STORM WATER CALCULATIONS

WEST HAVEN

BLOOMINGTON FERRY ROAD
BLOOMINGTON, MN

PROJECT NUMBER: 24046

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REVISIONS		
NO.	DATE	DESCRIPTION

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

Brian J. Schultz

DATE: 04/21/2025 REG. NO.: 43129

STORM WATER SUMMARY

The proposed project is designed so that the vast majority of the storm water run-off from the overall site drains to one of two proposed infiltration basins via storm sewer and surface drainage. The proposed infiltration basins and associated outlets have been designed such that overall post-developed site runoff rates do not exceed overall pre-developed site runoff rates.

Existing runoff rates were determined from the undeveloped site (see attached "Existing Drainage" map). The east half of the site drains south to the adjacent property via surface drainage. The west half of the site drains west private storm sewer via surface drainage and an existing culvert.

The proposed basins are designed to provide water quality for the new development, while limiting overall proposed runoff rates to overall existing runoff rates off the undeveloped site.

Site drainage has been modeled for the 24-hour – 2, 10, and 100-year storm events. Our calculations assume that the 2-year storm event in Bloomington would be approximately 2.84 inches, the 10-year event would be 4.24 inches, the 100-year event would be 7.50 inches based on current Bloomington NOAA Atlas 14 rainfall data. We have utilized HydroCAD software to generate storm water calculations, as shown on the following pages.

Existing Soils

Based on a geotechnical report completed by Chosen Valley Testing, dated 12/10/2024, the soils at the site predominantly consist of 12 to 24-inches of silty sand topsoil (SM) overlying 4 to 6-feet of poorly graded sand with silt fill material (SP-SM), as well as native poorly graded sands with silt (SP-SM) and poorly graded sands (SP).

Based on the above-mentioned geotechnical report, the surficial soils at the site were assumed to consist predominantly of Hydrologic Soil Group (HSG) "B" soils for the purposes of calculating subcatchment (drainage area) runoff.

Proposed Infiltration Basin (IB1) and proposed Infiltration Basin (IB2) are designed to extend to depths, which will place it within the poorly-graded sand (SP) and poorly graded sands with silt (SP-SM) soils. These soils are assumed to be Hydrologic Soil Group (HSG) "A" soils, and have an assumed infiltration rate of 0.8 in/hr.

Ground Water

Based on the soil borings by CVT referenced above, ground water is assumed to be below 802.0 as no water or redoximorphic soils were observed in the borings.

WATER QUALITY

The infiltration basins are proposed to meet City of Bloomington and Lower Minnesota River Watershed District requirements for water quality, which specifies treatment of the first 1.1-inches of runoff off proposed impervious surfacing. Water quality calculations are shown below:

Required Treatment Volume

Total proposed impervious surfacing = 33,760-SF

Required Infiltration Volume: 33,760 SF x 1.1-in = **3,100 cf**

Provided Treatment Volume

Provided Infiltration Volume:
(IB1) – 0.063 ac-ft x 43,560 cf/ac-ft = 2,740 cf
(IB2) – 0.075 ac-ft x 43,560 cf/ac-ft = 3,270 cf
Total Infiltration Volume = **6,010 cf**

(see attached HydroCad calculations)

Draw Down Time – IB1

Design Infiltration Rate: 0.8 in/hr
(Based on geotechnical report & MN Storm Water Manual)

Maximum Time of Infiltration = 48 hrs, 0 min

Design Time of Infiltration = 27 in (2.25-ft) / 0.8 in/hr = 33 hrs, 45 min
(assumes full basin to basin outlet)

Draw Down Time – IB2

Design Infiltration Rate: 0.8 in/hr
(Based on geotechnical report & MN Storm Water Manual)

Maximum Time of Infiltration = 48 hrs, 0 min

Design Time of Infiltration = 36 in (3.0-ft) / 0.8 in/hr = 45 hrs, 00 min
(assumes full basin to basin outlet)

RATE CONTROL

Existing Drainage

The existing site consists of two drainage area (EXIST). EXIST1 drains south to the adjacent property via surface drainage. EXIST2 drains west to private storm sewer via surface drainage and an existing culvert. The existing drainage areas have the following calculated runoff rates from the 24-hour 2, 10, and 100-year storm events:

EXISTING DRAINAGE			
Drainage Area	**2-Year Runoff (cfs)**	**10-Year Runoff (cfs)**	**100-Year Runoff (cfs)**
EXIST1	1.46	3.48	9.60
EXIST2	0.43	1.09	3.11

Proposed Drainage

The proposed site consists of eight drainage areas (DA). DA1-DA3 drain to proposed Infiltration Basin (IB1) via storm sewer. DA4 drains to proposed Infiltration Basin (IB2) via storm sewer. DA5 drains directly to proposed IB1 via surface drainage. DA6 drains to IB2 via surface drainage. IB1 outlets to IB2 via storm sewer. DA7 drains south directly off-site via surface drainage. DA8 drains west directly off-site to private storm sewer via surface drainage and an existing culvert. The proposed drainage areas have the following calculated runoff rates from the 24-hour 2, 10, and 100-year storm events:

PROPOSED DRAINAGE			
Drainage Area	**2-Year Runoff (cfs)**	**10-Year Runoff (cfs)**	**100-Year Runoff (cfs)**
DA1	0.57	0.88	1.61
DA2	0.25	0.41	0.82
DA3	0.36	0.57	1.10
DA4	1.00	1.64	3.24
DA5	0.37	0.85	2.31
DA6	0.95	1.86	4.44
DA7	0.04	0.07	0.15
DA8	0.24	0.62	1.76

The proposed infiltration basins and associated outlets have been designed to limit overall proposed site runoff rates to overall pre-developed site runoff rates. Pre-treatment of runoff directed to the proposed infiltration basins are provided via sumps and swales.

Data relating to the performance of the proposed infiltration basins during 24-hour 2, 10, and 100-year storm events is shown in the tables below:

INFILTRATION BASIN (IB1) DATA	
Bottom of Basin	816.75
Basin Outlet	819.00
Top of Basin	821.50
2-year Peak Water Level	818.87
2-year Peak Outflow (cfs)	0.00
10-year Peak Water Level	819.33
10-year Peak Outflow (cfs)	0.33
100-year Peak Water Level	820.30
100-year Peak Discharge (cfs)	1.65

INFILTRATION BASIN (IB2) DATA	
Bottom of Basin	807.00
Basin Overflow	810.00
Top of Basin	811.00
2-year Peak Water Level	810.01
2-year Peak Outflow (cfs)	0.03
10-year Peak Water Level	810.18
10-year Peak Outflow (cfs)	2.31
100-year Peak Water Level	810.43
100-year Peak Discharge (cfs)	8.71

The overflow outlet of Infiltration Basin #2 was sized to limit overflow velocities to reasonable levels in order to limit downstream erosion. These velocities are listed in the table below:

OVERFLOW OUTLET VELOCITIES			
Outlet	**2-Year Velocity (fps)**	**10-Year Velocity (fps)**	**100-Year Velocity (fps)**
IB2 Outlet	0.24	1.03	1.68

A link was used to calculate total proposed runoff rates to the adjacent property to the south from IB2 and DA7. Data relating to the link (L1) during 2, 10 and 100-year storm events is listed below:

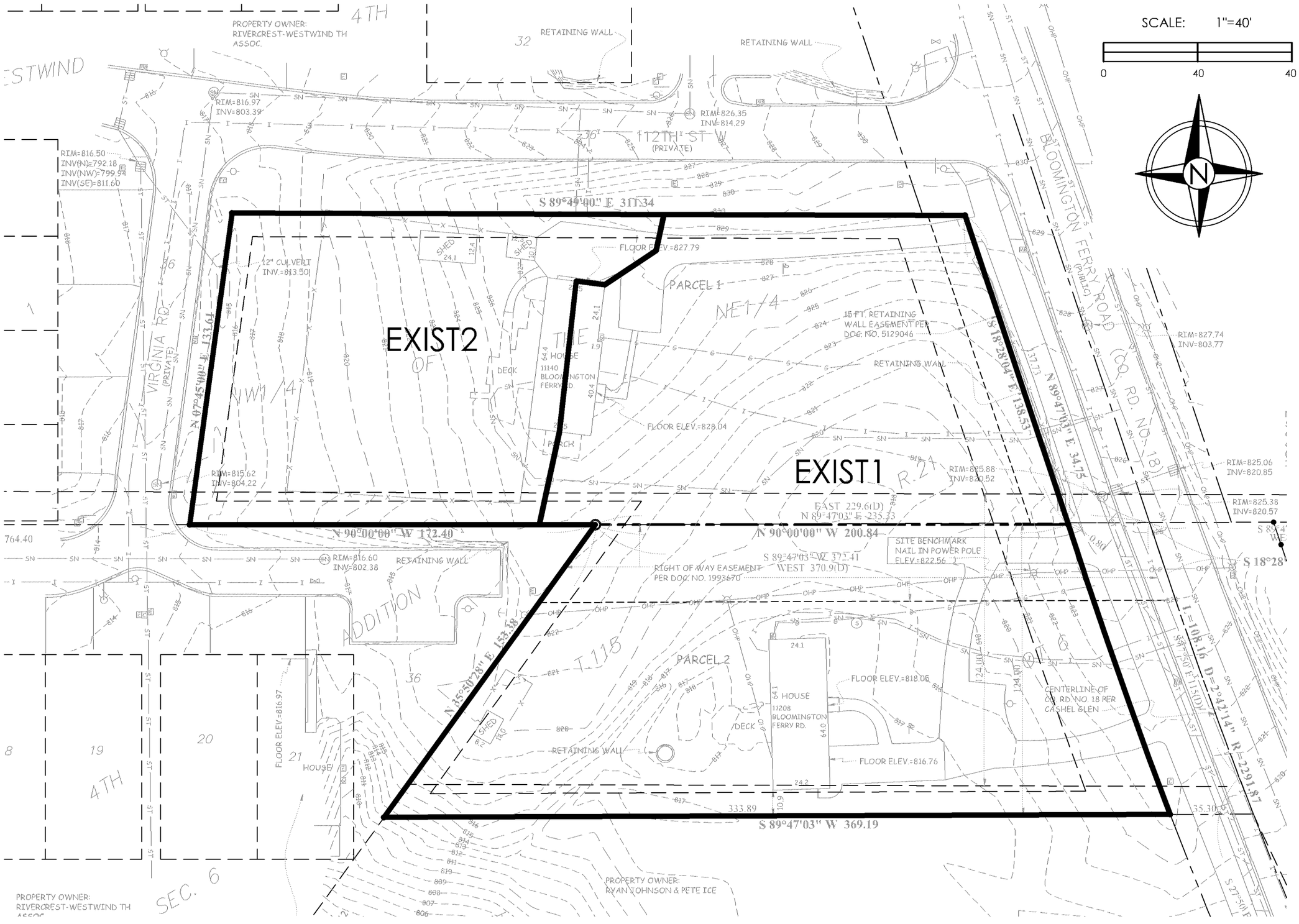
PROPOSED LINK (L1) RUNOFF RATES			
Drainage Area	**2-Year Runoff (cfs)**	**10-Year Runoff (cfs)**	**100-Year Runoff (cfs)**
L1	0.04	2.34	8.85

The total overall proposed runoff rates for the site are compared to the total overall existing runoff rates in the table below. L1 is compared to EXIST1 while DA8 is compared to EXIST2.

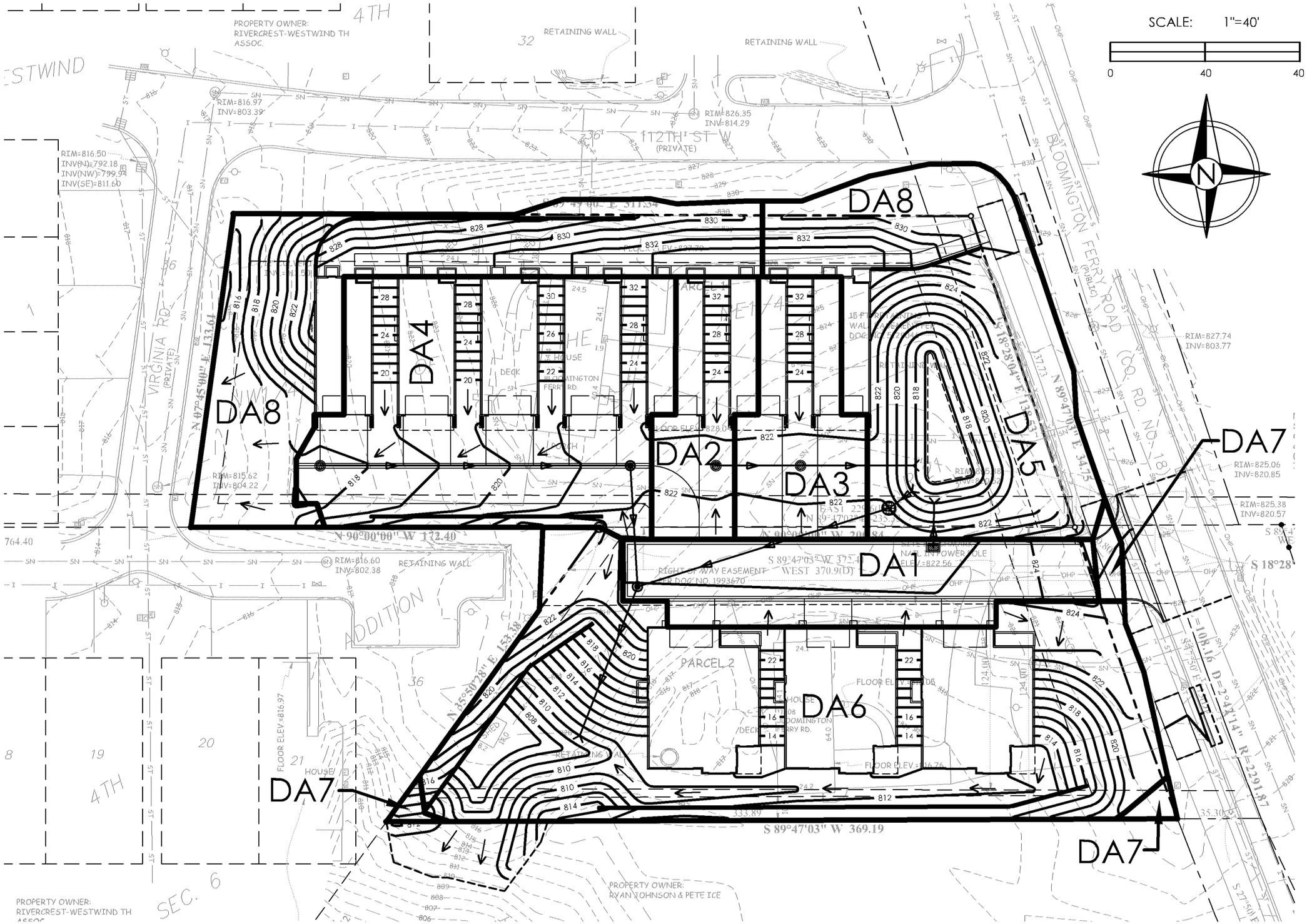
RUNOFF RATE COMPARISON (Discharge to adjacent south property)		
Storm Event	**Existing Runoff (cfs) (EXIST1)**	**Proposed Runoff (L1)**
2-Year Storm	1.46	0.04
10-Year Storm	3.48	2.34
100-Year Storm	9.60	8.85

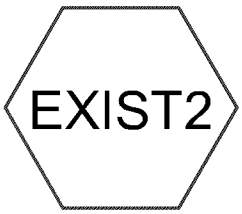
RUNOFF RATE COMPARISON (Discharge to west private storm sewer)		
Storm Event	**Existing Runoff (cfs) (EXIST2)**	**Proposed Runoff (DA8)**
2-Year Storm	0.43	0.24
10-Year Storm	1.09	0.62
100-Year Storm	3.11	1.76

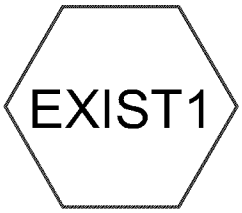
EXISTING DRAINAGE



PROPOSED DRAINAGE







Subcat Reach Pond Link

Routing Diagram for 2-Yr Exist
Prepared by Schultz Engineering And Site Design

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.604	61	>75% Grass cover, Good, HSG B (EXIST1, EXIST2)
0.330	98	Paved parking, HSG B (EXIST1, EXIST2)
1.934	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.934	HSG B	EXIST1, EXIST2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.934		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.604	0.000	0.000	0.000	1.604	>75% Grass cover, Good	EXIST1, EXIST2
0.000	0.330	0.000	0.000	0.000	0.330	Paved parking	EXIST1, EXIST2
0.000	**1.934**	**0.000**	**0.000**	**0.000**	**1.934**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EXIST1: Runoff Area=1.451 ac 17.85% Impervious Runoff Depth>0.72"
Tc=5.0 min CN=61/98 Runoff=1.46 cfs 0.087 af

Subcatchment EXIST2: Runoff Area=0.483 ac 14.70% Impervious Runoff Depth>0.64"
Tc=5.0 min CN=61/98 Runoff=0.43 cfs 0.026 af

Total Runoff Area = 1.934 ac Runoff Volume = 0.113 af Average Runoff Depth = 0.70"
82.94% Pervious = 1.604 ac 17.06% Impervious = 0.330 ac

Summary for Subcatchment EXIST1:

Runoff = 1.46 cfs @ 12.13 hrs, Volume= 0.087 af, Depth> 0.72"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.259	98	Paved parking, HSG B
1.192	61	>75% Grass cover, Good, HSG B
1.451	68	Weighted Average
1.192	61	82.15% Pervious Area
0.259	98	17.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

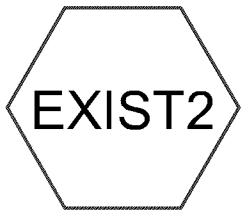
Summary for Subcatchment EXIST2:

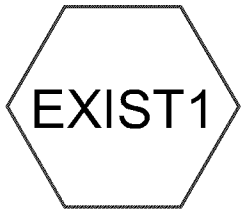
Runoff = 0.43 cfs @ 12.13 hrs, Volume= 0.026 af, Depth> 0.64"

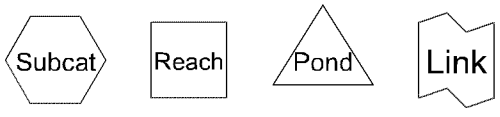
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.071	98	Paved parking, HSG B
0.412	61	>75% Grass cover, Good, HSG B
0.483	66	Weighted Average
0.412	61	85.30% Pervious Area
0.071	98	14.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**







Routing Diagram for 10-Yr Exist
Prepared by Schultz Engineering And Site Design

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.604	61	>75% Grass cover, Good, HSG B (EXIST1, EXIST2)
0.330	98	Paved parking, HSG B (EXIST1, EXIST2)
1.934	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.934	HSG B	EXIST1, EXIST2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.934		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.604	0.000	0.000	0.000	1.604	>75% Grass cover, Good	EXIST1, EXIST2
0.000	0.330	0.000	0.000	0.000	0.330	Paved parking	EXIST1, EXIST2
0.000	**1.934**	**0.000**	**0.000**	**0.000**	**1.934**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EXIST1: Runoff Area=1.451 ac 17.85% Impervious Runoff Depth>1.48"
Tc=5.0 min CN=61/98 Runoff=3.48 cfs 0.180 af

Subcatchment EXIST2: Runoff Area=0.483 ac 14.70% Impervious Runoff Depth>1.39"
Tc=5.0 min CN=61/98 Runoff=1.09 cfs 0.056 af

Total Runoff Area = 1.934 ac Runoff Volume = 0.235 af Average Runoff Depth = 1.46"
82.94% Pervious = 1.604 ac 17.06% Impervious = 0.330 ac

Summary for Subcatchment EXIST1:

Runoff = 3.48 cfs @ 12.12 hrs, Volume= 0.180 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.259	98	Paved parking, HSG B
1.192	61	>75% Grass cover, Good, HSG B
1.451	68	Weighted Average
1.192	61	82.15% Pervious Area
0.259	98	17.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

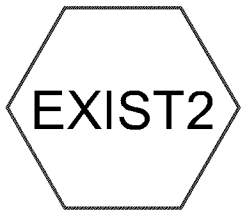
Summary for Subcatchment EXIST2:

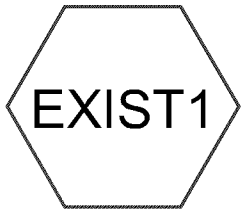
Runoff = 1.09 cfs @ 12.13 hrs, Volume= 0.056 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.071	98	Paved parking, HSG B
0.412	61	>75% Grass cover, Good, HSG B
0.483	66	Weighted Average
0.412	61	85.30% Pervious Area
0.071	98	14.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**





Subcat Reach Pond Link

Routing Diagram for 100-Yr Exist
Prepared by Schultz Engineering And Site Design

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.604	61	>75% Grass cover, Good, HSG B (EXIST1, EXIST2)
0.330	98	Paved parking, HSG B (EXIST1, EXIST2)
1.934	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.934	HSG B	EXIST1, EXIST2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.934		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.604	0.000	0.000	0.000	1.604	>75% Grass cover, Good	EXIST1, EXIST2
0.000	0.330	0.000	0.000	0.000	0.330	Paved parking	EXIST1, EXIST2
0.000	**1.934**	**0.000**	**0.000**	**0.000**	**1.934**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EXIST1: Runoff Area=1.451 ac 17.85% Impervious Runoff Depth>3.82"
Tc=5.0 min CN=61/98 Runoff=9.60 cfs 0.461 af

Subcatchment EXIST2: Runoff Area=0.483 ac 14.70% Impervious Runoff Depth>3.68"
Tc=5.0 min CN=61/98 Runoff=3.11 cfs 0.148 af

Total Runoff Area = 1.934 ac Runoff Volume = 0.610 af Average Runoff Depth = 3.78"
82.94% Pervious = 1.604 ac 17.06% Impervious = 0.330 ac

Summary for Subcatchment EXIST1:

Runoff = 9.60 cfs @ 12.12 hrs, Volume= 0.461 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.259	98	Paved parking, HSG B
1.192	61	>75% Grass cover, Good, HSG B
1.451	68	Weighted Average
1.192	61	82.15% Pervious Area
0.259	98	17.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

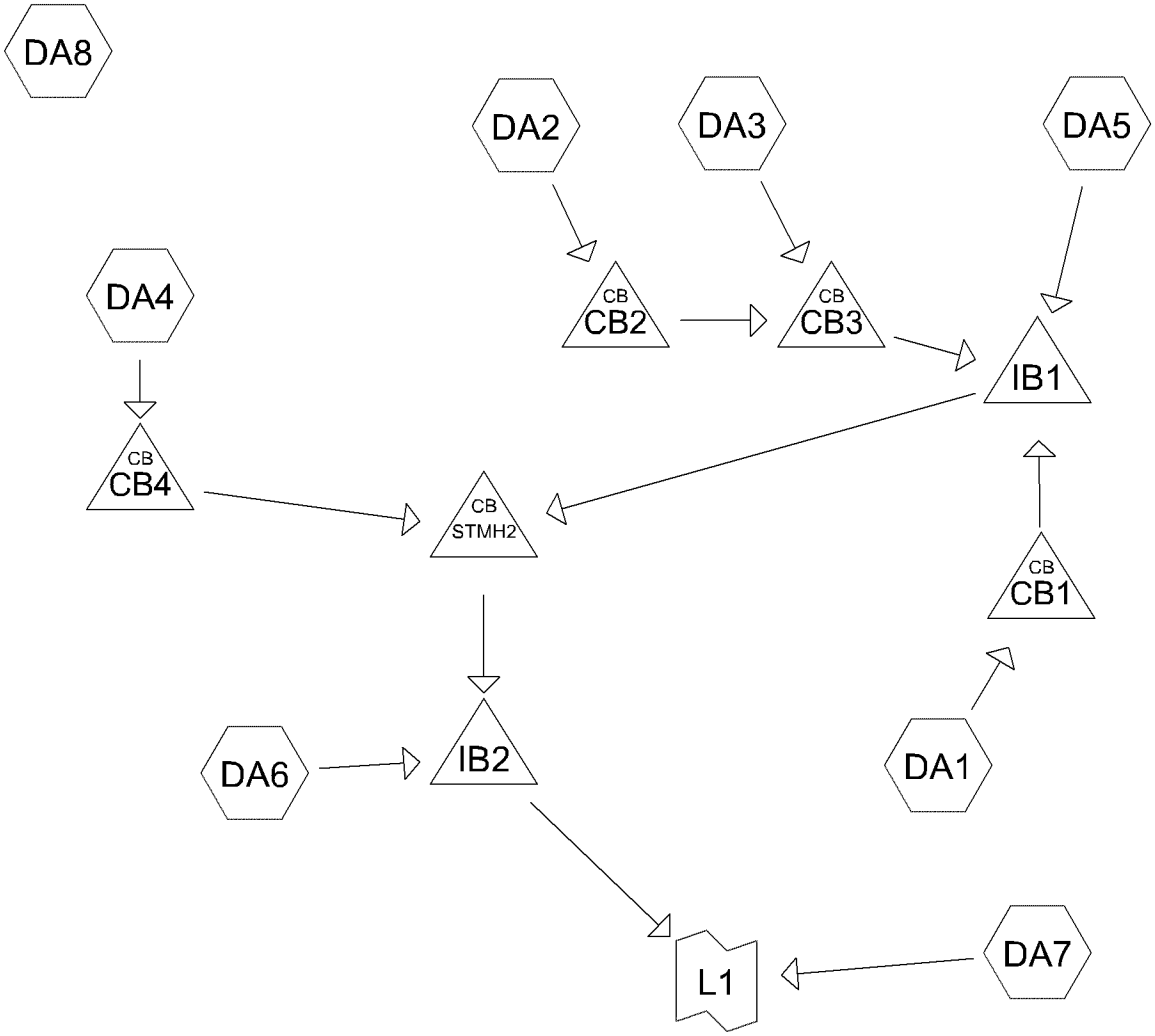
Summary for Subcatchment EXIST2:

Runoff = 3.11 cfs @ 12.12 hrs, Volume= 0.148 af, Depth> 3.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.071	98	Paved parking, HSG B
0.412	61	>75% Grass cover, Good, HSG B
0.483	66	Weighted Average
0.412	61	85.30% Pervious Area
0.071	98	14.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**



Subcat Reach Pond Link

Routing Diagram for 2-Yr Proposed
Prepared by Schultz Engineering And Site Design

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.111	61	>75% Grass cover, Good, HSG B (DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8)
0.823	98	Paved parking, HSG B (DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8)
1.934	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.934	HSG B	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.934		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.111	0.000	0.000	0.000	1.111	>75% Grass cover, Good	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	0.823	0.000	0.000	0.000	0.823	Paved parking	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	**1.934**	**0.000**	**0.000**	**0.000**	**1.934**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	CB1	819.10	819.00	20.0	0.0050	0.012	0.0	12.0	0.0
2	CB2	818.70	818.51	36.0	0.0053	0.012	0.0	12.0	0.0
3	CB3	818.51	818.25	48.0	0.0054	0.012	0.0	12.0	0.0
4	CB4	815.10	811.38	184.0	0.0202	0.012	0.0	12.0	0.0
5	IB1	819.00	811.38	112.0	0.0680	0.012	0.0	12.0	0.0
6	STMH2	811.38	810.00	68.0	0.0203	0.012	0.0	12.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA1: Runoff Area=0.154 ac 87.66% Impervious Runoff Depth>2.32"
Tc=5.0 min CN=61/98 Runoff=0.57 cfs 0.030 af

Subcatchment DA2: Runoff Area=0.089 ac 64.04% Impervious Runoff Depth>1.78"
Tc=5.0 min CN=61/98 Runoff=0.25 cfs 0.013 af

Subcatchment DA3: Runoff Area=0.114 ac 72.81% Impervious Runoff Depth>1.98"
Tc=5.0 min CN=61/98 Runoff=0.36 cfs 0.019 af

Subcatchment DA4: Runoff Area=0.348 ac 66.67% Impervious Runoff Depth>1.84"
Tc=5.0 min CN=61/98 Runoff=1.00 cfs 0.053 af

Subcatchment DA5: Runoff Area=0.345 ac 19.42% Impervious Runoff Depth>0.75"
Tc=5.0 min CN=61/98 Runoff=0.37 cfs 0.022 af

Subcatchment DA6: Runoff Area=0.593 ac 33.73% Impervious Runoff Depth>1.08"
Tc=5.0 min CN=61/98 Runoff=0.95 cfs 0.054 af

Subcatchment DA7: Runoff Area=0.018 ac 50.00% Impervious Runoff Depth>1.46"
Tc=5.0 min CN=61/98 Runoff=0.04 cfs 0.002 af

Subcatchment DA8: Runoff Area=0.273 ac 14.65% Impervious Runoff Depth>0.64"
Tc=5.0 min CN=61/98 Runoff=0.24 cfs 0.015 af

Pond CB1: Peak Elev=819.55' Inflow=0.57 cfs 0.030 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0050 '/' Outflow=0.57 cfs 0.030 af

Pond CB2: Peak Elev=819.05' Inflow=0.25 cfs 0.013 af
12.0" Round Culvert n=0.012 L=36.0' S=0.0053 '/' Outflow=0.25 cfs 0.013 af

Pond CB3: Peak Elev=818.95' Inflow=0.60 cfs 0.032 af
12.0" Round Culvert n=0.012 L=48.0' S=0.0054 '/' Outflow=0.60 cfs 0.032 af

Pond CB4: Peak Elev=815.62' Inflow=1.00 cfs 0.053 af
12.0" Round Culvert n=0.012 L=184.0' S=0.0202 '/' Outflow=1.00 cfs 0.053 af

Pond IB1: Peak Elev=818.87' Storage=0.057 af Inflow=1.53 cfs 0.084 af
Discarded=0.03 cfs 0.039 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.039 af

Pond IB2: Peak Elev=810.01' Storage=0.075 af Inflow=1.95 cfs 0.107 af
Discarded=0.03 cfs 0.039 af Primary=0.03 cfs 0.003 af Outflow=0.06 cfs 0.042 af

Pond STMH2: Peak Elev=811.90' Inflow=1.00 cfs 0.053 af
12.0" Round Culvert n=0.012 L=68.0' S=0.0203 '/' Outflow=1.00 cfs 0.053 af

Link L1: Inflow=0.04 cfs 0.005 af
Primary=0.04 cfs 0.005 af

Total Runoff Area = 1.934 ac Runoff Volume = 0.207 af Average Runoff Depth = 1.29"
57.45% Pervious = 1.111 ac 42.55% Impervious = 0.823 ac

Summary for Subcatchment DA1:

Runoff = 0.57 cfs @ 12.11 hrs, Volume= 0.030 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.135	98	Paved parking, HSG B
0.019	61	>75% Grass cover, Good, HSG B
0.154	93	Weighted Average
0.019	61	12.34% Pervious Area
0.135	98	87.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA2:

Runoff = 0.25 cfs @ 12.11 hrs, Volume= 0.013 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.057	98	Paved parking, HSG B
0.032	61	>75% Grass cover, Good, HSG B
0.089	85	Weighted Average
0.032	61	35.96% Pervious Area
0.057	98	64.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA3:

Runoff = 0.36 cfs @ 12.11 hrs, Volume= 0.019 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.083	98	Paved parking, HSG B
0.031	61	>75% Grass cover, Good, HSG B
0.114	88	Weighted Average
0.031	61	27.19% Pervious Area
0.083	98	72.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA4:

Runoff = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af, Depth> 1.84"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.232	98	Paved parking, HSG B
0.116	61	>75% Grass cover, Good, HSG B
0.348	86	Weighted Average
0.116	61	33.33% Pervious Area
0.232	98	66.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA5:

Runoff = 0.37 cfs @ 12.13 hrs, Volume= 0.022 af, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG B
0.278	61	>75% Grass cover, Good, HSG B
0.345	68	Weighted Average
0.278	61	80.58% Pervious Area
0.067	98	19.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA6:

Runoff = 0.95 cfs @ 12.12 hrs, Volume= 0.054 af, Depth> 1.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG B
0.393	61	>75% Grass cover, Good, HSG B
0.593	73	Weighted Average
0.393	61	66.27% Pervious Area
0.200	98	33.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA7:

Runoff = 0.04 cfs @ 12.12 hrs, Volume= 0.002 af, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.009	98	Paved parking, HSG B
0.009	61	>75% Grass cover, Good, HSG B
0.018	80	Weighted Average
0.009	61	50.00% Pervious Area
0.009	98	50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA8:

Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.015 af, Depth> 0.64"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=2.84"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG B
0.233	61	>75% Grass cover, Good, HSG B
0.273	66	Weighted Average
0.233	61	85.35% Pervious Area
0.040	98	14.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Pond CB1:

Inflow Area = 0.154 ac, 87.66% Impervious, Inflow Depth > 2.32"
Inflow = 0.57 cfs @ 12.11 hrs, Volume= 0.030 af
Outflow = 0.57 cfs @ 12.11 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min
Primary = 0.57 cfs @ 12.11 hrs, Volume= 0.030 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 819.55' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	819.10'	**12.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 819.10' / 819.00' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.55 cfs @ 12.11 hrs HW=819.54' TW=818.12' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.55 cfs @ 2.43 fps)

Summary for Pond CB2:

Inflow Area = 0.089 ac, 64.04% Impervious, Inflow Depth > 1.78"
Inflow = 0.25 cfs @ 12.11 hrs, Volume= 0.013 af
Outflow = 0.25 cfs @ 12.11 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.11 hrs, Volume= 0.013 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 819.05' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	818.70'	**12.0" Round Culvert** L= 36.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 818.70' / 818.51' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.11 hrs HW=819.03' TW=818.94' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.19 cfs @ 1.27 fps)

Summary for Pond CB3:

Inflow Area = 0.203 ac, 68.97% Impervious, Inflow Depth > 1.89"
Inflow = 0.60 cfs @ 12.11 hrs, Volume= 0.032 af
Outflow = 0.60 cfs @ 12.11 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 12.11 hrs, Volume= 0.032 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 818.95' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	818.51'	**12.0" Round Culvert** L= 48.0' CMP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 818.51' / 818.25' S= 0.0054 '/' Cc= 0.900
n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.58 cfs @ 12.11 hrs HW=818.94' TW=818.12' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.58 cfs @ 2.62 fps)

Summary for Pond CB4:

Inflow Area = 0.348 ac, 66.67% Impervious, Inflow Depth > 1.84"
Inflow = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af
Outflow = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min
Primary = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 815.62' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	815.10'	**12.0" Round Culvert**
			L= 184.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 815.10' / 811.38' S= 0.0202 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.96 cfs @ 12.11 hrs HW=815.61' TW=811.89' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.96 cfs @ 2.42 fps)

Summary for Pond IB1:

Inflow Area = 0.702 ac, 48.72% Impervious, Inflow Depth > 1.43"
Inflow = 1.53 cfs @ 12.12 hrs, Volume= 0.084 af
Outflow = 0.03 cfs @ 15.07 hrs, Volume= 0.039 af, Atten= 98%, Lag= 177.0 min
Discarded = 0.03 cfs @ 15.07 hrs, Volume= 0.039 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 818.87' @ 15.07 hrs Surf.Area= 0.043 ac Storage= 0.057 af

Plug-Flow detention time= 314.4 min calculated for 0.039 af (47% of inflow)
Center-of-Mass det. time= 215.7 min (982.6 - 766.9)

Volume	Invert	Avail.Storage	Storage Description
#1	816.75'	0.234 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
816.75	0.013	0.000	0.000
817.00	0.016	0.004	0.004
818.00	0.029	0.022	0.026
819.00	0.045	0.037	0.063
820.00	0.063	0.054	0.117
821.00	0.083	0.073	0.190
821.50	0.094	0.044	0.234

Device	Routing	Invert	Outlet Devices
#1	Primary	819.00'	**12.0" Round Culvert** L= 112.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 819.00' / 811.38' S= 0.0680 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	819.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	816.75'	**0.800 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 15.07 hrs HW=818.87' (Free Discharge)
↑—**3=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=816.75' TW=811.38' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond IB2:

Inflow Area = 1.643 ac, 47.11% Impervious, Inflow Depth > 0.78"
Inflow = 1.95 cfs @ 12.12 hrs, Volume= 0.107 af
Outflow = 0.06 cfs @ 14.04 hrs, Volume= 0.042 af, Atten= 97%, Lag= 115.2 min
Discarded = 0.03 cfs @ 14.04 hrs, Volume= 0.039 af
Primary = 0.03 cfs @ 14.04 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 810.01' @ 14.04 hrs Surf.Area= 0.042 ac Storage= 0.075 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 209.1 min (977.5 - 768.4)

Volume	Invert	Avail.Storage	Storage Description
#1	807.00'	0.124 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
807.00	0.011	0.000	0.000
808.00	0.019	0.015	0.015
809.00	0.029	0.024	0.039
810.00	0.042	0.036	0.075
811.00	0.057	0.050	0.124

Device	Routing	Invert	Outlet Devices
#1	Discarded	807.00'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	810.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.03 cfs @ 14.04 hrs HW=810.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.03 cfs @ 14.04 hrs HW=810.01' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.24 fps)

Summary for Pond STMH2:

Inflow Area = 1.050 ac, 54.67% Impervious, Inflow Depth > 0.61"
Inflow = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af
Outflow = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min
Primary = 1.00 cfs @ 12.11 hrs, Volume= 0.053 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 811.90' @ 12.11 hrs

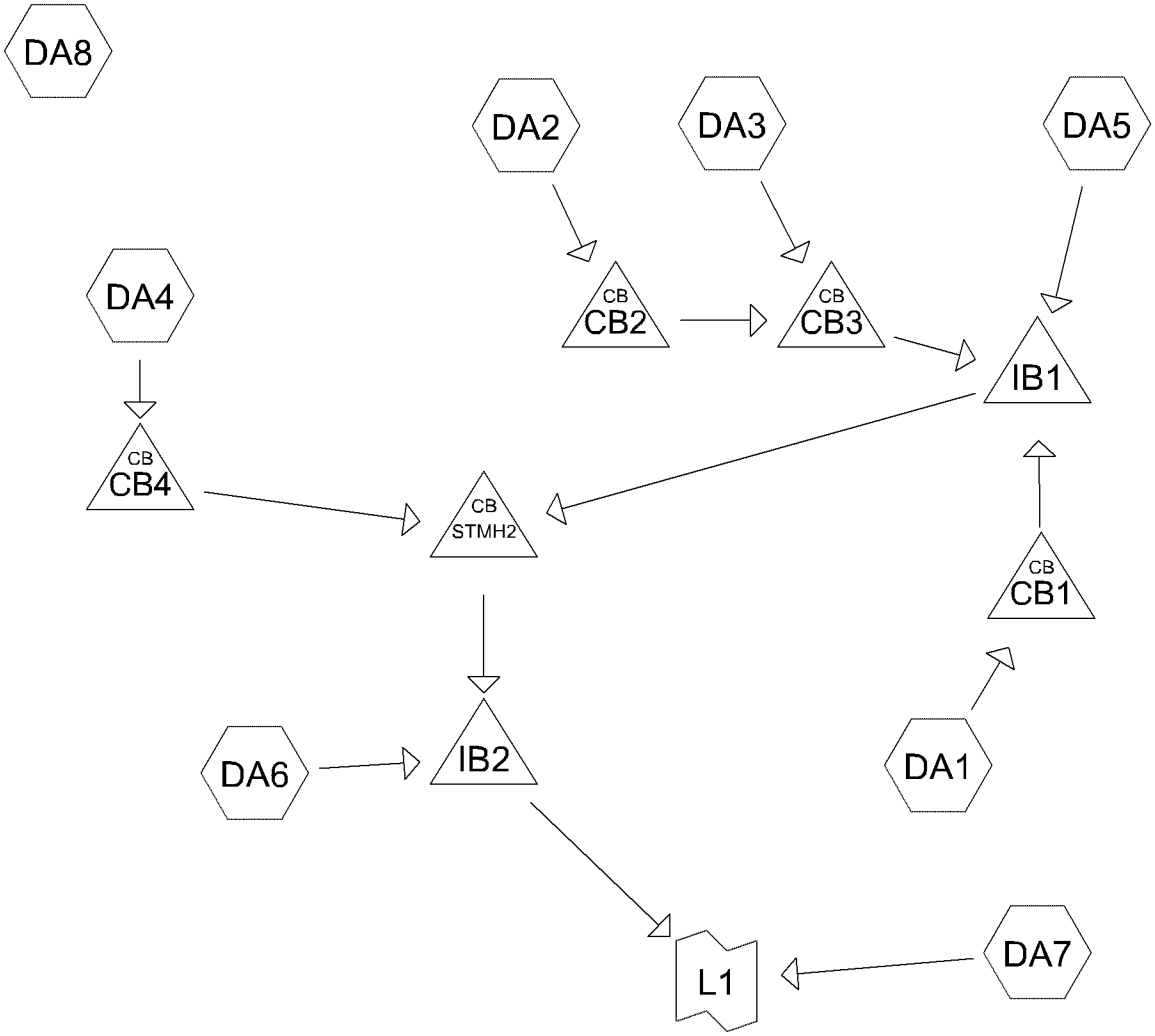
Device	Routing	Invert	Outlet Devices
#1	Primary	811.38'	**12.0" Round Culvert** L= 68.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 811.38' / 810.00' S= 0.0203 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.96 cfs @ 12.11 hrs HW=811.89' TW=809.03' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.96 cfs @ 2.42 fps)

Summary for Link L1:

Inflow Area = 1.661 ac, 47.14% Impervious, Inflow Depth > 0.04"
Inflow = 0.04 cfs @ 12.12 hrs, Volume= 0.005 af
Primary = 0.04 cfs @ 12.12 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for 10-Yr Proposed
Prepared by Schultz Engineering And Site Design

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.111	61	>75% Grass cover, Good, HSG B (DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8)
0.823	98	Paved parking, HSG B (DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8)
1.934	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.934	HSG B	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.934		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.111	0.000	0.000	0.000	1.111	>75% Grass cover, Good	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	0.823	0.000	0.000	0.000	0.823	Paved parking	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	**1.934**	**0.000**	**0.000**	**0.000**	**1.934**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	CB1	819.10	819.00	20.0	0.0050	0.012	0.0	12.0	0.0
2	CB2	818.70	818.51	36.0	0.0053	0.012	0.0	12.0	0.0
3	CB3	818.51	818.25	48.0	0.0054	0.012	0.0	12.0	0.0
4	CB4	815.10	811.38	184.0	0.0202	0.012	0.0	12.0	0.0
5	IB1	819.00	811.38	112.0	0.0680	0.012	0.0	12.0	0.0
6	STMH2	811.38	810.00	68.0	0.0203	0.012	0.0	12.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA1: Runoff Area=0.154 ac 87.66% Impervious Runoff Depth>3.63"
Tc=5.0 min CN=61/98 Runoff=0.88 cfs 0.047 af

Subcatchment DA2: Runoff Area=0.089 ac 64.04% Impervious Runoff Depth>2.90"
Tc=5.0 min CN=61/98 Runoff=0.41 cfs 0.022 af

Subcatchment DA3: Runoff Area=0.114 ac 72.81% Impervious Runoff Depth>3.17"
Tc=5.0 min CN=61/98 Runoff=0.57 cfs 0.030 af

Subcatchment DA4: Runoff Area=0.348 ac 66.67% Impervious Runoff Depth>2.98"
Tc=5.0 min CN=61/98 Runoff=1.64 cfs 0.086 af

Subcatchment DA5: Runoff Area=0.345 ac 19.42% Impervious Runoff Depth>1.53"
Tc=5.0 min CN=61/98 Runoff=0.85 cfs 0.044 af

Subcatchment DA6: Runoff Area=0.593 ac 33.73% Impervious Runoff Depth>1.97"
Tc=5.0 min CN=61/98 Runoff=1.86 cfs 0.097 af

Subcatchment DA7: Runoff Area=0.018 ac 50.00% Impervious Runoff Depth>2.47"
Tc=5.0 min CN=61/98 Runoff=0.07 cfs 0.004 af

Subcatchment DA8: Runoff Area=0.273 ac 14.65% Impervious Runoff Depth>1.39"
Tc=5.0 min CN=61/98 Runoff=0.62 cfs 0.032 af

Pond CB1: Peak Elev=819.67' Inflow=0.88 cfs 0.047 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0050 '/' Outflow=0.88 cfs 0.047 af

Pond CB2: Peak Elev=819.33' Inflow=0.41 cfs 0.022 af
12.0" Round Culvert n=0.012 L=36.0' S=0.0053 '/' Outflow=0.41 cfs 0.022 af

Pond CB3: Peak Elev=819.33' Inflow=0.98 cfs 0.052 af
12.0" Round Culvert n=0.012 L=48.0' S=0.0054 '/' Outflow=0.98 cfs 0.052 af

Pond CB4: Peak Elev=815.79' Inflow=1.64 cfs 0.086 af
12.0" Round Culvert n=0.012 L=184.0' S=0.0202 '/' Outflow=1.64 cfs 0.086 af

Pond IB1: Peak Elev=819.33' Storage=0.079 af Inflow=2.70 cfs 0.142 af
Discarded=0.04 cfs 0.045 af Primary=0.33 cfs 0.040 af Outflow=0.38 cfs 0.086 af

Pond IB2: Peak Elev=810.18' Storage=0.082 af Inflow=3.50 cfs 0.224 af
Discarded=0.04 cfs 0.042 af Primary=2.31 cfs 0.112 af Outflow=2.35 cfs 0.154 af

Pond STMH2: Peak Elev=812.07' Inflow=1.64 cfs 0.127 af
12.0" Round Culvert n=0.012 L=68.0' S=0.0203 '/' Outflow=1.64 cfs 0.127 af

Link L1: Inflow=2.34 cfs 0.116 af
Primary=2.34 cfs 0.116 af

Total Runoff Area = 1.934 ac Runoff Volume = 0.361 af Average Runoff Depth = 2.24"
57.45% Pervious = 1.111 ac 42.55% Impervious = 0.823 ac

Summary for Subcatchment DA1:

Runoff = 0.88 cfs @ 12.11 hrs, Volume= 0.047 af, Depth> 3.63"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.135	98	Paved parking, HSG B
0.019	61	>75% Grass cover, Good, HSG B
0.154	93	Weighted Average
0.019	61	12.34% Pervious Area
0.135	98	87.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA2:

Runoff = 0.41 cfs @ 12.11 hrs, Volume= 0.022 af, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.057	98	Paved parking, HSG B
0.032	61	>75% Grass cover, Good, HSG B
0.089	85	Weighted Average
0.032	61	35.96% Pervious Area
0.057	98	64.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA3:

Runoff = 0.57 cfs @ 12.11 hrs, Volume= 0.030 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.083	98	Paved parking, HSG B
0.031	61	>75% Grass cover, Good, HSG B
0.114	88	Weighted Average
0.031	61	27.19% Pervious Area
0.083	98	72.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA4:

Runoff = 1.64 cfs @ 12.11 hrs, Volume= 0.086 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.232	98	Paved parking, HSG B
0.116	61	>75% Grass cover, Good, HSG B
0.348	86	Weighted Average
0.116	61	33.33% Pervious Area
0.232	98	66.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA5:

Runoff = 0.85 cfs @ 12.12 hrs, Volume= 0.044 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG B
0.278	61	>75% Grass cover, Good, HSG B
0.345	68	Weighted Average
0.278	61	80.58% Pervious Area
0.067	98	19.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA6:

Runoff = 1.86 cfs @ 12.12 hrs, Volume= 0.097 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG B
0.393	61	>75% Grass cover, Good, HSG B
0.593	73	Weighted Average
0.393	61	66.27% Pervious Area
0.200	98	33.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA7:

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.004 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.009	98	Paved parking, HSG B
0.009	61	>75% Grass cover, Good, HSG B
0.018	80	Weighted Average
0.009	61	50.00% Pervious Area
0.009	98	50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA8:

Runoff = 0.62 cfs @ 12.13 hrs, Volume= 0.032 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=4.24"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG B
0.233	61	>75% Grass cover, Good, HSG B
0.273	66	Weighted Average
0.233	61	85.35% Pervious Area
0.040	98	14.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Pond CB1:

Inflow Area = 0.154 ac, 87.66% Impervious, Inflow Depth > 3.63"
Inflow = 0.88 cfs @ 12.11 hrs, Volume= 0.047 af
Outflow = 0.88 cfs @ 12.11 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.88 cfs @ 12.11 hrs, Volume= 0.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 819.67' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	819.10'	**12.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 819.10' / 819.00' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.11 hrs HW=819.66' TW=818.73' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.85 cfs @ 2.70 fps)

Summary for Pond CB2:

Inflow Area = 0.089 ac, 64.04% Impervious, Inflow Depth > 2.90"
Inflow = 0.41 cfs @ 12.11 hrs, Volume= 0.022 af
Outflow = 0.41 cfs @ 12.11 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.41 cfs @ 12.11 hrs, Volume= 0.022 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 819.33' @ 12.62 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	818.70'	**12.0" Round Culvert** L= 36.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 818.70' / 818.51' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.28 cfs @ 12.11 hrs HW=819.15' TW=819.08' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.28 cfs @ 1.23 fps)

Summary for Pond CB3:

Inflow Area = 0.203 ac, 68.97% Impervious, Inflow Depth > 3.05"
Inflow = 0.98 cfs @ 12.11 hrs, Volume= 0.052 af
Outflow = 0.98 cfs @ 12.11 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min
Primary = 0.98 cfs @ 12.11 hrs, Volume= 0.052 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 819.33' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	818.51'	**12.0" Round Culvert** L= 48.0' CMP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 818.51' / 818.25' S= 0.0054 '/' Cc= 0.900
n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.86 cfs @ 12.11 hrs HW=819.08' TW=818.74' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.86 cfs @ 2.70 fps)

Summary for Pond CB4:

Inflow Area = 0.348 ac, 66.67% Impervious, Inflow Depth > 2.98"
Inflow = 1.64 cfs @ 12.11 hrs, Volume= 0.086 af
Outflow = 1.64 cfs @ 12.11 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min
Primary = 1.64 cfs @ 12.11 hrs, Volume= 0.086 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 815.79' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	815.10'	**12.0" Round Culvert**
			L= 184.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 815.10' / 811.38' S= 0.0202 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.57 cfs @ 12.11 hrs HW=815.77' TW=812.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.57 cfs @ 2.80 fps)

Summary for Pond IB1:

Inflow Area = 0.702 ac, 48.72% Impervious, Inflow Depth > 2.43"
Inflow = 2.70 cfs @ 12.12 hrs, Volume= 0.142 af
Outflow = 0.38 cfs @ 12.53 hrs, Volume= 0.086 af, Atten= 86%, Lag= 25.0 min
Discarded = 0.04 cfs @ 12.53 hrs, Volume= 0.045 af
Primary = 0.33 cfs @ 12.53 hrs, Volume= 0.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 819.33' @ 12.53 hrs Surf.Area= 0.051 ac Storage= 0.079 af

Plug-Flow detention time= 210.8 min calculated for 0.086 af (60% of inflow)
Center-of-Mass det. time= 124.8 min (890.7 - 765.9)

Volume	Invert	Avail.Storage	Storage Description
#1	816.75'	0.234 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
816.75	0.013	0.000	0.000
817.00	0.016	0.004	0.004
818.00	0.029	0.022	0.026
819.00	0.045	0.037	0.063
820.00	0.063	0.054	0.117
821.00	0.083	0.073	0.190
821.50	0.094	0.044	0.234

Device	Routing	Invert	Outlet Devices
#1	Primary	819.00'	**12.0" Round Culvert** L= 112.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 819.00' / 811.38' S= 0.0680 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	819.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	816.75'	**0.800 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.53 hrs HW=819.33' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.33 cfs @ 12.53 hrs HW=819.33' TW=811.75' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.33 cfs of 0.44 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 1.95 fps)

Summary for Pond IB2:

Inflow Area = 1.643 ac, 47.11% Impervious, Inflow Depth > 1.64"
Inflow = 3.50 cfs @ 12.12 hrs, Volume= 0.224 af
Outflow = 2.35 cfs @ 12.21 hrs, Volume= 0.154 af, Atten= 33%, Lag= 5.7 min
Discarded = 0.04 cfs @ 12.21 hrs, Volume= 0.042 af
Primary = 2.31 cfs @ 12.21 hrs, Volume= 0.112 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 810.18' @ 12.21 hrs Surf.Area= 0.045 ac Storage= 0.082 af

Plug-Flow detention time= 136.9 min calculated for 0.154 af (69% of inflow)
Center-of-Mass det. time= 64.9 min (840.3 - 775.4)

Volume	Invert	Avail.Storage	Storage Description
#1	807.00'	0.124 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
807.00	0.011	0.000	0.000
808.00	0.019	0.015	0.015
809.00	0.029	0.024	0.039
810.00	0.042	0.036	0.075
811.00	0.057	0.050	0.124

Device	Routing	Invert	Outlet Devices
#1	Discarded	807.00'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	810.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.04 cfs @ 12.21 hrs HW=810.17' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=2.11 cfs @ 12.21 hrs HW=810.17' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 2.11 cfs @ 1.03 fps)

Summary for Pond STMH2:

Inflow Area = 1.050 ac, 54.67% Impervious, Inflow Depth > 1.45"
Inflow = 1.64 cfs @ 12.11 hrs, Volume= 0.127 af
Outflow = 1.64 cfs @ 12.11 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min
Primary = 1.64 cfs @ 12.11 hrs, Volume= 0.127 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 812.07' @ 12.11 hrs

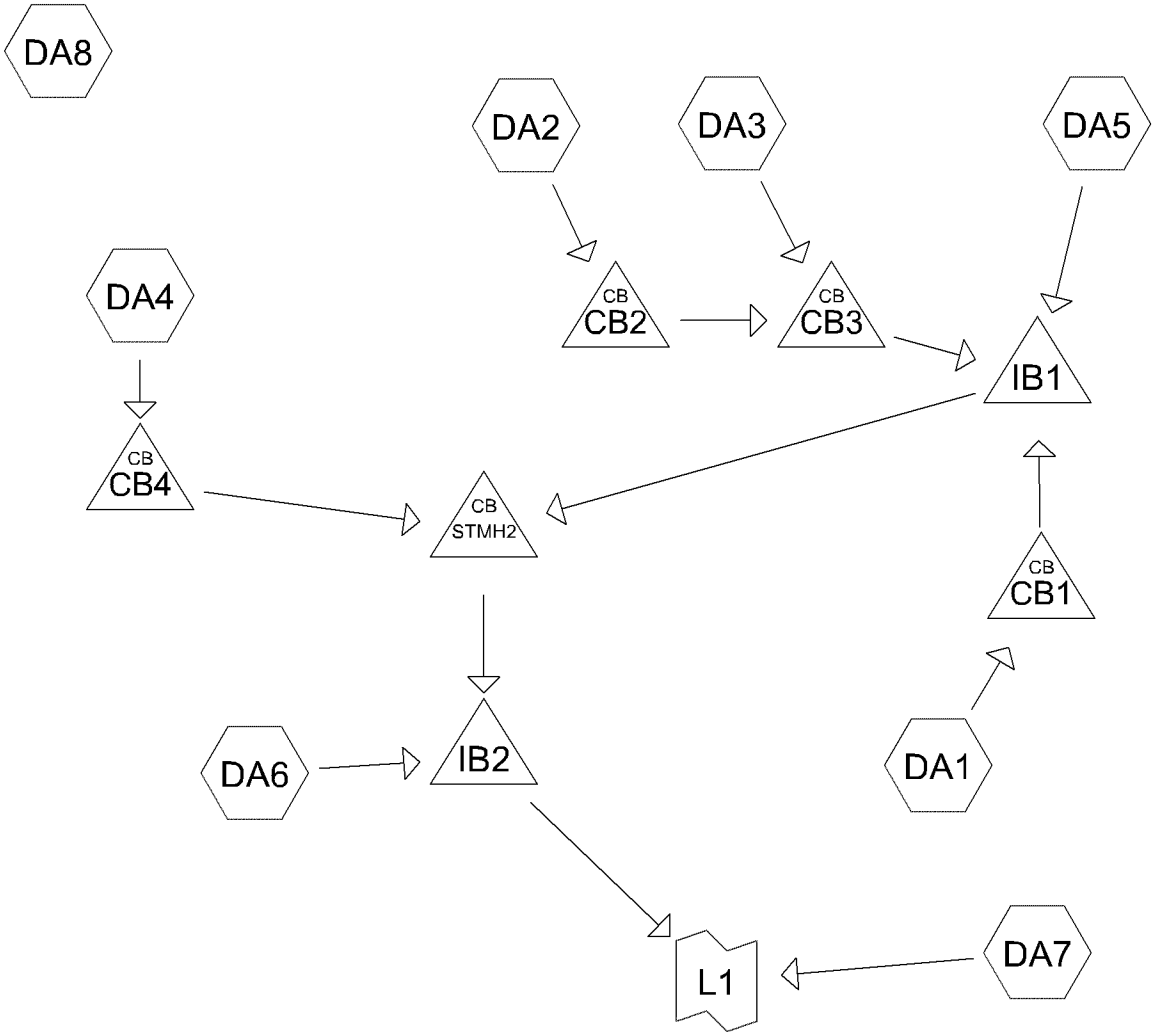
Device	Routing	Invert	Outlet Devices
#1	Primary	811.38'	**12.0" Round Culvert** L= 68.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 811.38' / 810.00' S= 0.0203 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.57 cfs @ 12.11 hrs HW=812.05' TW=809.86' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.57 cfs @ 2.80 fps)

Summary for Link L1:

Inflow Area = 1.661 ac, 47.14% Impervious, Inflow Depth = 0.84"
Inflow = 2.34 cfs @ 12.21 hrs, Volume= 0.116 af
Primary = 2.34 cfs @ 12.21 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for 100-Yr Proposed
Prepared by Schultz Engineering And Site Design

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.111	61	>75% Grass cover, Good, HSG B (DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8)
0.823	98	Paved parking, HSG B (DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8)
1.934	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.934	HSG B	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.934		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.111	0.000	0.000	0.000	1.111	>75% Grass cover, Good	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	0.823	0.000	0.000	0.000	0.823	Paved parking	DA1, DA2, DA3, DA4, DA5, DA6, DA7, DA8
0.000	**1.934**	**0.000**	**0.000**	**0.000**	**1.934**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	CB1	819.10	819.00	20.0	0.0050	0.012	0.0	12.0	0.0
2	CB2	818.70	818.51	36.0	0.0053	0.012	0.0	12.0	0.0
3	CB3	818.51	818.25	48.0	0.0054	0.012	0.0	12.0	0.0
4	CB4	815.10	811.38	184.0	0.0202	0.012	0.0	12.0	0.0
5	IB1	819.00	811.38	112.0	0.0680	0.012	0.0	12.0	0.0
6	STMH2	811.38	810.00	68.0	0.0203	0.012	0.0	12.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA1: Runoff Area=0.154 ac 87.66% Impervious Runoff Depth>6.74"
Tc=5.0 min CN=61/98 Runoff=1.61 cfs 0.087 af

Subcatchment DA2: Runoff Area=0.089 ac 64.04% Impervious Runoff Depth>5.75"
Tc=5.0 min CN=61/98 Runoff=0.82 cfs 0.043 af

Subcatchment DA3: Runoff Area=0.114 ac 72.81% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=61/98 Runoff=1.10 cfs 0.058 af

Subcatchment DA4: Runoff Area=0.348 ac 66.67% Impervious Runoff Depth>5.86"
Tc=5.0 min CN=61/98 Runoff=3.24 cfs 0.170 af

Subcatchment DA5: Runoff Area=0.345 ac 19.42% Impervious Runoff Depth>3.88"
Tc=5.0 min CN=61/98 Runoff=2.31 cfs 0.112 af

Subcatchment DA6: Runoff Area=0.593 ac 33.73% Impervious Runoff Depth>4.48"
Tc=5.0 min CN=61/98 Runoff=4.44 cfs 0.221 af

Subcatchment DA7: Runoff Area=0.018 ac 50.00% Impervious Runoff Depth>5.16"
Tc=5.0 min CN=61/98 Runoff=0.15 cfs 0.008 af

Subcatchment DA8: Runoff Area=0.273 ac 14.65% Impervious Runoff Depth>3.68"
Tc=5.0 min CN=61/98 Runoff=1.76 cfs 0.084 af

Pond CB1: Peak Elev=820.31' Inflow=1.61 cfs 0.087 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0050 '/' Outflow=1.61 cfs 0.087 af

Pond CB2: Peak Elev=820.32' Inflow=0.82 cfs 0.043 af
12.0" Round Culvert n=0.012 L=36.0' S=0.0053 '/' Outflow=0.82 cfs 0.043 af

Pond CB3: Peak Elev=820.32' Inflow=1.92 cfs 0.101 af
12.0" Round Culvert n=0.012 L=48.0' S=0.0054 '/' Outflow=1.92 cfs 0.101 af

Pond CB4: Peak Elev=816.33' Inflow=3.24 cfs 0.170 af
12.0" Round Culvert n=0.012 L=184.0' S=0.0202 '/' Outflow=3.24 cfs 0.170 af

Pond IB1: Peak Elev=820.30' Storage=0.137 af Inflow=5.84 cfs 0.299 af
Discarded=0.06 cfs 0.051 af Primary=1.65 cfs 0.186 af Outflow=1.71 cfs 0.237 af

Pond IB2: Peak Elev=810.43' Storage=0.094 af Inflow=8.95 cfs 0.577 af
Discarded=0.04 cfs 0.046 af Primary=8.71 cfs 0.458 af Outflow=8.75 cfs 0.503 af

Pond STMH2: Peak Elev=813.28' Inflow=4.50 cfs 0.356 af
12.0" Round Culvert n=0.012 L=68.0' S=0.0203 '/' Outflow=4.50 cfs 0.356 af

Link L1: Inflow=8.85 cfs 0.465 af
Primary=8.85 cfs 0.465 af

Total Runoff Area = 1.934 ac Runoff Volume = 0.782 af Average Runoff Depth = 4.85"
57.45% Pervious = 1.111 ac 42.55% Impervious = 0.823 ac

Summary for Subcatchment DA1:

Runoff = 1.61 cfs @ 12.11 hrs, Volume= 0.087 af, Depth> 6.74"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.135	98	Paved parking, HSG B
0.019	61	>75% Grass cover, Good, HSG B
0.154	93	Weighted Average
0.019	61	12.34% Pervious Area
0.135	98	87.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA2:

Runoff = 0.82 cfs @ 12.11 hrs, Volume= 0.043 af, Depth> 5.75"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.057	98	Paved parking, HSG B
0.032	61	>75% Grass cover, Good, HSG B
0.089	85	Weighted Average
0.032	61	35.96% Pervious Area
0.057	98	64.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA3:

Runoff = 1.10 cfs @ 12.11 hrs, Volume= 0.058 af, Depth> 6.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.083	98	Paved parking, HSG B
0.031	61	>75% Grass cover, Good, HSG B
0.114	88	Weighted Average
0.031	61	27.19% Pervious Area
0.083	98	72.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA4:

Runoff = 3.24 cfs @ 12.11 hrs, Volume= 0.170 af, Depth> 5.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.232	98	Paved parking, HSG B
0.116	61	>75% Grass cover, Good, HSG B
0.348	86	Weighted Average
0.116	61	33.33% Pervious Area
0.232	98	66.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA5:

Runoff = 2.31 cfs @ 12.12 hrs, Volume= 0.112 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG B
0.278	61	>75% Grass cover, Good, HSG B
0.345	68	Weighted Average
0.278	61	80.58% Pervious Area
0.067	98	19.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA6:

Runoff = 4.44 cfs @ 12.12 hrs, Volume= 0.221 af, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG B
0.393	61	>75% Grass cover, Good, HSG B
0.593	73	Weighted Average
0.393	61	66.27% Pervious Area
0.200	98	33.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA7:

Runoff = 0.15 cfs @ 12.12 hrs, Volume= 0.008 af, Depth> 5.16"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.009	98	Paved parking, HSG B
0.009	61	>75% Grass cover, Good, HSG B
0.018	80	Weighted Average
0.009	61	50.00% Pervious Area
0.009	98	50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Subcatchment DA8:

Runoff = 1.76 cfs @ 12.12 hrs, Volume= 0.084 af, Depth> 3.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 Rainfall=7.50"

Area (ac)	CN	Description
0.040	98	Paved parking, HSG B
0.233	61	>75% Grass cover, Good, HSG B
0.273	66	Weighted Average
0.233	61	85.35% Pervious Area
0.040	98	14.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, 5 MINUTE MINIMUM**

Summary for Pond CB1:

Inflow Area = 0.154 ac, 87.66% Impervious, Inflow Depth > 6.74"
Inflow = 1.61 cfs @ 12.11 hrs, Volume= 0.087 af
Outflow = 1.61 cfs @ 12.11 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min
Primary = 1.61 cfs @ 12.11 hrs, Volume= 0.087 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 820.31' @ 12.34 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	819.10'	**12.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 819.10' / 819.00' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 12.11 hrs HW=819.94' TW=819.86' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.81 cfs @ 1.56 fps)

Summary for Pond CB2:

Inflow Area = 0.089 ac, 64.04% Impervious, Inflow Depth > 5.75"
Inflow = 0.82 cfs @ 12.11 hrs, Volume= 0.043 af
Outflow = 0.82 cfs @ 12.11 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.11 hrs, Volume= 0.043 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 820.32' @ 12.38 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	818.70'	**12.0" Round Culvert** L= 36.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 818.70' / 818.51' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.11 hrs HW=819.62' TW=819.83' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Pond CB3:

Inflow Area = 0.203 ac, 68.97% Impervious, Inflow Depth > 5.96"
Inflow = 1.92 cfs @ 12.11 hrs, Volume= 0.101 af
Outflow = 1.92 cfs @ 12.11 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min
Primary = 1.92 cfs @ 12.11 hrs, Volume= 0.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 820.32' @ 12.34 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	818.51'	**12.0" Round Culvert** L= 48.0' CMP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 818.51' / 818.25' S= 0.0054 '/' Cc= 0.900
n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.11 hrs HW=819.82' TW=819.87' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Pond CB4:

Inflow Area = 0.348 ac, 66.67% Impervious, Inflow Depth > 5.86"
Inflow = 3.24 cfs @ 12.11 hrs, Volume= 0.170 af
Outflow = 3.24 cfs @ 12.11 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min
Primary = 3.24 cfs @ 12.11 hrs, Volume= 0.170 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 816.33' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	815.10'	**12.0" Round Culvert**
			L= 184.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 815.10' / 811.38' S= 0.0202 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=3.13 cfs @ 12.11 hrs HW=816.28' TW=813.20' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.13 cfs @ 3.98 fps)

Summary for Pond IB1:

Inflow Area = 0.702 ac, 48.72% Impervious, Inflow Depth > 5.11"
Inflow = 5.84 cfs @ 12.12 hrs, Volume= 0.299 af
Outflow = 1.71 cfs @ 12.30 hrs, Volume= 0.237 af, Atten= 71%, Lag= 10.9 min
Discarded = 0.06 cfs @ 12.30 hrs, Volume= 0.051 af
Primary = 1.65 cfs @ 12.30 hrs, Volume= 0.186 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 820.30' @ 12.30 hrs Surf.Area= 0.069 ac Storage= 0.137 af

Plug-Flow detention time= 130.8 min calculated for 0.237 af (79% of inflow)
Center-of-Mass det. time= 66.1 min (829.1 - 763.0)

Volume	Invert	Avail.Storage	Storage Description
#1	816.75'	0.234 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
816.75	0.013	0.000	0.000
817.00	0.016	0.004	0.004
818.00	0.029	0.022	0.026
819.00	0.045	0.037	0.063
820.00	0.063	0.054	0.117
821.00	0.083	0.073	0.190
821.50	0.094	0.044	0.234

Device	Routing	Invert	Outlet Devices
#1	Primary	819.00'	**12.0" Round Culvert** L= 112.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 819.00' / 811.38' S= 0.0680 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	819.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	816.75'	**0.800 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 12.30 hrs HW=820.30' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.65 cfs @ 12.30 hrs HW=820.30' TW=812.33' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.65 cfs of 3.38 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 1.65 cfs @ 4.74 fps)

Summary for Pond IB2:

Inflow Area = 1.643 ac, 47.11% Impervious, Inflow Depth > 4.21"
Inflow = 8.95 cfs @ 12.12 hrs, Volume= 0.577 af
Outflow = 8.75 cfs @ 12.14 hrs, Volume= 0.503 af, Atten= 2%, Lag= 1.4 min
Discarded = 0.04 cfs @ 12.14 hrs, Volume= 0.046 af
Primary = 8.71 cfs @ 12.14 hrs, Volume= 0.458 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 810.43' @ 12.14 hrs Surf.Area= 0.048 ac Storage= 0.094 af

Plug-Flow detention time= 71.2 min calculated for 0.502 af (87% of inflow)
Center-of-Mass det. time= 27.3 min (804.4 - 777.1)

Volume	Invert	Avail.Storage	Storage Description
#1	807.00'	0.124 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
807.00	0.011	0.000	0.000
808.00	0.019	0.015	0.015
809.00	0.029	0.024	0.039
810.00	0.042	0.036	0.075
811.00	0.057	0.050	0.124

Device	Routing	Invert	Outlet Devices
#1	Discarded	807.00'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	810.00'	**12.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.04 cfs @ 12.14 hrs HW=810.42' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=8.54 cfs @ 12.14 hrs HW=810.42' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 8.54 cfs @ 1.68 fps)

Summary for Pond STMH2:

Inflow Area = 1.050 ac, 54.67% Impervious, Inflow Depth > 4.06"
Inflow = 4.50 cfs @ 12.13 hrs, Volume= 0.356 af
Outflow = 4.50 cfs @ 12.13 hrs, Volume= 0.356 af, Atten= 0%, Lag= 0.0 min
Primary = 4.50 cfs @ 12.13 hrs, Volume= 0.356 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 813.28' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	811.38'	**12.0" Round Culvert** L= 68.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 811.38' / 810.00' S= 0.0203 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=4.36 cfs @ 12.13 hrs HW=813.21' TW=810.41' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.36 cfs @ 5.55 fps)

Summary for Link L1:

Inflow Area = 1.661 ac, 47.14% Impervious, Inflow Depth = 3.36"
Inflow = 8.85 cfs @ 12.14 hrs, Volume= 0.465 af
Primary = 8.85 cfs @ 12.14 hrs, Volume= 0.465 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs