HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

STORMWATER MANAGEMENT REPORT

Date: March 26, 2026

To: Brian Hansen - City of Bloomington
1800 West Old Shakopee Road
Bloomington, MN 55431

From: Eric Fagerberg, PE
Project: Gallery Bloomington

PROJECT SUMMARY

The proposed project is located at 7900 Xerxes Avenue South, and consists of construction of a 73,290 SF building on a 4.69 acre site.

AREA SUMMARY	
TOTAL SITE	4.69 AC
TOTAL DISTURBED	199,066 SF
EXISTING IMPERVIOUS	154,992 SF
PROPOSED IMPERVIOUS	167,496 SF
PROPOSED IMPERVIOUS (53 STALL)	16,625 SF
NET NEW IMPERVIOUS	12,504 SF

EXISTING CONDITIONS SUMMARY

The site is currently a developed lot with parking lot, sidewalks, building and landscape coverage. Haugo GTS drilled several soil borings on site which found primarily well-draining (HSG A and B) soils. Groundwater was encountered in SB-02 at an elevation of 829.7, otherwise groundwater was not present in the rest of the borings. Drainage primarily flows North and South, with a small amount of fugitive drainage to the East. There are currently no on site Stormwater features, except storm sewer that connects to Bloomington's storm water distribution system. The project is located within the Nine Mile Creek Watershed District.

PROPOSED CONDITIONS SUMMARY

The proposed improvements will require 100% removal of the existing impervious surfaces. A 270 unit apartment building with 2 below grade garage levels is proposed for the first phase of development. A possible ~90 unit future building is being considered for the second phase of construction, and the associate impervious area for that building is *included* in the proposed impervious totals. SB-01 (SP-SM [HSG B]) and SB-09 (SP [HSG A]) indicated favorable soils for infiltration. Basin 1P is located where HSG A soils persist and will provide the bulk of the volume control. Basin 2P is south of the building, where borings indicate HSG B soils persist and will provide the remainder of the required volume reduction. A majority of the existing runoff is directed towards American Boulevard, so oversizing of the northern underground basin is necessary to provide the required rate control. Therefore, 48" round perforated pipes are proposed for 1P to provide the necessary retention to meet the existing rates. Rate control is less of a concern in the southern direction, and with an HSG B soil infiltration depths are also more restrictive, so arch chambers are proposed for basin 2P. Both underground basins will utilize pre-treatment manholes as well as isolator rows for maintenance access and pre-treatment. Approximately half of the building is routed to each underground basin. All of the future building would be routed to basin 1P. Both the City and County require a trail to be constructed along Xerxes Avenue which drains directly offsite to the East. This fugitive runoff cannot be captured with the typical grades required for public trails and leads to an increase of ~1.6 cfs in the 100 year event in this runoff direction.

In addition to the proposed improvements for the apartment site, Chase Real Estate is contractually required to construct an adjacent 53 stall parking lot. Due to relatively poor underlying soils, Stormwater management is not efficient in this location (SB-11 and SB-12 are showing 7'-10' to clayey-sand fill). Basin 1P has been sized to accommodate the required volume control from the adjacent 53 stall lot. The fugitive flows from the 53 stall lot improvements have also been considered in the overall rate control for this discharge direction. The lowpoint collects drainage from the entirety of the new parking lot and will incorporate a sump manhole for water quality considerations. A separate watershed permit will be applied for by the adjacent property owner, as the impervious totals for the improvements on this lot will not trigger watershed Stormwater requirements.

GOVERNING REGULATIONS

Nine Mile Creek Watershed District's Rule 4.0 – Stormwater Management – requires rate control for the 2, 10, and 100 year events. Also required is volume reduction equal to 1.1" over the regulated impervious surfaces – fully reconstructed existing impervious and new impervious areas. 60% removal of TP and 90% removal of TSS is required from site runoff. The City of Bloomington has similar requirements within their Water Resource Management Plan.

The proposed project will disturb over 1 acre and is subject to the MPCA Construction Stormwater Permit. This permit requires that projects treat a water quality volume of 1" times the net increase in impervious area. Where feasible, infiltration of the full water quality volume is required. Where not feasible, the water quality volume is required to be treated by wet sedimentation basin, filtration basin, or regional pond. Where infiltration is proposed in HSG A soils, tests are required to verify the measured infiltration rate is below 8.3 inches per hour.

The stormwater management system has been designed to meet the most restrictive of the above requirements.

STORMWATER MANAGEMENT SUMMARY

Text.

1. RATE CONTROL
   Nine Mile Creek & The City of Bloomington require that proposed peak runoff rates not exceed existing peak runoff rates for the 2, 10 and 100-year (50%,10%, and 1% Annual Chance) frequency storm events. Refer to Attachment A for existing drainage maps and Attachment B for proposed drainage maps.

EXISTING CONDITIONS			
SUBCATCHMENT	2-YEAR PEAK RUNOFF (2.84")	10-YEAR PEAK RUNOFF (4.25")	100-YEAR PEAK RUNOFF (7.49")
5L (Existing North)	4.42 cfs	8.00 cfs	16.73 cfs
2X (Existing South)	8.98 cfs	14.60 cfs	27.31 cfs
3X (Existing East)	0.09 cfs	0.35 cfs	1.17 cfs
TOTAL			

PROPOSED CONDITIONS			
SUBCATCHMENT	2-YEAR PEAK RUNOFF (2.84")	10-YEAR PEAK RUNOFF (4.25")	100-YEAR PEAK RUNOFF (7.49")
1L (Prop. North)	1.80 cfs	3.15 cfs	14.41 cfs
2L (Prop. South)	3.58 cfs	7.31 cfs	14.50 cfs
3S (Fugitive East)	0.28 cfs	0.92 cfs	2.83 cfs
TOTAL			

2. VOLUME CONTROL
   NMCWD and The City of Bloomington require an infiltration volume of 1.1" times the net new and fully reconstructed impervious surfaces:
   Required Infiltration Volume = 167,496 sf proposed impervious * 1.1" = 15,354 CF
   53 Stall Parking Lot = 16,625 sf proposed impervious * 1.1" = 1,524 CF
   Total Required = 16,878 sf
   Provided Infiltration Volume (refer to Attachment C) = 17,351 CF

3. WATER QUALITY
   NMCWD and Bloomington requires treatment to be provided to remove 60 percent annual removal for total phosphorus (TP), and 90 percent annual removal for total suspended solids (TSS), no net increase is TSS or TP. P8 was utilized to determine the following provided removal rates (see Attachment D):

   TP = 88.1%
   TSS = 92.1%

ATTACHMENTS
Attachment A – Existing Drainage Map
Attachment B – Proposed Drainage Map
Attachment C – Stage Storage Tables
Attachment D – p8 Inputs and Results
Attachment E – Existing HydroCAD
Attachment F – Proposed HydroCAD
Attachment G – Geotechnical Report

Sincerely,

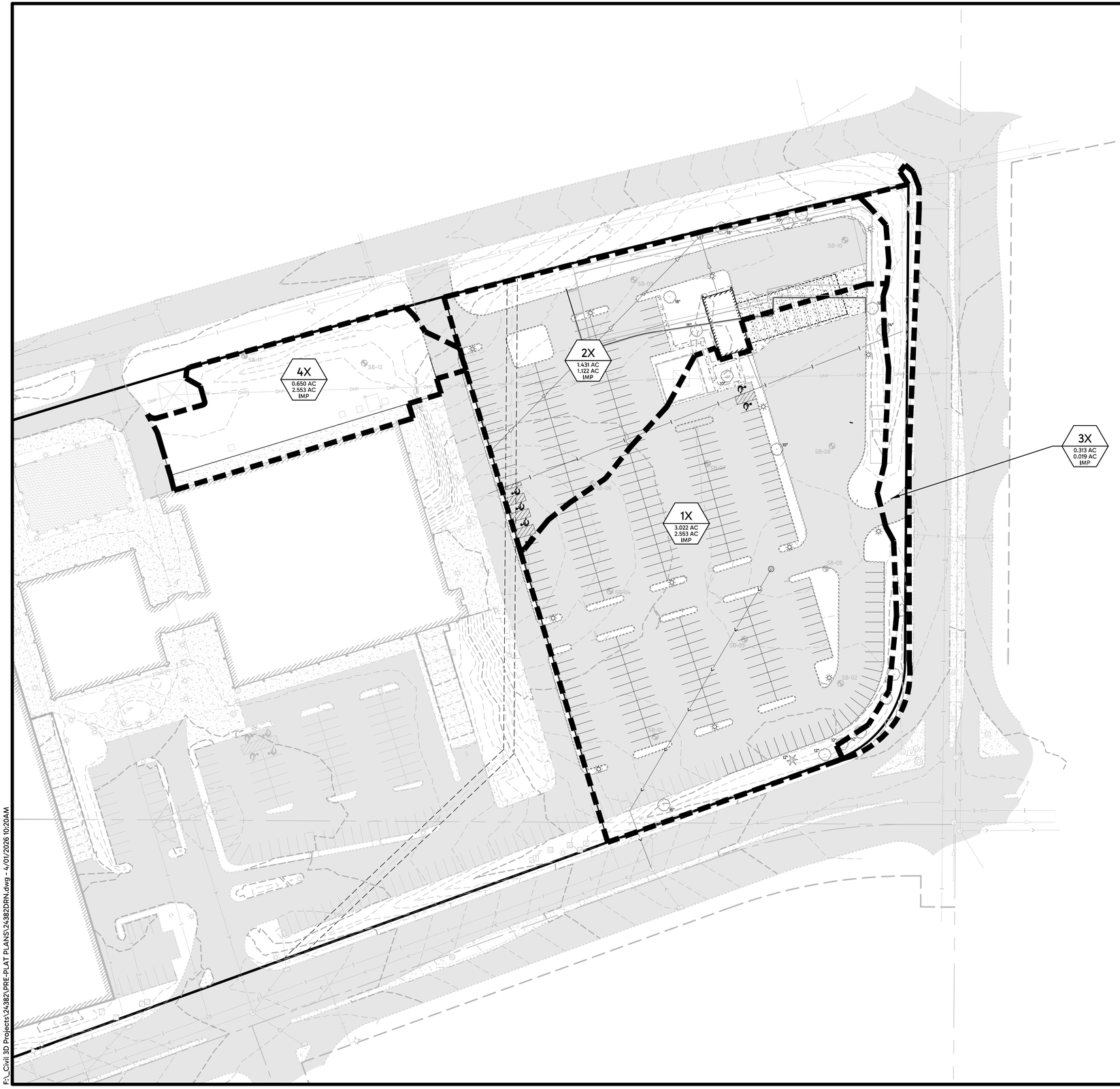
Eric Fagerberg, PE
Project Manager
eric@mnhill.com
952.890.6044

CIVIL ENGINEERS & LAND SURVEYORS
HILL INCORPORATED

HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT A



LEGEND

- 1P — POND AREA
- 1S (TOTAL DRAINAGE AREA 1.234 AC, IMPERVIOUS AREA 0.123 AC IMP) — DRAINAGE AREA
- 1R — REACH
- FLOW DIRECTION
- ToC PATH
- DRAINAGE BOUNDARY

2999 WEST C.R. 42, SUITE 100
BURNSVILLE, MN 55306
PHONE: 952-890-6044
info@mnhill.com
www.mnhill.com

HILL INCORPORATED

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

Reg.No.

Date:

GALLERY BLOOMINGTON
BLOOMINGTON, MINNESOTA

EXISTING DRAINAGE MAP

FOR
CHASE REAL ESTATE, INC
2140 COUNTY ROAD 42 WEST, BURNSVILLE, MN 55337

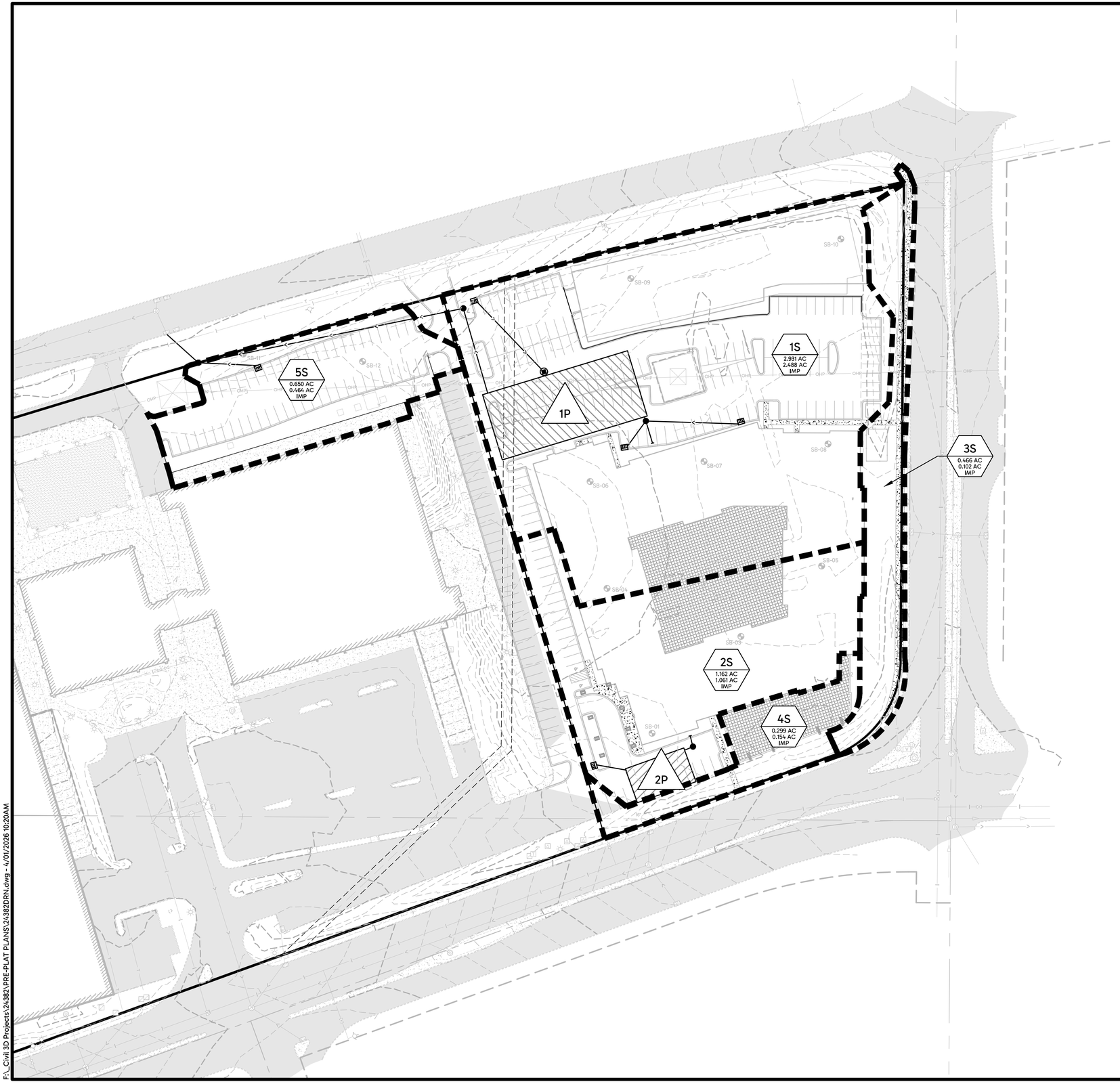
DRAWN BY	XXX
DATE	04/01/26
REVISIONS	
CAD FILE	24382DRN
PROJECT NO.	24382
	EXISTING

F:_Civil 3D Projects\24382\PRE-PLAT PLANS\24382DRN.dwg - 4/01/2026 10:20AM

HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT B



LEGEND

- 1P — POND AREA
- 1S — DRAINAGE AREA (TOTAL DRAINAGE AREA: 1.234 AC; IMPERVIOUS AREA: 0.123 AC IMP)
- 1R — REACH
- FLOW DIRECTION
- ToC PATH
- DRAINAGE BOUNDARY

HILL INCORPORATED
2999 WEST C.R. 42, SUITE 100
BURNSVILLE, MN 55306
PHONE: 952-890-6044
info@mnhill.com
www.mnhill.com

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

Reg.No.

Date:

GALLERY BLOOMINGTON

BLOOMINGTON, MINNESOTA

PROPOSED DRAINAGE MAP

FOR

CHASE REAL ESTATE, INC

2140 COUNTY ROAD 42 WEST, BURNSVILLE, MN 55337

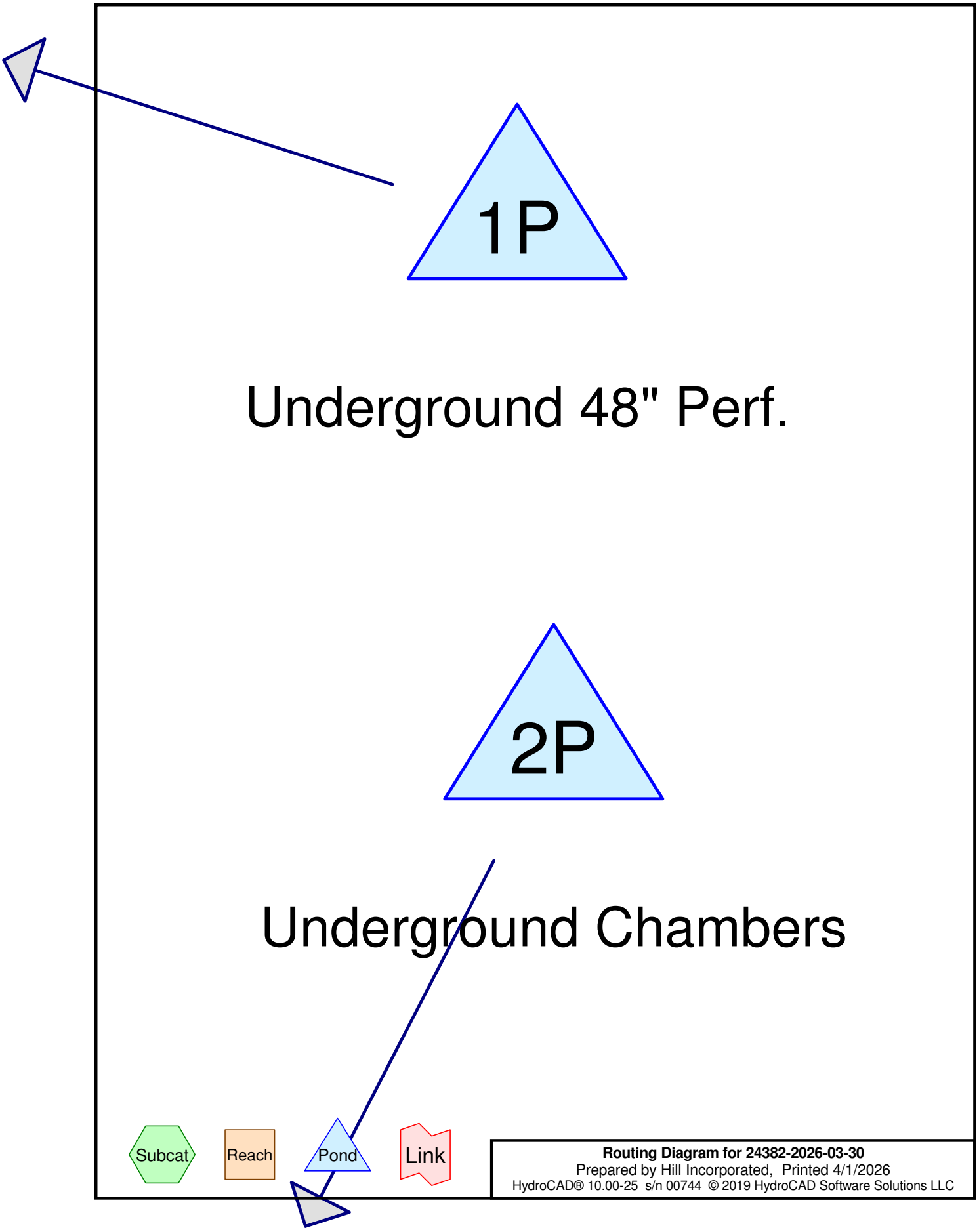
DRAWN BY	EPF
DATE	04/01/26
REVISIONS	
CAD FILE	24382DRN
PROJECT NO.	24382
	PROPOSED

F:_Civil 3D Projects\24382\PRE-PLAT PLANS\24382DRN.dwg - 4/01/2026 10:20AM

HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

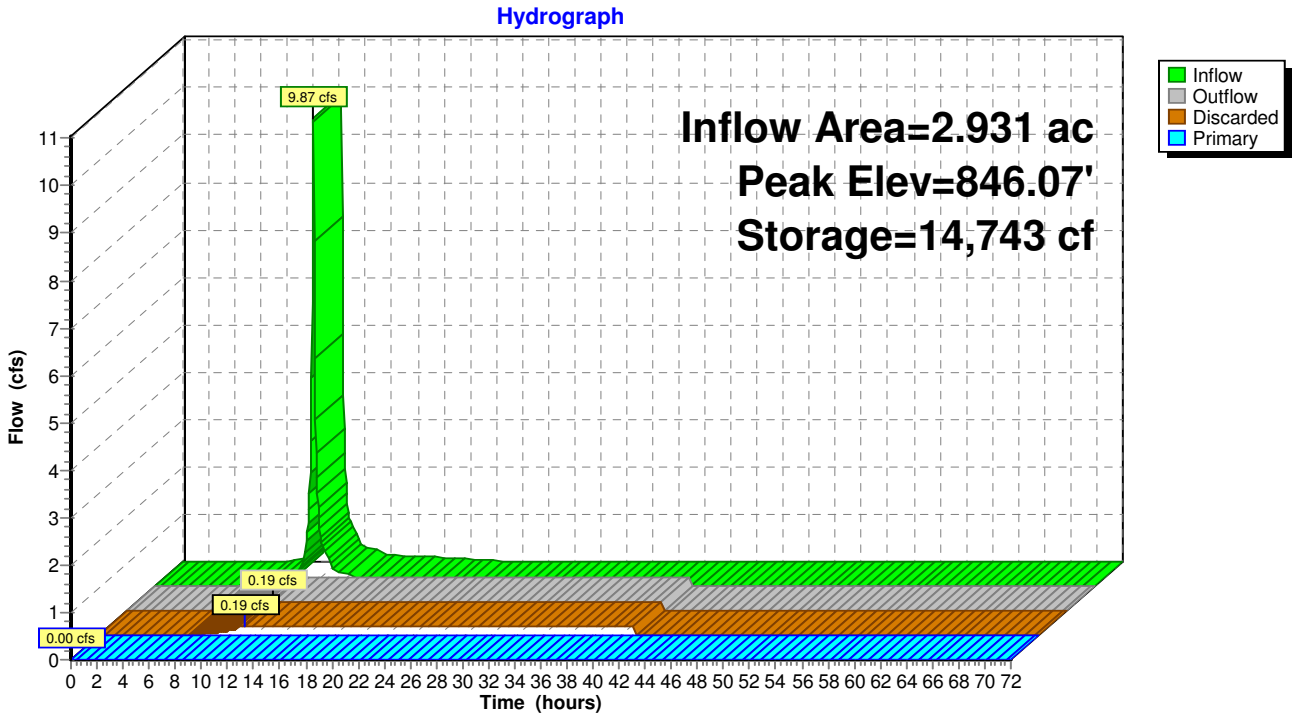
2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT C



Routing Diagram for 24382-2026-03-30
Prepared by Hill Incorporated, Printed 4/1/2026

Pond 1P: Underground 48" Perf.



Stage-Area-Storage for Pond 1P: Underground 48" Perf.

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
843.50	10,156	0	844.52	10,156	4,077
843.52	10,156	81	844.54	10,156	4,186
843.54	10,156	162	844.56	10,156	4,296
843.56	10,156	244	844.58	10,156	4,408
843.58	10,156	325	844.60	10,156	4,522
843.60	10,156	406	844.62	10,156	4,637
843.62	10,156	487	844.64	10,156	4,753
843.64	10,156	569	844.66	10,156	4,870
843.66	10,156	650	844.68	10,156	4,989
843.68	10,156	731	844.70	10,156	5,108
843.70	10,156	812	844.72	10,156	5,229
843.72	10,156	894	844.74	10,156	5,351
843.74	10,156	975	844.76	10,156	5,473
843.76	10,156	1,056	844.78	10,156	5,597
843.78	10,156	1,137	844.80	10,156	5,722
843.80	10,156	1,219	844.82	10,156	5,848
843.82	10,156	1,300	844.84	10,156	5,974
843.84	10,156	1,381	844.86	10,156	6,102
843.86	10,156	1,462	844.88	10,156	6,230
843.88	10,156	1,544	844.90	10,156	6,359
843.90	10,156	1,625	844.92	10,156	6,489
843.92	10,156	1,706	844.94	10,156	6,620
843.94	10,156	1,787	844.96	10,156	6,751
843.96	10,156	1,869	844.98	10,156	6,883
843.98	10,156	1,950	845.00	10,156	7,016
844.00	10,156	2,031	845.02	10,156	7,150
844.02	10,156	2,110	845.04	10,156	7,284
844.04	10,156	2,184	845.06	10,156	7,419
844.06	10,156	2,251	845.08	10,156	7,554
844.08	10,156	2,320	845.10	10,156	7,690
844.10	10,156	2,386	845.12	10,156	7,827
844.12	10,156	2,452	845.14	10,156	7,964
844.14	10,156	2,516	845.16	10,156	8,102
844.16	10,156	2,578	845.18	10,156	8,241
844.18	10,156	2,640	845.20	10,156	8,380
844.20	10,156	2,700	845.22	10,156	8,519
844.22	10,156	2,760	845.24	10,156	8,659
844.24	10,156	2,819	845.26	10,156	8,799
844.26	10,156	2,883	845.28	10,156	8,940
844.28	10,156	2,941	845.30	10,156	9,082
844.30	10,156	3,014	845.32	10,156	9,224
844.32	10,156	3,098	845.34	10,156	9,366
844.34	10,156	3,184	845.36	10,156	9,509
844.36	10,156	3,273	845.38	10,156	9,652
844.38	10,156	3,365	845.40	10,156	9,796
844.40	10,156	3,460	845.42	10,156	9,940
844.42	10,156	3,558	845.44	10,156	10,084
844.44	10,156	3,658	845.46	10,156	10,229
844.46	10,156	3,760	845.48	10,156	10,374
844.48	10,156	3,864	845.50	10,156	10,519
844.50	10,156	3,969	845.52	10,156	10,665

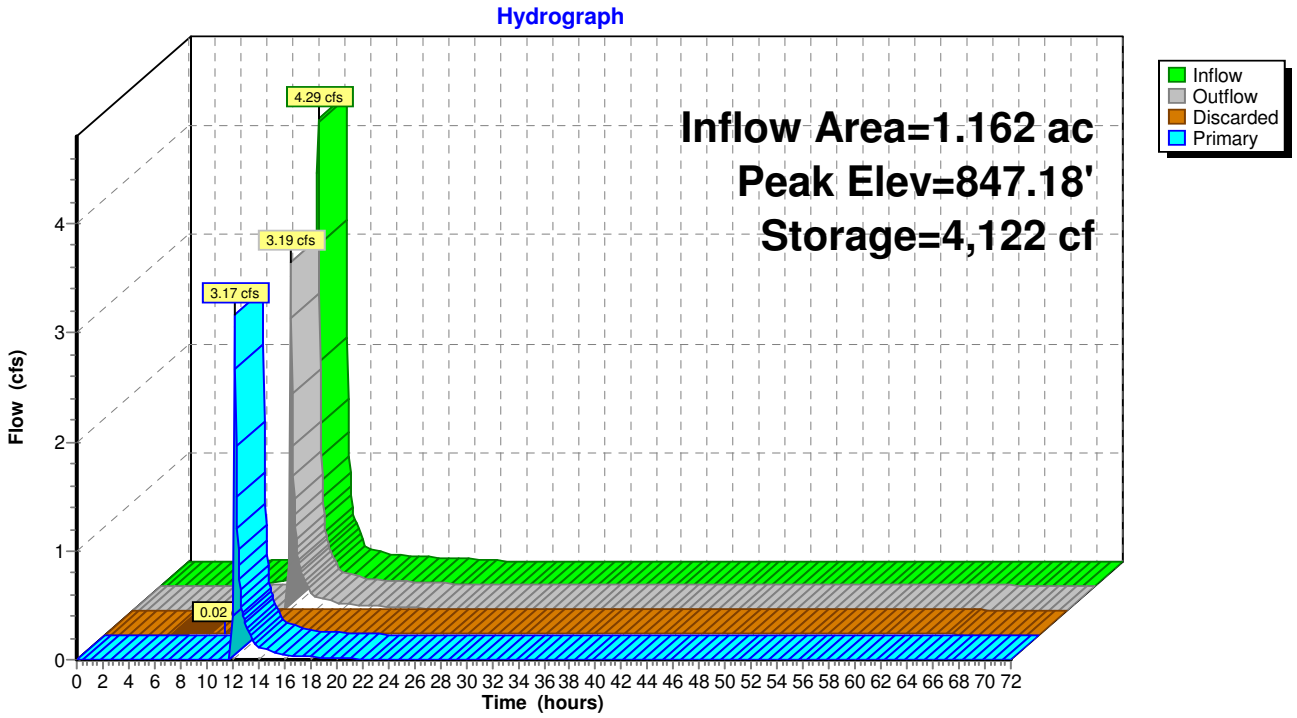
Stage-Area-Storage for Pond 1P: Underground 48" Perf. (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
845.54	10,156	10,811	846.56	10,156	18,479
845.56	10,156	10,957	846.58	10,156	18,630
845.58	10,156	11,104	846.60	10,156	18,780
845.60	10,156	11,251	846.62	10,156	18,931
845.62	10,156	11,399	846.64	10,156	19,081
845.64	10,156	11,546	846.66	10,156	19,231
845.66	10,156	11,694	846.68	10,156	19,381
845.68	10,156	11,842	846.70	10,156	19,530
845.70	10,156	11,991	846.72	10,156	19,680
845.72	10,156	12,139	846.74	10,156	19,829
845.74	10,156	12,288	846.76	10,156	19,978
845.76	10,156	12,437	846.78	10,156	20,127
845.78	10,156	12,586	846.80	10,156	20,276
845.80	10,156	12,736	846.82	10,156	20,424
845.82	10,156	12,885	846.84	10,156	20,572
845.84	10,156	13,035	846.86	10,156	20,720
845.86	10,156	13,185	846.88	10,156	20,867
845.88	10,156	13,335	846.90	10,156	21,015
845.90	10,156	13,486	846.92	10,156	21,162
845.92	10,156	13,636	846.94	10,156	21,309
845.94	10,156	13,787	846.96	10,156	21,455
845.96	10,156	13,938	846.98	10,156	21,601
845.98	10,156	14,089	847.00	10,156	21,747
846.00	10,156	14,240	847.02	10,156	21,892
846.02	10,156	14,391	847.04	10,156	22,037
846.04	10,156	14,542	847.06	10,156	22,182
846.06	10,156	14,693	847.08	10,156	22,326
846.08	10,156	14,844	847.10	10,156	22,470
846.10	10,156	14,996	847.12	10,156	22,614
846.12	10,156	15,147	847.14	10,156	22,757
846.14	10,156	15,299	847.16	10,156	22,900
846.16	10,156	15,450	847.18	10,156	23,042
846.18	10,156	15,602	847.20	10,156	23,184
846.20	10,156	15,754	847.22	10,156	23,326
846.22	10,156	15,905	847.24	10,156	23,467
846.24	10,156	16,057	847.26	10,156	23,607
846.26	10,156	16,209	847.28	10,156	23,747
846.28	10,156	16,361	847.30	10,156	23,887
846.30	10,156	16,512	847.32	10,156	24,025
846.32	10,156	16,664	847.34	10,156	24,164
846.34	10,156	16,815	847.36	10,156	24,302
846.36	10,156	16,967	847.38	10,156	24,439
846.38	10,156	17,119	847.40	10,156	24,576
846.40	10,156	17,270	847.42	10,156	24,712
846.42	10,156	17,422	847.44	10,156	24,847
846.44	10,156	17,573	847.46	10,156	24,982
846.46	10,156	17,724	847.48	10,156	25,116
846.48	10,156	17,875	847.50	10,156	25,250
846.50	10,156	18,026	847.52	10,156	25,383
846.52	10,156	18,177	847.54	10,156	25,515
846.54	10,156	18,328	847.56	10,156	25,646

Stage-Area-Storage for Pond 1P: Underground 48" Perf. (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
847.58	10,156	25,777
847.60	10,156	25,907
847.62	10,156	26,036
847.64	10,156	26,164
847.66	10,156	26,292
847.68	10,156	26,418
847.70	10,156	26,544
847.72	10,156	26,669
847.74	10,156	26,793
847.76	10,156	26,915
847.78	10,156	27,037
847.80	10,156	27,158
847.82	10,156	27,278
847.84	10,156	27,396
847.86	10,156	27,513
847.88	10,156	27,629
847.90	10,156	27,744
847.92	10,156	27,858
847.94	10,156	27,970
847.96	10,156	28,080
847.98	10,156	28,189
848.00	10,156	28,297
848.02	10,156	28,403
848.04	10,156	28,506
848.06	10,156	28,608
848.08	10,156	28,708
848.10	10,156	28,806
848.12	10,156	28,901
848.14	10,156	28,993
848.16	10,156	29,082
848.18	10,156	29,168
848.20	10,156	29,249
848.22	10,156	29,323
848.24	10,156	29,393
848.26	10,156	29,456
848.28	10,156	29,507
848.30	10,156	29,566
848.32	10,156	29,627
848.34	10,156	29,688
848.36	10,156	29,751
848.38	10,156	29,815
848.40	10,156	29,880
848.42	10,156	29,947
848.44	10,156	30,016
848.46	10,156	30,086
848.48	10,156	30,160
848.50	10,156	30,239
848.52	10,156	30,316
848.54	10,156	30,398
848.56	10,156	30,479
848.58	10,156	30,560
848.60	10,156	30,641
848.62	10,156	30,723
848.64	10,156	30,804
848.66	10,156	30,885
848.68	10,156	30,966
848.70	10,156	31,048
848.72	10,156	31,129
848.74	10,156	31,210
848.76	10,156	31,291
848.78	10,156	31,373
848.80	10,156	31,454
848.82	10,156	31,535
848.84	10,156	31,616
848.86	10,156	31,698
848.88	10,156	31,779
848.90	10,156	31,860
848.92	10,156	31,941
848.94	10,156	32,023
848.96	10,156	32,104
848.98	10,156	32,185
849.00	10,156	32,266

Pond 2P: Underground Chambers



Stage-Area-Storage for Pond 2P: Underground Chambers

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
844.12	2,105	0	844.63	2,105	438
844.13	2,105	8	844.64	2,105	456
844.14	2,105	17	844.65	2,105	473
844.15	2,105	25	844.66	2,105	490
844.16	2,105	34	844.67	2,105	508
844.17	2,105	42	844.68	2,105	525
844.18	2,105	51	844.69	2,105	542
844.19	2,105	59	844.70	2,105	560
844.20	2,105	67	844.71	2,105	577
844.21	2,105	76	844.72	2,105	594
844.22	2,105	84	844.73	2,105	611
844.23	2,105	93	844.74	2,105	629
844.24	2,105	101	844.75	2,105	646
844.25	2,105	109	844.76	2,105	663
844.26	2,105	118	844.77	2,105	680
844.27	2,105	126	844.78	2,105	698
844.28	2,105	135	844.79	2,105	715
844.29	2,105	143	844.80	2,105	732
844.30	2,105	152	844.81	2,105	749
844.31	2,105	160	844.82	2,105	767
844.32	2,105	168	844.83	2,105	784
844.33	2,105	177	844.84	2,105	801
844.34	2,105	185	844.85	2,105	818
844.35	2,105	194	844.86	2,105	835
844.36	2,105	202	844.87	2,105	853
844.37	2,105	211	844.88	2,105	870
844.38	2,105	219	844.89	2,105	887
844.39	2,105	227	844.90	2,105	904
844.40	2,105	236	844.91	2,105	921
844.41	2,105	244	844.92	2,105	938
844.42	2,105	253	844.93	2,105	955
844.43	2,105	261	844.94	2,105	972
844.44	2,105	269	844.95	2,105	990
844.45	2,105	278	844.96	2,105	1,007
844.46	2,105	286	844.97	2,105	1,024
844.47	2,105	295	844.98	2,105	1,041
844.48	2,105	303	844.99	2,105	1,058
844.49	2,105	312	845.00	2,105	1,075
844.50	2,105	320	845.01	2,105	1,092
844.51	2,105	328	845.02	2,105	1,109
844.52	2,105	337	845.03	2,105	1,126
844.53	2,105	345	845.04	2,105	1,143
844.54	2,105	354	845.05	2,105	1,160
844.55	2,105	362	845.06	2,105	1,177
844.56	2,105	370	845.07	2,105	1,193
844.57	2,105	379	845.08	2,105	1,210
844.58	2,105	387	845.09	2,105	1,227
844.59	2,105	396	845.10	2,105	1,244
844.60	2,105	404	845.11	2,105	1,261
844.61	2,105	413	845.12	2,105	1,278
844.62	2,105	421	845.13	2,105	1,295

Stage-Area-Storage for Pond 2P: Underground Chambers (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
845.14	2,105	1,311	845.65	2,105	2,147
845.15	2,105	1,328	845.66	2,105	2,163
845.16	2,105	1,345	845.67	2,105	2,179
845.17	2,105	1,362	845.68	2,105	2,195
845.18	2,105	1,379	845.69	2,105	2,211
845.19	2,105	1,395	845.70	2,105	2,227
845.20	2,105	1,412	845.71	2,105	2,243
845.21	2,105	1,429	845.72	2,105	2,258
845.22	2,105	1,446	845.73	2,105	2,274
845.23	2,105	1,462	845.74	2,105	2,290
845.24	2,105	1,479	845.75	2,105	2,305
845.25	2,105	1,496	845.76	2,105	2,321
845.26	2,105	1,512	845.77	2,105	2,337
845.27	2,105	1,529	845.78	2,105	2,352
845.28	2,105	1,545	845.79	2,105	2,368
845.29	2,105	1,562	845.80	2,105	2,383
845.30	2,105	1,579	845.81	2,105	2,399
845.31	2,105	1,595	845.82	2,105	2,415
845.32	2,105	1,612	845.83	2,105	2,430
845.33	2,105	1,628	845.84	2,105	2,446
845.34	2,105	1,645	845.85	2,105	2,461
845.35	2,105	1,661	845.86	2,105	2,476
845.36	2,105	1,678	845.87	2,105	2,492
845.37	2,105	1,694	845.88	2,105	2,507
845.38	2,105	1,711	845.89	2,105	2,522
845.39	2,105	1,727	845.90	2,105	2,538
845.40	2,105	1,743	845.91	2,105	2,553
845.41	2,105	1,760	845.92	2,105	2,568
845.42	2,105	1,776	845.93	2,105	2,584
845.43	2,105	1,792	845.94	2,105	2,599
845.44	2,105	1,809	845.95	2,105	2,614
845.45	2,105	1,825	845.96	2,105	2,629
845.46	2,105	1,841	845.97	2,105	2,644
845.47	2,105	1,858	845.98	2,105	2,659
845.48	2,105	1,874	845.99	2,105	2,674
845.49	2,105	1,890	846.00	2,105	2,690
845.50	2,105	1,906	846.01	2,105	2,705
845.51	2,105	1,923	846.02	2,105	2,720
845.52	2,105	1,939	846.03	2,105	2,734
845.53	2,105	1,955	846.04	2,105	2,749
845.54	2,105	1,971	846.05	2,105	2,764
845.55	2,105	1,987	846.06	2,105	2,779
845.56	2,105	2,003	846.07	2,105	2,794
845.57	2,105	2,019	846.08	2,105	2,809
845.58	2,105	2,035	846.09	2,105	2,824
845.59	2,105	2,052	846.10	2,105	2,838
845.60	2,105	2,068	846.11	2,105	2,853
845.61	2,105	2,084	846.12	2,105	2,868
845.62	2,105	2,100	846.13	2,105	2,882
845.63	2,105	2,116	846.14	2,105	2,897
845.64	2,105	2,131	846.15	2,105	2,912

Stage-Area-Storage for Pond 2P: Underground Chambers (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
846.16	2,105	2,926	846.67	2,105	3,614
846.17	2,105	2,941	846.68	2,105	3,626
846.18	2,105	2,955	846.69	2,105	3,638
846.19	2,105	2,970	846.70	2,105	3,650
846.20	2,105	2,984	846.71	2,105	3,662
846.21	2,105	2,999	846.72	2,105	3,674
846.22	2,105	3,013	846.73	2,105	3,686
846.23	2,105	3,027	846.74	2,105	3,697
846.24	2,105	3,042	846.75	2,105	3,709
846.25	2,105	3,056	846.76	2,105	3,721
846.26	2,105	3,070	846.77	2,105	3,732
846.27	2,105	3,084	846.78	2,105	3,743
846.28	2,105	3,098	846.79	2,105	3,755
846.29	2,105	3,112	846.80	2,105	3,766
846.30	2,105	3,126	846.81	2,105	3,777
846.31	2,105	3,140	846.82	2,105	3,788
846.32	2,105	3,154	846.83	2,105	3,798
846.33	2,105	3,168	846.84	2,105	3,809
846.34	2,105	3,182	846.85	2,105	3,820
846.35	2,105	3,196	846.86	2,105	3,830
846.36	2,105	3,210	846.87	2,105	3,840
846.37	2,105	3,223	846.88	2,105	3,851
846.38	2,105	3,237	846.89	2,105	3,861
846.39	2,105	3,251	846.90	2,105	3,871
846.40	2,105	3,264	846.91	2,105	3,880
846.41	2,105	3,278	846.92	2,105	3,890
846.42	2,105	3,291	846.93	2,105	3,900
846.43	2,105	3,305	846.94	2,105	3,909
846.44	2,105	3,318	846.95	2,105	3,919
846.45	2,105	3,332	846.96	2,105	3,928
846.46	2,105	3,345	846.97	2,105	3,937
846.47	2,105	3,358	846.98	2,105	3,946
846.48	2,105	3,372	846.99	2,105	3,956
846.49	2,105	3,385	847.00	2,105	3,965
846.50	2,105	3,398	847.01	2,105	3,974
846.51	2,105	3,411	847.02	2,105	3,983
846.52	2,105	3,424	847.03	2,105	3,992
846.53	2,105	3,437	847.04	2,105	4,001
846.54	2,105	3,450	847.05	2,105	4,009
846.55	2,105	3,463	847.06	2,105	4,018
846.56	2,105	3,476	847.07	2,105	4,027
846.57	2,105	3,489	847.08	2,105	4,035
846.58	2,105	3,502	847.09	2,105	4,044
846.59	2,105	3,514	847.10	2,105	4,053
846.60	2,105	3,527	847.11	2,105	4,061
846.61	2,105	3,540	847.12	2,105	4,070
846.62	2,105	3,552	847.13	2,105	4,078
846.63	2,105	3,565	847.14	2,105	4,086
846.64	2,105	3,577	847.15	2,105	4,095
846.65	2,105	3,589	847.16	2,105	4,103
846.66	2,105	3,602	847.17	2,105	4,112

Stage-Area-Storage for Pond 2P: Underground Chambers (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
847.18	2,105	4,120
847.19	2,105	4,129
847.20	2,105	4,137
847.21	2,105	4,145
847.22	2,105	4,154
847.23	2,105	4,162
847.24	2,105	4,171
847.25	2,105	4,179
847.26	2,105	4,188
847.27	2,105	4,196
847.28	2,105	4,204
847.29	2,105	4,213
847.30	2,105	4,221
847.31	2,105	4,230
847.32	2,105	4,238
847.33	2,105	4,246
847.34	2,105	4,255
847.35	2,105	4,263
847.36	2,105	4,272
847.37	2,105	4,280
847.38	2,105	4,289
847.39	2,105	4,297
847.40	2,105	4,305
847.41	2,105	4,314
847.42	2,105	4,322
847.43	2,105	4,331
847.44	2,105	4,339
847.45	2,105	4,347
847.46	2,105	4,356
847.47	2,105	4,364
847.48	2,105	4,373
847.49	2,105	4,381
847.50	2,105	4,390
847.51	2,105	4,398
847.52	2,105	4,406
847.53	2,105	4,415
847.54	2,105	4,423
847.55	2,105	4,432
847.56	2,105	4,440
847.57	2,105	4,449
847.58	2,105	4,457
847.59	2,105	4,465
847.60	2,105	4,474
847.61	2,105	4,482
847.62	2,105	4,491
847.63	2,105	4,491
847.64	2,105	4,491
847.65	2,105	4,491
847.66	2,105	4,491
847.67	2,105	4,491
847.68	2,105	4,491
847.69	2,105	4,491
847.70	2,105	4,491
847.71	2,105	4,491
847.72	2,105	4,491
847.73	2,105	4,491
847.74	2,105	4,491
847.75	2,105	4,491
847.76	2,105	4,491
847.77	2,105	4,491
847.78	2,105	4,491
847.79	2,105	4,491
847.80	2,105	4,491
847.81	2,105	4,491
847.82	2,105	4,491
847.83	2,105	4,491
847.84	2,105	4,491
847.85	2,105	4,491
847.86	2,105	4,491
847.87	2,105	4,491
847.88	2,105	4,491
847.89	2,105	4,491
847.90	2,105	4,491
847.91	2,105	4,491
847.92	2,105	4,491

HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT D

P8 Urban Catchment Model, Version 3.5

Case	24382proposed.p8c
Title	Startup Case
PrecFile	MSP4918.pcp
PartFile	nurp50.p8p

Case Title	Startup Case
Case Data File	24382proposed.p8c
Path	F:_Civil 3D Projects\24382\DOCUMENTS\ENGINEERING\DESIGN\STORMWATEF
Case Notes:	
Storm Data File	MSP4918.pcp
Particle File	nurp50.p8p
Air Temp File File	MSP4918.tem

Time Steps Per Hour	10
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	Fugitive	North	South		
Runoff to Device	Outflow	derground Basin	derground Basin 2P		
Infiltration to Device					
Watershed Area	0.765	2.93	1.16		
SCS Curve Number (Pervious)	61	61	61		
Scale Factor for Pervious Runoff Load	1	1	1		
Indirectly Connected Imperv Fraction	0	0	0		
UnSwept Impervious Fraction	0.3354	0.8488	0.913		
UnSwept Depression Storage (inches)	0.02	0.02	0.02		
UnSwept Imperv. Runoff Coefficient	1	1	1		
UnSwept Scale Factor for Particle Loads	1	1	1		
Swept Impervious Fraction	0	0	0		
Swept Depression Storage (inches)	0.02	0.02	0.02		
Swept Imperv. Runoff Coefficient	1	1	1		
Swept Scale Factor for Particle Loads	1	1	1		
Sweeping Frequency	0	0	0		
Sweeping Efficiency	1	1	1		
Sweeping Start Date (MMDD)	101	101	101		
Sweeping Stop Date (MMDD)	1231	1231	1231		

Device Data					
Device Name	Underground Basin	Outflow	derground Basin 2P		
Device Type	POND	PIPE	POND		
Infiltration Outlet					
Normal Outlet	Outflow		Outflow		
Spillway Outlet	Outflow		Outflow		
Particle Removal Scale Factor	1		1		
Bottom Elevation (ft)	0		0		
Bottom Area (acres)	0.22		0.05		
Permanent Pool Area (acres)	0.22		0.05		
Permanent Pool Volume (ac-ft)	0.35		0.08		
Perm Pool Infilt Rate (in/hr)	1.43		0.45		
Flood Pool Area (acres)	0.22		0.05		
Flood Pool Volume (ac-ft)	0.7		0.1		
Flood Pool Infilt Rate (in/hr)	1.43		0.45		
Infilt Basin Void Fraction (%)					
Detention Pond Outlet Parameters					
Outlet Type	WEIR		WEIR		
Outlet Orifice Diameter (in)					
Orifice Discharge Coef					
Outlet Weir Length (ft)	5		5		
Weir Discharge Coef	3		3		
Perforated Riser Height (ft)					
Number of Holes in Riser					
Holes Diameter					
Flood Pool Drain Time (hrs)					
Swale Parameters					
Length of Flow Path (ft)					
Slope of Flow Path %					
Bottom Width (ft)					
Side Slope (ft-v/ft-h)					
Maximum Depth of Flow (ft)					
Mannings n Constant					
Hydraulic Model					
Pipe, Splitter, Aquifer Parameter					
Hydraulic Res. Time (hrs)		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

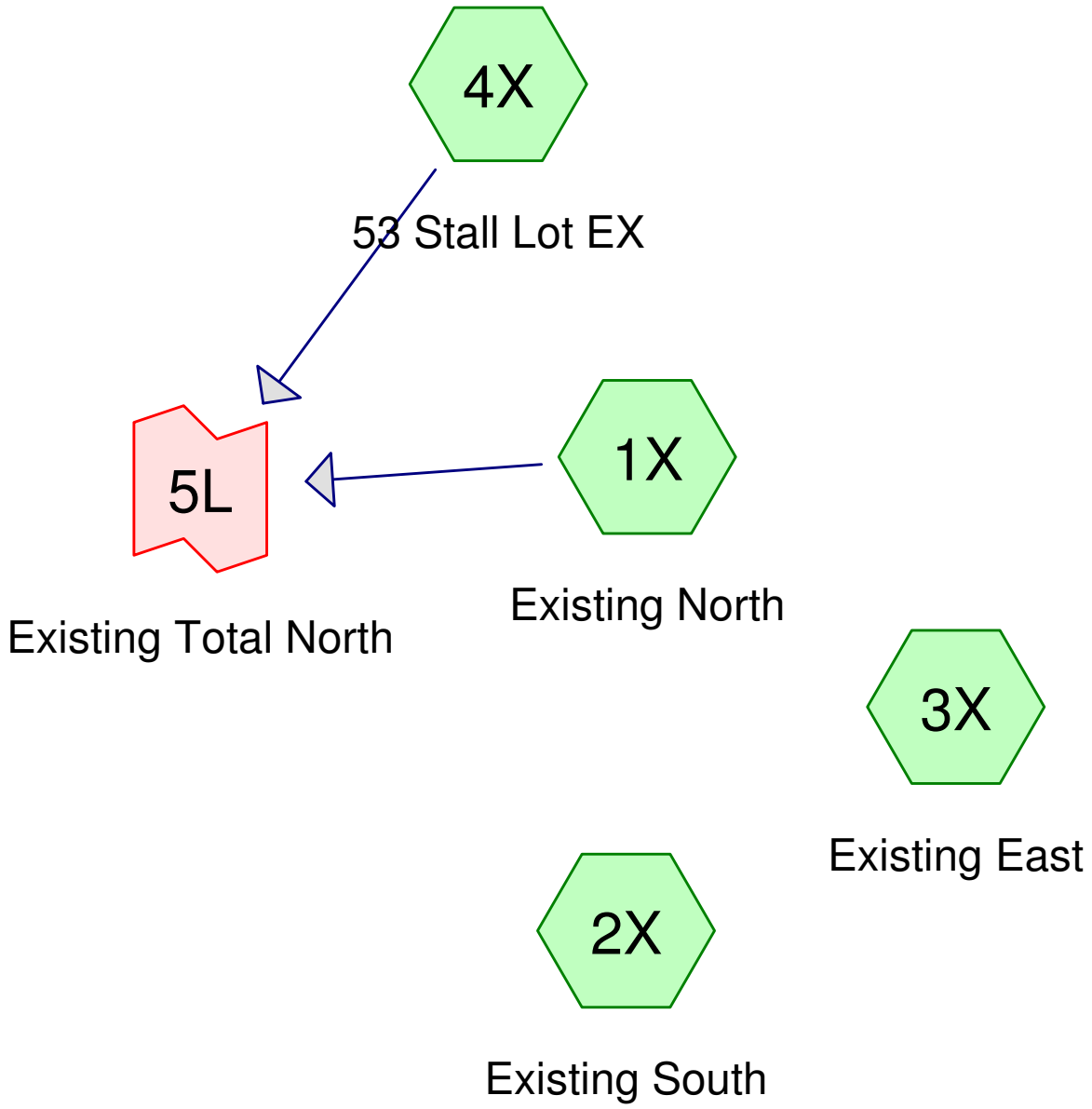
Water Quality Component Data						
Component Name	TSS	TP	TKN	CU	PB	ZN
Water Quality Criteria (ppm)						
Level 1	5	0.025	2	2	0.02	5
Level 2	10	0.05	1	0.0048	0.014	0.0362
Level 3	20	0.1	0.5	0.02	0.15	0.38
Content Scale Factor	1	1	1	1	1	1
Particle Composition (mg/kg)						
P0%	0	99000	600000	13600	2000	64000
P10%	1000000	3850	15000	340	180	1600
P30%	1000000	3850	15000	340	180	1600
P50%	1000000	3850	15000	340	180	1600
P80%	1000000	0	0	340	180	0

Variable	OVERALL	Underground Basin 1P	Underground Basin 2P	Outflow
P0%	79.4	89.0	77.6	
P10%	90.2	98.6	93.5	
P30%	91.8	99.7	96.9	
P50%	92.6	99.9	99.2	
P80%	92.8	100.0	99.9	
TSS	92.1	99.6	97.9	
TP	88.1	96.4	91.1	
TKN	86.9	95.4	89.3	
CU	88.6	96.7	92.4	
PB	90.9	98.6	96.0	
ZN	86.9	95.4	89.3	
HC	90.9	98.6	96.0	

HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT E



Subcat Reach Pond Link

Routing Diagram for 24382-2026-03-30
Prepared by Hill Incorporated, Printed 4/1/2026

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.544	61	>75% Grass cover, Good, HSG B (1X, 2X, 3X, 4X)
3.795	98	Paved parking, HSG B (1X, 2X, 3X, 4X)
5.339	87	TOTAL AREA

Summary for Subcatchment 1X: Existing North

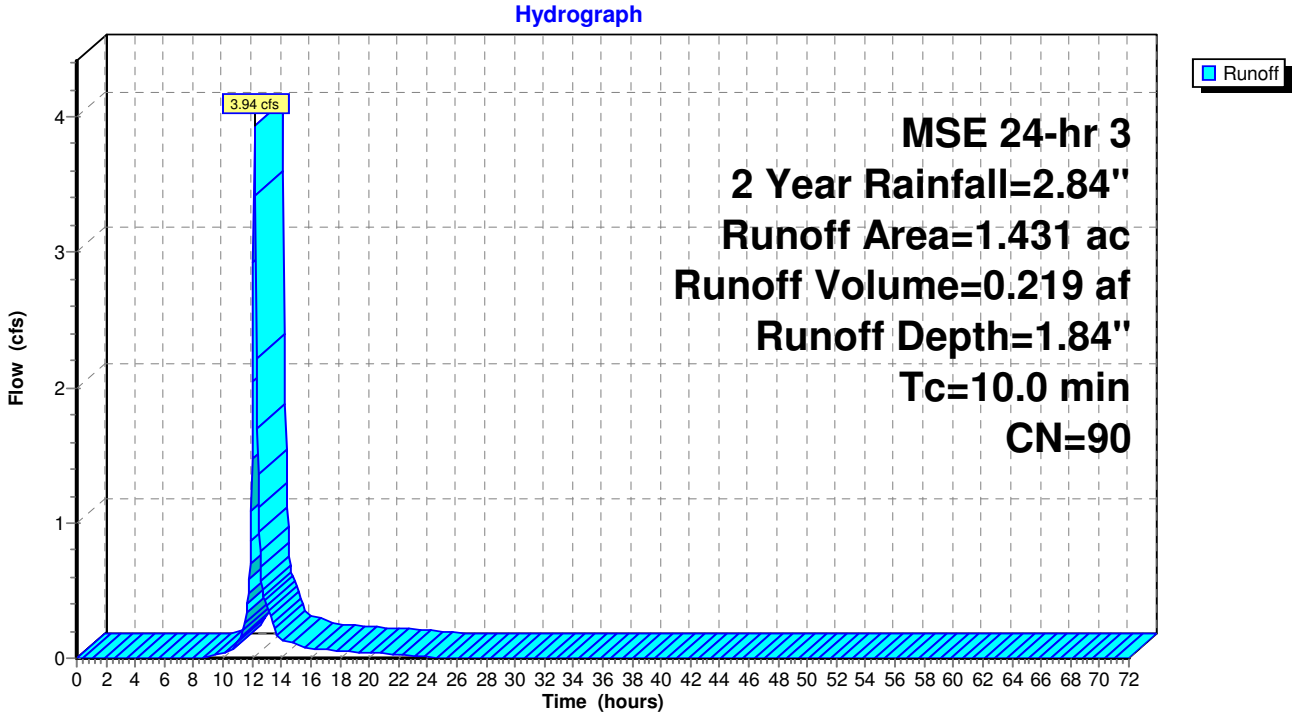
Runoff = 3.94 cfs @ 12.17 hrs, Volume= 0.219 af, Depth= 1.84"

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=2.84"

Area (ac)	CN	Description
1.122	98	Paved parking, HSG B
0.309	61	>75% Grass cover, Good, HSG B
1.431	90	Weighted Average
0.309		21.59% Pervious Area
1.122		78.41% Impervious Area

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

Subcatchment 1X: Existing North



Summary for Subcatchment 2X: Existing South

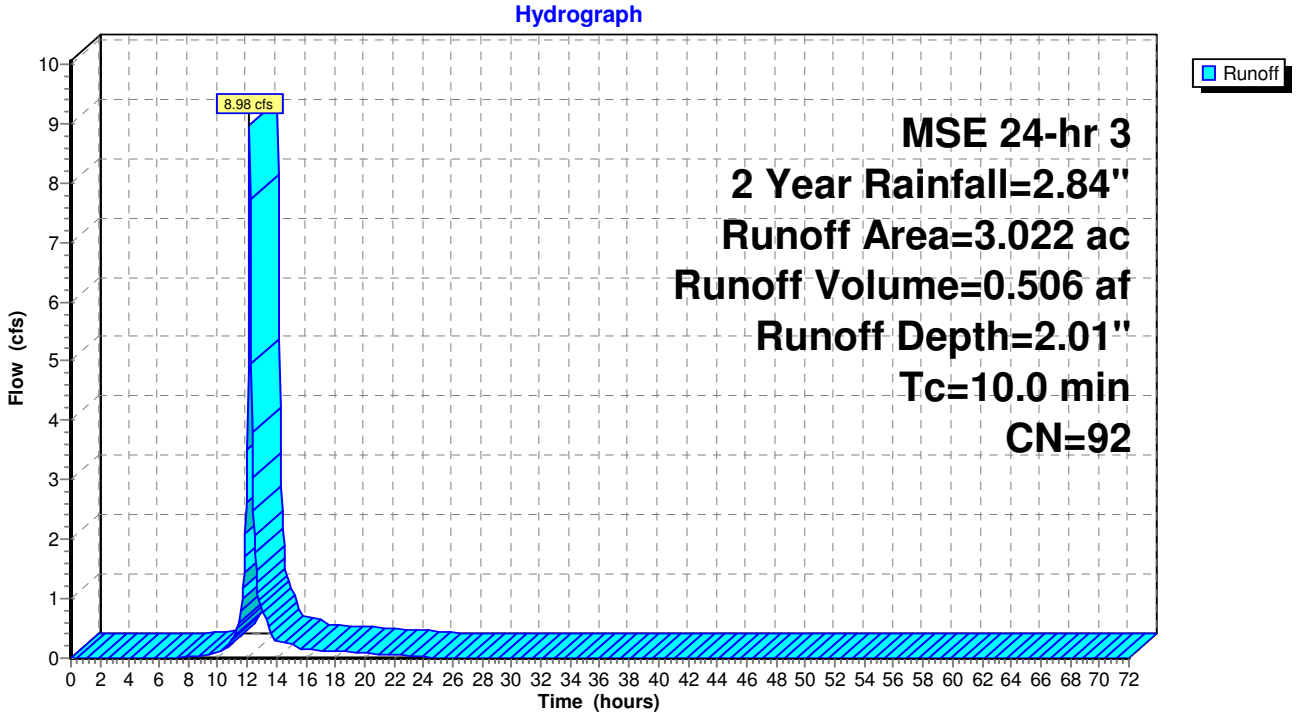
Runoff = 8.98 cfs @ 12.17 hrs, Volume= 0.506 af, Depth= 2.01"

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=2.84"

Area (ac)	CN	Description
2.553	98	Paved parking, HSG B
0.469	61	>75% Grass cover, Good, HSG B
3.022	92	Weighted Average
0.469		15.52% Pervious Area
2.553		84.48% Impervious Area

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

Subcatchment 2X: Existing South



Summary for Subcatchment 3X: Existing East

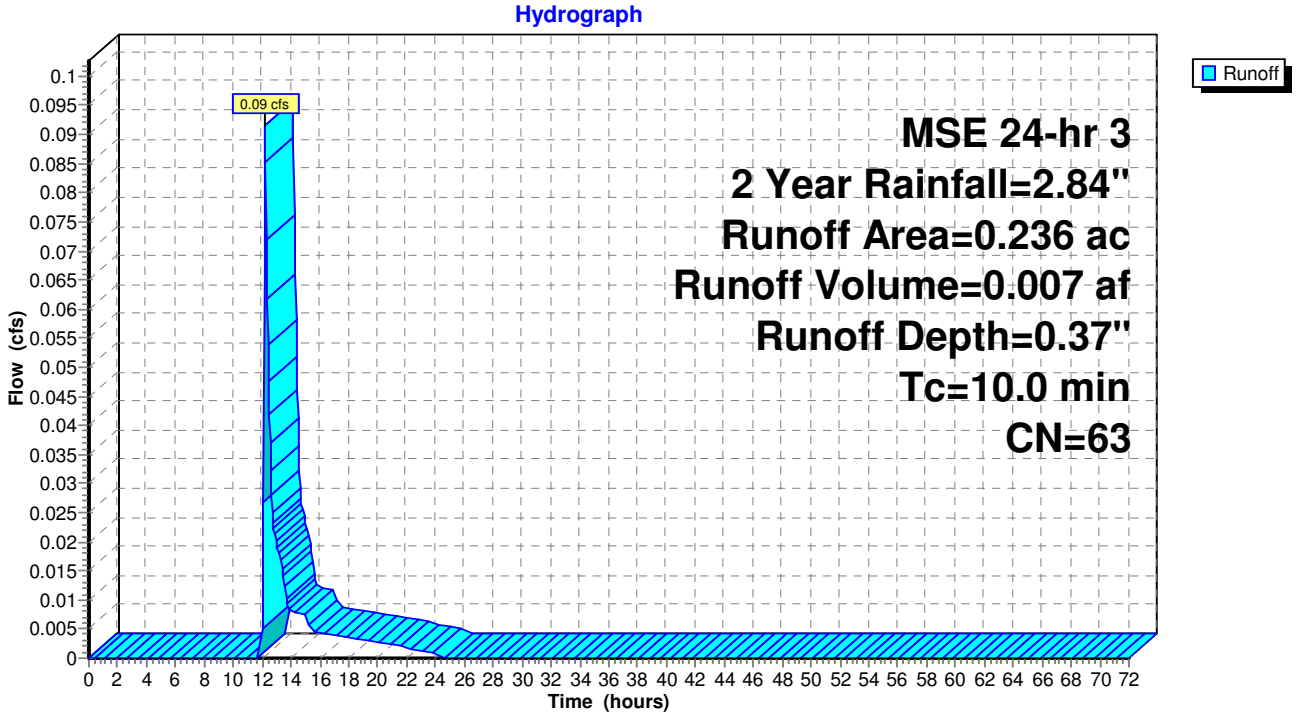
Runoff = 0.09 cfs @ 12.22 hrs, Volume= 0.007 af, Depth= 0.37"

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=2.84"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG B
0.223	61	>75% Grass cover, Good, HSG B
0.236	63	Weighted Average
0.223		94.49% Pervious Area
0.013		5.51% Impervious Area

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

Subcatchment 3X: Existing East



Summary for Subcatchment 4X: 53 Stall Lot EX

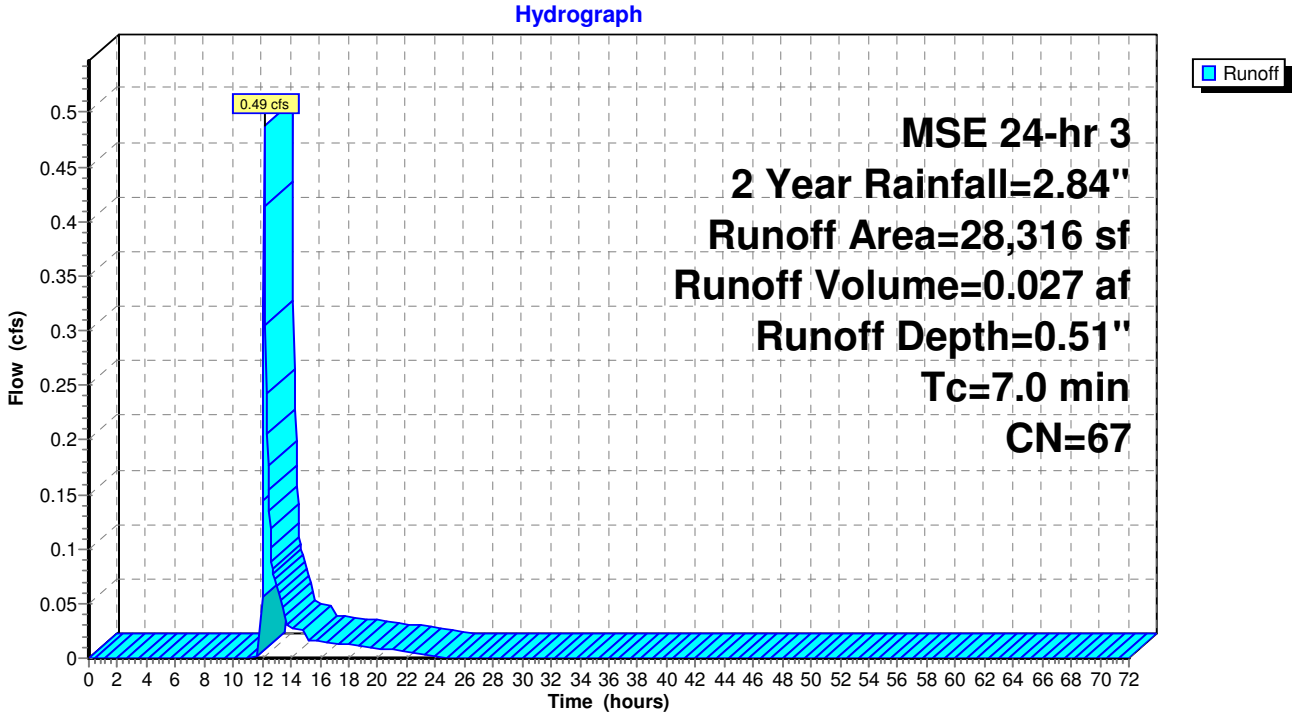
Runoff = 0.49 cfs @ 12.16 hrs, Volume= 0.027 af, Depth= 0.51"

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=2.84"

Area (sf)	CN	Description
4,665	98	Paved parking, HSG B
23,651	61	>75% Grass cover, Good, HSG B
28,316	67	Weighted Average
23,651		83.53% Pervious Area
4,665		16.47% Impervious Area

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

Subcatchment 4X: 53 Stall Lot EX

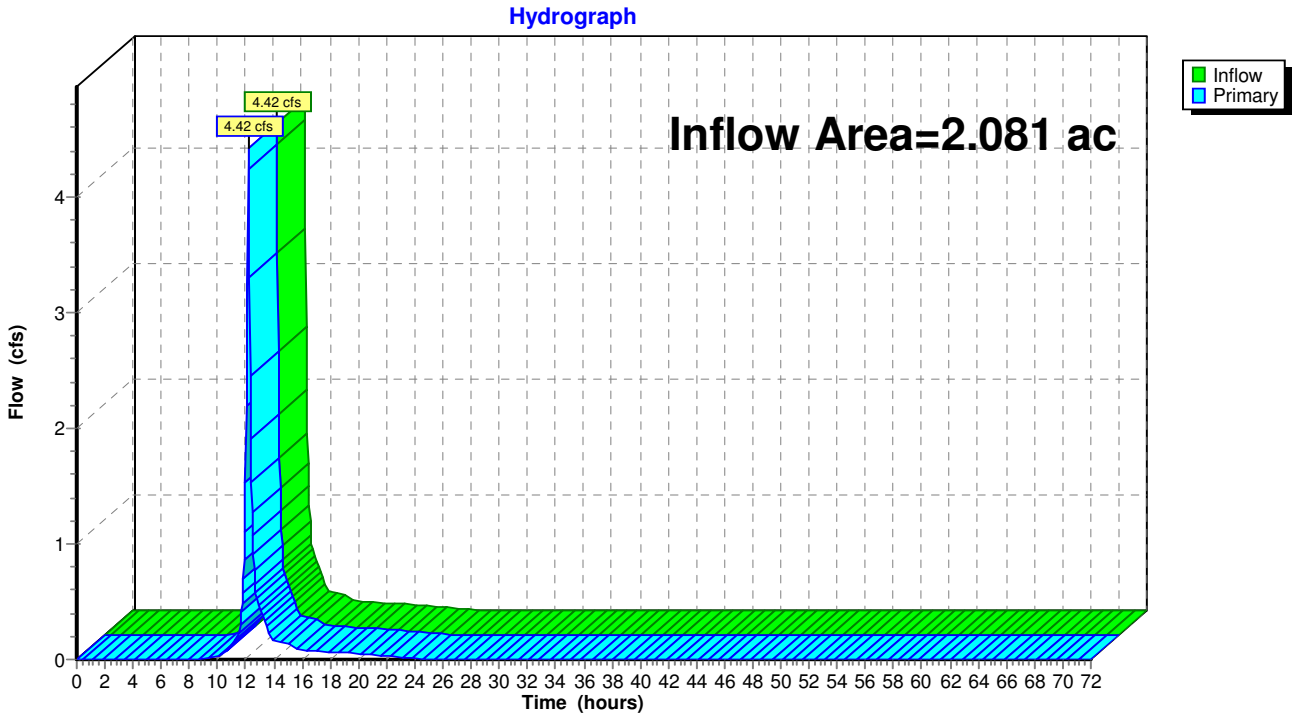


Summary for Link 5L: Existing Total North

Inflow Area = 2.081 ac, 59.06% Impervious, Inflow Depth = 1.42" for 2 Year event
Inflow = 4.42 cfs @ 12.17 hrs, Volume= 0.247 af
Primary = 4.42 cfs @ 12.17 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Existing Total North



Summary for Subcatchment 1X: Existing North

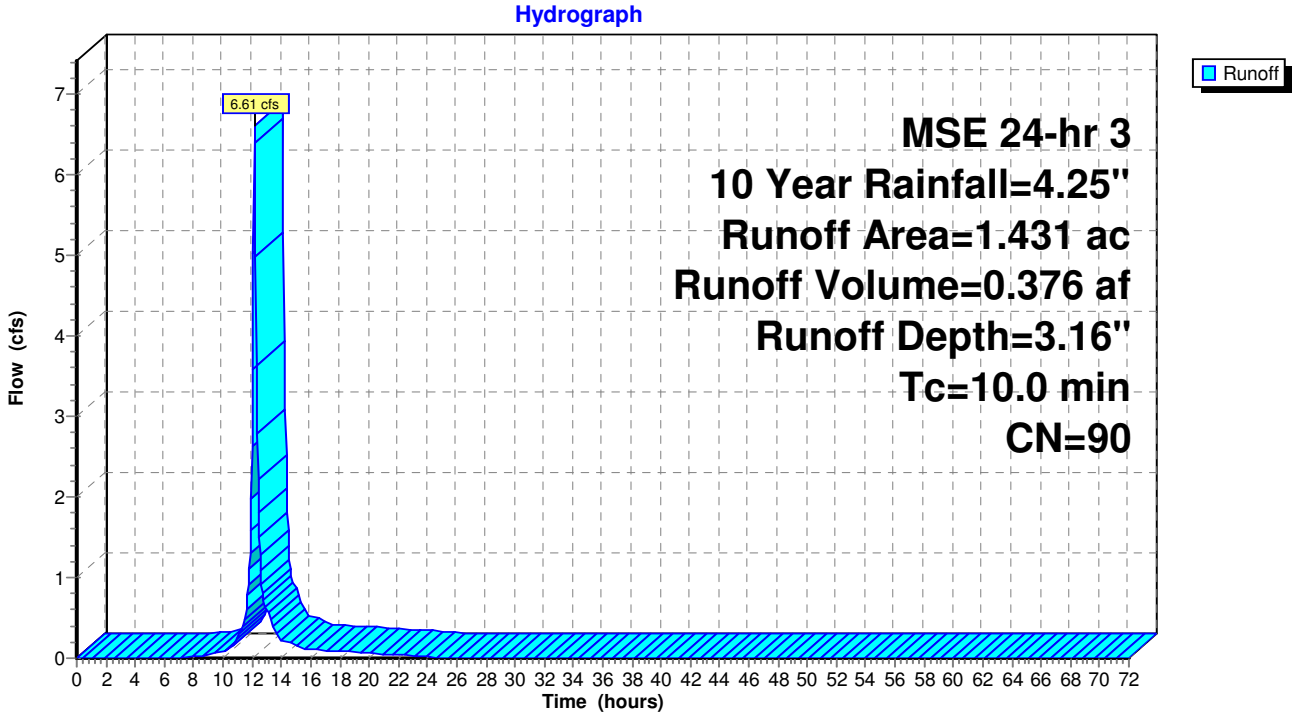
Runoff = 6.61 cfs @ 12.17 hrs, Volume= 0.376 af, Depth= 3.16"

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=4.25"

Area (ac)	CN	Description
1.122	98	Paved parking, HSG B
0.309	61	>75% Grass cover, Good, HSG B
1.431	90	Weighted Average
0.309		21.59% Pervious Area
1.122		78.41% Impervious Area

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

Subcatchment 1X: Existing North



Summary for Subcatchment 2X: Existing South

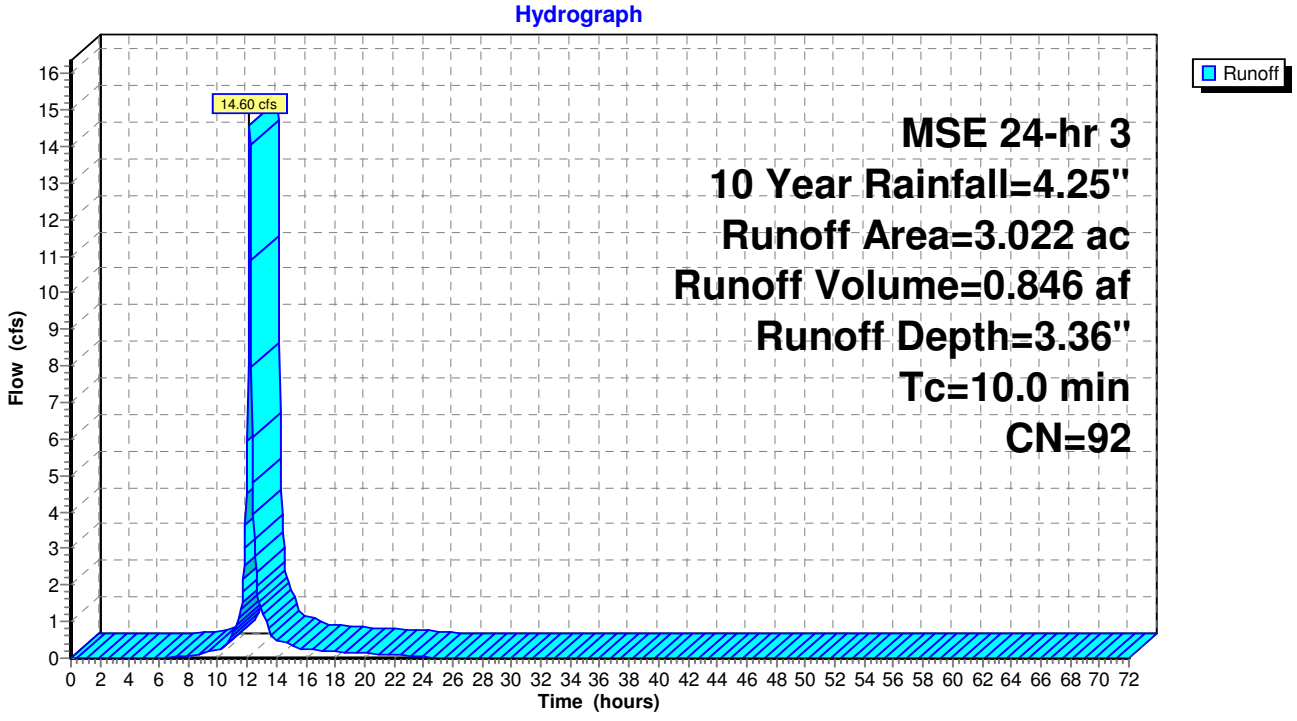
Runoff = 14.60 cfs @ 12.17 hrs, Volume= 0.846 af, Depth= 3.36"

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=4.25"

Area (ac)	CN	Description
2.553	98	Paved parking, HSG B
0.469	61	>75% Grass cover, Good, HSG B
3.022	92	Weighted Average
0.469		15.52% Pervious Area
2.553		84.48% Impervious Area

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

Subcatchment 2X: Existing South



Summary for Subcatchment 3X: Existing East

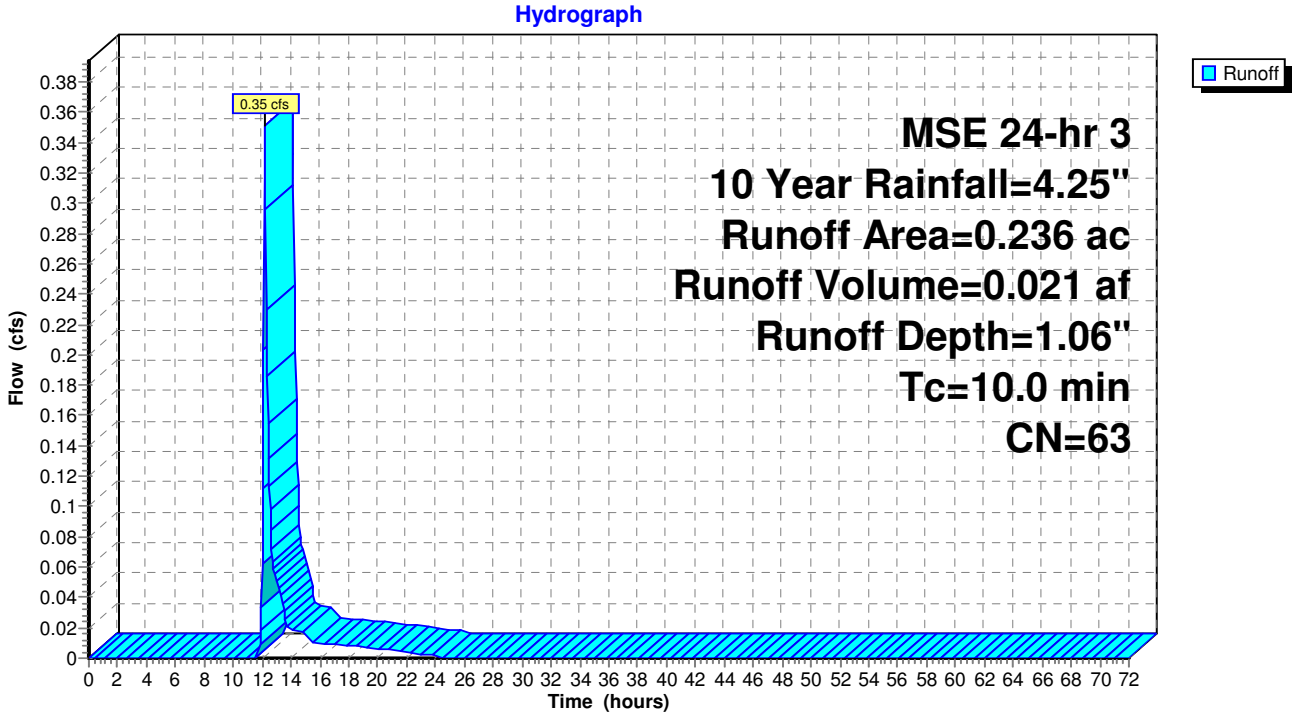
Runoff = 0.35 cfs @ 12.19 hrs, Volume= 0.021 af, Depth= 1.06"

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=4.25"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG B
0.223	61	>75% Grass cover, Good, HSG B
0.236	63	Weighted Average
0.223		94.49% Pervious Area
0.013		5.51% Impervious Area

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

Subcatchment 3X: Existing East



Summary for Subcatchment 4X: 53 Stall Lot EX

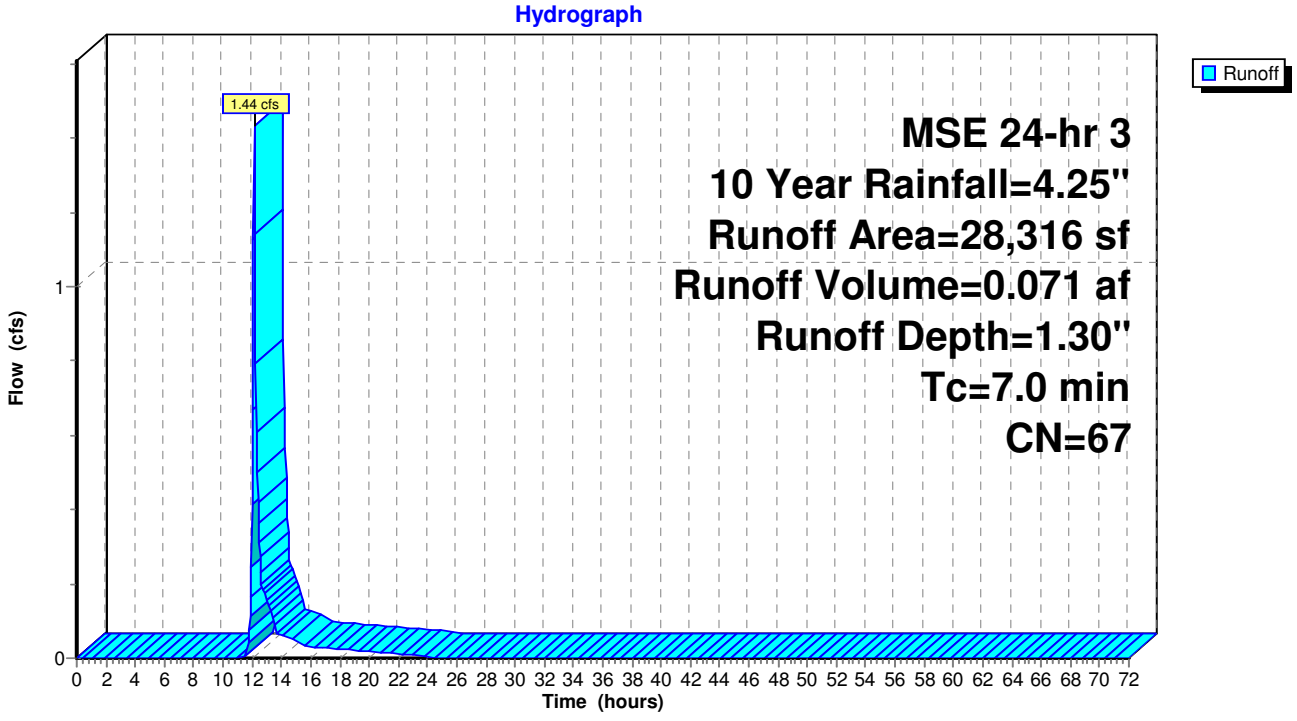
Runoff = 1.44 cfs @ 12.15 hrs, Volume= 0.071 af, Depth= 1.30"

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=4.25"

Area (sf)	CN	Description
4,665	98	Paved parking, HSG B
23,651	61	>75% Grass cover, Good, HSG B
28,316	67	Weighted Average
23,651		83.53% Pervious Area
4,665		16.47% Impervious Area

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

Subcatchment 4X: 53 Stall Lot EX

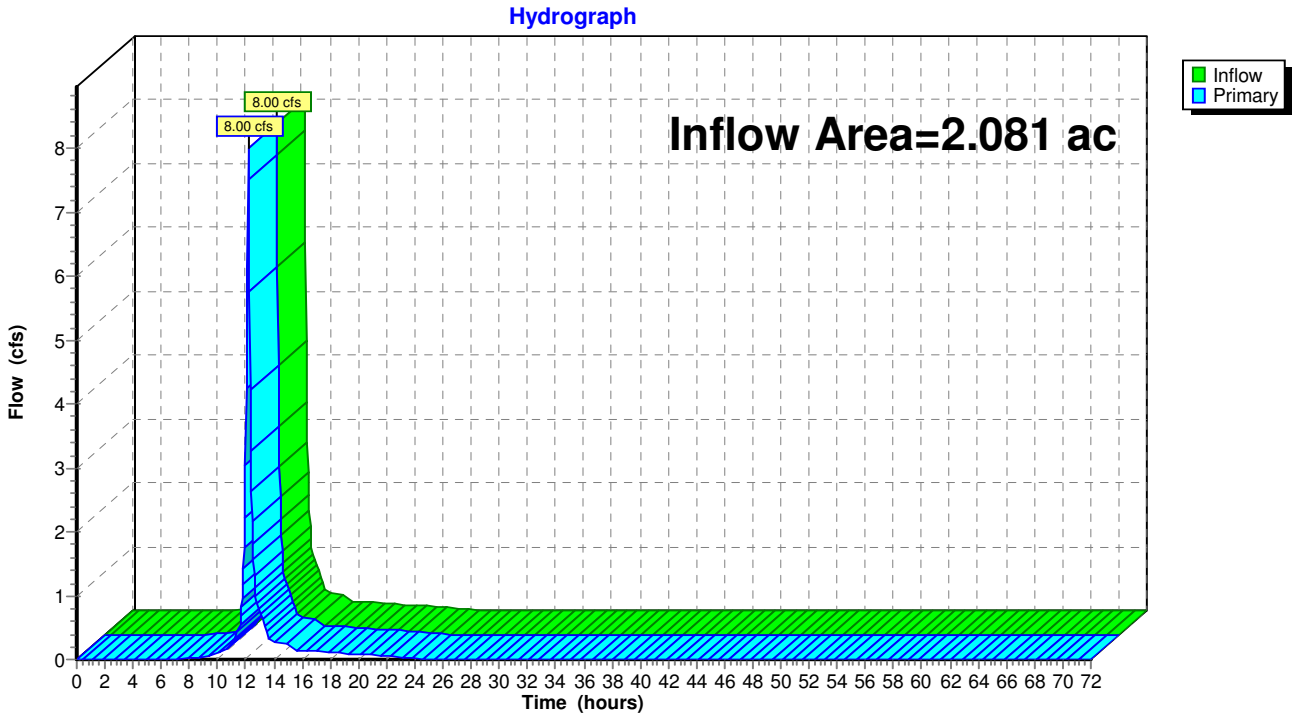


Summary for Link 5L: Existing Total North

Inflow Area = 2.081 ac, 59.06% Impervious, Inflow Depth = 2.58" for 10 Year event
Inflow = 8.00 cfs @ 12.17 hrs, Volume= 0.447 af
Primary = 8.00 cfs @ 12.17 hrs, Volume= 0.447 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Existing Total North



Summary for Subcatchment 1X: Existing North

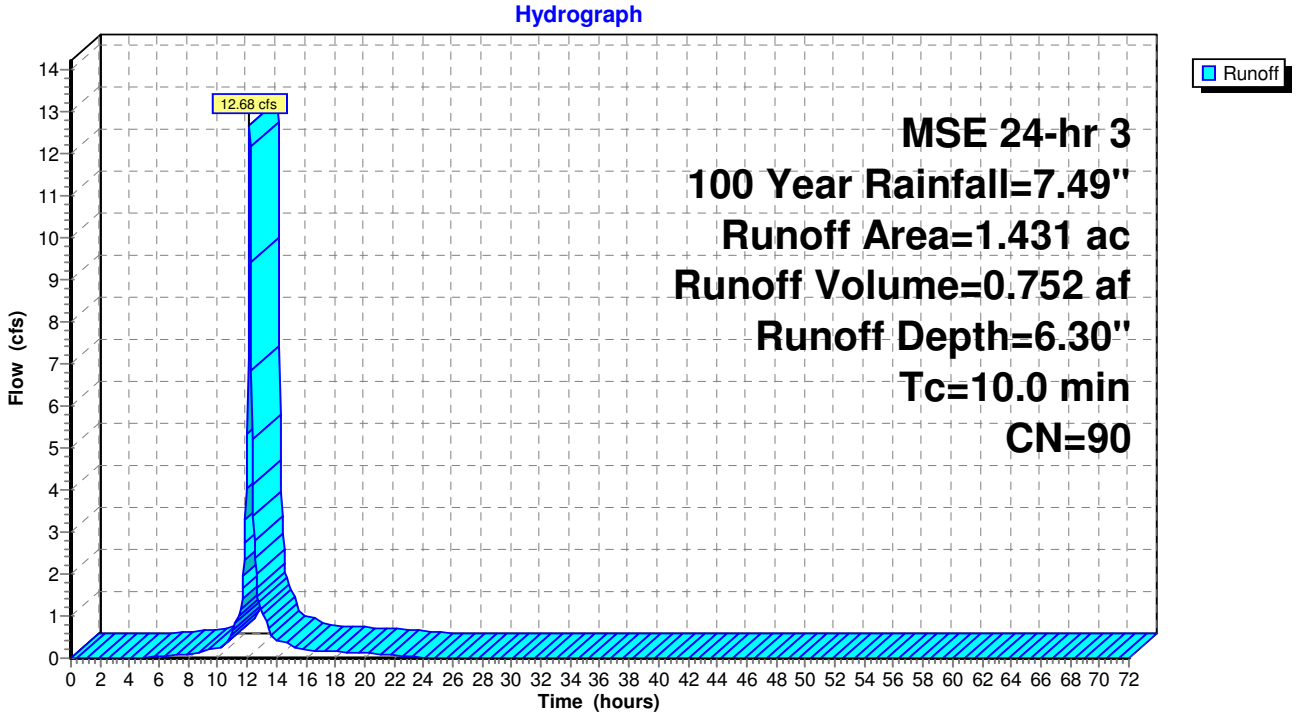
Runoff = 12.68 cfs @ 12.17 hrs, Volume= 0.752 af, Depth= 6.30"

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=7.49"

Area (ac)	CN	Description
1.122	98	Paved parking, HSG B
0.309	61	>75% Grass cover, Good, HSG B
1.431	90	Weighted Average
0.309		21.59% Pervious Area
1.122		78.41% Impervious Area

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

Subcatchment 1X: Existing North



Summary for Subcatchment 2X: Existing South

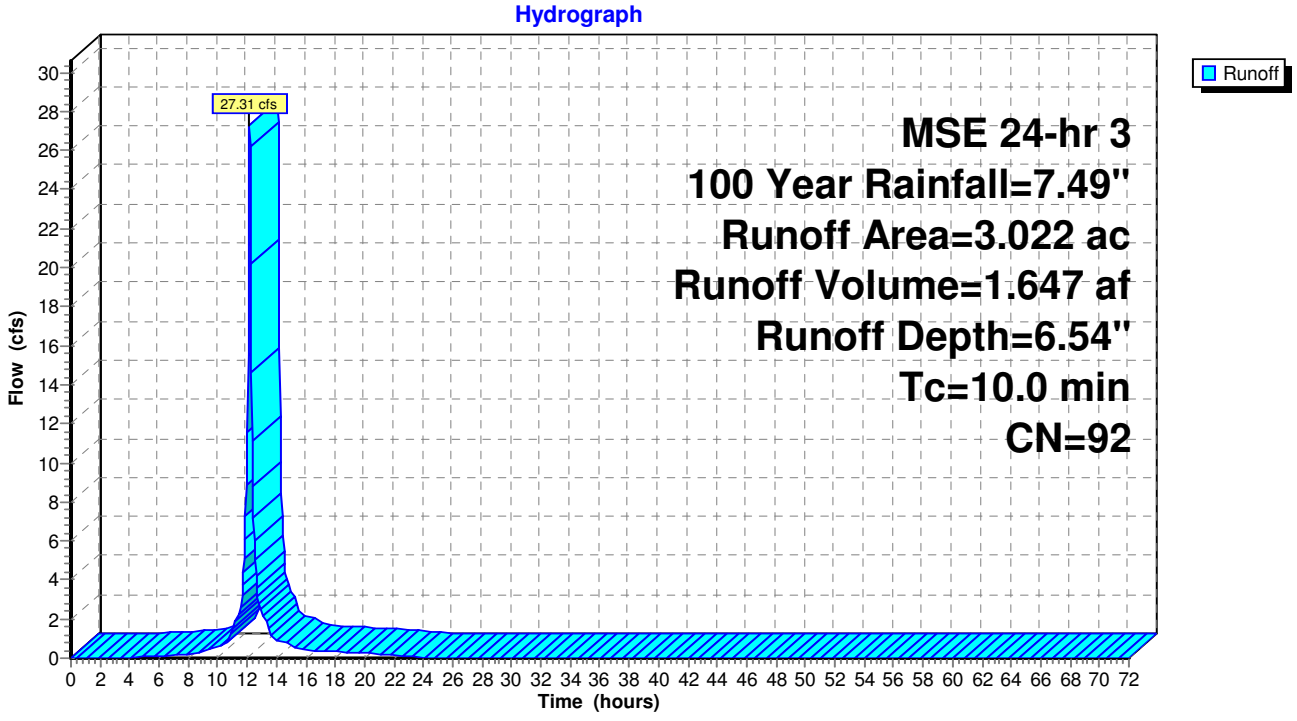
Runoff = 27.31 cfs @ 12.17 hrs, Volume= 1.647 af, Depth= 6.54"

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=7.49"

Area (ac)	CN	Description
2.553	98	Paved parking, HSG B
0.469	61	>75% Grass cover, Good, HSG B
3.022	92	Weighted Average
0.469		15.52% Pervious Area
2.553		84.48% Impervious Area

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

Subcatchment 2X: Existing South



Summary for Subcatchment 3X: Existing East

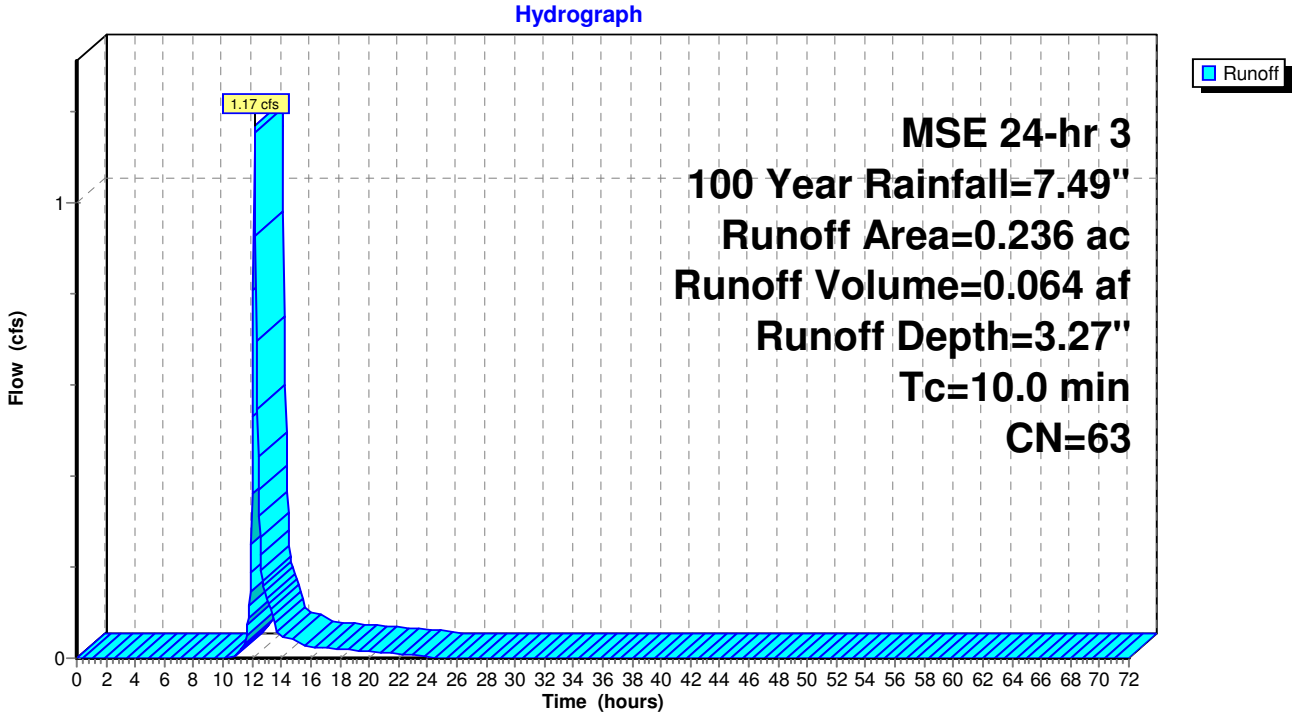
Runoff = 1.17 cfs @ 12.18 hrs, Volume= 0.064 af, Depth= 3.27"

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=7.49"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG B
0.223	61	>75% Grass cover, Good, HSG B
0.236	63	Weighted Average
0.223		94.49% Pervious Area
0.013		5.51% Impervious Area

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

Subcatchment 3X: Existing East



Summary for Subcatchment 4X: 53 Stall Lot EX

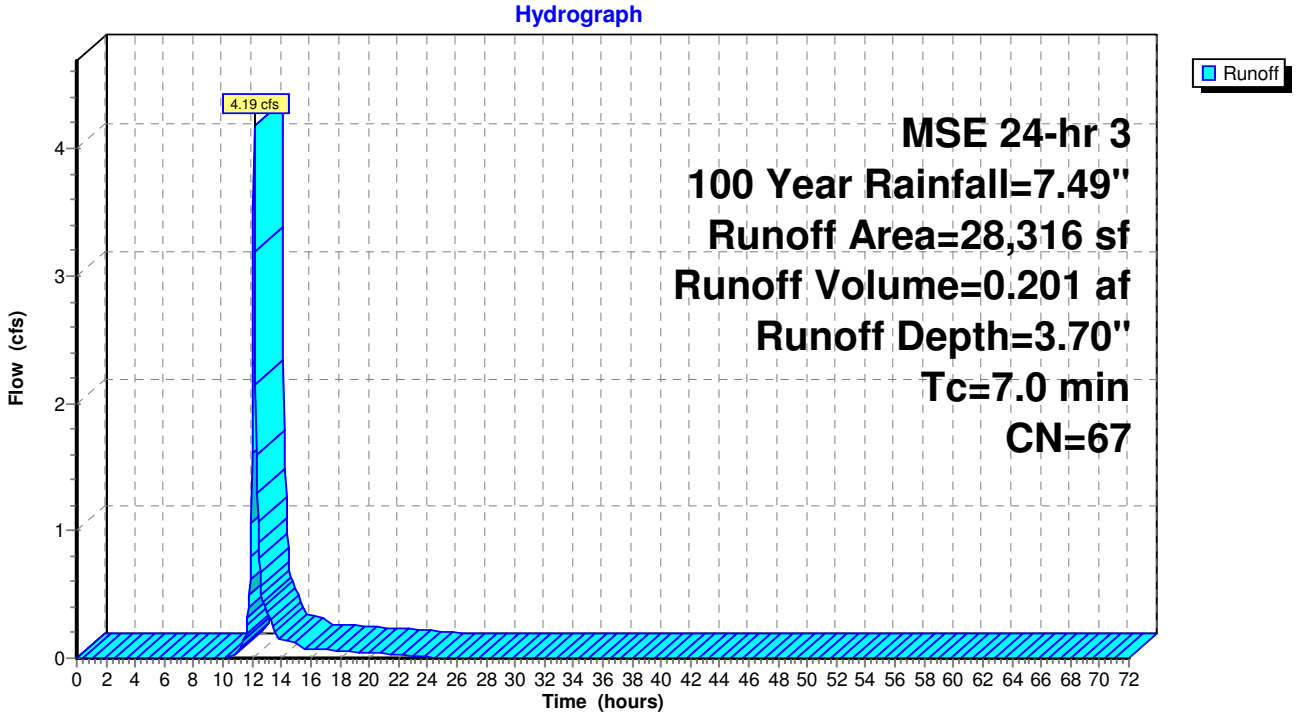
Runoff = 4.19 cfs @ 12.15 hrs, Volume= 0.201 af, Depth= 3.70"

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=7.49"

Area (sf)	CN	Description
4,665	98	Paved parking, HSG B
23,651	61	>75% Grass cover, Good, HSG B
28,316	67	Weighted Average
23,651		83.53% Pervious Area
4,665		16.47% Impervious Area

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

Subcatchment 4X: 53 Stall Lot EX

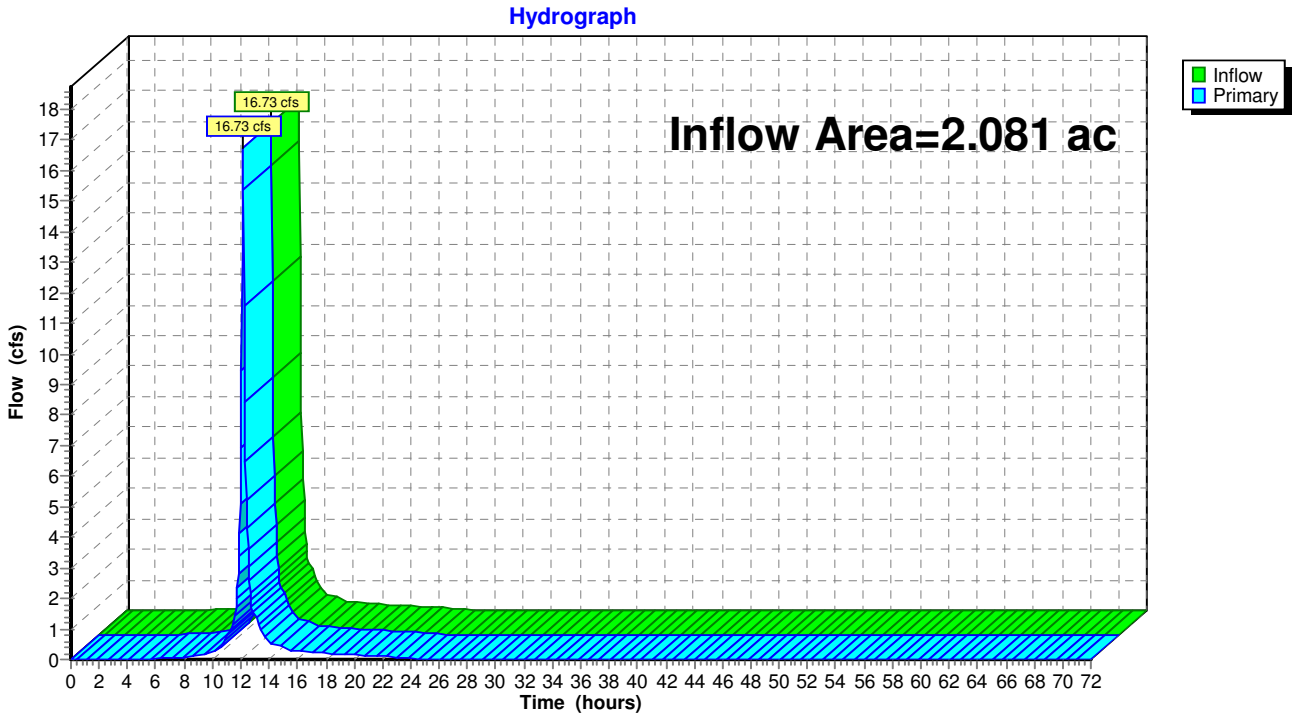


Summary for Link 5L: Existing Total North

Inflow Area = 2.081 ac, 59.06% Impervious, Inflow Depth = 5.49" for 100 Year event
Inflow = 16.73 cfs @ 12.16 hrs, Volume= 0.952 af
Primary = 16.73 cfs @ 12.16 hrs, Volume= 0.952 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

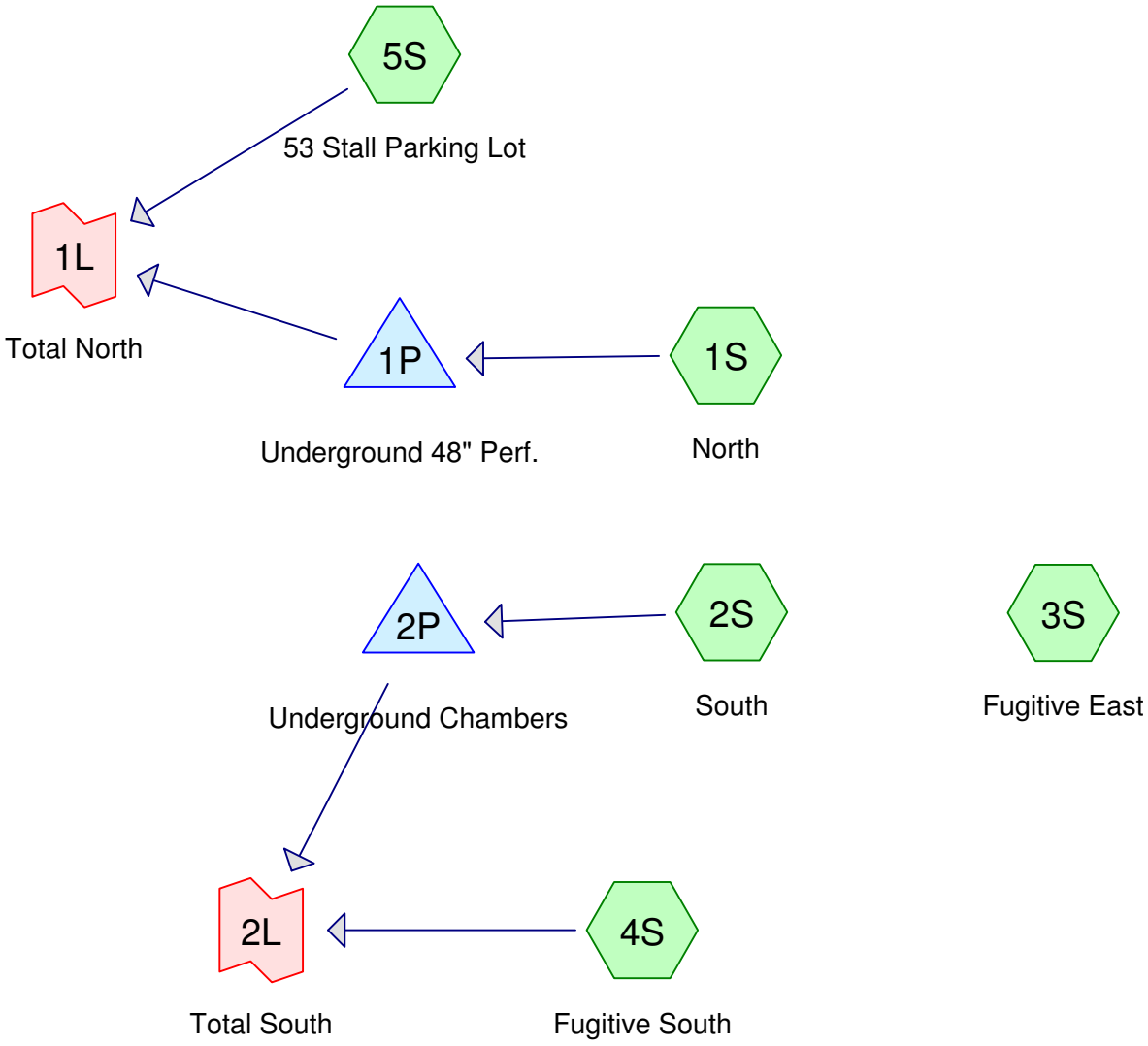
Link 5L: Existing Total North



HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT F



Subcat Reach Pond Link

Routing Diagram for 24382-2026-03-30
Prepared by Hill Incorporated, Printed 4/1/2026

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.238	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S, 4S, 5S)
3.246	98	Paved parking, HSG B (1S, 2S, 5S)
0.768	98	Roofs, HSG B (2S)
0.257	98	Unconnected pavement, HSG B (3S, 4S)
5.508	90	TOTAL AREA

Summary for Subcatchment 1S: North

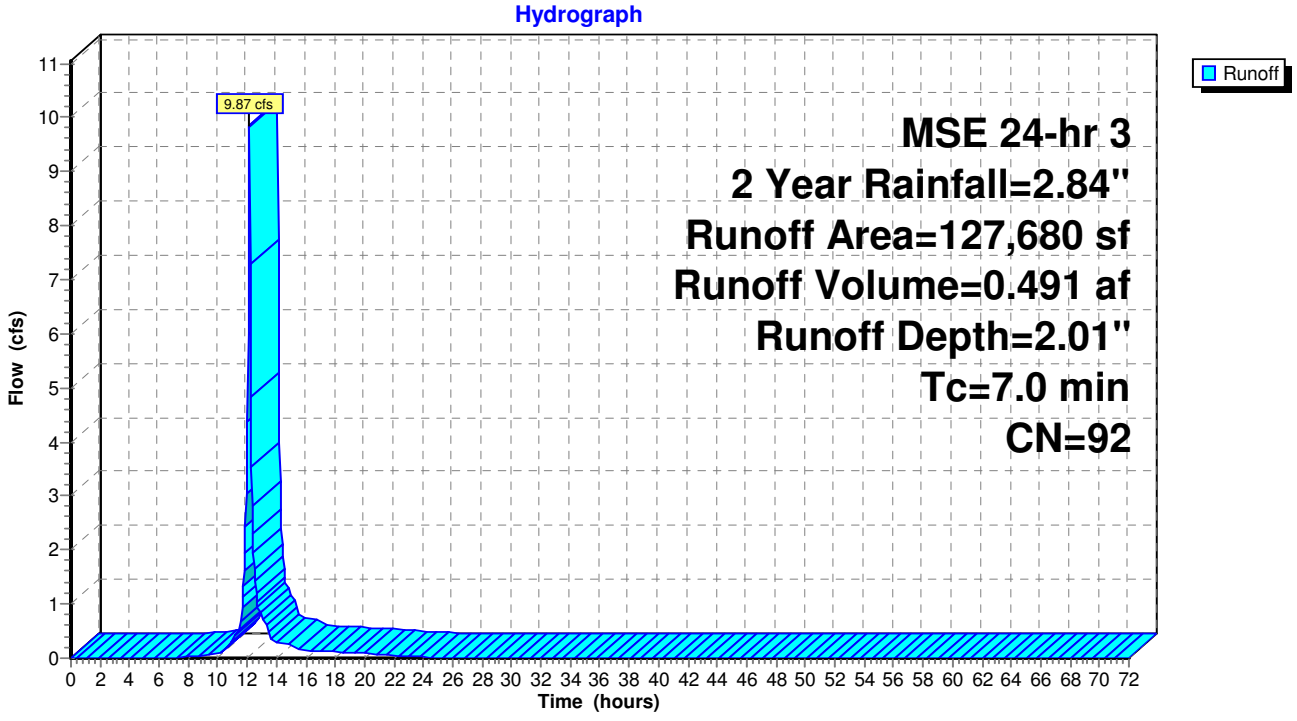
Runoff = 9.87 cfs @ 12.14 hrs, Volume= 0.491 af, Depth= 2.01"

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=2.84"

Area (sf)	CN	Description
108,373	98	Paved parking, HSG B
19,307	61	>75% Grass cover, Good, HSG B
127,680	92	Weighted Average
19,307		15.12% Pervious Area
108,373		84.88% Impervious Area

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

Subcatchment 1S: North



Summary for Subcatchment 2S: South

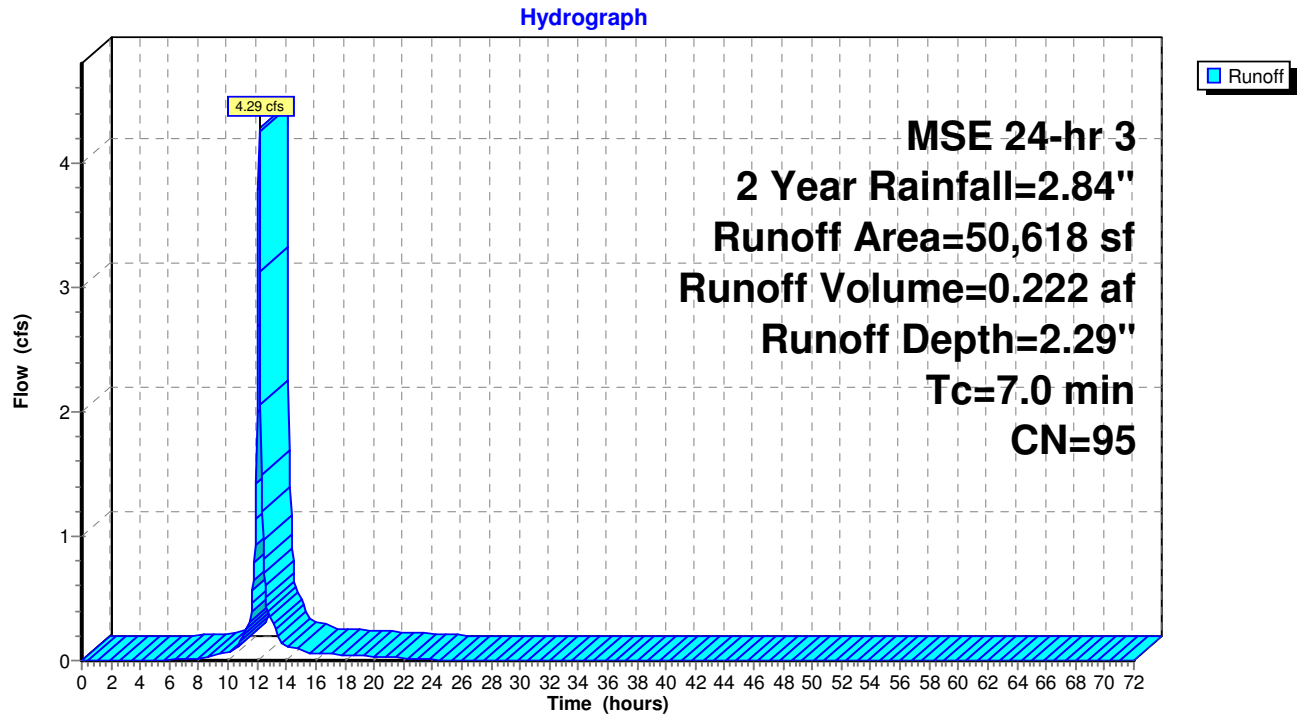
Runoff = 4.29 cfs @ 12.14 hrs, Volume= 0.222 af, Depth= 2.29"

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=2.84"

Area (sf)	CN	Description
12,787	98	Paved parking, HSG B
4,393	61	>75% Grass cover, Good, HSG B
33,438	98	Roofs, HSG B
50,618	95	Weighted Average
4,393		8.68% Pervious Area
46,225		91.32% Impervious Area

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

Subcatchment 2S: South



Summary for Subcatchment 3S: Fugitive East

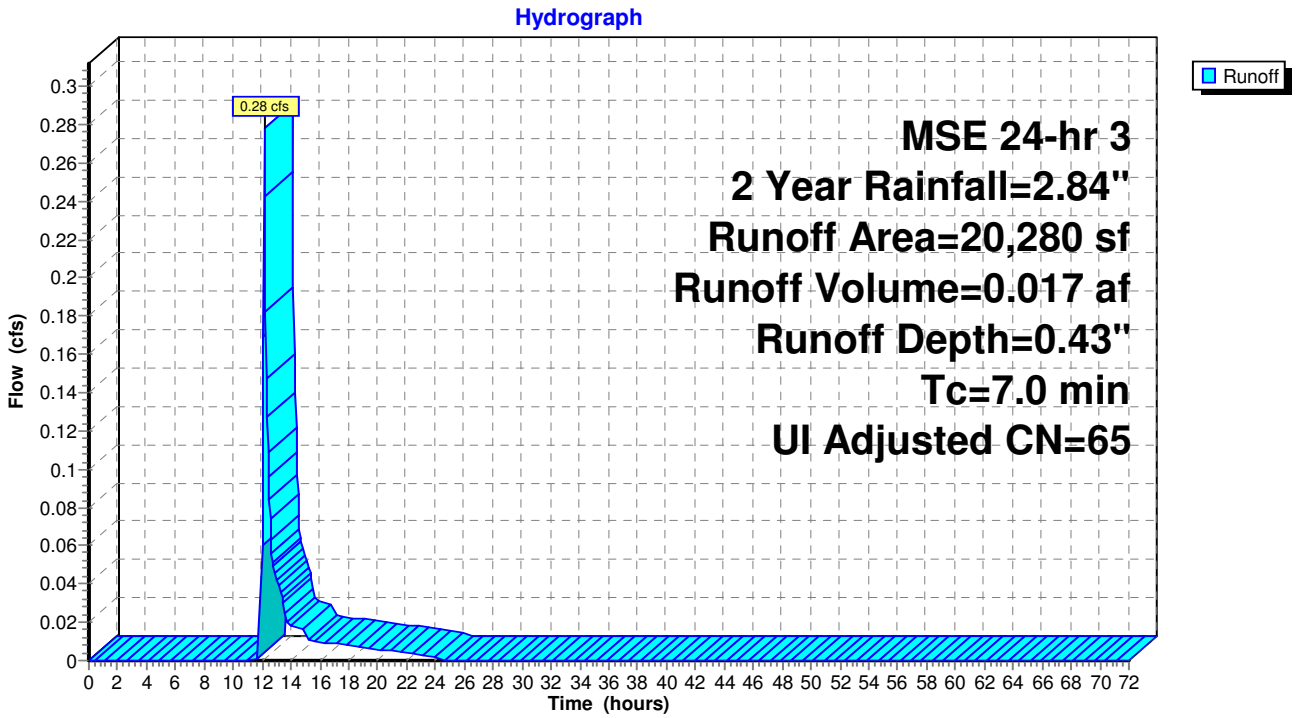
Runoff = 0.28 cfs @ 12.16 hrs, Volume= 0.017 af, Depth= 0.43"

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=2.84"

Area (sf)	CN	Adj	Description
4,445	98		Unconnected pavement, HSG B
15,835	61		>75% Grass cover, Good, HSG B
20,280	69	65	Weighted Average, UI Adjusted
15,835			78.08% Pervious Area
4,445			21.92% Impervious Area
4,445			100.00% Unconnected

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

Subcatchment 3S: Fugitive East



Summary for Subcatchment 4S: Fugitive South

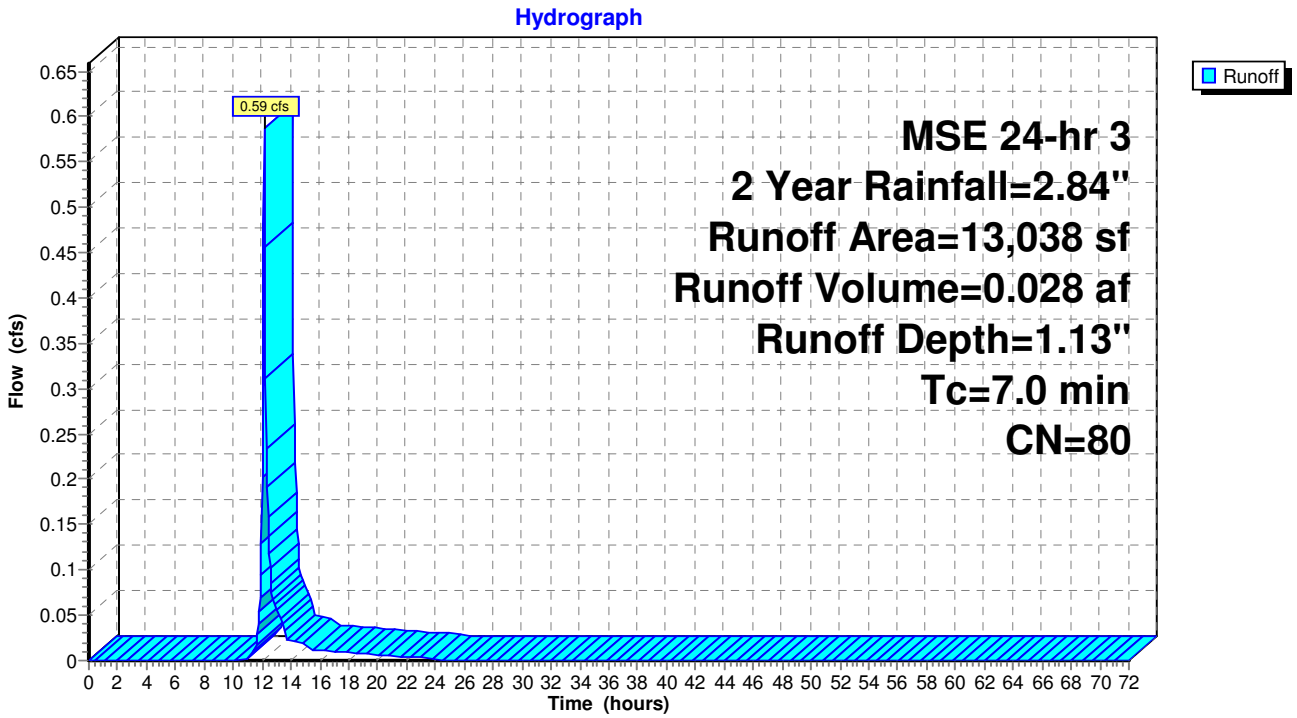
Runoff = 0.59 cfs @ 12.15 hrs, Volume= 0.028 af, Depth= 1.13"

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=2.84"

Area (sf)	CN	Description
6,730	98	Unconnected pavement, HSG B
6,308	61	>75% Grass cover, Good, HSG B
13,038	80	Weighted Average
6,308		48.38% Pervious Area
6,730		51.62% Impervious Area
6,730		100.00% Unconnected

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

Subcatchment 4S: Fugitive South



Summary for Subcatchment 5S: 53 Stall Parking Lot

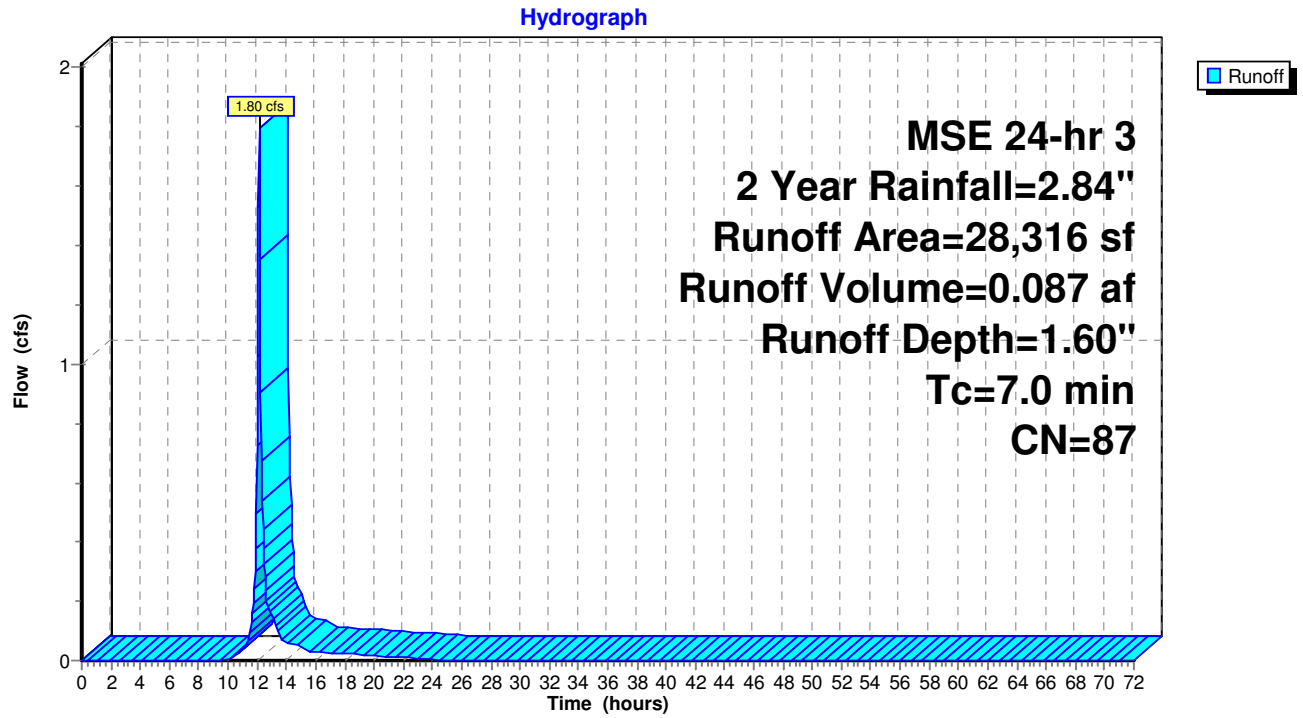
Runoff = 1.80 cfs @ 12.14 hrs, Volume= 0.087 af, Depth= 1.60"

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=2.84"

Area (sf)	CN	Description
15,568	98	Paved parking, HSG B
4,665	98	Paved parking, HSG B
8,083	61	>75% Grass cover, Good, HSG B
28,316	87	Weighted Average
8,083		28.55% Pervious Area
20,233		71.45% Impervious Area

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

Subcatchment 5S: 53 Stall Parking Lot



Summary for Pond 1P: Underground 48" Perf.

Inflow Area = 2.931 ac, 84.88% Impervious, Inflow Depth = 2.01" for 2 Year event
Inflow = 9.87 cfs @ 12.14 hrs, Volume= 0.491 af
Outflow = 0.19 cfs @ 11.20 hrs, Volume= 0.491 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.19 cfs @ 11.20 hrs, Volume= 0.491 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 846.07' @ 15.13 hrs Surf.Area= 10,156 sf Storage= 14,743 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 736.5 min (1,523.1 - 786.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	843.50'	13,211 cf	66.38'W x 153.00'L x 5.50'H Field A 55,856 cf Overall - 22,829 cf Embedded = 33,028 cf x 40.0% Voids
#2A	844.00'	19,056 cf	ADS N-12 48" x 70 Inside #1 Inside= 47.7"W x 47.7"H => 12.40 sf x 20.00'L = 248.0 cf Outside= 54.0"W x 54.0"H => 14.85 sf x 20.00'L = 297.0 cf Row Length Adjustment= +1.00' x 12.40 sf x 10 rows 63.38' Header x 12.40 sf x 2 = 1,571.7 cf Inside
		32,267 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	843.50'	0.800 in/hr Exfiltration over Surface area
#2	Primary	844.00'	18.0" Round Culvert L= 264.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 844.00' / 841.00' S= 0.0114 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#3	Device 2	846.30'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 2	846.30'	12.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	848.80'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.19 cfs @ 11.20 hrs HW=843.56' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=843.50' TW=0.00' (Dynamic Tailwater)
└2=Culvert (Controls 0.00 cfs)
  ├3=Orifice/Grate (Controls 0.00 cfs)
  ├4=Orifice/Grate (Controls 0.00 cfs)
  └5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Underground 48" Perf. - Chamber Wizard Field A

Chamber Model = ADS N-12 48" (ADS N-12® Pipe)
Inside= 47.7"W x 47.7"H => 12.40 sf x 20.00'L = 248.0 cf
Outside= 54.0"W x 54.0"H => 14.85 sf x 20.00'L = 297.0 cf
Row Length Adjustment= +1.00' x 12.40 sf x 10 rows

54.0" Wide + 24.5" Spacing = 78.5" C-C Row Spacing

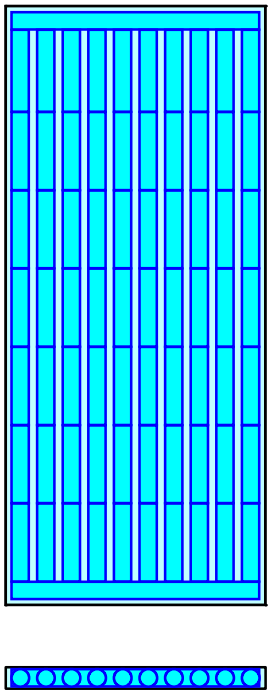
7 Chambers/Row x 20.00' Long +1.00' Row Adjustment +4.50' Header x 2 = 150.00' Row Length +18.0" End Stone x 2 = 153.00' Base Length
10 Rows x 54.0" Wide + 24.5" Spacing x 9 + 18.0" Side Stone x 2 = 66.38' Base Width
6.0" Base + 54.0" Chamber Height + 6.0" Cover = 5.50' Field Height

70 Chambers x 248.0 cf +1.00' Row Adjustment x 12.40 sf x 10 Rows + 63.38' Header x 12.40 sf x 2 = 19,055.7 cf Chamber Storage
70 Chambers x 297.0 cf +1.00' Row Adjustment x 14.85 sf x 10 Rows + 63.38' Header x 14.85 sf x 2 = 22,819.2 cf Displacement

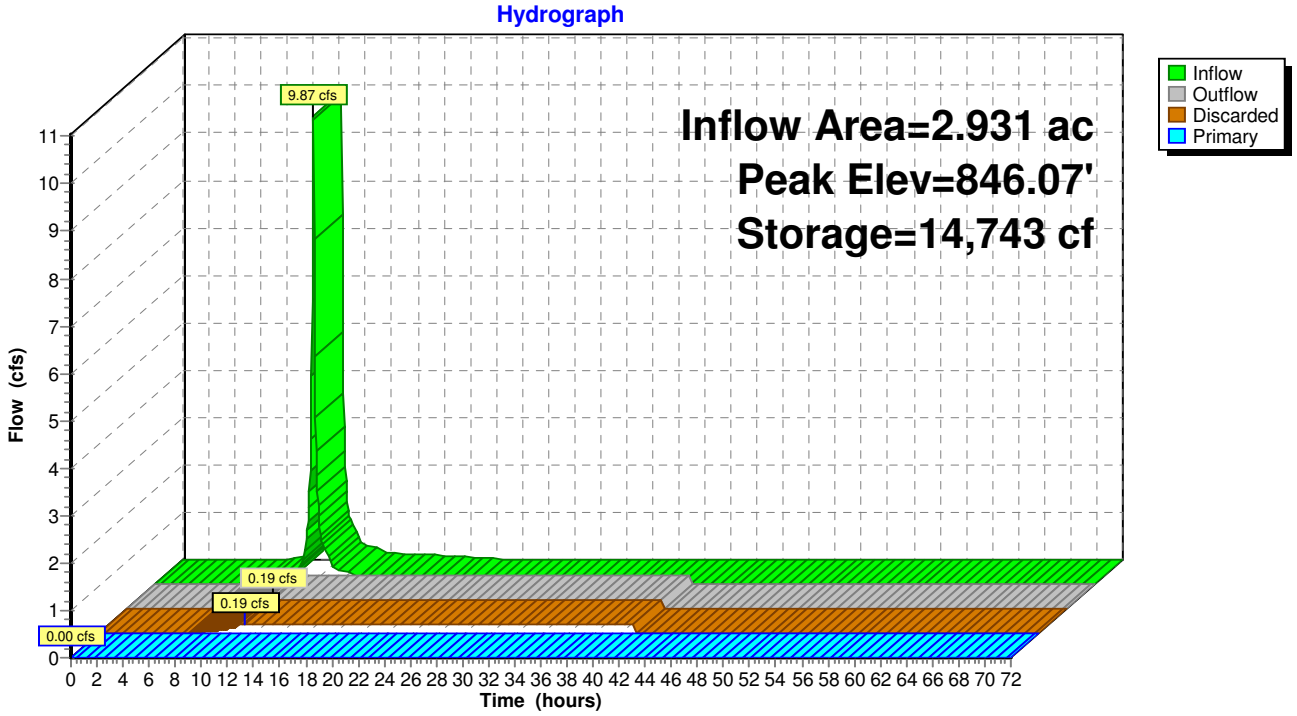
55,856.5 cf Field - 22,819.2 cf Chambers = 33,037.3 cf Stone x 40.0% Voids = 13,214.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,270.7 cf = 0.741 af
Overall Storage Efficiency = 57.8%
Overall System Size = 153.00' x 66.38' x 5.50'

70 Chambers
2,068.8 cy Field
1,223.6 cy Stone



Pond 1P: Underground 48" Perf.



Summary for Pond 2P: Underground Chambers

Inflow Area = 1.162 ac, 91.32% Impervious, Inflow Depth = 2.29" for 2 Year event
Inflow = 4.29 cfs @ 12.14 hrs, Volume= 0.222 af
Outflow = 3.19 cfs @ 12.22 hrs, Volume= 0.222 af, Atten= 26%, Lag= 4.6 min
Discarded = 0.02 cfs @ 9.30 hrs, Volume= 0.107 af
Primary = 3.17 cfs @ 12.22 hrs, Volume= 0.116 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 847.18' @ 12.22 hrs Surf.Area= 2,105 sf Storage= 4,122 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 682.2 min (1,456.3 - 774.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	844.12'	1,918 cf	34.75'W x 60.58'L x 3.50'H Field A 7,368 cf Overall - 2,573 cf Embedded = 4,795 cf x 40.0% Voids
#2A	844.62'	2,573 cf	ADS_StormTech SC-740 +Cap x 56 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 7 Rows
		4,491 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	844.12'	0.450 in/hr Exfiltration over Surface area
#2	Primary	846.42'	18.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 846.42' / 846.02' S= 0.0400 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Discarded OutFlow Max=0.02 cfs @ 9.30 hrs HW=844.16' (Free Discharge)
↑└1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=2.92 cfs @ 12.22 hrs HW=847.14' TW=0.00' (Dynamic Tailwater)
↑└2=Culvert (Barrel Controls 2.92 cfs @ 5.08 fps)

Pond 2P: Underground Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

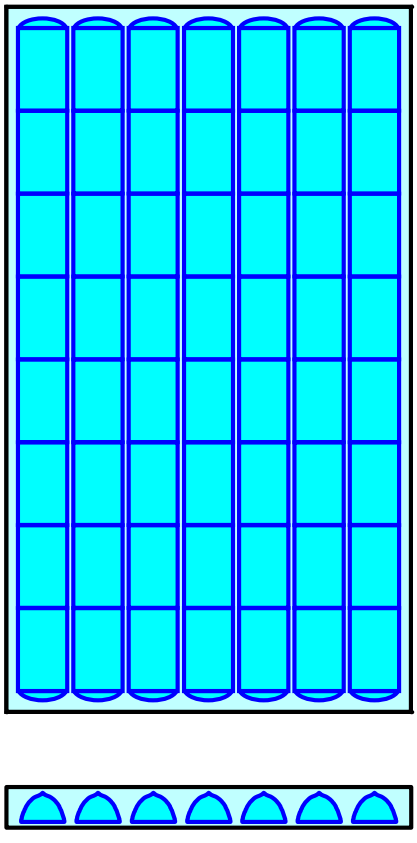
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

56 Chambers x 45.9 cf = 2,572.6 cf Chamber Storage

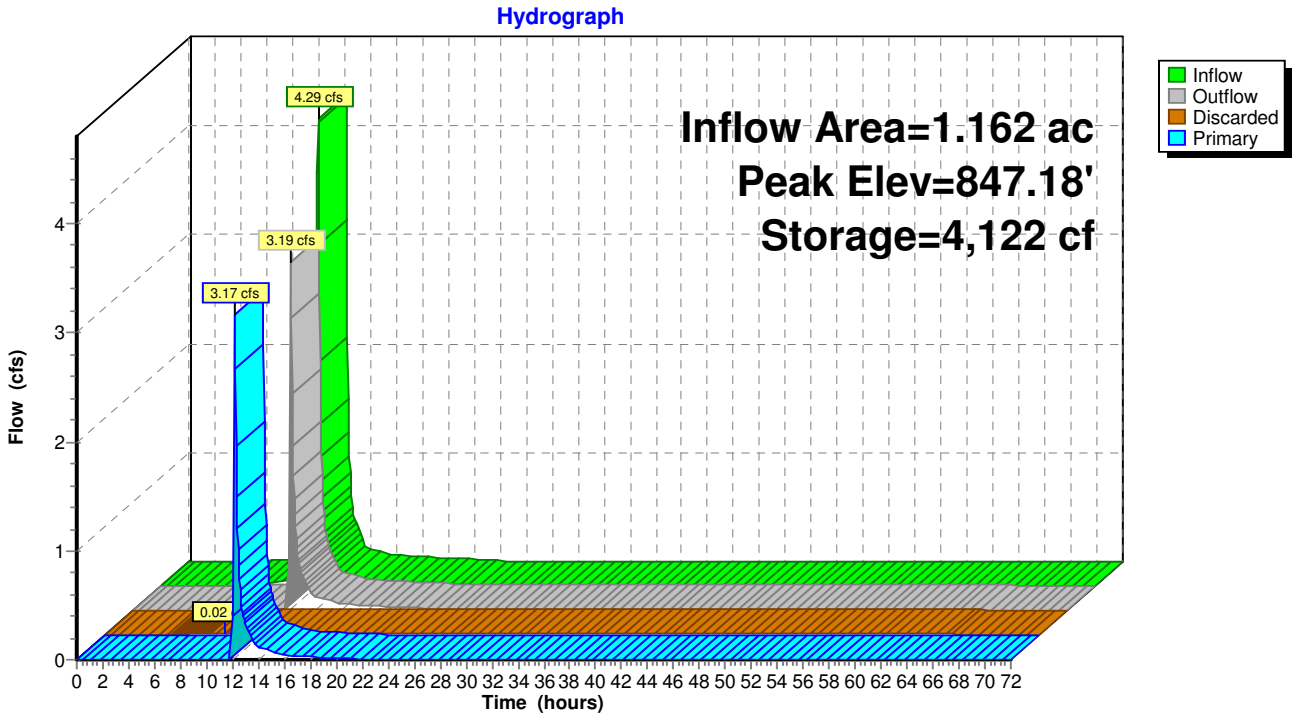
7,367.6 cf Field - 2,572.6 cf Chambers = 4,795.0 cf Stone x 40.0% Voids = 1,918.0 cf Stone Storage

Chamber Storage + Stone Storage = 4,490.6 cf = 0.103 af
Overall Storage Efficiency = 61.0%
Overall System Size = 60.58' x 34.75' x 3.50'

56 Chambers
272.9 cy Field
177.6 cy Stone



Pond 2P: Underground Chambers

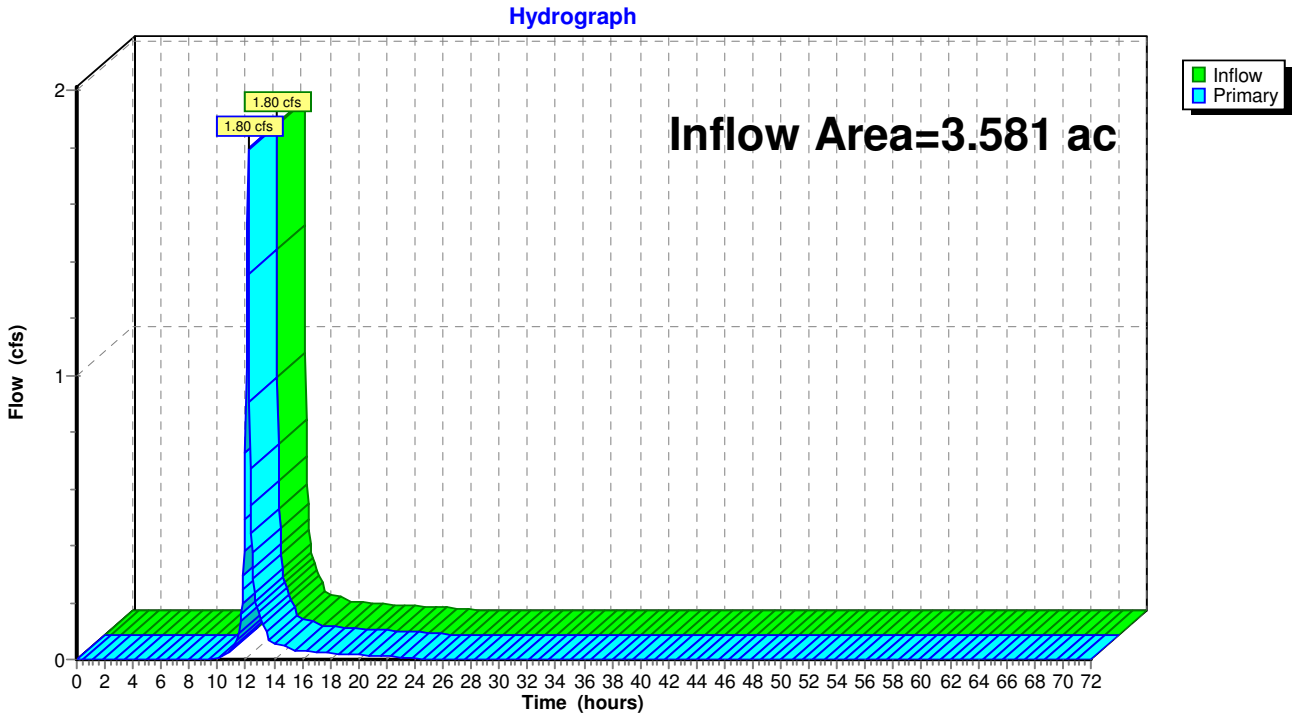


Summary for Link 1L: Total North

Inflow Area = 3.581 ac, 82.44% Impervious, Inflow Depth = 0.29" for 2 Year event
Inflow = 1.80 cfs @ 12.14 hrs, Volume= 0.087 af
Primary = 1.80 cfs @ 12.14 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Total North

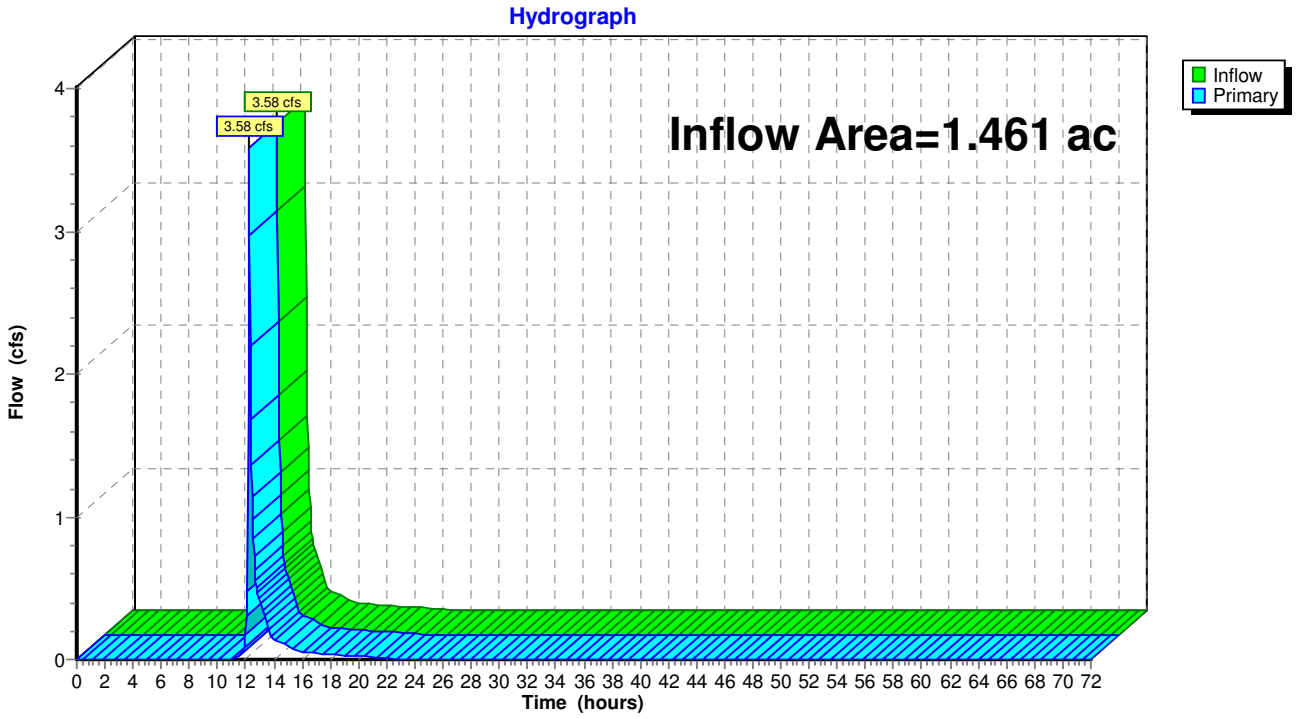


Summary for Link 2L: Total South

Inflow Area = 1.461 ac, 83.19% Impervious, Inflow Depth = 1.18" for 2 Year event
Inflow = 3.58 cfs @ 12.21 hrs, Volume= 0.144 af
Primary = 3.58 cfs @ 12.21 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Total South



Summary for Subcatchment 1S: North

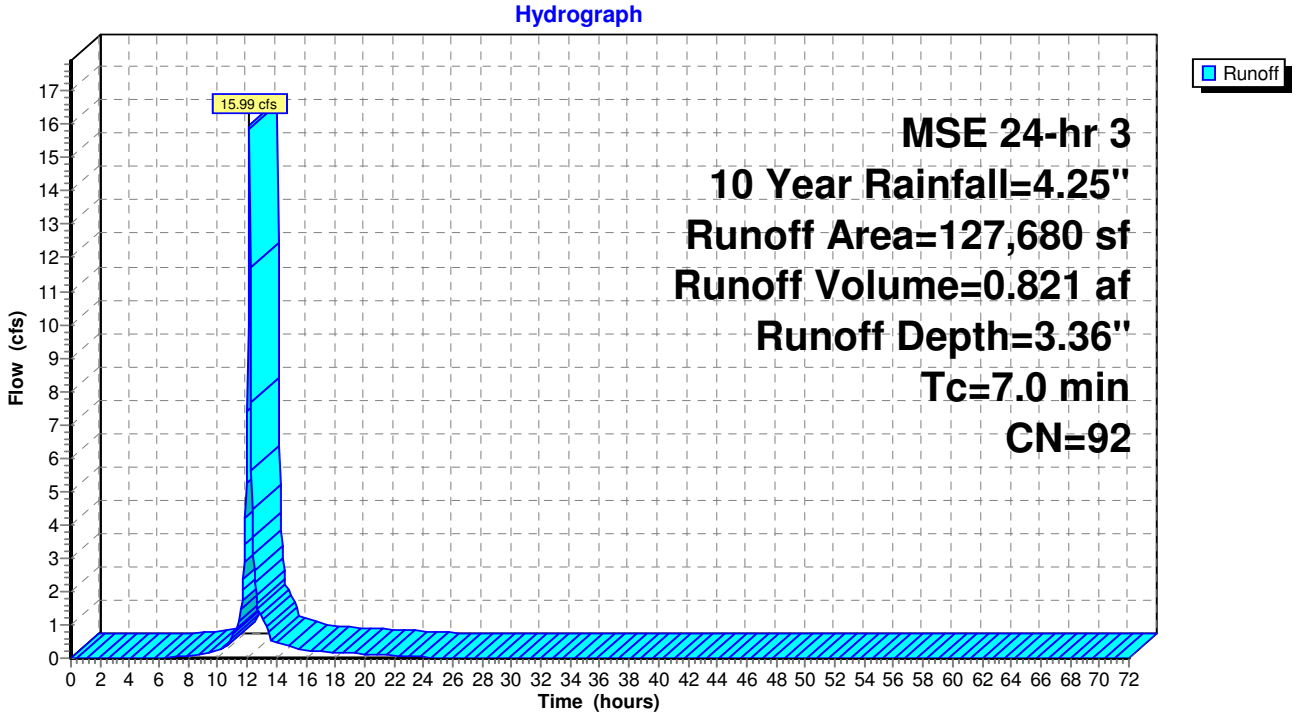
Runoff = 15.99 cfs @ 12.14 hrs, Volume= 0.821 af, Depth= 3.36"

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=4.25"

Area (sf)	CN	Description
108,373	98	Paved parking, HSG B
19,307	61	>75% Grass cover, Good, HSG B
127,680	92	Weighted Average
19,307		15.12% Pervious Area
108,373		84.88% Impervious Area

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

Subcatchment 1S: North



Summary for Subcatchment 2S: South

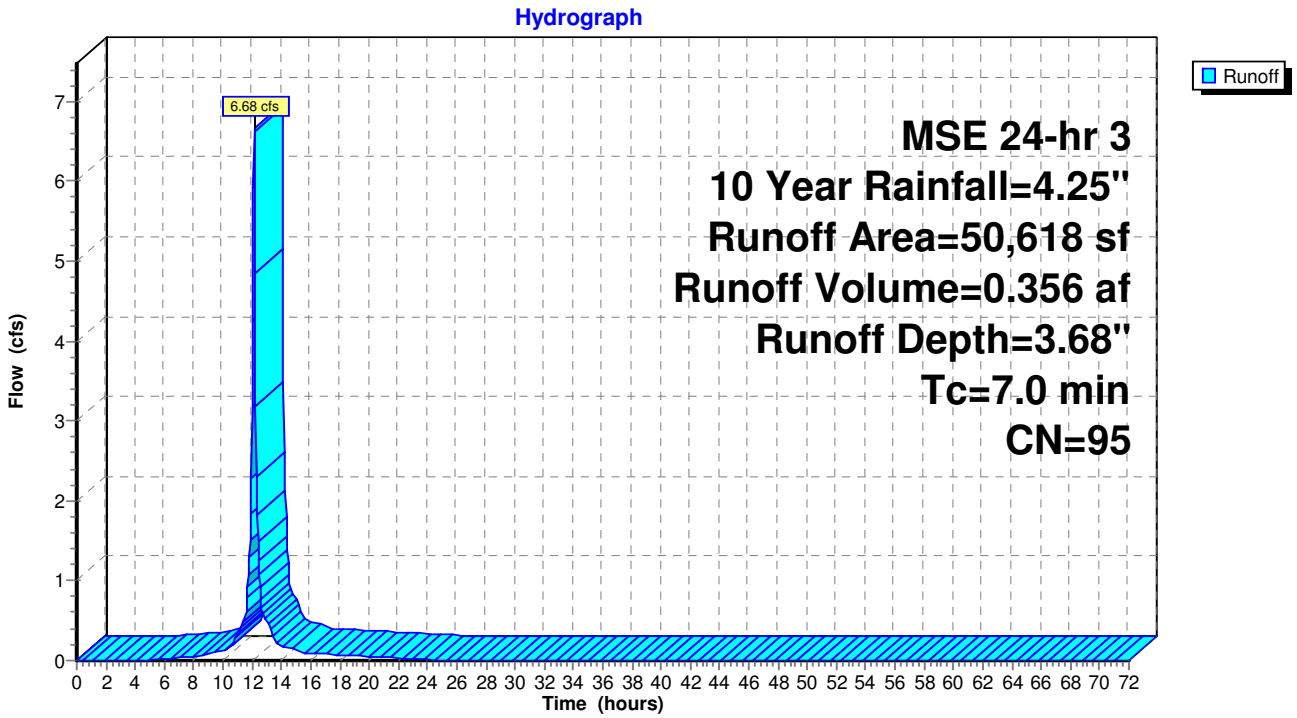
Runoff = 6.68 cfs @ 12.14 hrs, Volume= 0.356 af, Depth= 3.68"

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=4.25"

Area (sf)	CN	Description
12,787	98	Paved parking, HSG B
4,393	61	>75% Grass cover, Good, HSG B
33,438	98	Roofs, HSG B
50,618	95	Weighted Average
4,393		8.68% Pervious Area
46,225		91.32% Impervious Area

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

Subcatchment 2S: South



Summary for Subcatchment 3S: Fugitive East

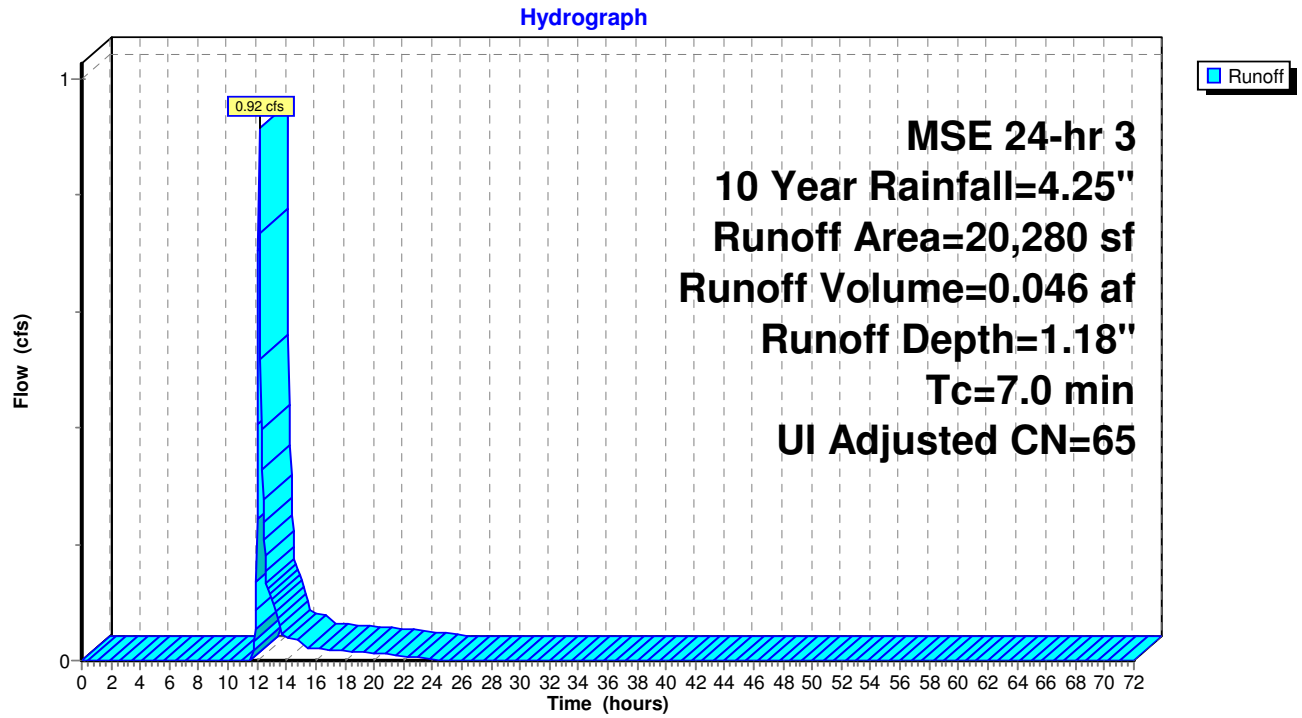
Runoff = 0.92 cfs @ 12.15 hrs, Volume= 0.046 af, Depth= 1.18"

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=4.25"

Area (sf)	CN	Adj	Description
4,445	98		Unconnected pavement, HSG B
15,835	61		>75% Grass cover, Good, HSG B
20,280	69	65	Weighted Average, UI Adjusted
15,835			78.08% Pervious Area
4,445			21.92% Impervious Area
4,445			100.00% Unconnected

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

Subcatchment 3S: Fugitive East



Summary for Subcatchment 4S: Fugitive South

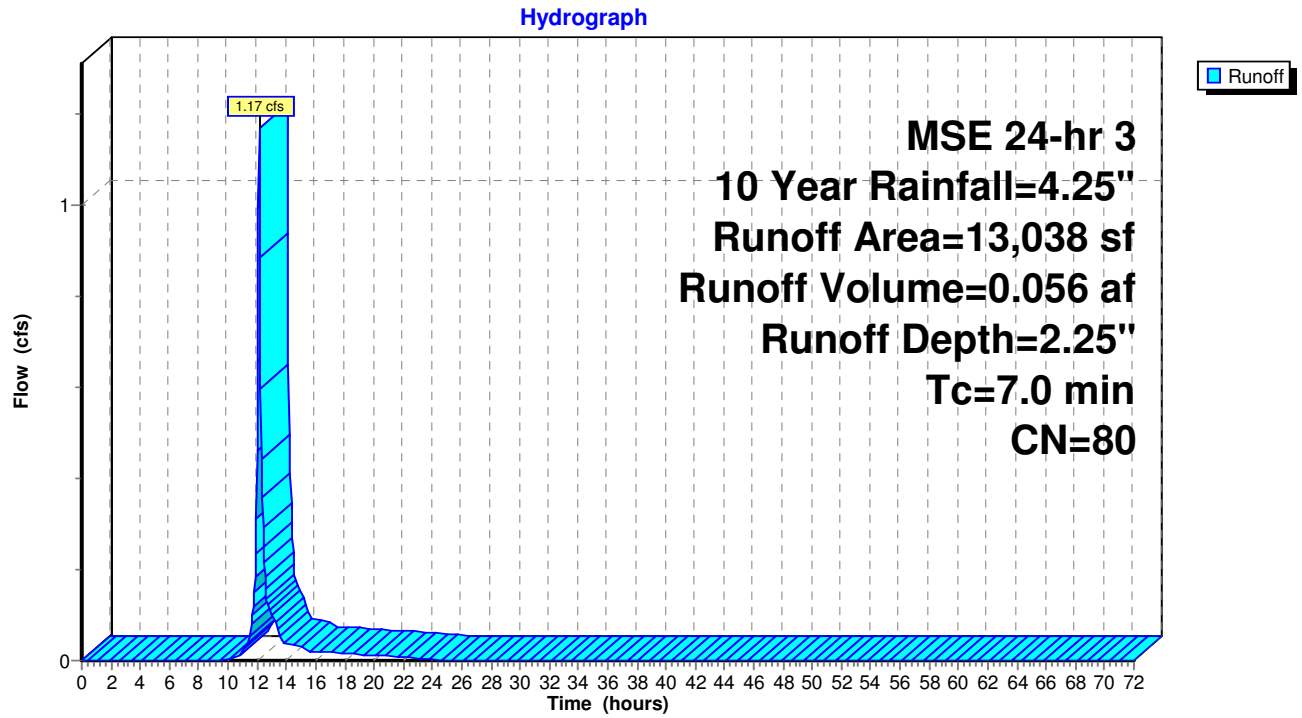
Runoff = 1.17 cfs @ 12.14 hrs, Volume= 0.056 af, Depth= 2.25"

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=4.25"

Area (sf)	CN	Description
6,730	98	Unconnected pavement, HSG B
6,308	61	>75% Grass cover, Good, HSG B
13,038	80	Weighted Average
6,308		48.38% Pervious Area
6,730		51.62% Impervious Area
6,730		100.00% Unconnected

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

Subcatchment 4S: Fugitive South



Summary for Subcatchment 5S: 53 Stall Parking Lot

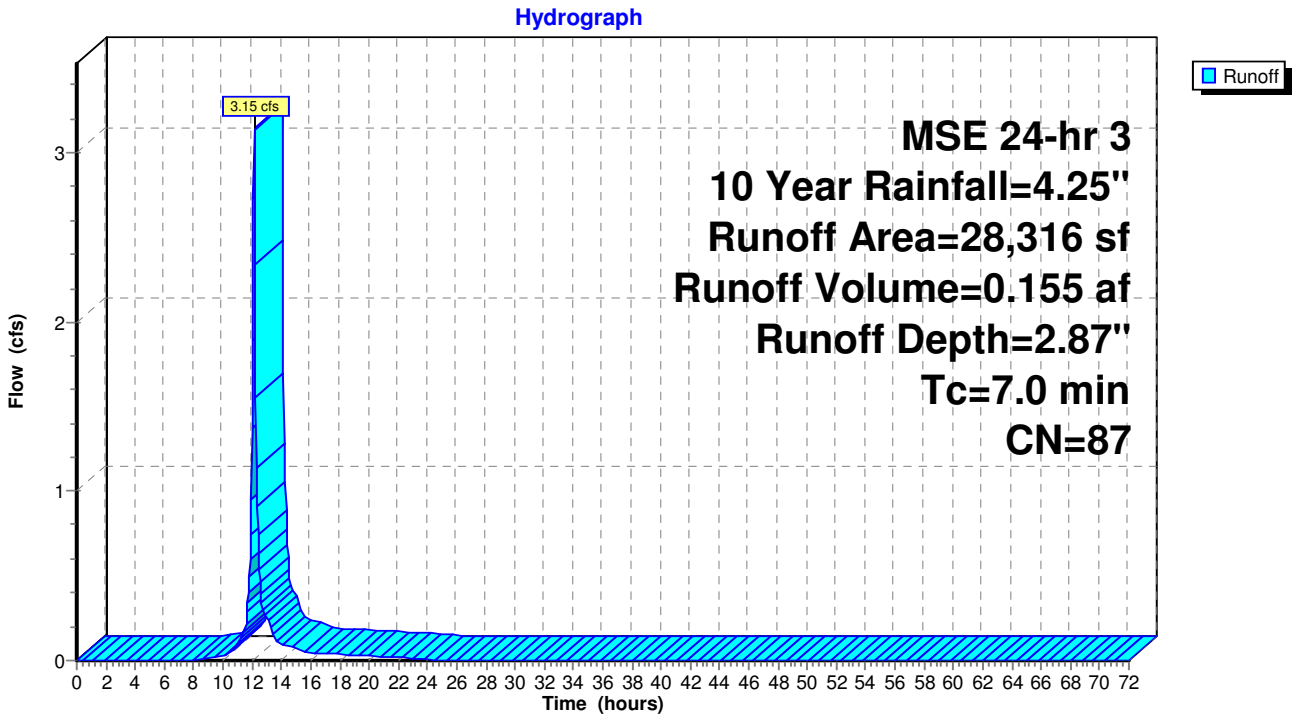
Runoff = 3.15 cfs @ 12.14 hrs, Volume= 0.155 af, Depth= 2.87"

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=4.25"

Area (sf)	CN	Description
15,568	98	Paved parking, HSG B
4,665	98	Paved parking, HSG B
8,083	61	>75% Grass cover, Good, HSG B
28,316	87	Weighted Average
8,083		28.55% Pervious Area
20,233		71.45% Impervious Area

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

Subcatchment 5S: 53 Stall Parking Lot



Summary for Pond 1P: Underground 48" Perf.

Inflow Area = 2.931 ac, 84.88% Impervious, Inflow Depth = 3.36" for 10 Year event
Inflow = 15.99 cfs @ 12.14 hrs, Volume= 0.821 af
Outflow = 2.03 cfs @ 12.58 hrs, Volume= 0.821 af, Atten= 87%, Lag= 26.7 min
Discarded = 0.19 cfs @ 10.60 hrs, Volume= 0.593 af
Primary = 1.84 cfs @ 12.58 hrs, Volume= 0.227 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 846.79' @ 12.58 hrs Surf.Area= 10,156 sf Storage= 20,217 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 631.0 min (1,407.5 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	843.50'	13,211 cf	66.38'W x 153.00'L x 5.50'H Field A 55,856 cf Overall - 22,829 cf Embedded = 33,028 cf x 40.0% Voids
#2A	844.00'	19,056 cf	ADS N-12 48" x 70 Inside #1 Inside= 47.7"W x 47.7"H => 12.40 sf x 20.00'L = 248.0 cf Outside= 54.0"W x 54.0"H => 14.85 sf x 20.00'L = 297.0 cf Row Length Adjustment= +1.00' x 12.40 sf x 10 rows 63.38' Header x 12.40 sf x 2 = 1,571.7 cf Inside
		32,267 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	843.50'	0.800 in/hr Exfiltration over Surface area
#2	Primary	844.00'	18.0" Round Culvert L= 264.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 844.00' / 841.00' S= 0.0114 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#3	Device 2	846.30'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 2	846.30'	12.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	848.80'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.19 cfs @ 10.60 hrs HW=843.56' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=1.83 cfs @ 12.58 hrs HW=846.79' TW=0.00' (Dynamic Tailwater)
└2=Culvert (Passes 1.83 cfs of 11.97 cfs potential flow)
  ├3=Orifice/Grate (Orifice Controls 0.92 cfs @ 2.39 fps)
  ├4=Orifice/Grate (Orifice Controls 0.92 cfs @ 2.39 fps)
  └5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Underground 48" Perf. - Chamber Wizard Field A

Chamber Model = ADS N-12 48" (ADS N-12® Pipe)
Inside= 47.7"W x 47.7"H => 12.40 sf x 20.00'L = 248.0 cf
Outside= 54.0"W x 54.0"H => 14.85 sf x 20.00'L = 297.0 cf
Row Length Adjustment= +1.00' x 12.40 sf x 10 rows

54.0" Wide + 24.5" Spacing = 78.5" C-C Row Spacing

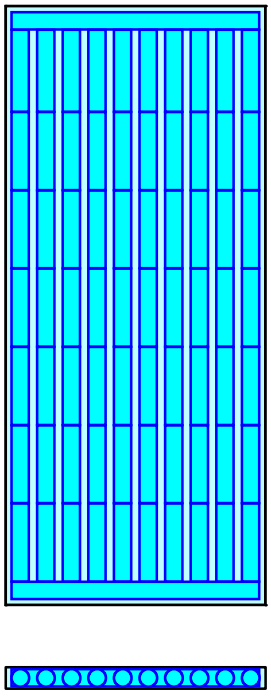
7 Chambers/Row x 20.00' Long +1.00' Row Adjustment +4.50' Header x 2 = 150.00' Row Length +18.0" End Stone x 2 = 153.00' Base Length
10 Rows x 54.0" Wide + 24.5" Spacing x 9 + 18.0" Side Stone x 2 = 66.38' Base Width
6.0" Base + 54.0" Chamber Height + 6.0" Cover = 5.50' Field Height

70 Chambers x 248.0 cf +1.00' Row Adjustment x 12.40 sf x 10 Rows + 63.38' Header x 12.40 sf x 2 = 19,055.7 cf Chamber Storage
70 Chambers x 297.0 cf +1.00' Row Adjustment x 14.85 sf x 10 Rows + 63.38' Header x 14.85 sf x 2 = 22,819.2 cf Displacement

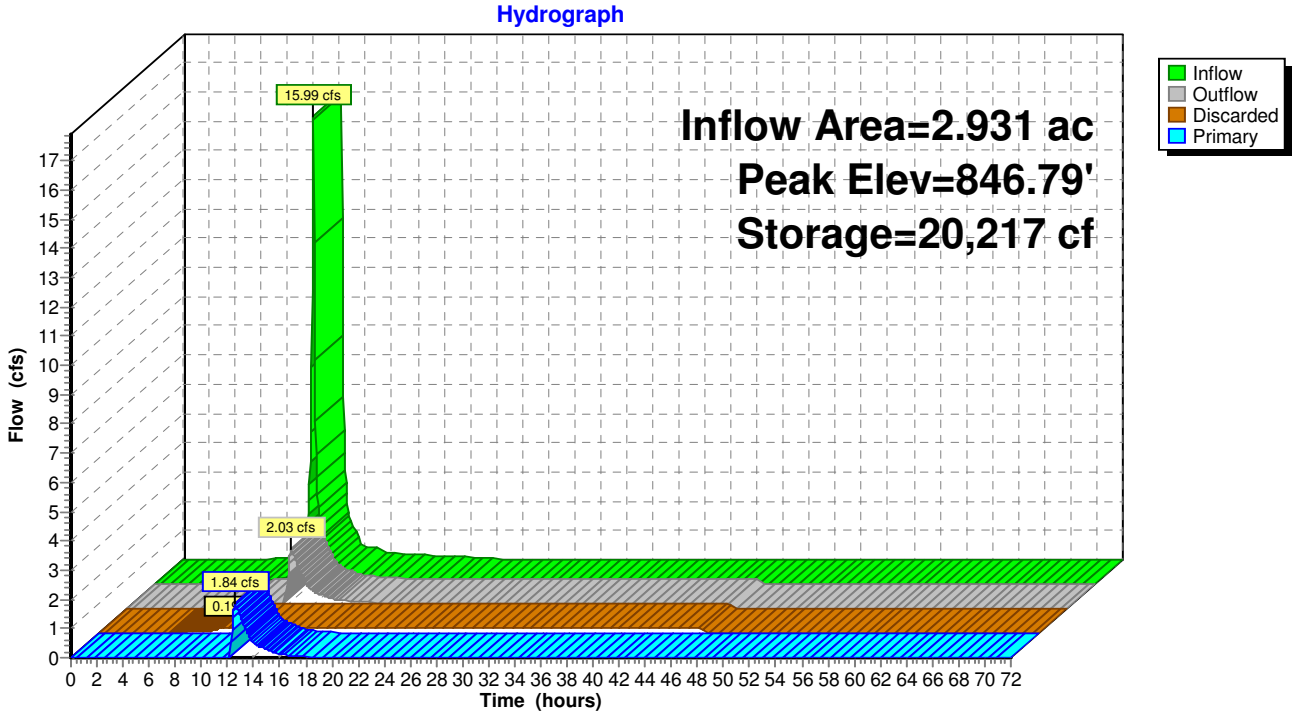
55,856.5 cf Field - 22,819.2 cf Chambers = 33,037.3 cf Stone x 40.0% Voids = 13,214.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,270.7 cf = 0.741 af
Overall Storage Efficiency = 57.8%
Overall System Size = 153.00' x 66.38' x 5.50'

70 Chambers
2,068.8 cy Field
1,223.6 cy Stone



Pond 1P: Underground 48" Perf.



Summary for Pond 2P: Underground Chambers

Inflow Area = 1.162 ac, 91.32% Impervious, Inflow Depth = 3.68" for 10 Year event
Inflow = 6.68 cfs @ 12.14 hrs, Volume= 0.356 af
Outflow = 6.19 cfs @ 12.16 hrs, Volume= 0.356 af, Atten= 7%, Lag= 1.5 min
Discarded = 0.02 cfs @ 7.25 hrs, Volume= 0.110 af
Primary = 6.17 cfs @ 12.16 hrs, Volume= 0.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 847.59' @ 12.16 hrs Surf.Area= 2,105 sf Storage= 4,468 cf

Plug-Flow detention time= 441.1 min calculated for 0.356 af (100% of inflow)
Center-of-Mass det. time= 442.6 min (1,207.8 - 765.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	844.12'	1,918 cf	34.75'W x 60.58'L x 3.50'H Field A 7,368 cf Overall - 2,573 cf Embedded = 4,795 cf x 40.0% Voids
#2A	844.62'	2,573 cf	ADS_StormTech SC-740 +Cap x 56 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 7 Rows
		4,491 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	844.12'	0.450 in/hr Exfiltration over Surface area
#2	Primary	846.42'	18.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 846.42' / 846.02' S= 0.0400 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Discarded OutFlow Max=0.02 cfs @ 7.25 hrs HW=844.16' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=6.00 cfs @ 12.16 hrs HW=847.57' TW=0.00' (Dynamic Tailwater)
↑2=Culvert (Barrel Controls 6.00 cfs @ 5.70 fps)

Pond 2P: Underground Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

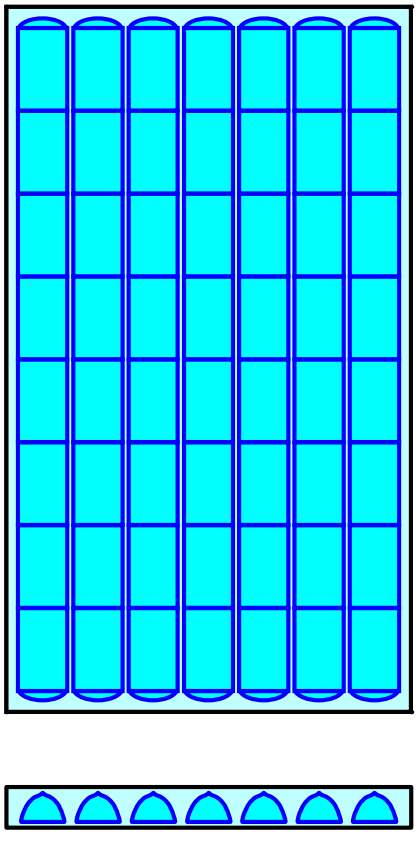
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

56 Chambers x 45.9 cf = 2,572.6 cf Chamber Storage

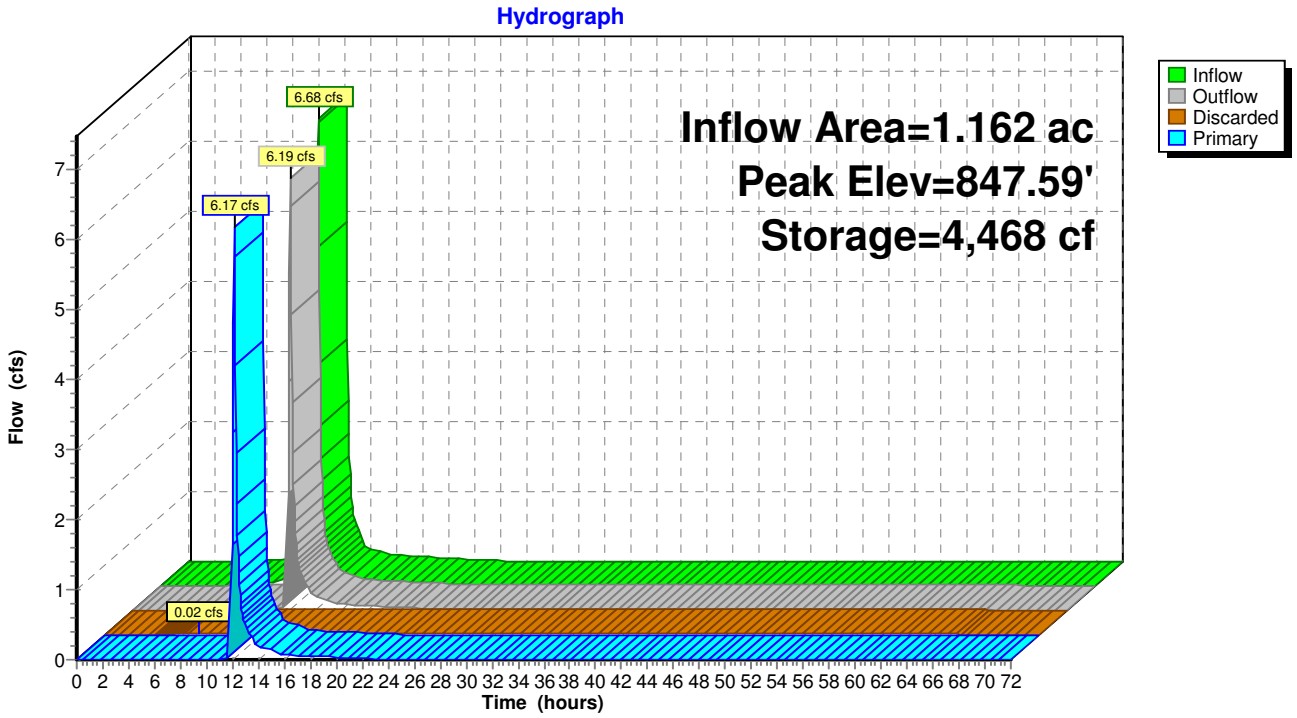
7,367.6 cf Field - 2,572.6 cf Chambers = 4,795.0 cf Stone x 40.0% Voids = 1,918.0 cf Stone Storage

Chamber Storage + Stone Storage = 4,490.6 cf = 0.103 af
Overall Storage Efficiency = 61.0%
Overall System Size = 60.58' x 34.75' x 3.50'

56 Chambers
272.9 cy Field
177.6 cy Stone



Pond 2P: Underground Chambers

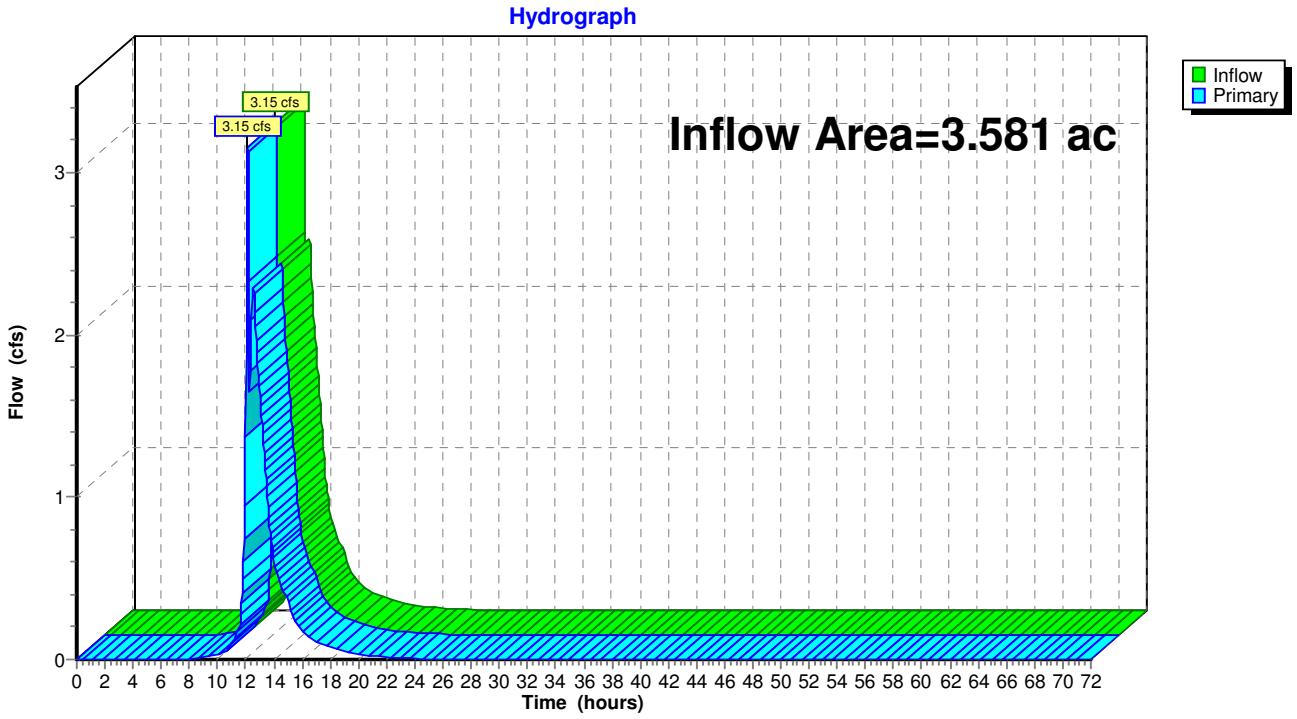


Summary for Link 1L: Total North

Inflow Area = 3.581 ac, 82.44% Impervious, Inflow Depth = 1.28" for 10 Year event
Inflow = 3.15 cfs @ 12.14 hrs, Volume= 0.383 af
Primary = 3.15 cfs @ 12.14 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Total North

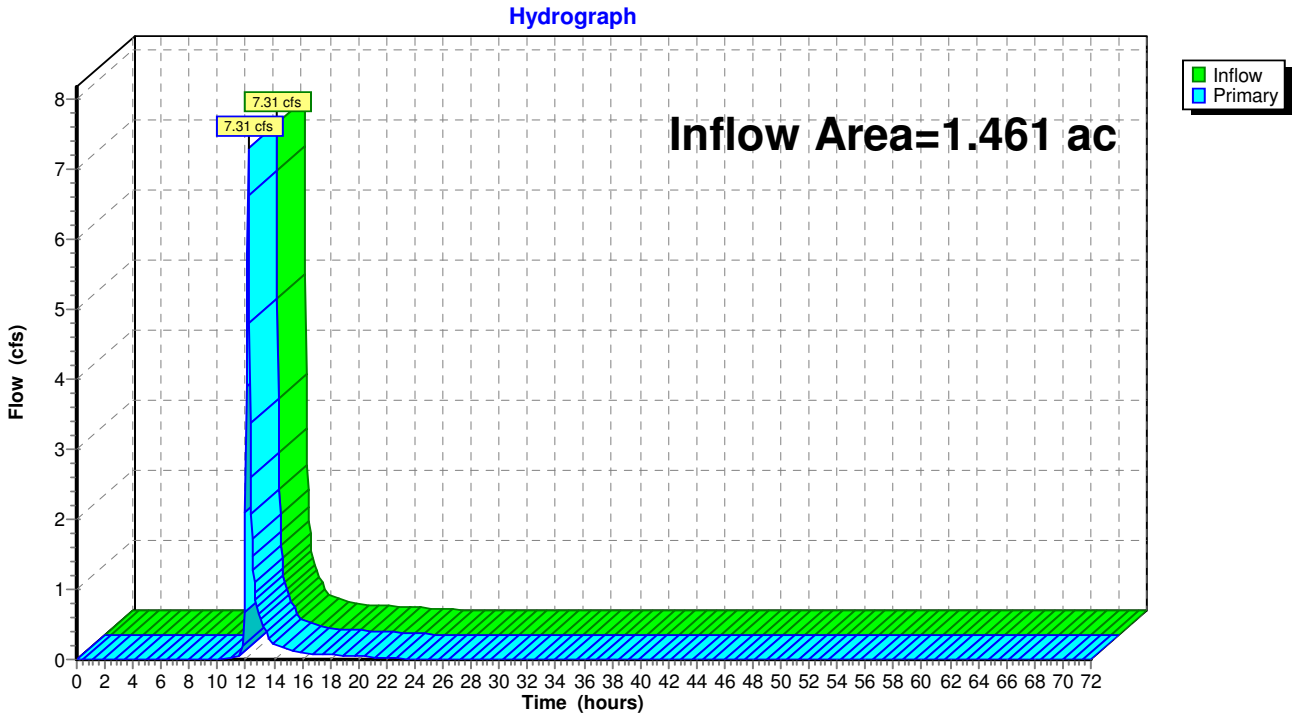


Summary for Link 2L: Total South

Inflow Area = 1.461 ac, 83.19% Impervious, Inflow Depth = 2.48" for 10 Year event
Inflow = 7.31 cfs @ 12.16 hrs, Volume= 0.302 af
Primary = 7.31 cfs @ 12.16 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Total South



Summary for Subcatchment 1S: North

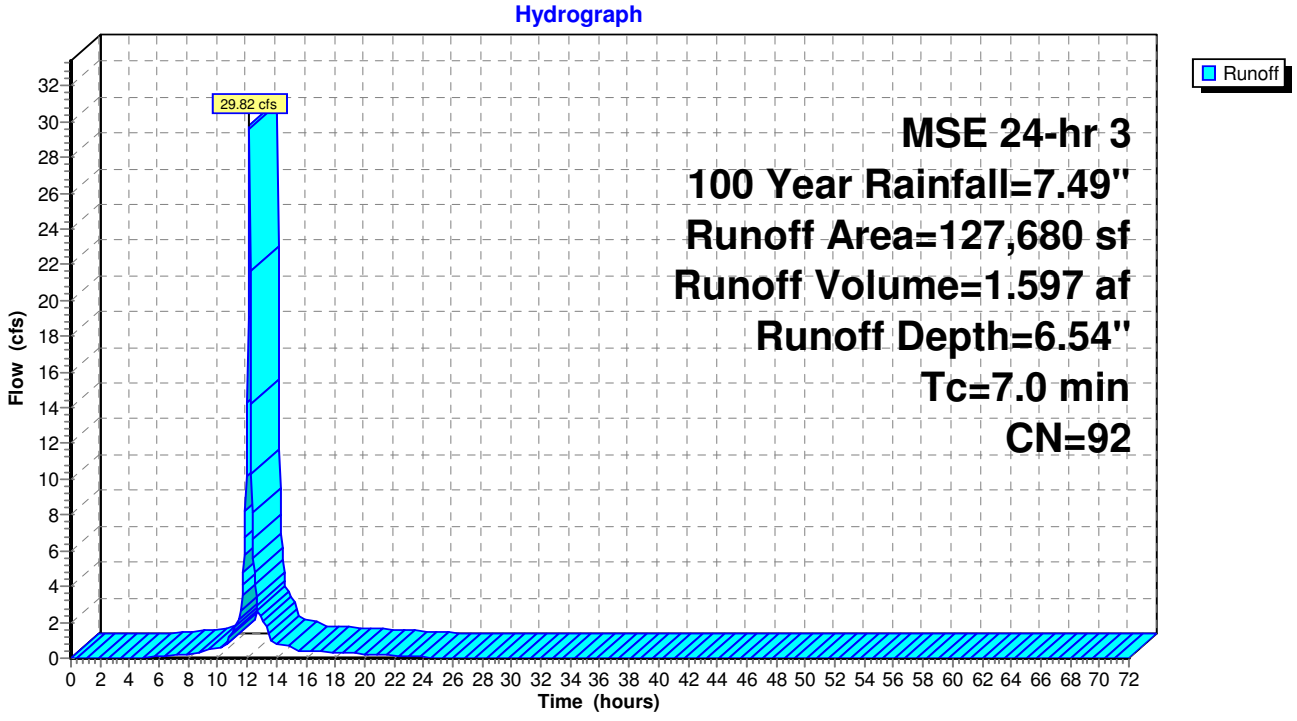
Runoff = 29.82 cfs @ 12.14 hrs, Volume= 1.597 af, Depth= 6.54"

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=7.49"

Area (sf)	CN	Description
108,373	98	Paved parking, HSG B
19,307	61	>75% Grass cover, Good, HSG B
127,680	92	Weighted Average
19,307		15.12% Pervious Area
108,373		84.88% Impervious Area

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

Subcatchment 1S: North



Summary for Subcatchment 2S: South

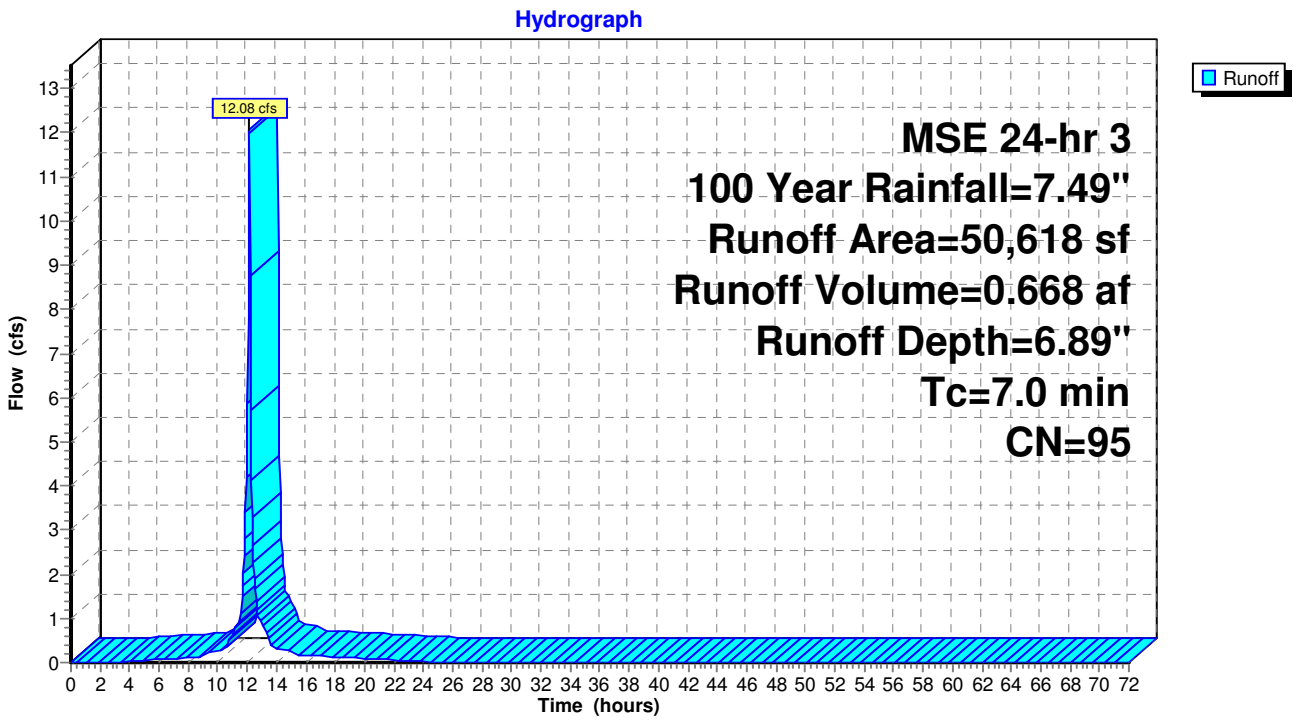
Runoff = 12.08 cfs @ 12.14 hrs, Volume= 0.668 af, Depth= 6.89"

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=7.49"

Area (sf)	CN	Description
12,787	98	Paved parking, HSG B
4,393	61	>75% Grass cover, Good, HSG B
33,438	98	Roofs, HSG B
50,618	95	Weighted Average
4,393		8.68% Pervious Area
46,225		91.32% Impervious Area

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

Subcatchment 2S: South



Summary for Subcatchment 3S: Fugitive East

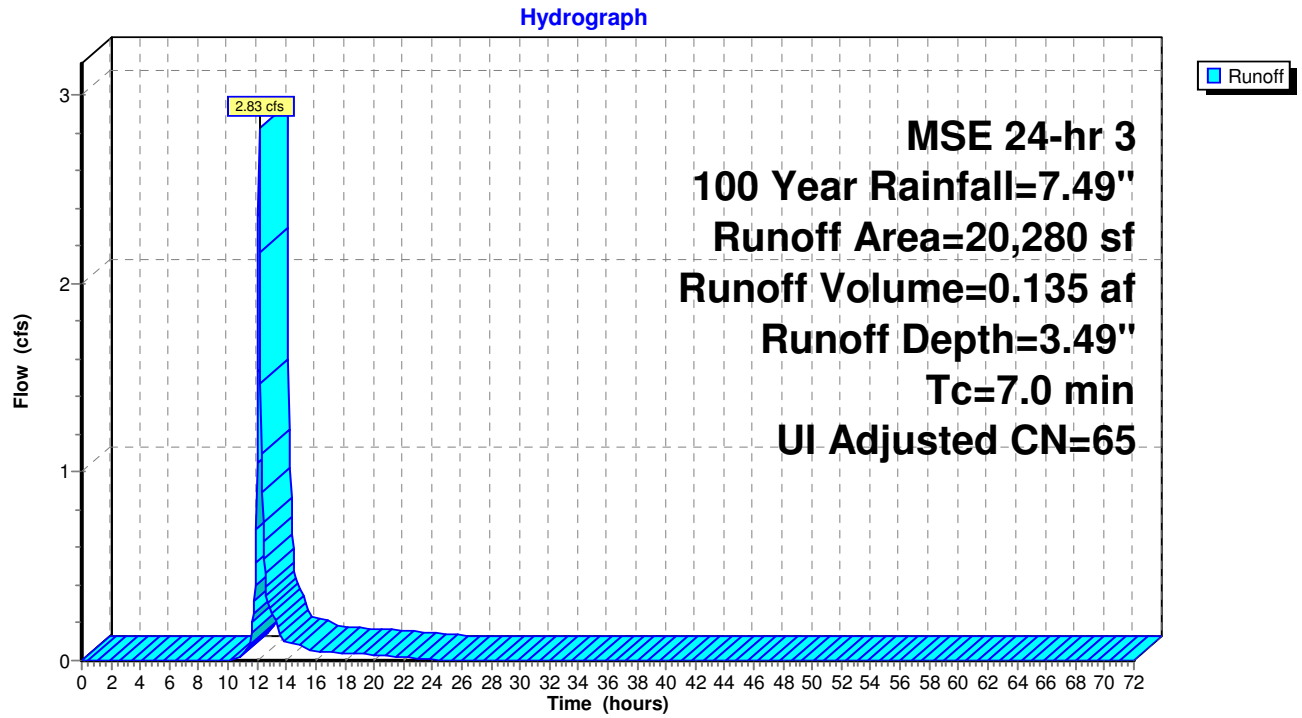
Runoff = 2.83 cfs @ 12.15 hrs, Volume= 0.135 af, Depth= 3.49"

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=7.49"

Area (sf)	CN	Adj	Description
4,445	98		Unconnected pavement, HSG B
15,835	61		>75% Grass cover, Good, HSG B
20,280	69	65	Weighted Average, UI Adjusted
15,835			78.08% Pervious Area
4,445			21.92% Impervious Area
4,445			100.00% Unconnected

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

Subcatchment 3S: Fugitive East



Summary for Subcatchment 4S: Fugitive South

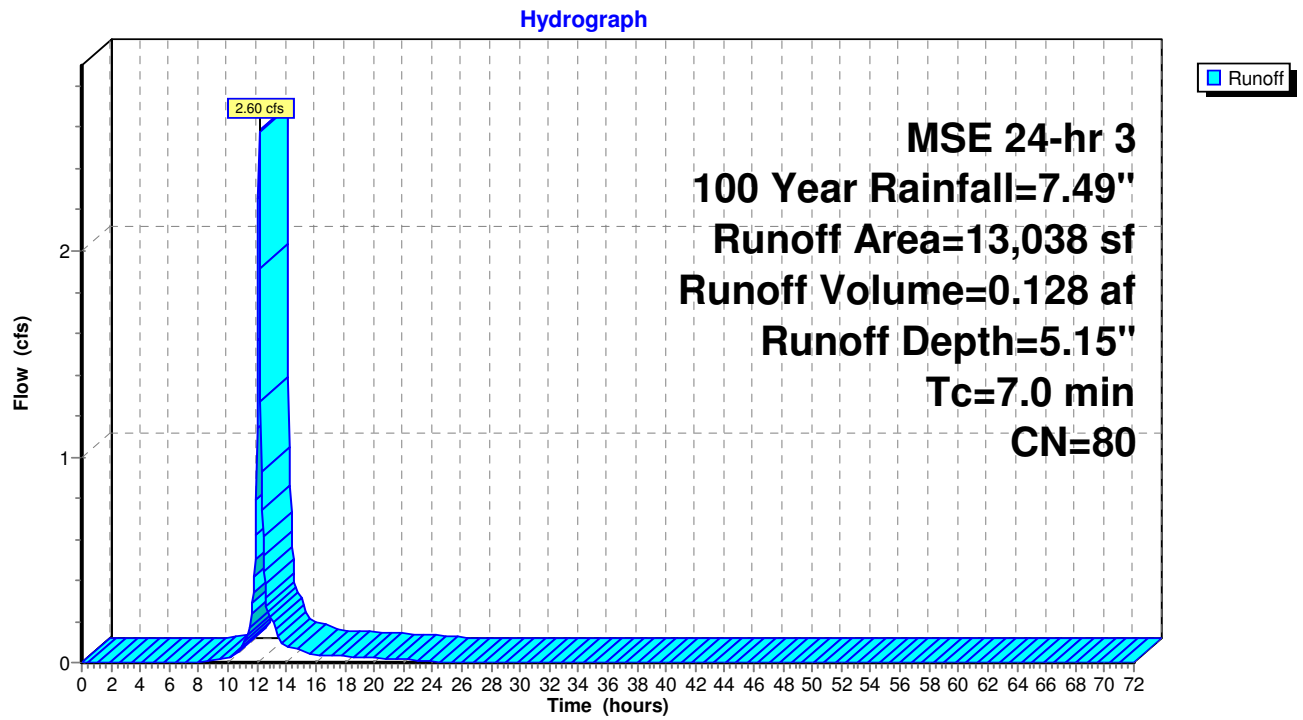
Runoff = 2.60 cfs @ 12.14 hrs, Volume= 0.128 af, Depth= 5.15"

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=7.49"

Area (sf)	CN	Description
6,730	98	Unconnected pavement, HSG B
6,308	61	>75% Grass cover, Good, HSG B
13,038	80	Weighted Average
6,308		48.38% Pervious Area
6,730		51.62% Impervious Area
6,730		100.00% Unconnected

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

Subcatchment 4S: Fugitive South



Summary for Subcatchment 5S: 53 Stall Parking Lot

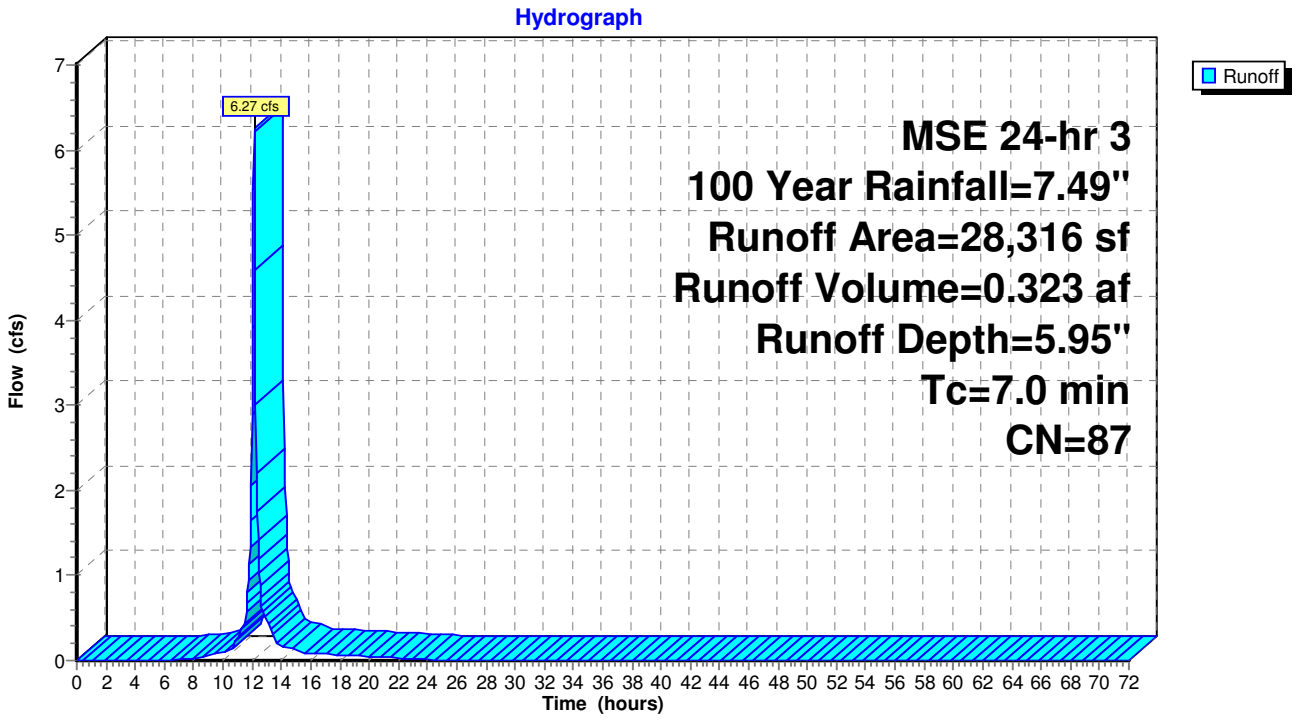
Runoff = 6.27 cfs @ 12.14 hrs, Volume= 0.323 af, Depth= 5.95"

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=7.49"

Area (sf)	CN	Description
15,568	98	Paved parking, HSG B
4,665	98	Paved parking, HSG B
8,083	61	>75% Grass cover, Good, HSG B
28,316	87	Weighted Average
8,083		28.55% Pervious Area
20,233		71.45% Impervious Area

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

Subcatchment 5S: 53 Stall Parking Lot



Summary for Pond 1P: Underground 48" Perf.

Inflow Area = 2.931 ac, 84.88% Impervious, Inflow Depth = 6.54" for 100 Year event
Inflow = 29.82 cfs @ 12.14 hrs, Volume= 1.597 af
Outflow = 11.29 cfs @ 12.30 hrs, Volume= 1.597 af, Atten= 62%, Lag= 9.4 min
Discarded = 0.19 cfs @ 8.85 hrs, Volume= 0.658 af
Primary = 11.10 cfs @ 12.30 hrs, Volume= 0.940 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 848.87' @ 12.29 hrs Surf.Area= 10,156 sf Storage= 31,722 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 370.0 min (1,133.9 - 763.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	843.50'	13,211 cf	66.38'W x 153.00'L x 5.50'H Field A 55,856 cf Overall - 22,829 cf Embedded = 33,028 cf x 40.0% Voids
#2A	844.00'	19,056 cf	ADS N-12 48" x 70 Inside #1 Inside= 47.7"W x 47.7"H => 12.40 sf x 20.00'L = 248.0 cf Outside= 54.0"W x 54.0"H => 14.85 sf x 20.00'L = 297.0 cf Row Length Adjustment= +1.00' x 12.40 sf x 10 rows 63.38' Header x 12.40 sf x 2 = 1,571.7 cf Inside
		32,267 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	843.50'	0.800 in/hr Exfiltration over Surface area
#2	Primary	844.00'	18.0" Round Culvert L= 264.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 844.00' / 841.00' S= 0.0114 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#3	Device 2	846.30'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 2	846.30'	12.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	848.80'	5.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.19 cfs @ 8.85 hrs HW=843.56' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=11.07 cfs @ 12.30 hrs HW=848.86' TW=0.00' (Dynamic Tailwater)
└2=Culvert (Passes 11.07 cfs of 14.57 cfs potential flow)
  ├3=Orifice/Grate (Orifice Controls 5.43 cfs @ 6.91 fps)
  ├4=Orifice/Grate (Orifice Controls 5.43 cfs @ 6.91 fps)
  └5=Broad-Crested Rectangular Weir (Weir Controls 0.21 cfs @ 0.69 fps)

Pond 1P: Underground 48" Perf. - Chamber Wizard Field A

Chamber Model = ADS N-12 48" (ADS N-12® Pipe)
Inside= 47.7"W x 47.7"H => 12.40 sf x 20.00'L = 248.0 cf
Outside= 54.0"W x 54.0"H => 14.85 sf x 20.00'L = 297.0 cf
Row Length Adjustment= +1.00' x 12.40 sf x 10 rows

54.0" Wide + 24.5" Spacing = 78.5" C-C Row Spacing

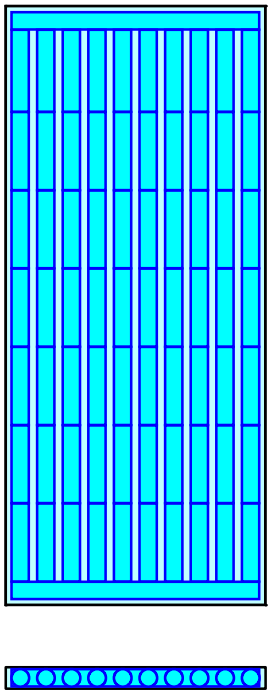
7 Chambers/Row x 20.00' Long +1.00' Row Adjustment +4.50' Header x 2 = 150.00' Row Length +18.0" End Stone x 2 = 153.00' Base Length
10 Rows x 54.0" Wide + 24.5" Spacing x 9 + 18.0" Side Stone x 2 = 66.38' Base Width
6.0" Base + 54.0" Chamber Height + 6.0" Cover = 5.50' Field Height

70 Chambers x 248.0 cf +1.00' Row Adjustment x 12.40 sf x 10 Rows + 63.38' Header x 12.40 sf x 2 = 19,055.7 cf Chamber Storage
70 Chambers x 297.0 cf +1.00' Row Adjustment x 14.85 sf x 10 Rows + 63.38' Header x 14.85 sf x 2 = 22,819.2 cf Displacement

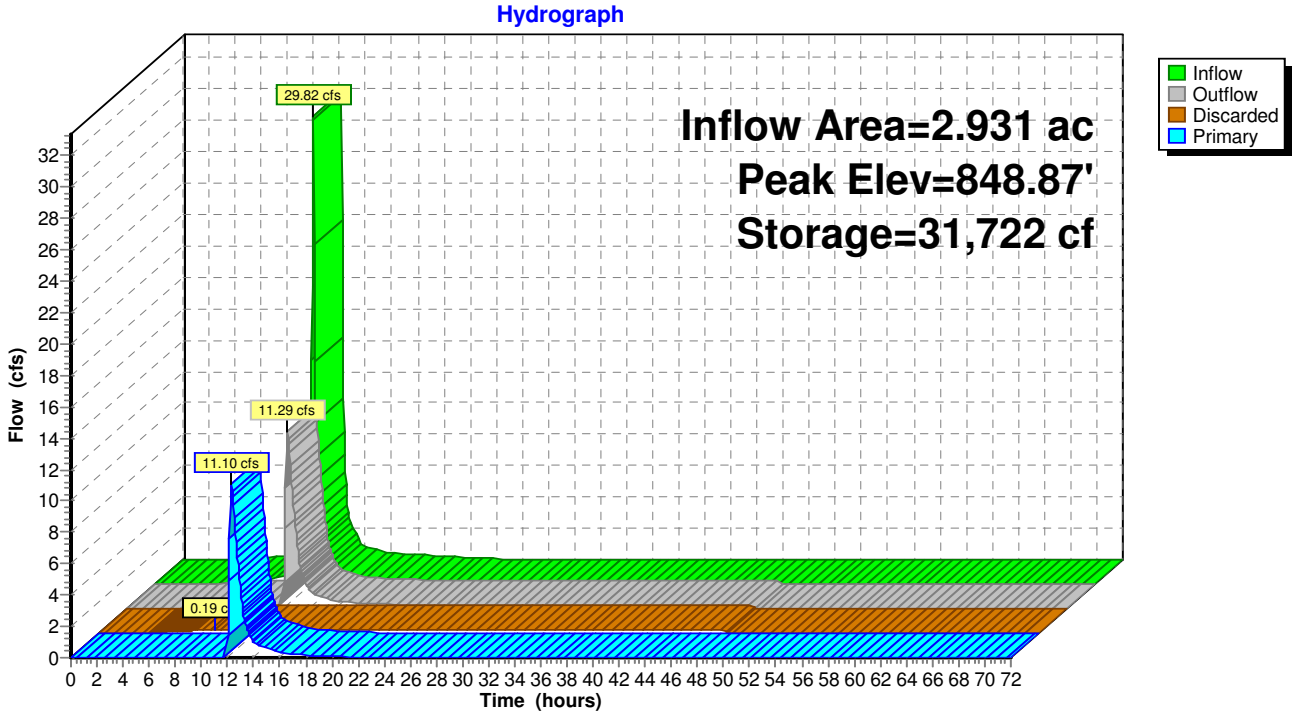
55,856.5 cf Field - 22,819.2 cf Chambers = 33,037.3 cf Stone x 40.0% Voids = 13,214.9 cf Stone Storage

Chamber Storage + Stone Storage = 32,270.7 cf = 0.741 af
Overall Storage Efficiency = 57.8%
Overall System Size = 153.00' x 66.38' x 5.50'

70 Chambers
2,068.8 cy Field
1,223.6 cy Stone



Pond 1P: Underground 48" Perf.



Summary for Pond 2P: Underground Chambers

Inflow Area = 1.162 ac, 91.32% Impervious, Inflow Depth = 6.89" for 100 Year event
Inflow = 12.08 cfs @ 12.14 hrs, Volume= 0.668 af
Outflow = 12.08 cfs @ 12.12 hrs, Volume= 0.668 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.02 cfs @ 4.90 hrs, Volume= 0.114 af
Primary = 12.06 cfs @ 12.12 hrs, Volume= 0.553 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 848.50' @ 12.12 hrs Surf.Area= 2,105 sf Storage= 4,491 cf

Plug-Flow detention time= 251.2 min calculated for 0.667 af (100% of inflow)
Center-of-Mass det. time= 252.8 min (1,007.2 - 754.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	844.12'	1,918 cf	34.75'W x 60.58'L x 3.50'H Field A 7,368 cf Overall - 2,573 cf Embedded = 4,795 cf x 40.0% Voids
#2A	844.62'	2,573 cf	ADS_StormTech SC-740 +Cap x 56 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 56 Chambers in 7 Rows
		4,491 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	844.12'	0.450 in/hr Exfiltration over Surface area
#2	Primary	846.42'	18.0" Round Culvert L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 846.42' / 846.02' S= 0.0400 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Discarded OutFlow Max=0.02 cfs @ 4.90 hrs HW=844.16' (Free Discharge)
↑└1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=11.43 cfs @ 12.12 hrs HW=848.39' TW=0.00' (Dynamic Tailwater)
↑└2=Culvert (Barrel Controls 11.43 cfs @ 6.49 fps)

Pond 2P: Underground Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

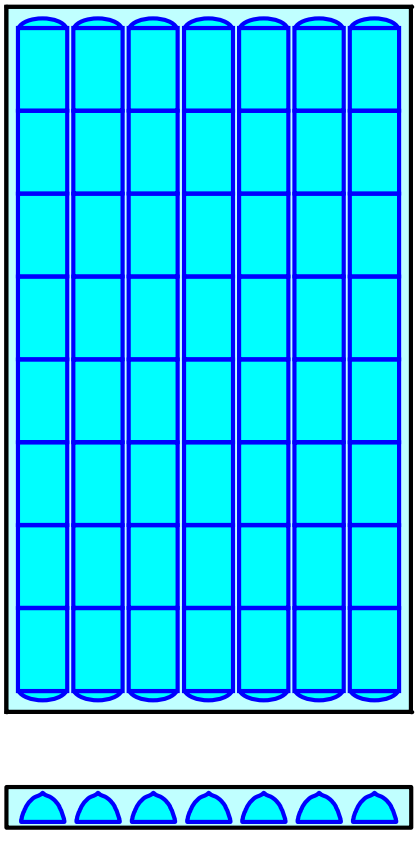
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

56 Chambers x 45.9 cf = 2,572.6 cf Chamber Storage

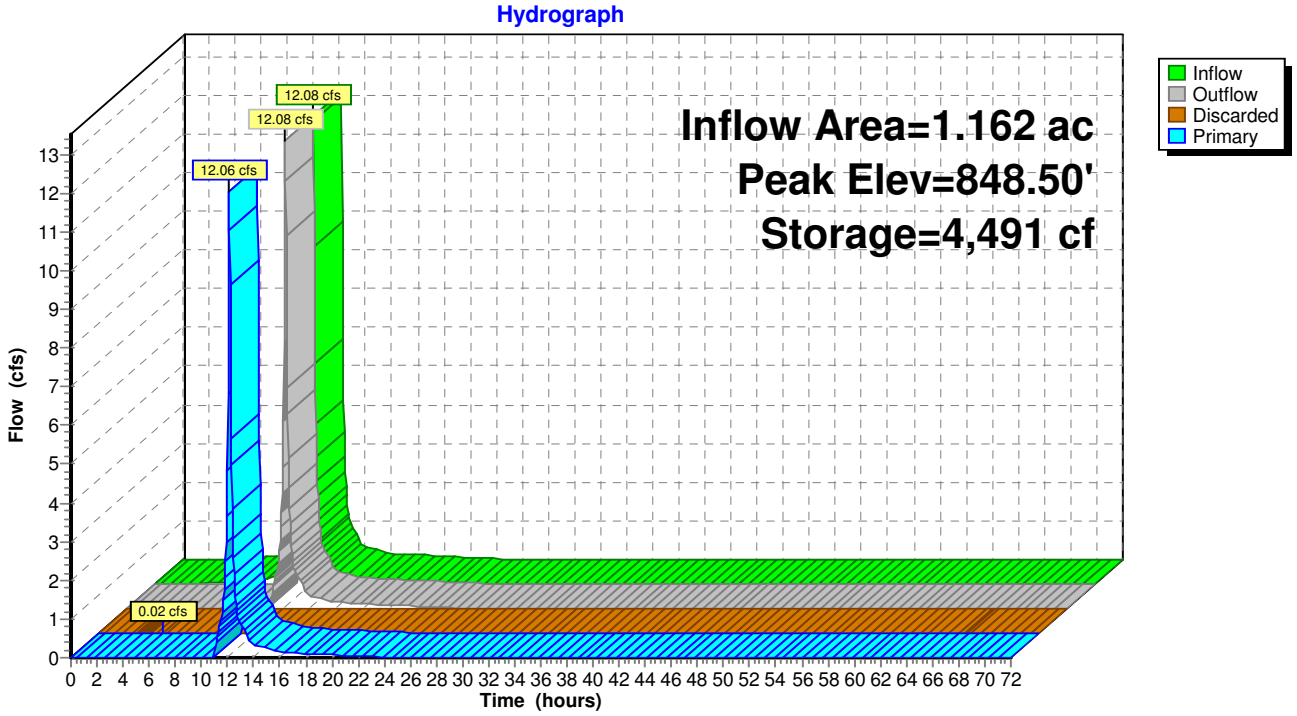
7,367.6 cf Field - 2,572.6 cf Chambers = 4,795.0 cf Stone x 40.0% Voids = 1,918.0 cf Stone Storage

Chamber Storage + Stone Storage = 4,490.6 cf = 0.103 af
Overall Storage Efficiency = 61.0%
Overall System Size = 60.58' x 34.75' x 3.50'

56 Chambers
272.9 cy Field
177.6 cy Stone



Pond 2P: Underground Chambers

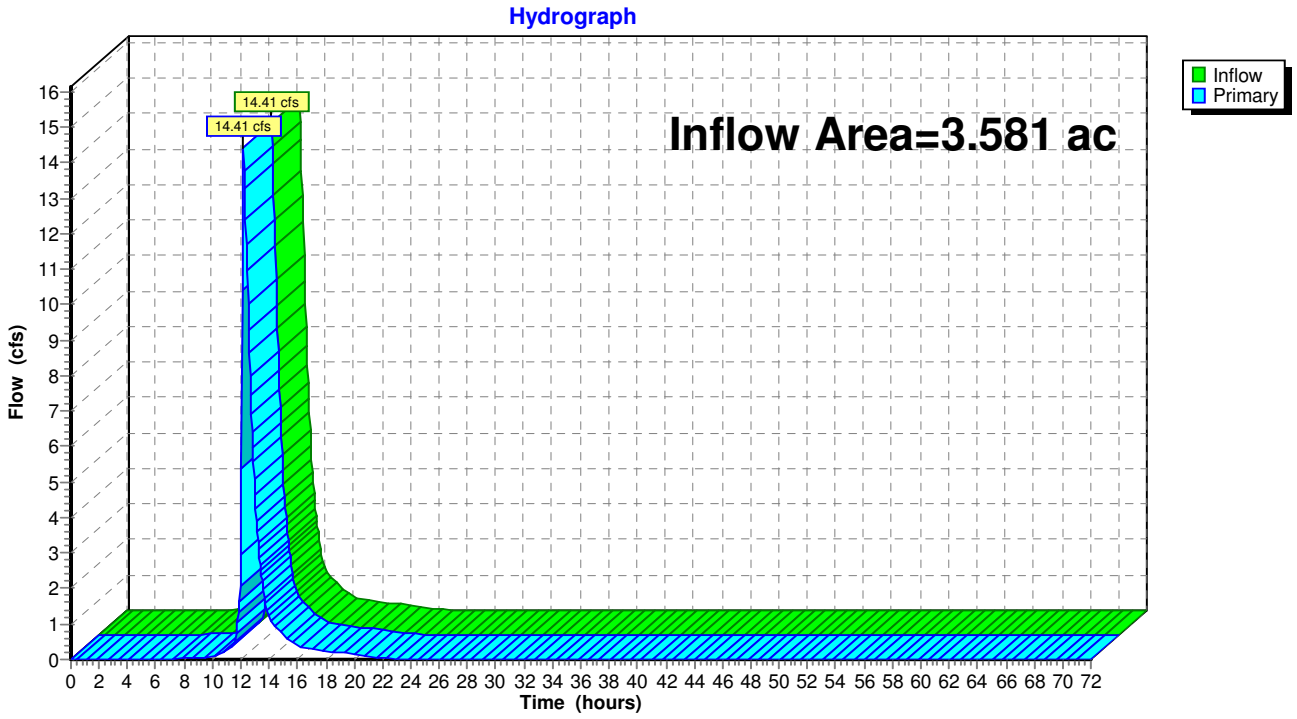


Summary for Link 1L: Total North

Inflow Area = 3.581 ac, 82.44% Impervious, Inflow Depth = 4.23" for 100 Year event
Inflow = 14.41 cfs @ 12.20 hrs, Volume= 1.262 af
Primary = 14.41 cfs @ 12.20 hrs, Volume= 1.262 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Total North

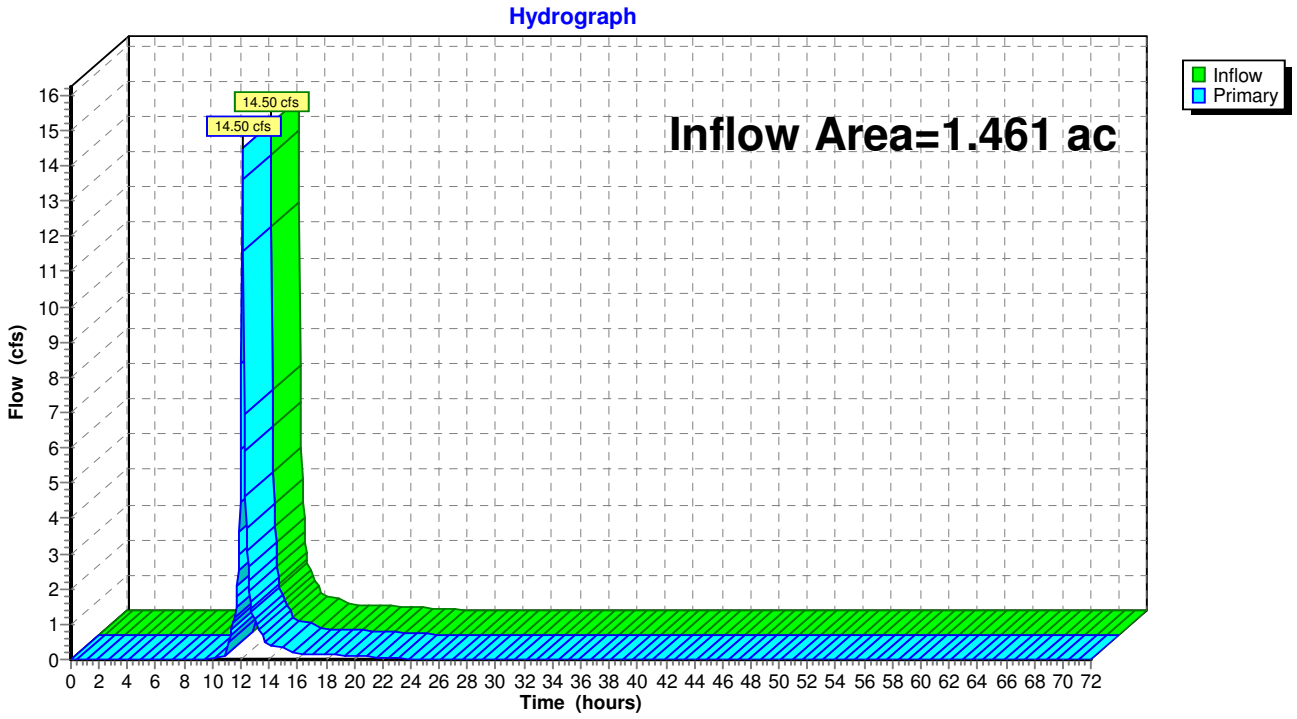


Summary for Link 2L: Total South

Inflow Area = 1.461 ac, 83.19% Impervious, Inflow Depth = 5.60" for 100 Year event
Inflow = 14.50 cfs @ 12.12 hrs, Volume= 0.682 af
Primary = 14.50 cfs @ 12.12 hrs, Volume= 0.682 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Total South



HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

2999 County Road 42 W, Ste. 100
Burnsville, MN 55306-5904
www.mnhill.com
952.890.6044

ATTACHMENT G

HAUGO GEOTECHNICAL SERVICES

February 24, 2026 HGTS Project Number: 25-1042

Mr. Joe McElwain
Chase Real Estate
210 County Road 42 West
Burnsville, MN 55337

Re: Geotechnical Exploration Report, Proposed Gallery Apartments, Bloomington, Minnesota

Dear Mr. McElwain:

We have completed the geotechnical exploration report for the proposed Gallery Apartments in Bloomington, Minnesota. Specific details regarding our procedures, results and recommendations follow in the attached geotechnical exploration report.

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 612-729-2959.

Sincerely,

Haugo GeoTechnical Services

Paul Gionfriddo, P.E.
Senior Engineer

GEOTECHNICAL EXPLORATION REPORT

PROJECT:

Proposed Gallery Apartments
7900 Xerxes Avenue S
Bloomington, Minnesota

PREPARED FOR:

Chase Real Estate
210 County Road 42 West
Burnsville, Minnesota 55337

PREPARED BY:

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, Minnesota 55359

Haugo GeoTechnical Services Project: 25-1042

February 24, 2026

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.

Paul Gionfriddo, P.E.
Senior Engineer
License Number: 23093

Table of Contents

1.0 INTRODUCTION

1.1 Project Description

Chase Real Estate is proposing to construct the Gallery Apartments complex at 7900 Xerxes Avenue S in Bloomington, Minnesota and retained Haugo GeoTechnical Services (HGTS) to perform a geotechnical exploration to evaluate the suitability of site soil conditions to support the proposed development.

1.2 Purpose

The purpose of this geotechnical exploration was to characterize subsurface soil and groundwater conditions and provide recommendations for foundation design and construction.

1.3 Site Description

The project site is located in the northwest quadrant of the intersections of Xerxes Avenue S and American Boulevard W in Vadnais Heights, Minnesota. At the time of our exploration, the project site was mostly occupied by a bituminous parking lot. A Wells Fargo Bank and the associated drive thru lanes and canopy was located in the north east corner of the project site. Areas not occupied by the bank and parking lot were lawn covered or landscaped.

The site topography was mostly flat and level with the ground surface at the boring locations mostly ranging from about 953 ½ to 956 feet above sea level (MSL). The exception was in the northwest quadrant of the site where the ground surface was near elevation 846 to 848 feet.

1.4 Scope of Services

Our services were performed in accordance with the Haugo Geotechnical Services proposal 25-1042 dated December 18, 2025. Our services were performed under the terms of our General Conditions and were limited to the following tasks:

- Clearing private underground utilities thru a private locating service.
- Clearing public underground utilities thru the Gopher One Call system.
- Completing 10 standard penetration test soil borings with each extending to a nominal depth of 30 feet.
- Completing 2 standard penetration test soil borings with each extending to a nominal depth of 14 ½ feet.
- Sealing the boring in accordance with Minnesota Department of Health requirements.
- Obtaining GPS coordinates and ground surface elevations at the soil boring location.
- Visually/manually classifying samples recovered from the soil boring.
- Performing laboratory tests on selected samples.
- Preparing soil boring logs describing the materials encountered and the results of groundwater level measurements.
- Preparing an engineering report describing soil and groundwater conditions and providing recommendations for foundation design and construction.

1.5 Documents Provided

We were provided a Concept Site Plan (Concept Plan) that was prepared by Chase Real Estate. The Concept Plan consisted of an aerial photograph that had the development superimposed onto it. The Concept Plan also included notes that identified the proposed Gallery Apartment Building, Future building(s) and parking areas. The proposed boring locations were also shown on the Concept Plan.

Other than the Concept Plan, specific architectural, structural or civil documents were not provided at the time of this assessment.

HGTS performed a Phase I Environmental Site Assessment in conjunction with this geotechnical exploration. The report was in progress at the time of this report. Results of the Phase I ESA will be presented under separate cover under HGTS project #26-0008.

1.6 Locations and Elevations

The soil boring locations were selected by Chase Real Estate and were staked in the field by Hill Engineering prior to our field work. The approximate locations of the soil borings are shown on the concept plan provided.

Ground surface elevations at the soil boring locations were provided by Hill Engineering.

2.0 FIELD PROCEDURES

The standard penetration test borings were advanced on January 27th and 28th, 2026 by HGTS with a rotary drilling rig, using continuous flight augers to advance the boreholes. Representative samples were obtained from the borings, using the split-barrel sampling procedures in general accordance with ASTM Specification D-1586. In the split-barrel sampling procedure, a 2-inch O.D. split-barrel spoon is driven into the ground with a 140-pound hammer falling 30 inches. The number of blows required to drive the sampling spoon the last 12 inches of an 18-inch penetration is recorded as the standard penetration resistance value, or "N" value. The results of the standard penetration tests are indicated on the boring logs. The samples were sealed in containers and provided to HGTS for testing and soil classification.

A field log of each boring was prepared by HGTS. The logs contain visual classifications of the soil materials encountered during drilling, as well as the driller's interpretation of the subsurface conditions between samples and water observation notes. The final boring logs included with this report represent an interpretation of the field logs and include modifications based on visual/manual method observation of the samples.

The soil boring logs, general terminology for soil description and identification, and classification of soils for engineering purposes are also included in the appendix. The soil boring logs identify and describe the materials encountered, the relative density or consistency based on the Standard Penetration resistance (N-value, “blows per foot”) and groundwater observations.

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 borings.

3.0 RESULTS

3.1 Geologic Setting

According to published information the project site is situated near the border of 2 geologic units and could consist of "ice contact deposits" composed of silty clay to loamy sand and gravel or could consist of "terrace sediment" composed of sand and gravel (Geologic Atlas of Hennepin County, County Atlas Series C-45, Part A, Plate 3, 2018).

Since the project site was a former sand and gravel pit the sandy soils are identified as "Terrace Sediment" on the boring logs while the clayey soils at depth are identified as "Ice Contact Deposits" on the boring logs.

3.2 Soil Conditions

Pavements At the surface 10 of the borings, SB-1 thru SB-10, encountered a pavement section that consisted of about 4 ½ to 6 of bituminous over varying thickness of aggregate base or possible aggregate. Because the underlying soils were sandy in composition it was difficult to distinguish between the aggregate base and underlying soils, therefore the aggregate base thicknesses were not determined.

Topsoil Soil borings SB-11 and SB-12 were completed within a lawn or landscaped area in the northwest corner of the project site. At the surface these borings encountered about a foot of topsoil that was composed of sandy lean clay or clayey sand that was black in color and contained some roots.

Fill Below the pavement section or topsoil 11 of the 12 soil borings encountered varying depths/thicknesses of Fill soils that extended to depths ranging from about 4 ½ to 19 ½ feet below the ground surface. The Fill soils consisted of a variety of soil types including; poorly graded sand with silt, poorly graded sand, silty sand, sandy lean clay, clayey sand and organic clay. Some brick debris observed in the Fill at boring SB-6.

The Fill varied from brown to dark brown to black in color. Portions of the Fill were also judged to be slightly organic to organic.

Penetration resistance values (N-Values), shown as blows per foot (bpf) on the boring logs, within the sandy Fill soil (clayey sand, silty clayey sand, silty sand, poorly graded sand with silt and poorly graded sand) ranged from 2 to 22 with most of the values less than 10 bpf. These values indicate the sandy Fill soils had Fill very loose to medium dense relative density but were mostly very loose to loose. N-Values within the clayey Fill (organic clay and sandy lean clay) was 4 bpf indicating a rather soft consistency.

Buried Topsoil Soil boring SB-10 encountered buried topsoil below the Fill at about 4 ½ feet below the ground surface that extended to about 14 ½ feet below the ground surface. The buried topsoil consisted of sandy lean clay that was black in color and contained traces of roots. The buried topsoil was judged to be slightly organic to organic.

Swamp Deposits Soil boring SB-7 encountered swamp deposits that were composed of silty clay that extended from about 9 ½ to 19 ½ feet below the ground surface. The silty clay was black to grey in color and had a swamp/organic odor to it.

The N-values within the silty clay was 4 bpf indicating a rather soft consistency.

Native Terrace and Ice Contact Deposits Below the topsoil, Fill, buried topsoil and swamp deposits the boring encountered native terrace deposits and ice contact deposits. The terrace deposits were composed of; poorly graded sand and poorly graded sand with silt. The ice contact deposits were composed of sandy lean clay and clayey sand. For the purposes of this report and simplicity the "ice contact deposits" are referred to as "glacial till" in the report and on the boring logs.

N-Values within the poorly graded sand and poorly graded sand with silt ranged from 2 to 32 bpf with most of the values ranging from 2 to 19 bpf. These values indicate the sand had a very loose to dense relative density but were mostly very loose to medium dense. N-Values within sandy lean clay and clayey sand soils ranged from 7 to 24 bpf indicating a medium to very stiff consistency.

3.2 Groundwater

Groundwater was encountered in soil boring SB-2 at about 25 feet below the ground surface while drilling and sampling corresponding to about elevation 829 ½ feet above mean sea level (MSL). Groundwater was not encountered in the remaining soil borings. The observed water levels are summarized in Table 1.

Table 1. Summary of Groundwater Levels

Boring Number	Measured Surface Elevation (feet)	Estimated Depth to Groundwater (feet)*	Estimated Groundwater Elevation (feet)*
SB-1	853.6	NE	-
SB-2	854.7	25	829 ½
SB-3	854.0	NE	-
SB-4	856.2	NE	-
SB-5	854.0	NE	-
SB-6	856.2	NE	-
SB-7	854.0	NE	-
SB-8	854.0	NE	-
SB-9	853.4	NE	-
SB-10	855.8	NE	-
SB-11	846.2	NE	-
SB-12	848.0	NE	-

* = Depths and elevations were rounded to the nearest ½ foot.

Water levels were measured on the dates as noted on the boring logs and the period of water level observations was relatively short. Groundwater monitoring wells or piezometers would be required to more accurately determine water levels. Seasonal and annual fluctuations in the groundwater levels should be expected.

3.3 Laboratory Testing

Laboratory moisture content tests, percent passing the #200 sieve and organic content tests were performed on selected samples recovered from the soil borings. Laboratory soil moisture contents varied significantly and ranged from about 3 ½ to 35 percent. The P-200 content is a measure of the silt and clay sized particle in a soil sample. The results are used to aid in classifying the soils and used to estimate some engineering properties. Laboratory tests results are summarized in Table 2 and are shown on the boring logs adjacent to the samples tested.

Table 2. Summary of Laboratory Tests

Boring Number	Sample Number	Depth (feet)	Moisture Content (%) *	P-200 (%)*	Organic Content (%)*
SB-1	SS-51	5	4	-	-
SB-1	SS-53	10	3	-	-
SB-2	SS-44	5	8 ½	-	-
SB-2	SS-46	10	8	-	-
SB-3	SS-201	5	4	-	-
SB-3	SS-203	15	2 ½	-	-
SB-3	SS-205	25	14	-	-
SB-4	SS-208	5	6	17 ½	-
SB-4	SS-209	10	13 ½	22 ½	-
SB-5	SS-16	5	4 ½	-	-
SB-5	SS-18	15	3	-	-
SB-5	SS-20	25	13	-	-
SB-6	SS-23	5	4	3	-
SB-6	SS-25	15	9 ½	-	2 ½
SB-7	SS-2	5	15	4	-
SB-7	SS-4	15	28	-	-
SB-8	SS-9	5	35	-	18
SB-8	SS-10	10	14	-	-
SB-8	SS-11	15	3 ½	-	-
SB-9	SS-30	5	6 ½	-	-
SB-9	SS-32	15	3	-	-
SB-10	SS-39	15	4 ½	-	-
SB-11	SS-65	2 ½	16 ½	-	1 ½
SB-11	SS-66	5	20 ½	-	-
SB-11	SS-67	7 ½	19 ½	-	-
SB-12	SS-58	2 ½	11	36	-

*Moisture content values rounded to the nearest ½ percent.

3.4 OSHA Soil Classification

Excavations for soil corrections and/or foundation construction are anticipated to extend to about 20 feet below the ground surface. The soils encountered in the borings to that depth consisted predominantly of; poorly graded sand, poorly graded sand with silt, silty sand and clayey generally meeting the ASTM classifications of SP, SP-SM, SM and SC, respectively. These soils will generally be Type C Type C soils under Department of Labor Occupational Safety and Health Administration (OSHA) guidelines.

The borings also encountered clayey soils composed of sandy lean clay, silty clay and organic clay generally meeting the ASTM classification Cl and CL-ML. These soils are often Type B soils under OSHA guideline but because of their low N-Values they might not meet the strength requirements for Type B soils.

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.

4.0 DISCUSSION AND RECOMMENDATIONS

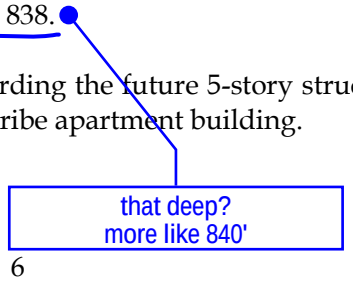
4.1 Proposed Construction

Based on the Concept Plan and correspondence with Chase Real Estate we understand that the project will likely be completed in 2 phases. Phase 1 will include constructing a 300-unit apartment building that will have 2 below grade levels for parking and 5 levels above grade for living spaces. Phase I will include the associated parking and drive lanes and underground utilities and will also include a 53-stall parking lot and/or infiltration area to the north of the neighboring business to the west. Phase 2 of the project could potentially include constructing a 5-story structure, with one underground parking level, in the northeast corner of the project site.

We anticipate construction for the 300-unit apartment building will consist of cast-in-place concrete foundation walls with precast concrete columns and beams supporting precast concrete planks over the parking levels with 5 levels of wood framing above grade. Based on correspondence with Chase Real Estate and/or the project structural engineers we understand that maximum wall loads will be 25 kips per lineal foot (25,000 pounds) and maximum column loads will be 750 kips (750,000 pounds).

We understand the main floor will be set at elevation 864 feet with the first garage level (G1) at elevation 853 feet and the second garage level (G2) set at elevation 842 feet. To account for footing thicknesses, we estimate the bottom of the footings will bear about 4 feet below the garage slab corresponding to about elevation 838.

We were not provided any information regarding the future 5-story structure but anticipate construction will be similar to the above describe apartment building.



We have attempted to describe our understanding of the project. If the proposed loads exceed these values, the proposed grades differ by more than 2 feet from the assumed values or if the design or location of the proposed development changes, we should be informed. Additional analyses and revised recommendations may be necessary.

4.2 Discussion

Structures (Wells Fargo Bank) existed on the project site which we assume will be removed/demolished to make was for the proposed development. We recommend that all remnants of the structure including footings, floor slabs, foundation walls, exterior flatwork and underground utilities be removed from within the proposed building and oversize areas.

The vegetation and topsoil are compressible and are not suitable for foundation support and will need to be removed from below the proposed building, parking lots, utilities and oversize areas and replaced, as needed, with suitable compacted engineered fill.

The origin of the Fill encountered in the borings is unknown but is likely associated with the former gravel pit that operated on the site. The Fill mostly had a very loose to loose relative density which suggests that the Fill was not compacted or was poorly compacted as it was placed. The Fill also contained some black colored soil which were determined to be slightly organic. Organic soils and soils containing organic materials are generally compressible and are not suitable for foundation support. The Fill will need to be removed and replaced with suitable compacted engineered fill to provide adequate foundation support. Since the apartment buildings will have 2 lower parking levels, removal of portions or all of the Fill materials will likely be incidental to construction.

Buried topsoil and swamp deposits were also encountered in the borings which are likewise compressible and are suitable for foundation support. The buried topsoil and swamp deposits will also need to be removed from below the proposed building, parking lots, utilities and oversize areas and replaced, as needed, with suitable compacted engineered fill.

Based on the soil borings excavations for soil corrections and/or foundation construction are anticipated to extend to about 20 feet or deeper below the ground surface.

It is our opinion that the underlying native terrace deposits and ice contact deposits (glacial till) are generally suitable for engineered fill and foundation support. However; portions of the native soils had a very loose to relative density and will need to be compacted/densified to provide adequate foundation support and reduce the potential for excessive settlements.

Groundwater was encountered in 1 of the soil borings at about 25 feet below the ground surface corresponding to about elevation 829 ½ feet above mean sea level. Soil corrections and/or foundation construction are anticipated to extend to about 20 feet below the ground surface corresponding to about elevation 834 feet. We do not anticipate that groundwater will be encountered and do not anticipate that dewatering will be required.

4.3 Site Grading Recommendations

Excavation We recommend that all vegetation, topsoil, Fill, buried topsoil, swamp deposits and any soft or otherwise unsuitable soils, if encountered, be removed from below the proposed building and oversize areas. Likewise, we recommend that all remnants of the structures including footings, floor slabs, foundation walls, exterior flatwork and underground utilities be removed from within the proposed building and oversize areas. Table 3 summarizes the anticipated excavation depths at the soil boring locations. Excavation depths may vary and could be deeper.

840' typical (S2 garage)

Table 3. Anticipated Excavation Depths

Boring Number	Measured Surface Elevation (feet)	Anticipated Excavation Depth (feet)*	Anticipated Excavation Elevation (feet)*	Approximate Groundwater Elevation (feet)*
SB-1	853.6	4 ½	849	NE
SB-2	854.7	14 ½	840	829 ½
SB-3	854.0	4 ½	849 ½	NE
SB-4	856.2	14 ½	841 ½	NE
SB-5	854.0	4 ½	849 ½	NE
SB-6	856.2	19 ½	836 ½	NE
SB-7	854.0	19 ½	834 ½	NE
SB-8	854.0	14 ½	839 ½	NE
SB-9	853.4	1 (Future)	852 ½	NE
SB-10	855.8	14 ½ (Future)	841 ½	NE
SB-11	846.2	1 - 11 ½ (Parking/Pond)	845 – 834 ½	NE
SB-12	848.0	1 - 7 (Parking/Pond)	847 - 841	NE

* = Excavation depths and elevations were rounded to nearest ½ foot. NE = Not Encountered

Oversizing In areas where the excavations for soil corrections extend below the proposed footing elevations, the excavations require oversizing. We recommend the perimeter of the excavation be extended a foot outside the proposed footprint for every foot below footing grade (1H:1V oversizing). The purpose of the oversizing is to provide lateral support of the foundation.

Shoring Excavations for soil corrections and foundation construction are anticipated to extend to about 20 feet and possibly deeper below the ground surface. At typical excavation sideslopes/backslopes of 1½:1 (horizontal: vertical) in Type C soils the excavation could extend about 30 feet or more beyond the perimeter of the building. Excavations with these dimensions could extend onto adjoining properties posing a risk of undermining structures on those properties. If site constraints will limit excavations with these dimensions, then shoring could be required.

Construction Vibrations As noted in the Discussion section, excavations for soil corrections and/or foundation construction will likely extend about 20 feet, or more, below existing site grades and because of that installing an earth retention system (shoring) could be required. Shoring system installation typically involves driving steel H-pile or steel sheeting which can generate vibrations that can potentially result in damage to nearby structures including roadways, sidewalks and underground utilities. In addition, the very loose sand can be susceptible to subsidence (settlement) from construction vibrations which can potentially result in distress to structures support in or on the very loose sands. This settlement could potentially impact structures in the adjoining properties. For these reasons it may be appropriate to perform pre-construction condition surveys of the nearby buildings and public improvements (i.e., roadways sidewalks etc.) and preparing and implementing a vibration control plan and vibration monitoring during construction, especially during shoring system installation and removal and other significant vibration producing events, such as demolition and soil compaction activities.

Fill Material Additional fill required to attain design grades can consist of any mineral soil provided it is free of debris, organic soil and any soft or otherwise unsuitable materials. However, we recommend using a "clean coarse sand" with less than 5 percent passing the number 200 sieve and at least 50 percent retained on the number 40 sieve. Further, we recommend that Fill or backfill placed in wet excavations or within 2 feet of the water table consist of "clean coarse sand" with less than 5 percent passing the number 200 sieve and at least 50 percent retained on the number 40 sieve.

The on-site native terrace deposits and glacial till soils appear to be suitable for reuse as structural fill or backfill provided it is free of debris, organic soils or other unsuitable materials.

Laboratory soil moisture contents of the native terrace deposits and glacial till soils ranged from about 2 ½ to 14 percent indicating that the soils ranged from below to above their assumed optimum moisture content based on the standard Proctor test. Soils that will be excavated and reused as fill and backfill will likely require some moisture conditioning (wetting or drying) to achieve the recommended compaction levels.

The existing Fill soil contained some debris as well as "black" colored soils. The Fill will not be suitable for reuse as structural fill or backfill. Likewise, the topsoil, buried topsoil, organic soils (swamp deposits) or other soils that are black in color are not suitable for reuse as structural fill or backfill.

Backfilling Prior to placing any fill or foundations the very loose to loose native soils must be compacted to increase their density in order to provide adequate foundation support and reduce the potential for excessive soil settlement. We recommend a minimum of 6 passes in each perpendicular direction with a large self-propelled vibratory compactor operating and/or until the soils have been compacted to at least 98 percent of their standard Proctor maximum dry density. We recommend performing compaction tests and/or Dynamic Cone Penetrometer tests to confirm the soils have been compacted to the minimum recommend density.

We recommend that backfill placed to attain site grades be compacted to a minimum of 98 percent of its standard Proctor density (ASTM D 698). 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. Other fill soils should be placed within 3 percentage points above and 1 percentage point below its optimum moisture content as determined by the standard Proctor. All fill should be placed in thin lifts and be compacted with a large self-propelled vibratory compactor operating in vibratory mode.

In areas where fill depths will exceed 10 feet, we recommend that compaction levels be increased to a minimum of 100 percent of the materials standard Proctor density. Even with the increased compaction levels a construction delay may be appropriate to allow for post construction settlement of the fill mass.

Fill and backfill placed on slopes must be "benched" into the underlying suitable soil to reduce the potential for slip planes to develop between the fill and underlying soil. We recommend "benching" or excavating into the slope at 5 feet vertical intervals to key the fill into the slope. We recommend each bench be a minimum of 10 feet wide.

Foundations We recommend the perimeter footings bear a minimum of 42 inches below the exterior grade for frost protection. Interior footings may be placed immediately below the slab provided construction does not occur during below freezing weather conditions. Foundation elements in unheated areas (i.e., deck or porch footings) should bear at least 5 feet below exterior grade for frost protection.

We anticipate the foundations and floor slabs will bear on compacted engineered fill or native soils. With the building pads prepared as recommended, it is our opinion the footings can be designed for a net allowable bearing pressure up to 4,000 pounds per square foot (psf).

Based on the anticipate structural loads we estimate that total and differential settlement of the foundations will be less than 1 inch and ½ inch, respectively, across a 30-foot span.

4.4 Dewatering

Groundwater was encountered in 1 of the soil borings at about 25 feet below the ground surface corresponding to about elevation 829 ½ feet above mean sea level. Soil corrections and/or foundation construction are anticipated to extend to about 20 feet below the ground surface corresponding to about elevation 834 feet. We do not anticipate that groundwater will be encountered and do not anticipate that dewatering will be required.

In the event dewatering is required, we recommend the groundwater level be temporarily lowered to a minimum of 2 feet below the lowest anticipated excavation elevation to allow for construction. In sand soils, we do not recommend attempting to dewater from within the excavation. Upward seepage will loosen and disturb the excavation, resulting in a "quick condition." Rather, we recommend groundwater to be drawn down below the anticipated excavation bottom.

4.5 Interior Slabs

The anticipated floor subgrade will consist of compacted sandy engineered fill or the sandy native soils. It is our opinion a modulus of subgrade reaction, k, of 100 pounds per square inch per inch of deflection (psi) may be used to design the floor.

If floor coverings or coatings less permeable than the concrete slab will be used, we recommend that a vapor retarder or vapor barrier be placed immediately beneath the slab. Some contractors prefer to bury the vapor barrier or vapor retarder beneath a layer of sand to reduce curling and shrinkage, but this practice often traps water between the slab and vapor retarder or barrier. Regardless of where the vapor retarder or vapor barrier is placed, we recommend consulting the floor covering manufacturer regarding the appropriate type, use and installation of the vapor retarder or vapor barrier to preserve the warranty.

We recommend following all state and local building codes with regards to a radon mitigation plan beneath interior slabs.

4.6 Below Grade Walls

We recommend general waterproofing of the below grade walls. We recommend either placing drainage composite against the backs of the exterior walls or backfilling adjacent to the walls with sand having less than 50 percent of the particles by weight passing the #40 sieve and less than 5 percent of the particles by weight passing the #200 sieve. The sand backfill should be placed within 2 feet horizontally of the wall. We recommend the balance of the backfill for the walls consist of sand however the sand may contain up to 20 percent of the particles by weight passing the #200 sieve.

We recommend installing drain tile behind the below grade walls, adjacent to the wall footing and below the slab elevation. Preferably the drain tile should consist of perforated pipe embedded in gravel. A geotextile filter fabric should encase the pipe and gravel. The drain tile should be routed to a storm sewer, sump pump or other suitable disposal site.

Foundation walls or below grade (basement) walls will have lateral loads from the surrounding soil transmitted to them. Active earth pressures can be used to design the below grade walls if the walls are allowed to rotate slightly. If wall rotation cannot be tolerated, then below grade wall design should be based on at-rest earth pressures. It is our opinion that the estimated soil parameters presented in Table 4 can be used for below grade wall design. These estimated parameters are based on the assumptions that the walls are drained, there are no surcharge loads within a horizontal distance equal to the height of the wall and the backfill is level.

Table 4. Estimated Soil Parameters

Soil Type	Estimated Unit Weight (pcf)	Estimated Friction Angle (degrees)	At-Rest Pressure (pcf)	Active Soil Pressure (pcf)	Passive Soil Pressure (pcf)
Sand (SP & SP-SM)	120	32	55	35	390
Other Soils (CL, CL-ML, SC, SC-SM, SM)	135	28	70	50	375

plenty of SP soil available for backfill

Resistance to lateral earth pressures will be provided by passive resistance against the wall footings and by sliding resistance along the bottom of the wall footings. We recommend a sliding coefficient of 0.35. This value does not include a factor of safety.

4.7 Retaining Walls

We are not aware of any retaining walls proposed for this project and were not provided any information regarding any proposed retaining walls. Retaining wall designers/installers should be aware that soil borings for any retaining walls were not completed as part of this evaluation. Because of that, additional geotechnical explorations (soil borings) could be required to determine and evaluate the suitability and/or stability of site soil conditions to support their design(s). Retaining wall designers and/or installers will be solely responsible to conduct additional geotechnical evaluation(s) as needed.

In addition, HGTS does not practice in retaining wall design. Retaining wall designers will be solely responsible for retaining wall design and construction.

4.8 Exterior Slabs

Exterior slabs could be underlain by silty or clayey soils which are considered to be moderately to highly frost susceptible. If these soils become saturated and freeze, frost heave may occur. This heave can be a nuisance in front of doors and at other critical grade areas. One way to help reduce the potential for heaving is to remove the frost-susceptible soils below the slabs down to bottom of footing grades and replace them with non-frost-susceptible backfill consisting of sand having less than 5 percent of the particles by weight passing the number 200 sieve.

If this approach is used and the excavation bottoms terminate in non-free draining granular soil, we recommend a drain tile be installed along the bottom outer edges of the excavation to collect and remove any water that may accumulate within the sand. The bottom of the excavation should be graded away from the building.

If the banks of the excavations to remove the frost-susceptible soils are not sloped, abrupt transitions between the frost-susceptible and non-frost-susceptible backfill will exist along which unfavorable amounts of differential heaving may occur. Such transitions could exist between exterior slabs and sidewalks, between exterior slabs and pavements and along the slabs themselves if the excavations are confined to only the building entrances. To address this issue, we recommend sloping the excavations to remove frost-susceptible soils at a minimum 3:1 (horizontal:vertical) gradient.

An alternative method of reducing frost heave is to place a minimum of 2 inches of extruded polystyrene foam insulation beneath the slabs and extending it about 4 feet beyond the slabs. The insulation will reduce frost penetration into the underlying soil and reduce heave. Six to twelve inches of granular soil is typically placed over the insulation to protect it during construction.

Another alternative for reducing frost heave is to support the slabs on frost depth footings. A void space of at least 4 inches should be provided between the slab and the underlying soil to allow the soil to heave without affecting the slabs.

4.9 Site Grading and Drainage

We recommend the site be graded to provide positive run-off away from the proposed buildings. We recommend landscaped areas be sloped a minimum of 6 inches within 10 feet of the building and slabs be sloped a minimum of 2 inches. In addition, we recommend downspouts with long splash blocks or extensions.

We recommend the lowest floor grades be constructed to meet City of Bloomington requirements with respect to groundwater separation distances. In the absence of city requirements, we recommend maintaining at least a 4-foot separation between the lowest floor slab and the observed groundwater levels and at least a 2-foot separation between the lowest floor slab and the 100-year flood level of nearby wetlands, storm water ponds or other surface water features.

4.10 Utilities

We anticipate that new utilities will be installed as part of this project. We further anticipate that new utilities will bear at depths ranging from about 7 to 10 feet below the ground surface. At these depths, we anticipate that the pipes will bear on compacted engineered fill or native soils, which in our opinion are suitable for pipe support. We recommend removing all vegetation, topsoil, Fill, buried topsoil and any other unsuitable soils, if any, beneath utilities prior to placement.

We recommend bedding material be thoroughly compacted around the pipes. We recommend trench backfill above the pipes be compacted to a minimum of 95 percent beneath slabs and pavements, the exception being within 3 feet of the proposed pavement subgrade, where 100 percent of standard Proctor density is required. In landscaped areas, we recommend a minimum compaction of 90 percent.

4.11 Bituminous Pavements

General The City of Bloomington may have standard plates that dictate pavement design. If so, we recommend that the bituminous pavements be designed and constructed in accordance with the city standard plates. The following paragraphs provide pavement recommendations in the absence of the city standard plates.

Traffic The apartment building will have 2 underground parking levels and because of that we do not anticipate that large surface parking lots will be constructed as part of the project but assume that some smaller surface lots could be constructed around the building. Further, we understand the project will include constructing a 53-stall parking lot in the northwest corner of the project site.

We assume the parking and drive lanes will be used predominantly by automobiles, light trucks, garbage trucks and delivery vans (FEDEX, UPS etc.). Based on the anticipated number of parking stall and assumed traffic types we estimate that any surface lots will be subjected to Equivalent Single Axle Loads (ESAL's) up to about 50,000 over a 20-year design life. This does not account for any future growth.

Subgrade Preparation We recommend removing all vegetation, topsoil and any soft or otherwise unsuitable soil from below the pavement and oversize areas. We typically recommend removing all Fill, buried topsoil and organic soils from below the pavement and oversize areas. In this case excavations to remove those soil materials could extend to depths about 12 feet or deeper below the ground surface. Excavations to depths greater than about 3 feet below the bottom of the pavement section are seldom cost effective for the benefit gained. Because of that we assume excavations to remove any unsuitable soils from below the pavement areas will be limited to a maximum depth of 3 feet below the bottom of the pavement section.

Prior to placing the aggregate base (Class 5) we recommend compaction tests or performing a proof-roll of the subgrade to identify soft, weak, loose, or unstable areas that may require additional subcuts. Backfill 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 should be placed within 3 percentage points above and 1 percentage point below its optimum moisture content as determined by the standard Proctor. All fill should be placed in thin lifts and be compacted to a minimum of 95 percent of its standard Proctor maximum dry density with a large self-propelled vibratory compactor operating in vibratory mode. The upper 3 feet of fill and backfill should be compacted to a minimum of 100 percent of its standard Proctor maximum dry density.

R-Value R-Value testing was beyond the scope of this project. The near surface soils (borings SB-11 and SB-12) consisted of clayey sand meeting the ASTM Classification SC. Soils meeting the ASTM Classification SC typically have R-Values ranging from about 20 to 40, or more. It is our opinion an R-Value of 25 can be used for pavement design.

Pavement Section Based on an estimated R-value of 25 and a maximum of 50,000 ESAL's we recommend pavement section consisting of a minimum of 3 ½ inches of bituminous (1 ½ inches of wear course and 2 inches of base course) underlain by a minimum of 8 inches of aggregate base.

If a heavy-duty section is required, we recommend pavement section consisting of a minimum of 4 inches of bituminous (2 inches of wear course and 2 inches of base course) underlain by a minimum of 9 inches of aggregate base.

4.12 Pavements Materials

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 dry density.

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 assume the parking lot will include concrete curb and gutter. We recommend specifying concrete that has a minimum 28-day compressive strength of 4,000 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.

4.13 Infiltration Basin Design Recommendations

The project will include constructing stormwater pond or swale near the parking lot in the northwest corner of the project site. We were not provided any information regarding proposed bottom elevations for the ponds. Soil borings SB-11 and SB-12 were completed within the area of the proposed stormwater pond/swale and below the topsoil these borings encountered; clayey sand and sandy lean clay to depths ranging from about 7 to 12 feet below the ground surface then poorly graded sand below those approximate depths. These soils correspond to the ASTM classifications of SC, CL and SP, respectively.

It is our opinion that the infiltration rates presented in Table 5 can be used for pond design. These values were obtained from tables included in the "Minnesota Storm Water Manual."

Table 5. Design Infiltration Rates

In-situ Soils	Soil Description	Hydrologic Soil Group	Design Infiltration Rate (in/hr.)
SP	Poorly Graded Sand	A	0.8
SC	Clayey Sand	D	0.06
CL	Sandy Lean Clay	D	0.06

It should be noted that soil infiltration rates can vary with soil moisture content, soil density (compaction), the introduction of fine-grained soils, topsoil, organic materials, filter or biofilter media, seasonal changes as well as changes or fluctuation in localized groundwater levels.

Field tests (double ring infiltrometer) can be performed within the proposed infiltration basin area to verify infiltration rates of the in-situ soils. We would be pleased to provide these services if required or requested.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation

Excavations for soil corrections and/or foundation construction are anticipated to extend to about 20 feet below the ground surface. The soils encountered in the borings to that depth consisted predominantly of; poorly graded sand, poorly graded sand with silt, silty sand and clayey generally meeting the ASTM classifications of SP, SP-SM, SM and SC, respectively. These soils will generally be Type C Type C soils under Department of Labor Occupational Safety and Health Administration (OSHA) guidelines.

The borings also encountered clayey soils composed of sandy lean clay, silty clay and organic clay generally meeting the ASTM classification Cl and CL-ML. These soils are often Type B

soils under OSHA guideline but because of their low N-Values they might not meet the strength requirements for Type B soils.

Temporary excavations in Type B soils should be constructed at a minimum of 1 foot horizontal to every 1-foot vertical within excavations. Temporary excavations in Type C soils should be constructed at a minimum of 1 ½ foot horizontal to every 1-foot vertical within excavations. Slopes constructed in this manner may still exhibit surface sloughing. If site constraints do not allow the construction of slopes with these dimensions, then temporary shoring may be required.

5.2 Observations

A geotechnical engineer or a qualified engineering technician should observe the excavation subgrade to evaluate if the subgrade soils are similar to those encountered in the borings and adequate to support the proposed construction.

5.3 Backfill and Fills

The on-site soils appear to range from below to above their assumed optimum soil moisture content. If these soils will be used or reused as structural fill or backfill, some wetting or drying of the soils could be required to meet the recommend compaction levels. We recommend moisture conditioning all soils that will be used as fill or backfill in accordance with Section 4.3 above. We recommend that fill and backfill be placed in lifts not exceeding 4 to 12 inches, depending on the size of the compactor and materials used.

5.4 Testing

We recommend density tests of backfill and fills placed for the proposed foundations. Samples of the proposed materials should be submitted to our laboratory prior to placement for evaluation of their suitability and to determine their optimum moisture content and maximum dry density (Standard Proctor).

5.5 Winter Construction

If site grading and construction is anticipated to proceed during cold weather, all snow and ice should be removed from cut and fill areas prior to additional grading and placement of fill. No fill should be placed on frozen soil and no frozen soil should be used as fill or backfill.

Concrete delivered to the site should meet the temperature requirements of ASTM and/or ACI. Concrete should not be placed on frozen soil. Concrete should be protected from freezing until the necessary strength is obtained. Frost should not be permitted to penetrate below the footings.

6.0 PROCEDURES

6.1 Soil Classification

The drill crew chief visually and manually classified the soils encountered in the borings in general accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedure)." Soil terminology notes are included in the Appendix. The samples were returned to our laboratory for review of the field classification by a soils engineer. Samples will be retained for a period of 30 days.

6.2 Groundwater Observations

Immediately after taking the final samples in the bottom of the boring, the hole was checked for the presence of groundwater. Immediately after removing the augers from the borehole the hole was once again checked and the depth to water and cave-in depths were noted.

7.0 GENERAL

7.1 Subsurface Variations

The analyses and recommendations presented in this report are based on data obtained from a limited number of soil borings. Variations can occur away from the boring, the nature of which may not become apparent until additional exploration work is completed, or construction is conducted. A reevaluation of the recommendations in this report should be made after performing on-site observations during construction to note the characteristics of any variations. The variations may result in additional foundation costs and it is suggested that a contingency be provided for this purpose.

It is recommended that we be retained to perform the observation and testing program during construction to evaluate whether the design is as expected, if any design changes have affected the validity of our recommendations, and if our recommendations have been correctly interpreted and implemented in the designs, specifications and construction methods. This will allow correlation of the soil conditions encountered during construction to the soil borings and will provide continuity of professional responsibility.

7.2 Review of Design

This report is based on the design of the proposed structures as related to us for preparation of this report. It is recommended that we be retained to review the geotechnical aspects of the design and specifications. With the review, we will evaluate whether any changes have affected the validity of the recommendations and whether our recommendations have been correctly interpreted and implemented in the design and specifications.

7.3 Groundwater Fluctuations

We made water level measurements in the borings at the times and under the conditions stated on the boring log. 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.

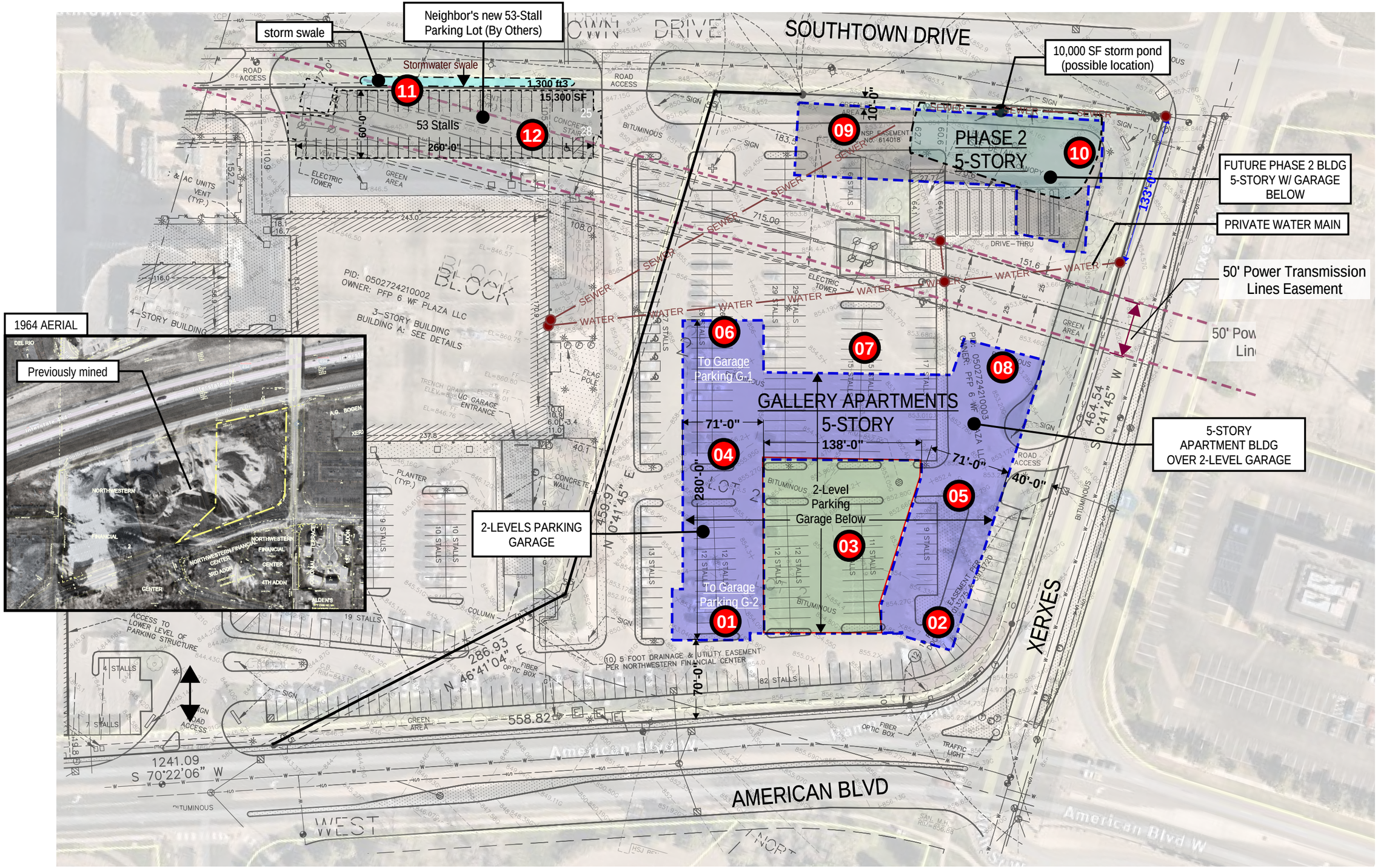
7.4 Use of Report

This report is for the exclusive use of Chase Real Estate and their design team to use to design the proposed structures and prepare construction documents. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report. The data, analysis and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

7.5 Level of Care

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.

APPENDIX



REAL ESTATE CHASE RE
DEVELOPMENT • CONSTRUCTION • FINANCE

7900 XERXES AVE S
Bloomington, MN

CONCEPT SITE PLAN

211
EL=846.22
N 125166.13
E 516031.13

212
EL=847.99
N 125159.00
E 516147.36

209
EL=853.36
N 125239.85
E 516408.79

210
EL=855.77
N 125278.36
E 516613.47

208
EL=854.00
N 125078.52
E 516600.97

207
EL=854.00
N 125061.41
E 516480.11

206
EL=856.19
N 125041.99
E 516369.13

205
EL=854.00
N 124959.57
E 516594.69

204
EL=856.24
N 124937.86
E 516385.57

203
EL=854.00
N 124891.03
E 516516.04

201
EL=853.63
N 124796.60
E 516429.42

202
EL=854.65
N 124848.26
E 516609.23

SOUTHTOWN DRIVE

AMERICAN BLVD

XERXES

Neighbor's new 53-Stall Parking Lot (By Others)

storm swale

Stormwater Swale

10,000 SF storm pond (possible location)

FUTURE PHASE 2 BLDG 5-STORY W/ GARAGE BELOW

PRIVATE WATER MAIN

50' Power Transmission Lines Easement

5-STORY APARTMENT BLDG OVER 2-LEVEL GARAGE

2-LEVELS PARKING GARAGE

Careful to avoid Water main

7900 XERXES AVE S
Bloomington, MN

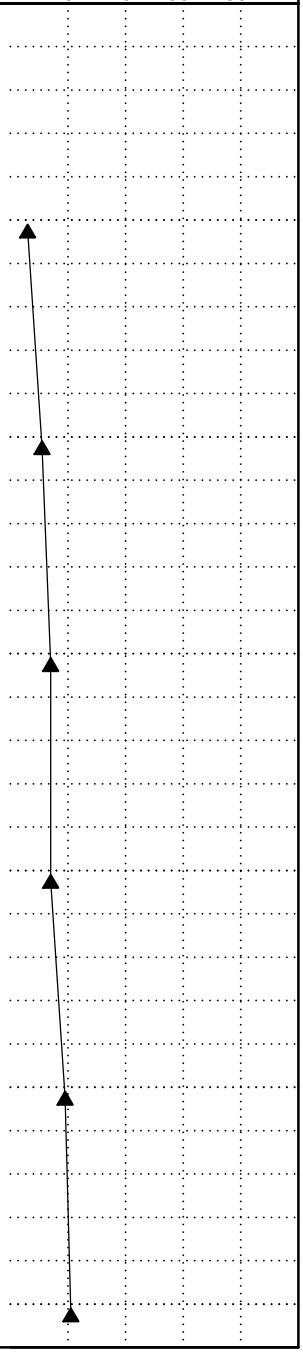
Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-1

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 853.6 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 5 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 50			
5		(SP-SM) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Loose to Medium Dense (Terrace Deposit)	SS 51		5-3-3 (6)	4
10		Approximate 3 Inch Clay Layer at about 10 Ft	SS 52		3-5-6 (11)	
		840.0				
15			SS 53		3-6-8 (14)	3
20			SS 54		6-7-7 (14)	
25			SS 55		7-9-10 (19)	
30		(SC) Clayey Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Medium Dense (Glacial Till)	SS 56		8-9-12 (21)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



Bottom of borehole at 31.0 feet.

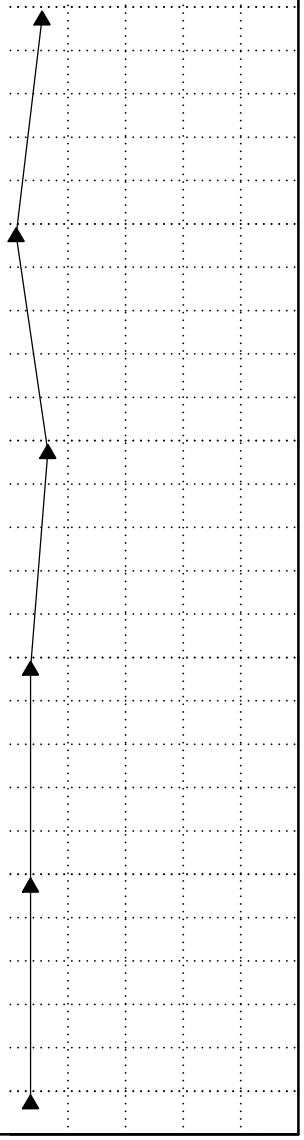
HAUGO GEOTECHNICAL SERVICES
Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-2

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 854.7 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 25.00 ft / Elev 829.70 ft
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 5.5 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 43			
5		Poorly Graded Sand with Silt, trace Gravel, Brown and Black, Moist (Fill)	SS 44		4-5-6 (11)	8.5
10			SS 45		2-1-1 (2)	
		840.0				
15		(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist to about 25 Ft then Waterbearing, Loose to Medium Dense (Terrace Deposit)	SS 46		5-6-7 (13)	8
20			SS 47		3-3-4 (7)	
25	▽		SS 48		3-3-4 (7)	
30		(CL) Sandy Lean Clay, trace Gravel, Grey, Wet, Medium (Glacial Till)	SS 49		3-3-4 (7)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-3

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 854 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0	Approximately 6 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 200			
5	(SP) Poorly Graded Sand, Fine to Medium Grained, Brown, Moist, Very Loose to Dense (Terrace Deposit)	SS 201		3-3-4 (7)	4
	Use SP for backfill				
10		SS 202		3-3-5 (8)	
15	840.0	SS 203		4-7-8 (15)	2.5
20		SS 204		10-13-19 (32)	
25	(CL) Sandy Lean Clay, trace Gravel, Brown, Wet, Very Stiff (Glacial Till)	SS 205		8-9-12 (21)	14
30	(CL) Sandy Lean Clay, trace Gravel, Grey, Wet, Rather Stiff (Glacial Till)	SS 206		4-4-6 (10)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

HAUGO GEOTECHNICAL SERVICES
Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-4

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 856.2 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Poorly Graded Sand with Silt, trace Gravel, Dark Brown, Moist (Fill)	AU 207			
5		Silty Clayey Sand, trace Gravel, Brown, Moist (Fill) P-200= 17.5%	SS 208		6-6-3 (9)	6
10		P-200= 22.5%	SS 209		4-4-2 (6)	13.5
15		(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Loose to Medium Dense (Terrace Deposit)	SS 210		2-3-2 (5)	
		840.0				
20			SS 211		6-8-7 (15)	
25			SS 212		4-7-12 (19)	
30		(CL) Sandy Lean Clay, trace Gravel, Grey, Wet, Very Stiff (Glacial Till)	SS 213		4-7-10 (17)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-5

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/27/26 **COMPLETED** 1/27/26
GROUND ELEVATION 854 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 4 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 15			
5		(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Very Loose to Medium Dense (Terrace Deposit)	SS 16		2-2-2 (4)	4.5
10			SS 17		4-4-4 (8)	
15		840.0	SS 18		4-5-6 (11)	3
20		(SC) Clayey Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Medium Dense (Glacial Till)	SS 19		5-5-6 (11)	
25			SS 20		5-10-14 (24)	13
30		(CL) Sandy Lean Clay, trace Gravel, Grey, Wet, Very Stiff (Glacial Till)	SS 21		10-13-7 (20)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-6

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 856.2 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 5 Inches of Bituminous				
		Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown and Dark Brown, Moist (Fill)	AU 22			
5		P-200= 3%	SS 23		4-6-7 (13)	4
10			SS 24		2-1-1 (2)	
15		Silty Sand with Pieces of Red Brick, Dark Brown to Black, Moist (Fill)	SS 25		8-9-6 (15)	9.5
		Organic Content= 2.5%				
		840.0				
20		(SP) Poorly Graded Sand, Fine Grained, trace Gravel, Brown, Moist, Medium Dense (Terrace Deposit)	SS 26		7-8-9 (17)	
25			SS 27		7-7-9 (16)	
30			SS 28		5-5-6 (11)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-7

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/27/26 **COMPLETED** 1/27/26
GROUND ELEVATION 854 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 4.5 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 1			
5		Silty Sand, trace Gravel, Brown and Black, Moist (Fill) Organic Content= 4%	SS 2		3-2-1 (3)	15
10		(CL-ML) Silty Clay, Organic Odor, Grey to Black, Wet, Rather Soft (Swamp Deposit)	SS 3		2-1-3 (4)	
15		840.0	SS 4		2-2-2 (4)	28
20		(SP) Poorly Graded Sand with Silt, Fine to Medium Grained, trace Gravel, Brown, Moist, Very Loose to Medium Dense (Terrace Deposit)	SS 5		2-2-1 (3)	
25			SS 6		4-4-6 (10)	
30			SS 7		9-9-10 (19)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

HAUGO GEOTECHNICAL SERVICES
Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-8

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/27/26 **COMPLETED** 1/27/26
GROUND ELEVATION 854 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 4.5 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 8			
5		Organic Clay, trace Gravel, Black, Wet (Fill) Organic Content= 18%	SS 9		3-2-2 (4)	35
10		Clayey Sand, trace Gravel, Brown and Black, Moist (Fill)	SS 10		9-7-9 (16)	10
		840.0				
15		(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Loose to Medium Dense (Terrace Deposit)	SS 11		3-3-7 (10)	3.5
20			SS 12		2-3-5 (8)	
25			SS 13		3-6-6 (12)	
30			SS 14		3-3-4 (7)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-9

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 853.4 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 6 Inches of Bituminous				
		(SP) Poorly Graded Sand, Fine Grained, Moist, Loose to Medium Dense (Terrace Deposit)	AU 29			
5			SS 30		4-7-8 (15)	6.5
10			SS 31		3-4-5 (9)	
		840.0				
15			SS 32		5-5-9 (14)	3
20			SS 33		6-8-12 (20)	
25			SS 34		5-6-8 (14)	
30			SS 35		10-11-15 (26)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

BORING NUMBER SB-10

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 855.8 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0		Approximately 6 Inches of Bituminous Poorly Graded Sand with Silt, trace Gravel, Brown, Moist (Fill)	AU 36			
5		Sandy Lean Clay, trace Gravel, trace Roots, Slightly Organic to Organic, Black, Wet (Buried Topsoil)	SS 37		3-4-3 (7)	
10			SS 38		5-5-6 (11)	
15		(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Loose to Medium Dense (Terrace Deposit)	SS 39		4-5-6 (11)	4.5
		840.0				
20			SS 40		4-4-6 (10)	
25			SS 41		8-11-7 (18)	
30			SS 42		5-5-9 (14)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.0 feet.

Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

53- stall parking lot

BORING NUMBER SB-11

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 846.2 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0.0	Clayey Sand, trace Gravel, trace Roots, Black, Frozen (Topsoil)	AU 64			
	Clayey Sand, trace Gravel, Brown to Black, Moist (Fill)				
2.5	Organic Content- 1.5%	SS 65		3-5-2 (7)	16.5
5.0	Sandy Lean Clay, trace Gravel, Brown, Wet (Fill)	SS 66		1-2-2 (4)	20.5
7.5	Clayey Sand, trace Gravel, Brown and Black, Moist (Fill)	SS 67		2-1-1 (2)	19.5
10.0	Clayey Sand, trace Gravel, Brown, Moist (Fill)	SS 68		2-1-2 (3)	
12.5	(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Medium Dense (Glacial Till)	SS 69		7-9-8 (17)	
		SS 70		10-11-15 (26)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 14.5 feet.

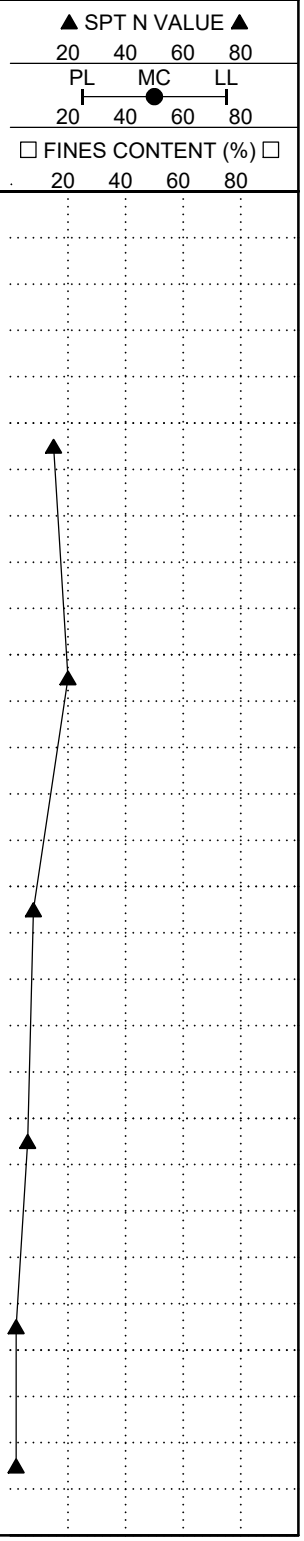
Haugo GeoTechnical Services
1985 County Road 90, Suite 300
Maple Plain, MN 55359
Telephone: 612-297-4108

53- stall parking lot

BORING NUMBER SB-12

CLIENT Chase Real Estate
PROJECT NAME Gallery Apartments - Bloomington
PROJECT NUMBER 25-1042
PROJECT LOCATION Bloomington, MN
DATE STARTED 1/28/26 **COMPLETED** 1/28/26
GROUND ELEVATION 848 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS- 45
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY MS/CK **CHECKED BY** PG
AT END OF DRILLING --- Not Encountered
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	Moisture Content (%)
0.0		Sandy Lean Clay, trace Gravel, trace Roots, Black, Frozen (Topsoil)	AU 57			
		Clayey Sand, Brown to Black, Moist (Fill)				
2.5		P-200= 36%	SS 58		5-7-8 (15)	11
5.0			SS 59		8-8-12 (20)	
7.5		(SP) Poorly Graded Sand, Fine to Medium Grained, trace Gravel, Brown, Moist, Very Loose to Loose (Terrace Deposit)	SS 60		4-4-4 (8)	
10.0			SS 61		3-4-2 (6)	
12.5			SS 62		2-1-1 (2)	
			SS 63		1-1-1 (2)	



Bottom of borehole at 14.5 feet.

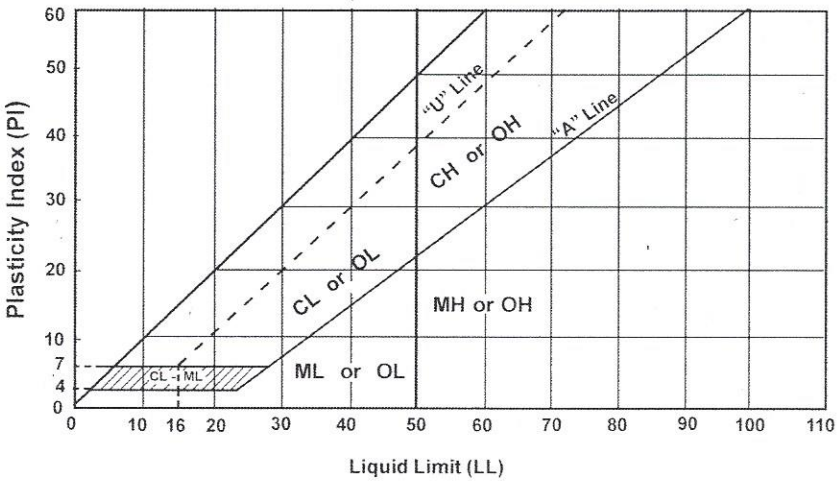
HAUGO GEOTECHNICAL SERVICES

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]
				OL	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]
				OH	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.