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Received
Planning Division
4/11/2024

Exhibit 3.08

Preliminary Drainage Report for Sikh Center of Oregon at 15660 SW Division Street Tax Lot 02900, Tax Map 1S1W 17CA City of Beaverton, Oregon 97007

Emerio Project Number:	2039-001
City of Beaverton Permit Numbers:	TBD
Date:	08/28/2023 Rev1: 02/12/2024

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Project Overview and Description:

The project is located on one large lot approximately 280 feet east of the intersection of SW 157th Place & SW Division Street on the south side of SW Division Street. The project site is currently a 1.77-acre single residential lot occupied by a single-family home with accompanying driveway areas and accessory buildings. The existing buildings and associated deck areas will remain with some portions removed. The proposed development will add an onsite parking lot, drive aisles, and walkways. A 12' right-of-way (ROW) dedication along SW Division Street with associated frontage improvements will accompany the onsite development. See Appendix A(1) for a vicinity map.

Soil Classification:

The NRCS soil survey of Washington County, Oregon classifies the project site soil as Helvetia silt loam. The associated hydrologic group of this soil is C. The associated curve numbers utilized in this design are 74 and 86 for pre-developed and post-developed pervious surfaces, respectively. A pre-developed curve number of 75 will be used for onsite redeveloped impervious surfaces. A curve number of 98 was set for all impervious surfaces, reference appendices B(1) and B(2).

Basin Delineation:

Onsite basins were created after determining how the stormwater runoff will flow after development. Onsite basins include all onsite areas to be managed by the proposed storm system, including landscaped surfaces that will remain untouched by the development.

Due to grading restrictions, most new impervious area along the frontage of SW Division Street (6,255 SF) will not be captured and treated in the onsite stormwater system. The roof areas of the retained onsite buildings (4,628 SF) will be proxy treated for most untreated frontage areas. The remaining 1,627 SF of untreated frontage area will be covered by a fee in lieu for water quality and hydromodification requirements.

Methodology:

A Contech chamber system will provide detention for hydromodification requirements discussed below. Contech Stormfilter cartridges housed in a 72" manhole will provide water quality treatment. The proxy treatment methods previously discussed will allow these facilities to meet the relevant stormwater management requirements for the whole development. The proposed facilities were selected per site constraints, hydromodification categorization, and table 530.1 of the City of Beaverton Engineering Design Manual.

Order 4 listed in Table 530.1 was used to select the proposed facilities due to the following reasons: no existing public facility is available to treat the development, not enough space in public areas associated with the project can accommodate vegetated facilities, and not enough onsite area can accommodate a private vegetated facility.

Hydromodification classification is discussed below.

Hydromodification:

Using the CWS hydromodification method, it was determined this project falls under Category 2 based on the following information obtained using the Hydromodification Map Web Tool (Appendix B(3)):

(1) The risk level is moderate based on the point of discharge into South Johnson Creek
(2) The location of this site is considered to be a developed area
(3) The project size category is medium based on the new impervious area of 49,636 SF.

Per Category 2 requirements, this project will use peak-flow matching detention. The 2, 5, and 10-year post-development flow rates will not exceed their respective ½ of the 2, 5, and 10-year pre-development runoff rates. These standards will be met by an underground Contech chamber system and the previously described fee-in-lieu for some frontage areas.

Water Quality:

Water quality for the proposed and modified impervious area will be by means of a 72" StormFilter manhole. The total tributary impervious area (43,381 SF) was entered into a StormFilter sizing spreadsheet shown in Appendix C(2). The calculation results show that the four 18" cartridges can adequately provide water quality treatment.

Quantity Control/Detention:

Peak-flow matching detention will be provided to match the onsite peak runoff from the post-developed 2-year, 5-year, 10-year, and 25-year design storms to the peak runoff from the pre-developed ½ of the 2-year, 5-year, and 10-year 24-hour design storms per hydromodification requirements found in CWS 4.08.6.c. Flows are detained via an onsite Contech chamber system. The base rock of the camber system was not modeled in the HydroCAD sizing calculations as the base rock will not drain and acts as dead storage. In total, nine rows of twelve Contech Chmabermaxx chambers wit associated dtandard drain rock layers will constitute the proposed system. The system will be surrounded by impermeable liner to prevent extraneous infiltration. Flow is controlled via two orifices set within a city of Beaverton flow control manhole with information shown below:

Orifice #1: 1.8" diameter, elevation 222.90'
Orifice #2: 4.0" diameter, elevation 227.15'

Reference Appendix C(3) for HydroCAD calculations and results for the existing and proposed site conditions.

Storm Event	Pre to Post-Development Peak Flows	
	Pre-Dev. (cfs)	Post-Dev. with Detention (cfs)
2-Year	0.26÷2 = 0.13	0.13
5-Year	0.46	0.26
10-Year	0.61	0.35
25-Year	0.81	0.50

As shown in the table above, the hydromodification requirements are met by limiting the peak discharge rate from each of the return periods to equal to or below the pre-developed discharge rate. Elevations from low point catch basins were considered when designing for freeboard requirements per CWS 4.09.2.c.5. With the 25-year design water elevation at 227.94' and the lowest rim elevation at 229.51', greater than one foot of freeboard is maintained. Reference Appendix C(3) for the HydroCAD modeling plots.

Conveyance Analysis:

Conveyance analysis will be provided at the time of engineering submittal.

Downstream Analysis:

The downstream system was analyzed to determine capacity during the 25-year design storm event. Per Clean Water Services code (section 2.04.2.m.3), the downstream analysis for this project was performed to the point where additional flows due to development

constituted 10% of total flows, continuing to the lesser distance of 1/4 of a mile or 5% of flows. Since this site will provide peak flow matching detention, this location occurs at the site discharge location into the public stormwater system in SW Division Street.

Pipe modeling was performed to the point of overland/drainageway flows one quarter of a mile downstream. The pipe sections were modeled using the design storm in HydroCAD V.10 and found to have sufficient conveyance capacity. See Appendix C(3).

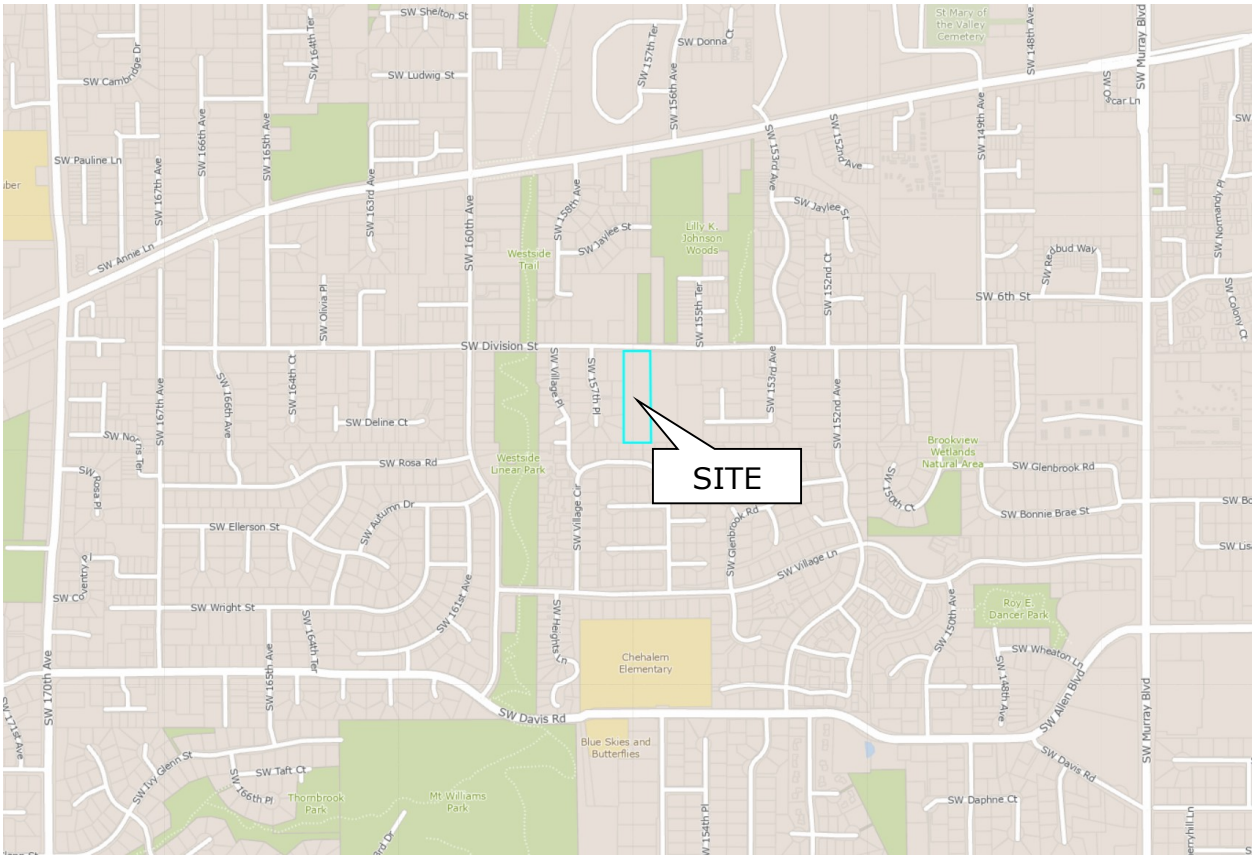
A visual inspection of the downstream system one-quarter of a mile beyond the end point of the downstream analysis was conducted May 6, 2022. The flow path continues north past the development in SW 155th Terrace, finally outfalling to a local drainageway that leads to Johnston Creek. There were no further observable negative impacts to structures downstream to this point.

Conclusion:

The design of the proposed site satisfies the hydromodification, water quality, and water quantity standards set by Clean Water Services R&O 19-22 and the City of Beaverton.

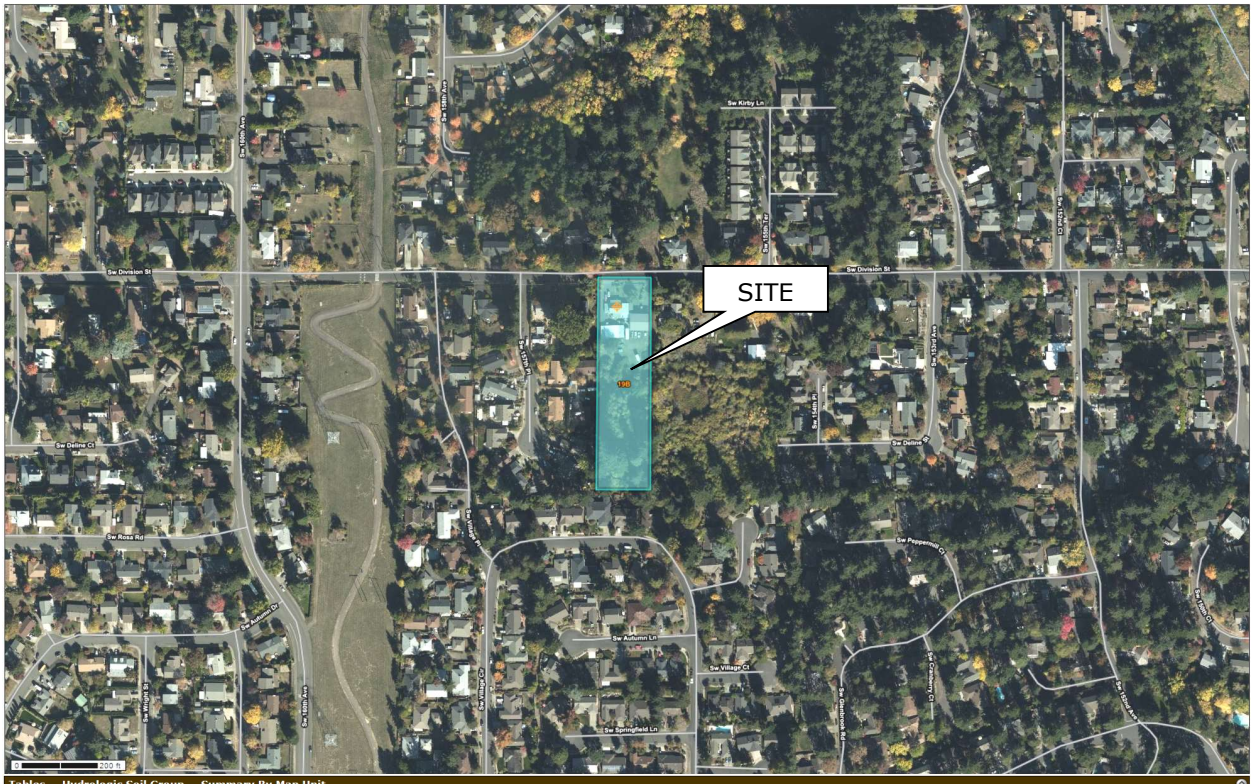
Appendix A:

Appendix A(1)
Vicinity Map



Appendix B:

Appendix B(1)
Soil Classification Map



Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Washington County, Oregon (OR067)

Summary by Map Unit — Washington County, Oregon (OR067)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
19B	Helvetia silt loam, 2 to 7 percent slopes	C	1.8	100.0%
Totals for Area of Interest			**1.8**	**100.0%**

RUNOFF CURVE NUMBERS (TR55)

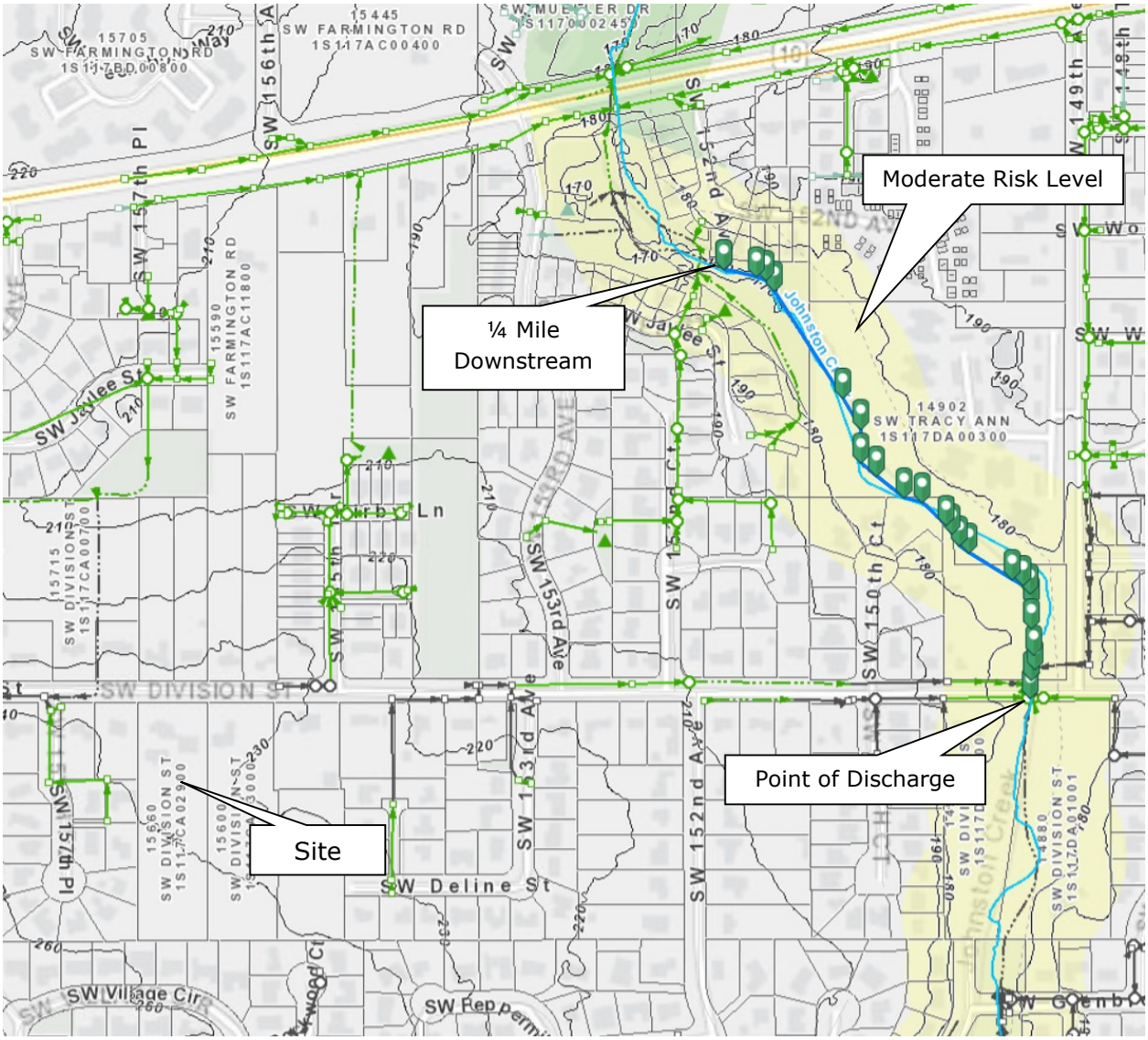
Table 2-2a: Runoff curve numbers for urban areas [1]

Cover description		CN for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover >75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		89	92	93	
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82

Use CN = 86 for Pre-Developed Pervious Areas

Use CN = 74 for Pre-Developed Pervious Areas

Use CN = 98 for Impervious Areas


Moderate Risk Level
¼ Mile Downstream
Point of Discharge
Site
SW Jaylee St
SW 157th Pl
SW 156th Ave
SW 153rd Ave
SW 152nd Ave
SW 150th Ct
SW DIVISION ST
SW Deline St
SW Village Cir
SW TRACY ANN
1S117DA00300
SW FARMINGTON RD
1S117AC00400
1S117AC11800
1S117CA00700
1S117CA02900
1S117DA01001

Appendix C:

Onsite Basin Area Tabulated Data
Division Street Sikh Center

Appendix C(1)

Basin #	Name	Total Area SF	Total Area Acres	# Lots	Lot Impervious SF	ROW/Tract Imp SF	Total Impervious SF	Total Impervious Acres	Total Pervious (Calc'd) SF	Total Pervious (Calc'd) Acres
100	Pre-developed Site	75,295	1.73	1	12,911	0	12,911	0.30	62,384	1.43
200	Pre-developed Offsite frontage	6,938	0.16	0	0	4,322	4,322	0.10	2,616	0.06
101	Post-developed Site	75,295	1.73	1	43,381	0	43,381	1.00	31,914	0.73
201	Offsite Frontage	6,938	0.16	0	0	6,255	6,255	0.14	683	0.02
301	Offsite landscape	11,453	0.26	5	0	0	0	0.00	11,453	0.26

WATER QUALITY/STORMFILTER ANALYSIS

Appendix C(2)

Storm Filter Catch Basin

REFERENCES:
1. Stormwater Management, Inc. Product Design Manual;
Version 3.3; Released September 2005

2. City of Beaverton Engineering Design Manual, Chapter 5, Section 510,
Revision to CWS 4.05.6.3, Page 10

Precipitation:	0.36	inches
Storm Duration:	3	hours
Storm Return Period:	96	hours

The number of StormFilter cartridges needed for a highly impervious site (>= 70% impervious) =

Design Impervious Area 44,158 sf

WQ Volume (cf) = $\frac{0.36 \text{ in} \times \text{Impervious Area (sf)}}{12 \text{ (in/ft)}}$

WQ Flow (cfs) = $\frac{\text{WQ Volume (cf)}}{(3 \text{ hr})(60 \text{ min/hr})(60 \text{ sec/min})}$

$= \frac{\text{Impervious Area (sf)}}{360{,}000 \text{ sec/ft}}$

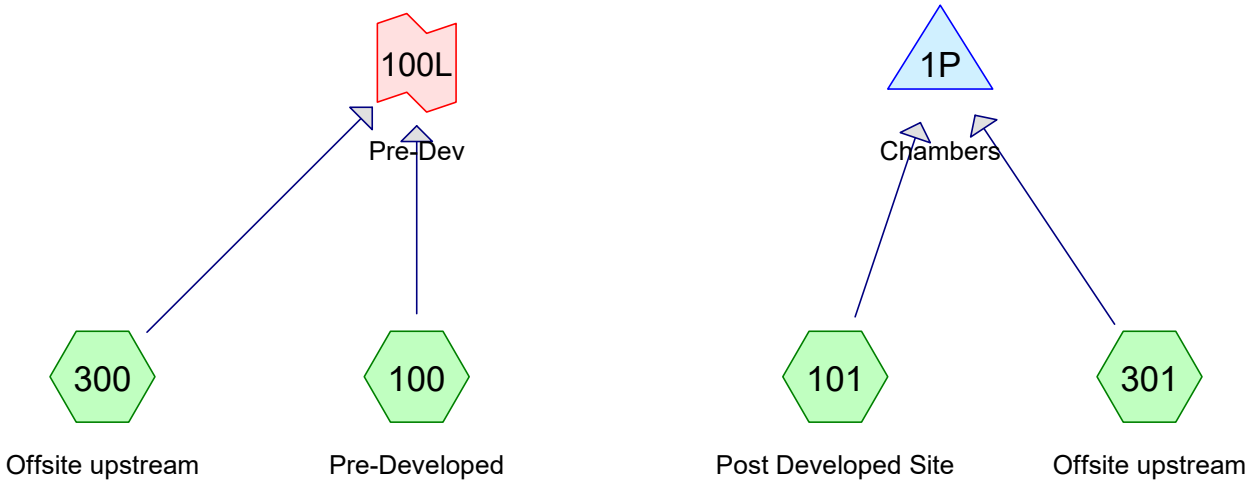
$= \frac{44{,}158 \text{ (sf)}}{360{,}000 \text{ sec/ft}}$

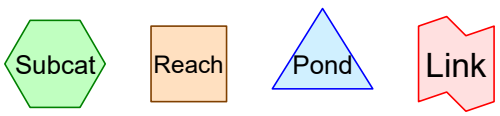
Design flow rate (Q_{treat})= 0.12 cfs

Maximum flow rate a cartridge can treat (Q_{cart}) = 15.0 gpm/cart

Number of cartridges required to treat the water quality design flow rate for the site (N_{flow})
$N_{flow} = Q_{treat}$ (449 gpm/cfs / Qcart gpm/cart) 3.67 cartridges

Round up for a total of 4.00 cartridges





Routing Diagram for 2039-001 HydroCAD 2023-08
Prepared by {enter your company name here}, Printed 2/12/2024
HydroCAD® 10.00-24 s/n 04804 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
62,384	74	<50% Grass cover, Poor, HSG C (100)
4,628	98	Buildings to Remain (100)
38,753	98	Impervious, lots (101)
8,283	75	Redeveloped Impervious (100)
4,628	98	ex. buildings (101)
54,820	86	pervious (101, 300, 301)
173,496	**84**	**TOTAL AREA**

Summary for Subcatchment 100: Pre-Developed

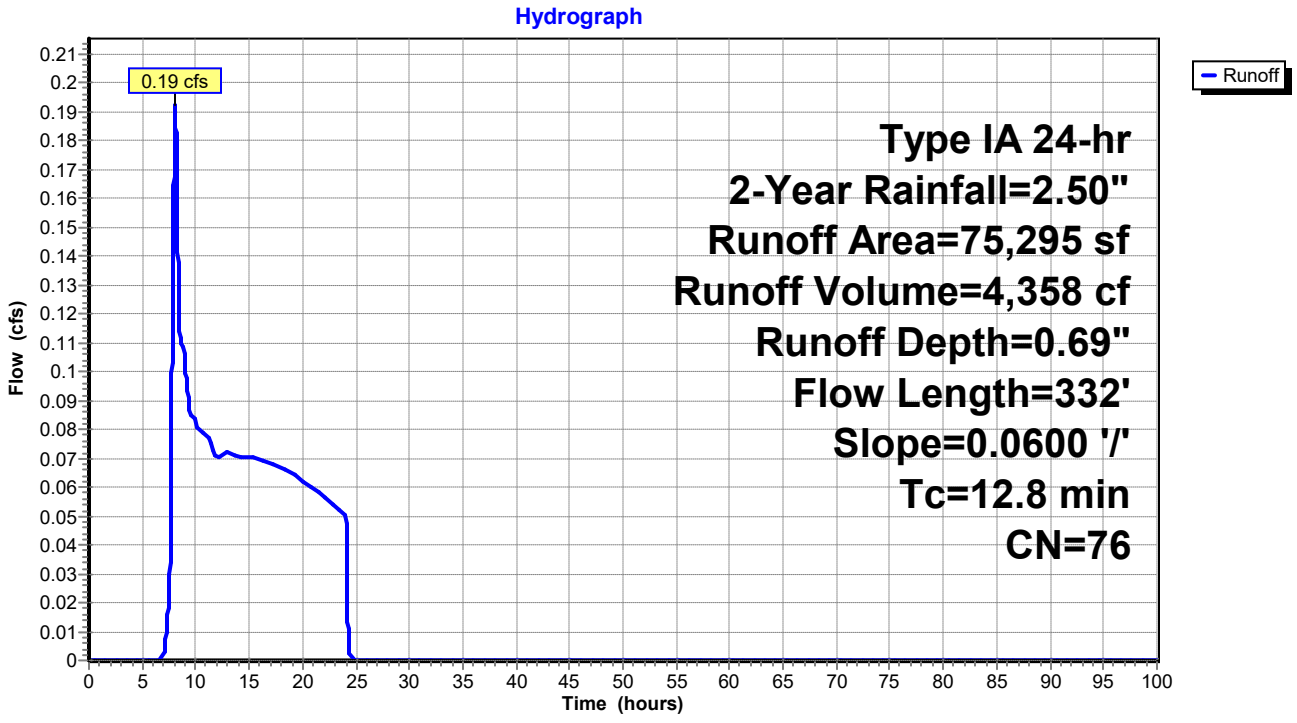
Runoff = 0.19 cfs @ 8.09 hrs, Volume= 4,358 cf, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.50"

	Area (sf)	CN	Description
*	8,283	75	Redeveloped Impervious
*	62,384	74	<50% Grass cover, Poor, HSG C
*	4,628	98	Buildings to Remain
	75,295	76	Weighted Average
	70,667		93.85% Pervious Area
	4,628		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0600	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.50"
3.8	282	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.8	332	Total			

Subcatchment 100: Pre-Developed



Summary for Subcatchment 101: Post Developed Site

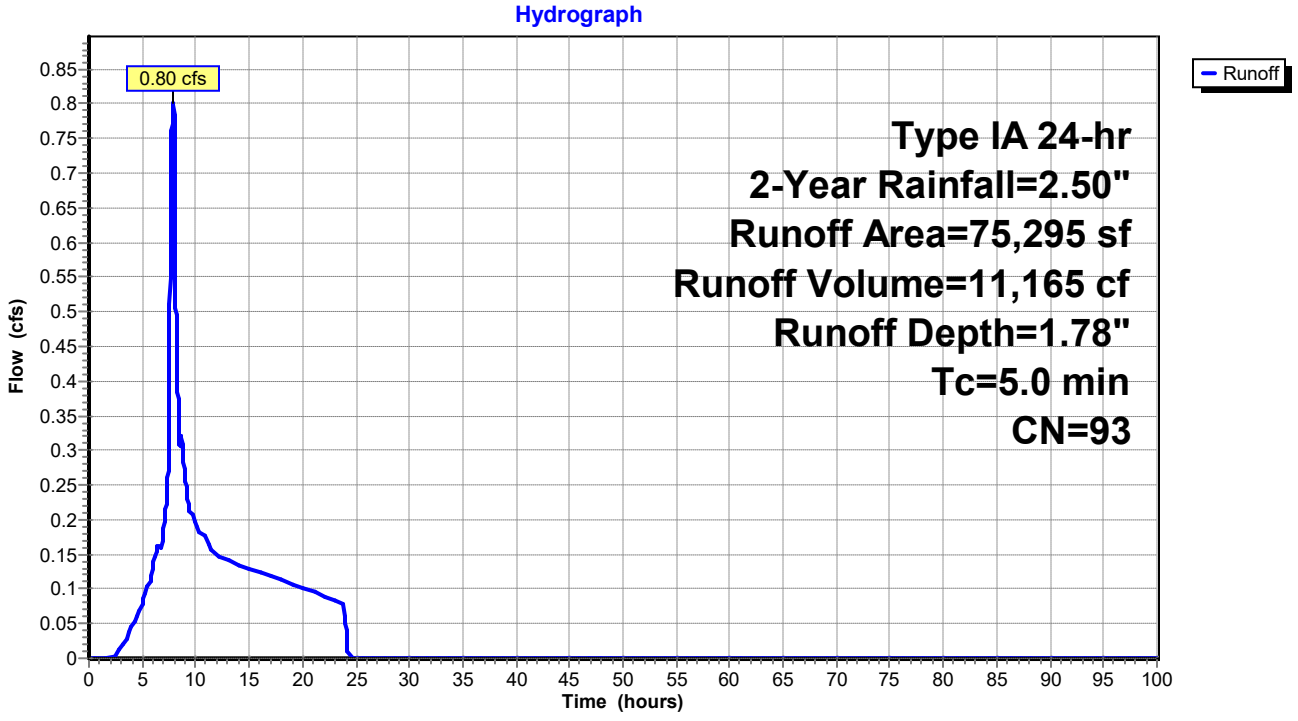
Runoff = 0.80 cfs @ 7.90 hrs, Volume= 11,165 cf, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.50"

	Area (sf)	CN	Description
*	38,753	98	Impervious, lots
*	4,628	98	ex. buildings
*	31,914	86	pervious
	75,295	93	Weighted Average
	31,914		42.39% Pervious Area
	43,381		57.61% Impervious Area

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

Subcatchment 101: Post Developed Site



Summary for Subcatchment 300: Offsite upstream

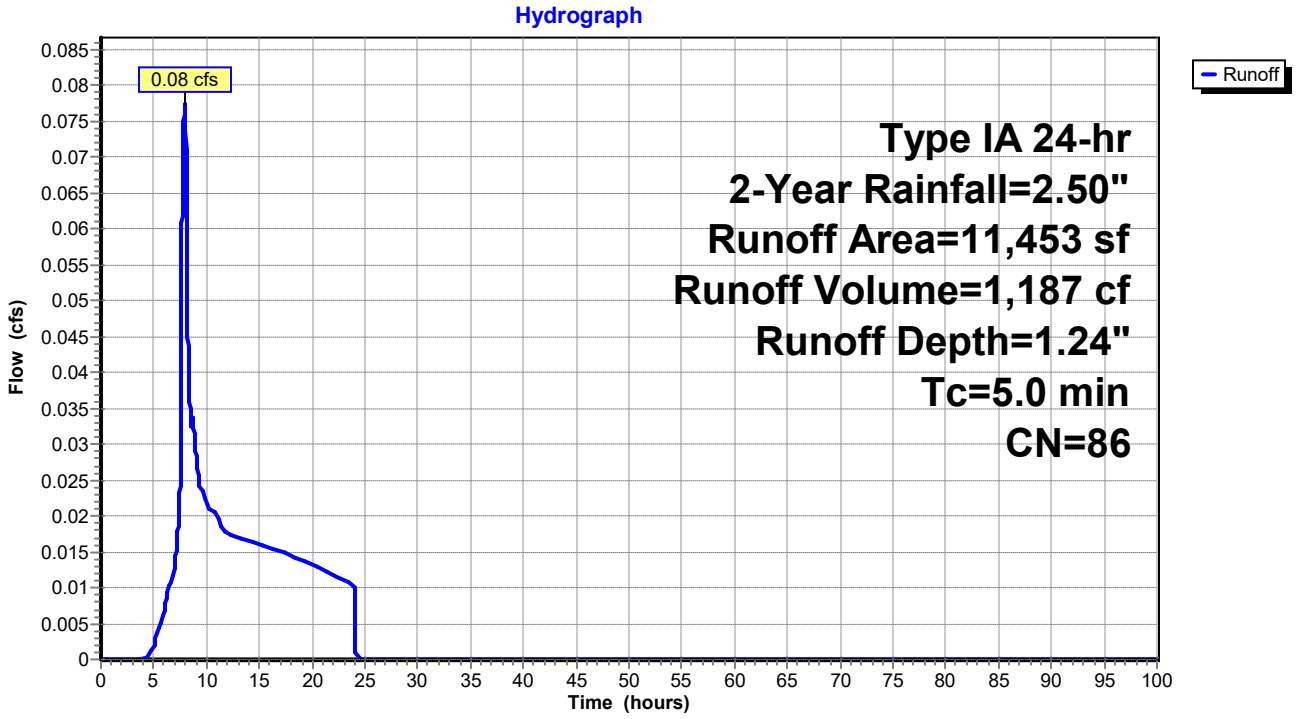
Runoff = 0.08 cfs @ 7.96 hrs, Volume= 1,187 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.50"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 300: Offsite upstream



Summary for Subcatchment 301: Offsite upstream

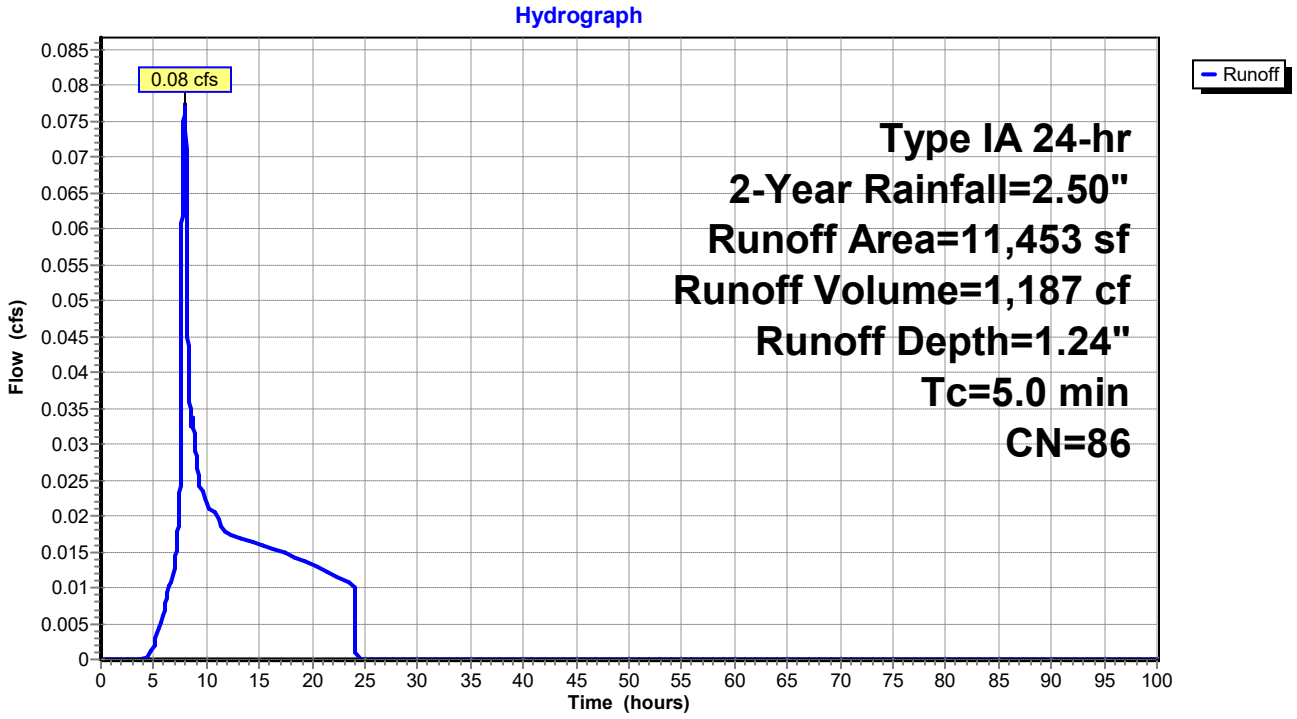
Runoff = 0.08 cfs @ 7.96 hrs, Volume= 1,187 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.50"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 301: Offsite upstream



Summary for Pond 1P: Chambers

Inflow Area = 86,748 sf, 50.01% Impervious, Inflow Depth = 1.71" for 2-Year event
Inflow = 0.88 cfs @ 7.91 hrs, Volume= 12,352 cf
Outflow = 0.13 cfs @ 17.44 hrs, Volume= 12,352 cf, Atten= 85%, Lag= 572.0 min
Primary = 0.13 cfs @ 17.44 hrs, Volume= 12,352 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 227.12' @ 17.44 hrs Surf.Area= 3,884 sf Storage= 4,309 cf

Plug-Flow detention time= 408.2 min calculated for 12,351 cf (100% of inflow)
Center-of-Mass det. time= 408.2 min (1,150.6 - 742.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	225.72'	1,923 cf	**44.28'W x 87.72'L x 3.02'H Field A** 11,750 cf Overall - 5,339 cf Embedded = 6,411 cf x 30.0% Voids
#2A	225.72'	5,116 cf	**Contech ChamberMaxx 2016** x 108 Inside #1 Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf Row Length Adjustment= +0.32' x 6.63 sf x 9 rows
		7,039 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	224.90'	**12.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 224.90' / 224.62' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	222.90'	**1.8" Vert. Orifice #1** C= 0.620
#3	Device 1	227.15'	**4.0" Vert. Orifice #2** C= 0.620
#4	Secondary	228.00'	**60.0" W x 24.0" H Vert. Overflow** C= 0.620

Primary OutFlow Max=0.13 cfs @ 17.44 hrs HW=227.12' (Free Discharge)
└**1=Culvert** (Passes 0.13 cfs of 3.91 cfs potential flow)
  ├**2=Orifice #1** (Orifice Controls 0.13 cfs @ 7.41 fps)
  └**3=Orifice #2** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=225.72' (Free Discharge)
└**4=Overflow** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = Contech ChamberMaxx 2016 (Contech® ChamberMaxx® capped at 47.2cf for air pocket)
Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf
Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf
Row Length Adjustment= +0.32' x 6.63 sf x 9 rows

51.4" Wide + 5.6" Spacing = 57.0" C-C Row Spacing

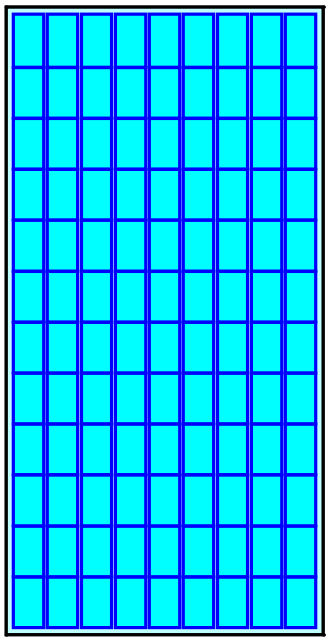
12 Chambers/Row x 7.12' Long +0.32' Row Adjustment = 85.72' Row Length +12.0" End Stone x 2 = 87.72' Base Length
9 Rows x 51.4" Wide + 5.6" Spacing x 8 + 12.0" Side Stone x 2 = 44.28' Base Width
30.3" Chamber Height + 6.0" Cover = 3.02' Field Height

108 Chambers x 47.2 cf +0.32' Row Adjustment x 6.63 sf x 9 Rows = 5,115.8 cf Chamber Storage
108 Chambers x 49.3 cf +0.32' Row Adjustment x 6.92 sf x 9 Rows = 5,339.5 cf Displacement

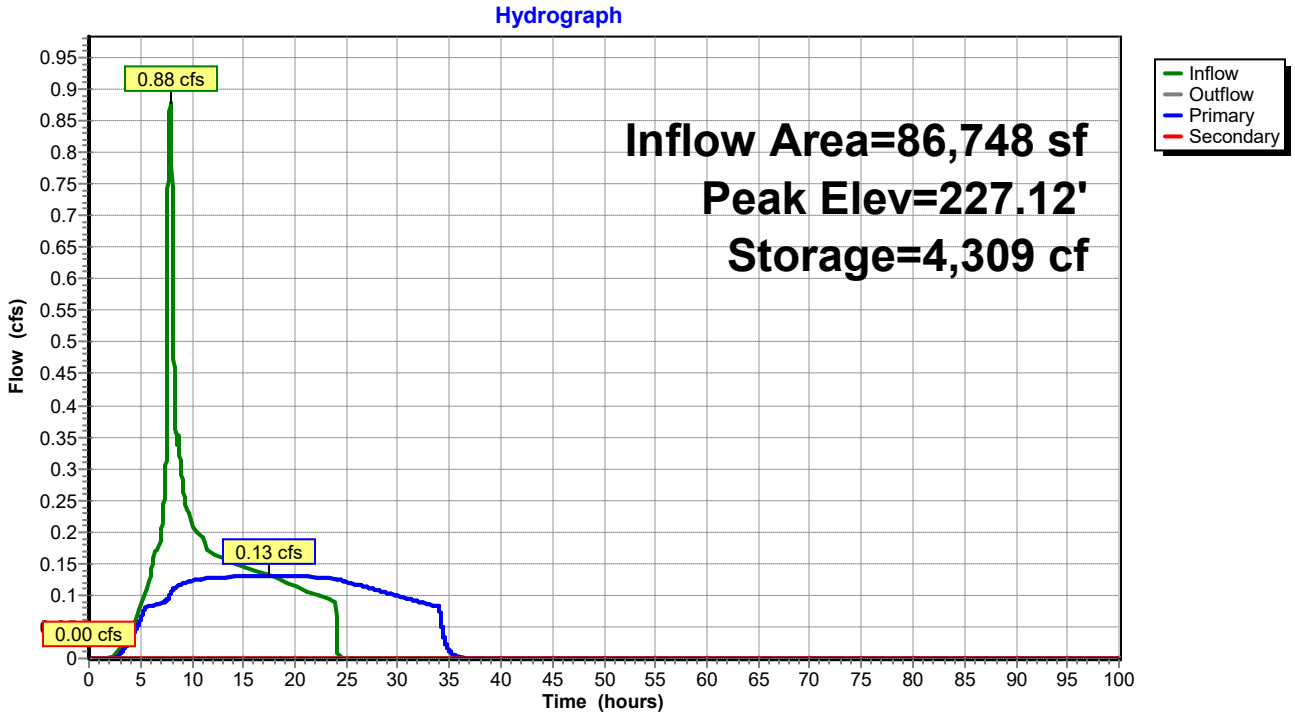
11,750.3 cf Field - 5,339.5 cf Chambers = 6,410.8 cf Stone x 30.0% Voids = 1,923.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,039.0 cf = 0.162 af
Overall Storage Efficiency = 59.9%
Overall System Size = 87.72' x 44.28' x 3.02'

108 Chambers
435.2 cy Field
237.4 cy Stone



Pond 1P: Chambers

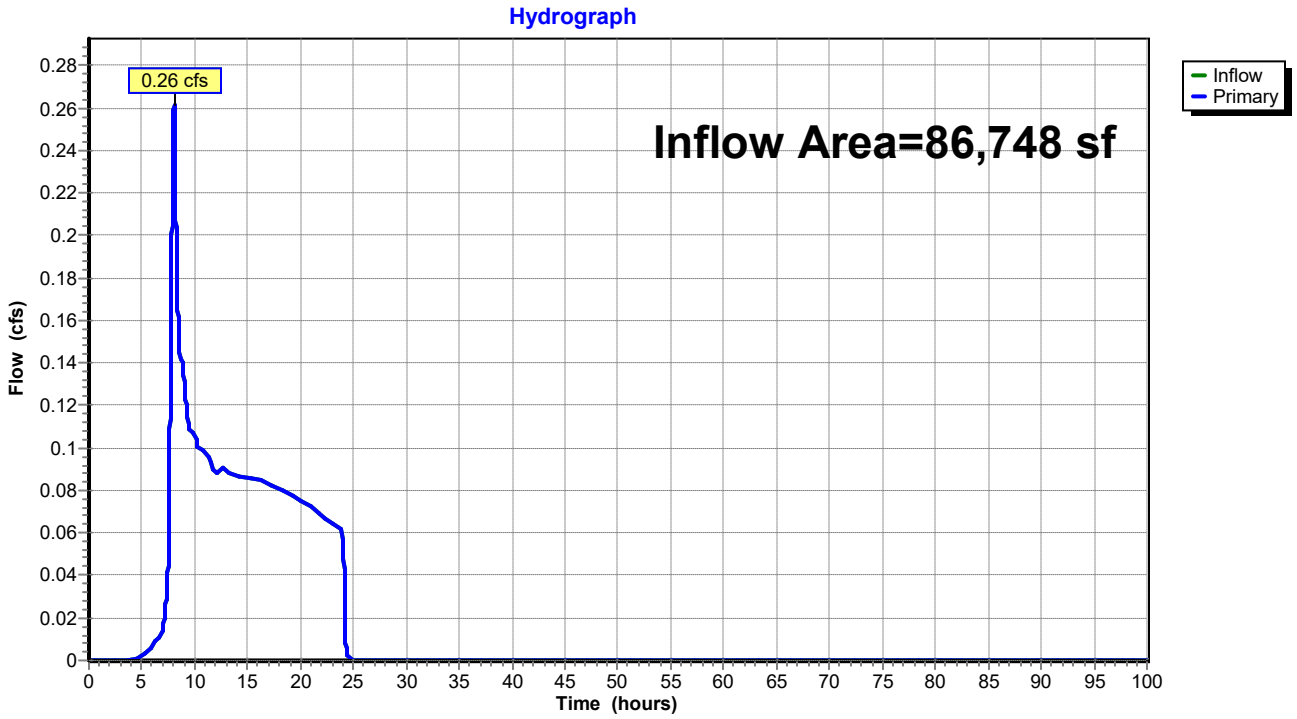


Summary for Link 100L: Pre-Dev

Inflow Area = 86,748 sf, 5.33% Impervious, Inflow Depth = 0.77" for 2-Year event
Inflow = 0.26 cfs @ 8.04 hrs, Volume= 5,545 cf
Primary = 0.26 cfs @ 8.04 hrs, Volume= 5,545 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link 100L: Pre-Dev



Summary for Subcatchment 100: Pre-Developed

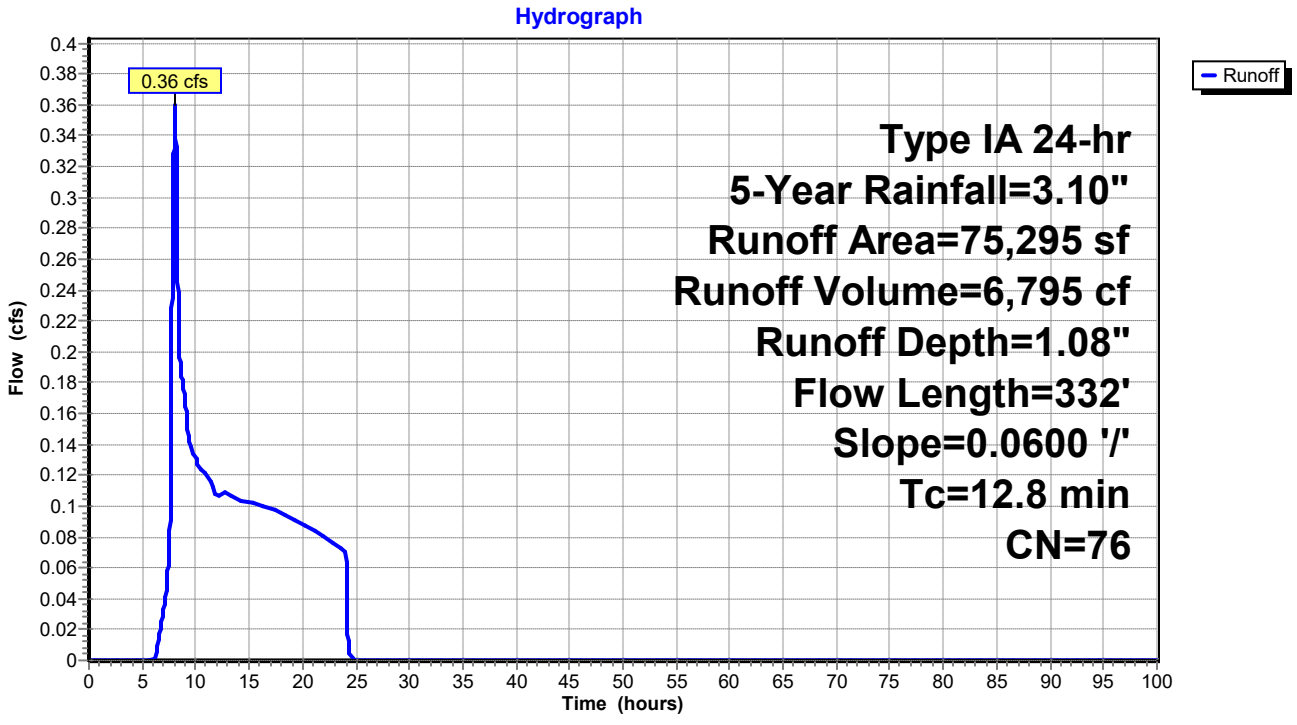
Runoff = 0.36 cfs @ 8.07 hrs, Volume= 6,795 cf, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	8,283	75	Redeveloped Impervious
*	62,384	74	<50% Grass cover, Poor, HSG C
*	4,628	98	Buildings to Remain
	75,295	76	Weighted Average
	70,667		93.85% Pervious Area
	4,628		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0600	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.50"
3.8	282	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.8	332	Total			

Subcatchment 100: Pre-Developed



Summary for Subcatchment 101: Post Developed Site

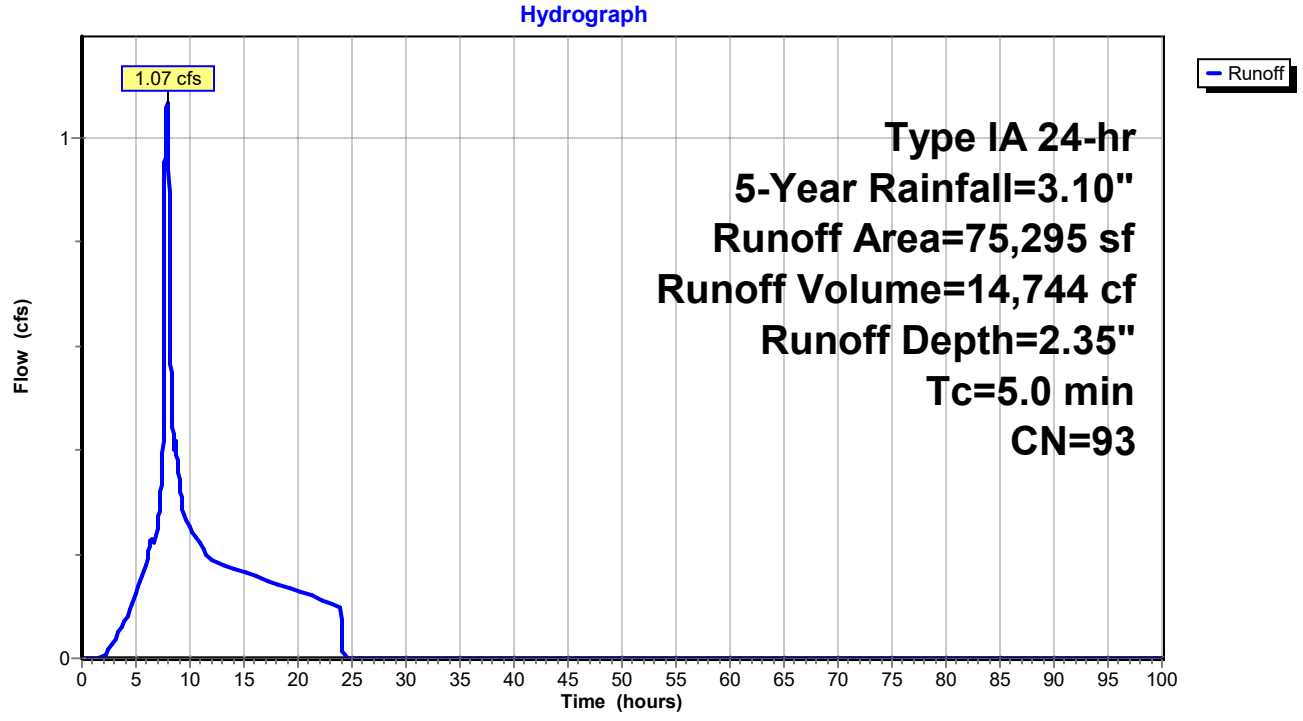
Runoff = 1.07 cfs @ 7.89 hrs, Volume= 14,744 cf, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	38,753	98	Impervious, lots
*	4,628	98	ex. buildings
*	31,914	86	pervious
	75,295	93	Weighted Average
	31,914		42.39% Pervious Area
	43,381		57.61% Impervious Area

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

Subcatchment 101: Post Developed Site



Summary for Subcatchment 300: Offsite upstream

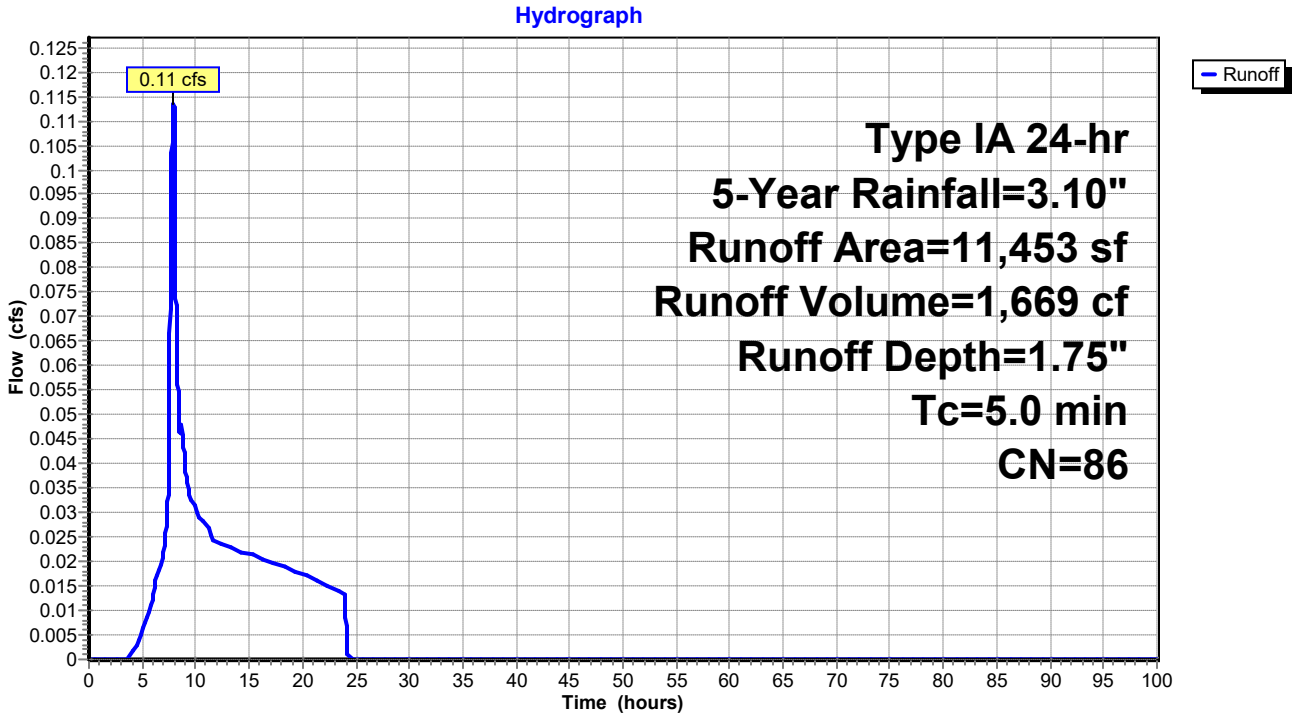
Runoff = 0.11 cfs @ 7.94 hrs, Volume= 1,669 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 300: Offsite upstream



Summary for Subcatchment 301: Offsite upstream

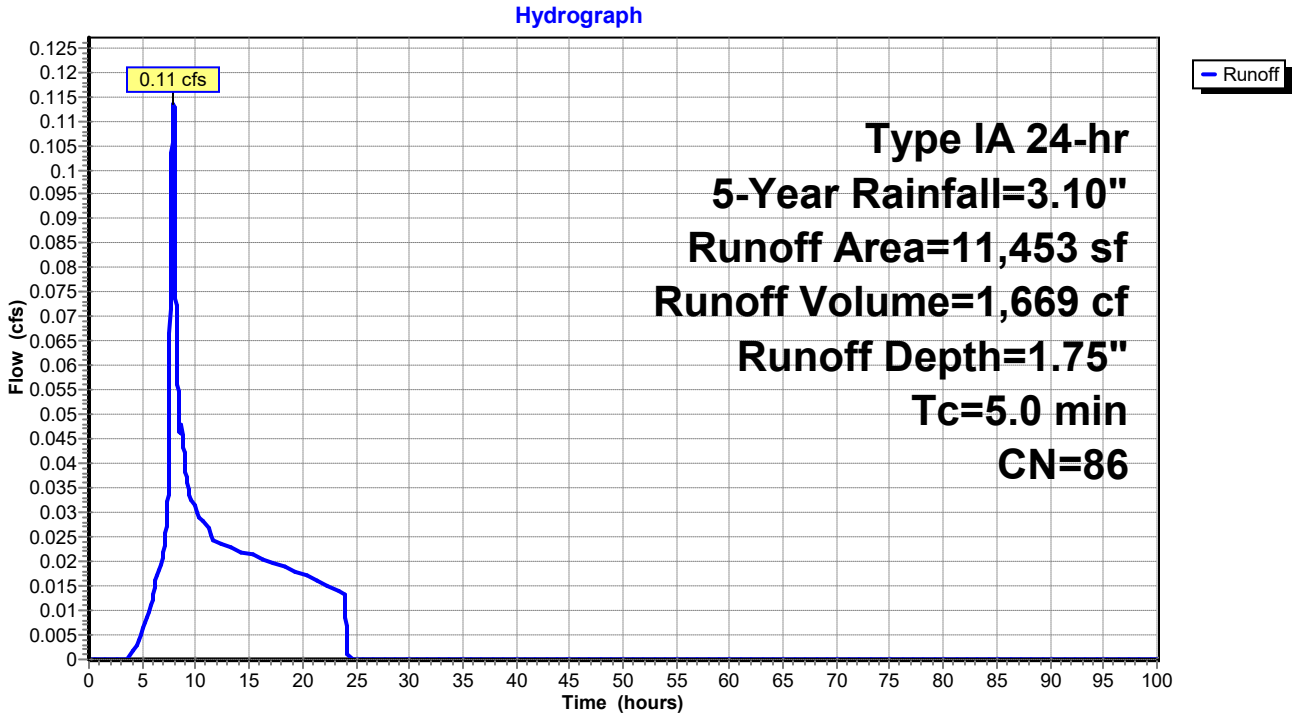
Runoff = 0.11 cfs @ 7.94 hrs, Volume= 1,669 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 301: Offsite upstream



Summary for Pond 1P: Chambers

Inflow Area = 86,748 sf, 50.01% Impervious, Inflow Depth = 2.27" for 5-Year event
Inflow = 1.18 cfs @ 7.90 hrs, Volume= 16,413 cf
Outflow = 0.26 cfs @ 10.80 hrs, Volume= 16,413 cf, Atten= 78%, Lag= 173.9 min
Primary = 0.26 cfs @ 10.80 hrs, Volume= 16,413 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 227.39' @ 10.80 hrs Surf.Area= 3,884 sf Storage= 5,033 cf

Plug-Flow detention time= 375.0 min calculated for 16,411 cf (100% of inflow)
Center-of-Mass det. time= 375.0 min (1,103.1 - 728.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	225.72'	1,923 cf	**44.28'W x 87.72'L x 3.02'H Field A** 11,750 cf Overall - 5,339 cf Embedded = 6,411 cf x 30.0% Voids
#2A	225.72'	5,116 cf	**Contech ChamberMaxx 2016** x 108 Inside #1 Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf Row Length Adjustment= +0.32' x 6.63 sf x 9 rows
		7,039 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	224.90'	**12.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 224.90' / 224.62' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	222.90'	**1.8" Vert. Orifice #1** C= 0.620
#3	Device 1	227.15'	**4.0" Vert. Orifice #2** C= 0.620
#4	Secondary	228.00'	**60.0" W x 24.0" H Vert. Overflow** C= 0.620

Primary OutFlow Max=0.26 cfs @ 10.80 hrs HW=227.39' (Free Discharge)
└**1=Culvert** (Passes 0.26 cfs of 4.21 cfs potential flow)
  ├**2=Orifice #1** (Orifice Controls 0.14 cfs @ 7.85 fps)
  └**3=Orifice #2** (Orifice Controls 0.12 cfs @ 1.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=225.72' (Free Discharge)
└**4=Overflow** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = Contech ChamberMaxx 2016 (Contech® ChamberMaxx® capped at 47.2cf for air pocket)
Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf
Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf
Row Length Adjustment= +0.32' x 6.63 sf x 9 rows

51.4" Wide + 5.6" Spacing = 57.0" C-C Row Spacing

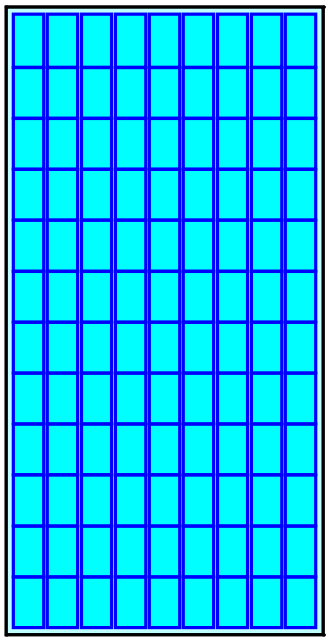
12 Chambers/Row x 7.12' Long +0.32' Row Adjustment = 85.72' Row Length +12.0" End Stone x 2 = 87.72' Base Length
9 Rows x 51.4" Wide + 5.6" Spacing x 8 + 12.0" Side Stone x 2 = 44.28' Base Width
30.3" Chamber Height + 6.0" Cover = 3.02' Field Height

108 Chambers x 47.2 cf +0.32' Row Adjustment x 6.63 sf x 9 Rows = 5,115.8 cf Chamber Storage
108 Chambers x 49.3 cf +0.32' Row Adjustment x 6.92 sf x 9 Rows = 5,339.5 cf Displacement

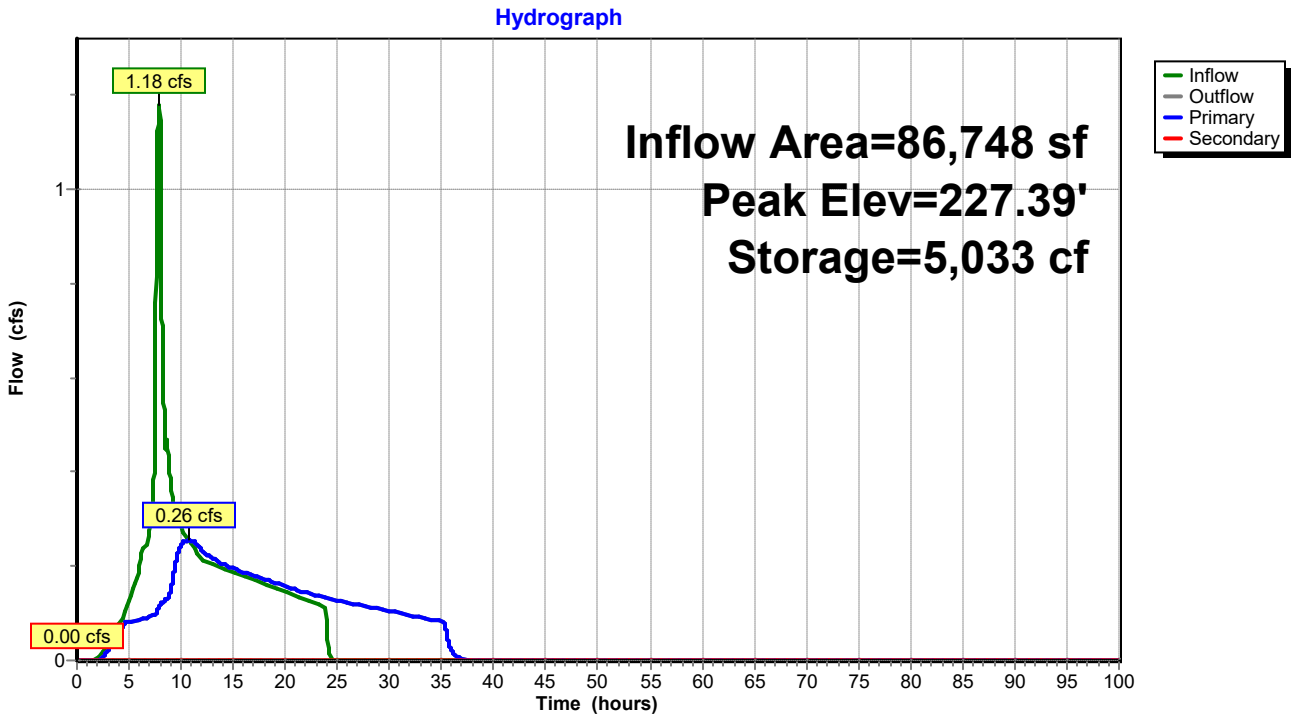
11,750.3 cf Field - 5,339.5 cf Chambers = 6,410.8 cf Stone x 30.0% Voids = 1,923.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,039.0 cf = 0.162 af
Overall Storage Efficiency = 59.9%
Overall System Size = 87.72' x 44.28' x 3.02'

108 Chambers
435.2 cy Field
237.4 cy Stone



Pond 1P: Chambers

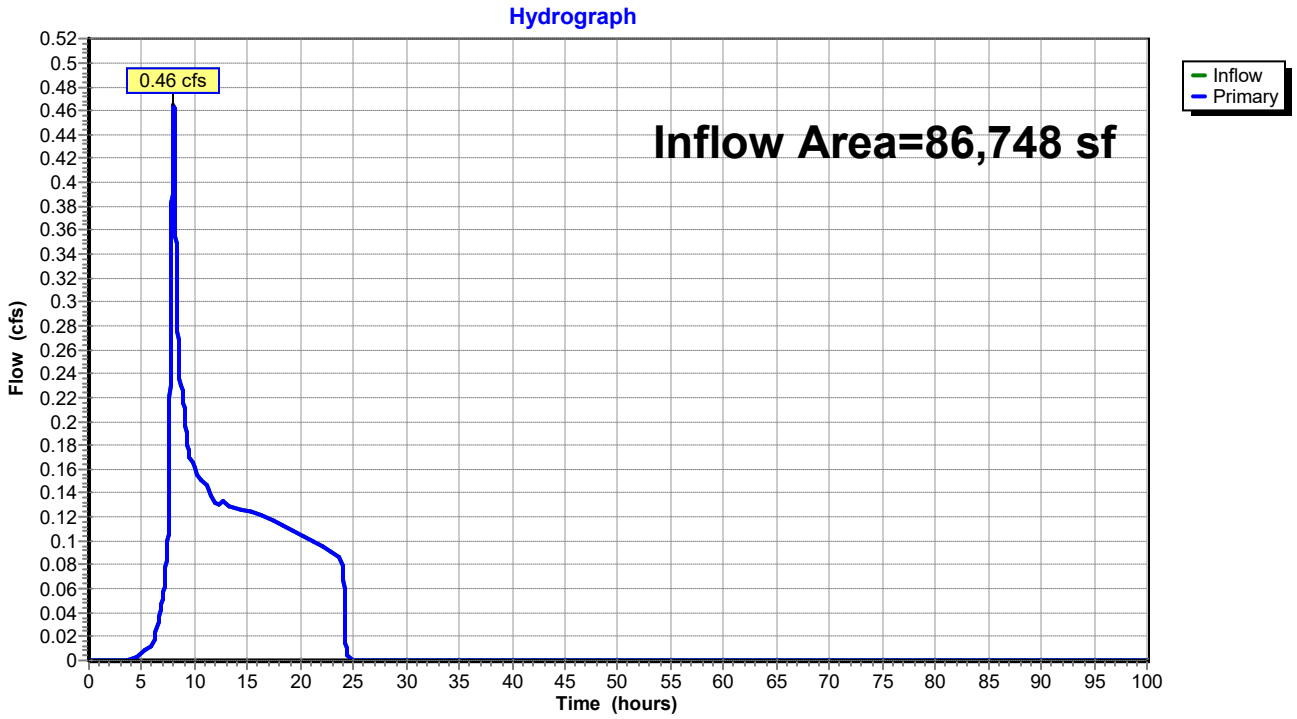


Summary for Link 100L: Pre-Dev

Inflow Area = 86,748 sf, 5.33% Impervious, Inflow Depth = 1.17" for 5-Year event
Inflow = 0.46 cfs @ 8.03 hrs, Volume= 8,464 cf
Primary = 0.46 cfs @ 8.03 hrs, Volume= 8,464 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link 100L: Pre-Dev



Summary for Subcatchment 100: Pre-Developed

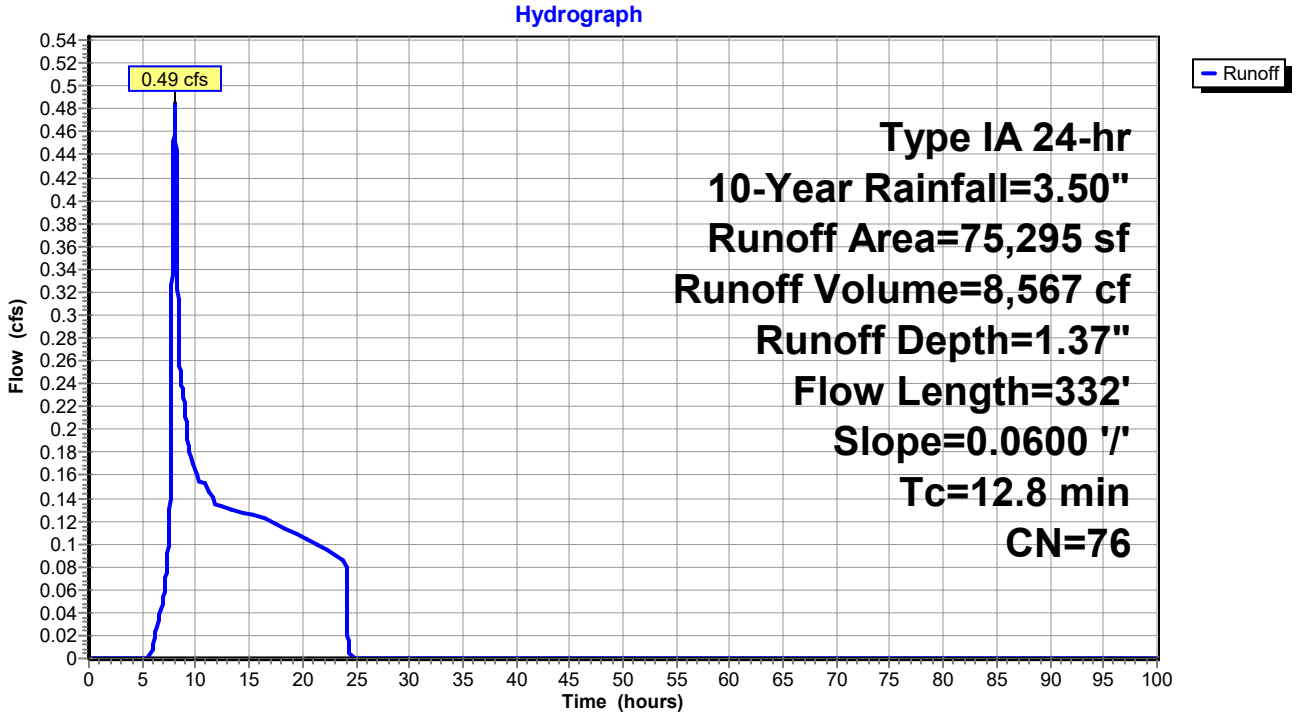
Runoff = 0.49 cfs @ 8.06 hrs, Volume= 8,567 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.50"

	Area (sf)	CN	Description
*	8,283	75	Redeveloped Impervious
*	62,384	74	<50% Grass cover, Poor, HSG C
*	4,628	98	Buildings to Remain
	75,295	76	Weighted Average
	70,667		93.85% Pervious Area
	4,628		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0600	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.50"
3.8	282	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.8	332	Total			

Subcatchment 100: Pre-Developed



Summary for Subcatchment 101: Post Developed Site

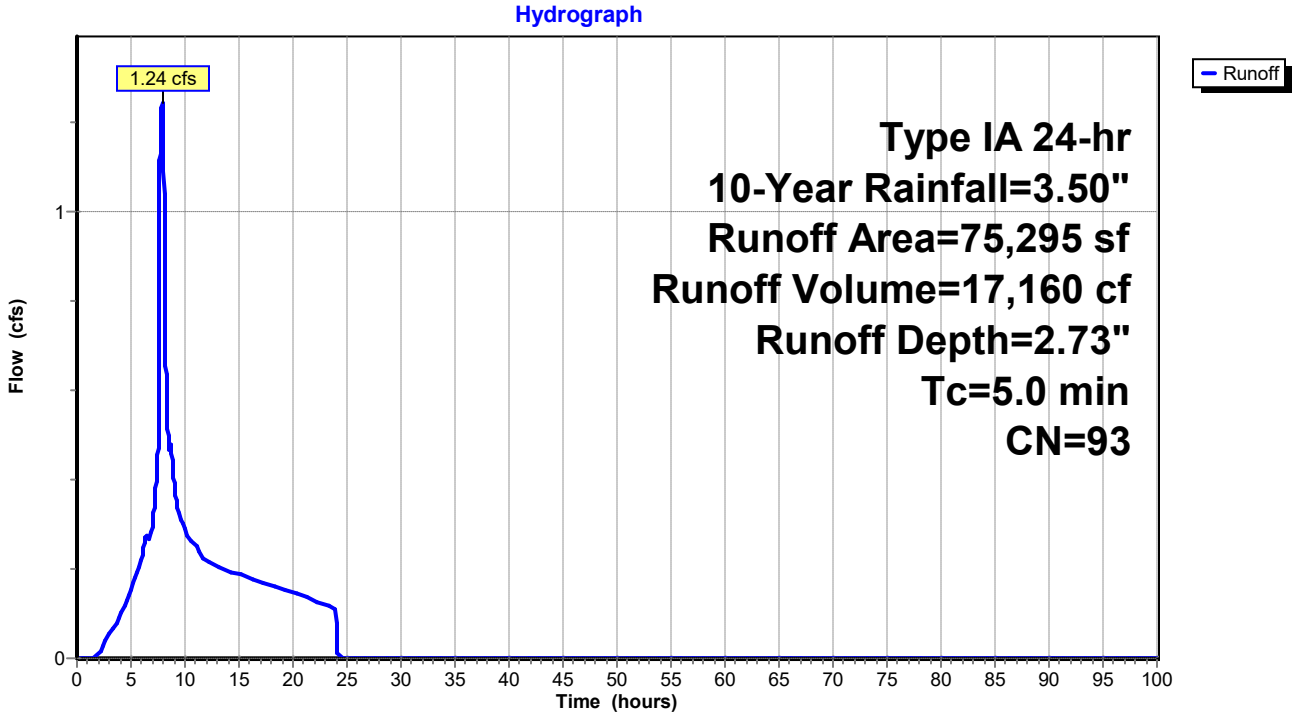
Runoff = 1.24 cfs @ 7.89 hrs, Volume= 17,160 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.50"

	Area (sf)	CN	Description
*	38,753	98	Impervious, lots
*	4,628	98	ex. buildings
*	31,914	86	pervious
	75,295	93	Weighted Average
	31,914		42.39% Pervious Area
	43,381		57.61% Impervious Area

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

Subcatchment 101: Post Developed Site



Summary for Subcatchment 300: Offsite upstream

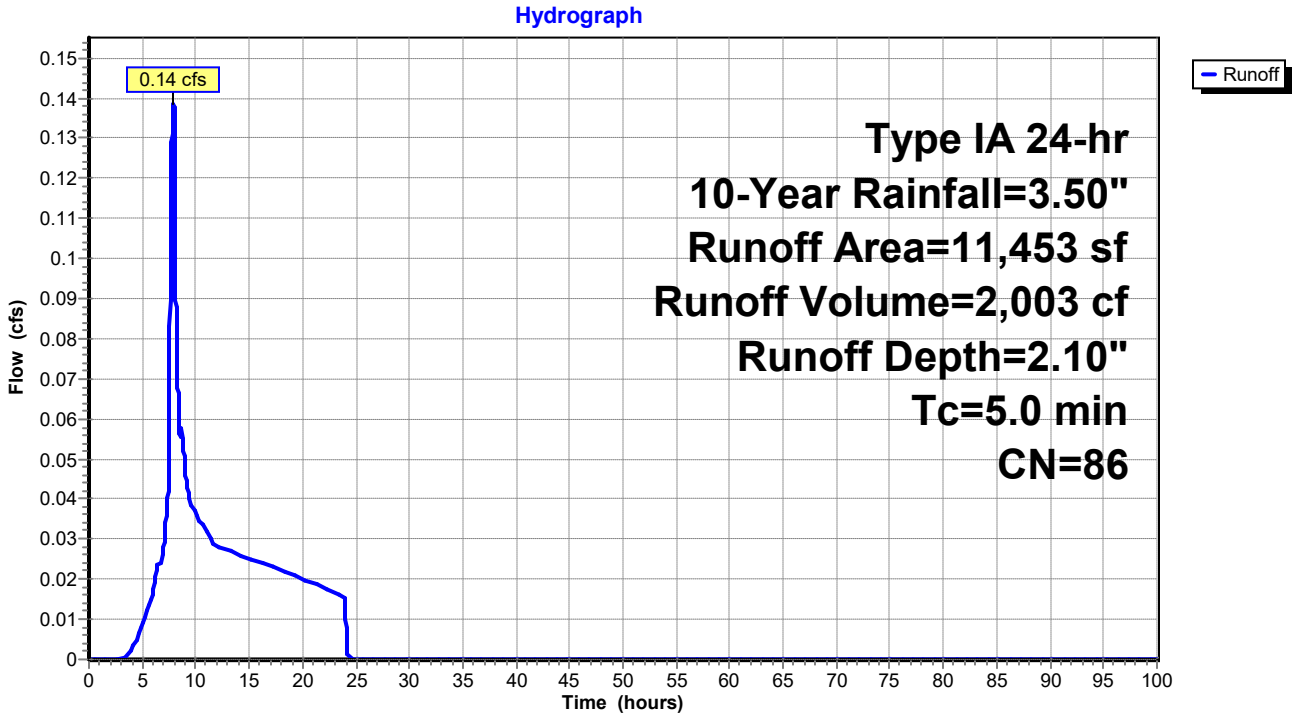
Runoff = 0.14 cfs @ 7.93 hrs, Volume= 2,003 cf, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.50"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 300: Offsite upstream



Summary for Subcatchment 301: Offsite upstream

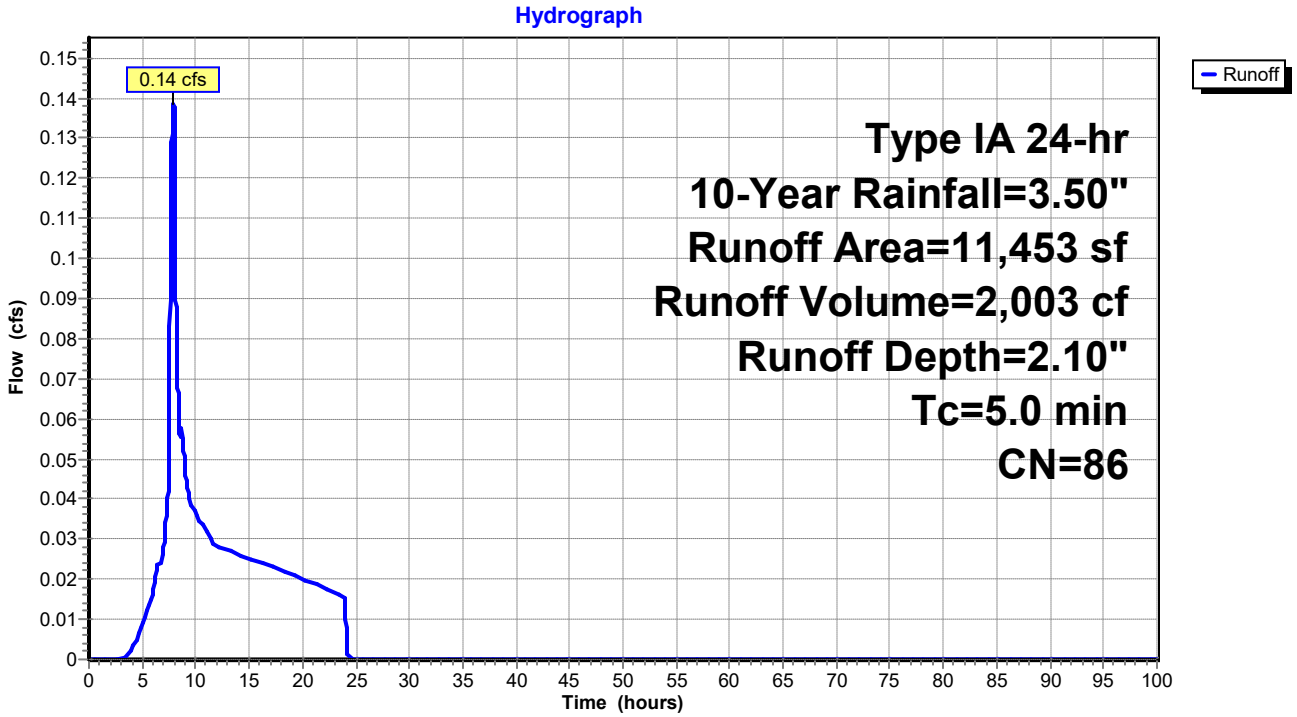
Runoff = 0.14 cfs @ 7.93 hrs, Volume= 2,003 cf, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.50"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 301: Offsite upstream



Summary for Pond 1P: Chambers

Inflow Area = 86,748 sf, 50.01% Impervious, Inflow Depth = 2.65" for 10-Year event
Inflow = 1.38 cfs @ 7.89 hrs, Volume= 19,163 cf
Outflow = 0.35 cfs @ 9.46 hrs, Volume= 19,163 cf, Atten= 74%, Lag= 94.0 min
Primary = 0.35 cfs @ 9.46 hrs, Volume= 19,163 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 227.55' @ 9.46 hrs Surf.Area= 3,884 sf Storage= 5,426 cf

Plug-Flow detention time= 338.6 min calculated for 19,161 cf (100% of inflow)
Center-of-Mass det. time= 338.6 min (1,059.3 - 720.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	225.72'	1,923 cf	**44.28'W x 87.72'L x 3.02'H Field A** 11,750 cf Overall - 5,339 cf Embedded = 6,411 cf x 30.0% Voids
#2A	225.72'	5,116 cf	**Contech ChamberMaxx 2016** x 108 Inside #1 Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf Row Length Adjustment= +0.32' x 6.63 sf x 9 rows
		7,039 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	224.90'	**12.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 224.90' / 224.62' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	222.90'	**1.8" Vert. Orifice #1** C= 0.620
#3	Device 1	227.15'	**4.0" Vert. Orifice #2** C= 0.620
#4	Secondary	228.00'	**60.0" W x 24.0" H Vert. Overflow** C= 0.620

Primary OutFlow Max=0.35 cfs @ 9.46 hrs HW=227.55' (Free Discharge)
└**1=Culvert** (Passes 0.35 cfs of 4.38 cfs potential flow)
  ├**2=Orifice #1** (Orifice Controls 0.14 cfs @ 8.10 fps)
  └**3=Orifice #2** (Orifice Controls 0.21 cfs @ 2.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=225.72' (Free Discharge)
└**4=Overflow** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = Contech ChamberMaxx 2016 (Contech® ChamberMaxx® capped at 47.2cf for air pocket)
Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf
Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf
Row Length Adjustment= +0.32' x 6.63 sf x 9 rows

51.4" Wide + 5.6" Spacing = 57.0" C-C Row Spacing

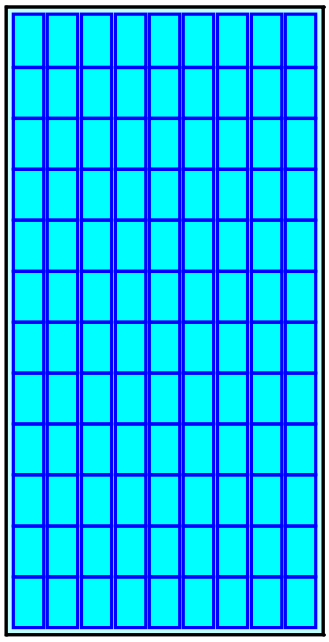
12 Chambers/Row x 7.12' Long +0.32' Row Adjustment = 85.72' Row Length +12.0" End Stone x 2 = 87.72' Base Length
9 Rows x 51.4" Wide + 5.6" Spacing x 8 + 12.0" Side Stone x 2 = 44.28' Base Width
30.3" Chamber Height + 6.0" Cover = 3.02' Field Height

108 Chambers x 47.2 cf +0.32' Row Adjustment x 6.63 sf x 9 Rows = 5,115.8 cf Chamber Storage
108 Chambers x 49.3 cf +0.32' Row Adjustment x 6.92 sf x 9 Rows = 5,339.5 cf Displacement

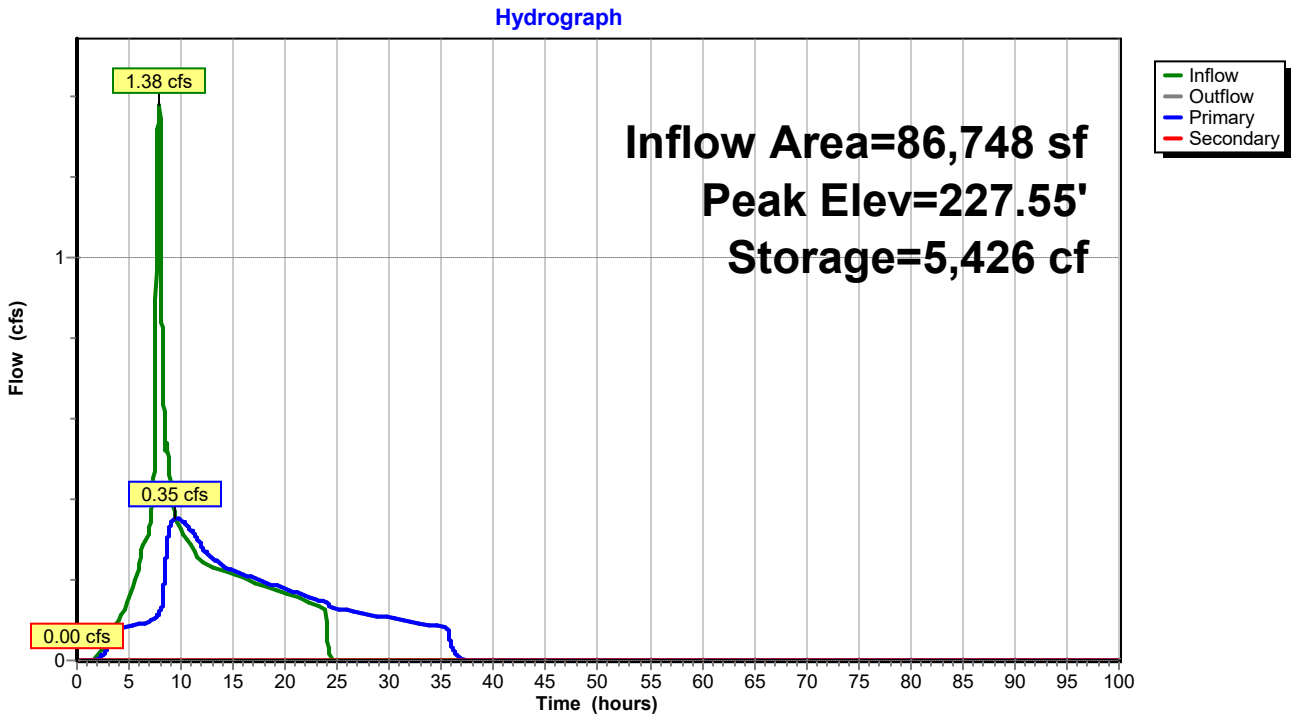
11,750.3 cf Field - 5,339.5 cf Chambers = 6,410.8 cf Stone x 30.0% Voids = 1,923.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,039.0 cf = 0.162 af
Overall Storage Efficiency = 59.9%
Overall System Size = 87.72' x 44.28' x 3.02'

108 Chambers
435.2 cy Field
237.4 cy Stone



Pond 1P: Chambers

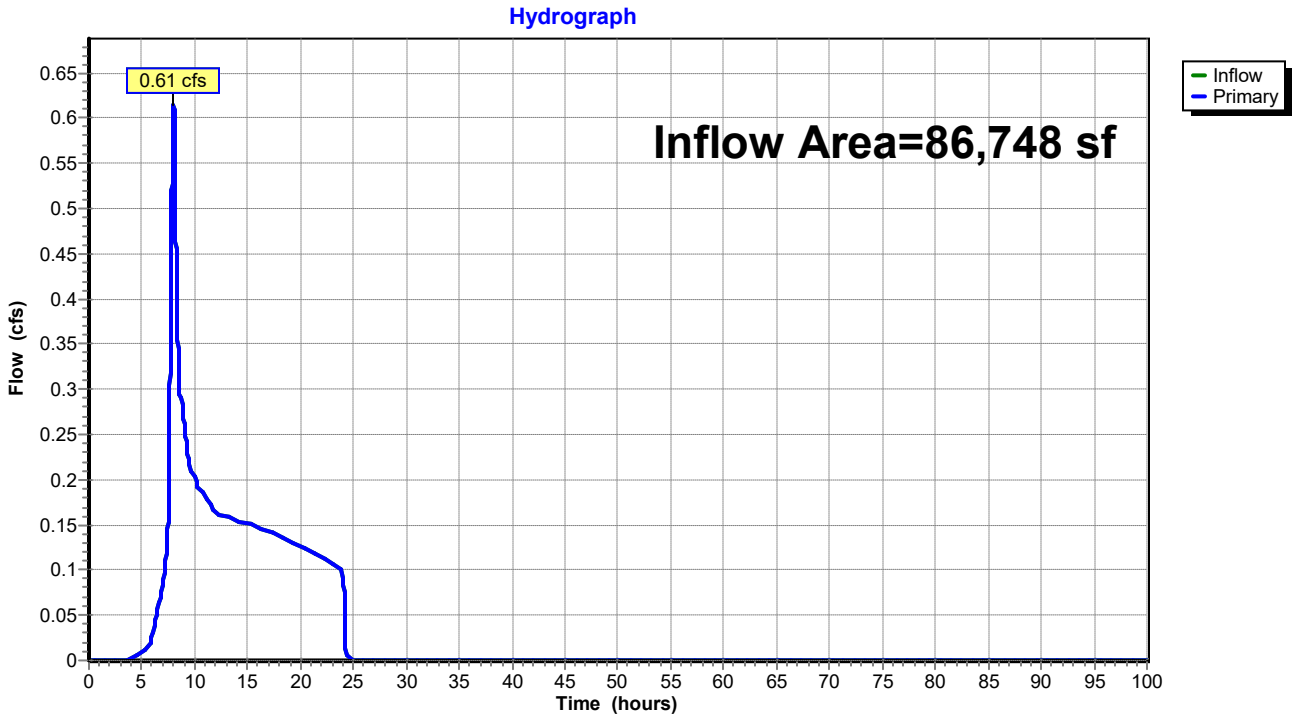


Summary for Link 100L: Pre-Dev

Inflow Area = 86,748 sf, 5.33% Impervious, Inflow Depth = 1.46" for 10-Year event
Inflow = 0.61 cfs @ 8.03 hrs, Volume= 10,569 cf
Primary = 0.61 cfs @ 8.03 hrs, Volume= 10,569 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link 100L: Pre-Dev



Summary for Subcatchment 100: Pre-Developed

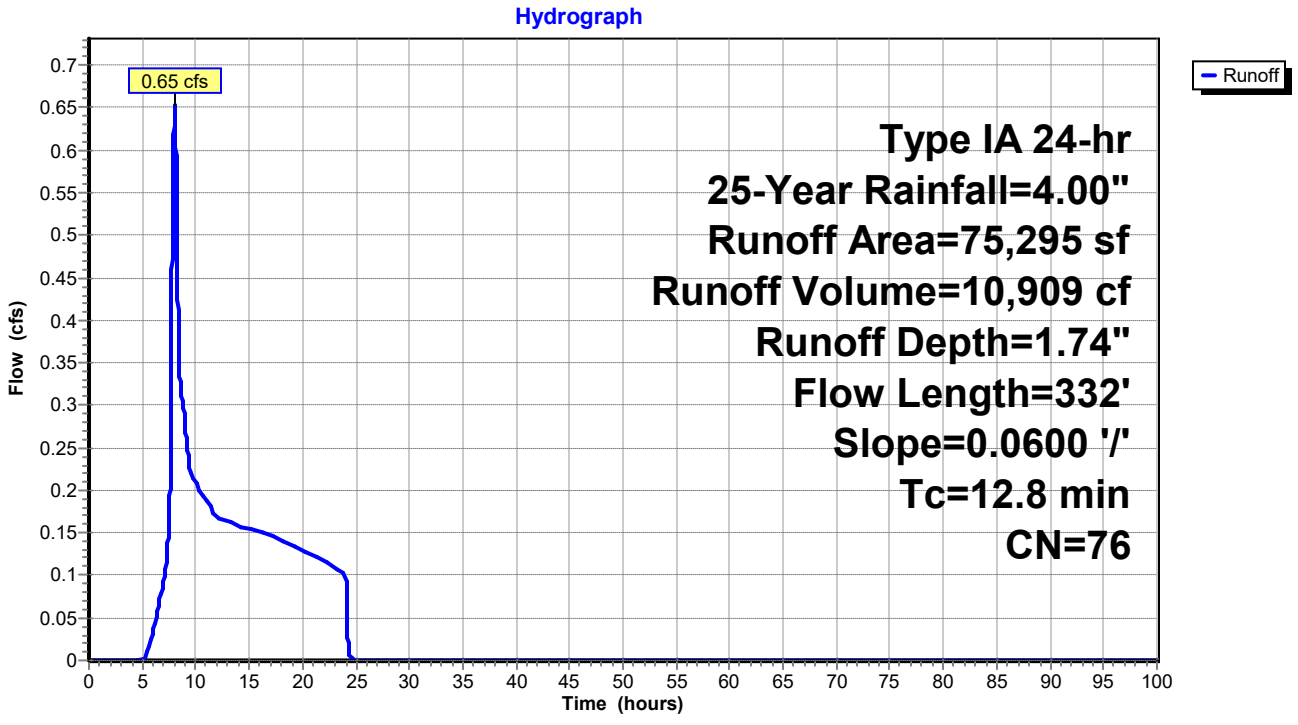
Runoff = 0.65 cfs @ 8.06 hrs, Volume= 10,909 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

	Area (sf)	CN	Description
*	8,283	75	Redeveloped Impervious
*	62,384	74	<50% Grass cover, Poor, HSG C
*	4,628	98	Buildings to Remain
	75,295	76	Weighted Average
	70,667		93.85% Pervious Area
	4,628		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0600	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.50"
3.8	282	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.8	332	Total			

Subcatchment 100: Pre-Developed



Summary for Subcatchment 101: Post Developed Site

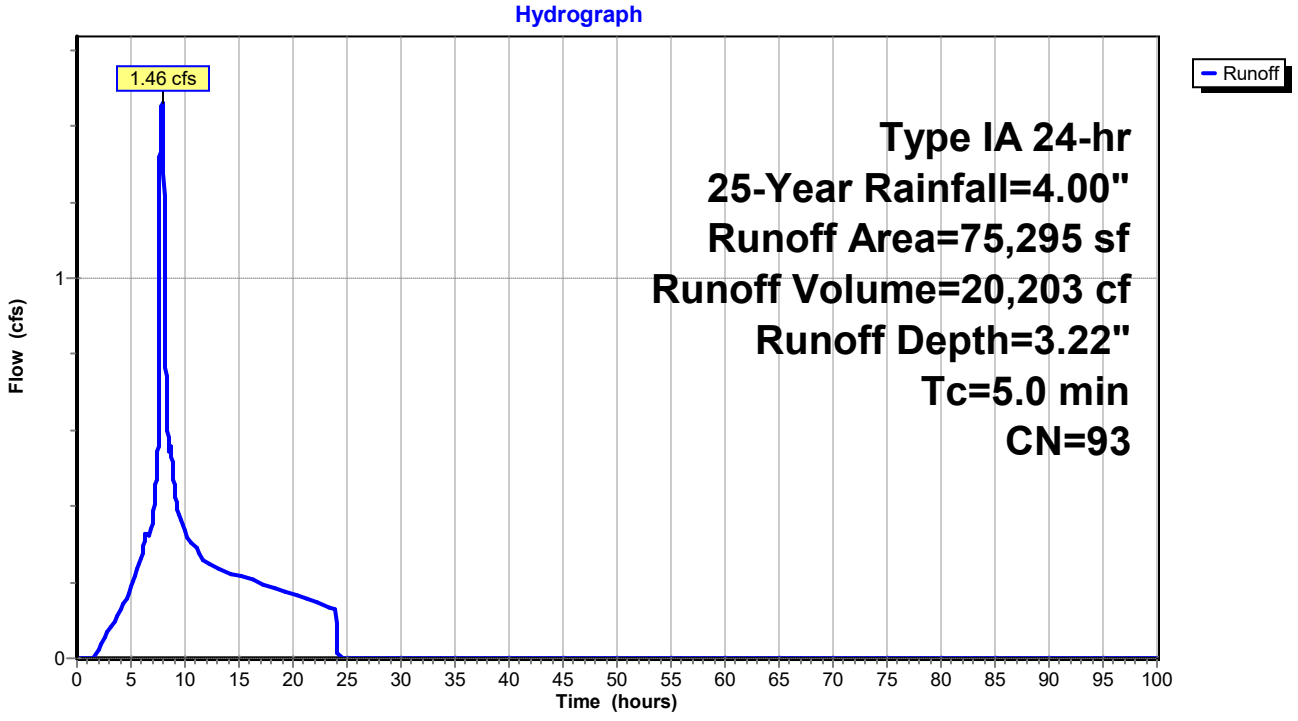
Runoff = 1.46 cfs @ 7.88 hrs, Volume= 20,203 cf, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

	Area (sf)	CN	Description
*	38,753	98	Impervious, lots
*	4,628	98	ex. buildings
*	31,914	86	pervious
	75,295	93	Weighted Average
	31,914		42.39% Pervious Area
	43,381		57.61% Impervious Area

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

Subcatchment 101: Post Developed Site



Summary for Subcatchment 300: Offsite upstream

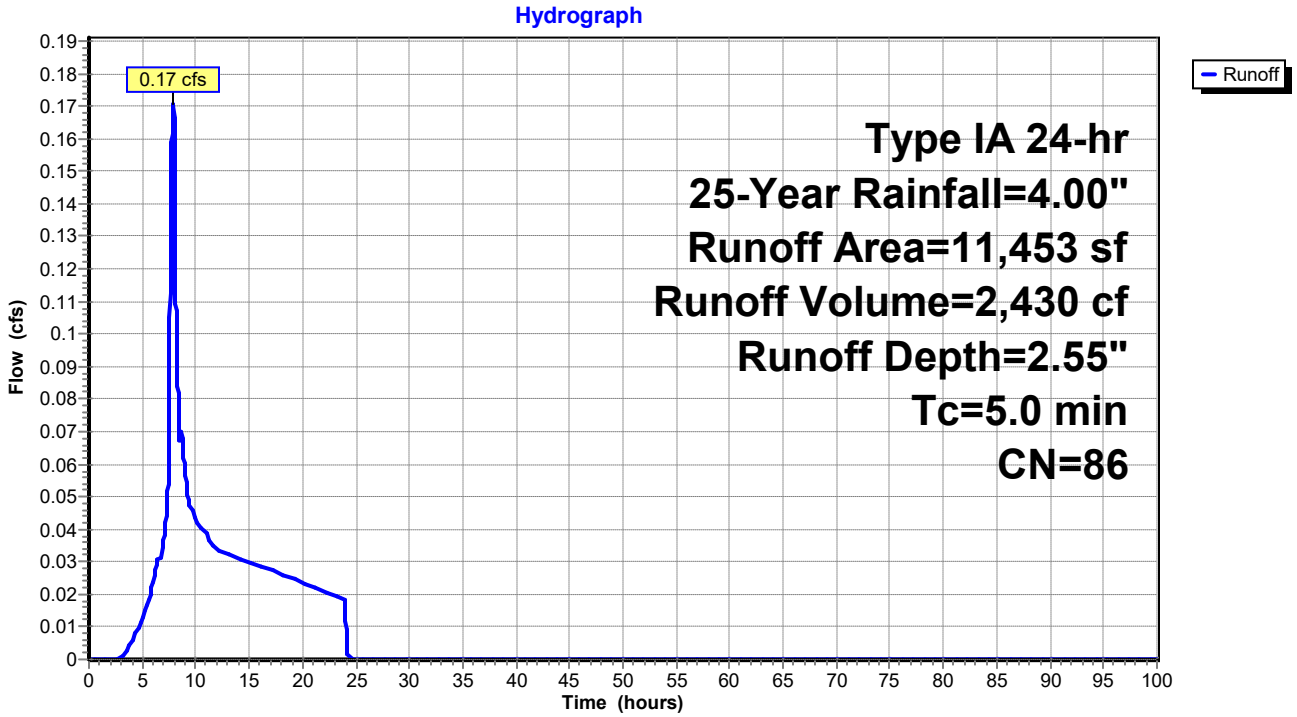
Runoff = 0.17 cfs @ 7.92 hrs, Volume= 2,430 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 300: Offsite upstream



Summary for Subcatchment 301: Offsite upstream

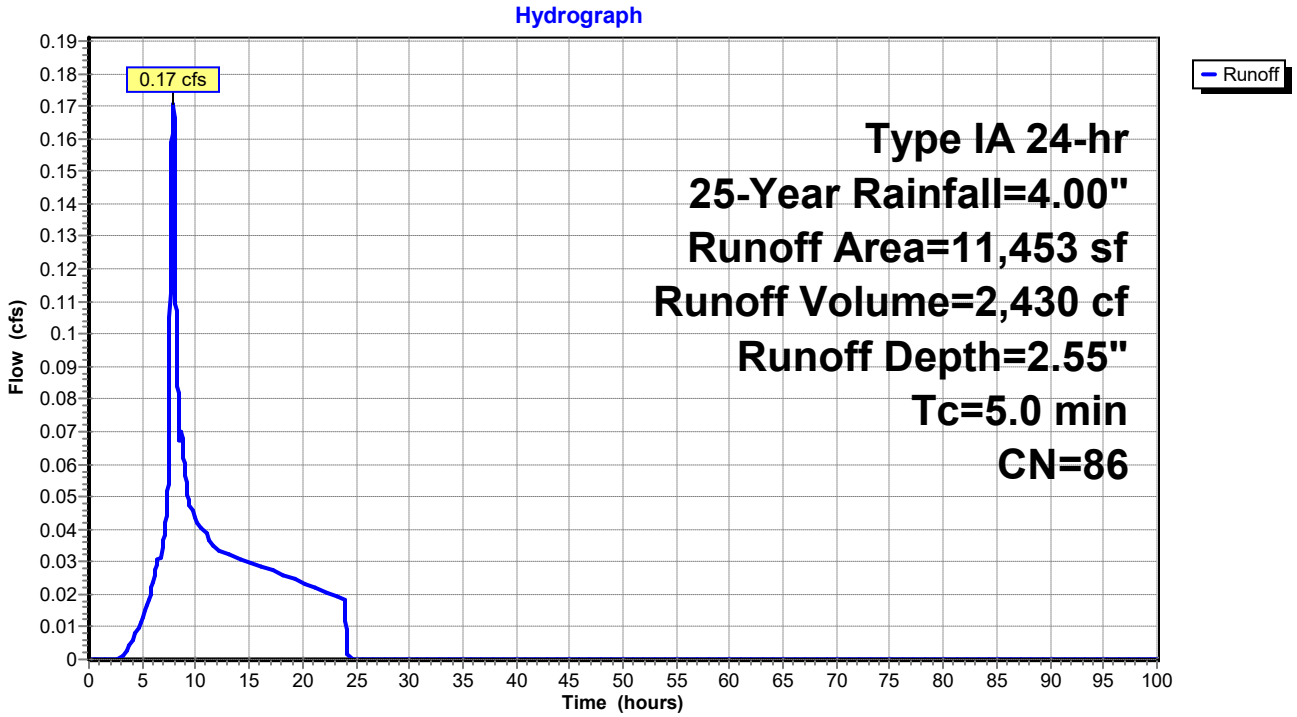
Runoff = 0.17 cfs @ 7.92 hrs, Volume= 2,430 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

	Area (sf)	CN	Description
*	11,453	86	pervious
	11,453		100.00% Pervious Area

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

Subcatchment 301: Offsite upstream



Summary for Pond 1P: Chambers

Inflow Area = 86,748 sf, 50.01% Impervious, Inflow Depth = 3.13" for 25-Year event
Inflow = 1.63 cfs @ 7.88 hrs, Volume= 22,634 cf
Outflow = 0.50 cfs @ 9.06 hrs, Volume= 22,634 cf, Atten= 70%, Lag= 70.6 min
Primary = 0.50 cfs @ 9.06 hrs, Volume= 22,634 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Peak Elev= 227.94' @ 9.06 hrs Surf.Area= 3,884 sf Storage= 6,135 cf

Plug-Flow detention time= 304.1 min calculated for 22,634 cf (100% of inflow)
Center-of-Mass det. time= 304.1 min (1,017.1 - 713.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	225.72'	1,923 cf	**44.28'W x 87.72'L x 3.02'H Field A** 11,750 cf Overall - 5,339 cf Embedded = 6,411 cf x 30.0% Voids
#2A	225.72'	5,116 cf	**Contech ChamberMaxx 2016** x 108 Inside #1 Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf Row Length Adjustment= +0.32' x 6.63 sf x 9 rows
		7,039 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	224.90'	**12.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 224.90' / 224.62' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	222.90'	**1.8" Vert. Orifice #1** C= 0.620
#3	Device 1	227.15'	**4.0" Vert. Orifice #2** C= 0.620
#4	Secondary	228.00'	**60.0" W x 24.0" H Vert. Overflow** C= 0.620

Primary OutFlow Max=0.50 cfs @ 9.06 hrs HW=227.94' (Free Discharge)
└**1=Culvert** (Passes 0.50 cfs of 4.76 cfs potential flow)
  ├**2=Orifice #1** (Orifice Controls 0.15 cfs @ 8.68 fps)
  └**3=Orifice #2** (Orifice Controls 0.34 cfs @ 3.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=225.72' (Free Discharge)
└**4=Overflow** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = Contech ChamberMaxx 2016 (Contech® ChamberMaxx® capped at 47.2cf for air pocket)
Inside= 49.6"W x 25.2"H => 6.63 sf x 7.12'L = 47.2 cf
Outside= 49.6"W x 30.0"H => 6.92 sf x 7.12'L = 49.3 cf
Row Length Adjustment= +0.32' x 6.63 sf x 9 rows

51.4" Wide + 5.6" Spacing = 57.0" C-C Row Spacing

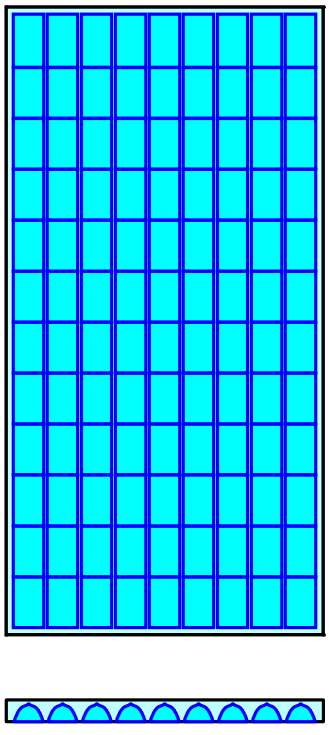
12 Chambers/Row x 7.12' Long +0.32' Row Adjustment = 85.72' Row Length +12.0" End Stone x 2 = 87.72' Base Length
9 Rows x 51.4" Wide + 5.6" Spacing x 8 + 12.0" Side Stone x 2 = 44.28' Base Width
30.3" Chamber Height + 6.0" Cover = 3.02' Field Height

108 Chambers x 47.2 cf +0.32' Row Adjustment x 6.63 sf x 9 Rows = 5,115.8 cf Chamber Storage
108 Chambers x 49.3 cf +0.32' Row Adjustment x 6.92 sf x 9 Rows = 5,339.5 cf Displacement

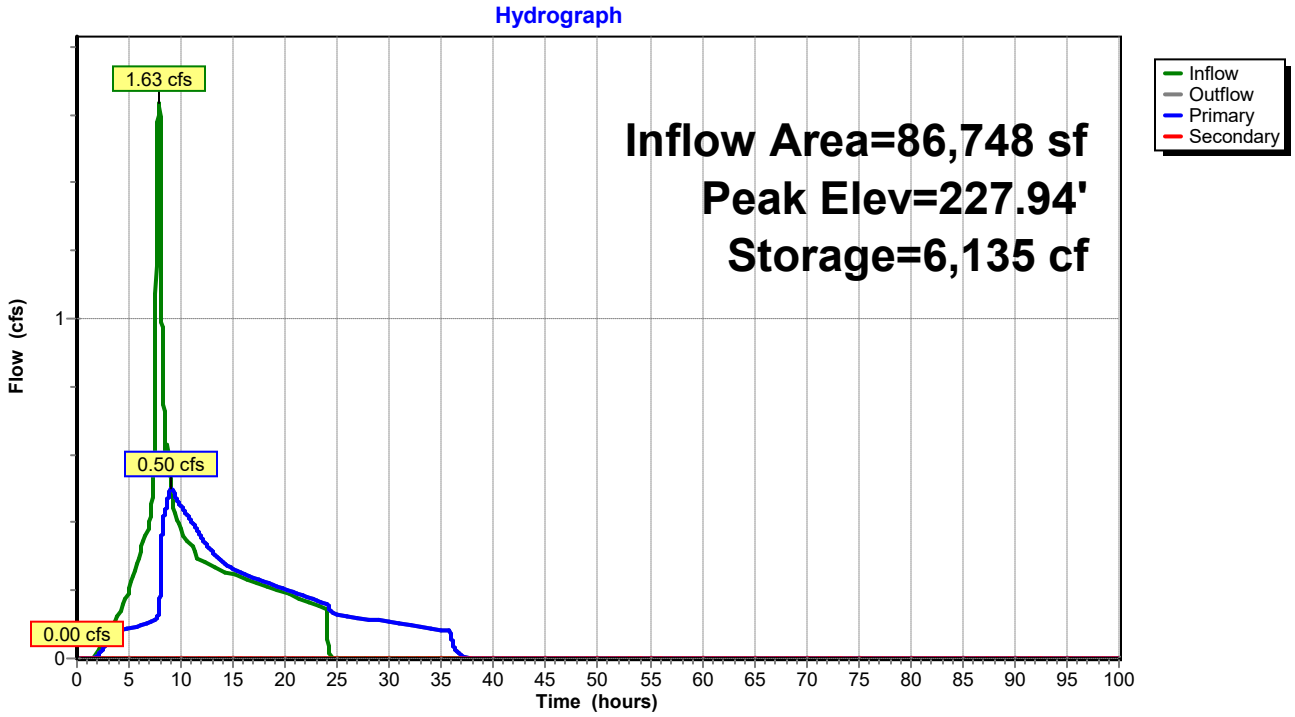
11,750.3 cf Field - 5,339.5 cf Chambers = 6,410.8 cf Stone x 30.0% Voids = 1,923.2 cf Stone Storage

Chamber Storage + Stone Storage = 7,039.0 cf = 0.162 af
Overall Storage Efficiency = 59.9%
Overall System Size = 87.72' x 44.28' x 3.02'

108 Chambers
435.2 cy Field
237.4 cy Stone



Pond 1P: Chambers

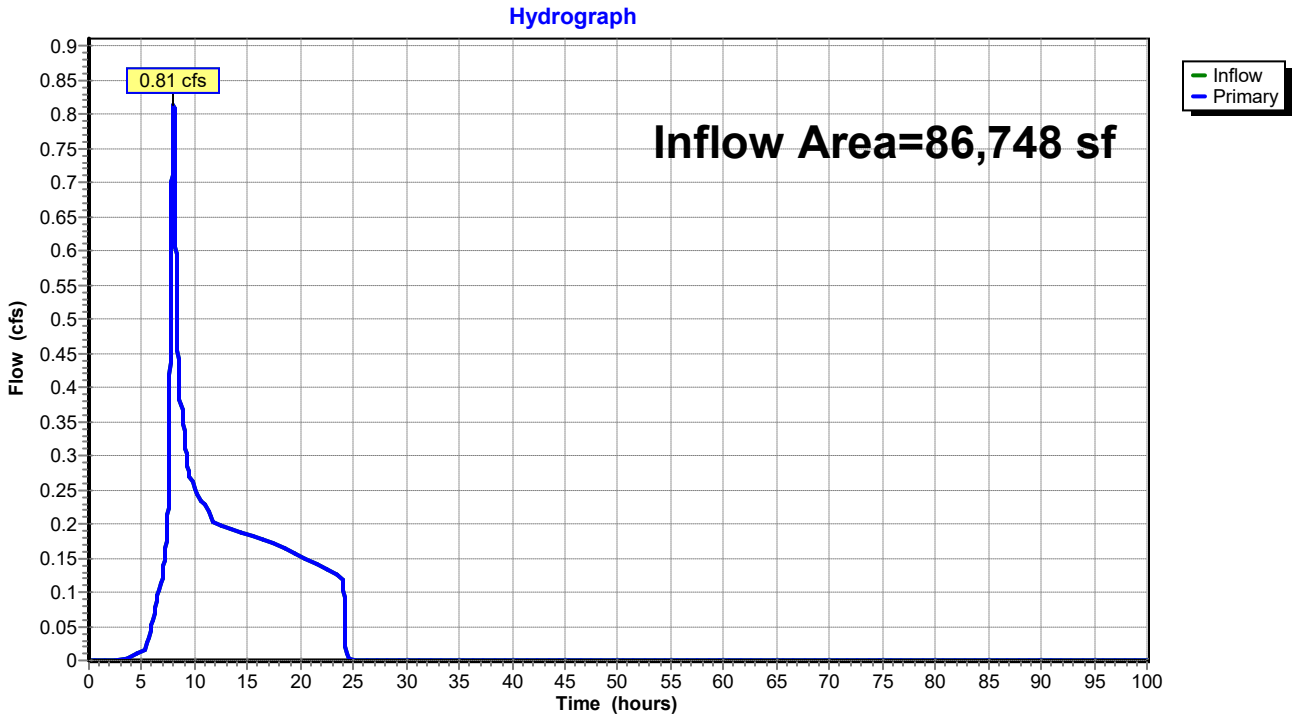


Summary for Link 100L: Pre-Dev

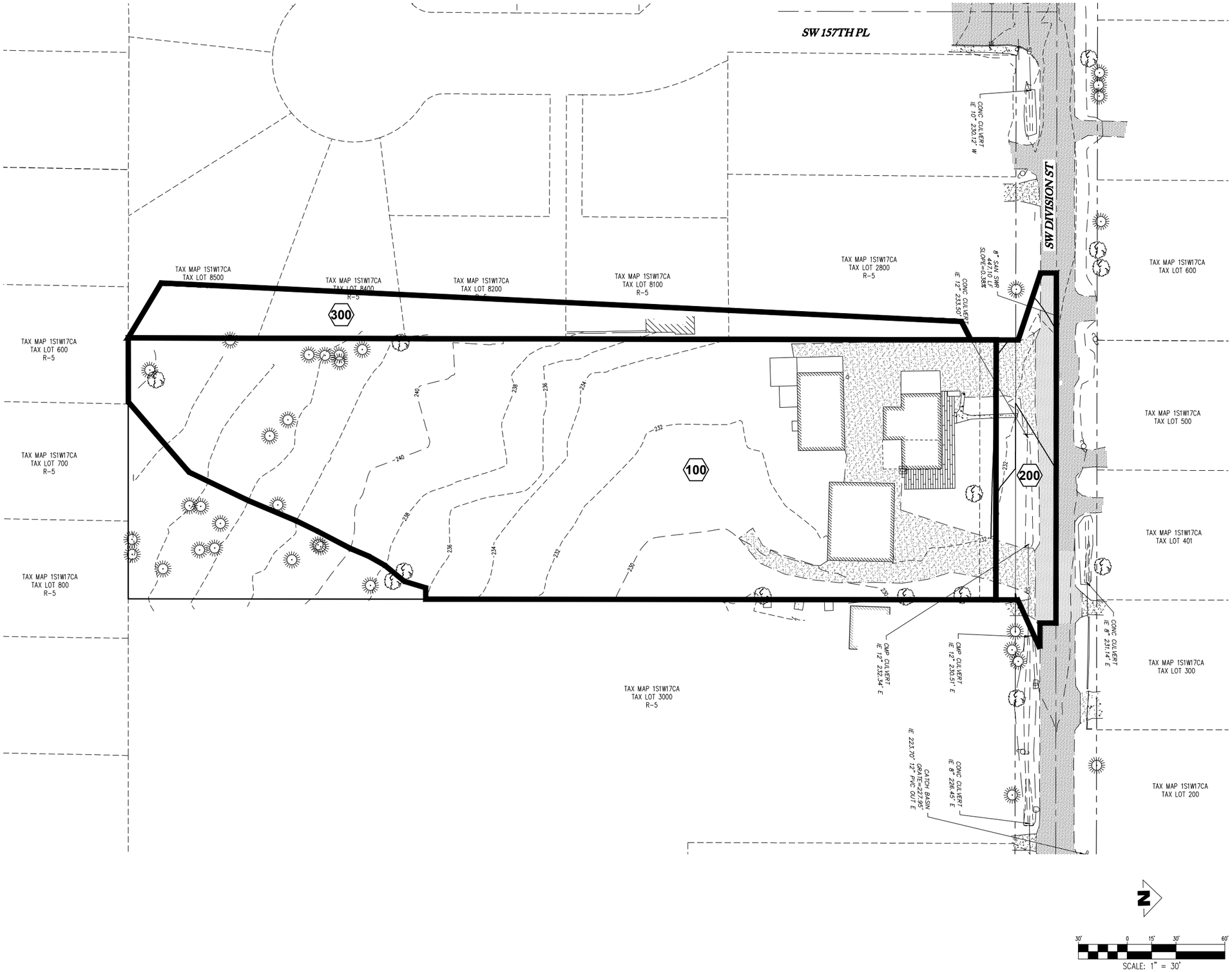
Inflow Area = 86,748 sf, 5.33% Impervious, Inflow Depth = 1.85" for 25-Year event
Inflow = 0.81 cfs @ 8.03 hrs, Volume= 13,339 cf
Primary = 0.81 cfs @ 8.03 hrs, Volume= 13,339 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Link 100L: Pre-Dev



Appendix D:



PRE-DEVELOPED BASIN MAP

PLANNING PLAN SET
DESIGN REVIEW SUBMITTAL
FOR THE SIKH CENTER OF OREGON
TAX MAP 1S1W 17CA, TL 02900
CITY OF BEAVERTON, OREGON

REVISIONS

NO.	DATE	DESCRIPTION

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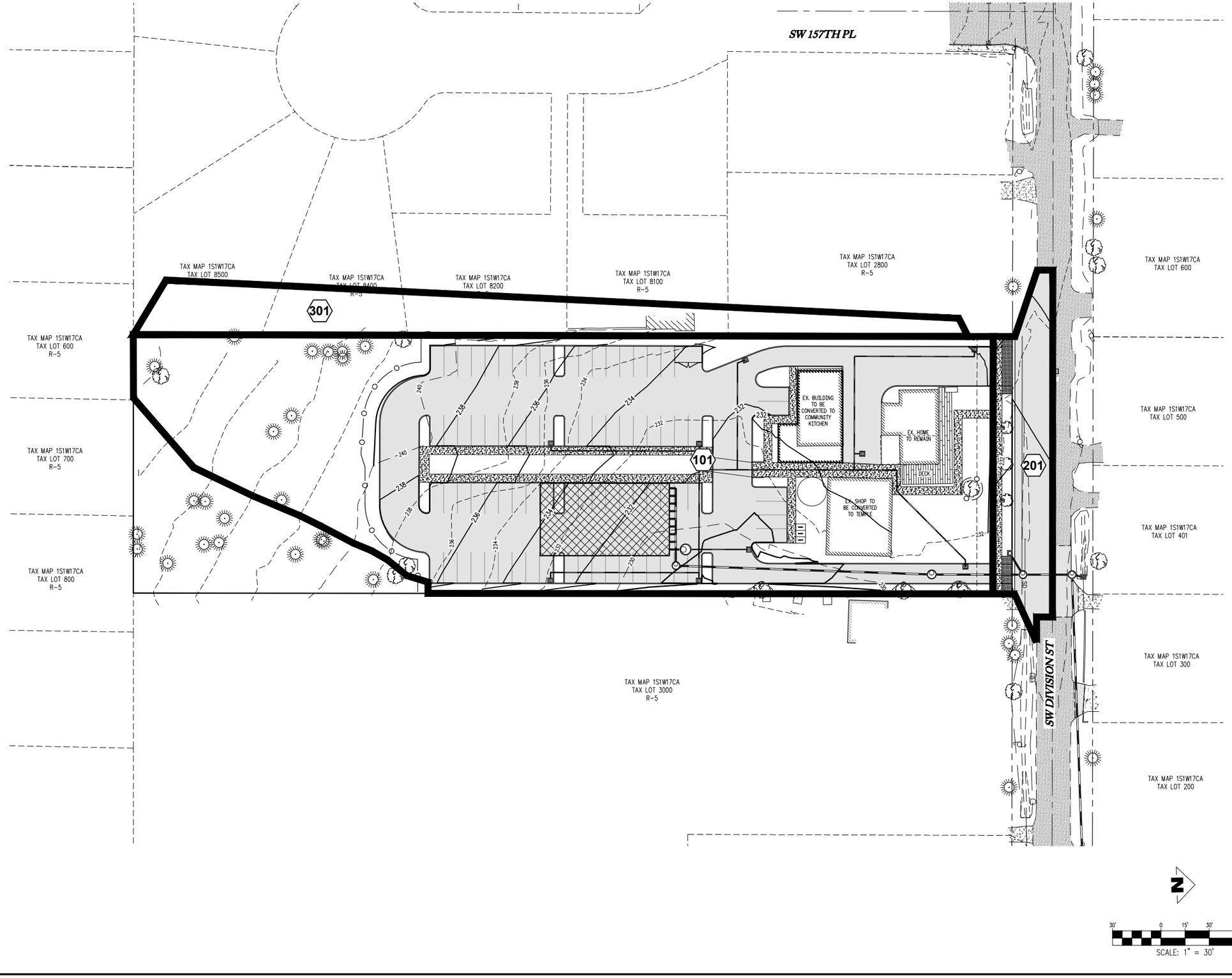
SHEET 1 OF 2

FILE:P:\2039-001 Beaverton Sikh Temple\docs\civil\STORM\CAD\2039-001 pre-dev, Layout: C4 PRELIMINARY UTILITY PLAN, Plot Date: 2/12/2024 3:54 PM, by: Josh Meyer



PLANNING PLAN SET
DESIGN REVIEW SUBMITTAL
FOR THE SIKH CENTER OF OREGON
TAX MAP 1S1W 17CA, TL 02900
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POST-DEVELOPED BASIN MAP

REVISIONS

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SHEET 2 OF 2

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