23R: Existing West Channel

[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 375.878 ac, 3.58% Impervious, Inflow Depth = 0.52" for 10-year event
Inflow = 40.88 cfs @ 12.25 hrs, Volume= 16.184 af
Outflow = 40.96 cfs @ 12.26 hrs, Volume= 16.184 af, Atten= 0%, Lag= 0.9 min

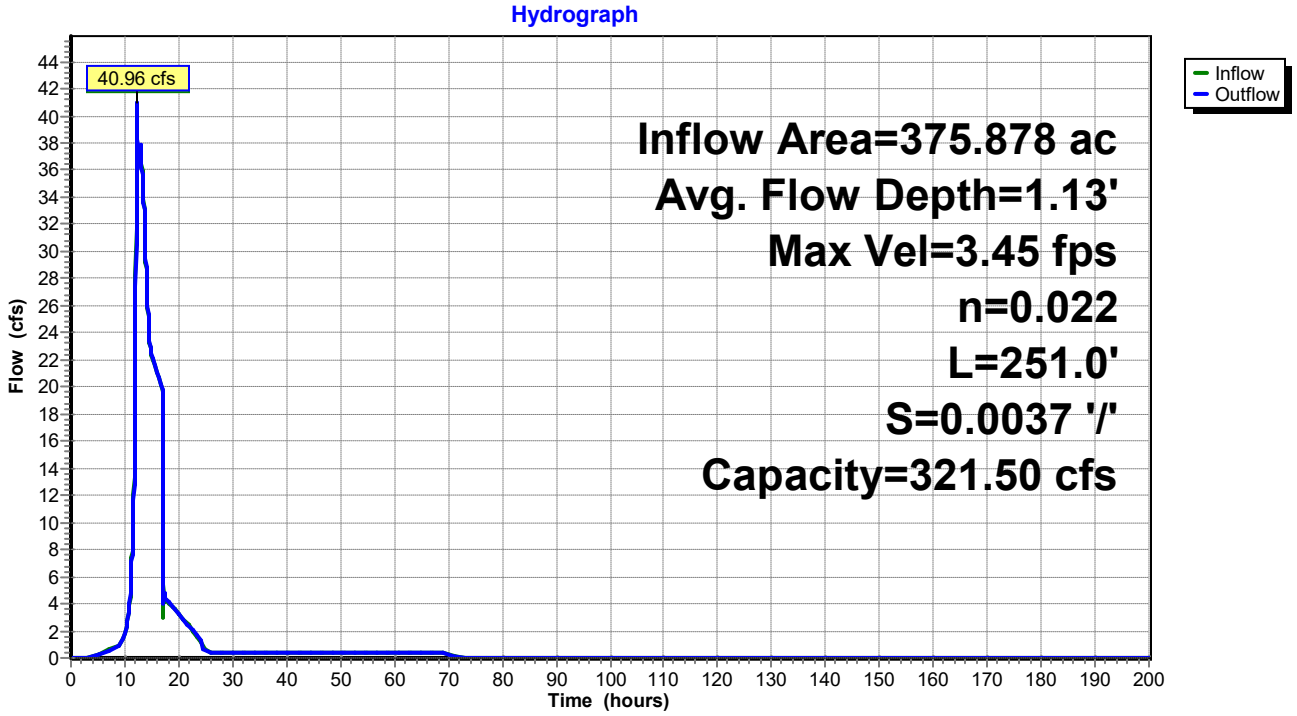
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.45 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 6.8 min

Peak Storage= 2,979 cf @ 12.26 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 3.00' Flow Area= 54.0 sf, Capacity= 321.50 cfs

6.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 '/' Top Width= 30.00'
Length= 251.0' Slope= 0.0037 '/'
Inlet Invert= 920.50', Outlet Invert= 919.58'

‡

Reach 23R: Existing West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 1.65" for 10-year event
Inflow = 458.46 cfs @ 12.40 hrs, Volume= 41.126 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 930.67' @ 25.55 hrs Surf.Area= 62.022 ac Storage= 41.126 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

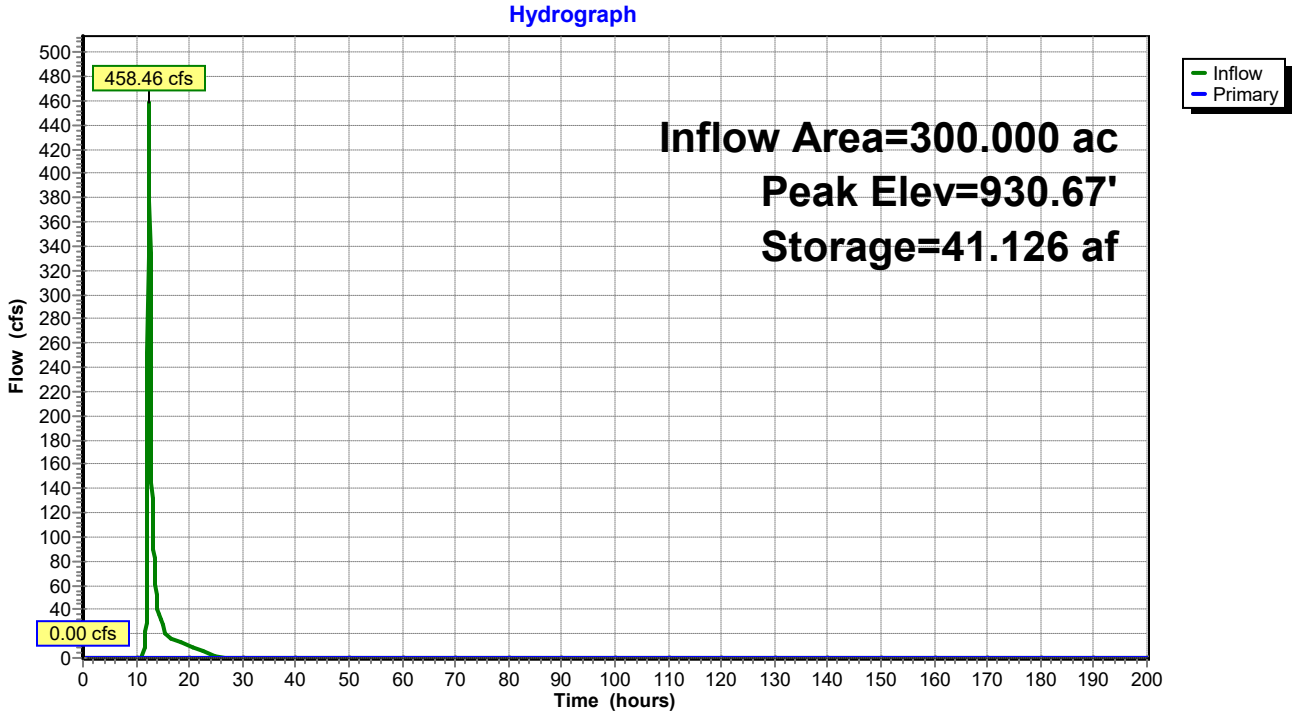
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=930.00' TW=930.22' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 10P: Proposed Northeast Pond/Filtration

[58] Hint: Peaked 0.92' above defined flood level

Inflow Area = 19.438 ac, 21.11% Impervious, Inflow Depth = 3.05" for 10-year event
Inflow = 58.41 cfs @ 12.34 hrs, Volume= 4.932 af
Outflow = 11.44 cfs @ 12.99 hrs, Volume= 4.932 af, Atten= 80%, Lag= 39.2 min
Primary = 11.44 cfs @ 12.99 hrs, Volume= 4.932 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 921.00' Surf.Area= 0.662 ac Storage= 2.955 af
Peak Elev= 922.92' @ 12.99 hrs Surf.Area= 1.668 ac Storage= 5.677 af (2.722 af above start)
Flood Elev= 922.00' Surf.Area= 1.255 ac Storage= 4.104 af (1.149 af above start)

Plug-Flow detention time= 1,552.4 min calculated for 1.977 af (40% of inflow)
Center-of-Mass det. time= 605.6 min (1,401.3 - 795.7)

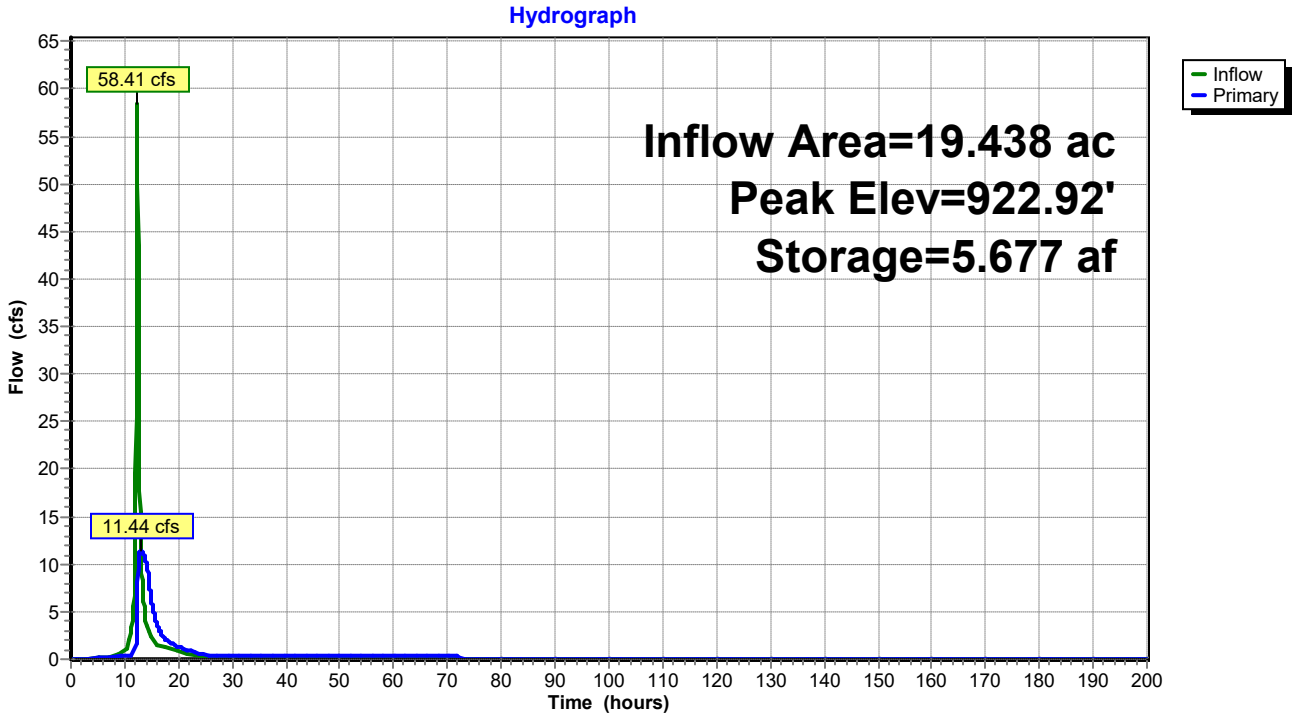
Volume	Invert	Avail.Storage	Storage Description
#1	913.00'	9.359 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
913.00	0.209	0.000	0.000
914.00	0.242	0.226	0.226
916.00	0.314	0.556	0.781
918.00	0.396	0.710	1.491
920.00	0.491	0.887	2.378
921.00	0.662	0.576	2.955
921.01	1.049	0.009	2.964
922.00	1.255	1.140	4.104
924.00	2.149	3.404	7.508
925.00	1.553	1.851	9.359

Device	Routing	Invert	Outlet Devices
#1	Primary	918.50'	**36.0" Round Culvert** L= 113.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.50' / 918.00' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	922.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	923.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	920.00'	**21.0" Round Culvert** L= 45.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 920.00' S= -0.0444 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	921.00'	**0.31 cfs Exfiltration when above 921.00'** Phase-In= 0.01'

Primary OutFlow Max=11.44 cfs @ 12.99 hrs HW=922.92' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 11.44 cfs of 51.65 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes 11.13 cfs of 16.89 cfs potential flow)
  │ └─**4=Culvert** (Inlet Controls 11.13 cfs @ 4.63 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.31 cfs)

Pond 10P: Proposed Northeast Pond/Filtration



Summary for Pond 25P: Proposed Northwest Pond/Filtration

[58] Hint: Peaked 0.33' above defined flood level

Inflow Area = 15.059 ac, 29.82% Impervious, Inflow Depth = 2.84" for 10-year event
Inflow = 49.08 cfs @ 12.26 hrs, Volume= 3.569 af
Outflow = 3.59 cfs @ 13.62 hrs, Volume= 3.569 af, Atten= 93%, Lag= 81.4 min
Primary = 3.59 cfs @ 13.62 hrs, Volume= 3.569 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 925.00' Surf.Area= 0.322 ac Storage= 1.156 af
Peak Elev= 926.83' @ 13.62 hrs Surf.Area= 1.416 ac Storage= 3.461 af (2.305 af above start)
Flood Elev= 926.50' Surf.Area= 1.369 ac Storage= 3.002 af (1.846 af above start)

Plug-Flow detention time= 1,633.6 min calculated for 2.413 af (68% of inflow)
Center-of-Mass det. time= 1,059.5 min (1,849.0 - 789.5)

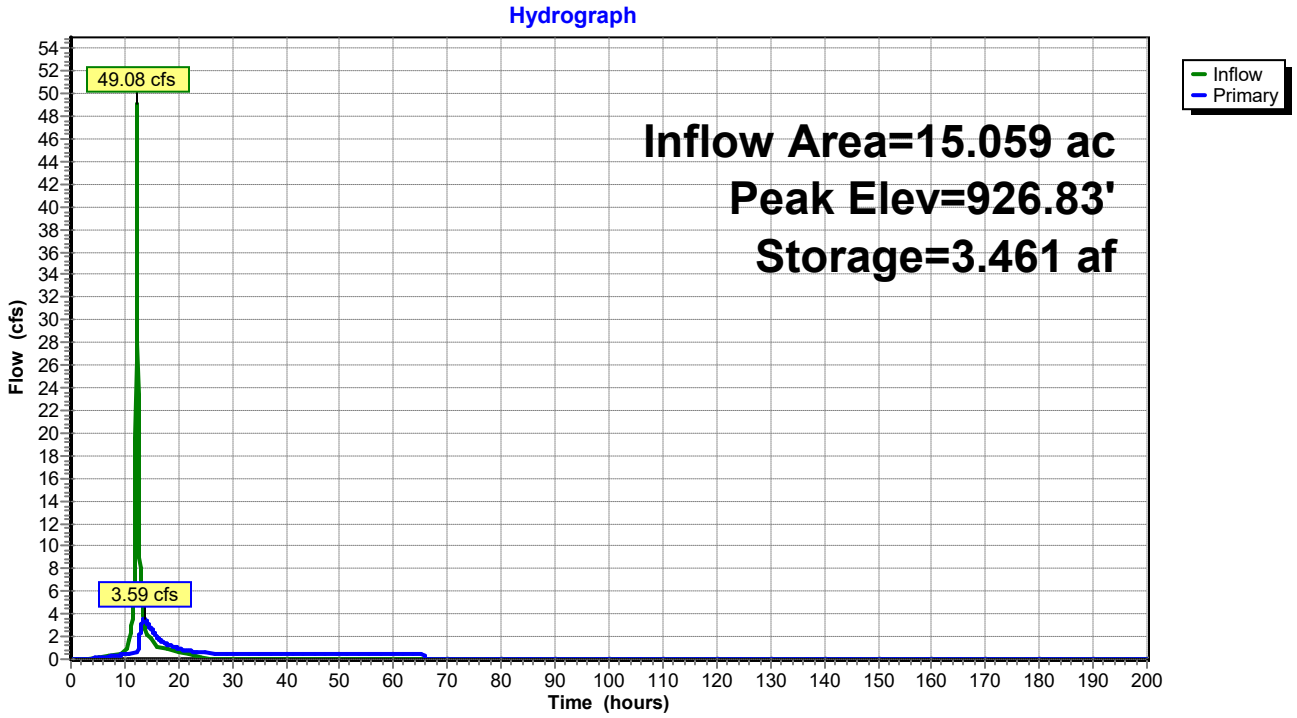
Volume	Invert	Avail.Storage	Storage Description
#1	917.00'	5.216 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
917.00	0.052	0.000	0.000
918.00	0.069	0.061	0.061
920.00	0.110	0.179	0.239
922.00	0.160	0.270	0.509
924.00	0.217	0.377	0.887
925.00	0.322	0.269	1.156
925.01	1.071	0.007	1.163
926.00	1.297	1.172	2.335
928.00	1.584	2.881	5.216

Device	Routing	Invert	Outlet Devices
#1	Primary	922.50'	**21.0" Round Culvert** L= 46.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.50' / 922.00' S= 0.0109 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	926.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	927.40'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	922.00'	**18.0" Round Culvert** L= 42.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 921.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#5	Device 1	925.00'	**0.54 cfs Exfiltration when above 925.00'** Phase-In= 0.01'

Primary OutFlow Max=3.59 cfs @ 13.62 hrs HW=926.83' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.59 cfs of 21.53 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.05 cfs @ 1.88 fps)
  │ └─**4=Culvert** (Passes 3.05 cfs of 4.89 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.54 cfs)

Pond 25P: Proposed Northwest Pond/Filtration



Summary for Pond 26P: Proposed Northwest Central Pond/Filtration

Inflow Area = 7.518 ac, 41.97% Impervious, Inflow Depth = 3.08" for 10-year event
Inflow = 21.83 cfs @ 12.16 hrs, Volume= 1.930 af
Outflow = 0.37 cfs @ 10.60 hrs, Volume= 1.930 af, Atten= 98%, Lag= 0.0 min
Primary = 0.37 cfs @ 10.60 hrs, Volume= 1.930 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.00' Surf.Area= 0.318 ac Storage= 0.894 af
Peak Elev= 925.37' @ 19.10 hrs Surf.Area= 0.979 ac Storage= 2.103 af (1.209 af above start)
Flood Elev= 925.50' Surf.Area= 0.997 ac Storage= 2.227 af (1.333 af above start)

Plug-Flow detention time= 2,576.9 min calculated for 1.036 af (54% of inflow)
Center-of-Mass det. time= 1,327.5 min (2,399.8 - 1,072.3)

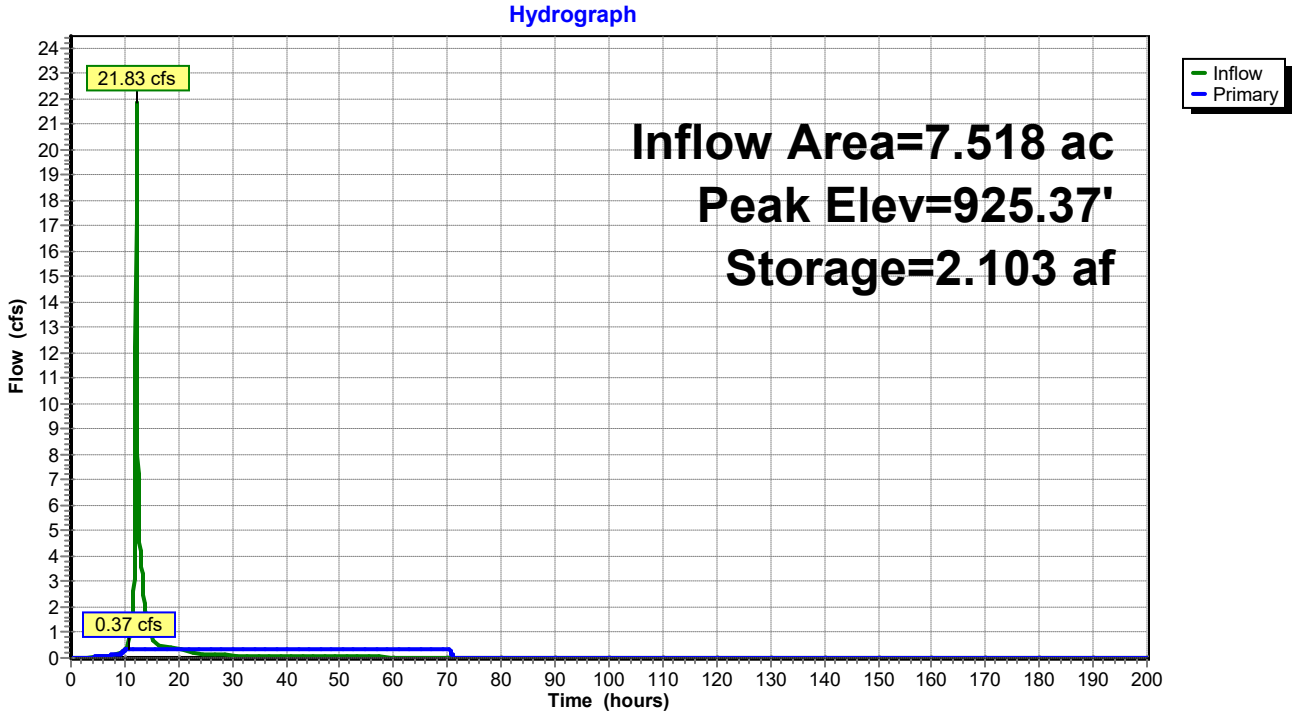
Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	3.855 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.00	0.009	0.000	0.000
918.00	0.045	0.054	0.054
920.00	0.099	0.144	0.198
922.00	0.162	0.261	0.459
923.00	0.195	0.179	0.637
924.00	0.318	0.256	0.894
924.01	0.784	0.006	0.900
926.00	1.069	1.844	2.743
927.00	1.155	1.112	3.855

Device	Routing	Invert	Outlet Devices
#1	Primary	921.50'	**21.0" Round Culvert** L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.50' / 921.00' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	925.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	926.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	921.00'	**21.0" Round Culvert** L= 44.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 920.00' / 921.00' S= -0.0227 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	924.00'	**0.37 cfs Exfiltration when above 924.00'** Phase-In= 0.01'

Primary OutFlow Max=0.37 cfs @ 10.60 hrs HW=924.01' TW=920.76' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.37 cfs of 13.00 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
    - **4=Culvert** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Exfiltration** (Exfiltration Controls 0.37 cfs)

Pond 26P: Proposed Northwest Central Pond/Filtration



Summary for Pond 27P: Proposed Northwest Central Pond

Inflow Area = 3.120 ac, 47.02% Impervious, Inflow Depth = 3.22" for 10-year event
Inflow = 14.95 cfs @ 12.16 hrs, Volume= 0.838 af
Outflow = 3.32 cfs @ 12.47 hrs, Volume= 0.835 af, Atten= 78%, Lag= 18.6 min
Primary = 3.32 cfs @ 12.47 hrs, Volume= 0.835 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.50' Surf.Area= 0.278 ac Storage= 0.732 af
Peak Elev= 925.66' @ 12.47 hrs Surf.Area= 0.432 ac Storage= 1.147 af (0.416 af above start)

Plug-Flow detention time= 3,137.3 min calculated for 0.103 af (12% of inflow)
Center-of-Mass det. time= 689.6 min (1,460.4 - 770.9)

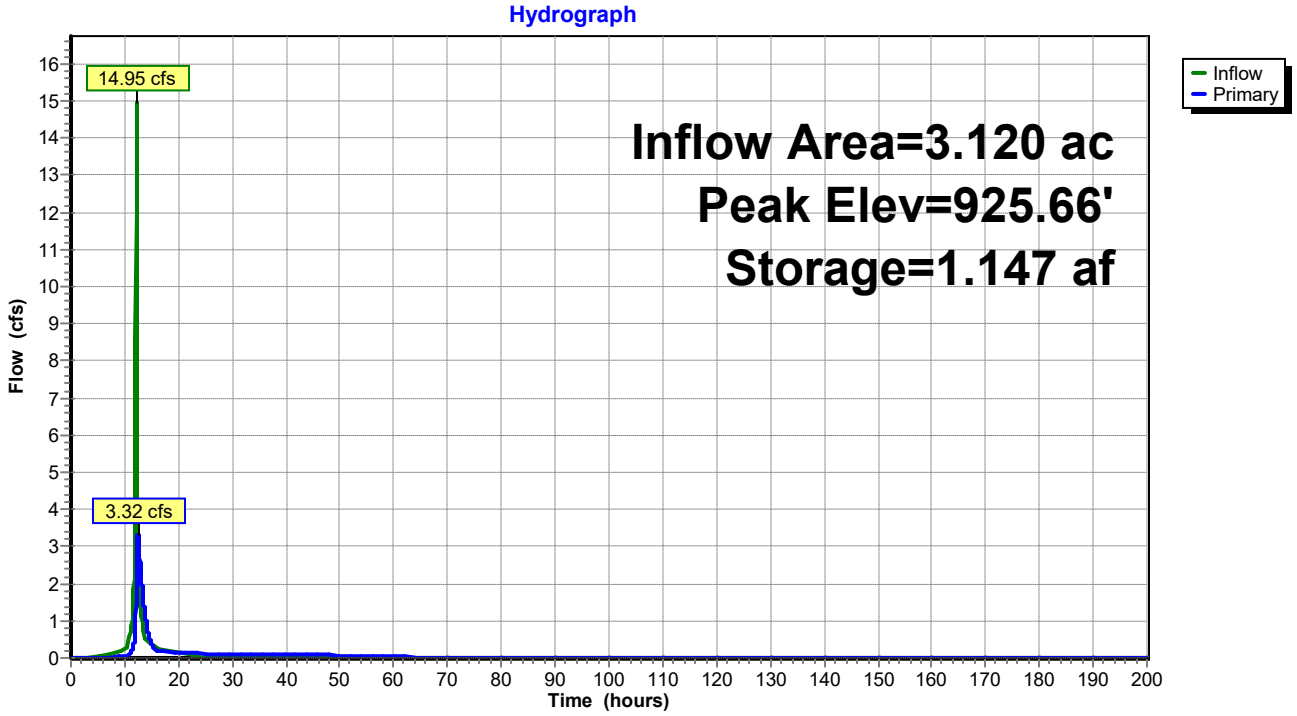
Volume	Invert	Avail.Storage	Storage Description
#1	916.50'	1.797 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.50	0.015	0.000	0.000
917.00	0.019	0.008	0.008
918.00	0.031	0.025	0.033
920.00	0.063	0.094	0.128
922.00	0.114	0.177	0.304
923.50	0.162	0.207	0.512
924.50	0.278	0.220	0.732
925.50	0.420	0.349	1.081
926.00	0.459	0.220	1.300
927.00	0.535	0.497	1.797

Device	Routing	Invert	Outlet Devices
#1	Primary	924.50'	**18.0" Round Culvert** L= 225.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.50' / 924.00' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	926.50'	**48.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	923.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 923.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=3.32 cfs @ 12.47 hrs HW=925.66' TW=924.84' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 3.32 cfs @ 3.13 fps)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 3.32 cfs of 7.69 cfs potential flow)

Pond 27P: Proposed Northwest Central Pond



Summary for Pond 28P: Proposed Northeast Central Pond

Inflow Area = 7.153 ac, 50.64% Impervious, Inflow Depth = 3.24" for 10-year event
Inflow = 28.04 cfs @ 12.22 hrs, Volume= 1.929 af
Outflow = 12.31 cfs @ 12.45 hrs, Volume= 1.929 af, Atten= 56%, Lag= 13.8 min
Primary = 12.31 cfs @ 12.45 hrs, Volume= 1.929 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 922.00' Surf.Area= 0.380 ac Storage= 1.043 af
Peak Elev= 923.13' @ 12.45 hrs Surf.Area= 0.575 ac Storage= 1.589 af (0.546 af above start)

Plug-Flow detention time= 246.9 min calculated for 0.886 af (46% of inflow)
Center-of-Mass det. time= 38.3 min (813.2 - 774.8)

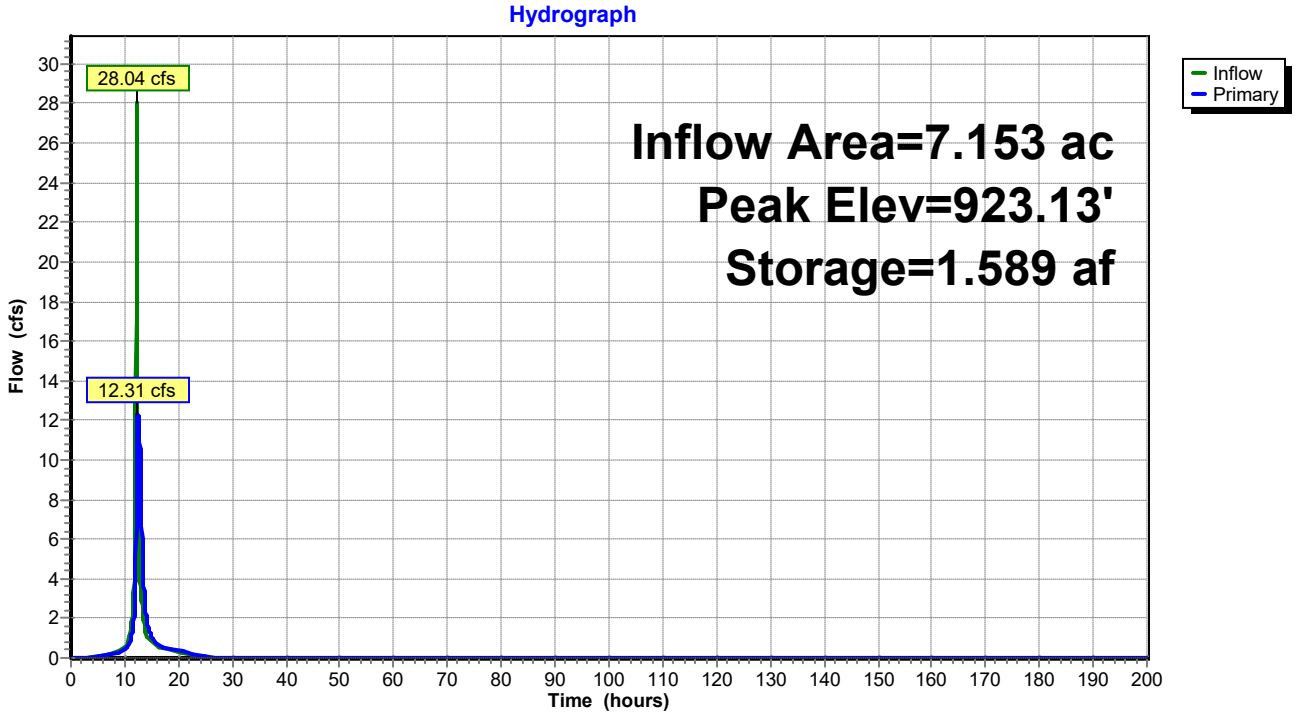
Volume	Invert	Avail.Storage	Storage Description
#1	914.00'	2.802 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
914.00	0.034	0.000	0.000
916.00	0.065	0.099	0.099
918.00	0.109	0.174	0.273
920.00	0.172	0.281	0.554
921.00	0.213	0.192	0.746
922.00	0.380	0.297	1.043
923.00	0.565	0.472	1.515
924.00	0.642	0.603	2.119
925.00	0.724	0.683	2.802

Device	Routing	Invert	Outlet Devices
#1	Primary	921.00'	**24.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.00' / 920.80' S= 0.0057 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	923.25'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	922.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 3	919.00'	**21.0" Round Culvert** L= 33.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 919.00' S= -0.0303 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=12.30 cfs @ 12.45 hrs HW=923.13' TW=921.58' (Dynamic Tailwater)
- **1=Culvert** (Passes 12.30 cfs of 13.63 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Sharp-Crested Rectangular Weir** (Passes 12.30 cfs of 18.72 cfs potential flow)
    - **4=Culvert** (Inlet Controls 12.30 cfs @ 5.12 fps)

Pond 28P: Proposed Northeast Central Pond



Summary for Pond 30P: Wetland 4A

[44] Hint: Outlet device #5 is below defined storage

Inflow Area = 357.822 ac, 1.86% Impervious, Inflow Depth = 0.39" for 10-year event
Inflow = 111.13 cfs @ 12.35 hrs, Volume= 11.661 af
Outflow = 28.68 cfs @ 13.46 hrs, Volume= 11.661 af, Atten= 74%, Lag= 66.8 min
Primary = 25.52 cfs @ 13.46 hrs, Volume= 8.706 af
Secondary = 3.17 cfs @ 13.81 hrs, Volume= 2.955 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 926.28' @ 13.46 hrs Surf.Area= 5.686 ac Storage= 4.311 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 65.1 min (883.6 - 818.5)

Volume	Invert	Avail.Storage	Storage Description
#1	923.50'	15.942 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

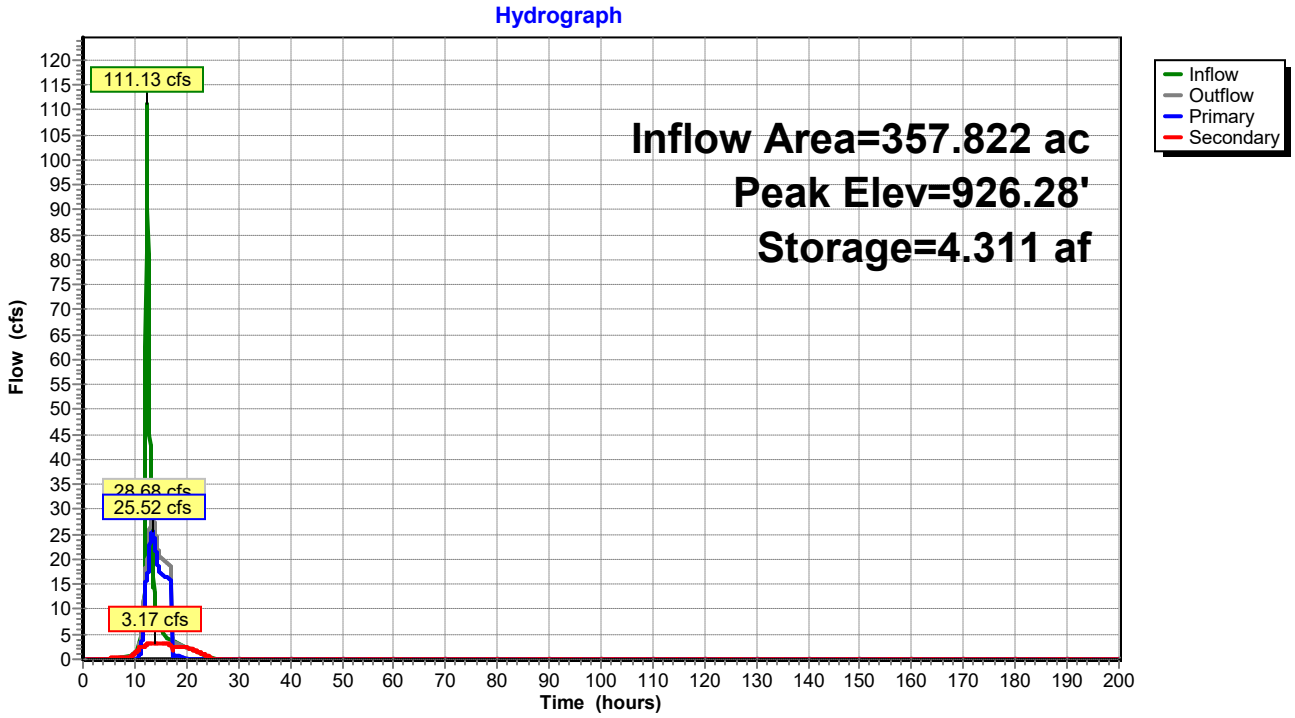
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.50	0.011	0.000	0.000
924.00	0.027	0.009	0.009
925.00	0.058	0.042	0.052
926.00	5.338	2.698	2.750
927.00	6.566	5.952	8.702
928.00	7.914	7.240	15.942

Device	Routing	Invert	Outlet Devices
#1	Primary	921.11'	**36.0" Round 36" RCP** L= 307.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.11' / 920.50' S= 0.0020 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 7.07 sf
#2	Device 1	926.00'	**60.0" Horiz. CBMH-3003** C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.17'	**18.0" Round 18" RCP** L= 23.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 921.17' / 921.11' S= 0.0026 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#4	Device 3	923.50'	**48.0" Horiz. CBMH-3004** C= 0.600 Limited to weir flow at low heads
#5	Secondary	919.60'	**12.0" Round 12" Draintile** L= 553.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.34' / 919.60' S= -0.0005 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=25.51 cfs @ 13.46 hrs HW=926.28' TW=921.53' (Dynamic Tailwater)
└─**1=36" RCP** (Passes 25.51 cfs of 49.01 cfs potential flow)
  ├─**2=CBMH-3003** (Weir Controls 7.74 cfs @ 1.74 fps)
  └─**3=18" RCP** (Inlet Controls 17.77 cfs @ 10.06 fps)
    └─**4=CBMH-3004** (Passes 17.77 cfs of 100.94 cfs potential flow)

Secondary OutFlow Max=3.17 cfs @ 13.81 hrs HW=926.24' TW=921.47' (Dynamic Tailwater)
└─**5=12" Draintile** (Outlet Controls 3.17 cfs @ 4.03 fps)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)
[80] Warning: Exceeded Pond 7P by 3.03' @ 12.85 hrs (389.13 cfs 34.431 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth = 0.13" for 10-year event
Inflow = 29.68 cfs @ 12.57 hrs, Volume= 3.430 af
Outflow = 20.21 cfs @ 12.88 hrs, Volume= 3.430 af, Atten= 32%, Lag= 18.3 min
Primary = 20.21 cfs @ 12.88 hrs, Volume= 3.430 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 933.39' @ 12.88 hrs Surf.Area= 0.537 ac Storage= 0.381 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.1 min (837.1 - 832.0)

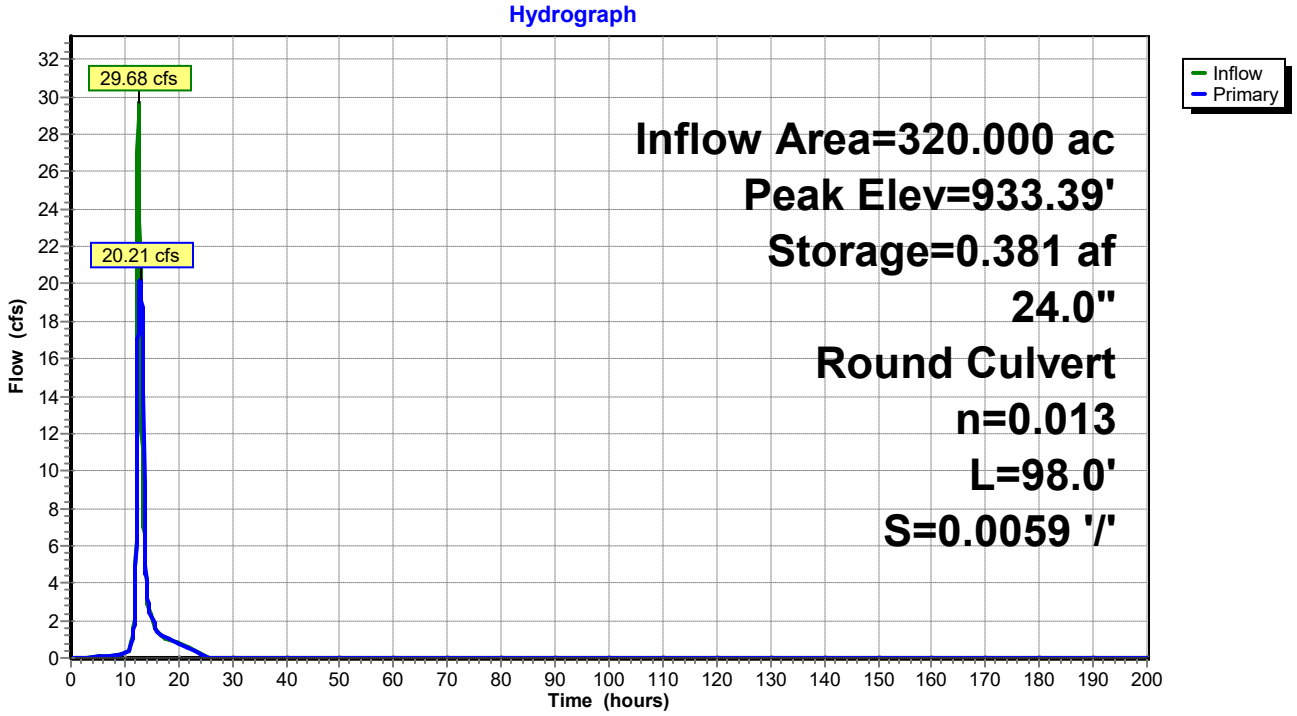
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=20.19 cfs @ 12.88 hrs HW=933.39' TW=926.21' (Dynamic Tailwater)
1=Culvert (Barrel Controls 20.19 cfs @ 6.43 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 32P: Proposed West Central Pond

Inflow Area = 3.686 ac, 36.52% Impervious, Inflow Depth = 3.07" for 10-year event
Inflow = 18.09 cfs @ 12.14 hrs, Volume= 0.942 af
Outflow = 8.21 cfs @ 12.27 hrs, Volume= 0.942 af, Atten= 55%, Lag= 7.7 min
Primary = 8.21 cfs @ 12.27 hrs, Volume= 0.942 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.00' Surf.Area= 0.395 ac Storage= 1.213 af
Peak Elev= 928.64' @ 12.27 hrs Surf.Area= 0.497 ac Storage= 1.500 af (0.287 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 45.5 min (820.4 - 774.9)

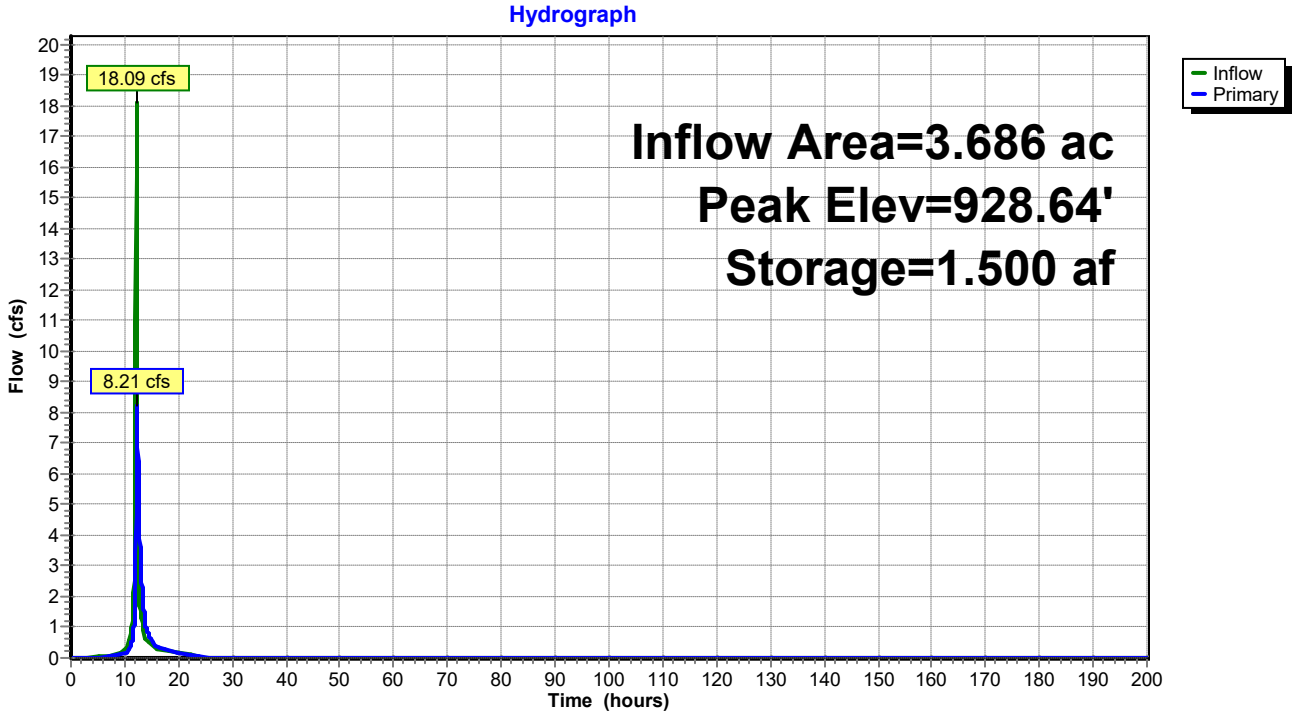
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2.284 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
920.00	0.034	0.000	0.000
922.00	0.073	0.107	0.107
924.00	0.134	0.207	0.314
926.00	0.211	0.345	0.659
927.00	0.251	0.231	0.890
928.00	0.395	0.323	1.213
929.00	0.554	0.475	1.687
930.00	0.638	0.596	2.284

Device	Routing	Invert	Outlet Devices
#1	Primary	923.05'	**18.0" Round Culvert** L= 212.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.05' / 922.52' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	929.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	925.00'	**21.0" Round Culvert** L= 20.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0500 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=8.14 cfs @ 12.27 hrs HW=928.64' TW=925.59' (Dynamic Tailwater)
- **1=Culvert** (Passes 8.14 cfs of 10.68 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Weir Controls 8.14 cfs @ 2.61 fps)
    - **4=Culvert** (Passes 8.14 cfs of 9.26 cfs potential flow)
  - **3=Orifice/Grate** (Controls 0.00 cfs)

Pond 32P: Proposed West Central Pond



Summary for Pond 40P: Wetland 2B

Inflow Area = 133.857 ac, 9.96% Impervious, Inflow Depth = 2.55" for 10-year event
Inflow = 224.73 cfs @ 12.33 hrs, Volume= 28.418 af
Outflow = 31.35 cfs @ 13.71 hrs, Volume= 28.418 af, Atten= 86%, Lag= 82.8 min
Primary = 31.35 cfs @ 13.71 hrs, Volume= 28.418 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 925.64' @ 13.71 hrs Surf.Area= 12.108 ac Storage= 11.791 af

Plug-Flow detention time= 244.2 min calculated for 28.411 af (100% of inflow)
Center-of-Mass det. time= 244.1 min (1,233.9 - 989.8)

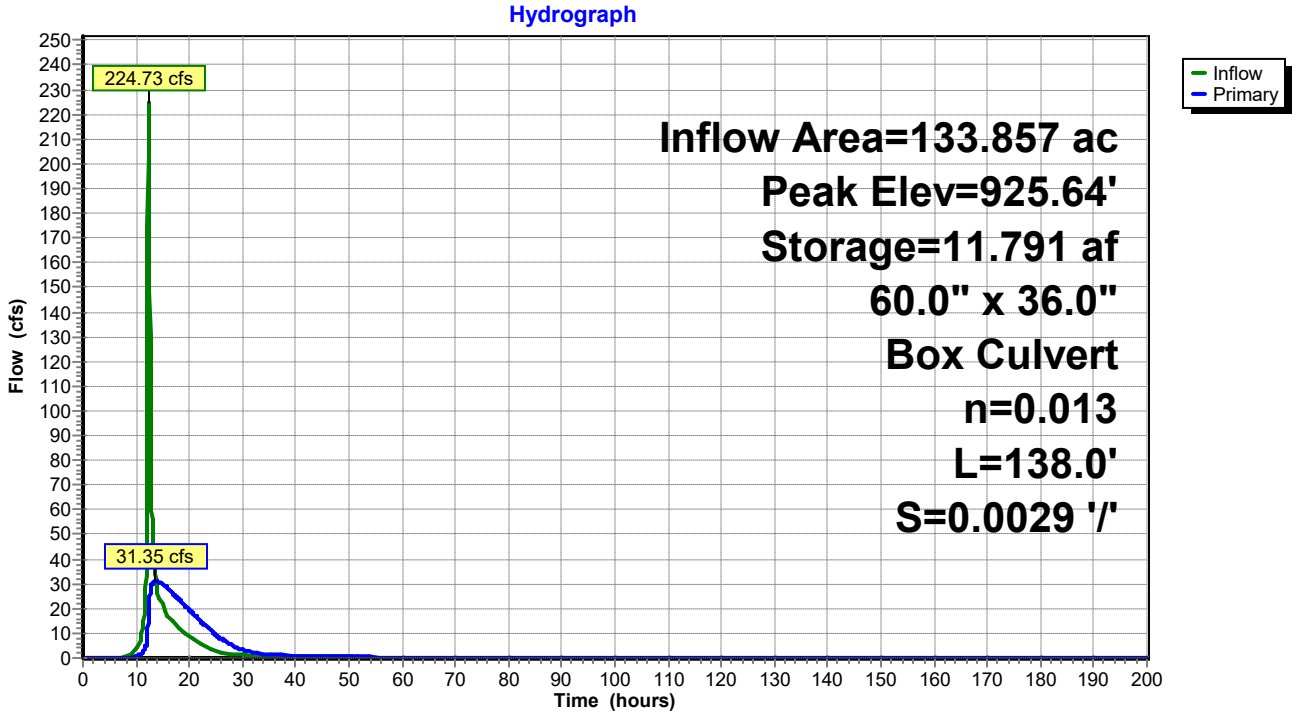
Volume	Invert	Avail.Storage	Storage Description
#1	923.90'	52.747 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.90	0.000	0.000	0.000
924.00	2.123	0.106	0.106
926.00	14.283	16.406	16.512
928.00	21.952	36.235	52.747

Device	Routing	Invert	Outlet Devices
#1	Primary	923.90'	**60.0" W x 36.0" H Box Culvert** L= 138.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.90' / 923.50' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 15.00 sf

Primary OutFlow Max=31.35 cfs @ 13.71 hrs HW=925.64' TW=924.47' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 31.35 cfs @ 4.80 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 2.50" for 10-year event
Inflow = 50.10 cfs @ 12.18 hrs, Volume= 2.852 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 940.11' @ 24.60 hrs Surf.Area= 2.036 ac Storage= 2.852 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

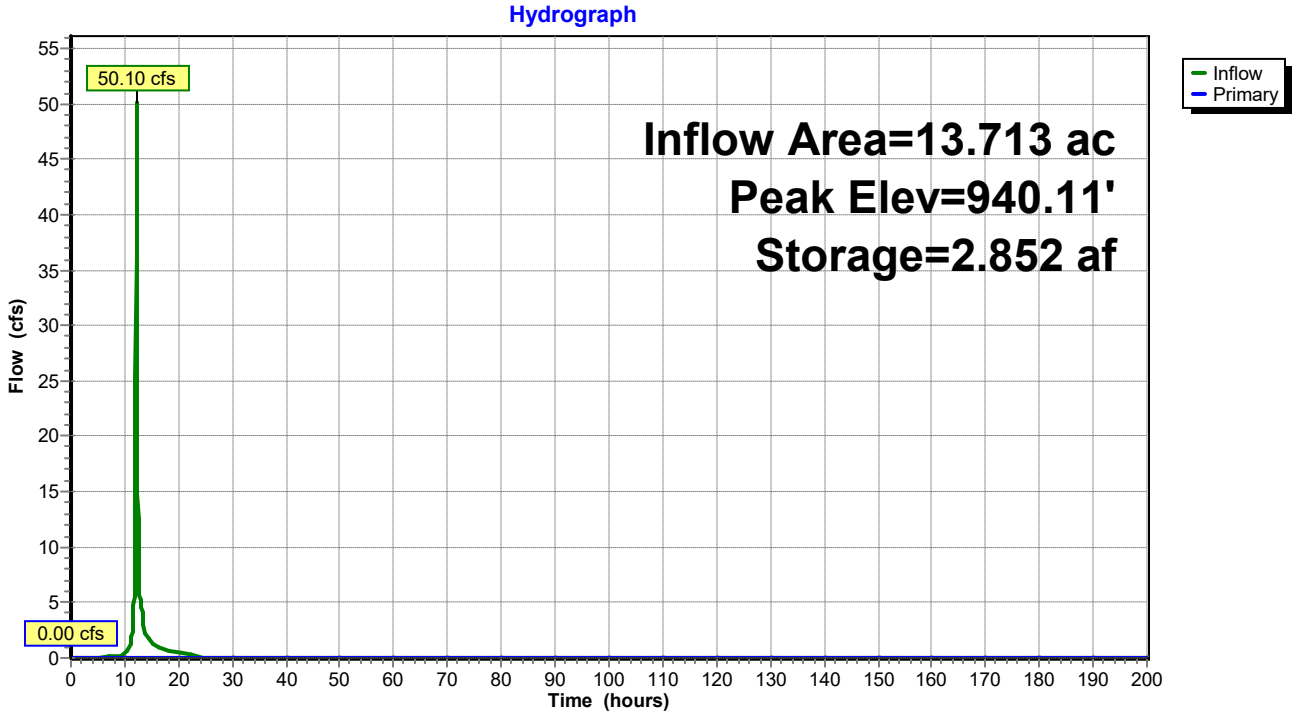
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=936.00' TW=923.90' (Dynamic Tailwater)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 41P: Ex South Off-site Pond



Summary for Pond 42P: Proposed South Central Pond

Inflow Area = 2.612 ac, 32.54% Impervious, Inflow Depth = 2.83" for 10-year event
Inflow = 10.46 cfs @ 12.18 hrs, Volume= 0.617 af
Outflow = 4.06 cfs @ 12.38 hrs, Volume= 0.616 af, Atten= 61%, Lag= 12.2 min
Primary = 4.06 cfs @ 12.38 hrs, Volume= 0.616 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.50' Surf.Area= 0.154 ac Storage= 0.309 af
Peak Elev= 929.60' @ 12.38 hrs Surf.Area= 0.250 ac Storage= 0.532 af (0.223 af above start)

Plug-Flow detention time= 311.2 min calculated for 0.307 af (50% of inflow)
Center-of-Mass det. time= 87.9 min (869.9 - 782.0)

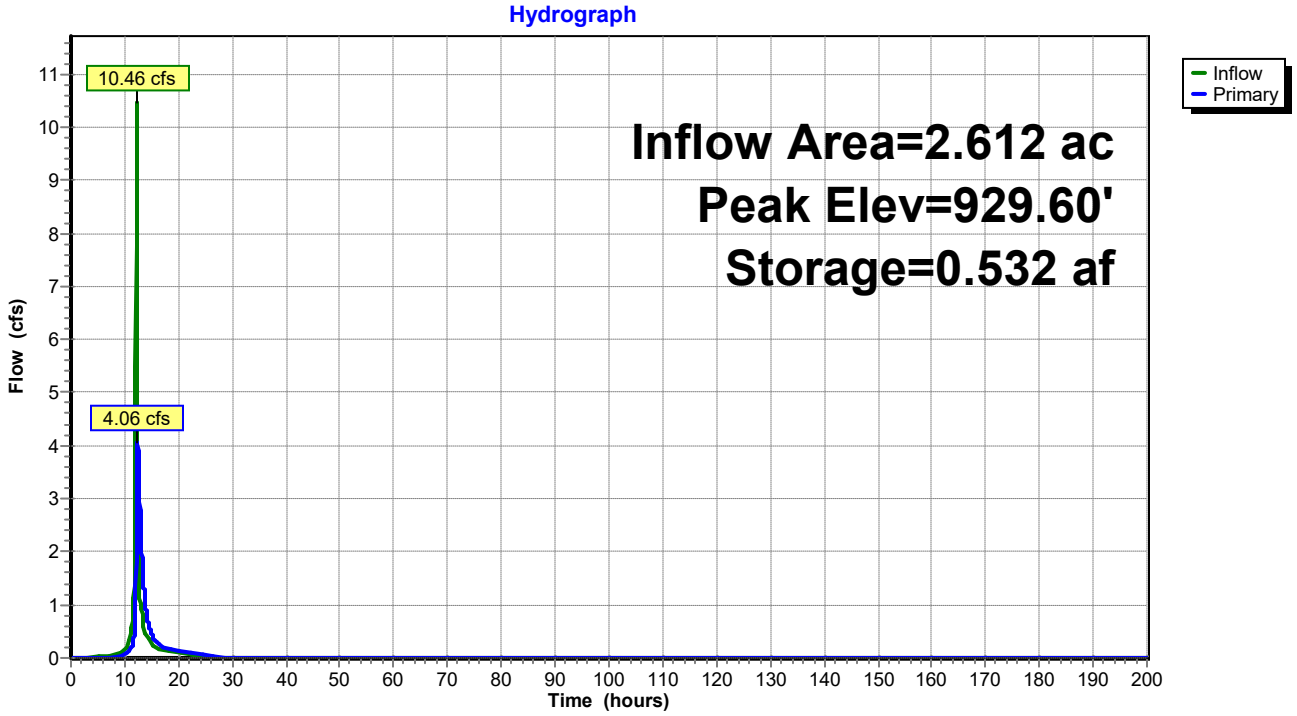
Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	1.122 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
922.00	0.004	0.000	0.000
924.00	0.022	0.026	0.026
926.00	0.050	0.072	0.098
927.50	0.078	0.096	0.194
928.00	0.114	0.048	0.242
928.50	0.154	0.067	0.309
929.50	0.244	0.199	0.508
930.00	0.274	0.130	0.637
931.50	0.372	0.484	1.122

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	**15.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 928.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	930.20'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	927.00'	**15.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.00' / 927.00' S= -0.0256 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=4.06 cfs @ 12.38 hrs HW=929.59' TW=925.15' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 4.06 cfs @ 3.56 fps)
↑**2=Orifice/Grate** (Controls 0.00 cfs)
3=Culvert (Passes 4.06 cfs of 6.18 cfs potential flow)

Pond 42P: Proposed South Central Pond



Summary for Pond 43P: Proposed East Central Pond

Inflow Area = 6.873 ac, 41.00% Impervious, Inflow Depth = 3.08" for 10-year event
Inflow = 25.57 cfs @ 12.23 hrs, Volume= 1.765 af
Outflow = 7.43 cfs @ 12.58 hrs, Volume= 1.763 af, Atten= 71%, Lag= 20.8 min
Primary = 7.43 cfs @ 12.58 hrs, Volume= 1.763 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 926.50' Surf.Area= 0.401 ac Storage= 1.319 af
Peak Elev= 928.01' @ 12.58 hrs Surf.Area= 0.620 ac Storage= 2.107 af (0.787 af above start)

Plug-Flow detention time= 663.0 min calculated for 0.443 af (25% of inflow)
Center-of-Mass det. time= 143.3 min (923.5 - 780.2)

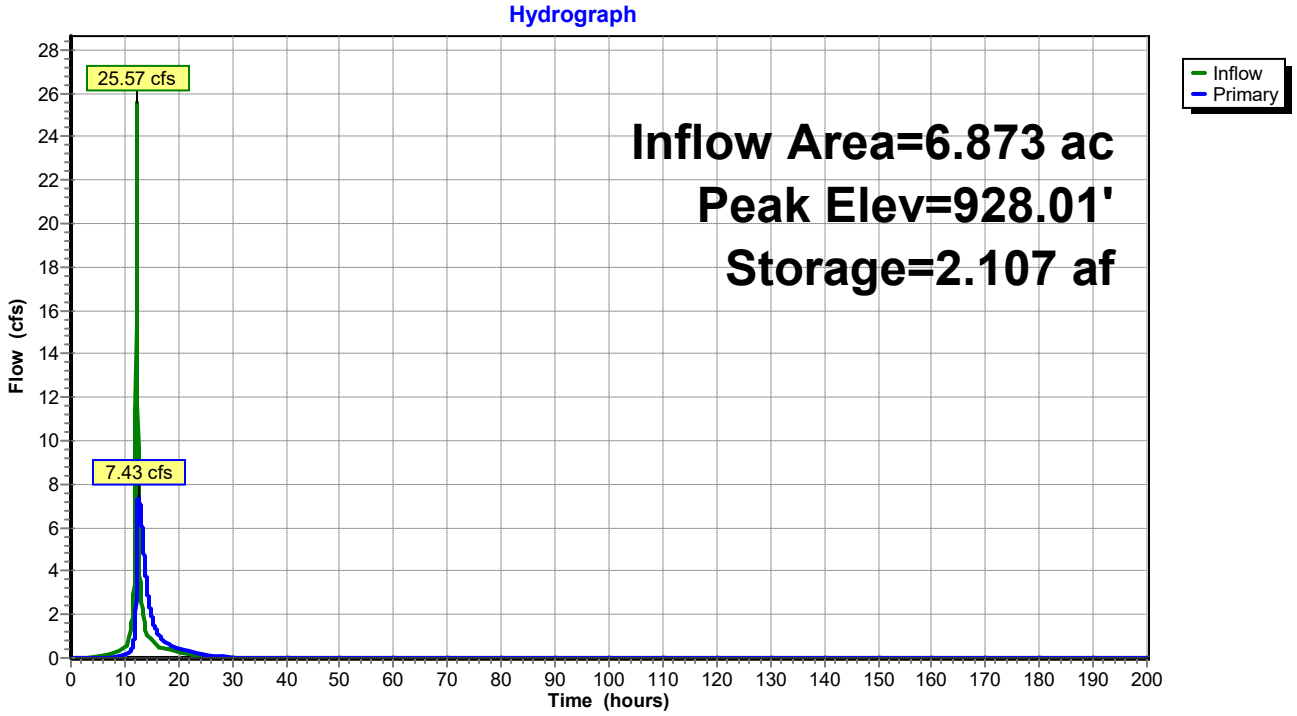
Volume	Invert	Avail.Storage	Storage Description
#1	918.50'	3.505 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
918.50	0.053	0.000	0.000
920.00	0.083	0.102	0.102
922.00	0.135	0.218	0.320
924.00	0.199	0.334	0.654
925.50	0.254	0.340	0.994
926.00	0.324	0.144	1.138
926.50	0.401	0.181	1.319
927.50	0.566	0.484	1.803
928.00	0.619	0.296	2.099
930.00	0.787	1.406	3.505

Device	Routing	Invert	Outlet Devices
#1	Primary	926.50'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.50' / 926.00' S= 0.0172 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	925.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=7.42 cfs @ 12.58 hrs HW=928.01' TW=925.41' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.42 cfs @ 4.20 fps)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 7.42 cfs of 10.46 cfs potential flow)

Pond 43P: Proposed East Central Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 1.19" for 10-year event
Inflow = 40.73 cfs @ 12.38 hrs, Volume= 3.922 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 941.05' @ 200.00 hrs Surf.Area= 114,737 sf Storage= 170,853 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

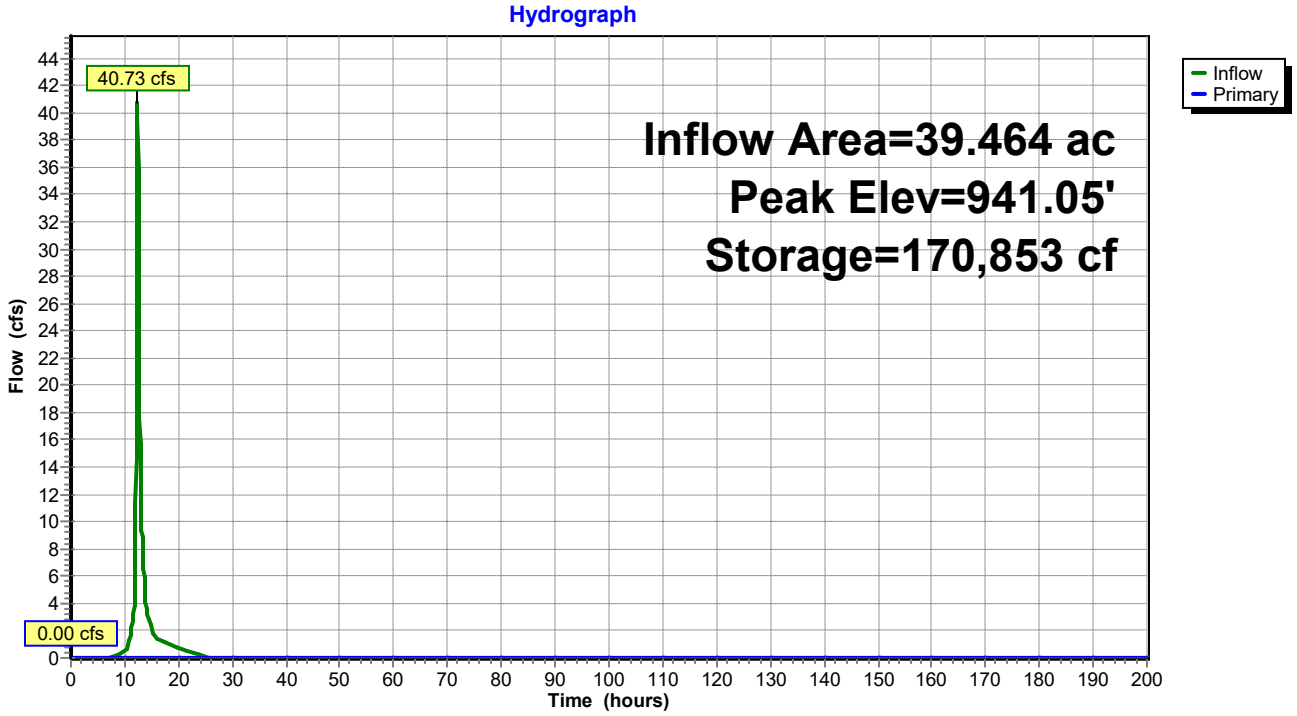
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	303,458 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
938.00	4,444	0	0
940.00	69,653	74,097	74,097
941.00	111,935	90,794	164,891
942.00	165,198	138,567	303,458

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=938.00' TW=923.90' (Dynamic Tailwater)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 29.95" for 10-year event
Inflow = 21.34 cfs @ 12.13 hrs, Volume= 9.384 af
Outflow = 19.91 cfs @ 12.16 hrs, Volume= 9.170 af, Atten= 7%, Lag= 1.8 min
Primary = 19.91 cfs @ 12.16 hrs, Volume= 9.170 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 938.81' @ 12.16 hrs Surf.Area= 12,564 sf Storage= 12,745 cf

Plug-Flow detention time= 104.5 min calculated for 9.167 af (98% of inflow)
Center-of-Mass det. time= 21.0 min (1,356.7 - 1,335.6)

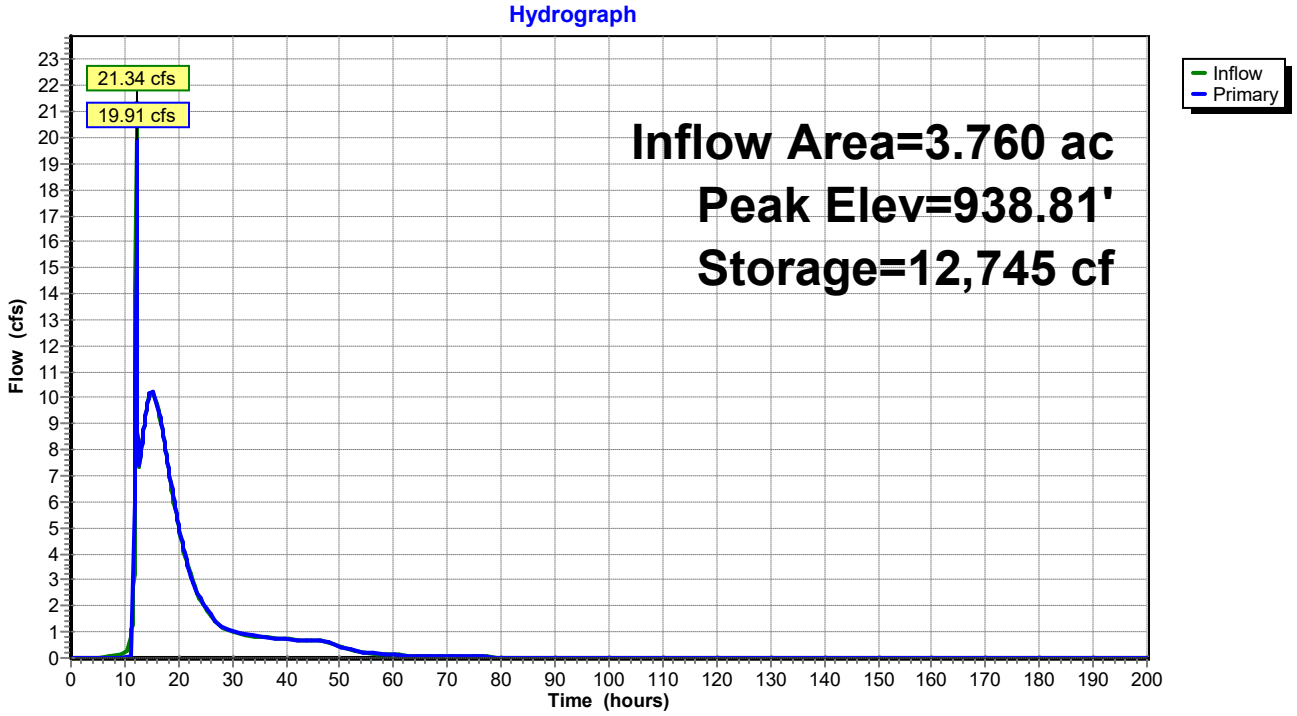
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	15,364 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
936.00	178	0	0
938.00	5,354	5,532	5,532
939.00	14,309	9,832	15,364

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=19.45 cfs @ 12.16 hrs HW=938.80' TW=924.72' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 19.45 cfs @ 1.72 fps)

Pond 60P: Wetland 5B



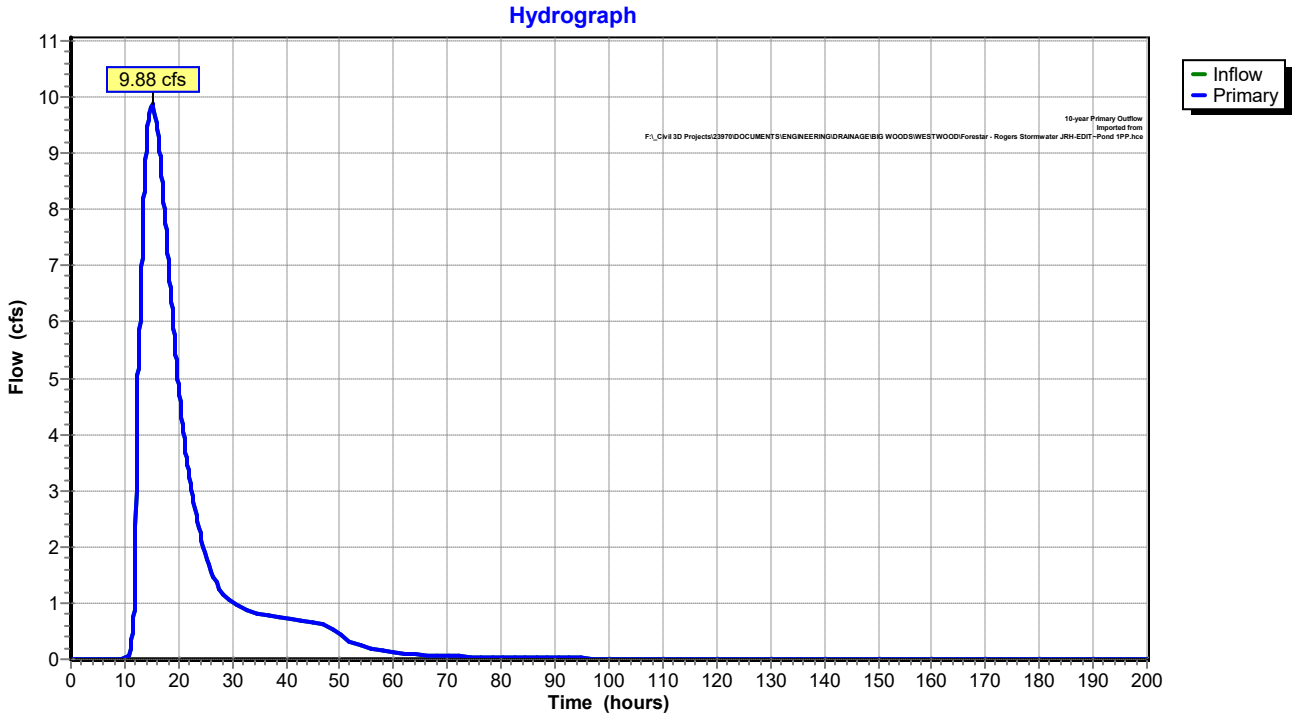
Summary for Link 1PP: Northwest Wetland

Inflow = 9.88 cfs @ 15.07 hrs, Volume= 8.508 af
Primary = 9.88 cfs @ 15.07 hrs, Volume= 8.508 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

10-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 1PP: Northwest Wetland



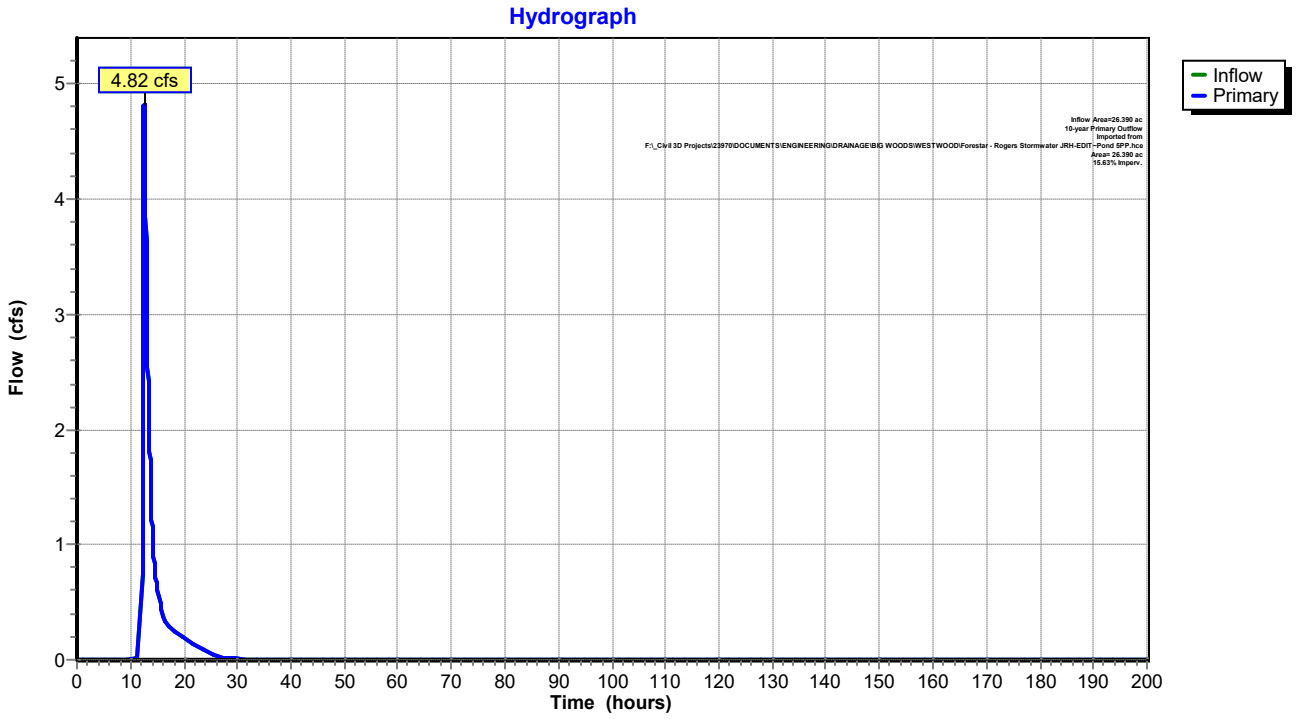
Summary for Link 5PP: Existing Pond

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 0.32" for 10-year event
Inflow = 4.82 cfs @ 12.52 hrs, Volume= 0.706 af
Primary = 4.82 cfs @ 12.52 hrs, Volume= 0.706 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

10-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 5PP: Existing Pond



Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=3.93"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=1,123.30 cfs 98.288 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=19.438 ac 21.11% Impervious Runoff Depth=5.78"
Flow Length=1,602' Tc=23.6 min CN=86/98 Runoff=108.68 cfs 9.357 af

Subcatchment 11S: Direct to Cowley Lake Runoff Area=6.152 ac 3.35% Impervious Runoff Depth=5.20"
Flow Length=1,308' Tc=15.2 min CN=83/98 Runoff=39.58 cfs 2.666 af

Subcatchment 12S: Fugitve to Fox Creek Runoff Area=0.547 ac 45.16% Impervious Runoff Depth=5.74"
Flow Length=165' Tc=8.1 min CN=80/98 Runoff=4.71 cfs 0.262 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=3.970 ac 7.66% Impervious Runoff Depth=4.86"
Flow Length=310' Tc=10.9 min CN=79/98 Runoff=27.57 cfs 1.608 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.782 ac 1.28% Impervious Runoff Depth=4.72"
Flow Length=392' Tc=17.3 min CN=79/98 Runoff=4.39 cfs 0.308 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=3.027 ac 10.37% Impervious Runoff Depth=4.92"
Flow Length=309' Tc=17.0 min CN=79/98 Runoff=17.55 cfs 1.241 af

Subcatchment 23S: Direct to Proposed Runoff Area=3.385 ac 0.68% Impervious Runoff Depth=4.93"
Flow Length=243' Tc=13.3 min CN=81/98 Runoff=22.25 cfs 1.391 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=7.873 ac 5.31% Impervious Runoff Depth=5.02"
Flow Length=407' Tc=11.1 min CN=81/98 Runoff=56.02 cfs 3.294 af

Subcatchment 25S: Direct to Proposed Runoff Area=15.059 ac 29.82% Impervious Runoff Depth=5.50"
Flow Length=1,817' Tc=17.1 min CN=81/98 Runoff=94.08 cfs 6.905 af

Subcatchment 26S: Direct to Proposed Runoff Area=4.398 ac 38.38% Impervious Runoff Depth=5.67"
Flow Length=621' Tc=8.6 min CN=81/98 Runoff=37.02 cfs 2.078 af

Subcatchment 27S: Direct to Proposed Runoff Area=3.120 ac 47.02% Impervious Runoff Depth=5.96"
Flow Length=621' Tc=8.6 min CN=83/98 Runoff=27.18 cfs 1.549 af

Subcatchment 28S: Direct to Proposed Runoff Area=7.153 ac 50.64% Impervious Runoff Depth=5.97"
Flow Length=1,013' Tc=14.4 min CN=82/98 Runoff=51.09 cfs 3.557 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=34.136 ac 8.50% Impervious Runoff Depth=5.19"
Flow Length=1,249' Tc=23.4 min CN=82/98 Runoff=176.81 cfs 14.753 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=4.47"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=65.78 cfs 7.458 af

Subcatchment 32S: Direct to Proposed Runoff Area=3.686 ac 36.52% Impervious Runoff Depth=5.78"
Flow Length=440' Slope=0.0200 '/' Tc=7.1 min CN=83/98 Runoff=33.42 cfs 1.774 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=67.435 ac 2.92% Impervious Runoff Depth=5.74"
Flow Length=1,354' Tc=23.6 min CN=88/98 Runoff=379.24 cfs 32.280 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=5.08"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=100.55 cfs 5.810 af

Subcatchment 42S: Direct to Proposed Runoff Area=2.612 ac 32.54% Impervious Runoff Depth=5.48"
Flow Length=422' Tc=10.2 min CN=80/98 Runoff=20.03 cfs 1.193 af

Subcatchment 43S: Direct to Proposed Runoff Area=6.873 ac 41.00% Impervious Runoff Depth=5.79"
Flow Length=1,173' Tc=14.8 min CN=82/98 Runoff=47.43 cfs 3.315 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=5.68"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=68.57 cfs 6.189 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=5.46"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=33.96 cfs 1.710 af

Reach 1R: Cowley Lake Outlet Channel Inflow=65.25 cfs 12.023 af
Outflow=65.25 cfs 12.023 af

Reach 2R: Cowley Lake Inflow=184.21 cfs 146.970 af
Outflow=184.21 cfs 146.970 af

Reach 21R: Proposed East Channel Avg. Flow Depth=1.28' Max Vel=6.46 fps Inflow=56.86 cfs 62.953 af
n=0.022 L=264.0' S=0.0125 '/' Capacity=149.23 cfs Outflow=56.86 cfs 62.953 af

Reach 23R: Existing West Channel Avg. Flow Depth=1.59' Max Vel=4.17 fps Inflow=82.09 cfs 70.970 af
n=0.022 L=251.0' S=0.0037 '/' Capacity=321.50 cfs Outflow=81.93 cfs 70.969 af

Pond 7P: Whiteford Lake and Peak Elev=931.48' Storage=92.213 af Inflow=1,123.30 cfs 98.288 af
Outflow=34.97 cfs 36.256 af

Pond 10P: Proposed Northeast Peak Elev=923.82' Storage=7.203 af Inflow=108.68 cfs 9.357 af
Outflow=54.13 cfs 9.357 af

Pond 25P: Proposed Northwest Peak Elev=927.80' Storage=4.908 af Inflow=94.08 cfs 6.905 af
Outflow=23.44 cfs 6.905 af

Pond 26P: Proposed Northwest Central Peak Elev=925.93' Storage=2.664 af Inflow=41.54 cfs 3.624 af
Outflow=4.83 cfs 3.624 af

Pond 27P: Proposed Northwest Central Peak Elev=926.35' Storage=1.466 af Inflow=27.18 cfs 1.549 af
Outflow=5.95 cfs 1.546 af

Pond 28P: Proposed Northeast Central Peak Elev=924.00' Storage=2.116 af Inflow=51.09 cfs 3.557 af
Outflow=19.81 cfs 3.557 af

Pond 30P: Wetland 4A Peak Elev=926.91' Storage=8.089 af Inflow=206.55 cfs 62.344 af
Primary=54.21 cfs 42.527 af Secondary=3.20 cfs 19.871 af Outflow=57.41 cfs 62.398 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=934.52' Storage=1.969 af Inflow=65.78 cfs 43.714 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=25.92 cfs 45.816 af

Pond 32P: Proposed West Central Pond Peak Elev=929.13' Storage=1.763 af Inflow=33.42 cfs 1.774 af
Outflow=11.07 cfs 1.774 af

Pond 40P: Wetland 2B Peak Elev=926.55' Storage=24.891 af Inflow=415.75 cfs 62.645 af
60.0" x 36.0" Box Culvert n=0.013 L=138.0' S=0.0029 '/' Outflow=56.67 cfs 62.645 af

Pond 41P: Ex South Off-site Pond Peak Elev=940.67' Storage=4.079 af Inflow=100.55 cfs 5.810 af
Outflow=7.88 cfs 2.123 af

Pond 42P: Proposed South Central Pond Peak Elev=930.36' Storage=0.739 af Inflow=20.03 cfs 1.193 af
Outflow=6.56 cfs 1.193 af

Pond 43P: Proposed East Central Pond Peak Elev=929.07' Storage=2.810 af Inflow=47.43 cfs 3.315 af
Outflow=11.48 cfs 3.313 af

Pond 50P: Wetland 4B Peak Elev=941.66' Storage=250,287 cf Inflow=78.67 cfs 10.852 af
Outflow=9.40 cfs 5.629 af

Pond 60P: Wetland 5B Peak Elev=938.96' Storage=14,745 cf Inflow=41.22 cfs 18.322 af
Outflow=39.47 cfs 18.108 af

Link DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=17.34 cfs 16.612 af
Primary=17.34 cfs 16.612 af

Link \DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=10.47 cfs 4.664 af
Area= 26.390 ac 15.63% Imperv. Primary=10.47 cfs 4.664 af

Total Runoff Area = 540.193 ac Runoff Volume = 206.987 af Average Runoff Depth = 4.60"
93.94% Pervious = 507.441 ac 6.06% Impervious = 32.752 ac

Summary for Subcatchment 7S: Approx DA to Lake

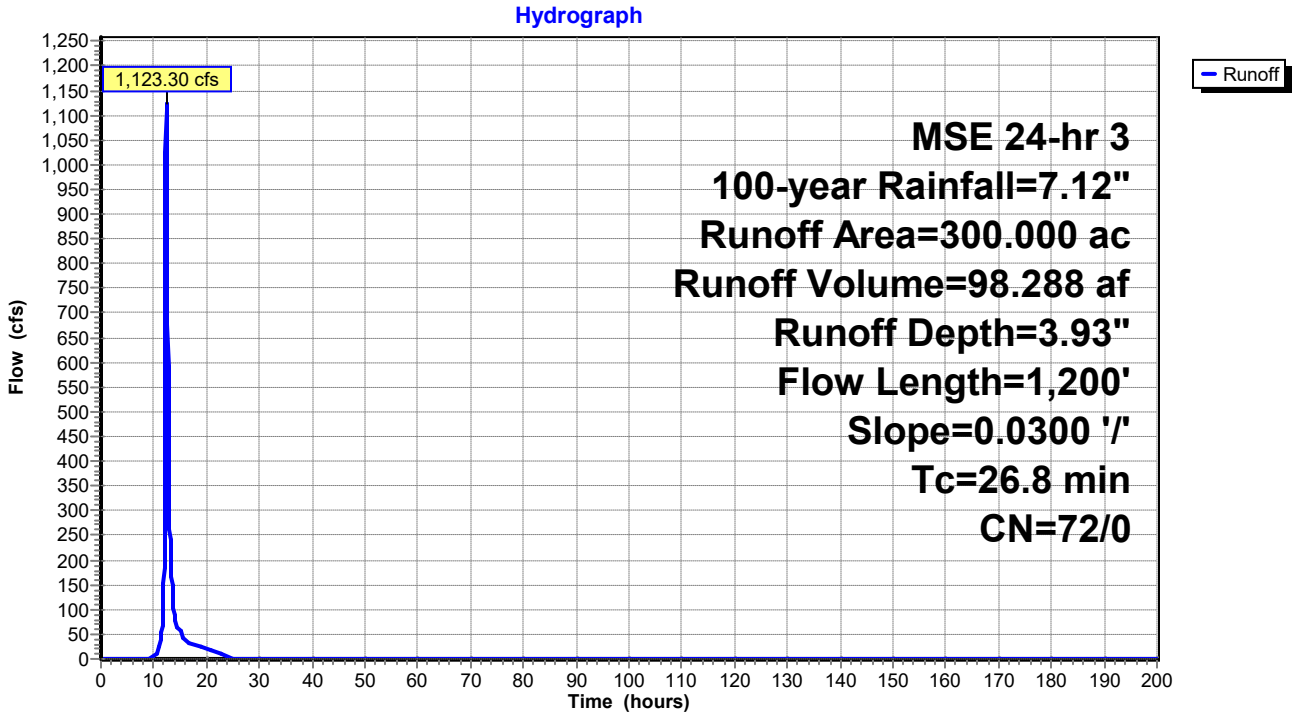
Runoff = 1,123.30 cfs @ 12.39 hrs, Volume= 98.288 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

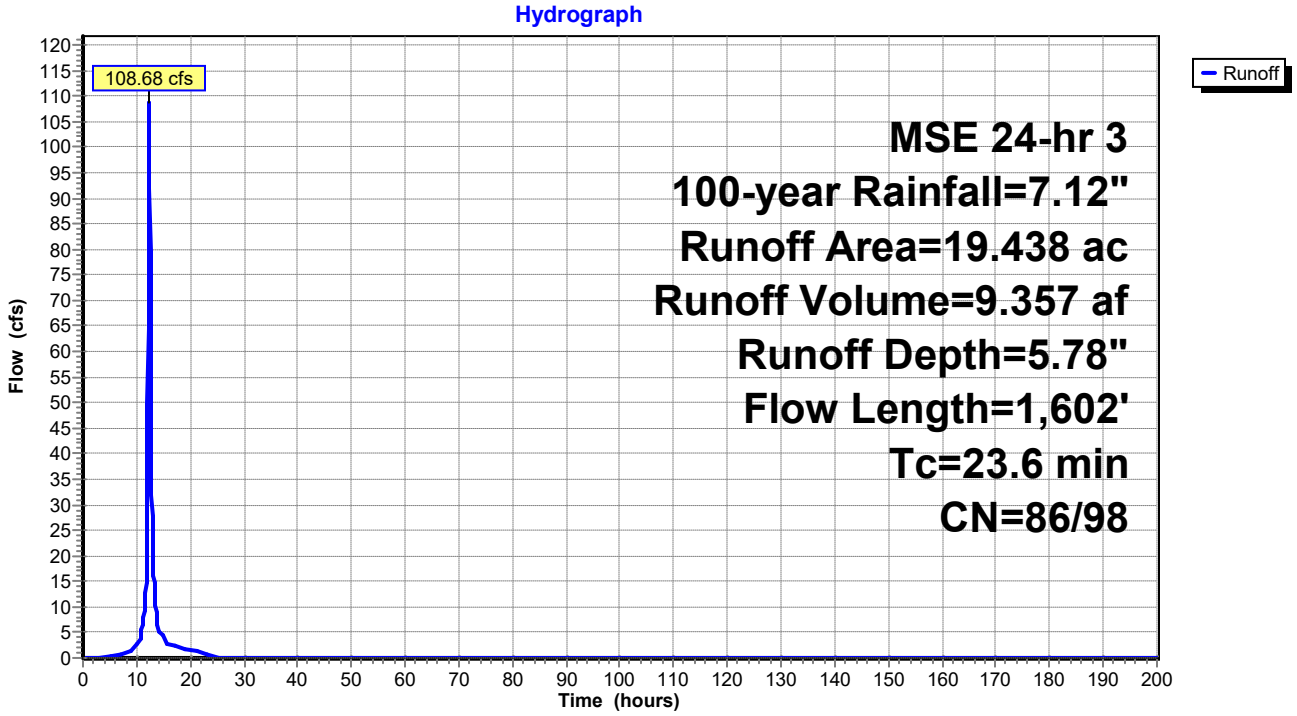
Runoff = 108.68 cfs @ 12.33 hrs, Volume= 9.357 af, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.399	98	Unconnected pavement, HSG D
1.088	98	Unconnected roofs, HSG D
1.617	98	Paved roads w/curbs & sewers, HSG D
0.606	98	Paved parking, HSG D
0.393	98	Roofs, HSG D
0.699	98	Water Surface, 0% imp, HSG D
8.527	89	Row crops, straight row, Good, HSG D
4.972	80	>75% Grass cover, Good, HSG D
1.137	78	Meadow, non-grazed, HSG D
19.438	88	Weighted Average
15.335	86	78.89% Pervious Area
4.103	98	21.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
14.6	842	0.0114	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.7	660		3.00		**Direct Entry, Pipe flow @ 3 fps**
23.6	1,602	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 11S: Direct to Cowley Lake Outlet Channel

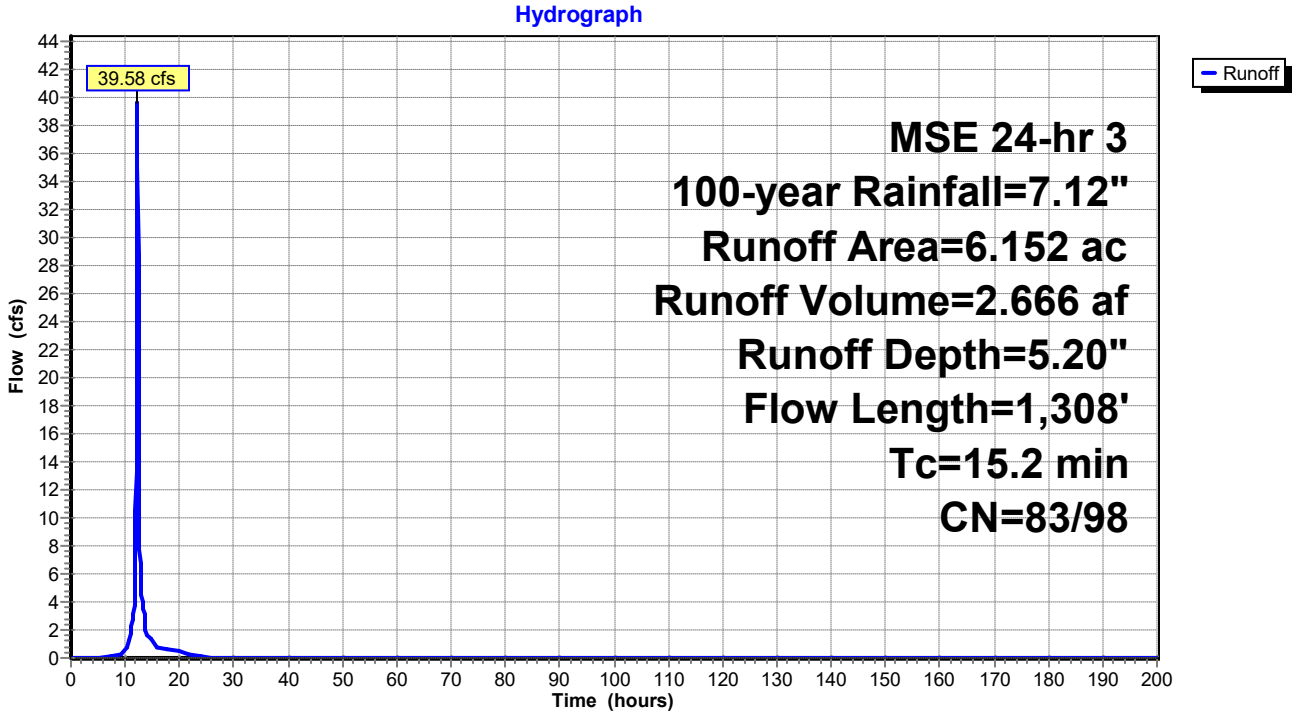
Runoff = 39.58 cfs @ 12.23 hrs, Volume= 2.666 af, Depth= 5.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.024	98	Unconnected pavement, HSG D
0.182	98	Unconnected roofs, HSG D
1.316	98	Water Surface, 0% imp, HSG D
1.199	80	>75% Grass cover, Good, HSG D
2.901	78	Meadow, non-grazed, HSG D
0.530	77	Woods, Good, HSG D
6.152	83	Weighted Average
5.946	83	96.65% Pervious Area
0.206	98	3.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.8	114	0.0263	2.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	1,094	0.0024	3.27	46.64	**Trap/Vee/Rect Channel Flow,** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
15.2	1,308	Total			

Subcatchment 11S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 12S: Fugitve to Fox Creek West 5th Addition

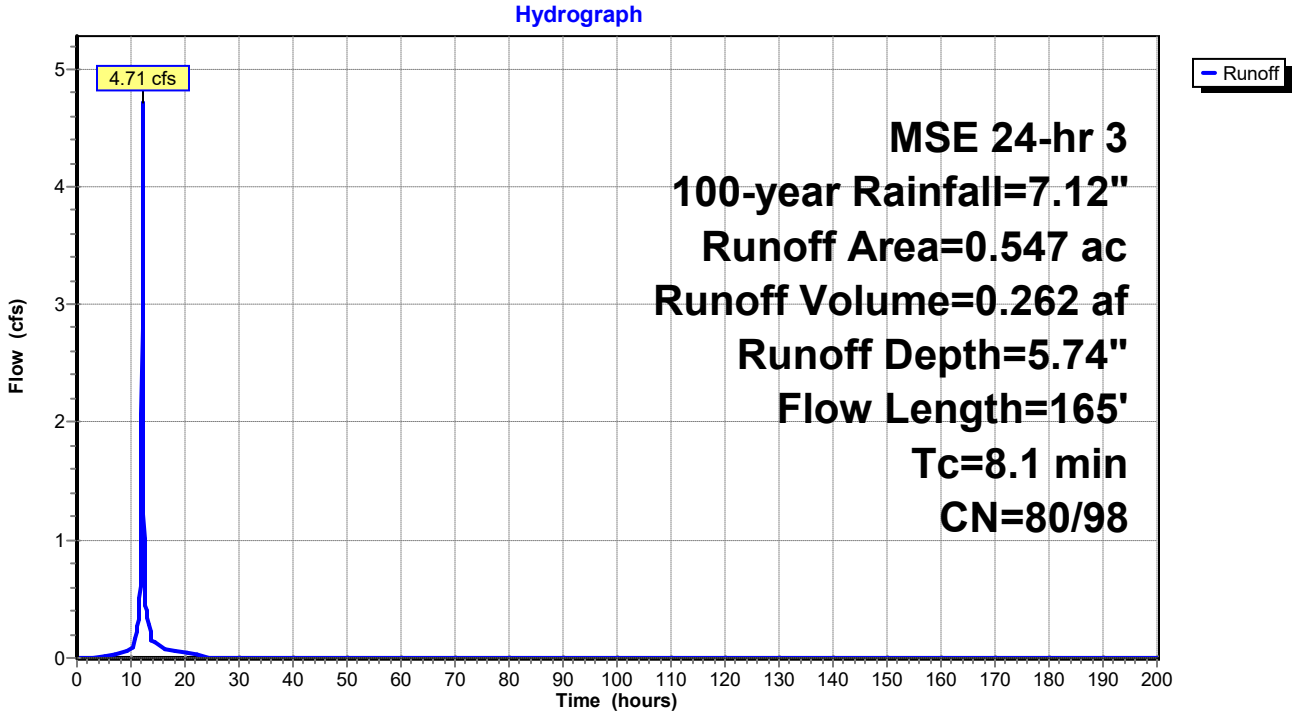
Runoff = 4.71 cfs @ 12.15 hrs, Volume= 0.262 af, Depth= 5.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.015	98	Unconnected pavement, HSG D
0.043	98	Unconnected roofs, HSG D
0.104	98	Paved roads w/curbs & sewers, HSG D
0.051	98	Paved parking, HSG D
0.034	98	Roofs, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.547	88	Weighted Average
0.300	80	54.84% Pervious Area
0.247	98	45.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.3	40	0.0250	2.37		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.1	165	Total			

Subcatchment 12S: Fugitve to Fox Creek West 5th Addition



Summary for Subcatchment 20S: Direct to Cowley Lake

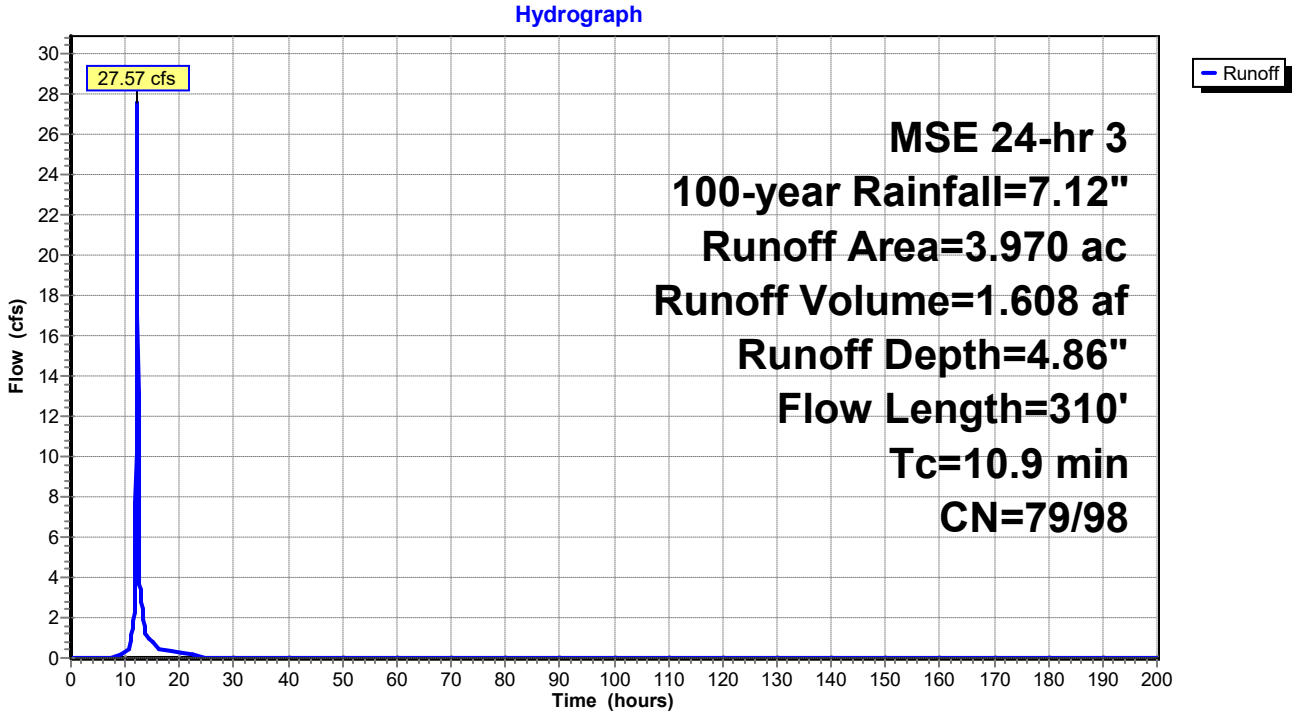
Runoff = 27.57 cfs @ 12.19 hrs, Volume= 1.608 af, Depth= 4.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.046	98	Unconnected pavement, HSG D
0.258	98	Unconnected roofs, HSG D
0.122	98	Water Surface, 0% imp, HSG D
0.949	80	>75% Grass cover, Good, HSG D
1.018	78	Meadow, non-grazed, HSG D
1.577	77	Woods, Good, HSG D
3.970	80	Weighted Average
3.666	79	92.34% Pervious Area
0.304	98	7.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0270	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	72	0.0347	2.79		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	138	0.0667	1.81		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.9	310	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

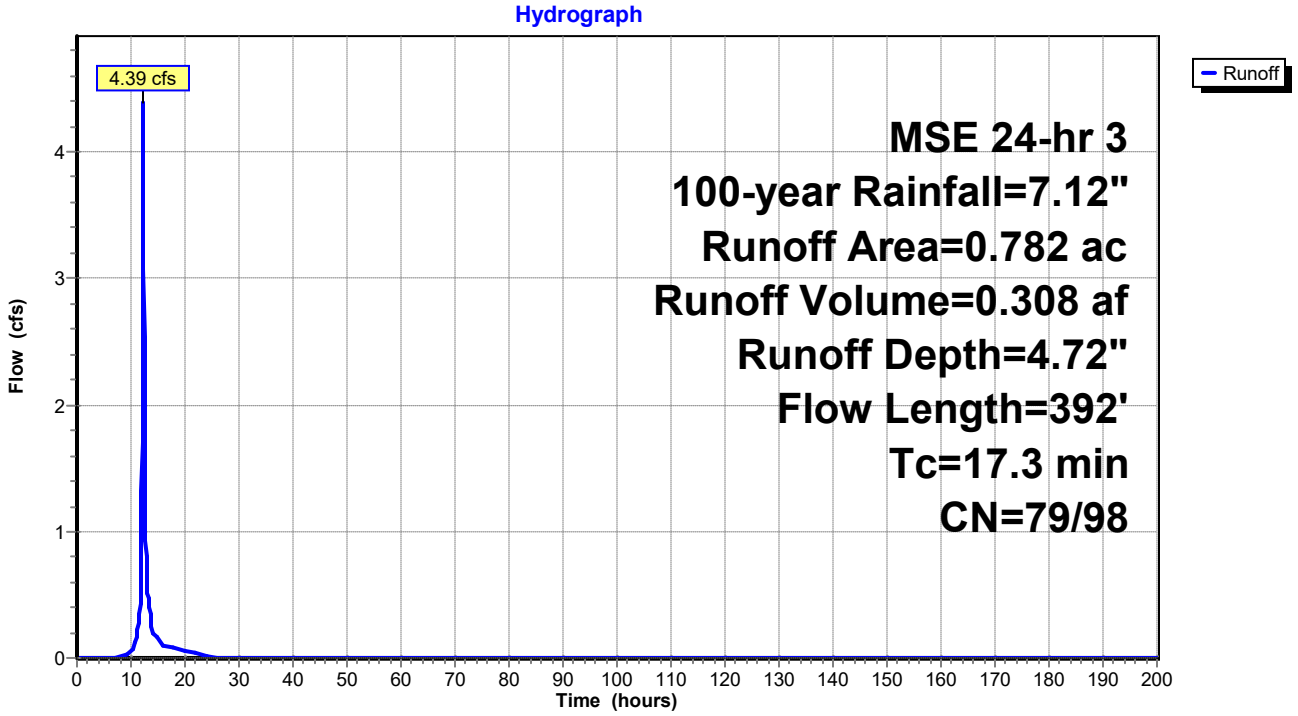
Runoff = 4.39 cfs @ 12.26 hrs, Volume= 0.308 af, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.010	98	Unconnected pavement, HSG D
0.054	98	Water Surface, 0% imp, HSG D
0.016	80	>75% Grass cover, Good, HSG D
0.162	78	Meadow, non-grazed, HSG D
0.540	77	Woods, Good, HSG D
0.782	79	Weighted Average
0.772	79	98.72% Pervious Area
0.010	98	1.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0590	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
2.3	146	0.0452	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	146	0.0164	10.55	221.46	**Channel Flow,** Area= 21.0 sf Perim= 15.6' r= 1.35' n= 0.022 Earth, clean & straight
17.3	392	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

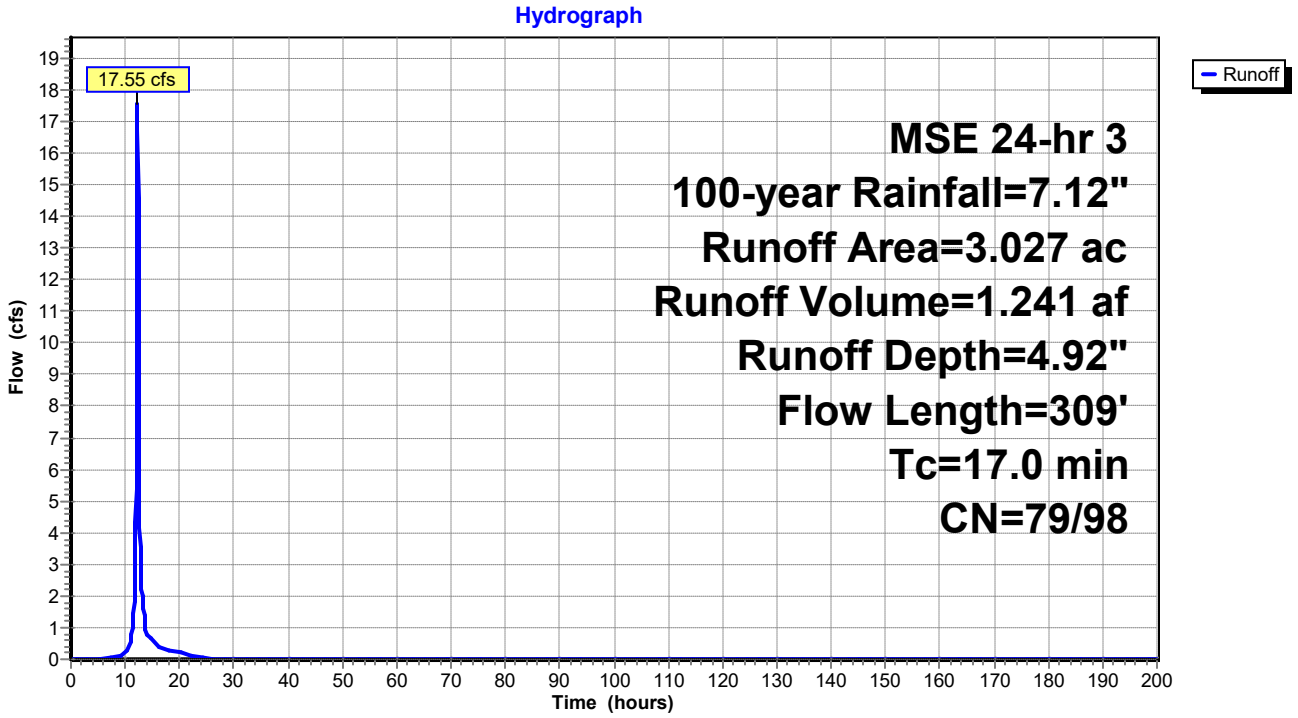
Runoff = 17.55 cfs @ 12.26 hrs, Volume= 1.241 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.125	98	Unconnected pavement, HSG D
0.189	98	Unconnected roofs, HSG D
0.031	98	Water Surface, 0% imp, HSG D
0.779	80	>75% Grass cover, Good, HSG D
1.348	78	Meadow, non-grazed, HSG D
0.555	77	Woods, Good, HSG D
3.027	81	Weighted Average
2.713	79	89.63% Pervious Area
0.314	98	10.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	100	0.0220	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
2.4	209	0.0445	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	309	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Proposed West Channel

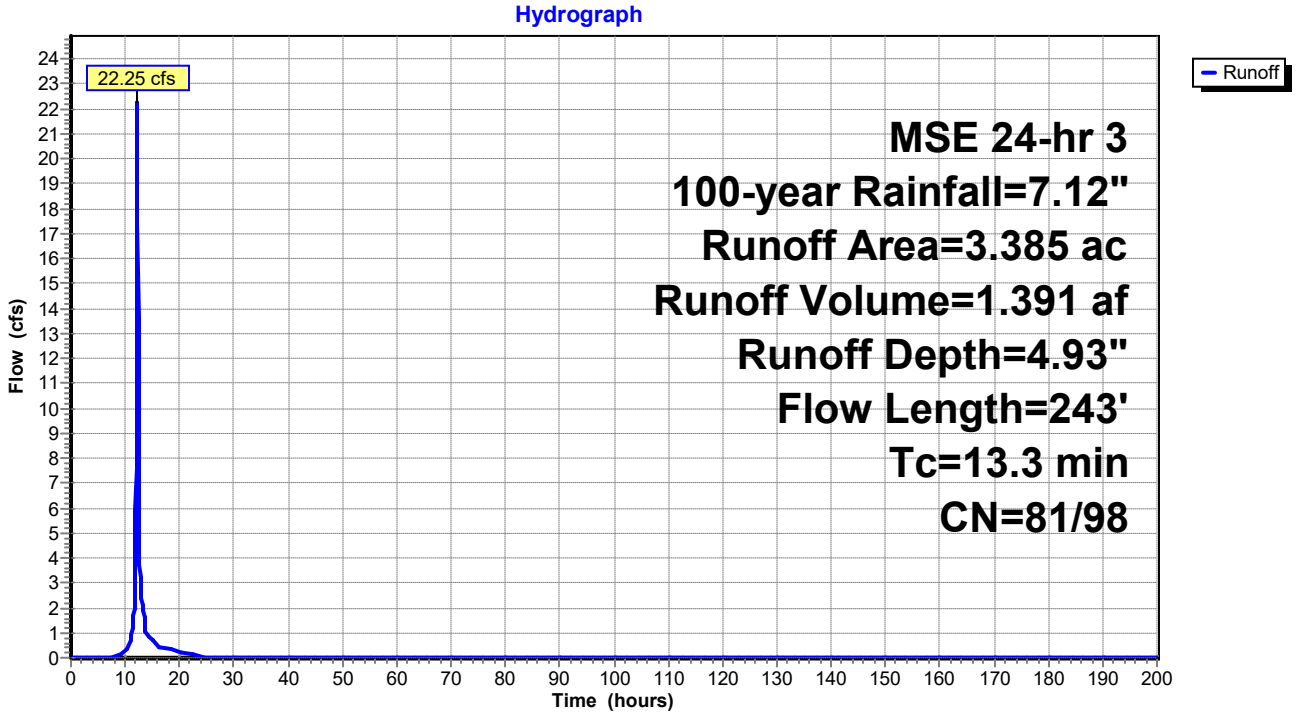
Runoff = 22.25 cfs @ 12.21 hrs, Volume= 1.391 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.023	98	Unconnected pavement, HSG D
0.467	98	Water Surface, 0% imp, HSG D
0.253	80	>75% Grass cover, Good, HSG D
1.225	78	Meadow, non-grazed, HSG D
1.417	77	Woods, Good, HSG D
3.385	81	Weighted Average
3.362	81	99.32% Pervious Area
0.023	98	0.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0520	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
3.0	143	0.0259	0.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.3	243	Total			

Subcatchment 23S: Direct to Proposed West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

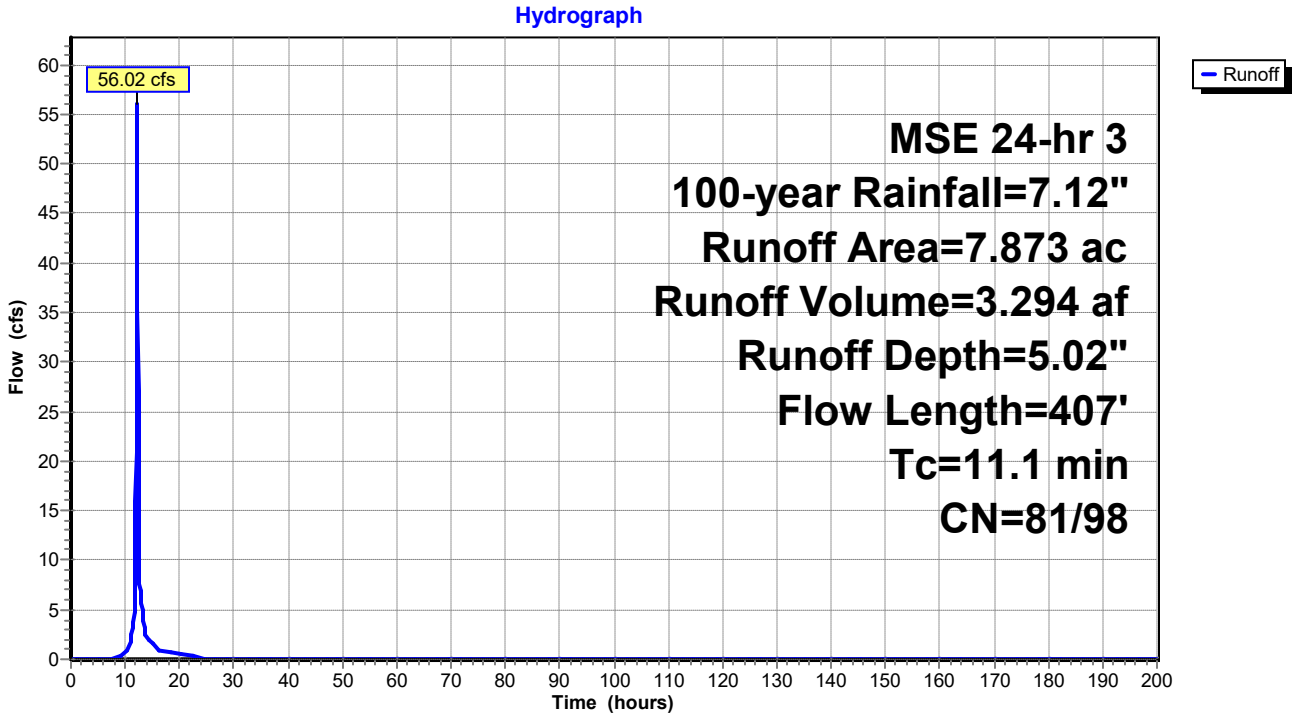
Runoff = 56.02 cfs @ 12.19 hrs, Volume= 3.294 af, Depth= 5.02"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.379	98	Unconnected roofs, HSG D
0.980	98	Water Surface, 0% imp, HSG D
1.643	80	>75% Grass cover, Good, HSG D
2.538	78	Meadow, non-grazed, HSG D
2.294	77	Woods, Good, HSG D
7.873	82	Weighted Average
7.455	81	94.69% Pervious Area
0.418	98	5.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.0600	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
4.4	307	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	407	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 25S: Direct to Proposed Northwest Pond

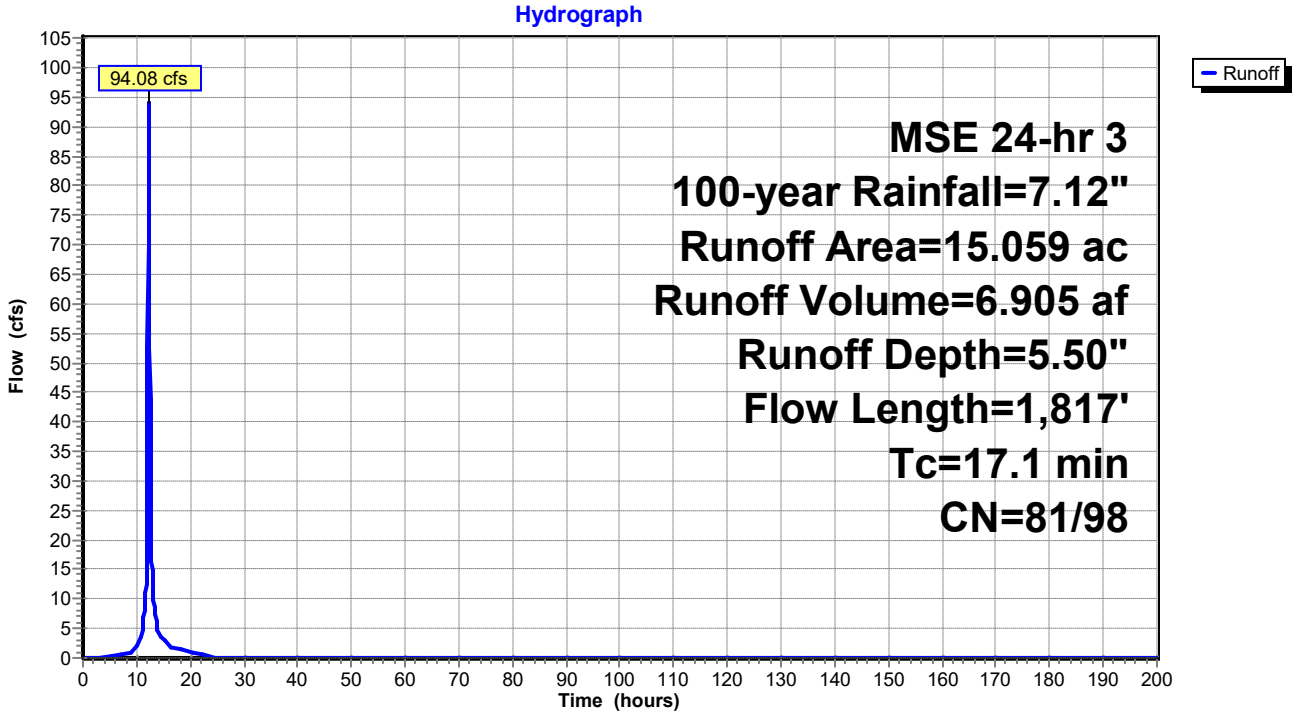
Runoff = 94.08 cfs @ 12.26 hrs, Volume= 6.905 af, Depth= 5.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.652	98	Unconnected pavement, HSG D
1.214	98	Unconnected roofs, HSG D
1.443	98	Paved roads w/curbs & sewers, HSG D
0.758	98	Paved parking, HSG D
0.424	98	Roofs, HSG D
0.322	98	Water Surface, 0% imp, HSG D
0.084	96	Gravel surface, HSG D
0.179	89	Row crops, straight row, Good, HSG D
8.582	80	>75% Grass cover, Good, HSG D
1.401	78	Meadow, non-grazed, HSG D
15.059	86	Weighted Average
10.568	81	70.18% Pervious Area
4.491	98	29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	90	0.0378	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	57	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.3	1,670		3.00		**Direct Entry, Pipe flow @ 3 fps**
17.1	1,817	Total			

Subcatchment 25S: Direct to Proposed Northwest Pond



Summary for Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration

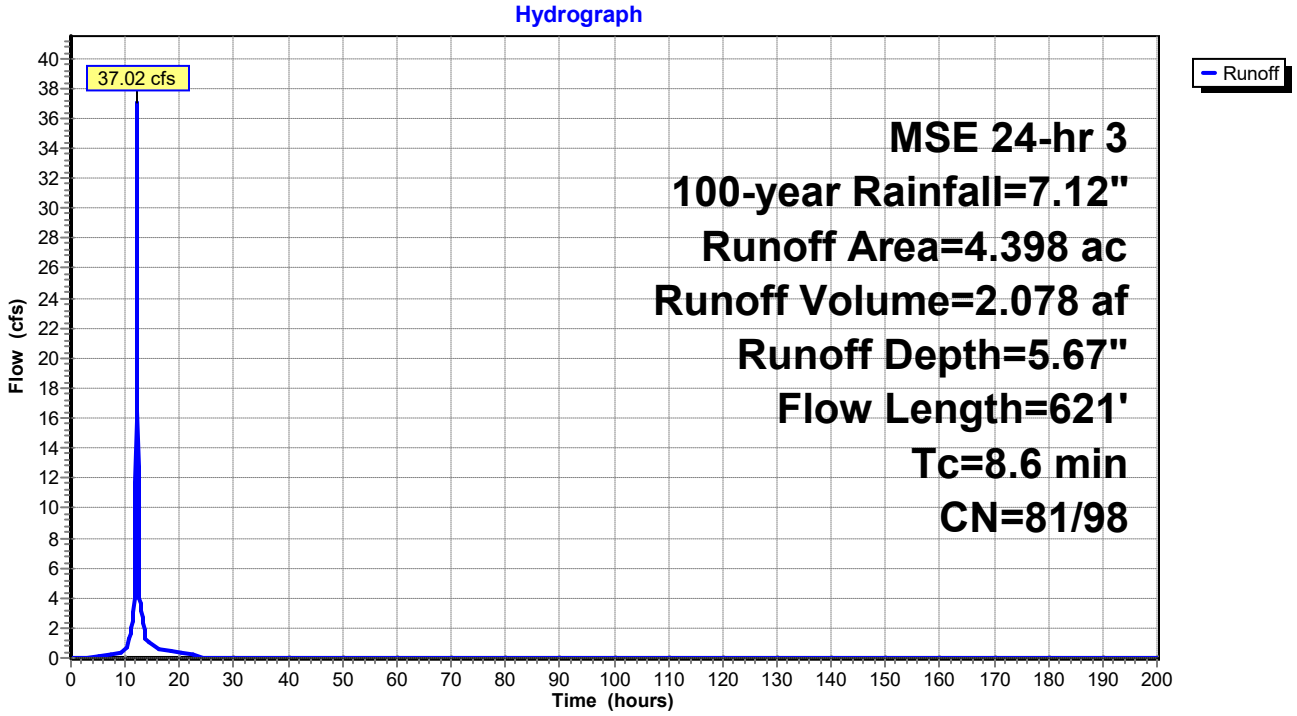
Runoff = 37.02 cfs @ 12.16 hrs, Volume= 2.078 af, Depth= 5.67"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.170	98	Unconnected pavement, HSG D
0.393	98	Unconnected roofs, HSG D
0.551	98	Paved roads w/curbs & sewers, HSG D
0.354	98	Paved parking, HSG D
0.220	98	Roofs, HSG D
0.318	98	Water Surface, 0% imp, HSG D
1.487	80	>75% Grass cover, Good, HSG D
0.905	78	Meadow, non-grazed, HSG D
4.398	88	Weighted Average
2.710	81	61.62% Pervious Area
1.688	98	38.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration



Summary for Subcatchment 27S: Direct to Proposed Northwest Central Pond

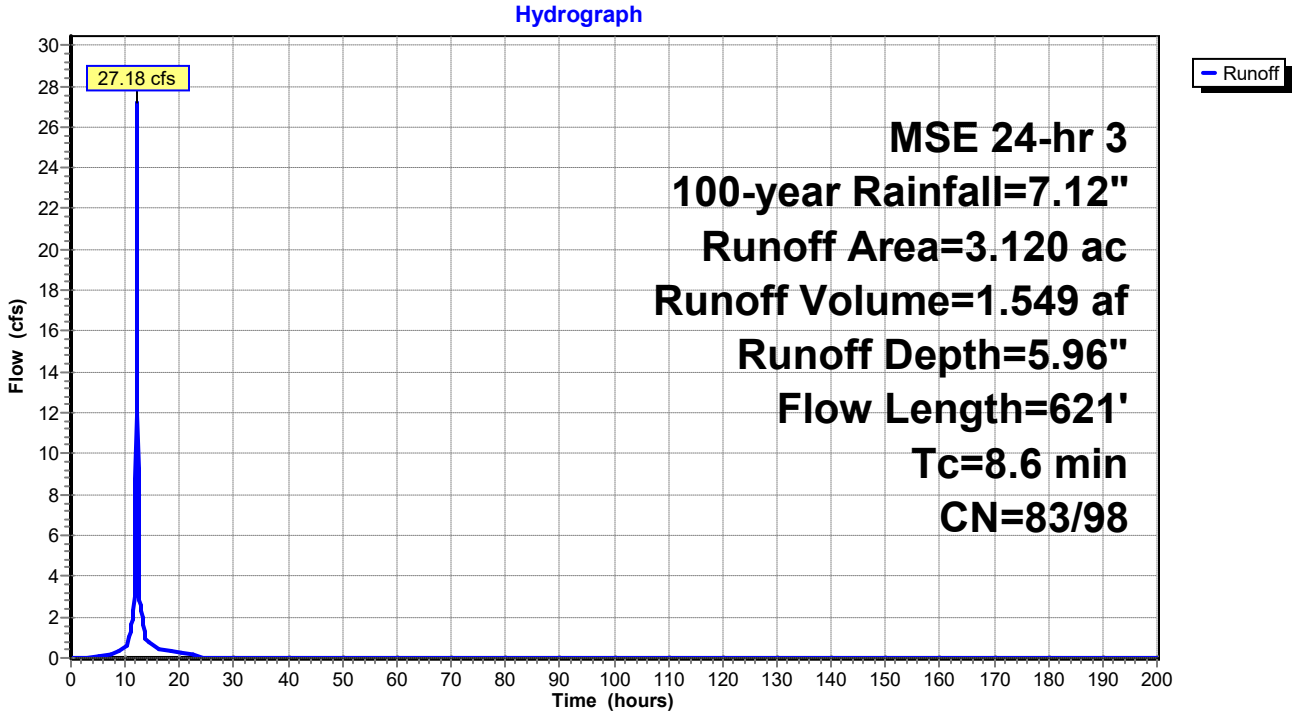
Runoff = 27.18 cfs @ 12.15 hrs, Volume= 1.549 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.134	98	Unconnected pavement, HSG D
0.275	98	Unconnected roofs, HSG D
0.506	98	Paved roads w/curbs & sewers, HSG D
0.328	98	Paved parking, HSG D
0.224	98	Roofs, HSG D
0.278	98	Water Surface, 0% imp, HSG D
0.979	80	>75% Grass cover, Good, HSG D
0.396	78	Meadow, non-grazed, HSG D
3.120	90	Weighted Average
1.653	83	52.98% Pervious Area
1.467	98	47.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 27S: Direct to Proposed Northwest Central Pond



Summary for Subcatchment 28S: Direct to Proposed Northeast Central Pond

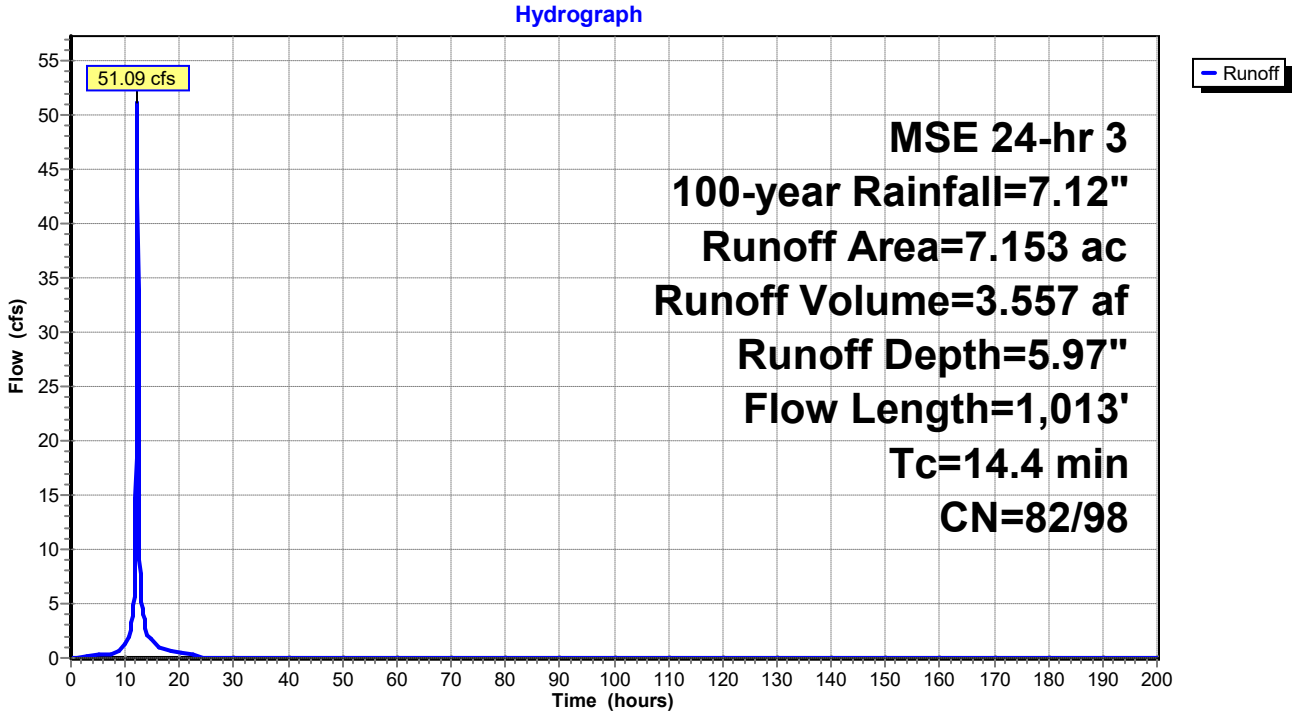
Runoff = 51.09 cfs @ 12.22 hrs, Volume= 3.557 af, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.152	98	Unconnected pavement, HSG D
0.932	98	Unconnected roofs, HSG D
0.930	98	Paved roads w/curbs & sewers, HSG D
1.004	98	Paved parking, HSG D
0.604	98	Roofs, HSG D
0.380	98	Water Surface, 0% imp, HSG D
2.416	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
0.051	77	Woods, Good, HSG D
7.153	90	Weighted Average
3.531	82	49.36% Pervious Area
3.622	98	50.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	71	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.6	242	0.0060	1.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.9	700		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.4	1,013	Total			

Subcatchment 28S: Direct to Proposed Northeast Central Pond



Summary for Subcatchment 30S: Direct to Wetland 4A

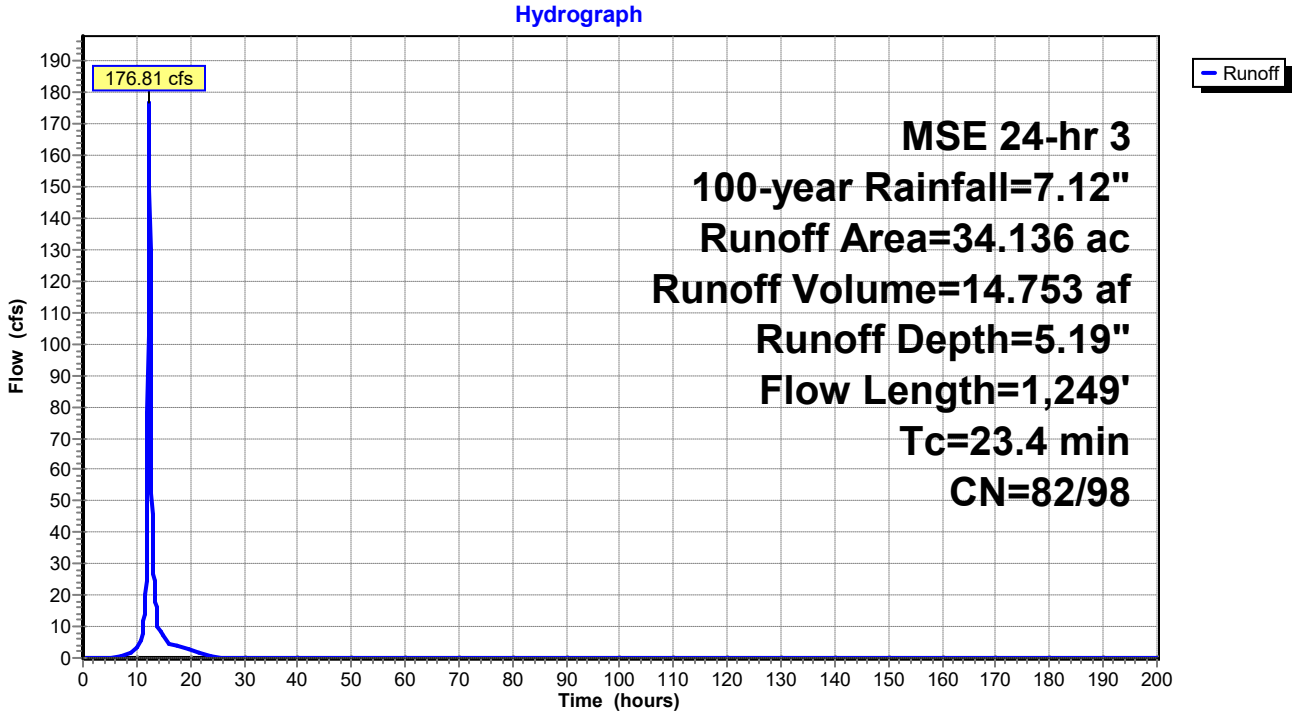
Runoff = 176.81 cfs @ 12.33 hrs, Volume= 14.753 af, Depth= 5.19"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
1.401	98	Unconnected pavement, HSG D
1.502	98	Unconnected roofs, HSG D
0.939	96	Gravel surface, HSG D
6.512	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
18.400	80	>75% Grass cover, Good, HSG D
3.773	77	Woods, Good, HSG D
34.136	84	Weighted Average
31.233	82	91.50% Pervious Area
2.903	98	8.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

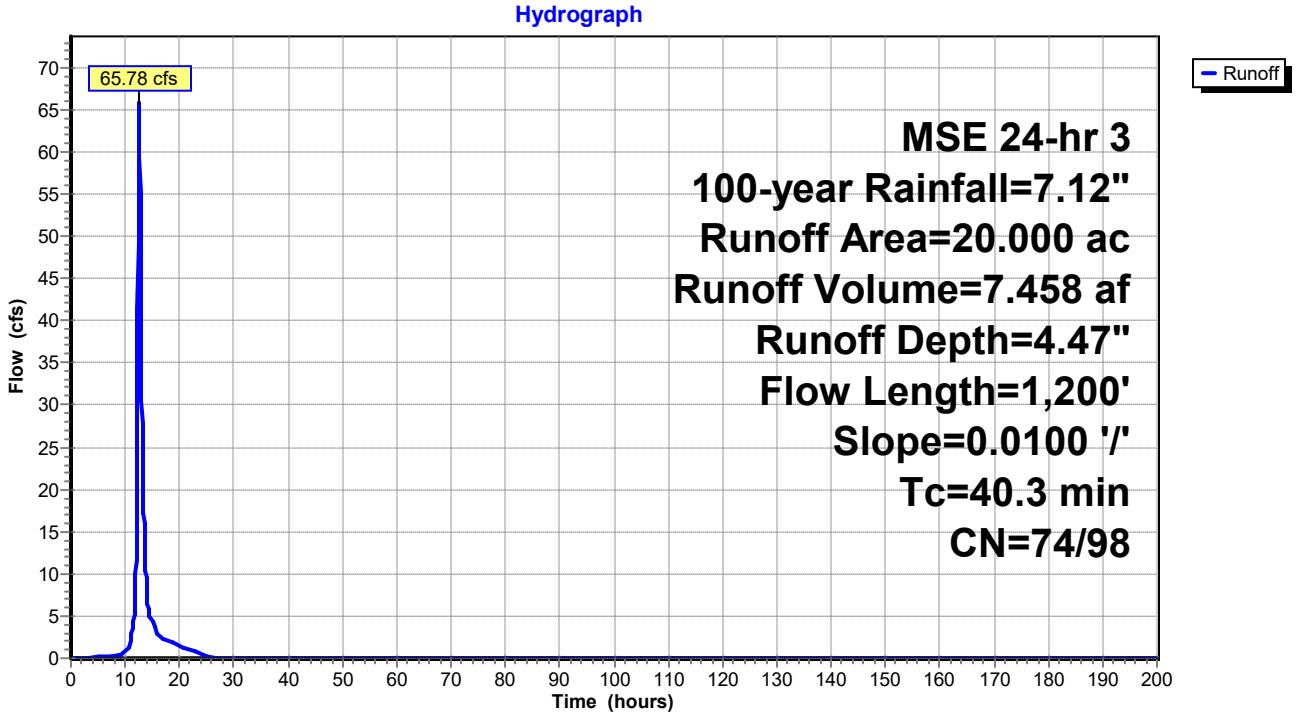
Runoff = 65.78 cfs @ 12.56 hrs, Volume= 7.458 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 32S: Direct to Proposed West Central Pond

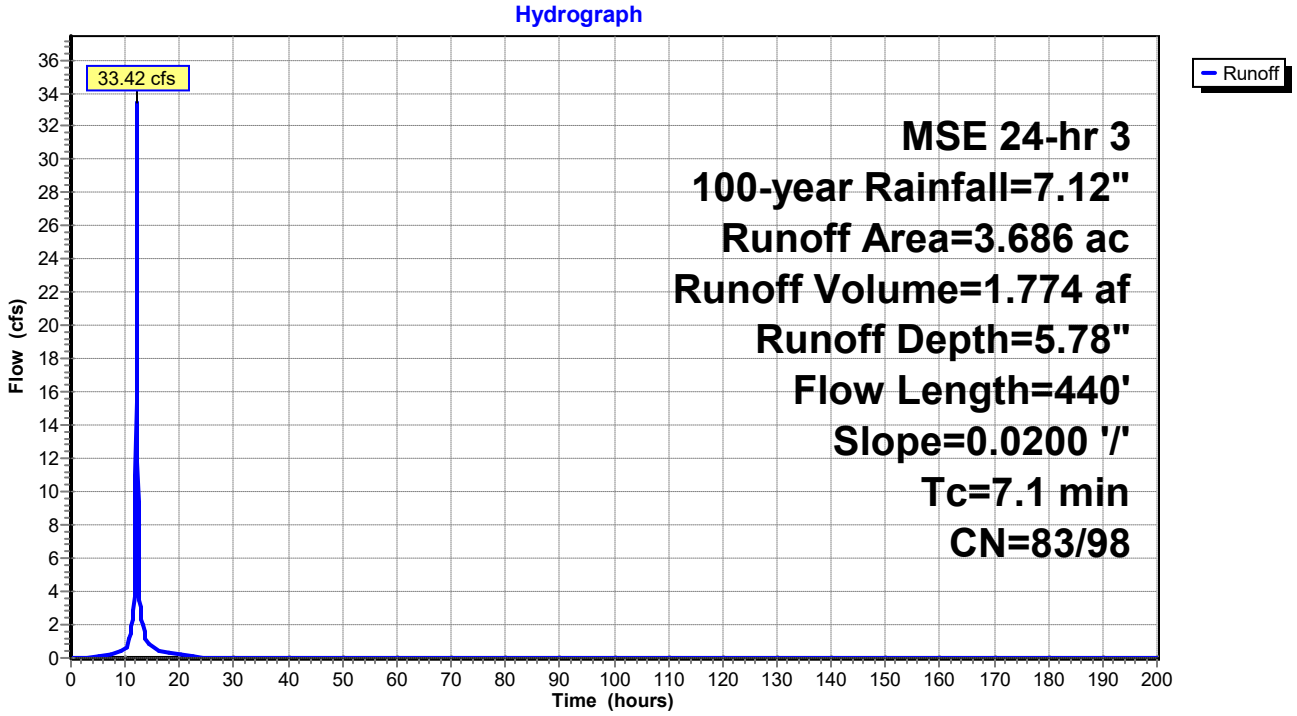
Runoff = 33.42 cfs @ 12.14 hrs, Volume= 1.774 af, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.438	98	Unconnected roofs, HSG D
0.377	98	Paved roads w/curbs & sewers, HSG D
0.298	98	Paved parking, HSG D
0.194	98	Roofs, HSG D
0.395	98	Water Surface, 0% imp, HSG D
1.443	80	>75% Grass cover, Good, HSG D
0.502	78	Meadow, non-grazed, HSG D
3.686	88	Weighted Average
2.340	83	63.48% Pervious Area
1.346	98	36.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.2	401		3.00		**Direct Entry,**
7.1	440	Total			

Subcatchment 32S: Direct to Proposed West Central Pond



Summary for Subcatchment 40S: Direct to Wetland 2B

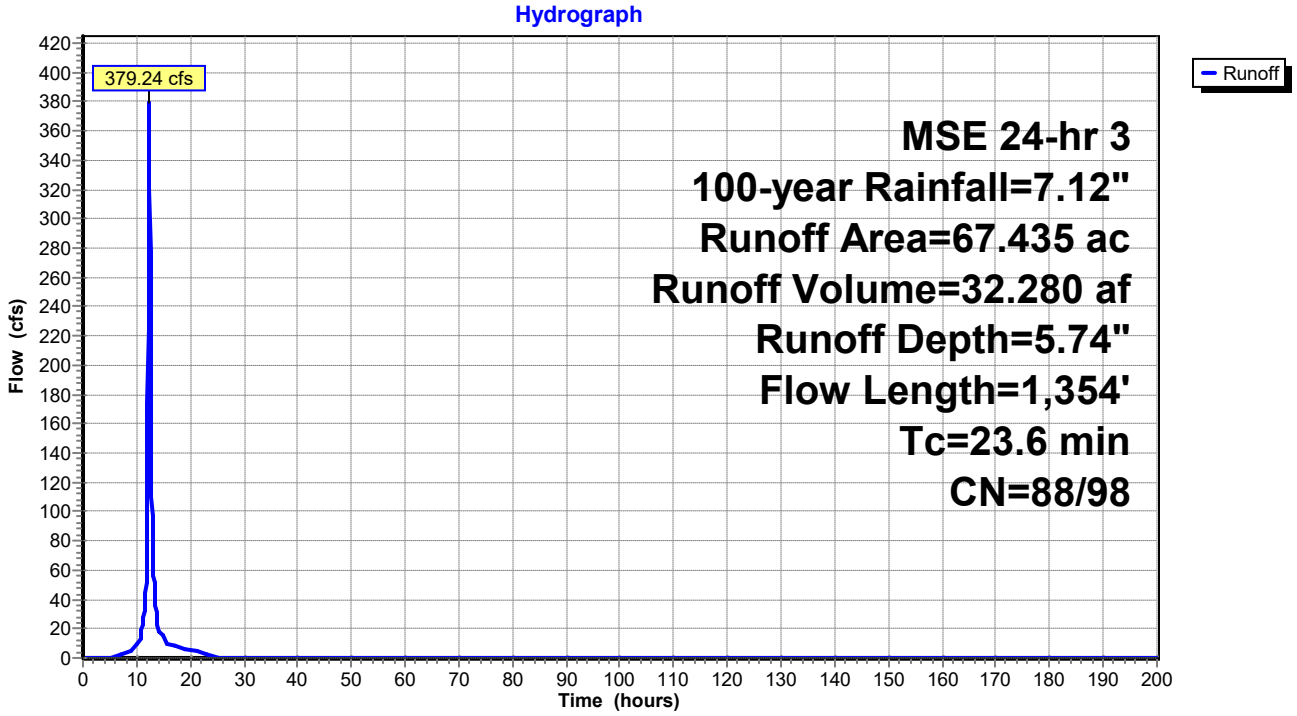
Runoff = 379.24 cfs @ 12.33 hrs, Volume= 32.280 af, Depth= 5.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
1.003	98	Unconnected roofs, HSG D
17.214	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
27.306	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
9.713	80	>75% Grass cover, Good, HSG D
6.057	78	Meadow, non-grazed, HSG D
3.720	77	Woods, Good, HSG D
67.435	89	Weighted Average
65.467	88	97.08% Pervious Area
1.968	98	2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

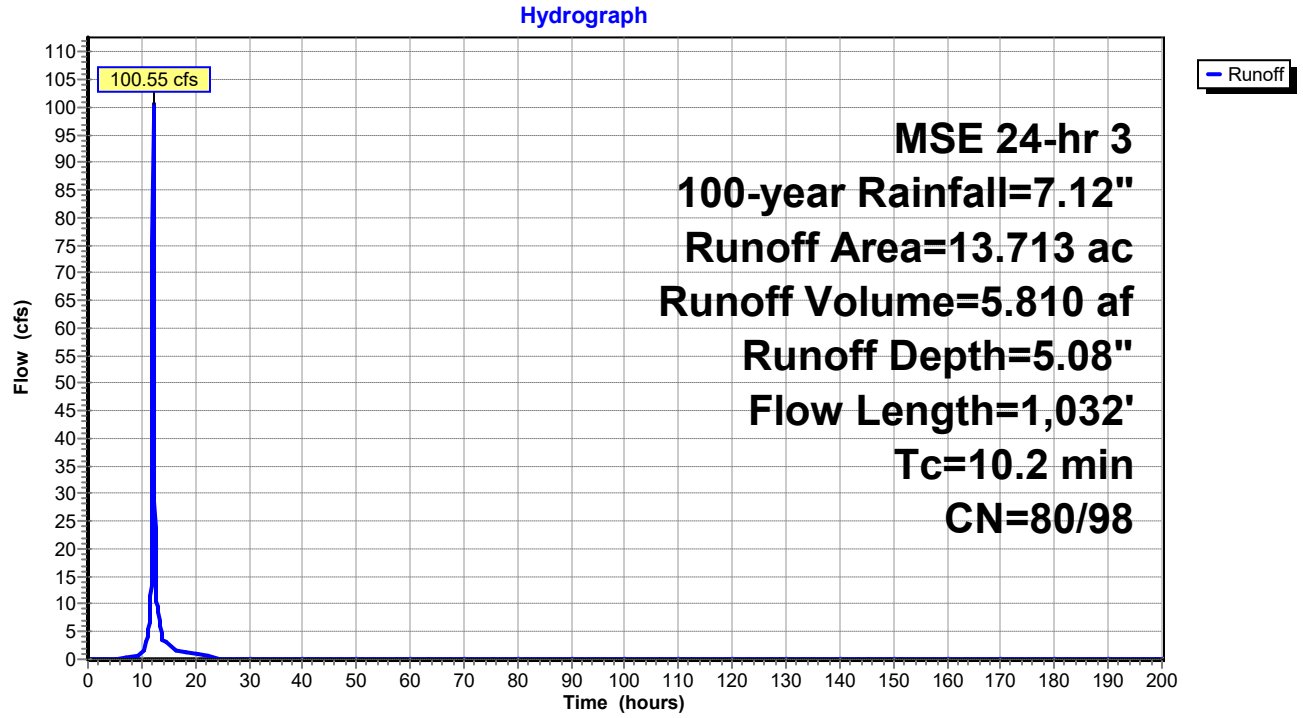
Runoff = 100.55 cfs @ 12.18 hrs, Volume= 5.810 af, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 42S: Direct to Proposed South Central Pond

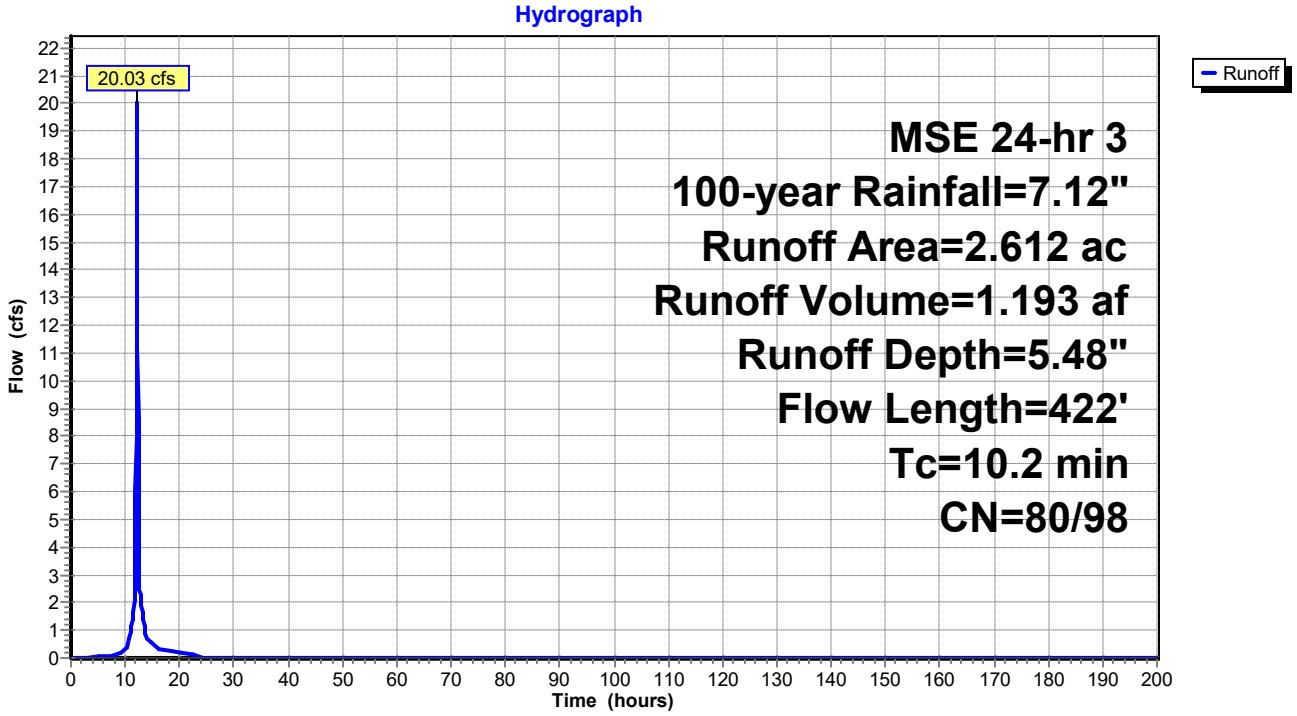
Runoff = 20.03 cfs @ 12.17 hrs, Volume= 1.193 af, Depth= 5.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.013	98	Unconnected pavement, HSG D
0.362	98	Unconnected roofs, HSG D
0.246	98	Paved roads w/curbs & sewers, HSG D
0.145	98	Paved parking, HSG D
0.084	98	Roofs, HSG D
0.154	98	Water Surface, 0% imp, HSG D
0.600	80	>75% Grass cover, Good, HSG D
0.811	78	Meadow, non-grazed, HSG D
0.197	77	Woods, Good, HSG D
2.612	86	Weighted Average
1.762	80	67.46% Pervious Area
0.850	98	32.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
1.7	235	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	117		3.00		**Direct Entry, Pipe flow @ 3 fps**
10.2	422	Total			

Subcatchment 42S: Direct to Proposed South Central Pond



Summary for Subcatchment 43S: Direct to Proposed Central Pond

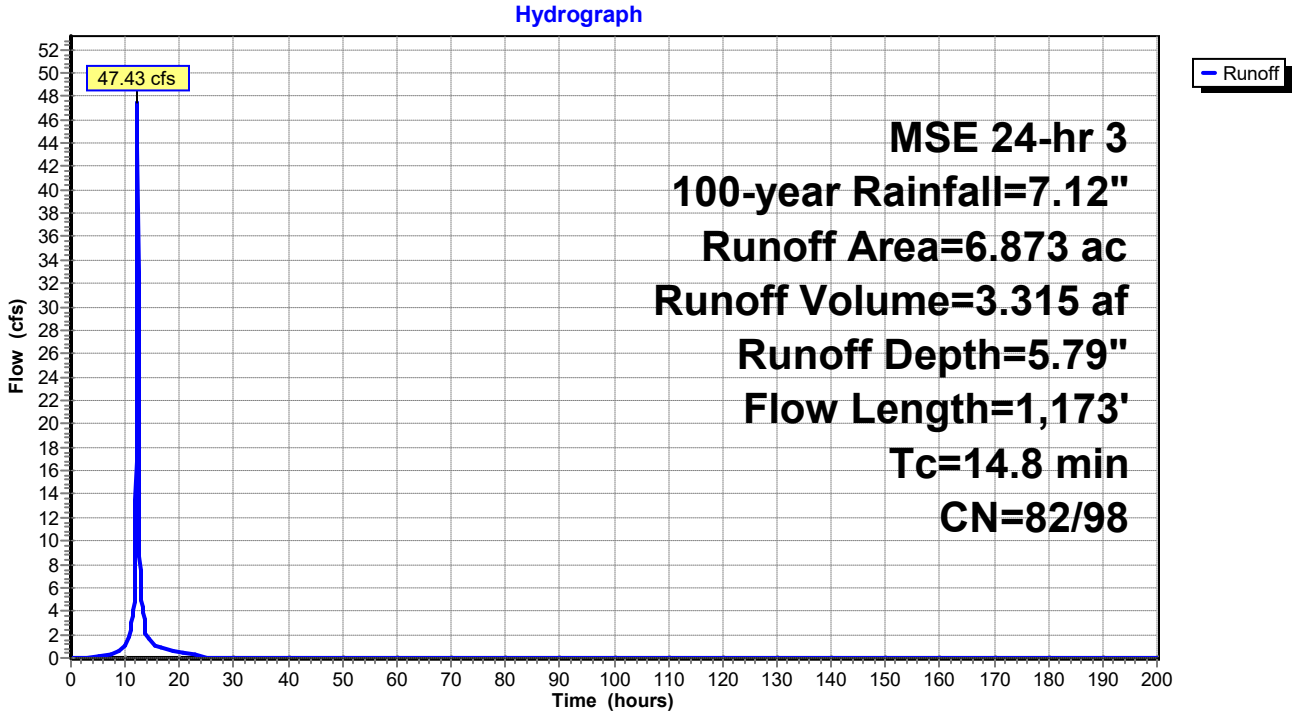
Runoff = 47.43 cfs @ 12.23 hrs, Volume= 3.315 af, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.205	98	Unconnected pavement, HSG D
0.855	98	Unconnected roofs, HSG D
0.896	98	Paved roads w/curbs & sewers, HSG D
0.530	98	Paved parking, HSG D
0.332	98	Roofs, HSG D
0.402	98	Water Surface, 0% imp, HSG D
0.383	89	Row crops, straight row, Good, HSG D
2.711	80	>75% Grass cover, Good, HSG D
0.559	78	Meadow, non-grazed, HSG D
6.873	89	Weighted Average
4.055	82	59.00% Pervious Area
2.818	98	41.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.5	286	0.0088	1.90		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	817		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.8	1,173	Total			

Subcatchment 43S: Direct to Proposed Central Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

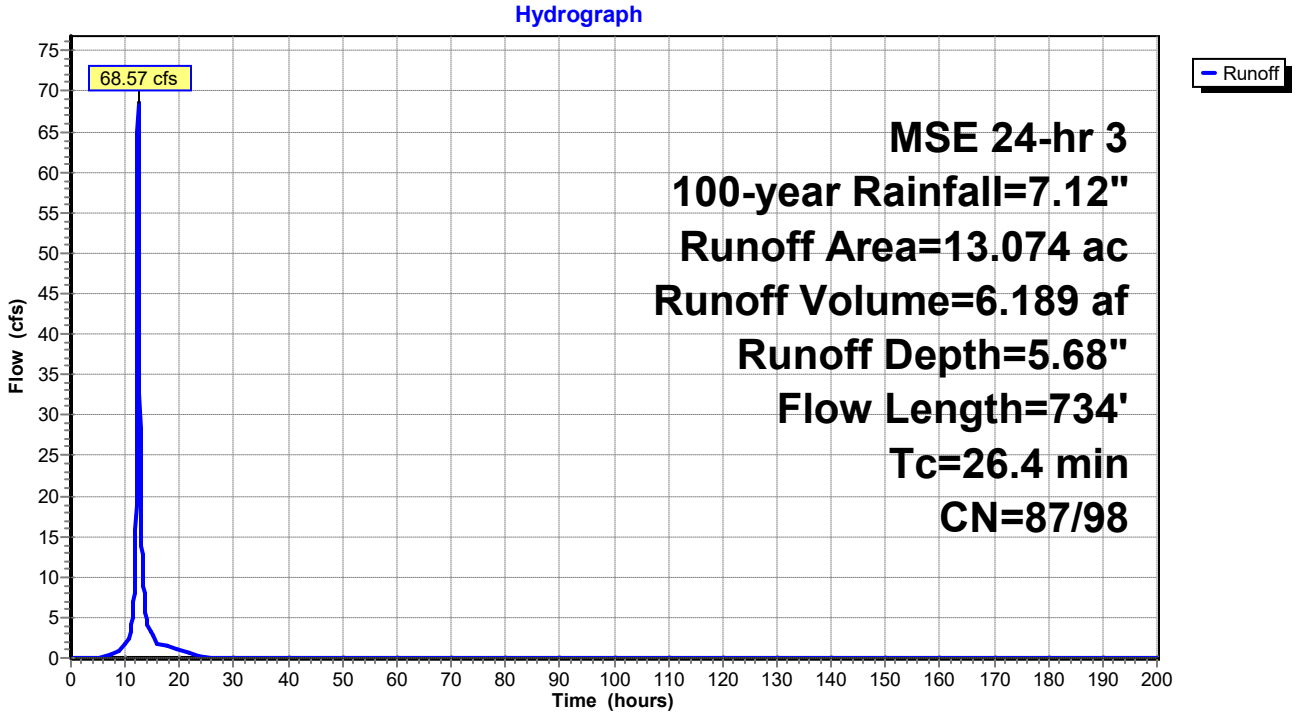
Runoff = 68.57 cfs @ 12.37 hrs, Volume= 6.189 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

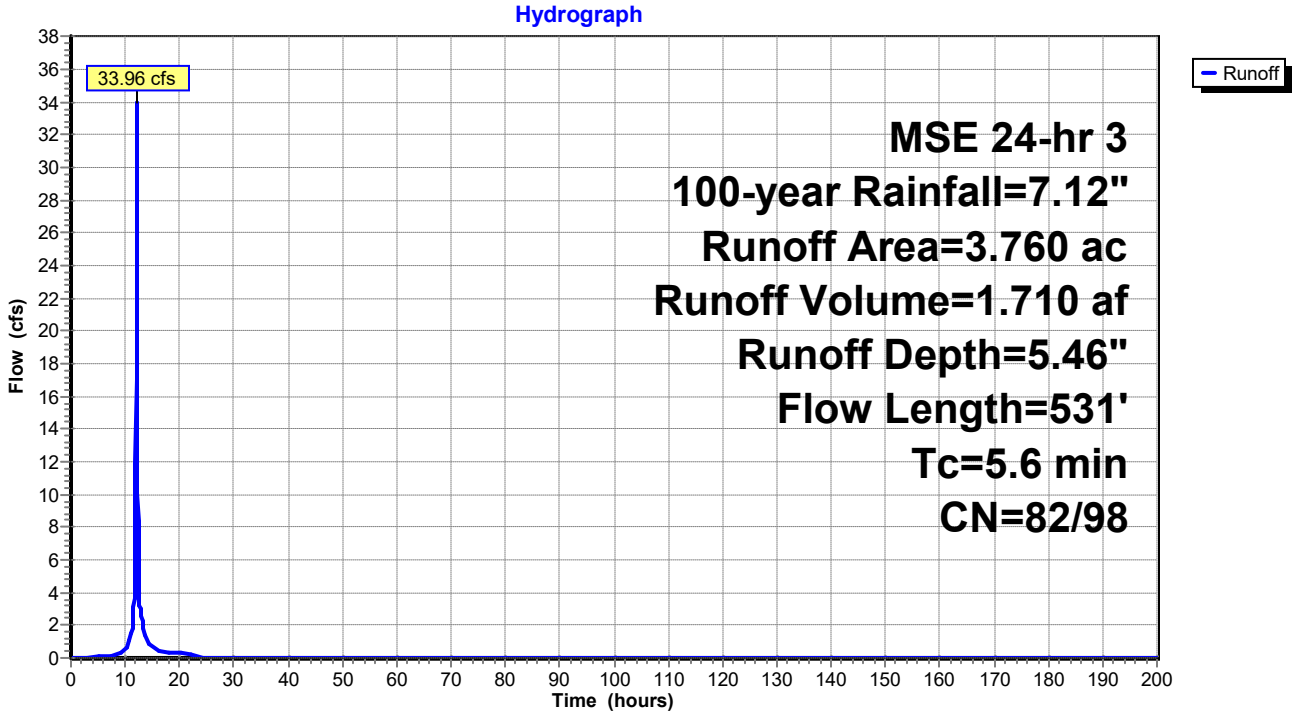
Runoff = 33.96 cfs @ 12.12 hrs, Volume= 1.710 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



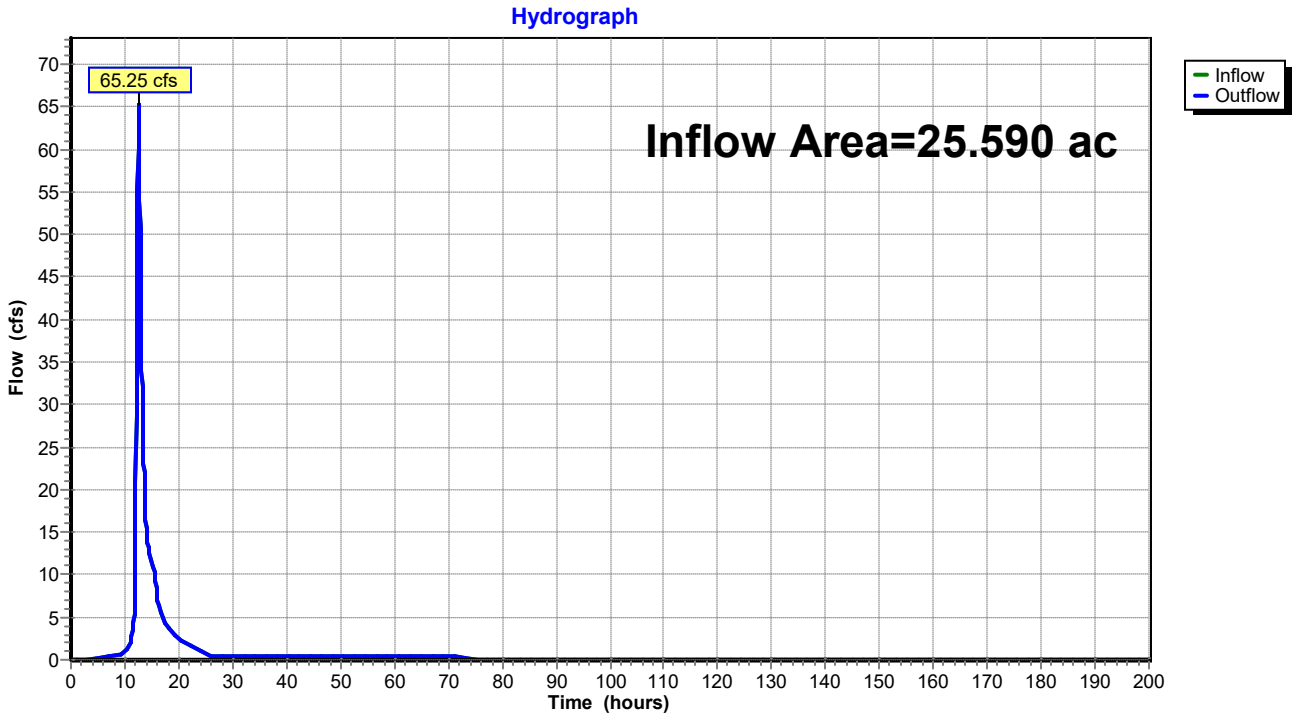
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.590 ac, 16.84% Impervious, Inflow Depth = 5.64" for 100-year event
Inflow = 65.25 cfs @ 12.57 hrs, Volume= 12.023 af
Outflow = 65.25 cfs @ 12.57 hrs, Volume= 12.023 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



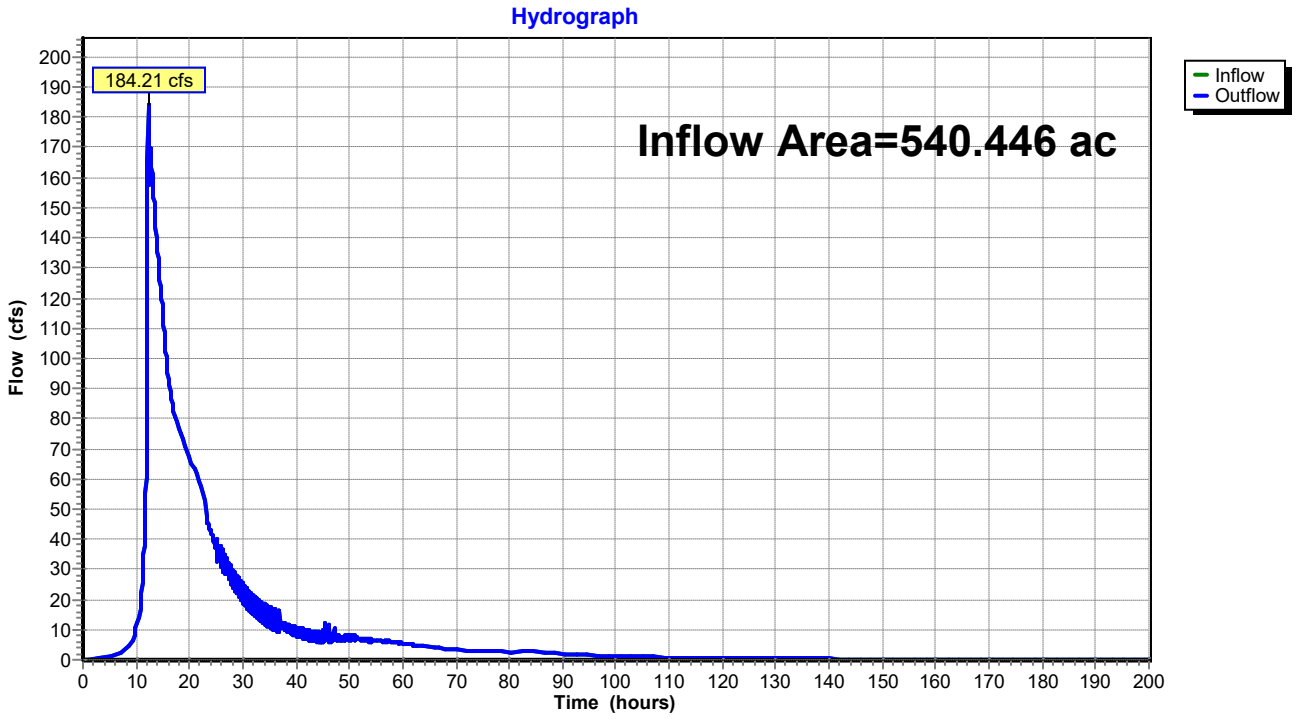
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.446 ac, 5.98% Impervious, Inflow Depth > 3.26" for 100-year event
Inflow = 184.21 cfs @ 12.22 hrs, Volume= 146.970 af
Outflow = 184.21 cfs @ 12.22 hrs, Volume= 146.970 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



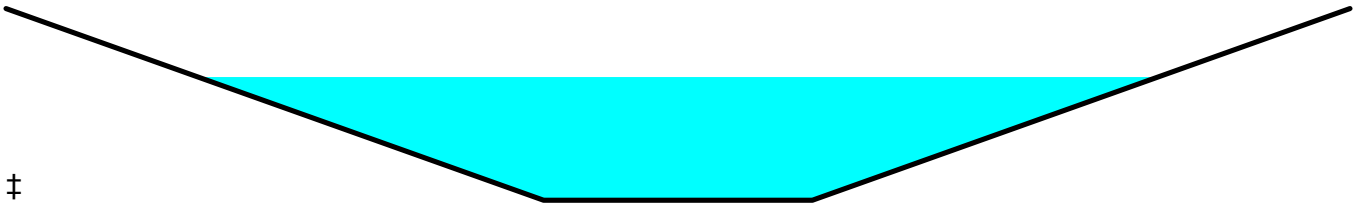
Summary for Reach 21R: Proposed East Channel

Inflow Area = 134.639 ac, 9.91% Impervious, Inflow Depth = 5.61" for 100-year event
Inflow = 56.86 cfs @ 14.34 hrs, Volume= 62.953 af
Outflow = 56.86 cfs @ 14.35 hrs, Volume= 62.953 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.46 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.37 fps, Avg. Travel Time= 3.2 min

Peak Storage= 2,323 cf @ 14.35 hrs
Average Depth at Peak Storage= 1.28'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 149.23 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 264.0' Slope= 0.0125 '/'
Inlet Invert= 923.50', Outlet Invert= 920.20'



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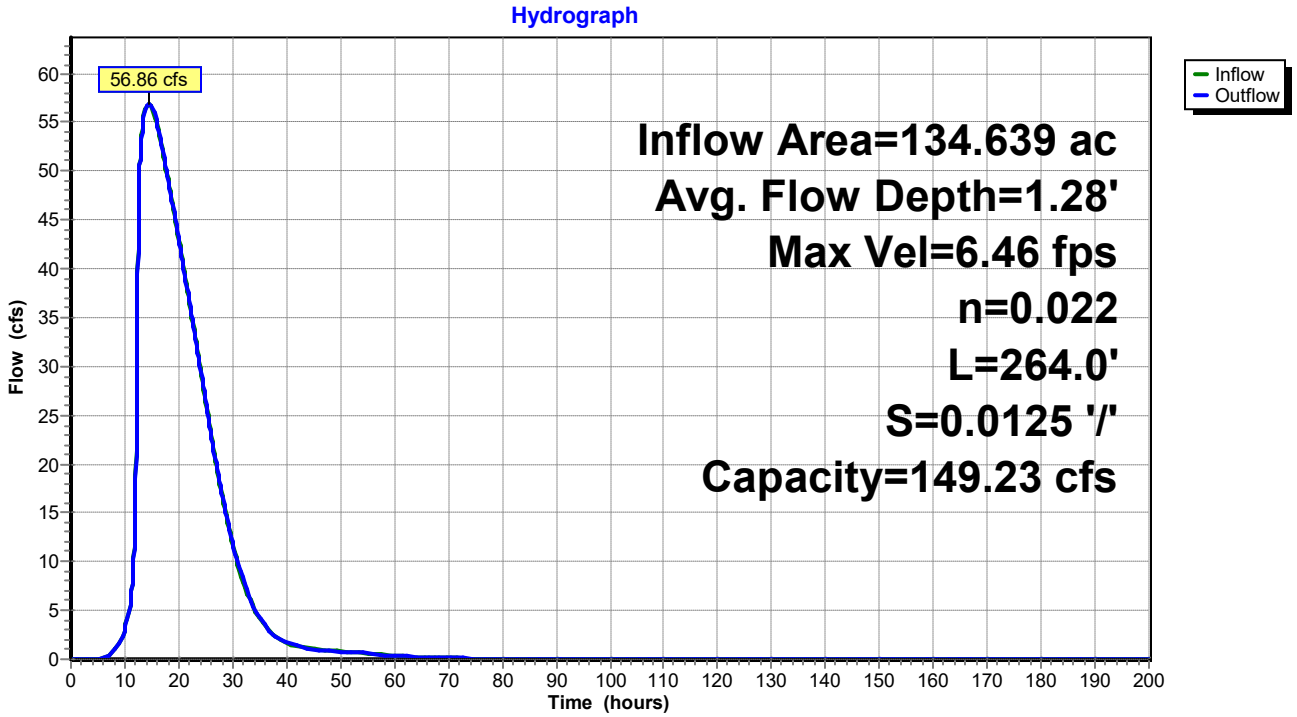
Reach 21R: Proposed East Channel



Summary for Reach 23R: Existing West Channel

Inflow Area = 375.878 ac, 3.58% Impervious, Inflow Depth > 2.27" for 100-year event
Inflow = 82.09 cfs @ 12.67 hrs, Volume= 70.970 af
Outflow = 81.93 cfs @ 12.70 hrs, Volume= 70.969 af, Atten= 0%, Lag= 1.6 min

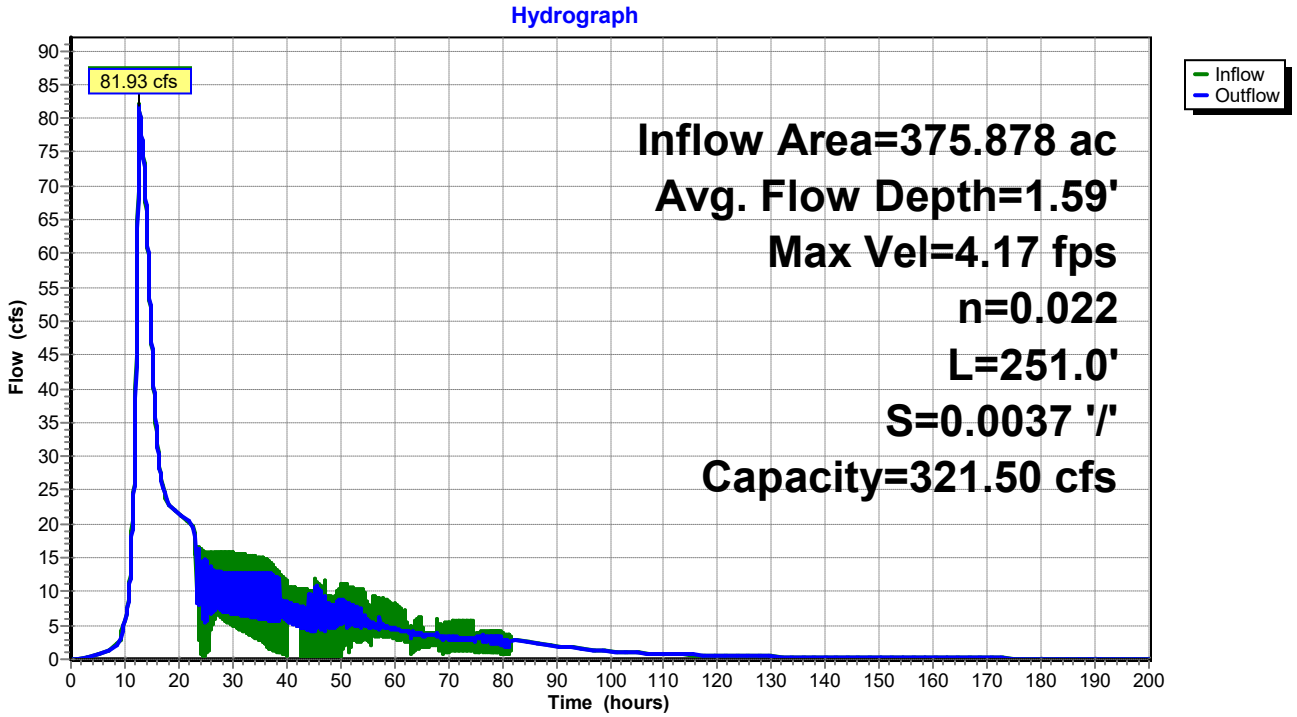
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.17 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 3.3 min

Peak Storage= 4,935 cf @ 12.70 hrs
Average Depth at Peak Storage= 1.59'
Bank-Full Depth= 3.00' Flow Area= 54.0 sf, Capacity= 321.50 cfs

6.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 '/' Top Width= 30.00'
Length= 251.0' Slope= 0.0037 '/'
Inlet Invert= 920.50', Outlet Invert= 919.58'

‡

Reach 23R: Existing West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=488)

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 3.93" for 100-year event
Inflow = 1,123.30 cfs @ 12.39 hrs, Volume= 98.288 af
Outflow = 34.97 cfs @ 23.30 hrs, Volume= 36.256 af, Atten= 97%, Lag= 654.8 min
Primary = 34.97 cfs @ 23.30 hrs, Volume= 36.256 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 931.48' @ 23.25 hrs Surf.Area= 64.446 ac Storage= 92.213 af

Plug-Flow detention time= 2,358.7 min calculated for 36.256 af (37% of inflow)
Center-of-Mass det. time= 2,265.8 min (3,087.3 - 821.5)

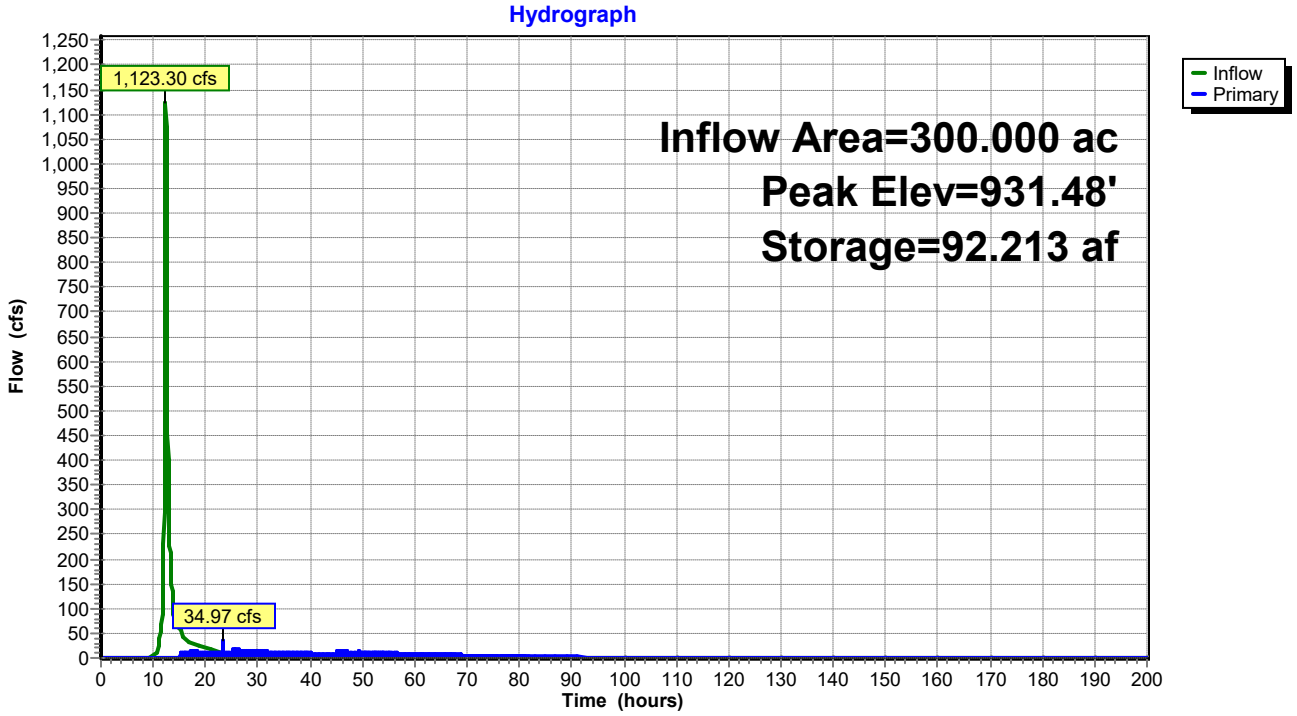
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 23.30 hrs HW=931.48' TW=932.44' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 10P: Proposed Northeast Pond/Filtration

[58] Hint: Peaked 1.82' above defined flood level

Inflow Area = 19.438 ac, 21.11% Impervious, Inflow Depth = 5.78" for 100-year event
Inflow = 108.68 cfs @ 12.33 hrs, Volume= 9.357 af
Outflow = 54.13 cfs @ 12.63 hrs, Volume= 9.357 af, Atten= 50%, Lag= 17.6 min
Primary = 54.13 cfs @ 12.63 hrs, Volume= 9.357 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 921.00' Surf.Area= 0.662 ac Storage= 2.955 af
Peak Elev= 923.82' @ 12.63 hrs Surf.Area= 2.069 ac Storage= 7.203 af (4.248 af above start)
Flood Elev= 922.00' Surf.Area= 1.255 ac Storage= 4.104 af (1.149 af above start)

Plug-Flow detention time= 622.5 min calculated for 6.402 af (68% of inflow)
Center-of-Mass det. time= 362.9 min (1,148.0 - 785.2)

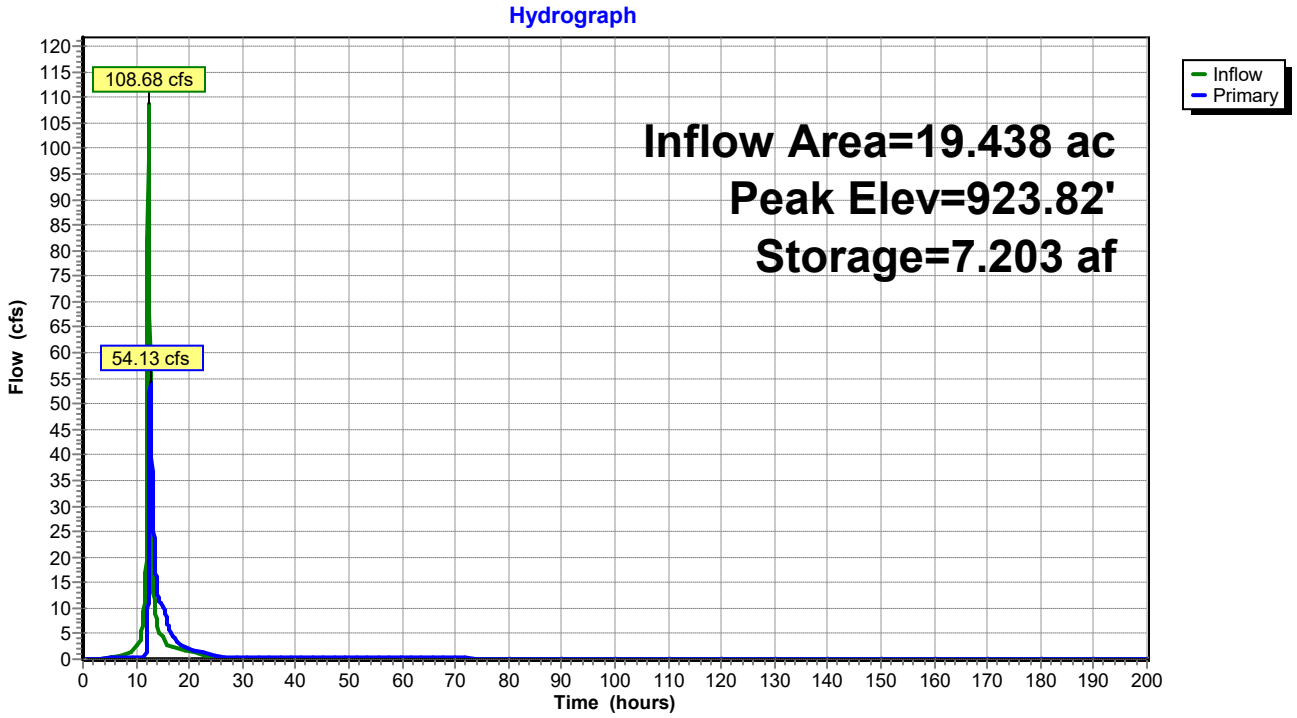
Volume	Invert	Avail.Storage	Storage Description
#1	913.00'	9.359 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
913.00	0.209	0.000	0.000
914.00	0.242	0.226	0.226
916.00	0.314	0.556	0.781
918.00	0.396	0.710	1.491
920.00	0.491	0.887	2.378
921.00	0.662	0.576	2.955
921.01	1.049	0.009	2.964
922.00	1.255	1.140	4.104
924.00	2.149	3.404	7.508
925.00	1.553	1.851	9.359

Device	Routing	Invert	Outlet Devices
#1	Primary	918.50'	**36.0" Round Culvert** L= 113.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.50' / 918.00' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	922.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	923.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	920.00'	**21.0" Round Culvert** L= 45.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 920.00' S= -0.0444 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	921.00'	**0.31 cfs Exfiltration when above 921.00'** Phase-In= 0.01'

Primary OutFlow Max=53.98 cfs @ 12.63 hrs HW=923.82' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 53.98 cfs of 62.52 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes 15.62 cfs of 45.20 cfs potential flow)
  │ └─**4=Culvert** (Inlet Controls 15.62 cfs @ 6.49 fps)
  ├─**3=Orifice/Grate** (Weir Controls 38.05 cfs @ 2.96 fps)
  └─**5=Exfiltration** (Exfiltration Controls 0.31 cfs)

Pond 10P: Proposed Northeast Pond/Filtration



Summary for Pond 25P: Proposed Northwest Pond/Filtration

[58] Hint: Peaked 1.30' above defined flood level

Inflow Area = 15.059 ac, 29.82% Impervious, Inflow Depth = 5.50" for 100-year event
Inflow = 94.08 cfs @ 12.26 hrs, Volume= 6.905 af
Outflow = 23.44 cfs @ 12.68 hrs, Volume= 6.905 af, Atten= 75%, Lag= 25.5 min
Primary = 23.44 cfs @ 12.68 hrs, Volume= 6.905 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 925.00' Surf.Area= 0.322 ac Storage= 1.156 af
Peak Elev= 927.80' @ 12.68 hrs Surf.Area= 1.556 ac Storage= 4.908 af (3.752 af above start)
Flood Elev= 926.50' Surf.Area= 1.369 ac Storage= 3.002 af (1.846 af above start)

Plug-Flow detention time= 815.4 min calculated for 5.749 af (83% of inflow)
Center-of-Mass det. time= 616.0 min (1,396.5 - 780.5)

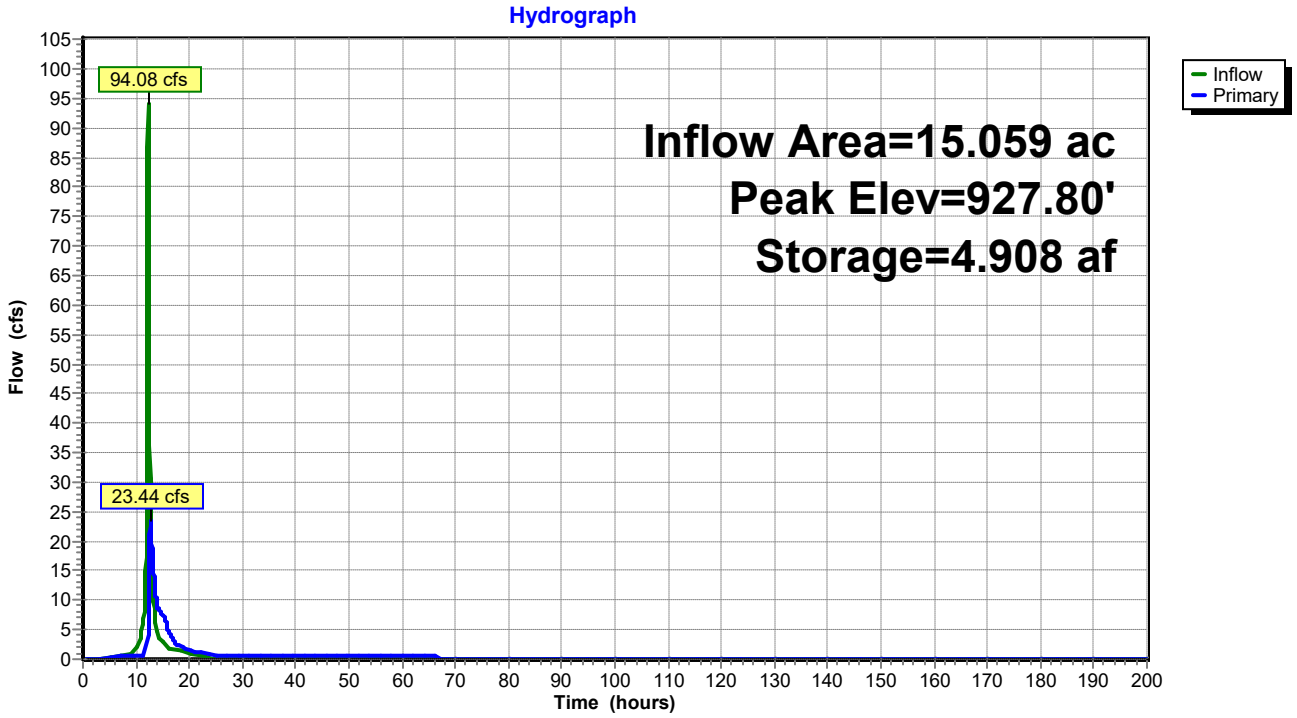
Volume	Invert	Avail.Storage	Storage Description
#1	917.00'	5.216 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
917.00	0.052	0.000	0.000
918.00	0.069	0.061	0.061
920.00	0.110	0.179	0.239
922.00	0.160	0.270	0.509
924.00	0.217	0.377	0.887
925.00	0.322	0.269	1.156
925.01	1.071	0.007	1.163
926.00	1.297	1.172	2.335
928.00	1.584	2.881	5.216

Device	Routing	Invert	Outlet Devices
#1	Primary	922.50'	**21.0" Round Culvert** L= 46.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.50' / 922.00' S= 0.0109 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	926.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	927.40'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	922.00'	**18.0" Round Culvert** L= 42.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 921.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#5	Device 1	925.00'	**0.54 cfs Exfiltration when above 925.00'** Phase-In= 0.01'

Primary OutFlow Max=23.38 cfs @ 12.68 hrs HW=927.80' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 23.38 cfs of 24.37 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes 9.71 cfs of 23.05 cfs potential flow)
  │ └─**4=Culvert** (Inlet Controls 9.71 cfs @ 5.50 fps)
  ├─**3=Orifice/Grate** (Weir Controls 13.13 cfs @ 2.08 fps)
  └─**5=Exfiltration** (Exfiltration Controls 0.54 cfs)

Pond 25P: Proposed Northwest Pond/Filtration



Summary for Pond 26P: Proposed Northwest Central Pond/Filtration

[58] Hint: Peaked 0.43' above defined flood level

Inflow Area = 7.518 ac, 41.97% Impervious, Inflow Depth = 5.78" for 100-year event
Inflow = 41.54 cfs @ 12.16 hrs, Volume= 3.624 af
Outflow = 4.83 cfs @ 13.41 hrs, Volume= 3.624 af, Atten= 88%, Lag= 74.8 min
Primary = 4.83 cfs @ 13.41 hrs, Volume= 3.624 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.00' Surf.Area= 0.318 ac Storage= 0.894 af
Peak Elev= 925.93' @ 13.41 hrs Surf.Area= 1.058 ac Storage= 2.664 af (1.770 af above start)
Flood Elev= 925.50' Surf.Area= 0.997 ac Storage= 2.227 af (1.333 af above start)

Plug-Flow detention time= 1,637.8 min calculated for 2.730 af (75% of inflow)
Center-of-Mass det. time= 971.5 min (1,978.4 - 1,006.8)

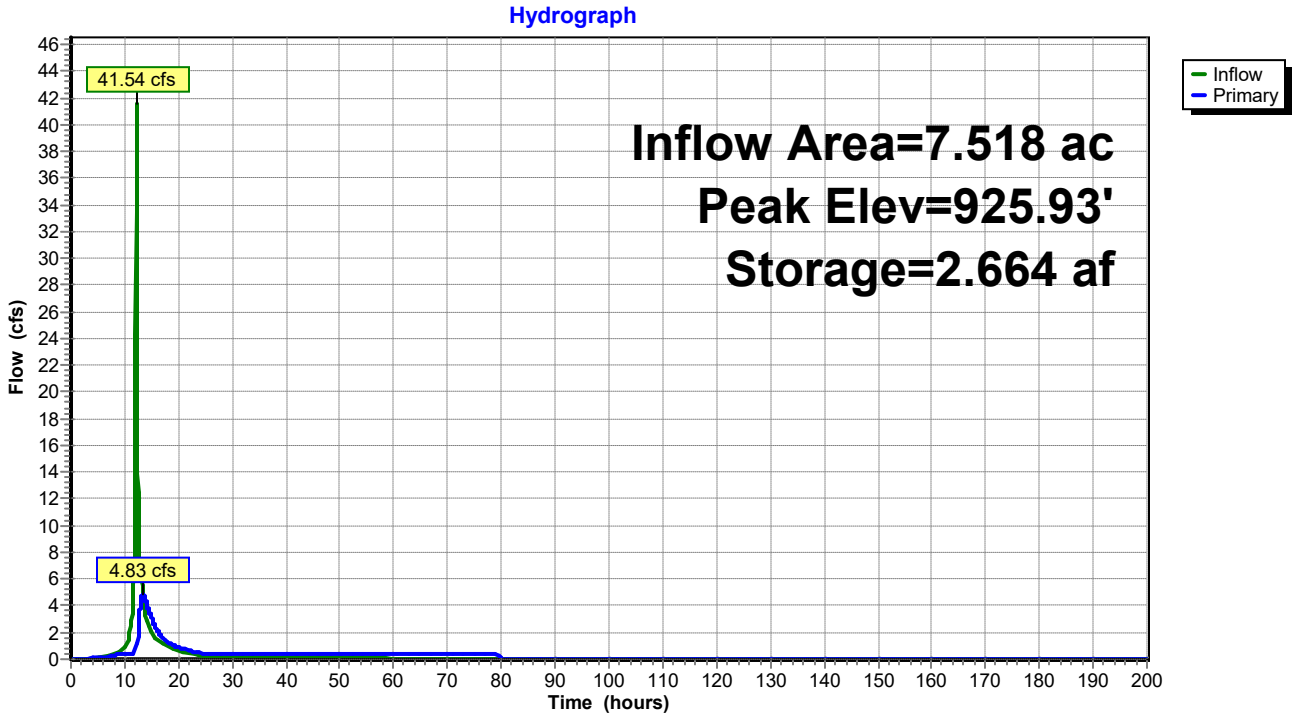
Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	3.855 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.00	0.009	0.000	0.000
918.00	0.045	0.054	0.054
920.00	0.099	0.144	0.198
922.00	0.162	0.261	0.459
923.00	0.195	0.179	0.637
924.00	0.318	0.256	0.894
924.01	0.784	0.006	0.900
926.00	1.069	1.844	2.743
927.00	1.155	1.112	3.855

Device	Routing	Invert	Outlet Devices
#1	Primary	921.50'	**21.0" Round Culvert** L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.50' / 921.00' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	925.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	926.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	921.00'	**21.0" Round Culvert** L= 44.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 920.00' / 921.00' S= -0.0227 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	924.00'	**0.37 cfs Exfiltration when above 924.00'** Phase-In= 0.01'

Primary OutFlow Max=4.83 cfs @ 13.41 hrs HW=925.93' TW=922.02' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.83 cfs of 20.63 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 4.46 cfs @ 2.13 fps)
  │ └─**4=Culvert** (Passes 4.46 cfs of 7.55 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.37 cfs)

Pond 26P: Proposed Northwest Central Pond/Filtration



Summary for Pond 27P: Proposed Northwest Central Pond

Inflow Area = 3.120 ac, 47.02% Impervious, Inflow Depth = 5.96" for 100-year event
Inflow = 27.18 cfs @ 12.15 hrs, Volume= 1.549 af
Outflow = 5.95 cfs @ 12.31 hrs, Volume= 1.546 af, Atten= 78%, Lag= 9.2 min
Primary = 5.95 cfs @ 12.31 hrs, Volume= 1.546 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.50' Surf.Area= 0.278 ac Storage= 0.732 af
Peak Elev= 926.35' @ 12.50 hrs Surf.Area= 0.486 ac Storage= 1.466 af (0.734 af above start)

Plug-Flow detention time= 1,168.6 min calculated for 0.814 af (53% of inflow)
Center-of-Mass det. time= 564.5 min (1,327.5 - 763.0)

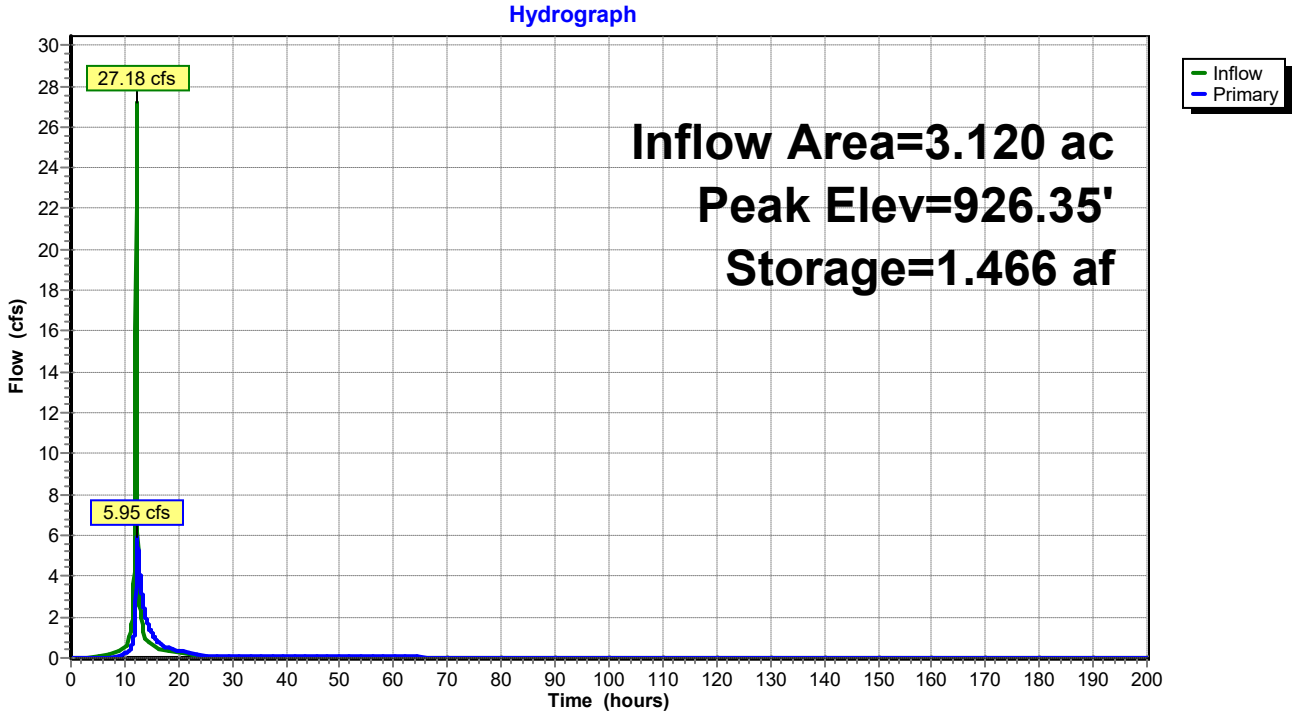
Volume	Invert	Avail.Storage	Storage Description
#1	916.50'	1.797 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.50	0.015	0.000	0.000
917.00	0.019	0.008	0.008
918.00	0.031	0.025	0.033
920.00	0.063	0.094	0.128
922.00	0.114	0.177	0.304
923.50	0.162	0.207	0.512
924.50	0.278	0.220	0.732
925.50	0.420	0.349	1.081
926.00	0.459	0.220	1.300
927.00	0.535	0.497	1.797

Device	Routing	Invert	Outlet Devices
#1	Primary	924.50'	**18.0" Round Culvert** L= 225.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.50' / 924.00' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	926.50'	**48.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	923.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 923.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=5.61 cfs @ 12.31 hrs HW=926.28' TW=925.44' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 5.61 cfs @ 3.38 fps)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 5.61 cfs of 7.79 cfs potential flow)

Pond 27P: Proposed Northwest Central Pond



Summary for Pond 28P: Proposed Northeast Central Pond

Inflow Area = 7.153 ac, 50.64% Impervious, Inflow Depth = 5.97" for 100-year event
Inflow = 51.09 cfs @ 12.22 hrs, Volume= 3.557 af
Outflow = 19.81 cfs @ 12.48 hrs, Volume= 3.557 af, Atten= 61%, Lag= 15.4 min
Primary = 19.81 cfs @ 12.48 hrs, Volume= 3.557 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 922.00' Surf.Area= 0.380 ac Storage= 1.043 af
Peak Elev= 924.00' @ 12.48 hrs Surf.Area= 0.642 ac Storage= 2.116 af (1.073 af above start)

Plug-Flow detention time= 164.9 min calculated for 2.513 af (71% of inflow)
Center-of-Mass det. time= 37.9 min (805.3 - 767.4)

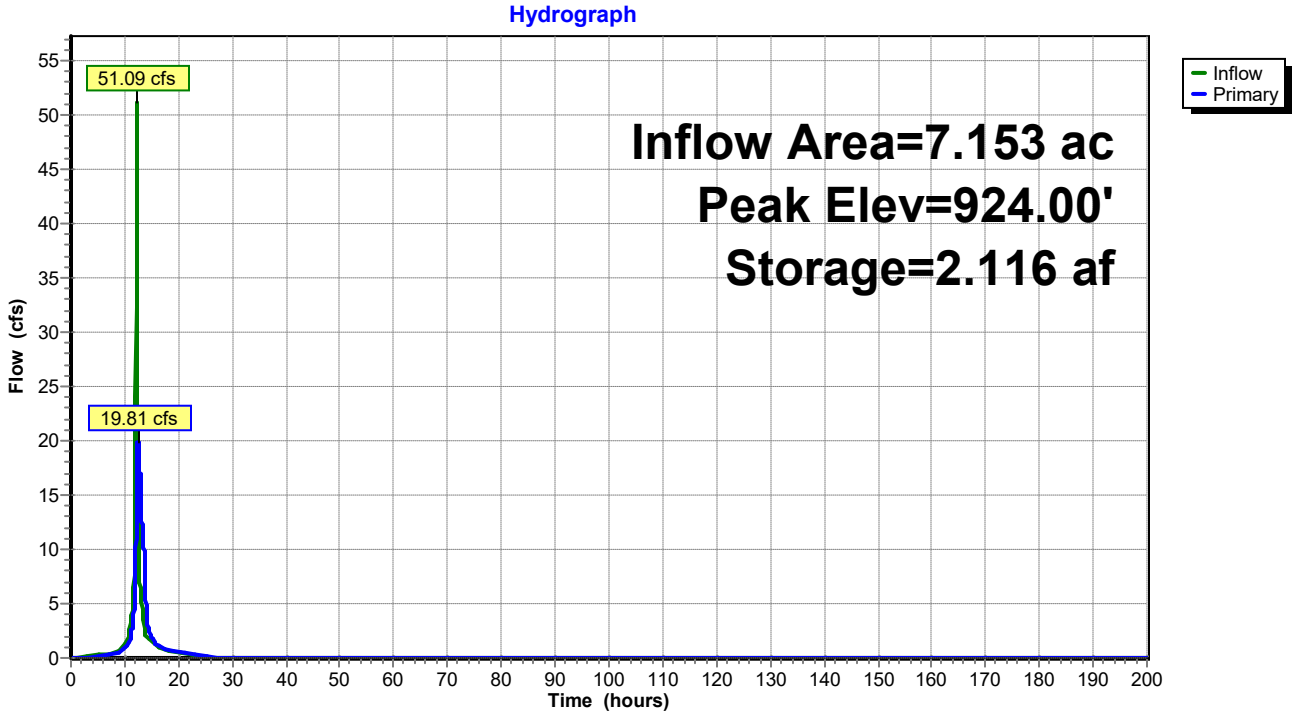
Volume	Invert	Avail.Storage	Storage Description
#1	914.00'	2.802 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
914.00	0.034	0.000	0.000
916.00	0.065	0.099	0.099
918.00	0.109	0.174	0.273
920.00	0.172	0.281	0.554
921.00	0.213	0.192	0.746
922.00	0.380	0.297	1.043
923.00	0.565	0.472	1.515
924.00	0.642	0.603	2.119
925.00	0.724	0.683	2.802

Device	Routing	Invert	Outlet Devices
#1	Primary	921.00'	**24.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.00' / 920.80' S= 0.0057 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	923.25'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	922.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 3	919.00'	**21.0" Round Culvert** L= 33.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 919.00' S= -0.0303 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=19.79 cfs @ 12.48 hrs HW=923.99' TW=921.98' (Dynamic Tailwater)
- **1=Culvert** (Barrel Controls 19.79 cfs @ 6.30 fps)
- **2=Orifice/Grate** (Passes < 32.86 cfs potential flow)
- **3=Sharp-Crested Rectangular Weir** (Passes < 42.32 cfs potential flow)
- **4=Culvert** (Passes < 16.35 cfs potential flow)

Pond 28P: Proposed Northeast Central Pond



Summary for Pond 30P: Wetland 4A

[44] Hint: Outlet device #5 is below defined storage

Inflow Area = 357.822 ac, 1.86% Impervious, Inflow Depth > 2.09" for 100-year event
Inflow = 206.55 cfs @ 12.34 hrs, Volume= 62.344 af
Outflow = 57.41 cfs @ 13.19 hrs, Volume= 62.398 af, Atten= 72%, Lag= 51.0 min
Primary = 54.21 cfs @ 13.18 hrs, Volume= 42.527 af
Secondary = 3.20 cfs @ 13.34 hrs, Volume= 19.871 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 926.91' @ 13.18 hrs Surf.Area= 6.450 ac Storage= 8.089 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 37.8 min (2,218.9 - 2,181.1)

Volume	Invert	Avail.Storage	Storage Description
#1	923.50'	15.942 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

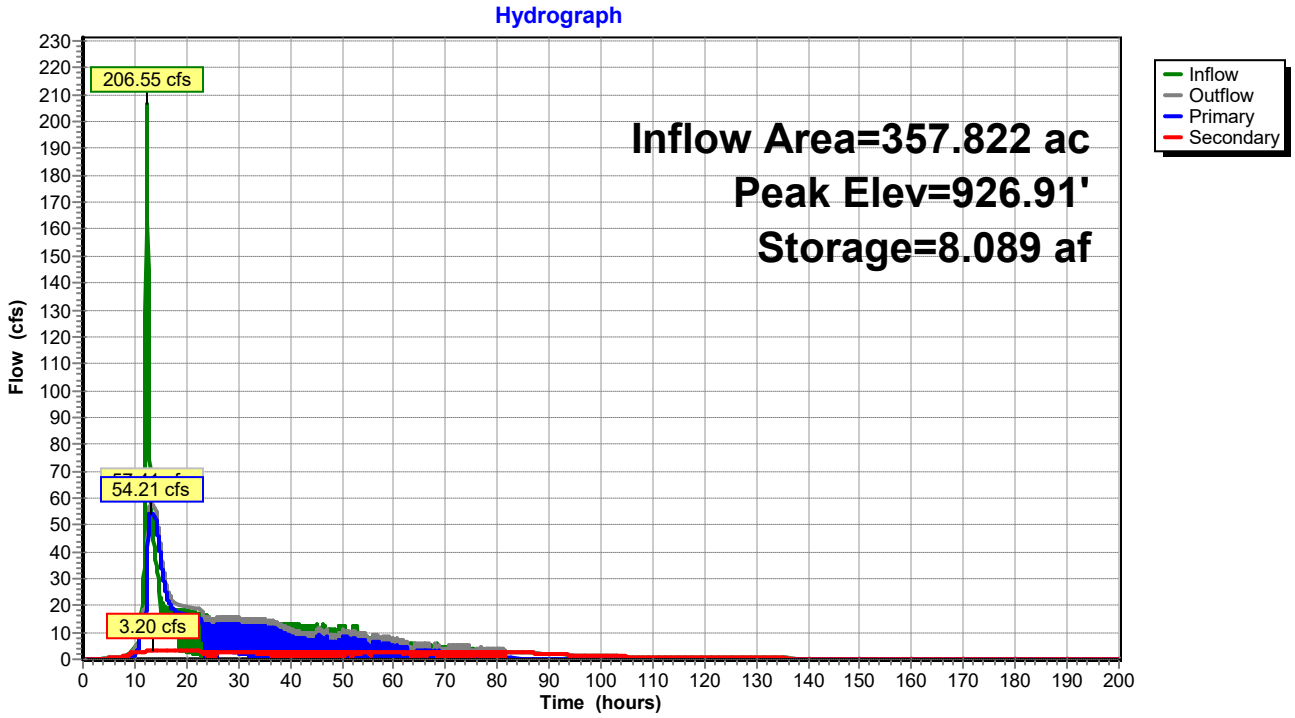
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.50	0.011	0.000	0.000
924.00	0.027	0.009	0.009
925.00	0.058	0.042	0.052
926.00	5.338	2.698	2.750
927.00	6.566	5.952	8.702
928.00	7.914	7.240	15.942

Device	Routing	Invert	Outlet Devices
#1	Primary	921.11'	**36.0" Round 36" RCP** L= 307.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.11' / 920.50' S= 0.0020 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 7.07 sf
#2	Device 1	926.00'	**60.0" Horiz. CBMH-3003** C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.17'	**18.0" Round 18" RCP** L= 23.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 921.17' / 921.11' S= 0.0026 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#4	Device 3	923.50'	**48.0" Horiz. CBMH-3004** C= 0.600 Limited to weir flow at low heads
#5	Secondary	919.60'	**12.0" Round 12" Draintile** L= 553.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.34' / 919.60' S= -0.0005 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=54.21 cfs @ 13.18 hrs HW=926.91' TW=922.04' (Dynamic Tailwater)
└─**1=36" RCP** (Barrel Controls 54.21 cfs @ 7.67 fps)
  ├─**2=CBMH-3003** (Passes < 44.27 cfs potential flow)
  └─**3=18" RCP** (Passes < 18.77 cfs potential flow)
    └─**4=CBMH-3004** (Passes < 111.66 cfs potential flow)

Secondary OutFlow Max=3.20 cfs @ 13.34 hrs HW=926.90' TW=922.03' (Dynamic Tailwater)
└─**5=12" Draintile** (Outlet Controls 3.20 cfs @ 4.08 fps)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)
[80] Warning: Exceeded Pond 7P by 3.52' @ 12.80 hrs (671.90 cfs 382.412 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth > 1.64" for 100-year event
Inflow = 65.78 cfs @ 12.56 hrs, Volume= 43.714 af
Outflow = 25.92 cfs @ 13.14 hrs, Volume= 45.816 af, Atten= 61%, Lag= 34.9 min
Primary = 25.92 cfs @ 13.14 hrs, Volume= 45.816 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 934.52' @ 13.14 hrs Surf.Area= 3.819 ac Storage= 1.969 af

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

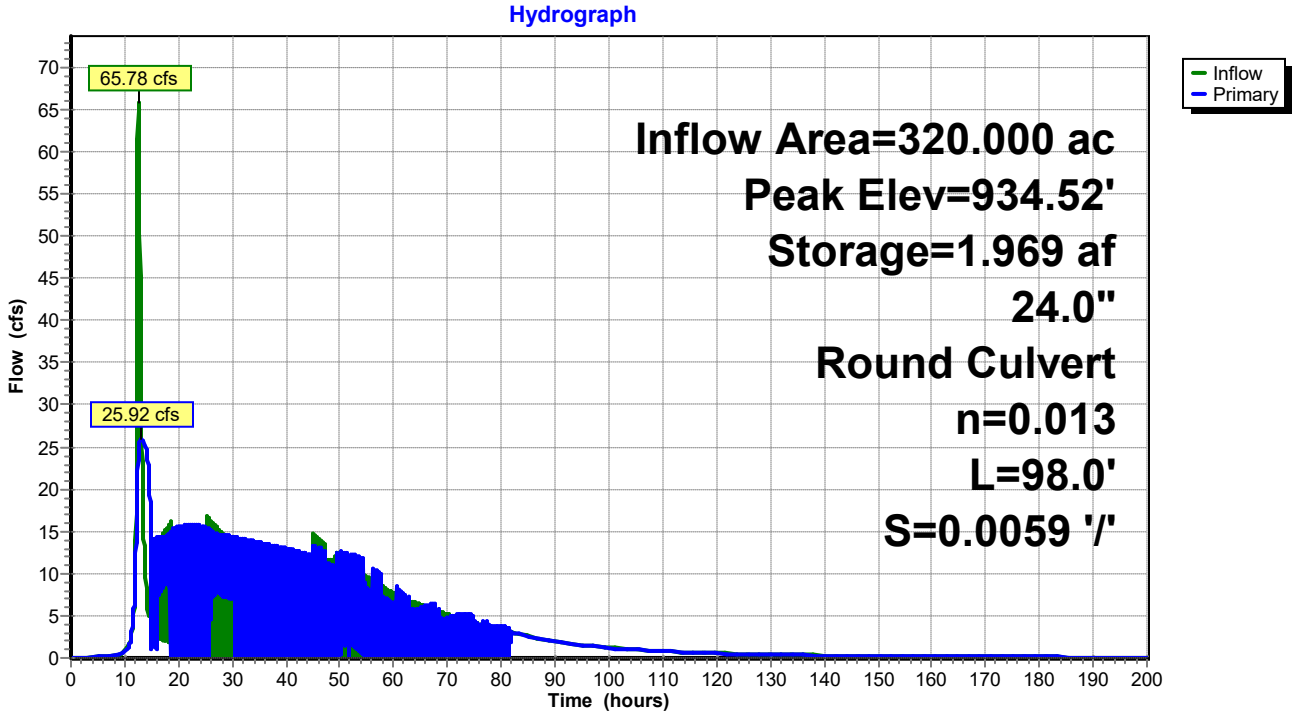
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=25.92 cfs @ 13.14 hrs HW=934.52' TW=926.91' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 25.92 cfs @ 8.25 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 32P: Proposed West Central Pond

Inflow Area = 3.686 ac, 36.52% Impervious, Inflow Depth = 5.78" for 100-year event
Inflow = 33.42 cfs @ 12.14 hrs, Volume= 1.774 af
Outflow = 11.07 cfs @ 12.20 hrs, Volume= 1.774 af, Atten= 67%, Lag= 3.4 min
Primary = 11.07 cfs @ 12.20 hrs, Volume= 1.774 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.00' Surf.Area= 0.395 ac Storage= 1.213 af
Peak Elev= 929.13' @ 12.32 hrs Surf.Area= 0.565 ac Storage= 1.763 af (0.550 af above start)

Plug-Flow detention time= 331.2 min calculated for 0.561 af (32% of inflow)
Center-of-Mass det. time= 41.6 min (807.9 - 766.3)

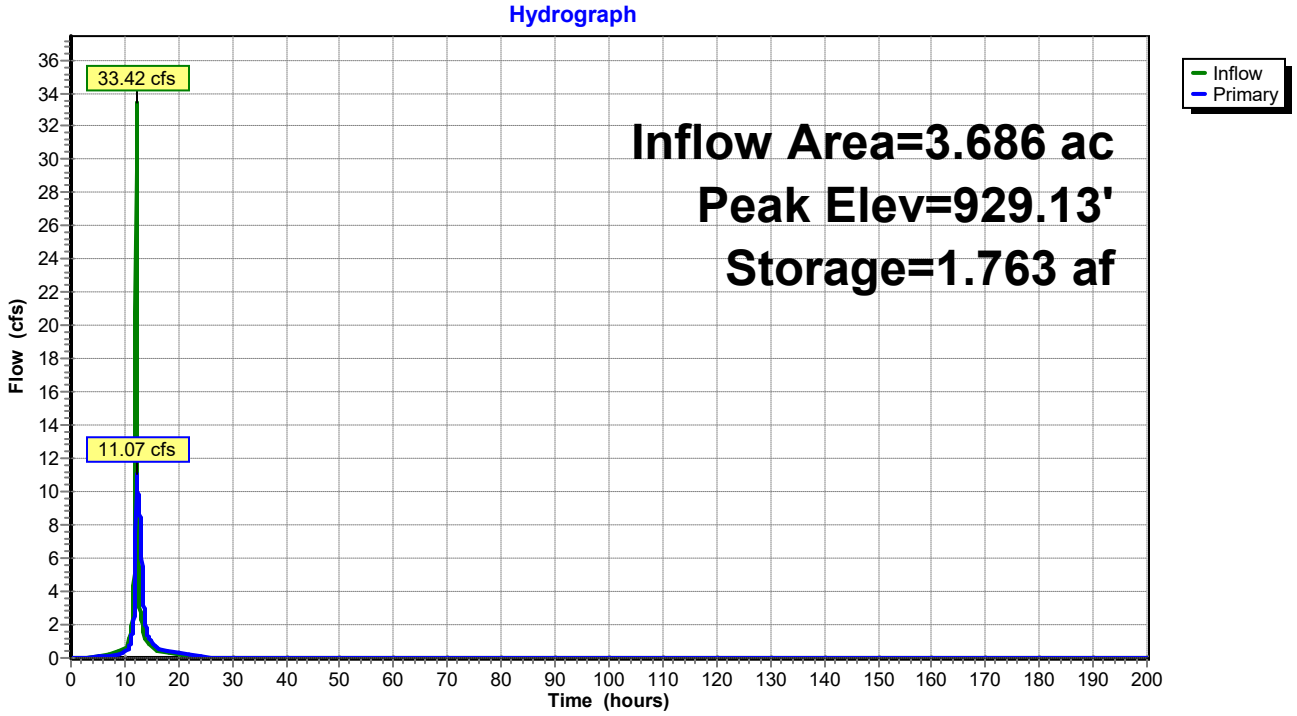
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2.284 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
920.00	0.034	0.000	0.000
922.00	0.073	0.107	0.107
924.00	0.134	0.207	0.314
926.00	0.211	0.345	0.659
927.00	0.251	0.231	0.890
928.00	0.395	0.323	1.213
929.00	0.554	0.475	1.687
930.00	0.638	0.596	2.284

Device	Routing	Invert	Outlet Devices
#1	Primary	923.05'	**18.0" Round Culvert** L= 212.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.05' / 922.52' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	929.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	925.00'	**21.0" Round Culvert** L= 20.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0500 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=10.87 cfs @ 12.20 hrs HW=929.03' TW=925.87' (Dynamic Tailwater)
- **1=Culvert** (Outlet Controls 10.87 cfs @ 6.15 fps)
  - **2=Sharp-Crested Rectangular Weir** (Passes 10.87 cfs of 16.44 cfs potential flow)
    - **4=Culvert** (Passes 10.87 cfs of 11.77 cfs potential flow)
  - **3=Orifice/Grate** (Controls 0.00 cfs)

Pond 32P: Proposed West Central Pond



Summary for Pond 40P: Wetland 2B

Inflow Area = 133.857 ac, 9.96% Impervious, Inflow Depth = 5.62" for 100-year event
Inflow = 415.75 cfs @ 12.33 hrs, Volume= 62.645 af
Outflow = 56.67 cfs @ 14.36 hrs, Volume= 62.645 af, Atten= 86%, Lag= 121.8 min
Primary = 56.67 cfs @ 14.36 hrs, Volume= 62.645 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 926.55' @ 14.36 hrs Surf.Area= 16.379 ac Storage= 24.891 af

Plug-Flow detention time= 283.5 min calculated for 62.645 af (100% of inflow)
Center-of-Mass det. time= 283.5 min (1,256.3 - 972.8)

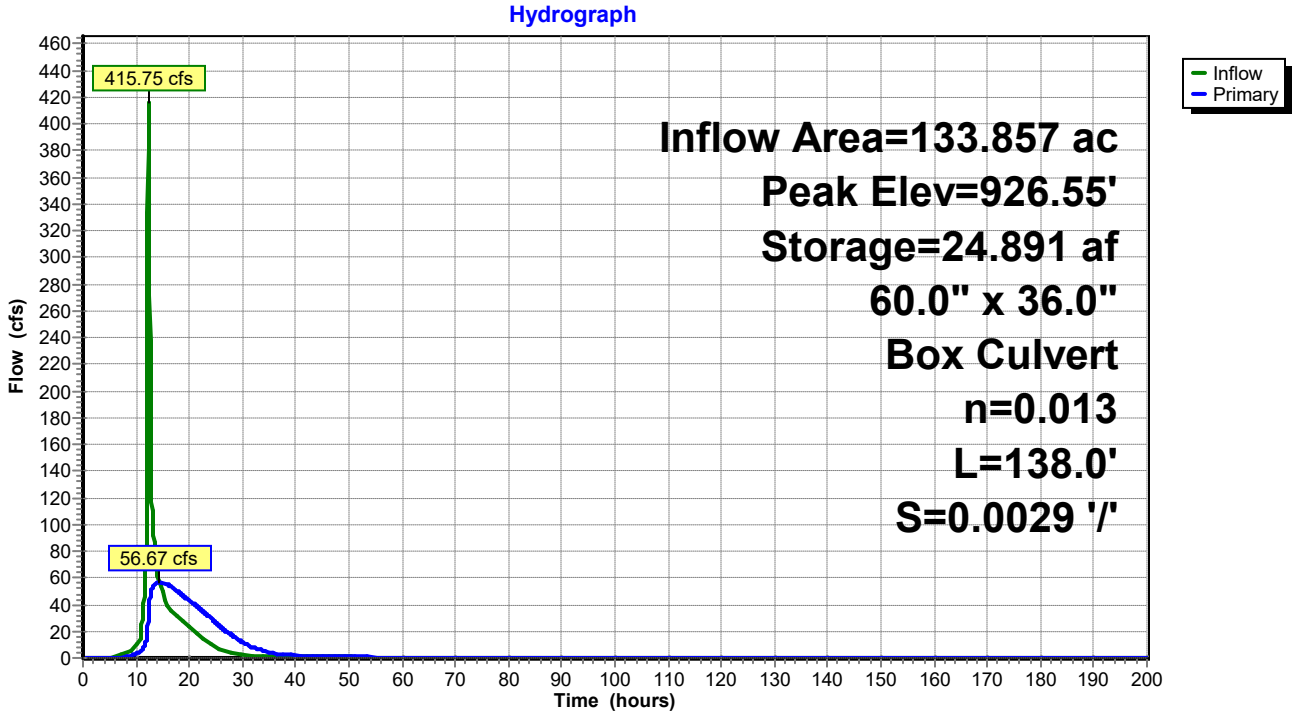
Volume	Invert	Avail.Storage	Storage Description
#1	923.90'	52.747 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.90	0.000	0.000	0.000
924.00	2.123	0.106	0.106
926.00	14.283	16.406	16.512
928.00	21.952	36.235	52.747

Device	Routing	Invert	Outlet Devices
#1	Primary	923.90'	**60.0" W x 36.0" H Box Culvert** L= 138.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.90' / 923.50' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 15.00 sf

Primary OutFlow Max=56.67 cfs @ 14.36 hrs HW=926.55' TW=924.78' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 56.67 cfs @ 5.71 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 5.08" for 100-year event
Inflow = 100.55 cfs @ 12.18 hrs, Volume= 5.810 af
Outflow = 7.88 cfs @ 13.21 hrs, Volume= 2.123 af, Atten= 92%, Lag= 62.0 min
Primary = 7.88 cfs @ 13.21 hrs, Volume= 2.123 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 940.67' @ 13.21 hrs Surf.Area= 2.395 ac Storage= 4.079 af

Plug-Flow detention time= 289.5 min calculated for 2.123 af (37% of inflow)
Center-of-Mass det. time= 192.8 min (977.2 - 784.4)

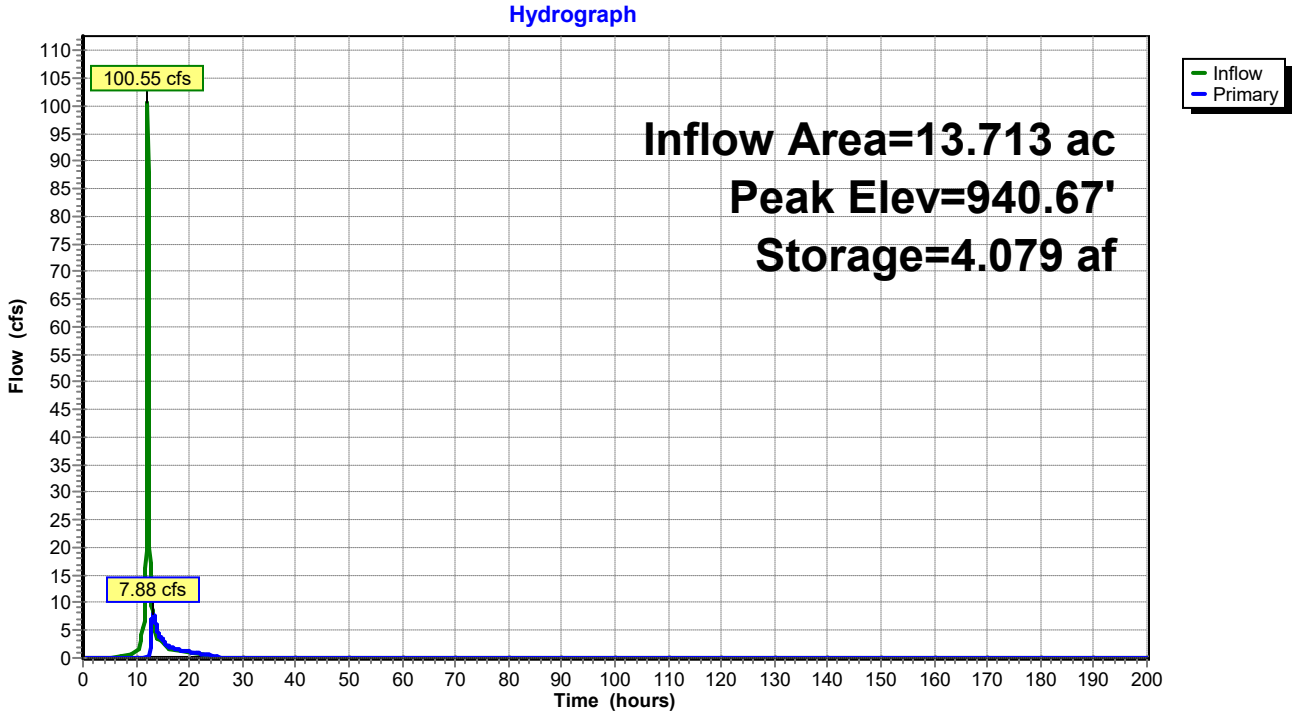
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=7.87 cfs @ 13.21 hrs HW=940.67' TW=926.45' (Dynamic Tailwater)
↑**1=Custom Weir/Orifice** (Weir Controls 7.87 cfs @ 1.25 fps)

Pond 41P: Ex South Off-site Pond



Summary for Pond 42P: Proposed South Central Pond

Inflow Area = 2.612 ac, 32.54% Impervious, Inflow Depth = 5.48" for 100-year event
Inflow = 20.03 cfs @ 12.17 hrs, Volume= 1.193 af
Outflow = 6.56 cfs @ 12.41 hrs, Volume= 1.193 af, Atten= 67%, Lag= 14.3 min
Primary = 6.56 cfs @ 12.41 hrs, Volume= 1.193 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.50' Surf.Area= 0.154 ac Storage= 0.309 af
Peak Elev= 930.36' @ 12.41 hrs Surf.Area= 0.297 ac Storage= 0.739 af (0.430 af above start)

Plug-Flow detention time= 186.6 min calculated for 0.883 af (74% of inflow)
Center-of-Mass det. time= 69.7 min (843.2 - 773.4)

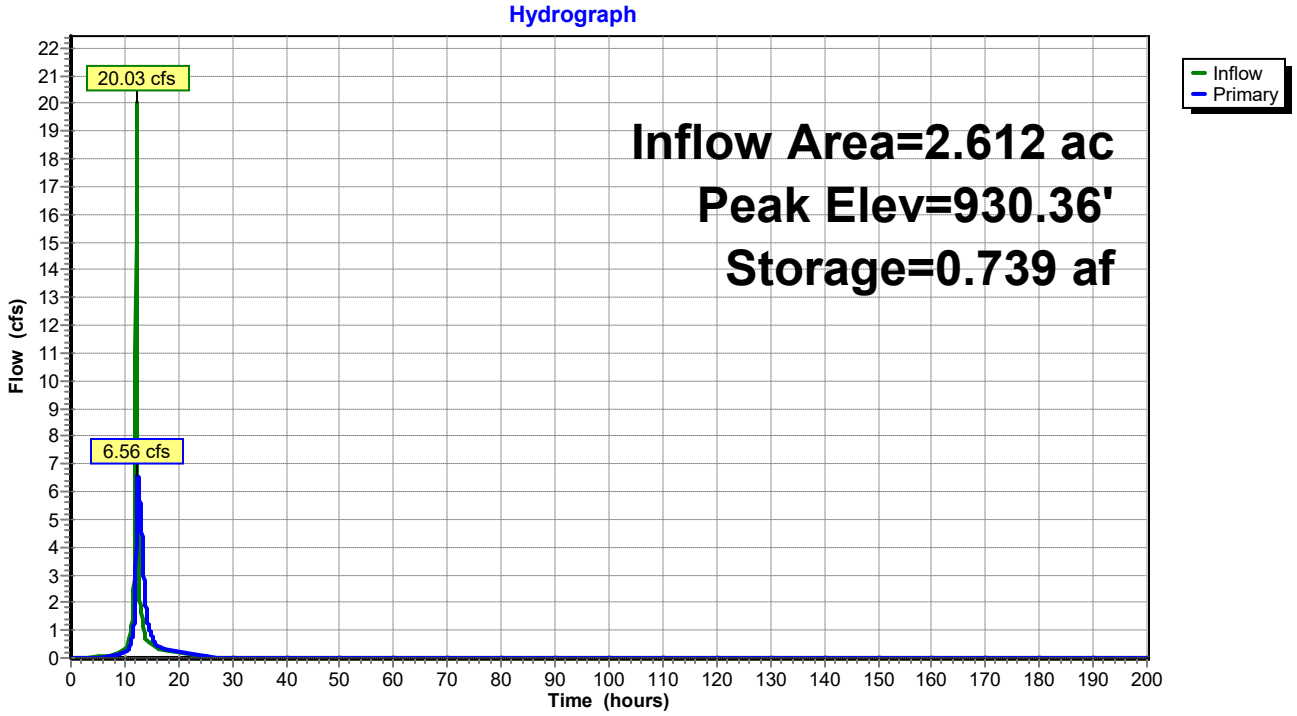
Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	1.122 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
922.00	0.004	0.000	0.000
924.00	0.022	0.026	0.026
926.00	0.050	0.072	0.098
927.50	0.078	0.096	0.194
928.00	0.114	0.048	0.242
928.50	0.154	0.067	0.309
929.50	0.244	0.199	0.508
930.00	0.274	0.130	0.637
931.50	0.372	0.484	1.122

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	**15.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 928.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	930.20'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	927.00'	**15.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.00' / 927.00' S= -0.0256 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=6.55 cfs @ 12.41 hrs HW=930.35' TW=925.88' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 6.55 cfs @ 5.34 fps)
↑**2=Orifice/Grate** (Passes < 2.49 cfs potential flow)
3=Culvert (Passes < 8.05 cfs potential flow)

Pond 42P: Proposed South Central Pond



Summary for Pond 43P: Proposed East Central Pond

Inflow Area = 6.873 ac, 41.00% Impervious, Inflow Depth = 5.79" for 100-year event
Inflow = 47.43 cfs @ 12.23 hrs, Volume= 3.315 af
Outflow = 11.48 cfs @ 12.62 hrs, Volume= 3.313 af, Atten= 76%, Lag= 23.6 min
Primary = 11.48 cfs @ 12.62 hrs, Volume= 3.313 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 926.50' Surf.Area= 0.401 ac Storage= 1.319 af
Peak Elev= 929.07' @ 12.62 hrs Surf.Area= 0.709 ac Storage= 2.810 af (1.491 af above start)

Plug-Flow detention time= 301.1 min calculated for 1.993 af (60% of inflow)
Center-of-Mass det. time= 119.9 min (892.0 - 772.1)

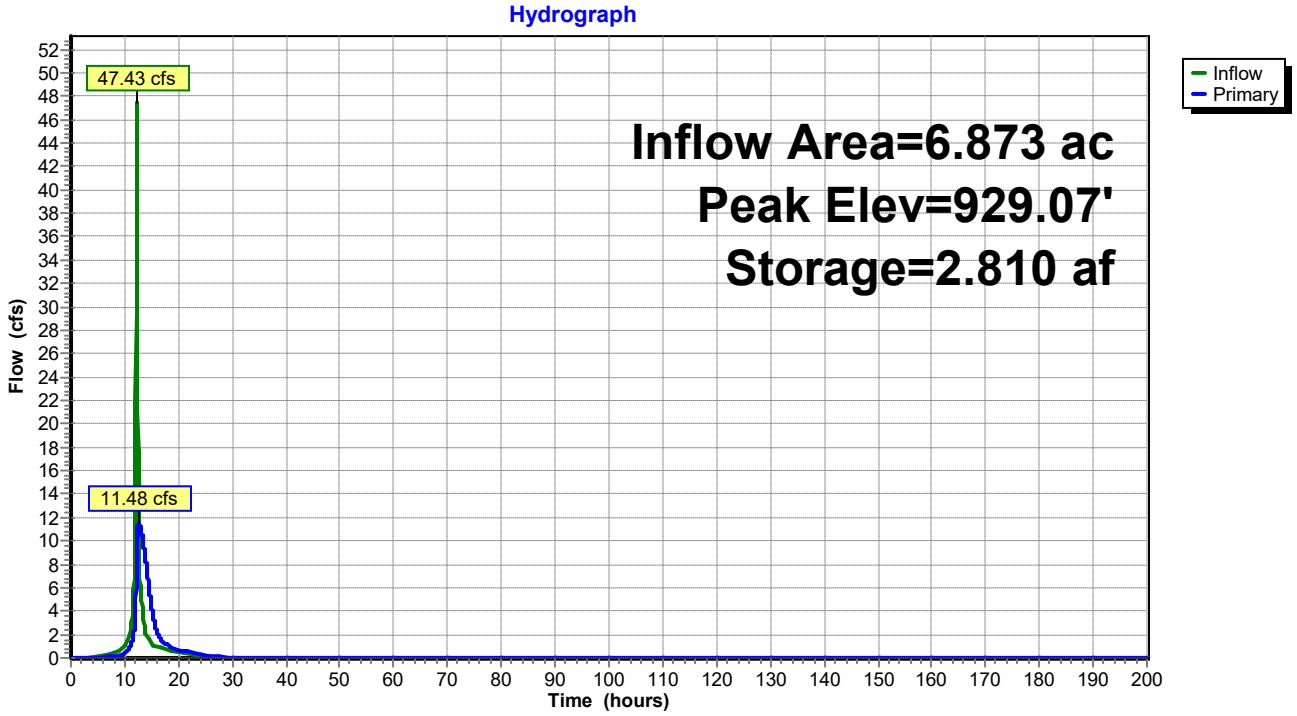
Volume	Invert	Avail.Storage	Storage Description
#1	918.50'	3.505 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
918.50	0.053	0.000	0.000
920.00	0.083	0.102	0.102
922.00	0.135	0.218	0.320
924.00	0.199	0.334	0.654
925.50	0.254	0.340	0.994
926.00	0.324	0.144	1.138
926.50	0.401	0.181	1.319
927.50	0.566	0.484	1.803
928.00	0.619	0.296	2.099
930.00	0.787	1.406	3.505

Device	Routing	Invert	Outlet Devices
#1	Primary	926.50'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.50' / 926.00' S= 0.0172 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	925.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=11.48 cfs @ 12.62 hrs HW=929.07' TW=926.18' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 11.48 cfs @ 6.49 fps)
  └─**2=Orifice/Grate** (Passes < 17.65 cfs potential flow)
  └─**3=Culvert** (Passes < 13.64 cfs potential flow)

Pond 43P: Proposed East Central Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 3.30" for 100-year event
Inflow = 78.67 cfs @ 12.37 hrs, Volume= 10.852 af
Outflow = 9.40 cfs @ 14.02 hrs, Volume= 5.629 af, Atten= 88%, Lag= 98.7 min
Primary = 9.40 cfs @ 14.02 hrs, Volume= 5.629 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 941.66' @ 14.02 hrs Surf.Area= 147,059 sf Storage= 250,287 cf

Plug-Flow detention time= 441.5 min calculated for 5.627 af (52% of inflow)
Center-of-Mass det. time= 246.7 min (1,177.4 - 930.7)

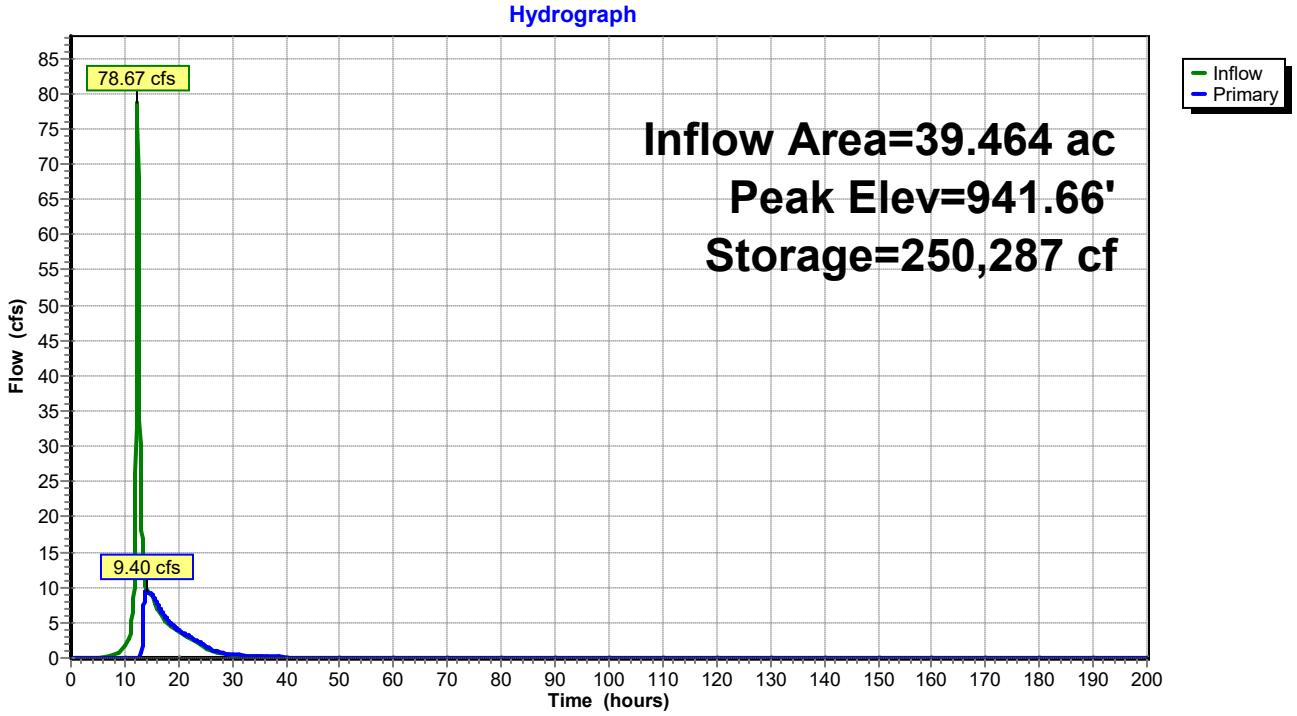
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	303,458 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
938.00	4,444	0	0
940.00	69,653	74,097	74,097
941.00	111,935	90,794	164,891
942.00	165,198	138,567	303,458

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=9.40 cfs @ 14.02 hrs HW=941.66' TW=926.54' (Dynamic Tailwater)
↑**1=Custom Weir/Orifice** (Weir Controls 9.40 cfs @ 1.27 fps)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth = 58.48" for 100-year event
Inflow = 41.22 cfs @ 12.13 hrs, Volume= 18.322 af
Outflow = 39.47 cfs @ 12.15 hrs, Volume= 18.108 af, Atten= 4%, Lag= 1.5 min
Primary = 39.47 cfs @ 12.15 hrs, Volume= 18.108 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 938.96' @ 12.15 hrs Surf.Area= 13,916 sf Storage= 14,745 cf

Plug-Flow detention time= 58.8 min calculated for 18.108 af (99% of inflow)
Center-of-Mass det. time= 12.0 min (1,259.6 - 1,247.5)

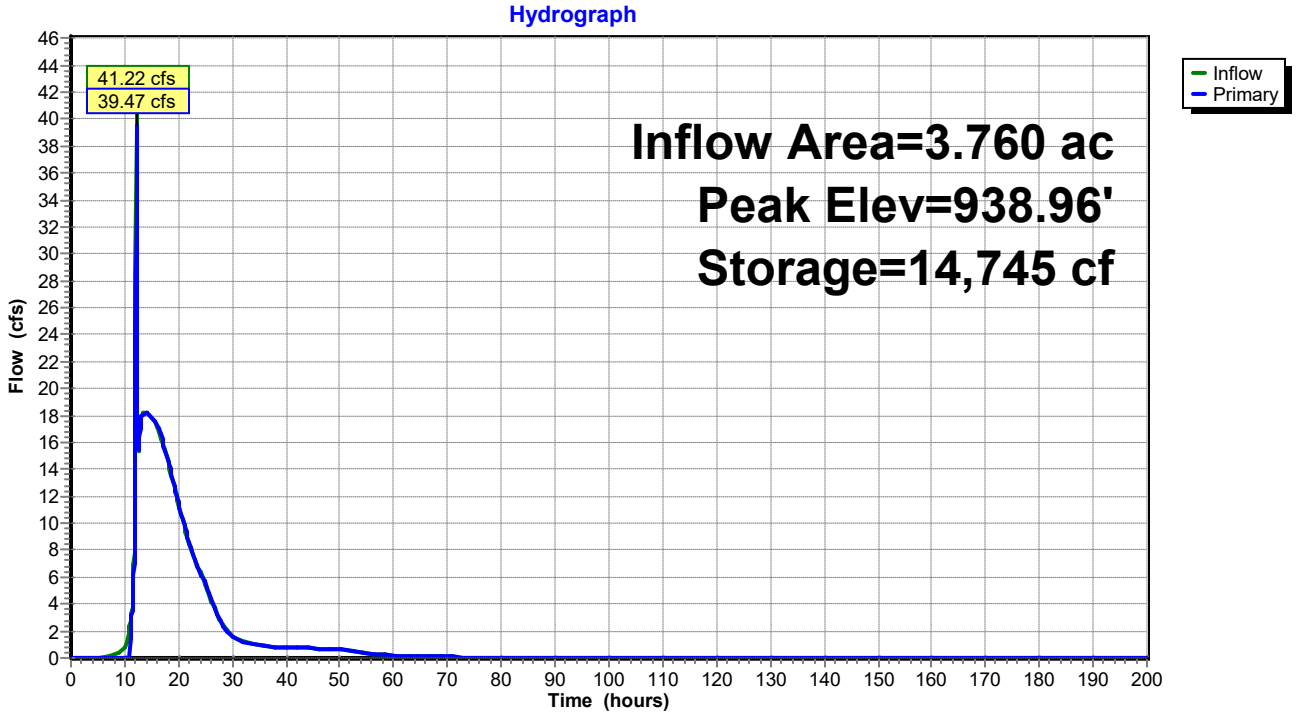
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	15,364 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
936.00	178	0	0
938.00	5,354	5,532	5,532
939.00	14,309	9,832	15,364

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=39.18 cfs @ 12.15 hrs HW=938.95' TW=925.23' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 39.18 cfs @ 2.09 fps)

Pond 60P: Wetland 5B



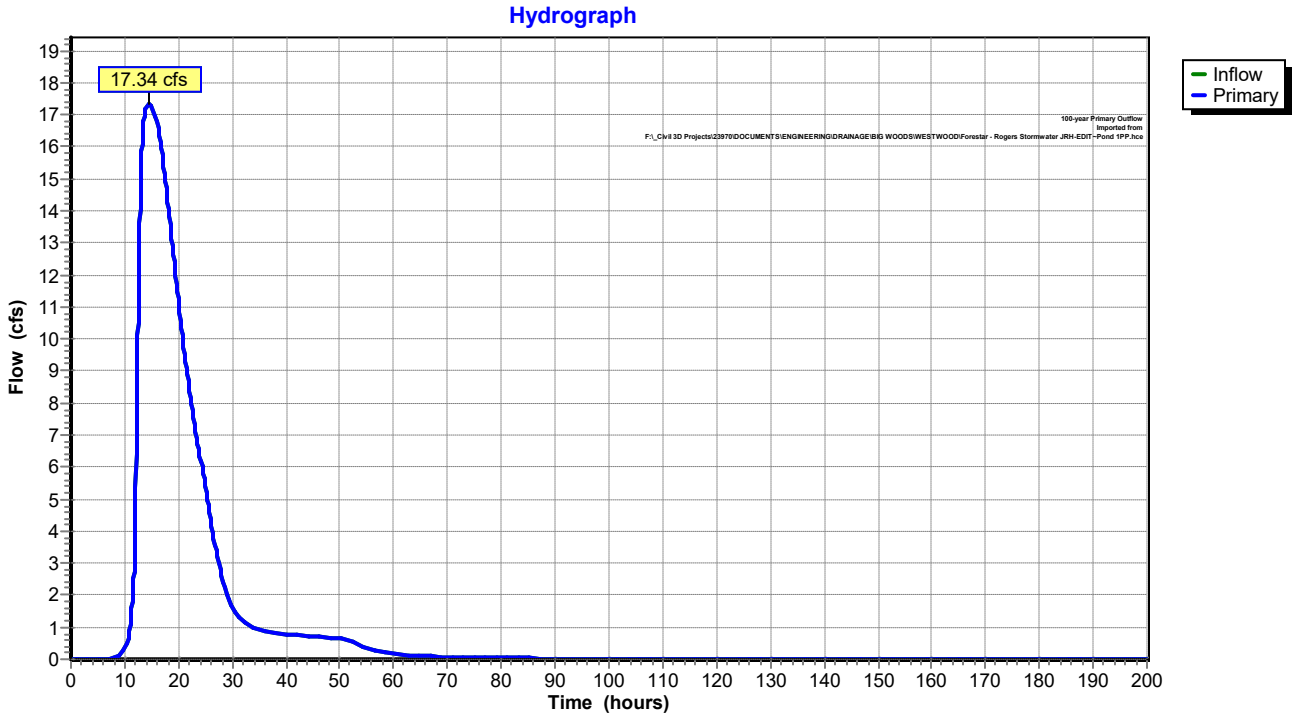
Summary for Link 1PP: Northwest Wetland

Inflow = 17.34 cfs @ 14.37 hrs, Volume= 16.612 af
Primary = 17.34 cfs @ 14.37 hrs, Volume= 16.612 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

100-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 1PP: Northwest Wetland



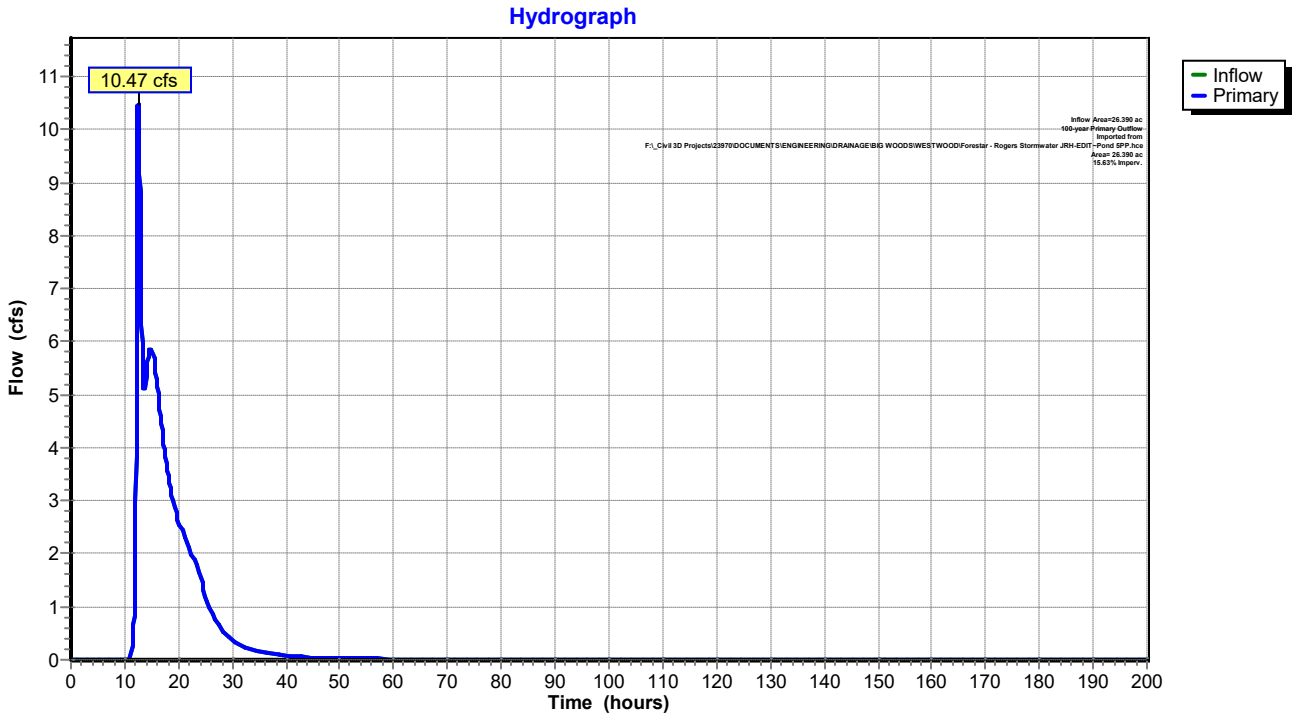
Summary for Link 5PP: Existing Pond

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 2.12" for 100-year event
Inflow = 10.47 cfs @ 12.49 hrs, Volume= 4.664 af
Primary = 10.47 cfs @ 12.49 hrs, Volume= 4.664 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

100-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 5PP: Existing Pond



Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth>6.47"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min AMC Adjusted CN=98/98 Runoff=139.00 cfs 161.795 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=19.438 ac 21.11% Impervious Runoff Depth>6.47"
Flow Length=1,602' Tc=23.6 min AMC Adjusted CN=98/98 Runoff=9.06 cfs 10.485 af

Subcatchment 11S: Direct to Cowley Lake Runoff Area=6.152 ac 3.35% Impervious Runoff Depth>6.47"
Flow Length=1,308' Tc=15.2 min AMC Adjusted CN=98/98 Runoff=2.91 cfs 3.319 af

Subcatchment 12S: Fugitve to Fox Creek Runoff Area=0.547 ac 45.16% Impervious Runoff Depth>6.48"
Flow Length=165' Tc=8.1 min AMC Adjusted CN=98/98 Runoff=0.26 cfs 0.295 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=3.970 ac 7.66% Impervious Runoff Depth>6.48"
Flow Length=310' Tc=10.9 min AMC Adjusted CN=98/98 Runoff=1.89 cfs 2.142 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.782 ac 1.28% Impervious Runoff Depth>6.47"
Flow Length=392' Tc=17.3 min AMC Adjusted CN=98/98 Runoff=0.37 cfs 0.422 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=3.027 ac 10.37% Impervious Runoff Depth>6.47"
Flow Length=309' Tc=17.0 min AMC Adjusted CN=98/98 Runoff=1.43 cfs 1.633 af

Subcatchment 23S: Direct to Proposed Runoff Area=3.385 ac 0.68% Impervious Runoff Depth>6.48"
Flow Length=243' Tc=13.3 min AMC Adjusted CN=98/98 Runoff=1.60 cfs 1.827 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=7.873 ac 5.31% Impervious Runoff Depth>6.48"
Flow Length=407' Tc=11.1 min AMC Adjusted CN=98/98 Runoff=3.75 cfs 4.249 af

Subcatchment 25S: Direct to Proposed Runoff Area=15.059 ac 29.82% Impervious Runoff Depth>6.47"
Flow Length=1,817' Tc=17.1 min AMC Adjusted CN=98/98 Runoff=7.10 cfs 8.125 af

Subcatchment 26S: Direct to Proposed Runoff Area=4.398 ac 38.38% Impervious Runoff Depth>6.48"
Flow Length=621' Tc=8.6 min AMC Adjusted CN=98/98 Runoff=2.10 cfs 2.374 af

Subcatchment 27S: Direct to Proposed Runoff Area=3.120 ac 47.02% Impervious Runoff Depth>6.48"
Flow Length=621' Tc=8.6 min AMC Adjusted CN=98/98 Runoff=1.49 cfs 1.684 af

Subcatchment 28S: Direct to Proposed Runoff Area=7.153 ac 50.64% Impervious Runoff Depth>6.47"
Flow Length=1,013' Tc=14.4 min AMC Adjusted CN=98/98 Runoff=3.39 cfs 3.860 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=34.136 ac 8.50% Impervious Runoff Depth>6.47"
Flow Length=1,249' Tc=23.4 min AMC Adjusted CN=98/98 Runoff=15.91 cfs 18.412 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth>6.47"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min AMC Adjusted CN=98/98 Runoff=9.05 cfs 10.781 af

Subcatchment 32S: Direct to Proposed Runoff Area=3.686 ac 36.52% Impervious Runoff Depth>6.48"
Flow Length=440' Slope=0.0200 '/' Tc=7.1 min AMC Adjusted CN=98/98 Runoff=1.77 cfs 1.989 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=67.435 ac 2.92% Impervious Runoff Depth>6.47"
Flow Length=1,354' Tc=23.6 min AMC Adjusted CN=98/98 Runoff=31.42 cfs 36.373 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth>6.48"
Flow Length=1,032' Tc=10.2 min AMC Adjusted CN=98/98 Runoff=6.54 cfs 7.400 af

Subcatchment 42S: Direct to Proposed Runoff Area=2.612 ac 32.54% Impervious Runoff Depth>6.48"
Flow Length=422' Tc=10.2 min AMC Adjusted CN=98/98 Runoff=1.24 cfs 1.410 af

Subcatchment 43S: Direct to Proposed Runoff Area=6.873 ac 41.00% Impervious Runoff Depth>6.47"
Flow Length=1,173' Tc=14.8 min AMC Adjusted CN=98/98 Runoff=3.25 cfs 3.708 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth>6.47"
Flow Length=734' Tc=26.4 min AMC Adjusted CN=98/98 Runoff=6.06 cfs 7.051 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth>6.48"
Flow Length=531' Tc=5.6 min AMC Adjusted CN=98/98 Runoff=1.81 cfs 2.029 af

Reach 1R: Cowley Lake Outlet Channel Inflow=9.57 cfs 12.642 af
Outflow=9.57 cfs 12.642 af

Reach 2R: Cowley Lake Inflow=50.41 cfs 205.650 af
Outflow=50.41 cfs 205.650 af

Reach 21R: Proposed East Channel Avg. Flow Depth=0.85' Max Vel=5.16 fps Inflow=24.39 cfs 75.080 af
n=0.022 L=264.0' S=0.0125 '/' Capacity=149.23 cfs Outflow=24.39 cfs 75.074 af

Reach 23R: Existing West Channel Avg. Flow Depth=0.85' Max Vel=2.96 fps Inflow=23.84 cfs 115.333 af
n=0.022 L=251.0' S=0.0037 '/' Capacity=321.50 cfs Outflow=23.84 cfs 115.316 af

Pond 7P: Whiteford Lake and Peak Elev=931.78' Storage=111.745 af Inflow=139.00 cfs 161.795 af
Outflow=74.34 cfs 71.447 af

Pond 10P: Proposed Northeast Peak Elev=922.51' Storage=4.965 af Inflow=9.06 cfs 10.485 af
Outflow=7.25 cfs 9.322 af

Pond 25P: Proposed Northwest Peak Elev=926.68' Storage=3.248 af Inflow=7.10 cfs 8.125 af
Outflow=1.76 cfs 7.235 af

Pond 26P: Proposed Northwest Central Peak Elev=925.11' Storage=1.848 af Inflow=2.98 cfs 4.013 af
Outflow=0.37 cfs 3.913 af

Pond 27P: Proposed Northwest Central Peak Elev=925.15' Storage=0.943 af Inflow=1.49 cfs 1.684 af
Outflow=0.98 cfs 1.640 af

Pond 28P: Proposed Northeast Central Pond Peak Elev=922.34' Storage=1.182 af Inflow=3.39 cfs 3.860 af
Outflow=3.16 cfs 3.846 af

Pond 30P: Wetland 4A Peak Elev=925.62' Storage=1.102 af Inflow=27.57 cfs 105.725 af
Primary=16.37 cfs 77.567 af Secondary=3.01 cfs 28.180 af Outflow=19.38 cfs 105.747 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=933.01' Storage=0.206 af Inflow=75.18 cfs 82.228 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=17.90 cfs 85.332 af

Pond 32P: Proposed West Central Pond Peak Elev=928.21' Storage=1.301 af Inflow=1.77 cfs 1.989 af
Outflow=1.60 cfs 1.980 af

Pond 40P: Wetland 2B Peak Elev=925.36' Storage=8.572 af Inflow=43.96 cfs 75.483 af
60.0" x 36.0" Box Culvert n=0.013 L=138.0' S=0.0029 '/' Outflow=24.29 cfs 74.658 af

Pond 41P: Ex South Off-site Pond Peak Elev=940.62' Storage=3.976 af Inflow=6.54 cfs 7.400 af
Outflow=4.65 cfs 3.670 af

Pond 42P: Proposed South Central Pond Peak Elev=929.00' Storage=0.397 af Inflow=1.24 cfs 1.410 af
Outflow=1.09 cfs 1.395 af

Pond 43P: Proposed East Central Pond Peak Elev=927.25' Storage=1.665 af Inflow=3.25 cfs 3.708 af
Outflow=2.59 cfs 3.649 af

Pond 50P: Wetland 4B Peak Elev=941.60' Storage=241,706 cf Inflow=7.65 cfs 13.885 af
Outflow=4.51 cfs 8.571 af

Pond 60P: Wetland 5B Peak Elev=938.67' Storage=11,107 cf Inflow=7.53 cfs 22.047 af
Outflow=7.53 cfs 21.824 af

Link \DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=6.94 cfs 20.018 af
Primary=6.94 cfs 20.018 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=2.94 cfs 6.834 af
Area= 26.390 ac 15.63% Imperv. Primary=2.94 cfs 6.834 af

Total Runoff Area = 540.193 ac Runoff Volume = 291.363 af Average Runoff Depth = 6.47"
93.94% Pervious = 507.441 ac 6.06% Impervious = 32.752 ac

Summary for Subcatchment 7S: Approx DA to Lake

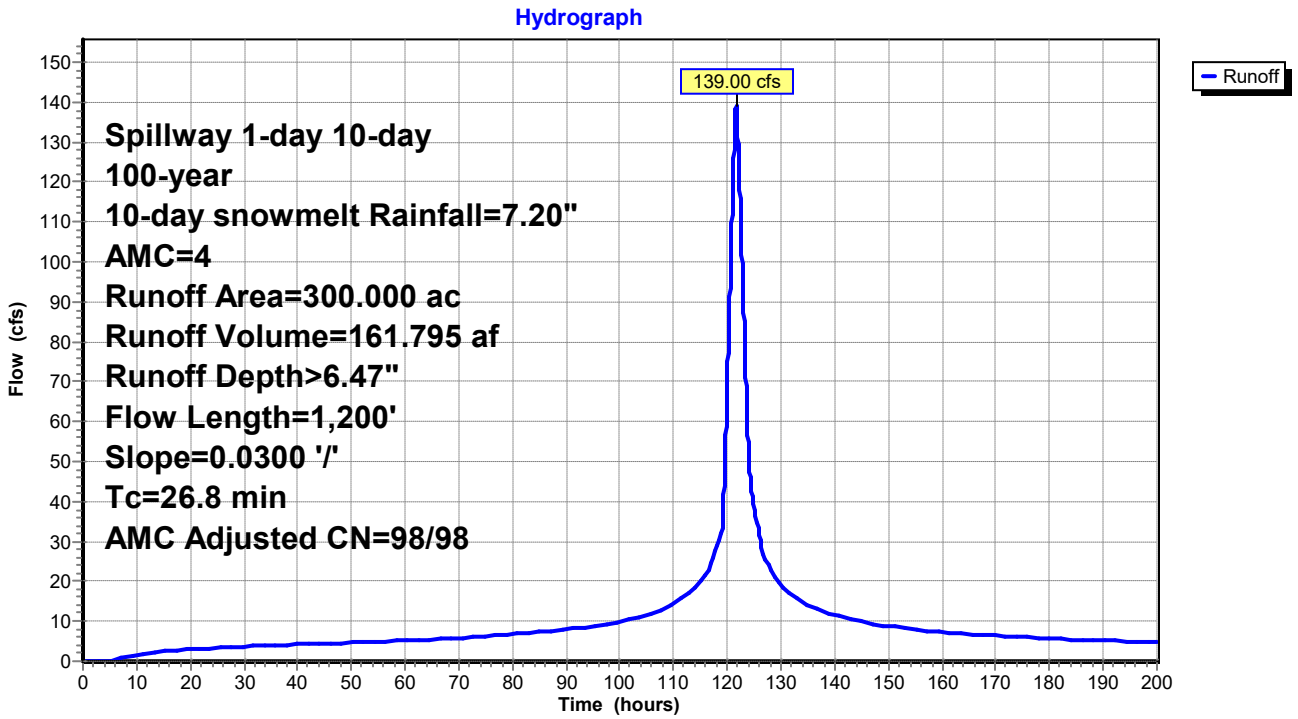
Runoff = 139.00 cfs @ 121.61 hrs, Volume= 161.795 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
300.000	72		Woods/grass comb., Good, HSG C
300.000	72	98	Weighted Average, AMC Adjusted
300.000	72	98	100.00% Pervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

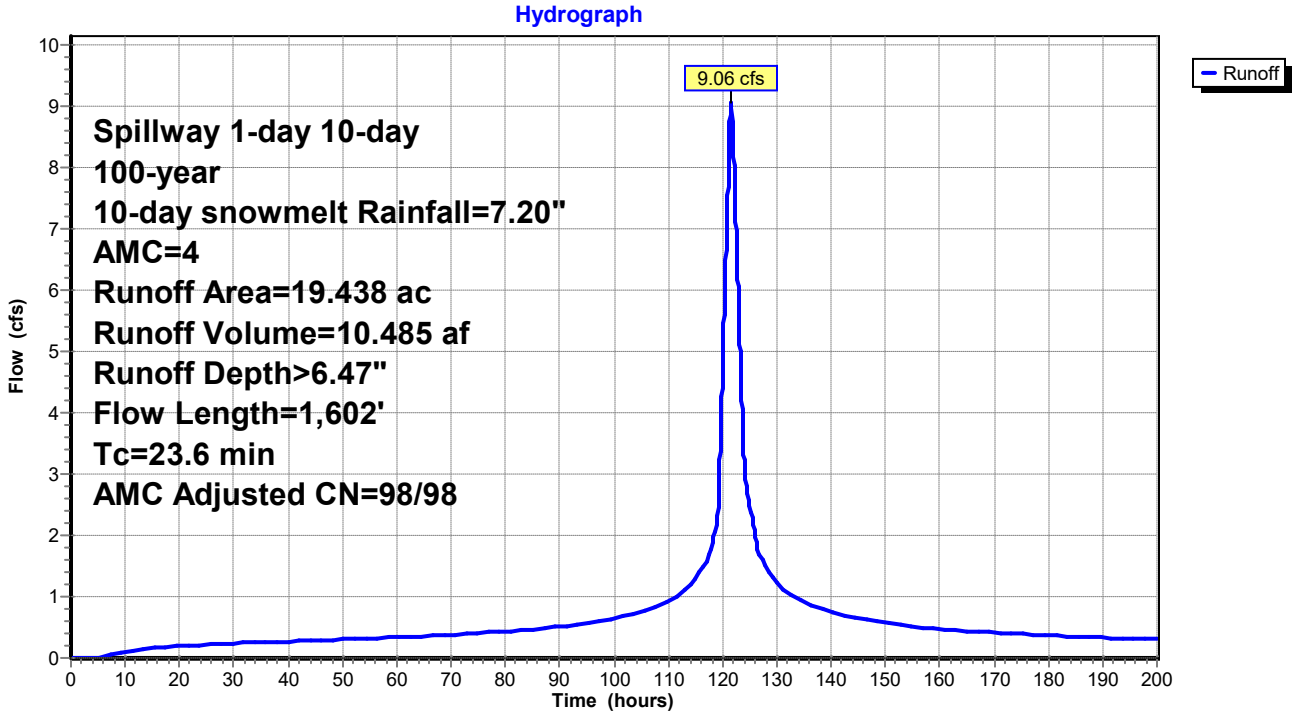
Runoff = 9.06 cfs @ 121.56 hrs, Volume= 10.485 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.399	98		Unconnected pavement, HSG D
1.088	98		Unconnected roofs, HSG D
1.617	98		Paved roads w/curbs & sewers, HSG D
0.606	98		Paved parking, HSG D
0.393	98		Roofs, HSG D
0.699	98		Water Surface, 0% imp, HSG D
8.527	89		Row crops, straight row, Good, HSG D
4.972	80		>75% Grass cover, Good, HSG D
1.137	78		Meadow, non-grazed, HSG D
19.438	88	98	Weighted Average, AMC Adjusted
15.335	86	98	78.89% Pervious Area, AMC Adjusted
4.103	98	98	21.11% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
14.6	842	0.0114	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.7	660		3.00		**Direct Entry, Pipe flow @ 3 fps**
23.6	1,602	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 11S: Direct to Cowley Lake Outlet Channel

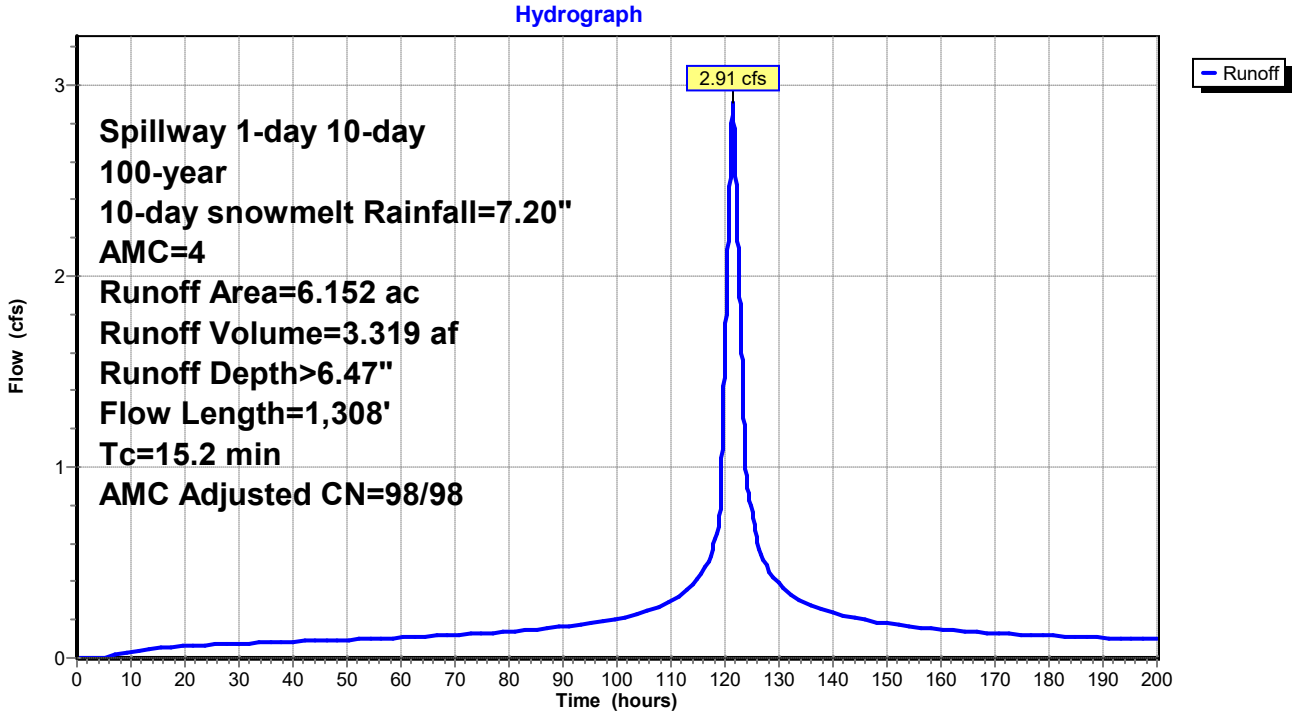
Runoff = 2.91 cfs @ 121.43 hrs, Volume= 3.319 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.024	98		Unconnected pavement, HSG D
0.182	98		Unconnected roofs, HSG D
1.316	98		Water Surface, 0% imp, HSG D
1.199	80		>75% Grass cover, Good, HSG D
2.901	78		Meadow, non-grazed, HSG D
0.530	77		Woods, Good, HSG D
6.152	83	98	Weighted Average, AMC Adjusted
5.946	83	98	96.65% Pervious Area, AMC Adjusted
0.206	98	98	3.35% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.8	114	0.0263	2.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	1,094	0.0024	3.27	46.64	**Trap/Vee/Rect Channel Flow,** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
15.2	1,308	Total			

Subcatchment 11S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 12S: Fugitve to Fox Creek West 5th Addition

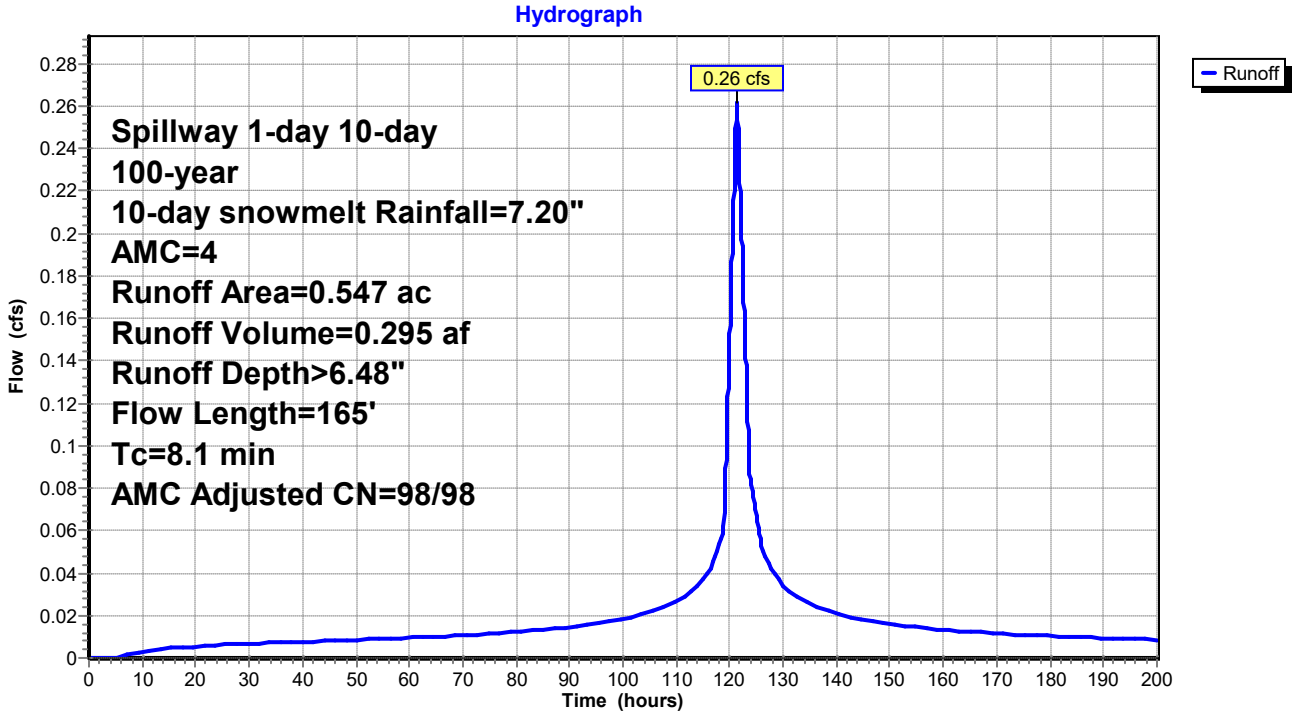
Runoff = 0.26 cfs @ 121.33 hrs, Volume= 0.295 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.015	98		Unconnected pavement, HSG D
0.043	98		Unconnected roofs, HSG D
0.104	98		Paved roads w/curbs & sewers, HSG D
0.051	98		Paved parking, HSG D
0.034	98		Roofs, HSG D
0.300	80		>75% Grass cover, Good, HSG D
0.547	88	98	Weighted Average, AMC Adjusted
0.300	80	98	54.84% Pervious Area, AMC Adjusted
0.247	98	98	45.16% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.3	40	0.0250	2.37		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.1	165	Total			

Subcatchment 12S: Fugitve to Fox Creek West 5th Addition



Summary for Subcatchment 20S: Direct to Cowley Lake

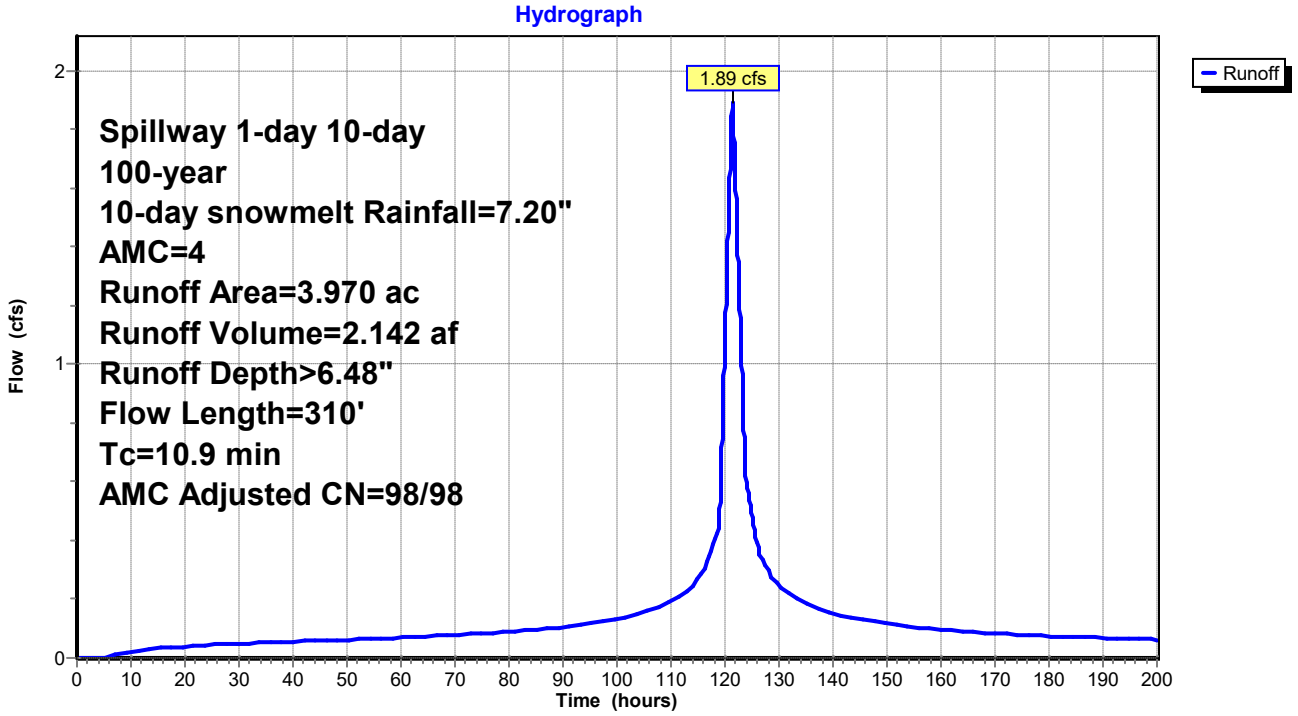
Runoff = 1.89 cfs @ 121.37 hrs, Volume= 2.142 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.046	98		Unconnected pavement, HSG D
0.258	98		Unconnected roofs, HSG D
0.122	98		Water Surface, 0% imp, HSG D
0.949	80		>75% Grass cover, Good, HSG D
1.018	78		Meadow, non-grazed, HSG D
1.577	77		Woods, Good, HSG D
3.970	80	98	Weighted Average, AMC Adjusted
3.666	79	98	92.34% Pervious Area, AMC Adjusted
0.304	98	98	7.66% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0270	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	72	0.0347	2.79		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	138	0.0667	1.81		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.9	310	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

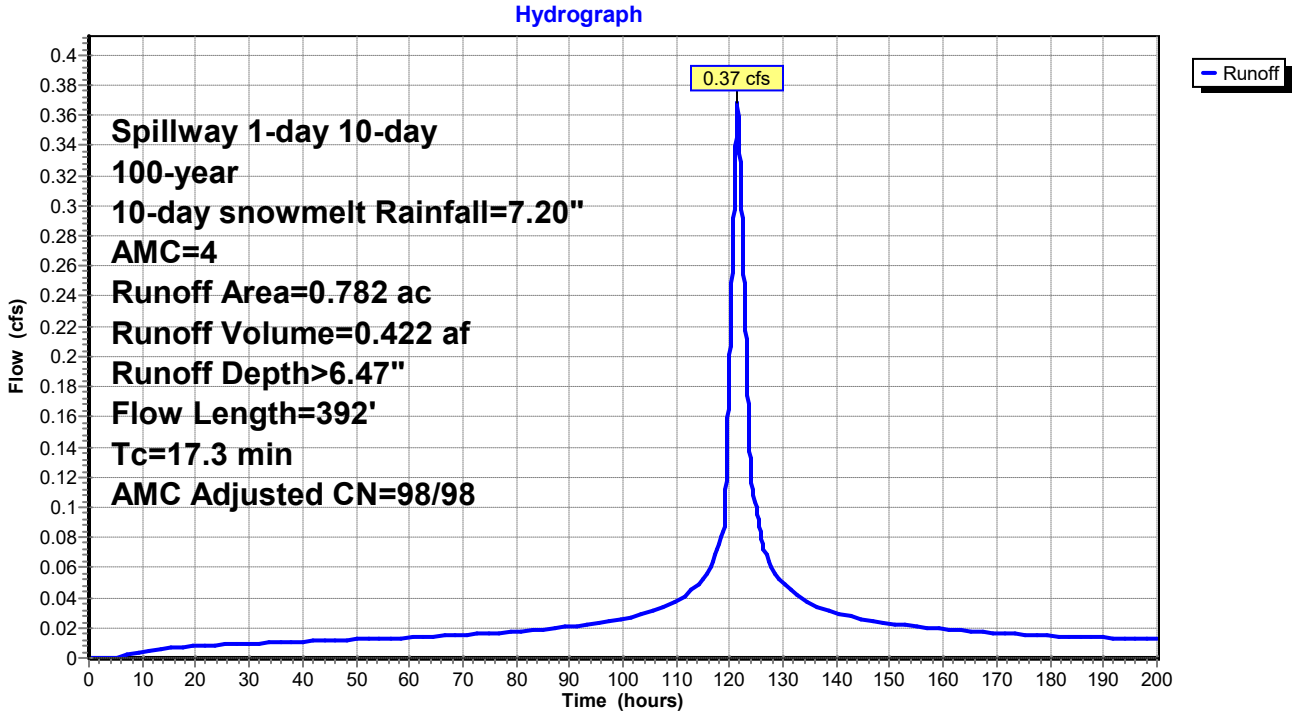
Runoff = 0.37 cfs @ 121.46 hrs, Volume= 0.422 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.010	98		Unconnected pavement, HSG D
0.054	98		Water Surface, 0% imp, HSG D
0.016	80		>75% Grass cover, Good, HSG D
0.162	78		Meadow, non-grazed, HSG D
0.540	77		Woods, Good, HSG D
0.782	79	98	Weighted Average, AMC Adjusted
0.772	79	98	98.72% Pervious Area, AMC Adjusted
0.010	98	98	1.28% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0590	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
2.3	146	0.0452	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	146	0.0164	10.55	221.46	**Channel Flow,** Area= 21.0 sf Perim= 15.6' r= 1.35' n= 0.022 Earth, clean & straight
17.3	392	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

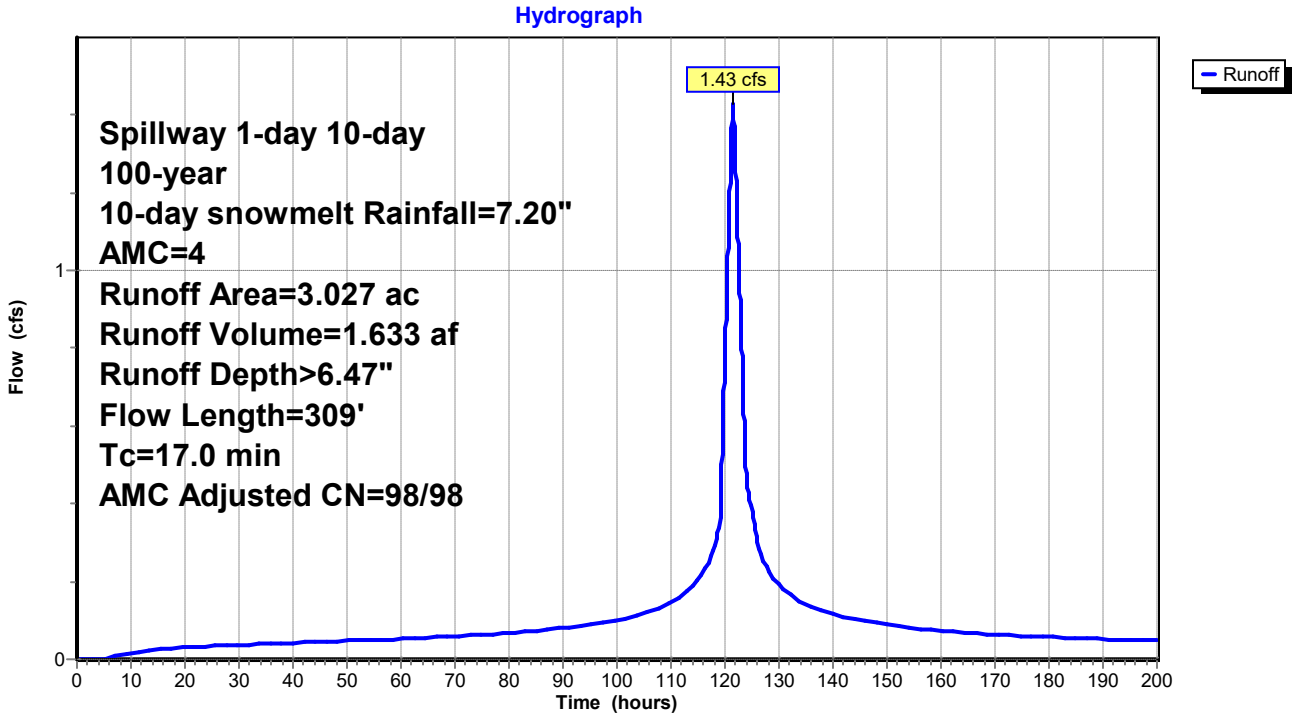
Runoff = 1.43 cfs @ 121.46 hrs, Volume= 1.633 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.125	98		Unconnected pavement, HSG D
0.189	98		Unconnected roofs, HSG D
0.031	98		Water Surface, 0% imp, HSG D
0.779	80		>75% Grass cover, Good, HSG D
1.348	78		Meadow, non-grazed, HSG D
0.555	77		Woods, Good, HSG D
3.027	81	98	Weighted Average, AMC Adjusted
2.713	79	98	89.63% Pervious Area, AMC Adjusted
0.314	98	98	10.37% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	100	0.0220	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
2.4	209	0.0445	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	309	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Proposed West Channel

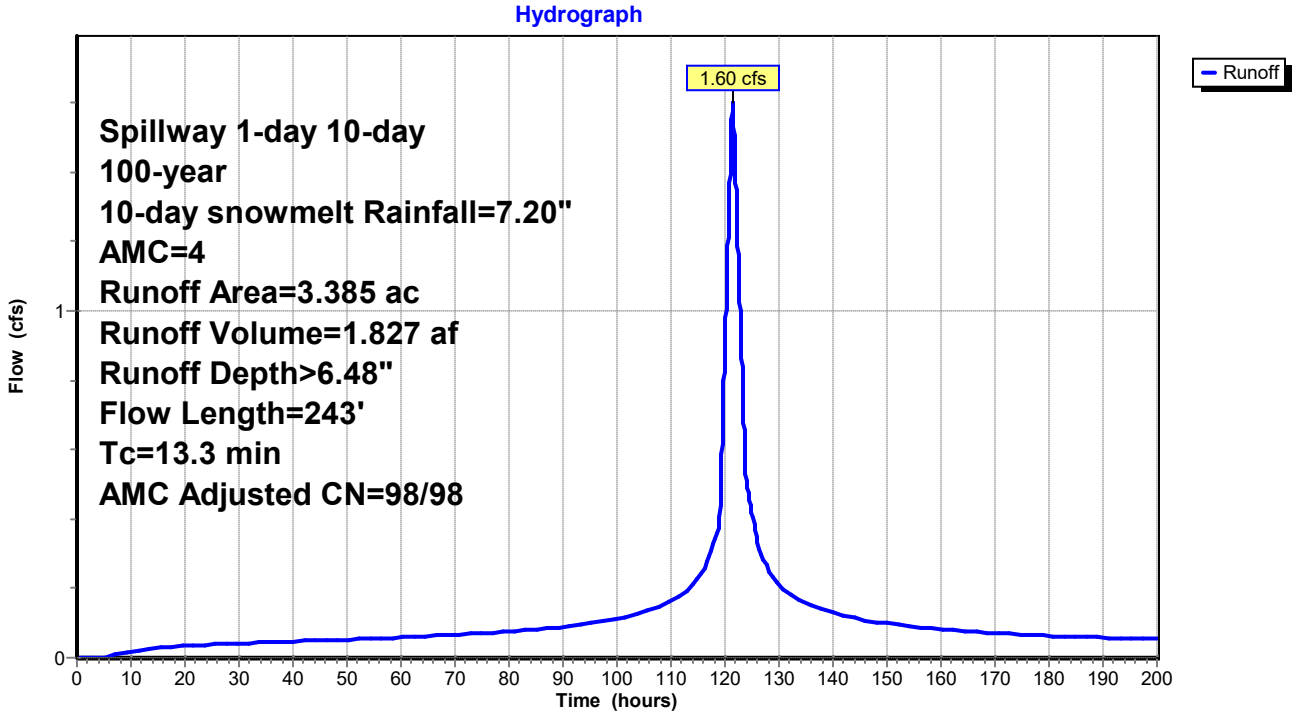
Runoff = 1.60 cfs @ 121.41 hrs, Volume= 1.827 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.023	98		Unconnected pavement, HSG D
0.467	98		Water Surface, 0% imp, HSG D
0.253	80		>75% Grass cover, Good, HSG D
1.225	78		Meadow, non-grazed, HSG D
1.417	77		Woods, Good, HSG D
3.385	81	98	Weighted Average, AMC Adjusted
3.362	81	98	99.32% Pervious Area, AMC Adjusted
0.023	98	98	0.68% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0520	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
3.0	143	0.0259	0.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.3	243	Total			

Subcatchment 23S: Direct to Proposed West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

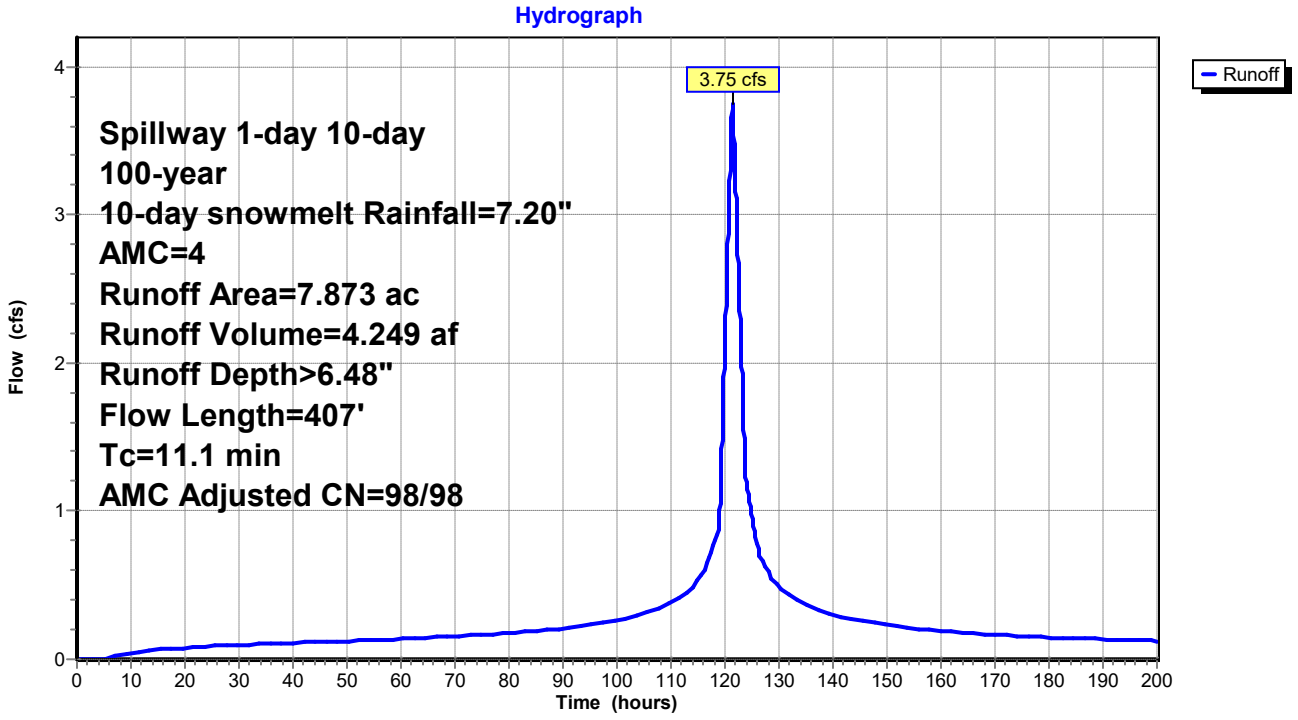
Runoff = 3.75 cfs @ 121.38 hrs, Volume= 4.249 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.039	98		Unconnected pavement, HSG D
0.379	98		Unconnected roofs, HSG D
0.980	98		Water Surface, 0% imp, HSG D
1.643	80		>75% Grass cover, Good, HSG D
2.538	78		Meadow, non-grazed, HSG D
2.294	77		Woods, Good, HSG D
7.873	82	98	Weighted Average, AMC Adjusted
7.455	81	98	94.69% Pervious Area, AMC Adjusted
0.418	98	98	5.31% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.0600	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
4.4	307	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	407	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 25S: Direct to Proposed Northwest Pond

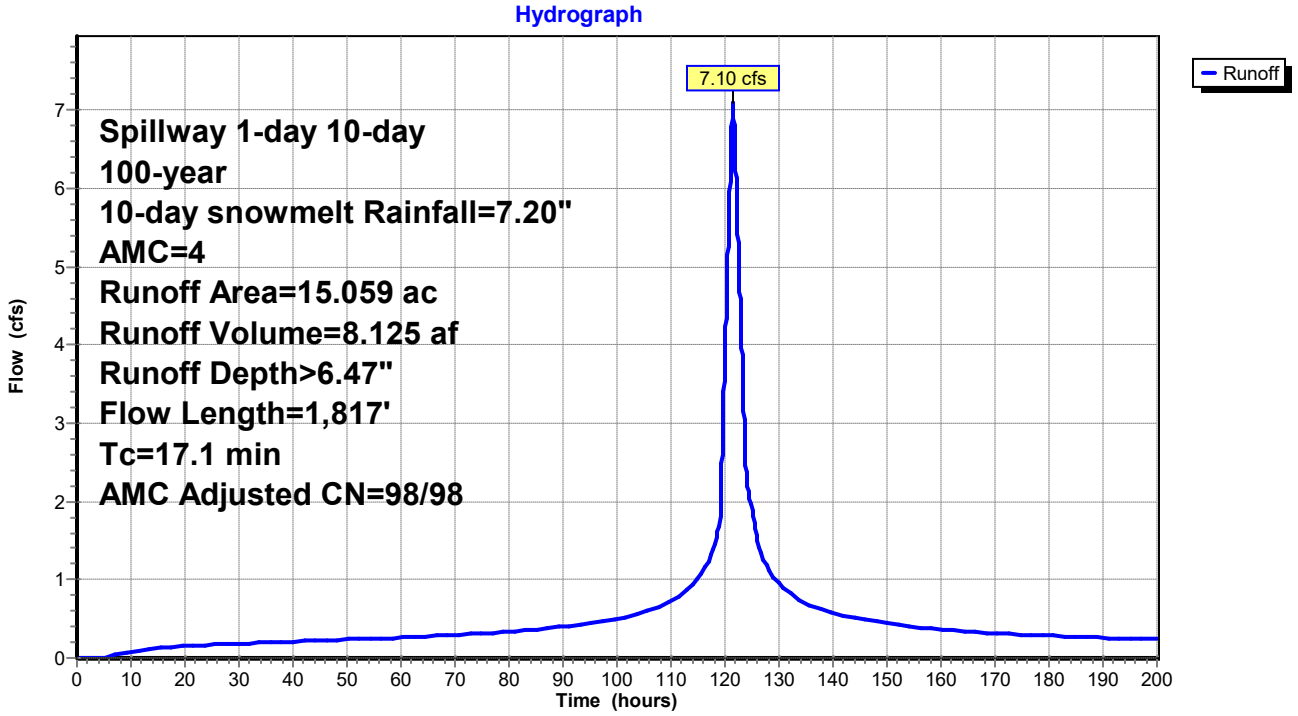
Runoff = 7.10 cfs @ 121.46 hrs, Volume= 8.125 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.652	98		Unconnected pavement, HSG D
1.214	98		Unconnected roofs, HSG D
1.443	98		Paved roads w/curbs & sewers, HSG D
0.758	98		Paved parking, HSG D
0.424	98		Roofs, HSG D
0.322	98		Water Surface, 0% imp, HSG D
0.084	96		Gravel surface, HSG D
0.179	89		Row crops, straight row, Good, HSG D
8.582	80		>75% Grass cover, Good, HSG D
1.401	78		Meadow, non-grazed, HSG D
15.059	86	98	Weighted Average, AMC Adjusted
10.568	81	98	70.18% Pervious Area, AMC Adjusted
4.491	98	98	29.82% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	90	0.0378	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	57	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.3	1,670		3.00		**Direct Entry, Pipe flow @ 3 fps**
17.1	1,817	Total			

Subcatchment 25S: Direct to Proposed Northwest Pond



Summary for Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration

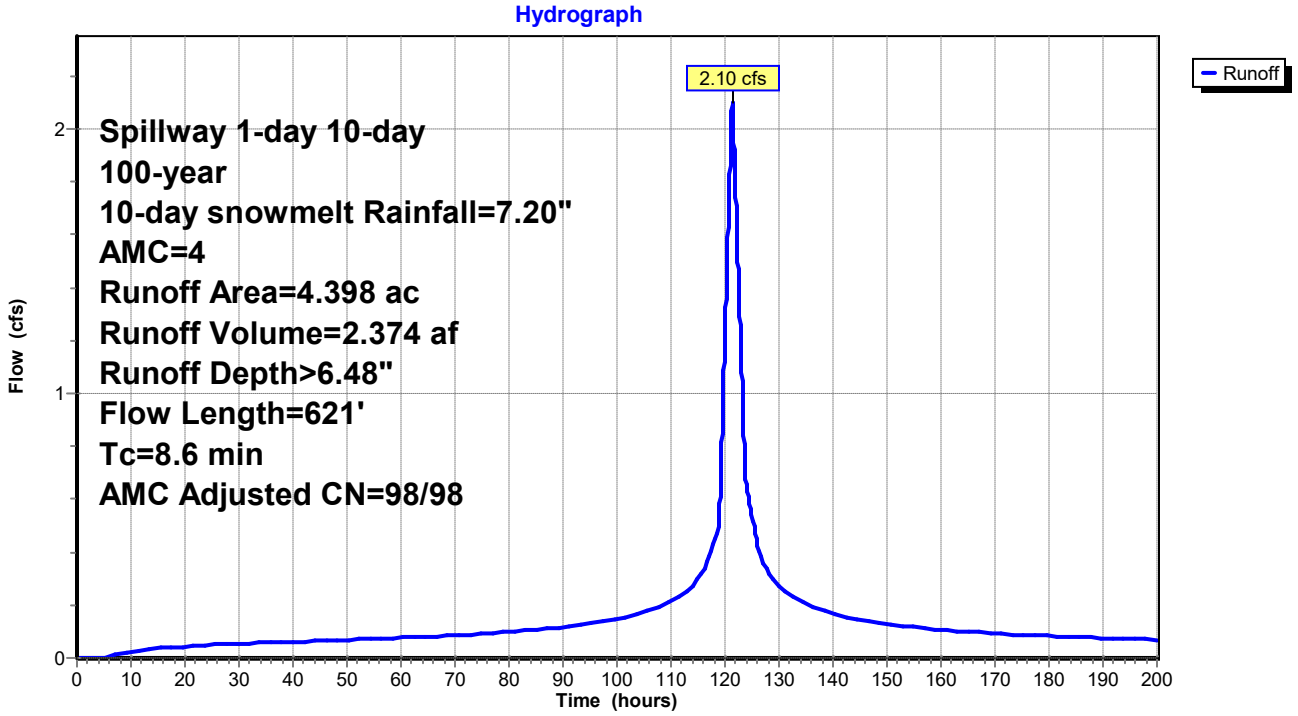
Runoff = 2.10 cfs @ 121.34 hrs, Volume= 2.374 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.170	98		Unconnected pavement, HSG D
0.393	98		Unconnected roofs, HSG D
0.551	98		Paved roads w/curbs & sewers, HSG D
0.354	98		Paved parking, HSG D
0.220	98		Roofs, HSG D
0.318	98		Water Surface, 0% imp, HSG D
1.487	80		>75% Grass cover, Good, HSG D
0.905	78		Meadow, non-grazed, HSG D
4.398	88	98	Weighted Average, AMC Adjusted
2.710	81	98	61.62% Pervious Area, AMC Adjusted
1.688	98	98	38.38% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration



Summary for Subcatchment 27S: Direct to Proposed Northwest Central Pond

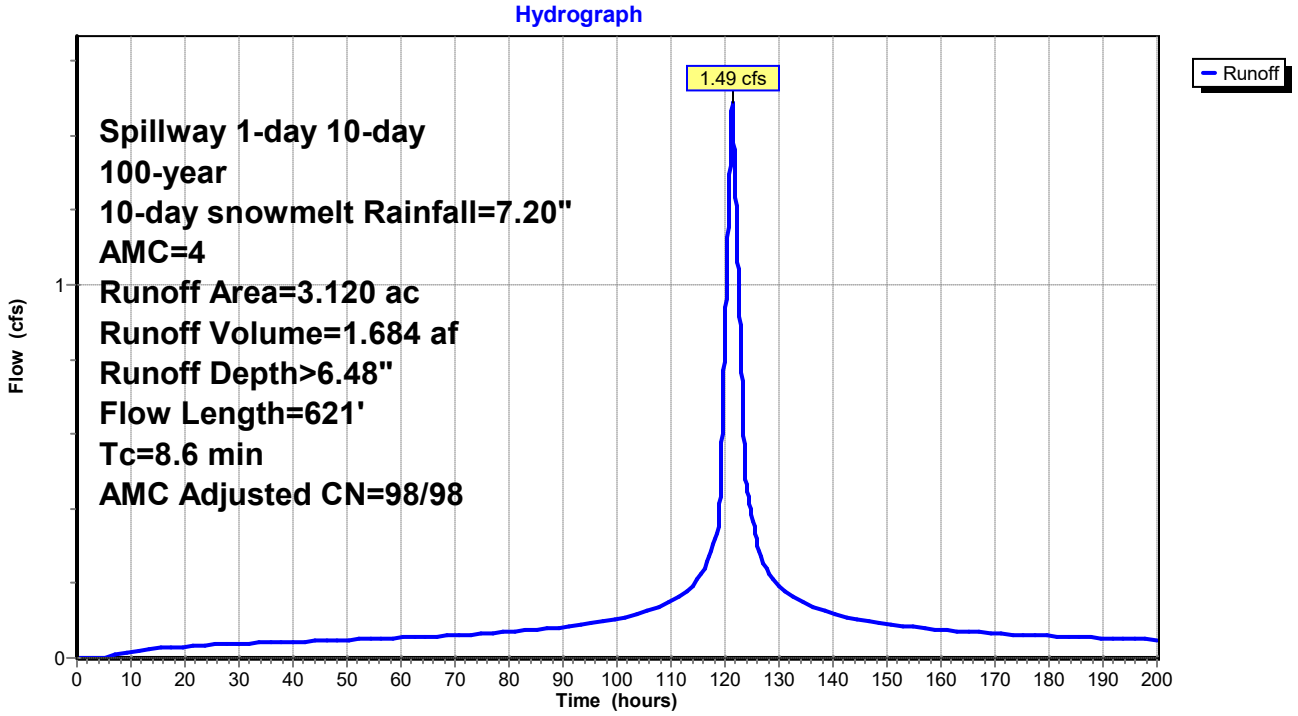
Runoff = 1.49 cfs @ 121.34 hrs, Volume= 1.684 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.134	98		Unconnected pavement, HSG D
0.275	98		Unconnected roofs, HSG D
0.506	98		Paved roads w/curbs & sewers, HSG D
0.328	98		Paved parking, HSG D
0.224	98		Roofs, HSG D
0.278	98		Water Surface, 0% imp, HSG D
0.979	80		>75% Grass cover, Good, HSG D
0.396	78		Meadow, non-grazed, HSG D
3.120	90	98	Weighted Average, AMC Adjusted
1.653	83	98	52.98% Pervious Area, AMC Adjusted
1.467	98	98	47.02% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 27S: Direct to Proposed Northwest Central Pond



Summary for Subcatchment 28S: Direct to Proposed Northeast Central Pond

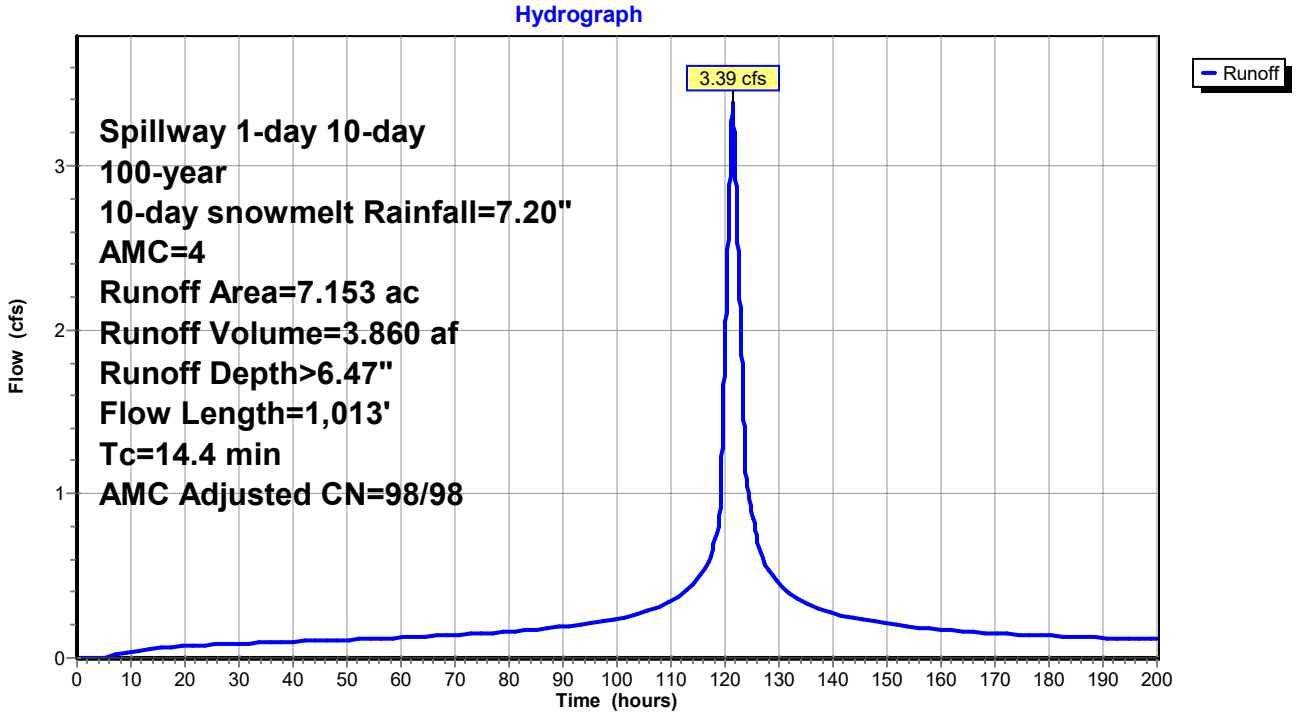
Runoff = 3.39 cfs @ 121.42 hrs, Volume= 3.860 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.152	98		Unconnected pavement, HSG D
0.932	98		Unconnected roofs, HSG D
0.930	98		Paved roads w/curbs & sewers, HSG D
1.004	98		Paved parking, HSG D
0.604	98		Roofs, HSG D
0.380	98		Water Surface, 0% imp, HSG D
2.416	80		>75% Grass cover, Good, HSG D
0.684	78		Meadow, non-grazed, HSG D
0.051	77		Woods, Good, HSG D
7.153	90	98	Weighted Average, AMC Adjusted
3.531	82	98	49.36% Pervious Area, AMC Adjusted
3.622	98	98	50.64% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	71	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.6	242	0.0060	1.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.9	700		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.4	1,013	Total			

Subcatchment 28S: Direct to Proposed Northeast Central Pond



Summary for Subcatchment 30S: Direct to Wetland 4A

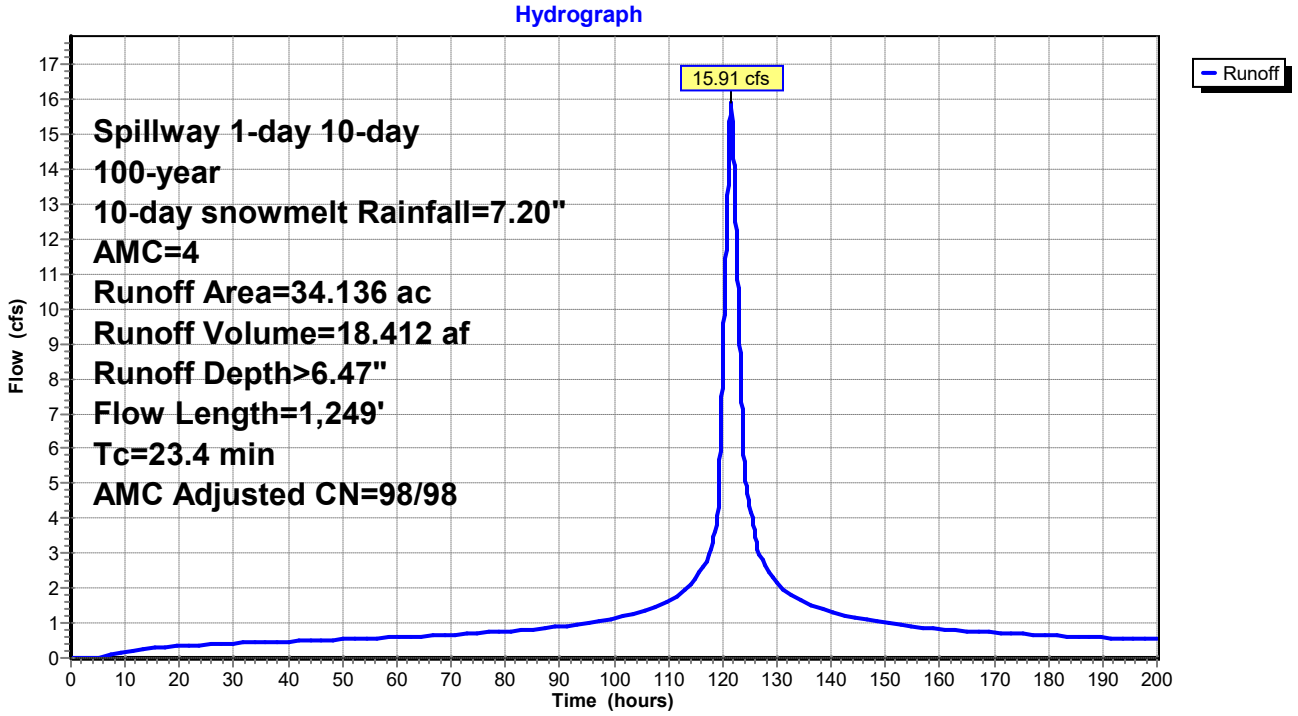
Runoff = 15.91 cfs @ 121.56 hrs, Volume= 18.412 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
1.401	98		Unconnected pavement, HSG D
1.502	98		Unconnected roofs, HSG D
0.939	96		Gravel surface, HSG D
6.512	89		Row crops, straight row, Good, HSG D
1.609	89		Pasture/grassland/range, Poor, HSG D
18.400	80		>75% Grass cover, Good, HSG D
3.773	77		Woods, Good, HSG D
34.136	84	98	Weighted Average, AMC Adjusted
31.233	82	98	91.50% Pervious Area, AMC Adjusted
2.903	98	98	8.50% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

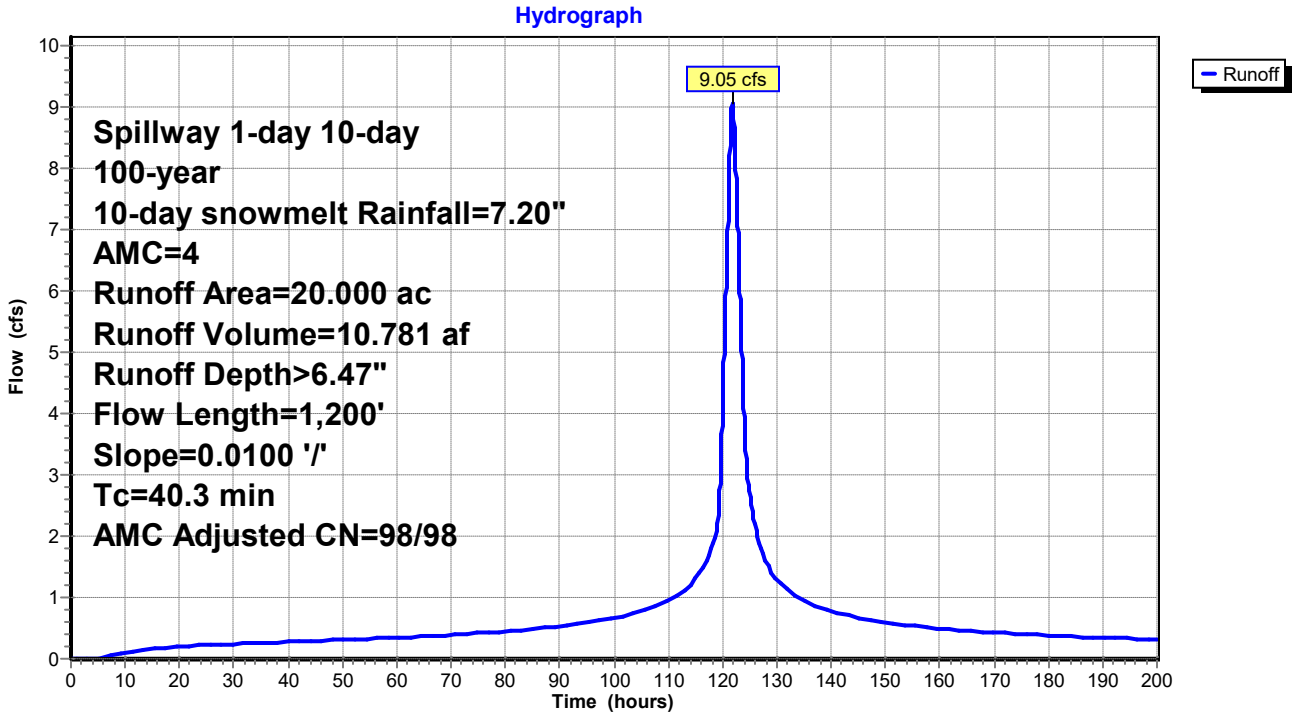
Runoff = 9.05 cfs @ 121.80 hrs, Volume= 10.781 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
20.000	77		2 acre lots, 12% imp, HSG C
20.000	77	98	Weighted Average, AMC Adjusted
17.600	74	98	88.00% Pervious Area, AMC Adjusted
2.400	98	98	12.00% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 32S: Direct to Proposed West Central Pond

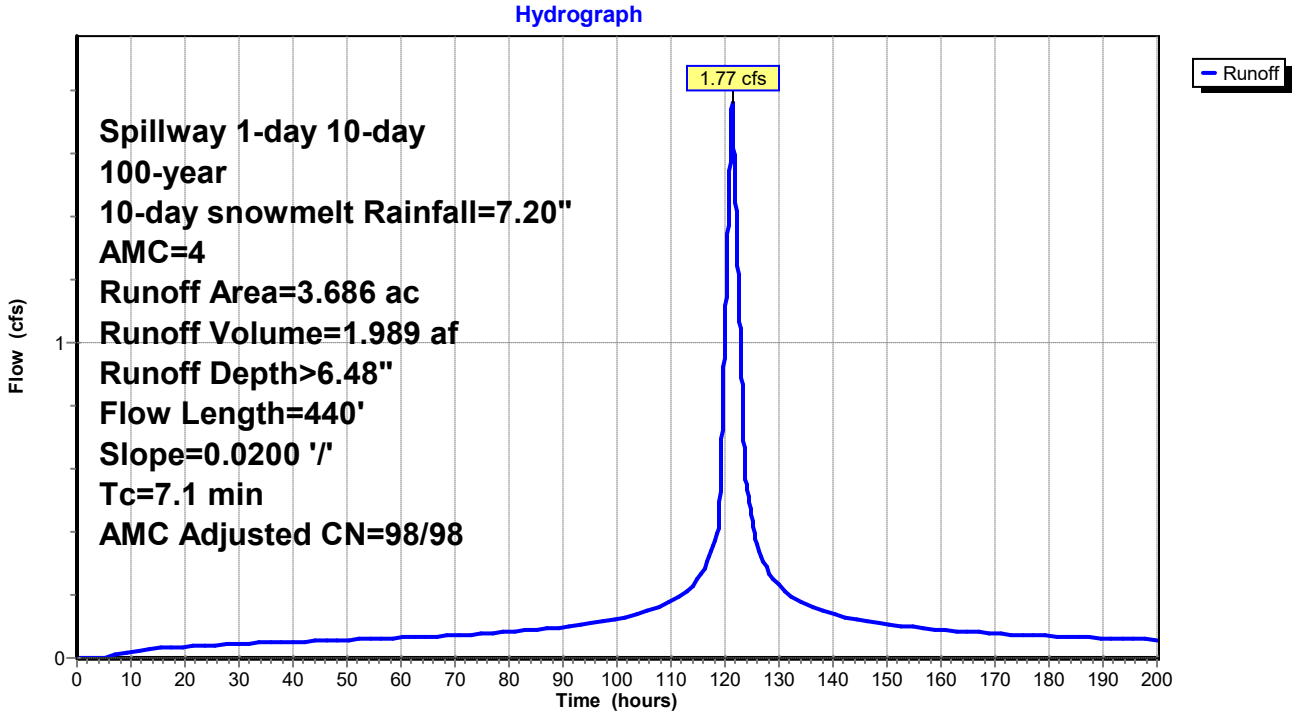
Runoff = 1.77 cfs @ 121.32 hrs, Volume= 1.989 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.039	98		Unconnected pavement, HSG D
0.438	98		Unconnected roofs, HSG D
0.377	98		Paved roads w/curbs & sewers, HSG D
0.298	98		Paved parking, HSG D
0.194	98		Roofs, HSG D
0.395	98		Water Surface, 0% imp, HSG D
1.443	80		>75% Grass cover, Good, HSG D
0.502	78		Meadow, non-grazed, HSG D
3.686	88	98	Weighted Average, AMC Adjusted
2.340	83	98	63.48% Pervious Area, AMC Adjusted
1.346	98	98	36.52% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.2	401		3.00		**Direct Entry,**
7.1	440	Total			

Subcatchment 32S: Direct to Proposed West Central Pond



Summary for Subcatchment 40S: Direct to Wetland 2B

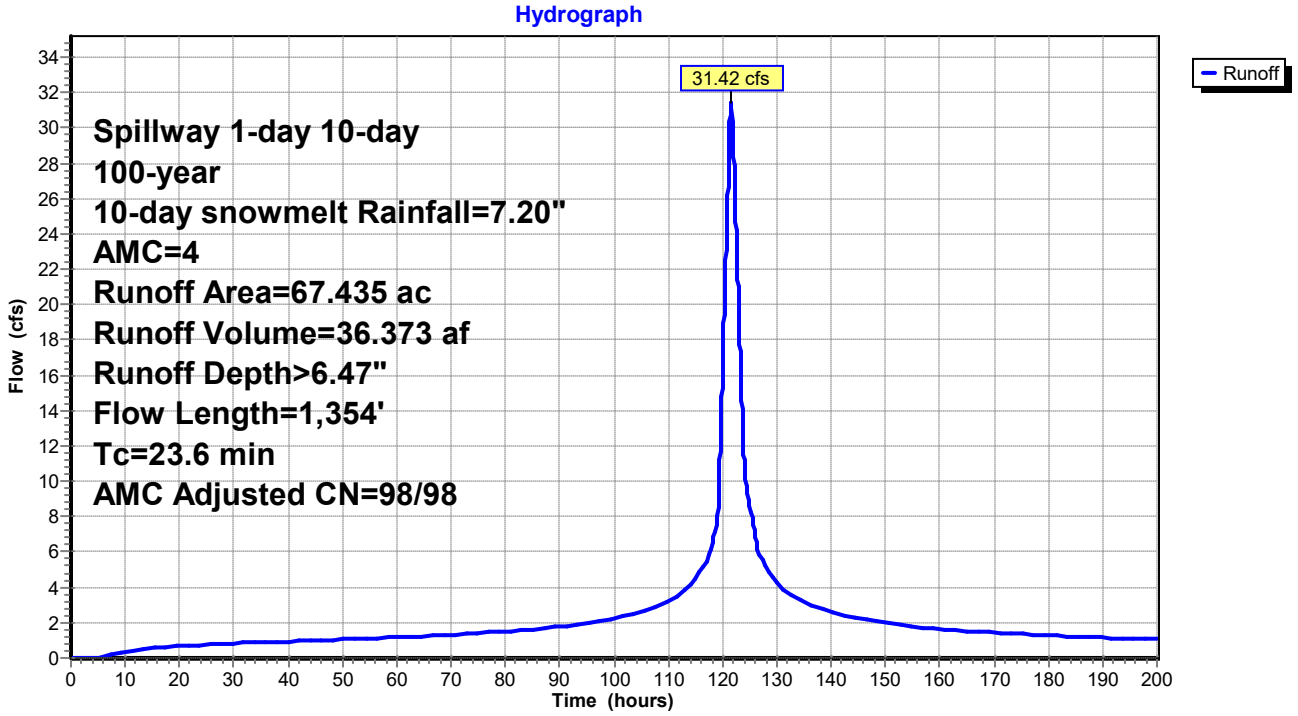
Runoff = 31.42 cfs @ 121.56 hrs, Volume= 36.373 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.965	98		Unconnected pavement, HSG D
1.003	98		Unconnected roofs, HSG D
17.214	98		Water Surface, 0% imp, HSG D
1.249	96		Gravel surface, HSG D
27.306	89		Row crops, straight row, Good, HSG D
0.208	89		Pasture/grassland/range, Poor, HSG D
9.713	80		>75% Grass cover, Good, HSG D
6.057	78		Meadow, non-grazed, HSG D
3.720	77		Woods, Good, HSG D
67.435	89	98	Weighted Average, AMC Adjusted
65.467	88	98	97.08% Pervious Area, AMC Adjusted
1.968	98	98	2.92% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

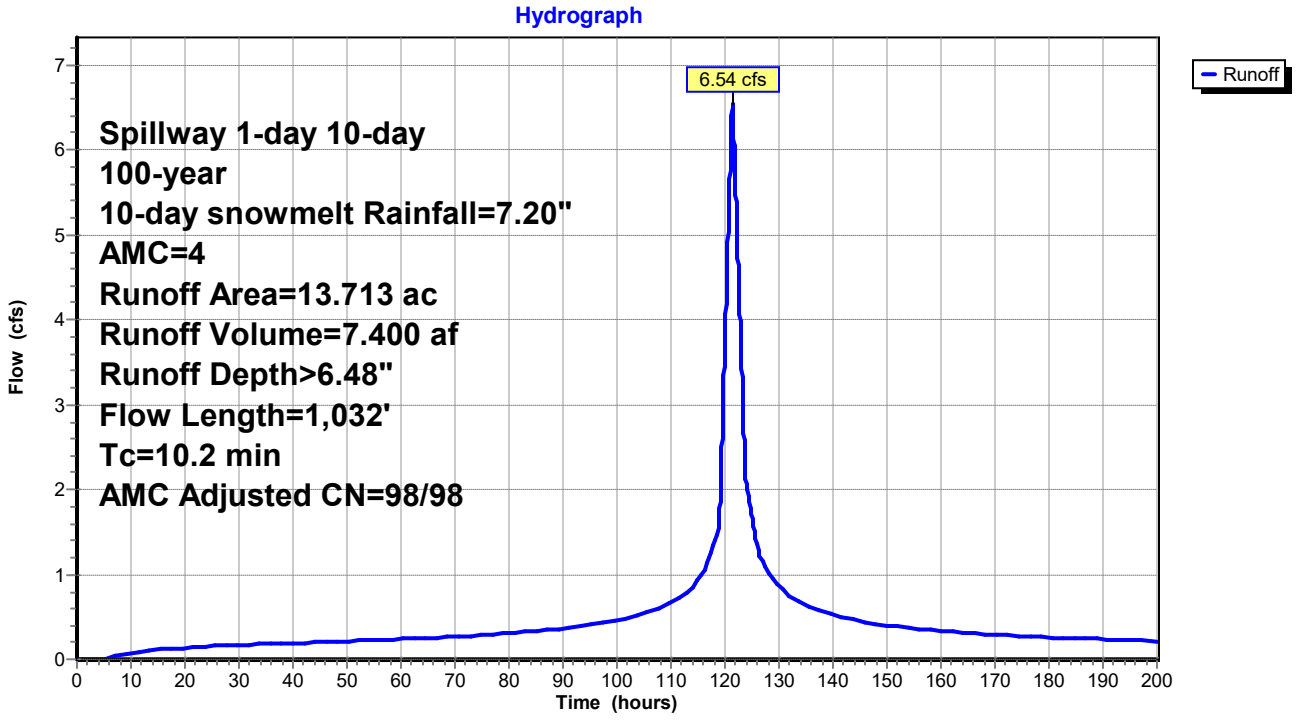
Runoff = 6.54 cfs @ 121.36 hrs, Volume= 7.400 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
1.568	98		Unconnected pavement, HSG D
0.273	98		Unconnected roofs, HSG D
0.107	98		Water Surface, 0% imp, HSG D
0.066	96		Gravel surface, HSG D
10.431	80		>75% Grass cover, Good, HSG D
1.268	78		Meadow, non-grazed, HSG D
13.713	82	98	Weighted Average, AMC Adjusted
11.872	80	98	86.57% Pervious Area, AMC Adjusted
1.841	98	98	13.43% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 42S: Direct to Proposed South Central Pond

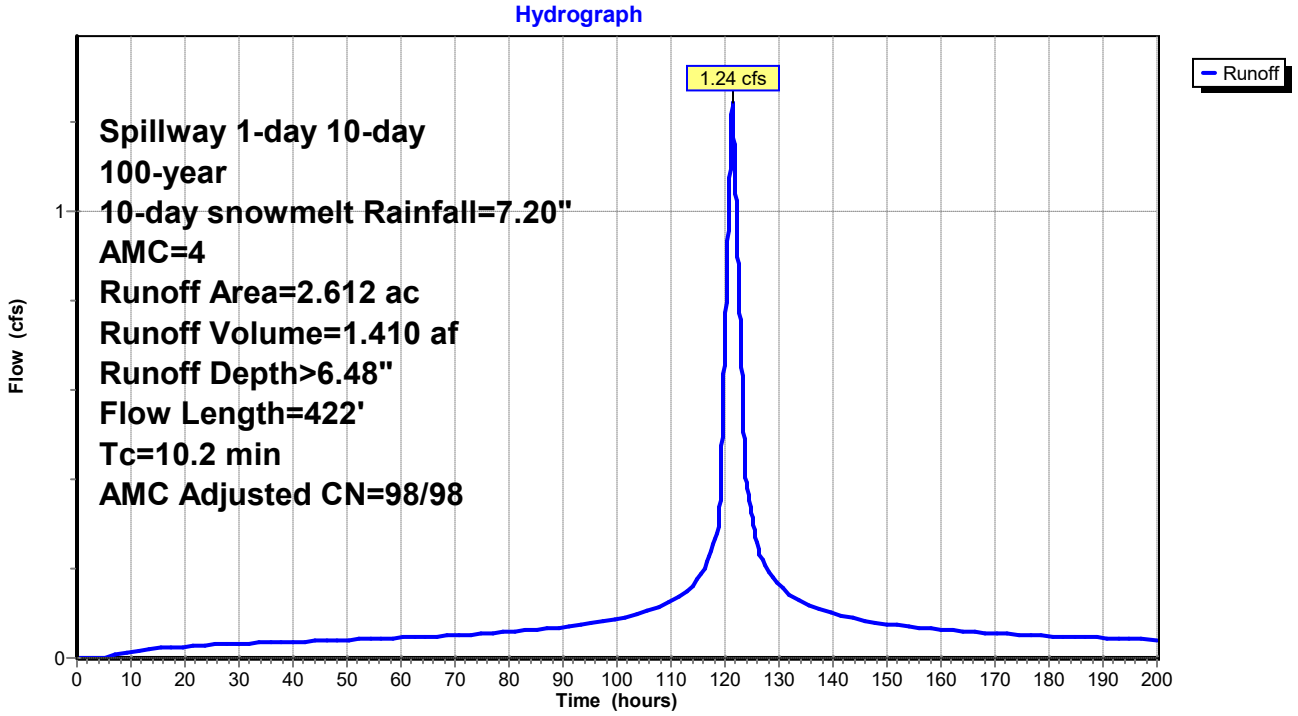
Runoff = 1.24 cfs @ 121.36 hrs, Volume= 1.410 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.013	98		Unconnected pavement, HSG D
0.362	98		Unconnected roofs, HSG D
0.246	98		Paved roads w/curbs & sewers, HSG D
0.145	98		Paved parking, HSG D
0.084	98		Roofs, HSG D
0.154	98		Water Surface, 0% imp, HSG D
0.600	80		>75% Grass cover, Good, HSG D
0.811	78		Meadow, non-grazed, HSG D
0.197	77		Woods, Good, HSG D
2.612	86	98	Weighted Average, AMC Adjusted
1.762	80	98	67.46% Pervious Area, AMC Adjusted
0.850	98	98	32.54% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
1.7	235	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	117		3.00		**Direct Entry, Pipe flow @ 3 fps**
10.2	422	Total			

Subcatchment 42S: Direct to Proposed South Central Pond



Summary for Subcatchment 43S: Direct to Proposed Central Pond

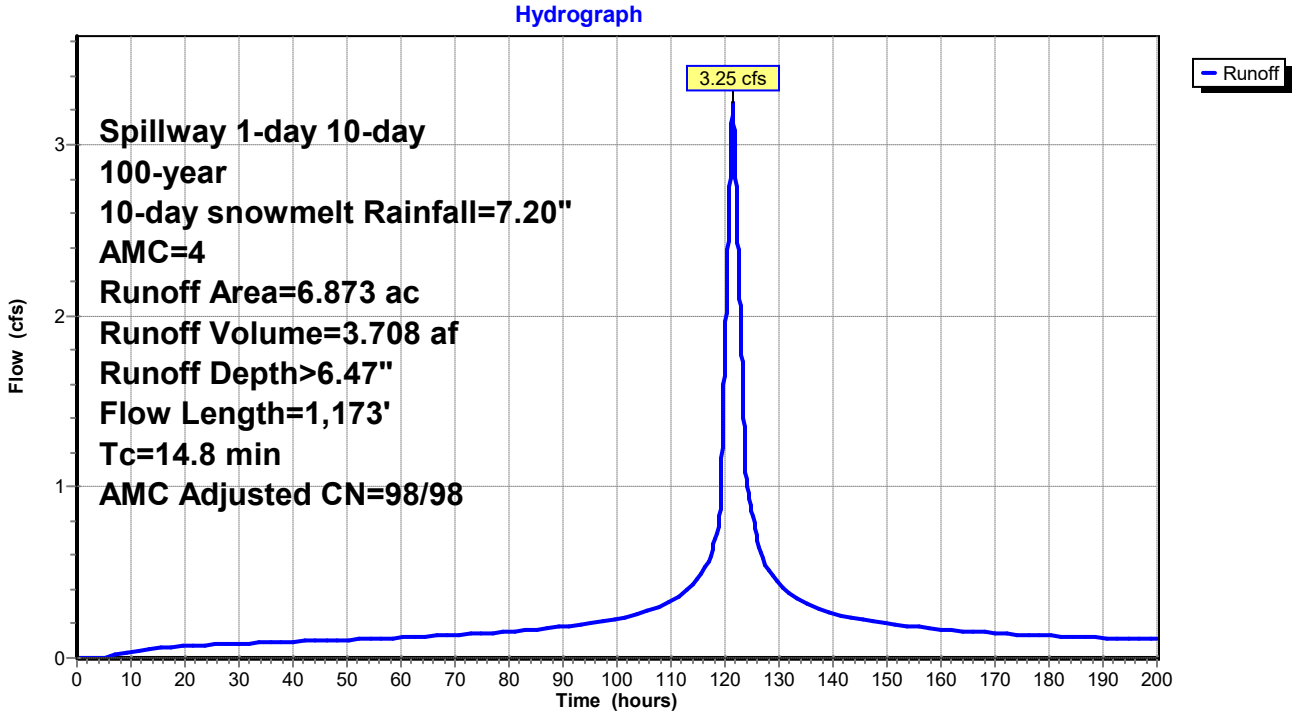
Runoff = 3.25 cfs @ 121.43 hrs, Volume= 3.708 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.205	98		Unconnected pavement, HSG D
0.855	98		Unconnected roofs, HSG D
0.896	98		Paved roads w/curbs & sewers, HSG D
0.530	98		Paved parking, HSG D
0.332	98		Roofs, HSG D
0.402	98		Water Surface, 0% imp, HSG D
0.383	89		Row crops, straight row, Good, HSG D
2.711	80		>75% Grass cover, Good, HSG D
0.559	78		Meadow, non-grazed, HSG D
6.873	89	98	Weighted Average, AMC Adjusted
4.055	82	98	59.00% Pervious Area, AMC Adjusted
2.818	98	98	41.00% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.5	286	0.0088	1.90		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	817		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.8	1,173	Total			

Subcatchment 43S: Direct to Proposed Central Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

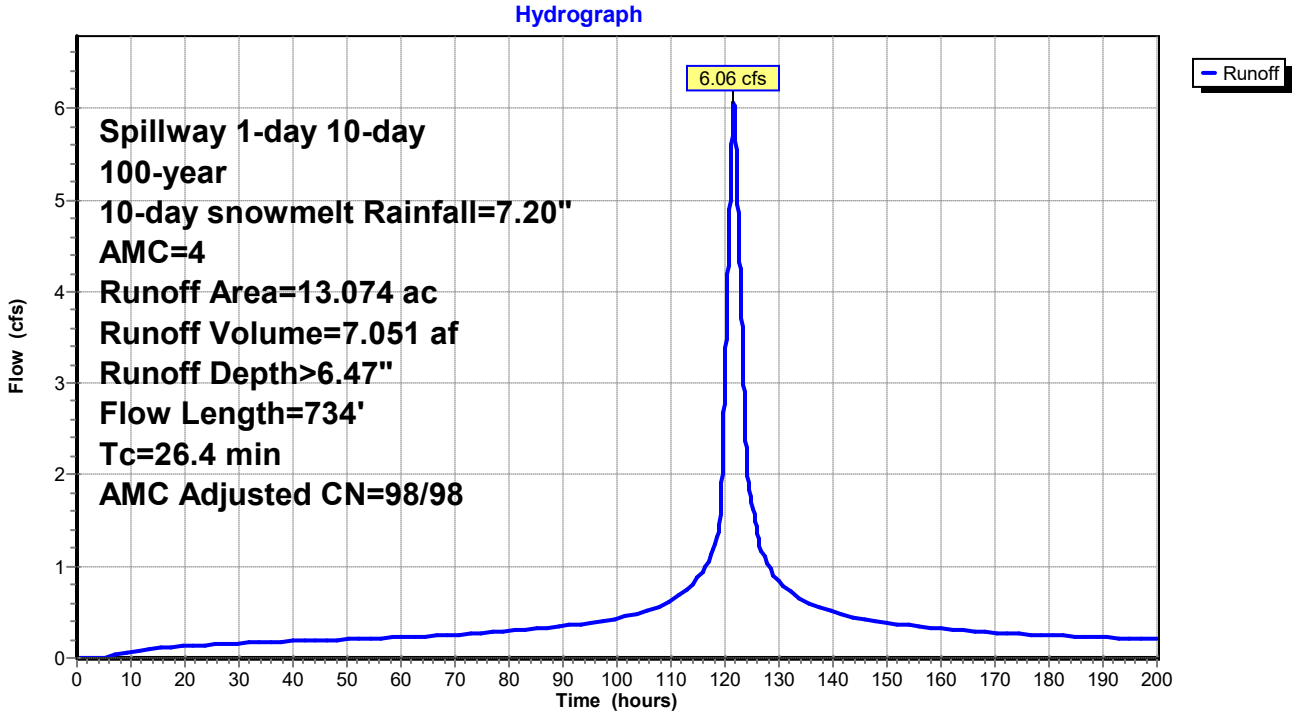
Runoff = 6.06 cfs @ 121.60 hrs, Volume= 7.051 af, Depth> 6.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.523	98		Unconnected pavement, HSG D
0.339	98		Unconnected roofs, HSG D
0.175	98		Water Surface, 0% imp, HSG D
0.233	96		Gravel surface, HSG D
8.346	89		Row crops, straight row, Good, HSG D
0.958	89		Pasture/grassland/range, Poor, HSG D
2.500	80		>75% Grass cover, Good, HSG D
13.074	88	98	Weighted Average, AMC Adjusted
12.212	87	98	93.41% Pervious Area, AMC Adjusted
0.862	98	98	6.59% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

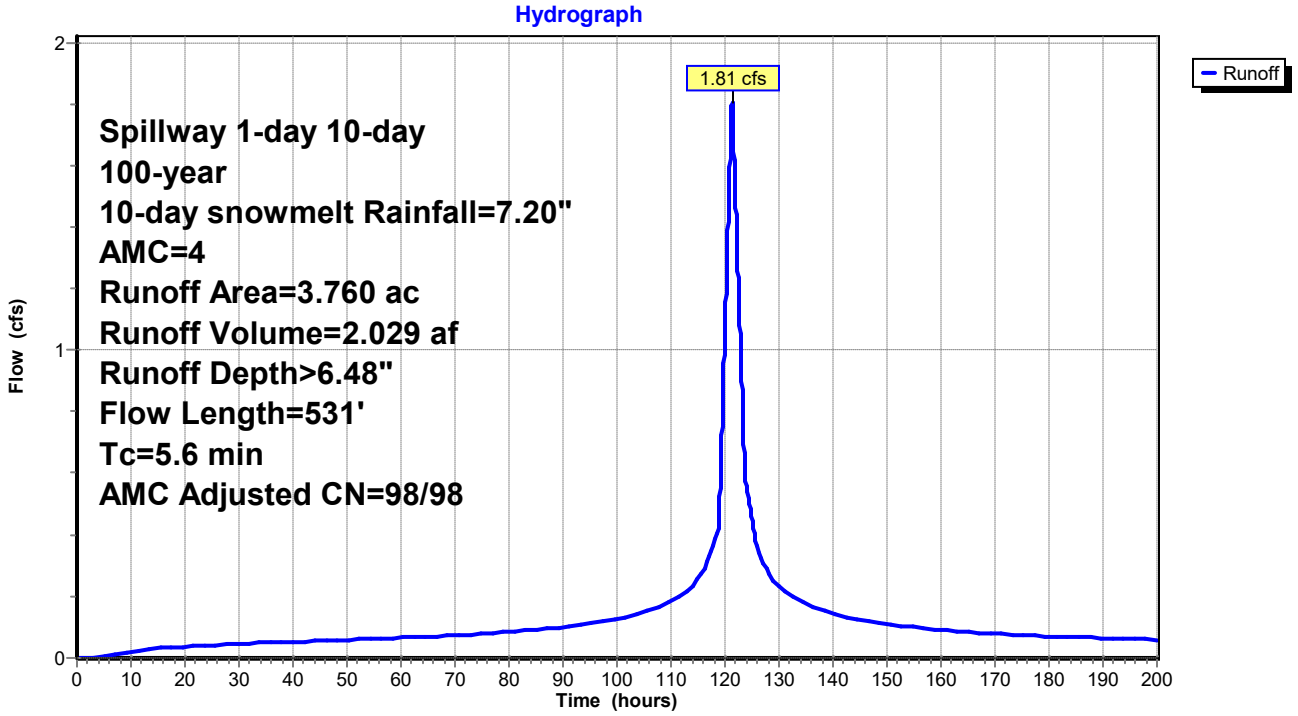
Runoff = 1.81 cfs @ 121.30 hrs, Volume= 2.029 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.428	98		Unconnected pavement, HSG D
0.443	98		Unconnected roofs, HSG D
0.064	98		Water Surface, 0% imp, HSG D
0.331	96		Gravel surface, HSG D
2.083	80		>75% Grass cover, Good, HSG D
0.411	77		Woods, Good, HSG D
3.760	86	98	Weighted Average, AMC Adjusted
2.889	82	98	76.84% Pervious Area, AMC Adjusted
0.871	98	98	23.16% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



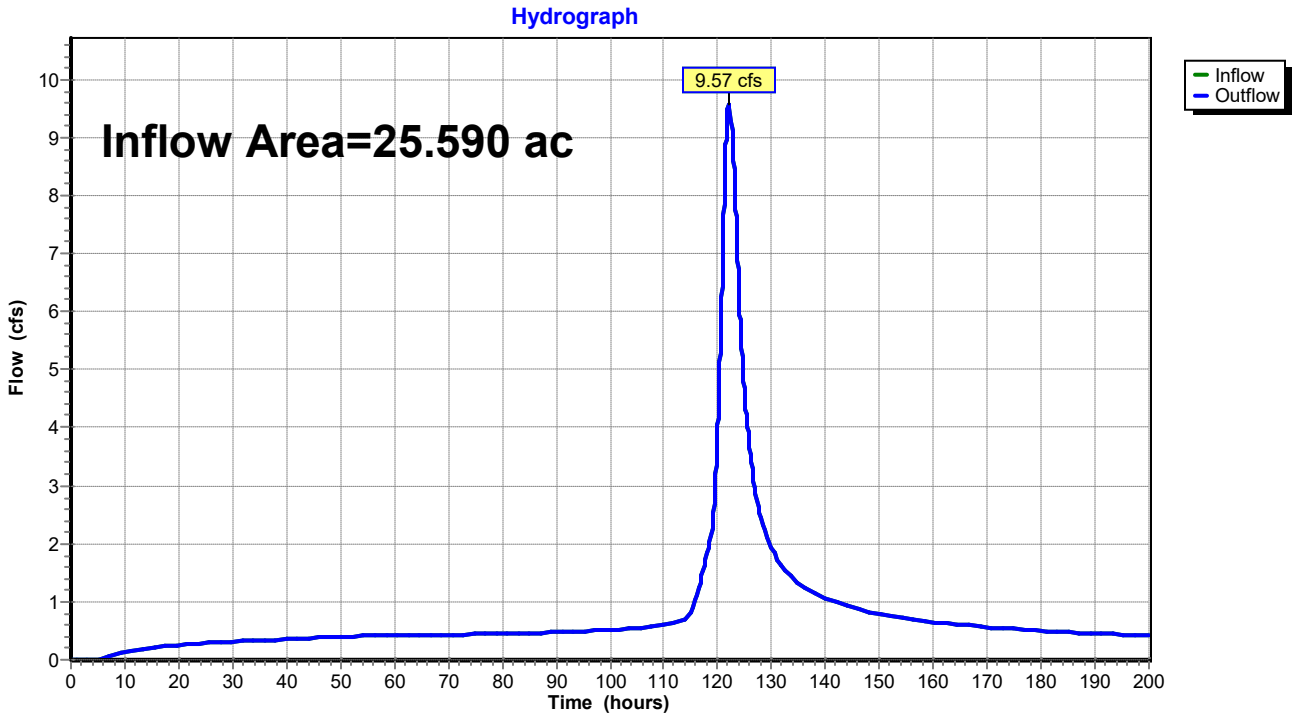
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.590 ac, 16.84% Impervious, Inflow Depth > 5.93" for 100-year, 10-day snowmelt event
Inflow = 9.57 cfs @ 122.11 hrs, Volume= 12.642 af
Outflow = 9.57 cfs @ 122.11 hrs, Volume= 12.642 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



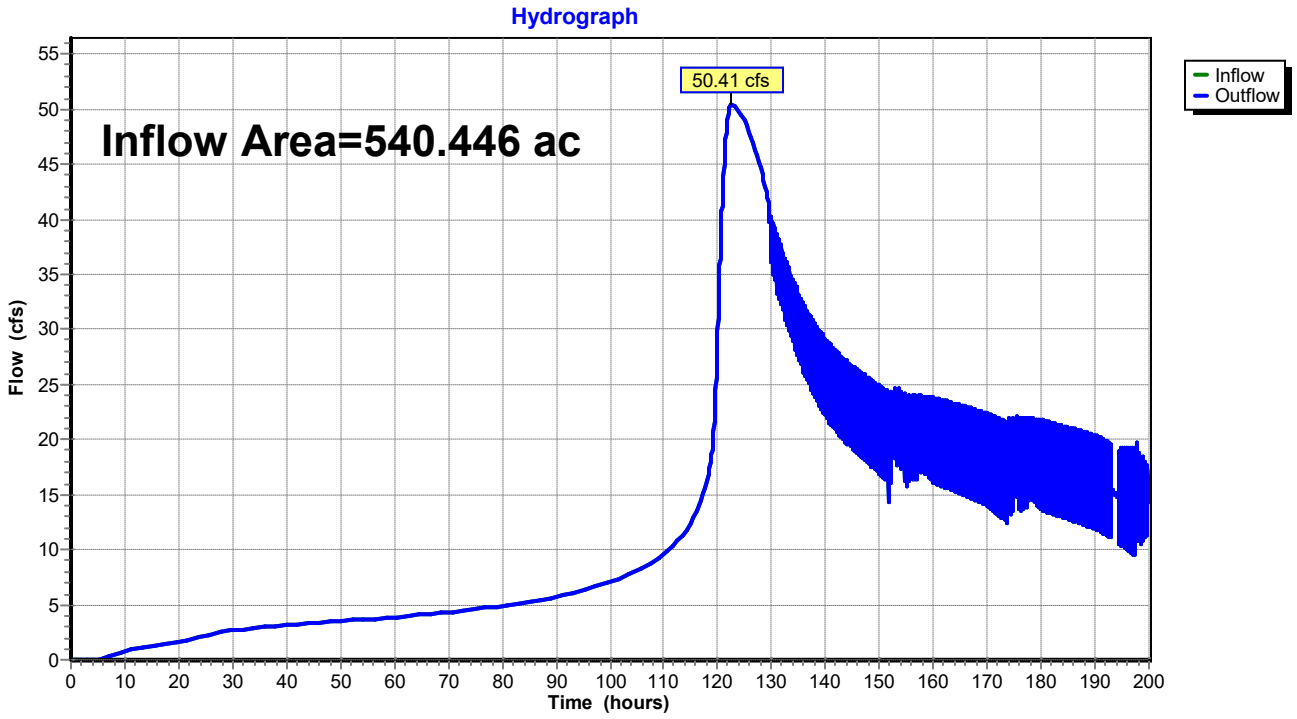
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.446 ac, 5.98% Impervious, Inflow Depth > 4.57" for 100-year, 10-day snowmelt event
Inflow = 50.41 cfs @ 122.63 hrs, Volume= 205.650 af
Outflow = 50.41 cfs @ 122.63 hrs, Volume= 205.650 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: Proposed East Channel

Inflow Area = 134.639 ac, 9.91% Impervious, Inflow Depth > 6.69" for 100-year, 10-day snowmelt event
Inflow = 24.39 cfs @ 124.87 hrs, Volume= 75.080 af
Outflow = 24.39 cfs @ 124.88 hrs, Volume= 75.074 af, Atten= 0%, Lag= 0.6 min

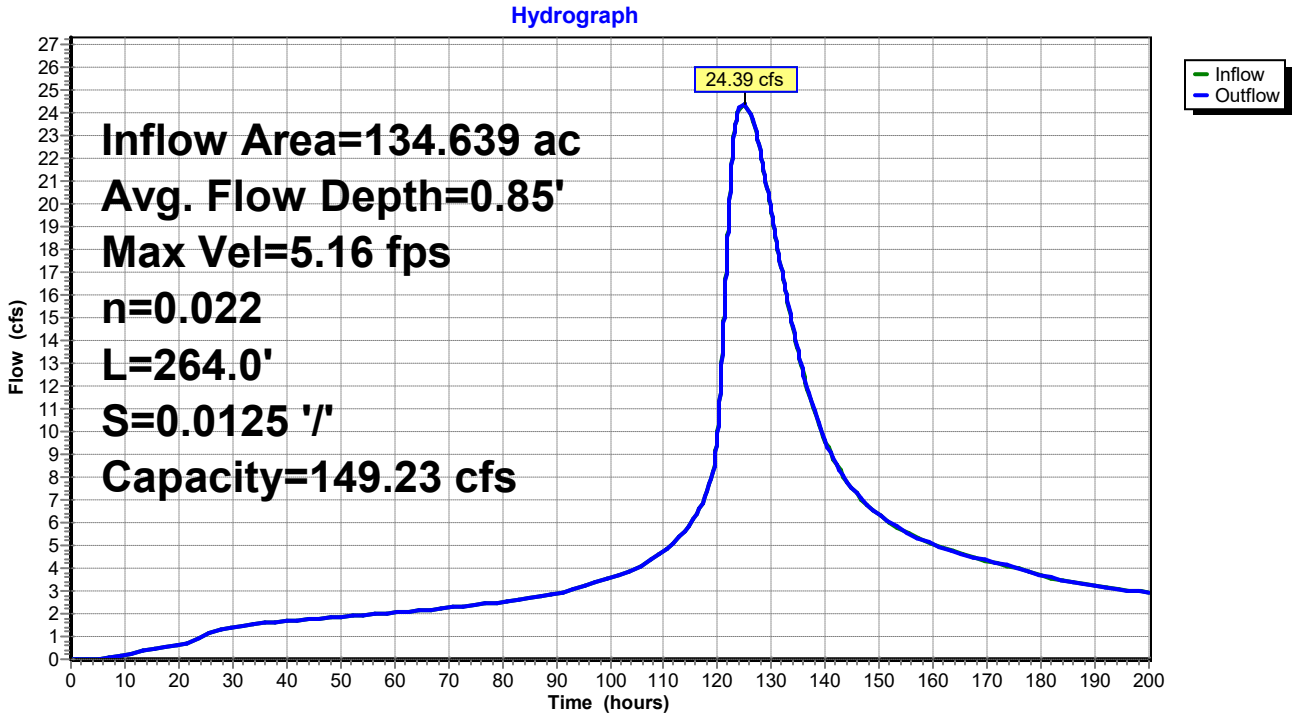
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.16 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.89 fps, Avg. Travel Time= 1.5 min

Peak Storage= 1,249 cf @ 124.88 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 149.23 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 264.0' Slope= 0.0125 '/'
Inlet Invert= 923.50', Outlet Invert= 920.20'

‡

Reach 21R: Proposed East Channel



Summary for Reach 23R: Existing West Channel

Inflow Area = 375.878 ac, 3.58% Impervious, Inflow Depth > 3.68" for 100-year, 10-day snowmelt event
Inflow = 23.84 cfs @ 121.84 hrs, Volume= 115.333 af
Outflow = 23.84 cfs @ 121.85 hrs, Volume= 115.316 af, Atten= 0%, Lag= 1.1 min

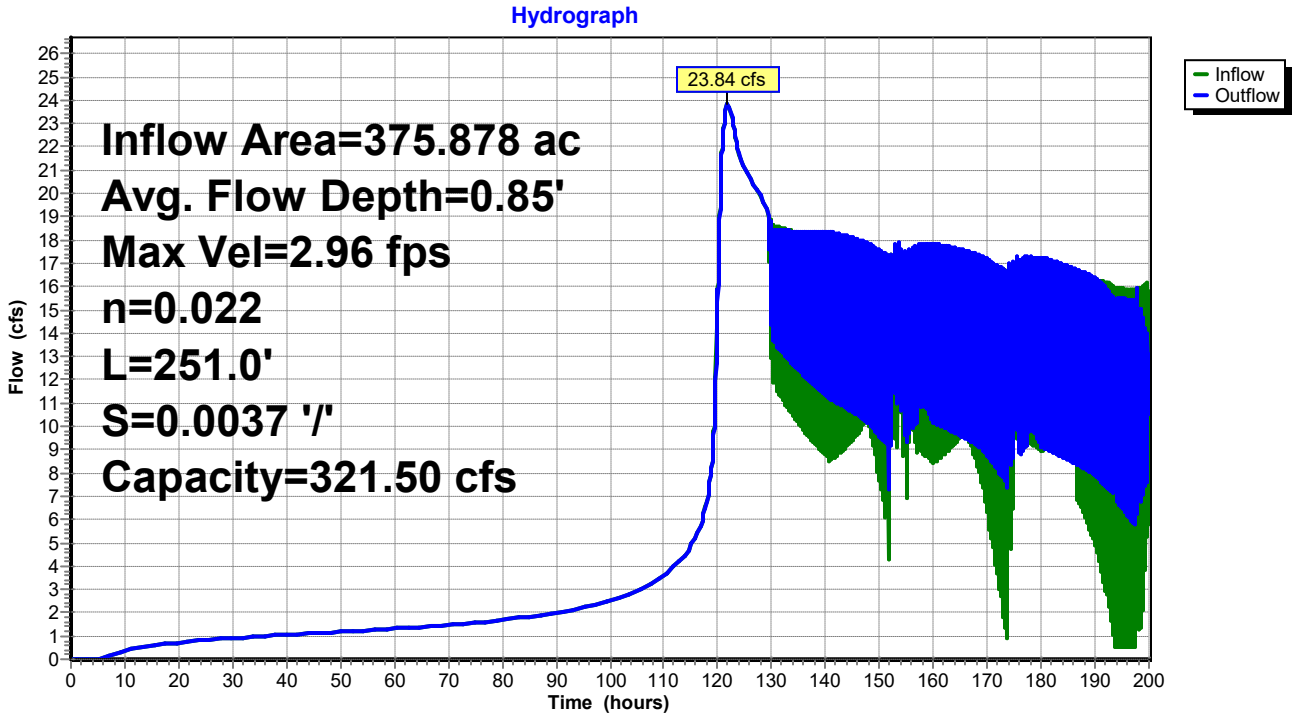
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.96 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 2.4 min

Peak Storage= 2,019 cf @ 121.85 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 3.00' Flow Area= 54.0 sf, Capacity= 321.50 cfs

6.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 '/' Top Width= 30.00'
Length= 251.0' Slope= 0.0037 '/'
Inlet Invert= 920.50', Outlet Invert= 919.58'

‡

Reach 23R: Existing West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=327)

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth > 6.47" for 100-year, 10-day snowmelt event
Inflow = 139.00 cfs @ 121.61 hrs, Volume= 161.795 af
Outflow = 74.34 cfs @ 138.05 hrs, Volume= 71.447 af, Atten= 47%, Lag= 986.6 min
Primary = 74.34 cfs @ 138.05 hrs, Volume= 71.447 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 931.78' @ 137.99 hrs Surf.Area= 65.349 ac Storage= 111.745 af

Plug-Flow detention time= 4,421.3 min calculated for 71.429 af (44% of inflow)
Center-of-Mass det. time= 2,592.8 min (9,597.9 - 7,005.1)

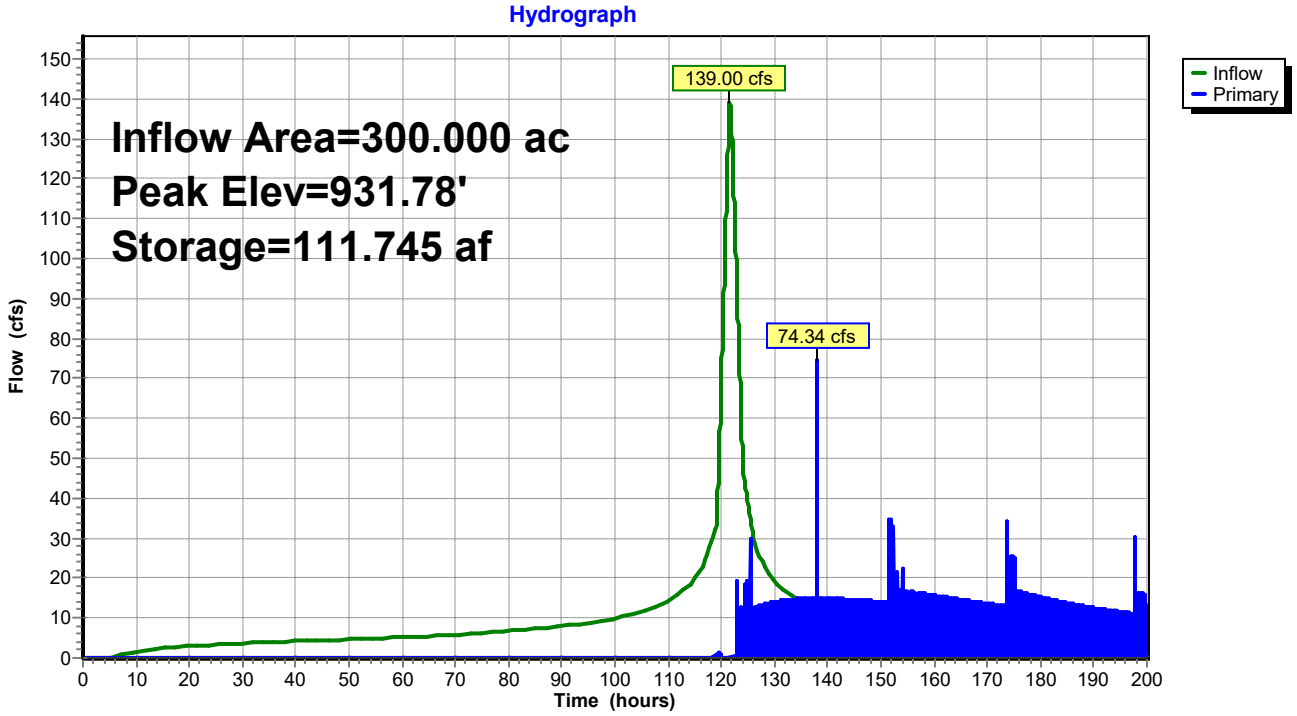
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 138.05 hrs HW=931.78' TW=932.77' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 10P: Proposed Northeast Pond/Filtration

[58] Hint: Peaked 0.51' above defined flood level

Inflow Area = 19.438 ac, 21.11% Impervious, Inflow Depth > 6.47" for 100-year, 10-day snowmelt event
Inflow = 9.06 cfs @ 121.56 hrs, Volume= 10.485 af
Outflow = 7.25 cfs @ 122.40 hrs, Volume= 9.322 af, Atten= 20%, Lag= 50.3 min
Primary = 7.25 cfs @ 122.40 hrs, Volume= 9.322 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 921.00' Surf.Area= 0.662 ac Storage= 2.955 af
Peak Elev= 922.51' @ 122.40 hrs Surf.Area= 1.481 ac Storage= 4.965 af (2.010 af above start)
Flood Elev= 922.00' Surf.Area= 1.255 ac Storage= 4.104 af (1.149 af above start)

Plug-Flow detention time= 2,688.9 min calculated for 6.367 af (61% of inflow)
Center-of-Mass det. time= 205.4 min (7,208.1 - 7,002.7)

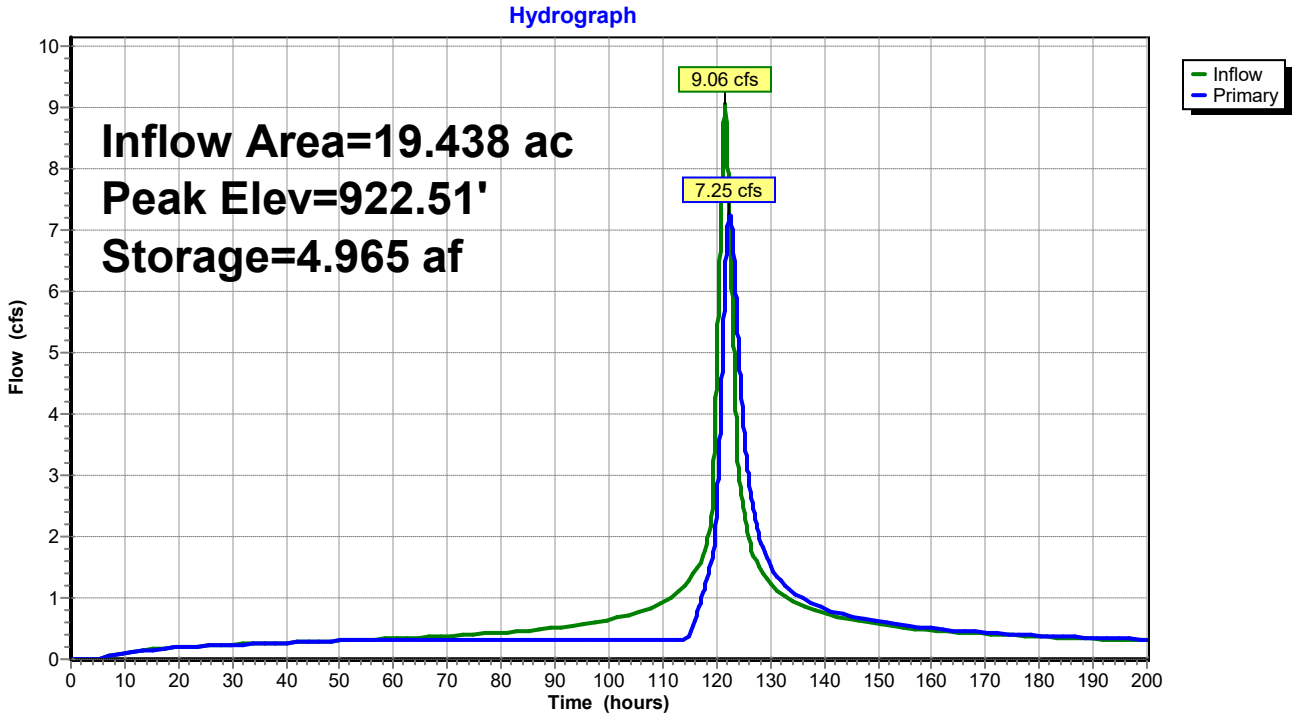
Volume	Invert	Avail.Storage	Storage Description
#1	913.00'	9.359 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
913.00	0.209	0.000	0.000
914.00	0.242	0.226	0.226
916.00	0.314	0.556	0.781
918.00	0.396	0.710	1.491
920.00	0.491	0.887	2.378
921.00	0.662	0.576	2.955
921.01	1.049	0.009	2.964
922.00	1.255	1.140	4.104
924.00	2.149	3.404	7.508
925.00	1.553	1.851	9.359

Device	Routing	Invert	Outlet Devices
#1	Primary	918.50'	**36.0" Round Culvert** L= 113.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.50' / 918.00' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	922.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	923.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	920.00'	**21.0" Round Culvert** L= 45.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 920.00' S= -0.0444 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	921.00'	**0.31 cfs Exfiltration when above 921.00'** Phase-In= 0.01'

Primary OutFlow Max=7.25 cfs @ 122.40 hrs HW=922.51' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 7.25 cfs of 45.70 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 6.94 cfs @ 2.33 fps)
  │ └─**4=Culvert** (Passes 6.94 cfs of 8.24 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.31 cfs)

Pond 10P: Proposed Northeast Pond/Filtration



Summary for Pond 25P: Proposed Northwest Pond/Filtration

[58] Hint: Peaked 0.18' above defined flood level

Inflow Area = 15.059 ac, 29.82% Impervious, Inflow Depth > 6.47" for 100-year, 10-day snowmelt event
Inflow = 7.10 cfs @ 121.46 hrs, Volume= 8.125 af
Outflow = 1.76 cfs @ 125.34 hrs, Volume= 7.235 af, Atten= 75%, Lag= 232.5 min
Primary = 1.76 cfs @ 125.34 hrs, Volume= 7.235 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 925.00' Surf.Area= 0.322 ac Storage= 1.156 af
Peak Elev= 926.68' @ 125.34 hrs Surf.Area= 1.394 ac Storage= 3.248 af (2.092 af above start)
Flood Elev= 926.50' Surf.Area= 1.369 ac Storage= 3.002 af (1.846 af above start)

Plug-Flow detention time= 2,241.7 min calculated for 6.078 af (75% of inflow)
Center-of-Mass det. time= 464.0 min (7,461.9 - 6,997.9)

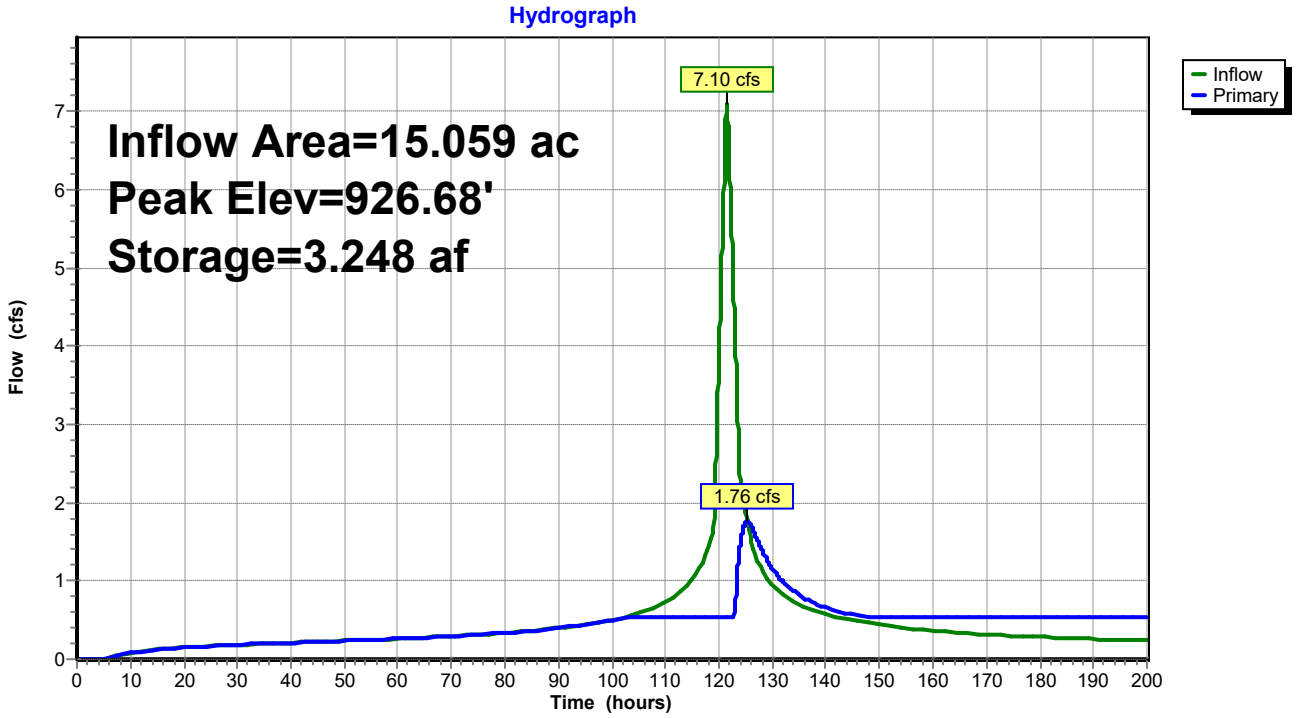
Volume	Invert	Avail.Storage	Storage Description
#1	917.00'	5.216 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
917.00	0.052	0.000	0.000
918.00	0.069	0.061	0.061
920.00	0.110	0.179	0.239
922.00	0.160	0.270	0.509
924.00	0.217	0.377	0.887
925.00	0.322	0.269	1.156
925.01	1.071	0.007	1.163
926.00	1.297	1.172	2.335
928.00	1.584	2.881	5.216

Device	Routing	Invert	Outlet Devices
#1	Primary	922.50'	**21.0" Round Culvert** L= 46.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.50' / 922.00' S= 0.0109 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	926.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	927.40'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	922.00'	**18.0" Round Culvert** L= 42.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 921.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#5	Device 1	925.00'	**0.54 cfs Exfiltration when above 925.00'** Phase-In= 0.01'

Primary OutFlow Max=1.76 cfs @ 125.34 hrs HW=926.68' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.76 cfs of 21.05 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.22 cfs @ 1.38 fps)
  │ └─**4=Culvert** (Passes 1.22 cfs of 3.59 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.54 cfs)

Pond 25P: Proposed Northwest Pond/Filtration



Summary for Pond 26P: Proposed Northwest Central Pond/Filtration

Inflow Area = 7.518 ac, 41.97% Impervious, Inflow Depth > 6.41" for 100-year, 10-day snowmelt event
Inflow = 2.98 cfs @ 121.39 hrs, Volume= 4.013 af
Outflow = 0.37 cfs @ 111.70 hrs, Volume= 3.913 af, Atten= 88%, Lag= 0.0 min
Primary = 0.37 cfs @ 111.70 hrs, Volume= 3.913 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.00' Surf.Area= 0.318 ac Storage= 0.894 af
Peak Elev= 925.11' @ 133.87 hrs Surf.Area= 0.942 ac Storage= 1.848 af (0.954 af above start)
Flood Elev= 925.50' Surf.Area= 0.997 ac Storage= 2.227 af (1.333 af above start)

Plug-Flow detention time= 2,787.5 min calculated for 3.018 af (75% of inflow)
Center-of-Mass det. time= 686.4 min (7,849.0 - 7,162.6)

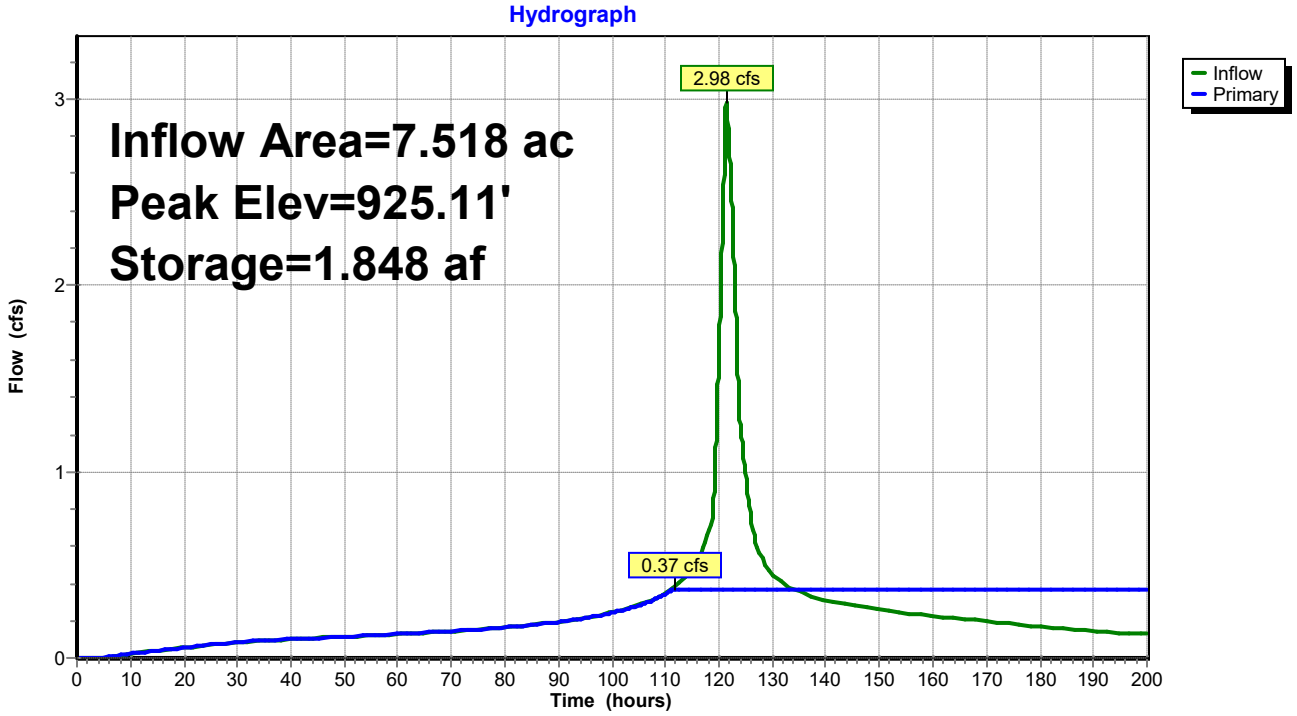
Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	3.855 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.00	0.009	0.000	0.000
918.00	0.045	0.054	0.054
920.00	0.099	0.144	0.198
922.00	0.162	0.261	0.459
923.00	0.195	0.179	0.637
924.00	0.318	0.256	0.894
924.01	0.784	0.006	0.900
926.00	1.069	1.844	2.743
927.00	1.155	1.112	3.855

Device	Routing	Invert	Outlet Devices
#1	Primary	921.50'	**21.0" Round Culvert** L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.50' / 921.00' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	925.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	926.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	921.00'	**21.0" Round Culvert** L= 44.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 920.00' / 921.00' S= -0.0227 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	924.00'	**0.37 cfs Exfiltration when above 924.00'** Phase-In= 0.01'

Primary OutFlow Max=0.37 cfs @ 111.70 hrs HW=924.01' TW=920.82' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.37 cfs of 12.99 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
    - **4=Culvert** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Exfiltration** (Exfiltration Controls 0.37 cfs)

Pond 26P: Proposed Northwest Central Pond/Filtration



Summary for Pond 27P: Proposed Northwest Central Pond

Inflow Area = 3.120 ac, 47.02% Impervious, Inflow Depth > 6.48" for 100-year, 10-day snowmelt event
Inflow = 1.49 cfs @ 121.34 hrs, Volume= 1.684 af
Outflow = 0.98 cfs @ 122.01 hrs, Volume= 1.640 af, Atten= 34%, Lag= 40.1 min
Primary = 0.98 cfs @ 122.01 hrs, Volume= 1.640 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.50' Surf.Area= 0.278 ac Storage= 0.732 af
Peak Elev= 925.15' @ 122.82 hrs Surf.Area= 0.371 ac Storage= 0.943 af (0.212 af above start)

Plug-Flow detention time= 3,381.8 min calculated for 0.908 af (54% of inflow)
Center-of-Mass det. time= 418.6 min (7,410.2 - 6,991.6)

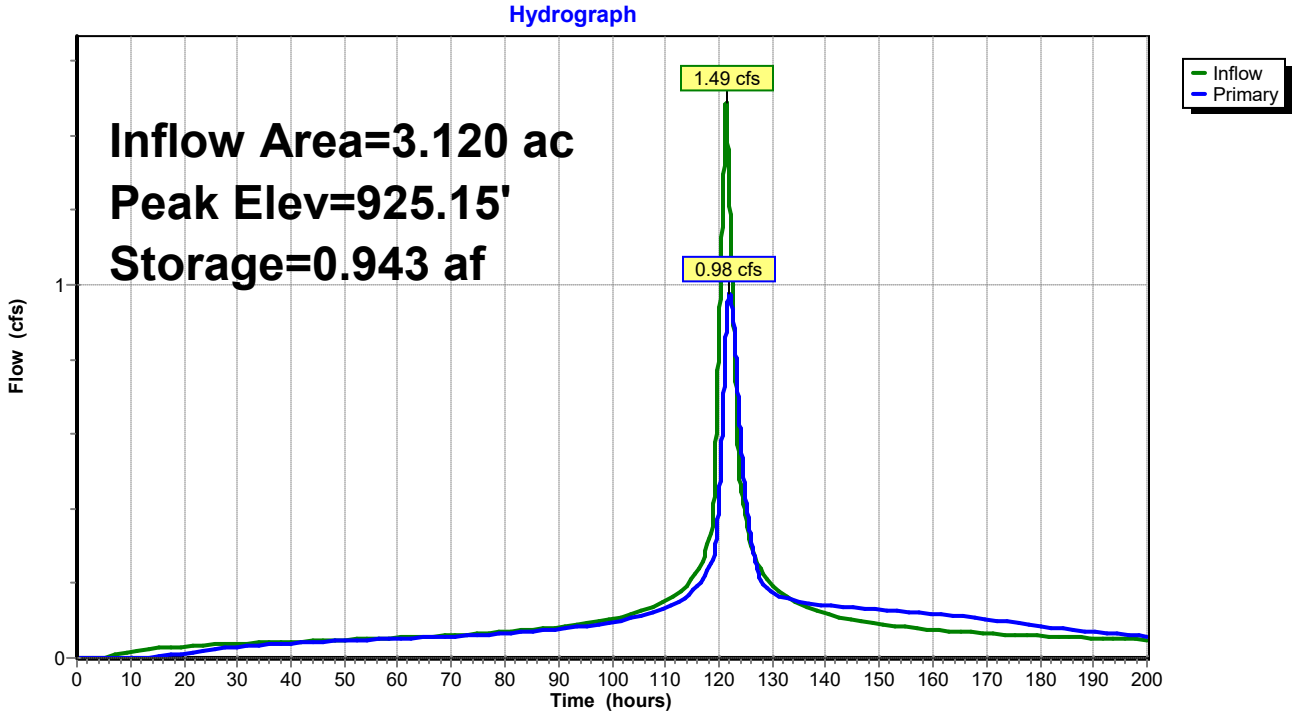
Volume	Invert	Avail.Storage	Storage Description
#1	916.50'	1.797 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.50	0.015	0.000	0.000
917.00	0.019	0.008	0.008
918.00	0.031	0.025	0.033
920.00	0.063	0.094	0.128
922.00	0.114	0.177	0.304
923.50	0.162	0.207	0.512
924.50	0.278	0.220	0.732
925.50	0.420	0.349	1.081
926.00	0.459	0.220	1.300
927.00	0.535	0.497	1.797

Device	Routing	Invert	Outlet Devices
#1	Primary	924.50'	**18.0" Round Culvert** L= 225.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.50' / 924.00' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	926.50'	**48.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	923.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 923.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=0.97 cfs @ 122.01 hrs HW=925.13' TW=924.63' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.97 cfs @ 2.02 fps)
↑**2=Orifice/Grate** (Controls 0.00 cfs)
3=Culvert (Passes 0.97 cfs of 6.03 cfs potential flow)

Pond 27P: Proposed Northwest Central Pond



Summary for Pond 28P: Proposed Northeast Central Pond

Inflow Area = 7.153 ac, 50.64% Impervious, Inflow Depth > 6.47" for 100-year, 10-day snowmelt event
Inflow = 3.39 cfs @ 121.42 hrs, Volume= 3.860 af
Outflow = 3.16 cfs @ 121.75 hrs, Volume= 3.846 af, Atten= 7%, Lag= 19.7 min
Primary = 3.16 cfs @ 121.75 hrs, Volume= 3.846 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 922.00' Surf.Area= 0.380 ac Storage= 1.043 af
Peak Elev= 922.34' @ 121.75 hrs Surf.Area= 0.442 ac Storage= 1.182 af (0.139 af above start)

Plug-Flow detention time= 2,069.1 min calculated for 2.803 af (73% of inflow)
Center-of-Mass det. time= 45.5 min (7,041.4 - 6,995.9)

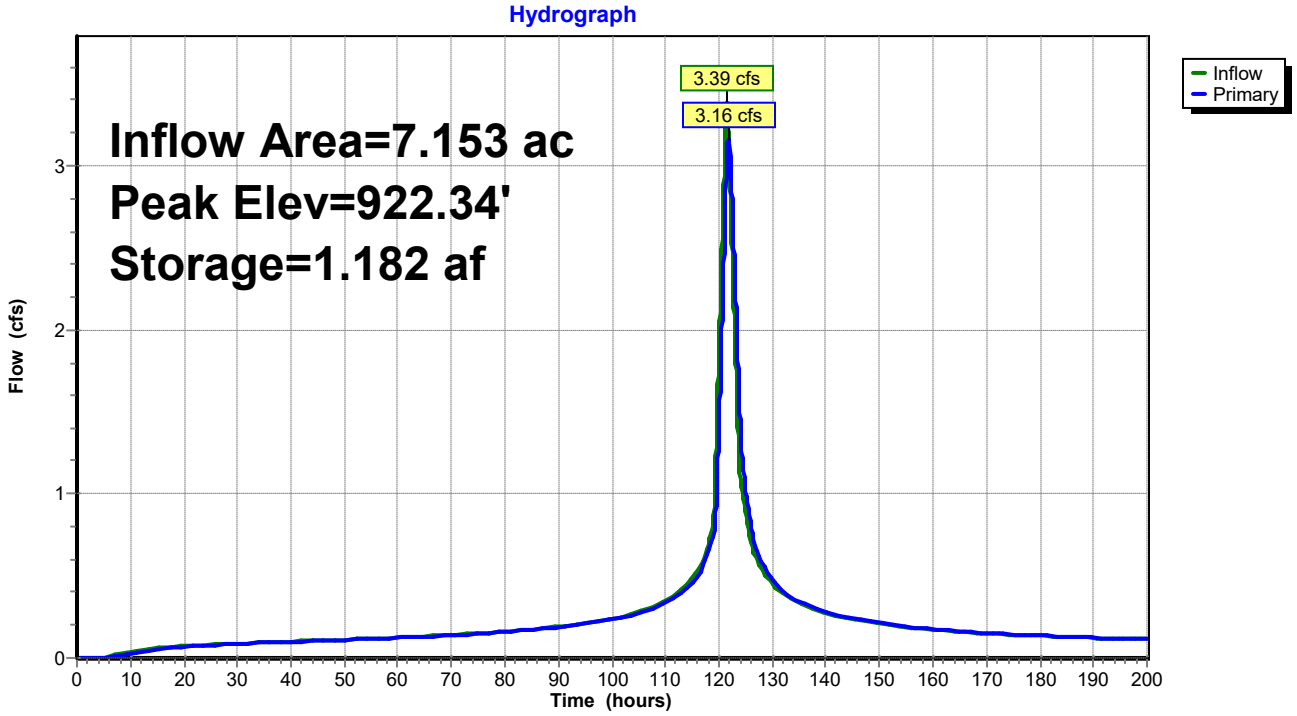
Volume	Invert	Avail.Storage	Storage Description
#1	914.00'	2.802 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
914.00	0.034	0.000	0.000
916.00	0.065	0.099	0.099
918.00	0.109	0.174	0.273
920.00	0.172	0.281	0.554
921.00	0.213	0.192	0.746
922.00	0.380	0.297	1.043
923.00	0.565	0.472	1.515
924.00	0.642	0.603	2.119
925.00	0.724	0.683	2.802

Device	Routing	Invert	Outlet Devices
#1	Primary	921.00'	**24.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.00' / 920.80' S= 0.0057 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	923.25'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	922.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 3	919.00'	**21.0" Round Culvert** L= 33.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 919.00' S= -0.0303 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=3.16 cfs @ 121.75 hrs HW=922.34' TW=921.35' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.16 cfs of 6.65 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Sharp-Crested Rectangular Weir** (Weir Controls 3.16 cfs @ 1.90 fps)
    - **4=Culvert** (Passes 3.16 cfs of 6.73 cfs potential flow)

Pond 28P: Proposed Northeast Central Pond



Summary for Pond 30P: Wetland 4A

[44] Hint: Outlet device #5 is below defined storage

Inflow Area = 357.822 ac, 1.86% Impervious, Inflow Depth > 3.55" for 100-year, 10-day snowmelt event
Inflow = 27.57 cfs @ 123.09 hrs, Volume= 105.725 af
Outflow = 19.38 cfs @ 124.01 hrs, Volume= 105.747 af, Atten= 30%, Lag= 55.0 min
Primary = 16.37 cfs @ 124.01 hrs, Volume= 77.567 af
Secondary = 3.01 cfs @ 124.01 hrs, Volume= 28.180 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 925.62' @ 124.01 hrs Surf.Area= 3.331 ac Storage= 1.102 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.6 min (8,852.9 - 8,848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	923.50'	15.942 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

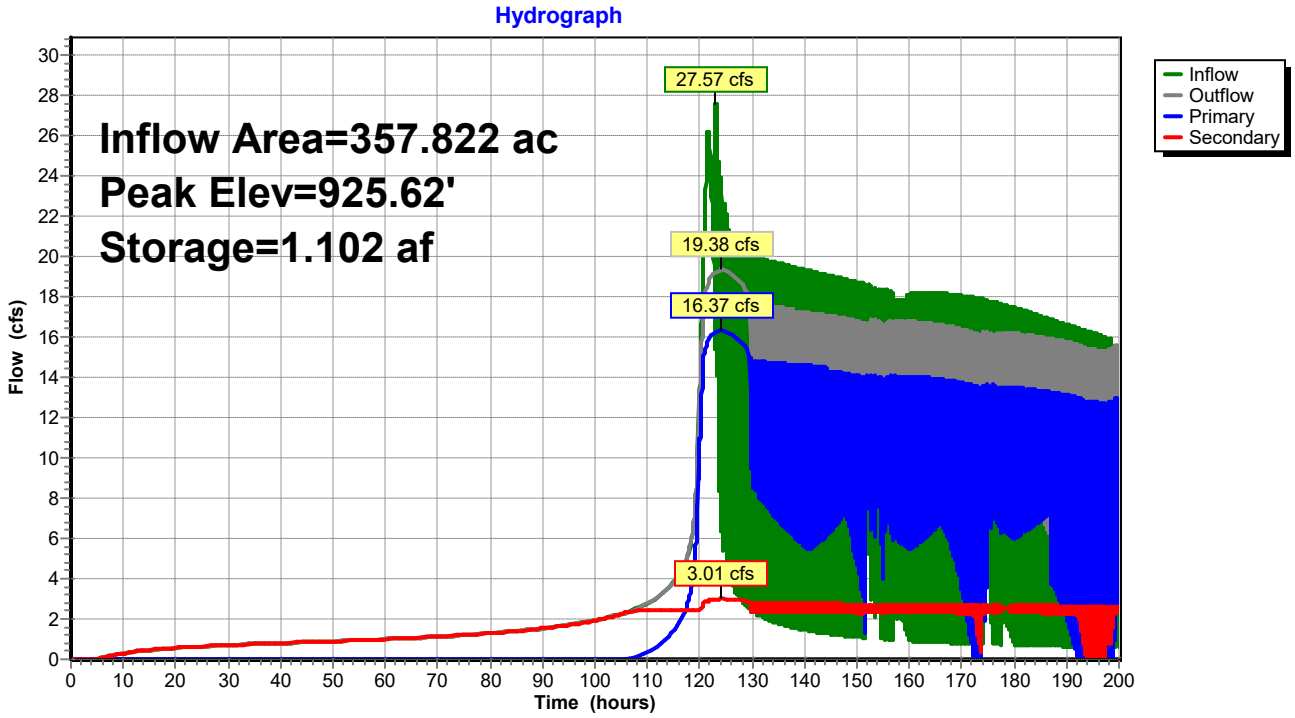
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.50	0.011	0.000	0.000
924.00	0.027	0.009	0.009
925.00	0.058	0.042	0.052
926.00	5.338	2.698	2.750
927.00	6.566	5.952	8.702
928.00	7.914	7.240	15.942

Device	Routing	Invert	Outlet Devices
#1	Primary	921.11'	**36.0" Round 36" RCP** L= 307.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.11' / 920.50' S= 0.0020 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 7.07 sf
#2	Device 1	926.00'	**60.0" Horiz. CBMH-3003** C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.17'	**18.0" Round 18" RCP** L= 23.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 921.17' / 921.11' S= 0.0026 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#4	Device 3	923.50'	**48.0" Horiz. CBMH-3004** C= 0.600 Limited to weir flow at low heads
#5	Secondary	919.60'	**12.0" Round 12" Draintile** L= 553.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.34' / 919.60' S= -0.0005 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=16.37 cfs @ 124.01 hrs HW=925.62' TW=921.31' (Dynamic Tailwater)
└─**1=36" RCP** (Passes 16.37 cfs of 42.77 cfs potential flow)
  ├─**2=CBMH-3003** (Controls 0.00 cfs)
  └─**3=18" RCP** (Inlet Controls 16.37 cfs @ 9.26 fps)
    └─**4=CBMH-3004** (Passes 16.37 cfs of 88.09 cfs potential flow)

Secondary OutFlow Max=3.01 cfs @ 124.01 hrs HW=925.62' TW=921.31' (Dynamic Tailwater)
└─**5=12" Draintile** (Outlet Controls 3.01 cfs @ 3.83 fps)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[80] Warning: Exceeded Pond 7P by 1.23' @ 135.40 hrs (270.84 cfs 901.086 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth > 3.08" for 100-year, 10-day snowmelt event
Inflow = 75.18 cfs @ 137.75 hrs, Volume= 82.228 af
Outflow = 17.90 cfs @ 137.20 hrs, Volume= 85.332 af, Atten= 76%, Lag= 0.0 min
Primary = 17.90 cfs @ 137.20 hrs, Volume= 85.332 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 933.01' @ 137.20 hrs Surf.Area= 0.394 ac Storage= 0.206 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 29.1 min (9,288.3 - 9,259.2)

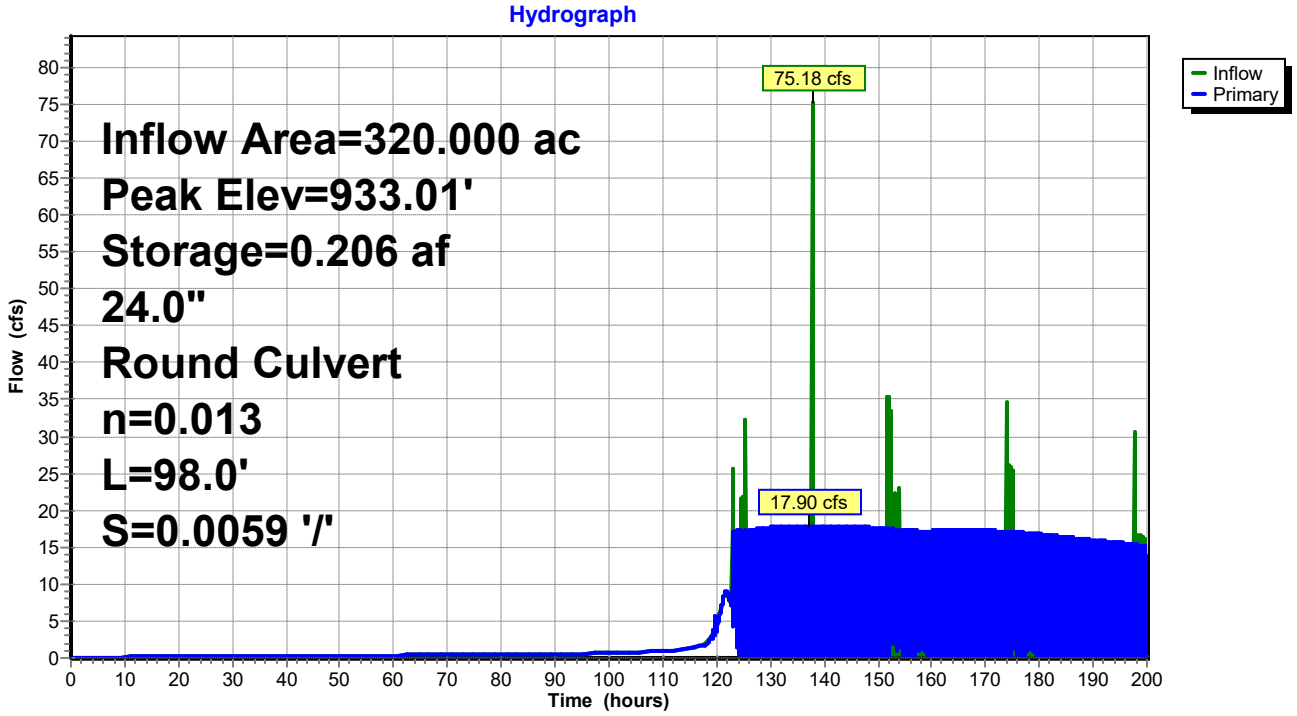
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=17.85 cfs @ 137.20 hrs HW=933.00' TW=924.61' (Dynamic Tailwater)
1=Culvert (Barrel Controls 17.85 cfs @ 5.68 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 32P: Proposed West Central Pond

Inflow Area = 3.686 ac, 36.52% Impervious, Inflow Depth > 6.48" for 100-year, 10-day snowmelt event
Inflow = 1.77 cfs @ 121.32 hrs, Volume= 1.989 af
Outflow = 1.60 cfs @ 121.70 hrs, Volume= 1.980 af, Atten= 9%, Lag= 22.8 min
Primary = 1.60 cfs @ 121.70 hrs, Volume= 1.980 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.00' Surf.Area= 0.395 ac Storage= 1.213 af
Peak Elev= 928.21' @ 121.70 hrs Surf.Area= 0.429 ac Storage= 1.301 af (0.088 af above start)

Plug-Flow detention time= 4,115.2 min calculated for 0.767 af (39% of inflow)
Center-of-Mass det. time= 58.1 min (7,048.6 - 6,990.5)

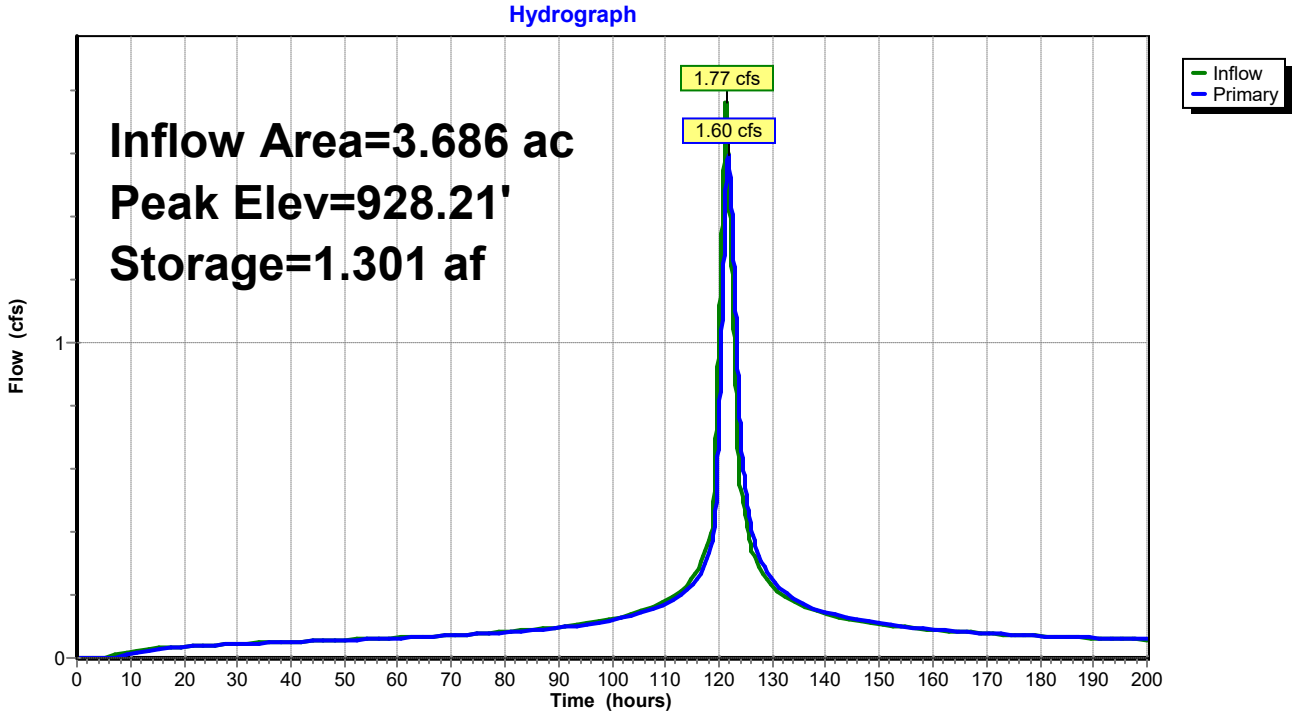
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2.284 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
920.00	0.034	0.000	0.000
922.00	0.073	0.107	0.107
924.00	0.134	0.207	0.314
926.00	0.211	0.345	0.659
927.00	0.251	0.231	0.890
928.00	0.395	0.323	1.213
929.00	0.554	0.475	1.687
930.00	0.638	0.596	2.284

Device	Routing	Invert	Outlet Devices
#1	Primary	923.05'	**18.0" Round Culvert** L= 212.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.05' / 922.52' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	929.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	925.00'	**21.0" Round Culvert** L= 20.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0500 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=1.60 cfs @ 121.70 hrs HW=928.21' TW=925.39' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.60 cfs of 10.27 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Weir Controls 1.60 cfs @ 1.51 fps)
    - **4=Culvert** (Passes 1.60 cfs of 5.35 cfs potential flow)
  - **3=Orifice/Grate** (Controls 0.00 cfs)

Pond 32P: Proposed West Central Pond



Summary for Pond 40P: Wetland 2B

Inflow Area = 133.857 ac, 9.96% Impervious, Inflow Depth > 6.77" for 100-year, 10-day snowmelt event
Inflow = 43.96 cfs @ 121.77 hrs, Volume= 75.483 af
Outflow = 24.29 cfs @ 124.91 hrs, Volume= 74.658 af, Atten= 45%, Lag= 188.3 min
Primary = 24.29 cfs @ 124.91 hrs, Volume= 74.658 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 925.36' @ 124.91 hrs Surf.Area= 10.366 ac Storage= 8.572 af

Plug-Flow detention time= 218.7 min calculated for 74.640 af (99% of inflow)
Center-of-Mass det. time= 169.0 min (7,566.4 - 7,397.4)

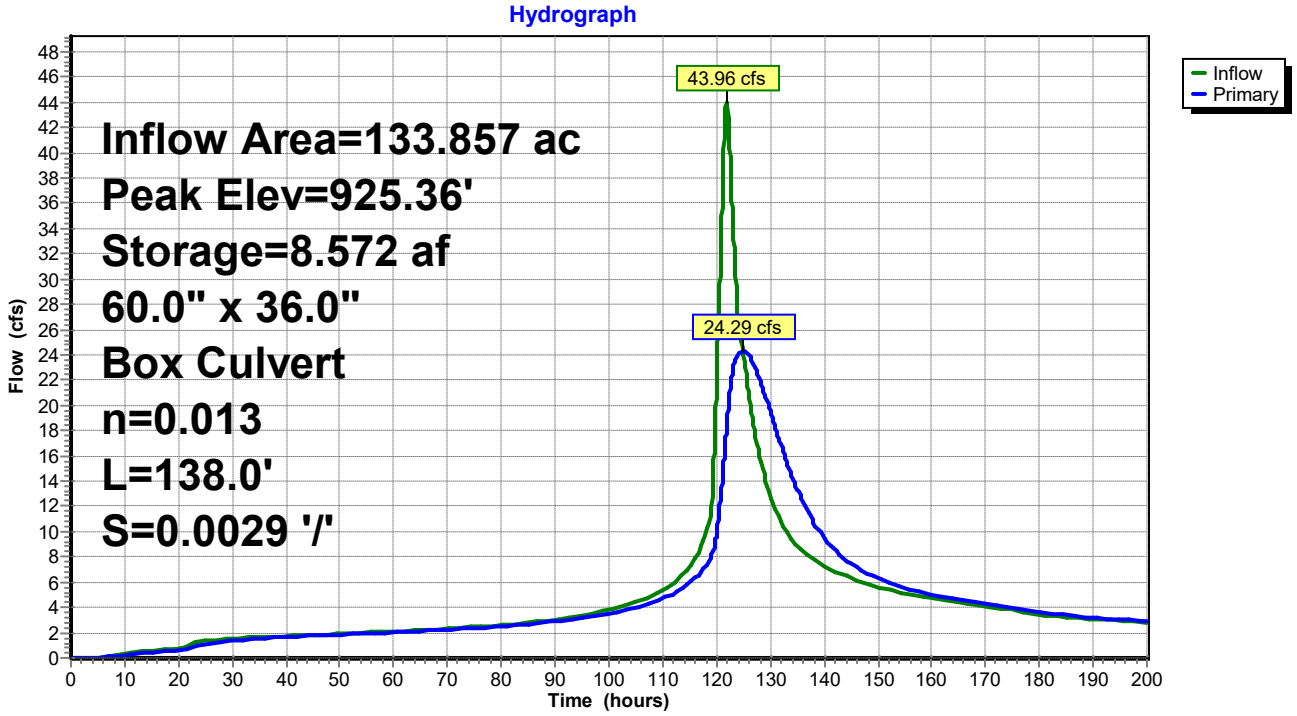
Volume	Invert	Avail.Storage	Storage Description
#1	923.90'	52.747 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.90	0.000	0.000	0.000
924.00	2.123	0.106	0.106
926.00	14.283	16.406	16.512
928.00	21.952	36.235	52.747

Device	Routing	Invert	Outlet Devices
#1	Primary	923.90'	**60.0" W x 36.0" H Box Culvert** L= 138.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.90' / 923.50' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 15.00 sf

Primary OutFlow Max=24.29 cfs @ 124.91 hrs HW=925.36' TW=924.35' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 24.29 cfs @ 4.45 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth > 6.48" for 100-year, 10-day snowmelt event
Inflow = 6.54 cfs @ 121.36 hrs, Volume= 7.400 af
Outflow = 4.65 cfs @ 122.44 hrs, Volume= 3.670 af, Atten= 29%, Lag= 64.8 min
Primary = 4.65 cfs @ 122.44 hrs, Volume= 3.670 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 940.62' @ 122.44 hrs Surf.Area= 2.367 ac Storage= 3.976 af

Plug-Flow detention time= 3,237.6 min calculated for 3.670 af (50% of inflow)
Center-of-Mass det. time= 1,635.7 min (8,628.5 - 6,992.8)

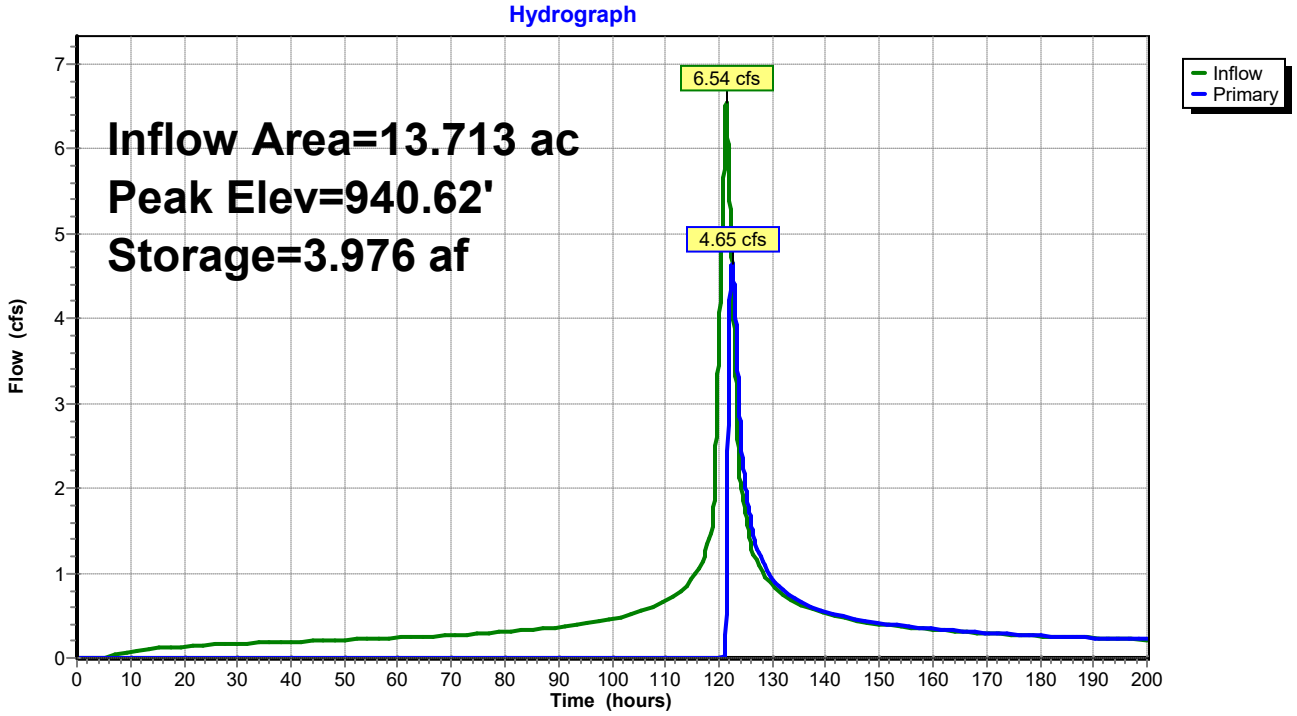
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=4.65 cfs @ 122.44 hrs HW=940.62' TW=925.21' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 4.65 cfs @ 1.09 fps)

Pond 41P: Ex South Off-site Pond



Summary for Pond 42P: Proposed South Central Pond

Inflow Area = 2.612 ac, 32.54% Impervious, Inflow Depth > 6.48" for 100-year, 10-day snowmelt event
Inflow = 1.24 cfs @ 121.36 hrs, Volume= 1.410 af
Outflow = 1.09 cfs @ 121.86 hrs, Volume= 1.395 af, Atten= 12%, Lag= 29.6 min
Primary = 1.09 cfs @ 121.86 hrs, Volume= 1.395 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.50' Surf.Area= 0.154 ac Storage= 0.309 af
Peak Elev= 929.00' @ 121.86 hrs Surf.Area= 0.199 ac Storage= 0.397 af (0.088 af above start)

Plug-Flow detention time= 1,867.0 min calculated for 1.086 af (77% of inflow)
Center-of-Mass det. time= 107.3 min (7,100.1 - 6,992.8)

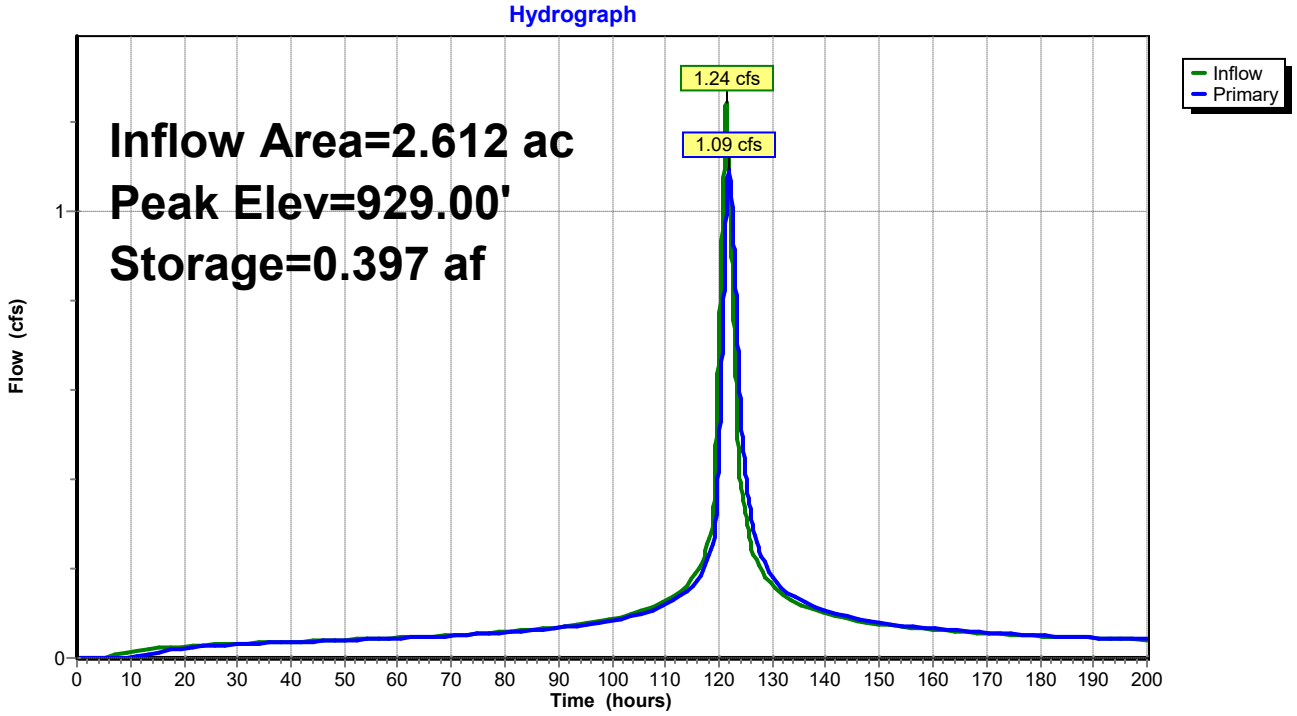
Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	1.122 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
922.00	0.004	0.000	0.000
924.00	0.022	0.026	0.026
926.00	0.050	0.072	0.098
927.50	0.078	0.096	0.194
928.00	0.114	0.048	0.242
928.50	0.154	0.067	0.309
929.50	0.244	0.199	0.508
930.00	0.274	0.130	0.637
931.50	0.372	0.484	1.122

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	**15.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 928.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	930.20'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	927.00'	**15.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.00' / 927.00' S= -0.0256 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=1.09 cfs @ 121.86 hrs HW=929.00' TW=925.09' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.09 cfs @ 2.40 fps)
↑**2=Orifice/Grate** (Controls 0.00 cfs)
3=Culvert (Passes 1.09 cfs of 4.17 cfs potential flow)

Pond 42P: Proposed South Central Pond



Summary for Pond 43P: Proposed East Central Pond

Inflow Area = 6.873 ac, 41.00% Impervious, Inflow Depth > 6.47" for 100-year, 10-day snowmelt event
Inflow = 3.25 cfs @ 121.43 hrs, Volume= 3.708 af
Outflow = 2.59 cfs @ 122.24 hrs, Volume= 3.649 af, Atten= 20%, Lag= 48.6 min
Primary = 2.59 cfs @ 122.24 hrs, Volume= 3.649 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 926.50' Surf.Area= 0.401 ac Storage= 1.319 af
Peak Elev= 927.25' @ 122.24 hrs Surf.Area= 0.524 ac Storage= 1.665 af (0.346 af above start)

Plug-Flow detention time= 2,578.8 min calculated for 2.330 af (63% of inflow)
Center-of-Mass det. time= 165.7 min (7,161.9 - 6,996.2)

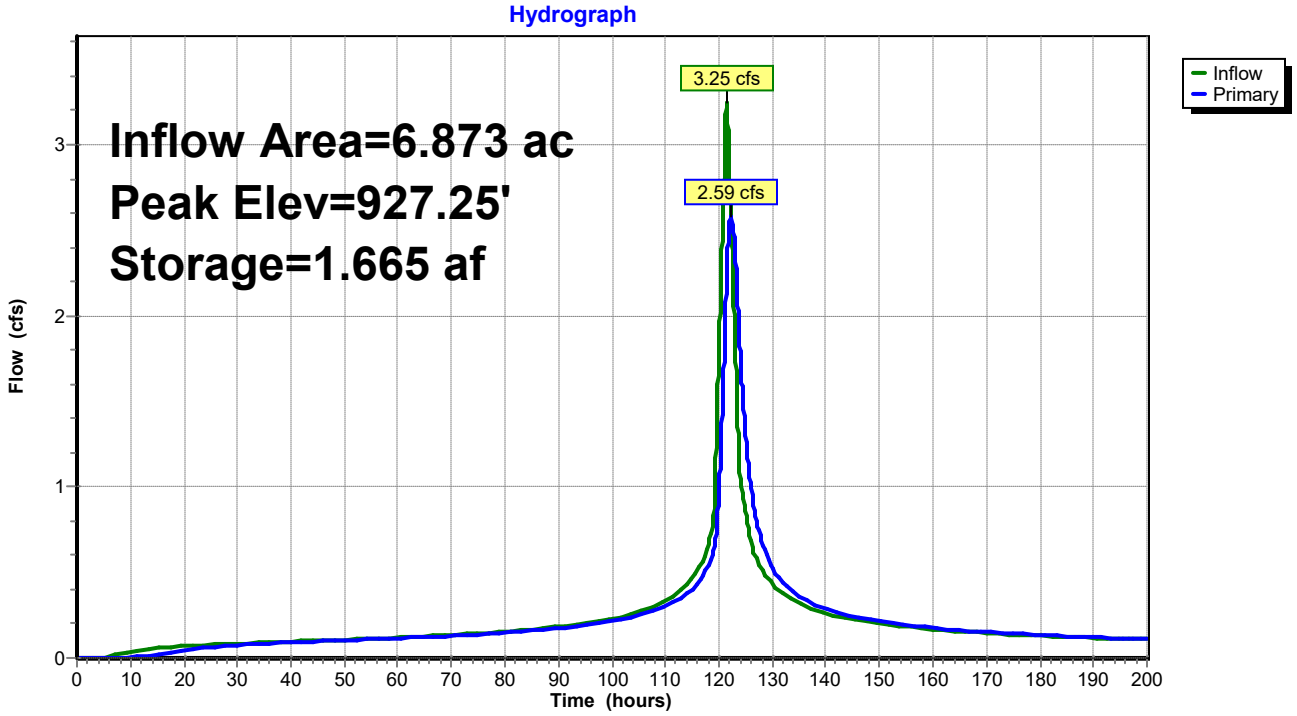
Volume	Invert	Avail.Storage	Storage Description
#1	918.50'	3.505 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
918.50	0.053	0.000	0.000
920.00	0.083	0.102	0.102
922.00	0.135	0.218	0.320
924.00	0.199	0.334	0.654
925.50	0.254	0.340	0.994
926.00	0.324	0.144	1.138
926.50	0.401	0.181	1.319
927.50	0.566	0.484	1.803
928.00	0.619	0.296	2.099
930.00	0.787	1.406	3.505

Device	Routing	Invert	Outlet Devices
#1	Primary	926.50'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.50' / 926.00' S= 0.0172 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	925.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=2.59 cfs @ 122.24 hrs HW=927.25' TW=925.18' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 2.59 cfs @ 2.94 fps)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Culvert** (Passes 2.59 cfs of 7.35 cfs potential flow)

Pond 43P: Proposed East Central Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth > 4.22" for 100-year, 10-day snowmelt event
Inflow = 7.65 cfs @ 121.64 hrs, Volume= 13.885 af
Outflow = 4.51 cfs @ 125.37 hrs, Volume= 8.571 af, Atten= 41%, Lag= 224.1 min
Primary = 4.51 cfs @ 125.37 hrs, Volume= 8.571 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 941.60' @ 125.37 hrs Surf.Area= 143,918 sf Storage= 241,706 cf

Plug-Flow detention time= 2,457.6 min calculated for 8.571 af (62% of inflow)
Center-of-Mass det. time= 1,231.3 min (8,990.5 - 7,759.2)

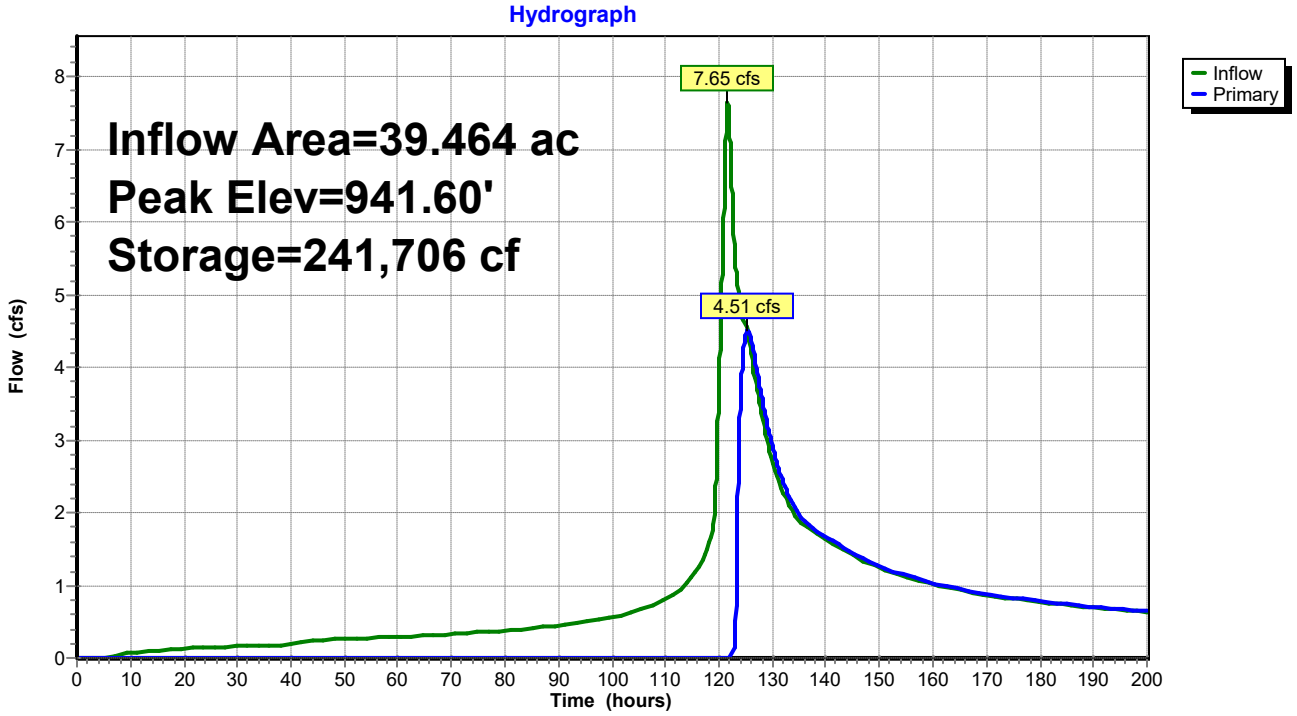
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	303,458 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
938.00	4,444	0	0
940.00	69,653	74,097	74,097
941.00	111,935	90,794	164,891
942.00	165,198	138,567	303,458

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=4.51 cfs @ 125.37 hrs HW=941.60' TW=925.35' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 4.51 cfs @ 1.02 fps)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 70.36" for 100-year, 10-day snowmelt event
Inflow = 7.53 cfs @ 123.33 hrs, Volume= 22.047 af
Outflow = 7.53 cfs @ 123.37 hrs, Volume= 21.824 af, Atten= 0%, Lag= 2.6 min
Primary = 7.53 cfs @ 123.37 hrs, Volume= 21.824 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 938.67' @ 123.37 hrs Surf.Area= 11,337 sf Storage= 11,107 cf

Plug-Flow detention time= 112.7 min calculated for 21.819 af (99% of inflow)
Center-of-Mass det. time= 65.0 min (7,280.9 - 7,215.9)

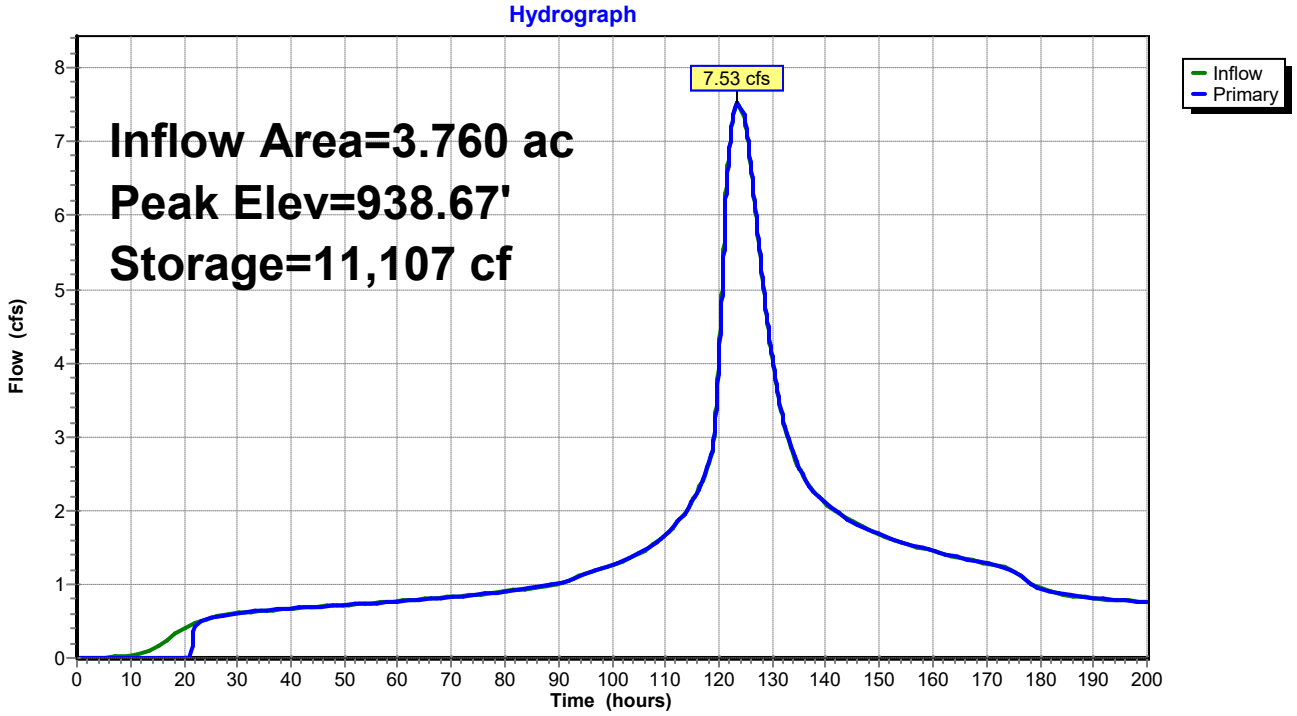
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	15,364 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
936.00	178	0	0
938.00	5,354	5,532	5,532
939.00	14,309	9,832	15,364

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=7.53 cfs @ 123.37 hrs HW=938.67' TW=925.32' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 7.53 cfs @ 1.31 fps)

Pond 60P: Wetland 5B



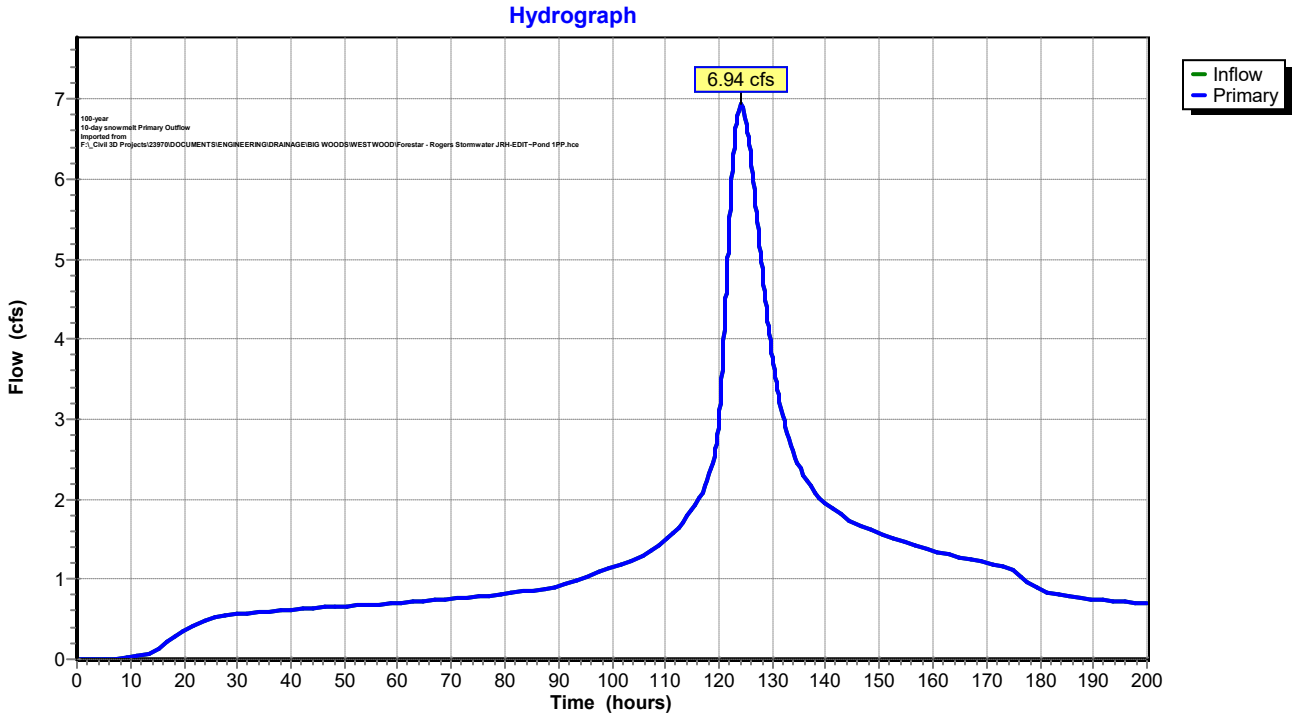
Summary for Link 1PP: Northwest Wetland

Inflow = 6.94 cfs @ 124.13 hrs, Volume= 20.018 af
Primary = 6.94 cfs @ 124.13 hrs, Volume= 20.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

100-year, 10-day snowmelt Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\

Link 1PP: Northwest Wetland



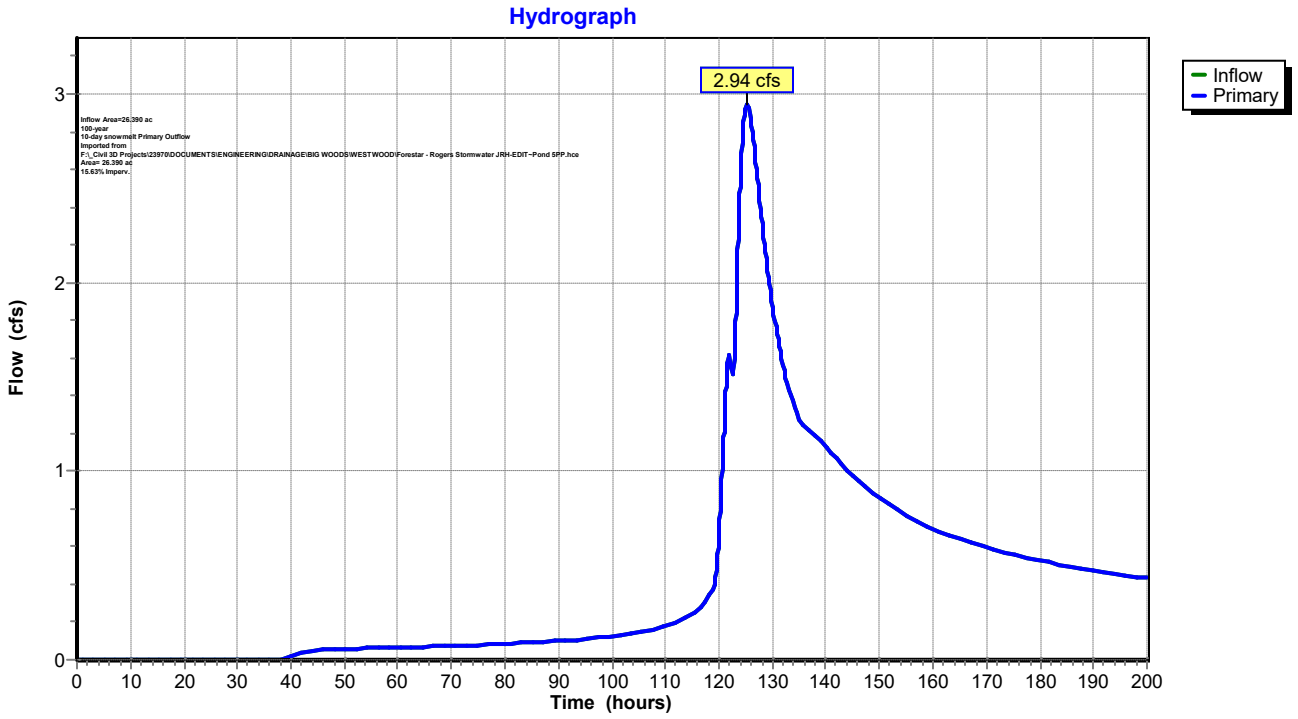
Summary for Link 5PP: Existing Pond

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth > 3.11" for 100-year, 10-day snowmelt event
Inflow = 2.94 cfs @ 125.27 hrs, Volume= 6.834 af
Primary = 2.94 cfs @ 125.27 hrs, Volume= 6.834 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

100-year, 10-day snowmelt Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\

Link 5PP: Existing Pond



Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=0.53"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=127.59 cfs 13.215 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=19.438 ac 21.11% Impervious Runoff Depth=1.46"
Flow Length=1,602' Tc=23.6 min CN=86/98 Runoff=28.13 cfs 2.365 af

Subcatchment 11S: Direct to Cowley Lake Runoff Area=6.152 ac 3.35% Impervious Runoff Depth=1.10"
Flow Length=1,308' Tc=15.2 min CN=83/98 Runoff=8.48 cfs 0.562 af

Subcatchment 12S: Fugitve to Fox Creek Runoff Area=0.547 ac 45.16% Impervious Runoff Depth=1.51"
Flow Length=165' Tc=8.1 min CN=80/98 Runoff=1.25 cfs 0.069 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=3.970 ac 7.66% Impervious Runoff Depth=0.95"
Flow Length=310' Tc=10.9 min CN=79/98 Runoff=5.31 cfs 0.313 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.782 ac 1.28% Impervious Runoff Depth=0.86"
Flow Length=392' Tc=17.3 min CN=79/98 Runoff=0.77 cfs 0.056 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=3.027 ac 10.37% Impervious Runoff Depth=0.99"
Flow Length=309' Tc=17.0 min CN=79/98 Runoff=3.42 cfs 0.249 af

Subcatchment 23S: Direct to Proposed Runoff Area=3.385 ac 0.68% Impervious Runoff Depth=0.95"
Flow Length=243' Tc=13.3 min CN=81/98 Runoff=4.30 cfs 0.268 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=7.873 ac 5.31% Impervious Runoff Depth=1.01"
Flow Length=407' Tc=11.1 min CN=81/98 Runoff=11.40 cfs 0.665 af

Subcatchment 25S: Direct to Proposed Runoff Area=15.059 ac 29.82% Impervious Runoff Depth=1.34"
Flow Length=1,817' Tc=17.1 min CN=81/98 Runoff=22.84 cfs 1.680 af

Subcatchment 26S: Direct to Proposed Runoff Area=4.398 ac 38.38% Impervious Runoff Depth=1.45"
Flow Length=621' Tc=8.6 min CN=81/98 Runoff=9.59 cfs 0.532 af

Subcatchment 27S: Direct to Proposed Runoff Area=3.120 ac 47.02% Impervious Runoff Depth=1.63"
Flow Length=621' Tc=8.6 min CN=83/98 Runoff=7.60 cfs 0.423 af

Subcatchment 28S: Direct to Proposed Runoff Area=7.153 ac 50.64% Impervious Runoff Depth=1.64"
Flow Length=1,013' Tc=14.4 min CN=82/98 Runoff=14.27 cfs 0.979 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=34.136 ac 8.50% Impervious Runoff Depth=1.11"
Flow Length=1,249' Tc=23.4 min CN=82/98 Runoff=37.52 cfs 3.147 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=0.81"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=10.74 cfs 1.346 af

Subcatchment 32S: Direct to Proposed Runoff Area=3.686 ac 36.52% Impervious Runoff Depth=1.50"
Flow Length=440' Slope=0.0200 '/' Tc=7.1 min CN=83/98 Runoff=8.91 cfs 0.461 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=67.435 ac 2.92% Impervious Runoff Depth=1.41"
Flow Length=1,354' Tc=23.6 min CN=88/98 Runoff=96.69 cfs 7.909 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=1.07"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=21.24 cfs 1.228 af

Subcatchment 42S: Direct to Proposed Runoff Area=2.612 ac 32.54% Impervious Runoff Depth=1.34"
Flow Length=422' Tc=10.2 min CN=80/98 Runoff=4.90 cfs 0.291 af

Subcatchment 43S: Direct to Proposed Runoff Area=6.873 ac 41.00% Impervious Runoff Depth=1.52"
Flow Length=1,173' Tc=14.8 min CN=82/98 Runoff=12.59 cfs 0.870 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=1.37"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=17.08 cfs 1.497 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=1.29"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=8.31 cfs 0.405 af

Reach 1R: Cowley Lake Outlet Channel Inflow=8.79 cfs 2.928 af
Outflow=8.79 cfs 2.928 af

Reach 2R: Cowley Lake Inflow=52.83 cfs 23.224 af
Outflow=52.83 cfs 23.224 af

Reach 21R: Proposed East Channel Avg. Flow Depth=0.68' Max Vel=4.58 fps Inflow=15.82 cfs 13.164 af
n=0.022 L=264.0' S=0.0125 '/' Capacity=149.23 cfs Outflow=15.82 cfs 13.164 af

Reach 23R: Existing West Channel Avg. Flow Depth=0.95' Max Vel=3.15 fps Inflow=29.45 cfs 7.154 af
n=0.022 L=251.0' S=0.0037 '/' Capacity=321.50 cfs Outflow=29.45 cfs 7.154 af

Pond 7P: Whiteford Lake and Wetlands Peak Elev=930.22' Storage=13.215 af Inflow=127.59 cfs 13.215 af
Outflow=0.00 cfs 0.000 af

Pond 10P: Proposed Northeast Peak Elev=922.23' Storage=4.487 af Inflow=28.13 cfs 2.365 af
Outflow=2.39 cfs 2.365 af

Pond 25P: Proposed Northwest Peak Elev=925.98' Storage=2.306 af Inflow=22.84 cfs 1.680 af
Outflow=0.54 cfs 1.680 af

Pond 26P: Proposed Northwest Central Peak Elev=924.65' Storage=1.427 af Inflow=10.27 cfs 0.953 af
Outflow=0.37 cfs 0.953 af

Pond 27P: Proposed Northwest Central Peak Elev=925.19' Storage=0.958 af Inflow=7.60 cfs 0.423 af
Outflow=1.32 cfs 0.420 af

Pond 28P: Proposed Northeast Central Peak Elev=922.62' Storage=1.314 af Inflow=14.27 cfs 0.979 af
Outflow=7.78 cfs 0.979 af

Pond 30P: Wetland 4A Peak Elev=925.60' Storage=1.044 af Inflow=47.98 cfs 4.954 af
Primary=16.33 cfs 3.025 af Secondary=2.99 cfs 1.929 af Outflow=19.31 cfs 4.954 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=931.92' Storage=0.004 af Inflow=10.74 cfs 1.346 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=10.74 cfs 1.346 af

Pond 32P: Proposed West Central Pond Peak Elev=928.36' Storage=1.366 af Inflow=8.91 cfs 0.461 af
Outflow=3.50 cfs 0.461 af

Pond 40P: Wetland 2B Peak Elev=924.97' Storage=5.065 af Inflow=105.34 cfs 13.108 af
60.0" x 36.0" Box Culvert n=0.013 L=138.0' S=0.0029 '/' Outflow=15.75 cfs 13.108 af

Pond 41P: Ex South Off-site Pond Peak Elev=939.12' Storage=1.228 af Inflow=21.24 cfs 1.228 af
Outflow=0.00 cfs 0.000 af

Pond 42P: Proposed South Central Pond Peak Elev=929.13' Storage=0.424 af Inflow=4.90 cfs 0.291 af
Outflow=1.68 cfs 0.291 af

Pond 43P: Proposed East Central Pond Peak Elev=927.37' Storage=1.733 af Inflow=12.59 cfs 0.870 af
Outflow=3.40 cfs 0.868 af

Pond 50P: Wetland 4B Peak Elev=940.02' Storage=75,669 cf Inflow=17.34 cfs 1.737 af
Outflow=0.00 cfs 0.000 af

Pond 60P: Wetland 5B Peak Elev=938.62' Storage=10,559 cf Inflow=9.74 cfs 4.254 af
Outflow=4.34 cfs 4.040 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=4.11 cfs 3.849 af
Primary=4.11 cfs 3.849 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=0.93 cfs 0.240 af
Area= 26.390 ac 15.63% Imperv. Primary=0.93 cfs 0.240 af

Total Runoff Area = 540.193 ac Runoff Volume = 38.531 af Average Runoff Depth = 0.86"
93.94% Pervious = 507.441 ac 6.06% Impervious = 32.752 ac

Summary for Subcatchment 7S: Approx DA to Lake

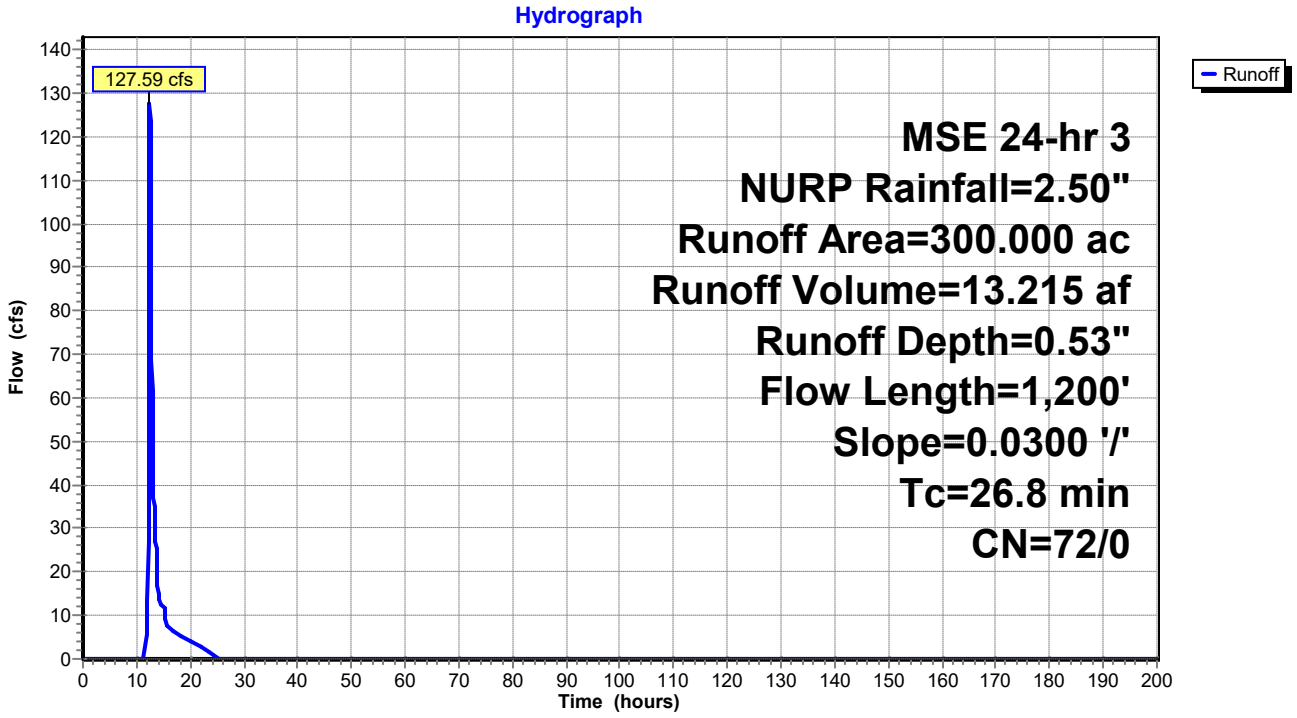
Runoff = 127.59 cfs @ 12.44 hrs, Volume= 13.215 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

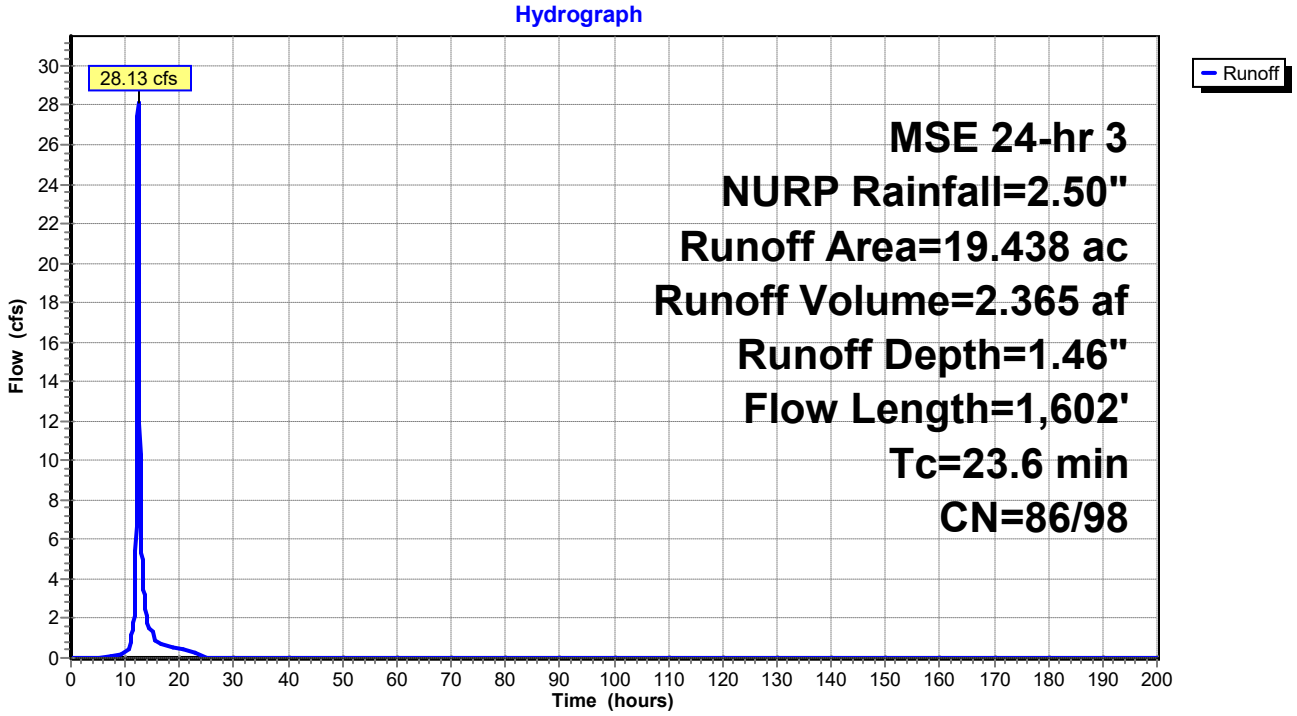
Runoff = 28.13 cfs @ 12.34 hrs, Volume= 2.365 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.399	98	Unconnected pavement, HSG D
1.088	98	Unconnected roofs, HSG D
1.617	98	Paved roads w/curbs & sewers, HSG D
0.606	98	Paved parking, HSG D
0.393	98	Roofs, HSG D
0.699	98	Water Surface, 0% imp, HSG D
8.527	89	Row crops, straight row, Good, HSG D
4.972	80	>75% Grass cover, Good, HSG D
1.137	78	Meadow, non-grazed, HSG D
19.438	88	Weighted Average
15.335	86	78.89% Pervious Area
4.103	98	21.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
14.6	842	0.0114	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.7	660		3.00		**Direct Entry, Pipe flow @ 3 fps**
23.6	1,602	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 11S: Direct to Cowley Lake Outlet Channel

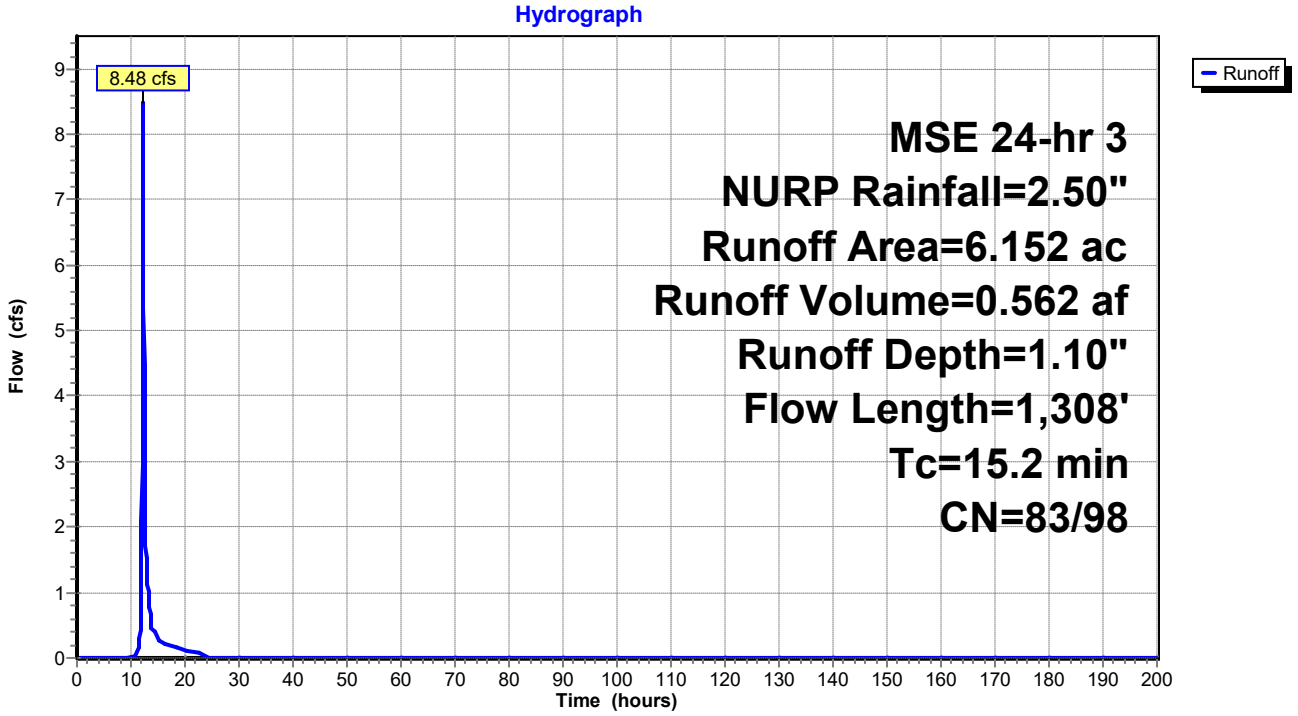
Runoff = 8.48 cfs @ 12.25 hrs, Volume= 0.562 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.024	98	Unconnected pavement, HSG D
0.182	98	Unconnected roofs, HSG D
1.316	98	Water Surface, 0% imp, HSG D
1.199	80	>75% Grass cover, Good, HSG D
2.901	78	Meadow, non-grazed, HSG D
0.530	77	Woods, Good, HSG D
6.152	83	Weighted Average
5.946	83	96.65% Pervious Area
0.206	98	3.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0300	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.8	114	0.0263	2.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	1,094	0.0024	3.27	46.64	**Trap/Vee/Rect Channel Flow,** Bot.W=5.00' D=1.50' Z= 3.0 '/' Top.W=14.00' n= 0.022 Earth, clean & straight
15.2	1,308	Total			

Subcatchment 11S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 12S: Fugitve to Fox Creek West 5th Addition

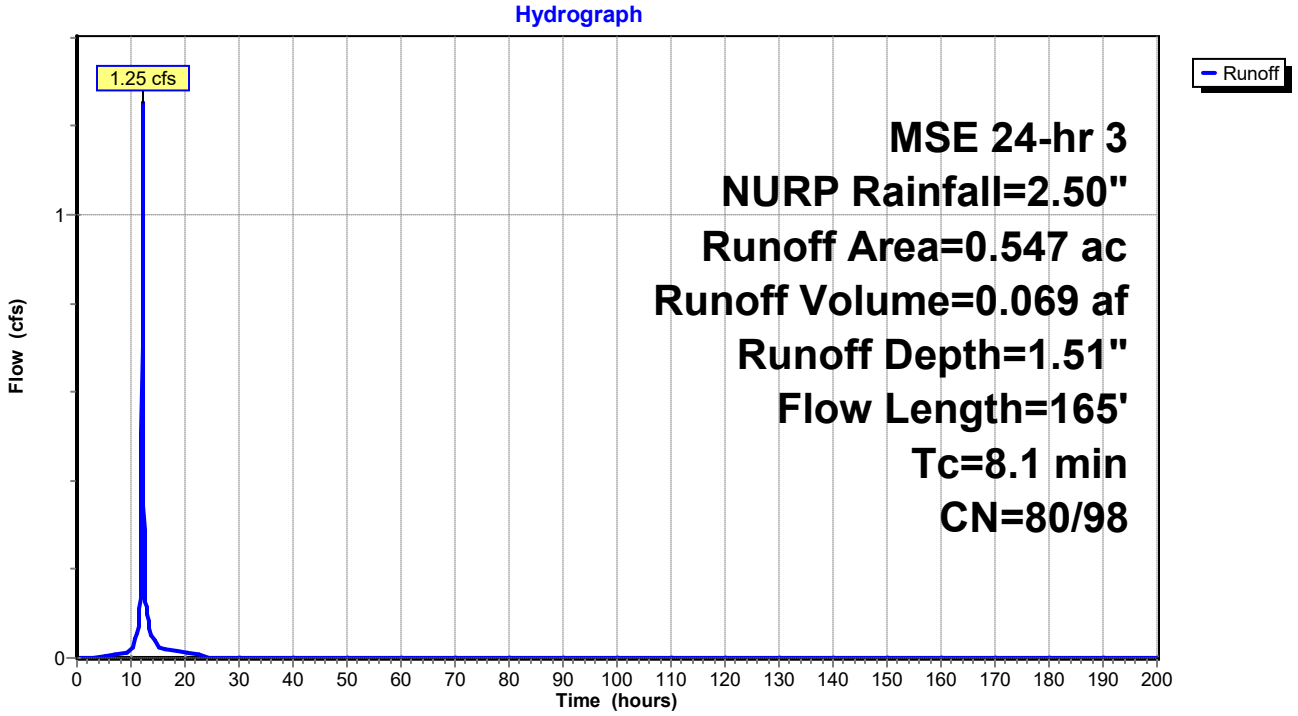
Runoff = 1.25 cfs @ 12.15 hrs, Volume= 0.069 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.015	98	Unconnected pavement, HSG D
0.043	98	Unconnected roofs, HSG D
0.104	98	Paved roads w/curbs & sewers, HSG D
0.051	98	Paved parking, HSG D
0.034	98	Roofs, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.547	88	Weighted Average
0.300	80	54.84% Pervious Area
0.247	98	45.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.3	40	0.0250	2.37		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0120	2.22		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.1	165	Total			

Subcatchment 12S: Fugitve to Fox Creek West 5th Addition



Summary for Subcatchment 20S: Direct to Cowley Lake

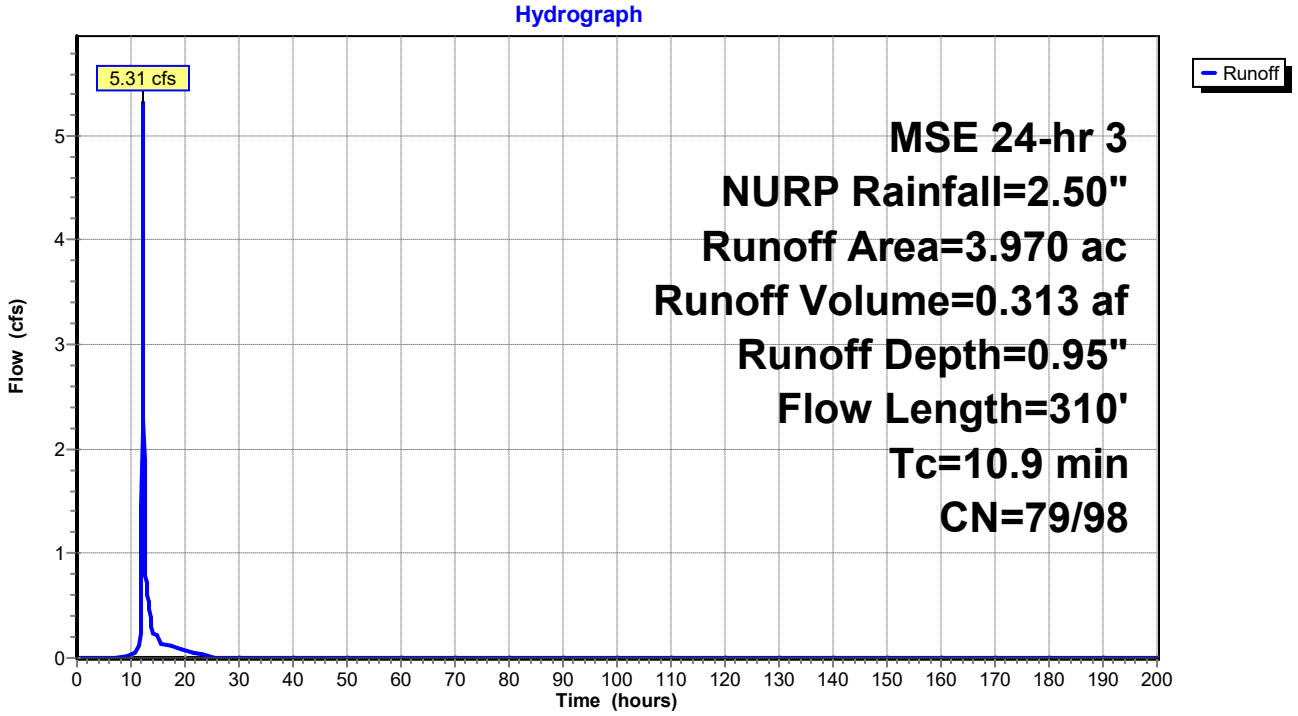
Runoff = 5.31 cfs @ 12.20 hrs, Volume= 0.313 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.046	98	Unconnected pavement, HSG D
0.258	98	Unconnected roofs, HSG D
0.122	98	Water Surface, 0% imp, HSG D
0.949	80	>75% Grass cover, Good, HSG D
1.018	78	Meadow, non-grazed, HSG D
1.577	77	Woods, Good, HSG D
3.970	80	Weighted Average
3.666	79	92.34% Pervious Area
0.304	98	7.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	100	0.0270	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	72	0.0347	2.79		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	138	0.0667	1.81		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.9	310	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

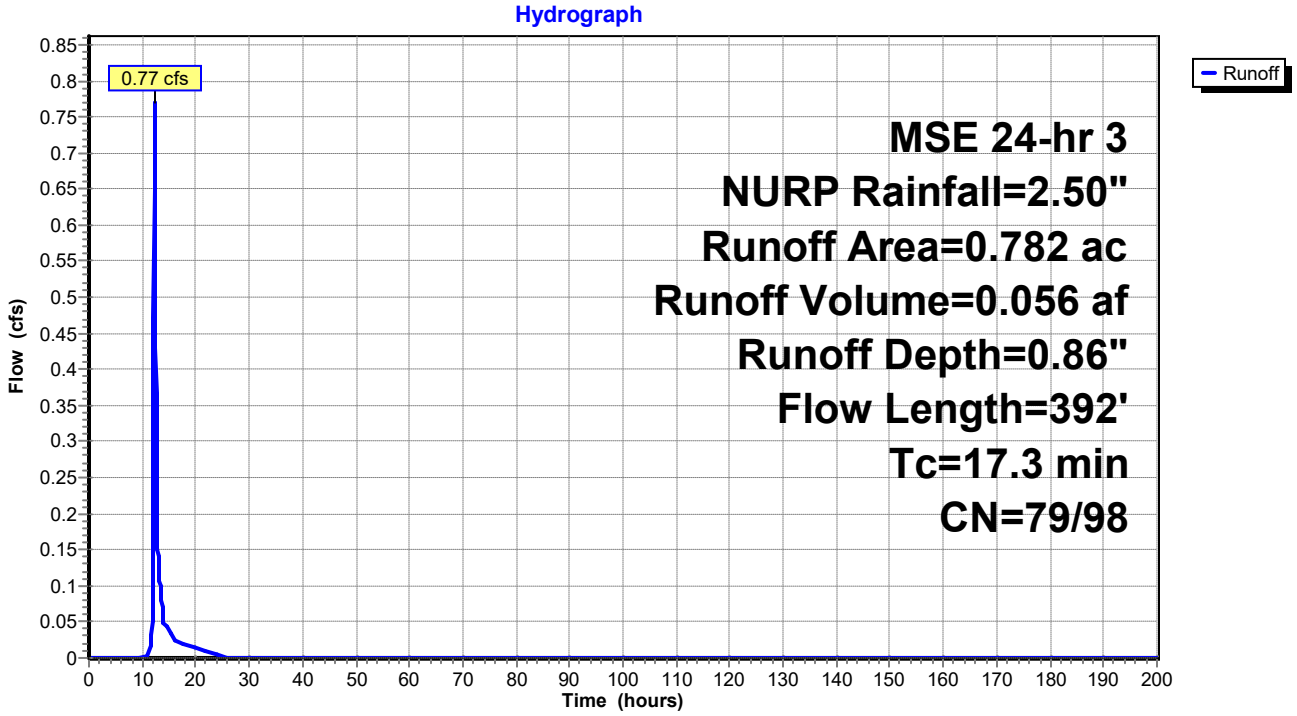
Runoff = 0.77 cfs @ 12.28 hrs, Volume= 0.056 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.010	98	Unconnected pavement, HSG D
0.054	98	Water Surface, 0% imp, HSG D
0.016	80	>75% Grass cover, Good, HSG D
0.162	78	Meadow, non-grazed, HSG D
0.540	77	Woods, Good, HSG D
0.782	79	Weighted Average
0.772	79	98.72% Pervious Area
0.010	98	1.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0590	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
2.3	146	0.0452	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	146	0.0164	10.55	221.46	**Channel Flow,** Area= 21.0 sf Perim= 15.6' r= 1.35' n= 0.022 Earth, clean & straight
17.3	392	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

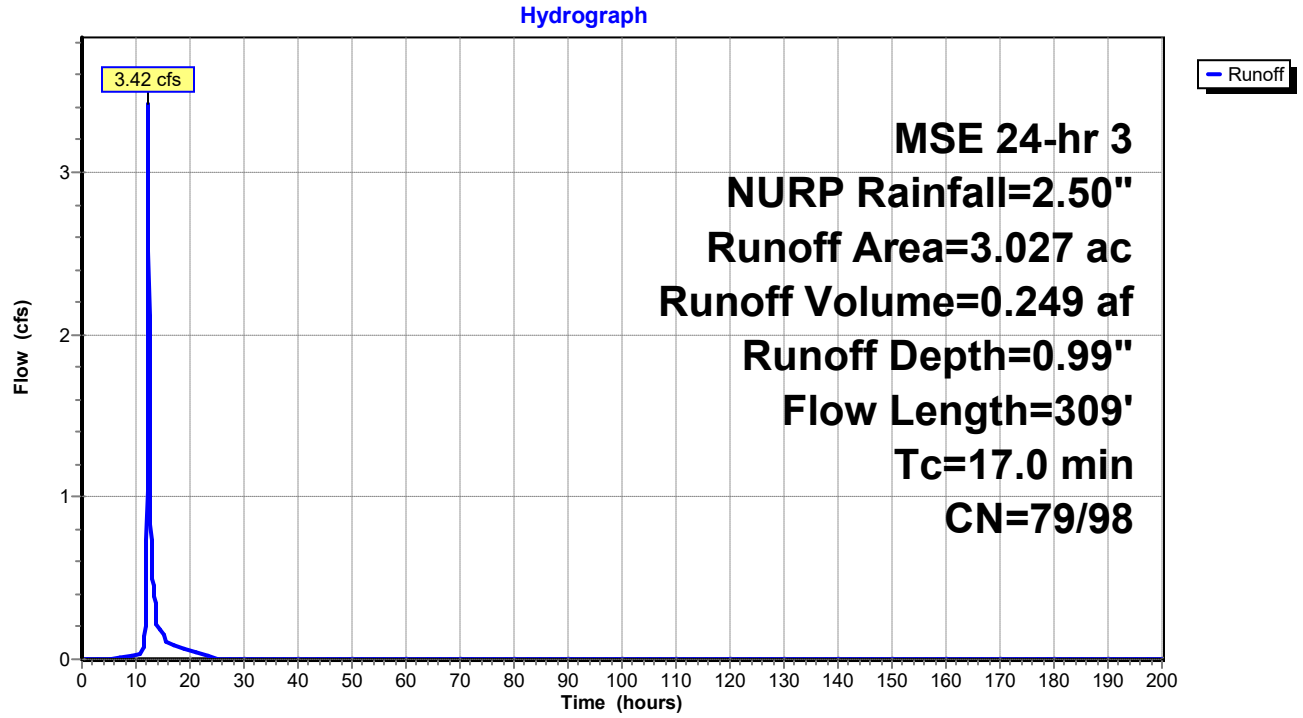
Runoff = 3.42 cfs @ 12.27 hrs, Volume= 0.249 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.125	98	Unconnected pavement, HSG D
0.189	98	Unconnected roofs, HSG D
0.031	98	Water Surface, 0% imp, HSG D
0.779	80	>75% Grass cover, Good, HSG D
1.348	78	Meadow, non-grazed, HSG D
0.555	77	Woods, Good, HSG D
3.027	81	Weighted Average
2.713	79	89.63% Pervious Area
0.314	98	10.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	100	0.0220	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
2.4	209	0.0445	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.0	309	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Proposed West Channel

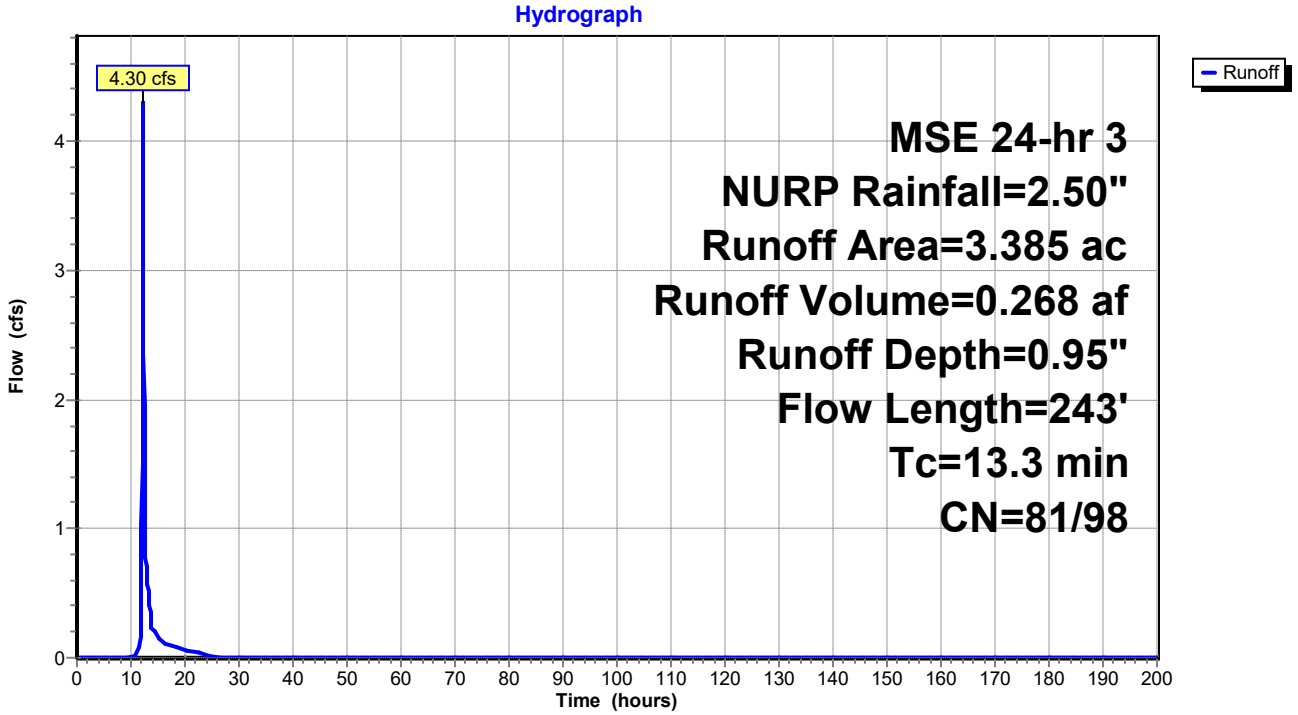
Runoff = 4.30 cfs @ 12.22 hrs, Volume= 0.268 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.023	98	Unconnected pavement, HSG D
0.467	98	Water Surface, 0% imp, HSG D
0.253	80	>75% Grass cover, Good, HSG D
1.225	78	Meadow, non-grazed, HSG D
1.417	77	Woods, Good, HSG D
3.385	81	Weighted Average
3.362	81	99.32% Pervious Area
0.023	98	0.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0520	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.84"
3.0	143	0.0259	0.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.3	243	Total			

Subcatchment 23S: Direct to Proposed West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

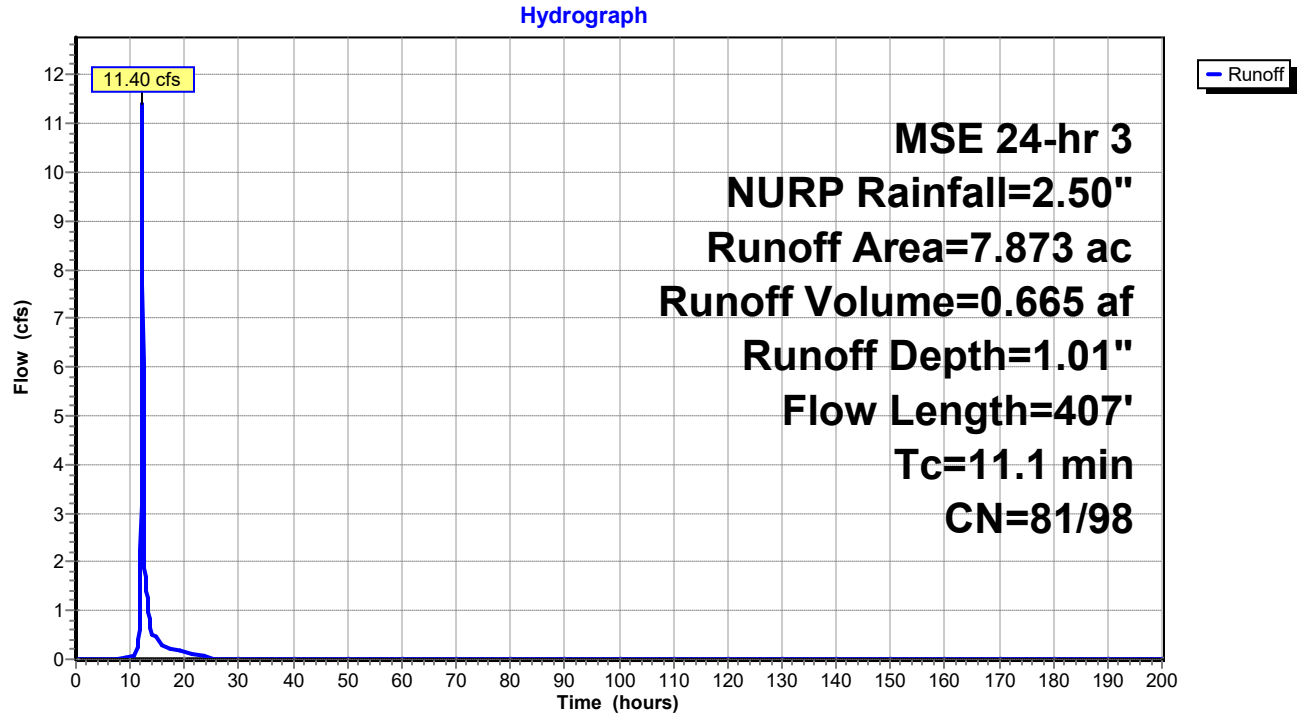
Runoff = 11.40 cfs @ 12.20 hrs, Volume= 0.665 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.379	98	Unconnected roofs, HSG D
0.980	98	Water Surface, 0% imp, HSG D
1.643	80	>75% Grass cover, Good, HSG D
2.538	78	Meadow, non-grazed, HSG D
2.294	77	Woods, Good, HSG D
7.873	82	Weighted Average
7.455	81	94.69% Pervious Area
0.418	98	5.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	100	0.0600	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
4.4	307	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.1	407	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 25S: Direct to Proposed Northwest Pond

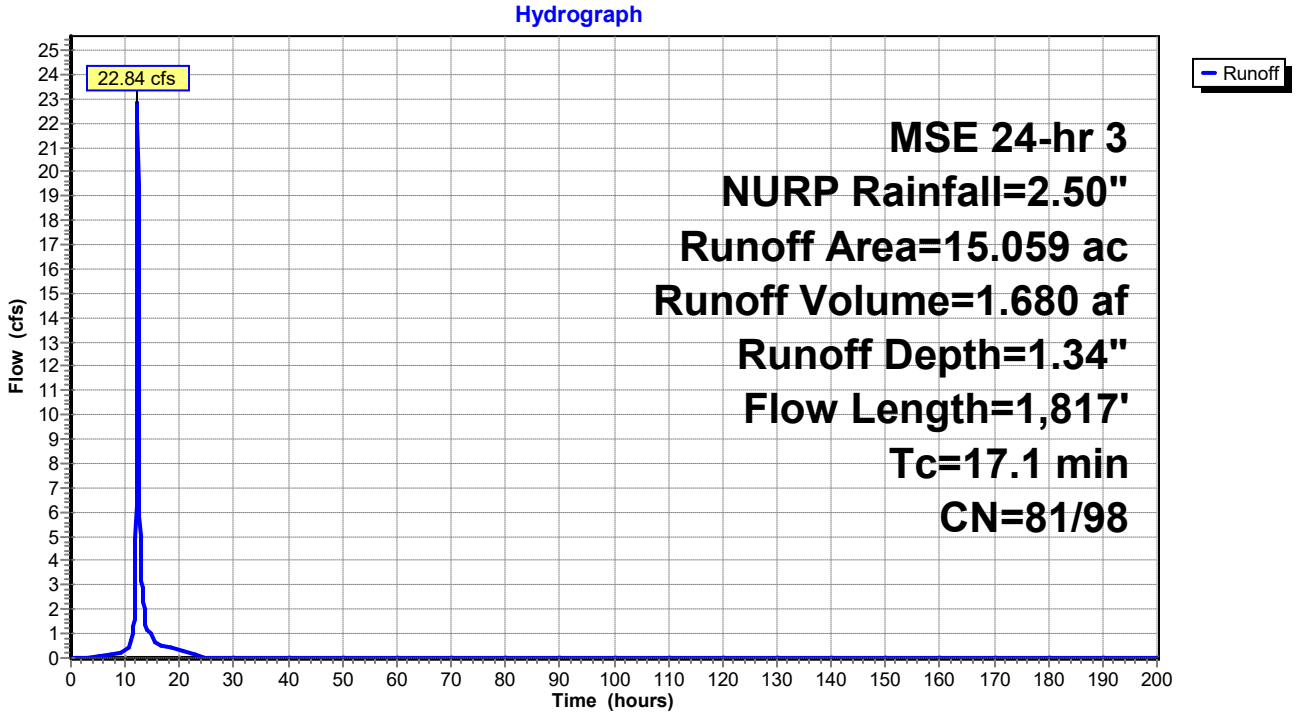
Runoff = 22.84 cfs @ 12.26 hrs, Volume= 1.680 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.652	98	Unconnected pavement, HSG D
1.214	98	Unconnected roofs, HSG D
1.443	98	Paved roads w/curbs & sewers, HSG D
0.758	98	Paved parking, HSG D
0.424	98	Roofs, HSG D
0.322	98	Water Surface, 0% imp, HSG D
0.084	96	Gravel surface, HSG D
0.179	89	Row crops, straight row, Good, HSG D
8.582	80	>75% Grass cover, Good, HSG D
1.401	78	Meadow, non-grazed, HSG D
15.059	86	Weighted Average
10.568	81	70.18% Pervious Area
4.491	98	29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	90	0.0378	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
0.4	57	0.0200	2.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.3	1,670		3.00		**Direct Entry, Pipe flow @ 3 fps**
17.1	1,817	Total			

Subcatchment 25S: Direct to Proposed Northwest Pond



Summary for Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration

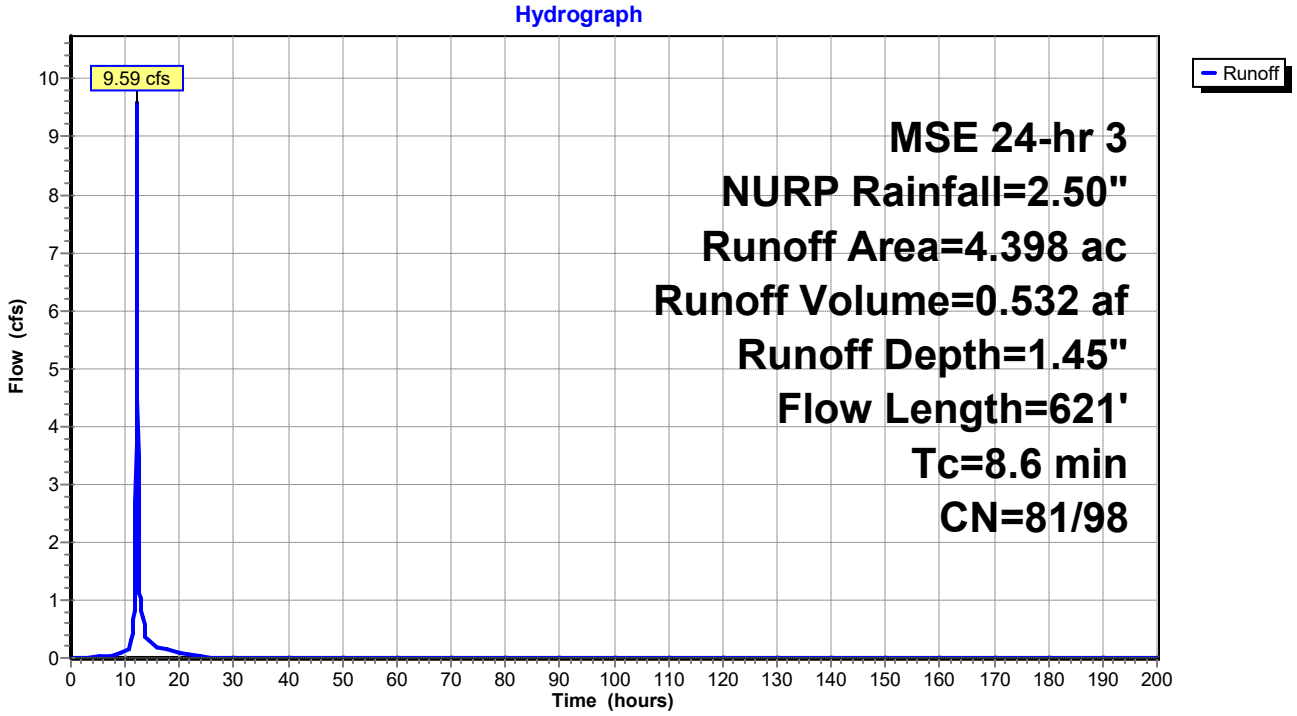
Runoff = 9.59 cfs @ 12.16 hrs, Volume= 0.532 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.170	98	Unconnected pavement, HSG D
0.393	98	Unconnected roofs, HSG D
0.551	98	Paved roads w/curbs & sewers, HSG D
0.354	98	Paved parking, HSG D
0.220	98	Roofs, HSG D
0.318	98	Water Surface, 0% imp, HSG D
1.487	80	>75% Grass cover, Good, HSG D
0.905	78	Meadow, non-grazed, HSG D
4.398	88	Weighted Average
2.710	81	61.62% Pervious Area
1.688	98	38.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 26S: Direct to Proposed Northwest Central Pond/Filtration



Summary for Subcatchment 27S: Direct to Proposed Northwest Central Pond

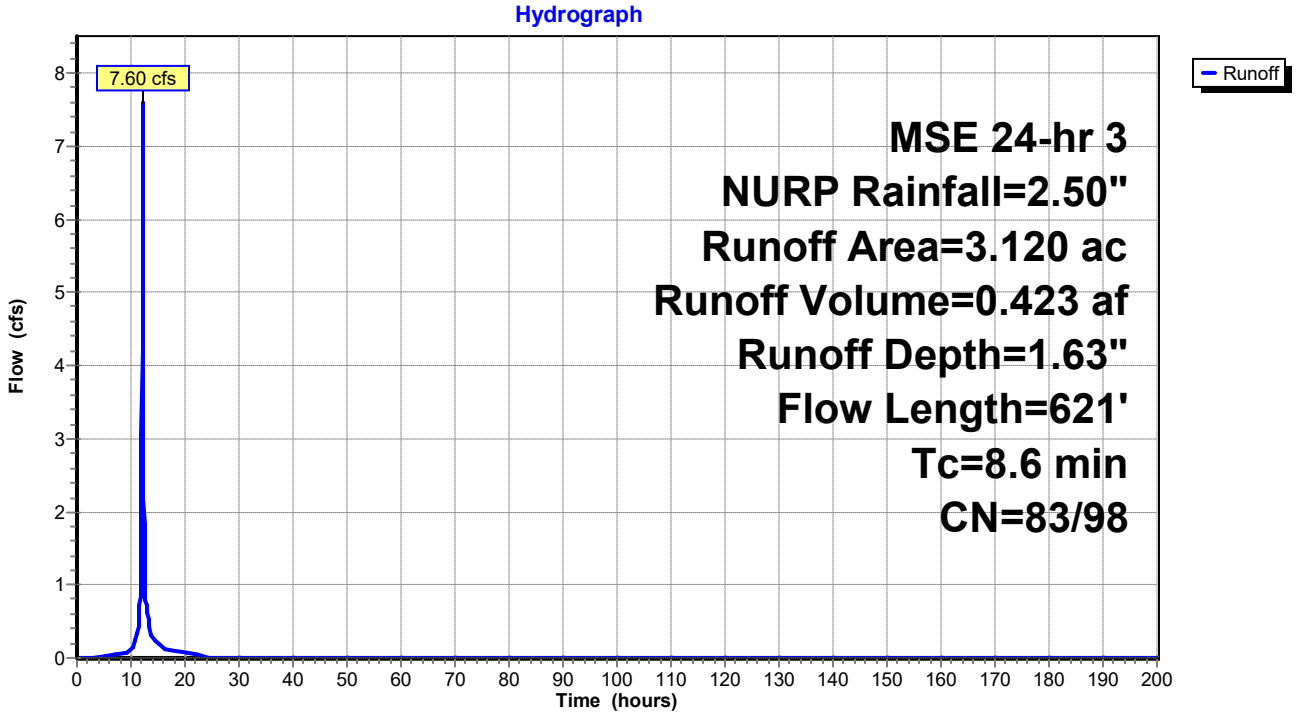
Runoff = 7.60 cfs @ 12.16 hrs, Volume= 0.423 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.134	98	Unconnected pavement, HSG D
0.275	98	Unconnected roofs, HSG D
0.506	98	Paved roads w/curbs & sewers, HSG D
0.328	98	Paved parking, HSG D
0.224	98	Roofs, HSG D
0.278	98	Water Surface, 0% imp, HSG D
0.979	80	>75% Grass cover, Good, HSG D
0.396	78	Meadow, non-grazed, HSG D
3.120	90	Weighted Average
1.653	83	52.98% Pervious Area
1.467	98	47.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.1	288	0.0132	2.33		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	294		3.00		**Direct Entry, Pipe flow @ 3 fps**
8.6	621	Total			

Subcatchment 27S: Direct to Proposed Northwest Central Pond



Summary for Subcatchment 28S: Direct to Proposed Northeast Central Pond

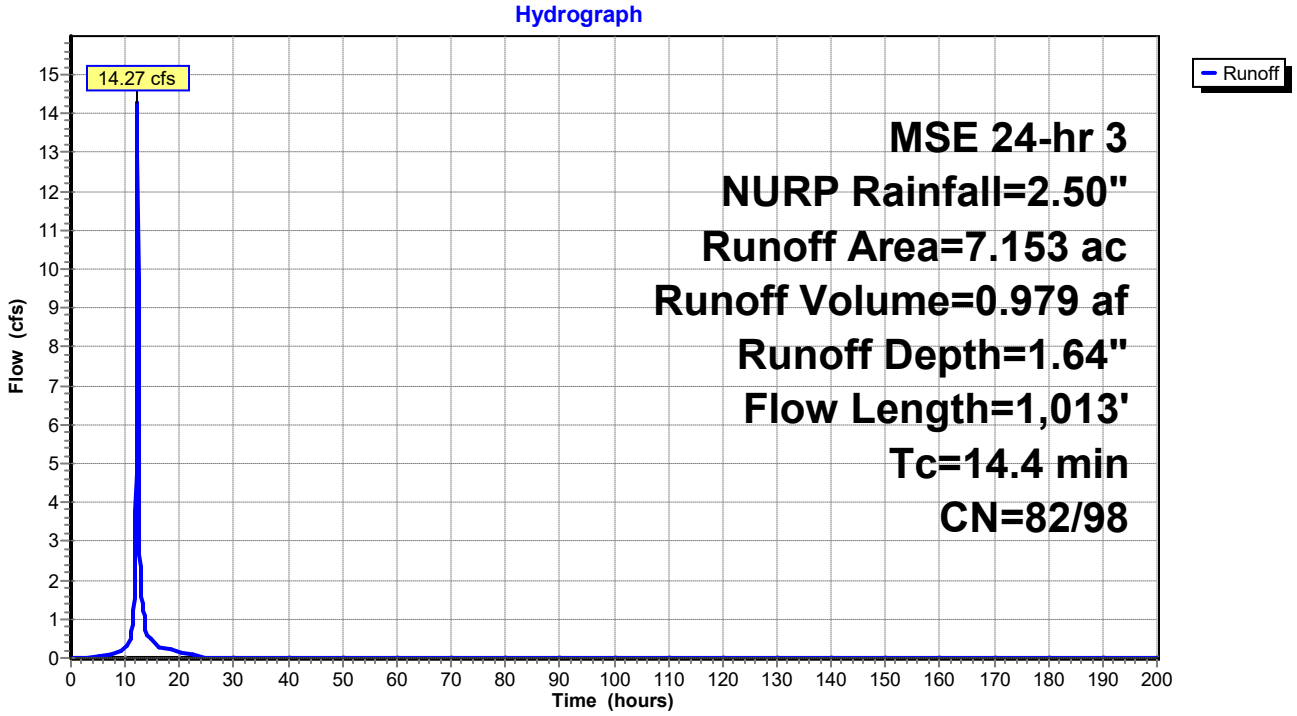
Runoff = 14.27 cfs @ 12.22 hrs, Volume= 0.979 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.152	98	Unconnected pavement, HSG D
0.932	98	Unconnected roofs, HSG D
0.930	98	Paved roads w/curbs & sewers, HSG D
1.004	98	Paved parking, HSG D
0.604	98	Roofs, HSG D
0.380	98	Water Surface, 0% imp, HSG D
2.416	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
0.051	77	Woods, Good, HSG D
7.153	90	Weighted Average
3.531	82	49.36% Pervious Area
3.622	98	50.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	71	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.6	242	0.0060	1.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.9	700		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.4	1,013	Total			

Subcatchment 28S: Direct to Proposed Northeast Central Pond



Summary for Subcatchment 30S: Direct to Wetland 4A

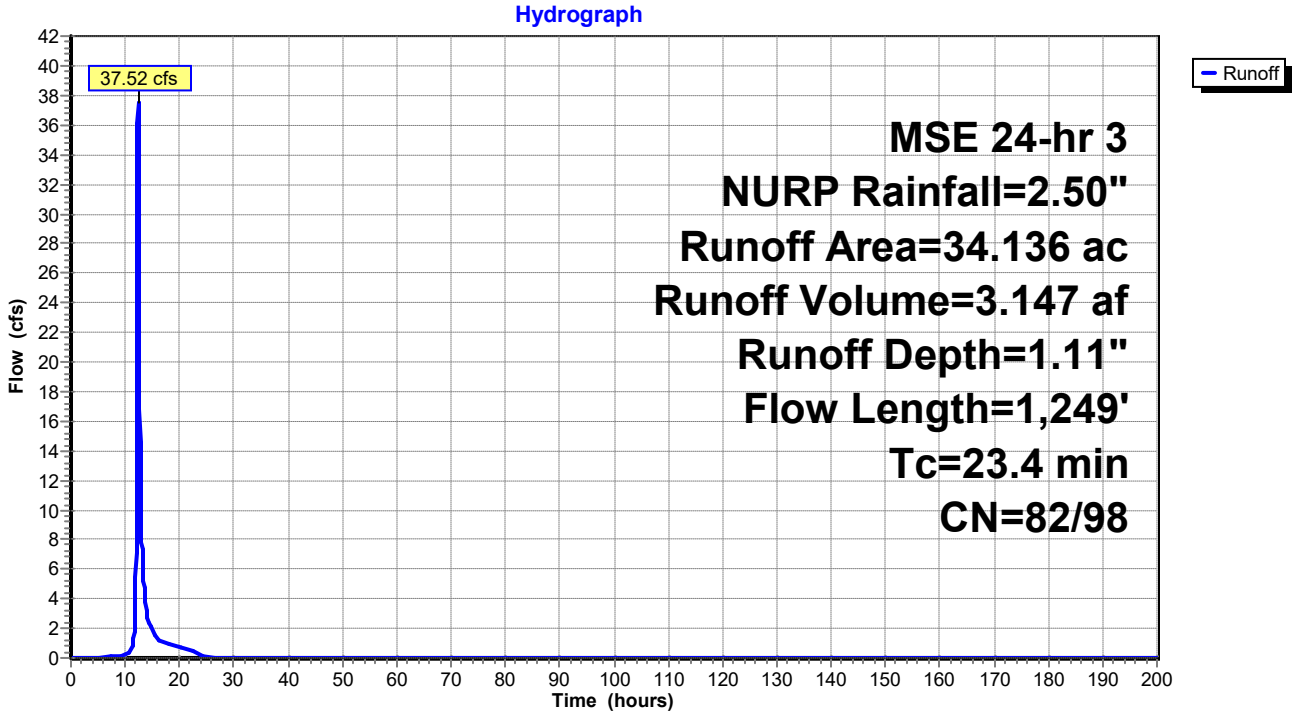
Runoff = 37.52 cfs @ 12.35 hrs, Volume= 3.147 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
1.401	98	Unconnected pavement, HSG D
1.502	98	Unconnected roofs, HSG D
0.939	96	Gravel surface, HSG D
6.512	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
18.400	80	>75% Grass cover, Good, HSG D
3.773	77	Woods, Good, HSG D
34.136	84	Weighted Average
31.233	82	91.50% Pervious Area
2.903	98	8.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

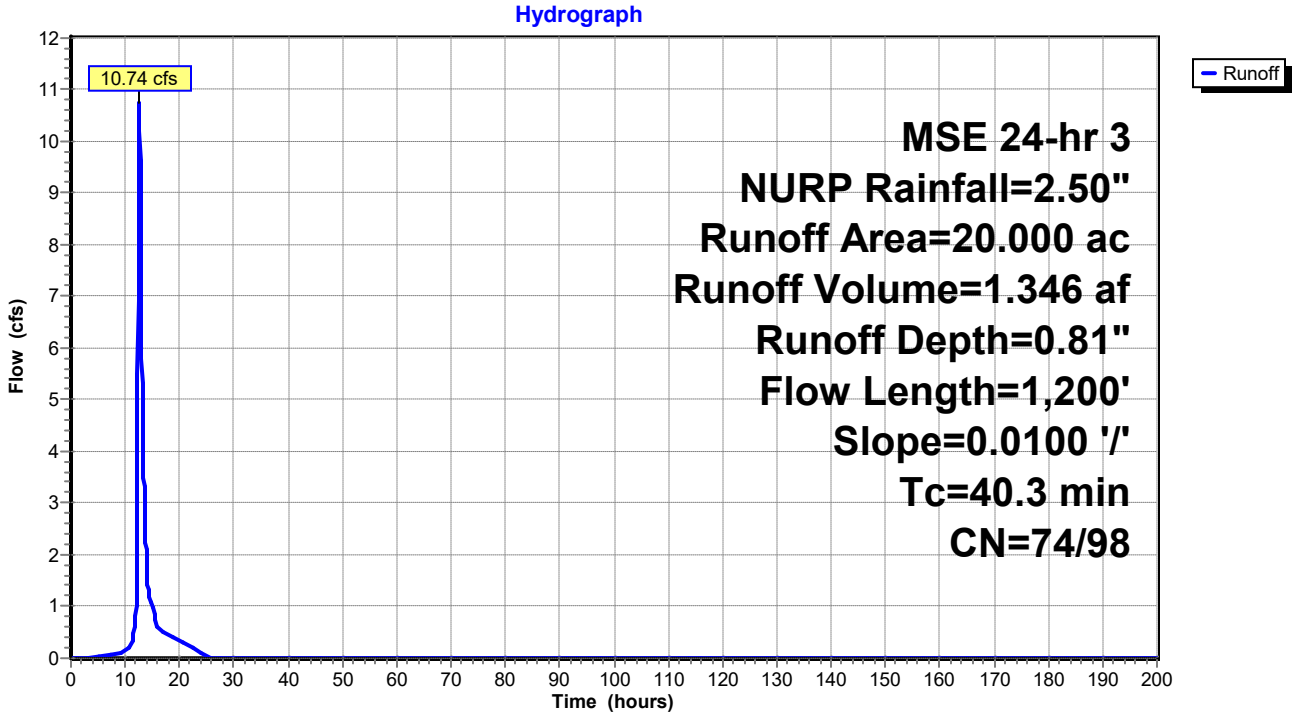
Runoff = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 32S: Direct to Proposed West Central Pond

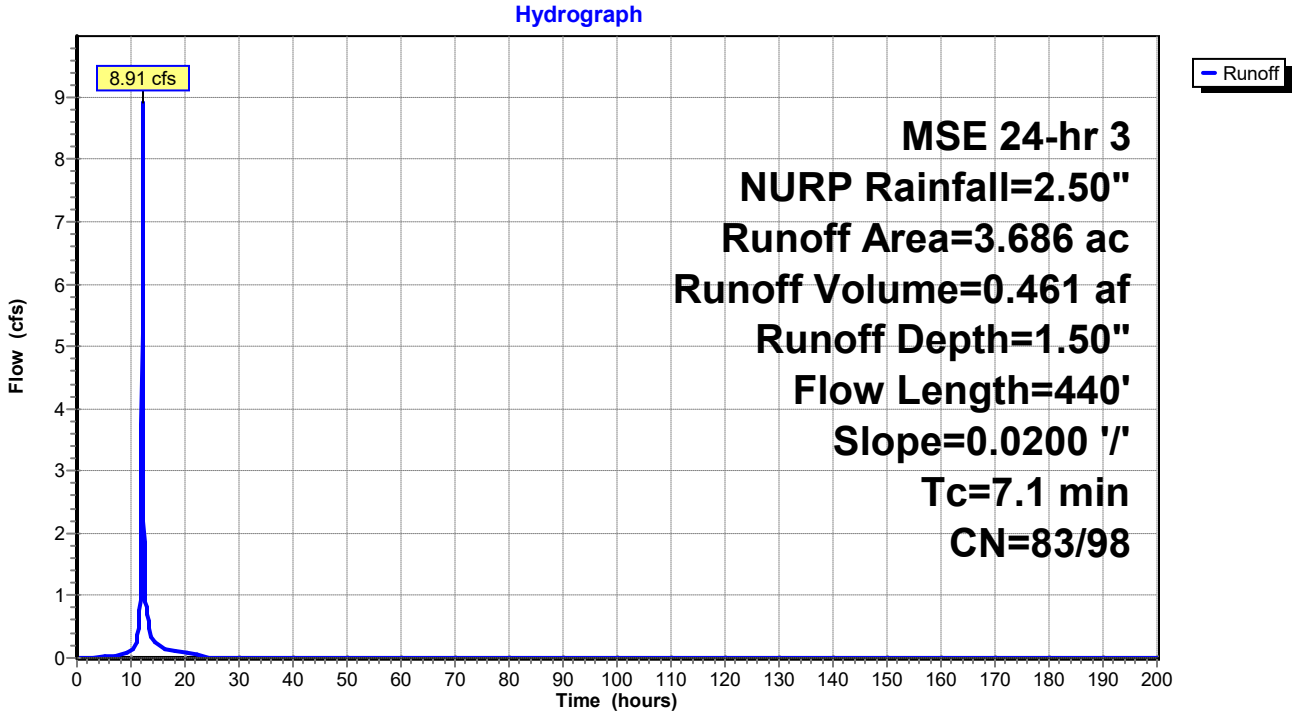
Runoff = 8.91 cfs @ 12.14 hrs, Volume= 0.461 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.039	98	Unconnected pavement, HSG D
0.438	98	Unconnected roofs, HSG D
0.377	98	Paved roads w/curbs & sewers, HSG D
0.298	98	Paved parking, HSG D
0.194	98	Roofs, HSG D
0.395	98	Water Surface, 0% imp, HSG D
1.443	80	>75% Grass cover, Good, HSG D
0.502	78	Meadow, non-grazed, HSG D
3.686	88	Weighted Average
2.340	83	63.48% Pervious Area
1.346	98	36.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	39	0.0200	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.2	401		3.00		**Direct Entry,**
7.1	440	Total			

Subcatchment 32S: Direct to Proposed West Central Pond



Summary for Subcatchment 40S: Direct to Wetland 2B

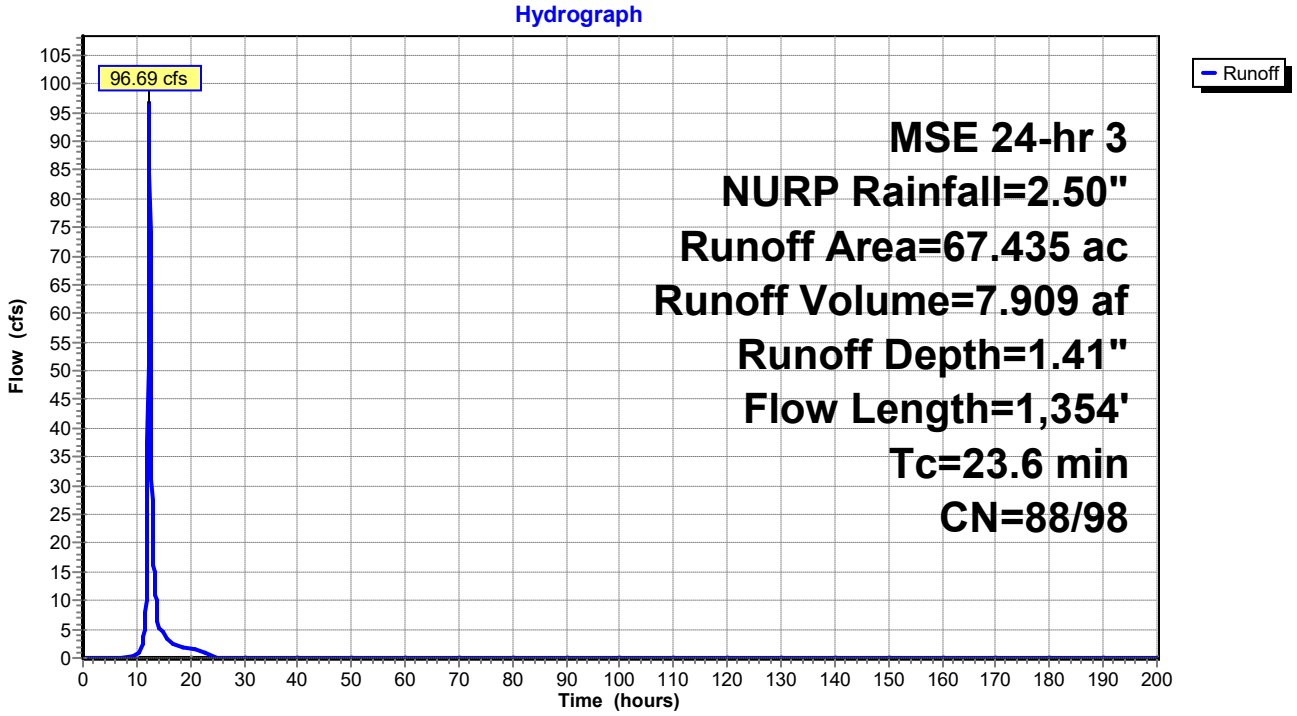
Runoff = 96.69 cfs @ 12.35 hrs, Volume= 7.909 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
1.003	98	Unconnected roofs, HSG D
17.214	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
27.306	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
9.713	80	>75% Grass cover, Good, HSG D
6.057	78	Meadow, non-grazed, HSG D
3.720	77	Woods, Good, HSG D
67.435	89	Weighted Average
65.467	88	97.08% Pervious Area
1.968	98	2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

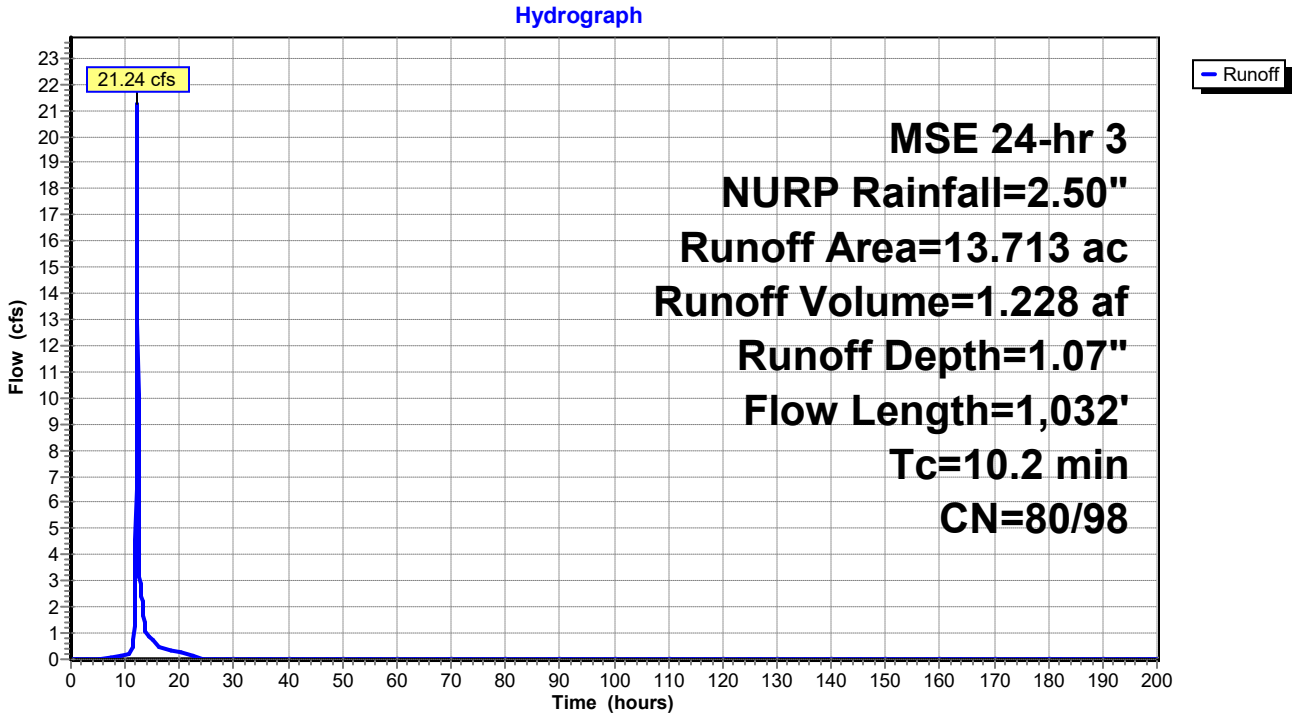
Runoff = 21.24 cfs @ 12.18 hrs, Volume= 1.228 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 42S: Direct to Proposed South Central Pond

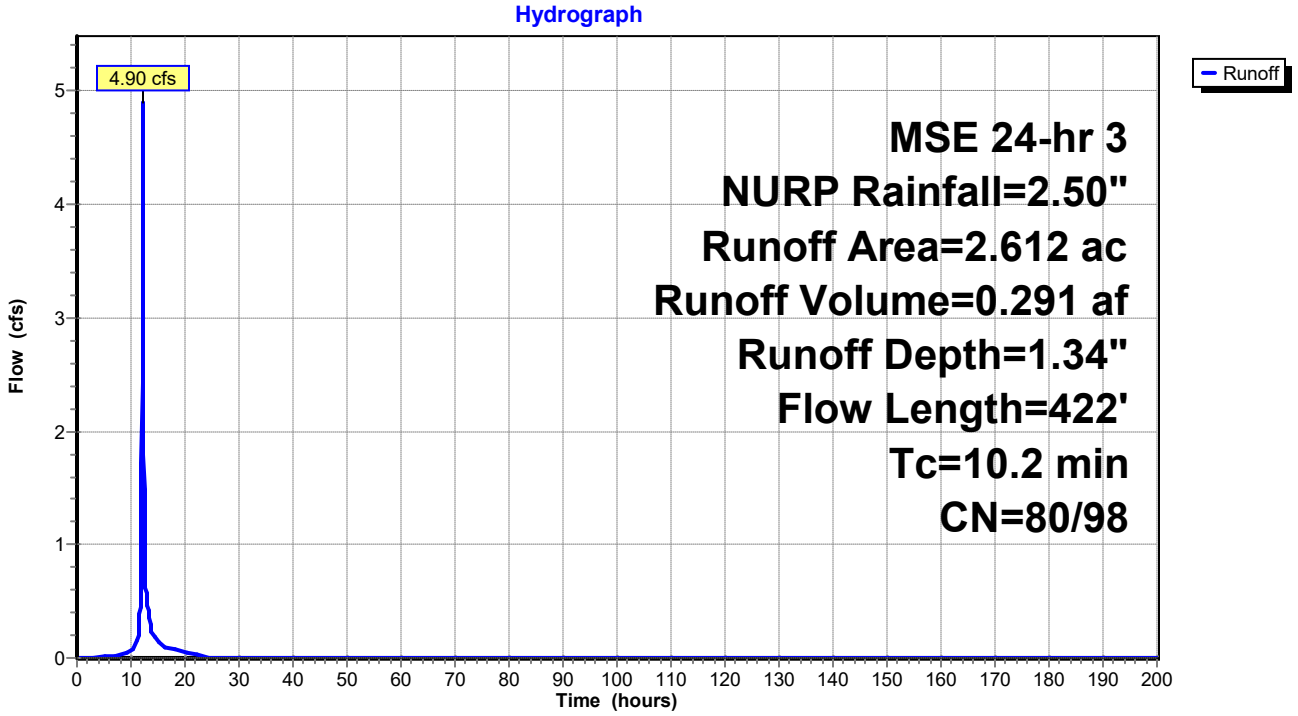
Runoff = 4.90 cfs @ 12.18 hrs, Volume= 0.291 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.013	98	Unconnected pavement, HSG D
0.362	98	Unconnected roofs, HSG D
0.246	98	Paved roads w/curbs & sewers, HSG D
0.145	98	Paved parking, HSG D
0.084	98	Roofs, HSG D
0.154	98	Water Surface, 0% imp, HSG D
0.600	80	>75% Grass cover, Good, HSG D
0.811	78	Meadow, non-grazed, HSG D
0.197	77	Woods, Good, HSG D
2.612	86	Weighted Average
1.762	80	67.46% Pervious Area
0.850	98	32.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
1.7	235	0.0130	2.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	117		3.00		**Direct Entry, Pipe flow @ 3 fps**
10.2	422	Total			

Subcatchment 42S: Direct to Proposed South Central Pond



Summary for Subcatchment 43S: Direct to Proposed Central Pond

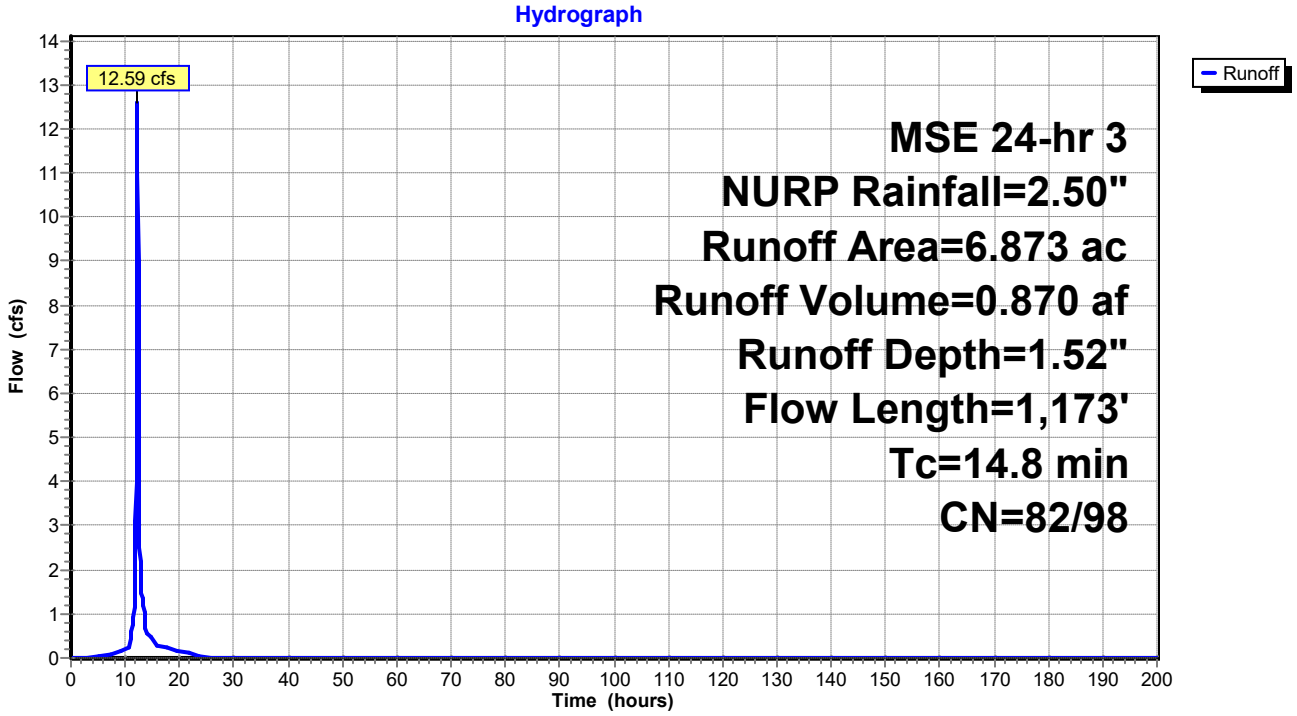
Runoff = 12.59 cfs @ 12.23 hrs, Volume= 0.870 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.205	98	Unconnected pavement, HSG D
0.855	98	Unconnected roofs, HSG D
0.896	98	Paved roads w/curbs & sewers, HSG D
0.530	98	Paved parking, HSG D
0.332	98	Roofs, HSG D
0.402	98	Water Surface, 0% imp, HSG D
0.383	89	Row crops, straight row, Good, HSG D
2.711	80	>75% Grass cover, Good, HSG D
0.559	78	Meadow, non-grazed, HSG D
6.873	89	Weighted Average
4.055	82	59.00% Pervious Area
2.818	98	41.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	70	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
2.5	286	0.0088	1.90		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	817		3.00		**Direct Entry, Pipe flow @ 3 fps**
14.8	1,173	Total			

Subcatchment 43S: Direct to Proposed Central Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

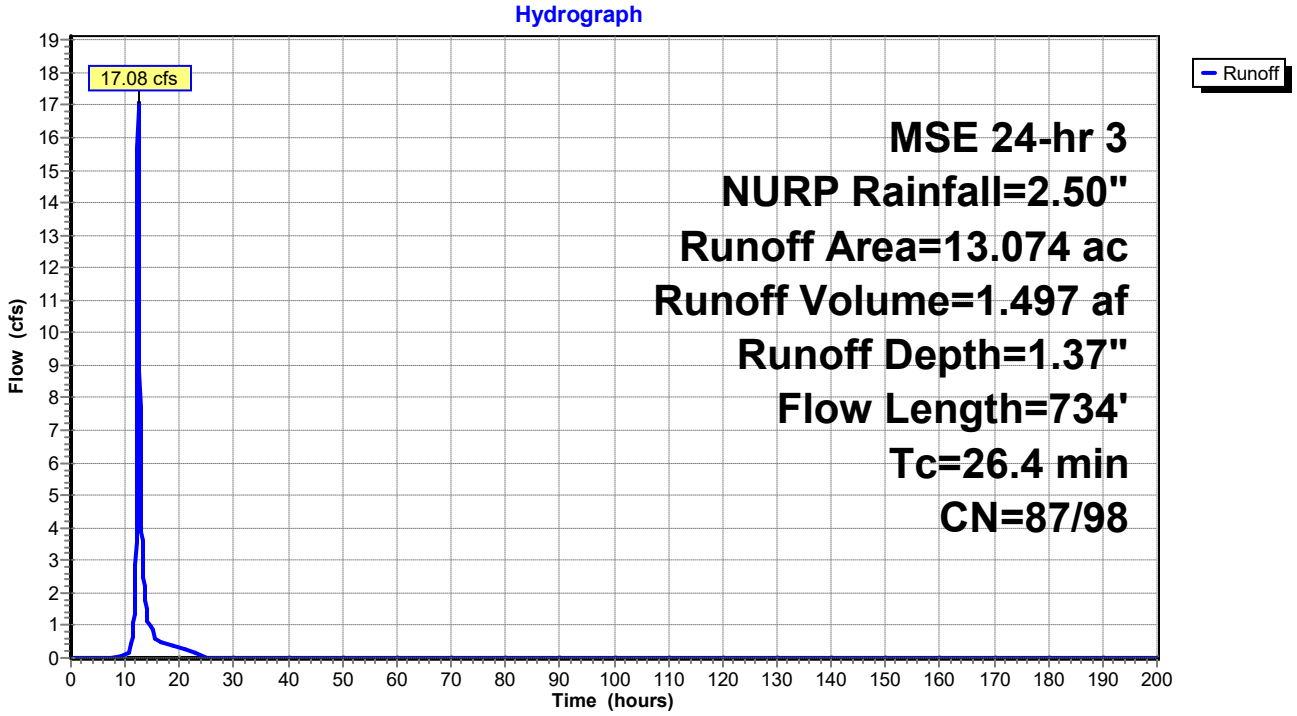
Runoff = 17.08 cfs @ 12.38 hrs, Volume= 1.497 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

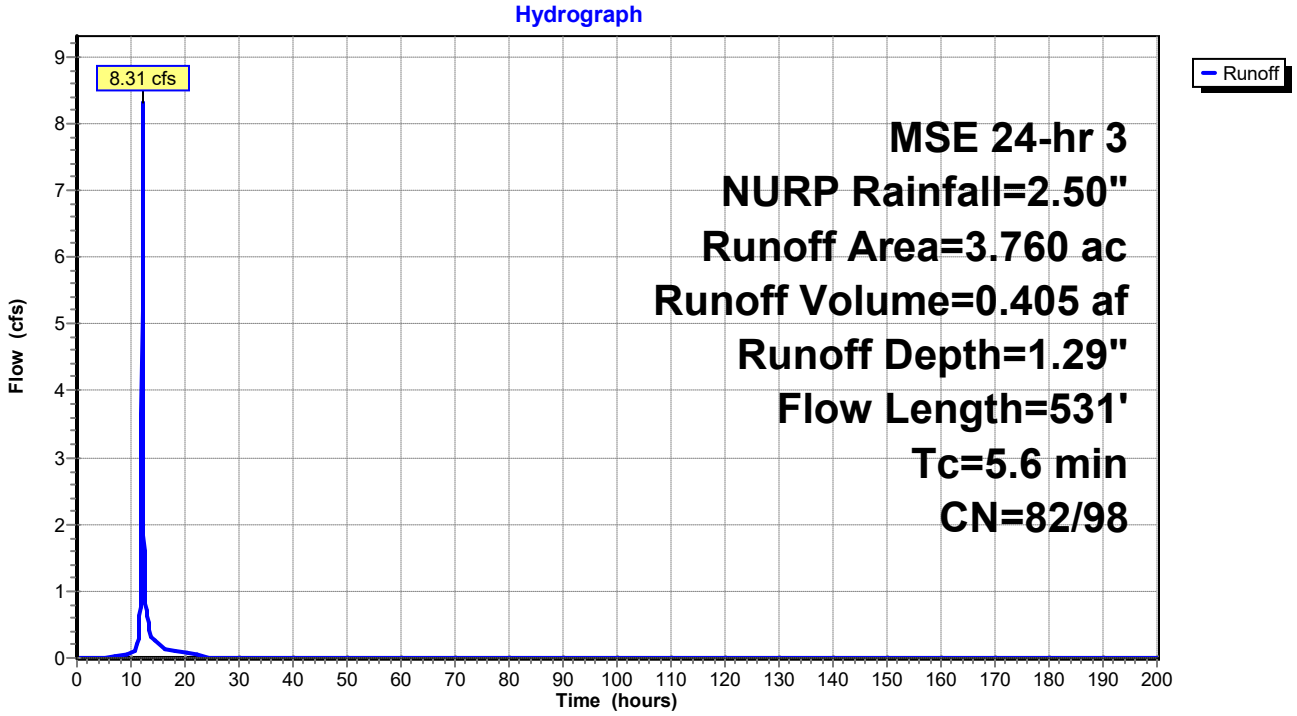
Runoff = 8.31 cfs @ 12.13 hrs, Volume= 0.405 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



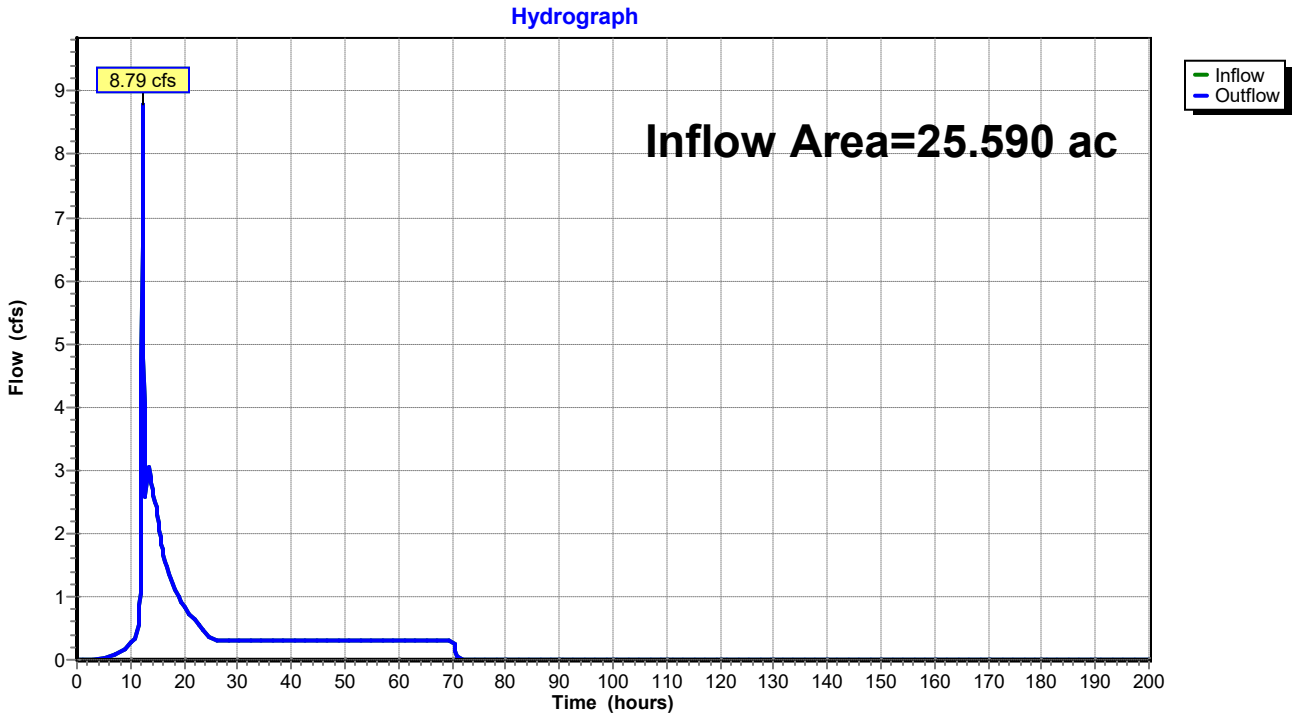
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.590 ac, 16.84% Impervious, Inflow Depth = 1.37" for NURP event
Inflow = 8.79 cfs @ 12.25 hrs, Volume= 2.928 af
Outflow = 8.79 cfs @ 12.25 hrs, Volume= 2.928 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



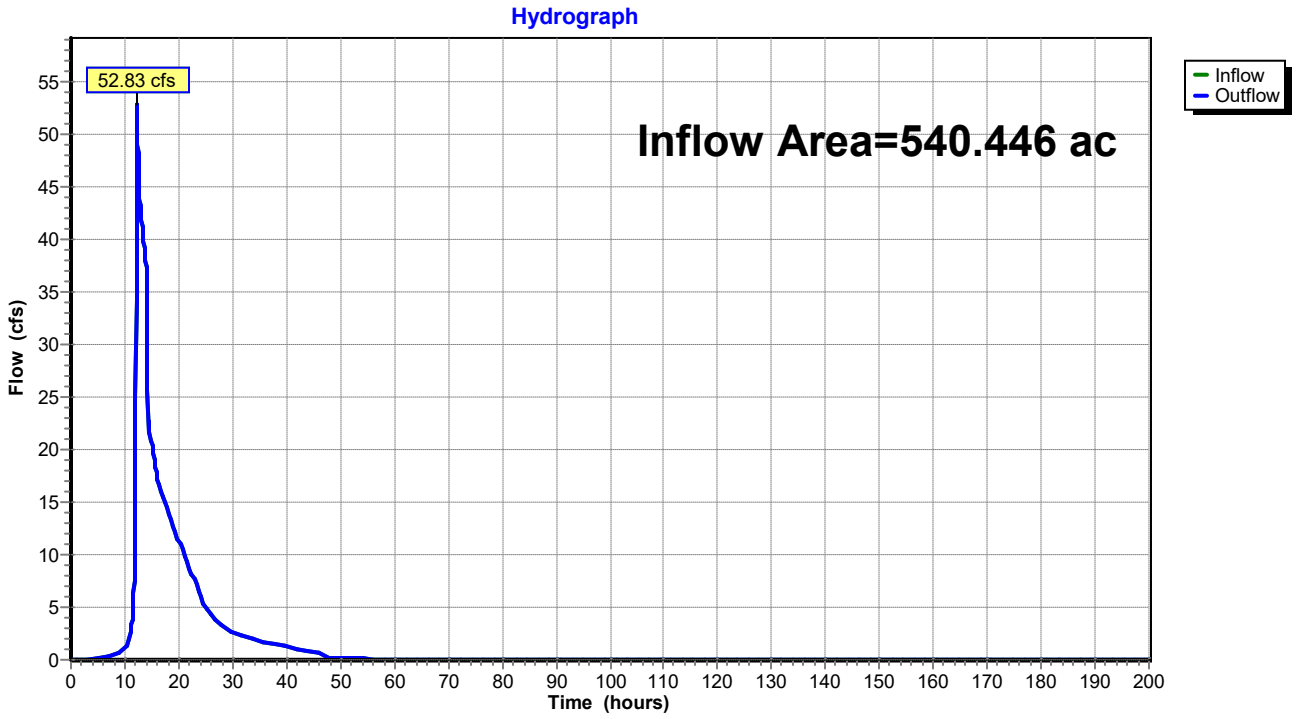
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.446 ac, 5.98% Impervious, Inflow Depth = 0.52" for NURP event
Inflow = 52.83 cfs @ 12.25 hrs, Volume= 23.224 af
Outflow = 52.83 cfs @ 12.25 hrs, Volume= 23.224 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: Proposed East Channel

Inflow Area = 134.639 ac, 9.91% Impervious, Inflow Depth > 1.17" for NURP event
Inflow = 15.82 cfs @ 13.62 hrs, Volume= 13.164 af
Outflow = 15.82 cfs @ 13.63 hrs, Volume= 13.164 af, Atten= 0%, Lag= 0.7 min

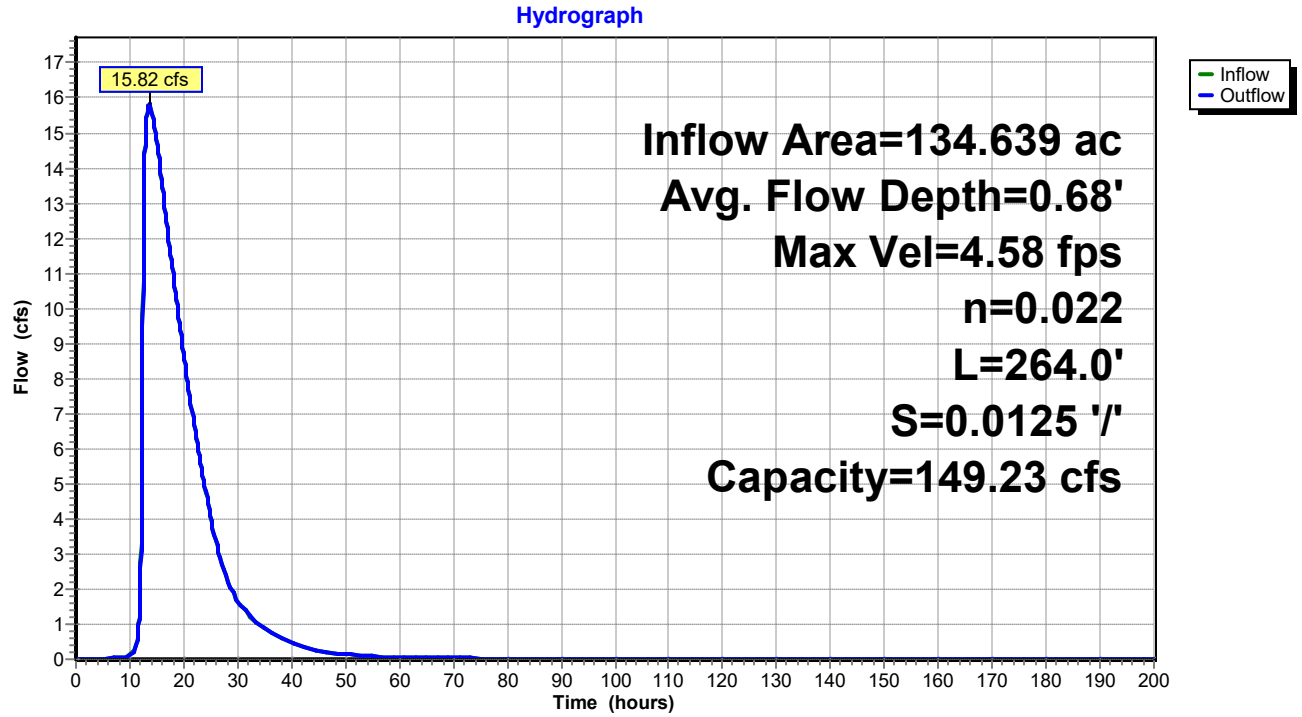
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.58 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.95 fps, Avg. Travel Time= 4.6 min

Peak Storage= 913 cf @ 13.63 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 149.23 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 264.0' Slope= 0.0125 '/'
Inlet Invert= 923.50', Outlet Invert= 920.20'

‡

Reach 21R: Proposed East Channel



Summary for Reach 23R: Existing West Channel

[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 375.878 ac, 3.58% Impervious, Inflow Depth = 0.23" for NURP event
Inflow = 29.45 cfs @ 12.33 hrs, Volume= 7.154 af
Outflow = 29.45 cfs @ 12.35 hrs, Volume= 7.154 af, Atten= 0%, Lag= 1.3 min

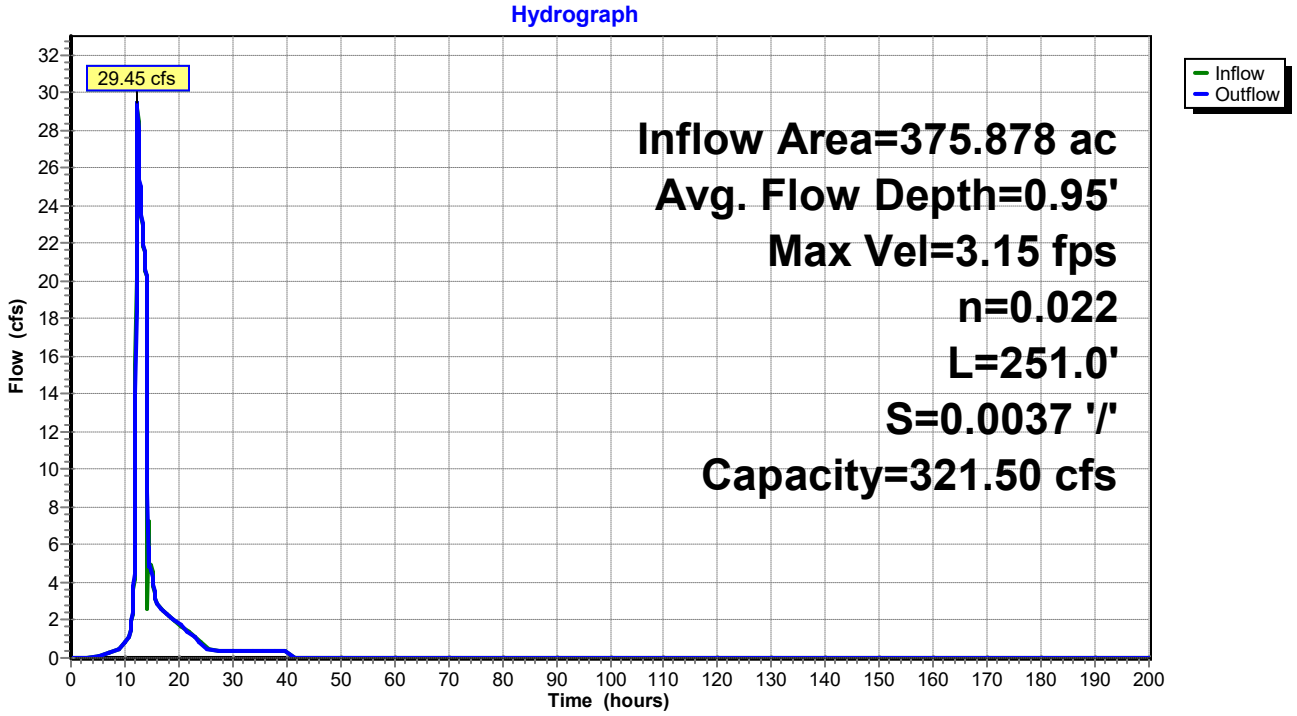
Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.15 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 8.1 min

Peak Storage= 2,349 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.95'
Bank-Full Depth= 3.00' Flow Area= 54.0 sf, Capacity= 321.50 cfs

6.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 '/' Top Width= 30.00'
Length= 251.0' Slope= 0.0037 '/'
Inlet Invert= 920.50', Outlet Invert= 919.58'

‡

Reach 23R: Existing West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 0.53" for NURP event
Inflow = 127.59 cfs @ 12.44 hrs, Volume= 13.215 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 930.22' @ 25.55 hrs Surf.Area= 60.657 ac Storage= 13.215 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

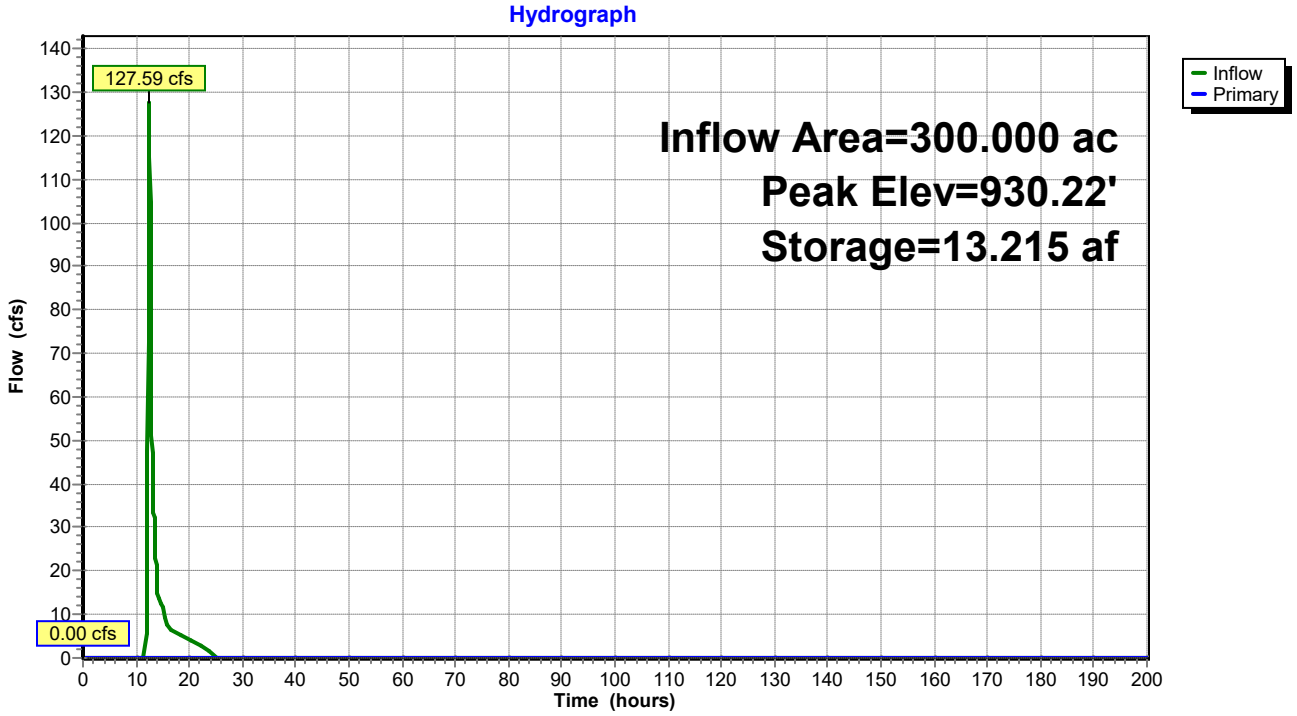
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=930.00' TW=930.22' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 10P: Proposed Northeast Pond/Filtration

[58] Hint: Peaked 0.23' above defined flood level

Inflow Area = 19.438 ac, 21.11% Impervious, Inflow Depth = 1.46" for NURP event
Inflow = 28.13 cfs @ 12.34 hrs, Volume= 2.365 af
Outflow = 2.39 cfs @ 13.75 hrs, Volume= 2.365 af, Atten= 92%, Lag= 84.5 min
Primary = 2.39 cfs @ 13.75 hrs, Volume= 2.365 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 921.00' Surf.Area= 0.662 ac Storage= 2.955 af
Peak Elev= 922.23' @ 13.75 hrs Surf.Area= 1.356 ac Storage= 4.487 af (1.532 af above start)
Flood Elev= 922.00' Surf.Area= 1.255 ac Storage= 4.104 af (1.149 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,106.1 min (1,913.4 - 807.2)

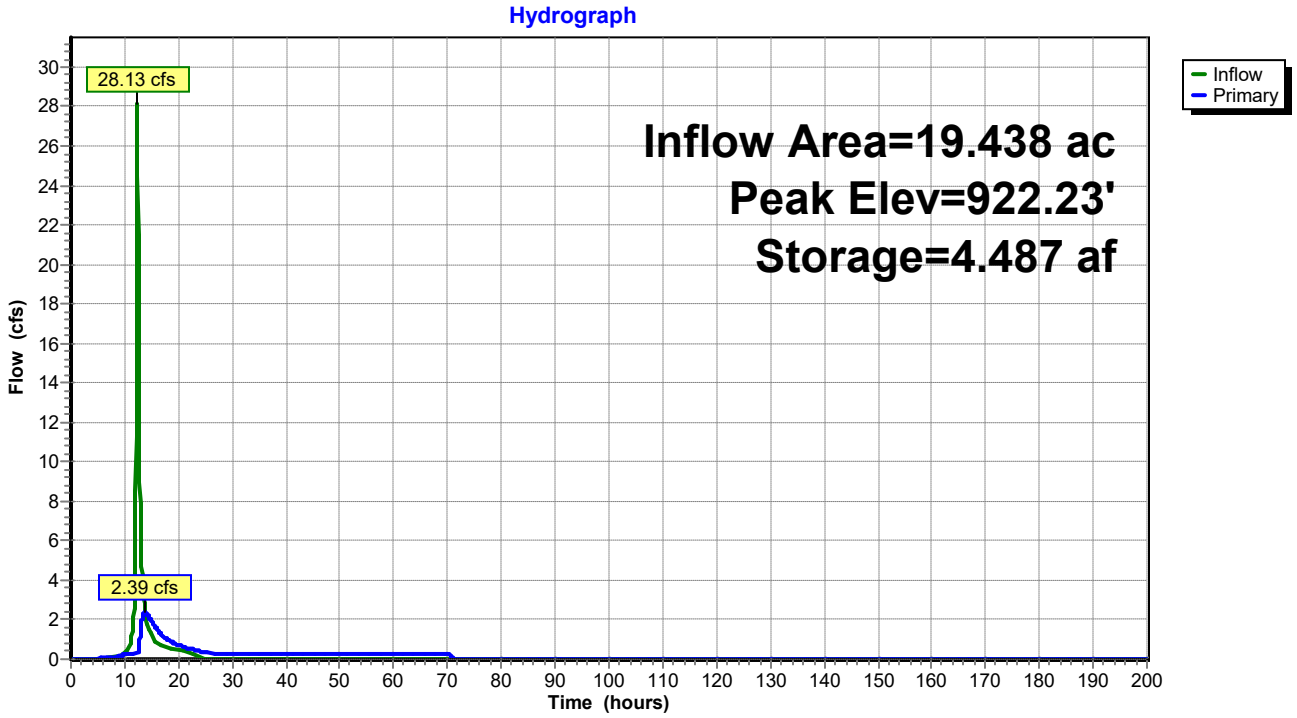
Volume	Invert	Avail.Storage	Storage Description
#1	913.00'	9.359 af	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
913.00	0.209	0.000	0.000
914.00	0.242	0.226	0.226
916.00	0.314	0.556	0.781
918.00	0.396	0.710	1.491
920.00	0.491	0.887	2.378
921.00	0.662	0.576	2.955
921.01	1.049	0.009	2.964
922.00	1.255	1.140	4.104
924.00	2.149	3.404	7.508
925.00	1.553	1.851	9.359

Device	Routing	Invert	Outlet Devices
#1	Primary	918.50'	**36.0" Round Culvert** L= 113.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.50' / 918.00' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf
#2	Device 1	922.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	923.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	920.00'	**21.0" Round Culvert** L= 45.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 920.00' S= -0.0444 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	921.00'	**0.31 cfs Exfiltration when above 921.00'** Phase-In= 0.01'

Primary OutFlow Max=2.39 cfs @ 13.75 hrs HW=922.23' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.39 cfs of 44.71 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.08 cfs @ 1.55 fps)
  │ └─**4=Culvert** (Passes 2.08 cfs of 5.49 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Exfiltration** (Exfiltration Controls 0.31 cfs)

Pond 10P: Proposed Northeast Pond/Filtration



Summary for Pond 25P: Proposed Northwest Pond/Filtration

Inflow Area = 15.059 ac, 29.82% Impervious, Inflow Depth = 1.34" for NURP event
Inflow = 22.84 cfs @ 12.26 hrs, Volume= 1.680 af
Outflow = 0.54 cfs @ 11.00 hrs, Volume= 1.680 af, Atten= 98%, Lag= 0.0 min
Primary = 0.54 cfs @ 11.00 hrs, Volume= 1.680 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 925.00' Surf.Area= 0.322 ac Storage= 1.156 af
Peak Elev= 925.98' @ 16.27 hrs Surf.Area= 1.292 ac Storage= 2.306 af (1.150 af above start)
Flood Elev= 926.50' Surf.Area= 1.369 ac Storage= 3.002 af (1.846 af above start)

Plug-Flow detention time= 1,761.9 min calculated for 0.524 af (31% of inflow)
Center-of-Mass det. time= 868.3 min (1,667.0 - 798.7)

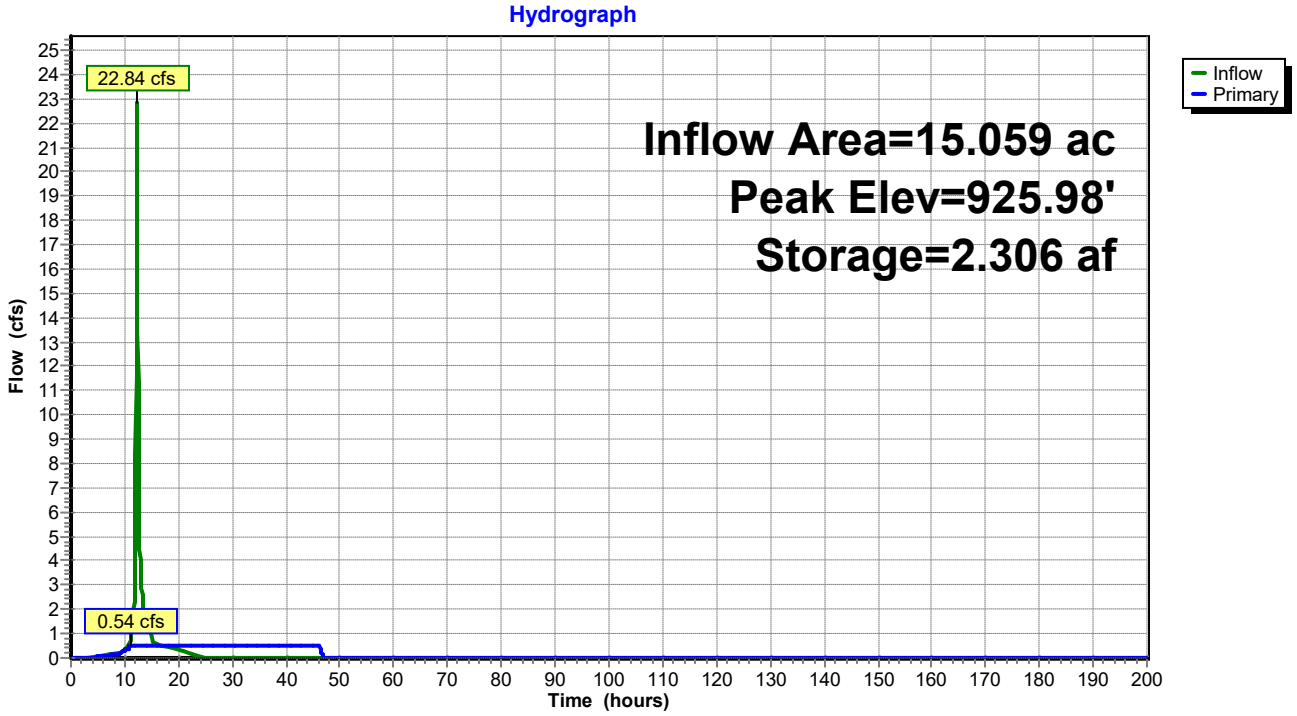
Volume	Invert	Avail.Storage	Storage Description
#1	917.00'	5.216 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
917.00	0.052	0.000	0.000
918.00	0.069	0.061	0.061
920.00	0.110	0.179	0.239
922.00	0.160	0.270	0.509
924.00	0.217	0.377	0.887
925.00	0.322	0.269	1.156
925.01	1.071	0.007	1.163
926.00	1.297	1.172	2.335
928.00	1.584	2.881	5.216

Device	Routing	Invert	Outlet Devices
#1	Primary	922.50'	**21.0" Round Culvert** L= 46.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.50' / 922.00' S= 0.0109 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	926.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	927.40'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	922.00'	**18.0" Round Culvert** L= 42.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 921.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#5	Device 1	925.00'	**0.54 cfs Exfiltration when above 925.00'** Phase-In= 0.01'

Primary OutFlow Max=0.54 cfs @ 11.00 hrs HW=925.01' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.54 cfs of 14.66 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
    - **4=Culvert** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Exfiltration** (Exfiltration Controls 0.54 cfs)

Pond 25P: Proposed Northwest Pond/Filtration



Summary for Pond 26P: Proposed Northwest Central Pond/Filtration

Inflow Area = 7.518 ac, 41.97% Impervious, Inflow Depth = 1.52" for NURP event
Inflow = 10.27 cfs @ 12.16 hrs, Volume= 0.953 af
Outflow = 0.37 cfs @ 11.30 hrs, Volume= 0.953 af, Atten= 96%, Lag= 0.0 min
Primary = 0.37 cfs @ 11.30 hrs, Volume= 0.953 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.00' Surf.Area= 0.318 ac Storage= 0.894 af
Peak Elev= 924.65' @ 17.18 hrs Surf.Area= 0.875 ac Storage= 1.427 af (0.533 af above start)
Flood Elev= 925.50' Surf.Area= 0.997 ac Storage= 2.227 af (1.333 af above start)

Plug-Flow detention time= 2,381.8 min calculated for 0.059 af (6% of inflow)
Center-of-Mass det. time= 605.1 min (1,554.1 - 949.0)

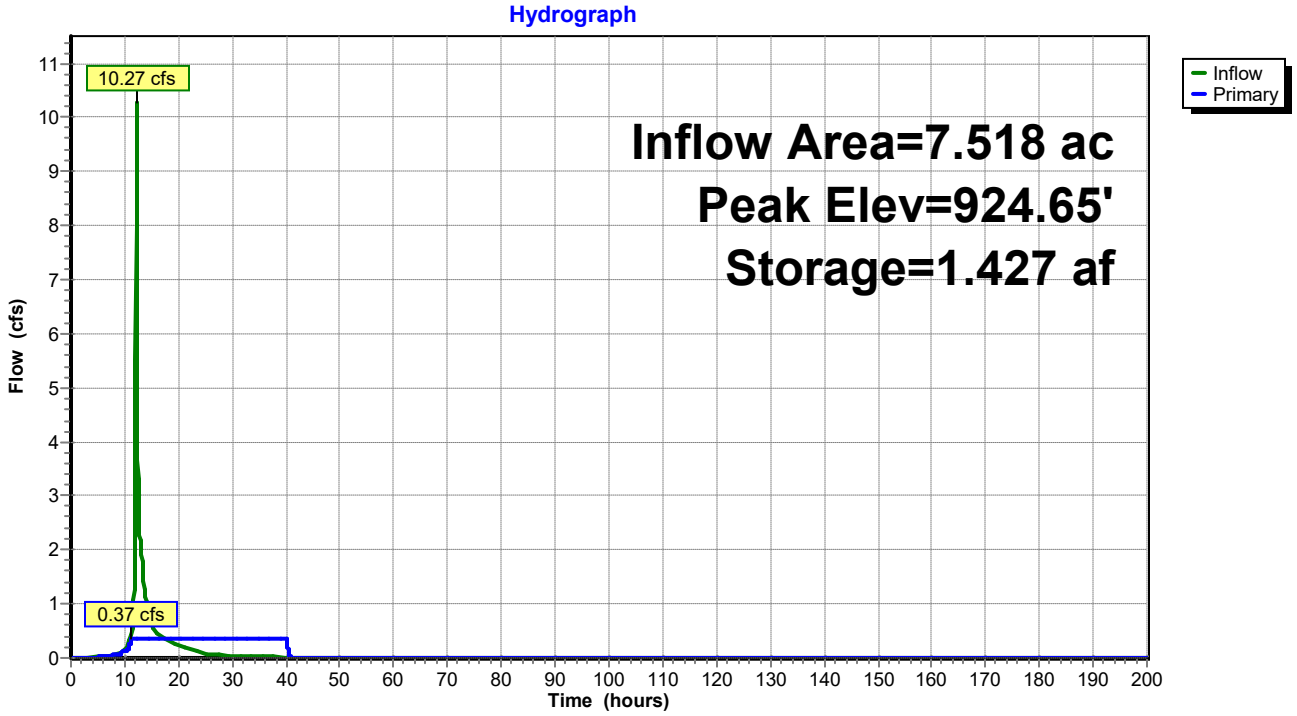
Volume	Invert	Avail.Storage	Storage Description
#1	916.00'	3.855 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.00	0.009	0.000	0.000
918.00	0.045	0.054	0.054
920.00	0.099	0.144	0.198
922.00	0.162	0.261	0.459
923.00	0.195	0.179	0.637
924.00	0.318	0.256	0.894
924.01	0.784	0.006	0.900
926.00	1.069	1.844	2.743
927.00	1.155	1.112	3.855

Device	Routing	Invert	Outlet Devices
#1	Primary	921.50'	**21.0" Round Culvert** L= 86.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.50' / 921.00' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#2	Device 1	925.50'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	926.00'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	921.00'	**21.0" Round Culvert** L= 44.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 920.00' / 921.00' S= -0.0227 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf
#5	Device 1	924.00'	**0.37 cfs Exfiltration when above 924.00'** Phase-In= 0.01'

Primary OutFlow Max=0.37 cfs @ 11.30 hrs HW=924.01' TW=920.72' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.37 cfs of 12.99 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
    - **4=Culvert** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Exfiltration** (Exfiltration Controls 0.37 cfs)

Pond 26P: Proposed Northwest Central Pond/Filtration



Summary for Pond 27P: Proposed Northwest Central Pond

Inflow Area = 3.120 ac, 47.02% Impervious, Inflow Depth = 1.63" for NURP event
Inflow = 7.60 cfs @ 12.16 hrs, Volume= 0.423 af
Outflow = 1.32 cfs @ 12.55 hrs, Volume= 0.420 af, Atten= 83%, Lag= 23.7 min
Primary = 1.32 cfs @ 12.55 hrs, Volume= 0.420 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 924.50' Surf.Area= 0.278 ac Storage= 0.732 af
Peak Elev= 925.19' @ 12.55 hrs Surf.Area= 0.376 ac Storage= 0.958 af (0.226 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 378.0 min (1,157.1 - 779.1)

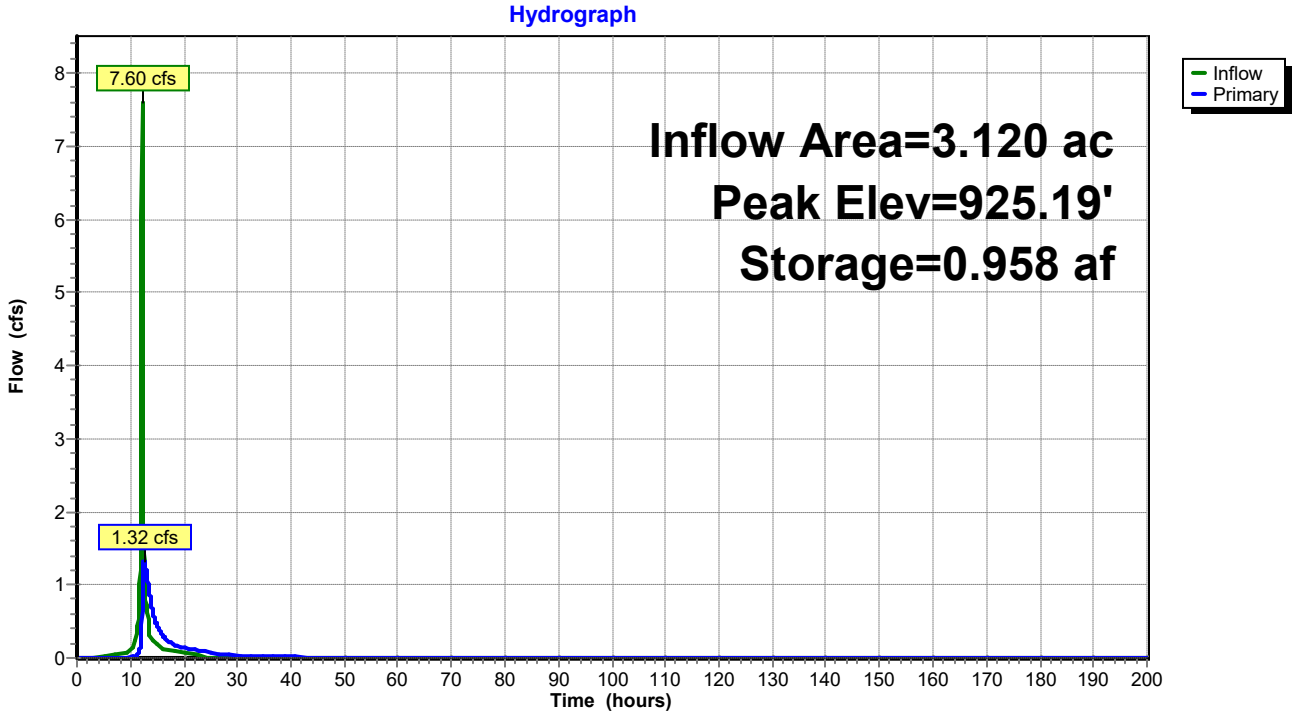
Volume	Invert	Avail.Storage	Storage Description
#1	916.50'	1.797 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
916.50	0.015	0.000	0.000
917.00	0.019	0.008	0.008
918.00	0.031	0.025	0.033
920.00	0.063	0.094	0.128
922.00	0.114	0.177	0.304
923.50	0.162	0.207	0.512
924.50	0.278	0.220	0.732
925.50	0.420	0.349	1.081
926.00	0.459	0.220	1.300
927.00	0.535	0.497	1.797

Device	Routing	Invert	Outlet Devices
#1	Primary	924.50'	**18.0" Round Culvert** L= 225.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.50' / 924.00' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	926.50'	**48.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	923.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 922.00' / 923.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=1.32 cfs @ 12.55 hrs HW=925.19' TW=924.38' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.32 cfs @ 2.43 fps)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 1.32 cfs of 7.08 cfs potential flow)

Pond 27P: Proposed Northwest Central Pond



Summary for Pond 28P: Proposed Northeast Central Pond

Inflow Area = 7.153 ac, 50.64% Impervious, Inflow Depth = 1.64" for NURP event
Inflow = 14.27 cfs @ 12.22 hrs, Volume= 0.979 af
Outflow = 7.78 cfs @ 12.41 hrs, Volume= 0.979 af, Atten= 45%, Lag= 10.9 min
Primary = 7.78 cfs @ 12.41 hrs, Volume= 0.979 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 922.00' Surf.Area= 0.380 ac Storage= 1.043 af
Peak Elev= 922.62' @ 12.41 hrs Surf.Area= 0.495 ac Storage= 1.314 af (0.271 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 43.8 min (826.5 - 782.7)

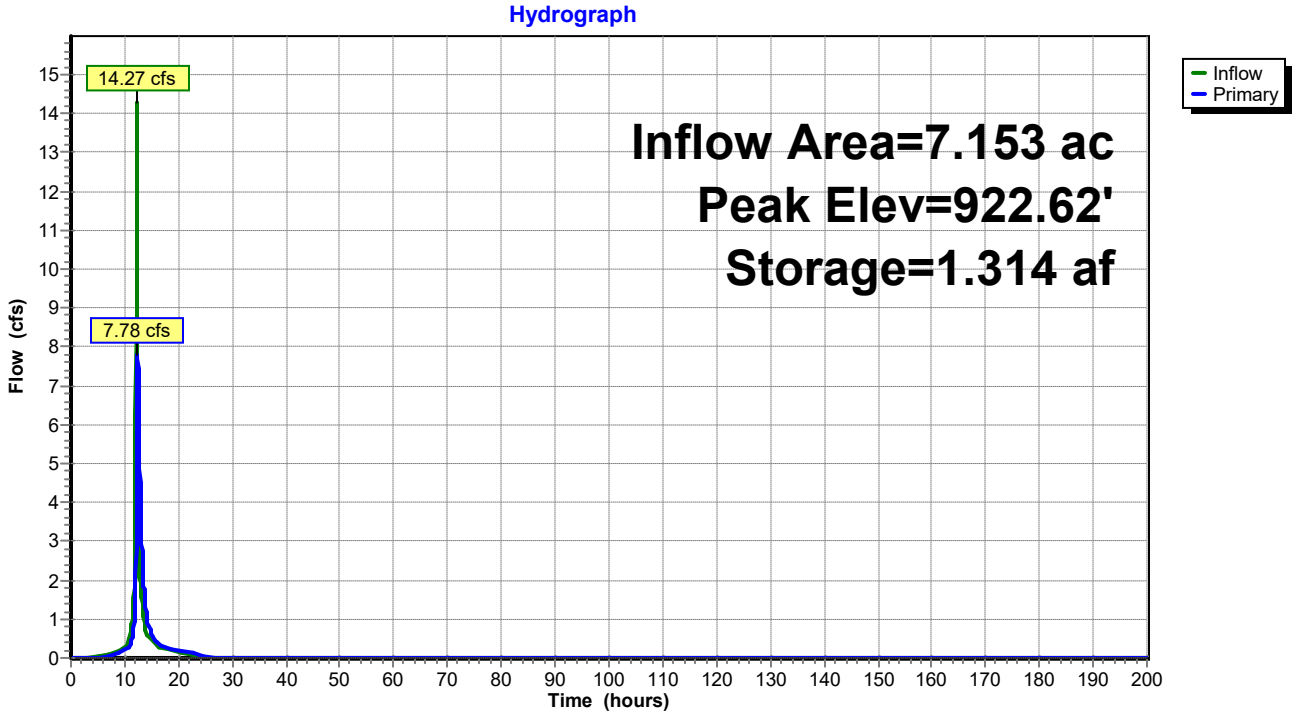
Volume	Invert	Avail.Storage	Storage Description
#1	914.00'	2.802 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
914.00	0.034	0.000	0.000
916.00	0.065	0.099	0.099
918.00	0.109	0.174	0.273
920.00	0.172	0.281	0.554
921.00	0.213	0.192	0.746
922.00	0.380	0.297	1.043
923.00	0.565	0.472	1.515
924.00	0.642	0.603	2.119
925.00	0.724	0.683	2.802

Device	Routing	Invert	Outlet Devices
#1	Primary	921.00'	**24.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.00' / 920.80' S= 0.0057 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf
#2	Device 1	923.25'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	922.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Device 3	919.00'	**21.0" Round Culvert** L= 33.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 918.00' / 919.00' S= -0.0303 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=7.77 cfs @ 12.41 hrs HW=922.62' TW=921.45' (Dynamic Tailwater)
- **1=Culvert** (Passes 7.77 cfs of 9.09 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Sharp-Crested Rectangular Weir** (Weir Controls 7.77 cfs @ 2.57 fps)
    - **4=Culvert** (Passes 7.77 cfs of 9.11 cfs potential flow)

Pond 28P: Proposed Northeast Central Pond



Summary for Pond 30P: Wetland 4A

[44] Hint: Outlet device #5 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 357.822 ac, 1.86% Impervious, Inflow Depth = 0.17" for NURP event
Inflow = 47.98 cfs @ 12.38 hrs, Volume= 4.954 af
Outflow = 19.31 cfs @ 12.92 hrs, Volume= 4.954 af, Atten= 60%, Lag= 32.9 min
Primary = 16.33 cfs @ 12.90 hrs, Volume= 3.025 af
Secondary = 2.99 cfs @ 13.05 hrs, Volume= 1.929 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 925.60' @ 12.90 hrs Surf.Area= 3.237 ac Storage= 1.044 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.0 min (847.2 - 831.2)

Volume	Invert	Avail.Storage	Storage Description
#1	923.50'	15.942 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

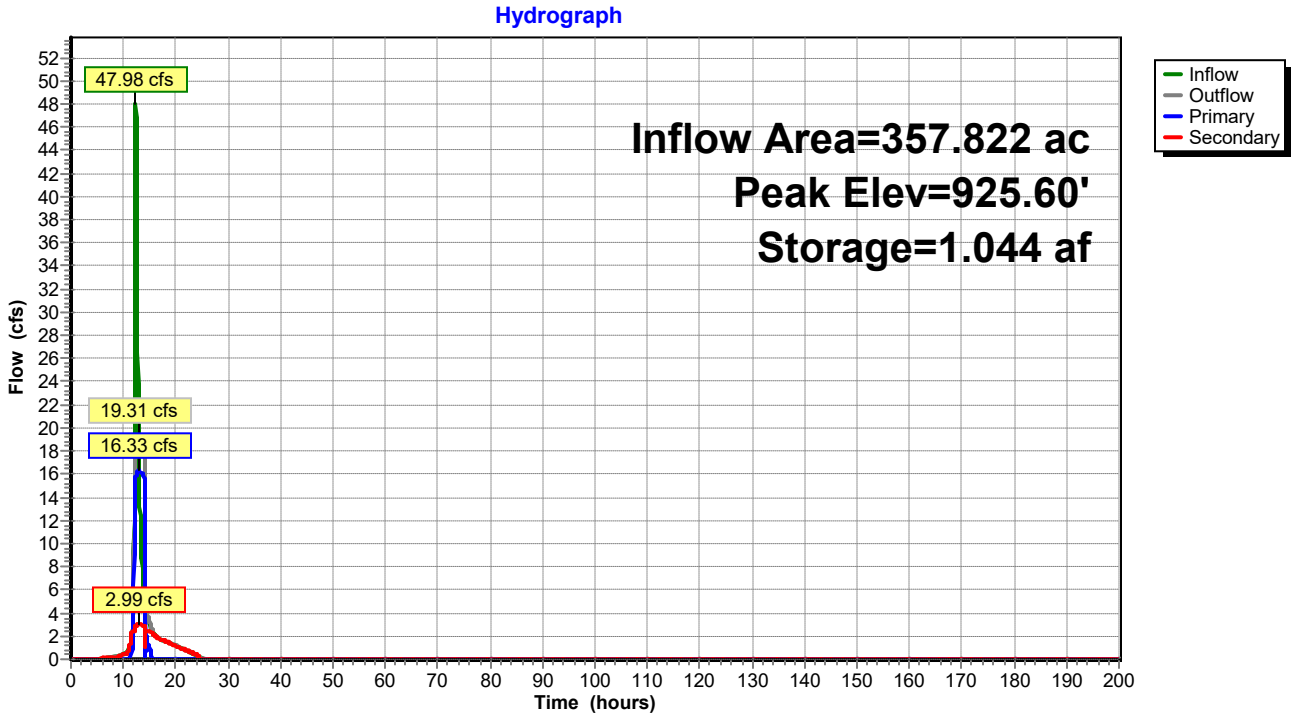
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.50	0.011	0.000	0.000
924.00	0.027	0.009	0.009
925.00	0.058	0.042	0.052
926.00	5.338	2.698	2.750
927.00	6.566	5.952	8.702
928.00	7.914	7.240	15.942

Device	Routing	Invert	Outlet Devices
#1	Primary	921.11'	**36.0" Round 36" RCP** L= 307.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 921.11' / 920.50' S= 0.0020 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 7.07 sf
#2	Device 1	926.00'	**60.0" Horiz. CBMH-3003** C= 0.600 Limited to weir flow at low heads
#3	Device 1	921.17'	**18.0" Round 18" RCP** L= 23.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 921.17' / 921.11' S= 0.0026 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#4	Device 3	923.50'	**48.0" Horiz. CBMH-3004** C= 0.600 Limited to weir flow at low heads
#5	Secondary	919.60'	**12.0" Round 12" Draintile** L= 553.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.34' / 919.60' S= -0.0005 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=16.33 cfs @ 12.90 hrs HW=925.60' TW=921.37' (Dynamic Tailwater)
└─**1=36" RCP** (Passes 16.33 cfs of 42.59 cfs potential flow)
  └─**2=CBMH-3003** (Controls 0.00 cfs)
  └─**3=18" RCP** (Inlet Controls 16.33 cfs @ 9.24 fps)
    └─**4=CBMH-3004** (Passes 16.33 cfs of 87.73 cfs potential flow)

Secondary OutFlow Max=2.99 cfs @ 13.05 hrs HW=925.59' TW=921.35' (Dynamic Tailwater)
└─**5=12" Draintile** (Outlet Controls 2.99 cfs @ 3.81 fps)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[80] Warning: Exceeded Pond 7P by 1.86' @ 12.60 hrs (95.23 cfs 4.382 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth = 0.05" for NURP event
Inflow = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af
Outflow = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af, Atten= 0%, Lag= 0.4 min
Primary = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 931.92' @ 12.60 hrs Surf.Area= 0.005 ac Storage= 0.004 af

Plug-Flow detention time= 0.2 min calculated for 1.346 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (844.7 - 844.5)

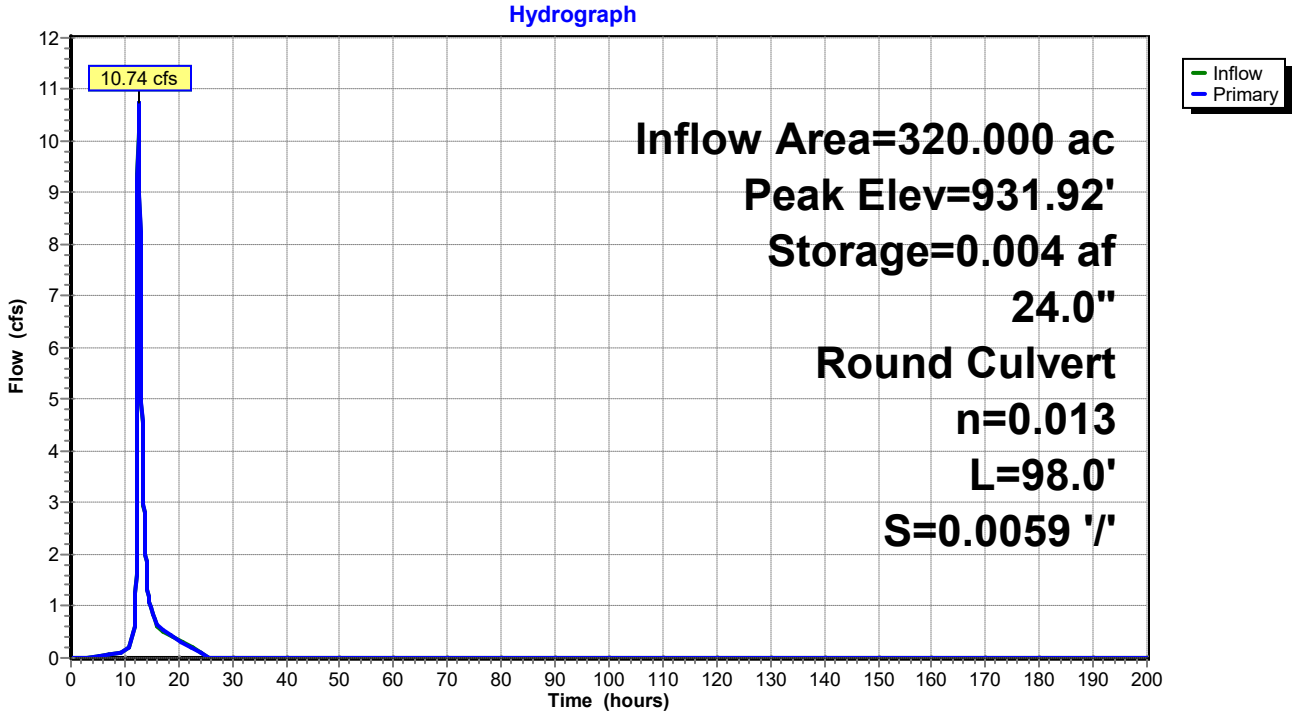
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=10.73 cfs @ 12.60 hrs HW=931.92' TW=925.54' (Dynamic Tailwater)
1=Culvert (Barrel Controls 10.73 cfs @ 5.07 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 32P: Proposed West Central Pond

Inflow Area = 3.686 ac, 36.52% Impervious, Inflow Depth = 1.50" for NURP event
Inflow = 8.91 cfs @ 12.14 hrs, Volume= 0.461 af
Outflow = 3.50 cfs @ 12.30 hrs, Volume= 0.461 af, Atten= 61%, Lag= 9.3 min
Primary = 3.50 cfs @ 12.30 hrs, Volume= 0.461 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.00' Surf.Area= 0.395 ac Storage= 1.213 af
Peak Elev= 928.36' @ 12.30 hrs Surf.Area= 0.452 ac Storage= 1.366 af (0.153 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 57.5 min (841.4 - 783.9)

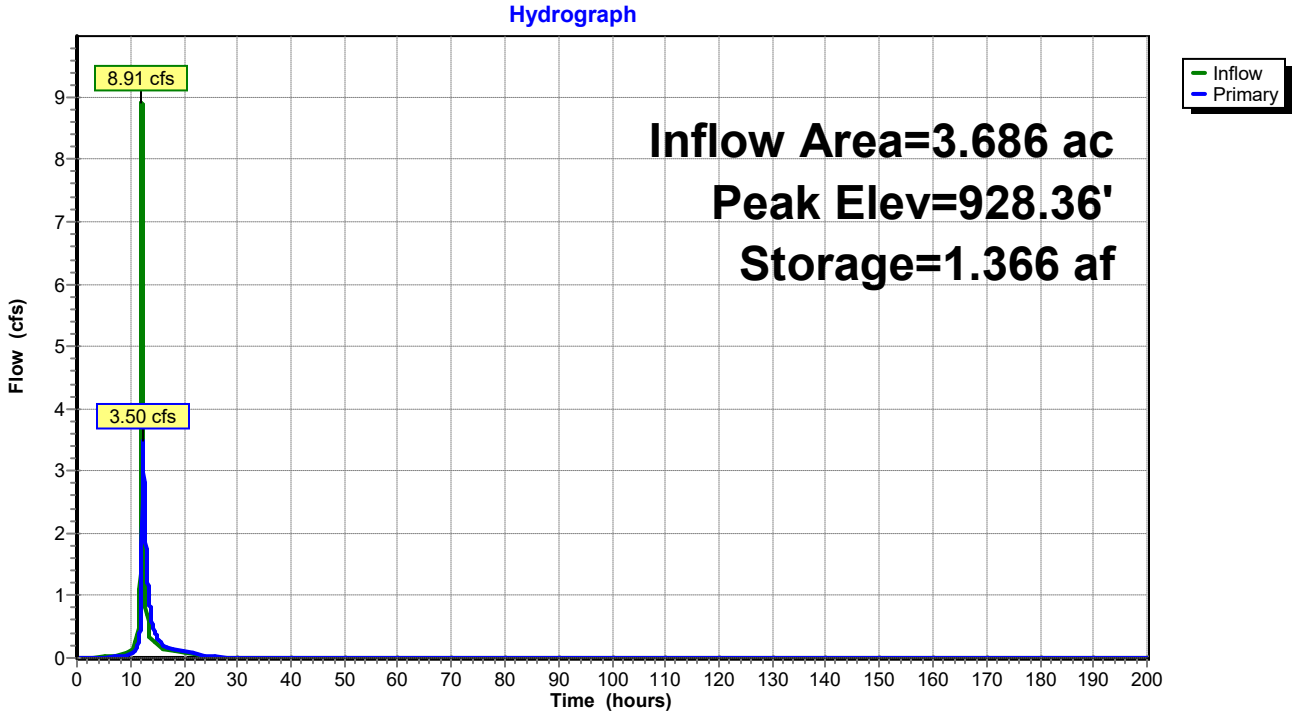
Volume	Invert	Avail.Storage	Storage Description
#1	920.00'	2.284 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
920.00	0.034	0.000	0.000
922.00	0.073	0.107	0.107
924.00	0.134	0.207	0.314
926.00	0.211	0.345	0.659
927.00	0.251	0.231	0.890
928.00	0.395	0.323	1.213
929.00	0.554	0.475	1.687
930.00	0.638	0.596	2.284

Device	Routing	Invert	Outlet Devices
#1	Primary	923.05'	**18.0" Round Culvert** L= 212.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.05' / 922.52' S= 0.0025 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.00'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	929.50'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	925.00'	**21.0" Round Culvert** L= 20.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0500 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf

Primary OutFlow Max=3.50 cfs @ 12.30 hrs HW=928.36' TW=925.25' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.50 cfs of 10.78 cfs potential flow)
  - **2=Sharp-Crested Rectangular Weir** (Weir Controls 3.50 cfs @ 1.96 fps)
    - **4=Culvert** (Passes 3.50 cfs of 6.96 cfs potential flow)
  - **3=Orifice/Grate** (Controls 0.00 cfs)

Pond 32P: Proposed West Central Pond



Summary for Pond 40P: Wetland 2B

Inflow Area = 133.857 ac, 9.96% Impervious, Inflow Depth = 1.18" for NURP event
Inflow = 105.34 cfs @ 12.35 hrs, Volume= 13.108 af
Outflow = 15.75 cfs @ 13.66 hrs, Volume= 13.108 af, Atten= 85%, Lag= 78.7 min
Primary = 15.75 cfs @ 13.66 hrs, Volume= 13.108 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 924.97' @ 13.66 hrs Surf.Area= 8.050 ac Storage= 5.065 af

Plug-Flow detention time= 216.9 min calculated for 13.108 af (100% of inflow)
Center-of-Mass det. time= 216.9 min (1,224.8 - 1,007.9)

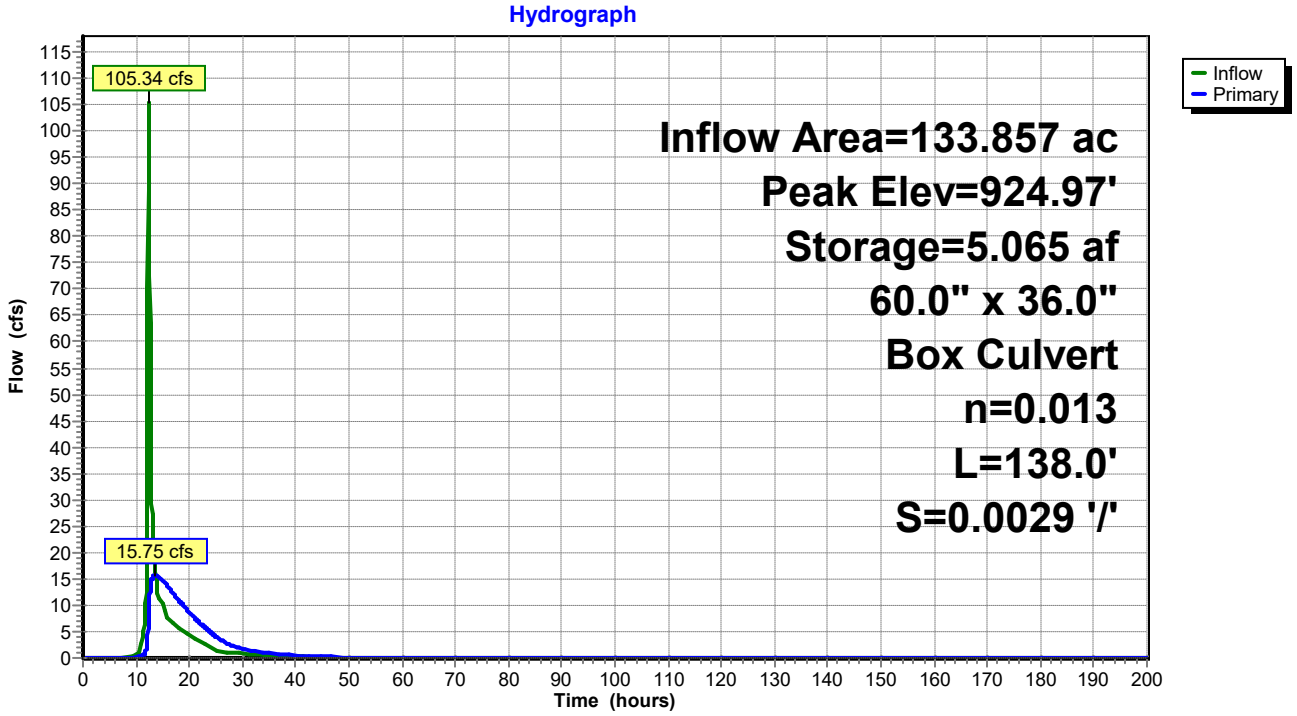
Volume	Invert	Avail.Storage	Storage Description
#1	923.90'	52.747 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.90	0.000	0.000	0.000
924.00	2.123	0.106	0.106
926.00	14.283	16.406	16.512
928.00	21.952	36.235	52.747

Device	Routing	Invert	Outlet Devices
#1	Primary	923.90'	**60.0" W x 36.0" H Box Culvert** L= 138.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 923.90' / 923.50' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 15.00 sf

Primary OutFlow Max=15.75 cfs @ 13.66 hrs HW=924.97' TW=924.18' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 15.75 cfs @ 3.91 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 1.07" for NURP event
Inflow = 21.24 cfs @ 12.18 hrs, Volume= 1.228 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 939.12' @ 24.60 hrs Surf.Area= 1.223 ac Storage= 1.228 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

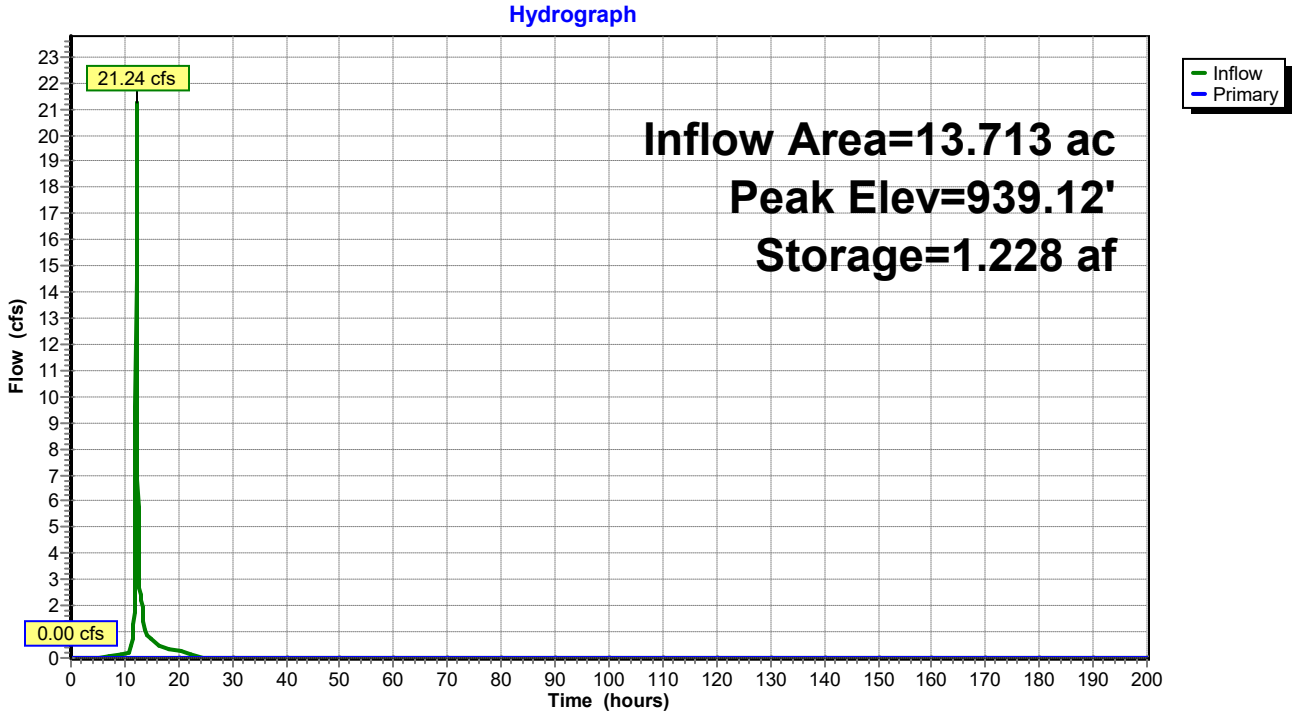
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=936.00' TW=923.90' (Dynamic Tailwater)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 41P: Ex South Off-site Pond



Summary for Pond 42P: Proposed South Central Pond

Inflow Area = 2.612 ac, 32.54% Impervious, Inflow Depth = 1.34" for NURP event
Inflow = 4.90 cfs @ 12.18 hrs, Volume= 0.291 af
Outflow = 1.68 cfs @ 12.42 hrs, Volume= 0.291 af, Atten= 66%, Lag= 14.4 min
Primary = 1.68 cfs @ 12.42 hrs, Volume= 0.291 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 928.50' Surf.Area= 0.154 ac Storage= 0.309 af
Peak Elev= 929.13' @ 12.42 hrs Surf.Area= 0.211 ac Storage= 0.424 af (0.115 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 128.5 min (919.0 - 790.5)

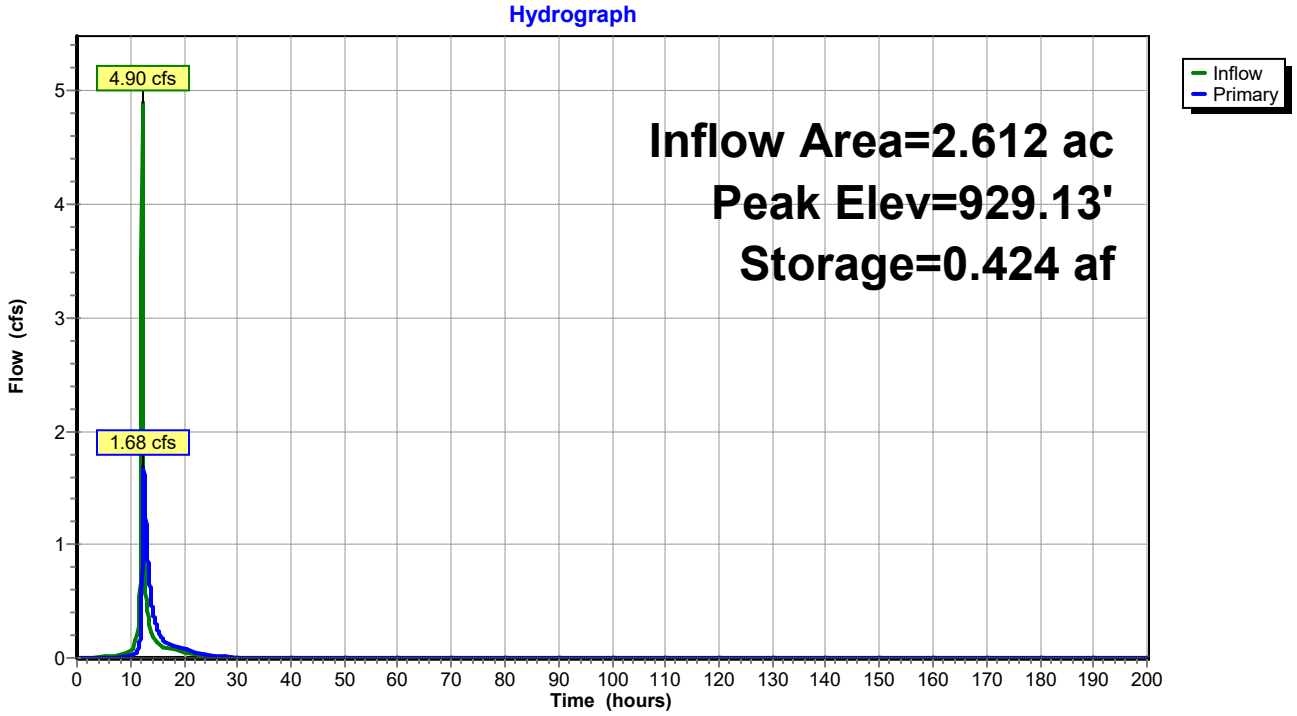
Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	1.122 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
922.00	0.004	0.000	0.000
924.00	0.022	0.026	0.026
926.00	0.050	0.072	0.098
927.50	0.078	0.096	0.194
928.00	0.114	0.048	0.242
928.50	0.154	0.067	0.309
929.50	0.244	0.199	0.508
930.00	0.274	0.130	0.637
931.50	0.372	0.484	1.122

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	**15.0" Round Culvert** L= 35.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 928.50' / 928.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	930.20'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	927.00'	**15.0" Round Culvert** L= 39.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.00' / 927.00' S= -0.0256 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=1.68 cfs @ 12.42 hrs HW=929.13' TW=924.66' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.68 cfs @ 2.70 fps)
↑**2=Orifice/Grate** (Controls 0.00 cfs)
3=Culvert (Passes 1.68 cfs of 4.69 cfs potential flow)

Pond 42P: Proposed South Central Pond



Summary for Pond 43P: Proposed East Central Pond

Inflow Area = 6.873 ac, 41.00% Impervious, Inflow Depth = 1.52" for NURP event
Inflow = 12.59 cfs @ 12.23 hrs, Volume= 0.870 af
Outflow = 3.40 cfs @ 12.61 hrs, Volume= 0.868 af, Atten= 73%, Lag= 22.7 min
Primary = 3.40 cfs @ 12.61 hrs, Volume= 0.868 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Starting Elev= 926.50' Surf.Area= 0.401 ac Storage= 1.319 af
Peak Elev= 927.37' @ 12.61 hrs Surf.Area= 0.545 ac Storage= 1.733 af (0.413 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 201.8 min (990.4 - 788.5)

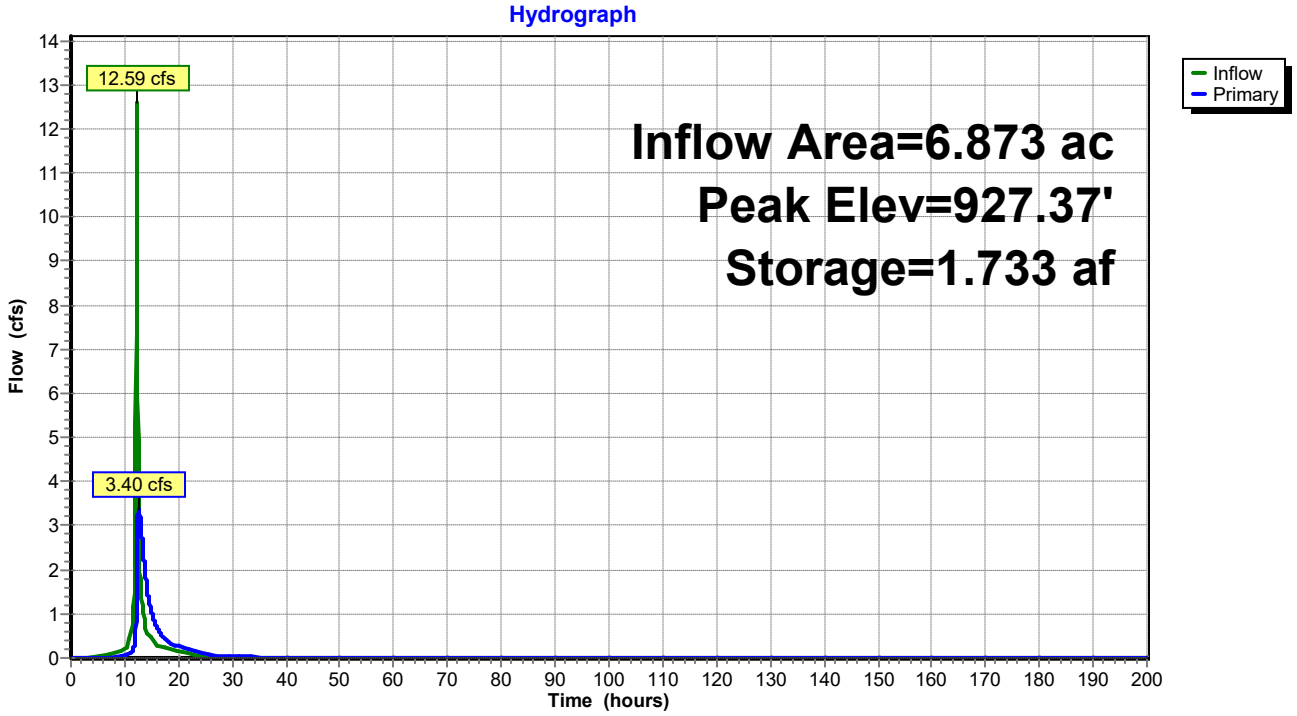
Volume	Invert	Avail.Storage	Storage Description
#1	918.50'	3.505 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
918.50	0.053	0.000	0.000
920.00	0.083	0.102	0.102
922.00	0.135	0.218	0.320
924.00	0.199	0.334	0.654
925.50	0.254	0.340	0.994
926.00	0.324	0.144	1.138
926.50	0.401	0.181	1.319
927.50	0.566	0.484	1.803
928.00	0.619	0.296	2.099
930.00	0.787	1.406	3.505

Device	Routing	Invert	Outlet Devices
#1	Primary	926.50'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 926.50' / 926.00' S= 0.0172 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	928.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	925.00'	**18.0" Round Culvert** L= 29.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 924.00' / 925.00' S= -0.0345 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=3.39 cfs @ 12.61 hrs HW=927.37' TW=924.83' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.39 cfs @ 3.18 fps)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 3.39 cfs of 7.95 cfs potential flow)

Pond 43P: Proposed East Central Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 0.53" for NURP event
Inflow = 17.34 cfs @ 12.39 hrs, Volume= 1.737 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 940.02' @ 200.00 hrs Surf.Area= 70,601 sf Storage= 75,669 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

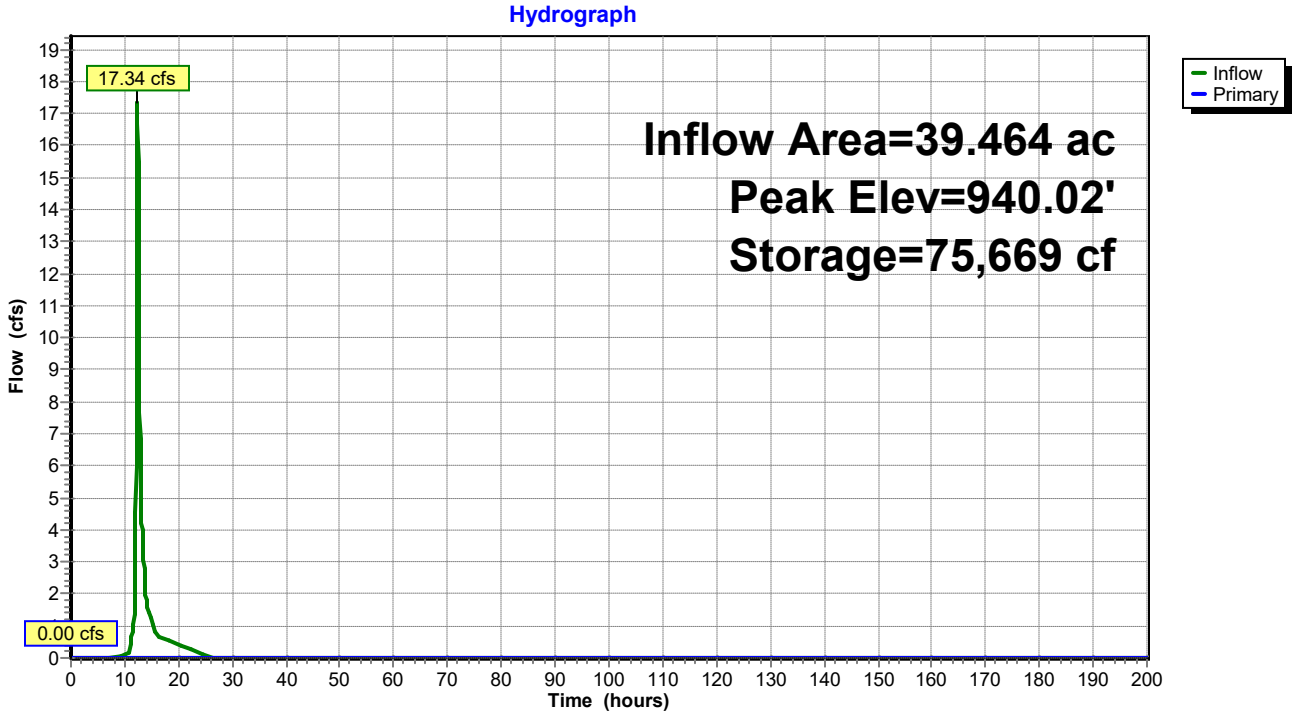
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	303,458 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
938.00	4,444	0	0
940.00	69,653	74,097	74,097
941.00	111,935	90,794	164,891
942.00	165,198	138,567	303,458

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=938.00' TW=923.90' (Dynamic Tailwater)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 13.58" for NURP event
Inflow = 9.74 cfs @ 12.13 hrs, Volume= 4.254 af
Outflow = 4.34 cfs @ 15.02 hrs, Volume= 4.040 af, Atten= 55%, Lag= 173.4 min
Primary = 4.34 cfs @ 15.02 hrs, Volume= 4.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 938.62' @ 15.02 hrs Surf.Area= 10,895 sf Storage= 10,559 cf

Plug-Flow detention time= 194.0 min calculated for 4.040 af (95% of inflow)
Center-of-Mass det. time= 41.2 min (1,393.1 - 1,351.9)

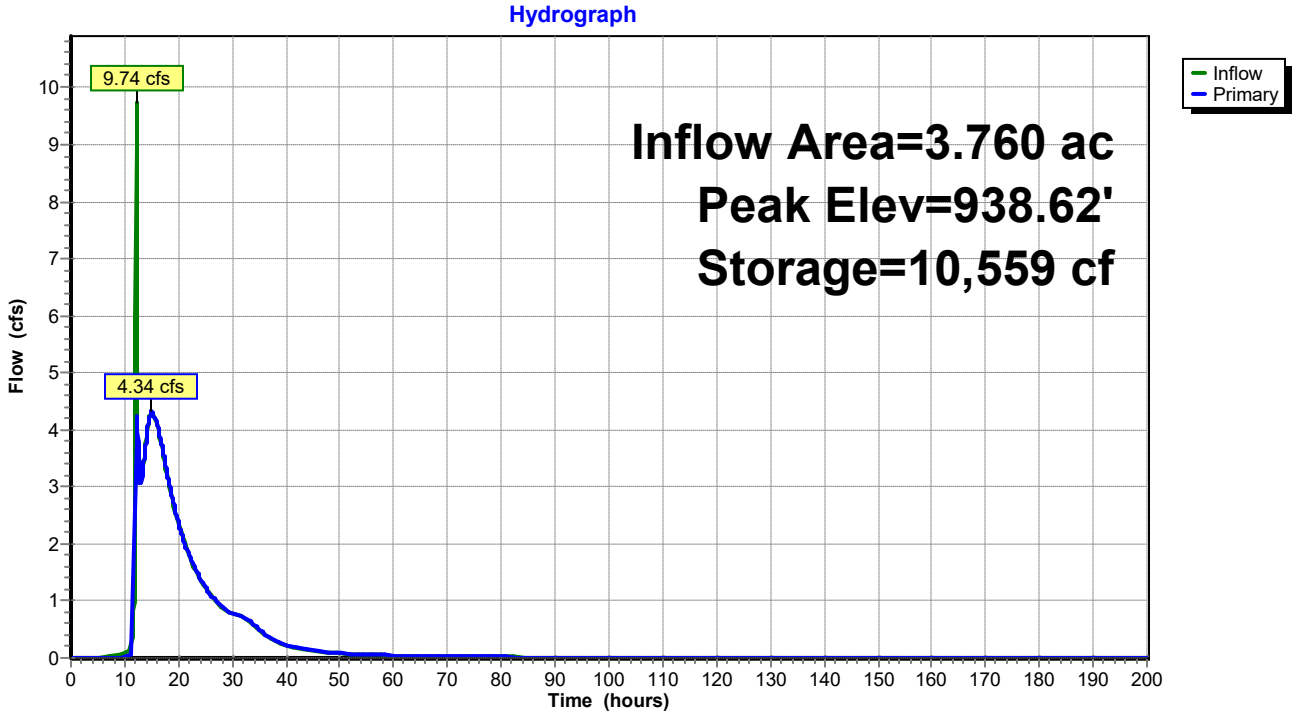
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	15,364 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
936.00	178	0	0
938.00	5,354	5,532	5,532
939.00	14,309	9,832	15,364

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=4.34 cfs @ 15.02 hrs HW=938.62' TW=924.92' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 4.34 cfs @ 1.11 fps)

Pond 60P: Wetland 5B



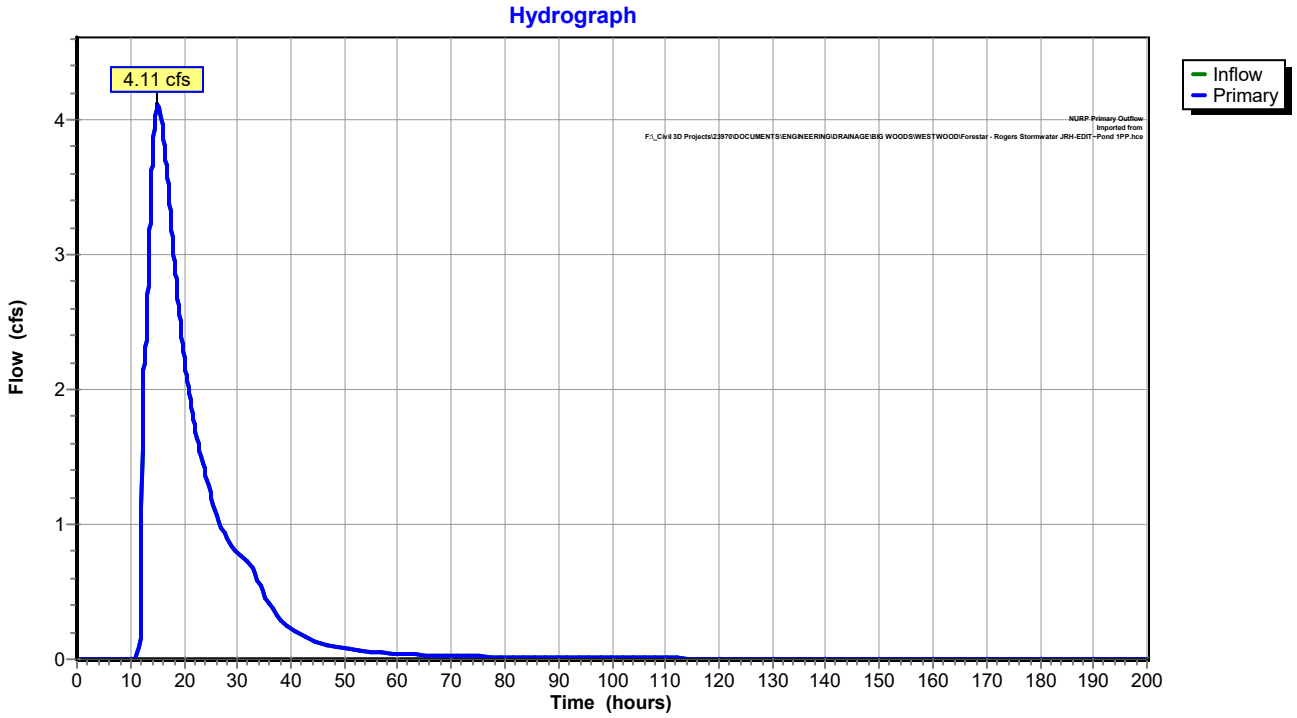
Summary for Link 1PP: Northwest Wetland

Inflow = 4.11 cfs @ 15.12 hrs, Volume= 3.849 af
Primary = 4.11 cfs @ 15.12 hrs, Volume= 3.849 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

NURP Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 1PP: Northwest Wetland



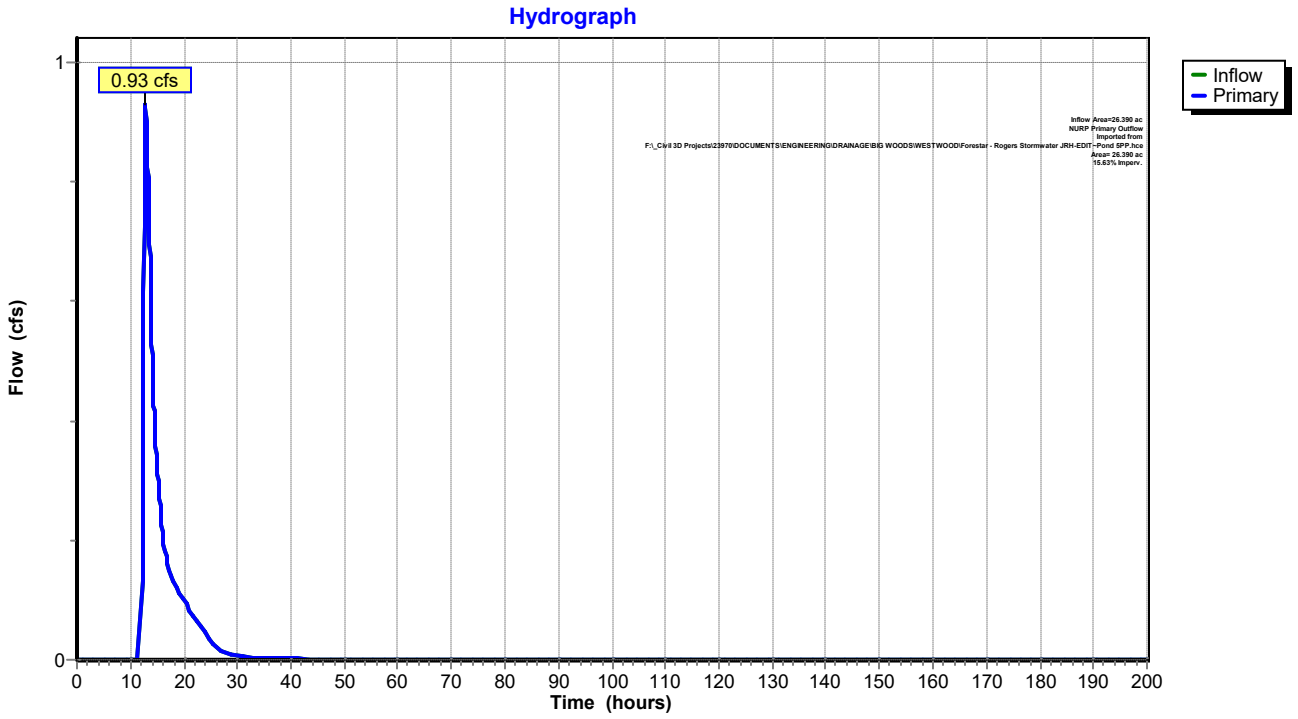
Summary for Link 5PP: Existing Pond

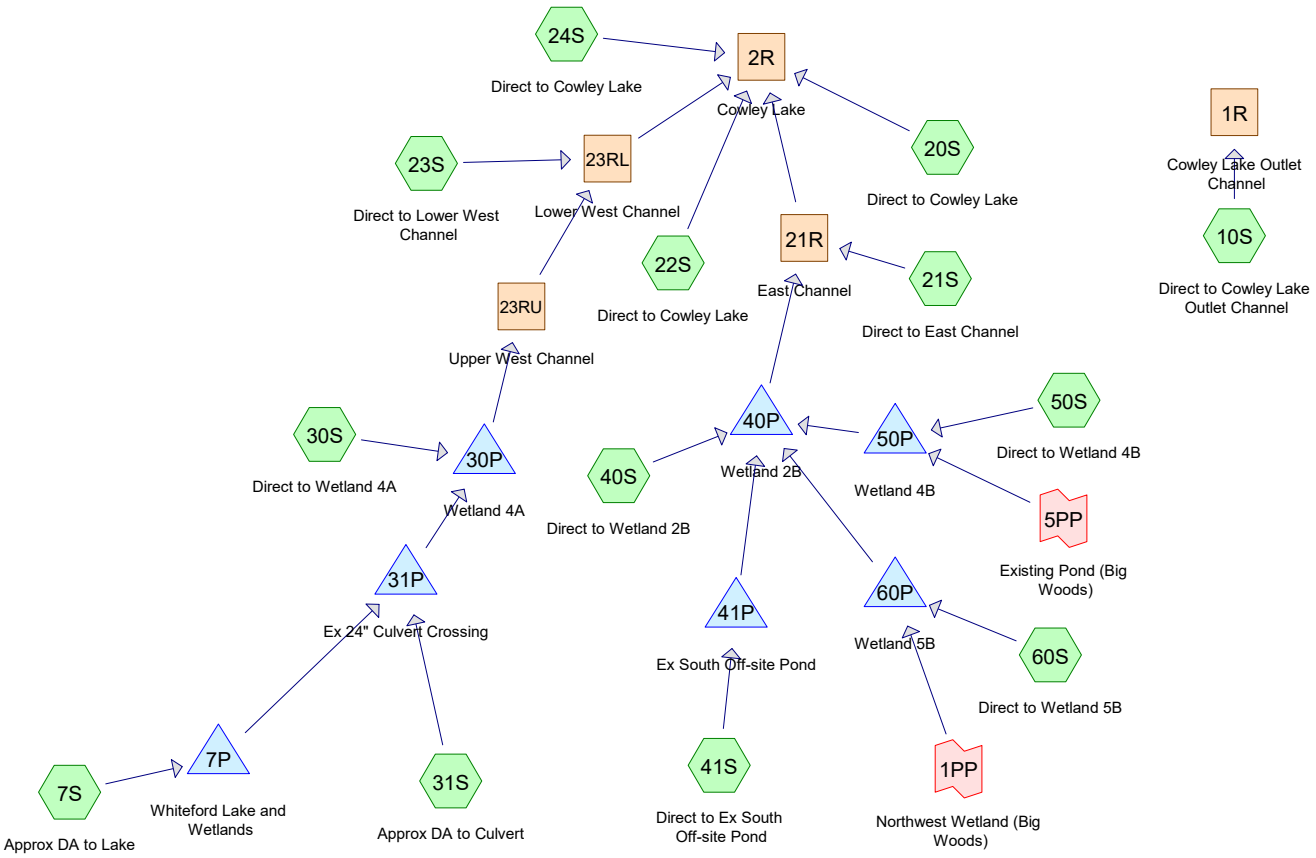
Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 0.11" for NURP event
Inflow = 0.93 cfs @ 12.82 hrs, Volume= 0.240 af
Primary = 0.93 cfs @ 12.82 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

NURP Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 5PP: Existing Pond





Subcat Reach Pond Link

Routing Diagram for COWLEY LAKE PRESERVE - EXISTING Rev 1
Prepared by James R. Hill, Inc., Printed 4/15/2025
HydroCAD® 10.00-25 s/n 00744 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
20.000	77	2 acre lots, 12% imp, HSG C (31S)
39.707	80	>75% Grass cover, Good, HSG D (10S, 24S, 30S, 40S, 41S, 50S, 60S)
2.908	96	Gravel surface, HSG D (24S, 30S, 40S, 41S, 50S, 60S)
9.291	78	Meadow, non-grazed, HSG D (10S, 22S, 23S, 24S, 30S, 40S, 41S)
2.775	89	Pasture/grassland/range, Poor, HSG D (30S, 40S, 50S)
120.604	89	Row crops, straight row, Good, HSG D (10S, 20S, 21S, 22S, 23S, 24S, 30S, 40S, 50S)
5.387	98	Unconnected pavement, HSG D (10S, 24S, 30S, 40S, 41S, 50S, 60S)
2.612	98	Unconnected roofs, HSG D (10S, 30S, 40S, 41S, 50S, 60S)
20.608	98	Water Surface, 0% imp, HSG D (10S, 20S, 21S, 22S, 23S, 24S, 40S, 41S, 50S, 60S)
16.301	77	Woods, Good, HSG D (10S, 20S, 21S, 22S, 23S, 24S, 30S, 40S, 60S)
300.000	72	Woods/grass comb., Good, HSG C (7S)
540.193	**78**	**TOTAL AREA**

Time span=0.00-240.00 hrs, dt=0.05 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=0.73"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=185.67 cfs 18.153 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=25.761 ac 0.80% Impervious Runoff Depth=1.70"
Flow Length=2,175' Tc=29.4 min CN=88/98 Runoff=39.59 cfs 3.653 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=6.216 ac 0.00% Impervious Runoff Depth=1.54"
Flow Length=586' Tc=8.9 min CN=86/0 Runoff=15.30 cfs 0.799 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.900 ac 0.00% Impervious Runoff Depth=1.09"
Flow Length=247' Tc=20.0 min CN=79/0 Runoff=1.07 cfs 0.082 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=5.776 ac 0.00% Impervious Runoff Depth=1.54"
Flow Length=737' Tc=11.1 min CN=86/0 Runoff=13.05 cfs 0.743 af

Subcatchment 23S: Direct to Lower West Runoff Area=9.551 ac 0.00% Impervious Runoff Depth=1.62"
Flow Length=391' Tc=9.5 min CN=87/0 Runoff=23.94 cfs 1.287 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=26.075 ac 1.14% Impervious Runoff Depth=1.70"
Flow Length=998' Tc=13.6 min CN=88/98 Runoff=59.53 cfs 3.705 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=41.507 ac 5.85% Impervious Runoff Depth=1.47"
Flow Length=1,249' Tc=23.4 min CN=84/98 Runoff=62.00 cfs 5.097 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=1.04"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=14.22 cfs 1.729 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=73.860 ac 2.02% Impervious Runoff Depth=1.79"
Flow Length=1,354' Tc=23.6 min CN=89/98 Runoff=134.60 cfs 11.024 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=1.35"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=26.82 cfs 1.537 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=1.68"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=20.94 cfs 1.835 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=1.58"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=10.21 cfs 0.496 af

Reach 1R: Cowley Lake Outlet Channel Inflow=39.59 cfs 3.653 af
Outflow=39.59 cfs 3.653 af

Reach 2R: Cowley Lake Inflow=111.83 cfs 26.839 af
Outflow=111.83 cfs 26.839 af

Reach 21R: East Channel Avg. Flow Depth=0.76' Max Vel=4.27 fps Inflow=17.07 cfs 16.147 af
n=0.022 L=382.0' S=0.0097 '/' Capacity=131.71 cfs Outflow=17.07 cfs 16.147 af

Reach 23RL: Lower West Channel Avg. Flow Depth=0.77' Max Vel=1.91 fps Inflow=23.94 cfs 5.445 af
n=0.022 L=534.0' S=0.0014 '/' Capacity=257.71 cfs Outflow=21.28 cfs 5.445 af

Reach 23RU: Upper West Channel Avg. Flow Depth=0.31' Max Vel=1.58 fps Inflow=6.48 cfs 4.158 af
n=0.022 L=490.0' S=0.0057 '/' Capacity=766.18 cfs Outflow=6.47 cfs 4.157 af

Pond 7P: Whiteford Lake and Wetlands Peak Elev=930.30' Storage=18.153 af Inflow=185.67 cfs 18.153 af
Outflow=0.00 cfs 0.000 af

Pond 30P: Wetland 4A Peak Elev=926.32' Storage=4.577 af Inflow=71.45 cfs 6.827 af
Outflow=6.48 cfs 4.158 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=932.25' Storage=0.018 af Inflow=14.22 cfs 1.729 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=13.72 cfs 1.729 af

Pond 40P: Wetland 2B Peak Elev=925.21' Storage=7.098 af Inflow=140.55 cfs 16.070 af
Outflow=16.97 cfs 16.066 af

Pond 41P: Ex South Off-site Pond Peak Elev=939.36' Storage=1.537 af Inflow=26.82 cfs 1.537 af
Outflow=0.00 cfs 0.000 af

Pond 50P: Wetland 4B Peak Elev=940.27' Storage=2.164 af Inflow=21.86 cfs 2.164 af
Outflow=0.00 cfs 0.000 af

Pond 60P: Wetland 5B Peak Elev=938.67' Storage=0.254 af Inflow=12.04 cfs 5.261 af
Outflow=7.33 cfs 5.046 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=5.22 cfs 4.764 af
Primary=5.22 cfs 4.764 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=1.61 cfs 0.329 af
Area= 26.390 ac 15.63% Imperv. Primary=1.61 cfs 0.329 af

Total Runoff Area = 540.193 ac Runoff Volume = 50.141 af Average Runoff Depth = 1.11"
98.07% Pervious = 529.794 ac 1.93% Impervious = 10.399 ac

Summary for Subcatchment 7S: Approx DA to Lake

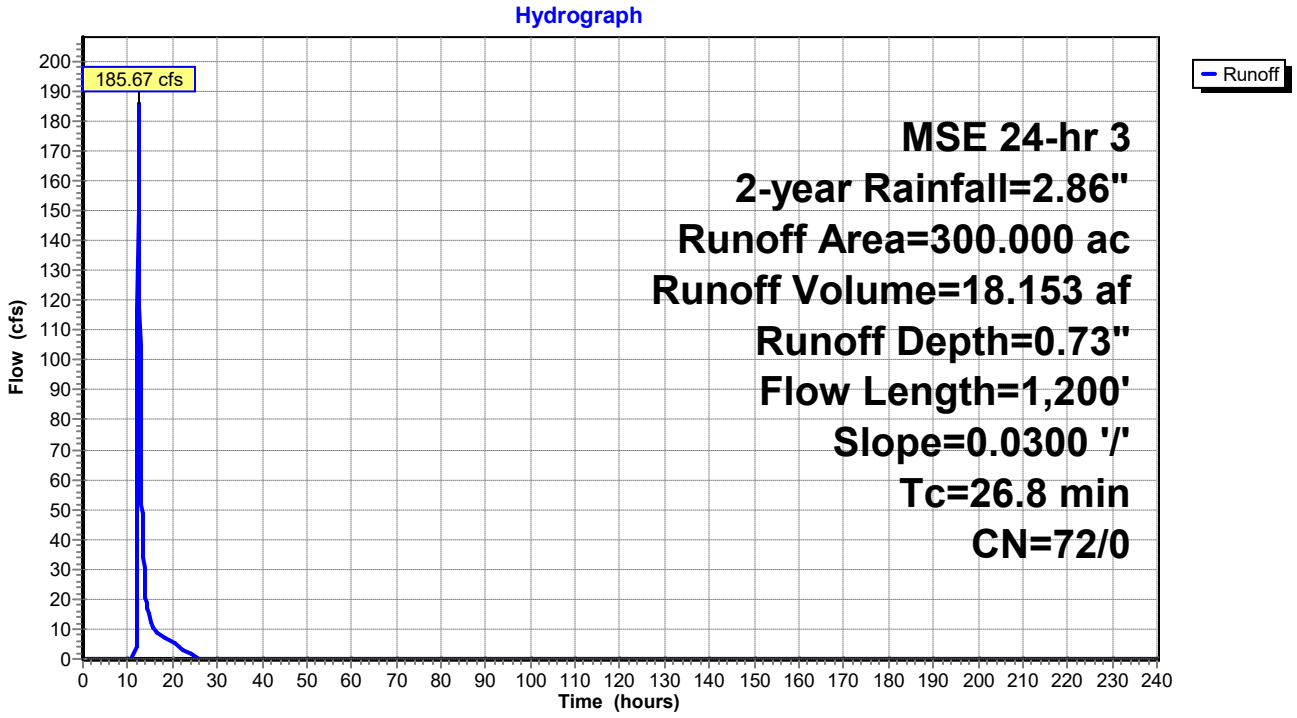
Runoff = 185.67 cfs @ 12.43 hrs, Volume= 18.153 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

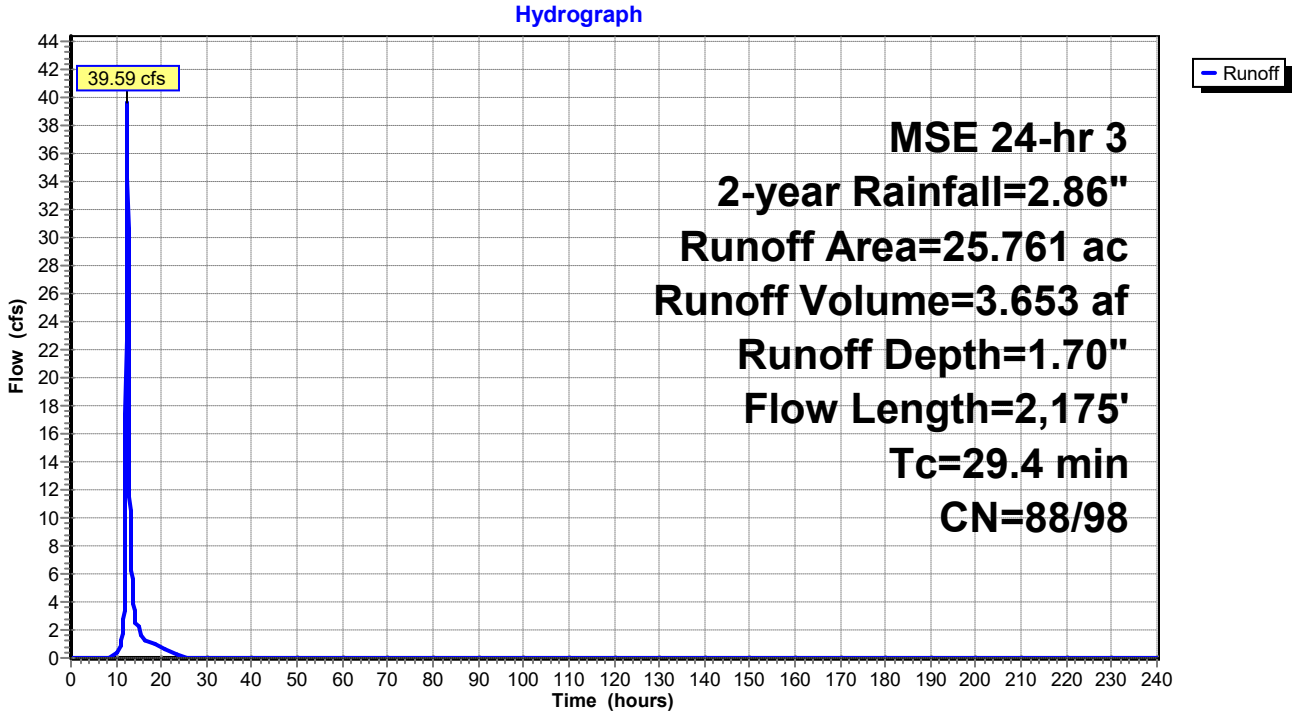
Runoff = 39.59 cfs @ 12.42 hrs, Volume= 3.653 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.136	98	Unconnected pavement, HSG D
0.070	98	Unconnected roofs, HSG D
1.380	98	Water Surface, 0% imp, HSG D
21.395	89	Row crops, straight row, Good, HSG D
1.284	80	>75% Grass cover, Good, HSG D
0.797	78	Meadow, non-grazed, HSG D
0.699	77	Woods, Good, HSG D
25.761	88	Weighted Average
25.555	88	99.20% Pervious Area
0.206	98	0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
20.2	1,454	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.9	621	0.0020	2.64	68.60	**Channel Flow,** Area= 26.0 sf Perim= 20.0' r= 1.30' n= 0.030 Earth, grassed & winding
29.4	2,175	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 20S: Direct to Cowley Lake

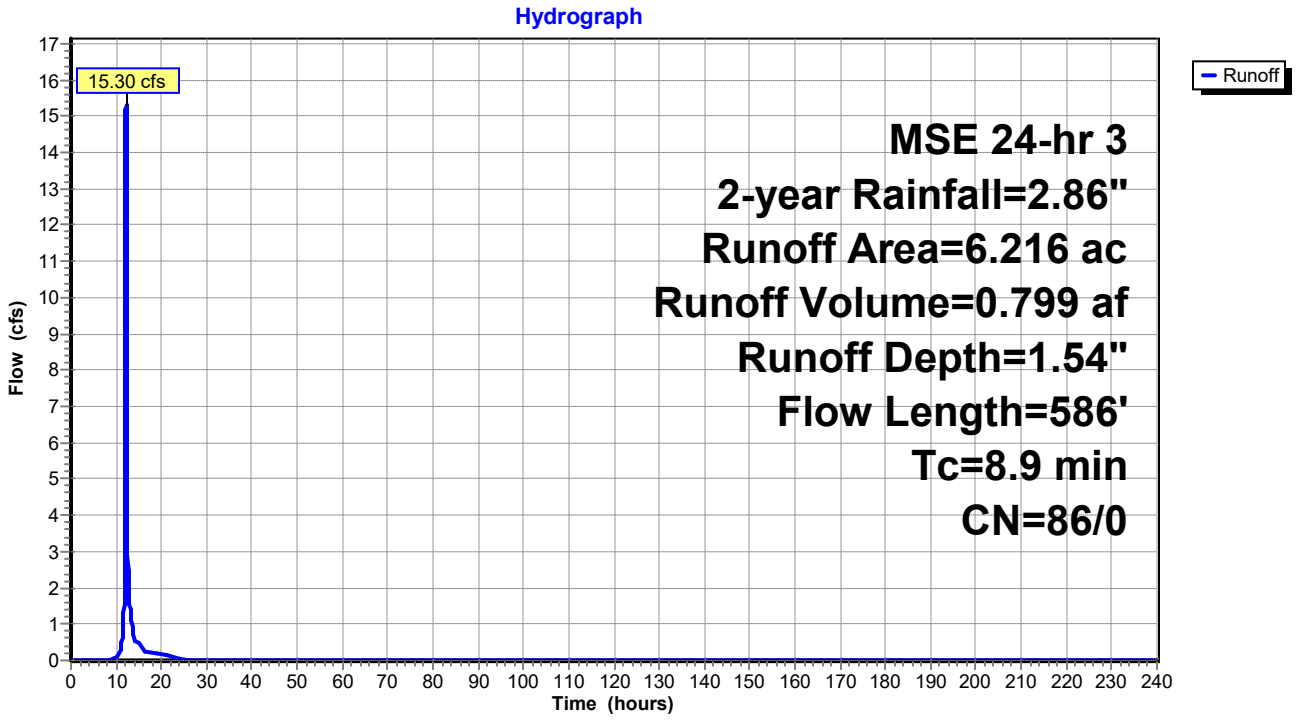
Runoff = 15.30 cfs @ 12.16 hrs, Volume= 0.799 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.123	98	Water Surface, 0% imp, HSG D
4.384	89	Row crops, straight row, Good, HSG D
1.709	77	Woods, Good, HSG D
6.216	86	Weighted Average
6.216	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0240	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
4.3	486	0.0440	1.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.9	586	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

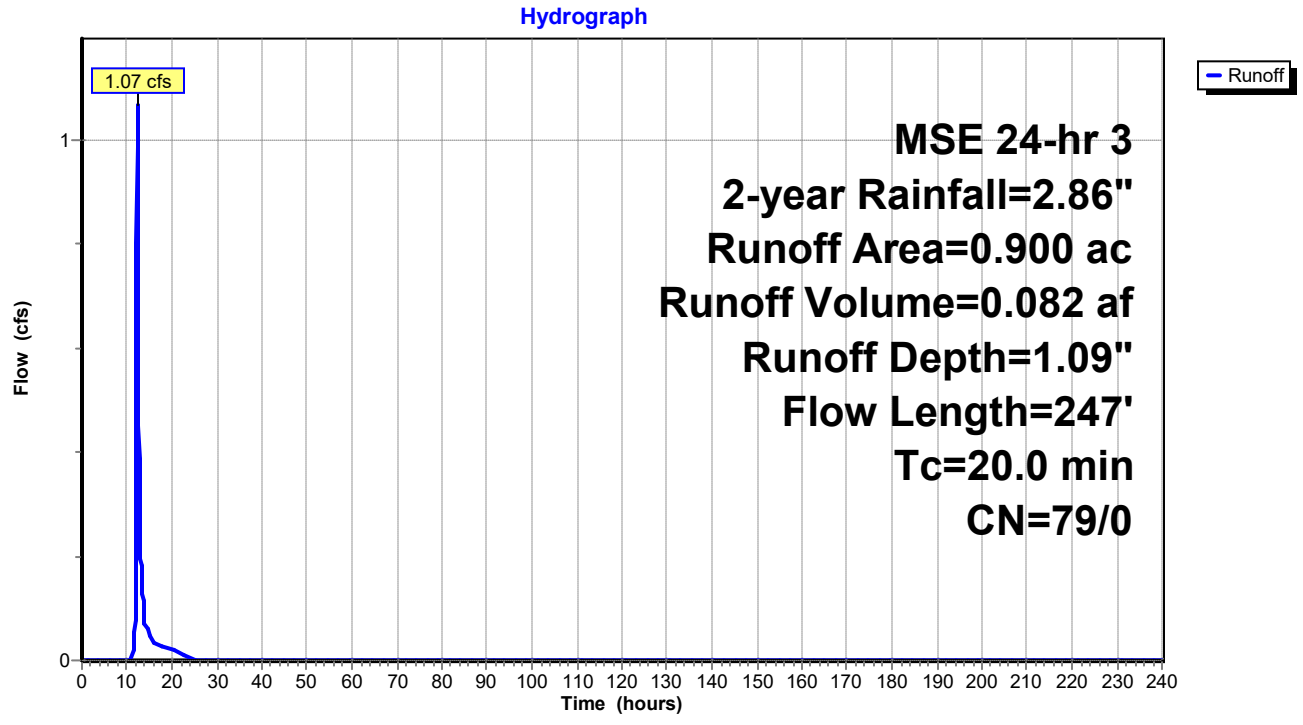
Runoff = 1.07 cfs @ 12.31 hrs, Volume= 0.082 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.074	98	Water Surface, 0% imp, HSG D
0.005	89	Row crops, straight row, Good, HSG D
0.821	77	Woods, Good, HSG D
0.900	79	Weighted Average
0.900	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
1.8	147	0.0721	1.34		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.0	247	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

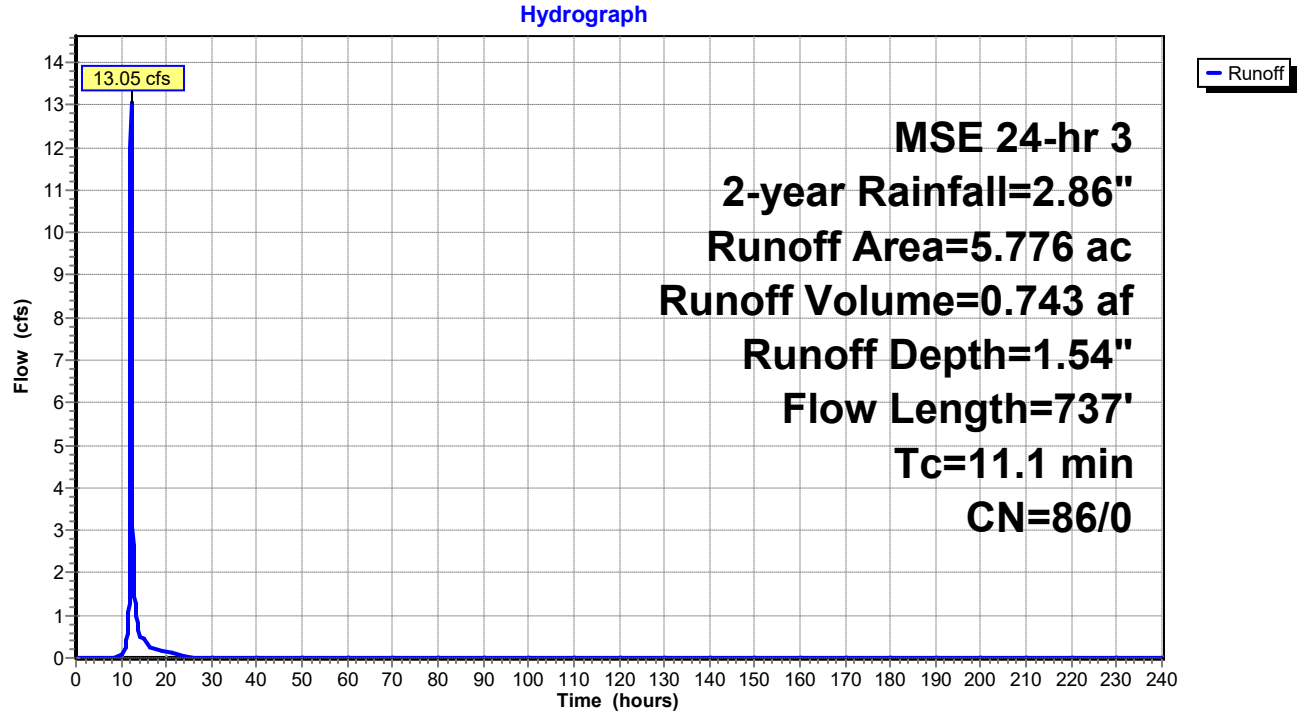
Runoff = 13.05 cfs @ 12.19 hrs, Volume= 0.743 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.031	98	Water Surface, 0% imp, HSG D
4.386	89	Row crops, straight row, Good, HSG D
0.729	78	Meadow, non-grazed, HSG D
0.630	77	Woods, Good, HSG D
5.776	86	Weighted Average
5.776	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.0440	0.46		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
7.5	637	0.0248	1.42		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.1	737	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Lower West Channel

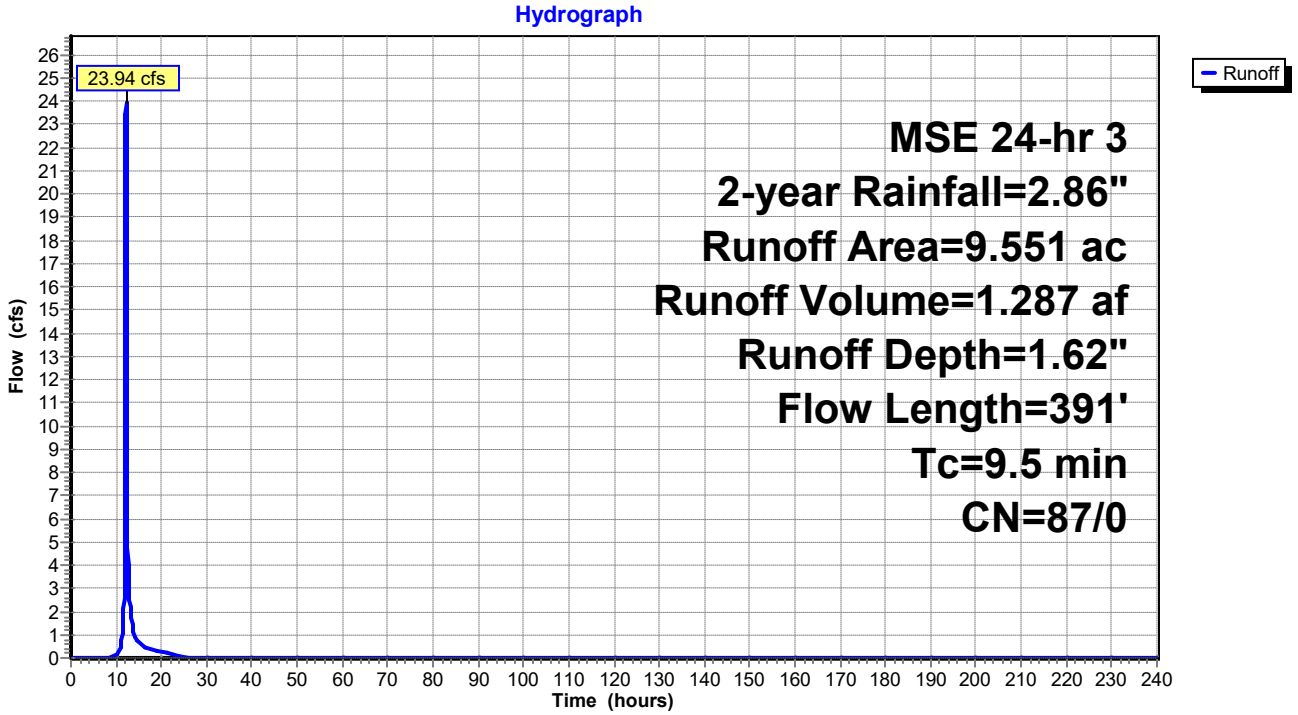
Runoff = 23.94 cfs @ 12.17 hrs, Volume= 1.287 af, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.467	98	Water Surface, 0% imp, HSG D
7.263	89	Row crops, straight row, Good, HSG D
0.213	78	Meadow, non-grazed, HSG D
1.608	77	Woods, Good, HSG D
9.551	87	Weighted Average
9.551	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0090	0.24		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
2.6	291	0.0433	1.87		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
9.5	391	Total			

Subcatchment 23S: Direct to Lower West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

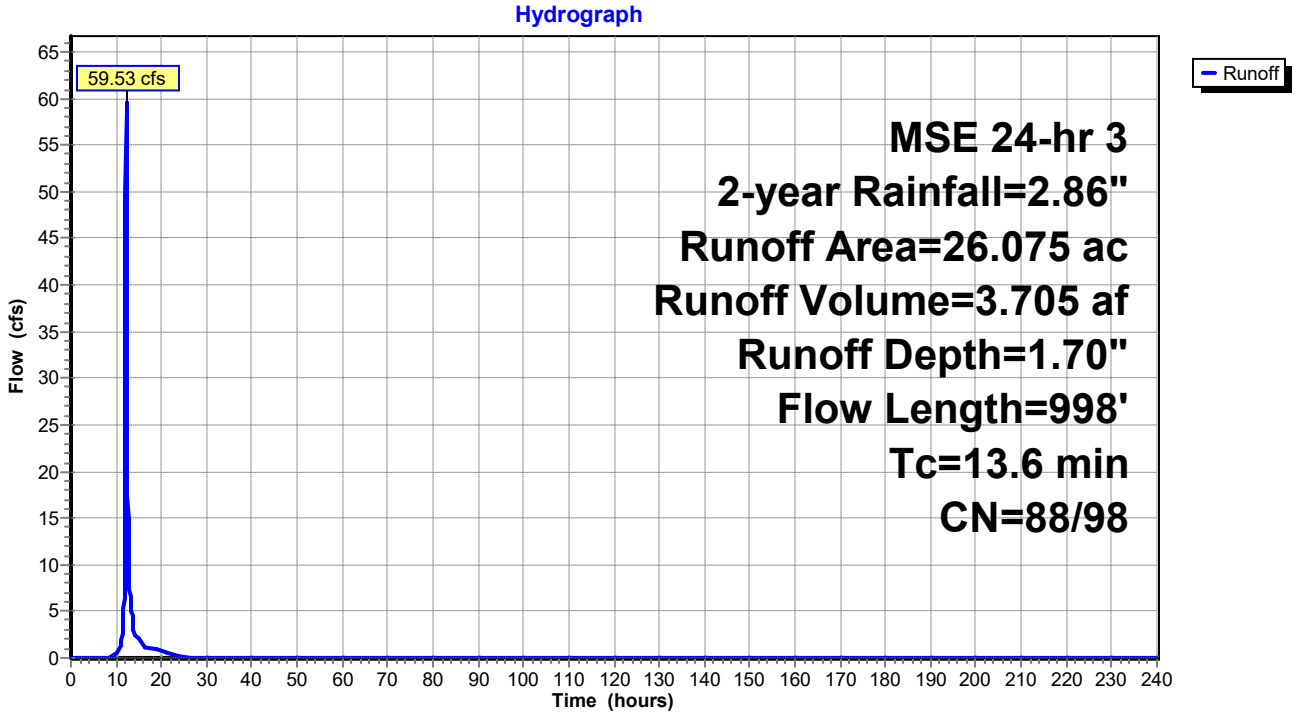
Runoff = 59.53 cfs @ 12.22 hrs, Volume= 3.705 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.298	98	Unconnected pavement, HSG D
0.980	98	Water Surface, 0% imp, HSG D
0.082	96	Gravel surface, HSG D
0.357	80	>75% Grass cover, Good, HSG D
21.863	89	Row crops, straight row, Good, HSG D
0.151	78	Meadow, non-grazed, HSG D
2.344	77	Woods, Good, HSG D
26.075	88	Weighted Average
25.777	88	98.86% Pervious Area
0.298	98	1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	30	0.0200	1.02		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
10.3	819	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.8	149	0.0315	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.6	998	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 30S: Direct to Wetland 4A

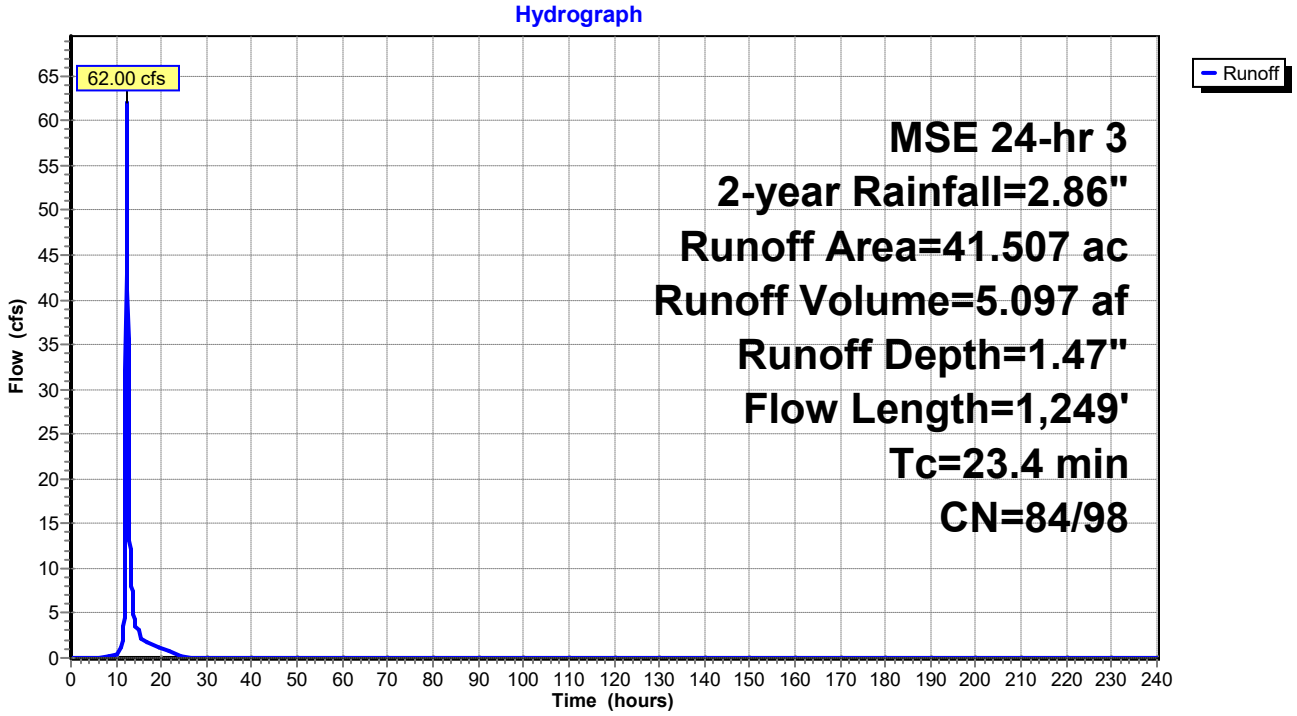
Runoff = 62.00 cfs @ 12.35 hrs, Volume= 5.097 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
1.469	98	Unconnected pavement, HSG D
0.959	98	Unconnected roofs, HSG D
0.947	96	Gravel surface, HSG D
17.469	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
14.597	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
3.773	77	Woods, Good, HSG D
41.507	85	Weighted Average
39.079	84	94.15% Pervious Area
2.428	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

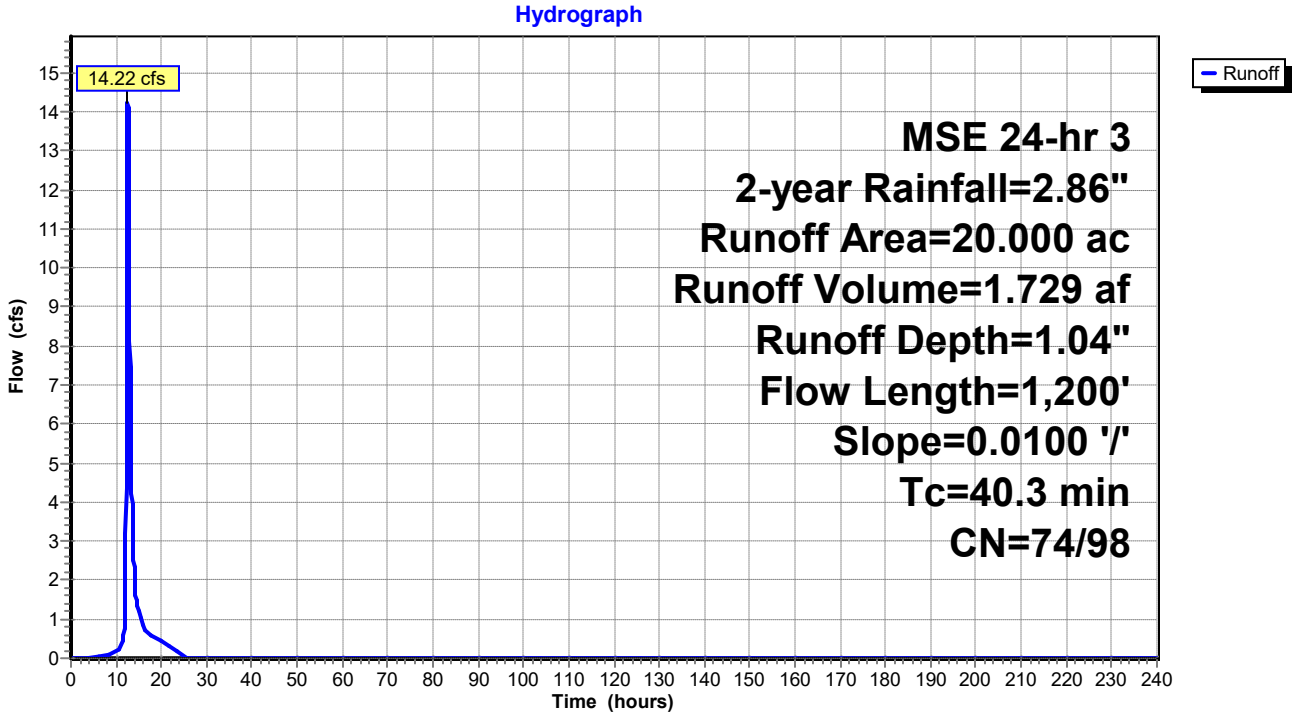
Runoff = 14.22 cfs @ 12.59 hrs, Volume= 1.729 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 40S: Direct to Wetland 2B

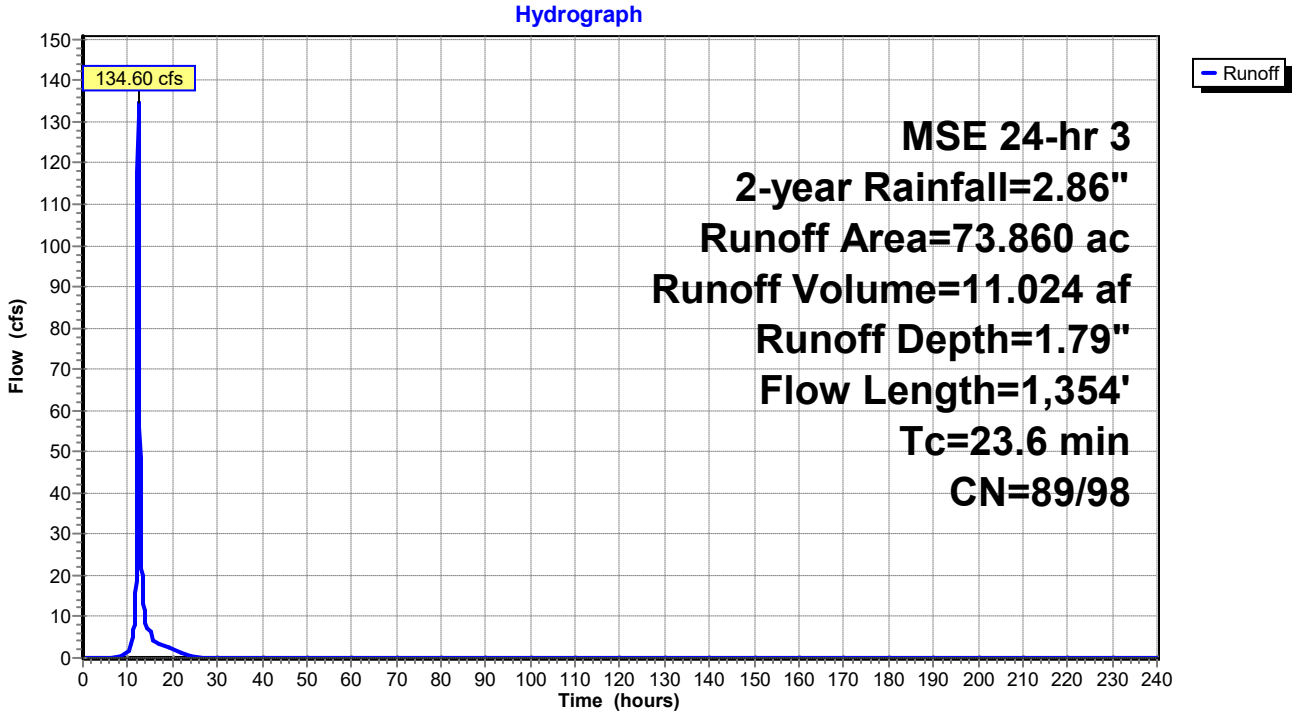
Runoff = 134.60 cfs @ 12.34 hrs, Volume= 11.024 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
0.528	98	Unconnected roofs, HSG D
17.207	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
35.493	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
8.455	80	>75% Grass cover, Good, HSG D
5.449	78	Meadow, non-grazed, HSG D
4.306	77	Woods, Good, HSG D
73.860	89	Weighted Average
72.367	89	97.98% Pervious Area
1.493	98	2.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

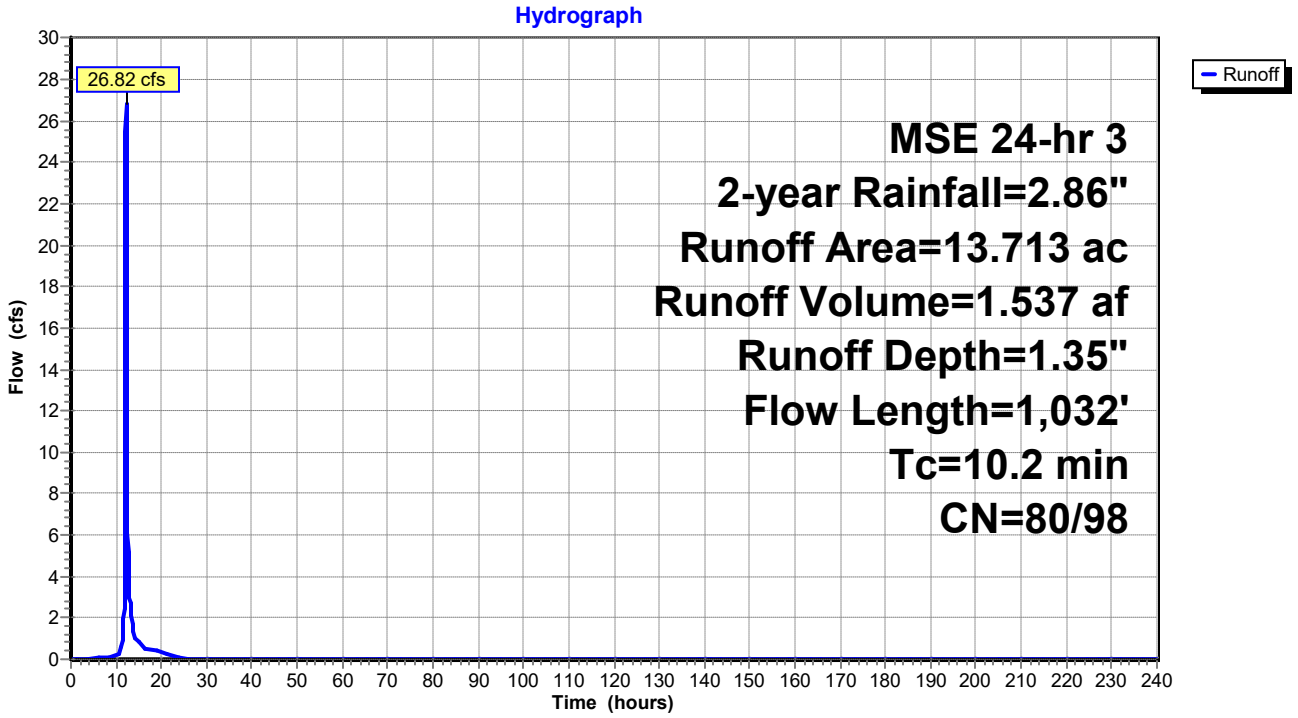
Runoff = 26.82 cfs @ 12.18 hrs, Volume= 1.537 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

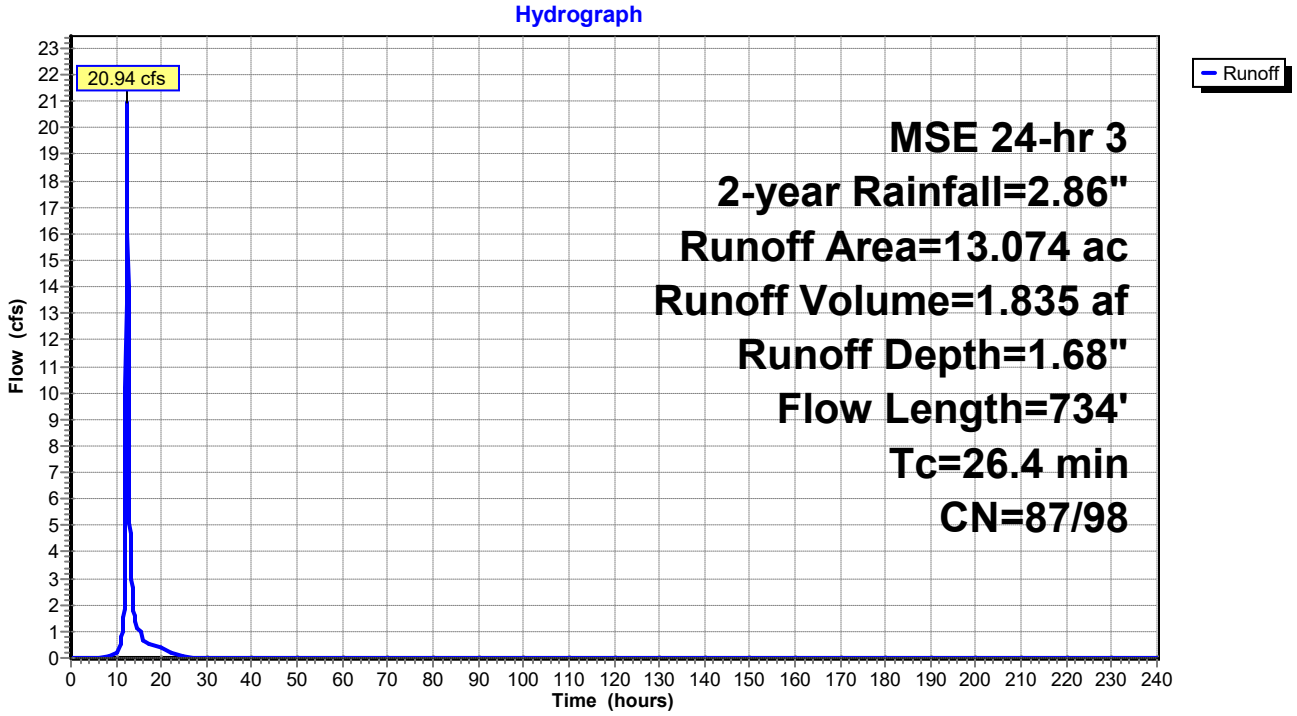
Runoff = 20.94 cfs @ 12.38 hrs, Volume= 1.835 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

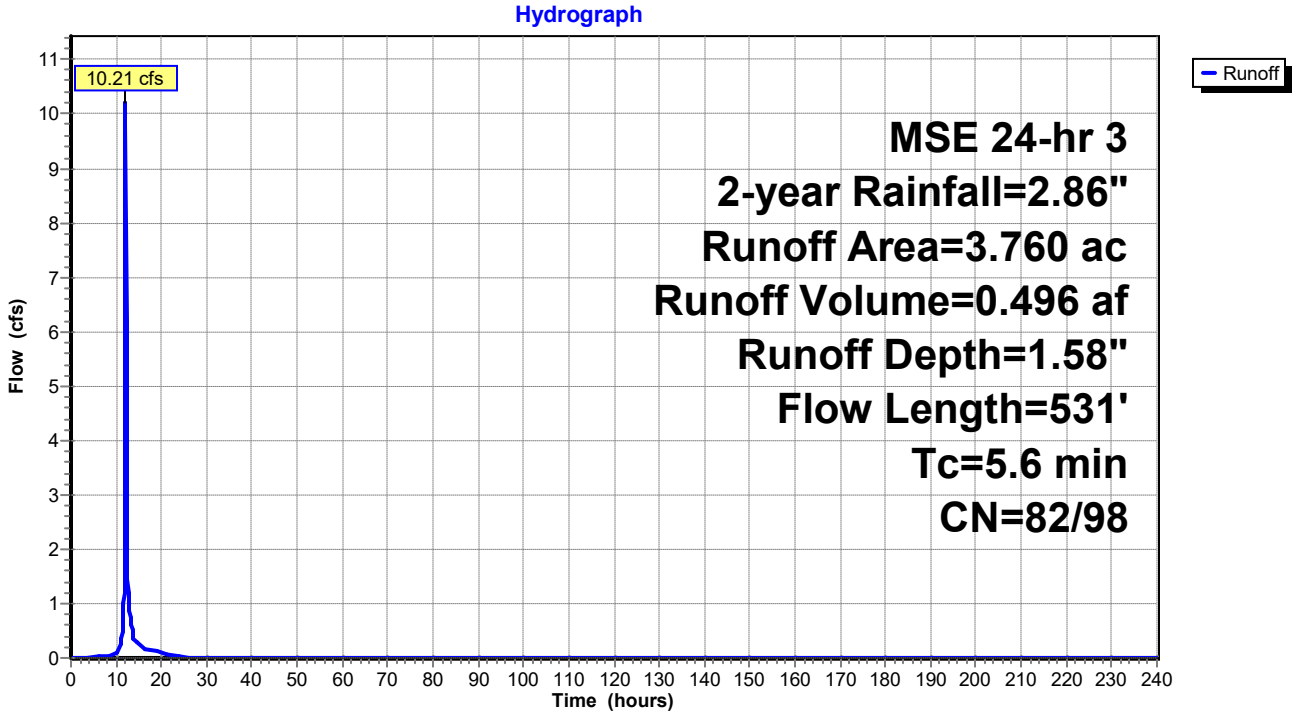
Runoff = 10.21 cfs @ 12.13 hrs, Volume= 0.496 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-year Rainfall=2.86"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



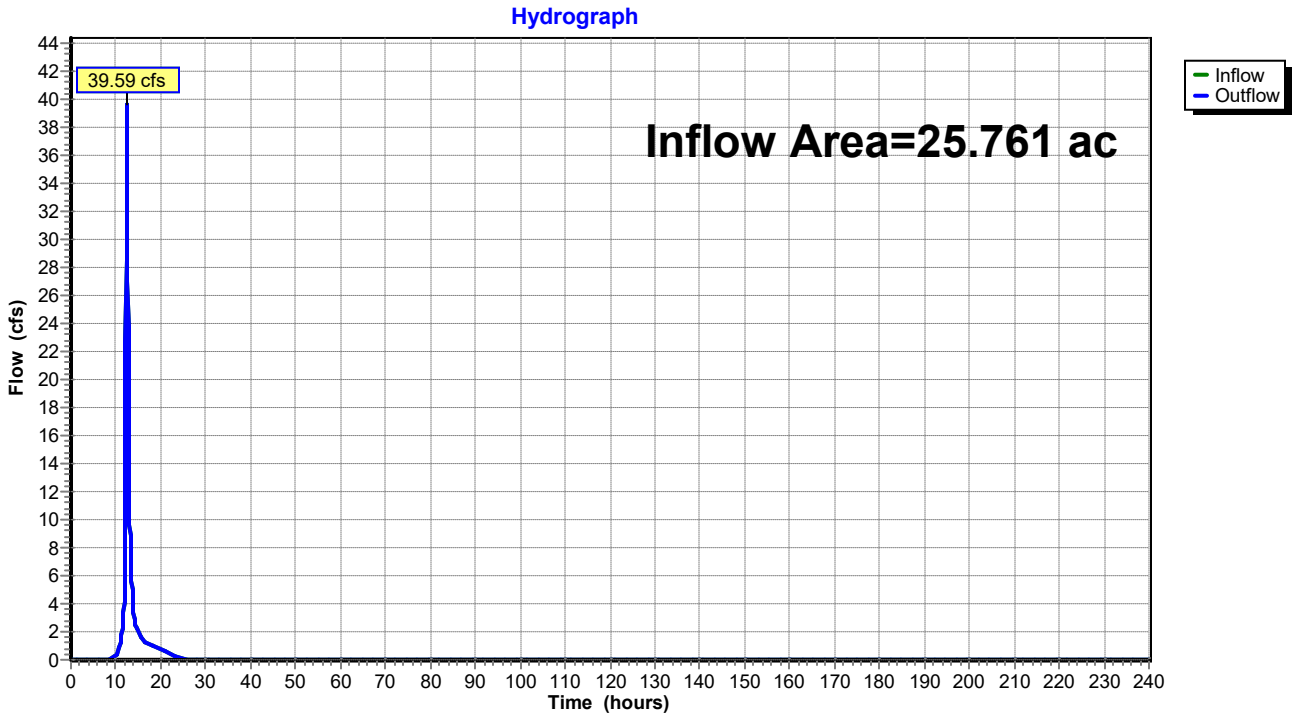
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.761 ac, 0.80% Impervious, Inflow Depth = 1.70" for 2-year event
Inflow = 39.59 cfs @ 12.42 hrs, Volume= 3.653 af
Outflow = 39.59 cfs @ 12.42 hrs, Volume= 3.653 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



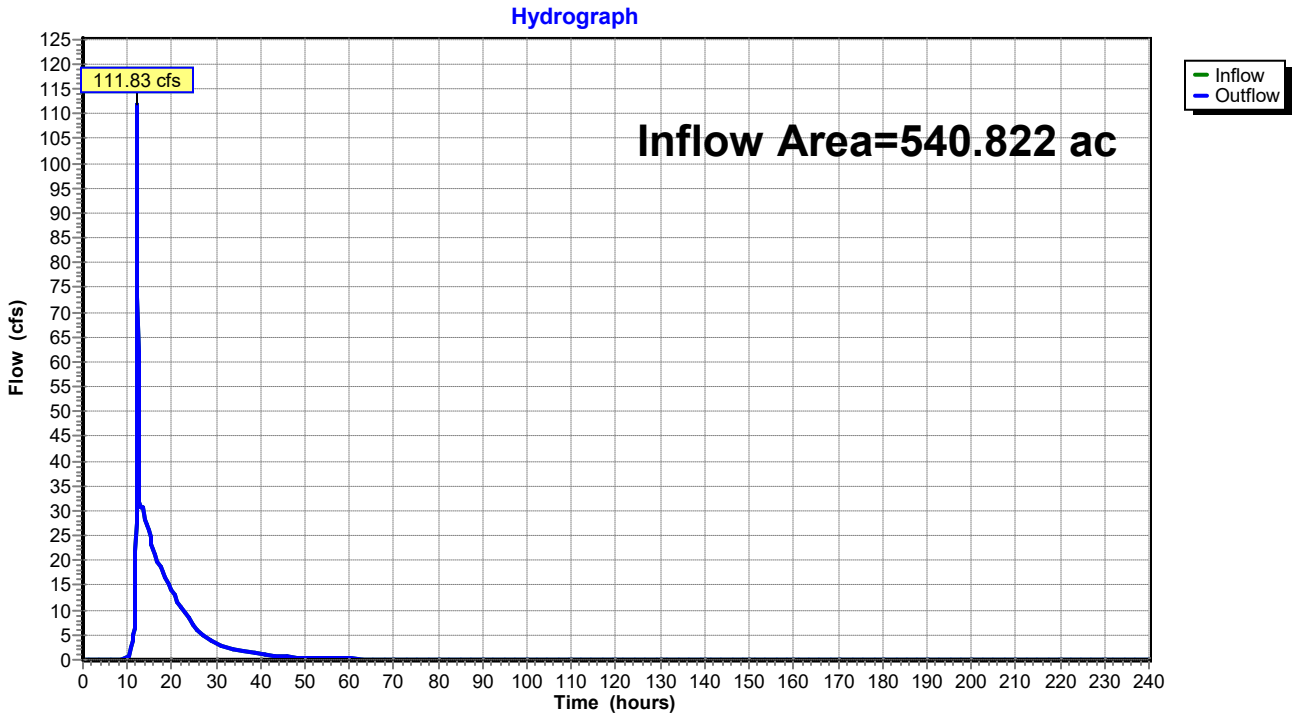
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.822 ac, 2.65% Impervious, Inflow Depth = 0.60" for 2-year event
Inflow = 111.83 cfs @ 12.21 hrs, Volume= 26.839 af
Outflow = 111.83 cfs @ 12.21 hrs, Volume= 26.839 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: East Channel

Inflow Area = 131.697 ac, 6.98% Impervious, Inflow Depth > 1.47" for 2-year event
Inflow = 17.07 cfs @ 13.63 hrs, Volume= 16.147 af
Outflow = 17.07 cfs @ 13.65 hrs, Volume= 16.147 af, Atten= 0%, Lag= 1.1 min

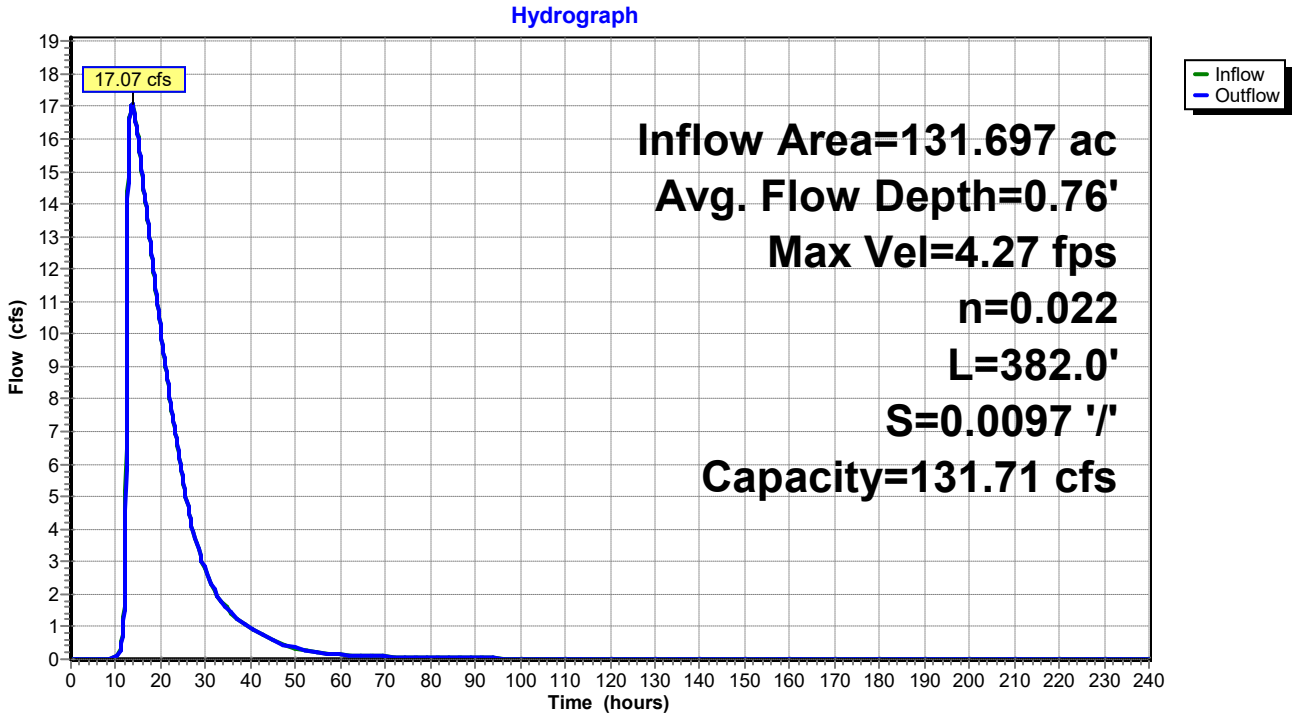
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.27 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.88 fps, Avg. Travel Time= 7.3 min

Peak Storage= 1,527 cf @ 13.65 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 131.71 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 382.0' Slope= 0.0097 '/'
Inlet Invert= 923.92', Outlet Invert= 920.20'

‡

Reach 21R: East Channel



Summary for Reach 23RL: Lower West Channel

Inflow Area = 371.058 ac, 1.30% Impervious, Inflow Depth > 0.18" for 2-year event
Inflow = 23.94 cfs @ 12.17 hrs, Volume= 5.445 af
Outflow = 21.28 cfs @ 12.22 hrs, Volume= 5.445 af, Atten= 11%, Lag= 2.9 min

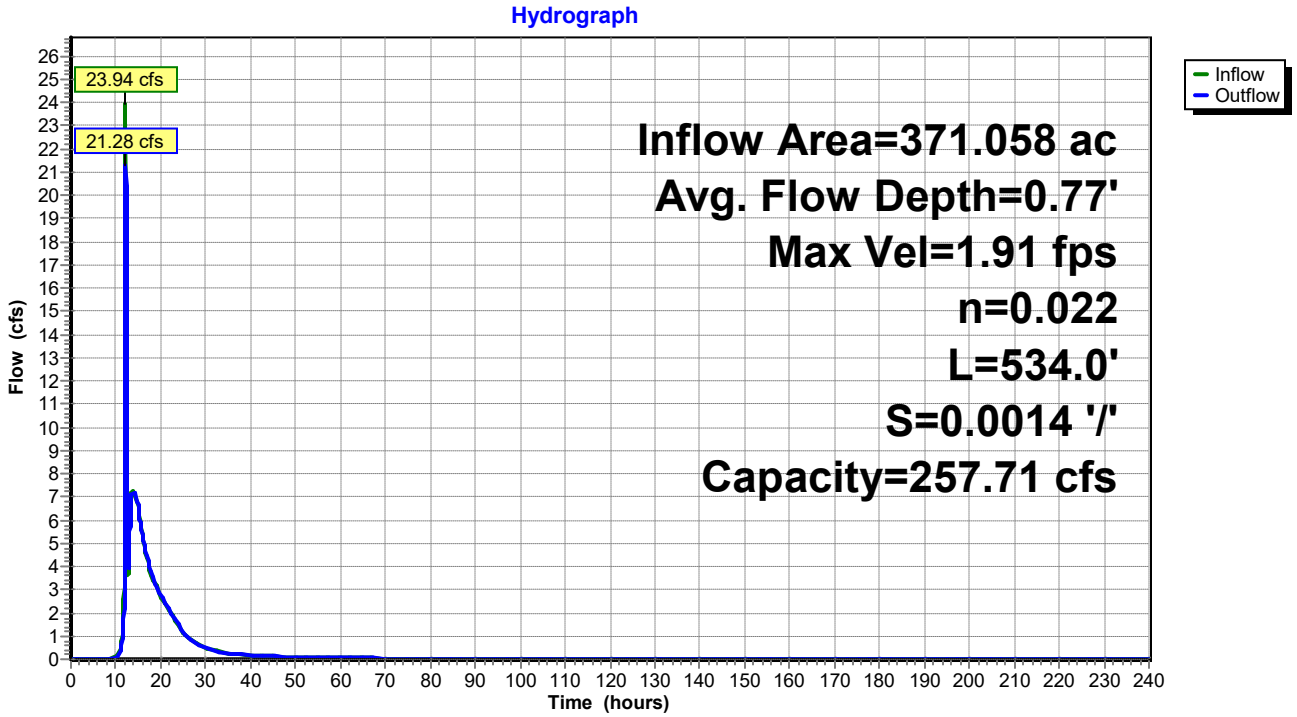
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.91 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 29.1 min

Peak Storage= 5,912 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.77'
Bank-Full Depth= 3.00' Flow Area= 63.0 sf, Capacity= 257.71 cfs

12.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 30.00'
Length= 534.0' Slope= 0.0014 '/'
Inlet Invert= 919.58', Outlet Invert= 918.82'

‡

Reach 23RL: Lower West Channel



Summary for Reach 23RU: Upper West Channel

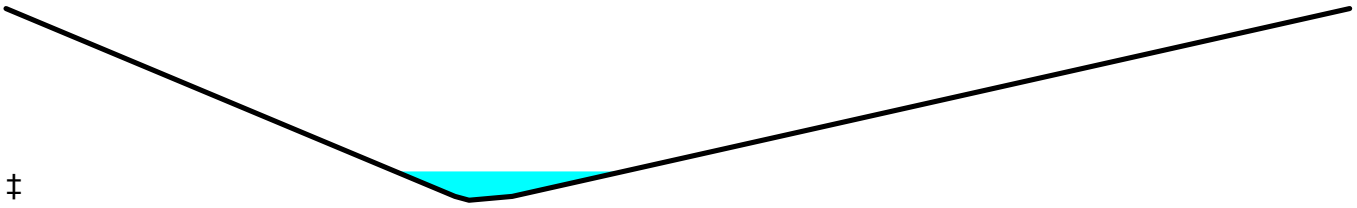
[80] Warning: Exceeded Pond 30P by 0.96' @ 0.00 hrs (0.58 cfs 0.685 af)

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 0.14" for 2-year event
Inflow = 6.48 cfs @ 13.89 hrs, Volume= 4.158 af
Outflow = 6.47 cfs @ 13.97 hrs, Volume= 4.157 af, Atten= 0%, Lag= 4.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.58 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 21.8 min

Peak Storage= 2,011 cf @ 13.97 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 2.04' Flow Area= 146.2 sf, Capacity= 766.18 cfs

Custom cross-section, Length= 490.0' Slope= 0.0057 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 925.96', Outlet Invert= 923.17'

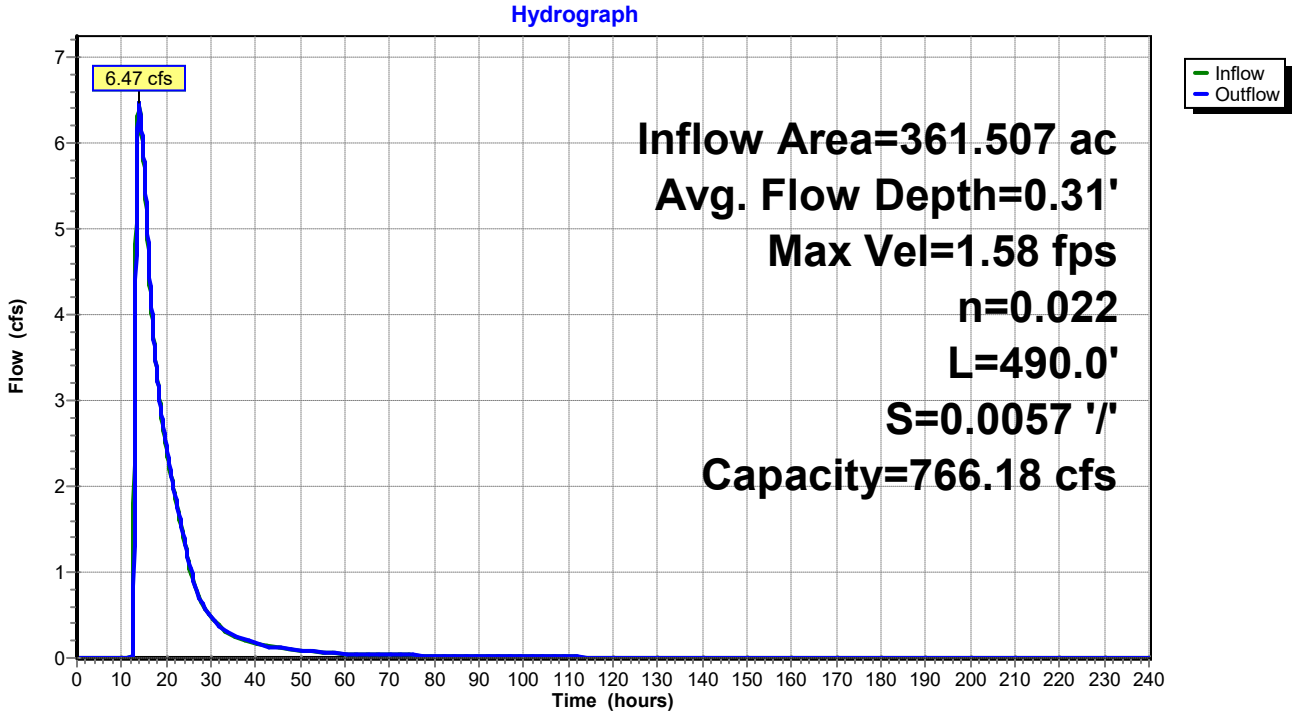


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-48.27	928.00	0.00
-1.47	926.00	2.00
0.00	925.96	2.04
4.51	926.00	2.00
91.79	928.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.04	0.1	6.0	59	0.05
2.04	146.2	140.1	71,618	766.18

Reach 23RU: Upper West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 0.73" for 2-year event
Inflow = 185.67 cfs @ 12.43 hrs, Volume= 18.153 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 930.30' @ 25.55 hrs Surf.Area= 60.901 ac Storage= 18.153 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

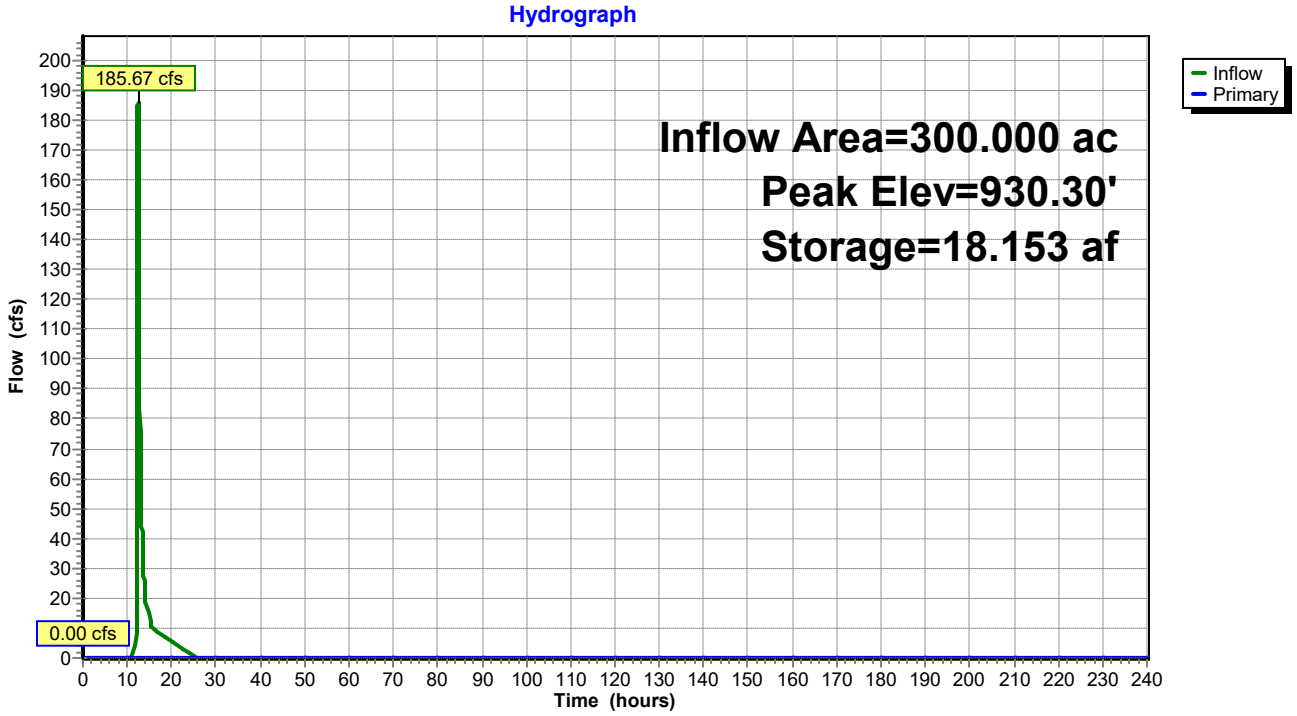
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=930.00' TW=930.22' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 30P: Wetland 4A

[58] Hint: Peaked 0.36' above defined flood level

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth = 0.23" for 2-year event
Inflow = 71.45 cfs @ 12.37 hrs, Volume= 6.827 af
Outflow = 6.48 cfs @ 13.89 hrs, Volume= 4.158 af, Atten= 91%, Lag= 91.6 min
Primary = 6.48 cfs @ 13.89 hrs, Volume= 4.158 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 926.32' @ 13.96 hrs Surf.Area= 5.727 ac Storage= 4.577 af
Flood Elev= 925.96' Surf.Area= 5.112 ac Storage= 2.616 af

Plug-Flow detention time= 687.2 min calculated for 4.157 af (61% of inflow)
Center-of-Mass det. time= 603.5 min (1,428.3 - 824.8)

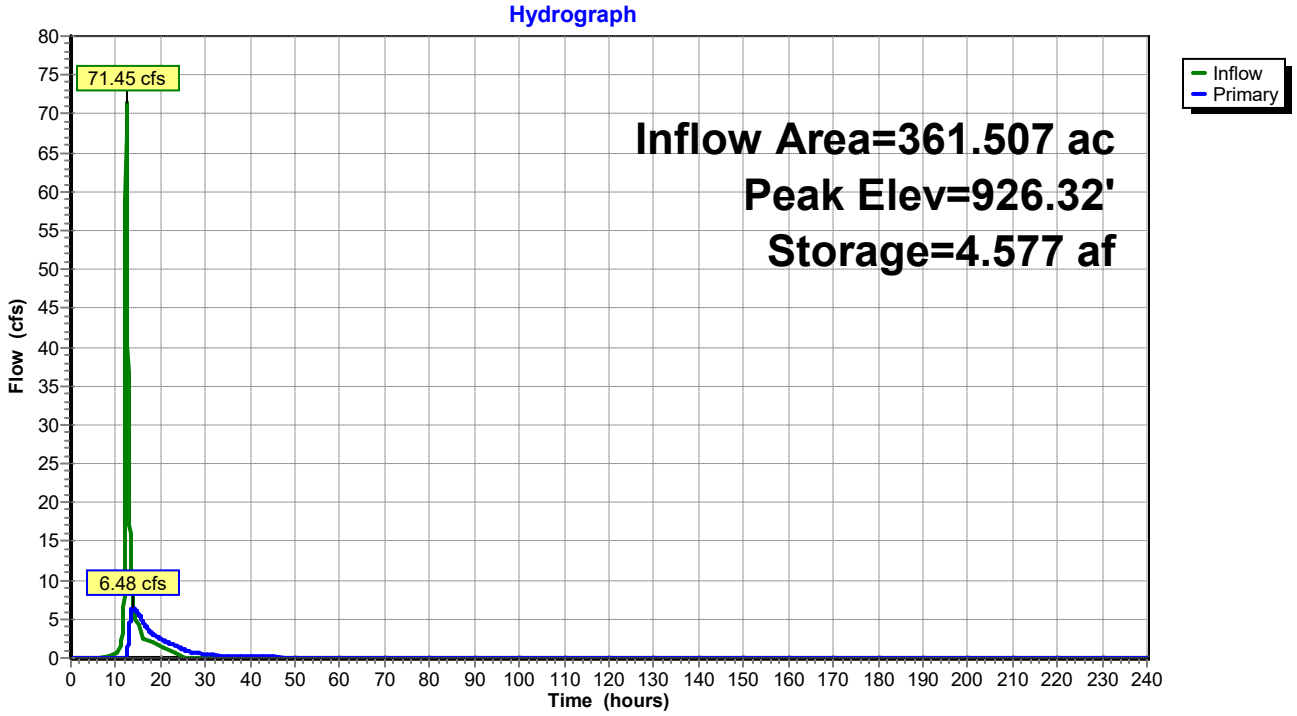
Volume	Invert	Avail.Storage	Storage Description
#1	925.00'	16.212 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
925.00	0.338	0.000	0.000
926.00	5.311	2.824	2.824
927.00	6.620	5.965	8.790
928.00	8.223	7.422	16.212

Device	Routing	Invert	Outlet Devices
#1	Primary	925.96'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.04 1.04 2.04 Width (feet) 0.00 6.00 90.00 140.00
#2	Primary	919.70'	**10.0" Round Culvert** L= 1,310.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.30' / 919.70' S= -0.0003 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#3	Device 2	925.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=6.45 cfs @ 13.89 hrs HW=926.32' TW=926.27' (Dynamic Tailwater)
- **1=Custom Weir/Orifice** (Weir Controls 6.32 cfs @ 1.01 fps)
- **2=Culvert** (Outlet Controls 0.13 cfs @ 0.25 fps)
  - **3=Orifice/Grate** (Passes 0.13 cfs of 0.59 cfs potential flow)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[80] Warning: Exceeded Pond 7P by 2.14' @ 12.65 hrs (149.57 cfs 7.851 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth = 0.06" for 2-year event
Inflow = 14.22 cfs @ 12.59 hrs, Volume= 1.729 af
Outflow = 13.72 cfs @ 12.67 hrs, Volume= 1.729 af, Atten= 4%, Lag= 4.9 min
Primary = 13.72 cfs @ 12.67 hrs, Volume= 1.729 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 932.25' @ 12.67 hrs Surf.Area= 0.101 ac Storage= 0.018 af

Plug-Flow detention time= 0.3 min calculated for 1.729 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (841.7 - 841.4)

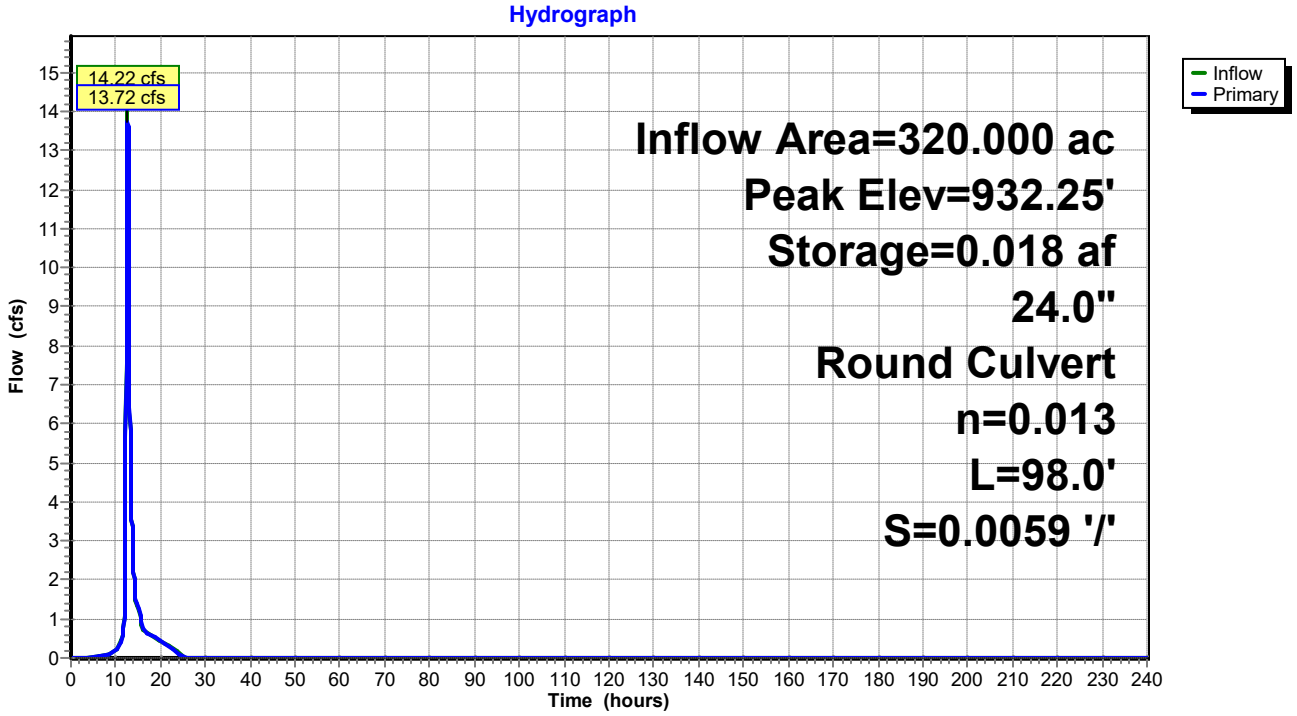
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=13.70 cfs @ 12.67 hrs HW=932.25' TW=926.08' (Dynamic Tailwater)
1=Culvert (Barrel Controls 13.70 cfs @ 5.35 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 40P: Wetland 2B

Inflow Area = 130.797 ac, 7.03% Impervious, Inflow Depth = 1.47" for 2-year event
Inflow = 140.55 cfs @ 12.34 hrs, Volume= 16.070 af
Outflow = 16.97 cfs @ 13.67 hrs, Volume= 16.066 af, Atten= 88%, Lag= 80.2 min
Primary = 16.97 cfs @ 13.67 hrs, Volume= 16.066 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 925.21' @ 13.68 hrs Surf.Area= 9.475 ac Storage= 7.098 af

Plug-Flow detention time= 347.5 min calculated for 16.062 af (100% of inflow)
Center-of-Mass det. time= 344.4 min (1,339.3 - 994.9)

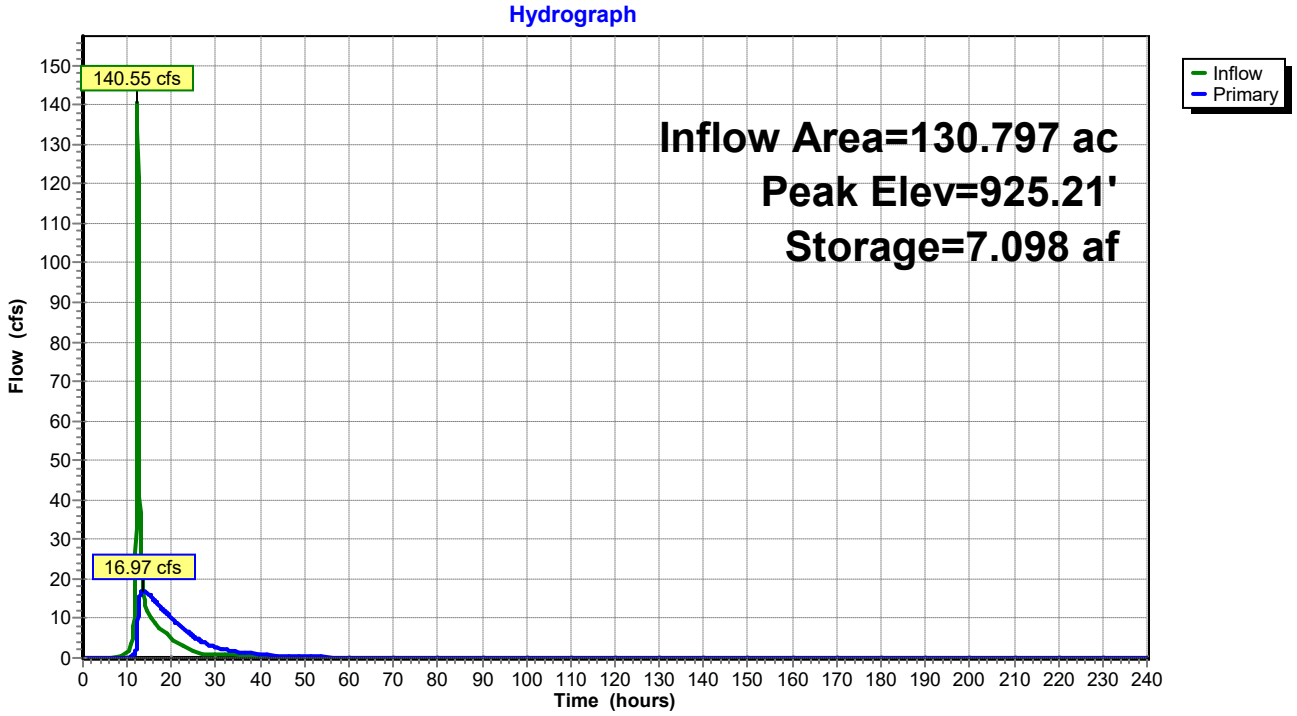
Volume	Invert	Avail.Storage	Storage Description
#1	923.92'	52.726 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.92	0.000	0.000	0.000
924.00	2.123	0.085	0.085
926.00	14.283	16.406	16.491
928.00	21.952	36.235	52.726

Device	Routing	Invert	Outlet Devices
#1	Primary	923.58'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -12.19 0.00 7.43 15.99
			Height (feet) 3.38 0.00 0.09 3.38
#2	Device 1	923.92'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -56.17 -5.92 -1.08 0.00 3.27 6.37 30.87 135.00
			Height (feet) 4.08 2.08 1.66 0.00 0.12 1.87 2.08 4.08

Primary OutFlow Max=16.96 cfs @ 13.67 hrs HW=925.21' TW=924.68' (Dynamic Tailwater)
↑**1=Asymmetrical Weir** (Passes 16.96 cfs of 59.88 cfs potential flow)
↑**2=Asymmetrical Weir** (Weir Controls 16.96 cfs @ 2.20 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 1.35" for 2-year event
Inflow = 26.82 cfs @ 12.18 hrs, Volume= 1.537 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 939.36' @ 24.60 hrs Surf.Area= 1.420 ac Storage= 1.537 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

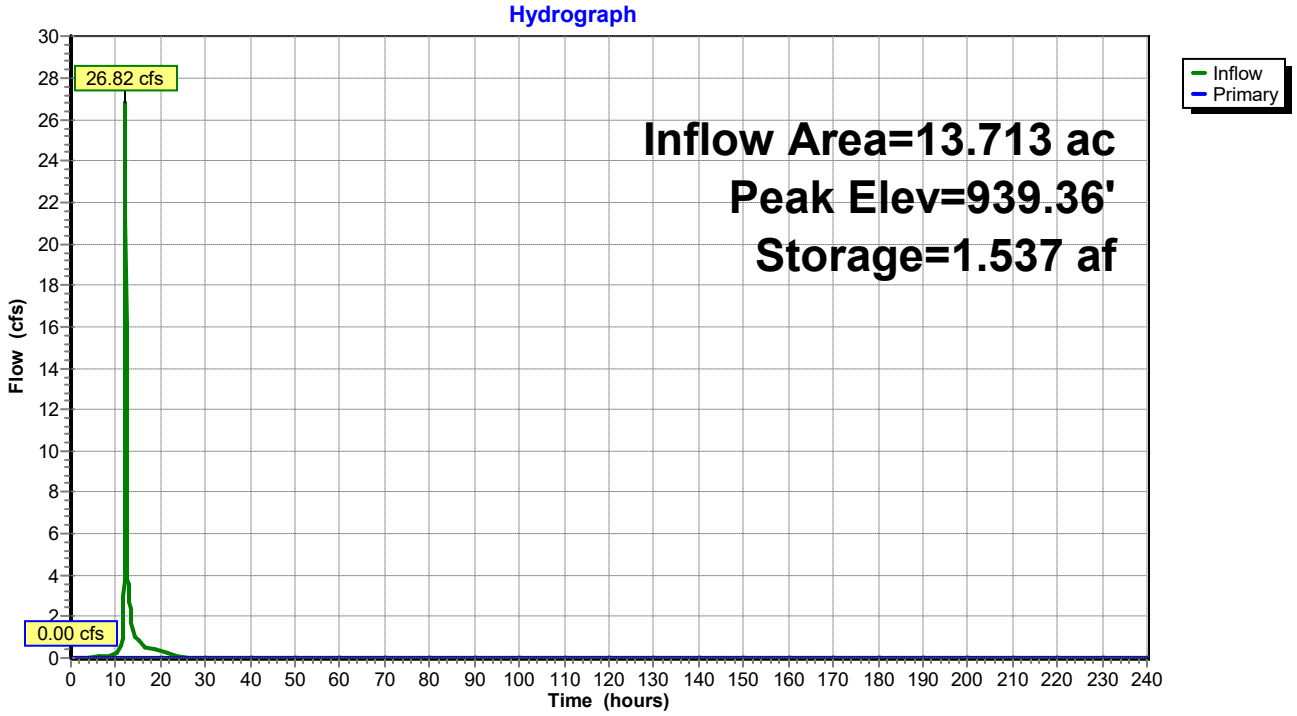
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=936.00' TW=923.92' (Dynamic Tailwater)
↑**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 41P: Ex South Off-site Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 0.66" for 2-year event
Inflow = 21.86 cfs @ 12.39 hrs, Volume= 2.164 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 940.27' @ 240.00 hrs Surf.Area= 1.859 ac Storage= 2.164 af
Flood Elev= 941.50' Surf.Area= 3.181 ac Storage= 5.223 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

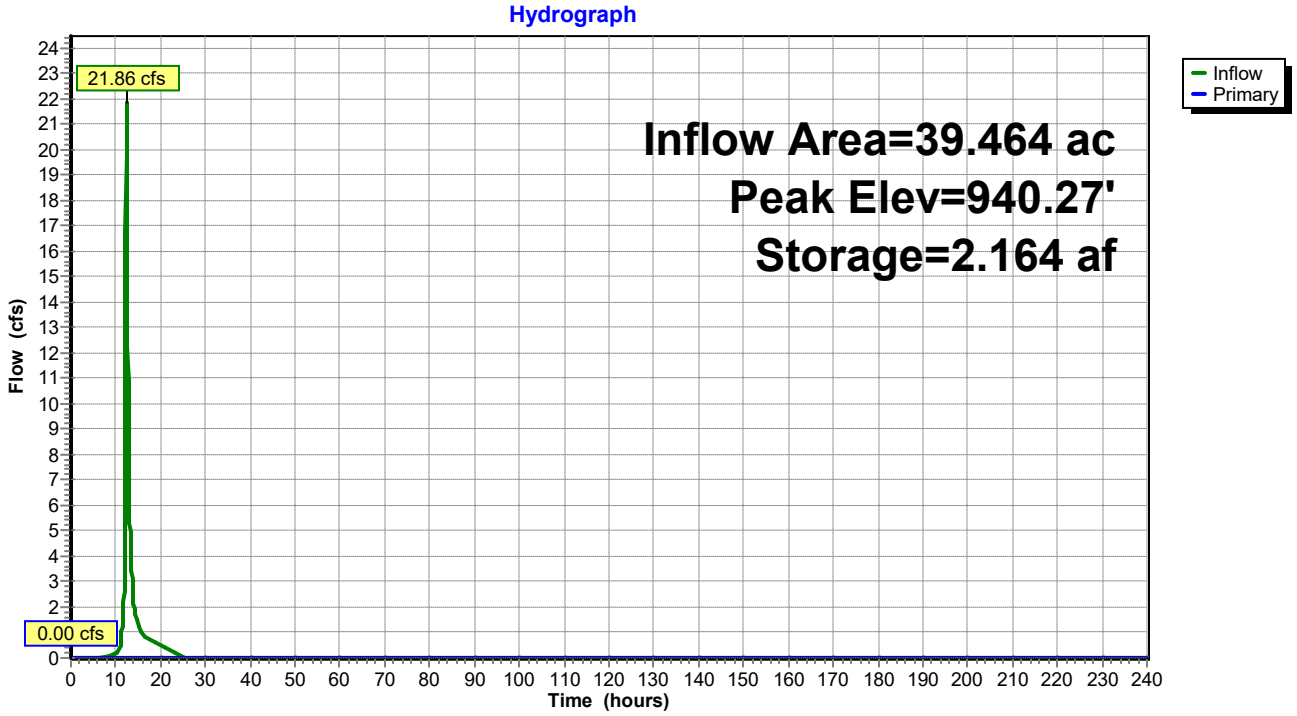
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	6.966 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
938.00	0.102	0.000	0.000
940.00	1.599	1.701	1.701
941.00	2.570	2.085	3.785
942.00	3.792	3.181	6.966

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=938.00' TW=923.92' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

[58] Hint: Peaked 0.17' above defined flood level

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 16.79" for 2-year event
Inflow = 12.04 cfs @ 12.13 hrs, Volume= 5.261 af
Outflow = 7.33 cfs @ 12.25 hrs, Volume= 5.046 af, Atten= 39%, Lag= 6.8 min
Primary = 7.33 cfs @ 12.25 hrs, Volume= 5.046 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 938.67' @ 12.25 hrs Surf.Area= 0.259 ac Storage= 0.254 af
Flood Elev= 938.50' Surf.Area= 0.226 ac Storage= 0.214 af

Plug-Flow detention time= 173.4 min calculated for 5.045 af (96% of inflow)
Center-of-Mass det. time= 34.8 min (1,398.0 - 1,363.2)

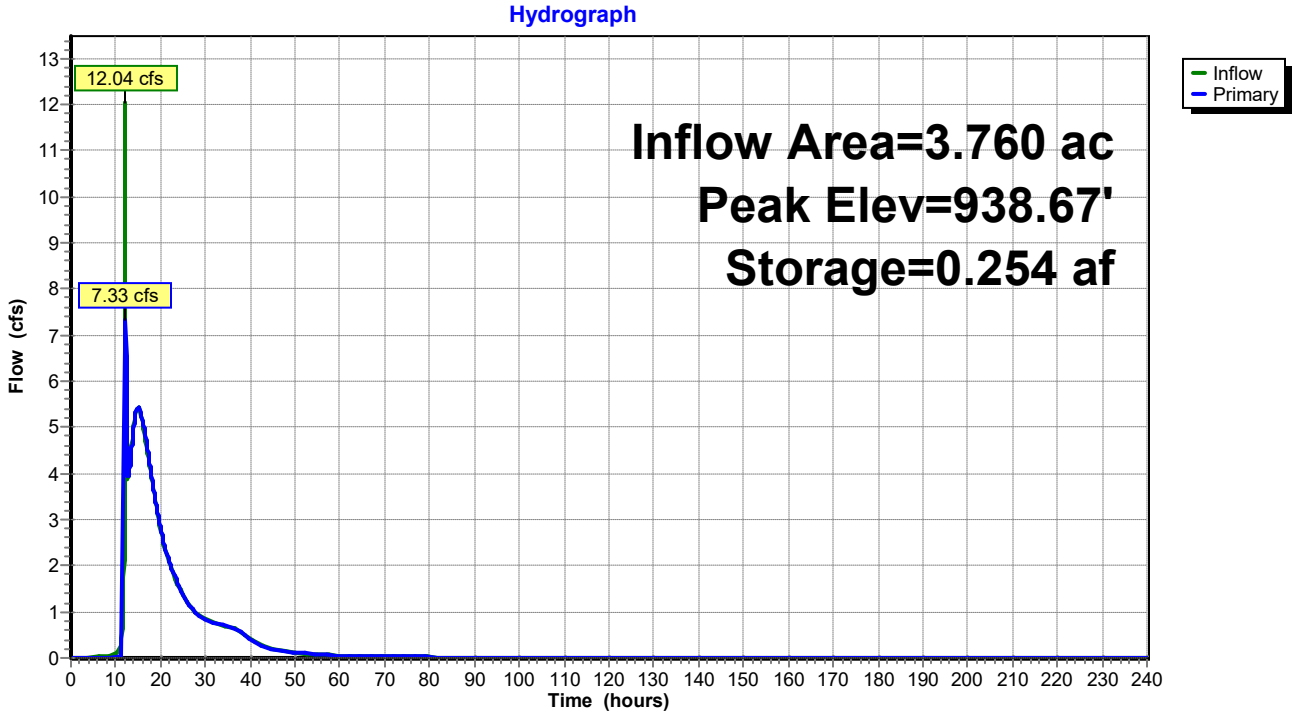
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	0.353 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.004	0.000	0.000
938.00	0.123	0.127	0.127
939.00	0.328	0.226	0.353

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=7.29 cfs @ 12.25 hrs HW=938.66' TW=924.60' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 7.29 cfs @ 1.30 fps)

Pond 60P: Wetland 5B



Summary for Link 1PP: Northwest Wetland (Big Woods)

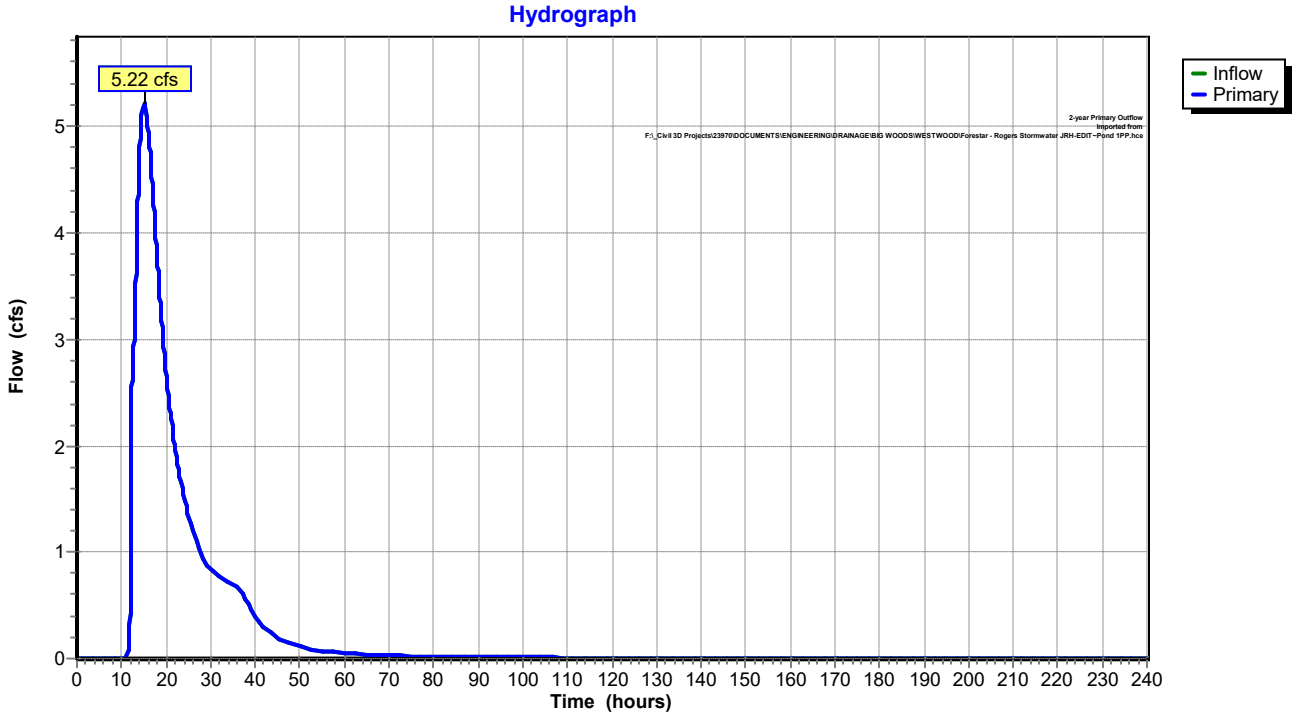
From the Big Woods development drainage model prepared by Westwood.

Inflow	=	5.22 cfs @	15.04 hrs, Volume=	4.764 af
Primary	=	5.22 cfs @	15.04 hrs, Volume=	4.764 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

2-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 1PP: Northwest Wetland (Big Woods)



Summary for Link 5PP: Existing Pond (Big Woods)

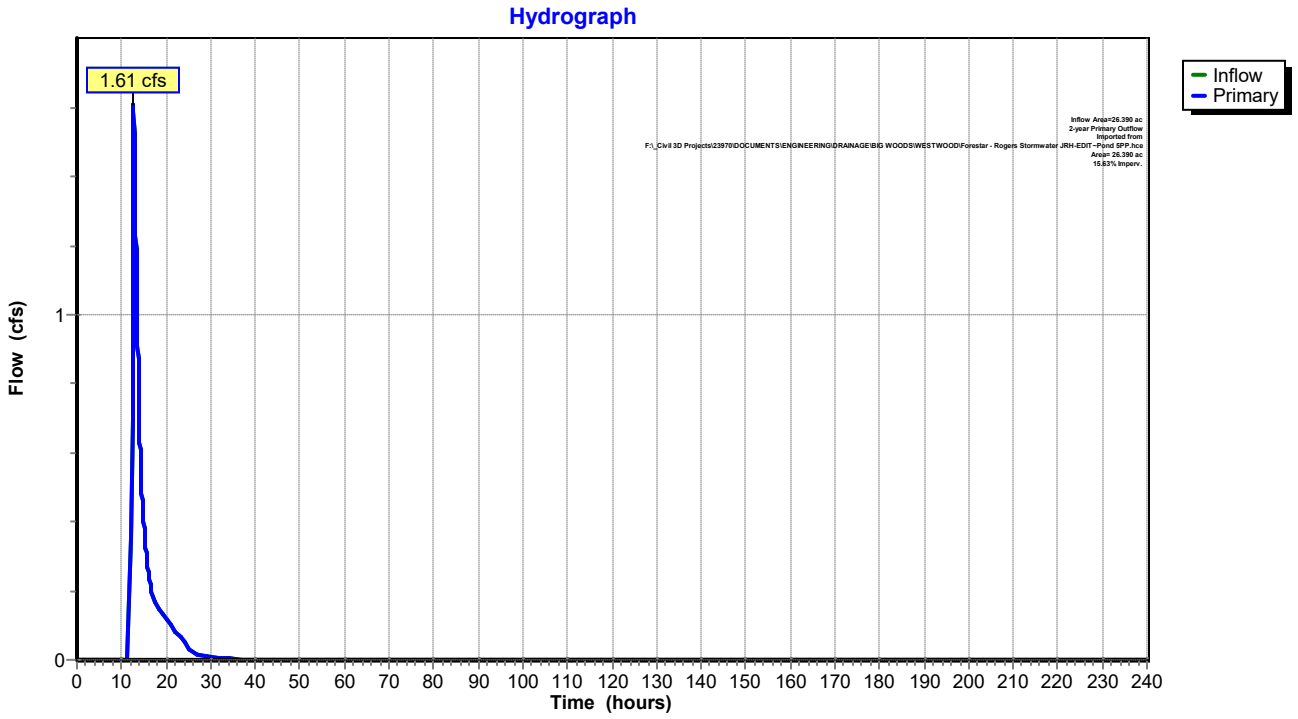
From the Big Woods development drainage model prepared by Westwood.

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 0.15" for 2-year event
Inflow = 1.61 cfs @ 12.68 hrs, Volume= 0.329 af
Primary = 1.61 cfs @ 12.68 hrs, Volume= 0.329 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

2-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 5PP: Existing Pond (Big Woods)



Time span=0.00-240.00 hrs, dt=0.05 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=1.65"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=458.46 cfs 41.126 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=25.761 ac 0.80% Impervious Runoff Depth=2.98"
Flow Length=2,175' Tc=29.4 min CN=88/98 Runoff=68.61 cfs 6.396 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=6.216 ac 0.00% Impervious Runoff Depth=2.78"
Flow Length=586' Tc=8.9 min CN=86/0 Runoff=27.18 cfs 1.442 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.900 ac 0.00% Impervious Runoff Depth=2.18"
Flow Length=247' Tc=20.0 min CN=79/0 Runoff=2.18 cfs 0.163 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=5.776 ac 0.00% Impervious Runoff Depth=2.78"
Flow Length=737' Tc=11.1 min CN=86/0 Runoff=23.19 cfs 1.340 af

Subcatchment 23S: Direct to Lower West Runoff Area=9.551 ac 0.00% Impervious Runoff Depth=2.88"
Flow Length=391' Tc=9.5 min CN=87/0 Runoff=41.83 cfs 2.289 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=26.075 ac 1.14% Impervious Runoff Depth=2.98"
Flow Length=998' Tc=13.6 min CN=88/98 Runoff=102.44 cfs 6.482 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=41.507 ac 5.85% Impervious Runoff Depth=2.68"
Flow Length=1,249' Tc=23.4 min CN=84/98 Runoff=113.08 cfs 9.287 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=2.06"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=29.68 cfs 3.430 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=73.860 ac 2.02% Impervious Runoff Depth=3.09"
Flow Length=1,354' Tc=23.6 min CN=89/98 Runoff=228.63 cfs 19.002 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=2.50"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=50.10 cfs 2.852 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=2.95"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=36.48 cfs 3.216 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=2.80"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=17.92 cfs 0.876 af

Reach 1R: Cowley Lake Outlet Channel Inflow=68.61 cfs 6.396 af
Outflow=68.61 cfs 6.396 af

Reach 2R: Cowley Lake Inflow=198.51 cfs 49.934 af
Outflow=198.51 cfs 49.934 af

Reach 21R: East Channel Avg. Flow Depth=1.03' Max Vel=5.05 fps Inflow=31.62 cfs 28.336 af
n=0.022 L=382.0' S=0.0097 '/' Capacity=131.71 cfs Outflow=31.62 cfs 28.336 af

Reach 23RL: Lower West Channel Avg. Flow Depth=1.08' Max Vel=2.33 fps Inflow=41.83 cfs 12.336 af
n=0.022 L=534.0' S=0.0014 '/' Capacity=257.71 cfs Outflow=38.29 cfs 12.336 af

Reach 23RU: Upper West Channel Avg. Flow Depth=0.60' Max Vel=2.39 fps Inflow=33.63 cfs 10.047 af
n=0.022 L=490.0' S=0.0057 '/' Capacity=766.18 cfs Outflow=33.59 cfs 10.047 af

Pond 7P: Whiteford Lake and Wetlands Peak Elev=930.67' Storage=41.126 af Inflow=458.46 cfs 41.126 af
Outflow=0.00 cfs 0.000 af

Pond 30P: Wetland 4A Peak Elev=926.67' Storage=6.665 af Inflow=127.90 cfs 12.716 af
Outflow=33.63 cfs 10.047 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=933.39' Storage=0.381 af Inflow=29.68 cfs 3.430 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=20.21 cfs 3.430 af

Pond 40P: Wetland 2B Peak Elev=925.70' Storage=12.456 af Inflow=239.10 cfs 28.177 af
Outflow=31.39 cfs 28.172 af

Pond 41P: Ex South Off-site Pond Peak Elev=940.11' Storage=2.852 af Inflow=50.10 cfs 2.852 af
Outflow=0.00 cfs 0.000 af

Pond 50P: Wetland 4B Peak Elev=941.05' Storage=3.922 af Inflow=40.73 cfs 3.922 af
Outflow=0.00 cfs 0.000 af

Pond 60P: Wetland 5B Peak Elev=938.81' Storage=0.292 af Inflow=21.34 cfs 9.390 af
Outflow=19.92 cfs 9.176 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=9.88 cfs 8.513 af
Primary=9.88 cfs 8.513 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=4.82 cfs 0.706 af
Area= 26.390 ac 15.63% Imperv. Primary=4.82 cfs 0.706 af

Total Runoff Area = 540.193 ac Runoff Volume = 97.901 af Average Runoff Depth = 2.17"
98.07% Pervious = 529.794 ac 1.93% Impervious = 10.399 ac

Summary for Subcatchment 7S: Approx DA to Lake

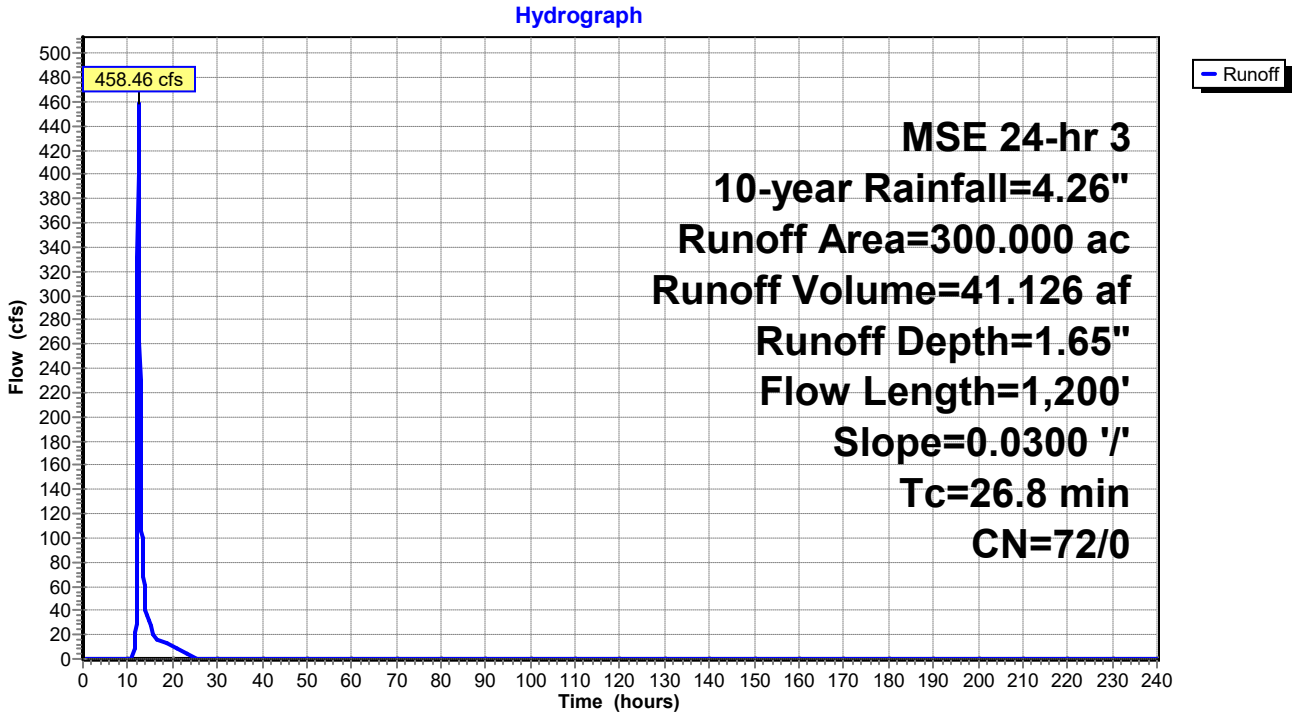
Runoff = 458.46 cfs @ 12.40 hrs, Volume= 41.126 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

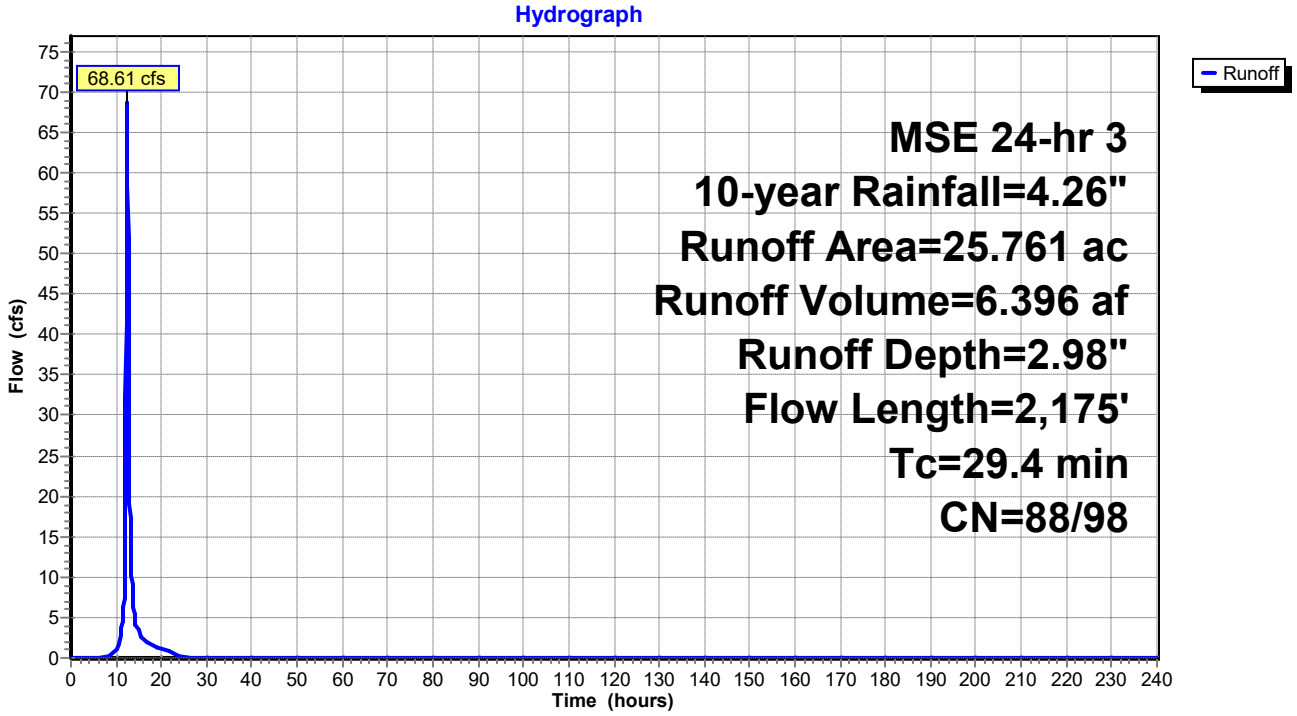
Runoff = 68.61 cfs @ 12.41 hrs, Volume= 6.396 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.136	98	Unconnected pavement, HSG D
0.070	98	Unconnected roofs, HSG D
1.380	98	Water Surface, 0% imp, HSG D
21.395	89	Row crops, straight row, Good, HSG D
1.284	80	>75% Grass cover, Good, HSG D
0.797	78	Meadow, non-grazed, HSG D
0.699	77	Woods, Good, HSG D
25.761	88	Weighted Average
25.555	88	99.20% Pervious Area
0.206	98	0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
20.2	1,454	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.9	621	0.0020	2.64	68.60	**Channel Flow,** Area= 26.0 sf Perim= 20.0' r= 1.30' n= 0.030 Earth, grassed & winding
29.4	2,175	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 20S: Direct to Cowley Lake

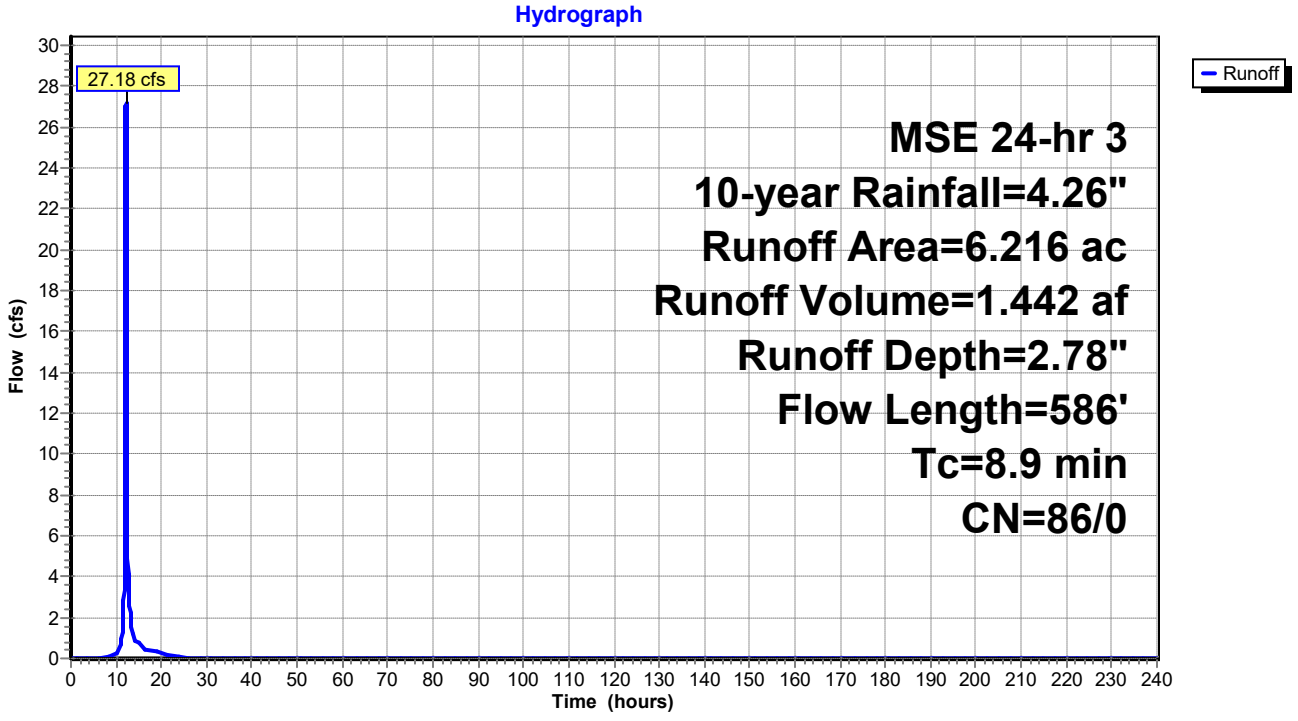
Runoff = 27.18 cfs @ 12.16 hrs, Volume= 1.442 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.123	98	Water Surface, 0% imp, HSG D
4.384	89	Row crops, straight row, Good, HSG D
1.709	77	Woods, Good, HSG D
6.216	86	Weighted Average
6.216	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0240	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
4.3	486	0.0440	1.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.9	586	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

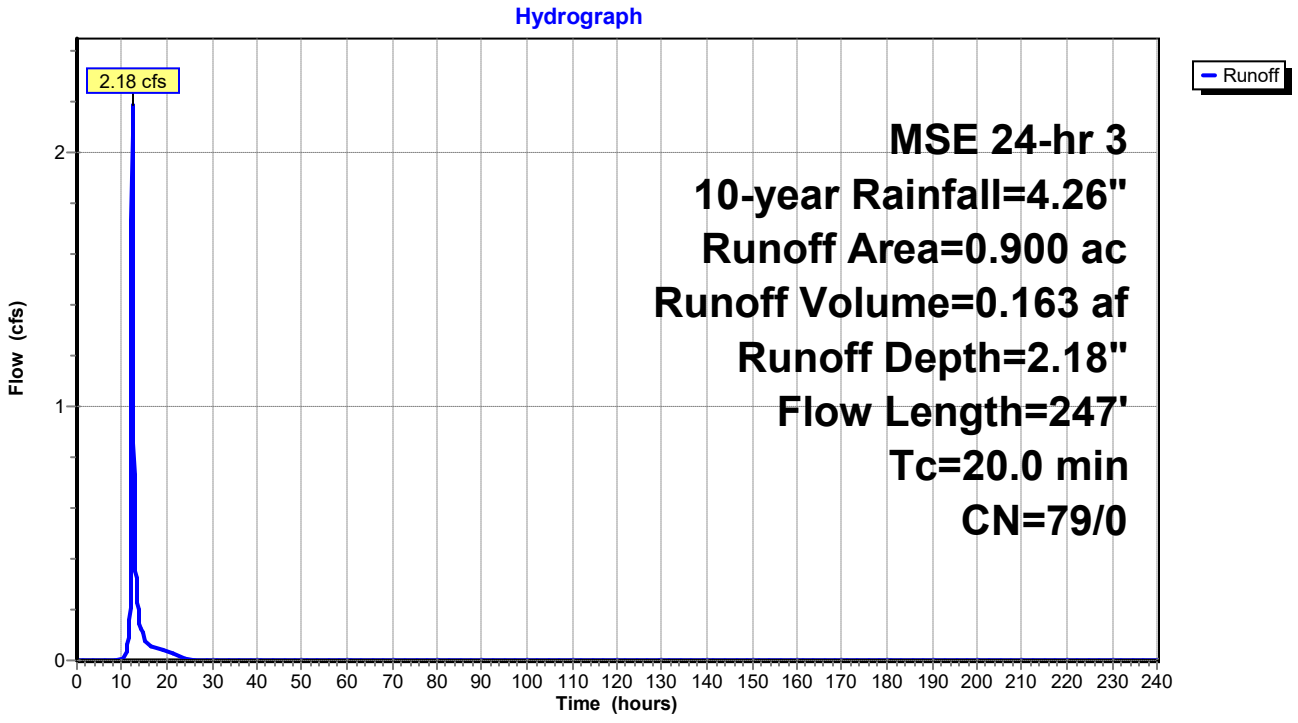
Runoff = 2.18 cfs @ 12.30 hrs, Volume= 0.163 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.074	98	Water Surface, 0% imp, HSG D
0.005	89	Row crops, straight row, Good, HSG D
0.821	77	Woods, Good, HSG D
0.900	79	Weighted Average
0.900	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
1.8	147	0.0721	1.34		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.0	247	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

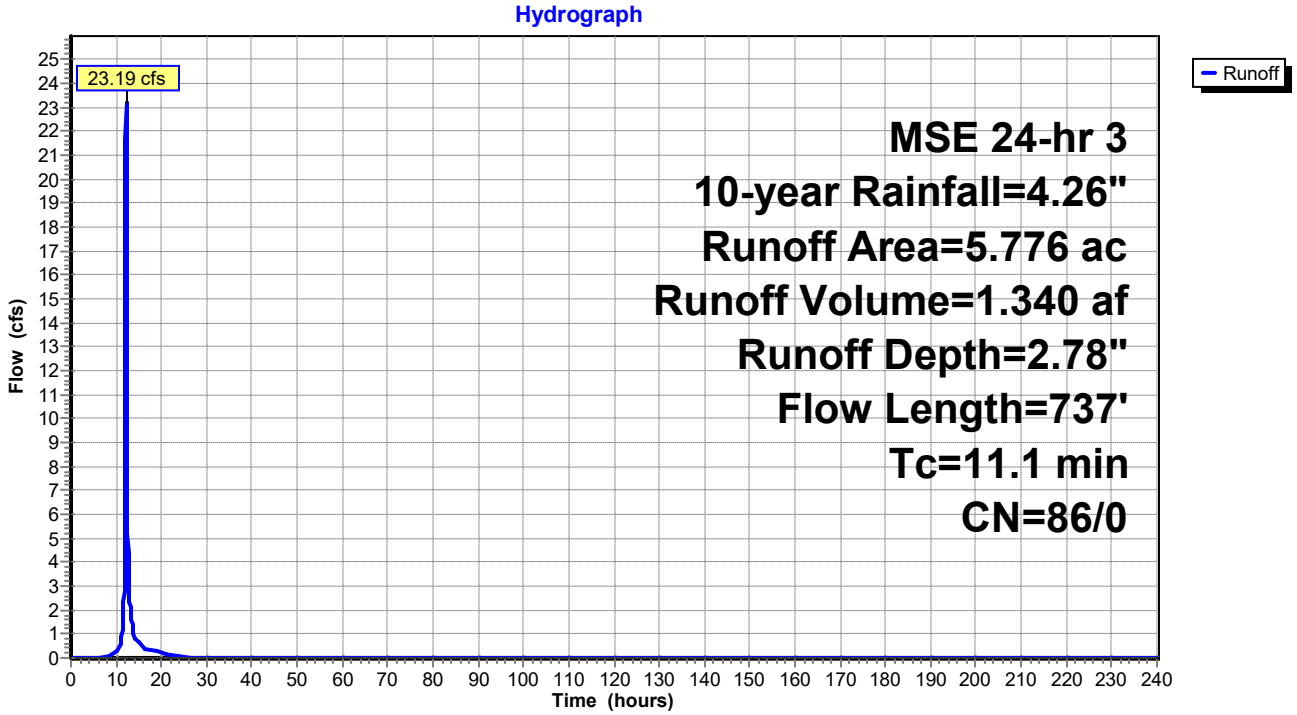
Runoff = 23.19 cfs @ 12.19 hrs, Volume= 1.340 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.031	98	Water Surface, 0% imp, HSG D
4.386	89	Row crops, straight row, Good, HSG D
0.729	78	Meadow, non-grazed, HSG D
0.630	77	Woods, Good, HSG D
5.776	86	Weighted Average
5.776	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.0440	0.46		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
7.5	637	0.0248	1.42		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.1	737	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Lower West Channel

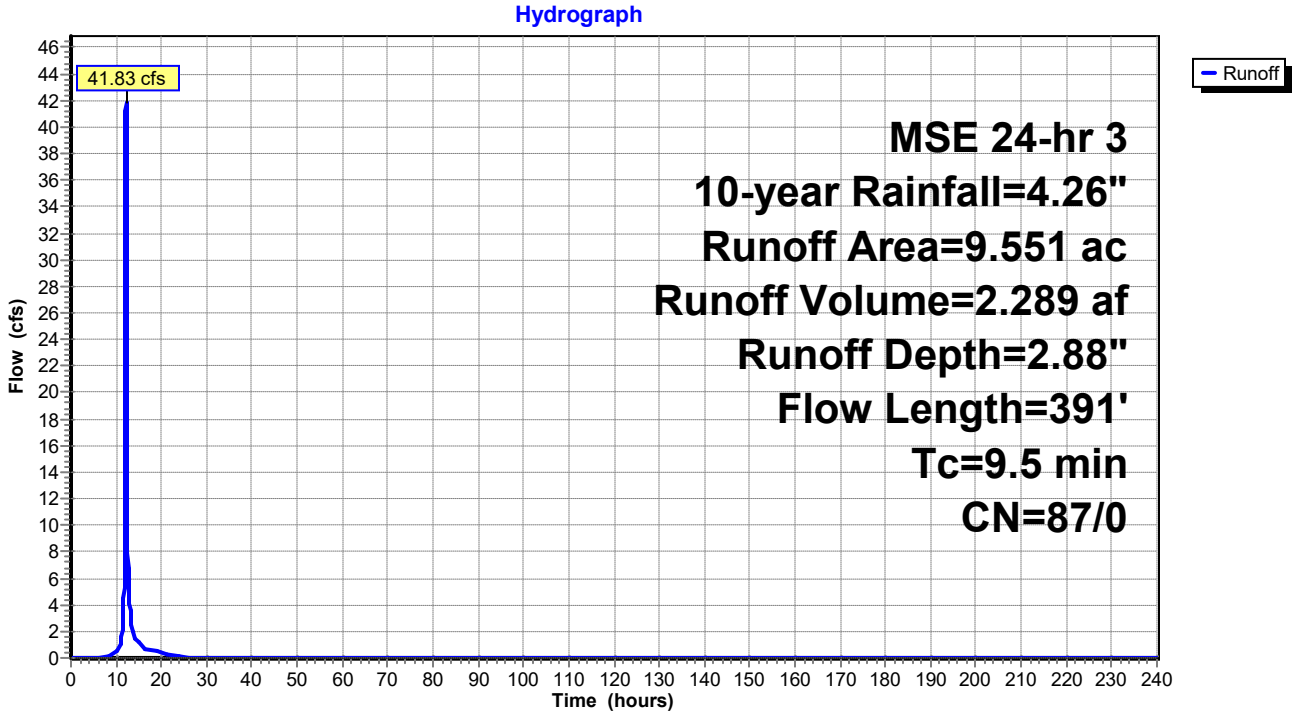
Runoff = 41.83 cfs @ 12.17 hrs, Volume= 2.289 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.467	98	Water Surface, 0% imp, HSG D
7.263	89	Row crops, straight row, Good, HSG D
0.213	78	Meadow, non-grazed, HSG D
1.608	77	Woods, Good, HSG D
9.551	87	Weighted Average
9.551	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0090	0.24		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
2.6	291	0.0433	1.87		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
9.5	391	Total			

Subcatchment 23S: Direct to Lower West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

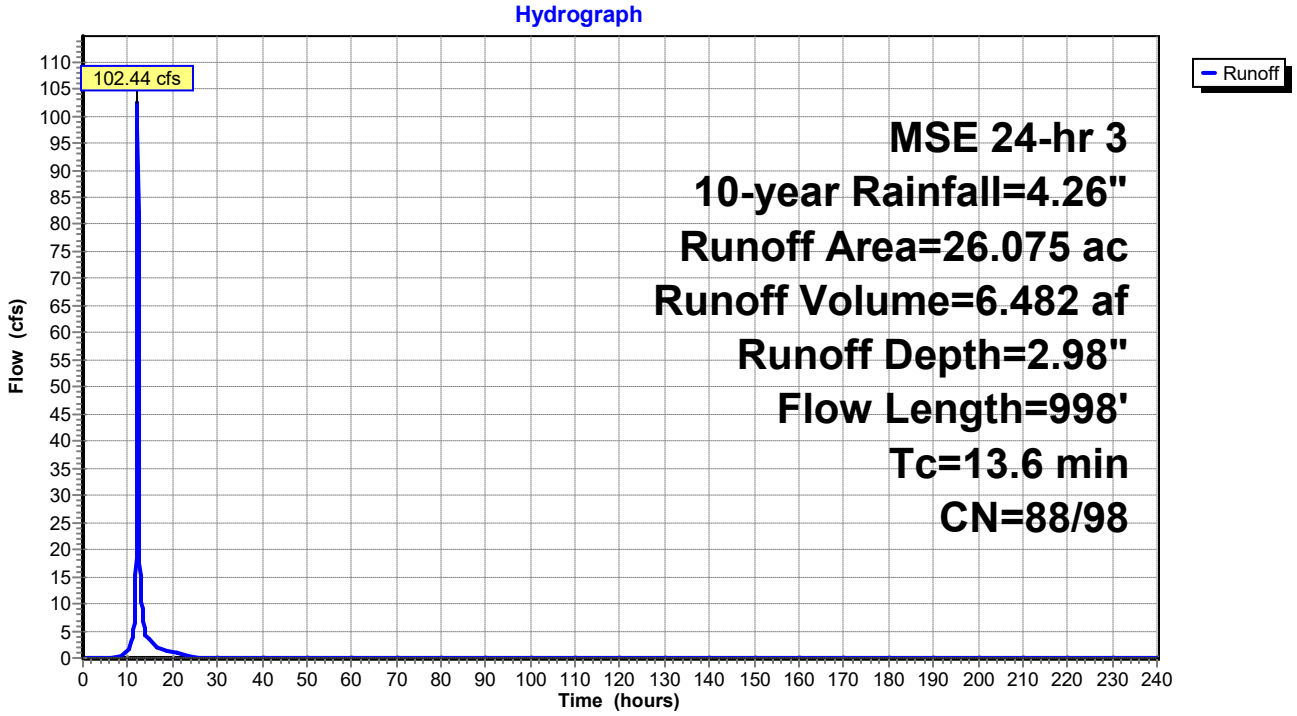
Runoff = 102.44 cfs @ 12.22 hrs, Volume= 6.482 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.298	98	Unconnected pavement, HSG D
0.980	98	Water Surface, 0% imp, HSG D
0.082	96	Gravel surface, HSG D
0.357	80	>75% Grass cover, Good, HSG D
21.863	89	Row crops, straight row, Good, HSG D
0.151	78	Meadow, non-grazed, HSG D
2.344	77	Woods, Good, HSG D
26.075	88	Weighted Average
25.777	88	98.86% Pervious Area
0.298	98	1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	30	0.0200	1.02		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
10.3	819	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.8	149	0.0315	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.6	998	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 30S: Direct to Wetland 4A

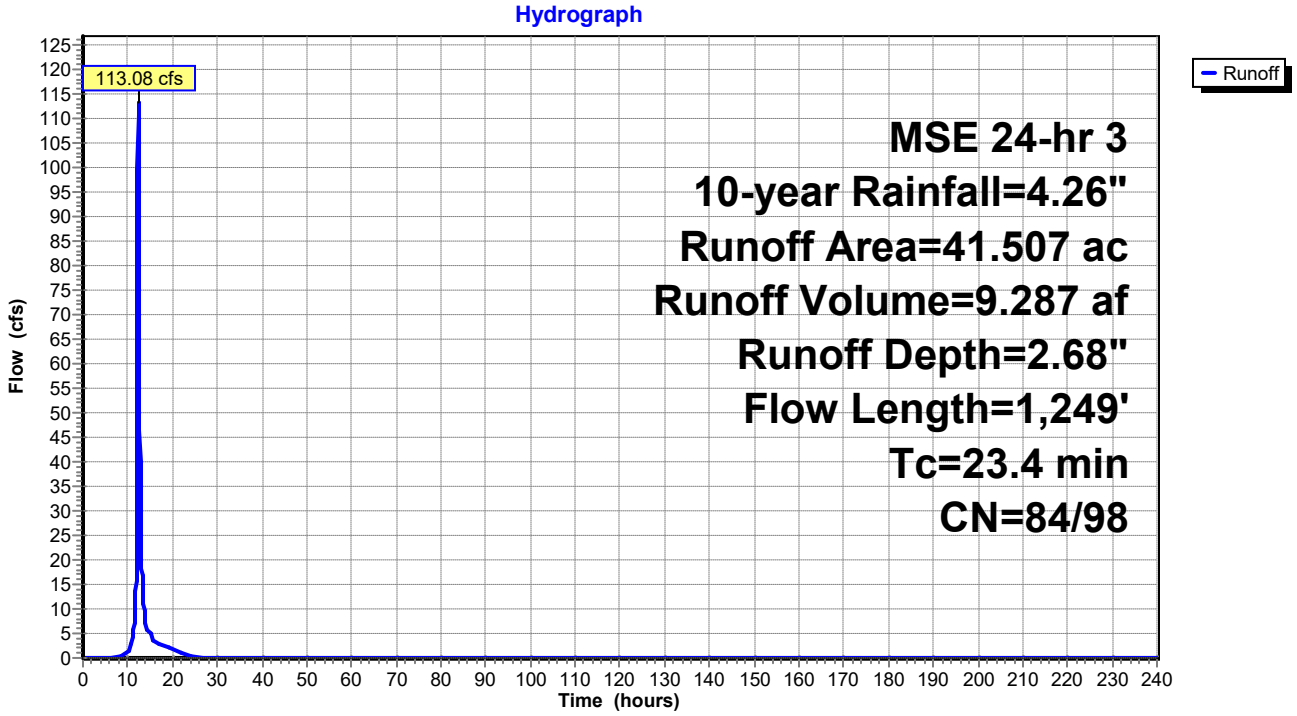
Runoff = 113.08 cfs @ 12.34 hrs, Volume= 9.287 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
1.469	98	Unconnected pavement, HSG D
0.959	98	Unconnected roofs, HSG D
0.947	96	Gravel surface, HSG D
17.469	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
14.597	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
3.773	77	Woods, Good, HSG D
41.507	85	Weighted Average
39.079	84	94.15% Pervious Area
2.428	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

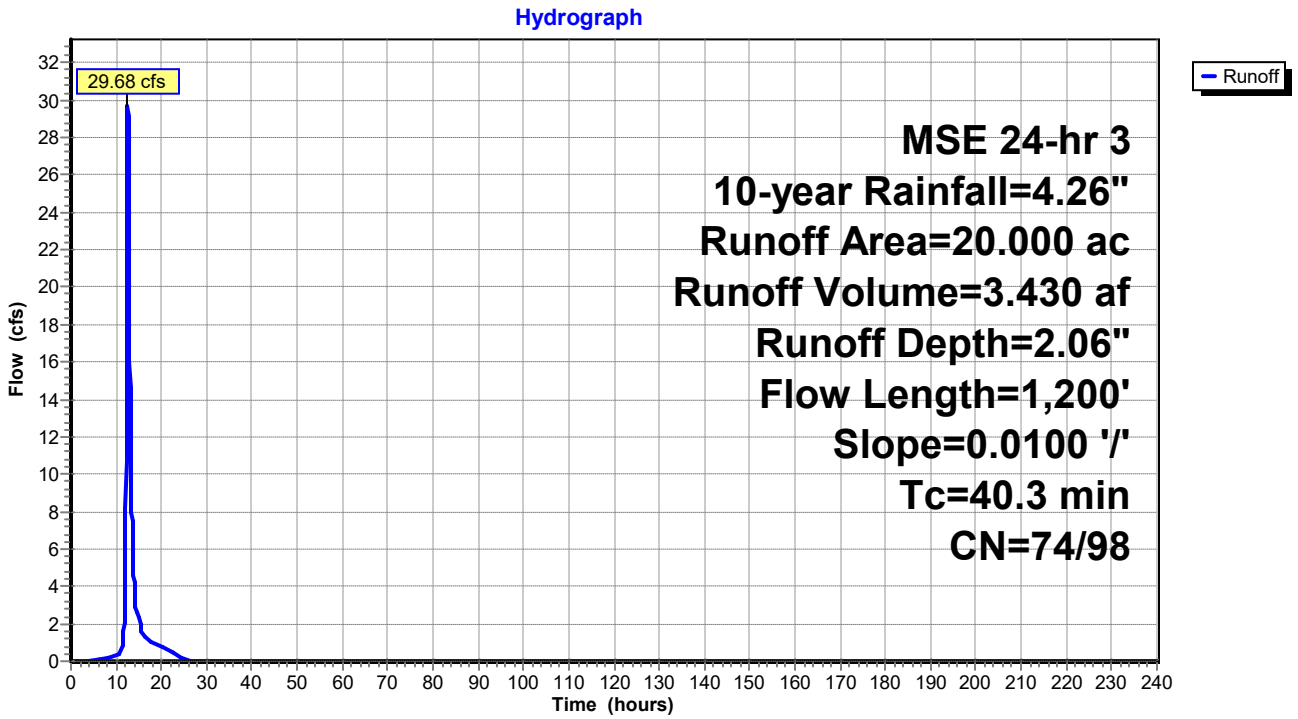
Runoff = 29.68 cfs @ 12.57 hrs, Volume= 3.430 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 40S: Direct to Wetland 2B

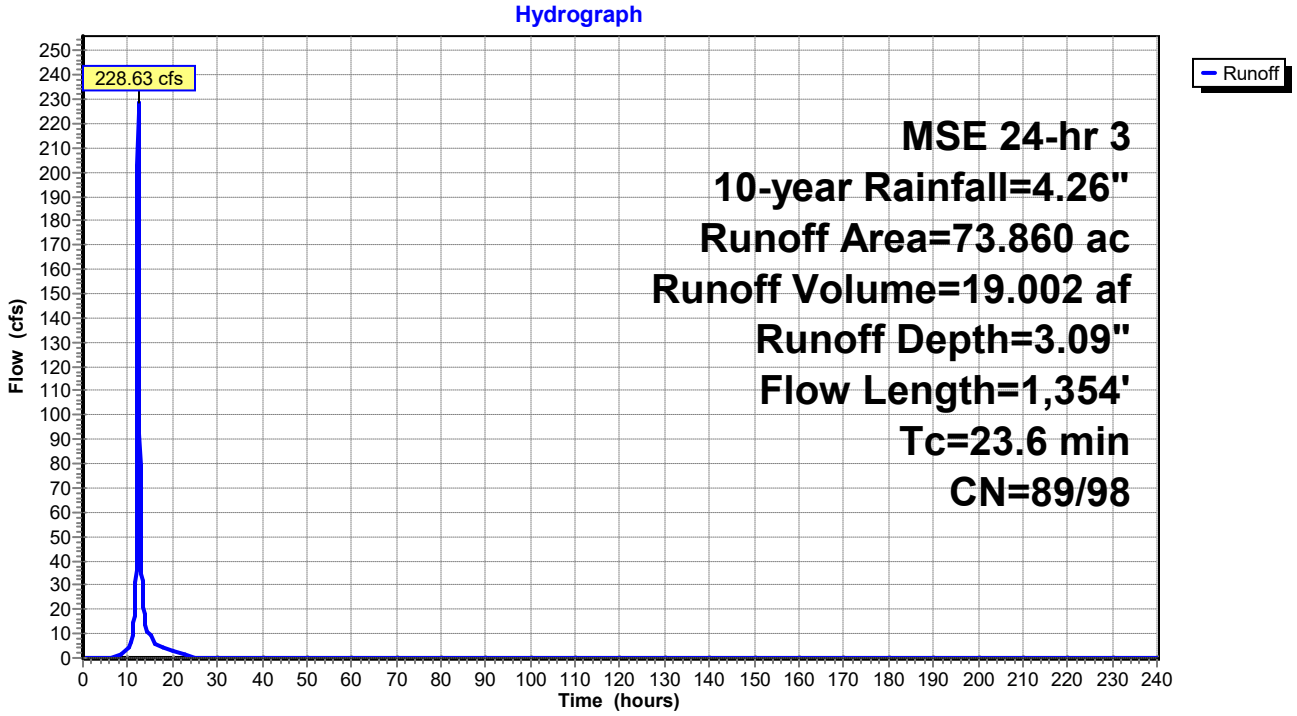
Runoff = 228.63 cfs @ 12.34 hrs, Volume= 19.002 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
0.528	98	Unconnected roofs, HSG D
17.207	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
35.493	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
8.455	80	>75% Grass cover, Good, HSG D
5.449	78	Meadow, non-grazed, HSG D
4.306	77	Woods, Good, HSG D
73.860	89	Weighted Average
72.367	89	97.98% Pervious Area
1.493	98	2.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

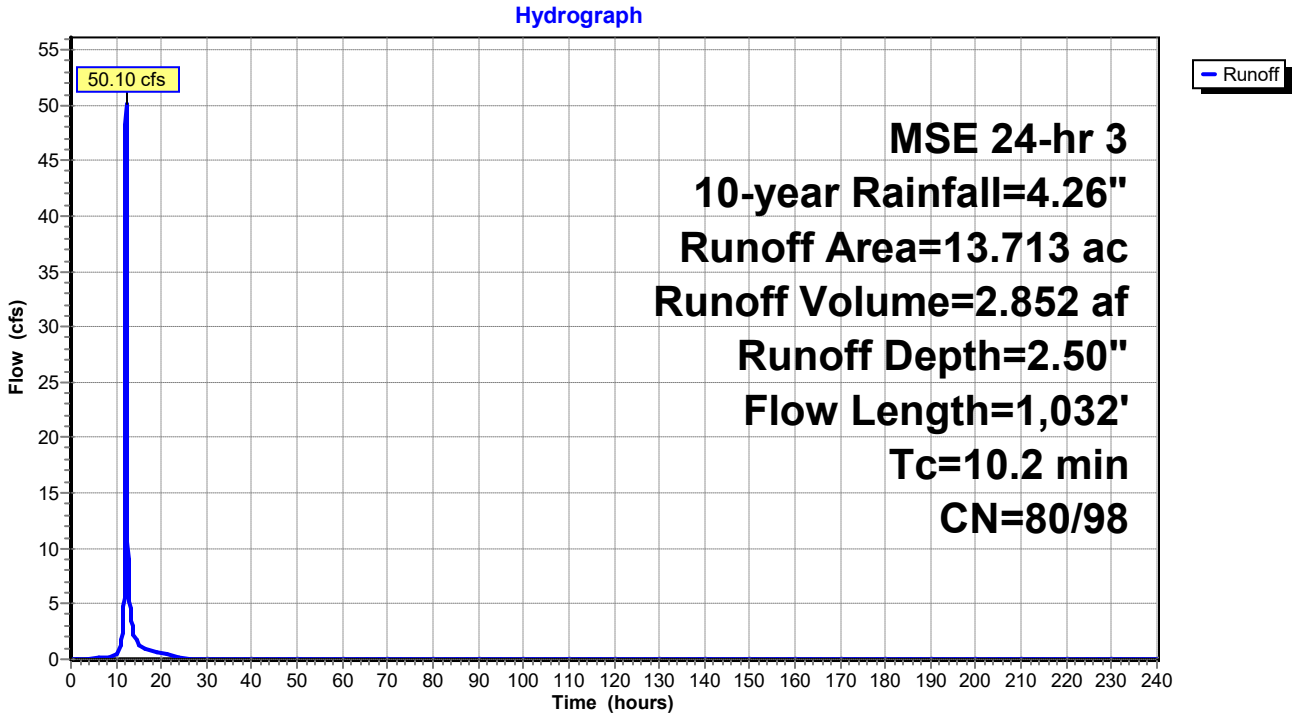
Runoff = 50.10 cfs @ 12.18 hrs, Volume= 2.852 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

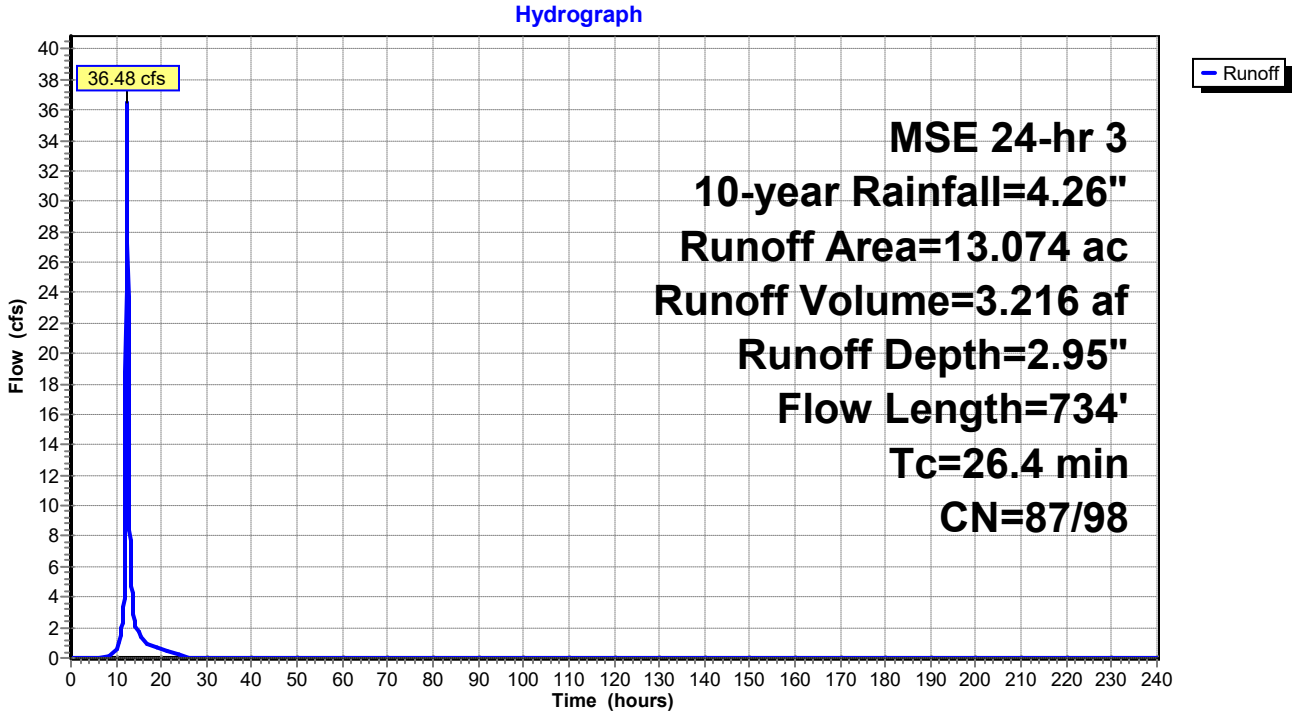
Runoff = 36.48 cfs @ 12.37 hrs, Volume= 3.216 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

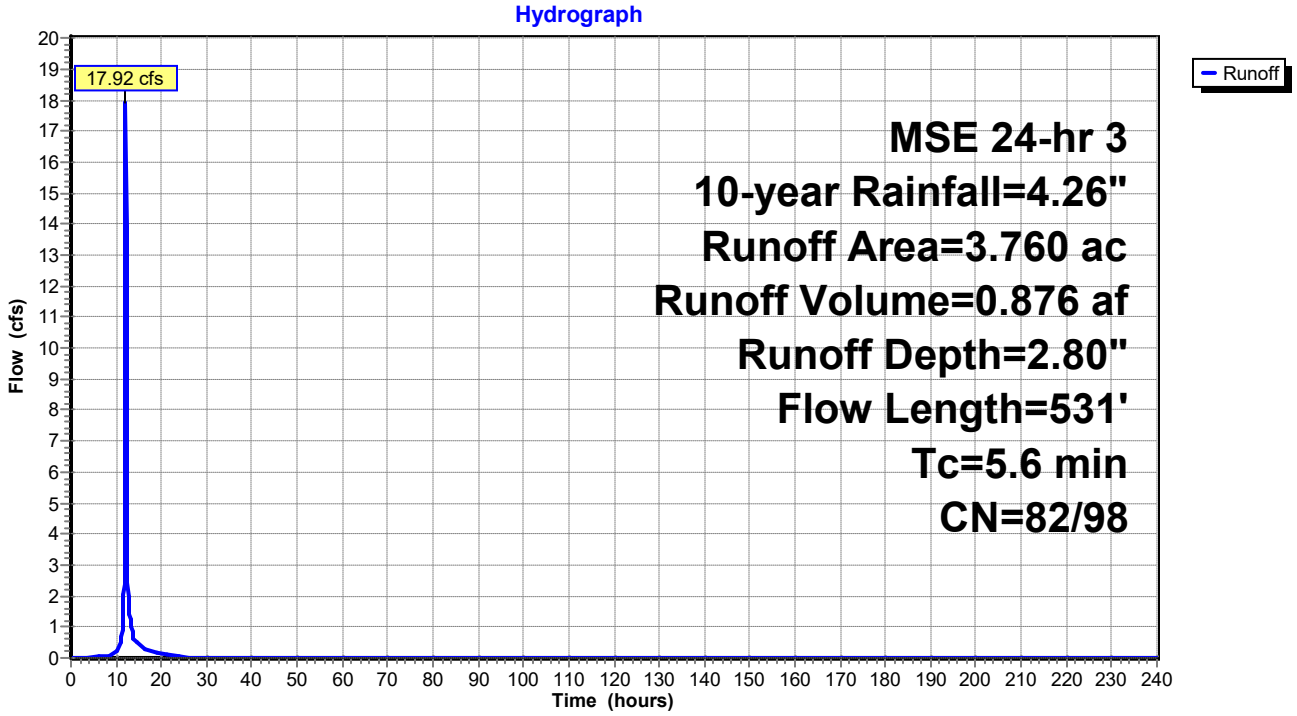
Runoff = 17.92 cfs @ 12.13 hrs, Volume= 0.876 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-year Rainfall=4.26"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



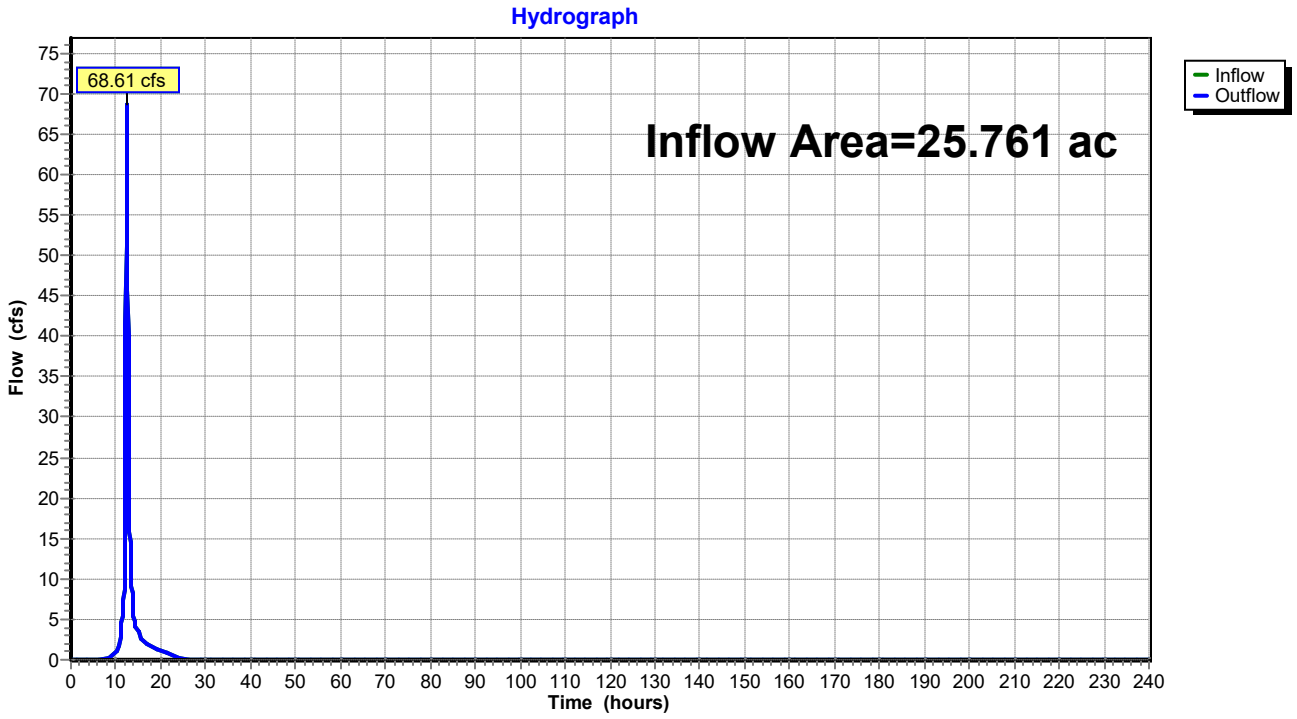
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.761 ac, 0.80% Impervious, Inflow Depth = 2.98" for 10-year event
Inflow = 68.61 cfs @ 12.41 hrs, Volume= 6.396 af
Outflow = 68.61 cfs @ 12.41 hrs, Volume= 6.396 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



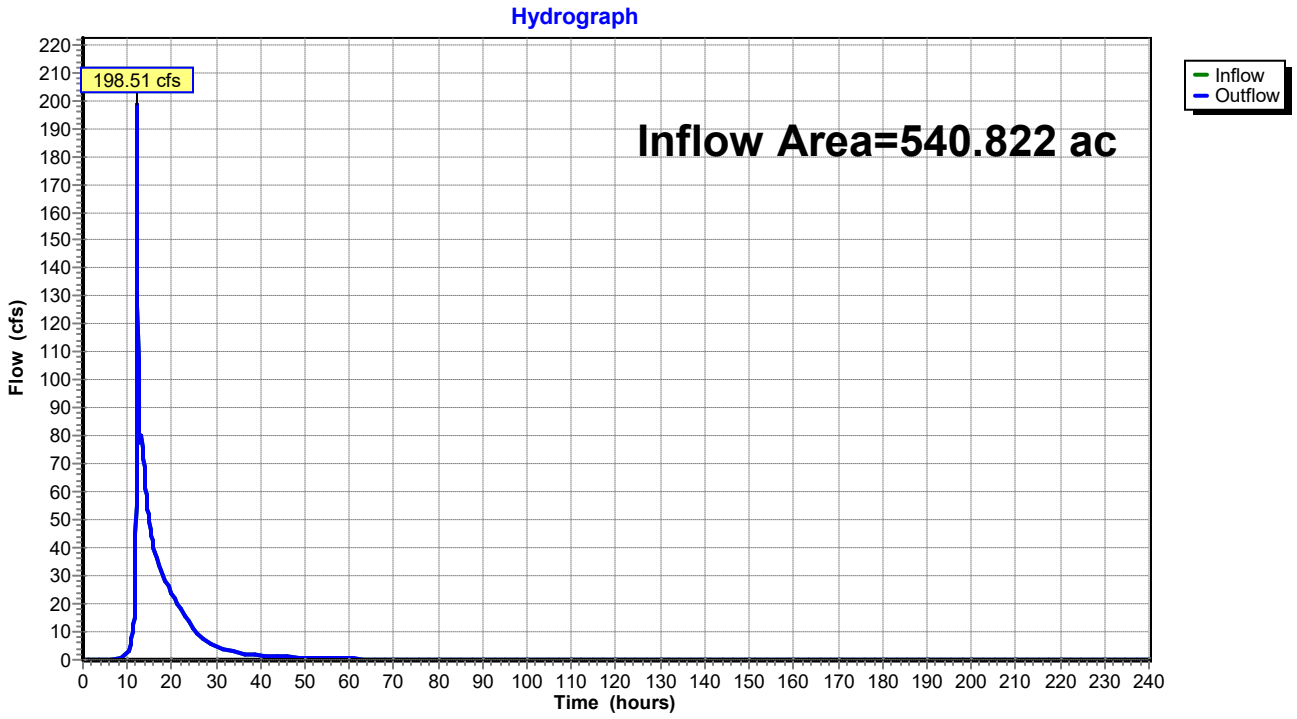
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.822 ac, 2.65% Impervious, Inflow Depth = 1.11" for 10-year event
Inflow = 198.51 cfs @ 12.21 hrs, Volume= 49.934 af
Outflow = 198.51 cfs @ 12.21 hrs, Volume= 49.934 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: East Channel

Inflow Area = 131.697 ac, 6.98% Impervious, Inflow Depth = 2.58" for 10-year event
Inflow = 31.62 cfs @ 13.52 hrs, Volume= 28.336 af
Outflow = 31.62 cfs @ 13.54 hrs, Volume= 28.336 af, Atten= 0%, Lag= 0.9 min

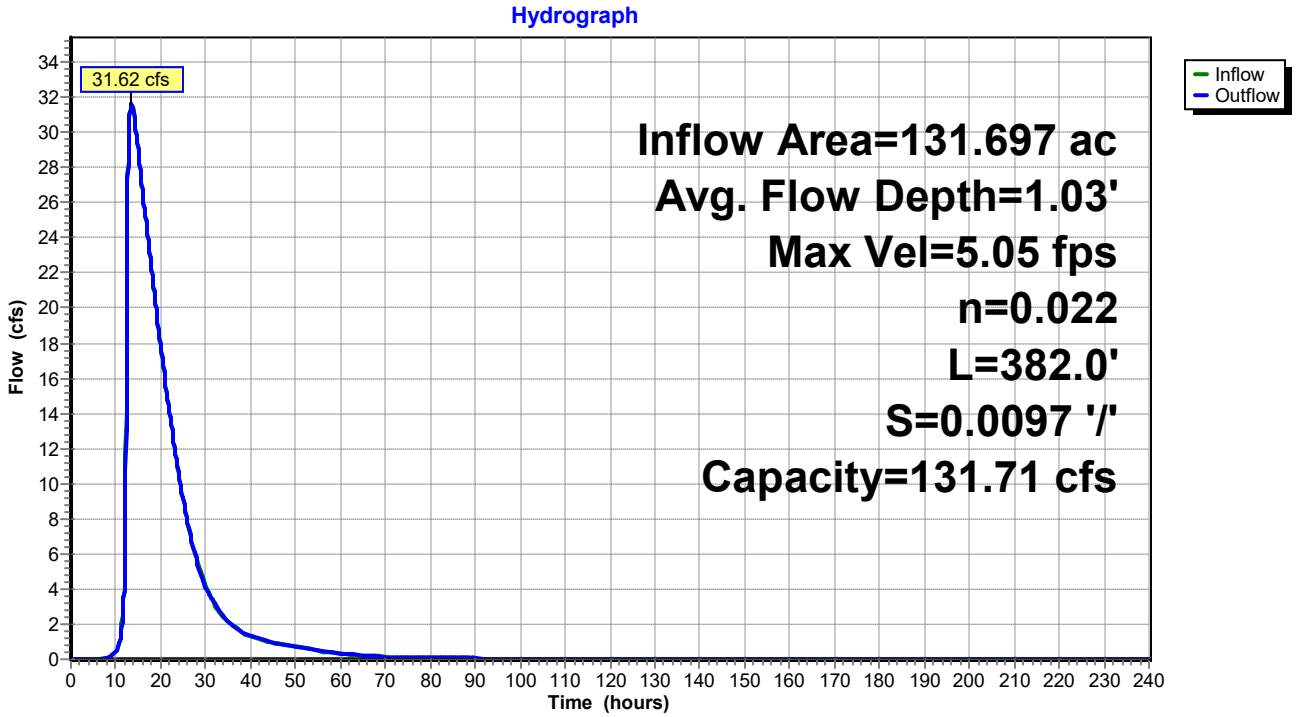
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.05 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 6.4 min

Peak Storage= 2,393 cf @ 13.54 hrs
Average Depth at Peak Storage= 1.03'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 131.71 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 382.0' Slope= 0.0097 '/'
Inlet Invert= 923.92', Outlet Invert= 920.20'

‡

Reach 21R: East Channel



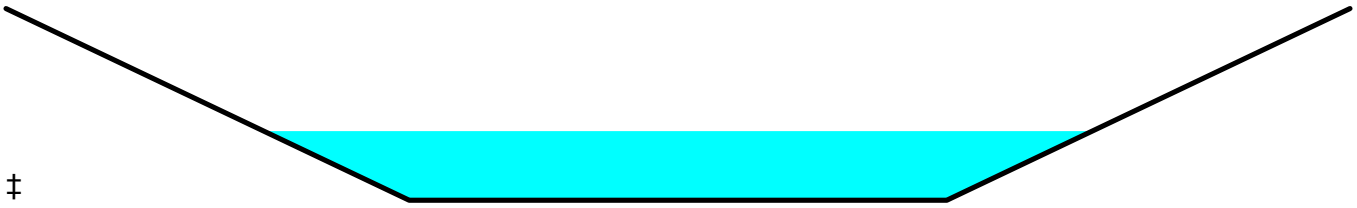
Summary for Reach 23RL: Lower West Channel

Inflow Area = 371.058 ac, 1.30% Impervious, Inflow Depth > 0.40" for 10-year event
Inflow = 41.83 cfs @ 12.17 hrs, Volume= 12.336 af
Outflow = 38.29 cfs @ 12.21 hrs, Volume= 12.336 af, Atten= 8%, Lag= 2.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.33 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 27.1 min

Peak Storage= 8,782 cf @ 12.21 hrs
Average Depth at Peak Storage= 1.08'
Bank-Full Depth= 3.00' Flow Area= 63.0 sf, Capacity= 257.71 cfs

12.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 30.00'
Length= 534.0' Slope= 0.0014 '/'
Inlet Invert= 919.58', Outlet Invert= 918.82'



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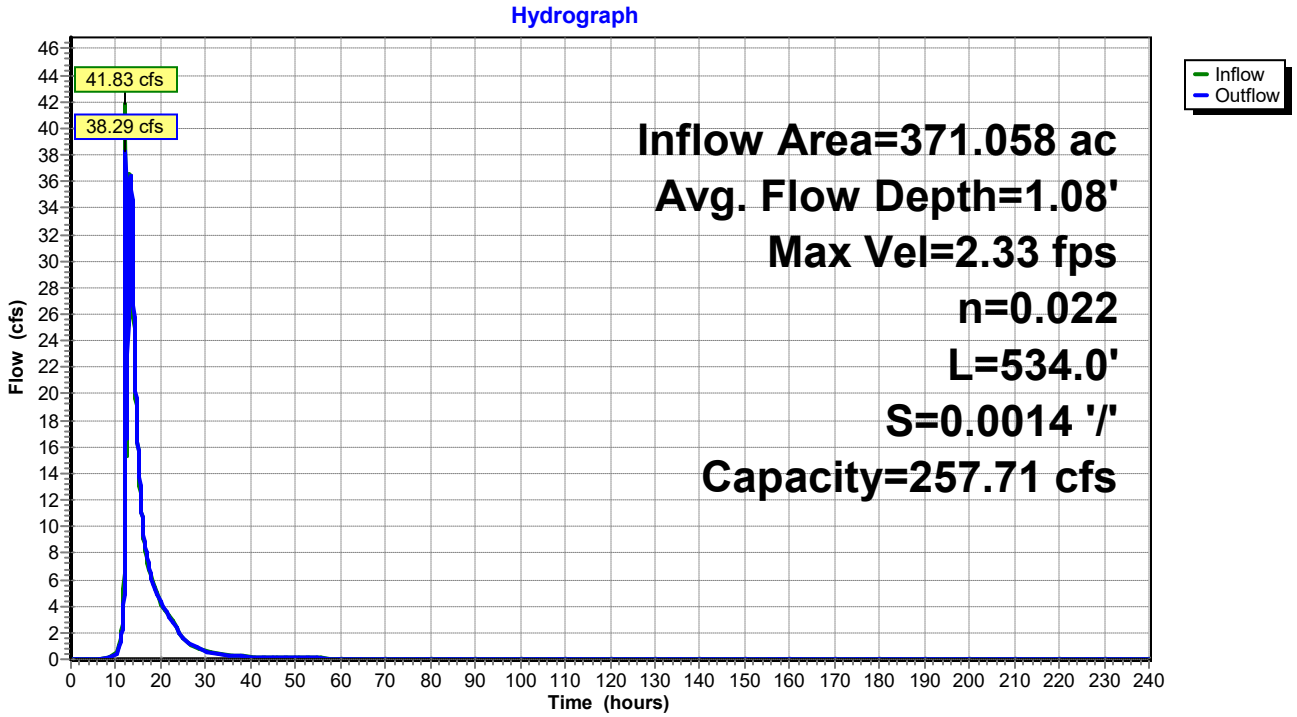
Reach 23RL: Lower West Channel



Summary for Reach 23RU: Upper West Channel

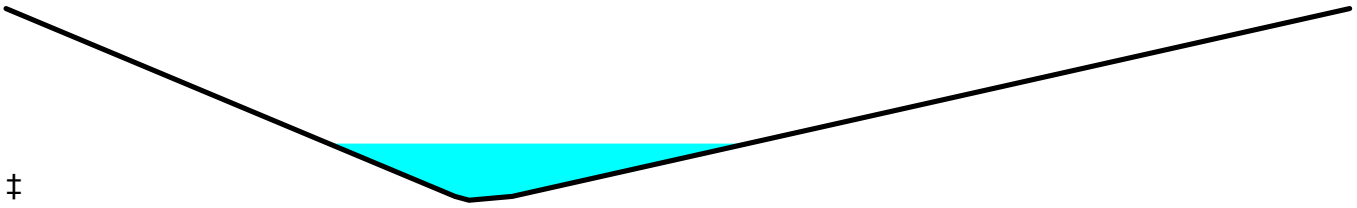
[80] Warning: Exceeded Pond 30P by 0.96' @ 0.00 hrs (0.58 cfs 0.660 af)

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 0.33" for 10-year event
Inflow = 33.63 cfs @ 13.23 hrs, Volume= 10.047 af
Outflow = 33.59 cfs @ 13.28 hrs, Volume= 10.047 af, Atten= 0%, Lag= 2.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.39 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 20.6 min

Peak Storage= 6,877 cf @ 13.28 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.04' Flow Area= 146.2 sf, Capacity= 766.18 cfs

Custom cross-section, Length= 490.0' Slope= 0.0057 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 925.96', Outlet Invert= 923.17'



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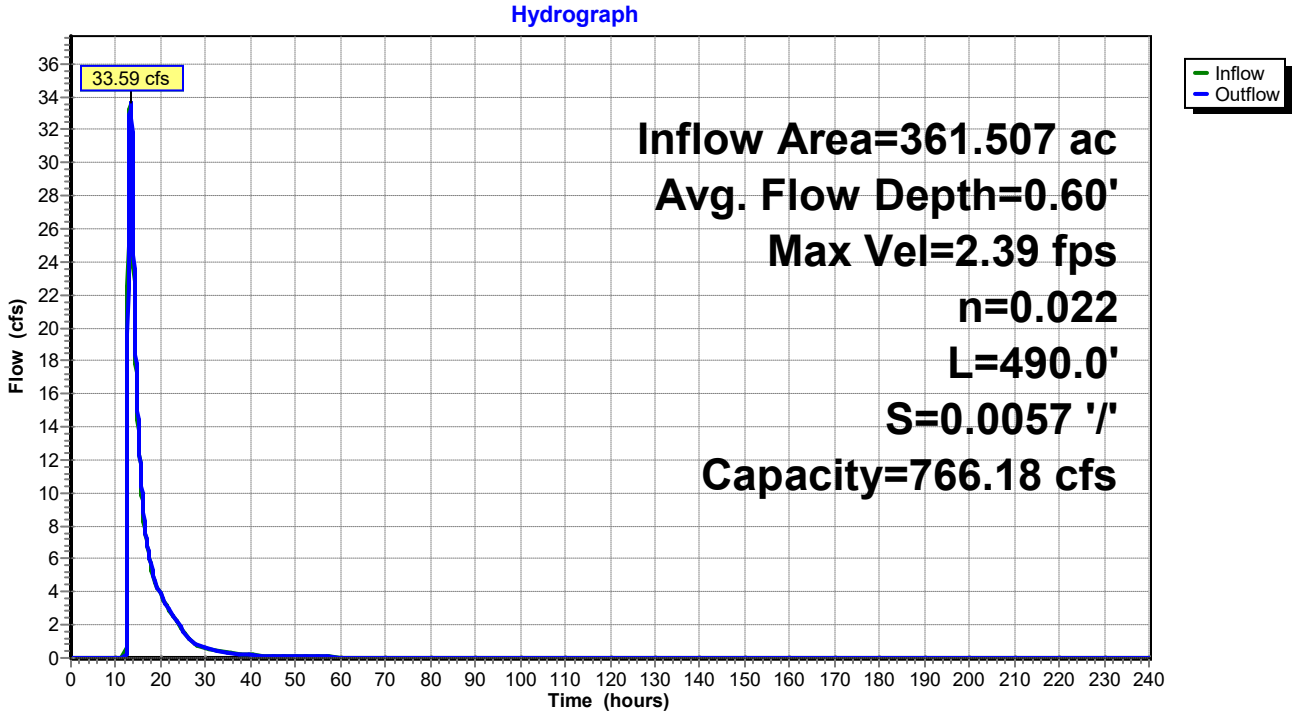
Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-48.27	928.00	0.00
-1.47	926.00	2.00
0.00	925.96	2.04
4.51	926.00	2.00
91.79	928.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.04	0.1	6.0	59	0.05
2.04	146.2	140.1	71,618	766.18

Reach 23RU: Upper West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 1.65" for 10-year event
Inflow = 458.46 cfs @ 12.40 hrs, Volume= 41.126 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 930.67' @ 25.55 hrs Surf.Area= 62.022 ac Storage= 41.126 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

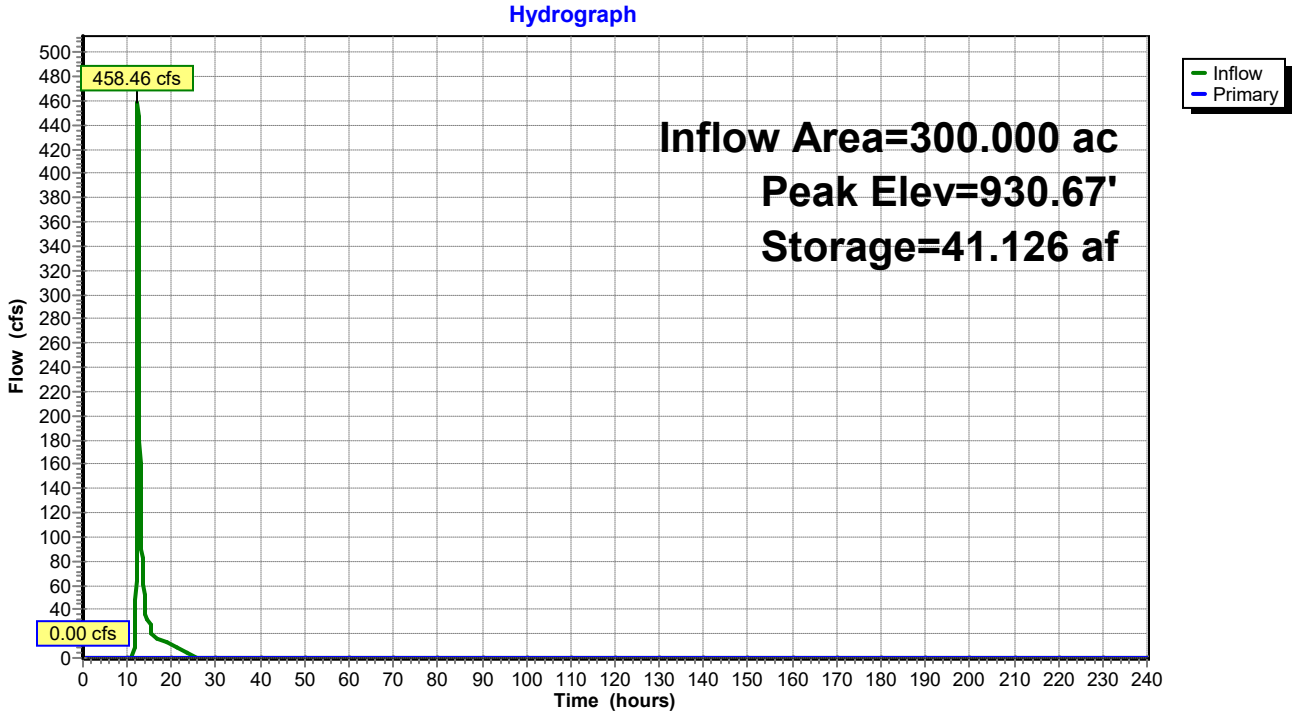
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=930.00' TW=930.22' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 30P: Wetland 4A

[58] Hint: Peaked 0.71' above defined flood level

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth = 0.42" for 10-year event
Inflow = 127.90 cfs @ 12.35 hrs, Volume= 12.716 af
Outflow = 33.63 cfs @ 13.23 hrs, Volume= 10.047 af, Atten= 74%, Lag= 53.2 min
Primary = 33.63 cfs @ 13.23 hrs, Volume= 10.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 926.67' @ 13.28 hrs Surf.Area= 6.186 ac Storage= 6.665 af
Flood Elev= 925.96' Surf.Area= 5.112 ac Storage= 2.616 af

Plug-Flow detention time= 372.6 min calculated for 10.045 af (79% of inflow)
Center-of-Mass det. time= 310.3 min (1,126.2 - 815.9)

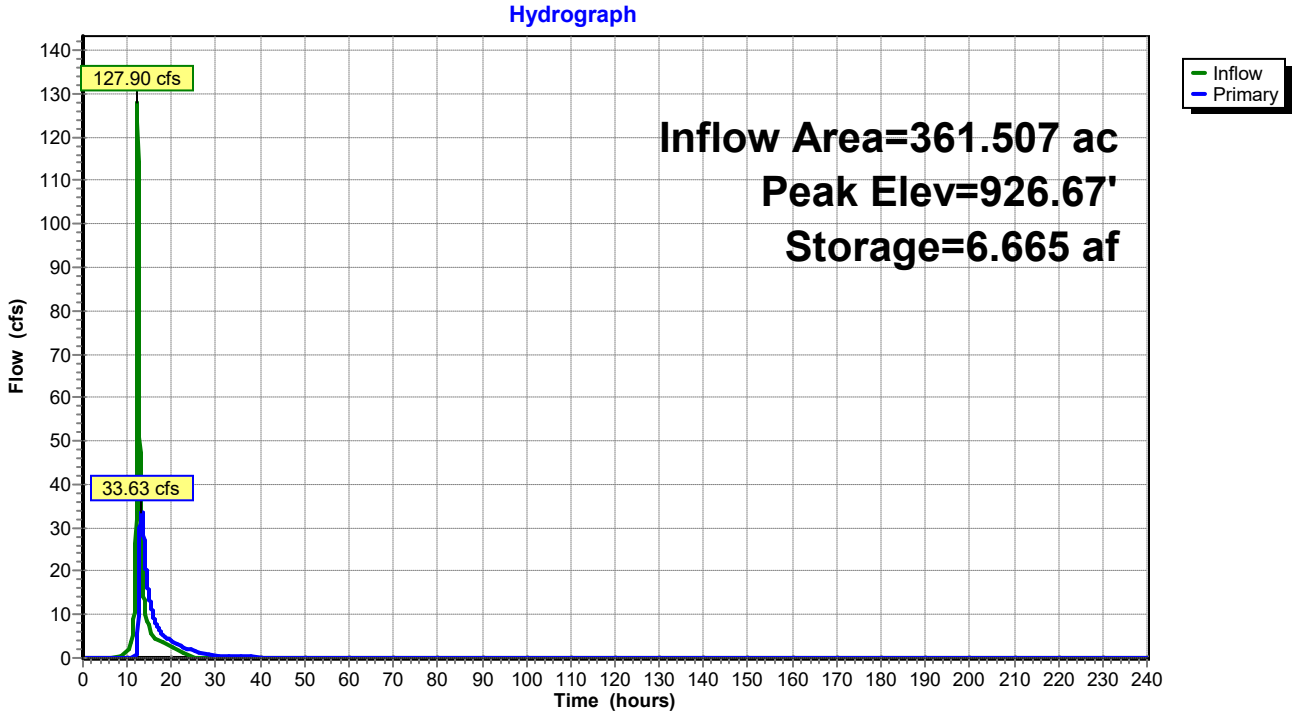
Volume	Invert	Avail.Storage	Storage Description
#1	925.00'	16.212 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
925.00	0.338	0.000	0.000
926.00	5.311	2.824	2.824
927.00	6.620	5.965	8.790
928.00	8.223	7.422	16.212

Device	Routing	Invert	Outlet Devices
#1	Primary	925.96'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.04 1.04 2.04 Width (feet) 0.00 6.00 90.00 140.00
#2	Primary	919.70'	**10.0" Round Culvert** L= 1,310.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.30' / 919.70' S= -0.0003 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#3	Device 2	925.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=33.49 cfs @ 13.23 hrs HW=926.67' TW=926.56' (Dynamic Tailwater)
- **1=Custom Weir/Orifice** (Weir Controls 33.29 cfs @ 1.46 fps)
- **2=Culvert** (Outlet Controls 0.19 cfs @ 0.36 fps)
  - **3=Orifice/Grate** (Passes 0.19 cfs of 0.86 cfs potential flow)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)
[80] Warning: Exceeded Pond 7P by 3.03' @ 12.85 hrs (389.13 cfs 34.431 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth = 0.13" for 10-year event
Inflow = 29.68 cfs @ 12.57 hrs, Volume= 3.430 af
Outflow = 20.21 cfs @ 12.88 hrs, Volume= 3.430 af, Atten= 32%, Lag= 18.3 min
Primary = 20.21 cfs @ 12.88 hrs, Volume= 3.430 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 933.39' @ 12.88 hrs Surf.Area= 0.537 ac Storage= 0.381 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.1 min (837.1 - 832.0)

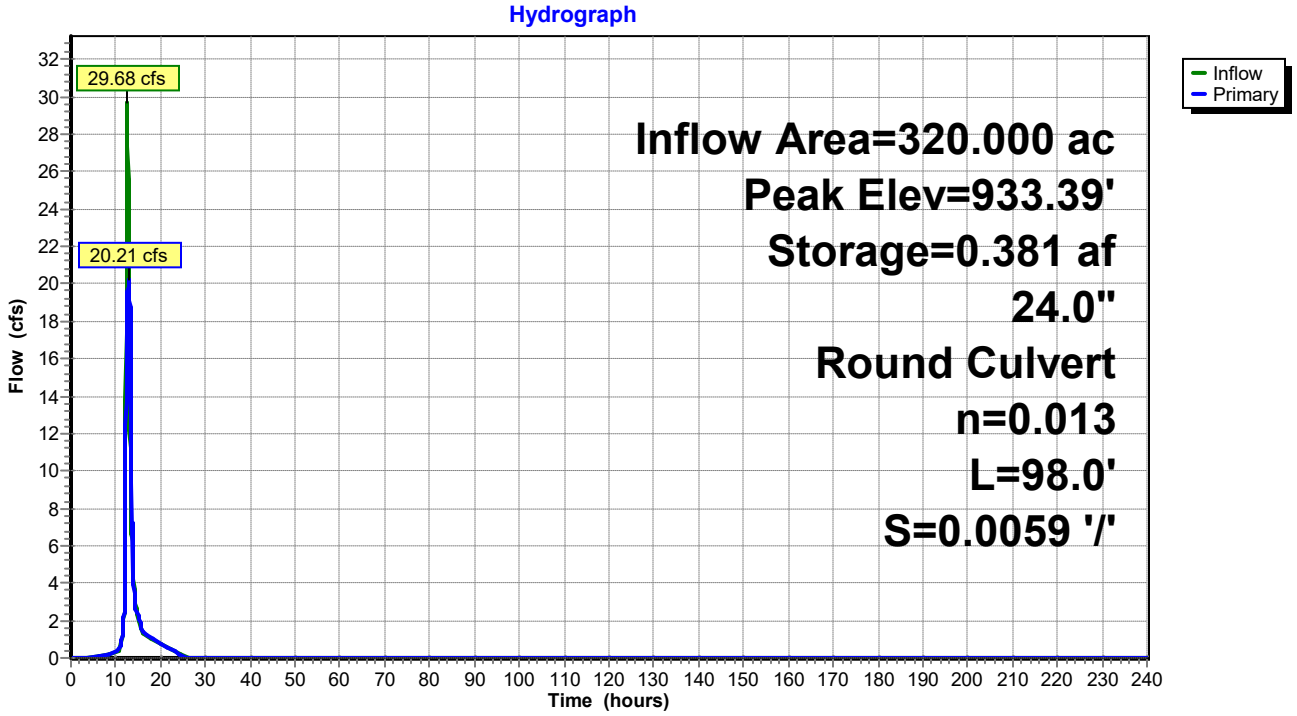
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=20.19 cfs @ 12.88 hrs HW=933.39' TW=926.63' (Dynamic Tailwater)
1=Culvert (Barrel Controls 20.19 cfs @ 6.43 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 40P: Wetland 2B

Inflow Area = 130.797 ac, 7.03% Impervious, Inflow Depth = 2.59" for 10-year event
Inflow = 239.10 cfs @ 12.33 hrs, Volume= 28.177 af
Outflow = 31.39 cfs @ 13.56 hrs, Volume= 28.172 af, Atten= 87%, Lag= 73.9 min
Primary = 31.39 cfs @ 13.56 hrs, Volume= 28.172 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 925.70' @ 13.57 hrs Surf.Area= 12.448 ac Storage= 12.456 af

Plug-Flow detention time= 324.5 min calculated for 28.167 af (100% of inflow)
Center-of-Mass det. time= 322.7 min (1,306.1 - 983.4)

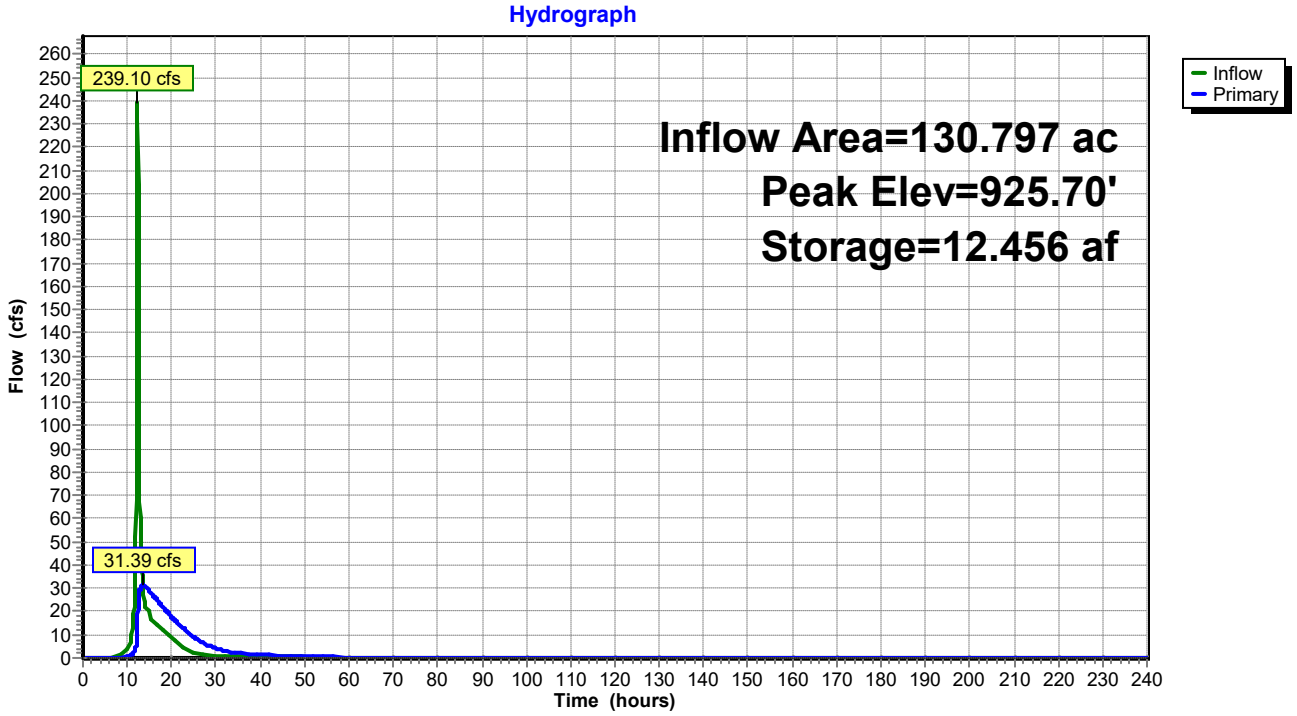
Volume	Invert	Avail.Storage	Storage Description
#1	923.92'	52.726 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.92	0.000	0.000	0.000
924.00	2.123	0.085	0.085
926.00	14.283	16.406	16.491
928.00	21.952	36.235	52.726

Device	Routing	Invert	Outlet Devices
#1	Primary	923.58'	**Asymmetrical Weir, C= 3.27** Offset (feet) -12.19 0.00 7.43 15.99 Height (feet) 3.38 0.00 0.09 3.38
#2	Device 1	923.92'	**Asymmetrical Weir, C= 3.27** Offset (feet) -56.17 -5.92 -1.08 0.00 3.27 6.37 30.87 135.00 Height (feet) 4.08 2.08 1.66 0.00 0.12 1.87 2.08 4.08

Primary OutFlow Max=31.39 cfs @ 13.56 hrs HW=925.70' TW=924.95' (Dynamic Tailwater)
↑**1=Asymmetrical Weir** (Passes 31.39 cfs of 102.36 cfs potential flow)
↑**2=Asymmetrical Weir** (Weir Controls 31.39 cfs @ 2.46 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 2.50" for 10-year event
Inflow = 50.10 cfs @ 12.18 hrs, Volume= 2.852 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 940.11' @ 24.60 hrs Surf.Area= 2.036 ac Storage= 2.852 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

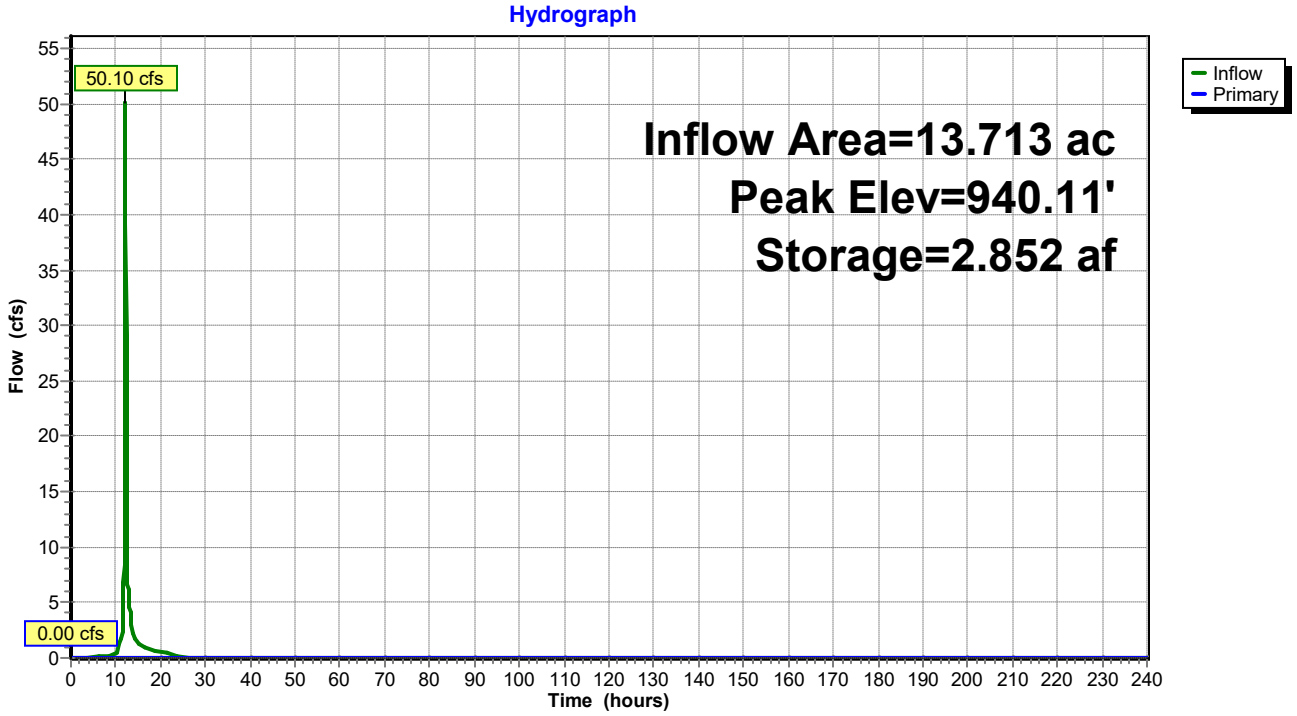
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=936.00' TW=923.92' (Dynamic Tailwater)
1=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 41P: Ex South Off-site Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 1.19" for 10-year event
Inflow = 40.73 cfs @ 12.38 hrs, Volume= 3.922 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 941.05' @ 240.00 hrs Surf.Area= 2.634 ac Storage= 3.922 af
Flood Elev= 941.50' Surf.Area= 3.181 ac Storage= 5.223 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

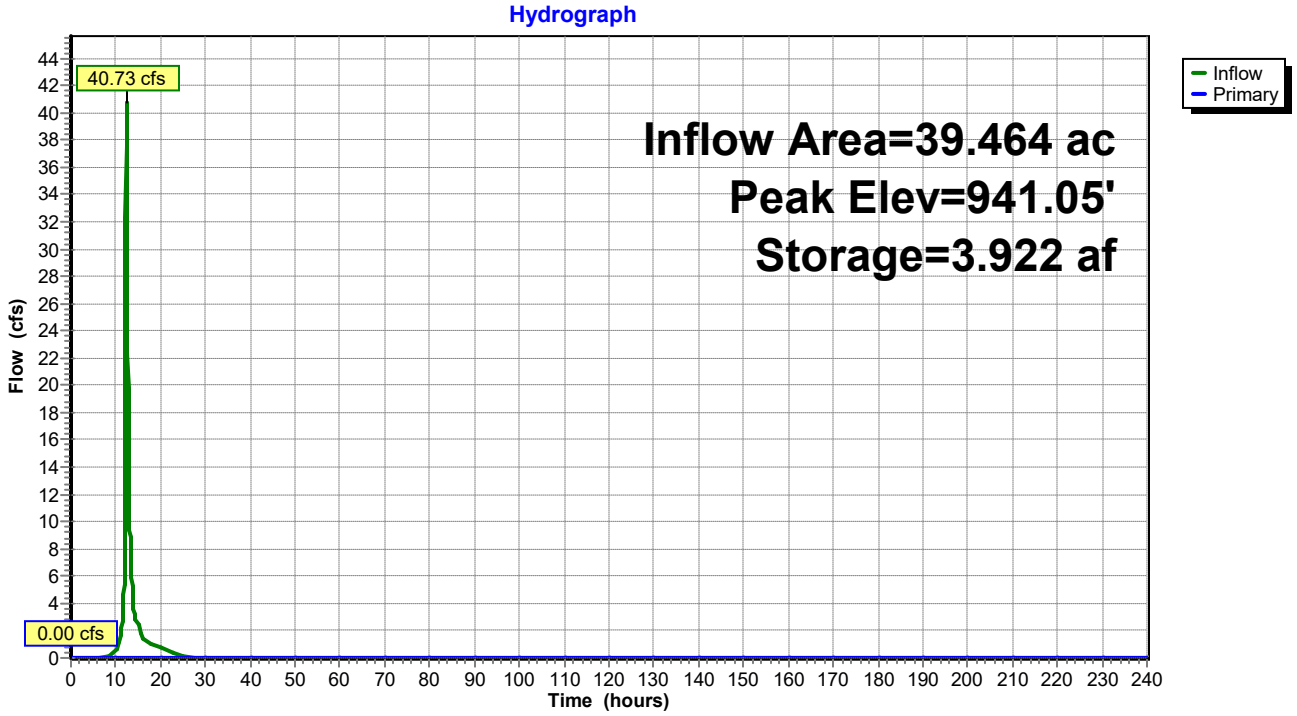
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	6.966 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
938.00	0.102	0.000	0.000
940.00	1.599	1.701	1.701
941.00	2.570	2.085	3.785
942.00	3.792	3.181	6.966

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=938.00' TW=923.92' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

[58] Hint: Peaked 0.31' above defined flood level

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth = 29.97" for 10-year event
Inflow = 21.34 cfs @ 12.13 hrs, Volume= 9.390 af
Outflow = 19.92 cfs @ 12.16 hrs, Volume= 9.176 af, Atten= 7%, Lag= 1.7 min
Primary = 19.92 cfs @ 12.16 hrs, Volume= 9.176 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 938.81' @ 12.16 hrs Surf.Area= 0.288 ac Storage= 0.292 af
Flood Elev= 938.50' Surf.Area= 0.226 ac Storage= 0.214 af

Plug-Flow detention time= 112.5 min calculated for 9.176 af (98% of inflow)
Center-of-Mass det. time= 21.2 min (1,364.0 - 1,342.8)

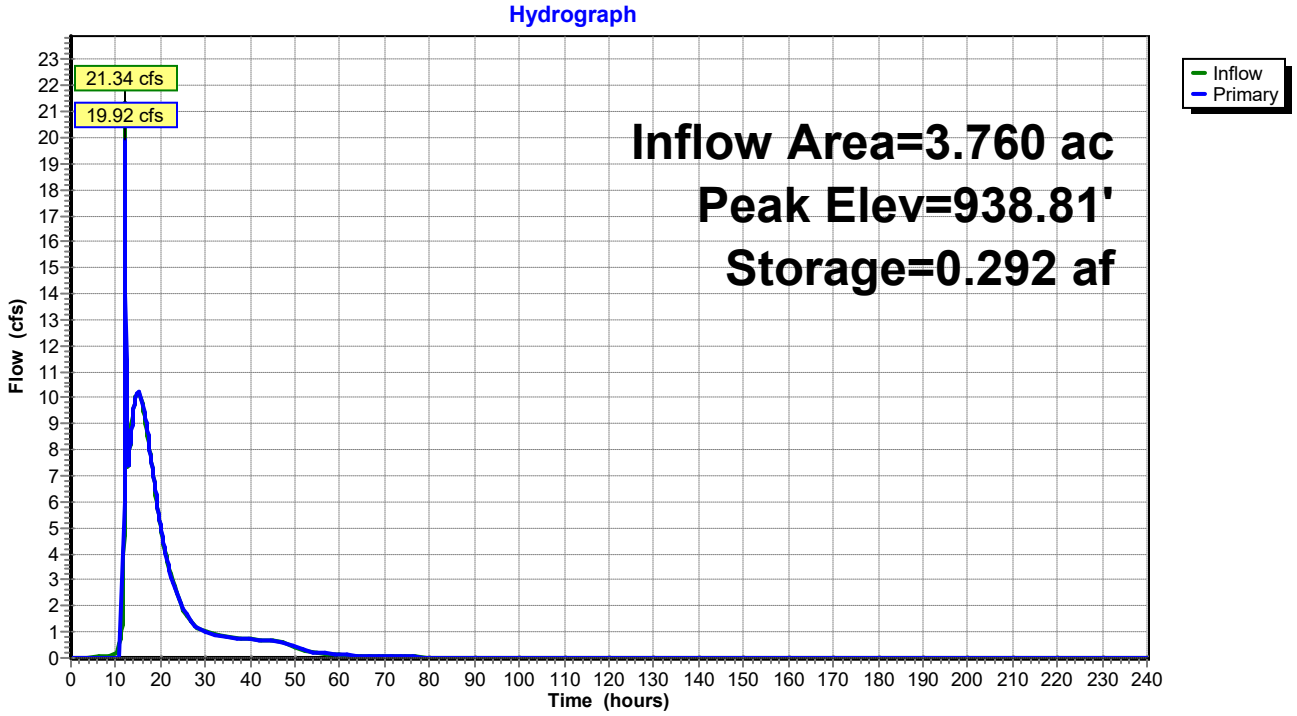
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	0.353 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.004	0.000	0.000
938.00	0.123	0.127	0.127
939.00	0.328	0.226	0.353

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=19.46 cfs @ 12.16 hrs HW=938.80' TW=924.80' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 19.46 cfs @ 1.72 fps)

Pond 60P: Wetland 5B



Summary for Link 1PP: Northwest Wetland (Big Woods)

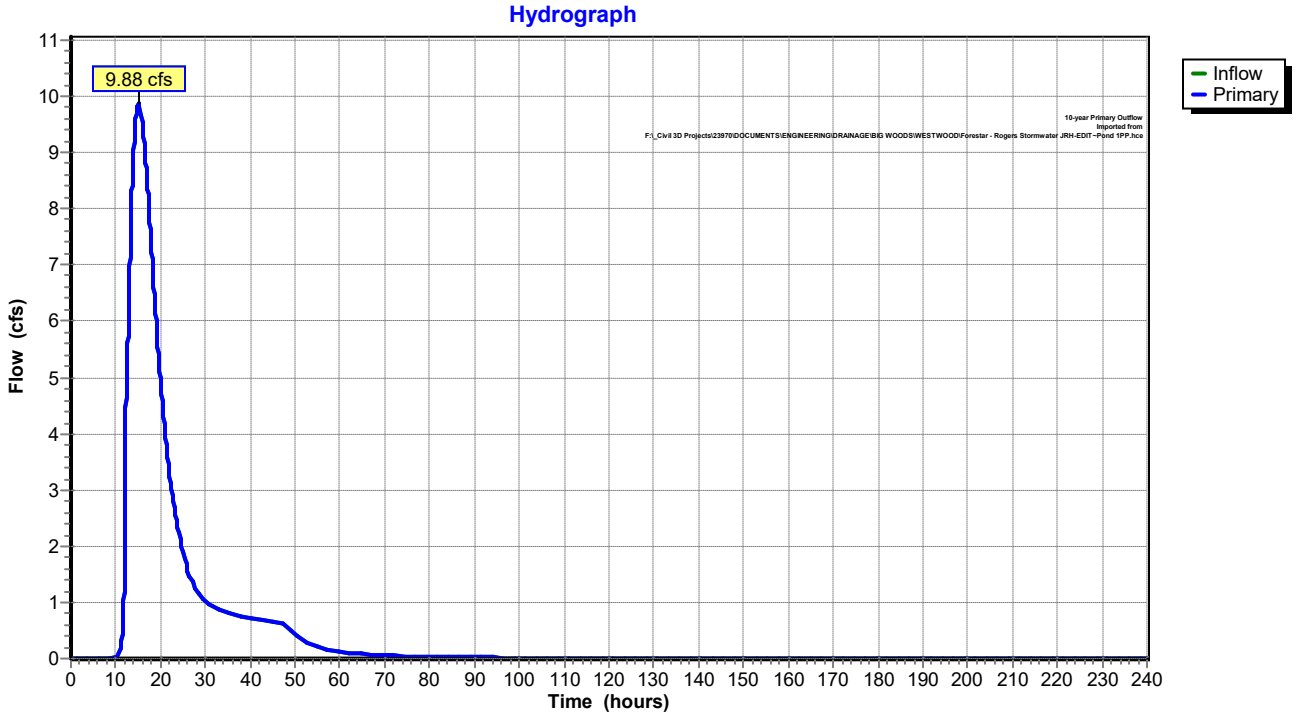
From the Big Woods development drainage model prepared by Westwood.

Inflow	=	9.88 cfs @	15.07 hrs, Volume=	8.513 af
Primary	=	9.88 cfs @	15.07 hrs, Volume=	8.513 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

10-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 1PP: Northwest Wetland (Big Woods)



Summary for Link 5PP: Existing Pond (Big Woods)

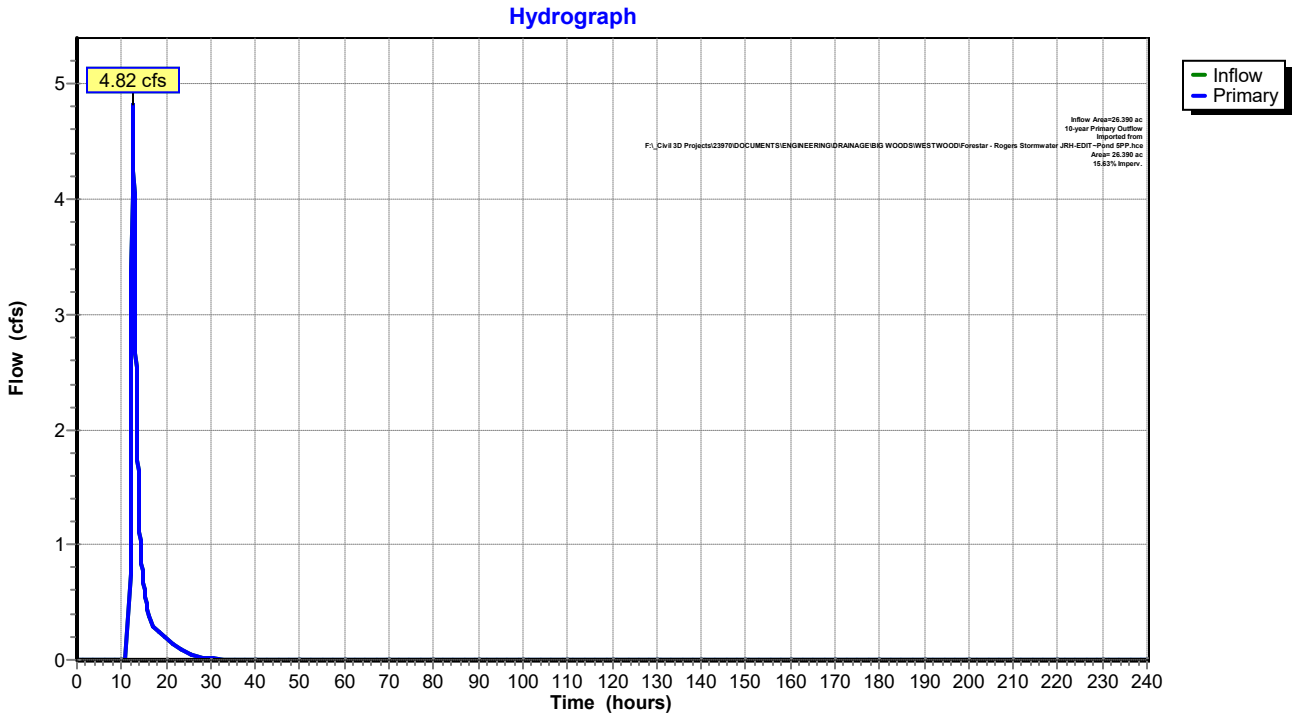
From the Big Woods development drainage model prepared by Westwood.

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 0.32" for 10-year event
Inflow = 4.82 cfs @ 12.52 hrs, Volume= 0.706 af
Primary = 4.82 cfs @ 12.52 hrs, Volume= 0.706 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

10-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 5PP: Existing Pond (Big Woods)



Time span=0.00-240.00 hrs, dt=0.05 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=3.93"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=1,123.30 cfs 98.288 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=25.761 ac 0.80% Impervious Runoff Depth=5.72"
Flow Length=2,175' Tc=29.4 min CN=88/98 Runoff=128.35 cfs 12.278 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=6.216 ac 0.00% Impervious Runoff Depth=5.48"
Flow Length=586' Tc=8.9 min CN=86/0 Runoff=51.77 cfs 2.839 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.900 ac 0.00% Impervious Runoff Depth=4.69"
Flow Length=247' Tc=20.0 min CN=79/0 Runoff=4.68 cfs 0.352 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=5.776 ac 0.00% Impervious Runoff Depth=5.48"
Flow Length=737' Tc=11.1 min CN=86/0 Runoff=44.21 cfs 2.638 af

Subcatchment 23S: Direct to Lower West Runoff Area=9.551 ac 0.00% Impervious Runoff Depth=5.60"
Flow Length=391' Tc=9.5 min CN=87/0 Runoff=78.66 cfs 4.453 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=26.075 ac 1.14% Impervious Runoff Depth=5.72"
Flow Length=998' Tc=13.6 min CN=88/98 Runoff=190.34 cfs 12.437 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=41.507 ac 5.85% Impervious Runoff Depth=5.35"
Flow Length=1,249' Tc=23.4 min CN=84/98 Runoff=221.25 cfs 18.502 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=4.47"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=65.78 cfs 7.458 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=73.860 ac 2.02% Impervious Runoff Depth=5.85"
Flow Length=1,354' Tc=23.6 min CN=89/98 Runoff=420.71 cfs 35.986 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=5.08"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=100.55 cfs 5.810 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=5.68"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=68.57 cfs 6.189 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=5.46"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=33.96 cfs 1.710 af

Reach 1R: Cowley Lake Outlet Channel Inflow=128.35 cfs 12.278 af
Outflow=128.35 cfs 12.278 af

Reach 2R: Cowley Lake Inflow=387.66 cfs 146.220 af
Outflow=387.66 cfs 146.220 af

Reach 21R: East Channel Avg. Flow Depth=1.74' Max Vel=6.77 fps Inflow=97.01 cfs 62.198 af
n=0.022 L=382.0' S=0.0097 '/' Capacity=131.71 cfs Outflow=97.00 cfs 62.198 af

Reach 23RL: Lower West Channel Avg. Flow Depth=2.07' Max Vel=3.34 fps Inflow=126.31 cfs 66.110 af
n=0.022 L=534.0' S=0.0014 '/' Capacity=257.71 cfs Outflow=126.04 cfs 66.107 af

Reach 23RU: Upper West Channel Avg. Flow Depth=0.98' Max Vel=3.27 fps Inflow=116.87 cfs 61.658 af
n=0.022 L=490.0' S=0.0057 '/' Capacity=766.18 cfs Outflow=116.47 cfs 61.657 af

Pond 7P: Whiteford Lake and Peak Elev=931.48' Storage=92.213 af Inflow=1,123.30 cfs 98.288 af
Outflow=34.97 cfs 36.442 af

Pond 30P: Wetland 4A Peak Elev=927.13' Storage=9.664 af Inflow=240.29 cfs 64.505 af
Outflow=116.87 cfs 61.658 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=934.52' Storage=1.969 af Inflow=65.78 cfs 43.901 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=25.92 cfs 46.003 af

Pond 40P: Wetland 2B Peak Elev=926.39' Storage=22.297 af Inflow=440.42 cfs 61.852 af
Outflow=96.31 cfs 61.846 af

Pond 41P: Ex South Off-site Pond Peak Elev=940.67' Storage=4.079 af Inflow=100.55 cfs 5.810 af
Outflow=7.88 cfs 2.123 af

Pond 50P: Wetland 4B Peak Elev=941.66' Storage=5.746 af Inflow=78.67 cfs 10.853 af
Outflow=9.40 cfs 5.629 af

Pond 60P: Wetland 5B Peak Elev=938.96' Storage=0.338 af Inflow=41.22 cfs 18.328 af
Outflow=39.48 cfs 18.114 af

Link DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=17.34 cfs 16.618 af
Primary=17.34 cfs 16.618 af

Link S\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=10.47 cfs 4.665 af
Area= 26.390 ac 15.63% Imperv. Primary=10.47 cfs 4.665 af

Total Runoff Area = 540.193 ac Runoff Volume = 208.941 af Average Runoff Depth = 4.64"
98.07% Pervious = 529.794 ac 1.93% Impervious = 10.399 ac

Summary for Subcatchment 7S: Approx DA to Lake

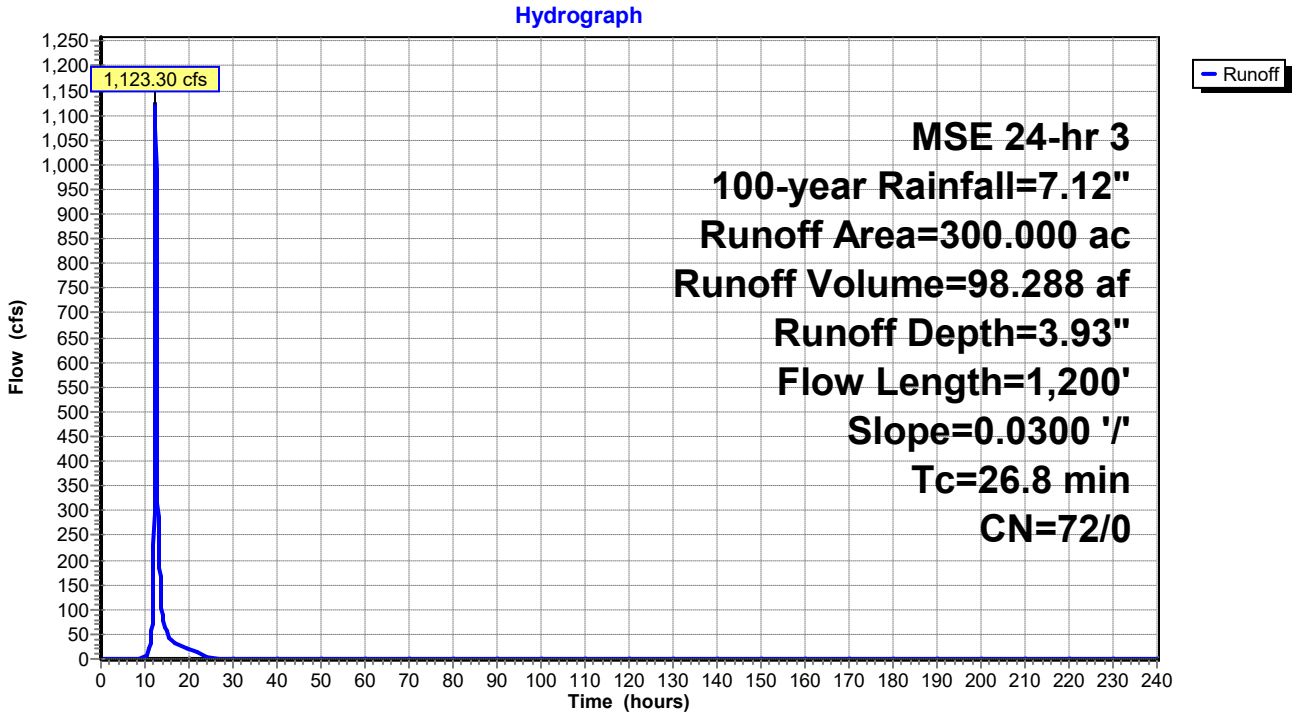
Runoff = 1,123.30 cfs @ 12.39 hrs, Volume= 98.288 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

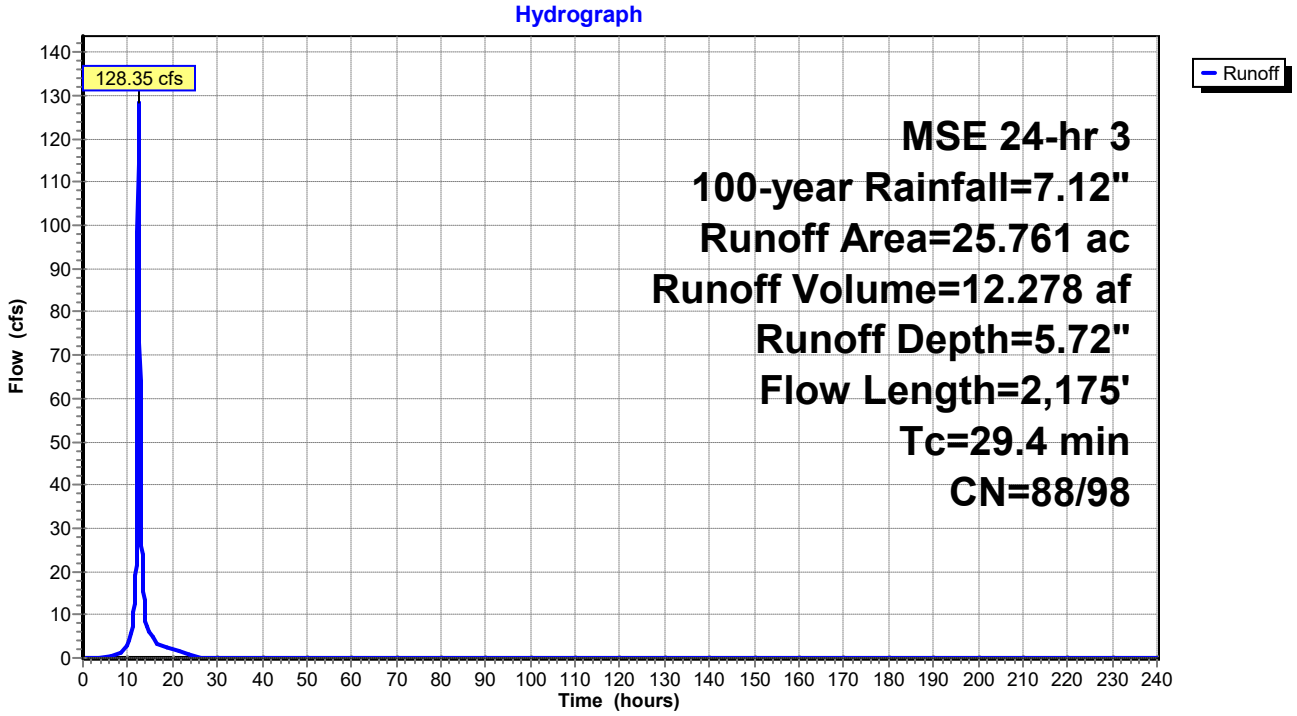
Runoff = 128.35 cfs @ 12.40 hrs, Volume= 12.278 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.136	98	Unconnected pavement, HSG D
0.070	98	Unconnected roofs, HSG D
1.380	98	Water Surface, 0% imp, HSG D
21.395	89	Row crops, straight row, Good, HSG D
1.284	80	>75% Grass cover, Good, HSG D
0.797	78	Meadow, non-grazed, HSG D
0.699	77	Woods, Good, HSG D
25.761	88	Weighted Average
25.555	88	99.20% Pervious Area
0.206	98	0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
20.2	1,454	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.9	621	0.0020	2.64	68.60	**Channel Flow,** Area= 26.0 sf Perim= 20.0' r= 1.30' n= 0.030 Earth, grassed & winding
29.4	2,175	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 20S: Direct to Cowley Lake

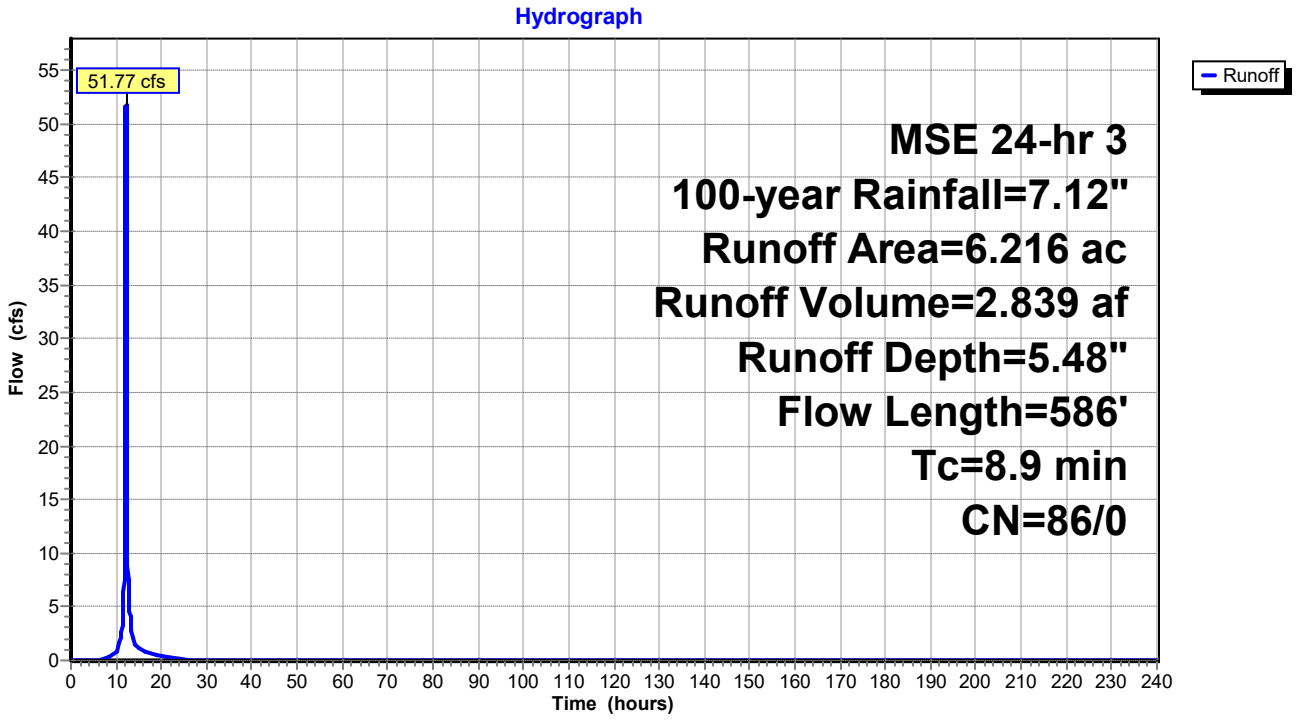
Runoff = 51.77 cfs @ 12.16 hrs, Volume= 2.839 af, Depth= 5.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.123	98	Water Surface, 0% imp, HSG D
4.384	89	Row crops, straight row, Good, HSG D
1.709	77	Woods, Good, HSG D
6.216	86	Weighted Average
6.216	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0240	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
4.3	486	0.0440	1.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.9	586	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

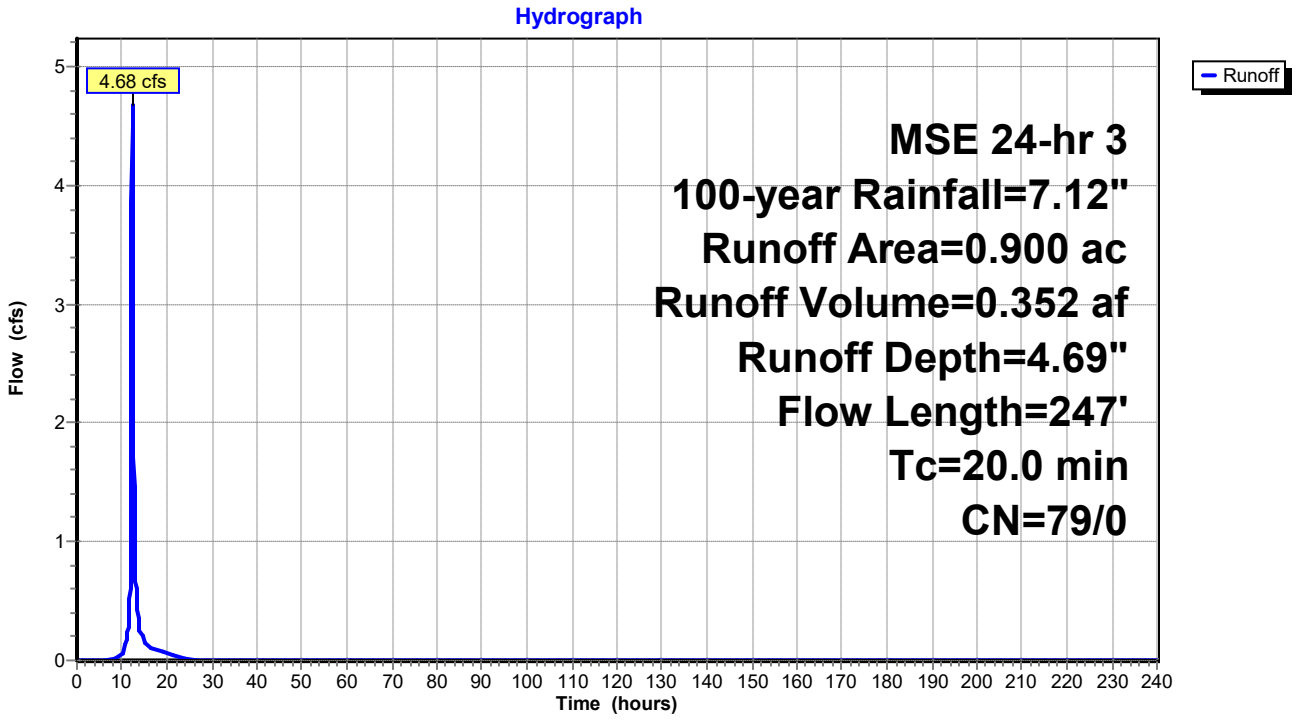
Runoff = 4.68 cfs @ 12.30 hrs, Volume= 0.352 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.074	98	Water Surface, 0% imp, HSG D
0.005	89	Row crops, straight row, Good, HSG D
0.821	77	Woods, Good, HSG D
0.900	79	Weighted Average
0.900	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
1.8	147	0.0721	1.34		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.0	247	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

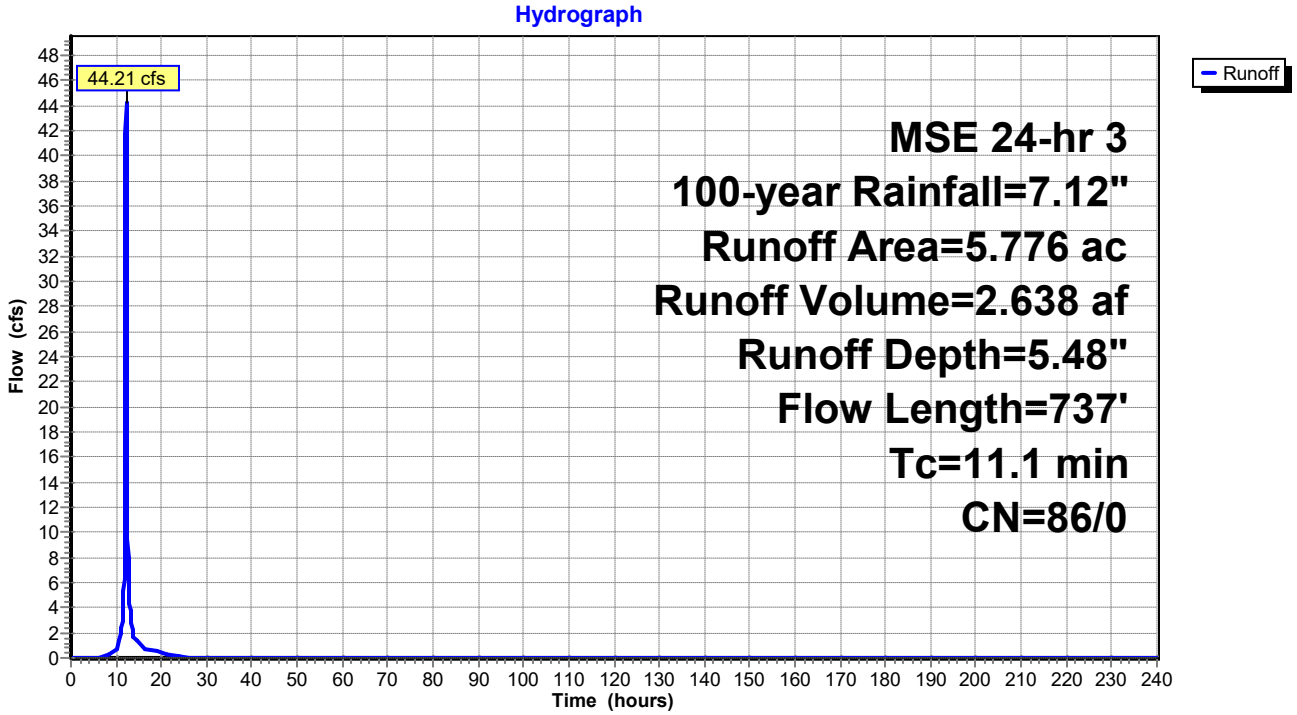
Runoff = 44.21 cfs @ 12.19 hrs, Volume= 2.638 af, Depth= 5.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.031	98	Water Surface, 0% imp, HSG D
4.386	89	Row crops, straight row, Good, HSG D
0.729	78	Meadow, non-grazed, HSG D
0.630	77	Woods, Good, HSG D
5.776	86	Weighted Average
5.776	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.0440	0.46		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
7.5	637	0.0248	1.42		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.1	737	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Lower West Channel

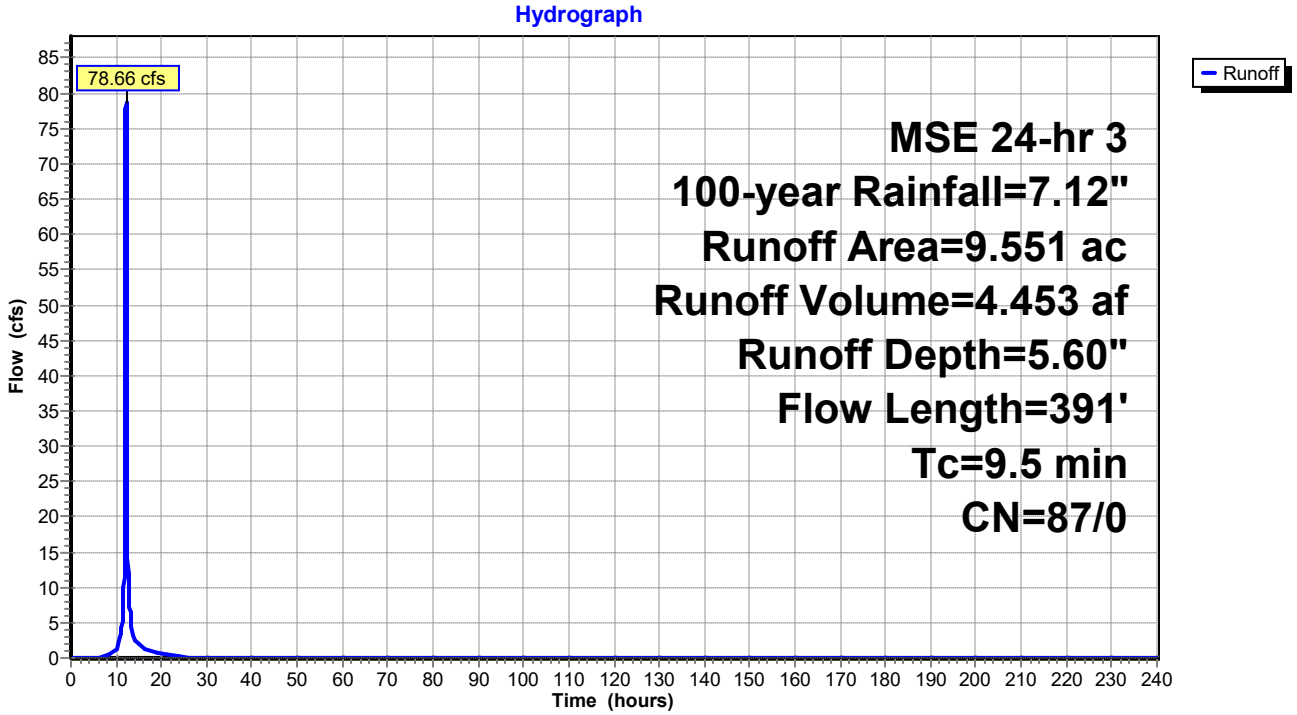
Runoff = 78.66 cfs @ 12.16 hrs, Volume= 4.453 af, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.467	98	Water Surface, 0% imp, HSG D
7.263	89	Row crops, straight row, Good, HSG D
0.213	78	Meadow, non-grazed, HSG D
1.608	77	Woods, Good, HSG D
9.551	87	Weighted Average
9.551	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0090	0.24		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
2.6	291	0.0433	1.87		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
9.5	391	Total			

Subcatchment 23S: Direct to Lower West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

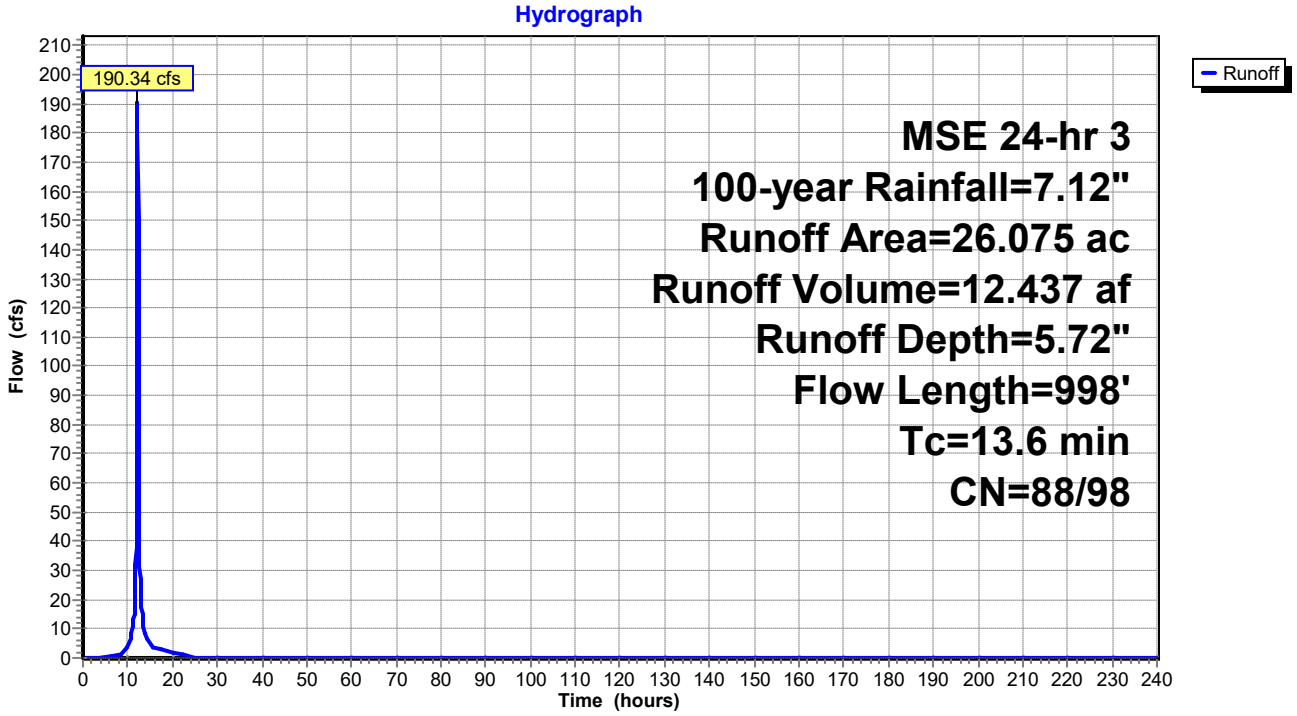
Runoff = 190.34 cfs @ 12.21 hrs, Volume= 12.437 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.298	98	Unconnected pavement, HSG D
0.980	98	Water Surface, 0% imp, HSG D
0.082	96	Gravel surface, HSG D
0.357	80	>75% Grass cover, Good, HSG D
21.863	89	Row crops, straight row, Good, HSG D
0.151	78	Meadow, non-grazed, HSG D
2.344	77	Woods, Good, HSG D
26.075	88	Weighted Average
25.777	88	98.86% Pervious Area
0.298	98	1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	30	0.0200	1.02		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
10.3	819	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.8	149	0.0315	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.6	998	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 30S: Direct to Wetland 4A

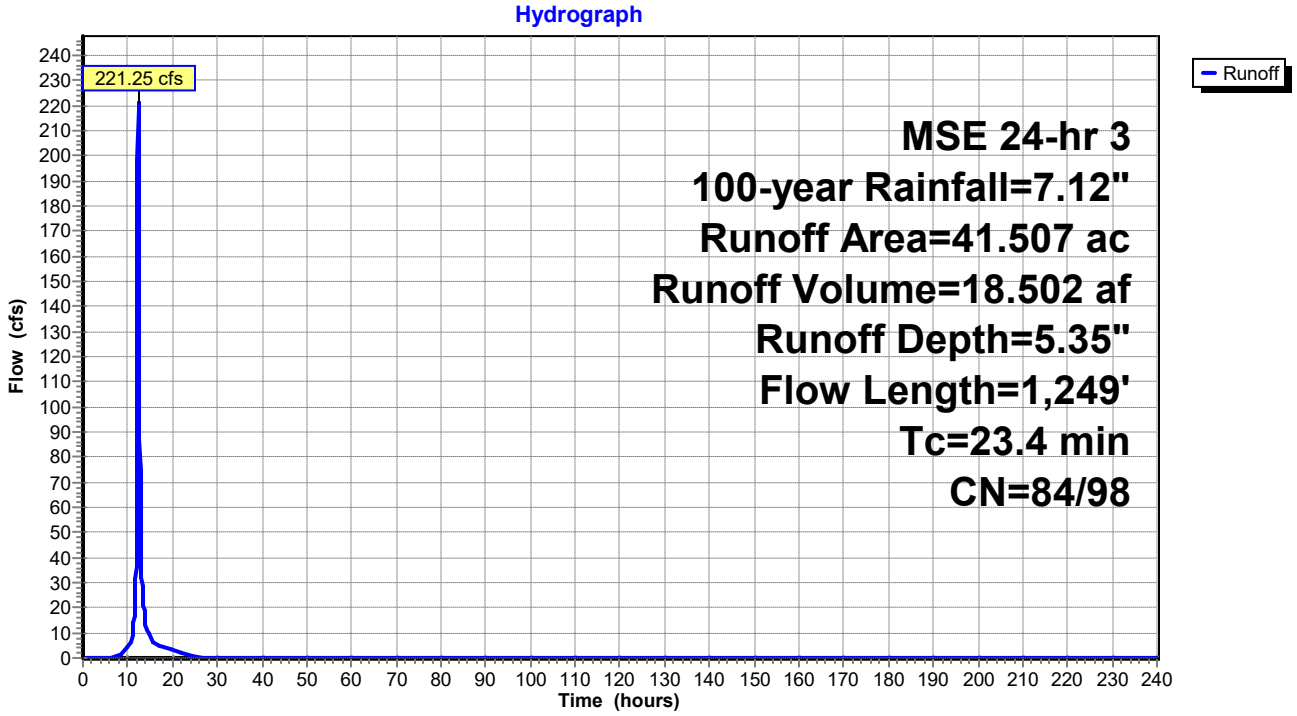
Runoff = 221.25 cfs @ 12.33 hrs, Volume= 18.502 af, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
1.469	98	Unconnected pavement, HSG D
0.959	98	Unconnected roofs, HSG D
0.947	96	Gravel surface, HSG D
17.469	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
14.597	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
3.773	77	Woods, Good, HSG D
41.507	85	Weighted Average
39.079	84	94.15% Pervious Area
2.428	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

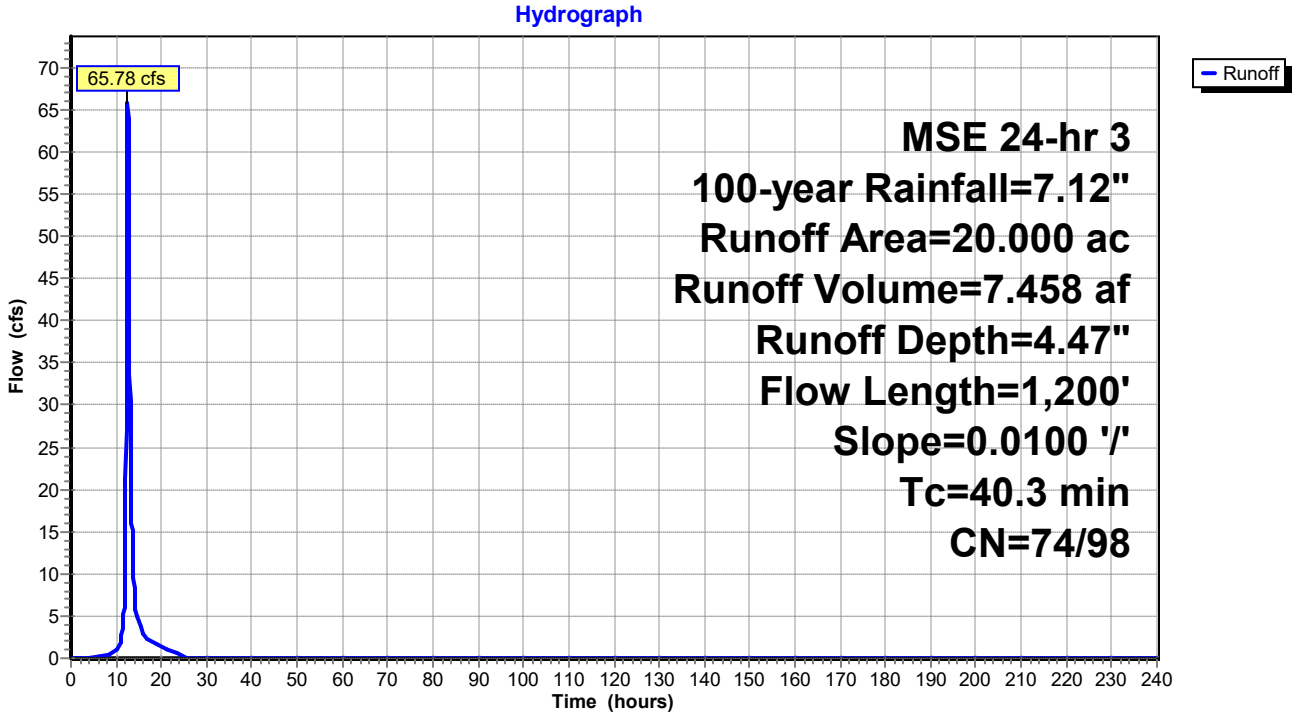
Runoff = 65.78 cfs @ 12.56 hrs, Volume= 7.458 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 40S: Direct to Wetland 2B

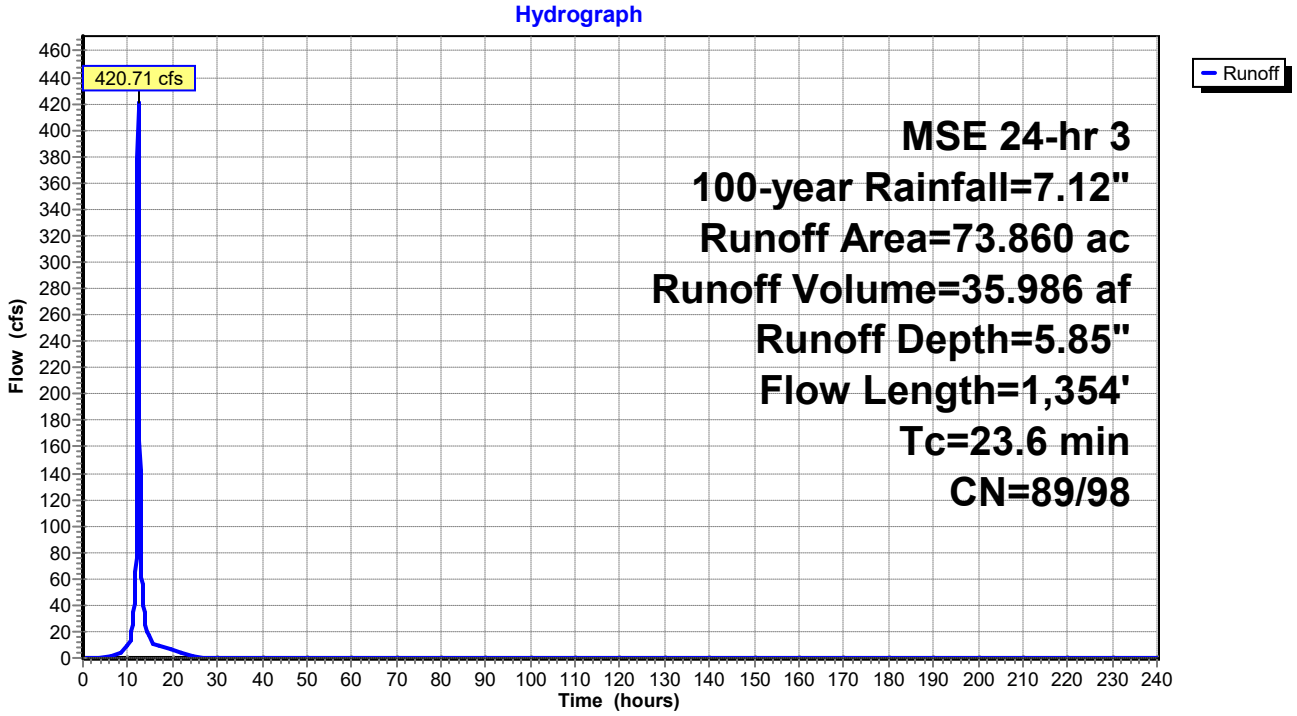
Runoff = 420.71 cfs @ 12.33 hrs, Volume= 35.986 af, Depth= 5.85"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
0.528	98	Unconnected roofs, HSG D
17.207	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
35.493	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
8.455	80	>75% Grass cover, Good, HSG D
5.449	78	Meadow, non-grazed, HSG D
4.306	77	Woods, Good, HSG D
73.860	89	Weighted Average
72.367	89	97.98% Pervious Area
1.493	98	2.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

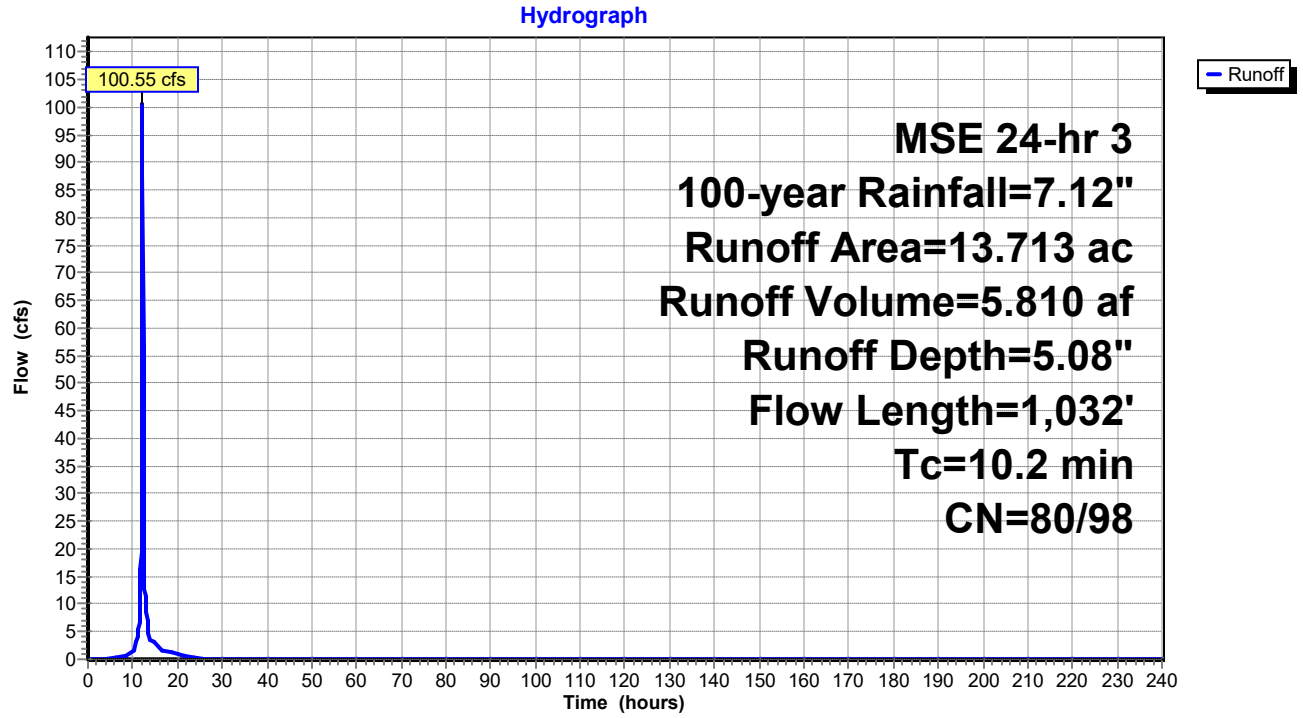
Runoff = 100.55 cfs @ 12.18 hrs, Volume= 5.810 af, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

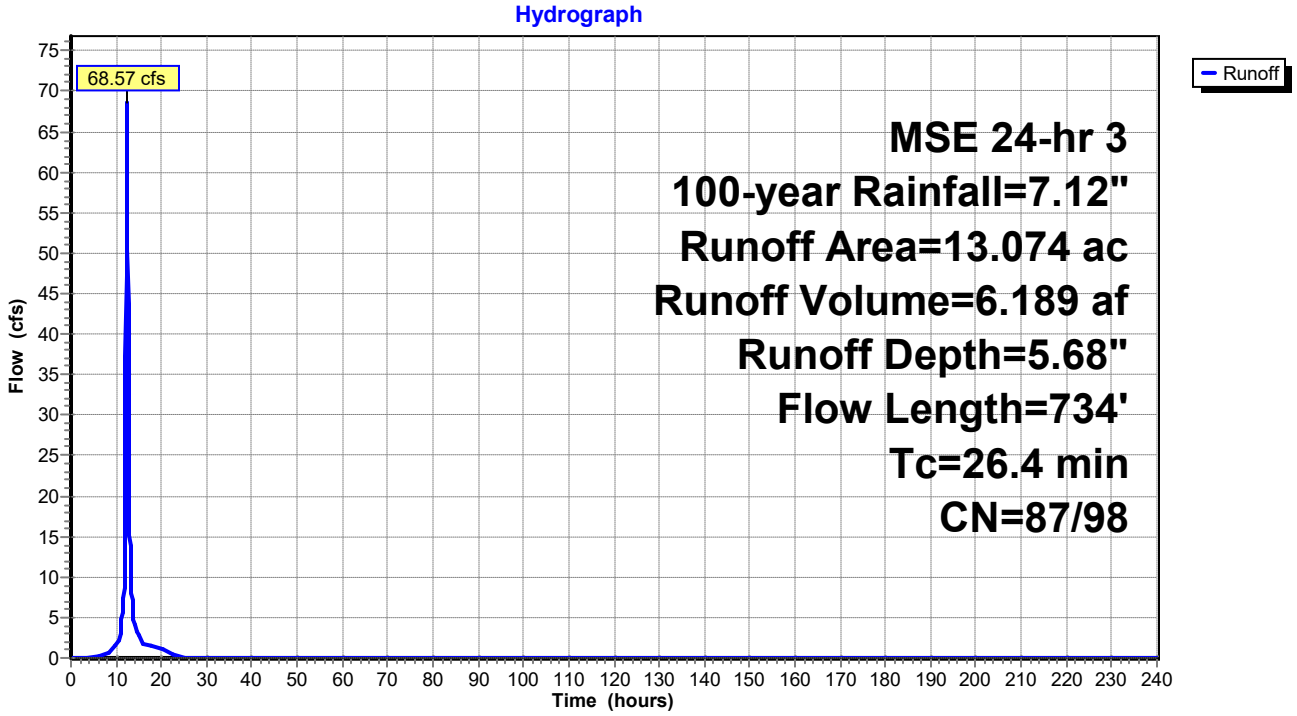
Runoff = 68.57 cfs @ 12.37 hrs, Volume= 6.189 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

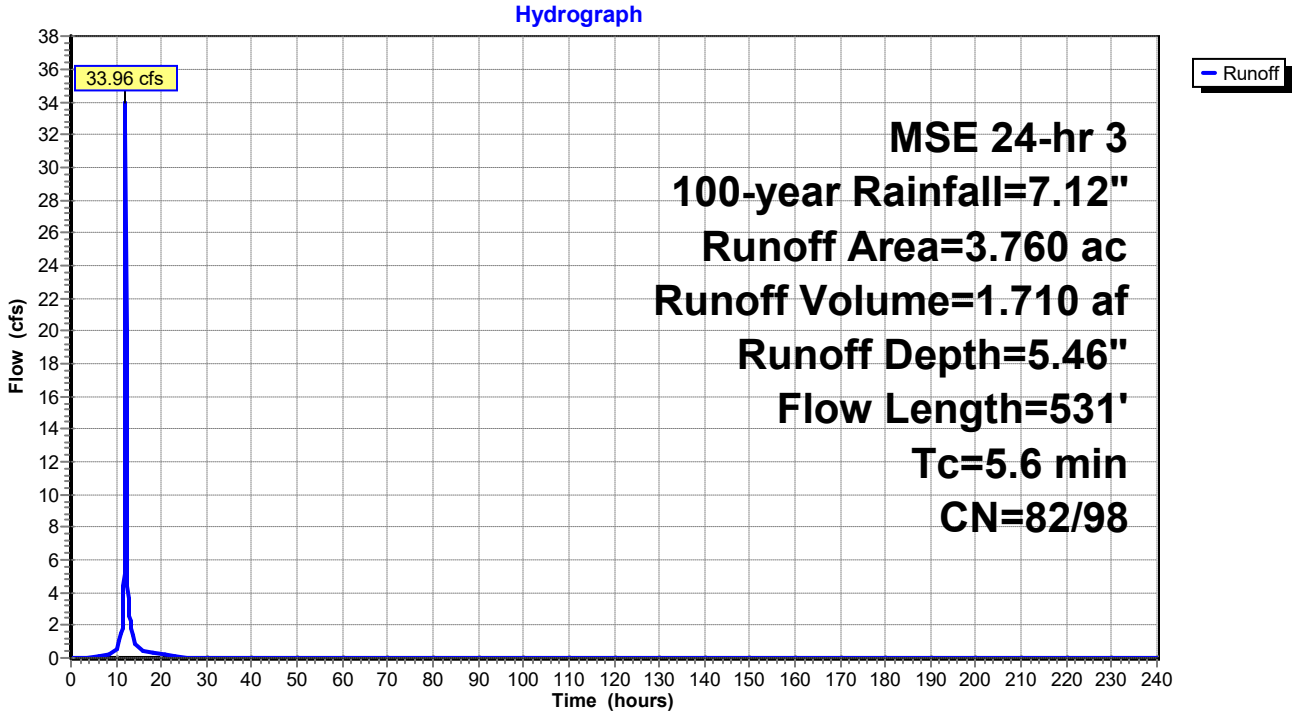
Runoff = 33.96 cfs @ 12.12 hrs, Volume= 1.710 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-year Rainfall=7.12"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



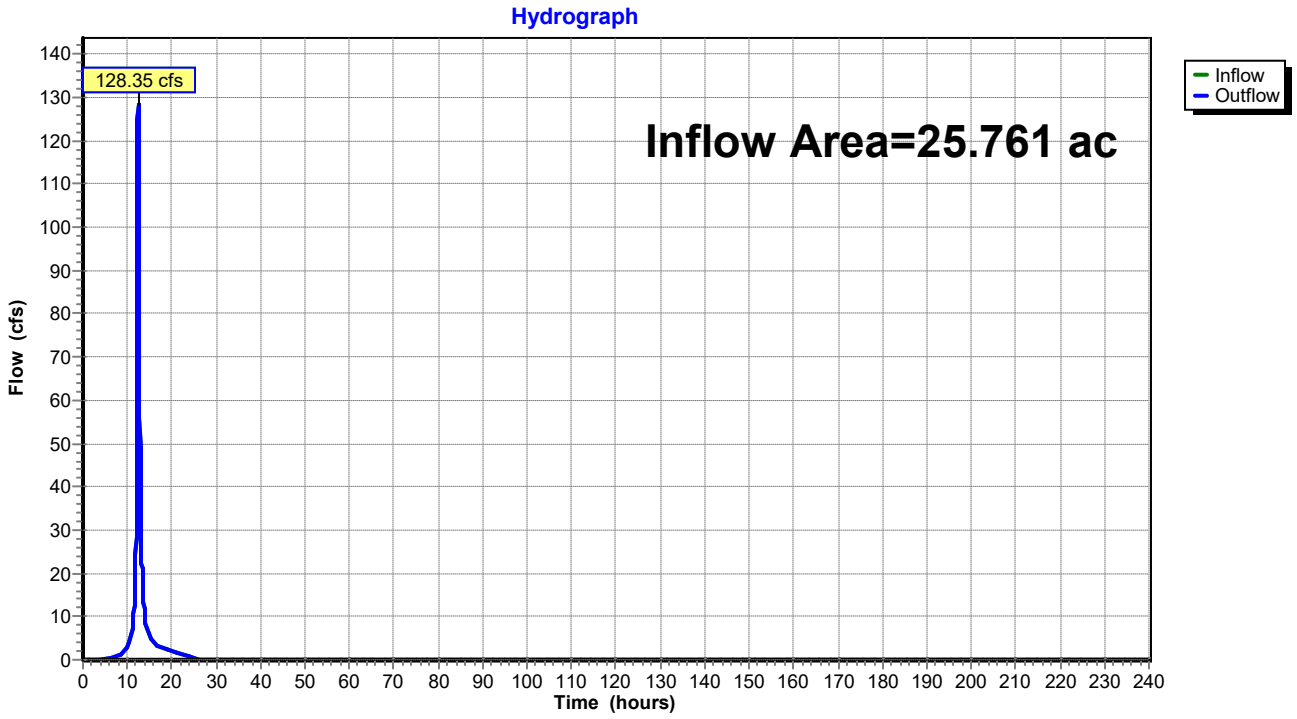
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.761 ac, 0.80% Impervious, Inflow Depth = 5.72" for 100-year event
Inflow = 128.35 cfs @ 12.40 hrs, Volume= 12.278 af
Outflow = 128.35 cfs @ 12.40 hrs, Volume= 12.278 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



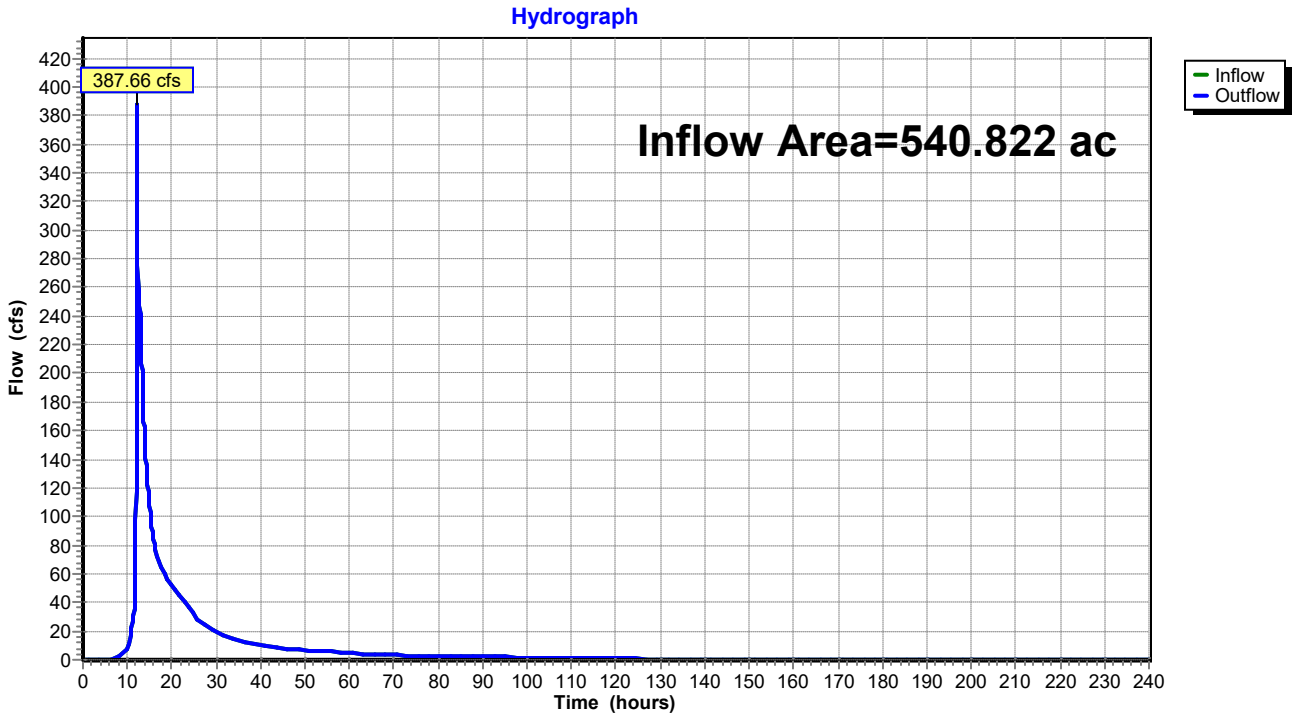
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.822 ac, 2.65% Impervious, Inflow Depth > 3.24" for 100-year event
Inflow = 387.66 cfs @ 12.21 hrs, Volume= 146.220 af
Outflow = 387.66 cfs @ 12.21 hrs, Volume= 146.220 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: East Channel

Inflow Area = 131.697 ac, 6.98% Impervious, Inflow Depth = 5.67" for 100-year event
Inflow = 97.01 cfs @ 13.03 hrs, Volume= 62.198 af
Outflow = 97.00 cfs @ 13.04 hrs, Volume= 62.198 af, Atten= 0%, Lag= 0.8 min

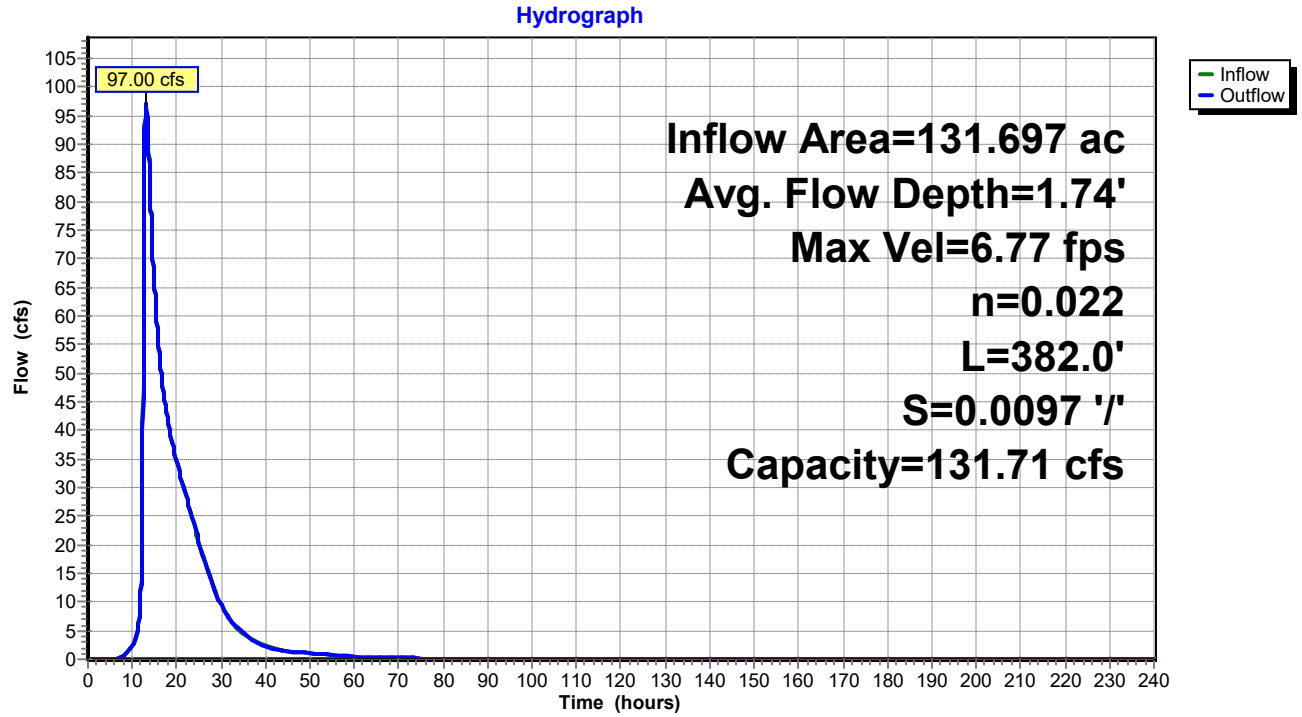
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.77 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.15 fps, Avg. Travel Time= 5.6 min

Peak Storage= 5,477 cf @ 13.04 hrs
Average Depth at Peak Storage= 1.74'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 131.71 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 382.0' Slope= 0.0097 '/'
Inlet Invert= 923.92', Outlet Invert= 920.20'

‡

Reach 21R: East Channel



Summary for Reach 23RL: Lower West Channel

Inflow Area = 371.058 ac, 1.30% Impervious, Inflow Depth > 2.14" for 100-year event
Inflow = 126.31 cfs @ 12.64 hrs, Volume= 66.110 af
Outflow = 126.04 cfs @ 12.67 hrs, Volume= 66.107 af, Atten= 0%, Lag= 2.1 min

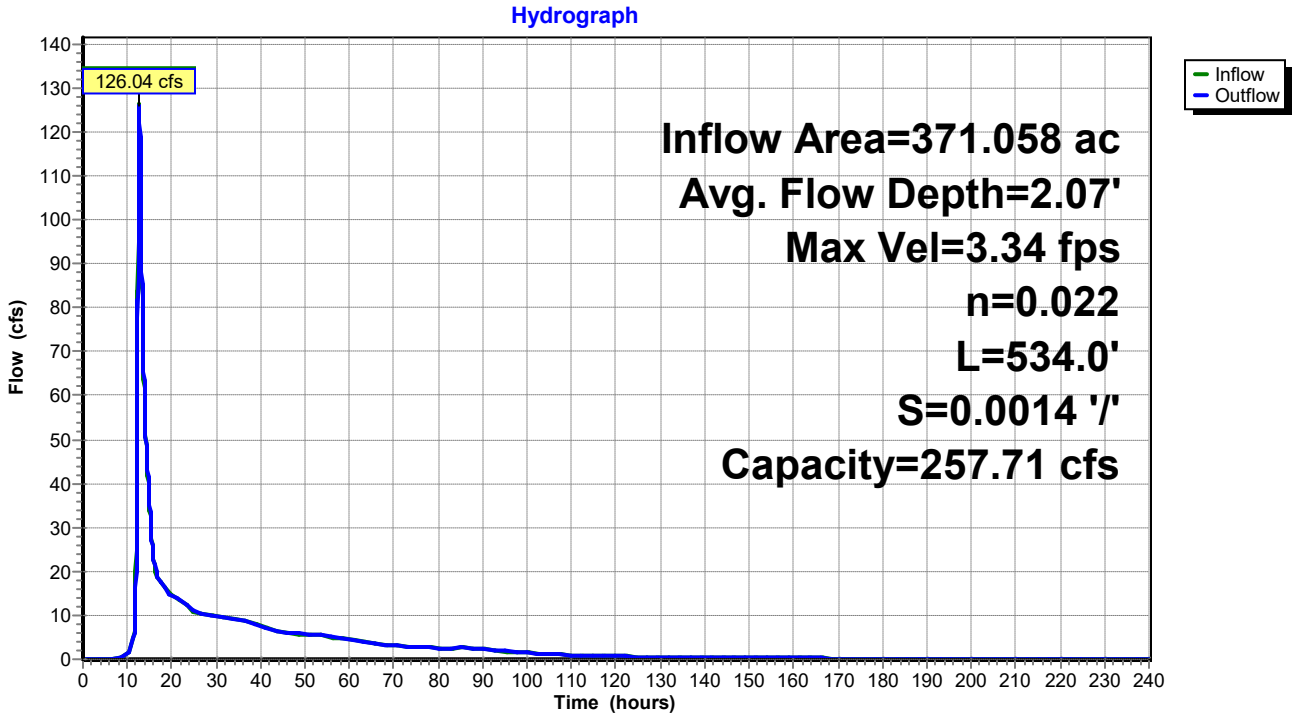
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.34 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 12.6 min

Peak Storage= 20,134 cf @ 12.67 hrs
Average Depth at Peak Storage= 2.07'
Bank-Full Depth= 3.00' Flow Area= 63.0 sf, Capacity= 257.71 cfs

12.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 30.00'
Length= 534.0' Slope= 0.0014 '/'
Inlet Invert= 919.58', Outlet Invert= 918.82'

‡

Reach 23RL: Lower West Channel



Summary for Reach 23RU: Upper West Channel

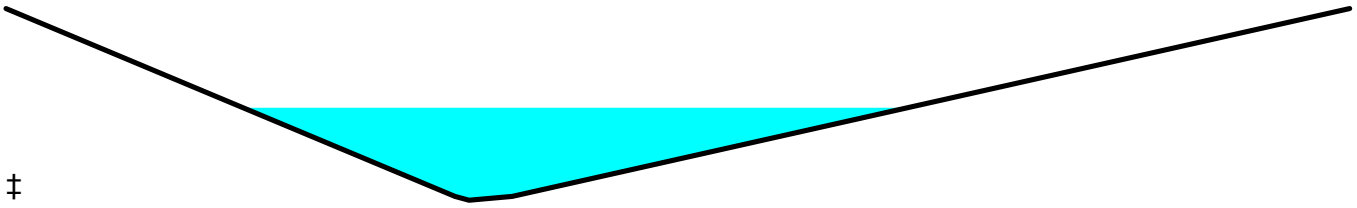
[80] Warning: Exceeded Pond 30P by 0.96' @ 0.00 hrs (0.58 cfs 0.503 af)

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 2.05" for 100-year event
Inflow = 116.87 cfs @ 12.65 hrs, Volume= 61.658 af
Outflow = 116.47 cfs @ 12.68 hrs, Volume= 61.657 af, Atten= 0%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.27 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 8.3 min

Peak Storage= 17,448 cf @ 12.68 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 2.04' Flow Area= 146.2 sf, Capacity= 766.18 cfs

Custom cross-section, Length= 490.0' Slope= 0.0057 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 925.96', Outlet Invert= 923.17'

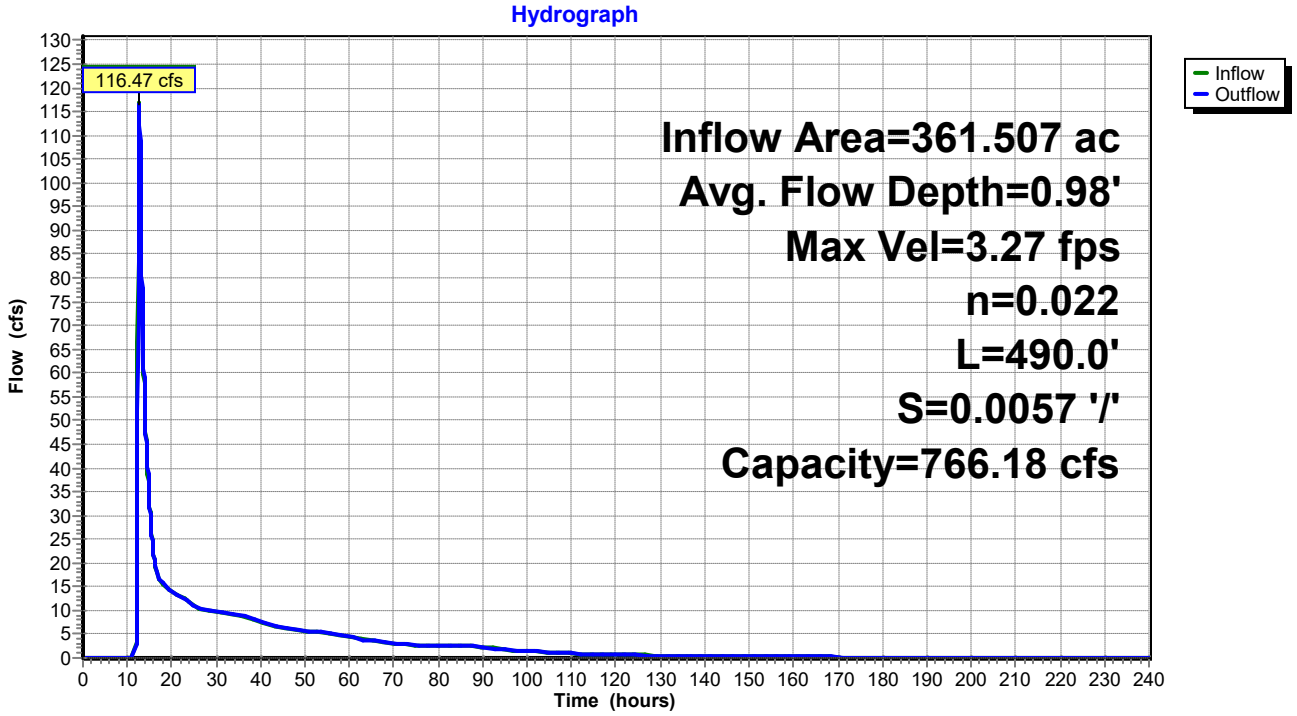


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-48.27	928.00	0.00
-1.47	926.00	2.00
0.00	925.96	2.04
4.51	926.00	2.00
91.79	928.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.04	0.1	6.0	59	0.05
2.04	146.2	140.1	71,618	766.18

Reach 23RU: Upper West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=488)

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 3.93" for 100-year event
Inflow = 1,123.30 cfs @ 12.39 hrs, Volume= 98.288 af
Outflow = 34.97 cfs @ 23.30 hrs, Volume= 36.442 af, Atten= 97%, Lag= 654.8 min
Primary = 34.97 cfs @ 23.30 hrs, Volume= 36.442 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 931.48' @ 23.25 hrs Surf.Area= 64.446 ac Storage= 92.213 af

Plug-Flow detention time= 2,407.3 min calculated for 36.435 af (37% of inflow)
Center-of-Mass det. time= 2,316.8 min (3,138.3 - 821.5)

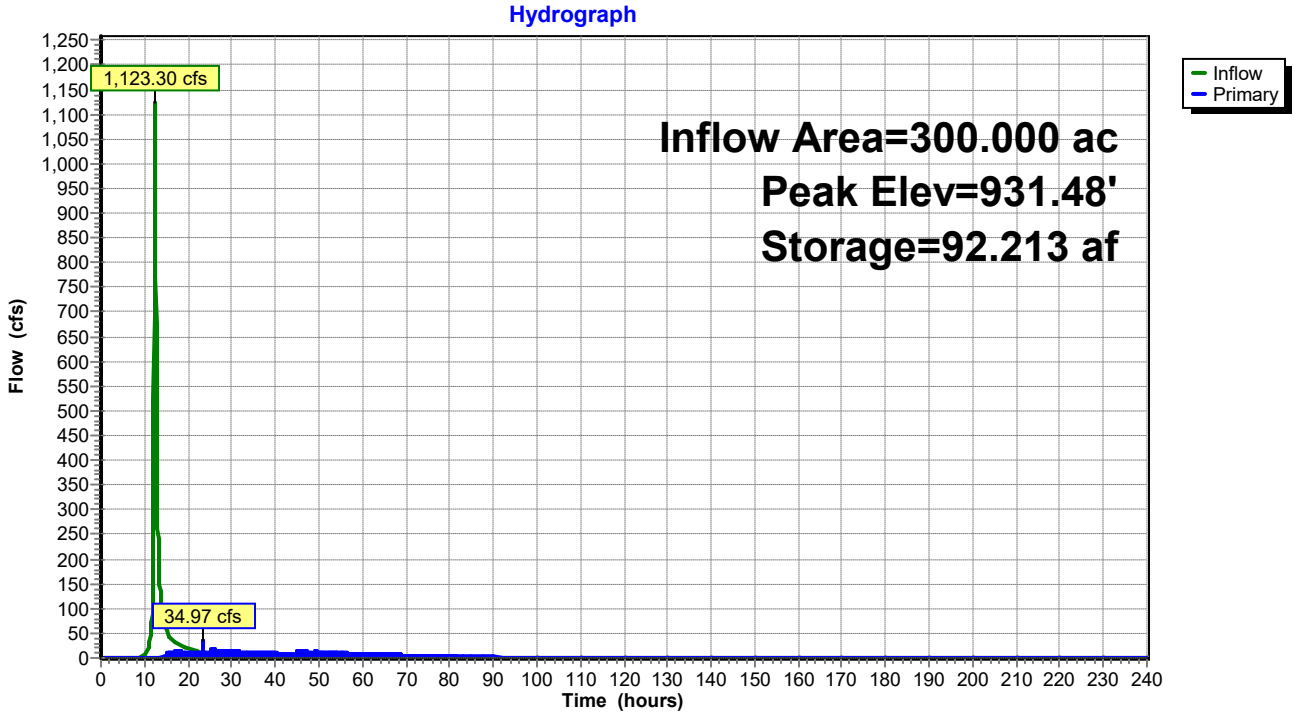
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 23.30 hrs HW=931.48' TW=932.44' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 30P: Wetland 4A

[58] Hint: Peaked 1.17' above defined flood level

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 2.14" for 100-year event
Inflow = 240.29 cfs @ 12.34 hrs, Volume= 64.505 af
Outflow = 116.87 cfs @ 12.65 hrs, Volume= 61.658 af, Atten= 51%, Lag= 18.6 min
Primary = 116.87 cfs @ 12.65 hrs, Volume= 61.658 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 927.13' @ 12.69 hrs Surf.Area= 6.828 ac Storage= 9.664 af
Flood Elev= 925.96' Surf.Area= 5.112 ac Storage= 2.616 af

Plug-Flow detention time= 520.8 min calculated for 61.658 af (96% of inflow)
Center-of-Mass det. time= 245.0 min (2,414.3 - 2,169.4)

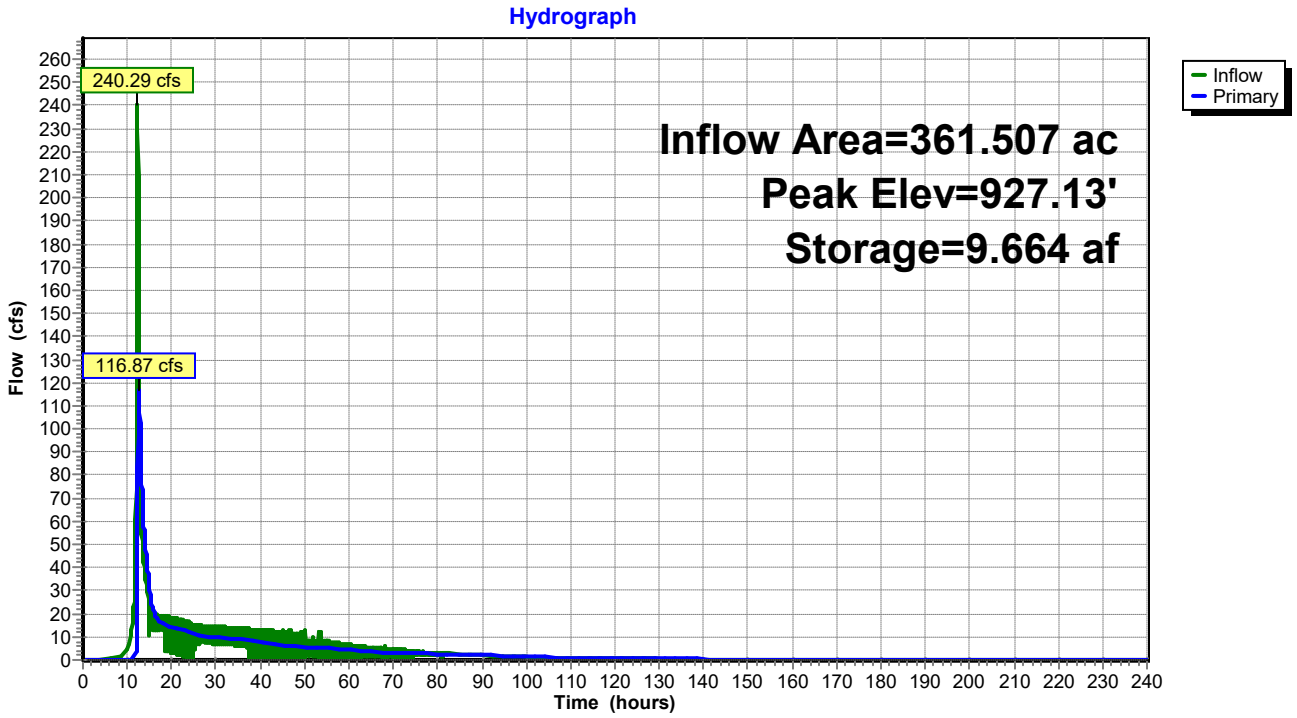
Volume	Invert	Avail.Storage	Storage Description
#1	925.00'	16.212 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
925.00	0.338	0.000	0.000
926.00	5.311	2.824	2.824
927.00	6.620	5.965	8.790
928.00	8.223	7.422	16.212

Device	Routing	Invert	Outlet Devices
#1	Primary	925.96'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.04 1.04 2.04 Width (feet) 0.00 6.00 90.00 140.00
#2	Primary	919.70'	**10.0" Round Culvert** L= 1,310.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.30' / 919.70' S= -0.0003 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#3	Device 2	925.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=114.84 cfs @ 12.65 hrs HW=927.13' TW=926.94' (Dynamic Tailwater)
- **1=Custom Weir/Orifice** (Weir Controls 114.59 cfs @ 1.91 fps)
- **2=Culvert** (Outlet Controls 0.26 cfs @ 0.47 fps)
  - **3=Orifice/Grate** (Passes 0.26 cfs of 1.13 cfs potential flow)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)
[80] Warning: Exceeded Pond 7P by 3.52' @ 12.80 hrs (671.90 cfs 382.412 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth > 1.65" for 100-year event
Inflow = 65.78 cfs @ 12.56 hrs, Volume= 43.901 af
Outflow = 25.92 cfs @ 13.14 hrs, Volume= 46.003 af, Atten= 61%, Lag= 34.9 min
Primary = 25.92 cfs @ 13.14 hrs, Volume= 46.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 934.52' @ 13.14 hrs Surf.Area= 3.819 ac Storage= 1.969 af

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

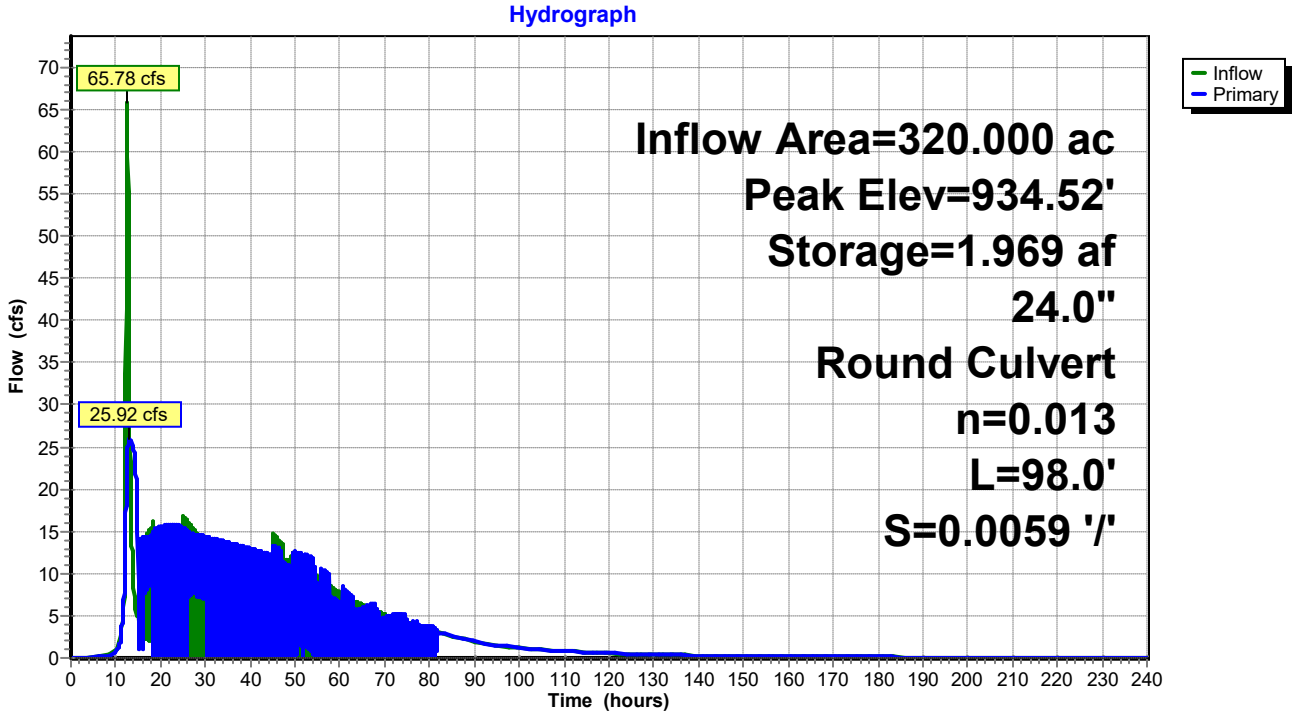
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=25.92 cfs @ 13.14 hrs HW=934.52' TW=927.01' (Dynamic Tailwater)
1=Culvert (Barrel Controls 25.92 cfs @ 8.25 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 40P: Wetland 2B

Inflow Area = 130.797 ac, 7.03% Impervious, Inflow Depth = 5.67" for 100-year event
Inflow = 440.42 cfs @ 12.33 hrs, Volume= 61.852 af
Outflow = 96.31 cfs @ 13.04 hrs, Volume= 61.846 af, Atten= 78%, Lag= 42.6 min
Primary = 96.31 cfs @ 13.04 hrs, Volume= 61.846 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 926.39' @ 13.05 hrs Surf.Area= 15.765 ac Storage= 22.297 af

Plug-Flow detention time= 266.0 min calculated for 61.833 af (100% of inflow)
Center-of-Mass det. time= 265.3 min (1,234.2 - 968.9)

Volume	Invert	Avail.Storage	Storage Description
#1	923.92'	52.726 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

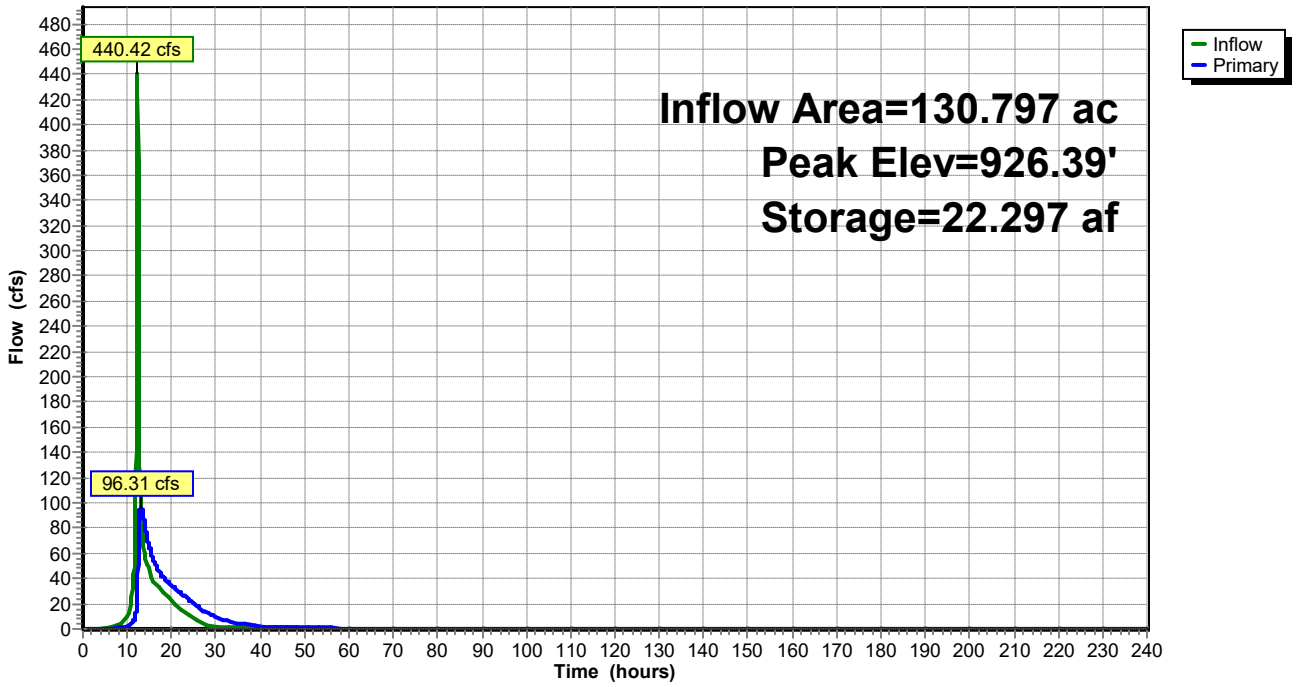
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.92	0.000	0.000	0.000
924.00	2.123	0.085	0.085
926.00	14.283	16.406	16.491
928.00	21.952	36.235	52.726

Device	Routing	Invert	Outlet Devices
#1	Primary	923.58'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -12.19 0.00 7.43 15.99
			Height (feet) 3.38 0.00 0.09 3.38
#2	Device 1	923.92'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -56.17 -5.92 -1.08 0.00 3.27 6.37 30.87 135.00
			Height (feet) 4.08 2.08 1.66 0.00 0.12 1.87 2.08 4.08

Primary OutFlow Max=96.26 cfs @ 13.04 hrs HW=926.39' TW=925.66' (Dynamic Tailwater)
↑**1=Asymmetrical Weir** (Passes 96.26 cfs of 161.51 cfs potential flow)
↑**2=Asymmetrical Weir** (Weir Controls 96.26 cfs @ 2.00 fps)

Pond 40P: Wetland 2B

Hydrograph



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 5.08" for 100-year event
Inflow = 100.55 cfs @ 12.18 hrs, Volume= 5.810 af
Outflow = 7.88 cfs @ 13.21 hrs, Volume= 2.123 af, Atten= 92%, Lag= 62.0 min
Primary = 7.88 cfs @ 13.21 hrs, Volume= 2.123 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 940.67' @ 13.21 hrs Surf.Area= 2.395 ac Storage= 4.079 af

Plug-Flow detention time= 289.5 min calculated for 2.123 af (37% of inflow)
Center-of-Mass det. time= 192.8 min (977.2 - 784.4)

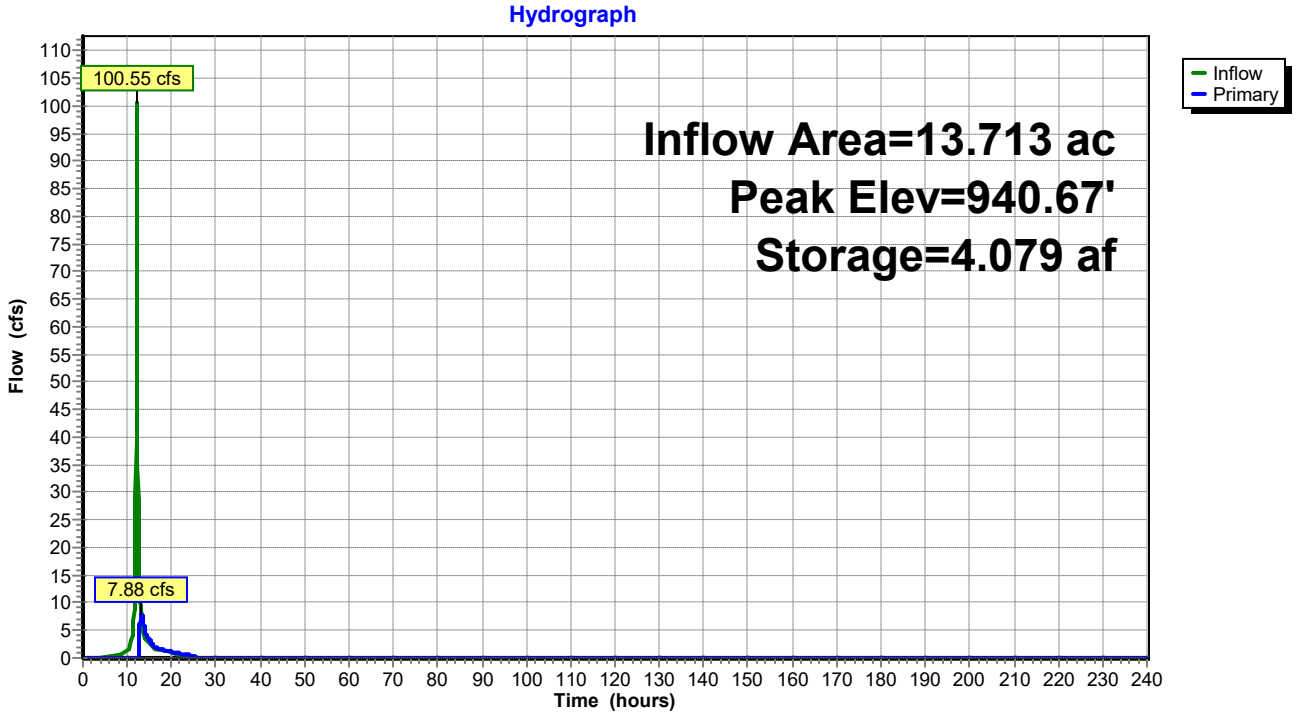
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=7.87 cfs @ 13.21 hrs HW=940.67' TW=926.38' (Dynamic Tailwater)
↑**1=Custom Weir/Orifice** (Weir Controls 7.87 cfs @ 1.25 fps)

Pond 41P: Ex South Off-site Pond



Summary for Pond 50P: Wetland 4B

[58] Hint: Peaked 0.16' above defined flood level

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 3.30" for 100-year event
Inflow = 78.67 cfs @ 12.37 hrs, Volume= 10.853 af
Outflow = 9.40 cfs @ 14.02 hrs, Volume= 5.629 af, Atten= 88%, Lag= 98.7 min
Primary = 9.40 cfs @ 14.02 hrs, Volume= 5.629 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 941.66' @ 14.02 hrs Surf.Area= 3.376 ac Storage= 5.746 af
Flood Elev= 941.50' Surf.Area= 3.181 ac Storage= 5.223 af

Plug-Flow detention time= 445.7 min calculated for 5.629 af (52% of inflow)
Center-of-Mass det. time= 247.8 min (1,179.2 - 931.5)

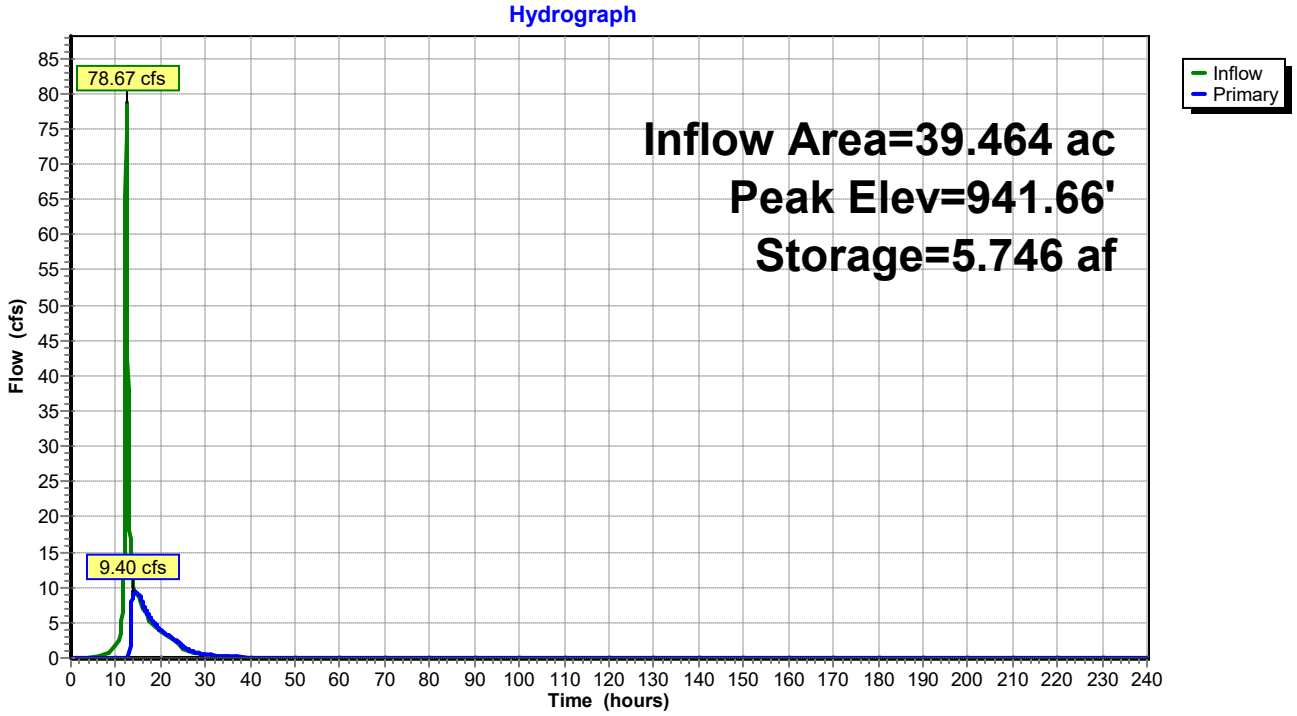
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	6.966 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
938.00	0.102	0.000	0.000
940.00	1.599	1.701	1.701
941.00	2.570	2.085	3.785
942.00	3.792	3.181	6.966

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=9.40 cfs @ 14.02 hrs HW=941.66' TW=926.30' (Dynamic Tailwater)
↑**1=Custom Weir/Orifice** (Weir Controls 9.40 cfs @ 1.27 fps)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

[58] Hint: Peaked 0.46' above defined flood level

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth = 58.49" for 100-year event
Inflow = 41.22 cfs @ 12.13 hrs, Volume= 18.328 af
Outflow = 39.48 cfs @ 12.15 hrs, Volume= 18.114 af, Atten= 4%, Lag= 1.5 min
Primary = 39.48 cfs @ 12.15 hrs, Volume= 18.114 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 938.96' @ 12.15 hrs Surf.Area= 0.319 ac Storage= 0.338 af
Flood Elev= 938.50' Surf.Area= 0.226 ac Storage= 0.214 af

Plug-Flow detention time= 59.8 min calculated for 18.110 af (99% of inflow)
Center-of-Mass det. time= 12.1 min (1,263.5 - 1,251.4)

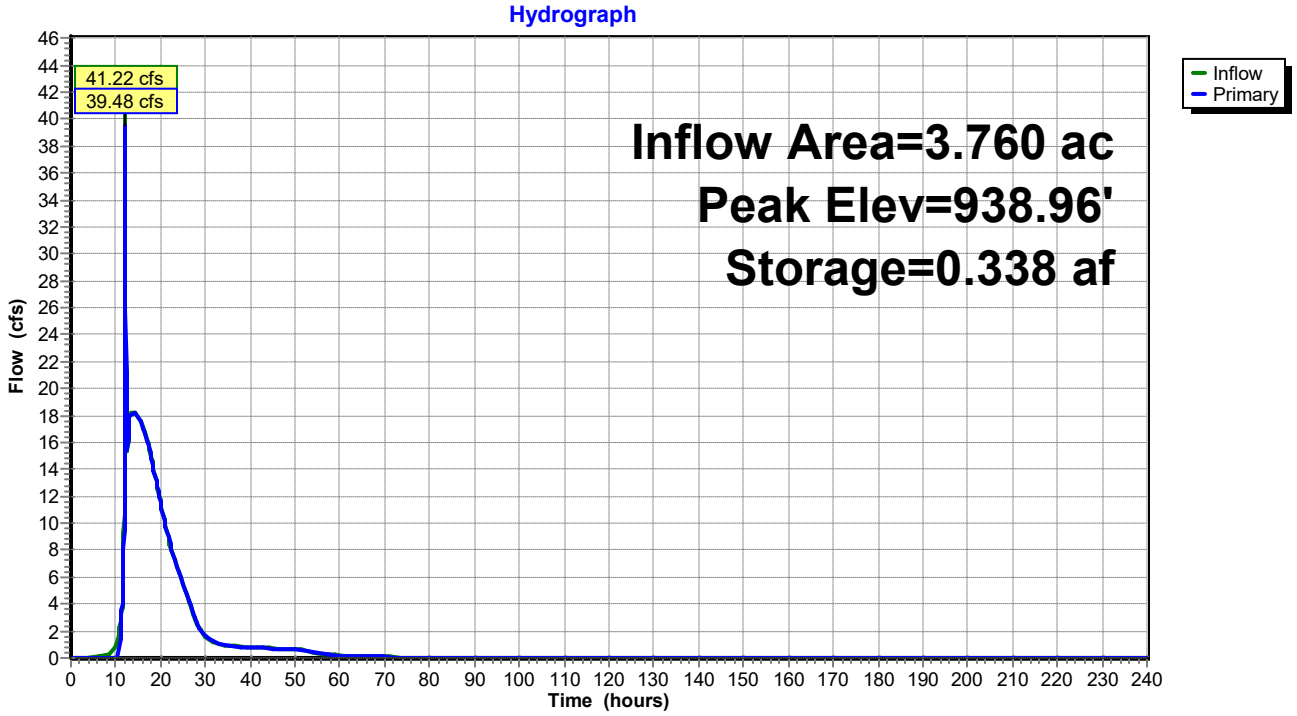
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	0.353 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.004	0.000	0.000
938.00	0.123	0.127	0.127
939.00	0.328	0.226	0.353

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=39.19 cfs @ 12.15 hrs HW=938.95' TW=925.33' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 39.19 cfs @ 2.09 fps)

Pond 60P: Wetland 5B



Summary for Link 1PP: Northwest Wetland (Big Woods)

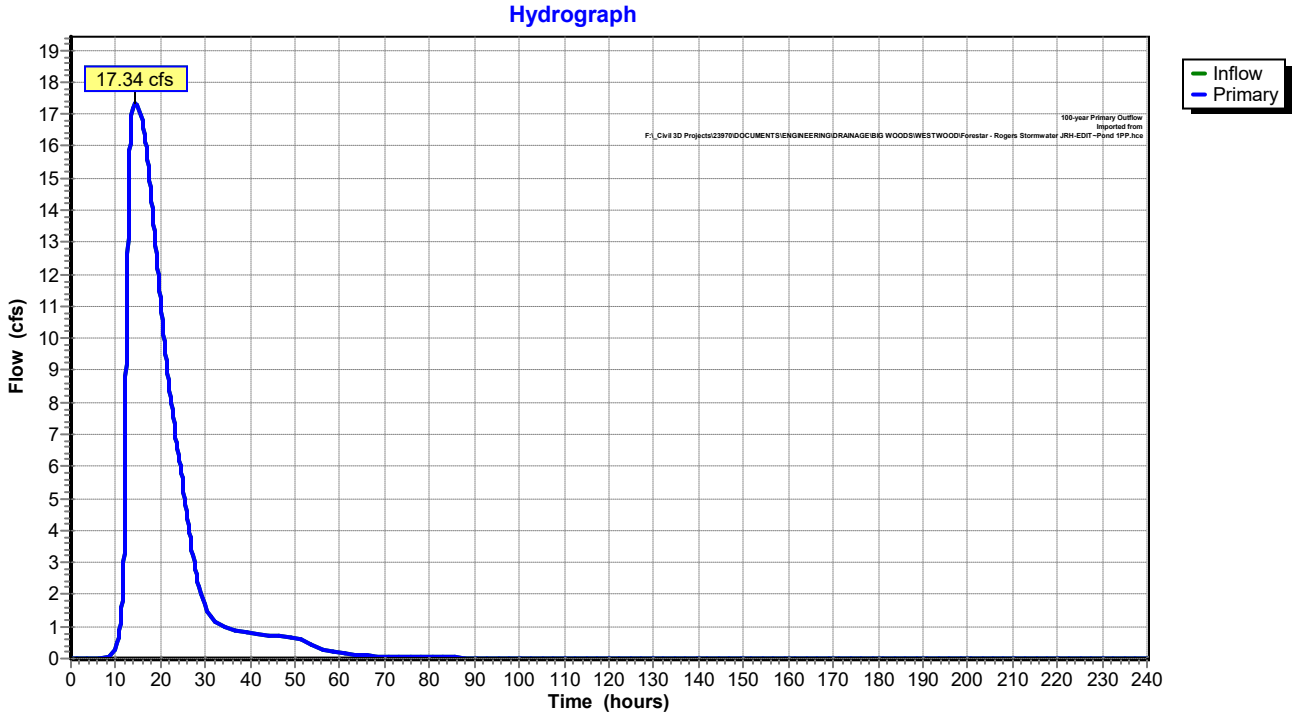
From the Big Woods development drainage model prepared by Westwood.

Inflow	=	17.34 cfs @	14.37 hrs, Volume=	16.618 af
Primary	=	17.34 cfs @	14.37 hrs, Volume=	16.618 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

100-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 1PP: Northwest Wetland (Big Woods)



Summary for Link 5PP: Existing Pond (Big Woods)

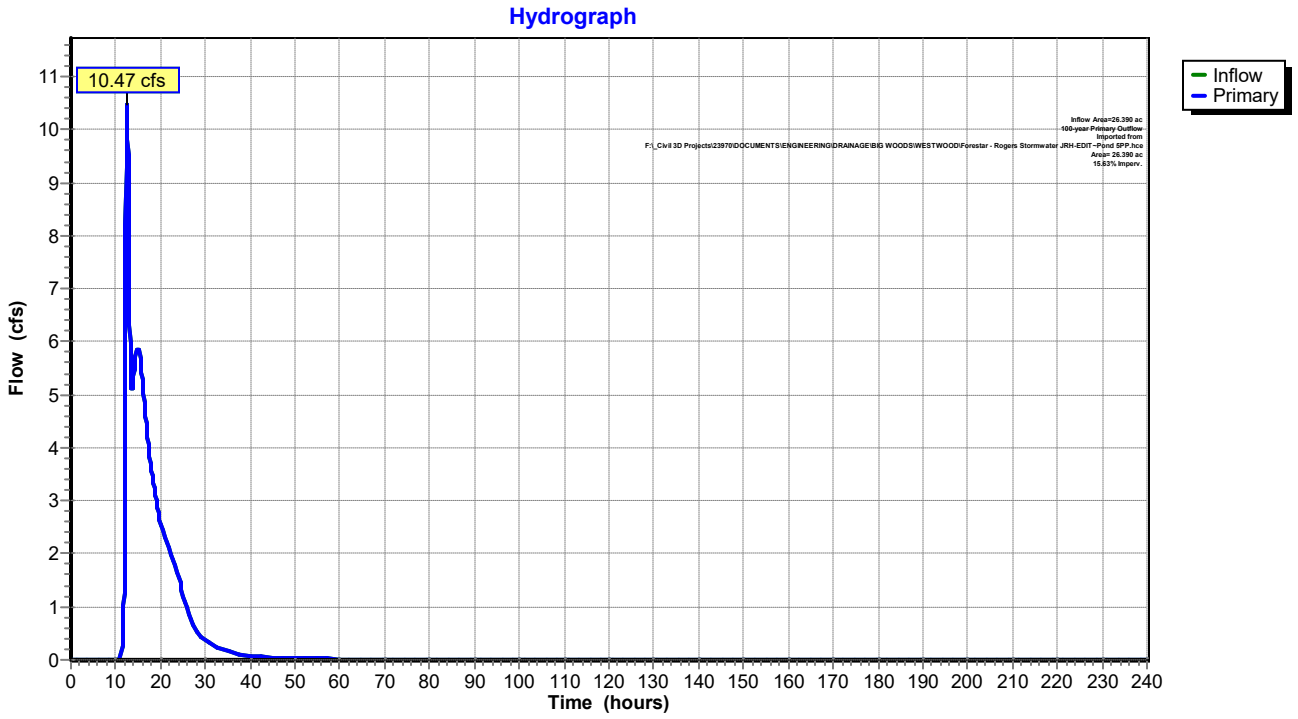
From the Big Woods development drainage model prepared by Westwood.

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 2.12" for 100-year event
Inflow = 10.47 cfs @ 12.49 hrs, Volume= 4.665 af
Primary = 10.47 cfs @ 12.49 hrs, Volume= 4.665 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

100-year Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG W

Link 5PP: Existing Pond (Big Woods)



Time span=0.00-240.00 hrs, dt=0.05 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth>6.96"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min AMC Adjusted CN=98/98 Runoff=139.00 cfs 174.019 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=25.761 ac 0.80% Impervious Runoff Depth>6.96"
Flow Length=2,175' Tc=29.4 min AMC Adjusted CN=98/98 Runoff=11.88 cfs 14.943 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=6.216 ac 0.00% Impervious Runoff Depth=6.96"
Flow Length=586' Tc=8.9 min AMC Adjusted CN=98/98 Runoff=2.97 cfs 3.606 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.900 ac 0.00% Impervious Runoff Depth>6.96"
Flow Length=247' Tc=20.0 min AMC Adjusted CN=98/98 Runoff=0.42 cfs 0.522 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=5.776 ac 0.00% Impervious Runoff Depth=6.96"
Flow Length=737' Tc=11.1 min AMC Adjusted CN=98/98 Runoff=2.75 cfs 3.350 af

Subcatchment 23S: Direct to Lower West Runoff Area=9.551 ac 0.00% Impervious Runoff Depth=6.96"
Flow Length=391' Tc=9.5 min AMC Adjusted CN=98/98 Runoff=4.56 cfs 5.540 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=26.075 ac 1.14% Impervious Runoff Depth=6.96"
Flow Length=998' Tc=13.6 min AMC Adjusted CN=98/98 Runoff=12.36 cfs 15.125 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=41.507 ac 5.85% Impervious Runoff Depth>6.96"
Flow Length=1,249' Tc=23.4 min AMC Adjusted CN=98/98 Runoff=19.35 cfs 24.077 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth>6.96"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min AMC Adjusted CN=98/98 Runoff=9.05 cfs 11.601 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=73.860 ac 2.02% Impervious Runoff Depth>6.96"
Flow Length=1,354' Tc=23.6 min AMC Adjusted CN=98/98 Runoff=34.41 cfs 42.843 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=6.96"
Flow Length=1,032' Tc=10.2 min AMC Adjusted CN=98/98 Runoff=6.54 cfs 7.954 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth>6.96"
Flow Length=734' Tc=26.4 min AMC Adjusted CN=98/98 Runoff=6.06 cfs 7.584 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=6.96"
Flow Length=531' Tc=5.6 min AMC Adjusted CN=98/98 Runoff=1.81 cfs 2.181 af

Reach 1R: Cowley Lake Outlet Channel Inflow=11.88 cfs 14.943 af
Outflow=11.88 cfs 14.943 af

Reach 2R: Cowley Lake Inflow=60.66 cfs 241.121 af
Outflow=60.66 cfs 241.121 af

Reach 21R: East Channel Avg. Flow Depth=0.89' Max Vel=4.67 fps Inflow=23.77 cfs 81.123 af
n=0.022 L=382.0' S=0.0097 '/' Capacity=131.71 cfs Outflow=23.77 cfs 81.116 af

Reach 23RL: Lower West Channel Avg. Flow Depth=0.88' Max Vel=2.08 fps Inflow=26.95 cfs 137.984 af
n=0.022 L=534.0' S=0.0014 '/' Capacity=257.71 cfs Outflow=26.94 cfs 137.923 af

Reach 23RU: Upper West Channel Avg. Flow Depth=0.52' Max Vel=2.19 fps Inflow=23.73 cfs 132.489 af
n=0.022 L=490.0' S=0.0057 '/' Capacity=766.18 cfs Outflow=23.58 cfs 132.444 af

Pond 7P: Whiteford Lake and Peak Elev=931.78' Storage=111.745 af Inflow=139.00 cfs 174.019 af
Outflow=74.34 cfs 95.344 af

Pond 30P: Wetland 4A Peak Elev=926.57' Storage=6.081 af Inflow=28.49 cfs 137.053 af
Outflow=23.73 cfs 132.489 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=933.01' Storage=0.206 af Inflow=75.18 cfs 106.945 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=17.90 cfs 112.976 af

Pond 40P: Wetland 2B Peak Elev=925.46' Storage=9.621 af Inflow=43.34 cfs 81.491 af
Outflow=23.65 cfs 80.601 af

Pond 41P: Ex South Off-site Pond Peak Elev=940.62' Storage=3.976 af Inflow=6.54 cfs 7.954 af
Outflow=4.65 cfs 4.254 af

Pond 50P: Wetland 4B Peak Elev=941.60' Storage=5.549 af Inflow=7.65 cfs 15.607 af
Outflow=4.51 cfs 10.335 af

Pond 60P: Wetland 5B Peak Elev=938.67' Storage=0.255 af Inflow=7.53 cfs 24.279 af
Outflow=7.53 cfs 24.059 af

Link 1PL: \DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=6.94 cfs 22.098 af
Primary=6.94 cfs 22.098 af

Link 5PL: G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=2.94 cfs 8.023 af
Area= 26.390 ac 15.63% Imperv. Primary=2.94 cfs 8.023 af

Total Runoff Area = 540.193 ac Runoff Volume = 313.346 af Average Runoff Depth = 6.96"
98.07% Pervious = 529.794 ac 1.93% Impervious = 10.399 ac

Summary for Subcatchment 7S: Approx DA to Lake

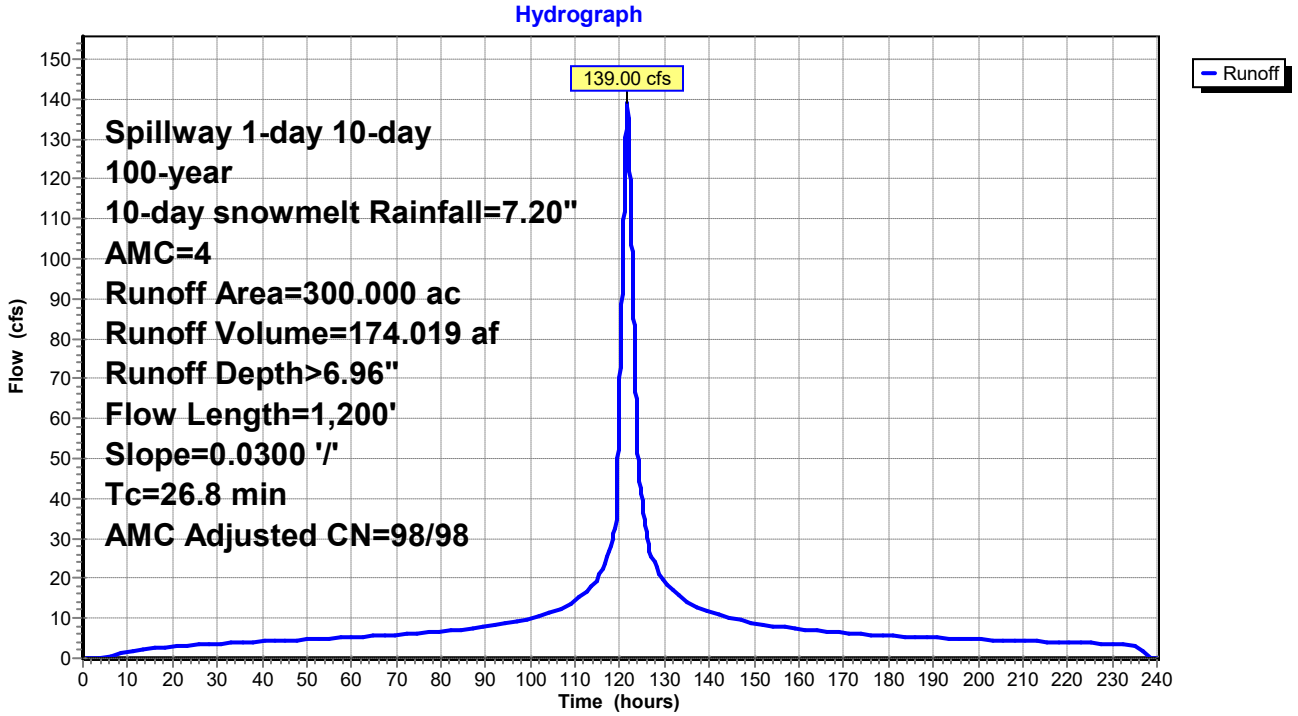
Runoff = 139.00 cfs @ 121.61 hrs, Volume= 174.019 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
300.000	72		Woods/grass comb., Good, HSG C
300.000	72	98	Weighted Average, AMC Adjusted
300.000	72	98	100.00% Pervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

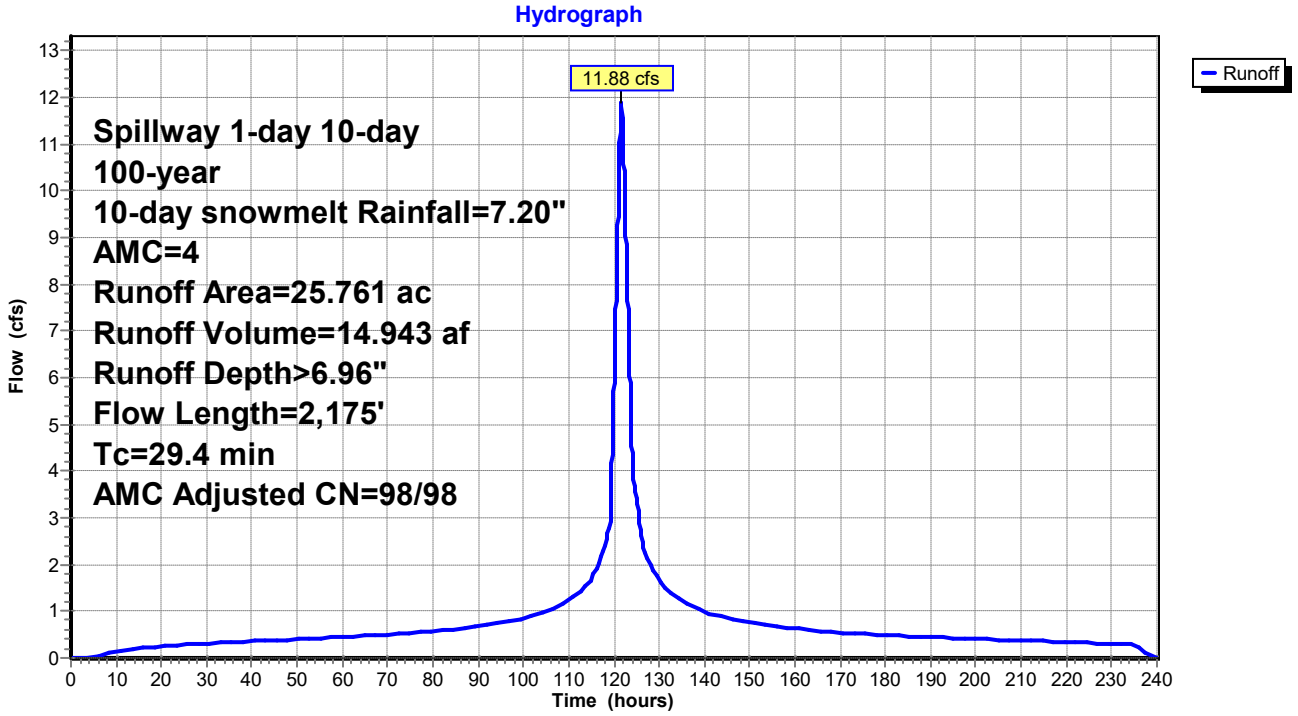
Runoff = 11.88 cfs @ 121.64 hrs, Volume= 14.943 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.136	98		Unconnected pavement, HSG D
0.070	98		Unconnected roofs, HSG D
1.380	98		Water Surface, 0% imp, HSG D
21.395	89		Row crops, straight row, Good, HSG D
1.284	80		>75% Grass cover, Good, HSG D
0.797	78		Meadow, non-grazed, HSG D
0.699	77		Woods, Good, HSG D
25.761	88	98	Weighted Average, AMC Adjusted
25.555	88	98	99.20% Pervious Area, AMC Adjusted
0.206	98	98	0.80% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
20.2	1,454	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.9	621	0.0020	2.64	68.60	**Channel Flow,** Area= 26.0 sf Perim= 20.0' r= 1.30' n= 0.030 Earth, grassed & winding
29.4	2,175	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 20S: Direct to Cowley Lake

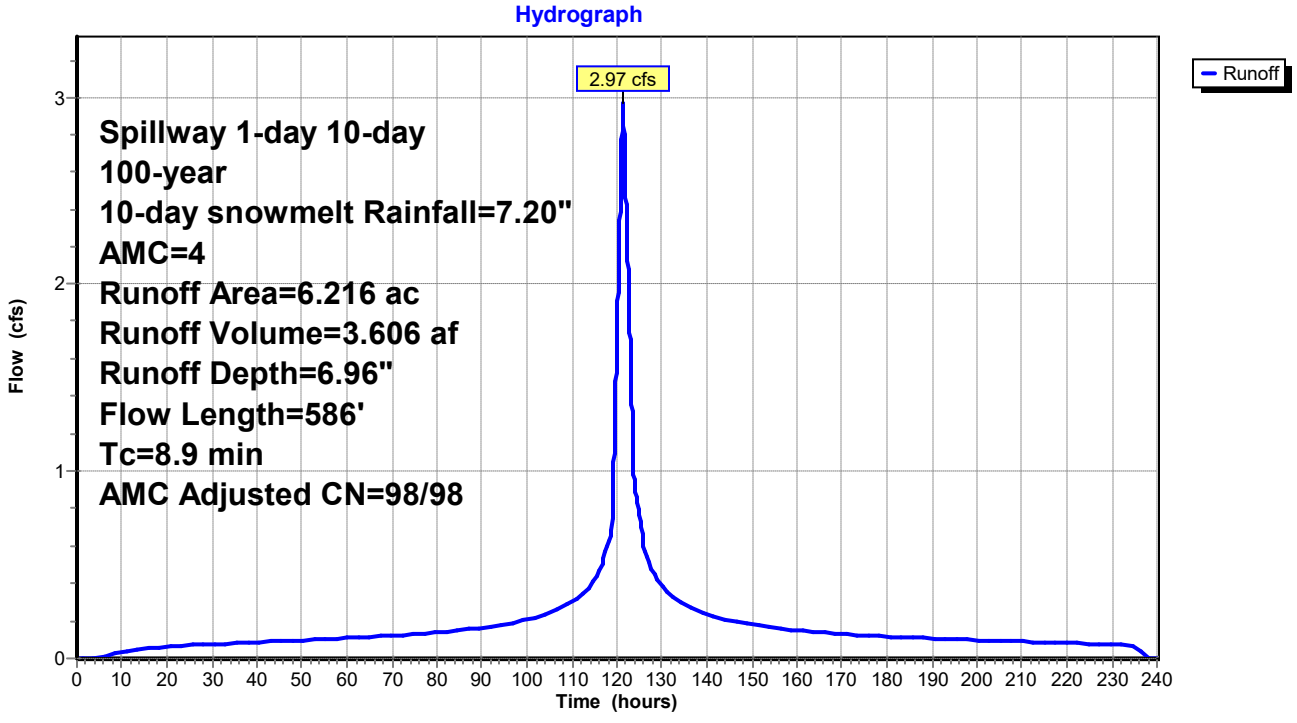
Runoff = 2.97 cfs @ 121.35 hrs, Volume= 3.606 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.123	98		Water Surface, 0% imp, HSG D
4.384	89		Row crops, straight row, Good, HSG D
1.709	77		Woods, Good, HSG D
6.216	86	98	Weighted Average, AMC Adjusted
6.216	86	98	100.00% Pervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0240	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
4.3	486	0.0440	1.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.9	586	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

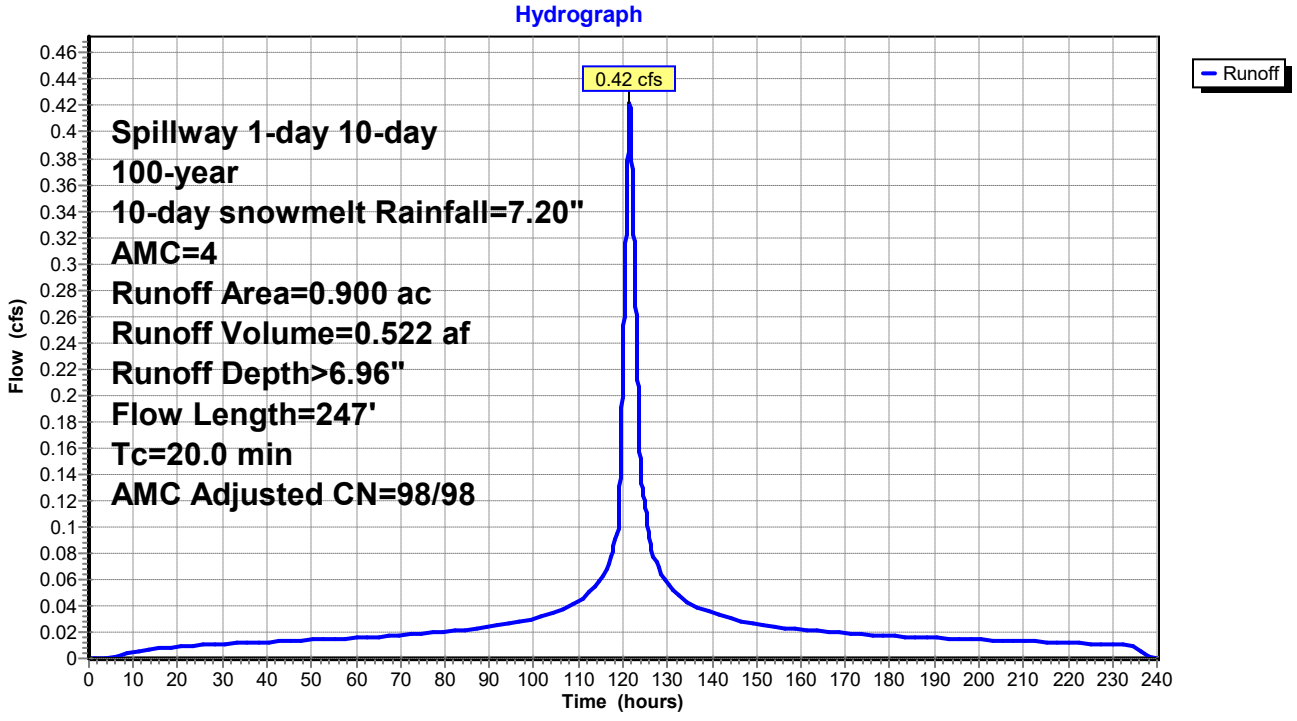
Runoff = 0.42 cfs @ 121.51 hrs, Volume= 0.522 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.074	98		Water Surface, 0% imp, HSG D
0.005	89		Row crops, straight row, Good, HSG D
0.821	77		Woods, Good, HSG D
0.900	79	98	Weighted Average, AMC Adjusted
0.900	79	98	100.00% Pervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
1.8	147	0.0721	1.34		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.0	247	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

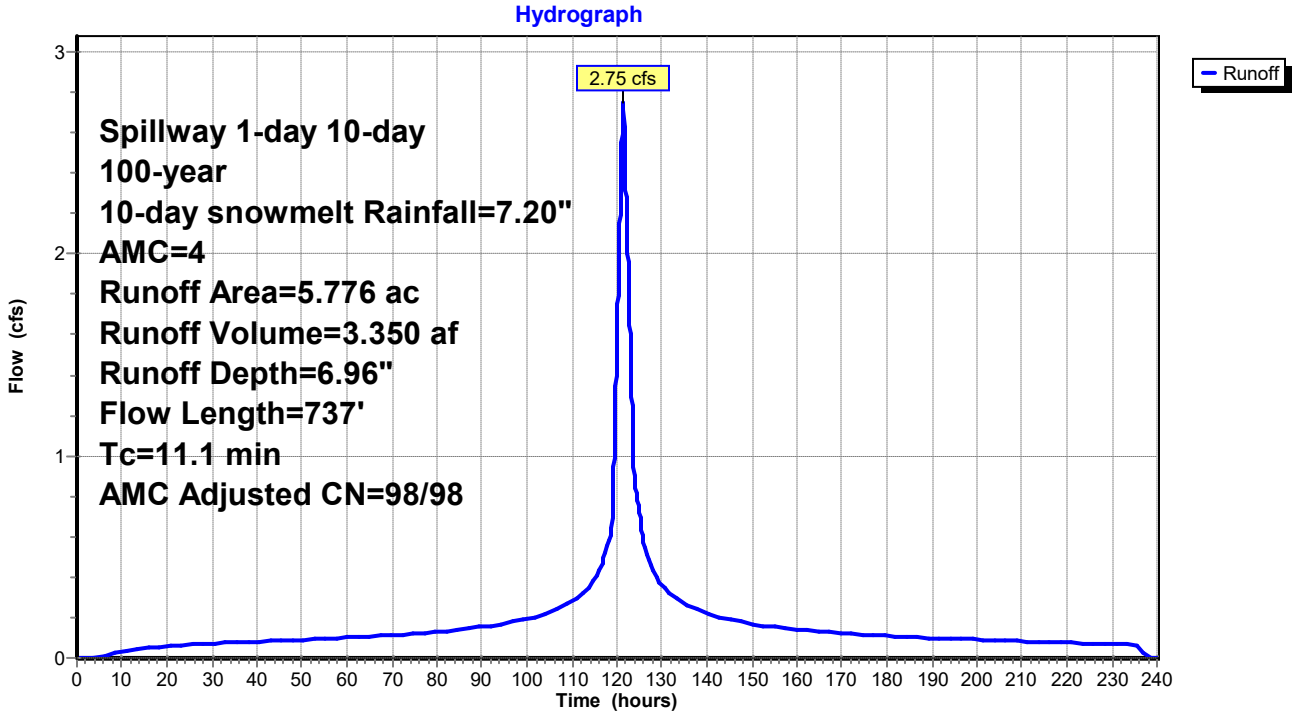
Runoff = 2.75 cfs @ 121.38 hrs, Volume= 3.350 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.031	98		Water Surface, 0% imp, HSG D
4.386	89		Row crops, straight row, Good, HSG D
0.729	78		Meadow, non-grazed, HSG D
0.630	77		Woods, Good, HSG D
5.776	86	98	Weighted Average, AMC Adjusted
5.776	86	98	100.00% Pervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.0440	0.46		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
7.5	637	0.0248	1.42		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.1	737	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Lower West Channel

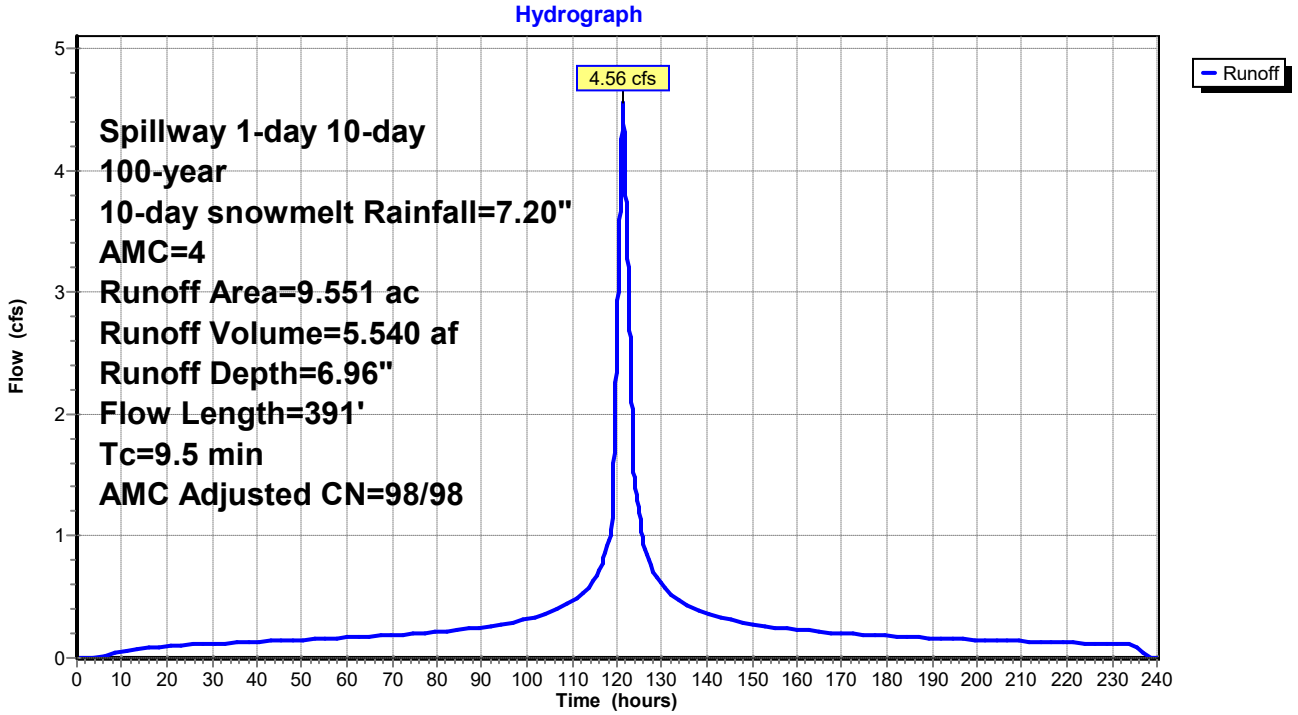
Runoff = 4.56 cfs @ 121.35 hrs, Volume= 5.540 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.467	98		Water Surface, 0% imp, HSG D
7.263	89		Row crops, straight row, Good, HSG D
0.213	78		Meadow, non-grazed, HSG D
1.608	77		Woods, Good, HSG D
9.551	87	98	Weighted Average, AMC Adjusted
9.551	87	98	100.00% Pervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0090	0.24		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
2.6	291	0.0433	1.87		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
9.5	391	Total			

Subcatchment 23S: Direct to Lower West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

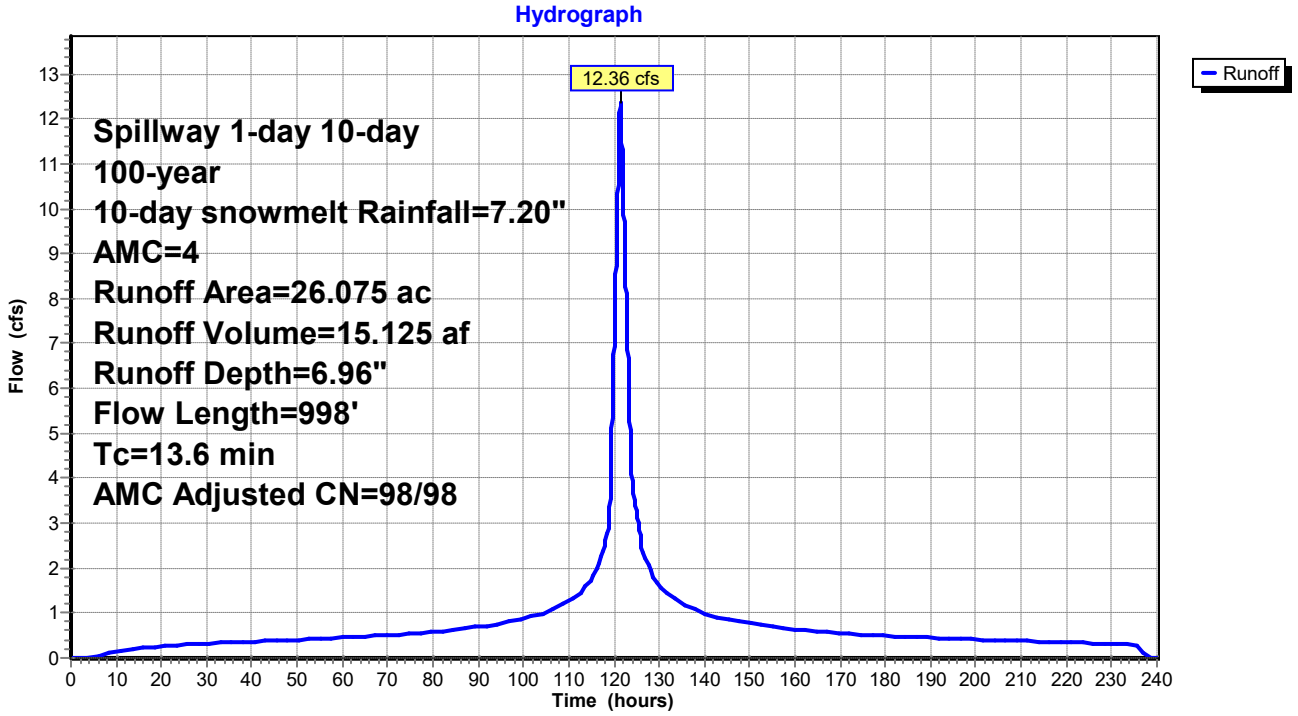
Runoff = 12.36 cfs @ 121.41 hrs, Volume= 15.125 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.298	98		Unconnected pavement, HSG D
0.980	98		Water Surface, 0% imp, HSG D
0.082	96		Gravel surface, HSG D
0.357	80		>75% Grass cover, Good, HSG D
21.863	89		Row crops, straight row, Good, HSG D
0.151	78		Meadow, non-grazed, HSG D
2.344	77		Woods, Good, HSG D
26.075	88	98	Weighted Average, AMC Adjusted
25.777	88	98	98.86% Pervious Area, AMC Adjusted
0.298	98	98	1.14% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	30	0.0200	1.02		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
10.3	819	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.8	149	0.0315	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.6	998	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 30S: Direct to Wetland 4A

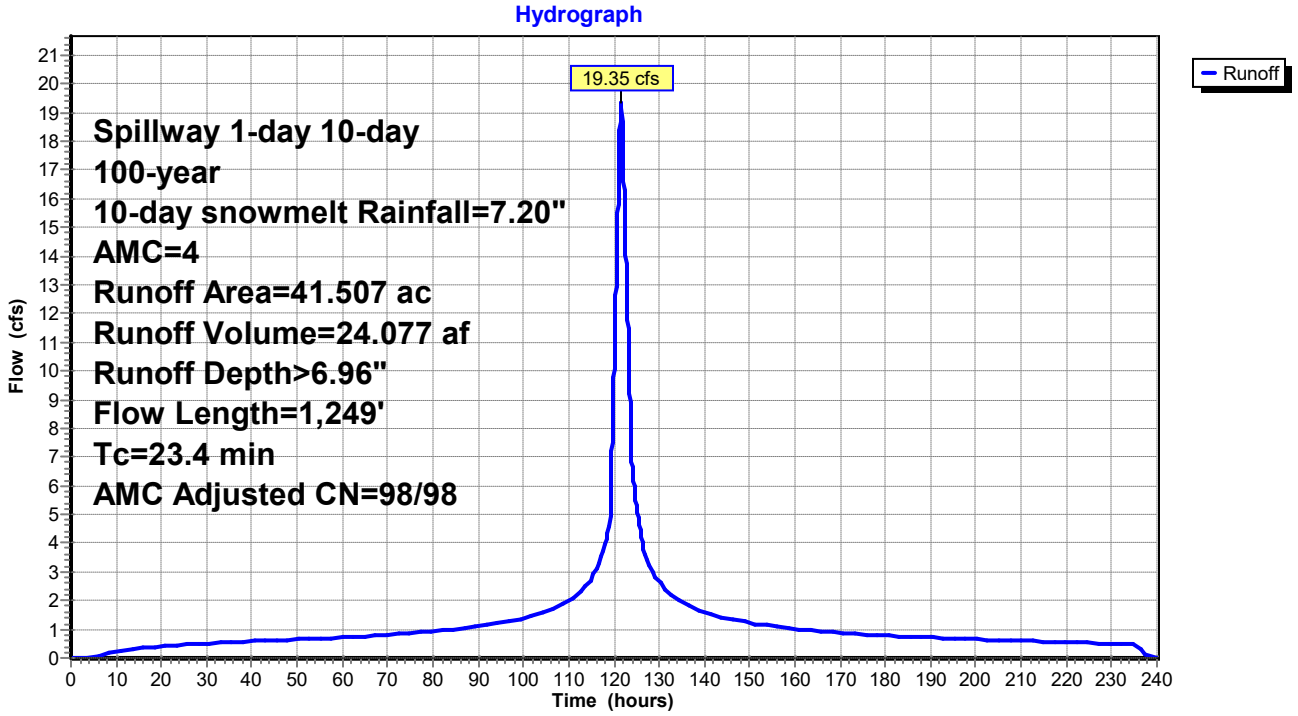
Runoff = 19.35 cfs @ 121.56 hrs, Volume= 24.077 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
1.469	98		Unconnected pavement, HSG D
0.959	98		Unconnected roofs, HSG D
0.947	96		Gravel surface, HSG D
17.469	89		Row crops, straight row, Good, HSG D
1.609	89		Pasture/grassland/range, Poor, HSG D
14.597	80		>75% Grass cover, Good, HSG D
0.684	78		Meadow, non-grazed, HSG D
3.773	77		Woods, Good, HSG D
41.507	85	98	Weighted Average, AMC Adjusted
39.079	84	98	94.15% Pervious Area, AMC Adjusted
2.428	98	98	5.85% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

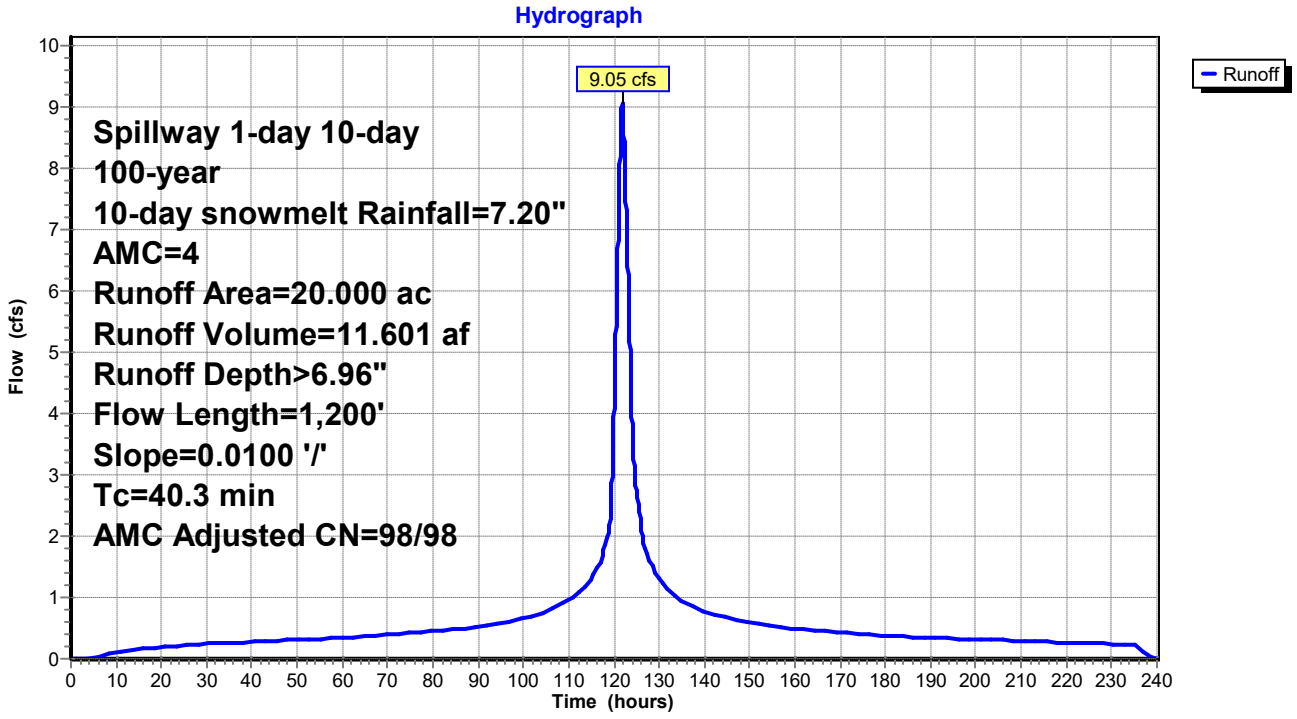
Runoff = 9.05 cfs @ 121.80 hrs, Volume= 11.601 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
20.000	77		2 acre lots, 12% imp, HSG C
20.000	77	98	Weighted Average, AMC Adjusted
17.600	74	98	88.00% Pervious Area, AMC Adjusted
2.400	98	98	12.00% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 40S: Direct to Wetland 2B

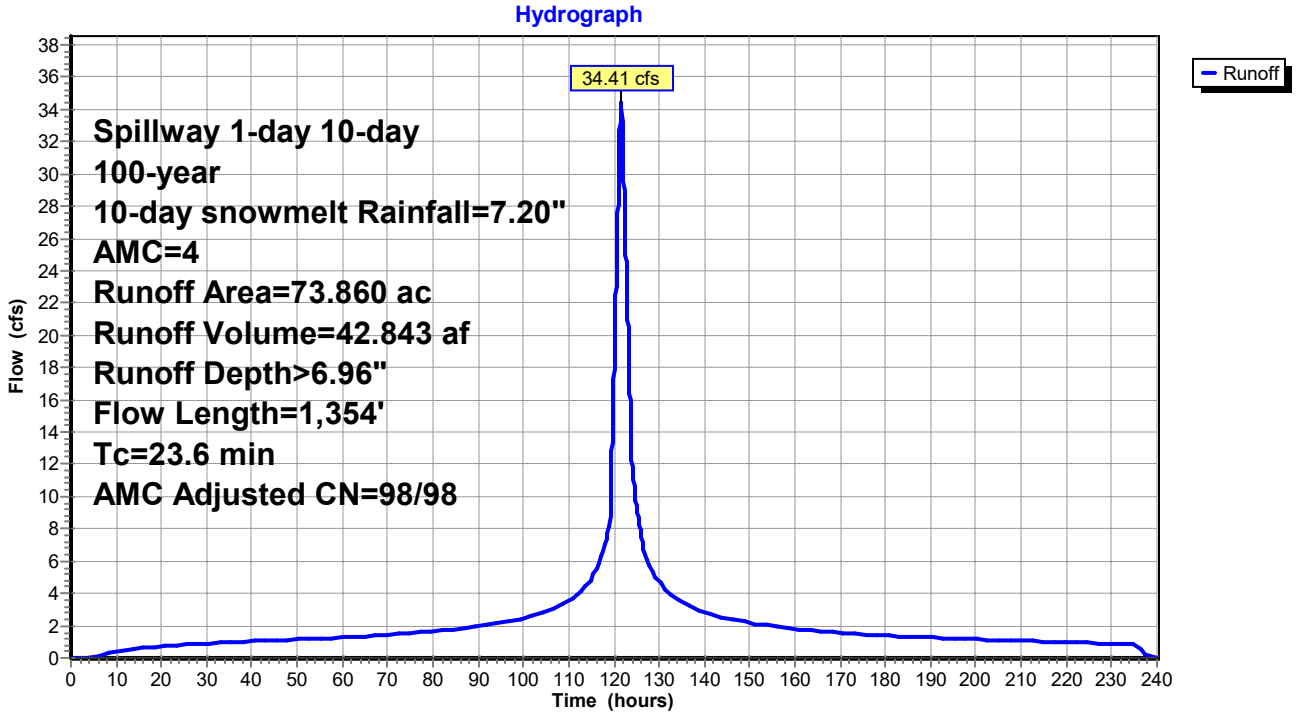
Runoff = 34.41 cfs @ 121.56 hrs, Volume= 42.843 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.965	98		Unconnected pavement, HSG D
0.528	98		Unconnected roofs, HSG D
17.207	98		Water Surface, 0% imp, HSG D
1.249	96		Gravel surface, HSG D
35.493	89		Row crops, straight row, Good, HSG D
0.208	89		Pasture/grassland/range, Poor, HSG D
8.455	80		>75% Grass cover, Good, HSG D
5.449	78		Meadow, non-grazed, HSG D
4.306	77		Woods, Good, HSG D
73.860	89	98	Weighted Average, AMC Adjusted
72.367	89	98	97.98% Pervious Area, AMC Adjusted
1.493	98	98	2.02% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

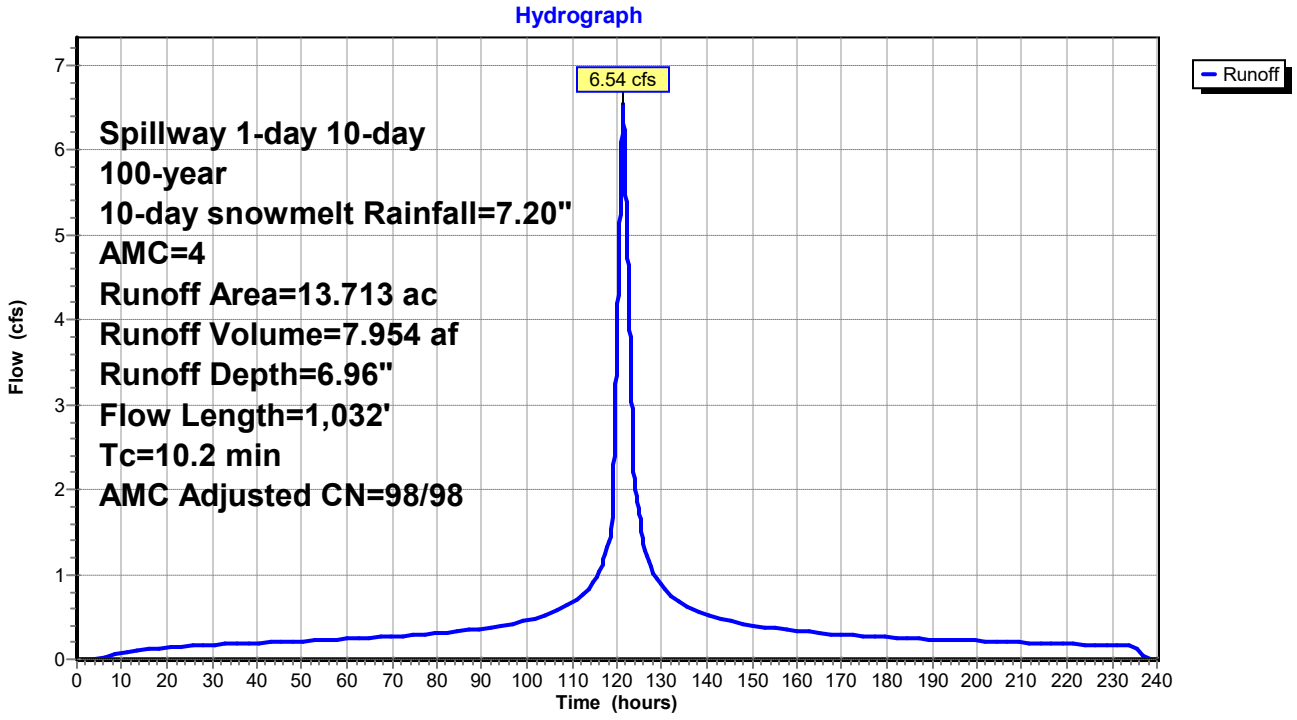
Runoff = 6.54 cfs @ 121.36 hrs, Volume= 7.954 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
1.568	98		Unconnected pavement, HSG D
0.273	98		Unconnected roofs, HSG D
0.107	98		Water Surface, 0% imp, HSG D
0.066	96		Gravel surface, HSG D
10.431	80		>75% Grass cover, Good, HSG D
1.268	78		Meadow, non-grazed, HSG D
13.713	82	98	Weighted Average, AMC Adjusted
11.872	80	98	86.57% Pervious Area, AMC Adjusted
1.841	98	98	13.43% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

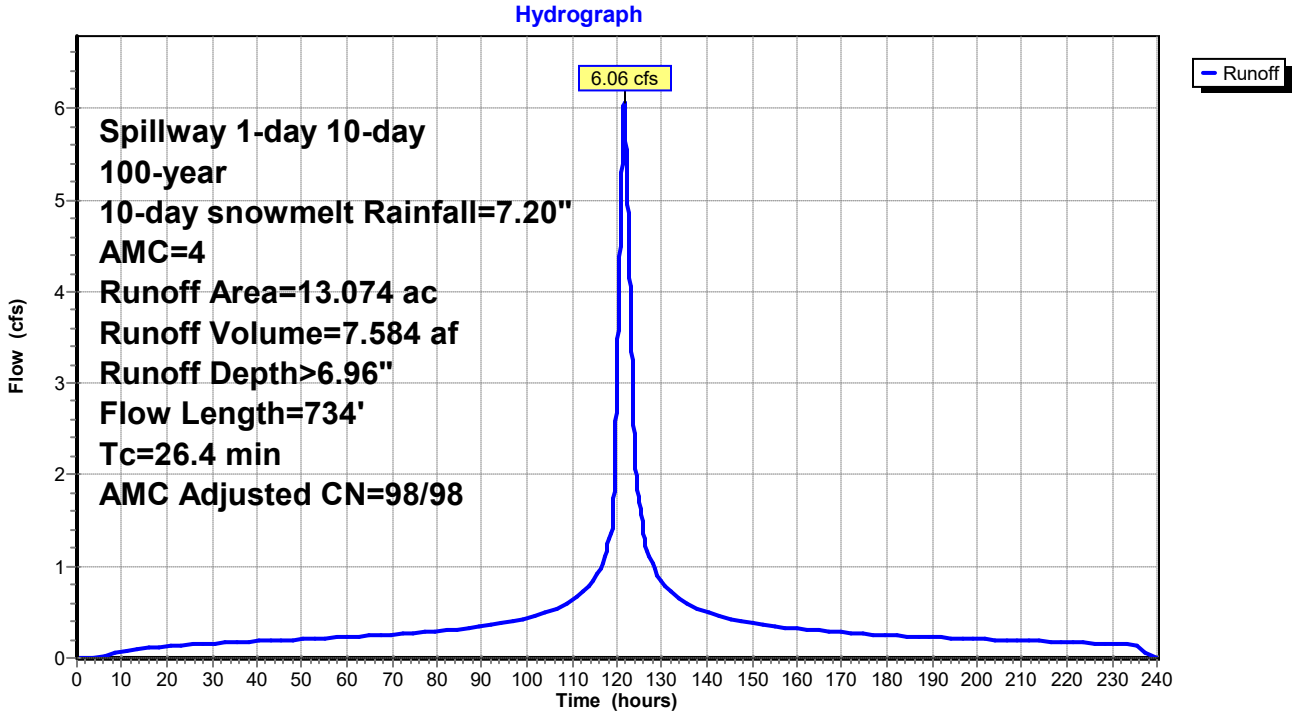
Runoff = 6.06 cfs @ 121.60 hrs, Volume= 7.584 af, Depth> 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.523	98		Unconnected pavement, HSG D
0.339	98		Unconnected roofs, HSG D
0.175	98		Water Surface, 0% imp, HSG D
0.233	96		Gravel surface, HSG D
8.346	89		Row crops, straight row, Good, HSG D
0.958	89		Pasture/grassland/range, Poor, HSG D
2.500	80		>75% Grass cover, Good, HSG D
13.074	88	98	Weighted Average, AMC Adjusted
12.212	87	98	93.41% Pervious Area, AMC Adjusted
0.862	98	98	6.59% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

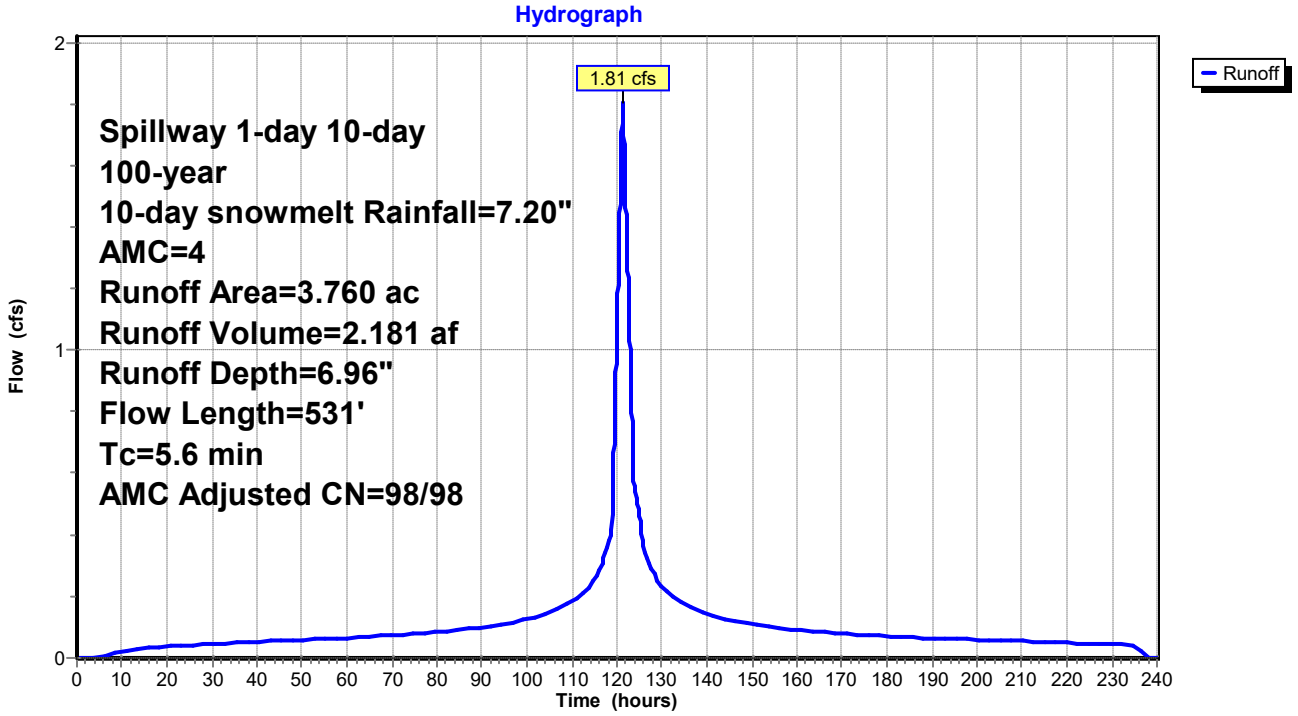
Runoff = 1.81 cfs @ 121.30 hrs, Volume= 2.181 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Spillway 1-day 10-day 100-year, 10-day snowmelt Rainfall=7.20", AMC=4

Area (ac)	CN	Adj	Description
0.428	98		Unconnected pavement, HSG D
0.443	98		Unconnected roofs, HSG D
0.064	98		Water Surface, 0% imp, HSG D
0.331	96		Gravel surface, HSG D
2.083	80		>75% Grass cover, Good, HSG D
0.411	77		Woods, Good, HSG D
3.760	86	98	Weighted Average, AMC Adjusted
2.889	82	98	76.84% Pervious Area, AMC Adjusted
0.871	98	98	23.16% Impervious Area, AMC Adjusted

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



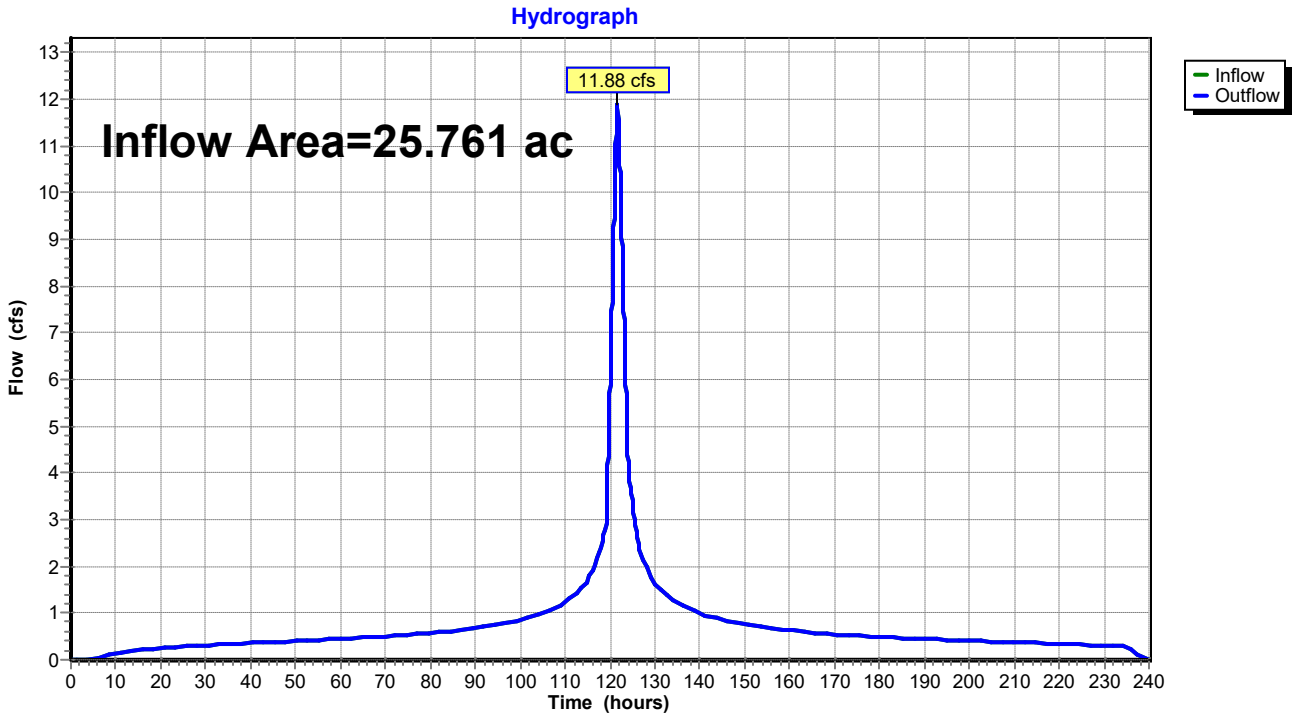
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.761 ac, 0.80% Impervious, Inflow Depth > 6.96" for 100-year, 10-day snowmelt event
Inflow = 11.88 cfs @ 121.64 hrs, Volume= 14.943 af
Outflow = 11.88 cfs @ 121.64 hrs, Volume= 14.943 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



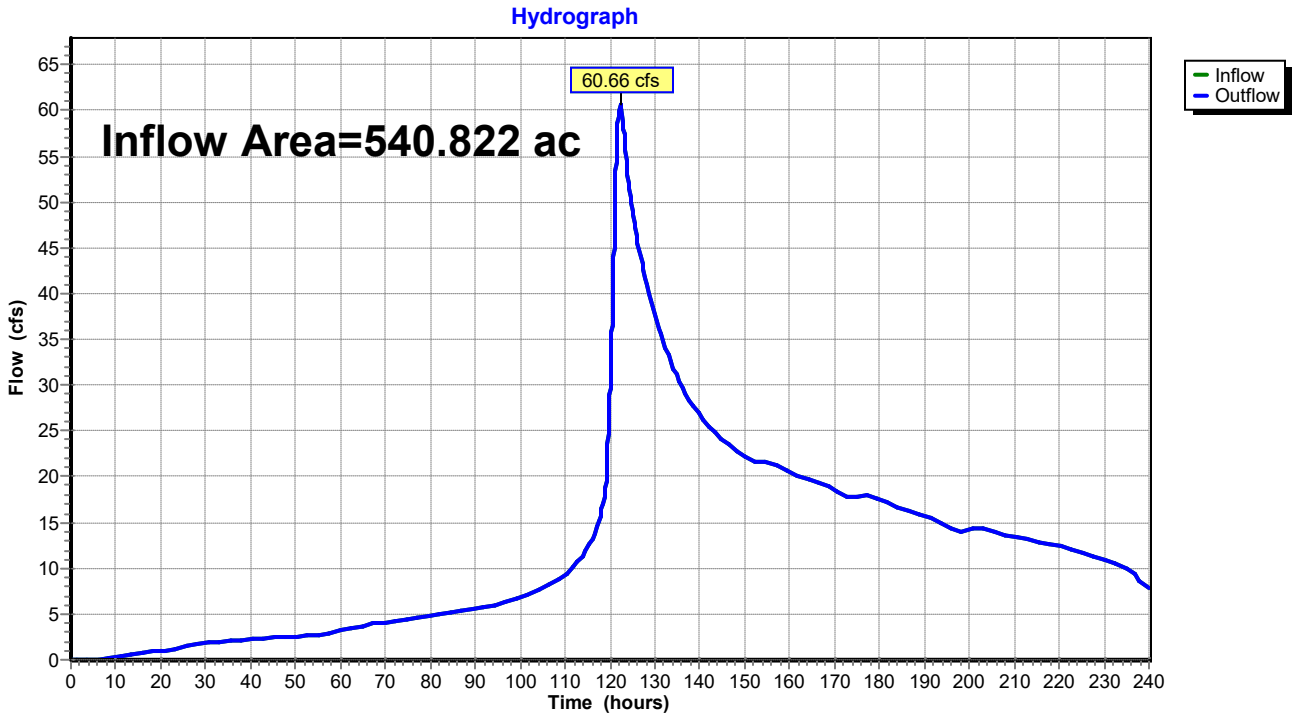
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.822 ac, 2.65% Impervious, Inflow Depth > 5.35" for 100-year, 10-day snowmelt event
Inflow = 60.66 cfs @ 122.26 hrs, Volume= 241.121 af
Outflow = 60.66 cfs @ 122.26 hrs, Volume= 241.121 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: East Channel

Inflow Area = 131.697 ac, 6.98% Impervious, Inflow Depth > 7.39" for 100-year, 10-day snowmelt event
Inflow = 23.77 cfs @ 124.75 hrs, Volume= 81.123 af
Outflow = 23.77 cfs @ 124.77 hrs, Volume= 81.116 af, Atten= 0%, Lag= 1.0 min

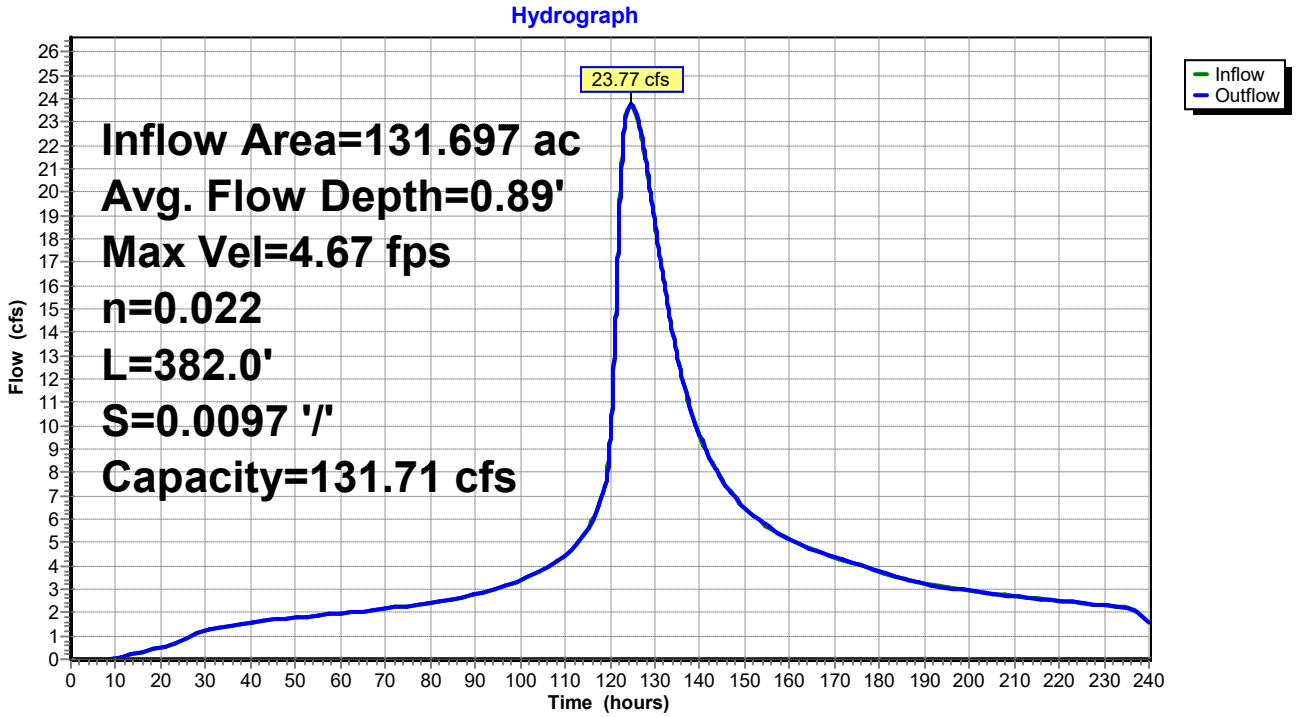
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.67 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 2.58 fps, Avg. Travel Time= 2.5 min

Peak Storage= 1,942 cf @ 124.77 hrs
Average Depth at Peak Storage= 0.89'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 131.71 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 382.0' Slope= 0.0097 '/'
Inlet Invert= 923.92', Outlet Invert= 920.20'

‡

Reach 21R: East Channel



Summary for Reach 23RL: Lower West Channel

Inflow Area = 371.058 ac, 1.30% Impervious, Inflow Depth > 4.46" for 100-year, 10-day snowmelt event
Inflow = 26.95 cfs @ 122.27 hrs, Volume= 137.984 af
Outflow = 26.94 cfs @ 122.32 hrs, Volume= 137.923 af, Atten= 0%, Lag= 3.0 min

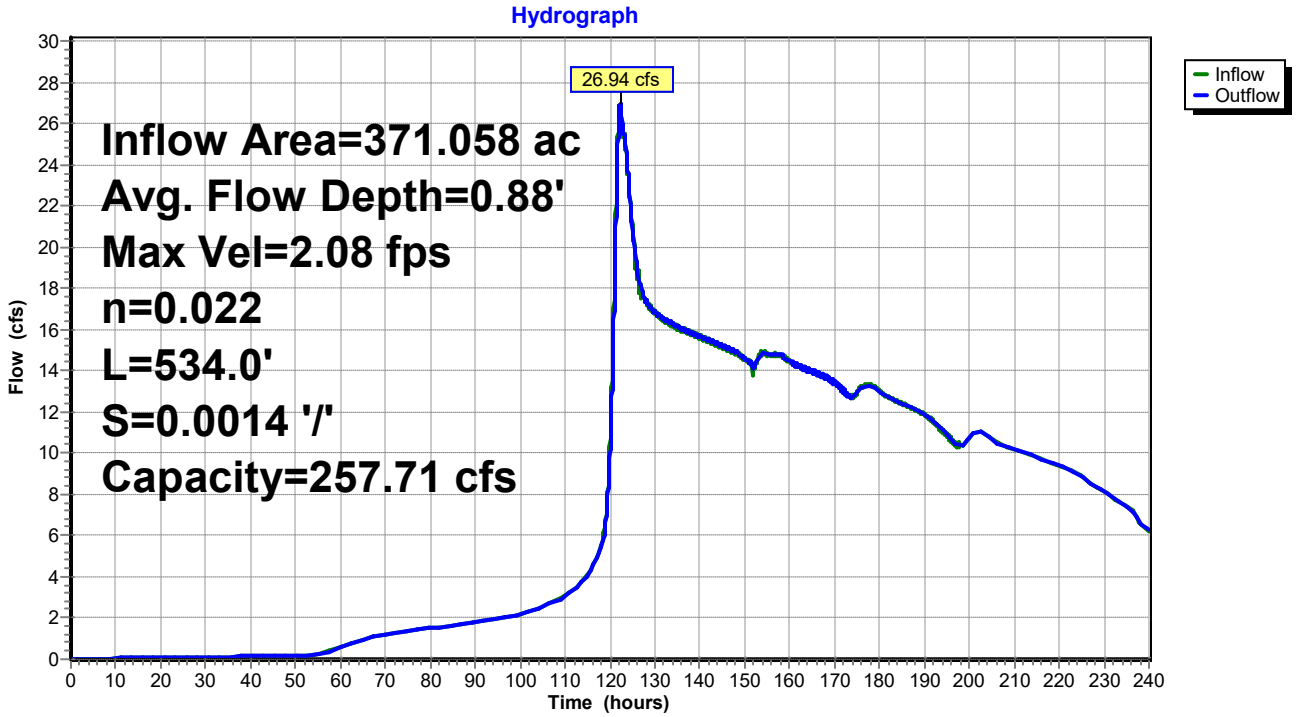
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.08 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 1.09 fps, Avg. Travel Time= 8.1 min

Peak Storage= 6,920 cf @ 122.32 hrs
Average Depth at Peak Storage= 0.88'
Bank-Full Depth= 3.00' Flow Area= 63.0 sf, Capacity= 257.71 cfs

12.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 30.00'
Length= 534.0' Slope= 0.0014 '/'
Inlet Invert= 919.58', Outlet Invert= 918.82'

‡

Reach 23RL: Lower West Channel



Summary for Reach 23RU: Upper West Channel

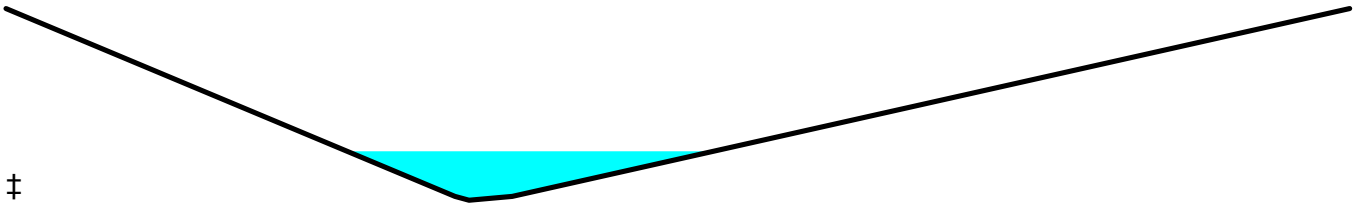
[80] Warning: Exceeded Pond 30P by 0.96' @ 0.00 hrs (0.58 cfs 1.672 af)

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 4.40" for 100-year, 10-day snowmelt event
Inflow = 23.73 cfs @ 123.16 hrs, Volume= 132.489 af
Outflow = 23.58 cfs @ 122.40 hrs, Volume= 132.444 af, Atten= 1%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 1.55 fps, Avg. Travel Time= 5.3 min

Peak Storage= 5,278 cf @ 122.40 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 2.04' Flow Area= 146.2 sf, Capacity= 766.18 cfs

Custom cross-section, Length= 490.0' Slope= 0.0057 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 925.96', Outlet Invert= 923.17'

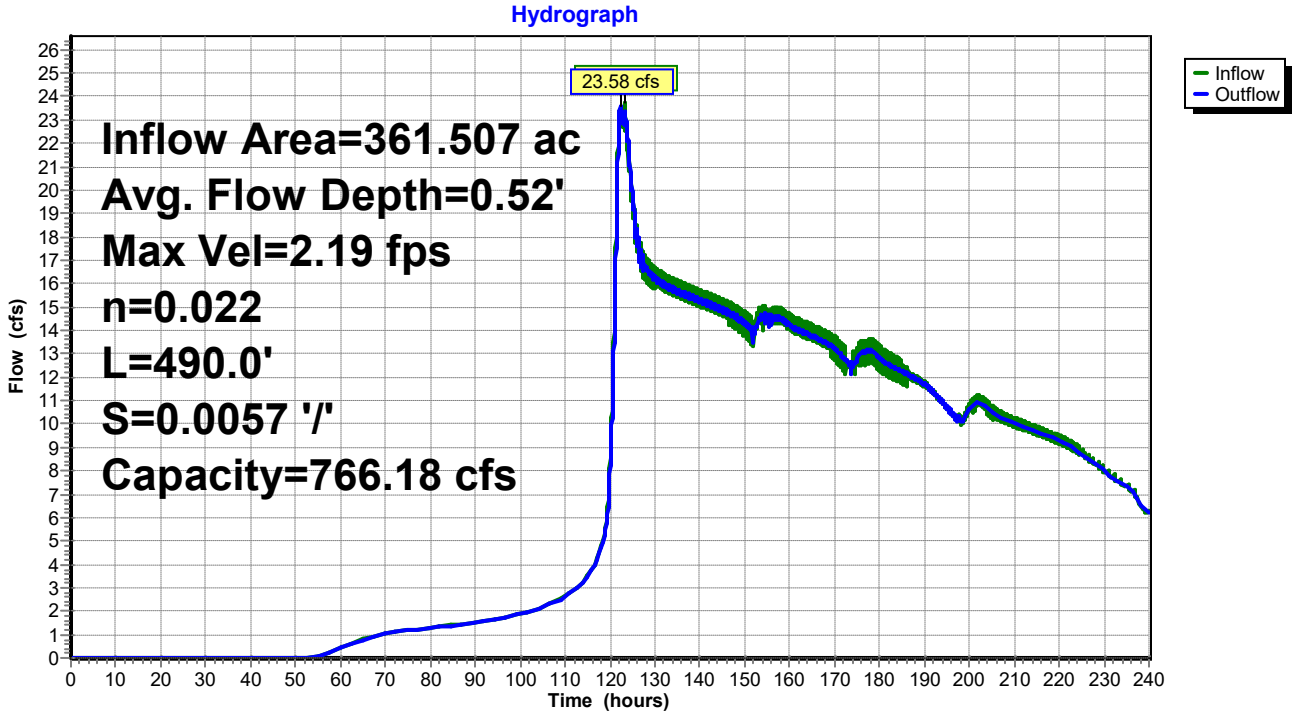


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-48.27	928.00	0.00
-1.47	926.00	2.00
0.00	925.96	2.04
4.51	926.00	2.00
91.79	928.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.04	0.1	6.0	59	0.05
2.04	146.2	140.1	71,618	766.18

Reach 23RU: Upper West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=594)

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth > 6.96" for 100-year, 10-day snowmelt event
Inflow = 139.00 cfs @ 121.61 hrs, Volume= 174.019 af
Outflow = 74.34 cfs @ 138.05 hrs, Volume= 95.344 af, Atten= 47%, Lag= 986.6 min
Primary = 74.34 cfs @ 138.05 hrs, Volume= 95.344 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 931.78' @ 137.99 hrs Surf.Area= 65.349 ac Storage= 111.745 af

Plug-Flow detention time= 4,756.8 min calculated for 95.324 af (55% of inflow)
Center-of-Mass det. time= 3,037.4 min (10,466.6 - 7,429.2)

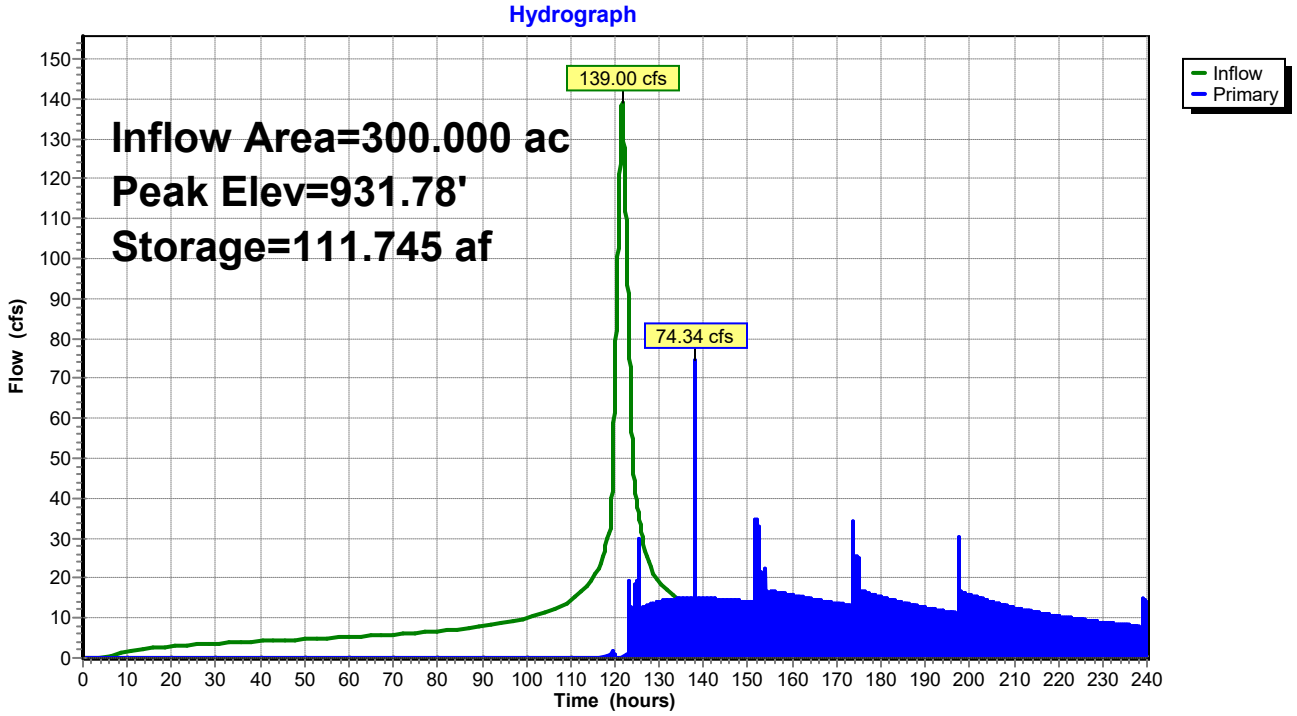
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 138.05 hrs HW=931.78' TW=932.77' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 30P: Wetland 4A

[58] Hint: Peaked 0.61' above defined flood level

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 4.55" for 100-year, 10-day snowmelt event
Inflow = 28.49 cfs @ 123.09 hrs, Volume= 137.053 af
Outflow = 23.73 cfs @ 123.16 hrs, Volume= 132.489 af, Atten= 17%, Lag= 4.3 min
Primary = 23.73 cfs @ 123.16 hrs, Volume= 132.489 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 926.57' @ 122.40 hrs Surf.Area= 6.061 ac Storage= 6.081 af
Flood Elev= 925.96' Surf.Area= 5.112 ac Storage= 2.616 af

Plug-Flow detention time= 407.3 min calculated for 132.461 af (97% of inflow)
Center-of-Mass det. time= 255.5 min (9,985.2 - 9,729.7)

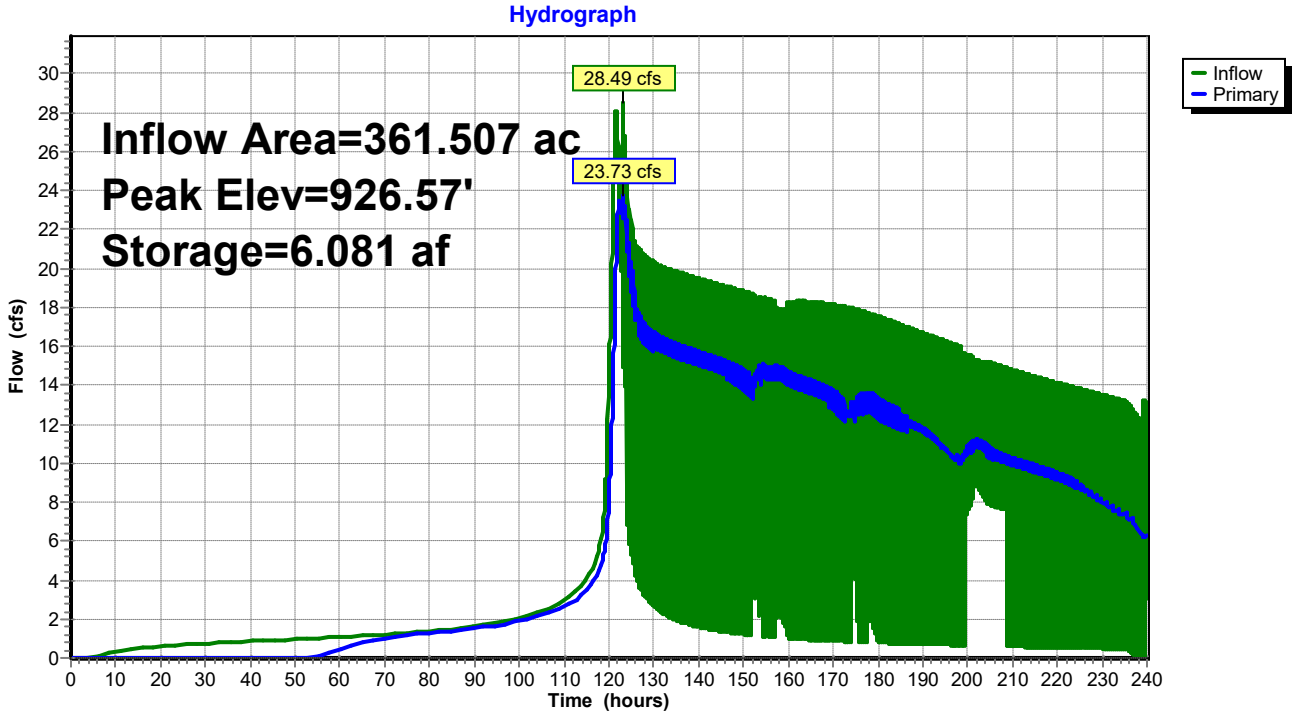
Volume	Invert	Avail.Storage	Storage Description
#1	925.00'	16.212 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
925.00	0.338	0.000	0.000
926.00	5.311	2.824	2.824
927.00	6.620	5.965	8.790
928.00	8.223	7.422	16.212

Device	Routing	Invert	Outlet Devices
#1	Primary	925.96'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.04 1.04 2.04 Width (feet) 0.00 6.00 90.00 140.00
#2	Primary	919.70'	**10.0" Round Culvert** L= 1,310.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.30' / 919.70' S= -0.0003 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#3	Device 2	925.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=23.33 cfs @ 123.16 hrs HW=926.57' TW=926.48' (Dynamic Tailwater)
- **1=Custom Weir/Orifice** (Weir Controls 23.15 cfs @ 1.34 fps)
- **2=Culvert** (Outlet Controls 0.18 cfs @ 0.33 fps)
  - **3=Orifice/Grate** (Passes 0.18 cfs of 0.79 cfs potential flow)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[80] Warning: Exceeded Pond 7P by 1.23' @ 135.40 hrs (270.84 cfs 1,162.955 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth > 4.01" for 100-year, 10-day snowmelt event
Inflow = 75.18 cfs @ 137.75 hrs, Volume= 106.945 af
Outflow = 17.90 cfs @ 137.20 hrs, Volume= 112.976 af, Atten= 76%, Lag= 0.0 min
Primary = 17.90 cfs @ 137.20 hrs, Volume= 112.976 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 933.01' @ 137.20 hrs Surf.Area= 0.394 ac Storage= 0.206 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 82.1 min (10,220.6 - 10,138.5)

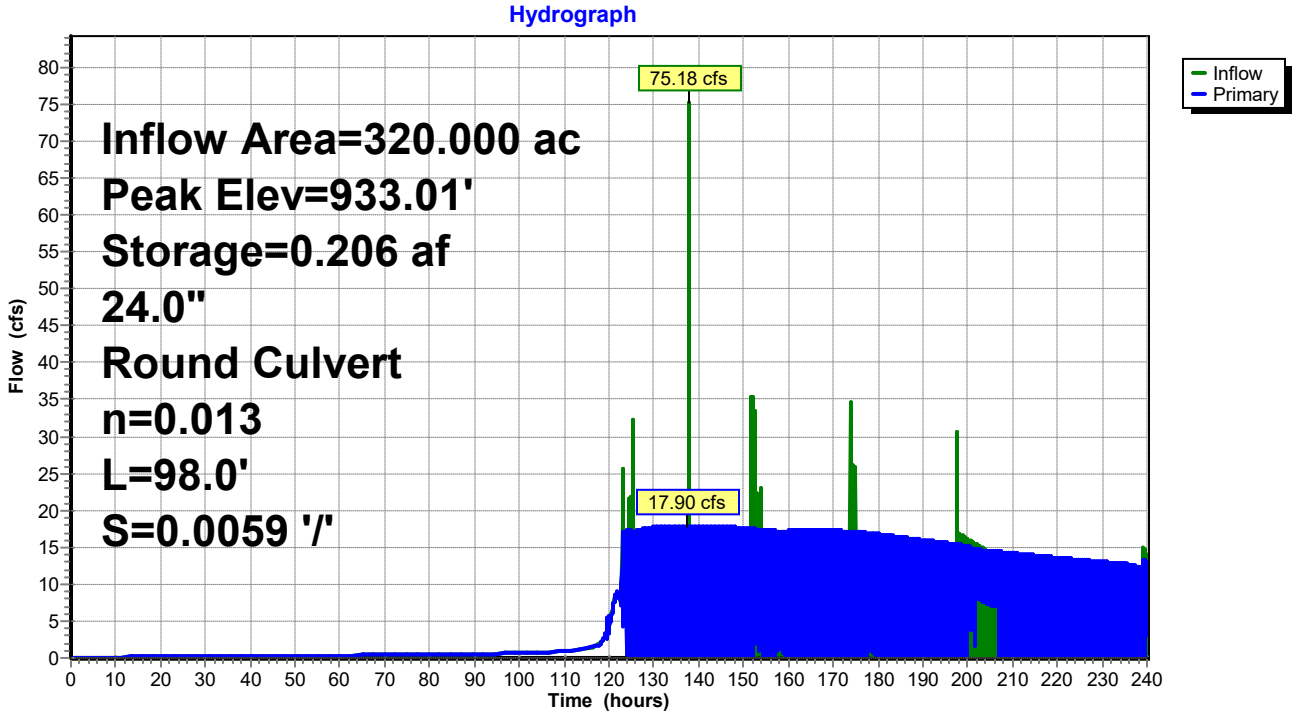
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=17.85 cfs @ 137.20 hrs HW=933.00' TW=926.47' (Dynamic Tailwater)
1=Culvert (Barrel Controls 17.85 cfs @ 5.68 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 40P: Wetland 2B

Inflow Area = 130.797 ac, 7.03% Impervious, Inflow Depth > 7.48" for 100-year, 10-day snowmelt event
Inflow = 43.34 cfs @ 121.73 hrs, Volume= 81.491 af
Outflow = 23.65 cfs @ 124.80 hrs, Volume= 80.601 af, Atten= 45%, Lag= 184.1 min
Primary = 23.65 cfs @ 124.80 hrs, Volume= 80.601 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 925.46' @ 124.80 hrs Surf.Area= 10.976 ac Storage= 9.621 af

Plug-Flow detention time= 338.0 min calculated for 80.601 af (99% of inflow)
Center-of-Mass det. time= 269.3 min (8,195.5 - 7,926.2)

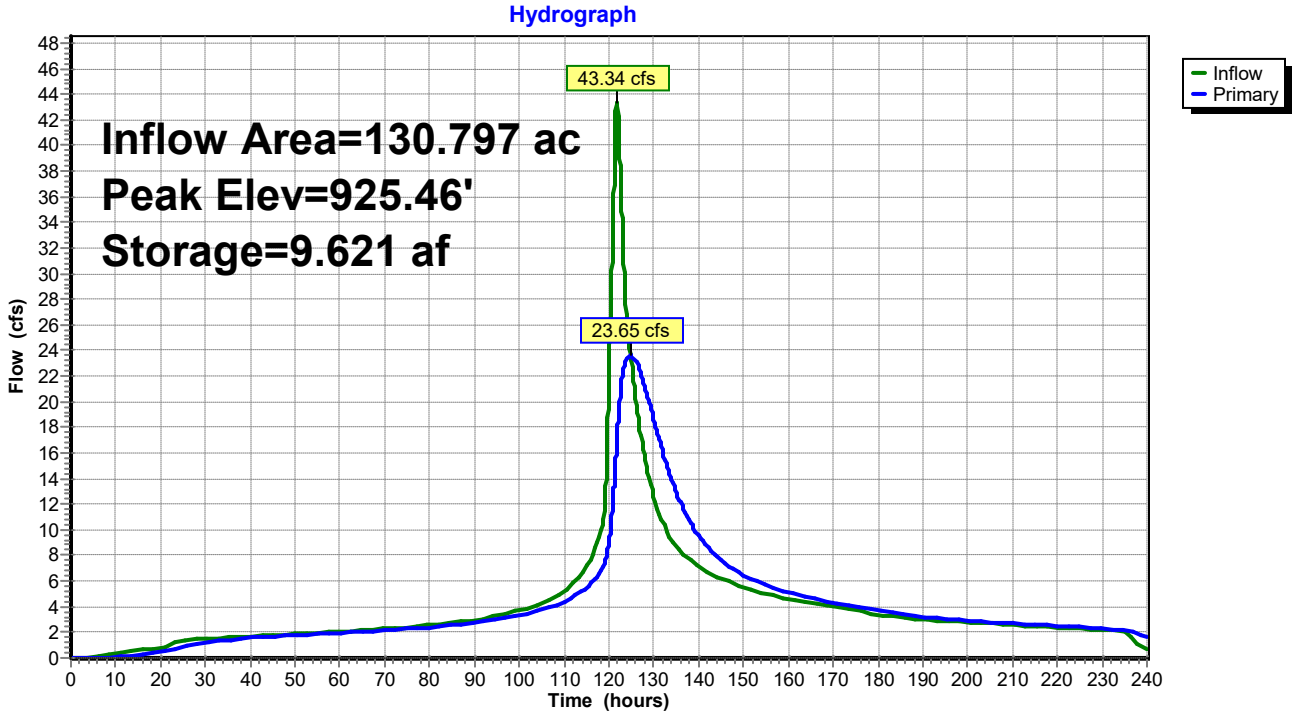
Volume	Invert	Avail.Storage	Storage Description
#1	923.92'	52.726 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.92	0.000	0.000	0.000
924.00	2.123	0.085	0.085
926.00	14.283	16.406	16.491
928.00	21.952	36.235	52.726

Device	Routing	Invert	Outlet Devices
#1	Primary	923.58'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -12.19 0.00 7.43 15.99
			Height (feet) 3.38 0.00 0.09 3.38
#2	Device 1	923.92'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -56.17 -5.92 -1.08 0.00 3.27 6.37 30.87 135.00
			Height (feet) 4.08 2.08 1.66 0.00 0.12 1.87 2.08 4.08

Primary OutFlow Max=23.65 cfs @ 124.80 hrs HW=925.46' TW=924.81' (Dynamic Tailwater)
↑**1=Asymmetrical Weir** (Passes 23.65 cfs of 79.85 cfs potential flow)
↑**2=Asymmetrical Weir** (Weir Controls 23.65 cfs @ 2.34 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 6.96" for 100-year, 10-day snowmelt event
Inflow = 6.54 cfs @ 121.36 hrs, Volume= 7.954 af
Outflow = 4.65 cfs @ 122.44 hrs, Volume= 4.254 af, Atten= 29%, Lag= 64.8 min
Primary = 4.65 cfs @ 122.44 hrs, Volume= 4.254 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 940.62' @ 122.44 hrs Surf.Area= 2.367 ac Storage= 3.976 af

Plug-Flow detention time= 3,585.2 min calculated for 4.253 af (53% of inflow)
Center-of-Mass det. time= 1,825.5 min (9,239.4 - 7,413.8)

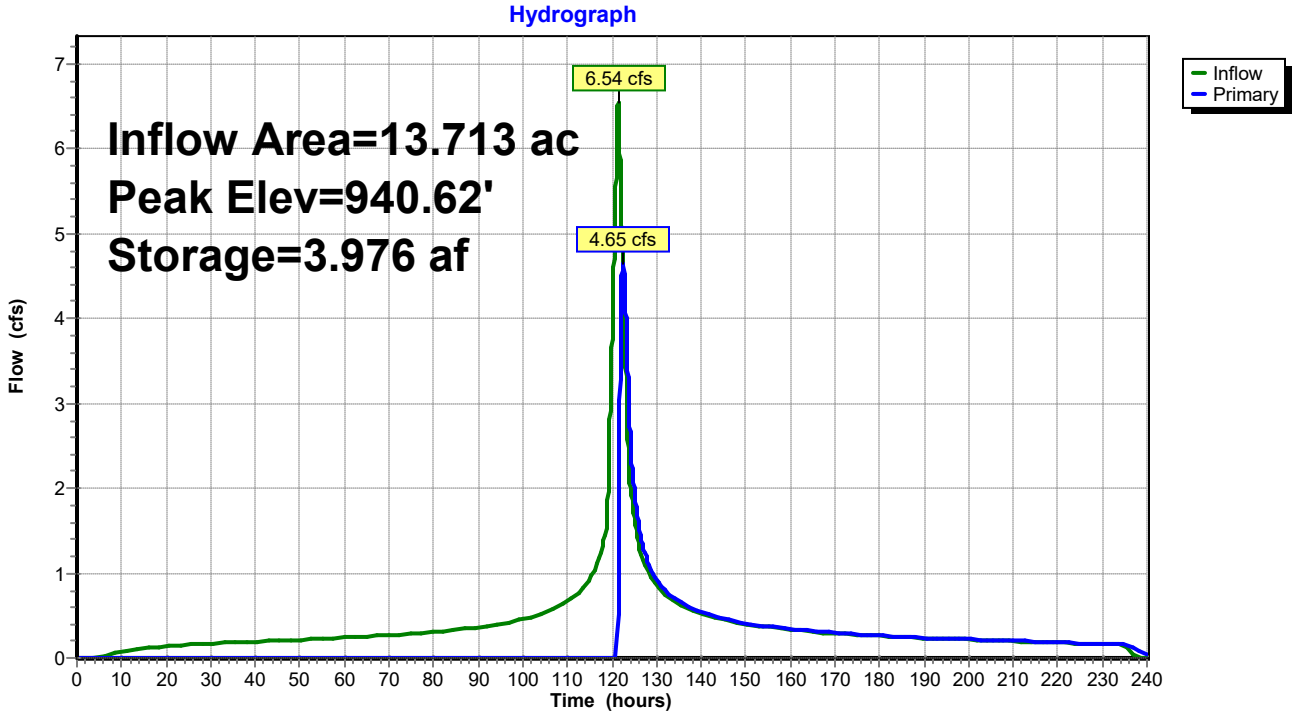
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=4.65 cfs @ 122.44 hrs HW=940.62' TW=925.34' (Dynamic Tailwater)
1=Custom Weir/Orifice (Weir Controls 4.65 cfs @ 1.09 fps)

Pond 41P: Ex South Off-site Pond



Summary for Pond 50P: Wetland 4B

[58] Hint: Peaked 0.10' above defined flood level

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth > 4.75" for 100-year, 10-day snowmelt event
Inflow = 7.65 cfs @ 121.64 hrs, Volume= 15.607 af
Outflow = 4.51 cfs @ 125.37 hrs, Volume= 10.335 af, Atten= 41%, Lag= 224.1 min
Primary = 4.51 cfs @ 125.37 hrs, Volume= 10.335 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 941.60' @ 125.37 hrs Surf.Area= 3.304 ac Storage= 5.549 af
Flood Elev= 941.50' Surf.Area= 3.181 ac Storage= 5.223 af

Plug-Flow detention time= 2,816.9 min calculated for 10.333 af (66% of inflow)
Center-of-Mass det. time= 1,345.9 min (9,693.0 - 8,347.2)

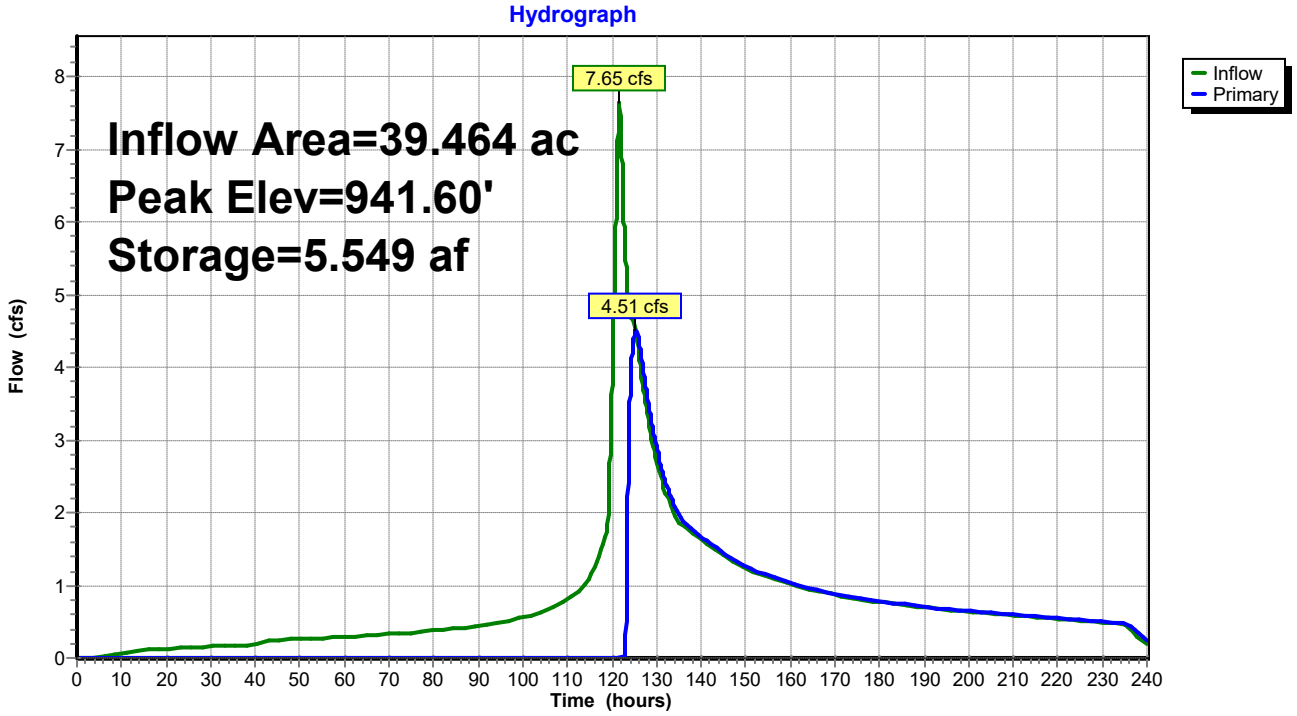
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	6.966 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
938.00	0.102	0.000	0.000
940.00	1.599	1.701	1.701
941.00	2.570	2.085	3.785
942.00	3.792	3.181	6.966

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=4.51 cfs @ 125.37 hrs HW=941.60' TW=925.45' (Dynamic Tailwater)
↑**1=Custom Weir/Orifice** (Weir Controls 4.51 cfs @ 1.02 fps)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

[58] Hint: Peaked 0.17' above defined flood level

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 77.49" for 100-year, 10-day snowmelt event
Inflow = 7.53 cfs @ 123.33 hrs, Volume= 24.279 af
Outflow = 7.53 cfs @ 123.37 hrs, Volume= 24.059 af, Atten= 0%, Lag= 2.6 min
Primary = 7.53 cfs @ 123.37 hrs, Volume= 24.059 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 938.67' @ 123.37 hrs Surf.Area= 0.260 ac Storage= 0.255 af
Flood Elev= 938.50' Surf.Area= 0.226 ac Storage= 0.214 af

Plug-Flow detention time= 123.9 min calculated for 24.054 af (99% of inflow)
Center-of-Mass det. time= 64.6 min (7,825.3 - 7,760.7)

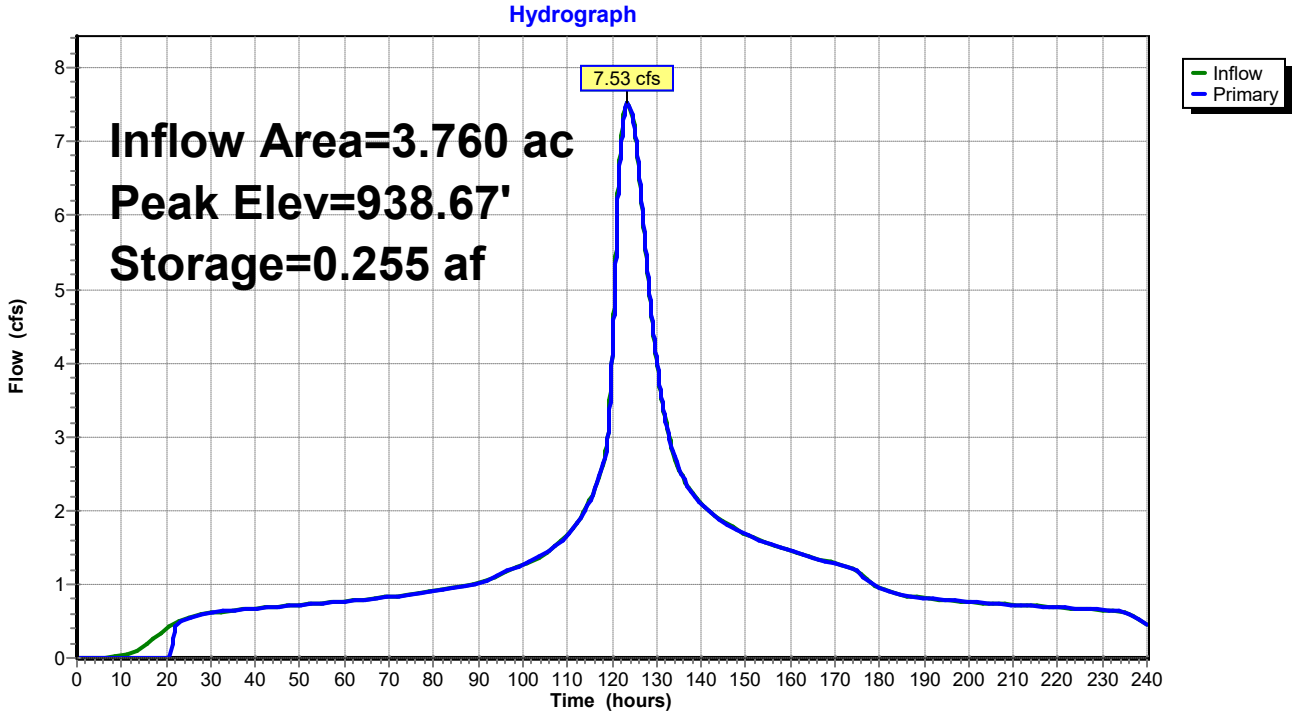
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	0.353 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.004	0.000	0.000
938.00	0.123	0.127	0.127
939.00	0.328	0.226	0.353

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=7.53 cfs @ 123.37 hrs HW=938.67' TW=925.43' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 7.53 cfs @ 1.31 fps)

Pond 60P: Wetland 5B



Summary for Link 1PP: Northwest Wetland (Big Woods)

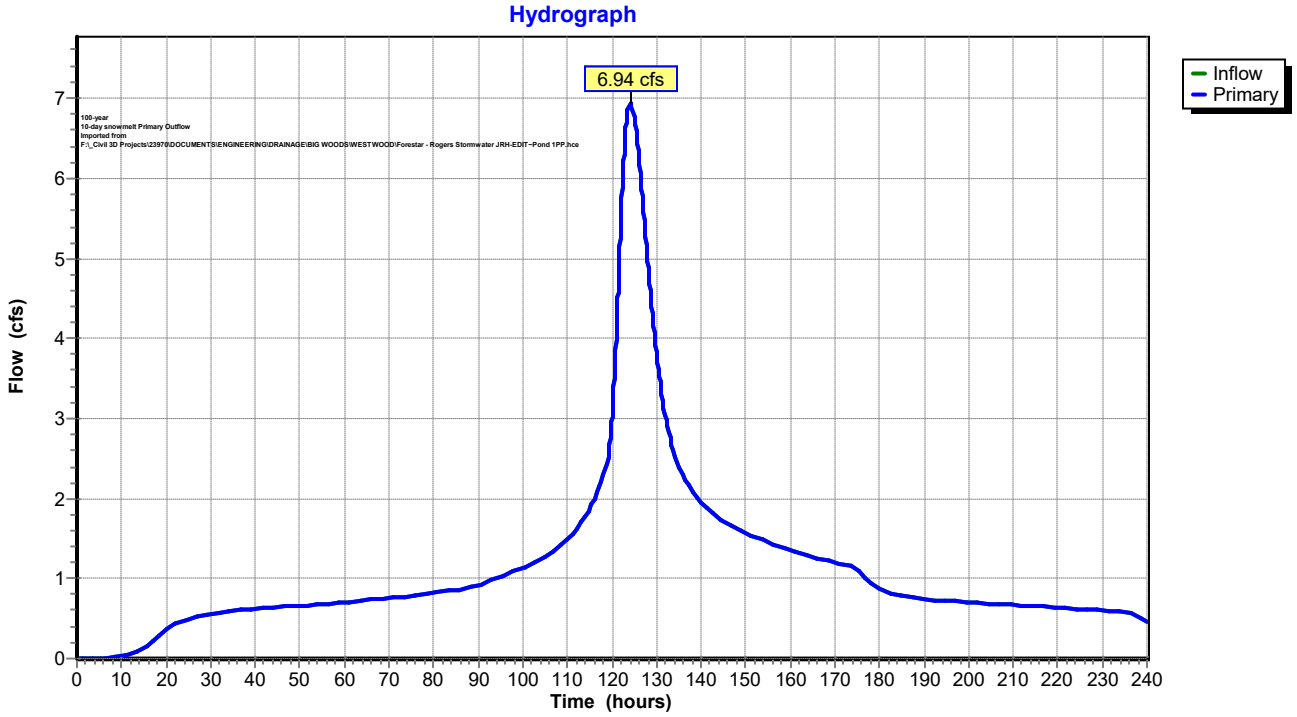
From the Big Woods development drainage model prepared by Westwood.

Inflow	=	6.94 cfs @ 124.13 hrs, Volume=	22.098 af
Primary	=	6.94 cfs @ 124.13 hrs, Volume=	22.098 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

100-year, 10-day snowmelt Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\

Link 1PP: Northwest Wetland (Big Woods)



Summary for Link 5PP: Existing Pond (Big Woods)

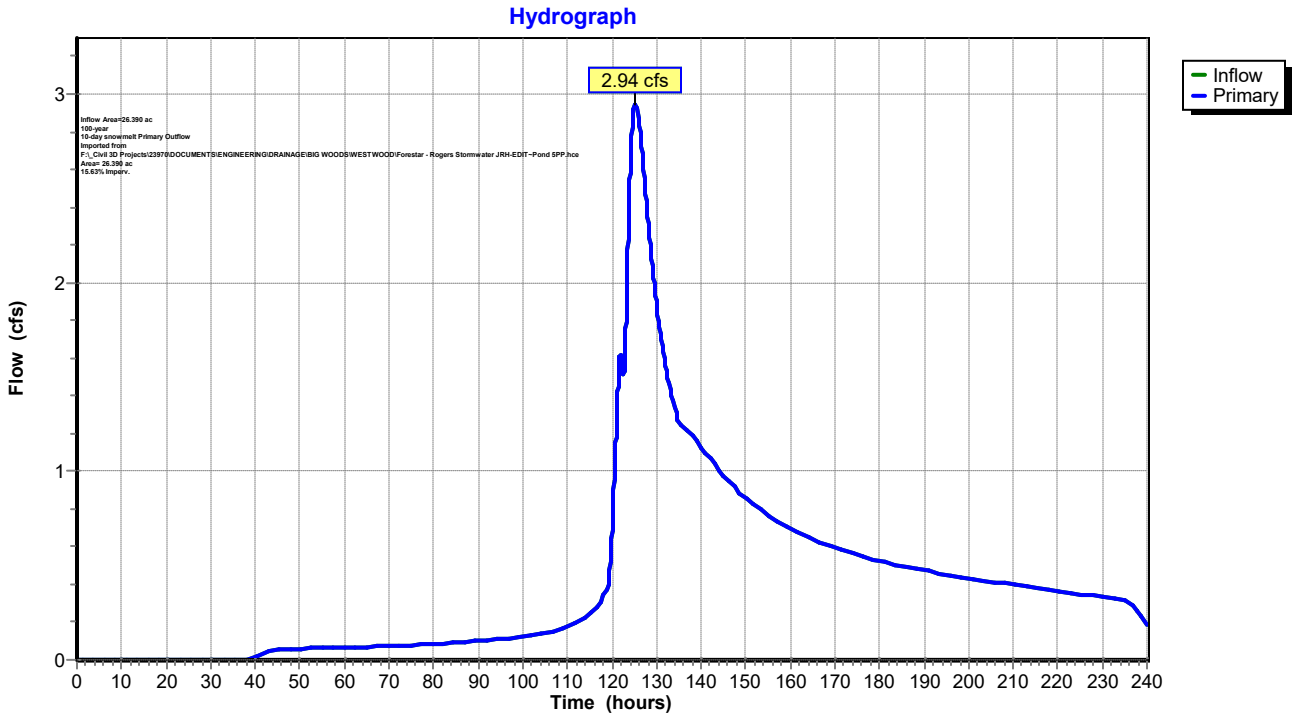
From the Big Woods development drainage model prepared by Westwood.

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth > 3.65" for 100-year, 10-day snowmelt event
Inflow = 2.94 cfs @ 125.27 hrs, Volume= 8.023 af
Primary = 2.94 cfs @ 125.27 hrs, Volume= 8.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

100-year, 10-day snowmelt Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\

Link 5PP: Existing Pond (Big Woods)



Time span=0.00-240.00 hrs, dt=0.05 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 7S: Approx DA to Lake Runoff Area=300.000 ac 0.00% Impervious Runoff Depth=0.53"
Flow Length=1,200' Slope=0.0300 '/' Tc=26.8 min CN=72/0 Runoff=127.59 cfs 13.215 af

Subcatchment 10S: Direct to Cowley Lake Runoff Area=25.761 ac 0.80% Impervious Runoff Depth=1.39"
Flow Length=2,175' Tc=29.4 min CN=88/98 Runoff=32.31 cfs 2.981 af

Subcatchment 20S: Direct to Cowley Lake Runoff Area=6.216 ac 0.00% Impervious Runoff Depth=1.24"
Flow Length=586' Tc=8.9 min CN=86/0 Runoff=12.35 cfs 0.644 af

Subcatchment 21S: Direct to East Channel Runoff Area=0.900 ac 0.00% Impervious Runoff Depth=0.84"
Flow Length=247' Tc=20.0 min CN=79/0 Runoff=0.81 cfs 0.063 af

Subcatchment 22S: Direct to Cowley Lake Runoff Area=5.776 ac 0.00% Impervious Runoff Depth=1.24"
Flow Length=737' Tc=11.1 min CN=86/0 Runoff=10.53 cfs 0.599 af

Subcatchment 23S: Direct to Lower West Runoff Area=9.551 ac 0.00% Impervious Runoff Depth=1.31"
Flow Length=391' Tc=9.5 min CN=87/0 Runoff=19.45 cfs 1.044 af

Subcatchment 24S: Direct to Cowley Lake Runoff Area=26.075 ac 1.14% Impervious Runoff Depth=1.39"
Flow Length=998' Tc=13.6 min CN=88/98 Runoff=48.72 cfs 3.024 af

Subcatchment 30S: Direct to Wetland 4A Runoff Area=41.507 ac 5.85% Impervious Runoff Depth=1.18"
Flow Length=1,249' Tc=23.4 min CN=84/98 Runoff=49.53 cfs 4.094 af

Subcatchment 31S: Approx DA to Culvert Runoff Area=20.000 ac 12.00% Impervious Runoff Depth=0.81"
Flow Length=1,200' Slope=0.0100 '/' Tc=40.3 min CN=74/98 Runoff=10.74 cfs 1.346 af

Subcatchment 40S: Direct to Wetland 2B Runoff Area=73.860 ac 2.02% Impervious Runoff Depth=1.47"
Flow Length=1,354' Tc=23.6 min CN=89/98 Runoff=110.81 cfs 9.055 af

Subcatchment 41S: Direct to Ex South Runoff Area=13.713 ac 13.43% Impervious Runoff Depth=1.07"
Flow Length=1,032' Tc=10.2 min CN=80/98 Runoff=21.24 cfs 1.228 af

Subcatchment 50S: Direct to Wetland 4B Runoff Area=13.074 ac 6.59% Impervious Runoff Depth=1.37"
Flow Length=734' Tc=26.4 min CN=87/98 Runoff=17.08 cfs 1.497 af

Subcatchment 60S: Direct to Wetland 5B Runoff Area=3.760 ac 23.16% Impervious Runoff Depth=1.29"
Flow Length=531' Tc=5.6 min CN=82/98 Runoff=8.31 cfs 0.405 af

Reach 1R: Cowley Lake Outlet Channel Inflow=32.31 cfs 2.981 af
Outflow=32.31 cfs 2.981 af

Reach 2R: Cowley Lake Inflow=90.39 cfs 21.239 af
Outflow=90.39 cfs 21.239 af

Reach 21R: East Channel Avg. Flow Depth=0.67' Max Vel=4.01 fps Inflow=13.60 cfs 13.158 af
n=0.022 L=382.0' S=0.0097 '/' Capacity=131.71 cfs Outflow=13.60 cfs 13.158 af

Reach 23RL: Lower West Channel Avg. Flow Depth=0.68' Max Vel=1.77 fps Inflow=19.45 cfs 3.814 af
n=0.022 L=534.0' S=0.0014 '/' Capacity=257.71 cfs Outflow=17.05 cfs 3.814 af

Reach 23RU: Upper West Channel Avg. Flow Depth=0.22' Max Vel=1.29 fps Inflow=2.97 cfs 2.771 af
n=0.022 L=490.0' S=0.0057 '/' Capacity=766.18 cfs Outflow=2.97 cfs 2.771 af

Pond 7P: Whiteford Lake and Wetlands Peak Elev=930.22' Storage=13.215 af Inflow=127.59 cfs 13.215 af
Outflow=0.00 cfs 0.000 af

Pond 30P: Wetland 4A Peak Elev=926.22' Storage=4.003 af Inflow=56.56 cfs 5.440 af
Outflow=2.97 cfs 2.771 af

Pond 31P: Ex 24" Culvert Crossing Peak Elev=931.92' Storage=0.004 af Inflow=10.74 cfs 1.346 af
24.0" Round Culvert n=0.013 L=98.0' S=0.0059 '/' Outflow=10.74 cfs 1.346 af

Pond 40P: Wetland 2B Peak Elev=925.06' Storage=5.768 af Inflow=115.05 cfs 13.100 af
Outflow=13.52 cfs 13.096 af

Pond 41P: Ex South Off-site Pond Peak Elev=939.12' Storage=1.228 af Inflow=21.24 cfs 1.228 af
Outflow=0.00 cfs 0.000 af

Pond 50P: Wetland 4B Peak Elev=940.02' Storage=1.737 af Inflow=17.34 cfs 1.737 af
Outflow=0.00 cfs 0.000 af

Pond 60P: Wetland 5B Peak Elev=938.62' Storage=0.242 af Inflow=9.74 cfs 4.259 af
Outflow=4.34 cfs 4.045 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 1PP.hce Inflow=4.11 cfs 3.854 af
Primary=4.11 cfs 3.854 af

Link G\DRAINAGE\BIG WOODS\WESTWOOD\Forestar - Rogers Stormwater JRH-EDIT~Pond 5PP.hce Inflow=0.93 cfs 0.240 af
Area= 26.390 ac 15.63% Imperv. Primary=0.93 cfs 0.240 af

Total Runoff Area = 540.193 ac Runoff Volume = 39.194 af Average Runoff Depth = 0.87"
98.07% Pervious = 529.794 ac 1.93% Impervious = 10.399 ac

Summary for Subcatchment 7S: Approx DA to Lake

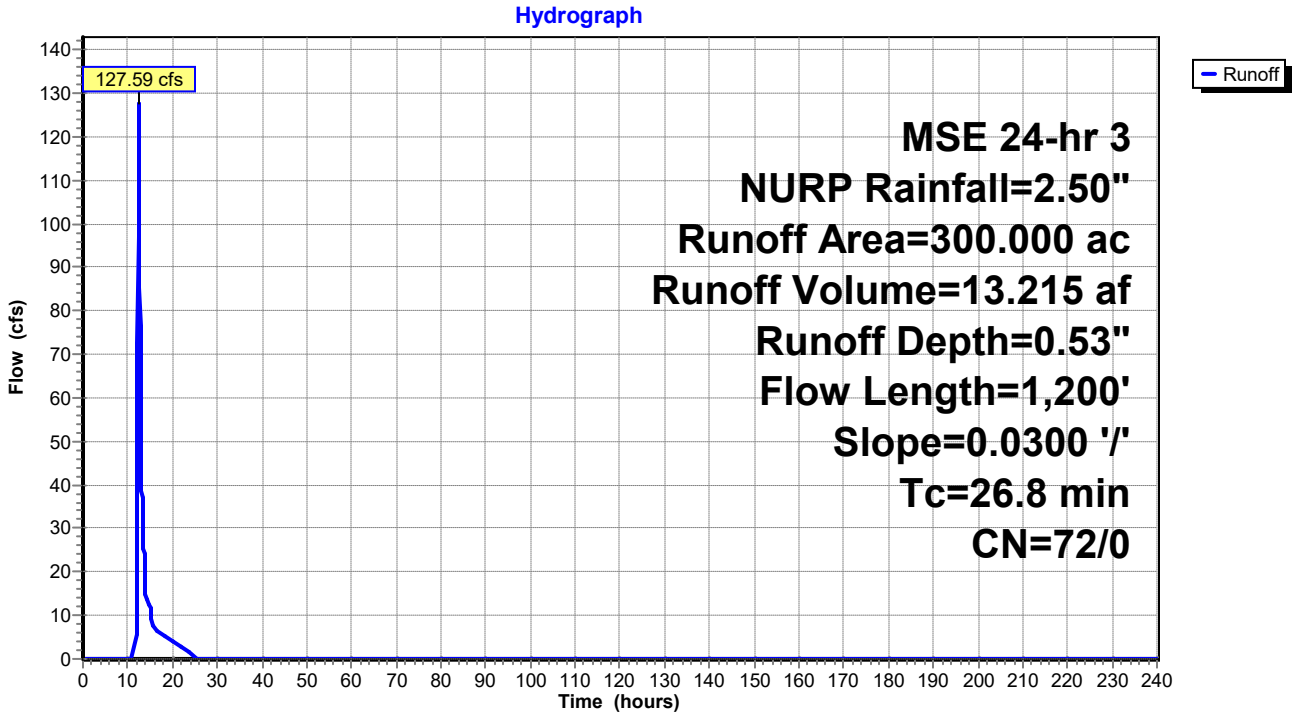
Runoff = 127.59 cfs @ 12.44 hrs, Volume= 13.215 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
300.000	72	Woods/grass comb., Good, HSG C
300.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	1,200	0.0300	0.75		**Lag/CN Method,**

Subcatchment 7S: Approx DA to Lake



Summary for Subcatchment 10S: Direct to Cowley Lake Outlet Channel

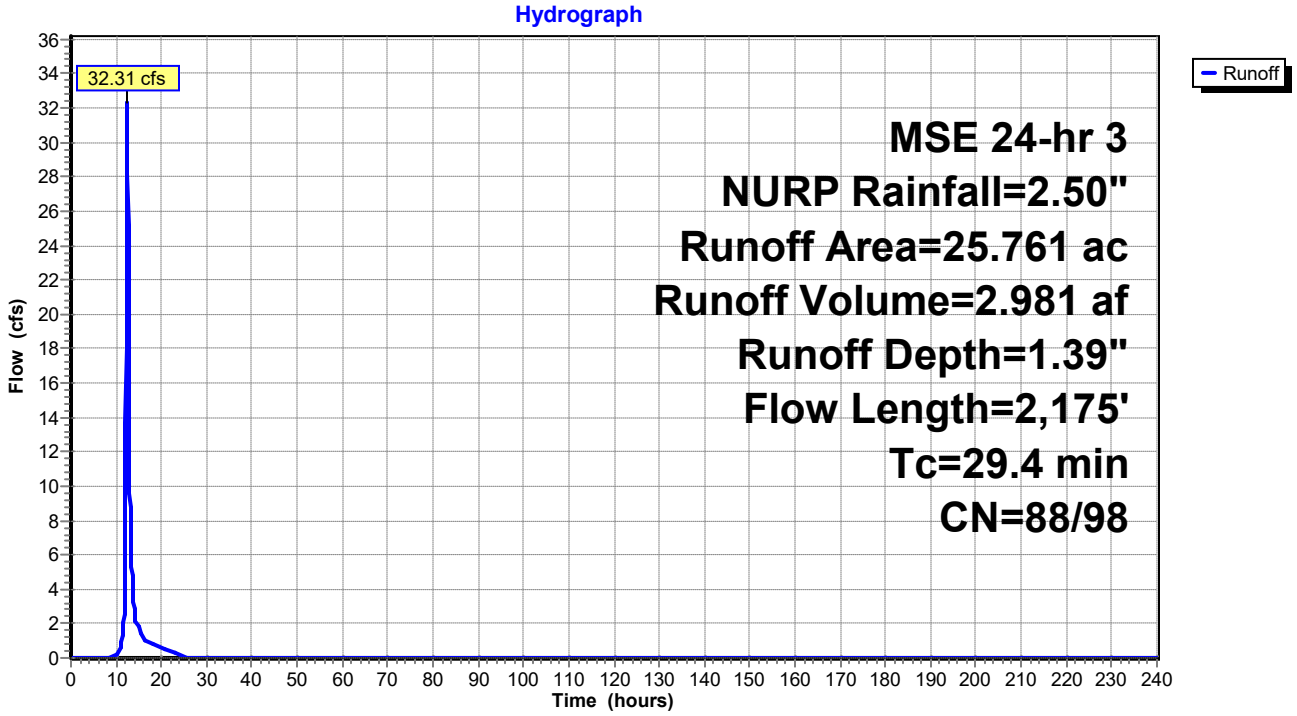
Runoff = 32.31 cfs @ 12.42 hrs, Volume= 2.981 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.136	98	Unconnected pavement, HSG D
0.070	98	Unconnected roofs, HSG D
1.380	98	Water Surface, 0% imp, HSG D
21.395	89	Row crops, straight row, Good, HSG D
1.284	80	>75% Grass cover, Good, HSG D
0.797	78	Meadow, non-grazed, HSG D
0.699	77	Woods, Good, HSG D
25.761	88	Weighted Average
25.555	88	99.20% Pervious Area
0.206	98	0.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0170	0.31		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
20.2	1,454	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
3.9	621	0.0020	2.64	68.60	**Channel Flow,** Area= 26.0 sf Perim= 20.0' r= 1.30' n= 0.030 Earth, grassed & winding
29.4	2,175	Total			

Subcatchment 10S: Direct to Cowley Lake Outlet Channel



Summary for Subcatchment 20S: Direct to Cowley Lake

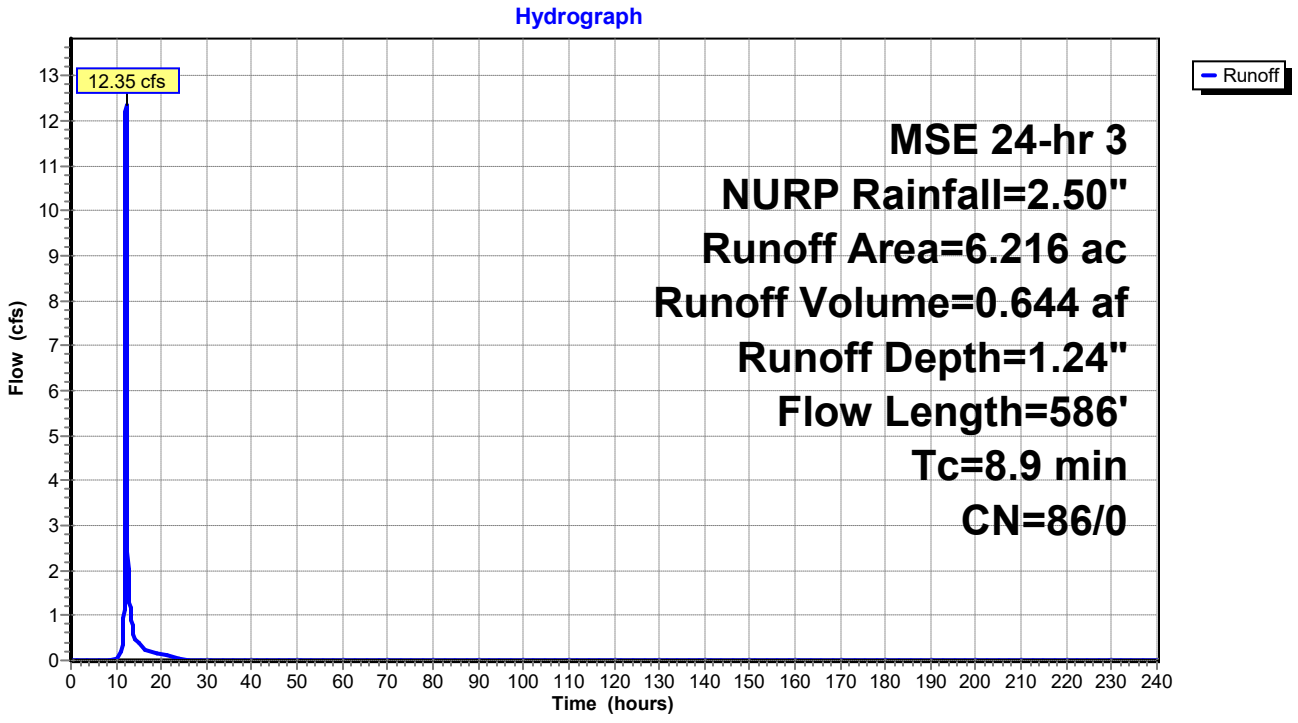
Runoff = 12.35 cfs @ 12.16 hrs, Volume= 0.644 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.123	98	Water Surface, 0% imp, HSG D
4.384	89	Row crops, straight row, Good, HSG D
1.709	77	Woods, Good, HSG D
6.216	86	Weighted Average
6.216	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0240	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
4.3	486	0.0440	1.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.9	586	Total			

Subcatchment 20S: Direct to Cowley Lake



Summary for Subcatchment 21S: Direct to East Channel

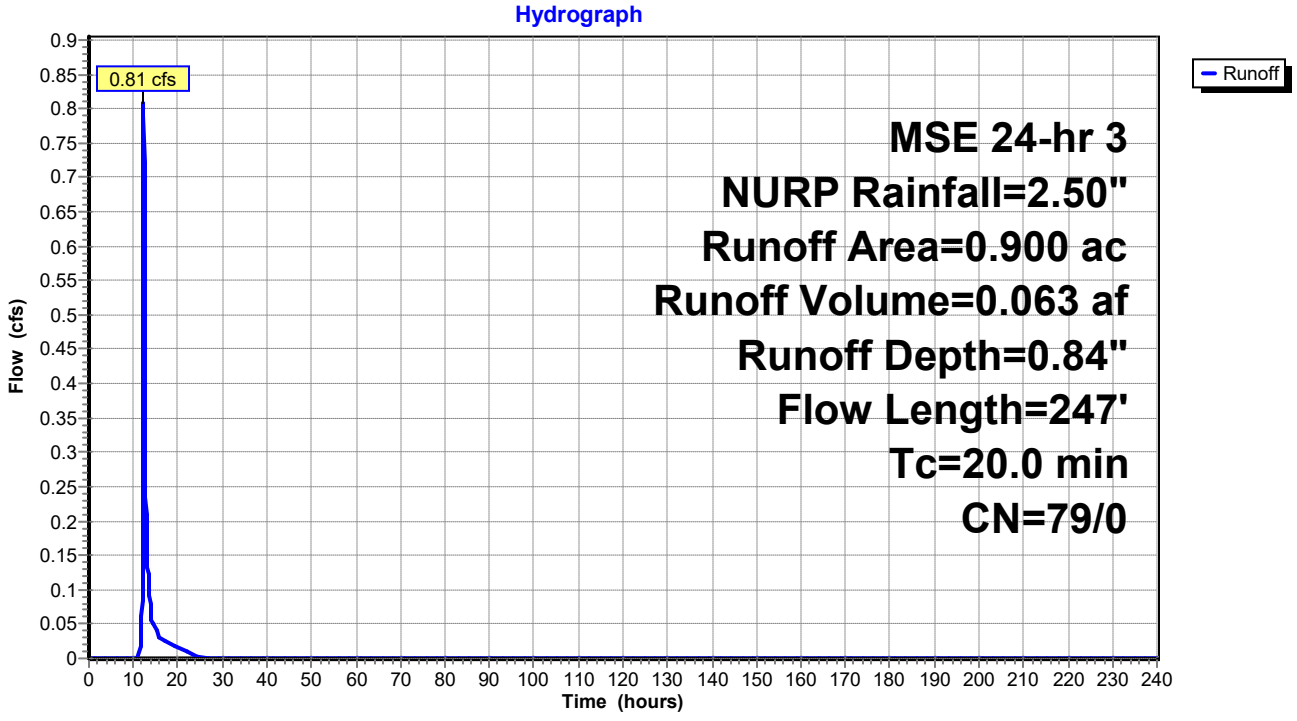
Runoff = 0.81 cfs @ 12.32 hrs, Volume= 0.063 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.074	98	Water Surface, 0% imp, HSG D
0.005	89	Row crops, straight row, Good, HSG D
0.821	77	Woods, Good, HSG D
0.900	79	Weighted Average
0.900	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0350	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.84"
1.8	147	0.0721	1.34		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.0	247	Total			

Subcatchment 21S: Direct to East Channel



Summary for Subcatchment 22S: Direct to Cowley Lake

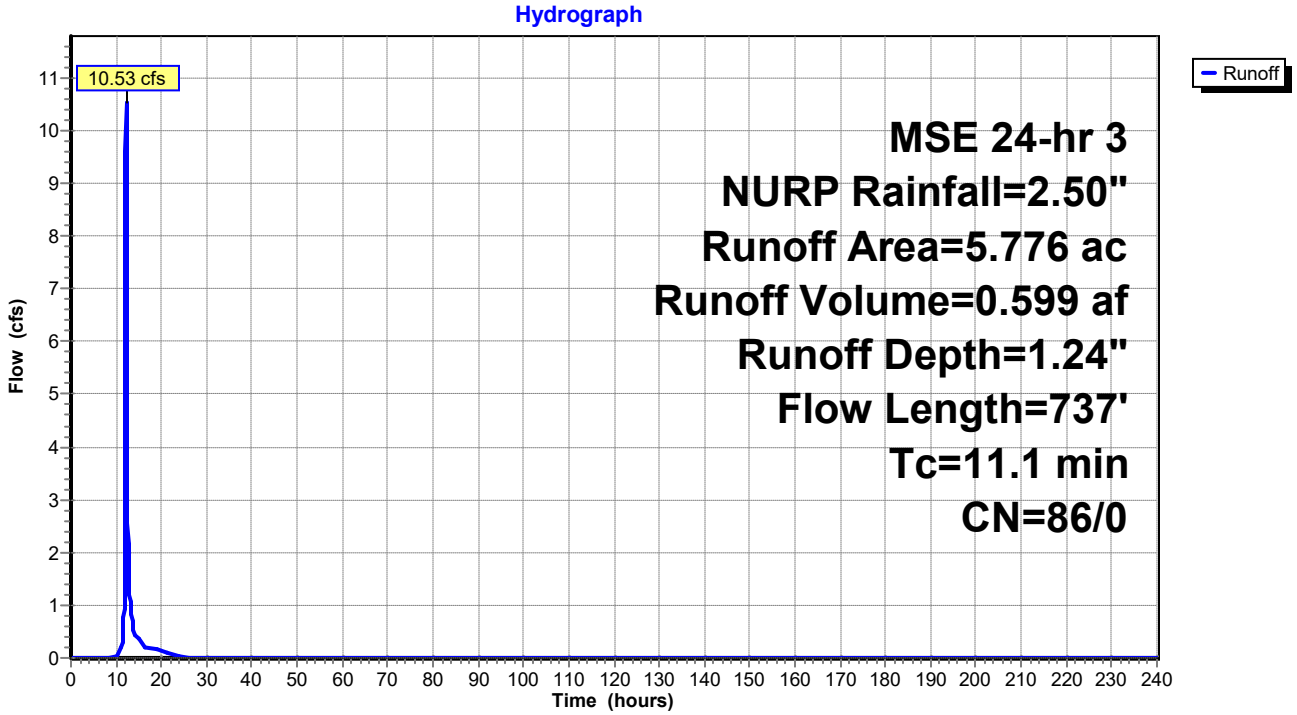
Runoff = 10.53 cfs @ 12.19 hrs, Volume= 0.599 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.031	98	Water Surface, 0% imp, HSG D
4.386	89	Row crops, straight row, Good, HSG D
0.729	78	Meadow, non-grazed, HSG D
0.630	77	Woods, Good, HSG D
5.776	86	Weighted Average
5.776	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.0440	0.46		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
7.5	637	0.0248	1.42		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.1	737	Total			

Subcatchment 22S: Direct to Cowley Lake



Summary for Subcatchment 23S: Direct to Lower West Channel

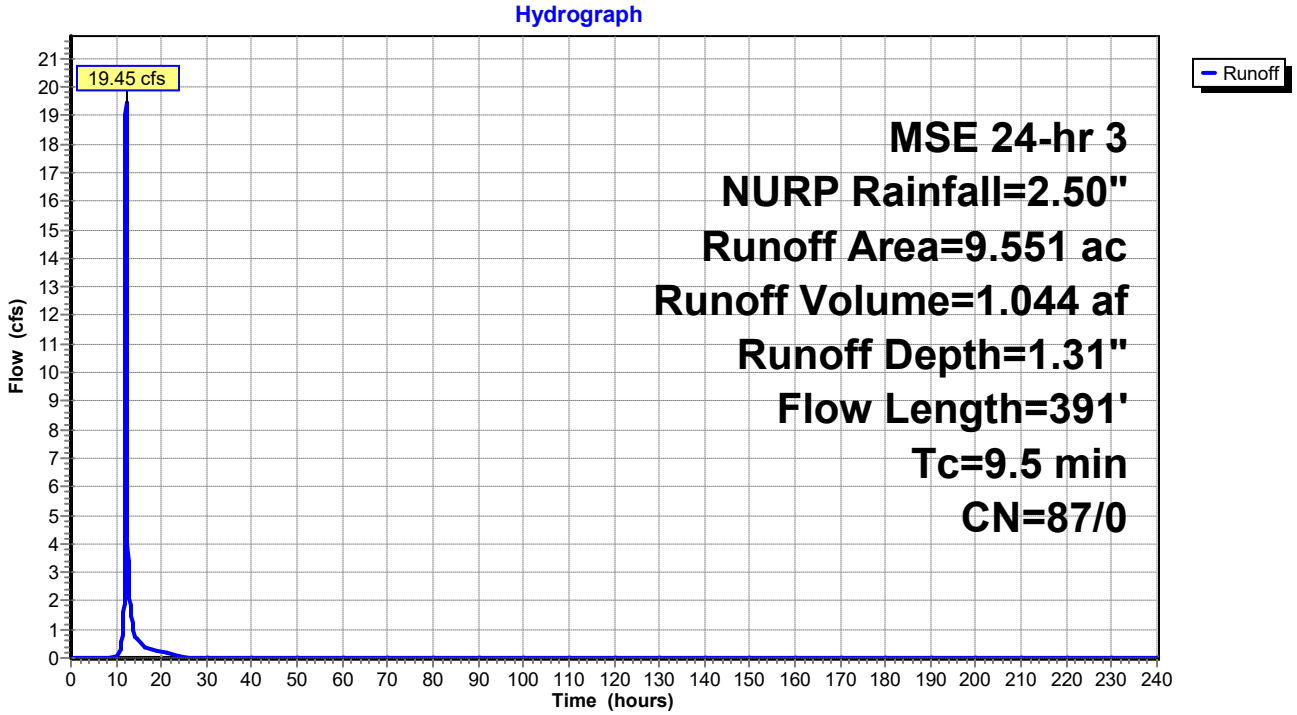
Runoff = 19.45 cfs @ 12.17 hrs, Volume= 1.044 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.467	98	Water Surface, 0% imp, HSG D
7.263	89	Row crops, straight row, Good, HSG D
0.213	78	Meadow, non-grazed, HSG D
1.608	77	Woods, Good, HSG D
9.551	87	Weighted Average
9.551	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0090	0.24		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
2.6	291	0.0433	1.87		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
9.5	391	Total			

Subcatchment 23S: Direct to Lower West Channel



Summary for Subcatchment 24S: Direct to Cowley Lake

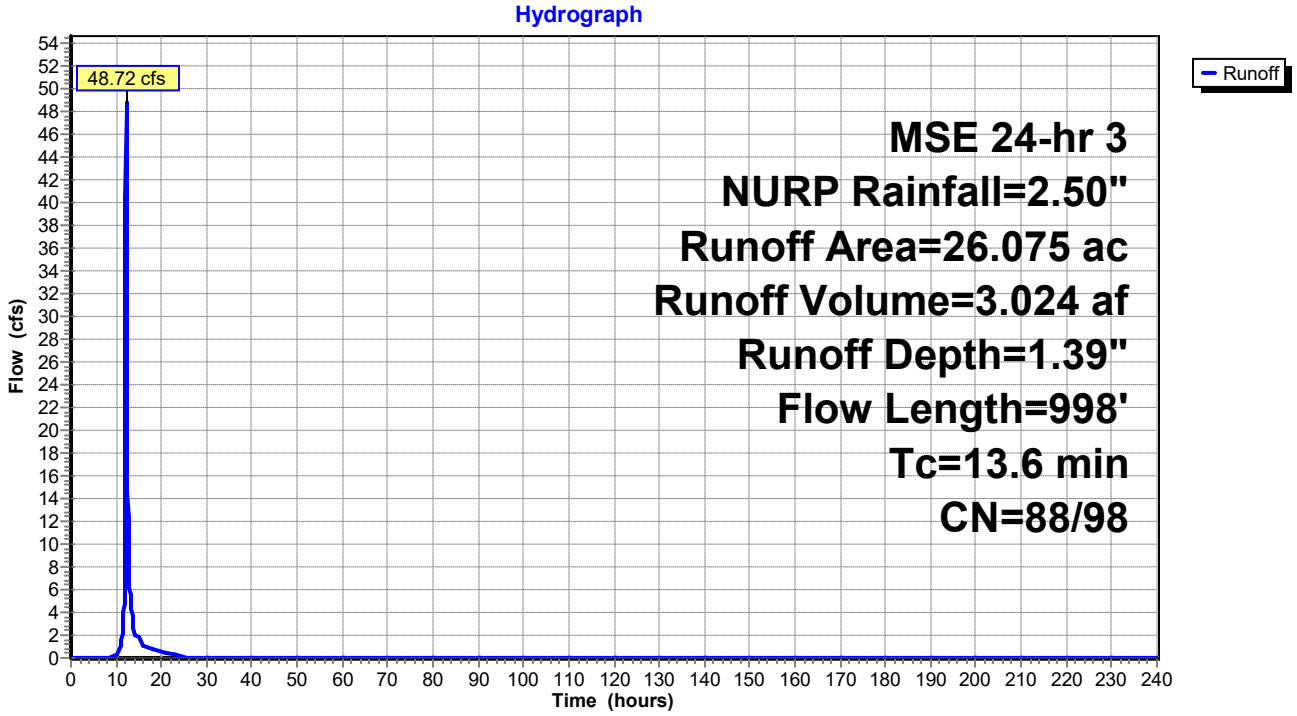
Runoff = 48.72 cfs @ 12.22 hrs, Volume= 3.024 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.298	98	Unconnected pavement, HSG D
0.980	98	Water Surface, 0% imp, HSG D
0.082	96	Gravel surface, HSG D
0.357	80	>75% Grass cover, Good, HSG D
21.863	89	Row crops, straight row, Good, HSG D
0.151	78	Meadow, non-grazed, HSG D
2.344	77	Woods, Good, HSG D
26.075	88	Weighted Average
25.777	88	98.86% Pervious Area
0.298	98	1.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	30	0.0200	1.02		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
10.3	819	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.8	149	0.0315	0.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.6	998	Total			

Subcatchment 24S: Direct to Cowley Lake



Summary for Subcatchment 30S: Direct to Wetland 4A

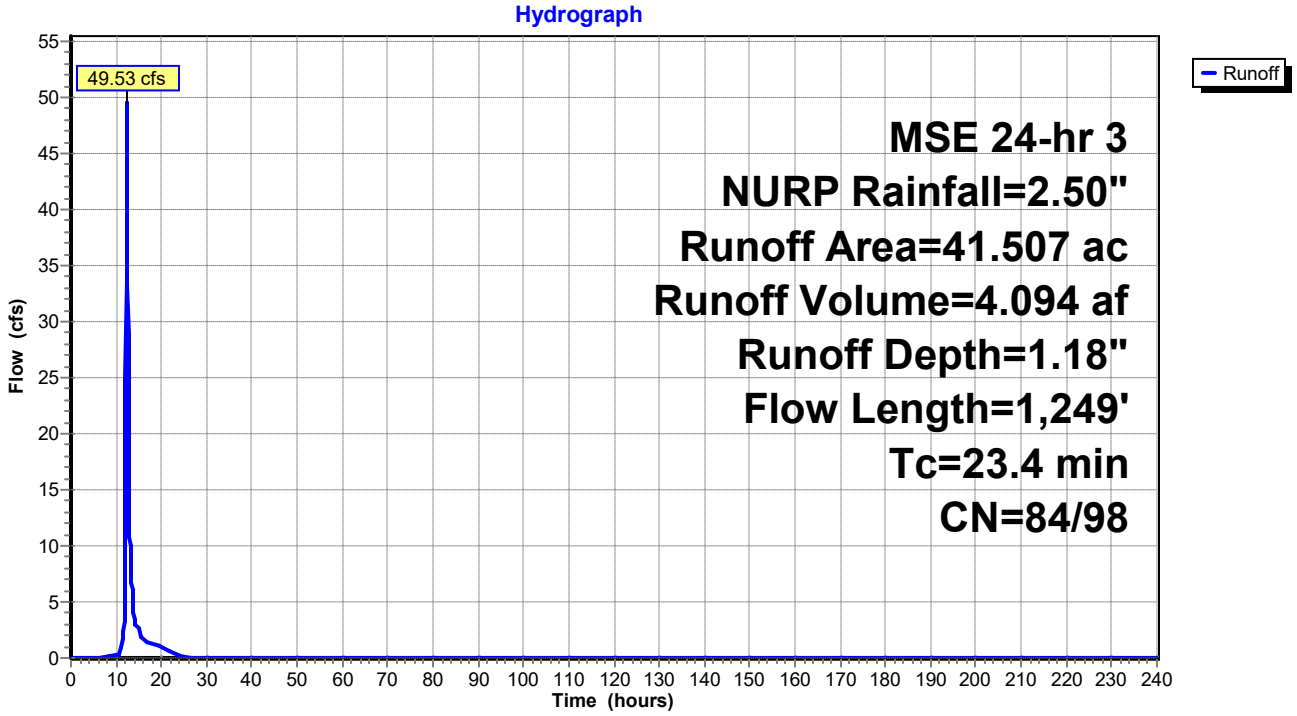
Runoff = 49.53 cfs @ 12.35 hrs, Volume= 4.094 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
1.469	98	Unconnected pavement, HSG D
0.959	98	Unconnected roofs, HSG D
0.947	96	Gravel surface, HSG D
17.469	89	Row crops, straight row, Good, HSG D
1.609	89	Pasture/grassland/range, Poor, HSG D
14.597	80	>75% Grass cover, Good, HSG D
0.684	78	Meadow, non-grazed, HSG D
3.773	77	Woods, Good, HSG D
41.507	85	Weighted Average
39.079	84	94.15% Pervious Area
2.428	98	5.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.84"
9.7	1,149	0.0174	1.98		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
23.4	1,249	Total			

Subcatchment 30S: Direct to Wetland 4A



Summary for Subcatchment 31S: Approx DA to Culvert

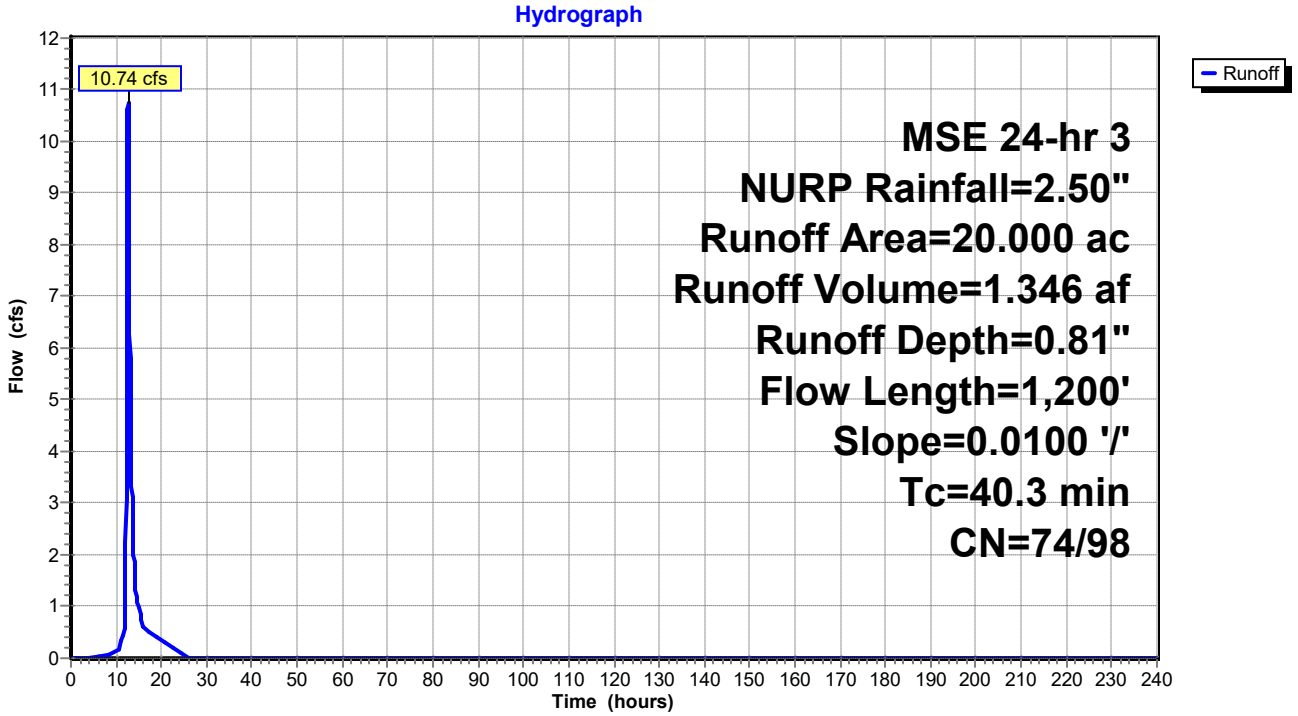
Runoff = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
20.000	77	2 acre lots, 12% imp, HSG C
17.600	74	88.00% Pervious Area
2.400	98	12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.3	1,200	0.0100	0.50		**Lag/CN Method,**

Subcatchment 31S: Approx DA to Culvert



Summary for Subcatchment 40S: Direct to Wetland 2B

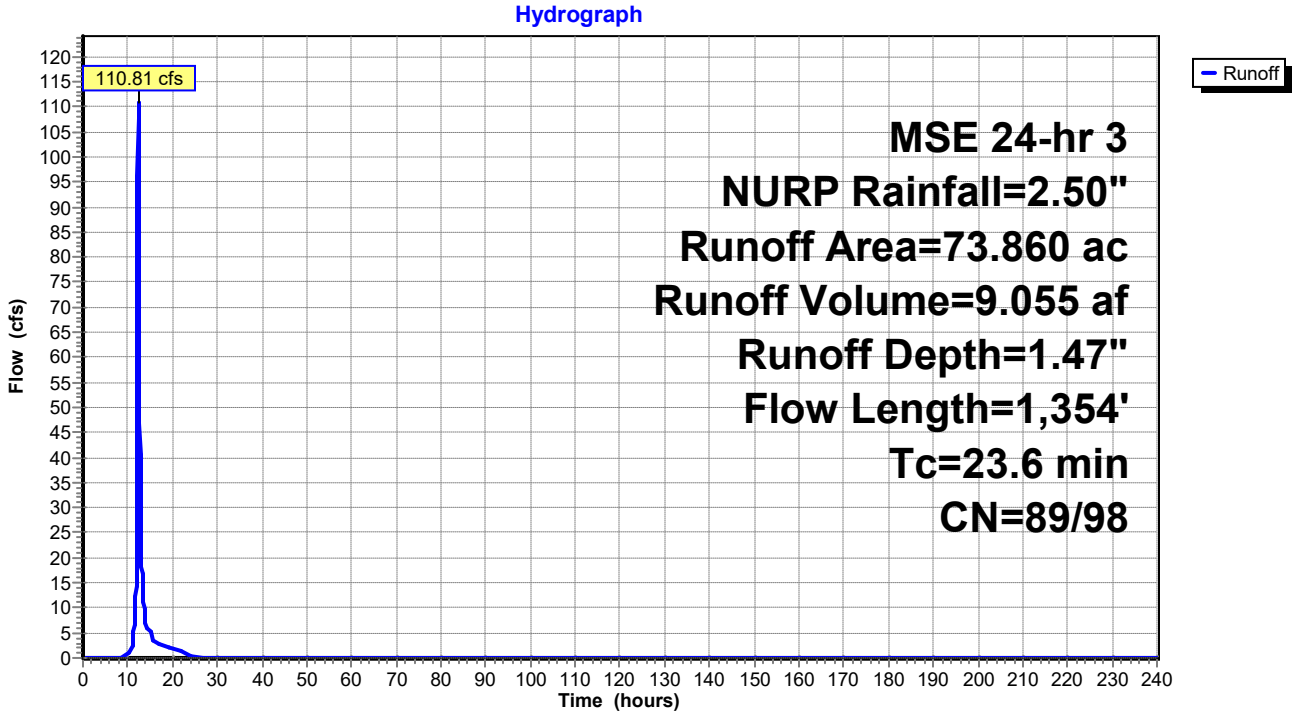
Runoff = 110.81 cfs @ 12.34 hrs, Volume= 9.055 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.965	98	Unconnected pavement, HSG D
0.528	98	Unconnected roofs, HSG D
17.207	98	Water Surface, 0% imp, HSG D
1.249	96	Gravel surface, HSG D
35.493	89	Row crops, straight row, Good, HSG D
0.208	89	Pasture/grassland/range, Poor, HSG D
8.455	80	>75% Grass cover, Good, HSG D
5.449	78	Meadow, non-grazed, HSG D
4.306	77	Woods, Good, HSG D
73.860	89	Weighted Average
72.367	89	97.98% Pervious Area
1.493	98	2.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.0300	0.39		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.84"
19.4	1,254	0.0143	1.08		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.6	1,354	Total			

Subcatchment 40S: Direct to Wetland 2B



Summary for Subcatchment 41S: Direct to Ex South Off-site Pond

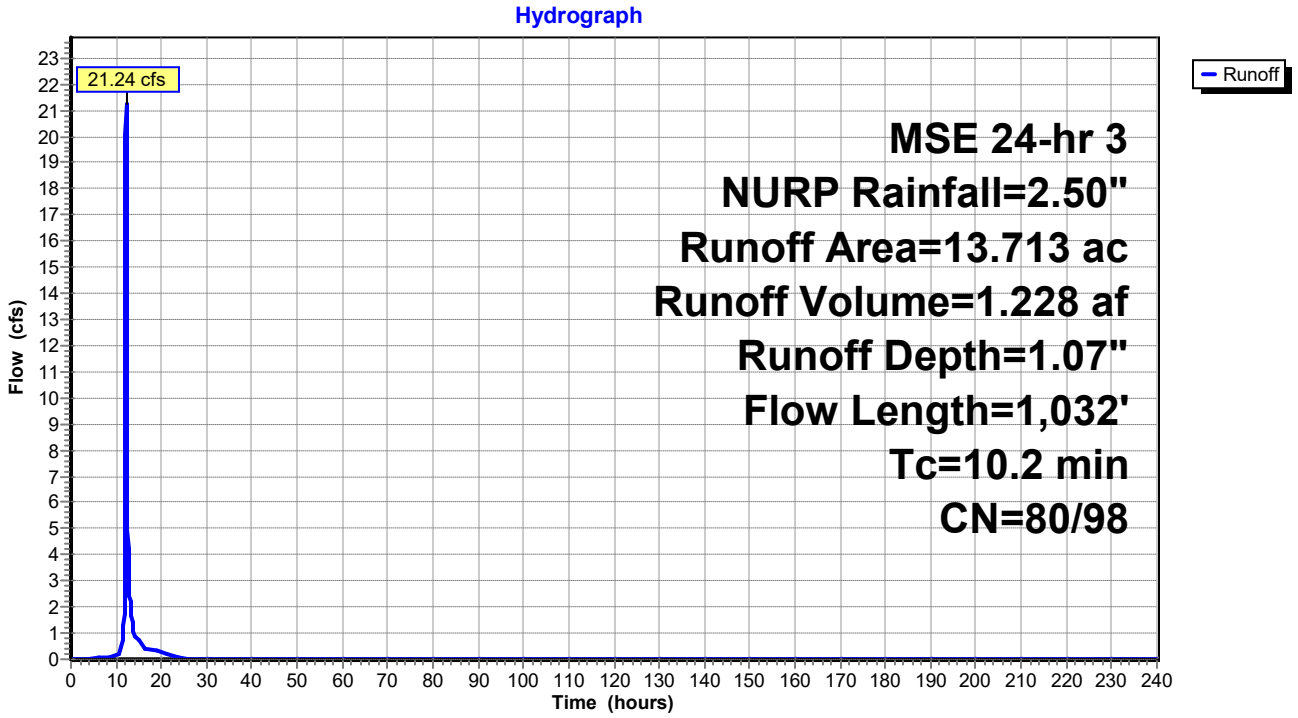
Runoff = 21.24 cfs @ 12.18 hrs, Volume= 1.228 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
1.568	98	Unconnected pavement, HSG D
0.273	98	Unconnected roofs, HSG D
0.107	98	Water Surface, 0% imp, HSG D
0.066	96	Gravel surface, HSG D
10.431	80	>75% Grass cover, Good, HSG D
1.268	78	Meadow, non-grazed, HSG D
13.713	82	Weighted Average
11.872	80	86.57% Pervious Area
1.841	98	13.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	53	0.0200	1.14		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
9.4	979	0.0135	1.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
10.2	1,032	Total			

Subcatchment 41S: Direct to Ex South Off-site Pond



Summary for Subcatchment 50S: Direct to Wetland 4B

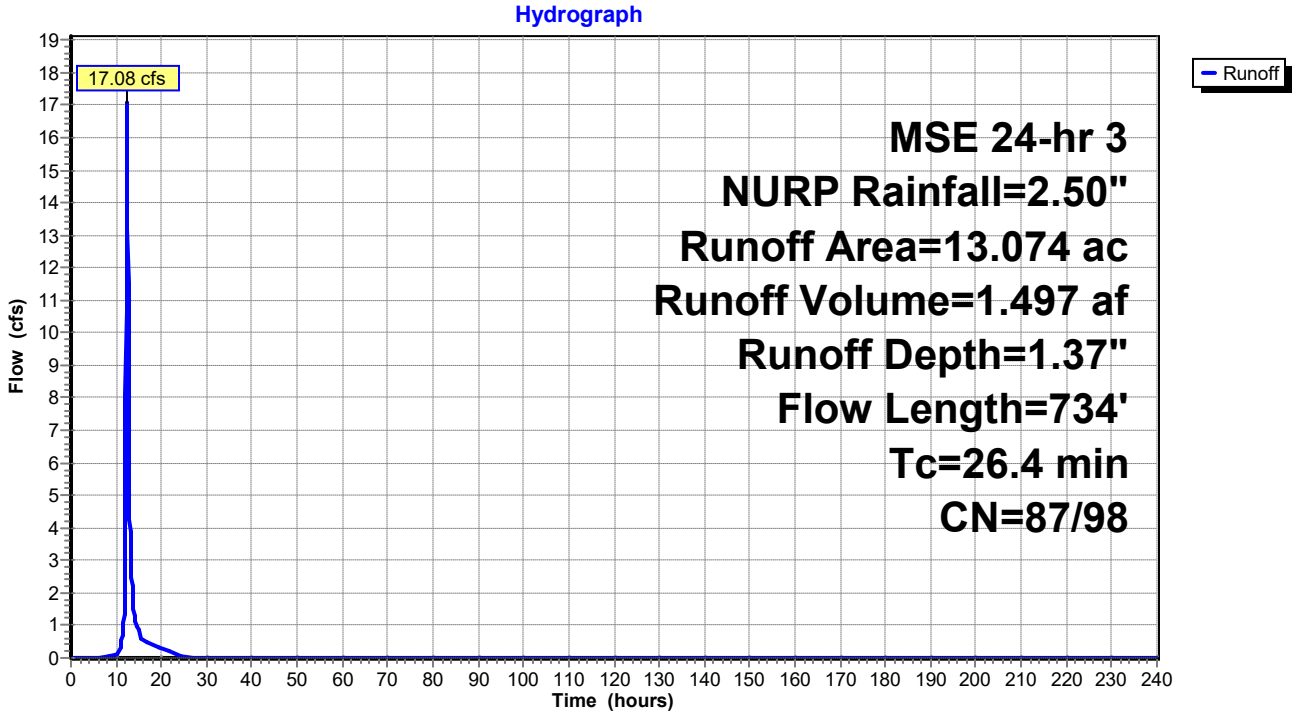
Runoff = 17.08 cfs @ 12.38 hrs, Volume= 1.497 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.523	98	Unconnected pavement, HSG D
0.339	98	Unconnected roofs, HSG D
0.175	98	Water Surface, 0% imp, HSG D
0.233	96	Gravel surface, HSG D
8.346	89	Row crops, straight row, Good, HSG D
0.958	89	Pasture/grassland/range, Poor, HSG D
2.500	80	>75% Grass cover, Good, HSG D
13.074	88	Weighted Average
12.212	87	93.41% Pervious Area
0.862	98	6.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0120	0.12		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.84"
12.3	634	0.0091	0.86		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	734	Total			

Subcatchment 50S: Direct to Wetland 4B



Summary for Subcatchment 60S: Direct to Wetland 5B

[49] Hint: Tc<2dt may require smaller dt

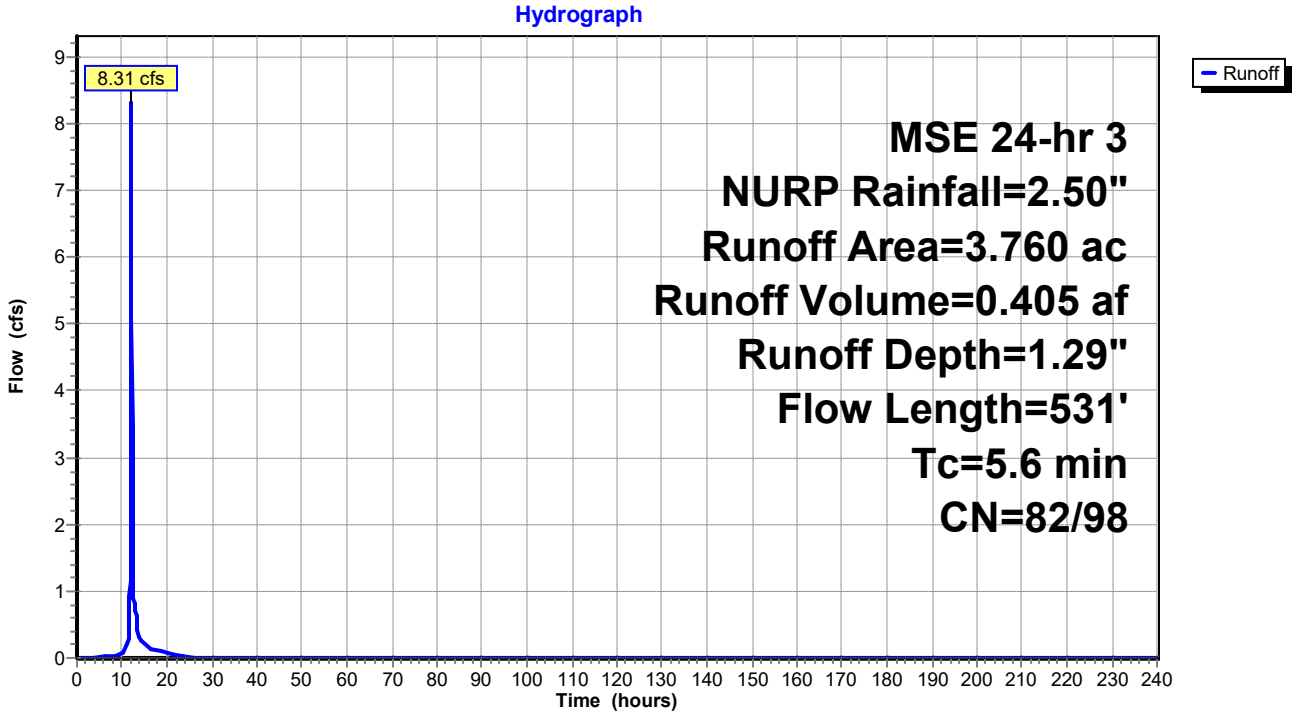
Runoff = 8.31 cfs @ 12.13 hrs, Volume= 0.405 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 NURP Rainfall=2.50"

Area (ac)	CN	Description
0.428	98	Unconnected pavement, HSG D
0.443	98	Unconnected roofs, HSG D
0.064	98	Water Surface, 0% imp, HSG D
0.331	96	Gravel surface, HSG D
2.083	80	>75% Grass cover, Good, HSG D
0.411	77	Woods, Good, HSG D
3.760	86	Weighted Average
2.889	82	76.84% Pervious Area
0.871	98	23.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0310	1.54		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.84"
4.5	431	0.0111	1.58		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.6	531	Total			

Subcatchment 60S: Direct to Wetland 5B



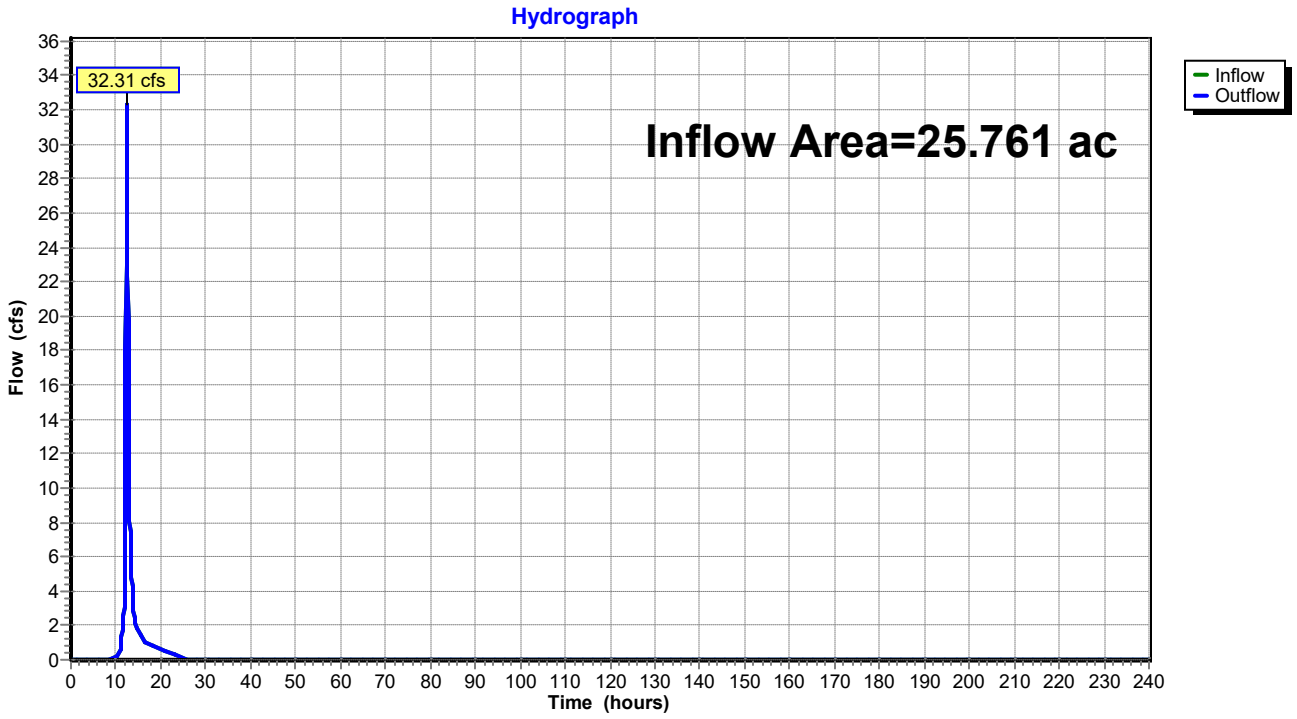
Summary for Reach 1R: Cowley Lake Outlet Channel

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 25.761 ac, 0.80% Impervious, Inflow Depth = 1.39" for NURP event
Inflow = 32.31 cfs @ 12.42 hrs, Volume= 2.981 af
Outflow = 32.31 cfs @ 12.42 hrs, Volume= 2.981 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 1R: Cowley Lake Outlet Channel



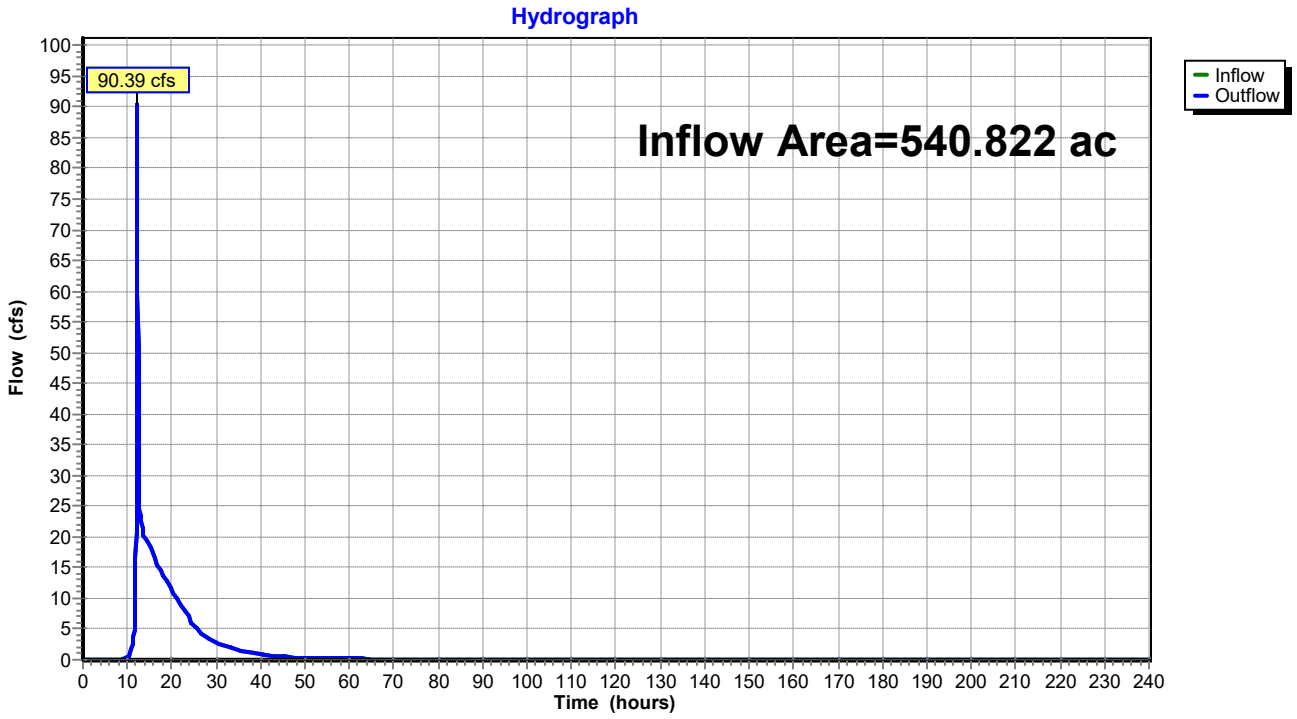
Summary for Reach 2R: Cowley Lake

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 540.822 ac, 2.65% Impervious, Inflow Depth = 0.47" for NURP event
Inflow = 90.39 cfs @ 12.21 hrs, Volume= 21.239 af
Outflow = 90.39 cfs @ 12.21 hrs, Volume= 21.239 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

Reach 2R: Cowley Lake



Summary for Reach 21R: East Channel

Inflow Area = 131.697 ac, 6.98% Impervious, Inflow Depth > 1.20" for NURP event
Inflow = 13.60 cfs @ 13.66 hrs, Volume= 13.158 af
Outflow = 13.60 cfs @ 13.68 hrs, Volume= 13.158 af, Atten= 0%, Lag= 1.2 min

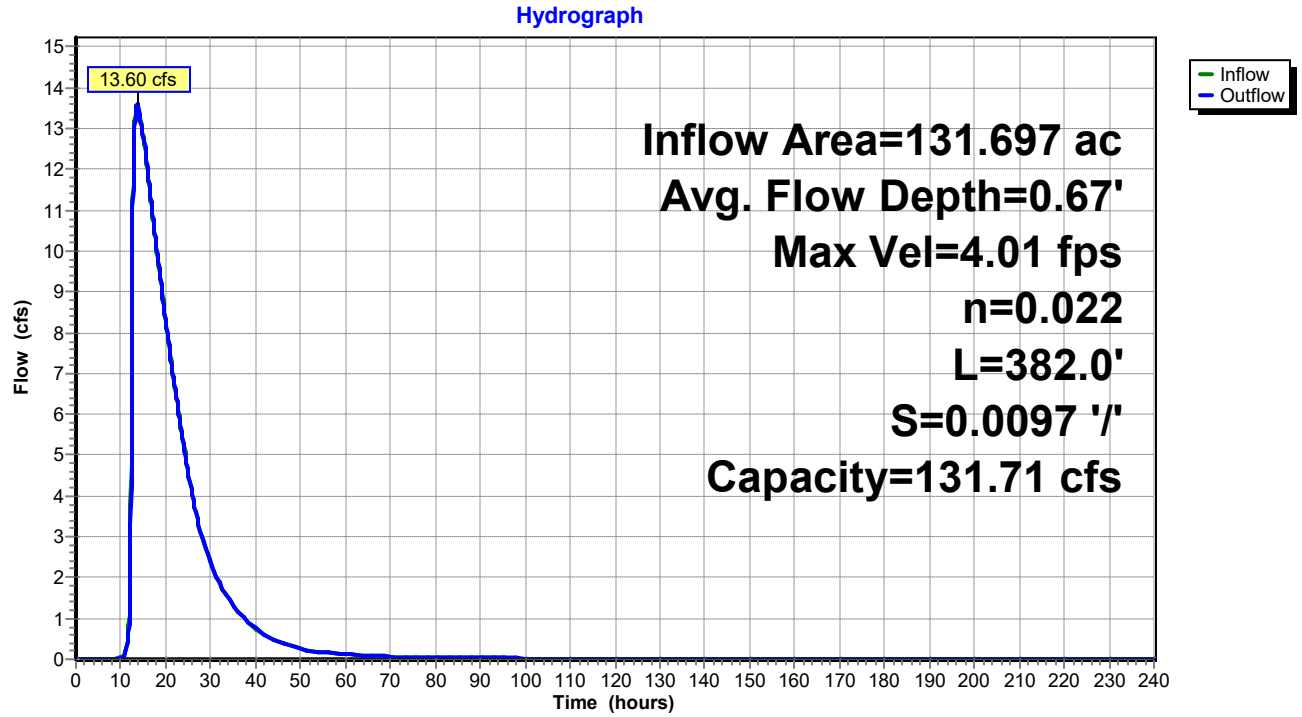
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.01 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 7.6 min

Peak Storage= 1,296 cf @ 13.68 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 131.71 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 382.0' Slope= 0.0097 '/'
Inlet Invert= 923.92', Outlet Invert= 920.20'

‡

Reach 21R: East Channel



Summary for Reach 23RL: Lower West Channel

Inflow Area = 371.058 ac, 1.30% Impervious, Inflow Depth > 0.12" for NURP event
Inflow = 19.45 cfs @ 12.17 hrs, Volume= 3.814 af
Outflow = 17.05 cfs @ 12.22 hrs, Volume= 3.814 af, Atten= 12%, Lag= 3.1 min

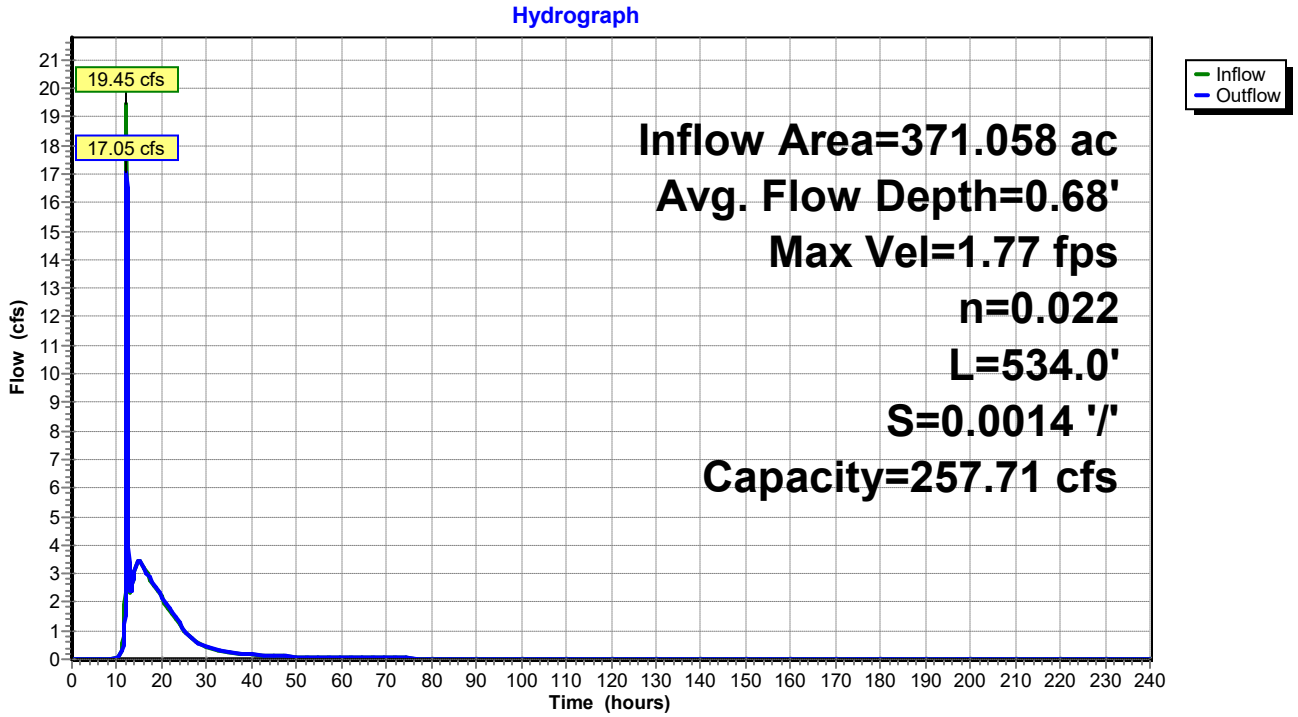
Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.30 fps, Avg. Travel Time= 30.0 min

Peak Storage= 5,105 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00' Flow Area= 63.0 sf, Capacity= 257.71 cfs

12.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 30.00'
Length= 534.0' Slope= 0.0014 '/'
Inlet Invert= 919.58', Outlet Invert= 918.82'

‡

Reach 23RL: Lower West Channel



Summary for Reach 23RU: Upper West Channel

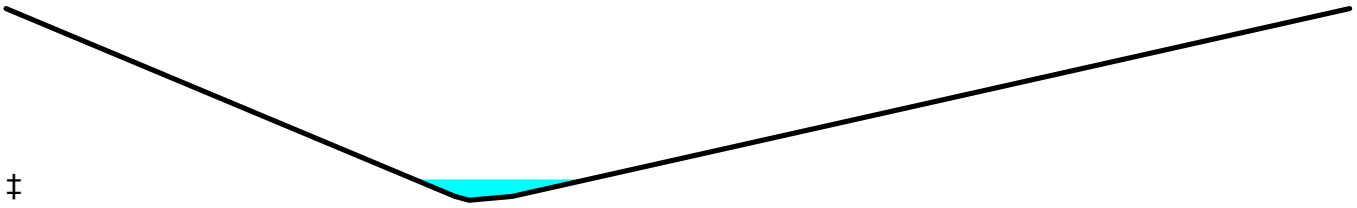
[80] Warning: Exceeded Pond 30P by 0.96' @ 0.00 hrs (0.58 cfs 0.694 af)

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth > 0.09" for NURP event
Inflow = 2.97 cfs @ 15.28 hrs, Volume= 2.771 af
Outflow = 2.97 cfs @ 15.36 hrs, Volume= 2.771 af, Atten= 0%, Lag= 4.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.29 fps, Min. Travel Time= 6.3 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 22.5 min

Peak Storage= 1,128 cf @ 15.36 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 2.04' Flow Area= 146.2 sf, Capacity= 766.18 cfs

Custom cross-section, Length= 490.0' Slope= 0.0057 '/'
Constant n= 0.022 Earth, clean & straight
Inlet Invert= 925.96', Outlet Invert= 923.17'



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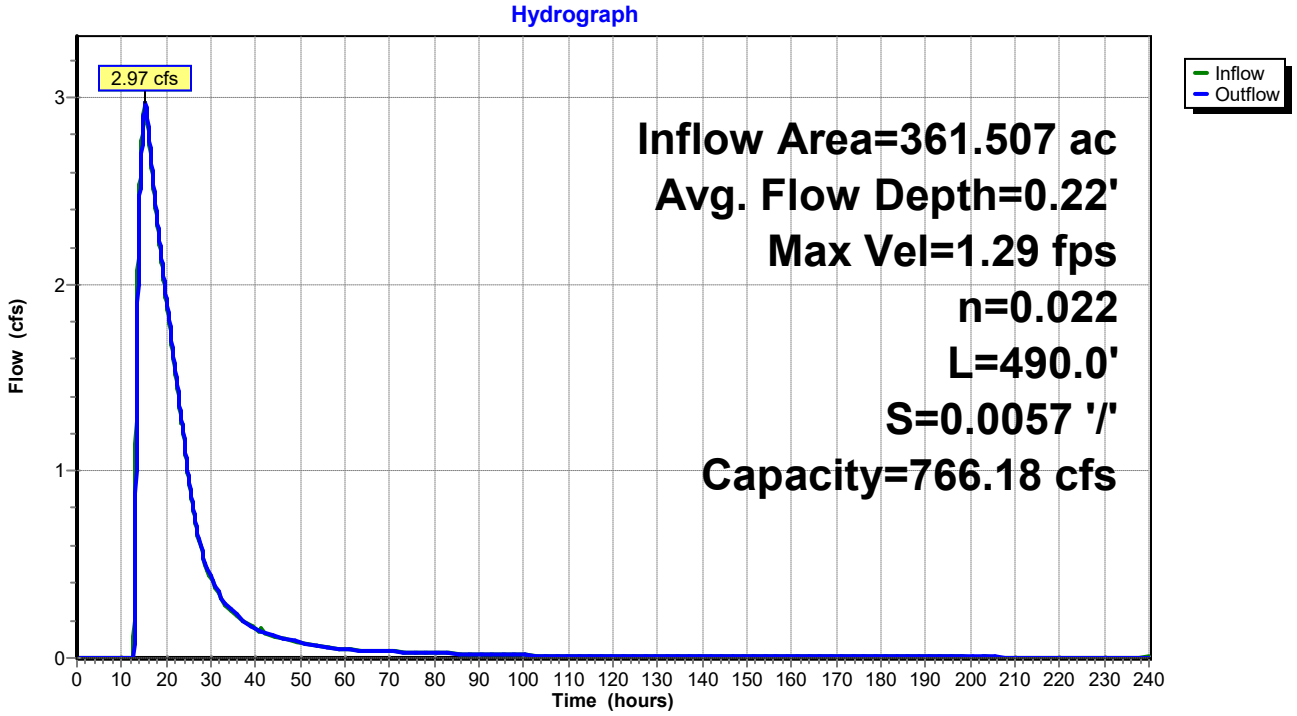
Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-48.27	928.00	0.00
-1.47	926.00	2.00
0.00	925.96	2.04
4.51	926.00	2.00
91.79	928.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.04	0.1	6.0	59	0.05
2.04	146.2	140.1	71,618	766.18

Reach 23RU: Upper West Channel



Summary for Pond 7P: Whiteford Lake and Wetlands

Inflow Area = 300.000 ac, 0.00% Impervious, Inflow Depth = 0.53" for NURP event
Inflow = 127.59 cfs @ 12.44 hrs, Volume= 13.215 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 930.22' @ 25.55 hrs Surf.Area= 60.657 ac Storage= 13.215 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

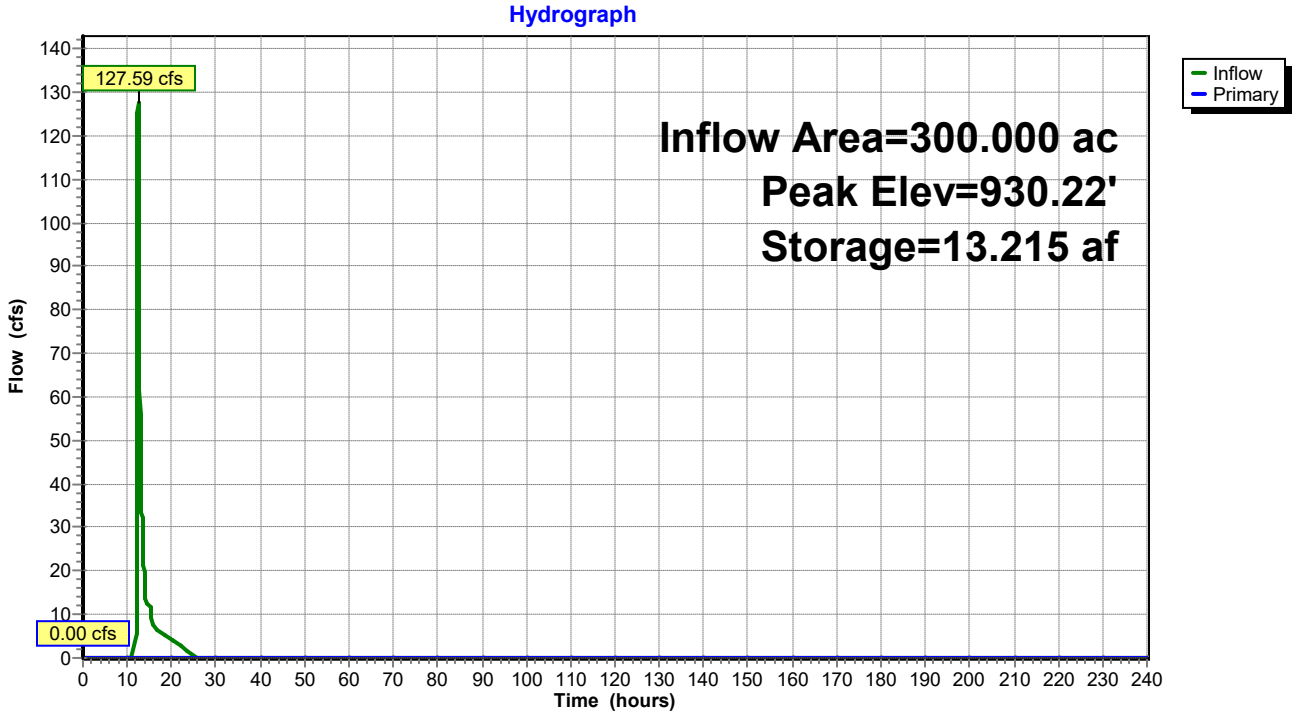
Volume	Invert	Avail.Storage	Storage Description
#1	930.00'	259.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.00	60.000	0.000	0.000
932.00	66.000	126.000	126.000
934.00	67.000	133.000	259.000

Device	Routing	Invert	Outlet Devices
#1	Primary	931.00'	**40.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=930.00' TW=930.22' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: Whiteford Lake and Wetlands



Summary for Pond 30P: Wetland 4A

[58] Hint: Peaked 0.26' above defined flood level
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=533)

Inflow Area = 361.507 ac, 1.34% Impervious, Inflow Depth = 0.18" for NURP event
Inflow = 56.56 cfs @ 12.37 hrs, Volume= 5.440 af
Outflow = 2.97 cfs @ 15.28 hrs, Volume= 2.771 af, Atten= 95%, Lag= 174.4 min
Primary = 2.97 cfs @ 15.28 hrs, Volume= 2.771 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 926.22' @ 15.35 hrs Surf.Area= 5.594 ac Storage= 4.003 af
Flood Elev= 925.96' Surf.Area= 5.112 ac Storage= 2.616 af

Plug-Flow detention time= 907.7 min calculated for 2.770 af (51% of inflow)
Center-of-Mass det. time= 815.3 min (1,643.8 - 828.5)

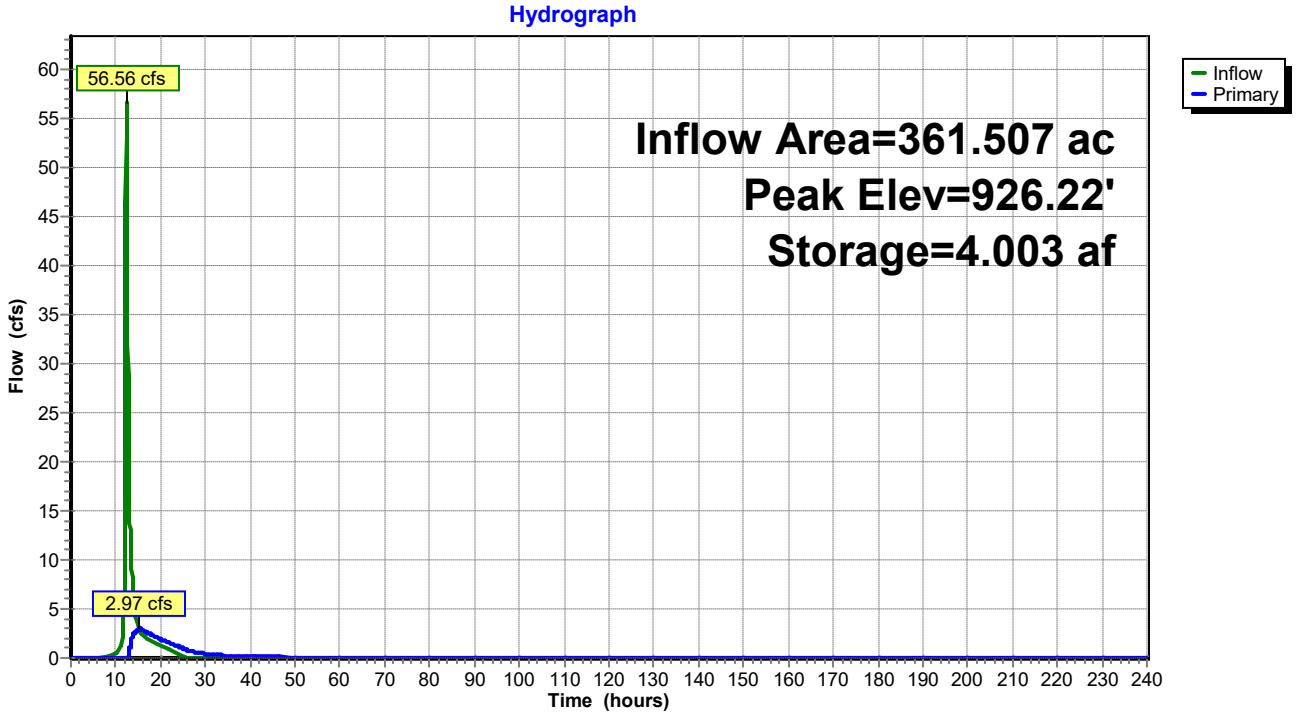
Volume	Invert	Avail.Storage	Storage Description
#1	925.00'	16.212 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
925.00	0.338	0.000	0.000
926.00	5.311	2.824	2.824
927.00	6.620	5.965	8.790
928.00	8.223	7.422	16.212

Device	Routing	Invert	Outlet Devices
#1	Primary	925.96'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.04 1.04 2.04 Width (feet) 0.00 6.00 90.00 140.00
#2	Primary	919.70'	**10.0" Round Culvert** L= 1,310.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 919.30' / 919.70' S= -0.0003 '/' Cc= 0.900 n= 0.013, Flow Area= 0.55 sf
#3	Device 2	925.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.96 cfs @ 15.28 hrs HW=926.22' TW=926.18' (Dynamic Tailwater)
- **1=Custom Weir/Orifice** (Weir Controls 2.85 cfs @ 0.85 fps)
- **2=Culvert** (Outlet Controls 0.11 cfs @ 0.20 fps)
  - **3=Orifice/Grate** (Passes 0.11 cfs of 0.49 cfs potential flow)

Pond 30P: Wetland 4A



Summary for Pond 31P: Ex 24" Culvert Crossing

[80] Warning: Exceeded Pond 7P by 1.86' @ 12.60 hrs (95.23 cfs 4.382 af)

Inflow Area = 320.000 ac, 0.75% Impervious, Inflow Depth = 0.05" for NURP event
Inflow = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af
Outflow = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af, Atten= 0%, Lag= 0.4 min
Primary = 10.74 cfs @ 12.60 hrs, Volume= 1.346 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 931.92' @ 12.60 hrs Surf.Area= 0.005 ac Storage= 0.004 af

Plug-Flow detention time= 0.2 min calculated for 1.346 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (844.7 - 844.5)

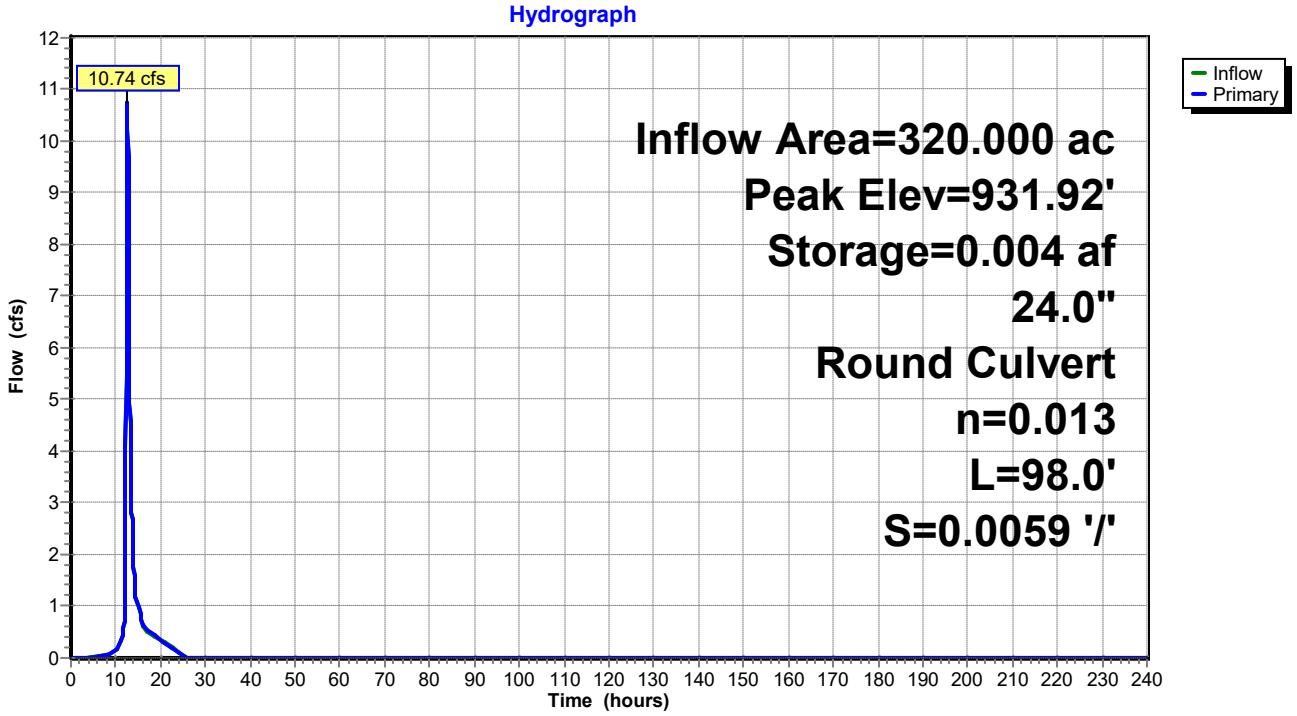
Volume	Invert	Avail.Storage	Storage Description
#1	930.22'	14.106 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
930.22	0.000	0.000	0.000
932.00	0.005	0.004	0.004
934.00	0.772	0.777	0.781
936.00	12.553	13.325	14.106

Device	Routing	Invert	Outlet Devices
#1	Primary	930.22'	**24.0" Round Culvert** L= 98.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 930.22' / 929.64' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=10.73 cfs @ 12.60 hrs HW=931.92' TW=925.91' (Dynamic Tailwater)
1=Culvert (Barrel Controls 10.73 cfs @ 5.07 fps)

Pond 31P: Ex 24" Culvert Crossing



Summary for Pond 40P: Wetland 2B

Inflow Area = 130.797 ac, 7.03% Impervious, Inflow Depth = 1.20" for NURP event
Inflow = 115.05 cfs @ 12.35 hrs, Volume= 13.100 af
Outflow = 13.52 cfs @ 13.71 hrs, Volume= 13.096 af, Atten= 88%, Lag= 81.6 min
Primary = 13.52 cfs @ 13.71 hrs, Volume= 13.096 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 925.06' @ 13.71 hrs Surf.Area= 8.580 ac Storage= 5.768 af

Plug-Flow detention time= 357.1 min calculated for 13.093 af (100% of inflow)
Center-of-Mass det. time= 353.4 min (1,350.7 - 997.4)

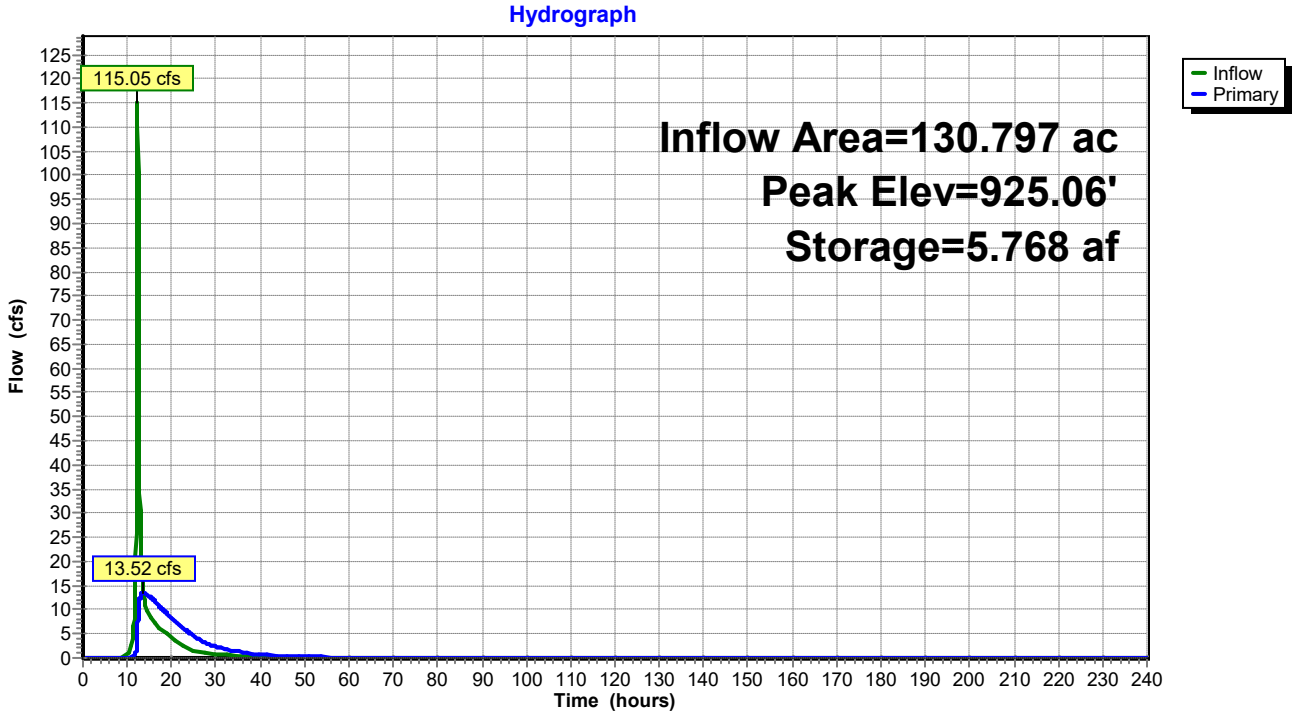
Volume	Invert	Avail.Storage	Storage Description
#1	923.92'	52.726 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
923.92	0.000	0.000	0.000
924.00	2.123	0.085	0.085
926.00	14.283	16.406	16.491
928.00	21.952	36.235	52.726

Device	Routing	Invert	Outlet Devices
#1	Primary	923.58'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -12.19 0.00 7.43 15.99
			Height (feet) 3.38 0.00 0.09 3.38
#2	Device 1	923.92'	**Asymmetrical Weir, C= 3.27**
			Offset (feet) -56.17 -5.92 -1.08 0.00 3.27 6.37 30.87 135.00
			Height (feet) 4.08 2.08 1.66 0.00 0.12 1.87 2.08 4.08

Primary OutFlow Max=13.52 cfs @ 13.71 hrs HW=925.06' TW=924.59' (Dynamic Tailwater)
↑**1=Asymmetrical Weir** (Passes 13.52 cfs of 49.41 cfs potential flow)
↑**2=Asymmetrical Weir** (Weir Controls 13.52 cfs @ 2.10 fps)

Pond 40P: Wetland 2B



Summary for Pond 41P: Ex South Off-site Pond

Inflow Area = 13.713 ac, 13.43% Impervious, Inflow Depth = 1.07" for NURP event
Inflow = 21.24 cfs @ 12.18 hrs, Volume= 1.228 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 939.12' @ 24.60 hrs Surf.Area= 1.223 ac Storage= 1.228 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

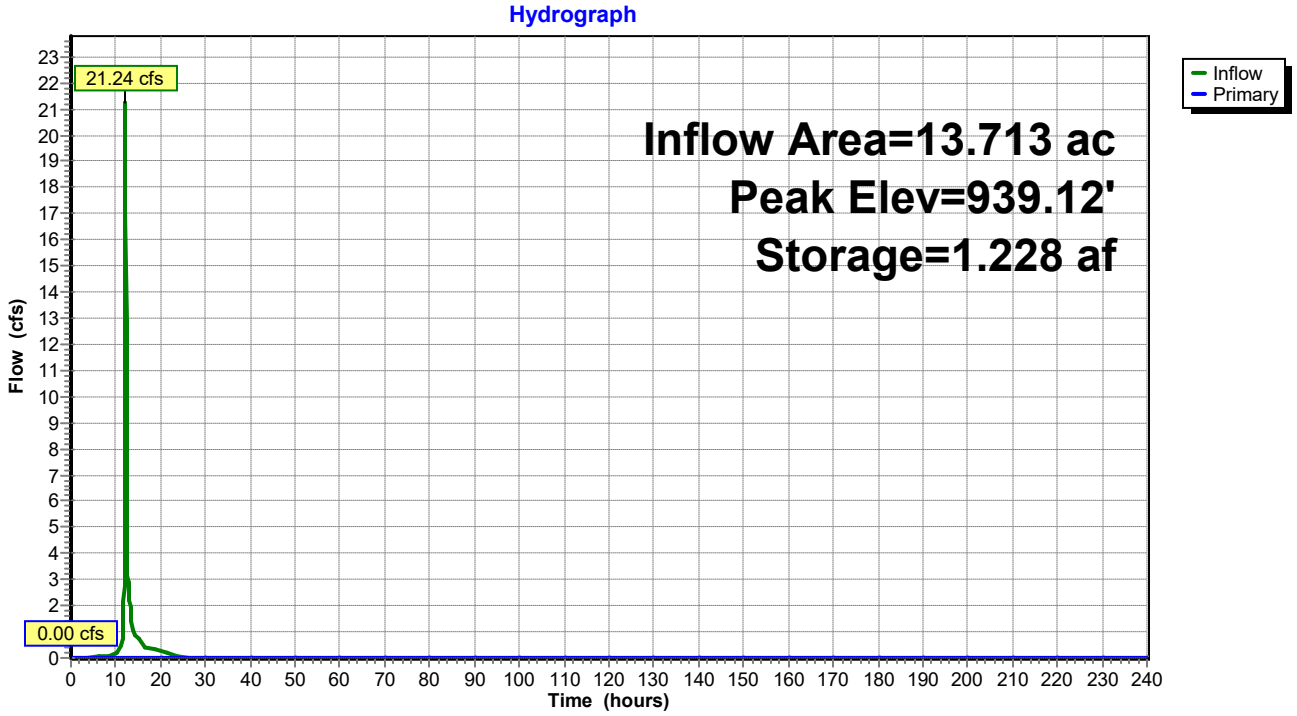
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	4.911 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.107	0.000	0.000
938.00	0.278	0.385	0.385
940.00	1.962	2.240	2.625
941.00	2.611	2.286	4.911

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 25.00 100.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=936.00' TW=923.92' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 41P: Ex South Off-site Pond



Summary for Pond 50P: Wetland 4B

Inflow Area = 39.464 ac, 12.63% Impervious, Inflow Depth = 0.53" for NURP event
Inflow = 17.34 cfs @ 12.39 hrs, Volume= 1.737 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 940.02' @ 240.00 hrs Surf.Area= 1.621 ac Storage= 1.737 af
Flood Elev= 941.50' Surf.Area= 3.181 ac Storage= 5.223 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

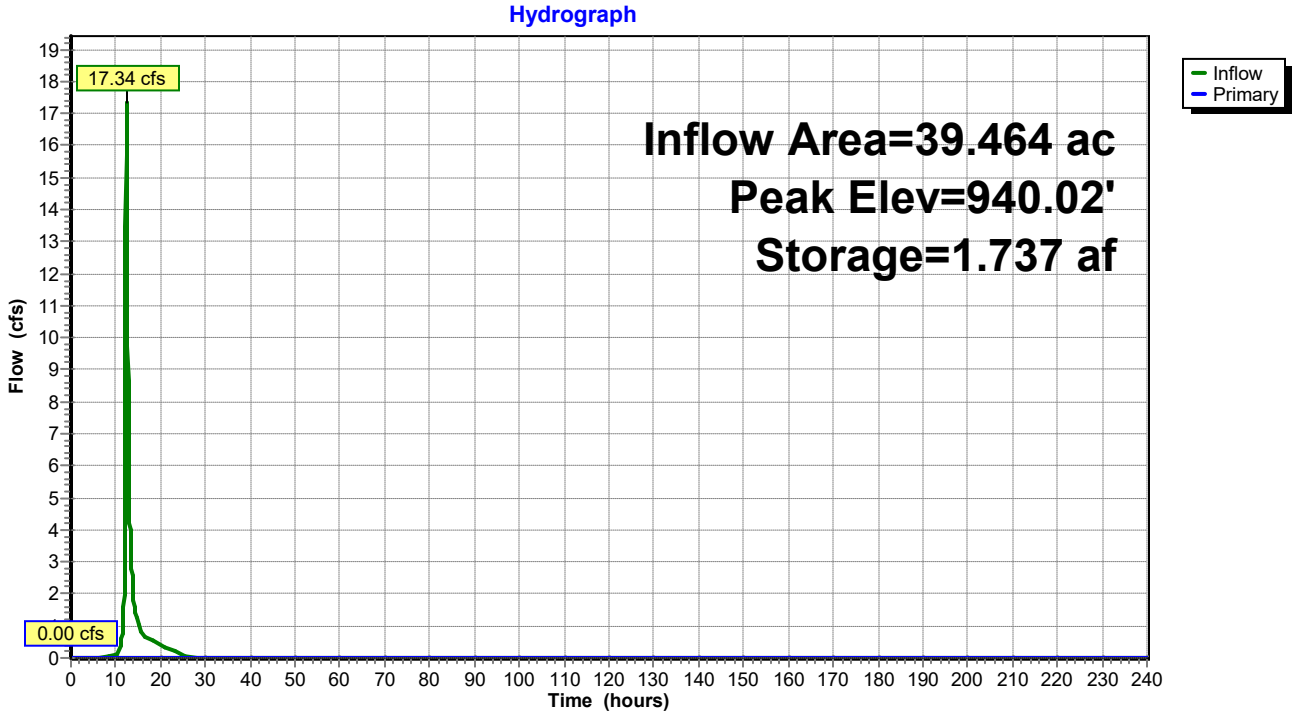
Volume	Invert	Avail.Storage	Storage Description
#1	938.00'	6.966 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
938.00	0.102	0.000	0.000
940.00	1.599	1.701	1.701
941.00	2.570	2.085	3.785
942.00	3.792	3.181	6.966

Device	Routing	Invert	Outlet Devices
#1	Primary	941.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 40.00 80.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=938.00' TW=923.92' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 50P: Wetland 4B



Summary for Pond 60P: Wetland 5B

[58] Hint: Peaked 0.12' above defined flood level

Inflow Area = 3.760 ac, 23.16% Impervious, Inflow Depth > 13.59" for NURP event
Inflow = 9.74 cfs @ 12.13 hrs, Volume= 4.259 af
Outflow = 4.34 cfs @ 15.02 hrs, Volume= 4.045 af, Atten= 55%, Lag= 173.4 min
Primary = 4.34 cfs @ 15.02 hrs, Volume= 4.045 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs
Peak Elev= 938.62' @ 15.02 hrs Surf.Area= 0.250 ac Storage= 0.242 af
Flood Elev= 938.50' Surf.Area= 0.226 ac Storage= 0.214 af

Plug-Flow detention time= 206.7 min calculated for 4.045 af (95% of inflow)
Center-of-Mass det. time= 42.0 min (1,407.5 - 1,365.5)

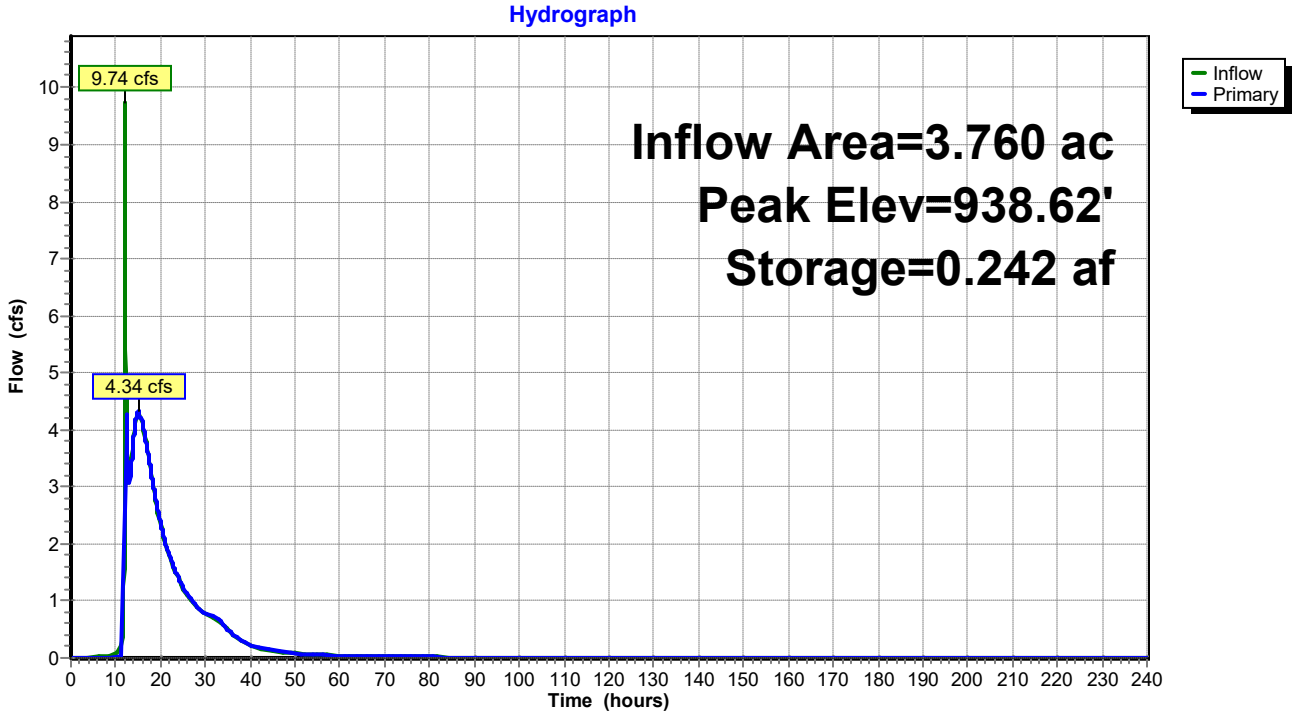
Volume	Invert	Avail.Storage	Storage Description
#1	936.00'	0.353 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
936.00	0.004	0.000	0.000
938.00	0.123	0.127	0.127
939.00	0.328	0.226	0.353

Device	Routing	Invert	Outlet Devices
#1	Primary	938.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 30.00 55.00

Primary OutFlow Max=4.34 cfs @ 15.02 hrs HW=938.62' TW=925.03' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Weir Controls 4.34 cfs @ 1.11 fps)

Pond 60P: Wetland 5B



Summary for Link 1PP: Northwest Wetland (Big Woods)

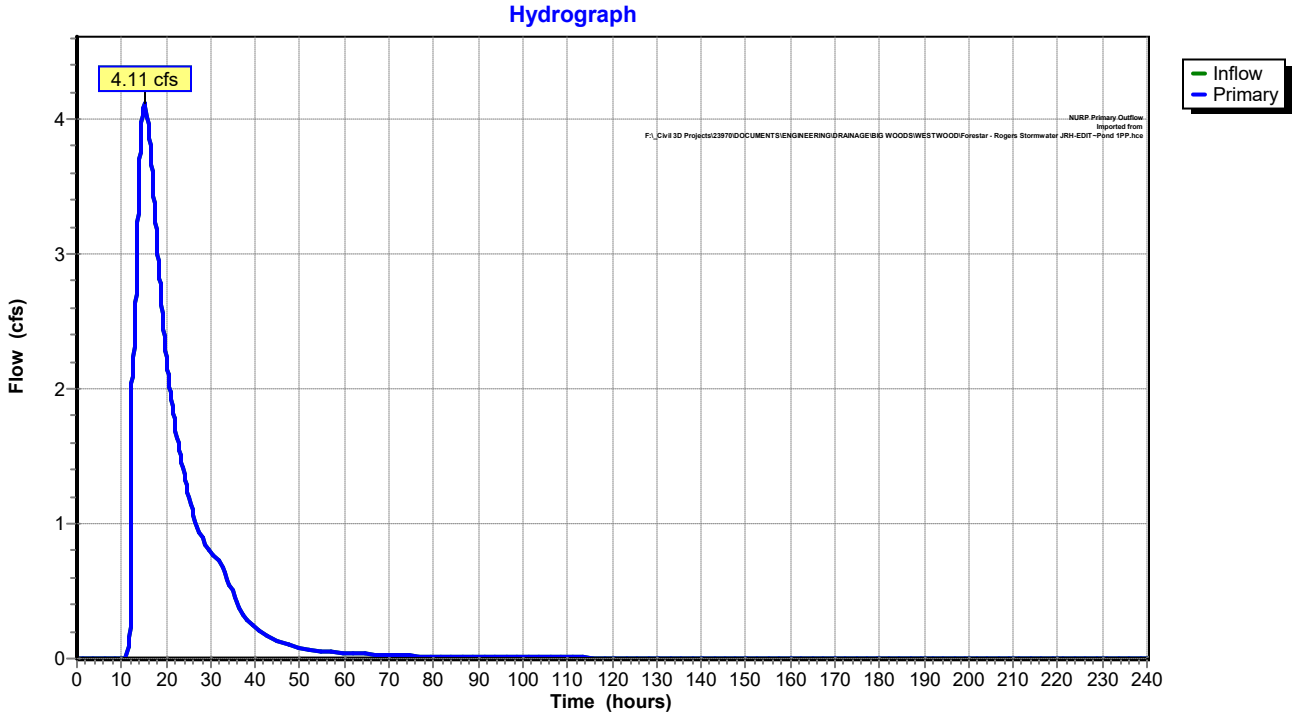
From the Big Woods development drainage model prepared by Westwood.

Inflow	=	4.11 cfs @	15.12 hrs, Volume=	3.854 af
Primary	=	4.11 cfs @	15.12 hrs, Volume=	3.854 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

NURP Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 1PP: Northwest Wetland (Big Woods)



Summary for Link 5PP: Existing Pond (Big Woods)

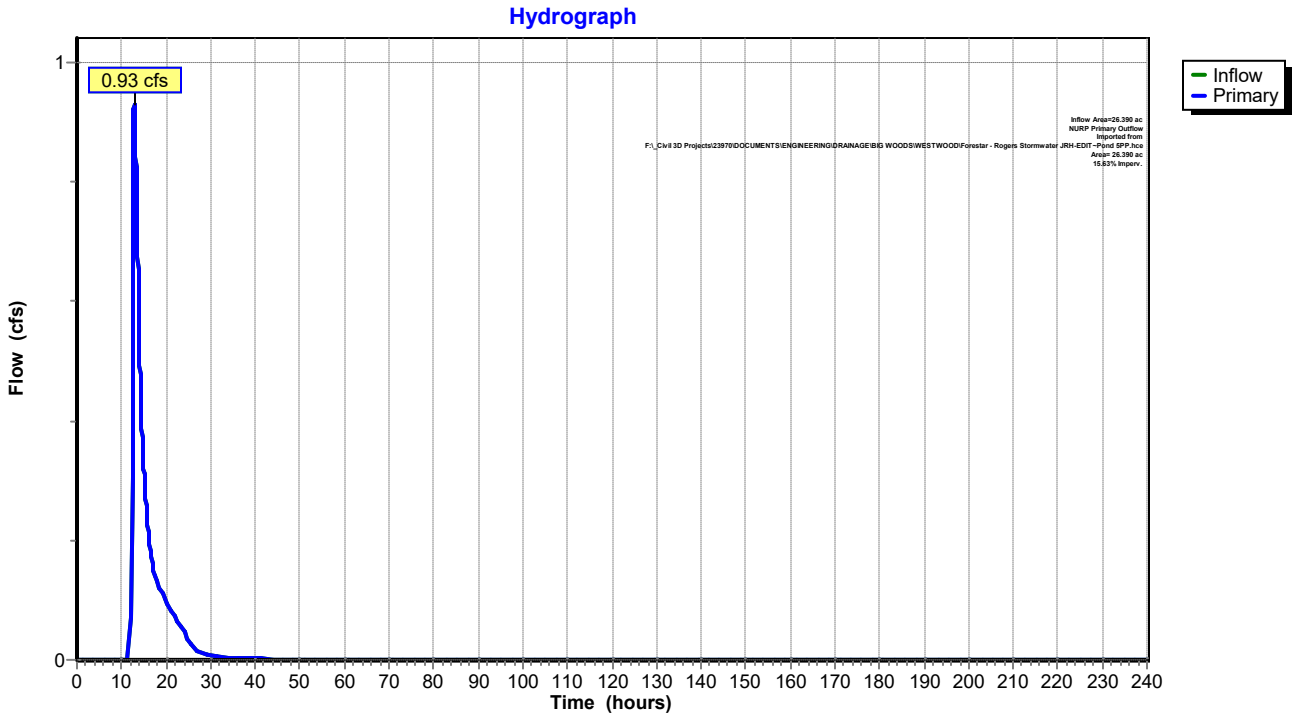
From the Big Woods development drainage model prepared by Westwood.

Inflow Area = 26.390 ac, 15.63% Impervious, Inflow Depth = 0.11" for NURP event
Inflow = 0.93 cfs @ 12.82 hrs, Volume= 0.240 af
Primary = 0.93 cfs @ 12.82 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-240.00 hrs, dt= 0.05 hrs

NURP Primary Outflow Imported from F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\BIG WC

Link 5PP: Existing Pond (Big Woods)



COWLEY LAKE PRESERVE - DESIGN IMPERVIOUS SURFACE SUMMARY **2/24/2025**

COMPUTATION OF IMPERVIOUS SURFACE AND REQUIRED VOLUME CONTROL

IMPERVIOUS AREA:							
STREETS WITHIN PLAT				275,189	SF	6.317	AC
STREETS OUTSIDE PLAT				7,794	SF	0.179	AC
TRAILS/WALKS WITHIN PLAT				67,561	SF	1.551	AC
TRAILS/WALKS OUTSIDE PLAT				2,477	SF	0.057	AC
FUTURE STREETS WITHIN PLAT				4,164	SF	0.096	AC
FUTURE TRAILS/WALKS WITHIN PLAT				752	SF	0.017	AC
LOTS	# LOTS						
ROOFS							
42' CARRIAGE LOTS	36	2,100	SF	75,600	SF	1.736	AC
60' VILLA LOTS	26	2,600	SF	67,600	SF	1.552	AC
60' STANDARD LOTS	48	2,400	SF	115,200	SF	2.645	AC
70' STANDARD LOTS	59	3,000	SF	177,000	SF	4.063	AC
DRIVEWAYS							
CARRIAGE LOTS	36	900	SF	32,400	SF	0.744	AC
STANDARD AND VILLA LOTS	133	1,100	SF	146,300	SF	3.359	AC
TOTAL IMPERVIOUS				**972,037**	**SF**	**22.315**	**AC**

INDICATES AREA MEASURED IN CAD

INDICATES ASSUMED VALUES

VOLUME CONTROL REQUIRED

REQUIRED VOL = 1.1"/12"/FT X TOTAL IMP = *2.046 AC-FT*

*FILTRATION CREDIT AT 55% = 2.046*1.82 =* *3.724 AC-FT REQUIRED*

VOLUME CONTROL PROVIDED	SEE HYDROCAD MODEL	
POND 10P NORTHEAST POND/FILTRATION	1.149	AC-FT
POND 25P NORTHWEST POND/FILTRATION	1.846	AC-FT
POND 26P NORTHWEST CENTRAL POND/FILTRATION	1.333	AC-FT
TOTAL VOLUME	**4.328**	**AC-FT PROVIDED**

COWLEY LAKE PRESERVE - FILTRATION COMPUTATIONS **2/24/2025**

	POND 10P	POND 25P	POND 26P
1. RATE (IN/HR)	0.8	0.8	0.8
2. SURFACE AREA (SF)	16,819	29,363	20,260
3. FLOW (CFS)	0.31	0.54	0.38
4. VOLUME (CF)	50,050	80,412	58,065
5. DRAWDOWN (HR)	44.6	41.1	43.0

NOTES:

1. Assumed infiltration rate of the filtration media mix.
2. Proposed surface area of the filtration media mix.
3. Computed infiltration flow (Surface Area times Rate). Used as constant flow in the HydroCAD model.
4. Retainted volume below the primary pond outlet.
5. Computed drawdown time of the retained volume (Volume divided by Flow).

USER INPUT

P8 Urban Catchment Model, Version 3.5

Case	23970-EXISTING.p8c
Title	Cowley Lake Preserve Existing
PrecFile	MSP4918.pcp
PartFile	nurp50.p8p

Case Title	Cowley Lake Preserve Existing
Case Data File	23970-EXISTING.p8c
Path	F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\P8\
Case Notes:	Existing Conditions Cowley Lake Preserve Rogers, MN
Storm Data File	MSP4918.pcp
Particle File	nurp50.p8p
Air Temp File File	MSP4918.tem

Time Steps Per Hour	4
Minimum Inter-Event Time (hrs)	10
Maximum Continuity Error %	2
Rainfall Breakpoint (inches)	0.8
Precipitation Scale Factor	1
Air Temp Offset (deg-F)	0
Loops Thru Storm File	1
Simulation Dates	
Start	1/1/2000
Keep	6/1/2000
Stop	12/31/2018

Max Snowfall Temperature (deg-f)	32.0
SnowMelt Temperature (deg-f)	32.0
Snowmelt Coef (in/degF-Day)	0.06
Soil Freeze Temp (deg-F)	32.0
Snowmelt Abstraction Factor	1.00
Evapo-Trans. Calibration Factor	1.00
Growing Season Start Month	5
Growing Season End Month	10

5-Day Antecedent Rainfall + Runoff (inches)		
CN Antecedent Moisture Condition	AMC-II	AMC-III
Growing Season	1.40	2.10
NonGrowing Season	0.50	1.10

Watershed Data

Watershed Name	10S	20S	21S	22S	23S	24S	30S	40S	41S	50S	60S				
Runoff to Device	1R	2R	21R	2R	23RL	2R	30P	40P	41P	50P	60P				
Infiltration to Device															
Watershed Area	25.761	6.216	0.9	5.776	9.551	26.075	41.507	73.86	13.713	13.074	3.76				
SCS Curve Number (Pervious)	87	85	77	86	86	87	84	84	80	87	81				
Scale Factor for Pervious Runoff Load	1	1	1	1	1	1	1	1	1	1	1				
Indirectly Connected Imperv Fraction	0.008	0	0	0	0	0.0114	0.0585	0.0202	0.1343	0.0659	0.2316				
UnSwept Impervious Fraction	0	0	0	0	0	0	0	0	0	0	0				
UnSwept Depression Storage (inches)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
UnSwept Imperv. Runoff Coefficient	1	1	1	1	1	1	1	1	1	1	1				
UnSwept Scale Factor for Particle Loads	1	1	1	1	1	1	1	1	1	1	1				
Swept Impervious Fraction	0	0	0	0	0	0	0	0	0	0	0				
Swept Depression Storage (inches)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
Swept Imperv. Runoff Coefficient	1	1	1	1	1	1	1	1	1	1	1				
Swept Scale Factor for Particle Loads	1	1	1	1	1	1	1	1	1	1	1				
Sweeping Frequency	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
Sweeping Efficiency	1	1	1	1	1	1	1	1	1	1	1				
Sweeping Start Date (MMDD)	101	101	101	101	101	101	101	101	101	101	101				
Sweeping Stop Date (MMDD)	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231				

Device Data															
Device Name	21R	23RL	23RU	30P	40P	41P	50P	60P	1R	2R					
Device Type	SWALE	SWALE	SWALE	POND	POND	POND	POND	POND	PIPE	PIPE					
Infiltration Outlet															
Normal Outlet	2R	2R	23RL	23RU	21R	40P	40P	40P							
Spillway Outlet	2R	2R	23RL	23RU	21R	40P	40P	40P							
Particle Removal Scale Factor	1	1	1	1	1	1	1	1							
Bottom Elevation (ft)	923.92	919.58	925.96	925	923.92	936	938	936							
Bottom Area (acres)				0.338	2.123	0.107	0.102	0.004							
Permanent Pool Area (acres)				5.112	2.123	0.107	3.181	0.226							
Permanent Pool Volume (ac-ft)				2.616	0	0	5.223	0.214							
Perm Pool Infilt Rate (in/hr)				0	0	0	0	0							
Flood Pool Area (acres)				8.223	15.343	2.395	3.376	0.318							
Flood Pool Volume (ac-ft)				16.212	20.585	4.079	5.746	0.337							
Flood Pool Infilt Rate (in/hr)	0	0	0	0	0	0	0	0							
Infilt Basin Void Fraction (%)															
Detention Pond Outlet Parameters															
Outlet Type				WEIR	WEIR	WEIR	WEIR	WEIR							
Outlet Orifice Diameter (in)															
Orifice Discharge Coef															
Outlet Weir Length (ft)				90	7	25	40	30							
Weir Discharge Coef				2.62	3.27	2.62	2.62	2.62							
Perforated Riser Height (ft)															
Number of Holes in Riser															
Holes Diameter															
Flood Pool Drain Time (hrs)															
Swale Parameters															
Length of Flow Path (ft)	382	534	490												
Slope of Flow Path %	0.97	0.14	0.57												
Bottom Width (ft)	3	12	5.98												
Side Slope (ft-v/ft-h)	3	3	23.4												
Maximum Depth of Flow (ft)	1.58	2.41	1.1												
Mannings n Constant	0.022	0.022	0.022												
Hydraulic Model	0	0	0												
Pipe, Splitter, Aquifer Parameter															
Hydraulic Res. Time (hrs)									0	0					

Particle Data					
Particle File	nurp50.p8p				
Particle Class	P0%	P10%	P30%	P50%	P80%
Filtration Efficiency (%)	90	100	100	100	100
Settling Velocity (ft/hr)	0	0.03	0.3	1.5	15
First Order Decay Rate (1/day)	0	0	0	0	0
2nd Order Decay (1/day-ppm)	0	0	0	0	0
Impervious Runoff Conc (ppm)	1	0	0	0	0
Pervious Runoff Conc (ppm)	1	100	100	100	200
Pervious Conc Exponent	0	1	1	1	1
Accum. Rate (lbs-ac-day)	0	1.75	1.75	1.75	3.5
Particle Removal Rate (1/day)	0	0.25	0.25	0.25	0.25
Washoff Coefficient	0	20	20	20	20
Washoff Exponent	0	2	2	2	2
Sweeper Efficiency	0	0	0	5	15

Water Quality Component Data										
Component Name	TSS	TP	TKN	CU	PB	ZN	HC			
Water Quality Criteria (ppm)										
Level 1	5	0.025	2	2	0.02	5	0.1			
Level 2	10	0.05	1	0.0048	0.014	0.0362	0.5			
Level 3	20	0.1	0.5	0.02	0.15	0.38	1			
Content Scale Factor	1	1	1	1	1	1	1			
Particle Composition (mg/kg)										
P0%	0	99000	600000	13600	2000	64000	250000			
P10%	1000000	3850	15000	340	180	1600	22500			
P30%	1000000	3850	15000	340	180	1600	22500			
P50%	1000000	3850	15000	340	180	1600	22500			
P80%	1000000	0	0	340	180	0	22500			

P8 Urban Catchment Model, Version 3.5				Run Date	02/12/25
Case	23970-PROPOSED.p8c	FirstDate	06/01/00	Precip(in)	545.0
Title	Cowley Lake Preserve Proposed	LastDate	12/31/18	Rain(in)	481.61
PrecFile	MSP4918.pcp	Events	1355	Snow(in)	63.35
PartFile	nurp50.p8p	TotalHrs	162806	TotalYrs	18.57

Case Title	Cowley Lake Preserve Proposed
Case Data File	23970-PROPOSED.p8c
Path	F:_Civil 3D Projects\23970\DOCUMENTS\ENGINEERING\DRAINAGE\P8\
Case Notes:	Proposed Conditions Cowley Lake Preserve Rogers, MN
Storm Data File	MSP4918.pcp
Particle File	nurp50.p8p
Air Temp File File	MSP4918.tem

Time Steps Per Hour	4
Minimum Inter-Event Time (hrs)	10
Maximum Continuity Error %	2
Rainfall Breakpoint (inches)	0.8
Precipitation Scale Factor	1
Air Temp Offset (deg-F)	0
Loops Thru Storm File	1
Simulation Dates	
Start	1/1/2000
Keep	6/1/2000
Stop	12/31/2018

Max Snowfall Temperature (deg-f)	32.0
SnowMelt Temperature (deg-f)	32.0
Snowmelt Coef (in/degF-Day)	0.06
Soil Freeze Temp (deg-F)	32.0
Snowmelt Abstraction Factor	1.00
Evapo-Trans. Calibration Factor	1.00
Growing Season Start Month	5
Growing Season End Month	10

5-Day Antecedent Rainfall + Runoff (inches)		
CN Antecedent Moisture Condition	AMC-II	AMC-III
Growing Season	1.40	2.10
NonGrowing Season	0.50	1.10

Watershed Data

Watershed Name	10S	11S		20S	21S	22S	23S	24S	25S	26S	27S	28S	30S	32S	40S	41S	42S	43S	50S	60S
Runoff to Device	10P	1R		2R	21R	2R	23R	2R	25P	26P	27P	28P	30P	32P	40P	41P	42P	43P	50P	60P
Infiltration to Device																				
Watershed Area	19.438	6.152		3.97	0.782	3.04	3.385	7.873	15.059	4.398	3.12	7.153	34.339	3.686	67.435	13.713	2.409	6.86	13.074	3.76
SCS Curve Number (Pervious)	86	78		78	77	78	78	78	81	81	83	82	82	83	83	80	80	82	87	81
Scale Factor for Pervious Runoff Load	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Indirectly Connected Imperv Fraction	0.0765	0.0335		0.0766	0.0128	0.1033	0.0068	0.0531	0.131	0.128	0.1311	0.1515	0.0687	0.1294	0.0292	0.1343	0.0805	0.1544	0.0659	0.2316
UnSwept Impervious Fraction	0.1346	0		0	0	0	0	0	0.1843	0.2558	0.3391	0.3549	0	0.2358	0	0	0.1972	0.2567	0	0
UnSwept Depression Storage (inches)	0.02	0.02		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
UnSwept Imperv. Runoff Coefficient	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UnSwept Scale Factor for Particle Loads	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Swept Impervious Fraction	0	0		0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0
Swept Depression Storage (inches)	0.02	0.02		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Swept Imperv. Runoff Coefficient	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Swept Scale Factor for Particle Loads	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sweeping Frequency	0	0		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sweeping Efficiency	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sweeping Start Date (MMDD)	101	101		101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101
Sweeping Stop Date (MMDD)	1231	1231		1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231	1231

Device Data																				
Device Name	10P	21R	23R	25P	26P	27P	28P	30P	32P	40P	41P	42P	43P	50P	60P	1R	2R			
Device Type	POND	SWALE	SWALE	POND	POND	POND	POND	POND	POND	POND	POND	POND	POND	POND	POND	PIPE	PIPE			
Infiltration Outlet	1R	2R	2R	2R	23R	26P	23R	23R	30P	21R	40P	40P	40P	40P	40P					
Normal Outlet	1R	2R	2R	2R	23R	26P	23R	23R	30P	21R	40P	40P	40P	40P	40P					
Spillway Outlet	1R	2R	2R	2R	23R	2R	23R	23R	30P	21R	40P	40P	40P	40P	40P					
Particle Removal Scale Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Bottom Elevation (ft)	913	923.5	919.58	917	916	917	914	924.6	920	923.9	936	922.5	918.5	938	936					
Bottom Area (acres)	0.209			0.052	0.009	0.019	0.034	0.002	0.034	2.123	0.107	0.007	0.053	0.102	0.004					
Permanent Pool Area (acres)	0.662			0.322	0.318	0.278	0.38	0.002	0.395	2.123	0.107	0.154	0.401	3.181	0.226					
Permanent Pool Volume (ac-ft)	2.995			1.156	0.894	0.723	1.043	0	1.213	0	0	0.305	1.319	5.223	0.214					
Perm Pool Infilt Rate (in/hr)	0			0	0	0	0	0	0	0	0	0	0	0	0					
Flood Pool Area (acres)	1.553			1.584	1.155	0.543	0.724	8.223	0.638	21.952	2.611	0.372	0.787	3.376	0.318					
Flood Pool Volume (ac-ft)	9.359			5.216	3.855	1.777	2.802	16.279	2.284	36.235	4.911	1.118	3.505	5.746	0.337					
Flood Pool Infilt Rate (in/hr)	0.8	0	0	0.8	0.8	0	0	0	0	0	0	0	0	0	0					
Infilt Basin Void Fraction (%)																				
Detention Pond Outlet Parameters																				
Outlet Type	ORIFICE			ORIFICE	ORIFICE	ORIFICE	ORIFICE	WEIR	ORIFICE	WEIR	WEIR	ORIFICE	ORIFICE	WEIR	WEIR					
Outlet Orifice Diameter (in)	36			21	21	24	24		18			15	18							
Orifice Discharge Coef	0.6			0.6	0.6	0.6	0.6		1			0.6	0.6							
Outlet Weir Length (ft)								8		8	25			40	30					
Weir Discharge Coef								2.62		3.27	2.62			2.62	2.62					
Perforated Riser Height (ft)																				
Number of Holes in Riser																				
Holes Diameter																				
Flood Pool Drain Time (hrs)																				
Swale Parameters																				
Length of Flow Path (ft)		264	251																	
Slope of Flow Path %		0.0125	0.37																	
Bottom Width (ft)		3	6																	
Side Slope (ft-v/ft-h)		3	4																	
Maximum Depth of Flow (ft)		2	3																	
Mannings n Constant		0.022	0.022																	
Hydraulic Model		0	0																	
Pipe, Splitter, Aquifer Parameter																				
Hydraulic Res. Time (hrs)																0	0			

Particle Data					
Particle File	nurp50.p8p				
Particle Class	P0%	P10%	P30%	P50%	P80%
Filtration Efficiency (%)	90	100	100	100	100
Settling Velocity (ft/hr)	0	0.03	0.3	1.5	15
First Order Decay Rate (1/day)	0	0	0	0	0
2nd Order Decay (1/day-ppm)	0	0	0	0	0
Impervious Runoff Conc (ppm)	1	0	0	0	0
Pervious Runoff Conc (ppm)	1	100	100	100	200
Pervious Conc Exponent	0	1	1	1	1
Accum. Rate (lbs-ac-day)	0	1.75	1.75	1.75	3.5
Particle Removal Rate (1/day)	0	0.25	0.25	0.25	0.25
Washoff Coefficient	0	20	20	20	20
Washoff Exponent	0	2	2	2	2
Sweeper Efficiency	0	0	0	5	15

Water Quality Component Data										
Component Name	TSS	TP	TKN	CU	PB	ZN	HC			
Water Quality Criteria (ppm)										
Level 1	5	0.025	2	2	0.02	5	0.1			
Level 2	10	0.05	1	0.0048	0.014	0.0362	0.5			
Level 3	20	0.1	0.5	0.02	0.15	0.38	1			
Content Scale Factor	1	1	1	1	1	1	1			
Particle Composition (mg/kg)										
P0%	0	99000	600000	13600	2000	64000	250000			
P10%	1000000	3850	15000	340	180	1600	22500			
P30%	1000000	3850	15000	340	180	1600	22500			
P50%	1000000	3850	15000	340	180	1600	22500			
P80%	1000000	0	0	340	180	0	22500			

COWLEY LAKE PRESERVE - p8 RESULTS **2/24/2025**

EXISTING

Variable	OVERALL	30P	23RU	23RL	41P	50P	60P	40P	21R	1R	2R
P0%	261.9	47.2	47.2	59.2	13.2	18	4.3	116.9	117.5	35.1	226.8
P10%	4239.4	516.4	509.8	750.2	253.2	75.5	51	1684.3	1691.9	744.2	3495.3
P30%	3124.7	347.8	325.1	541.1	220.3	54.5	39.9	787	786.2	744.2	2380.5
P50%	2315.9	158.3	124.6	296.1	150	28.7	24.9	227.4	222.5	744.2	1571.8
P80%	3788	40.7	11.9	155.2	71.8	7.8	10	43.1	38	1488.4	2299.7
TSS	**13468.1**	1063.2	971.4	1742.6	695.3	166.4	125.8	2741.8	2738.5	**3720.9**	**9747.2**
TP	**63.2**	8.6	8.4	12	3.7	2.4	0.9	22	22	**12.1**	**51.1**
TKN	302.3	43.7	42.7	59.3	17.3	13.2	4.3	110.6	111	54.5	247.8
CU	8.1	1	1	1.4	0.4	0.3	0.1	2.5	2.5	1.7	6.4
PB	2.9	0.3	0.3	0.4	0.2	0.1	0	0.7	0.7	0.7	2.2
ZN	32.2	4.7	4.6	6.3	1.8	1.4	0.5	11.8	11.8	5.8	26.4
HC	368.5	35.7	33.7	54	19	8.2	3.9	90.9	91	92.5	276

PROPOSED

Variable	OVERALL	10P	25P	27P	26P	28P	32P	30P	23R	41P	42P	43P	50P	60P	40P	21R	1R	2R
P0%	311.9	38.9	29.7	9.2	19.4	33.6	8.8	43.5	99	13.2	4.8	17.1	18	4.3	127.4	127.9	43.6	268.3
P10%	3392.7	261	239.5	36.2	78.9	221	27.7	684.1	1023.5	253.2	24.2	82.2	75.5	51	1556	1561.8	347.3	3045.4
P30%	2058.4	187	162.7	22.6	49.4	130.4	18.1	495.9	698	220.8	16.3	52.8	54.5	39.9	706.3	703.7	273.4	1785.1
P50%	1060.9	131.4	97.3	13.4	26.9	72.9	11.2	229.6	333.8	151.2	9.4	30.8	28.7	24.9	197.3	191.5	217.7	843.3
P80%	847.5	65.2	32.6	4.7	7.2	21.4	4.1	64.2	104.9	73	3.1	10	7.8	10	36.1	31	237.8	609.7
TSS	**7359.7**	644.6	532.1	76.9	162.3	445.7	61.1	1473.7	2160.2	698.3	53	175.8	166.4	125.8	2495.6	2488	**1076.2**	**6283.5**
TP	**55.9**	6.1	4.9	1.2	2.5	5	1.1	9.7	17.7	3.7	0.7	2.3	2.4	0.9	22.1	22.1	**7.5**	**48.4**
TKN	284.8	32.1	25.3	6.6	14	26.5	6.1	47.3	90.2	17.3	3.6	12.8	13.2	4.3	113.3	113.6	38.7	246.1
CU	6.7	0.7	0.6	0.2	0.3	0.6	0.1	1.1	2.1	0.4	0.1	0.3	0.3	0.1	2.6	2.6	1	5.8
PB	1.9	0.2	0.2	0	0.1	0.1	0	0.4	0.6	0.2	0	0.1	0.1	0	0.7	0.7	0.3	1.7
ZN	30.4	3.4	2.7	0.7	1.5	2.8	0.7	5	9.6	1.8	0.4	1.4	1.4	0.5	12.1	12.1	4.1	26.3
HC	243.6	24.2	19.4	4	8.5	18.4	3.6	44	73.4	19	2.4	8.2	8.2	3.9	88	88	35.1	208.5

Geotechnical Evaluation Report

Proposed Scherber Property Residential Development
24910 Territorial Road
Rogers, Minnesota

Prepared for

Rachel Development, Inc.

Professional Certification:
I hereby certify that this plan, specification, or report, was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

John T. Carlson, PE
Senior Engineer
License Number: 20663
June 12, 2023

BRAUN INTERTEC
The Science You Build On.

Project B2303953

Braun Intertec Corporation

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Web: braunintertec.com

June 12, 2023 Project B2303953

Mr. Steve Wolbeck
Rachel Development, Inc.
4180 Napier Court NE
St. Michael, MN 55376

Re: Geotechnical Evaluation
Proposed Scherber Property Residential Development
24910 Territorial Road
Rogers, Minnesota

Dear Mr. Wolbeck:

We are pleased to present this Geotechnical Evaluation Report for the proposed Scherber Property Residential Development project located north of 24910 Territorial Road in Rogers, Minnesota. Please read the entire attached report for details regarding our findings and recommendations.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact John Carlson at 952.540.7248 (johcarlson@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

John T. Carlson, PE
Senior Engineer

Henry Vloo, PE
Senior Engineer

c: Mr. David Stradtman; Rachel Development
Rick Osberg, PE; James R. Hill, Inc.
Joe Westphal, PE: Braun Intertec

AA/EOE

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Appendix

Soil Boring Location Sketch
Log of Boring Sheets ST-1 through ST-14
Descriptive Terminology of Soil

A. Introduction

A.1. Project Description

Rachel Development, Inc. is planning to construct a Residential Development project at the Scherber Property located north of 24910 Territorial Road in Rogers, Minnesota. The proposed development will consist of 173 single family house building pads, along with the associated streets, underground utilities, and stormwater ponds.

A.1.a. Structural Loads

We understand the residential construction will consist of one- to two-story wood framed houses with pitched roofs on poured concrete or masonry foundations. The houses will likely be slab-on-grade or have partial- to full-depth basements. Based on the residential construction, we have based our analysis and recommendations on the assumption that footing pressures will not exceed 2,000 pounds per square foot (psf). Please contact us if this information is not correct.

A.1.b. Pavement Traffic Loads

We have assumed that bituminous pavements, typical of residential neighborhoods, will be subjected to normal traffic conditions over a design life of 20 years.

A.2. Site Conditions and History

The site of the Scherber Property located north of 24910 Territorial Road in Rogers, Minnesota. The north portion of the site borders Cowley Lake. The site generally contains open cultivated fields, several wetlands, and brush and mature trees around the fields, Cowley Lake, wetlands, and property lines.

The ground surface on this site is generally flat to rolling with current grades at the boring locations ranging from about elevation 920 to 944 feet Mean Sea Level (MSL).

The following recent aerial Photograph 1 shows the current site conditions, as obtained through Google Earth.

Photograph 1. Aerial Photograph of the Site - 2023

Photograph provided by Google Earth.

A.3. Purpose

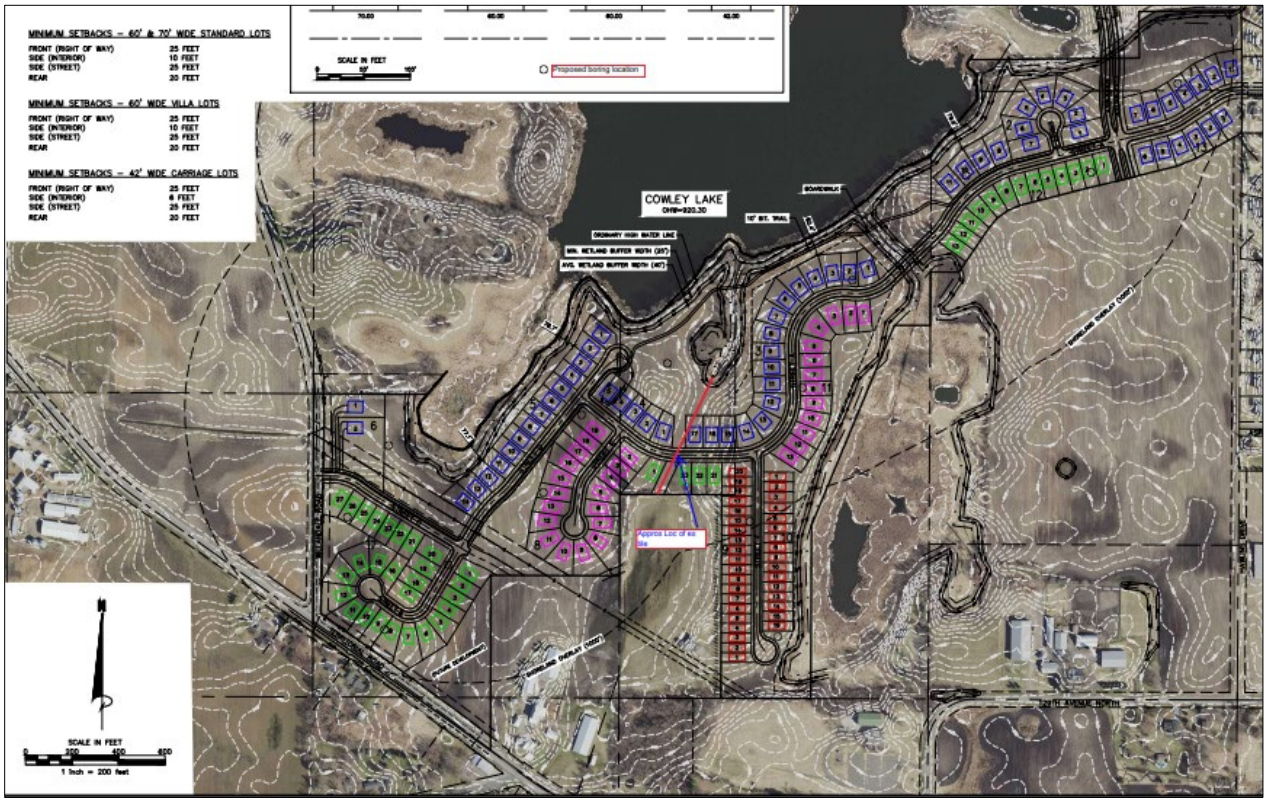
The purpose of our geotechnical evaluation will be to characterize subsurface geologic conditions at selected exploration locations and evaluate their impact on the design and construction of the proposed residential development.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Available public aerial photographs showing the existing site conditions.
- Geologic atlas showing the general soil types present in this area.
- A conceptual site plan dated April 13, 2023 prepared by James R. Hill, Inc. The conceptual site plan is shown on Figure 1 below.

Figure 1. Conceptual Site Plan



We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.5. Scope of Services

We completed our services based on our Proposal QTB177344 for a Geotechnical Evaluation to Rachel Development, Inc., dated May 2, 2023. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearing of the exploration locations of public underground utilities.
- Performing 14 standard penetration test (SPT) borings, denoted as ST-1 to ST-14, to nominal depths of 14 1/2 to 21 feet below grade across the site.
- We acquired the surface elevations and locations at the boring locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location sketch included in the Appendix shows the approximate boring locations.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.
- Preparing this report containing a boring location sketch, logs of the soil borings, a summary of the soils encountered by the borings, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs, exterior slabs, and utilities.

Our scope included to observe backhoe test pits excavated by Rachel Contracting, Inc. to further evaluate the site soil conditions. As of the date of this report, those test pits have not yet been scheduled.

Our geotechnical scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing.

B. Results

B.1. Geologic Overview

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Boring Results

Table 1 provides a summary of the current soil boring results in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology of Soil sheet in the Appendix includes definitions of abbreviations used in Table 1.

Table 1. Subsurface Profile Summary*

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Topsoil	CL, SC	N/A	▪ Encountered at the surface of all 14 borings and consisted of lean clay, sandy lean clay or clayey sand. ▪ Approximately 1/2 to 2 1/2 feet thick. ▪ Dark brown and black in color with varying organic content. ▪ Moisture content generally moist.
Alluvium	CL, SC, SC-SM	2 to 6 BPF	▪ Encountered in Borings ST-1, ST-2, ST-4, ST-5, ST-7, ST-9, ST-11, ST-13, and ST-14 below the topsoil and consisted of a mixture of lean clay, clayey sand and silty clayey sand. ▪ Ranges from about 2 to 8 1/2 feet thick. Generally 2 to 3 feet thick. ▪ Contained seams of Silty Sand. ▪ Brown, dark brown and light gray in color. ▪ Moisture condition generally moist.
Glacial Till	CL-S, CL, SM, SP	3 to 65 BPF	▪ Encountered below the topsoil and/or alluvial soils at all 14 borings. ▪ Consisted of a mixture of clayey and sandy soil. ▪ Contained variable amounts of gravel. ▪ Contained lenses and seams of Sand, Silty Sand, Clayey Sand. ▪ Brown and gray in color. ▪ Moisture condition generally moist to wet.

*Abbreviations defined in the attached Descriptive Terminology of Soil sheet.

B.3. Groundwater

Table 2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details. We have only included the borings at which water was observed in the bore holes.

Table 2. Groundwater Summary

Location	Measured Surface Elevation (feet MSL)	Measured Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet MSL)
ST-4	929.9	18	912
ST-5	935.5	20	915 1/2
ST-6	930.8	12	919

The MN DNR indicates the Ordinary High-Water level of Cowley Lake to be 920.3 feet.

Groundwater may take days or longer to reach equilibrium in the boreholes, and we immediately backfilled the boreholes, in accordance with our scope of work. The groundwater levels at the site are likely related to the water level of Cowley Lake. Seasonal and annual fluctuations of groundwater should be anticipated.

B.4. Laboratory Test Results

The boring logs show the results of the moisture content and percent passing a #200 sieve laboratory testing we performed, next to the tested sample depth. The laboratory tests were all completed in general conformance with the applicable ASTM standards. The Log of Boring sheets are included in the Appendix of this report.

The moisture content tests (ASTM D2218) of the selected clayey soil samples tested ranged from 18 to 30 percent, indicating the clayey soils were near to above the soils' estimated optimum moisture content.

One soil sample from the 5-foot depth in Boring ST-3 was washed through a number 200 sieve (ASTM C117) to assist in classifying the soil. The result was 14 percent passing the number 200 sieve, classifying this soil as silty sand. The moisture content of this soil sample was 33 percent.

A number of pocket penetrometer tests were performed on selected clayey soil samples to assist in determining the unconfined compressive strengths of these soils. The results indicated penetrometer tests ranging from about 1/4 to 2 tons per square foot (tsf).

C. Recommendations

C.1. Design and Construction Discussion

C.1.a. Building Subgrade Preparation

Based on the results of our subsurface exploration and evaluation, spread footing foundations bearing on engineered fill and/or native soils can support the proposed houses, after performing typical subgrade preparation. Typical subgrade preparation includes removal of the vegetation, topsoil, existing fill, soft clays, and any other unsuitable soils, along with proper compaction of the required fill soils. Also any relic buried structures – such as old pavements, wells, tile lines, cisterns or foundations, etc., should be removed from building pads and paved areas.

Although preliminary grading plans were not available, we anticipate cuts and fills within the development could range from 1 to 10 feet from existing grades. Any soil correction work could add or subtract to the cut and fill depths.

C.1.b. Reuse of On-Site Soils

The on-site native soils, free of organic materials and debris, appear suitable for reuse as engineered fill. Some of the on-site soils will likely require moisture conditioning (drying or wetting) prior to reuse and compaction.

However, we caution that the alluvial clays encountered on the site are moisture sensitive and will likely be difficult for reuse as engineered fill in building or roadway areas. Additional moisture conditioning (drying) will likely be required prior to reuse for structural fill. Any materials to be used as engineered fill should be tested and approved by the geotechnical engineer prior to placement.

C.1.c. Disturbance of On-Site Soils

We caution that the silty or clayey nature of some of the site soils makes them susceptible to disturbance from construction. Care should be taken not to disturb these soils during construction as once stable subgrades can be destabilized and require additional moisture conditioning and compacting or excavation and replacement of the disturbed or unstable soils.

We recommend any loose or disturbed sandy soils be moisture conditioned, if necessary, and surface compacted prior to engineered fill and/or footing placement.

C.1.d. Effects of Groundwater

Groundwater is anticipated to be encountered during the site grading and utility construction in deeper excavation areas at this site. Despite the groundwater levels observed in the soil borings, we anticipate water will be at or slightly above the Ordinary High Water (OHW) level of Cowley Lake near 920.3 feet MSL, although perched water could be present at higher elevations.

The contractor should immediately remove any collected water within the excavations to facilitate construction and proper backfilling. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as clays and silts. Dewatering of high-permeability soils (e.g., sands) from within the excavation with conventional pumps has the potential to loosen the soils, due to upward flow, and we recommend that well points or dewatering wells be used in these areas.

The low floor of the proposed house sites should include a vertical separation from the OHW level of the lake. The amount of separation required varies by city and county building code. Foundation drain tile and sump pumps are highly recommended for each unit, regardless of vertical separation amounts.

C.2. Site Grading and Subgrade Preparation

C.2.a. Building Subgrade Excavations

Based on the soil boring information, we have estimated the depths of soil corrections for building pads. We recommend removing unsuitable materials from beneath house pads and oversize areas. We define unsuitable materials as vegetation, topsoil, organic soils, existing fill, soft clays and any other unsuitable soils. Table 3 shows the anticipated excavation depths and bottom of excavation elevations at each of the current soil boring.

Table 3. Recommended Excavation Depths for Building Pads

Location	Measured Surface Elevation (feet MSL)	Anticipated Excavation Depth (feet)	Anticipated Bottom Elevation (feet MSL)
ST-1	924.7	Pond	---
ST-2	939.0	1 ½ – 4*	937 ½-935*
ST-3	944.2	1	943
ST-4	929.9	2 ½ – 4*	927 ½-926*
ST-5	935.5	1	934 ½
ST-6	930.8	1 ½	929
ST-7	928.9	Pond	---
ST-8	934.9	½	934 ½

Location	Measured Surface Elevation (feet MSL)	Anticipated Excavation Depth (feet)	Anticipated Bottom Elevation (feet MSL)
ST-9	934.5	2	932 ½
ST-10	937.3	1 ½	935 ½
ST-11	931.1	2	929
ST-12	933.7	4	929 ½
ST-13	930.6	4	926 ½
ST-14	920.4	Pond	---

*Provided Range, final correct depth to be determined in the field during site grading.

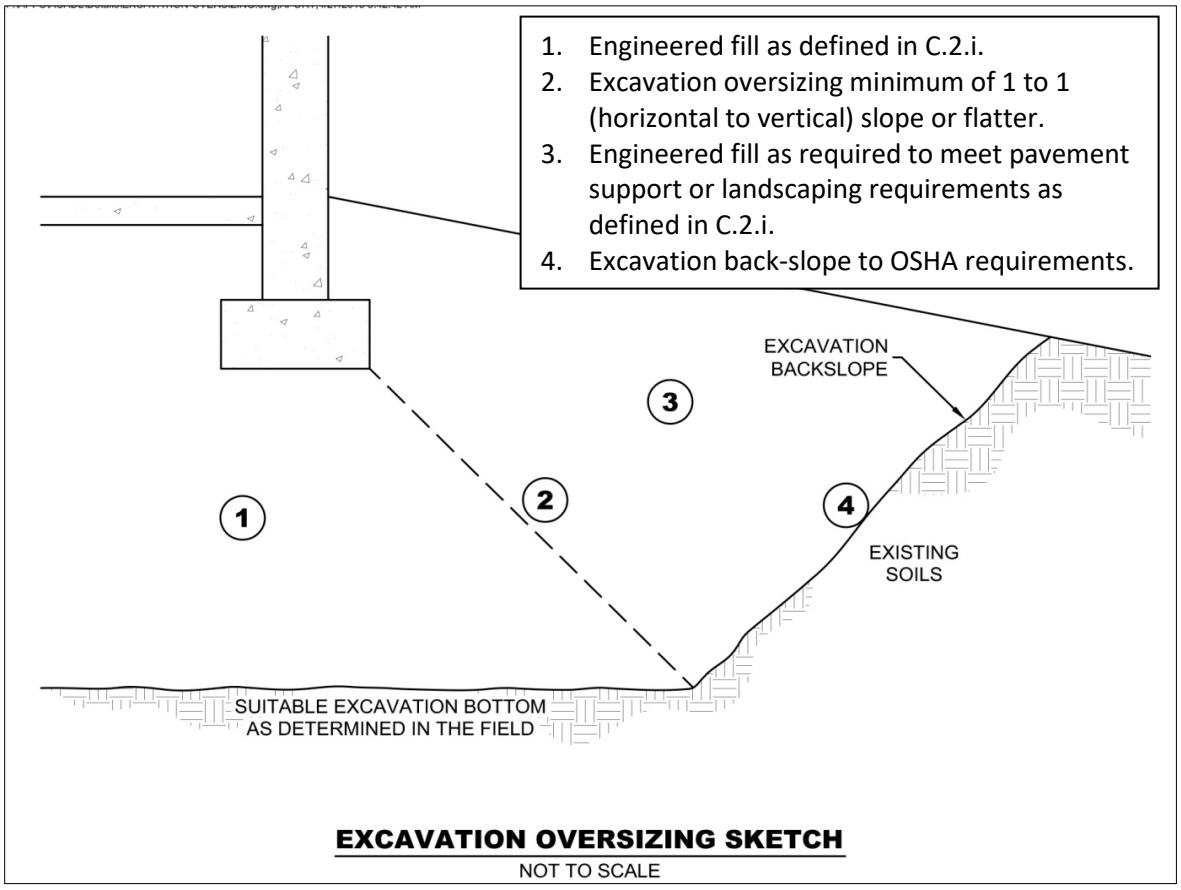
Excavation depths will vary between the borings. Portions of the excavations may also extend deeper than indicated by the borings. A geotechnical representative should observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils. Any loose or disturbed areas should be recompacted.

Several borings encountered layers of softer alluvial clays. These soils can be moisture sensitive and easily disturbed. The contractor should use equipment and techniques to minimize soil disturbance. If soils become disturbed or are wet, we recommend excavation and replacement of the disturbed or unstable soils.

C.2.b. Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter. See Figure 2 for an illustration of excavation oversizing.

Figure 2. Generalized Illustration of Oversizing



C.2.c. Excavated Slopes

Based on the borings, we anticipate on-site soils in excavations will consist of mostly clayey soils. The clayey soils are typically considered Type B Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type B soils should have a gradient no steeper than 1H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, “Excavations and Trenches.” This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.2.d. Filling on Slopes

Where existing grades or soil correction excavation grades are steeper than 5H:1V, we recommend placing fill from low to high elevations on horizontal benches cut into the native soils so that successive lifts are spread and compacted on level surfaces, and a potential failure surface is not created along the fill's lower boundary. Depending on fill requirements, the contractor can construct benches by cutting into existing grades while placing fill (the composition of the exposed soils thus being in compliance with fill specifications), or by cutting the benches in advance of filling (to prevent mixing with soils not in compliance with fill specifications). The height of a given bench may vary but the width should consistently be great enough to accommodate compaction equipment.

C.2.e. Excavation Dewatering

At the time of the soil borings, groundwater was encountered in 3 of the 14 borings between depths of about 12 to 20 feet below the ground surface. If encountered during site grading or utility construction, groundwater should be removed from the excavations. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as clays and silts, and well points or dewatering wells in high-permeability soils, such as sands.

C.2.f. Selecting Excavation Backfill and Additional Required Fill

On-site soils free of organic soil and debris can be considered for reuse as backfill and fill. However, the topsoil and the organic soils should not be reused as engineered fill under building pads or below streets. Also, the alluvial clay soils exhibit a high sensitivity to moisture and if it is necessary to use these soil types in building pad areas, the moisture contents will need to comply with the requirements of those listed in Table 5. These soils will then need to be placed in thin lifts and should have close supervision and testing.

Unless a drainage composite is placed against the backs of the exterior perimeter basement walls, we recommend that backfill placed within 2 horizontal feet of those walls consist of sand having less than 50 percent of the particles, by weight, passing a #40 sieve and less than 10 percent of the particles, by weight, passing a #200 sieve. We recommend that the balance of the backfill placed against exterior perimeter walls also consist of sand; although it is our opinion that the sand may contain up to 20 percent of the particles, by weight, passing a #200 sieve.

C.2.g. Pavement and Exterior Slab Subgrade Preparation

We recommend the following steps for pavement and exterior slab subgrade preparation. Note that project planning may need to require additional subcuts to limit frost heave.

1. Strip unsuitable soils consisting of topsoil, organic soils, vegetation, and soft clays from the area, down to suitable native soils.

2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.

3. Slope subgrade soils to areas of sand or drain tile to allow the removal of accumulating water.

4. Place pavement fill to grade and compact in accordance with Section C.2.i. to bottom of pavement and/or exterior slab section.

5. Proofroll the pavement or exterior slab subgrade as described in Section C.2.h.

C.2.h. Pavement Subgrade Proofroll

After preparing the subgrade as described above and prior to the placement of the aggregate base, we recommend proofrolling the subgrade soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements or slabs.

The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and re-compaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous or concrete pavement/slabs.

C.2.i. Engineered Fill Materials and Compaction

Table 4 that follows contains our recommendations for engineered fill materials.

Table 4. Engineered Fill Materials*

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
▪ Below foundations ▪ Below interior slabs	Structural fill	SP, SP-SM, SM, SC, CL	100% passing 2-inch sieve	< 2% Organic Content (OC) Plasticity Index (PI) < 20%
▪ Drainage layer ▪ Non-frost-susceptible	▪ Free-draining ▪ Non-frost-susceptible fill	GP, GW, SP, SP-SM, SW	100% passing 1-inch sieve < 50% passing #40 sieve < 10% passing #200 sieve	< 2% OC

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
Behind below-grade walls, beyond drainage layer	Retained fill	SP, SP-SM, SM	100% passing 3-inch sieve < 20% passing #200 sieve	< 2% OC PI < 4%
Pavements	Pavement fill	SP, SP-SM, SM, SC, CL	100% passing 3-inch sieve	< 2% OC PI < 20%
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	SP, SP-SM, SM, SC, ML, CL, CH, OL	100% passing 6-inch sieve	< 10% OC

*More select soils comprised of coarse sands with < 5 percent passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

We recommend spreading fill in loose lifts of approximately 8 inches thick. We recommend compacting each lift of fill with a full size vibratory or sheepsfoot compactor in accordance with the criteria presented in Table 5. The project documents should specify relative compaction of fill, based on the structure located above the fill, and vertical proximity to that structure.

Table 5. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points
Below foundations, less than 10 feet of fill	95	-1 to +3 for clayey soils ±3 for sandy soils
Below foundations, greater than 10 feet of fill	98	-1 to +2 for clayey soils ±3 for sandy soils
Below slabs	95	-1 to +3 for clayey soils ±3 for sandy soils
Below pavements, within 3 feet of top of subgrade elevations	100	-2 to +1 for clayey soils ±3 for sandy soils
Below pavements, more than 3 feet below subgrade elevations	95	-1 to +3 for clayey soils ±3 for sandy soils
Below landscaped surfaces	90	-1 to +5 for clayey soils ±6 for sandy soils

The project documents should not allow the contractor to use frozen material as fill or to place fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

Based on the need for some deeper soil correction work, it is likely that some of the house pads will require more than 10 feet of compacted fill. If only clay fill is used to fill those house pads where more

than 10 feet of fill is needed, a construction delay ranging from 6 to 12 months may be needed, depending on the final depths of clay fill used. As an alternative, on lots where deep fills are needed, clean sand fill (less than 12 percent passing the number 200 sieve) could be used to initially fill the excavations below these house pads. The clean sand fill should be placed in thin compacted lifts up to an elevation of 10 feet or less from finished basement floor grades. On-site clay fill can then be used to complete construction of the building pads. If the alternative method of filling the house pads partially with sand is used, a construction delay would not be needed.

C.3. Spread Footings

C.3.a. Embedment Depth

For frost protection, we recommend embedding perimeter footings of the structures, including attached garages, a minimum of 42 inches below the lowest exterior grade. Interior footings may be placed directly below floor slabs unless they will be subjected to freezing. We recommend embedding building footings not heated during winter construction, and other unheated footings associated with decks, porches, stoops, or sidewalks 60 inches below the lowest exterior grade.

C.3.b. Subgrade Improvement

If a small amount of groundwater is present within the footing excavation, or if the footing subgrade soils become disturbed prior to placing forms or reinforcement, we recommend subcutting any soft or wet soil and placing a 6- to 12-inch layer of clear rock. The clear rock will provide a stable working surface and will allow for the flow of water to a drain tile or sump pump.

C.3.c. Net Allowable Bearing Pressure

We recommend sizing spread footings to exert a net allowable bearing pressure of up to 2,000 pounds per square foot (psf). This value includes a safety factor of at least 3.0 with regard to bearing capacity failure.

C.3.d. Settlement

We estimate that total and differential settlements among the footings will amount to less than 1 and 1/2 inch, respectively, under the assumed loads. If there are areas where more than 10 feet of fill is required, higher settlements could occur, unless the deeper fill areas are only filled with poorly graded sand (SP) or poorly graded sand with silt (SP-SM) fill.

Please contact us prior to construction if there will be areas of fill placement in excess of 10 feet thick in building pad areas. If deep fill areas are completed using clay soil, a construction delay may also be needed to allow the fill soils to consolidate under its own weight. Construction delays could range from 6 to 12 months, depending on the type of fill used, the compaction level obtained in the fill and the

thickness of the fill. The construction delays should be evaluated after grading is completed by using settlement plates to monitor the consolidation of the fill.

C.4. Below-Grade Walls

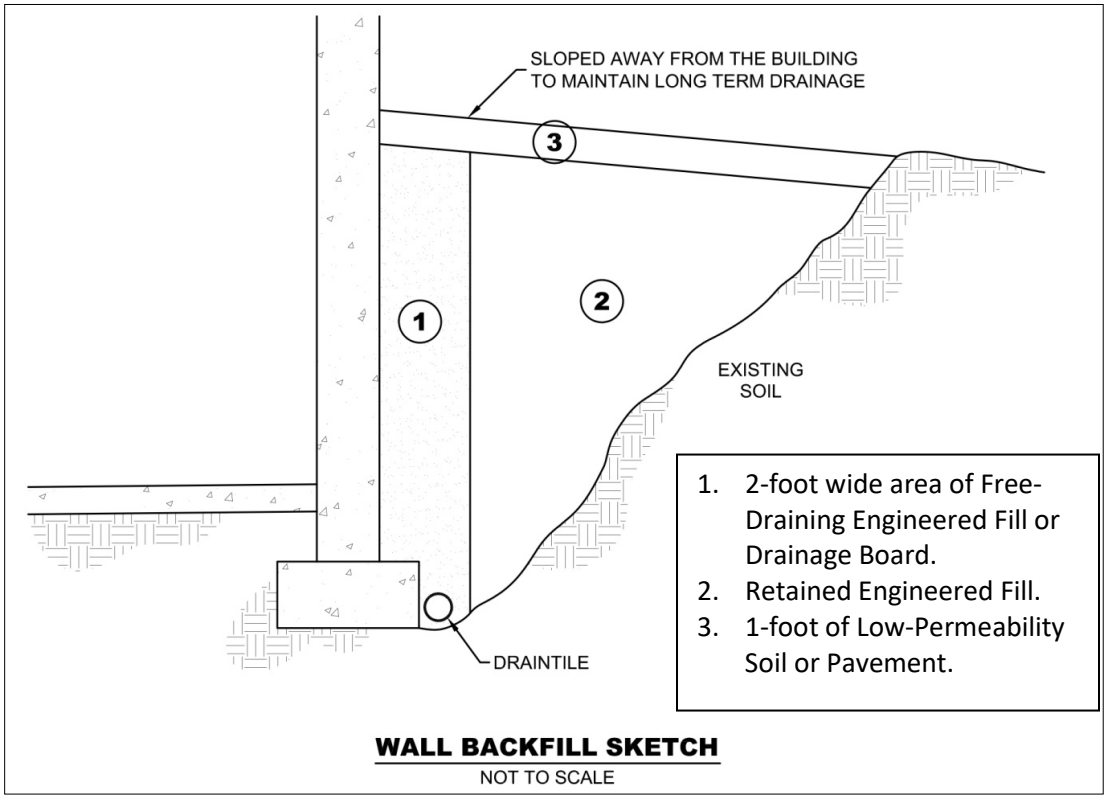
The following sections address soil parameters for basement wall design. Although construction of retaining walls has not been specified for this project to date, the following recommendations can also be used for preliminary retaining wall design. Depending on the location and height of potential walls, we recommend that additional soil borings may be completed for final retaining wall design.

C.4.a. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls at the location shown in Figure 3. The below-grade wall drainage system should also incorporate free-draining, engineered fill or a drainage board placed against the wall and connected to the drain tile.

Even with the use of free-draining, engineered fill, we recommend general waterproofing of below-grade walls that surround occupied or potentially occupied areas because of the potential cost impacts related to seepage after construction is complete.

Figure 3. Generalized Illustration of Wall Engineered Fill



The materials listed in the sketch should meet the definitions in Section C.2.i. Low-permeability material is capable of directing water away from the wall, like clay, topsoil, or pavement. The project documents should indicate if the contractor should brace the walls prior to filling, and the allowable unbalanced fill heights.

As shown in Figure 2, we recommend Zone 2 consist of retained, engineered fill, and this material will control lateral pressures on the wall. However, we are also providing design parameters for using other engineered fill material. If final design uses non-sand material for engineered fill, project planning should account for the following items:

- Other engineered fill material may result in higher lateral pressure on the wall.
- Other engineered fill material may be more difficult to compact.
- Post-construction consolidation of other engineered fill material may result in settlement-related damage to the structures or slabs supported on the engineered fill. Post-construction settlement of other engineered fill material may also cause drainage towards the structure. The magnitude of consolidation could be up to about 3 percent of the wall fill thickness.

C.4.b. Selection, Placement, and Compaction of Backfill

Unless a drainage composite is placed against the backs of the exterior perimeter basement walls, we recommend that backfill placed within 2 horizontal feet of those walls consist of sand having less than 50 percent of the particles, by weight, passing a #40 sieve and less than 10 percent of the particles, by weight, passing a #200 sieve. Sand meeting this gradation will likely be present on parts of the site. We recommend that the balance of the backfill placed against exterior perimeter walls also consist of sand, though it is our opinion that the sand may contain up to 20 percent of the particles, by weight, passing a #200 sieve.

If clay or silt must be considered for use to make up the balance of the below-grade wall backfill (assuming a drainage composite or sand is placed against the backs of the walls), post-compaction consolidation of the clay occurring under its own weight can be expected to continue beyond the end of construction. The magnitude of consolidation could typically amount to between 1 and 3 percent of the backfill thickness, or wall height, and if not accommodated, could cause slabs or pavements to settle unfavorably or be damaged.

Should clay or silt still be considered for use as backfill, however, we further recommend that:

- The bottoms of the excavations required for basement wall construction are wide enough to accommodate compaction equipment.
- Backfill is placed at moisture contents at least equal to, but not more than, 3 percentage points above its optimum moisture content.
- Backfill is placed in loose lifts no thicker than 6 inches prior to compaction.
- The relative compaction of the backfill is measured through density testing at intervals not exceeding one test per 50 horizontal feet for each 2 vertical feet of backfill placed.

We recommend using a walk behind compactor to compact the backfill placed within about 5 feet of the basement walls. Further away than that, a self-propelled compactor can be used. Compaction criteria for basement walls should be determined based on the compaction recommendations provided above in Section C.2.i.

Exterior backfill not capped with slabs or pavement should be capped with a low-permeability soil to limit the infiltration of surface drainage into the backfill. The finished surface should also be sloped to divert water away from the walls.

C.4.c. Configuring and Resisting Lateral Loads

Below-grade wall design can use active earth pressure conditions, if the walls can rotate slightly. If the wall design cannot tolerate rotation, then design should use at-rest earth pressure conditions. Rotation up to 0.002 times the wall height is generally required for walls supporting sand. Rotation up to 0.02 times the wall height is required when wall supports clay.

Table 6 presents our recommended lateral coefficients and equivalent fluid pressures for wall design of active, at-rest, and passive earth pressure conditions. The table also provides recommended wet unit weights and internal friction angles. Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.

Table 6. Recommended Below-Grade Wall Design Parameters – Drained Conditions

Retained Soil	Wet Unit Weight (pcf)	Friction Angle (degrees)	Equivalent Active Fluid Pressure* (pcf)	Equivalent At-Rest Fluid Pressure* (pcf)	Equivalent Passive Fluid Pressure* (pcf)
Sand (SP, SP-SM)	120	33	35	55	405
Silty sand (SM)	130	30	42	62	390
Clayey sand, clay, silt (SC, CL, ML)	125	26	50	70	320

*Based on Rankine model for soils in a region behind the wall extending at least 2 horizontal feet beyond the bottom outer edges of the wall footings and then rising up and away from the wall at an angle no steeper than 60 degrees from horizontal.

Sliding resistance between the bottom of the footing and the soil can also resist lateral pressures. We recommend assuming a sliding coefficient equal to 0.30 between the concrete and clay or silt soil and a coefficient equal to 0.40 between concrete and sand soils.

The values presented in this section are un-factored.

C.5. Interior Slabs

C.5.a. Moisture Vapor Protection

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If project planning includes using floor coverings or coatings, we recommend placing a vapor retarder or vapor barrier immediately beneath the slab. We also recommend consulting with floor covering manufacturers regarding the appropriate type, use, and installation of the vapor retarder or barrier to preserve warranty assurances.

C.5.b. Radon

We recommend installing a radon mitigation system in occupied spaces in accordance with local building code. Our certified and licensed radon mitigation professionals can assist in this design, at your request.

C.6. Frost Protection

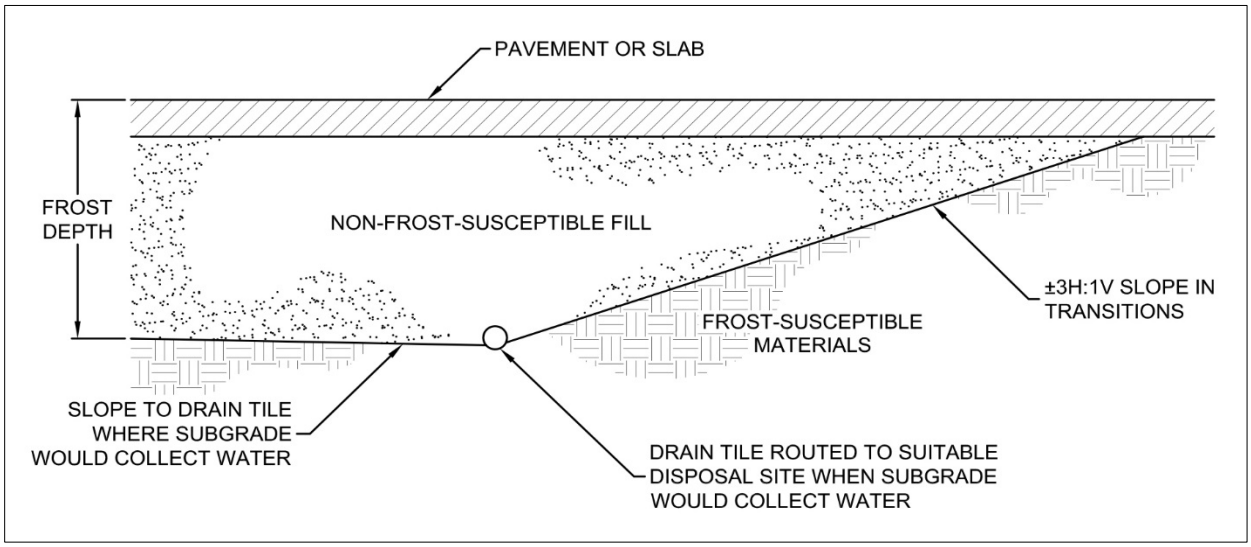
We consider the on-site clayey and silty sand soil to be moderately to highly frost susceptible. While the proposed construction will remove some of these soils, unfavorable amounts of heaving could occur if these soils become saturated and freeze. Grading to direct surface drainage away from buildings helps

limit the potential for saturation and subsequent heaving to occur. Still, even limited amounts of movement can create tripping hazards.

One method to help limit the potential for heaving to occur is to remove frost-susceptible soils present below the overlying slab or pavement area down to bottom-of-footing grades and replace the excavated material with non-frost-susceptible, engineered fill. We recommend providing drainage at the base of the subcut, as well as gradual transitions from this subcut (3H:1V or flatter gradient).

Figure 4 shows an illustration summarizing some of the recommendations above.

Figure 4. Frost Protection Geometry Illustration



An alternative method to reduce the risk of heaving is to support the slabs on frost-depth footings and suspend the slabs at least 4 inches above the underlying subgrade soils. With this alternative, we recommend making accommodations for differential frost heave at transition areas.

Over the life of the pavement or slab, cracks may develop, and joints may open up, which will expose the subgrade and allow water to enter the subgrade. This water entering the subgrade increases the likelihood of heave. It will be critical that the owner develop a detailed maintenance program to repair any cracks and joints that may develop during the useful life of the various surface features. The maintenance program should pay special attention to areas where dissimilar materials abut one another, where construction joints occur and where shrinkage cracks develop.

C.7. Pavements and Exterior Slabs

C.7.a. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Since most of the soils present on this site consist of sandy lean clays, we recommend pavement design assume an R-value of 12. We assumed that pavements for the residential development will be subject to a maximum of 50,000 ESAL's over a 20-year design life.

We assume that the pavements will be constructed in accordance with the City of Rogers standard section, which includes a sand subbase.

C.7.b. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible pavements. We can provide recommendations for pavement material selection during final pavement design.

C.7.c. Subgrade Drainage

We recommend installing perforated drainpipes throughout pavement areas at low points, around catch basins, and behind curb in landscaped areas. We also recommend installing drainpipes along pavement and exterior slab edges where exterior grades promote drainage toward those edge areas. The contractor should place drainpipes at the bottom of the sand subbase material.

C.7.d. Performance and Maintenance

The pavement designs are typically based on a 20-year performance life for bituminous. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions, and maintenance.

It is common to place the non-wear course of bituminous and then delay placement of wear course. For this situation, we recommend evaluating if the reduced pavement section will have sufficient structure to support construction traffic.

Many conditions affect the overall performance of the exterior slabs and pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regard to bituminous pavements in particular, it is common to have thermal cracking develop within the first few years of placement and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in exterior slabs and pavements to lessen the

potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.8. Utilities

C.8.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside the building area should adhere to the recommendations in Section C.2.

For exterior utilities, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils, or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

C.8.b. Selection, Placement, and Compaction of Backfill

We recommend selecting, placing, and compacting utility trench backfill in accordance with the recommendations provided above in Section C.2.i.

C.8.c. Corrosion Potential

Based on our experience, the clayey soils generally encountered by the borings are moderately corrosive to metallic conduits. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

C.9. Stormwater

Based on the abundance of clayey, fine grained soils encountered within the soil borings, we do not recommend infiltration of stormwater at this site. The site soils are judged to be in the Hydrologic Soil Group D according to the Minnesota Stormwater manual. However, if a design is requested, we offer the following.

If Infiltration basins are proposed, we recommend field-testing of in-situ soils, such as double-ring infiltrometer tests (ASTM D3385), to determine infiltration rates. Alternatively, preliminary infiltration rates can be found in the Minnesota Stormwater Manual based on soil types.

Fine-grained soils (silts and clays), topsoil, or organic matter that mixes into or washes onto the soil will lower the permeability of an infiltration/filtration basin. The contractor should maintain and protect infiltration areas during construction. Furthermore, organic matter and silt washed into the system after construction can fill the soil pores and reduce permeability over time. Proper maintenance is important for long-term performance of infiltration/filtration systems.

This geotechnical evaluation does not constitute a review of site suitability for stormwater infiltration or evaluate the potential impacts, if any, from infiltration of large amounts of stormwater.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings on May 12 and 15, 2023, with an off-road-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance to ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed the penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout. A sealing record was submitted to MDH, as required.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

D.4. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications, and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. Braun Intertec should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations. Braun Intertec should also be retained to complete the soil observations and testing as the site is being graded.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

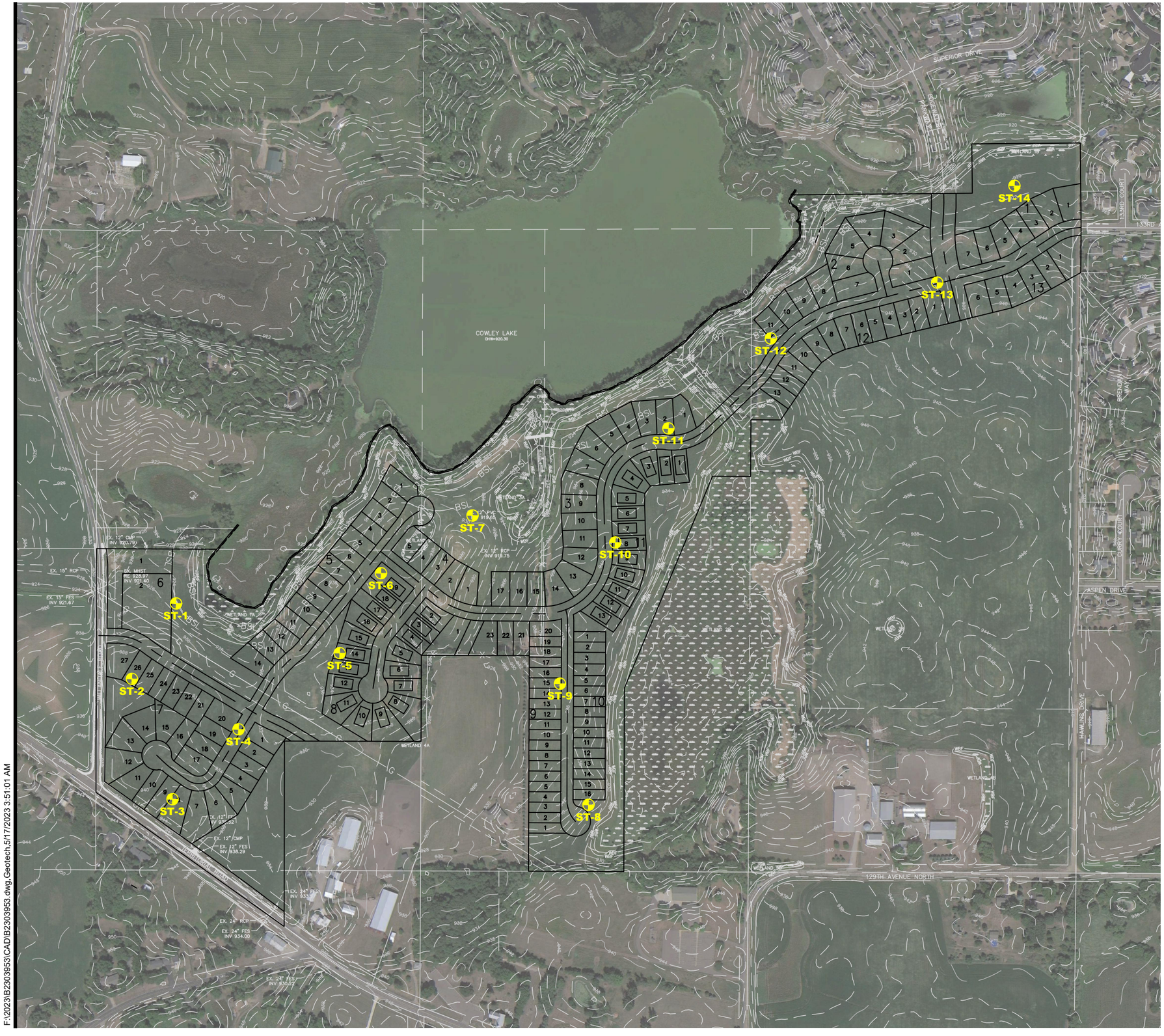
E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses, and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

200' 0 400'

SCALE: 1"= 400'

BRAUN INTERTEC
The Science You Build On.

11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No:	B2303953
Drawing No:	B2303953
Drawn By:	JAG
Date Drawn:	5/3/23
Checked By:	JLW
Last Modified:	5/17/23

Project Information

Scherber Property

North of
24910 Territorial Road

Rogers, Minnesota

Soil Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2303953
Geotechnical Evaluation
Scherber Property
North of 24910 Territorial Road
Rogers, Minnesota

BORING: **ST-1**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 246215 EASTING: 444782
DRILLER: S. Hull LOGGED BY: H. Vloo START DATE: 05/11/23 END DATE: 05/11/23
SURFACE ELEVATION: 924.7 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
923.7		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
1.0		LEAN CLAY (CL), grayish brown, moist, soft (ALLUVIUM)		1-2-2 (4) 8"	0.25	30	
920.7							
4.0		SANDY LEAN CLAY (CL), trace Gravel, with lens of Silty Sand, brown, moist, medium (GLACIAL TILL)	5	2-3-3 (6) 18"	0.75		
917.7							
7.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		2-4-4 (8) 18"	1.5	21	
			10	3-5-6 (11) 18"			
				3-4-6-6 (10) 24"			
910.2							
14.5		END OF BORING Boring immediately backfilled	15				Water not observed while drilling.
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2303953
Geotechnical Evaluation
Scherber Property
North of 24910 Territorial Road
Rogers, Minnesota

BORING: **ST-2**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 245909 EASTING: 444603
DRILLER: S. Hull LOGGED BY: H. Vloo START DATE: 05/11/23 END DATE: 05/11/23
SURFACE ELEVATION: 939.0 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
937.5		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
1.5 935.0		CLAYEY SAND (SC), trace Gravel, contains seams of Silty Sand, brown, moist, medium (ALLUVIUM)		1-2-3 (5) 12"	0.25	23	
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to very stiff (GLACIAL TILL)		1-3-4 (7) 10"	1.25	21	
				3-5-6 (11) 18"			
				4-6-9 (15) 18"			
924.5				4-8-9-11 (17) 24"			
14.5		END OF BORING Boring immediately backfilled					Water not observed while drilling.

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See Descriptive Terminology sheet for explanation of abbreviations

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BORING: **ST-3**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 245421 EASTING: 444767
DRILLER: S. Hull LOGGED BY: H. Vloo START DATE: 05/11/23 END DATE: 05/11/23
SURFACE ELEVATION: 944.2 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
943.2		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
1.0		SANDY LEAN CLAY (CL), contains seams of Silty Sand, brown, moist, medium (GLACIAL TILL)		1-3-4 (7) 14"	0.5	26	
940.2							
4.0		SILTY SAND (SM), fine to medium-grained, brown, moist, loose (GLACIAL TILL)		3-4-5 (9) 12"		33	P200=14%
937.2							
7.0		LEAN CLAY (CL), brown, moist, medium (GLACIAL TILL)		2-3-5 (8) 16"	1.25		
935.2							
9.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		2-3-5 (8) 18"			
				3-4-6-6 (10) 24"			
929.7							
14.5		END OF BORING Boring immediately backfilled					Water not observed while drilling.

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See Descriptive Terminology sheet for explanation of abbreviations

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BORING: **ST-4**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 245705 EASTING: 445035
DRILLER: S. Hull LOGGED BY: H. Vloo START DATE: 05/11/23 END DATE: 05/11/23
SURFACE ELEVATION: 929.9 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
927.4		LEAN CLAY (CL), organic, black, moist (TOPSOIL)					
2.5		SILTY, CLAYEY SAND (SC-SM), fine to medium-grained, light gray, moist, very loose to loose (ALLUVIUM)		2-2-2 (4) 6"			
923.9			5	2-2-4 (6) 10"		30	
6.0		SANDY LEAN CLAY (CL), grayish brown to gray, moist, stiff to medium (GLACIAL TILL)		2-4-6 (10) 16"		18	
			10	3-4-5 (9) 14"	1.25		
				3-3-4 (7) 16"	1.5		
			15	2-3-4 (7) 18"			
911.9	▽						
18.0		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, gray, wet, very loose (GLACIAL OUTWASH)					
			20	1-0-4 (4) 18"			
908.9							
21.0		END OF BORING Boring immediately backfilled with bentonite grout					Water observed at 18.0 feet while drilling.
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

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BORING: **ST-5**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 246014 EASTING: 445446
DRILLER: J. Tatro LOGGED BY: H. Vloo START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 935.5 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
934.5		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
1.0		LEAN CLAY with SAND (CL), brown, moist, medium (ALLUVIUM)		2-2-3 (5) 10"	0.75	28	
931.5							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)	5	2-3-3 (6) 12"	1	21	
				3-4-6 (10) 18"	2		
			10	3-4-5 (9) 16"	2		
923.5							
12.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to very stiff (GLACIAL TILL)		4-6-9 (15) 18"			
			15	6-7-10 (17) 18"			
917.5							
18.0	▽	SILTY SAND (SM), fine-grained, brown, moist to wet, dense (GLACIAL TILL)	20	16-17-19 (36) 18"			
914.5							
21.0		END OF BORING Boring immediately backfilled with bentonite grout					Water observed at 20.0 feet while drilling.
			25				
			30				

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BORING: **ST-6**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 246338 EASTING: 445613
DRILLER: J. Tatro LOGGED BY: H. Vloo
START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 930.8 ft RIG: 75011 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
929.3		LEAN CLAY (CL), organic, black, moist (TOPSOIL)					
1.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		2-2-3 (5) 10"	0.5	21	
			5	2-2-3 (5) 12"	1	21	
				3-5-7 (12) 16"			
			10	4-6-7 (13) 16"			
918.8	▽						
12.0		SILTY SAND (SM), contains seams of Clayey Sand, brown, wet, dense (GLACIAL TILL)		13-15-16-17 (31) 24"			
916.3							
14.5		END OF BORING	15				Water observed at 12.0 feet while drilling.
		Boring immediately backfilled					
			20				
			25				
			30				

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BORING: **ST-7**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 246572 EASTING: 445984
DRILLER: J. Tatro LOGGED BY: H. Vloo
START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 928.9 ft RIG: 75011 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
926.9		LEAN CLAY (CL), organic, black, moist (TOPSOIL)					
2.0 924.9		LEAN CLAY (CL), dark brown, moist, soft (ALLUVIUM)		2-2-2 (4) 12"	1	24	
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)	5	3-3-4 (7) 12"	1.5		
		Lens of coarse Sand at 8 feet		2-2-3 (5) 14"	1	24	
			10	2-3-5 (8) 16"	1		
914.4				5-5-8-10 (13) 24"			
14.5		END OF BORING Boring immediately backfilled	15				Water not observed while drilling.
			20				
			25				
			30				

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BORING: **ST-8**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 245399 EASTING: 446455
DRILLER: J. Tatro LOGGED BY: H. Vloo
START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 934.9 ft RIG: 75011 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
934.4							
0.5		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
		LEAN CLAY (CL), with Sand, brown, moist, medium (GLACIAL TILL)		1-3-3 (6) 12"	1.25	26	
930.9							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		2-4-5 (9) 14"	1		
			5	3-4-5 (9) 16"	1	21	
			10	4-4-5 (9) 14"			
				3-4-9-8 (13) 24"			
920.4							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring immediately backfilled	20				
			25				
			30				

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BORING: **ST-9**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 245890 EASTING: 446339
START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 934.5 ft
DRILLER: J. Tatro
LOGGED BY: H. Vloo
RIG: 75011
METHOD: 3 1/4" HSA
SURFACING: Soil
WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
932.5		CLAYEY SAND (SC), organic, black, moist (TOPSOIL)					
2.0		LEAN CLAY (CL), with Sand, brown, moist, medium (ALLUVIUM)		1-2-3 (5) 10"	1	24	
930.5							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		2-3-3 (6) 14"	0.75	21	
			5	3-3-4 (7) 18"	1		
			10	3-6-8 (14) 18"			
				3-4-9-10 (13) 24"			
920.0		*With lens of Poorly Graded Sand at 14 feet*					
14.5		END OF BORING	15				Water not observed while drilling.
		Boring immediately backfilled	20				
			25				
			30				

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BORING: **ST-10**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 246462 EASTING: 446564
DRILLER: J. Tatro LOGGED BY: H. Vloo START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 937.3 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
935.8		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
1.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		1-3-4 (7) 10"	1	19	
			5	3-4-6 (10) 14"	1.25		
				3-5-5 (10) 18"	1.5	19	
			10	3-4-5 (9) 18"			
		With seams of Silty Sand at 12 feet		10-6-9 (15) 14"			
			15	5-4-6 (10) 16"			
919.3							
18.0		SANDY LEAN CLAY (CL), trace Gravel, with layer of POORLY GRADED SAND, brown, moist, hard (GLACIAL TILL)	20	13-25-29 (54) 18"			
916.3							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately backfilled with bentonite grout					
			25				
			30				

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BORING: **ST-11**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 246925 EASTING: 446779
DRILLER: J. Tatro LOGGED BY: H. Vloo START DATE: 05/12/23 END DATE: 05/12/23
SURFACE ELEVATION: 931.1 ft RIG: 75011 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
929.1		CLAYEY SAND (SC), organic, dark brown, moist (TOPSOIL)					
2.0		LEAN CLAY (CL), brown, moist, medium (ALLUVIUM)		1-2-4 (6) 12"	1	27	
927.1							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to very stiff (GLACIAL TILL)		2-3-5 (8) 12"	1		
			5	3-3-4 (7) 16"	0.75	21	
			10	3-4-5 (9) 14"	1.25		
				5-7-10-17 (17) 24"			
916.6							
14.5		END OF BORING Boring immediately backfilled	15				Water not observed while drilling.
			20				
			25				
			30				

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BORING: **ST-12**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 247290 EASTING: 447194
DRILLER: M. Barber LOGGED BY: H. Vloo START DATE: 05/15/23 END DATE: 05/15/23
SURFACE ELEVATION: 933.7 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
932.7		LEAN CLAY (CL), organic, dark brown, moist (TOPSOIL)					
1.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, soft to stiff (GLACIAL TILL)		1-1-2 (3) 18"	0.5	20	
			5	1-2-4 (6) 18"	1.25		
				2-3-6 (9) 18"	1.25	20	
924.7							
9.0		SILTY SAND (SM), fine-grained, brown, moist, medium dense (GLACIAL TILL)	10	3-6-10 (16) 18"			
921.7							
12.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, very stiff (GLACIAL TILL)		11-11-13-16 (24) 18"			
919.2							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring immediately backfilled					
			20				
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

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BORING: **ST-13**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 247517 EASTING: 447870
DRILLER: M. Barber LOGGED BY: H. Vloo START DATE: 05/15/23 END DATE: 05/15/23
SURFACE ELEVATION: 930.6 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
930.1		CLAYEY SAND (SC), organic, dark brown, moist (TOPSOIL)					
0.5		LEAN CLAY (CL), contains seams of Silty Sand, brown, moist, soft (ALLUVIUM)		1-1-2 (3) 11"			
926.6							
4.0		LEAN CLAY with SAND (CL), brown and dark brown, moist, medium to soft (ALLUVIUM)	5	1-4-4 (8) 18"	0.25	27	
				1-1-3 (4) 18"	0.25		
921.6		*With layer of SILTY SAND at 8 feet*					
9.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, very stiff to hard (GLACIAL TILL)	10	4-8-13 (21) 18"		19	
				11-28-37 (65) 18"			
915.6			15	14-15-26 (41) 18"			
15.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, light brown, moist, dense (GLACIAL OUTWASH)					
			20	25-16-20 (36) 14"			
909.6							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately backfilled with bentonite grout					
			25				
			30				

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BORING: **ST-14**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 247909 EASTING: 448183
START DATE: 05/15/23 END DATE: 05/15/23
SURFACE ELEVATION: 920.4 ft
DRILLER: M. Barber LOGGED BY: H. Vloo
RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER:

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
919.6		CLAYEY SAND (SC), organic, dark brown, moist (TOPSOIL)					
0.8		SANDY LEAN CLAY (CL), grayish brown, moist, soft (ALLUVIUM)		1-1-1 (2) 14"	0.25	29	
916.4							
4.0		LEAN CLAY (CL), brown to gray, moist, stiff (GLACIAL TILL)	5	2-5-5 (10) 14"	1.5	23	
		With layer of SILTY SAND at 8 feet		2-5-9 (14) 11"			
911.4							
9.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff to very stiff (GLACIAL TILL)	10	2-4-5 (9) 18"			
				6-8-9-8 (17) 18"			
905.9							
14.5		END OF BORING Boring immediately backfilled	15				Water not observed while drilling.
			20				
			25				
			30				

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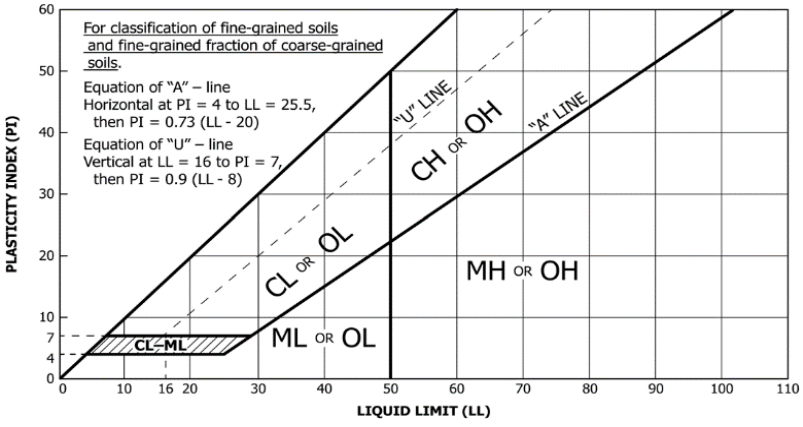
Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

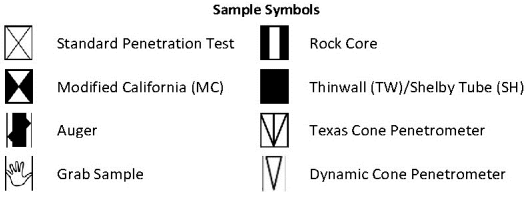
Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Sample Symbols



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 Hennepin County, Minnesota

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Map Scale: 1:8,280 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: Hennepin County, Minnesota
Survey Area Data: Version 20, Sep 7, 2024

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

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
L16A	Muskego, Blue Earth, and Houghton soils, ponded, 0 to 1 percent slopes	0.8	0.9%
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	19.6	22.1%
L22D2	Lester loam, 10 to 16 percent slopes, moderately eroded	2.0	2.3%
L23A	Cordova loam, 0 to 2 percent slopes	6.9	7.8%
L24A	Glencoe clay loam, 0 to 1 percent slopes	3.1	3.5%
L25A	Le Sueur loam, 1 to 3 percent slopes	2.3	2.6%
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	4.7	5.3%
L37B	Angus loam, 2 to 6 percent slopes	31.0	34.9%
L44A	Nessel loam, 1 to 3 percent slopes	4.1	4.6%
L45A	Dundas-Cordova complex, 0 to 3 percent slopes	14.2	16.0%
Totals for Area of Interest		**88.8**	**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.

Hennepin County, Minnesota

L16A—Muskego, Blue Earth, and Houghton soils, ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: h4xy
Elevation: 800 to 1,020 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 124 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Muskego, ponded, and similar soils: 35 percent
Blue earth, ponded, and similar soils: 30 percent
Houghton, ponded, and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Muskego, Ponded

Setting

Landform: Marshes on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over coprogenous earth

Typical profile

Oa1 - 0 to 9 inches: muck
Oa2 - 9 to 36 inches: muck
Lco - 36 to 60 inches: coprogenous earth

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 80 percent
Available water supply, 0 to 60 inches: Very high (about 19.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: C/D
Ecological site: R103XY016MN - Organic Marsh
Forage suitability group: Not Suited (G103XS024MN)
Other vegetative classification: Not Suited (G103XS024MN)
Hydric soil rating: Yes

Description of Blue Earth, Ponded

Setting

Landform: Marshes on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coprogenous earth

Typical profile

A - 0 to 50 inches: silt loam
Cg - 50 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: R103XY018MN - Shallow Lakes
Forage suitability group: Not Suited (G103XS024MN)
Other vegetative classification: Not Suited (G103XS024MN)
Hydric soil rating: Yes

Description of Houghton, Ponded

Setting

Landform: Marshes on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material

Typical profile

Oa - 0 to 80 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R103XY016MN - Organic Marsh
Forage suitability group: Not Suited (G103XS024MN)
Other vegetative classification: Not Suited (G103XS024MN)
Hydric soil rating: Yes

Minor Components

Klossner, ponded
Percent of map unit: 10 percent
Landform: Marshes on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY016MN - Organic Marsh
Other vegetative classification: Not Suited (G103XS024MN)
Hydric soil rating: Yes

L22C2—Lester loam, 6 to 10 percent slopes, moderately eroded

Map Unit Setting
National map unit symbol: 2ttc4
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Lester, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lester, Moderately Eroded

Setting
Landform: Hillslopes, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Fine-loamy till

Typical profile
Ap - 0 to 6 inches: loam
Bt - 6 to 38 inches: clay loam
C - 38 to 79 inches: loam

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 47 to 63 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R103XY020MN - Loamy Upland Savannas
Forage suitability group: Sloping Upland, Acid (G103XS006MN)
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Storden, moderately eroded

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Calcareous (G103XS010MN)
Hydric soil rating: No

Le sueur

Percent of map unit: 3 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Hamel

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Ecological site: F103XY030MN - Wet Footslope/Drainageway Forests
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

L22D2—Lester loam, 10 to 16 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2ttc8
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Lester, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lester, Moderately Eroded

Setting

Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Fine-loamy till

Typical profile

Ap - 0 to 6 inches: loam
Bt - 6 to 38 inches: clay loam
C - 38 to 79 inches: loam

Properties and qualities

Slope: 10 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 55 to 71 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R103XY020MN - Loamy Upland Savannas
Forage suitability group: Sloping Upland, Acid (G103XS006MN)
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)

Hydric soil rating: No

Minor Components

Storden, moderately eroded

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Calcareous (G103XS010MN)
Hydric soil rating: No

Lester, moderately eroded

Percent of map unit: 3 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Le sueur

Percent of map unit: 2 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

L23A—Cordova loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: h4xf
Elevation: 800 to 1,080 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 124 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Cordova and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cordova

Setting

Landform: Drainageways on moraines
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Till

Typical profile

Ap,AB - 0 to 13 inches: loam
Btg - 13 to 33 inches: clay loam
Cg - 33 to 80 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F103XY027MN - Loamy Wet Forests
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Minor Components

Glencoe, depressional

Percent of map unit: 10 percent
Landform: Depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

Nessel

Percent of map unit: 5 percent
Landform: Moraines
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F103XY025MN - Loamy Upland Forests
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

L24A—Glencoe clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tsjr
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Glencoe and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Glencoe

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Local alluvium over till

Typical profile

Ap - 0 to 9 inches: clay loam
A - 9 to 39 inches: clay loam
Bg - 39 to 50 inches: clay loam
Cg - 50 to 79 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R103XY015MN - Depressional Marsh
Forage suitability group: Ponded If Not Drained (G103XS013MN)
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

Minor Components

Okoboji

Percent of map unit: 10 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

Webster

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R103XY001MN - Loamy Wet Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Canisteo

Percent of map unit: 5 percent
Landform: Ground moraines, rims on depressions
Landform position (three-dimensional): Talf
Down-slope shape: Linear, concave
Across-slope shape: Linear
Ecological site: R103XY001MN - Loamy Wet Prairies
Other vegetative classification: Level Swale, Calcareous (G103XS009MN)
Hydric soil rating: Yes

L25A—Le Sueur loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2vvdg
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Le sueur and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Le Sueur

Setting

Landform: Ground moraines, hillslopes

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Fine-loamy till

Typical profile

Ap - 0 to 8 inches: loam
A - 8 to 14 inches: loam
Btg - 14 to 52 inches: clay loam
Cg - 52 to 79 inches: loam

Properties and qualities

Slope: 1 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 to high (0.20 to 2.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C/D
Ecological site: R103XY020MN - Loamy Upland Savannas
Forage suitability group: Sloping Upland, Acid (G103XS006MN)
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Cordova

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Ecological site: F103XY027MN - Loamy Wet Forests
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Lester

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Webster

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY001MN - Loamy Wet Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

L36A—Hamel, overwash-Hamel complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tsjx
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Hamel, overwash, and similar soils: 50 percent
Hamel and similar soils: 43 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hamel, Overwash

Setting

Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Colluvium over till

Typical profile

Ap - 0 to 12 inches: loam
A - 12 to 26 inches: loam
Btg - 26 to 48 inches: clay loam
Cg - 48 to 79 inches: clay loam

Properties and qualities

Slope: 1 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 to high (0.20 to 2.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F103XY029MN - Footslope/Drainageway Forests
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: No

Description of Hamel

Setting

Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Colluvium over till

Typical profile

Ap - 0 to 10 inches: loam
A - 10 to 24 inches: loam
Btg - 24 to 46 inches: clay loam
Cg - 46 to 79 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 8 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F103XY030MN - Wet Footslope/Drainageway Forests
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Minor Components

Terril

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip

Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R103XY011MN - Footslope/Drainageway Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: No

Glencoe

Percent of map unit: 2 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

L37B—Angus loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2syrq
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Angus and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Angus

Setting

Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Fine-loamy till

Typical profile

Ap - 0 to 7 inches: loam
Bt - 7 to 37 inches: clay loam
BC - 37 to 50 inches: clay loam
C - 50 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 39 to 51 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R103XY020MN - Loamy Upland Savannas
Forage suitability group: Sloping Upland, Acid (G103XS006MN)
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Angus, moderately eroded

Percent of map unit: 10 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Cordova

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F103XY027MN - Loamy Wet Forests
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Le sueur

Percent of map unit: 5 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

L44A—Nessel loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: h657
Elevation: 820 to 1,080 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 124 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nessel and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nessel

Setting

Landform: Moraines
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Ap - 0 to 6 inches: loam
Bt - 6 to 38 inches: clay loam
C - 38 to 80 inches: loam

Properties and qualities

Slope: 1 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 to high (0.60 to 2.00 in/hr)
Depth to water table: About 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Ecological site: F103XY025MN - Loamy Upland Forests
Forage suitability group: Sloping Upland, Acid (G103XS006MN)
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Cordova

Percent of map unit: 10 percent
Landform: Drainageways on moraines
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F103XY027MN - Loamy Wet Forests
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Angus

Percent of map unit: 5 percent
Landform: Hills on moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R103XY020MN - Loamy Upland Savannas
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

L45A—Dundas-Cordova complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: h660
Elevation: 820 to 1,070 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 124 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Dundas and similar soils: 65 percent
Cordova and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dundas

Setting

Landform: Moraines
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Ap - 0 to 9 inches: silt loam
E - 9 to 15 inches: loam
Btg - 15 to 40 inches: clay loam
Cg - 40 to 80 inches: loam

Properties and qualities

Slope: 1 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 0.60 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R103XY020MN - Loamy Upland Savannas
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: No

Description of Cordova

Setting

Landform: Drainageways on moraines
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Till

Typical profile

Ap,AB - 0 to 13 inches: loam
Btg - 13 to 33 inches: clay loam
Cg - 33 to 80 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F103XY027MN - Loamy Wet Forests
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Minor Components

Nessel

Percent of map unit: 5 percent
Landform: Moraines
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F103XY025MN - Loamy Upland Forests
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Glencoe

Percent of map unit: 5 percent
Landform: Depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Cowley Lake Preserve)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

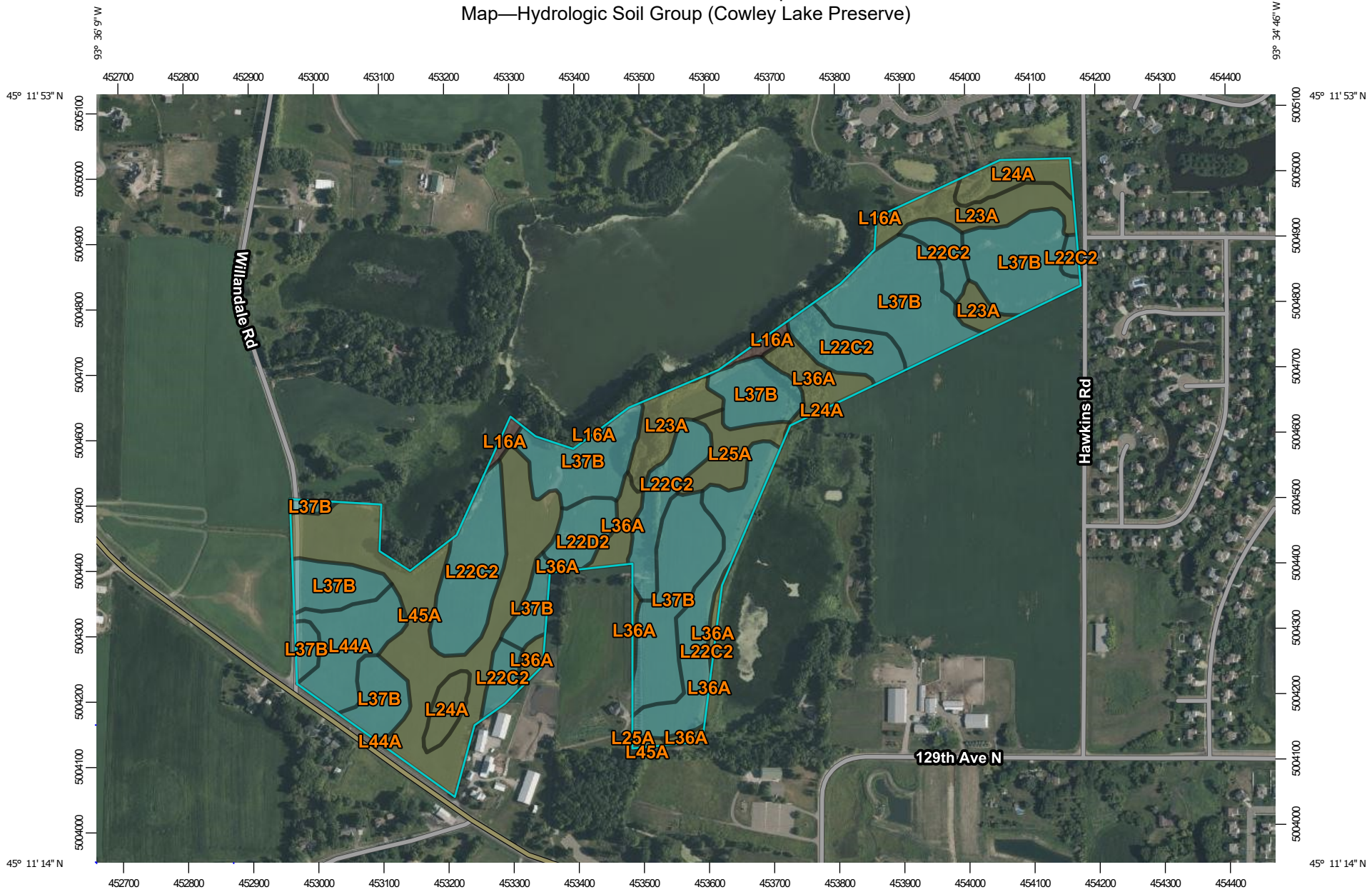
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group (Cowley Lake Preserve)



Map Scale: 1:8,280 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: Hennepin County, Minnesota
Survey Area Data: Version 20, Sep 7, 2024

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

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

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.

Table—Hydrologic Soil Group (Cowley Lake Preserve)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
L16A	Muskego, Blue Earth, and Houghton soils, ponded, 0 to 1 percent slopes	B/D	0.8	0.9%
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	C	19.6	22.1%
L22D2	Lester loam, 10 to 16 percent slopes, moderately eroded	C	2.0	2.3%
L23A	Cordova loam, 0 to 2 percent slopes	C/D	6.9	7.8%
L24A	Glencoe clay loam, 0 to 1 percent slopes	C/D	3.1	3.5%
L25A	Le Sueur loam, 1 to 3 percent slopes	C/D	2.3	2.6%
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	C/D	4.7	5.3%
L37B	Angus loam, 2 to 6 percent slopes	C	31.0	34.9%
L44A	Nessel loam, 1 to 3 percent slopes	C	4.1	4.6%
L45A	Dundas-Cordova complex, 0 to 3 percent slopes	C/D	14.2	16.0%
Totals for Area of Interest			**88.8**	**100.0%**

Rating Options—Hydrologic Soil Group (Cowley Lake Preserve)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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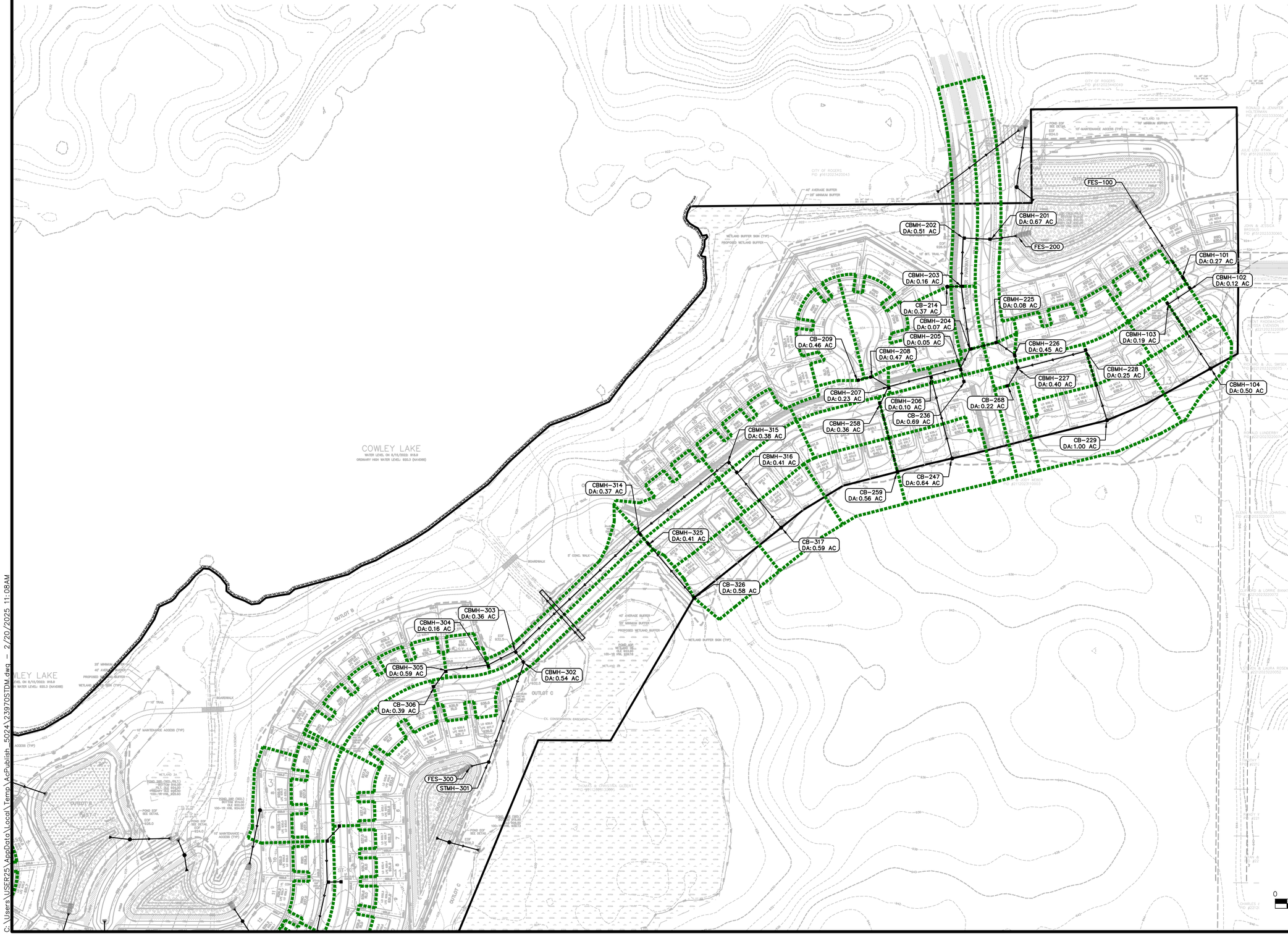
STORM SEWER 100s, 200s & 300s

LEGEND

PROPOSED STORM SEWER

CATCH BASIN SUBCATCHMENT BOUNDARY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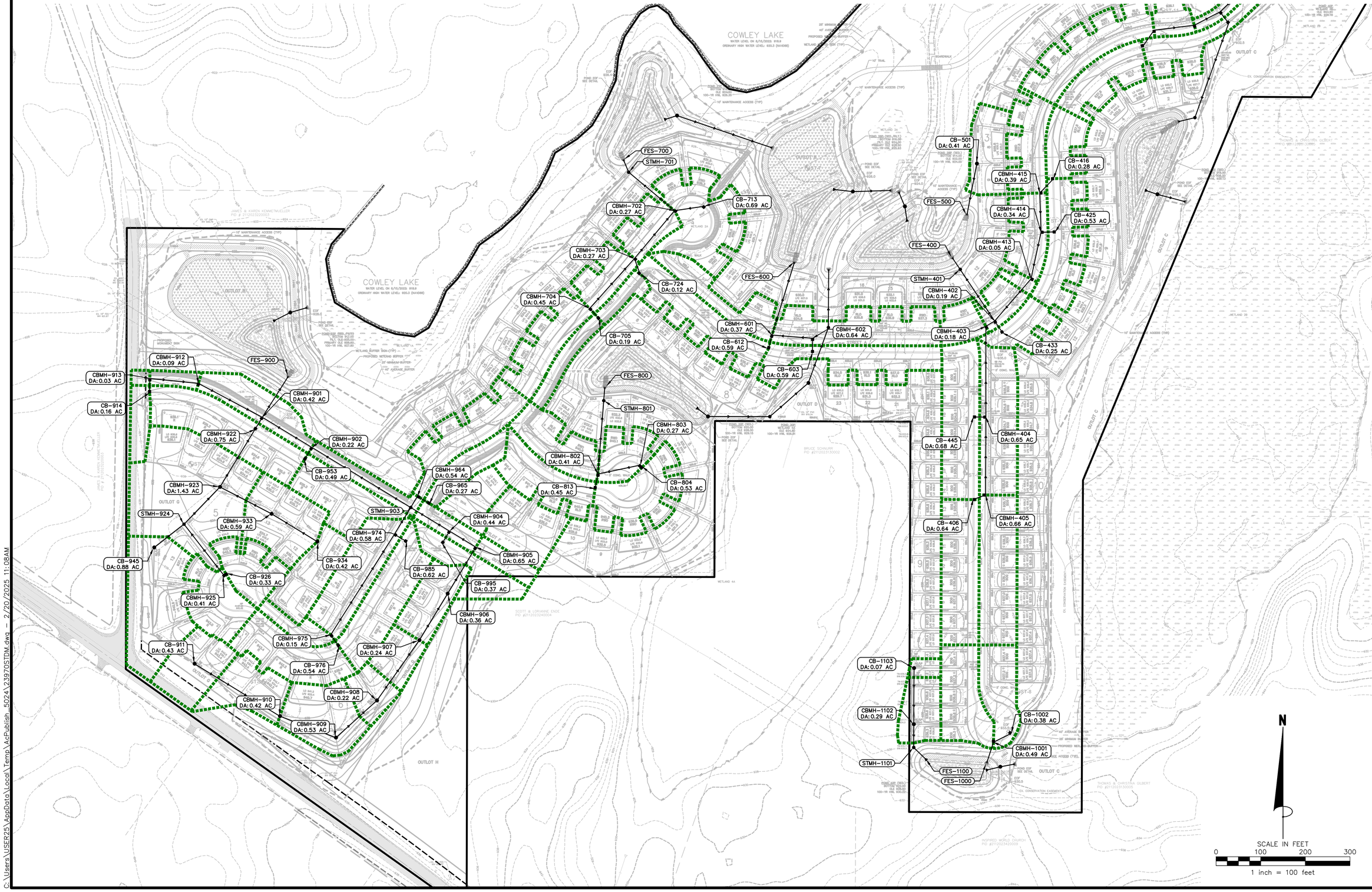
STORM SEWER 400s, 500s, 600s, 700s, 800s, 900s, 1000s & 1100s

LEGEND

PROPOSED STORM SEWER

CATCH BASIN SUBCATCHMENT BOUNDARY



James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 W. Cty. Rd. 42, Suite 100, Burnsville, MN 55306
PHONE: (952)890-6044 FAX: (952)890-6244

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

PRELIMINARY

Date: _____ Reg.No. _____

COWLEY LAKE PRESERVE
ROGERS, MINNESOTA
STORM SEWER DRAINAGE MAP
FOR
RACHEL DEVELOPMENT
4180 NAPIER COURT, ST. MICHAEL, MN 55376

DRAWN BY	JSO
DATE	02/24/2024
REVISIONS	
CAD FILE	23970STDM
PROJECT NO.	23970
SHEET	2 OF 2

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James R. Hill, Inc.
PLANNERS / ENGINEERS / SURVEYORS
2999 West County Road 42, Suite 100
Burnsville, MN 55306
Phone: 952-890-6044

STORM SEWER DESIGN COMPUTATION SHEET

Project: Cowley Lake Preserve
Location: Rogers, MN
Desc: Storm Sewer Comps
Design Return Period: 10 yr
Pipe Type: RCP/HDPE 15" Min Req'd? yes
Manning's n : 0.013

Job No.: 23970
Prepared by: Josh O.
Date: 2/24/2025

	Up-stream Str	Dn-stream Str	A	C	C x A	Σ	Tc_Da	Tc_Str	i	Qd	UPSTREAM			DOWNSTREAM			Length	Slope	Min. Dia.	Q-full	Vel.-full	T_trav			Qds
	From	To	acres	coef.		C x A	min.	min.	intens.	c.f.s.	Rim	Inv.	Depth	Rim	Inv.	Depth	ft.	ft./ft.	in.	c.f.s.	ft./sec.	min.	Remarks		c.f.s.
	STORM SEWER 100s																								
1	CB-104	CBMH-103	0.50	0.40	0.20	0.20	10.00	10.00	6.13	1.23	931.84	928.84	3.00	932.65	928.02	4.63	164	0.50%	15	4.58	3.72	0.73	OK	1	1.23
2	CBMH-103	CBMH-102	0.19	0.70	0.13	0.33	10.00	10.73	5.92	1.97	932.65	928.02	4.63	930.35	926.35	4.00	58	2.88%	15	10.99	8.94	0.11	OK	2	0.79
3	CBMH-102	CBMH-101	0.12	0.70	0.08	0.42	10.00	10.84	5.89	2.45	930.35	926.35	4.00	930.35	926.19	4.16	32	0.50%	15	4.58	3.72	0.14	OK	3	0.49
4	CBMH-101	FES-100	0.27	0.70	0.19	0.61	10.00	10.99	5.85	3.54	930.35	924.00	6.35	923.25	922.00	1.25	168	1.19%	15	7.07	5.75	0.49	OK	4	1.10
	STORM SEWER 200s																								
1	CB-209	CBMH-208	0.46	0.70	0.32	0.32	10.00	10.00	6.13	1.97	936.96	932.96	4.00	936.96	932.80	4.16	32	0.50%	15	4.58	3.72	0.14	OK	1	1.97
2	CBMH-208	CBMH-207	0.47	0.70	0.33	0.65	10.00	10.14	6.09	3.96	936.96	932.80	4.16	935.95	931.95	4.00	42	2.02%	15	9.21	7.49	0.09	OK	2	2.00
3	CB-259	CBMH-258	0.56	0.40	0.22	0.22	10.00	10.00	6.13	1.37	936.07	933.07	3.00	936.45	932.33	4.12	149	0.50%	15	4.56	3.71	0.67	OK	3	1.37
4	CBMH-258	CBMH-207	0.36	0.70	0.25	0.48	10.00	10.67	5.94	2.83	936.45	932.33	4.12	935.95	931.95	4.00	42	0.90%	15	6.16	5.01	0.14	OK	4	1.50
5	CBMH-207	CBMH-206	0.23	0.70	0.16	1.29	10.00	10.81	5.90	7.59	935.95	931.95	4.00	934.21	929.76	4.45	93	2.35%	15	9.94	8.08	0.19	OK	5	0.95
6	CB-247	CBMH-206	0.64	0.40	0.26	0.26	10.00	10.00	6.13	1.57	933.67	930.67	3.00	934.21	929.76	4.45	182	0.50%	15	4.58	3.72	0.81	OK	6	1.57
7	CBMH-206	CBMH-205	0.10	0.70	0.07	1.61	10.00	11.00	5.84	9.43	934.21	929.56	4.65	932.99	928.63	4.36	66	1.41%	18	12.50	7.06	0.16	OK	7	0.41
8	CB-236	CBMH-205	0.69	0.70	0.48	0.48	10.00	10.00	6.13	2.96	932.99	928.99	4.00	932.99	928.83	4.16	32	0.50%	15	4.58	3.72	0.14	OK	8	2.96
9	CBMH-205	CBMH-204	0.05	0.70	0.04	2.13	10.00	11.16	5.80	12.37	932.99	928.63	4.36	931.20	927.20	4.00	45	3.18%	18	18.78	10.60	0.07	OK	9	0.20
10	CB-229	CBMH-228	1.00	0.40	0.40	0.40	10.00	10.00	6.13	2.45	931.41	928.41	3.00	933.85	927.64	6.21	154	0.50%	15	4.58	3.72	0.69	OK	10	2.45
11	CBMH-228	CBMH-227	0.25	0.70	0.18	0.58	10.00	10.69	5.93	3.41	933.85	927.64	6.21	932.65	926.89	5.76	150	0.50%	15	4.58	3.72	0.67	OK	11	1.04
12	CB-268	CBMH-227	0.22	0.70	0.15	0.15	10.00	10.00	6.13	0.94	933.92	929.92	4.00	932.65	928.65	4.00	42	3.02%	15	11.26	9.16	0.08	OK	12	0.94
13	CBMH-227	CBMH-226	0.40	0.70	0.28	1.01	10.00	11.36	5.75	5.80	932.65	926.89	5.76	932.65	926.63	6.02	32	0.81%	15	5.84	4.75	0.11	OK	13	1.61
14	CBMH-226	CBMH-225	0.45	0.70	0.32	1.32	10.00	11.47	5.72	7.58	932.65	926.43	6.22	931.16	926.11	5.05	45	0.71%	18	8.88	5.02	0.15	OK	14	1.80
15	CBMH-225	CBMH-204	0.08	0.70	0.06	1.38	10.00	11.62	5.68	7.84	931.16	926.11	5.05	931.20	925.63	5.57	60	0.80%	18	9.42	5.32	0.19	OK	15	0.32
16	CBMH-204	CBMH-203	0.07	0.70	0.05	3.56	10.00	11.81	5.64	20.07	931.20	925.23	5.97	927.08	923.08	4.00	136	1.58%	24	28.52	9.06	0.25	OK	16	0.28
17	CB-214	CBMH-203	0.37	0.40	0.15	0.15	10.00	10.00	6.13	0.91	927.24	924.24	3.00	927.08	923.68	3.40	30	1.87%	15	8.85	7.20	0.07	OK	17	0.91
18	CBMH-203	CBMH-202	0.16	0.70	0.11	3.82	10.00	12.06	5.57	21.30	927.08	923.08	4.00	925.62	921.80	3.82	103	1.24%	24	25.29	8.03	0.21	OK	18	0.62
19	CBMH-202	CBMH-201	0.51	0.70	0.36	4.18	10.00	12.27	5.53	23.09	925.62	921.40	4.22	925.62	921.20	4.42	60	0.33%	30	23.75	4.83	0.21	OK	19	1.97
20	CBMH-201	FES-200	0.67	0.70	0.47	4.65	10.00	12.48	5.48	25.47	925.62	921.20	4.42	922.00	921.00	1.00	55	0.36%	36	40.33	5.69	0.16	OK	20	2.57
	STORM SEWER 300s																								
1	CB-317	CBMH-316	0.59	0.40	0.24	0.24	10.00	10.00	6.13	1.45	936.90	933.90	3.00	938.19	933.15	5.04	149	0.50%	15	4.60	3.74	0.66	OK	1	1.45
2	CBMH-316	CBMH-315	0.41	0.70	0.29	0.52	10.00	10.66	5.94	3.11	938.19	933.15	5.04	938.19	932.99	5.20	32	0.50%	15	4.58	3.72	0.14	OK	2	1.70
3	CBMH-315	CBMH-314	0.38	0.70	0.27	0.79	10.00	10.81	5.90	4.65	938.19	932.99	5.20	934.15	929.99	4.16	244	1.23%	15	7.18	5.84	0.70	OK	3	1.57

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STORM SEWER DESIGN COMPUTATION SHEET

Project: Cowley Lake Preserve
Location: Rogers, MN
Desc: Storm Sewer Comps
Design Return Period: 10 yr
Pipe Type: RCP/HDPE 15" Min Req'd? yes
Manning's n : 0.013

Job No.: 23970
Prepared by: Josh O.
Date: 2/24/2025

	Up-stream Str	Dn-stream Str	A	C	C x A	Σ	Tc_Da	Tc_Str	i	Qd	UPSTREAM			DOWNSTREAM			Length	Slope	Min. Dia.	Q-full	Vel.-full	T_trav			Qds
	From	To	acres	coef.		C x A	min.	min.	intens.	c.f.s.	Rim	Inv.	Depth	Rim	Inv.	Depth	ft.	ft./ft.	in.	c.f.s.	ft./sec.	min.	Remarks		c.f.s.
4	CB-326	CBMH-325	0.58	0.40	0.23	0.23	10.00	10.00	6.13	1.42	934.53	931.53	3.00	934.15	930.15	4.00	149	0.93%	15	6.23	5.07	0.49	OK	4	1.42
5	CBMH-325	CBMH-314	0.41	0.70	0.29	0.52	10.00	10.49	5.99	3.11	934.15	930.15	4.00	934.15	929.99	4.16	32	0.50%	15	4.58	3.72	0.14	OK	5	1.72
6	CBMH-314	CBMH-303	0.37	0.70	0.26	1.57	10.00	11.50	5.71	8.95	934.10	929.59	4.51	931.13	927.88	3.25	359	0.48%	21	10.97	4.55	1.32	OK	6	1.48
7	CB-306	CBMH-305	0.39	0.70	0.27	0.27	10.00	10.00	6.13	1.67	934.42	930.42	4.00	934.01	930.01	4.00	45	0.91%	15	6.18	5.03	0.15	OK	7	1.67
8	CBMH-305	CBMH-304	0.59	0.70	0.41	0.69	10.00	10.15	6.09	4.18	934.01	930.01	4.00	932.18	928.58	3.60	91	1.57%	15	8.12	6.60	0.23	OK	8	2.51
9	CBMH-304	CBMH-303	0.16	0.70	0.11	0.80	10.00	10.38	6.02	4.81	932.18	928.18	4.00	931.13	927.88	3.25	72	0.42%	18	6.80	3.84	0.31	OK	9	0.67
10	CBMH-303	CBMH-302	0.36	0.80	0.29	2.65	10.00	12.82	5.41	14.34	931.13	927.68	3.45	931.13	927.52	3.61	32	0.50%	24	16.04	5.09	0.10	OK	10	1.56
11	CBMH-302	STMH-301	0.54	0.70	0.38	3.03	10.00	12.92	5.38	16.31	931.13	927.32	3.81	930.47	926.62	3.85	232	0.30%	27	17.06	4.28	0.90	OK	11	2.03
12	STMH-301	FES-300	0.00	0.40	0.00	3.03	10.00	13.83	5.20	15.76	930.47	926.62	3.85	928.75	926.50	2.25	38	0.32%	27	17.45	4.38	0.14	OK	12	0.00
	STORM SEWER 400s																								
1	CB-416	CBMH-415	0.28	0.70	0.20	0.20	10.00	10.00	6.13	1.20	934.95	930.95	4.00	934.76	930.73	4.03	45	0.49%	15	4.53	3.68	0.20	OK	1	1.20
2	CBMH-415	CBMH-414	0.39	0.70	0.27	0.47	10.00	10.20	6.07	2.85	934.76	930.73	4.03	934.38	930.22	4.16	88	0.58%	15	4.93	4.01	0.37	OK	2	1.66
3	CB-425	CBMH-414	0.53	0.70	0.37	0.37	10.00	10.00	6.13	2.27	934.38	930.38	4.00	934.38	930.22	4.16	32	0.50%	15	4.58	3.72	0.14	OK	3	2.27
4	CBMH-414	CBMH-413	0.34	0.70	0.24	1.08	10.00	10.57	5.97	6.43	934.38	930.02	4.36	934.91	929.49	5.42	107	0.50%	18	7.41	4.19	0.43	OK	4	1.42
5	CBMH-413	CBMH-402	0.05	0.70	0.04	1.11	10.00	11.00	5.84	6.50	934.91	929.49	5.42	934.68	928.87	5.81	125	0.50%	18	7.42	4.19	0.50	OK	5	0.20
6	CB-433	CBMH-402	0.25	0.70	0.18	0.18	10.00	10.00	6.13	1.07	934.68	930.68	4.00	934.68	930.52	4.16	32	0.50%	15	4.58	3.72	0.14	OK	6	1.07
7	CB-406	CBMH-405	0.64	0.70	0.45	0.45	10.00	10.00	6.13	2.75	933.07	929.07	4.00	933.01	928.92	4.09	30	0.50%	15	4.58	3.72	0.13	OK	7	2.75
8	CBMH-405	CBMH-404	0.66	0.70	0.46	0.91	10.00	10.13	6.09	5.54	933.01	928.72	4.29	932.03	927.69	4.34	175	0.59%	18	8.08	4.56	0.64	OK	8	2.81
9	CB-445	CBMH-404	0.68	0.70	0.48	0.48	10.00	10.00	6.13	2.92	932.03	928.03	4.00	932.03	927.89	4.14	28	0.50%	15	4.58	3.72	0.13	OK	9	2.92
10	CBMH-404	CBMH-403	0.65	0.70	0.46	1.84	10.00	10.77	5.91	10.87	932.03	927.49	4.54	934.72	926.47	8.25	203	0.50%	21	11.26	4.67	0.72	OK	10	2.69
11	CBMH-403	CBMH-402	0.18	0.70	0.13	1.97	10.00	11.50	5.72	11.24	934.72	926.47	8.25	934.68	926.35	8.33	23	0.52%	21	11.48	4.76	0.08	OK	11	0.72
12	CBMH-402	STMH-401	0.19	0.70	0.13	3.39	10.00	11.58	5.69	19.29	934.68	926.35	8.33	927.61	924.21	3.40	139	1.54%	21	19.71	8.18	0.28	OK	12	0.76
13	STMH-401	FES-400	0.00	0.70	0.00	3.39	10.00	11.86	5.62	19.05	927.61	922.16	5.45	924.25	922.00	2.25	32	0.50%	27	21.96	5.51	0.10	OK	13	0.00
	STORM SEWER 500s																								
1	CB-501	FES-500	0.41	0.40	0.16	0.16	10.00	10.00	6.13	1.01	925.78	922.78	3.00	923.25	922.00	1.25	117	0.67%	15	5.29	4.30	0.45	OK	1	1.01
	STORM SEWER 600s																								
1	CB-603	CBMH-602	0.59	0.70	0.41	0.41	10.00	10.00	6.13	2.53	931.41	927.41	4.00	931.41	927.25	4.16	32	0.50%	15	4.58	3.72	0.14	OK	1	2.53
2	CBMH-602	CBMH-601	0.64	0.70	0.45	0.86	10.00	10.14	6.09	5.24	931.41	927.05	4.36	932.59	926.59	6.00	91	0.51%	18	7.49	4.23	0.36	OK	2	2.73
3	CB-612	CBMH-601	0.59	0.70	0.41	0.41	10.00	10.00	6.13	2.53	932.59	928.59	4.00	932.59	928.43	4.16	32	0.50%	15	4.58	3.72	0.14	OK	3	2.53

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STORM SEWER DESIGN COMPUTATION SHEET

Project: Cowley Lake Preserve
Location: Rogers, MN
Desc: Storm Sewer Comps
Design Return Period: 10 yr
Pipe Type: RCP/HDPE 15" Min Req'd? yes
Manning's n : 0.013

Job No.: 23970
Prepared by: Josh O.
Date: 2/24/2025

	Up-stream Str	Dn-stream Str	A	C	C x A	Σ	Tc_Da	Tc_Str	i	Qd	UPSTREAM			DOWNSTREAM			Length	Slope	Min. Dia.	Q-full	Vel.-full	T_trav			Qds
	From	To	acres	coef.		C x A	min.	min.	intens.	c.f.s.	Rim	Inv.	Depth	Rim	Inv.	Depth	ft.	ft./ft.	in.	c.f.s.	ft./sec.	min.	Remarks		c.f.s.
4	CBMH-601	FES-600	0.37	0.70	0.26	1.53	10.00	10.50	5.99	9.18	932.59	925.71	6.88		924.00	-924.00	171	1.00%	18	10.53	5.95	0.48	OK	4	1.55
	STORM SEWER 700s																								
1	CB-705	CBMH-704	0.19	0.80	0.15	0.15	10.00	10.00	6.13	0.93	939.23	935.23	4.00	939.23	935.07	4.16	32	0.50%	15	4.58	3.72	0.14	OK	1	0.93
2	CBMH-704	CBMH-703	0.45	0.70	0.32	0.47	10.00	10.14	6.09	2.84	939.23	935.07	4.16	938.55	934.32	4.23	150	0.50%	15	4.58	3.72	0.67	OK	2	1.92
3	CB-724	CBMH-703	0.12	0.80	0.10	0.10	10.00	10.00	6.13	0.59	938.43	934.43	4.00	938.45	934.24	4.21	37	0.51%	15	4.64	3.77	0.16	OK	3	0.59
4	CBMH-703	CBMH-702	0.27	0.70	0.19	0.75	10.00	10.81	5.89	4.43	938.45	934.24	4.21	937.23	932.62	4.61	140	1.16%	15	6.97	5.67	0.41	OK	4	1.11
5	CB-713	CBMH-702	0.69	0.70	0.48	0.48	10.00	10.00	6.13	2.96	936.96	932.96	4.00	937.23	932.62	4.61	68	0.50%	15	4.58	3.72	0.30	OK	5	2.96
6	CBMH-702	STMH-701	0.27	0.70	0.19	1.42	10.00	11.23	5.78	8.24	937.51	932.62	4.89	928.56	925.06	3.50	134	5.64%	15	15.38	12.51	0.18	OK	6	1.09
7	STMH-701	FES-700	0.00	0.70	0.00	1.42	10.00	11.40	5.74	8.17	928.56	924.25	4.31	925.50	924.00	1.50	31	0.81%	18	9.46	5.34	0.10	OK	7	0.00
	STORM SEWER 800s																								
1	CB-804	CBMH-803	0.53	0.70	0.37	0.37	10.00	10.00	6.13	2.27	937.09	933.09	4.00	937.05	933.05	4.00	6	0.67%	15	5.29	4.30	0.02	OK	1	2.27
2	CBMH-803	CBMH-802	0.27	0.70	0.19	0.56	10.00	10.02	6.13	3.43	937.05	933.05	4.00	938.10	932.56	5.54	98	0.50%	15	4.58	3.72	0.44	OK	2	1.16
3	CB-813	CBMH-802	0.45	0.70	0.32	0.32	10.00	10.00	6.13	1.93	938.18	934.18	4.00	938.10	934.01	4.09	34	0.50%	15	4.58	3.72	0.15	OK	3	1.93
4	CBMH-802	STMH-801	0.41	0.40	0.16	1.04	11.00	11.00	5.84	6.07	938.10	932.56	5.54	930.97	928.35	2.62	165	2.55%	15	10.35	8.41	0.33	OK	4	0.96
5	STMH-801	FES-800	0.00	0.70	0.00	1.04	10.00	11.33	5.76	5.98	938.10	928.15	9.95	930.97	928.00	2.97	30	0.50%	18	7.45	4.21	0.12	OK	5	0.00
	STORM SEWER 900s																								
1	CB-911	CBMH-910	0.43	0.40	0.17	0.17	10.00	10.00	6.13	1.05	940.16	937.16	3.00	938.11	935.11	3.00	225	0.91%	15	6.18	5.03	0.75	OK	1	1.05
2	CBMH-910	CBMH-909	0.42	0.40	0.17	0.34	10.00	10.75	5.91	2.01	938.11	935.11	3.00	935.42	932.42	3.00	134	2.01%	15	9.18	7.46	0.30	OK	2	0.99
3	CBMH-909	CBMH-908	0.53	0.40	0.21	0.55	10.00	11.05	5.83	3.22	935.42	932.42	3.00	935.80	931.80	4.00	124	0.50%	15	4.58	3.72	0.55	OK	3	1.24
4	CBMH-908	CBMH-907	0.22	0.40	0.09	0.64	10.00	11.60	5.69	3.64	935.80	931.80	4.00	934.93	930.98	3.95	165	0.50%	15	4.57	3.71	0.74	OK	4	0.50
5	CBMH-907	CBMH-906	0.24	0.40	0.10	0.74	10.00	12.34	5.51	4.06	934.93	930.98	3.95	932.49	929.49	3.00	122	1.22%	15	7.16	5.82	0.35	OK	5	0.53
6	CBMH-906	CBMH-905	0.36	0.40	0.14	0.88	10.00	12.69	5.43	4.78	932.49	929.29	3.20	933.55	928.92	4.63	122	0.30%	18	5.80	3.28	0.62	OK	6	0.78
7	CBMH-905	CBMH-904	0.65	0.50	0.33	1.21	10.00	13.31	5.30	6.39	933.55	928.92	4.63	933.20	928.64	4.56	69	0.41%	18	6.71	3.79	0.30	OK	7	1.72
8	CB-995	CBMH-904	0.37	0.60	0.22	0.22	10.00	10.00	6.13	1.36	933.20	929.20	4.00	933.20	929.04	4.16	32	0.50%	15	4.58	3.72	0.14	OK	8	1.36
9	CBMH-904	STMH-903	0.44	0.50	0.22	1.65	10.00	13.61	5.24	8.63	933.20	928.64	4.56	934.64	927.93	6.71	102	0.70%	18	8.79	4.96	0.34	OK	9	1.15
10	CB-976	CBMH-975	0.54	0.70	0.38	0.38	10.00	10.00	6.13	2.32	936.30	932.30	4.00	936.30	932.14	4.16	32	0.50%	15	4.58	3.72	0.14	OK	10	2.32
11	CBMH-975	CBMH-974	0.15	0.70	0.11	0.48	10.00	10.14	6.09	2.94	936.30	932.14	4.16	933.89	929.73	4.16	267	0.90%	15	6.15	5.00	0.89	OK	11	0.64
12	CB-985	CBMH-974	0.62	0.70	0.43	0.43	10.00	10.00	6.13	2.66	933.89	929.89	4.00	933.89	929.73	4.16	32	0.50%	15	4.58	3.72	0.14	OK	12	2.66
13	CBMH-974	STMH-903	0.58	0.70	0.41	1.32	10.00	11.03	5.83	7.72	933.89	929.73	4.16	934.64	928.13	6.51	70	2.29%	15	9.79	7.96	0.15	OK	13	2.37

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STORM SEWER DESIGN COMPUTATION SHEET

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Desc: Storm Sewer Comps
Design Return Period: 10 yr
Pipe Type: RCP/HDPE 15" Min Req'd? yes
Manning's n : 0.013

Job No.: 23970
Prepared by: Josh O.
Date: 2/24/2025

	Up-stream Str	Dn-stream Str	A	C	C x A	Σ	Tc_Da	Tc_Str	i	Qd	UPSTREAM			DOWNSTREAM			Length	Slope	Min. Dia.	Q-full	Vel.-full	T_trav			Qds
	From	To	acres	coef.		C x A	min.	min.	intens.	c.f.s.	Rim	Inv.	Depth	Rim	Inv.	Depth	ft.	ft./ft.	in.	c.f.s.	ft./sec.	min.	Remarks		c.f.s.
14	CB-965	CBMH-964	0.27	0.70	0.19	0.19	10.00	10.00	6.13	1.16	934.78	930.78	4.00	934.76	930.62	4.14	32	0.50%	15	4.58	3.72	0.14	OK	14	1.16
15	CBMH-964	STMH-903	0.54	0.70	0.38	0.57	10.00	10.14	6.09	3.45	934.76	930.62	4.14	934.40	930.40	4.00	29	0.76%	15	5.64	4.59	0.11	OK	15	2.30
16	STMH-903	CBMH-902	0.00	0.80	0.00	3.54	10.00	13.96	5.17	18.30	934.64	927.33	7.31	932.50	926.42	6.08	259	0.35%	27	18.41	4.62	0.93	OK	16	0.00
17	CB-953	CBMH-902	0.49	0.70	0.34	0.34	10.00	10.00	6.13	2.10	932.50	928.50	4.00	932.50	928.34	4.16	32	0.50%	15	4.58	3.72	0.14	OK	17	2.10
25	CBMH-902	CBMH-901	0.22	0.80	0.18	4.06	10.00	14.89	5.01	20.31	932.50	926.22	6.28	931.85	925.72	6.13	130	0.38%	30	25.51	5.18	0.42	OK	25	0.88
18	CB-926	CBMH-925	0.33	0.70	0.23	0.23	10.00	10.00	6.13	1.42	939.96	935.96	4.00	939.92	935.92	4.00	6	0.67%	15	5.29	4.30	0.02	OK	18	1.42
19	CBMH-925	STMH-924	0.41	0.70	0.29	0.52	10.00	10.02	6.13	3.17	939.92	935.92	4.00	934.39	930.94	3.45	144	3.46%	15	12.05	9.79	0.25	OK	19	1.76
20	CB-945	STMH-924	0.88	0.40	0.35	0.35	10.00	10.00	6.13	2.16	934.36	931.36	3.00	934.39	930.94	3.45	85	0.49%	15	4.55	3.70	0.38	OK	20	2.16
21	STMH-924	CBMH-923	0.00	0.35	0.00	0.87	10.00	10.38	6.02	5.24	934.39	930.94	3.45	930.84	927.19	3.65	130	2.88%	15	11.00	8.94	0.24	OK	21	0.00
22	CB-934	CBMH-933	0.42	0.40	0.17	0.17	10.00	10.00	6.13	1.03	933.24	930.24	3.00	930.84	927.84	3.00	120	2.00%	15	9.16	7.45	0.27	OK	22	1.03
23	CBMH-933	CBMH-923	0.59	0.40	0.24	0.40	10.00	10.27	6.05	2.45	930.84	927.84	3.00	930.84	927.38	3.46	130	0.35%	15	3.85	3.13	0.69	OK	23	1.43
24	CBMH-923	CBMH-922	1.43	0.35	0.50	1.77	10.00	10.96	5.85	10.39	930.84	926.59	4.25	931.85	926.25	5.60	151	0.23%	24	10.76	3.42	0.74	OK	24	2.93
25	CBMH-922	CBMH-901	0.75	0.70	0.53	2.30	10.00	11.70	5.66	13.03	931.85	926.25	5.60	931.85	926.12	5.73	32	0.41%	24	14.46	4.59	0.12	OK	25	2.97
27	CB-914	CBMH-913	0.16	0.70	0.11	0.11	10.00	10.00	6.13	0.69	933.72	929.72	4.00	933.72	929.56	4.16	32	0.50%	15	4.58	3.72	0.14	OK	27	0.69
28	CBMH-913	CBMH-912	0.03	0.80	0.02	0.14	10.00	10.14	6.09	0.83	933.72	929.56	4.16	932.88	928.88	4.00	110	0.62%	15	5.09	4.14	0.44	OK	28	0.15
29	CBMH-912	CBMH-901	0.09	0.80	0.07	0.21	10.00	10.59	5.96	1.24	932.88	928.88	4.00	931.85	927.85	4.00	165	0.62%	15	5.12	4.16	0.66	OK	29	0.43
30	CBMH-901	FES-900	0.42	0.80	0.34	6.90	10.00	15.31	4.94	34.06	931.74	925.32	6.42	928.00	925.00	3.00	109	0.29%	36	36.24	5.12	0.36	OK	30	1.66
	STORM SEWER 1000s																								
1	CB-1002	CBMH-1001	0.38	0.70	0.27	0.27	10.00	10.00	6.13	1.63	932.83	928.83	4.00	933.14	928.69	4.45	44	0.32%	15	3.69	3.00	0.24	OK	1	1.63
2	CBMH-1001	FES-1000	0.49	0.70	0.34	0.61	10.00	10.24	6.06	3.69	933.14	928.69	4.45	929.75	928.50	1.25	49	0.39%	15	4.03	3.28	0.25	OK	2	2.08
	STORM SEWER 1100s																								
1	CB-1103	CBMH-1102	0.07	0.50	0.04	0.04	10.00	10.00	6.13	0.21	935.10	932.10	3.00	933.42	930.42	3.00	126	1.33%	15	7.48	6.08	0.35	OK	1	0.21
2	CBMH-1102	STMH-1101	0.29	0.50	0.15	0.18	10.00	10.35	6.03	1.09	933.42	930.42	3.00	935.15	930.16	4.99	52	0.50%	15	4.58	3.72	0.23	OK	2	0.87
3	STMH-1101	FES-1100	0.00	0.40	0.00	0.18	10.00	10.58	5.96	1.07	935.15	929.00	6.15	929.75	928.50	1.25	40	1.25%	15	7.24	5.89	0.11	OK	3	0.00

DRAFT REPORT

To: David Stradtman, VP of Development
Rachel Development

From: Matt Pacyna, PE, Principal
Transportation Collaborative & Consultants, LLC

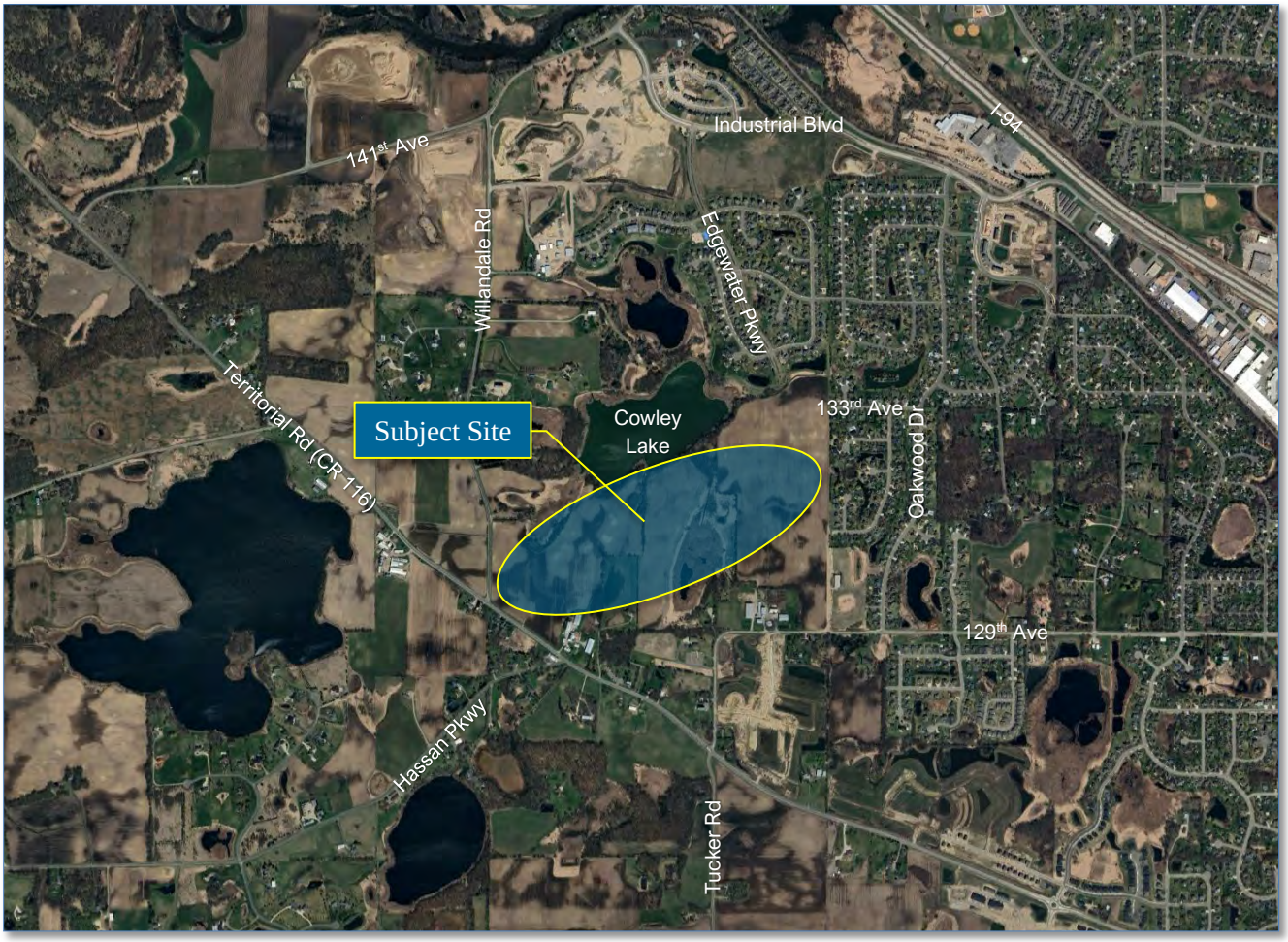
Date: March 19, 2025

Subject: Scherber Property Development Traffic Study, Rogers, MN

INTRODUCTION

TC2 completed a traffic study for the proposed Scherber Property Residential Development in Rogers, MN. The site under consideration, shown in Figure 1, is generally bound by Territorial Road (CR 116) to the south, Willandale Road to the west, Cowley Lake to the north, and Hawkins Drive to the east. The main objectives of the study are to quantify existing traffic operations within the study area, evaluate potential impacts of the proposed development, and recommend improvements, if necessary, to ensure safe and efficient operations for all users. The following study assumptions, methodology, and findings are offered for consideration.

Figure 1 Subject Site



EXISTING CONDITIONS

Existing conditions were reviewed within the study area to establish current traffic conditions to help determine impacts associated with the proposed development. The evaluation of existing conditions included collecting traffic volumes, observing transportation characteristics, and analyzing crash history and intersection capacity, which are described in the following sections.

Traffic Volumes

Vehicular intersection turning movement counts were collected at the following locations on Tuesday, February 4, 2025. The counts were collected from 6 a.m. to 7 p.m. at each study intersection.

- Territorial Road (CR 116) and Willandale Road
- Edgewater Parkway and Industrial Boulevard
- Oakwood Drive and 133rd Avenue

The a.m. and p.m. peak hours represent 7 to 8 a.m. and 4:15 to 5:15 p.m., respectively. Average daily traffic (ADT) volumes were provided by MnDOT or estimated based on the data collected.

Transportation Characteristics

Observations were conducted within the study area to identify various transportation characteristics such as roadway geometry, traffic controls, speed limits, and multimodal facilities. A general overview of key roadways within the study area is as follows:

- ***Territorial Road (CR 116)*** – a 2-lane undivided minor arterial roadway with no turn lanes at Willandale Road. There are no multimodal facilities and the speed limit is 50-mph.
- ***Willandale Road*** – a 2-lane undivided local roadway with no turn lanes at Territorial Road (CR 166). There are no multimodal facilities and the speed limit is 45-mph.
- ***Industrial Boulevard*** – a 2-lane divided major collector roadway with periodic left and right turn lanes at key intersections. There is sidewalk along north side of the roadway, as well as the south side to the east of Edgewater Parkway; the speed limit is 30 mph.
- ***Edgewater Parkway*** – a 2-lane divided local roadway with no turn lanes. There is a multiuse trail along the west side and a sidewalk along the east side of the roadway; the speed limit is 20 mph.
- ***133rd Avenue*** – a 2-lane undivided local roadway with no turn lanes. There is sidewalk along the south side of the roadway; the speed limit is 25 mph.
- ***Oakwood Drive*** – a 2-lane undivided minor collector roadway with no turn lanes. There is sidewalk along the west side of the roadway; the speed limit is 25 mph.

The Oakwood Drive and 133rd Avenue intersection has all-way stop control, while all other study intersections have side-street stop control. Existing conditions are illustrated in Figure 2.

Crash History

Five years of crash history within the study area (January 2020 through December 2024) was reviewed using data from *MnDOT's Crash Mapping Analysis Tool* (MnCMAT). There were two (2) non-animal reported crashes within the study area; one (1) at both the Territorial Road (CR 116) / Willandale Road and Industrial Boulevard / Edgewater Parkway intersections. Both reported crashes were property damage only. Therefore, there are no existing safety issues within the study area from a crash frequency or severity perspective

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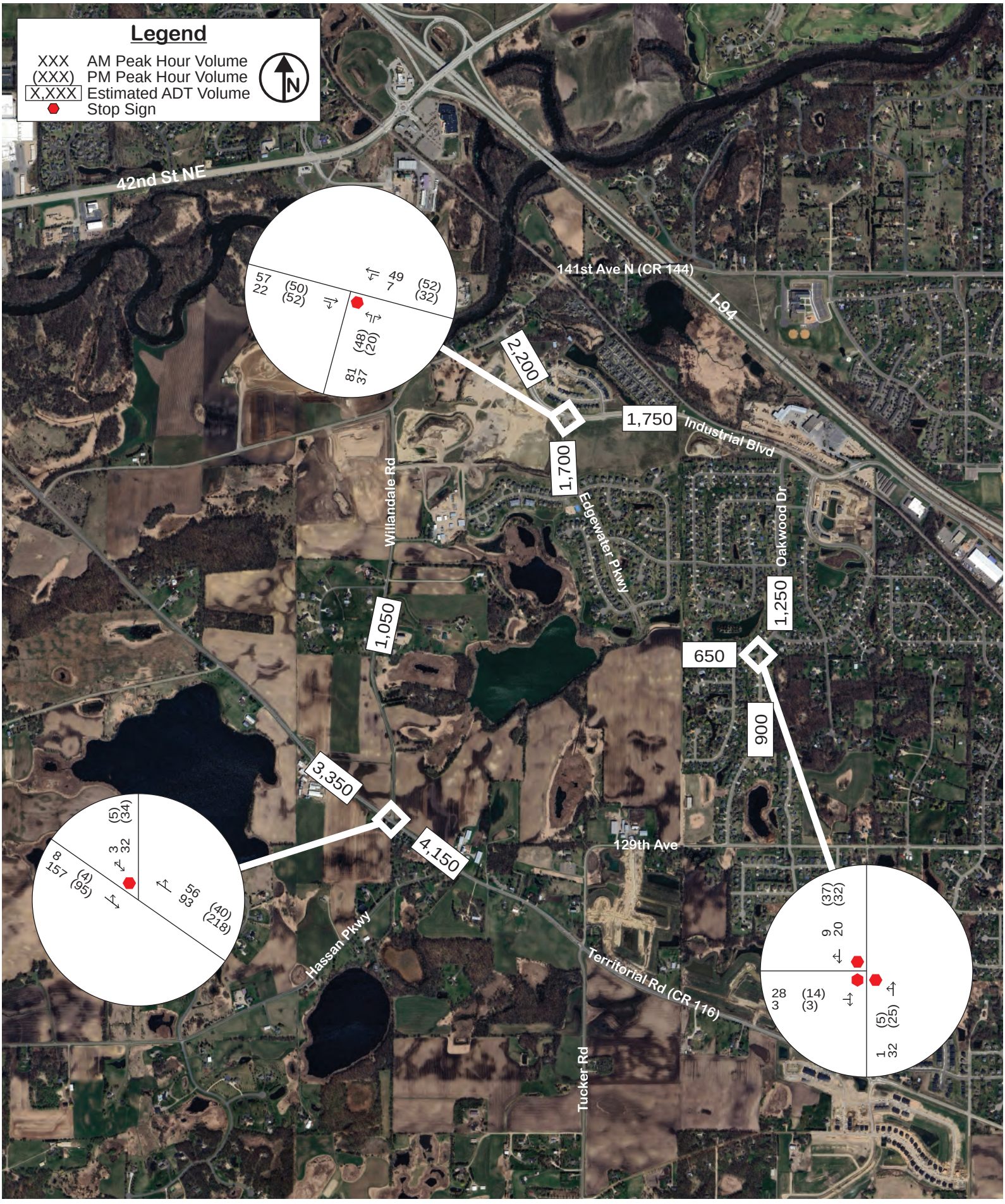

Legend
XXX AM Peak Hour Volume
(XXX) PM Peak Hour Volume
X,XXX Estimated ADT Volume
Stop Sign
N
42nd St NE
141st Ave N (CR 144)
I-94
Industrial Blvd
Willandale Rd
Edgewater Pkwy
Oakwood Dr
129th Ave
Hassan Pkwy
Territorial Rd (CR 116)
Tucker Rd
2,200
1,750
1,700
1,050
1,250
650
900
3,350
4,150
57
22
(50)
(52)
49
7
(52)
(32)
(48)
(20)
81
37
(5)
(34)
3
32
8
157
(4)
(95)
56
93
(40)
(218)
(37)
(32)
9
20
28
3
(14)
(3)
(5)
(25)
1
32

Intersection Capacity

Intersection capacity was evaluated using Synchro / SimTraffic Software (version 11), which uses methods outlined in the *Highway Capacity Manual, 6th Edition*. The software is used to develop calibrated models that simulate observed traffic operations and identify key metrics such as intersection Level of Service (LOS) and queues. These models incorporate collected traffic, pedestrian, and bicyclist volumes, traffic controls, peaking characteristics, and driver behavior factors. Level of Service (LOS) quantifies how an intersection is operating. Intersections are graded from LOS A to LOS F, which corresponds to the average delay per vehicle values shown. LOS A indicates the best traffic operation, while LOS F indicates an intersection where demand exceeds capacity. An overall intersection LOS A though LOS D is generally considered acceptable in the study area.

Level of Service	Average Delay / Vehicles	
	Stop, Yield, and Roundabout	Signalized
A	< 10 seconds	< 10 seconds
B	10 to 15 seconds	10 to 20 seconds
C	15 to 25 seconds	20 to 35 seconds
D	25 to 35 seconds	35 to 55 seconds
E	35 to 50 seconds	55 to 80 seconds
F	> 50 seconds	> 80 seconds

For side-street stop-controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service, which takes into account the total number of vehicles entering the intersection and the capability of the intersection to support the volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, most delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high-levels of delay (i.e., poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

The existing intersection capacity analysis results, summarized in Table 2, indicate that all study intersections and approaches currently operate at an acceptable LOS B or better during the typical weekday a.m. and p.m. peak hours. Peak queues for all approaches are generally 50 feet or less (i.e., 2 to 3 vehicles). Thus, there are currently no significant issues within the study area from an intersection capacity perspective.

Table 1 Existing Intersection Capacity

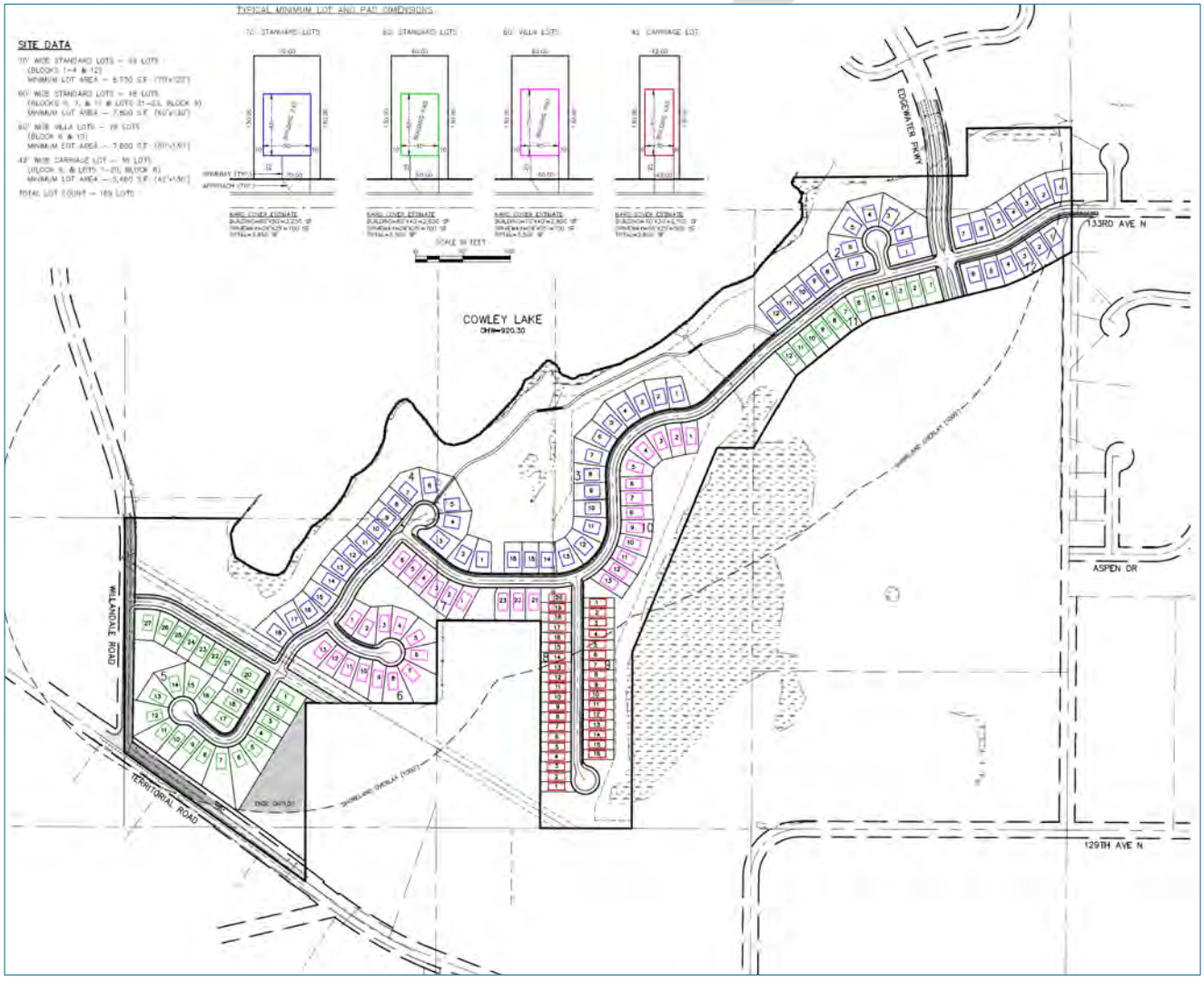
Intersection	Traffic Control	Level of Service (Delay)	
		AM Peak Hour	PM Peak Hour
Willandale Road and Territorial Road (CR 116)	SSS	A / B (11 sec)	A / B (12 sec)
Edgewater Parkway and Industrial Boulevard	SSS	A / B (10 sec)	A / B (10 sec)
Oakwood Drive and 133rd Avenue	AWSC	A (7 sec)	A (7 sec)

AWSC – All Way Stop Control *SSS – Side-Street-Stop*

PROPOSED DEVELOPMENT

The proposed development, shown in Figure 3, is generally bound by Territorial Road (CR 116) to the south, Willandale Road to the west, Cowley Lake to the north, and Hawkins Drive to the east. As proposed, the project would include a total of 169 single-family residential homes and complete a roadway connection between Willandale Road and both Edgewater Parkway and 133rd Avenue. The development would also provide for future roadway extensions of Edgewater Parkway and 129th Avenue. Sidewalk is proposed throughout the site along one side of each roadway and includes connections to adjacent facilities. Construction was assumed to be fully completed by 2030.

Figure 3 Proposed Site Plan



TRAFFIC FORECASTS

Traffic forecasts were developed for year 2030 conditions and account for general background growth, travel pattern changes associated with the new roadway connections, and trip generation from the proposed development. The following information summarizes the traffic forecast development process.

Background Growth

To account for general background growth in the study area, an annual growth rate of three (3) percent was applied to the existing traffic volumes to develop year 2030 background traffic forecasts. This growth rate is consistent with historical ADT volumes over the last 20-years, as well as future year 2040 traffic forecasts within the *Hennepin County Mobility 2040 Plan*.

Roadway Network Travel Pattern Changes

The proposed development would complete a roadway connection between Willandale Road and both Edgewater Parkway and 133rd Avenue. This roadway connection would provide existing area residents to the north and east additional route options to / from their residences. With this roadway connection, approximately 150 to 250 daily motorists could be expected to change current travel patterns and utilize the new roadway connections. A corresponding reduction in motorists along portions of Edgewater Parkway and / or Oakwood Drive could also be expected. At this level of travel pattern change, no significant impacts would be expected and therefore existing travel patterns were not modified as part of this study to better understand traffic volume impacts associated with the proposed development. Note that travel pattern changes associated with the future extension of Edgewater Parkway and 129th Avenue were also not evaluated as part of this study.

Proposed Development Trip Generation

The trip generation estimate for the proposed development was created using the *ITE Trip Generation Manual, 11th Edition* and includes trips for typical weekday a.m. and p.m. peak hours, as well as daily. The proposed development, shown in Table 2, is estimated to generate 120 a.m. peak hour (30 in / 90 out), 163 p.m. peak hour (103 in / 60 out), and 1,636 daily trips. No modal reductions were applied to provide a more conservative estimate.

Table 2 Trip Generation Summary

Land Use Type *(ITE Code)*	**Size**	**AM Peak Hour**		**PM Peak Hour**		**Daily**
		In	**Out**	**In**	**Out**	
Single-Family Residential *(210)*	169 homes	30	90	103	60	1,636

Site generated trips were distributed throughout the study area using the directional distribution shown in Figure 4, which is based on a combination of existing area travel patterns and engineering judgment. The resultant year 2030 build condition traffic forecasts are illustrated in Figure 5.

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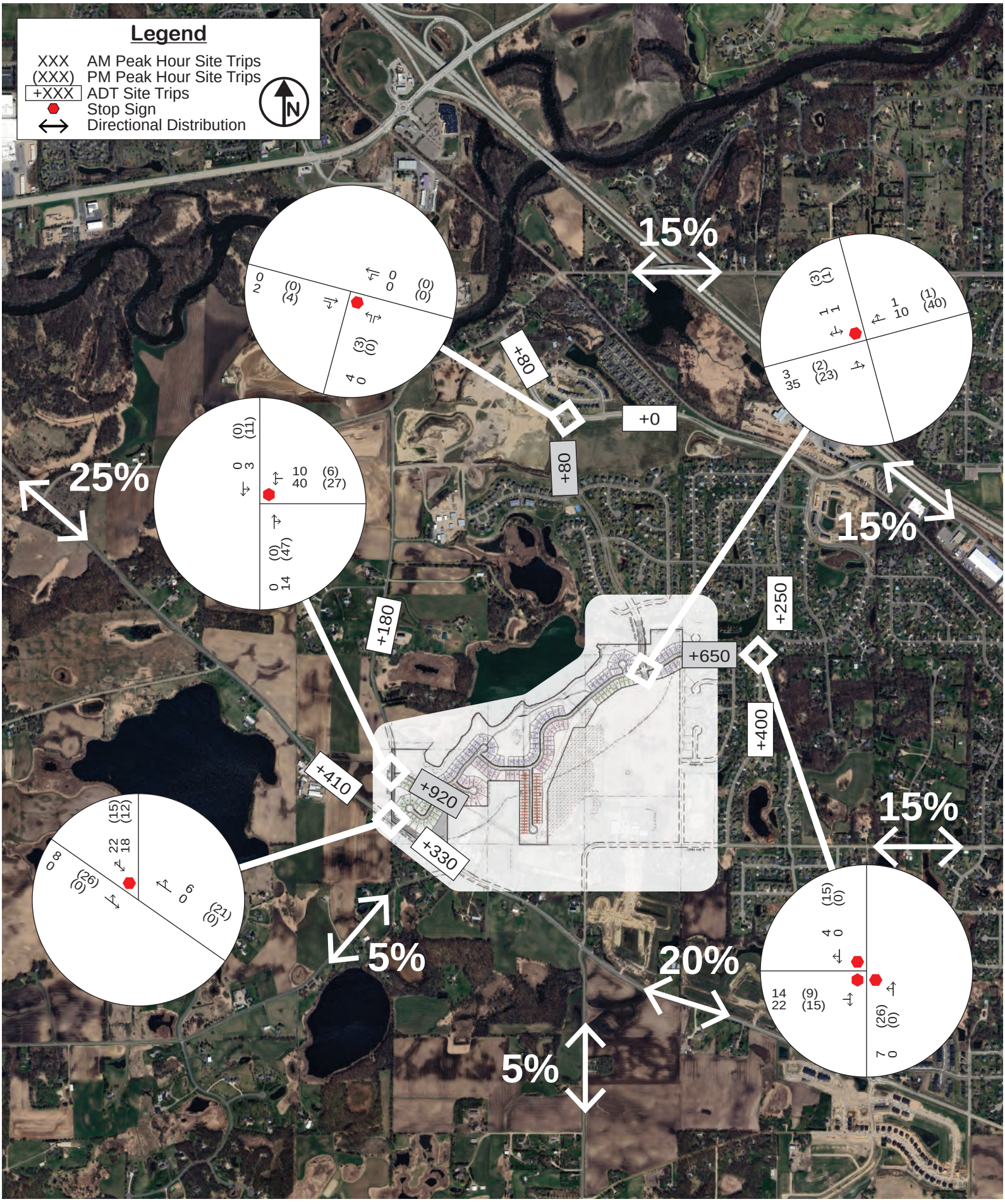
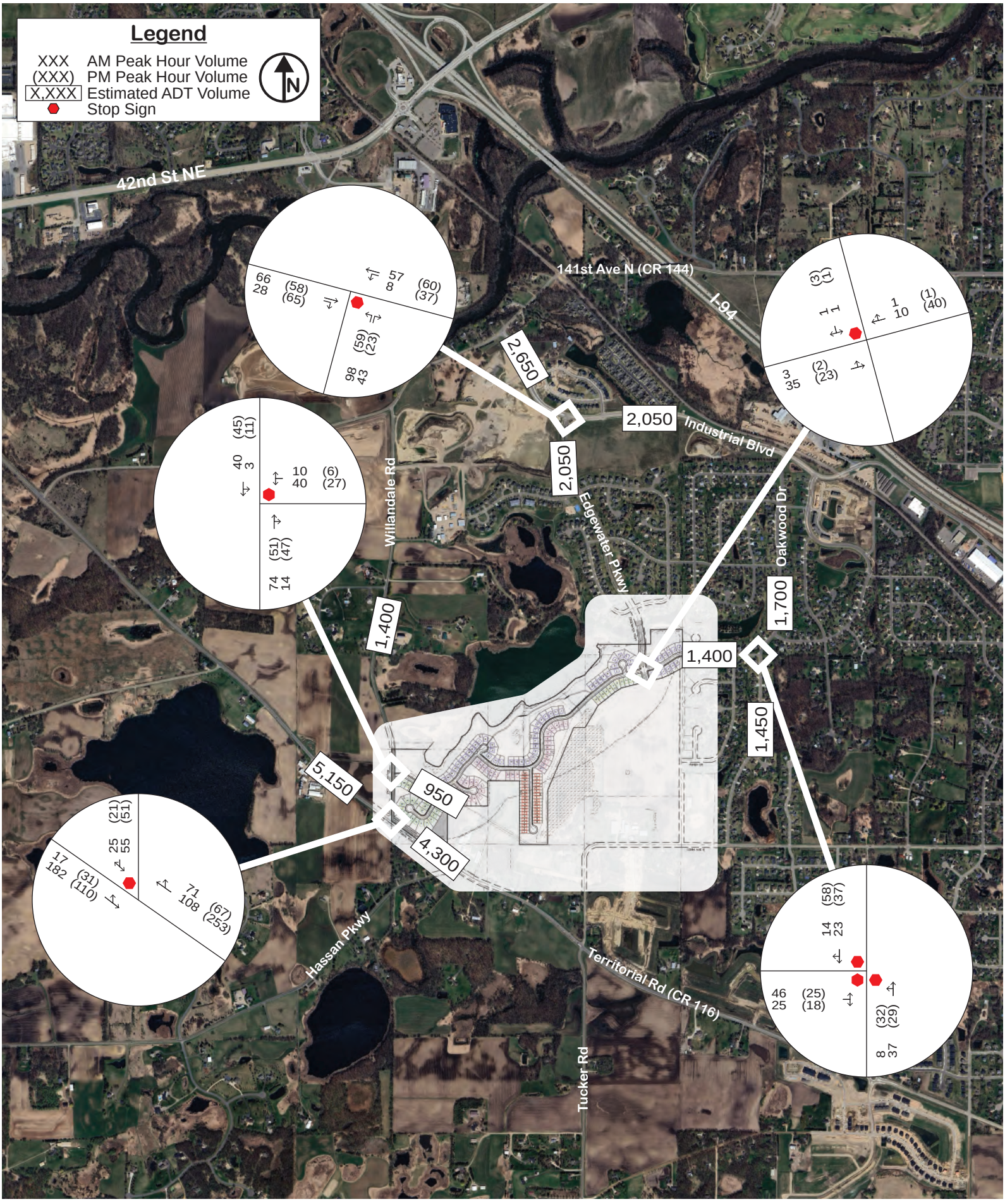


Site Generated Trips

Scherber Property Development Traffic Study

Figure 4



Year 2030 Build Conditions

Scherber Property Development Traffic Study

Figure 5

YEAR 2030 CONDITIONS

To understand impacts associated with the proposed development, a year 2030 build condition intersection capacity analysis was conducted. Results of the future analysis shown Table 3 indicate that all study intersections and approaches will continue to operate at an acceptable LOS B or better during the typical weekday a.m. and p.m. peak hours. In addition, peak queues for all approaches will also continue to be generally 50 feet or less (i.e., 2 to 3 vehicles). Thus, the overall change in operations as a result of the proposed development from an intersection capacity perspective is relatively minimal and within acceptable industry standards. No additional infrastructure is needed to support the proposed development from a roadway capacity perspective.

Table 3 Year 2030 Build Intersection Capacity

Intersection	Traffic Control	Level of Service (Delay)	
		AM Peak Hour	PM Peak Hour
Willandale Road and West Site Access	SSS	A / B (10 sec)	A / B (10 sec)
Willandale Road and Territorial Road (CR 116)	SSS	A / B (12 sec)	A / B (13 sec)
Edgewater Parkway and Industrial Boulevard	SSS	A / B (10 sec)	A / B (10 sec)
Edgewater Parkway and 133rd Avenue	SSS	A / A (9 sec)	A / A (9 sec)
Oakwood Drive and 133rd Avenue	AWSC	A (8 sec)	A (8 sec)

AWSC – All Way Stop Control *SSS – Side-Street-Stop*

TURN LANE REVIEW

Although not needed from an intersection capacity perspective, turn lanes can provide safety benefits by limiting conflicts between thru and turning vehicles. To determine if turn lanes are warranted within the study area, specifically along Willandale Avenue at both the West Site Access and Territorial Road (CR 116) intersections, a turn lane analysis was conducted. Guidance from *MnDOT's Access Management Manual*, *AASHTO's Geometric Design of Highways and Streets*, and the *NCHRP Report on Evaluating Intersection Improvements: An Engineering Study Guide* were reviewed. Each of these guidelines consider traffic volumes along the roadways, including hourly directional, left- / right-turning, and ADT volumes.

Results of the turn lane review indicate that the traffic volumes at the Territorial Road (CR 116) and Willandale Road intersection will meet the guidance to warrant a westbound right-turn lane. However, the eastbound left-turn and opposing volumes do not meet the guidance to warrant an eastbound left-turn lane. In addition, the anticipated traffic volumes along Willandale Road at the West Site Access do not meet the guidance for either a northbound right-turn lane or a southbound left-turn lane. Therefore, further coordination with area agencies, including Hennepin County, should occur to discuss the turn lane needs. Detailed information used for the turn lane analysis is included in the Appendix.

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SITE PLAN / OTHER CONSIDERATIONS

A review of the proposed site plan does not indicate any major issues. However, the following items are offered for further consideration between the City, County, and / or project team.

- Locate signage and landscaping to avoid creating any sight distance issues.
- Increase the curve radius near the internal cul-de-sac intersection or reorientate the roadway so the roadway / cul-de-sac are the continue roadway and the east approach intersects at 90 degrees.
- Add internal traffic controls (i.e., stop signs) per direction from the City Engineer; traffic controls should be reviewed further upon the future extension of Edgewater Parkway and / or 129th Avenue.
- Review truck maneuverability to limit potential circulation conflicts.

CONCLUSIONS

Based on the findings of the study, the following conclusions are offered for consideration.

1) There does not appear to be any significant safety issues within the study area from a crash history perspective.
2) All study intersections and approaches currently operate at an acceptable overall LOS B or better during the typical weekday a.m. and p.m. peak hours and there are no significant existing intersection capacity issues within the study area.
3) The proposed development includes 169 single-family residential homes with construction anticipated to be fully completed by the year 2030.
4) Traffic forecasts were developed for year 2030 build conditions, which included a three (3) percent annual background growth and trip generation from the proposed development; the proposed development is estimated to generate 120 a.m. peak hour (30 in / 90 out), 163 p.m. peak hour (103 in / 60 out), and 1,636 daily trips.
5) Key takeaways from the future year 2030 build capacity analysis, include:
    a. All study intersections and approaches are expected to continue to operate at an acceptable LOS B or better during typical weekday a.m. and p.m. peak hours.
    b. The overall change in operations as a result of the proposed development is relatively minimal and within acceptable industry standards and no additional infrastructure is needed to support the proposed development from an intersection capacity perspective.
6) Traffic volumes at the Territorial Road (CR 116) and Willandale Road intersection are expected to meet the guidance to warrant a westbound right-turn lane; no other locations will meet the guidance to warrant any additional turn lanes. Thus, further coordination with area agencies, including Hennepin County, should occur to discuss the turn lane needs.
7) A review of the proposed site plan does not indicate any major issues although the site plan items noted above are offered for further consideration between the City, County, and / or project team.

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APPENDIX

Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

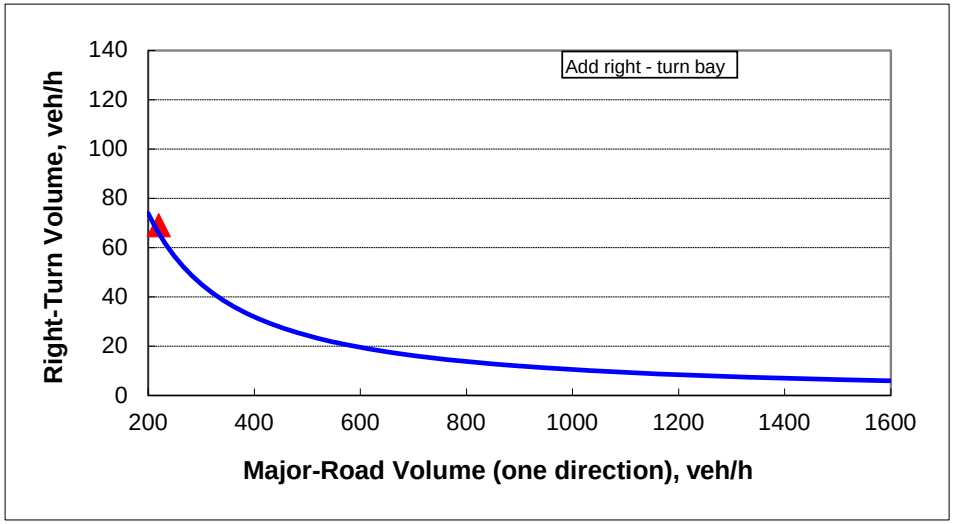
INPUT

Roadway geometry:	2-lane roadway

Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	220
Right-turn volume, veh/h:	69

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	66
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



	Territorial Road (CR 116) / Willandale Road Intersection Year 2030 Build Traffic Volumes			
	EBLT	EBT	WBT	WBR
6:00 AM	5	89	48	25
7:00 AM	17	182	108	71
8:00 AM	21	110	75	43
9:00 AM	17	74	68	32
10:00 AM	22	65	58	28
11:00 AM	23	58	75	29
12:00 PM	31	58	79	34
1:00 PM	26	77	104	37
2:00 PM	34	71	147	58
3:00 PM	34	102	169	74
4:00 PM	31	89	255	69
5:00 PM	36	107	190	58
6:00 PM	26	68	85	50

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

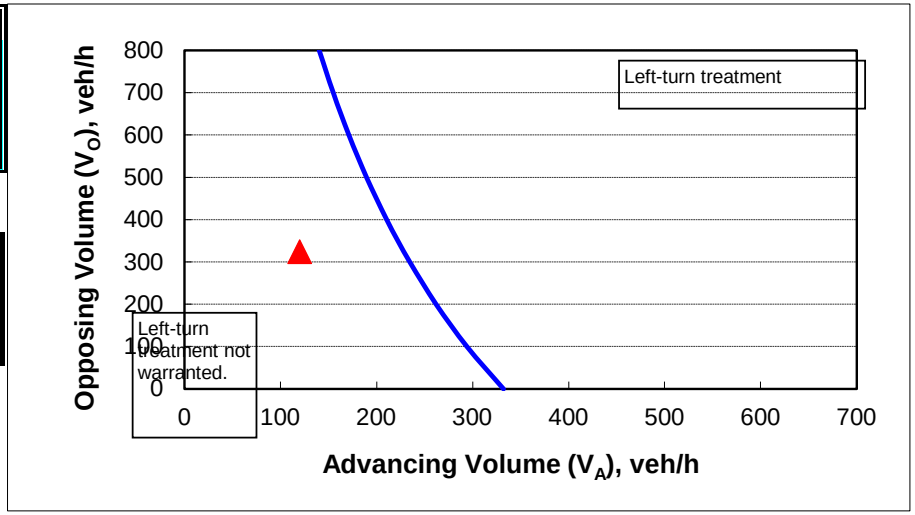
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	22%
Advancing volume (V_A), veh/h:	120
Opposing volume (V_O), veh/h:	324

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	228
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane , s:	1.9

Territorial Road (CR 116) / Willandale Road Intersection
Year 2030 Build Traffic Volumes

	EBLT	EBT	WBT	WBR
6:00 AM	5	89	48	25
7:00 AM	17	182	108	71
8:00 AM	21	110	75	43
9:00 AM	17	74	68	32
10:00 AM	22	65	58	28
11:00 AM	23	58	75	29
12:00 PM	31	58	79	34
1:00 PM	26	77	104	37
2:00 PM	34	71	147	58
3:00 PM	34	102	169	74
4:00 PM	31	89	255	69
5:00 PM	36	107	190	58
6:00 PM	26	68	85	50

Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

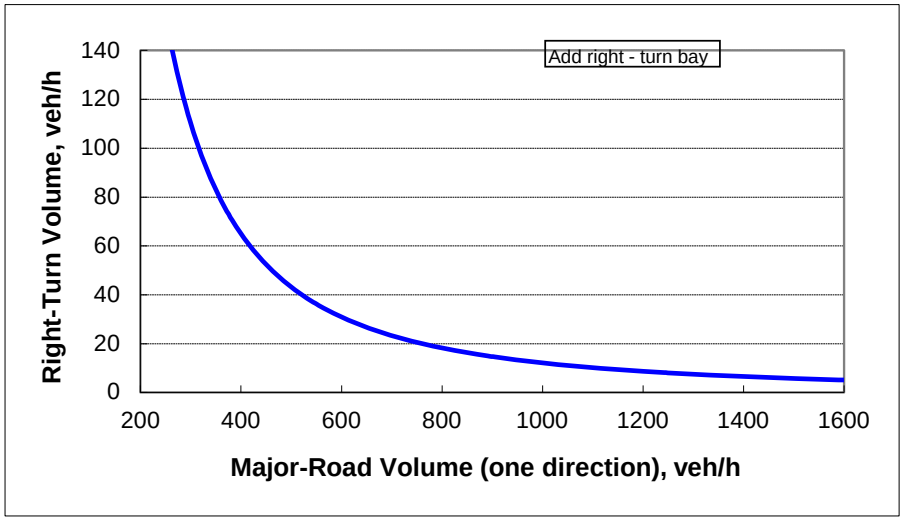
INPUT

Roadway geometry:	2-lane roadway

Variable	Value
Major-road speed, mph:	45
Major-road volume (one direction), veh/h:	100
Right-turn volume, veh/h:	47

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	824
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



	Willandale Road / West Site Access Intersection Year 2030 Build Traffic Volumes			
	SBL	SBT	NBT	NBR
6:00 AM	2	22	23	7
7:00 AM	3	41	74	14
8:00 AM	7	37	35	29
9:00 AM	7	24	20	29
10:00 AM	8	9	14	37
11:00 AM	8	14	16	37
12:00 PM	10	16	20	44
1:00 PM	10	22	19	44
2:00 PM	12	34	39	51
3:00 PM	12	60	56	51
4:00 PM	11	57	52	47
5:00 PM	12	45	42	51
6:00 PM	10	29	31	44

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

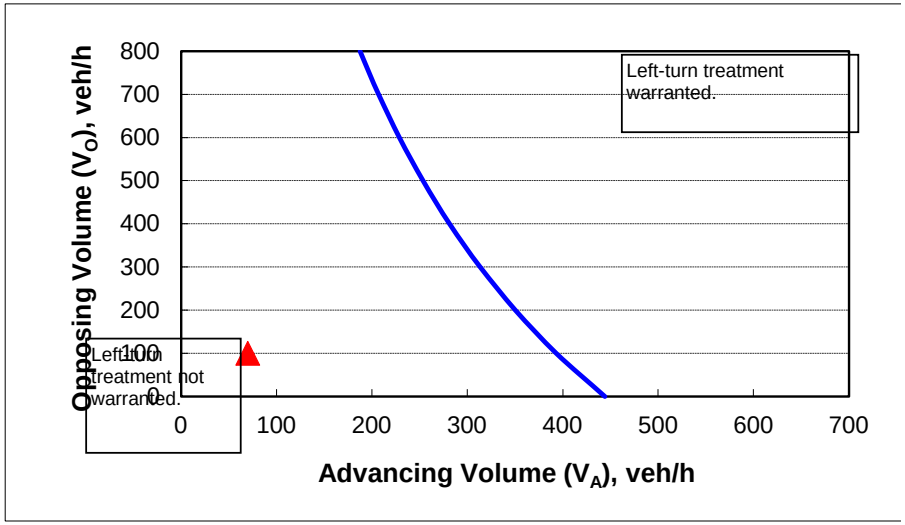
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	16%
Advancing volume (V_A), veh/h:	70
Opposing volume (V_O), veh/h:	100

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	393
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane , s:	1.9

	Willandale Road / West Site Access Intersection Year 2030 Build Traffic Volumes			
	SBL	SBT	NBT	NBR
6:00 AM	2	22	23	7
7:00 AM	3	41	74	14
8:00 AM	7	37	35	29
9:00 AM	7	24	20	29
10:00 AM	8	9	14	37
11:00 AM	8	14	16	37
12:00 PM	10	16	20	44
1:00 PM	10	22	19	44
2:00 PM	12	34	39	51
3:00 PM	12	60	56	51
4:00 PM	11	57	52	47
5:00 PM	12	45	42	51
6:00 PM	10	29	31	44

SURVEYED PROPERTY

Scherber Parcel:

Parcel 1:
Beginning at a point on the East line of Government Three (3) distant 525 feet North 0 degrees 14 minutes 28 seconds West from the Southeast corner thereof; thence South 89 degrees 44 minutes 7 seconds West parallel with the South line thereof distant 553.53 feet; thence South 0 degrees 21 minutes East to center line of county road; thence Northwesterly along said center line to the West line thereof; thence Northerly to the Northwest corner thereof; thence along the Northerly line thereof to the Northeast corner thereof; thence Southerly to the point of beginning. Also that part of the West 30 rods of Government Lot 2 lying North of the South 53 rods thereof, except roads, in Section Twenty-one (21), Township One Hundred Twenty (120), Range Twenty-three (23), Hennepin County, State of Minnesota.

Casco Parcel:

That part of Government Lot 2 in Section 21, Township 120, Range 23, described as commencing at the Southwest corner thereof, thence South 89 degrees 48 minutes 24 seconds East, assumed bearing along the South line of Government Lot 2, a distance of 438.00 feet to the point of beginning; thence North 00 degrees 13 minutes 06 seconds East parallel to the West line of Government Lot 2, a distance of 874.50 feet; thence South 89 degrees 48 minutes 24 seconds East a distance of 57.00 feet; thence North 0 degrees 13 minutes 06 seconds East a distance of 891.00 feet, more or less, to the shore of Crowley Lake; thence Northeasterly along said shoreline a distance of 1043.00 feet, more or less, to the East line of Government Lot 2; thence South 00 degrees 20 minutes 20 seconds West along said East line to a point which is 1604.32 feet North of the Southeast corner of Government Lot 2; thence North 89 degrees 39 minutes 40 seconds West a distance of 154.63 feet; thence South 22 degrees 32 minutes 57 seconds West a distance of 930.19 feet; thence South 00 degrees 13 minutes 06 seconds West distance 744.43 feet to the South line of Government Lot 2; thence North 89 degrees 48 minutes 24 seconds West along said South line a distance of 387.00 feet to the point of beginning, Hennepin County, Minnesota.

Weber Parcel:

That part of Government Lot 1, Section 16, Township 120 North, Range 23 West, Hennepin County, Minnesota, which lies southerly of a line, and its westerly extension, described as commencing at the southeast comer of said Government Lot 1; thence northerly along the east line of said Government Lot 1, a distance of 343.00 feet to the point of beginning of the line to be described; thence westerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 440.00 feet; thence southerly, deflecting to the left, 90 degrees 00 minutes 00 seconds a distance of 200 feet; thence westerly deflecting to the right, 90 degrees 00 minutes 00 seconds to the west line of said Government Lot 1 and said line there terminating; AND

That part of Government Lot 1, Section 21, Township 120, Range 23, Hennepin County, Minnesota , which lies northerly of a line described as commencing at the northeast corner of said Government Lot 1; thence on an assumed bearing of South 00 degrees 27 minutes 31 seconds West, along the east line of said Government Lot 1, a distance of 182.88 feet to the point of beginning of the line to be described; thence South 61 degrees 03 minutes 26 seconds West a distance of 222.02 feet; thence South 67 degrees 30 minutes 11 seconds West a distance of 91.95 feet; thence South 76 degrees 13 minutes 23 seconds West a distance of 165.87 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 100.00 feet; thence South 76 degrees 59 minutes 00 seconds West a distance of 124.04 feet; thence South 75 degrees 35 minutes 51 seconds West a distance of 191.00 feet; thence South 58 degrees 41 minutes 05 seconds West a distance of 100.13 feet; thence South 51 degrees 12 minutes 52 seconds West a distance of 298.78 feet; thence South 30 degrees 17 minutes 17 seconds West a distance of 353.33 feet to a point in the west line of said Government Lot 1 which is 1604.32 feet north of the southwest corner of the Southeast Quarter of the Northeast Quarter of said Section 21, and said line there terminating.

EXISTING ZONING IS R2
PROPOSED ZONING IS PUD

TOTAL SITE AREA	±88.99 AC.
LOT AREA	35.64 AC.
–(70' WIDE LOTS)	(14.41 AC.)
–(60' WIDE LOTS)	(10.60 AC.)
–(60' WIDE VILLA LOTS)	(6.01 AC.)
–(42' WIDE CARRIAGE LOT)	(4.62 AC.)
OUTLOT AREA	±39.16 AC.
–(OPEN SPACE – OUTLOTS A–G)	(±36.98 AC.)
–(FUTURE DEVELOPMENT – OUTLOTS H–I)	(2.18 AC.)
RIGHT OF WAY AREA	14.19 AC.
–(EXISTING ROADS – WILLANDALE & TERRITORIAL)	(2.44 AC.)
–(SUBDIVISION ROADS)	(11.75 AC.)

SITE DATA

70' WIDE LOTS – 59 LOTS
(BLOCKS 1–4 & 13)
MINIMUM LOT AREA – 8,750 S.F. (70'x125')

60' WIDE LOTS – 48 LOTS
(BLOCKS 5, 6, 8, & 12 & LOTS 21–23, BLOCK 9)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

60' WIDE VILLA LOTS – 26 LOTS
(BLOCK 7 & 11)
MINIMUM LOT AREA – 7,500 S.F. (60'x125')

42' WIDE CARRIAGE LOT – 36 LOTS
(BLOCK 10, & LOTS 1–20, BLOCK 9)
MINIMUM LOT AREA – 5,460 S.F. (42'x130')

TOTAL LOT COUNT – 169 LOTS

MAXIMUM IMPERVIOUS (ALL LOTS) = 50%

MINIMUM SETBACKS – 60' & 70' WIDE STANDARD LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

MINIMUM SETBACKS – 60' WIDE VILLA LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	10 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

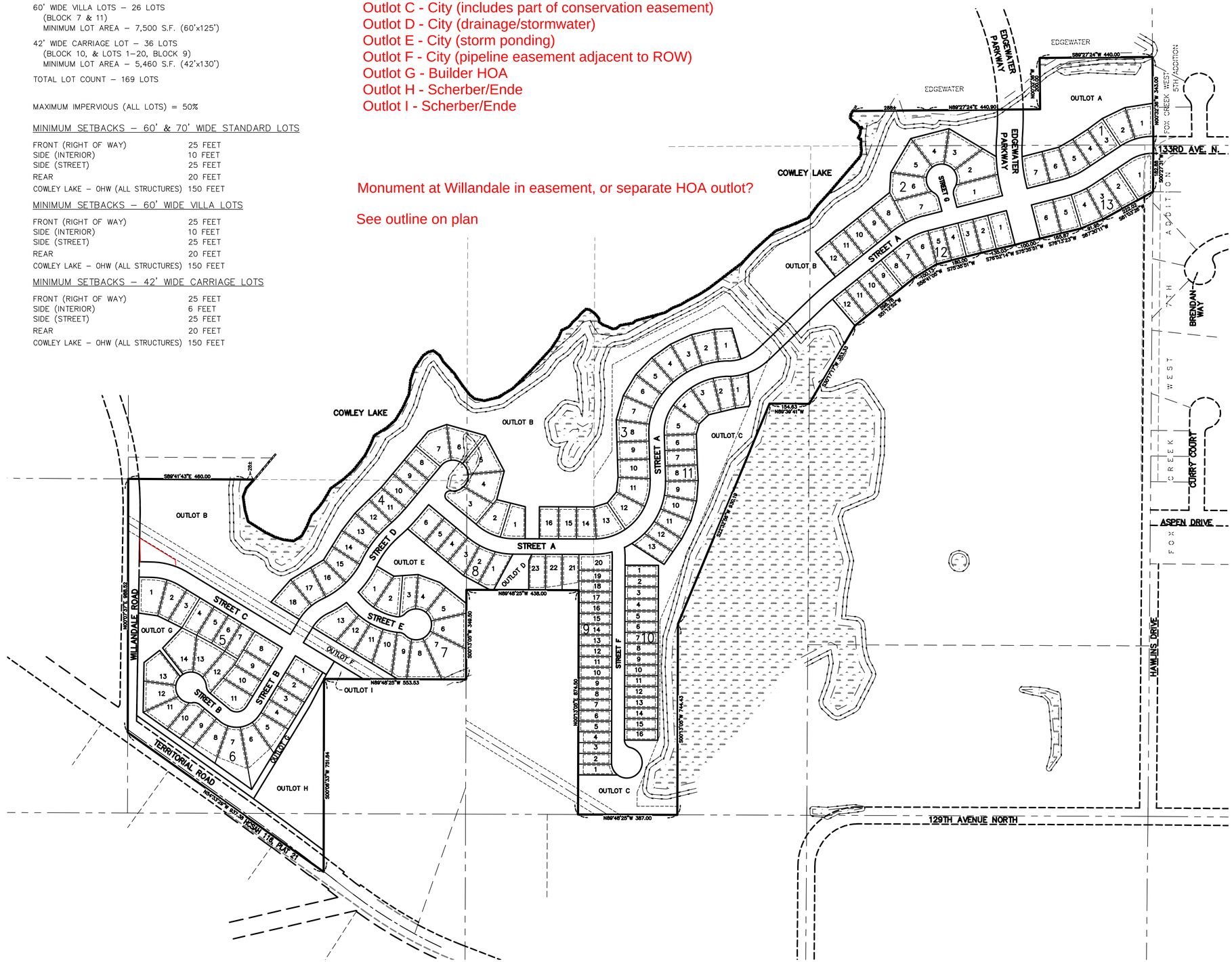
MINIMUM SETBACKS – 42' WIDE CARRIAGE LOTS

FRONT (RIGHT OF WAY)	25 FEET
SIDE (INTERIOR)	6 FEET
SIDE (STREET)	25 FEET
REAR	20 FEET
COWLEY LAKE – OHW (ALL STRUCTURES)	150 FEET

OUTLOT OWNERSHIP
Outlot A - City (storm ponding)
Outlot B - City (shoreland req'd)
Outlot C - City (includes part of conservation easement)
Outlot D - City (drainage/stormwater)
Outlot E - City (storm ponding)
Outlot F - City (pipeline easement adjacent to ROW)
Outlot G - Builder HOA
Outlot H - Scherber/Ende
Outlot I - Scherber/Ende

Monument at Willandale in easement, or separate HOA outlot?

See outline on plan



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SCALE IN FEET
0 200' 400'

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COWLEY LAKE PRESERVE
PRELIMINARY PLAT
FOR
RACHEL DEVELOPMENT
4180 NAPPER COURT, ST. MICHAEL, MN 55376
ROGERS, MINNESOTA

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