To: City of Watertown Engineering Department

From: Aaron Koch

Date: April, 10 2024

Subject: Consolidated Industrial Addition Stormwater Memo

For the purposes of notification to the City of Watertown, the following is a summary explaining the stormwater runoff for the proposed Consolidated Industrial Addition located at 1207 Boomer St. in Watertown, WI. The proposed site is tributary to the Rock River and the site improvements consist almost entirely of building roof. The total size of the proposed development is 1.5 acres and will require stormwater BMPs as required by the DNR and City of Watertown.

The City of Watertown requires 60% TSS removal rate for the proposed parking and road areas for redevelopment. The proposed addition will not add additional parking or roadway to the existing site. The proposed building addition is 59,290 S.F in size with the remaining disturbed areas being restored as green space.

The City also requires that peak flow from the 1-yr 24-hr storm in post-development conditions does not exceed the peak flow from the 1-yr 24-hr storm in pre-development conditions and that the peak flow from the 100-yr 24-hr storm in post-development conditions does not exceed the peak flow from the 2-yr 24-hr storm in pre-development conditions.
These requirements will be met through the use of a blue roof system utilizing 6 Accutrol Weir Flow controlled flow roof drains each with 2 notches.

Pre-Development Peak Flows

Drainage Area	Area (ac)	CN	Tc (min)	Peak Flows 1-year (cfs)	2-year (cfs)	100-year (cfs)
Undeveloped Offsite	1.50	71	6.0*	**1.09**	**1.54**	8.21

Post-Development Peak Flows

Drainage Area	Area (ac)	CN	Tc (min)	Peak Flows 1-year (cfs)	2-year (cfs)	100-year (cfs)
Proposed Roof	1.36	98	6.0*	4.49	5.08	11.69
Disturbed Green Area	0.14	71	6.0*	0.10	0.14	0.74
Controlled Flow Watts	---	---	---	0.74	0.75	1.02
Proposed Site Discharge	1.5	---	---	**0.83**	0.88	**1.53**

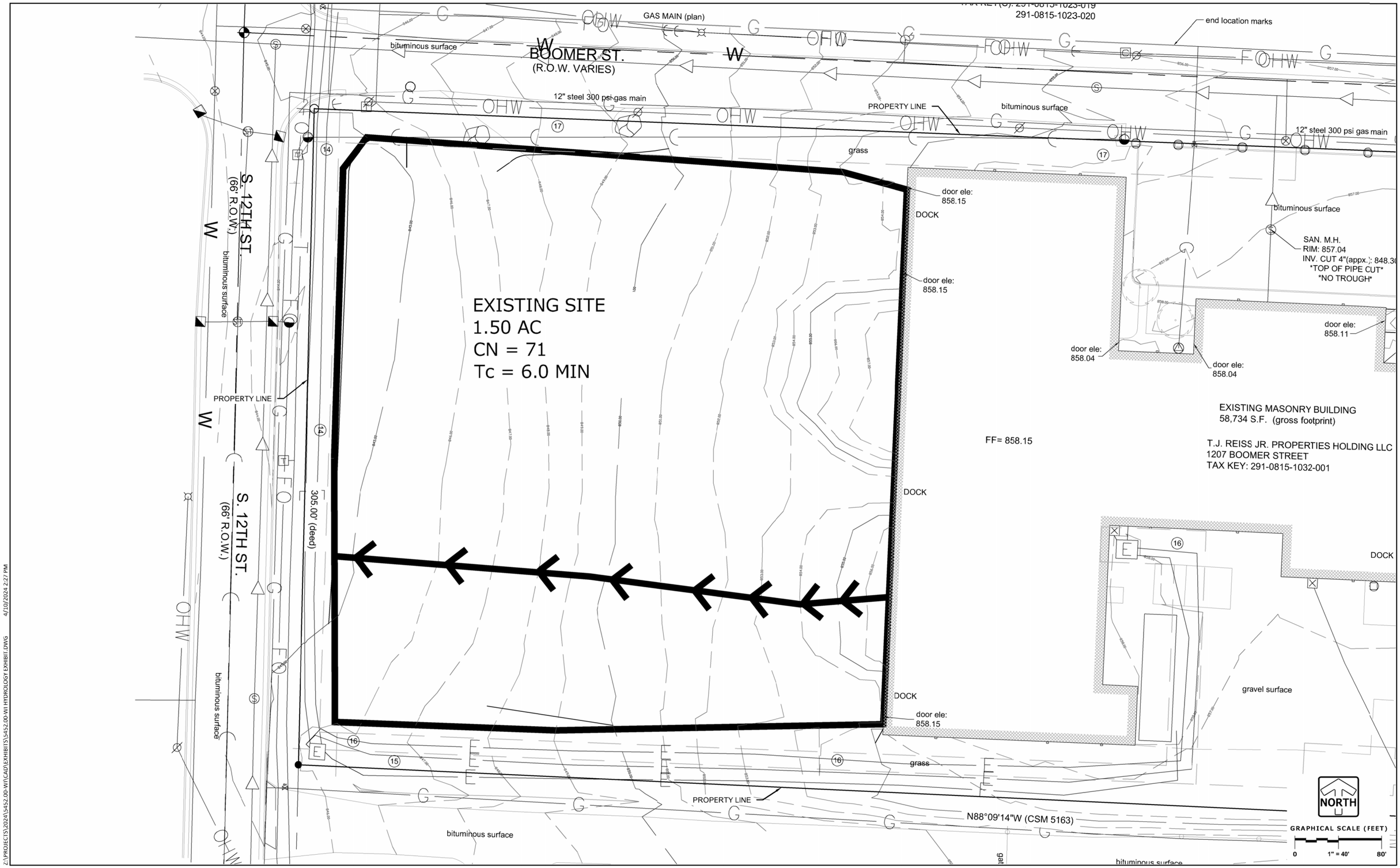
* A Tc of 6.0min is used since the actual computed Tc is less than the minimum allowed by TR-55

Comparison of Proposed to Allowable Release Rates

	1-year Release Rate (cfs)	100-year Release Rate (cfs)
Allowable	1.09	1.54
Proposed	0.83	1.53

As shown in the tables above, proposed stormwater quantity BMPs will reduce the peak flow from the post-development conditions to meet pre-development conditions per the City of Watertown requirements. The HydroCAD modeling data and the Proposed Hydrology Exhibit have been attached to this memo.


LOCATION MAP
Consolidated Industrial Addition
Legend
SITE LOCATION
Sunset Ave
E Hart St
Oconomowoc Ave
Rock River
Richards Ave
Brian Ct
Wakoka St
Randolph St
Mary St
Theresa St
Terry Ln
Janet Ln
Dorothy Pl
S Concord Ave
Allermann Dr
Clark St
Humboldt St
S 10th St
S 12th St
S 9th St
Franklin St
Lakeside Terrace
Boomer St
E Haven Dr
E
N
2000 ft
Google Earth
Image © 2024 Airbus



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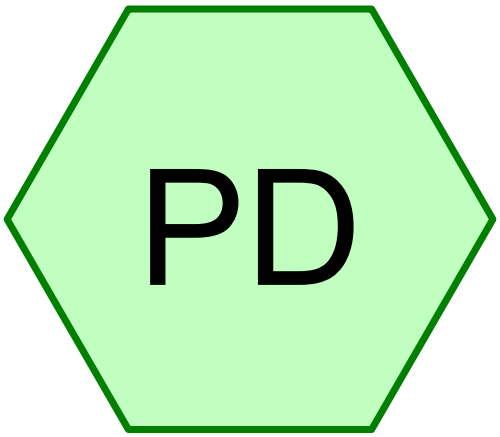
EXISTING HYDROLOGY - CONSOLIDATED INDUSTRIAL

4-10-24

PINNACLE ENGINEERING GROUP
20725 WATERTOWN ROAD | SUITE 100 | BROOKFIELD, WI 53186 | WWW.PINNACLE-ENGR.COM |

PLAN | DESIGN | DELIVER **PEG JOB#** 5452-WI



Pre-Development

Subcat Reach Pond Link

Routing Diagram for SITE
Prepared by Pinnacle Engineering Group, Printed 4/10/2024

Summary for Subcatchment PD: Pre-Development

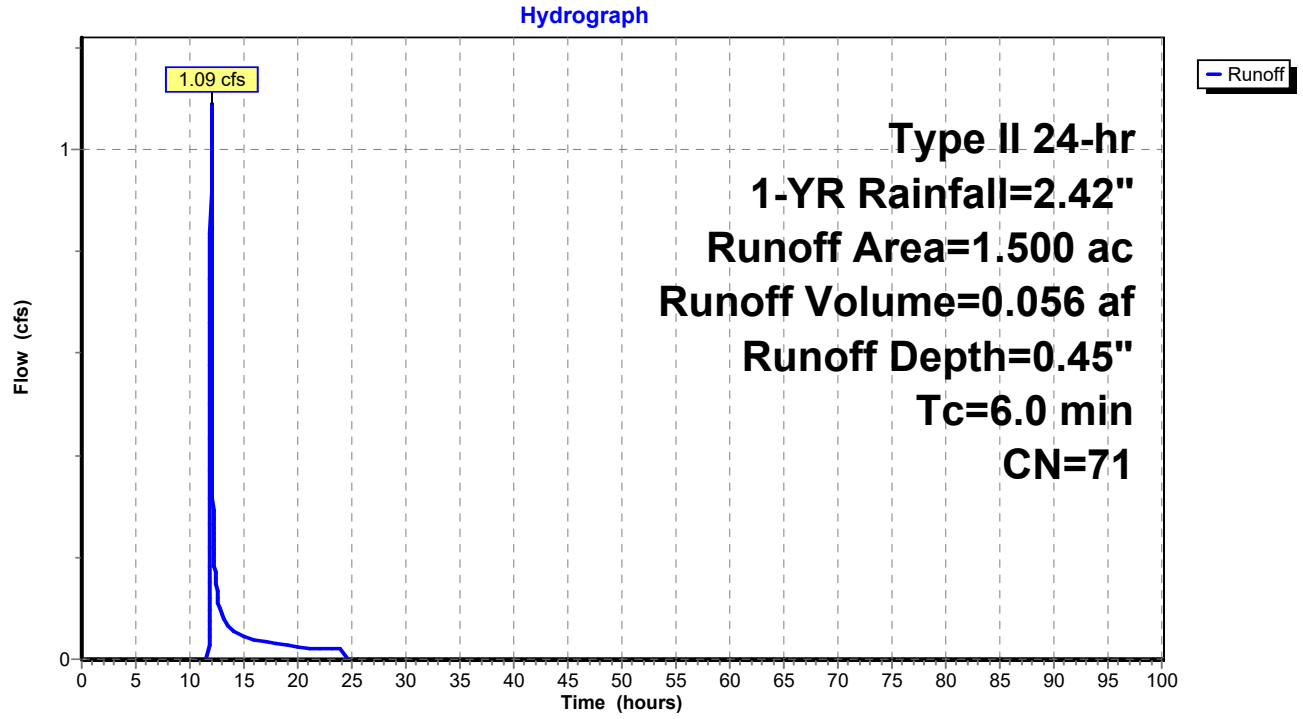
Runoff = 1.09 cfs @ 11.99 hrs, Volume= 0.056 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-YR Rainfall=2.42"

	Area (ac)	CN	Description
*	1.500	71	Grassland, HSG C
	1.500		100.00% Pervious Area

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

Subcatchment PD: Pre-Development



Summary for Subcatchment PD: Pre-Development

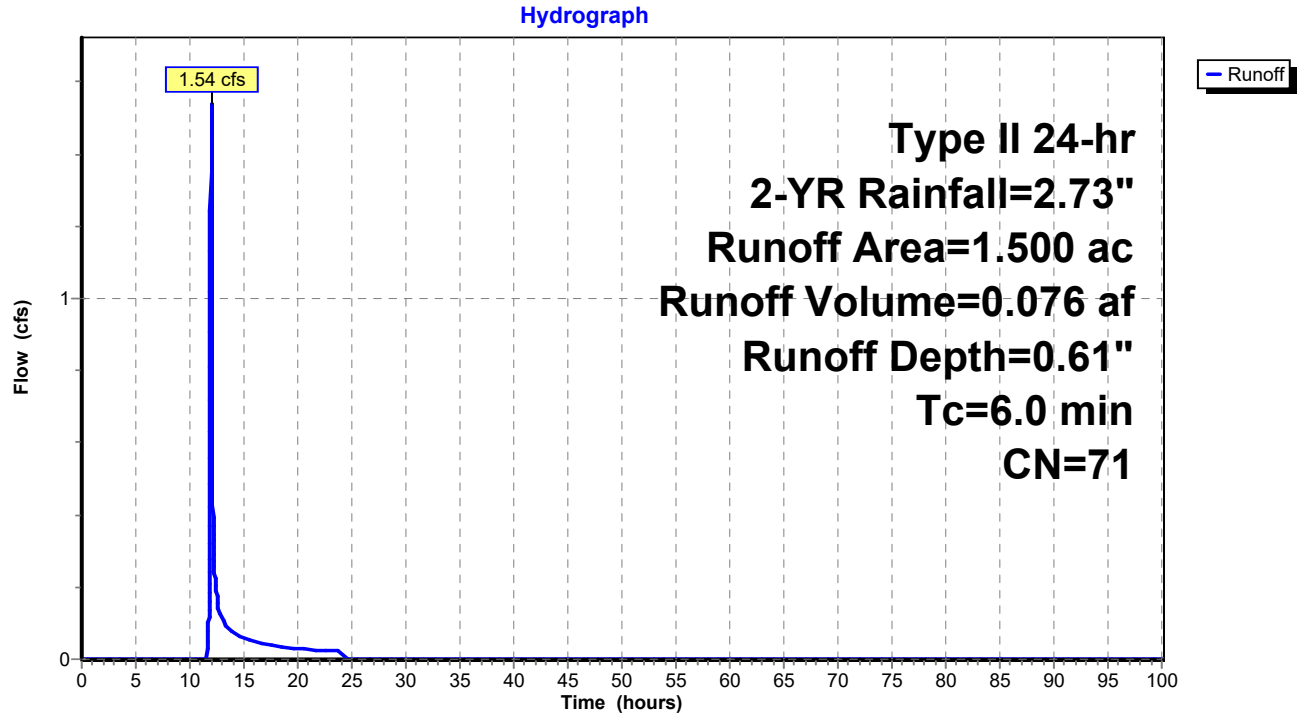
Runoff = 1.54 cfs @ 11.99 hrs, Volume= 0.076 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-YR Rainfall=2.73"

	Area (ac)	CN	Description
*	1.500	71	Grassland, HSG C
	1.500		100.00% Pervious Area

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

Subcatchment PD: Pre-Development



Summary for Subcatchment PD: Pre-Development

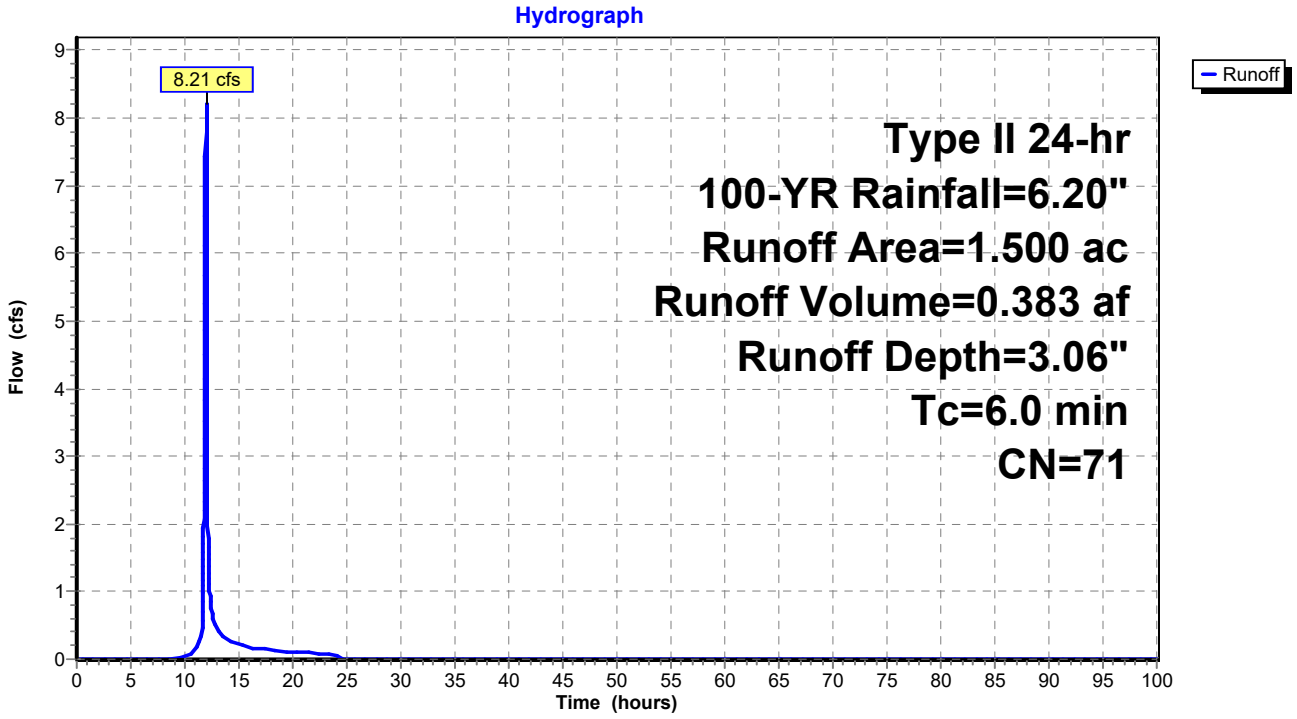
Runoff = 8.21 cfs @ 11.97 hrs, Volume= 0.383 af, Depth= 3.06"

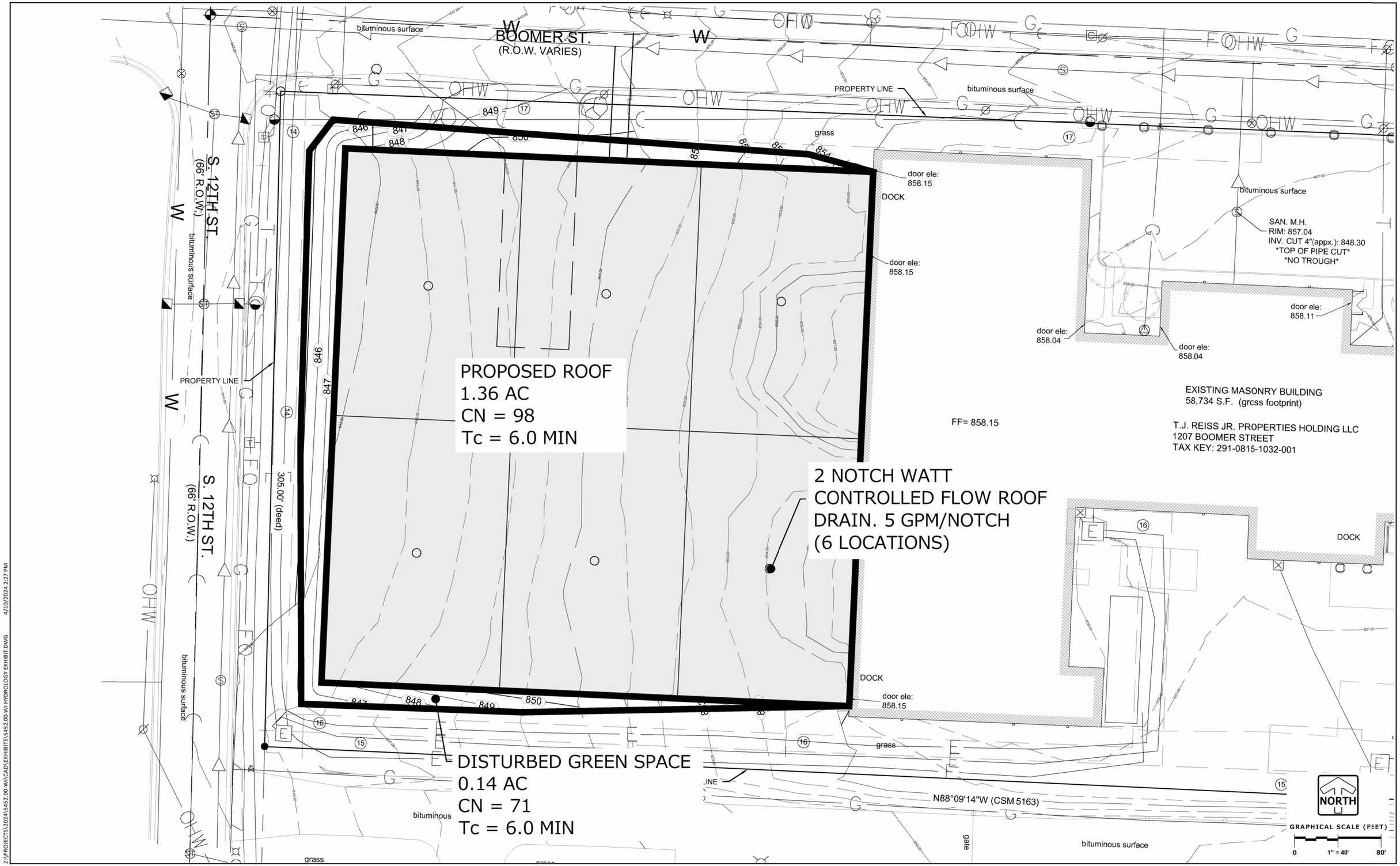
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-YR Rainfall=6.20"

	Area (ac)	CN	Description
*	1.500	71	Grassland, HSG C
	1.500		100.00% Pervious Area

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

Subcatchment PD: Pre-Development





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PROPOSED HYDROLOGY - CONSOLIDATED INDUSTRIAL

4-10-24

Accutrol Weirs

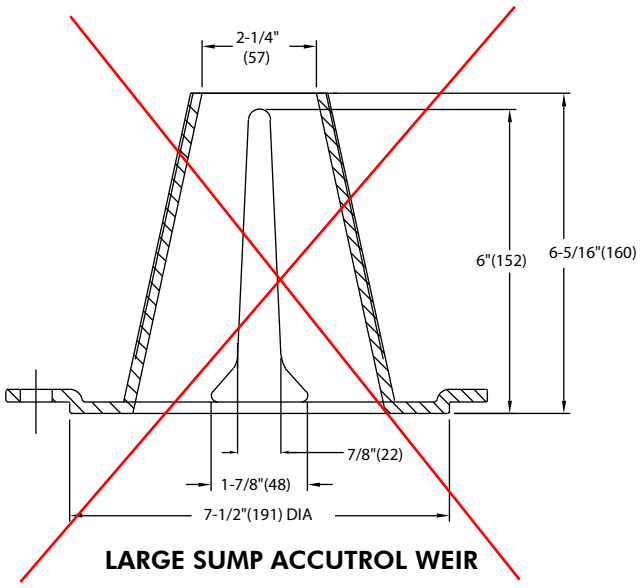
Tag: _____

Flow Control for Roof Drains

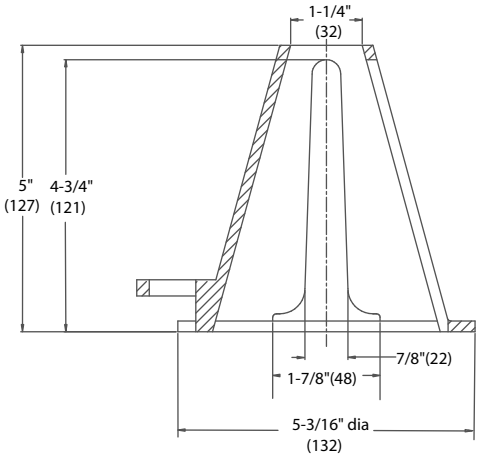
ACCUTROL WEIR FLOW CONTROL

SPECIFICATION: Watts Drainage Products epoxy coated cast iron Accutrol Weir is designed with parabolic openings which limit the flow of rain water off a roof. Each weir slot controls flow to 5 gpm per inch of head to a maximum of 30 gpm at 6" head(for large sump), 25 gpm at 5" head(for small sump) . The Accutrol Weir is secured to the flashing clamp of the roof drain. The Accutrol Weir is available with 1 to 4 slots for the large sump drain and up to 3 slots for the small sump drain.

For Large Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-100-A2" for two slot weir)
For Small Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-200-A1" for one slot weir)



LARGE SUMP ACCUTROL WEIR



SMALL SUMP ACCUTROL WEIR

1 GMP = 448.8 CFS
1" HEAD = 5 GPM = 0.011 CFS
4-3/4" HEAD = 18.75 GPM = 0.042 CFS

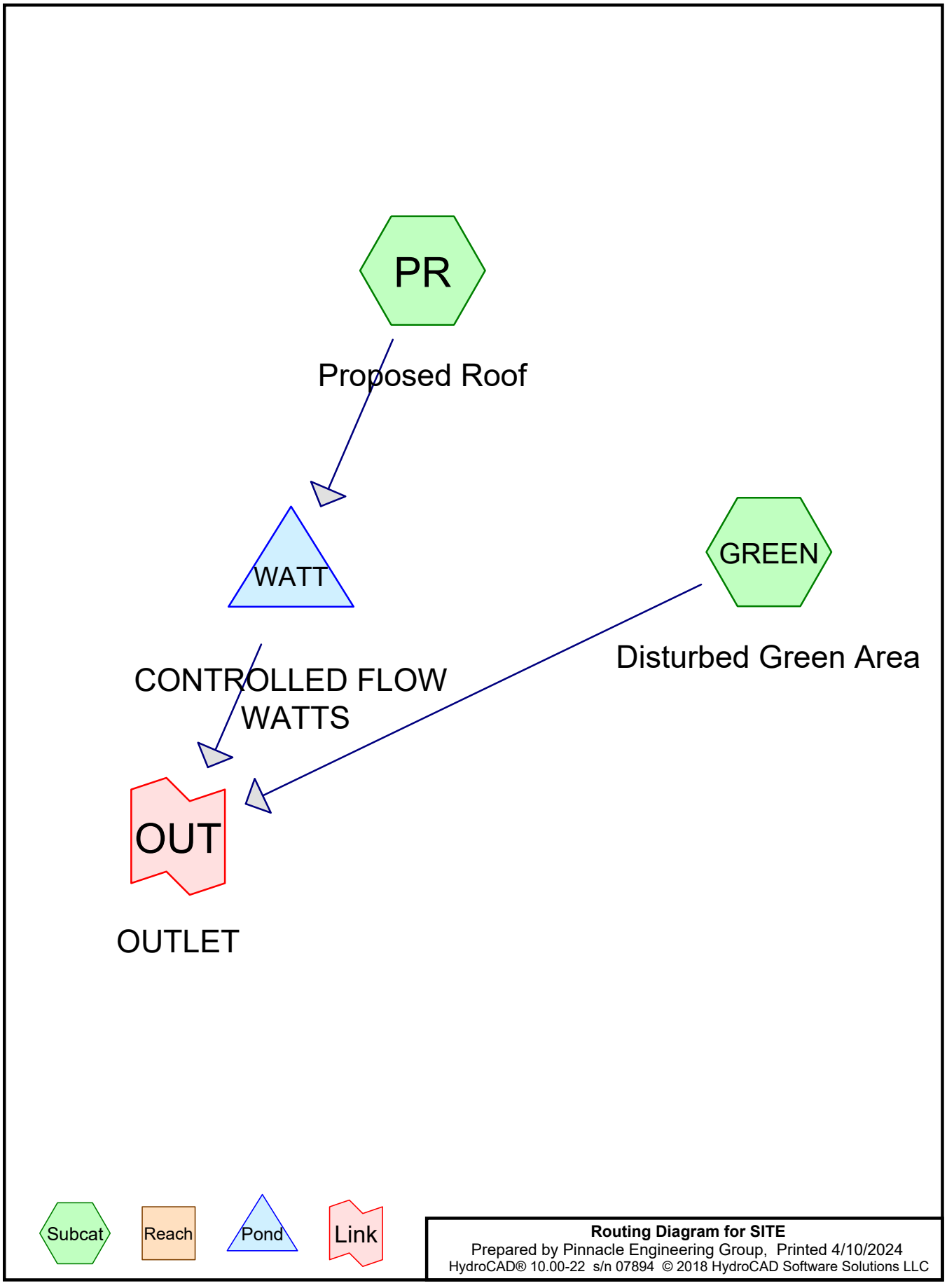
*ABOVE 5" HEAD 1-1/4"-DIA ORIFICE AT TOP OF STUCTURE IS USED

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca



Routing Diagram for SITE
Prepared by Pinnacle Engineering Group, Printed 4/10/2024

Summary for Subcatchment GREEN: Disturbed Green Area

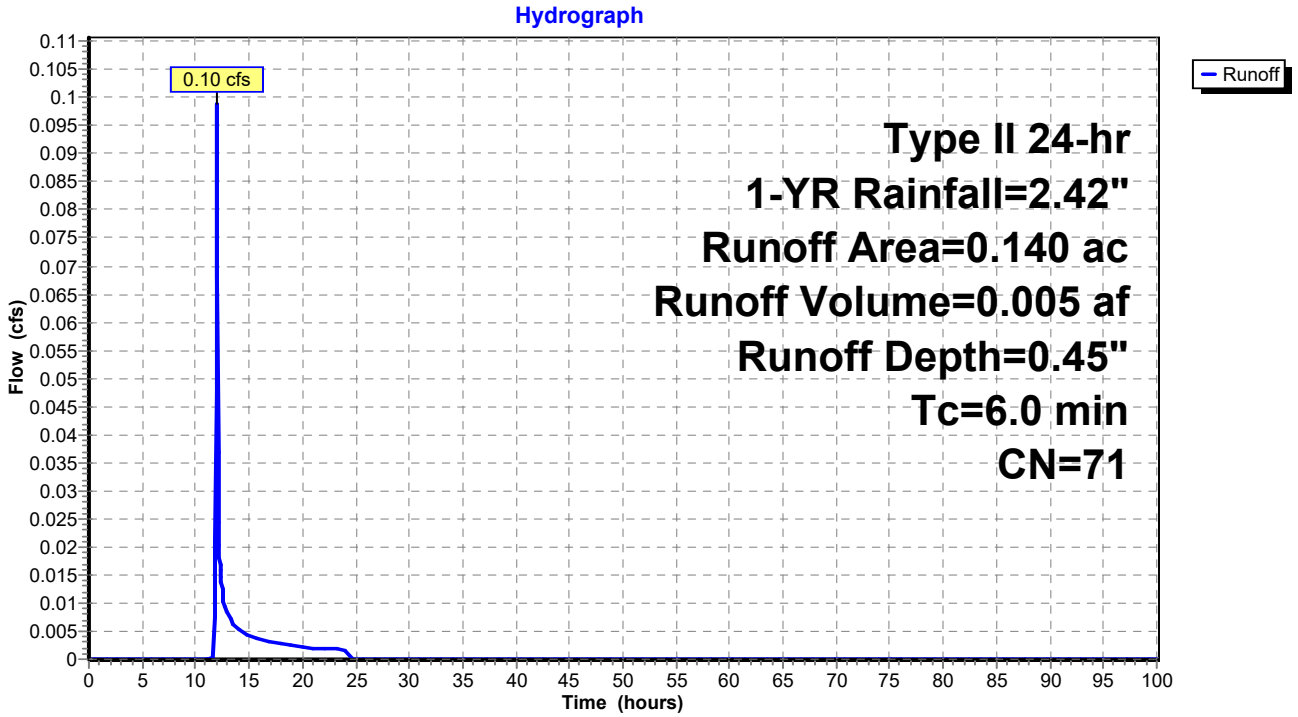
Runoff = 0.10 cfs @ 11.99 hrs, Volume= 0.005 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.42"

	Area (ac)	CN	Description
*	0.140	71	Grassland, HSG C
	0.140		100.00% Pervious Area

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

Subcatchment GREEN: Disturbed Green Area



Summary for Subcatchment PR: Proposed Roof

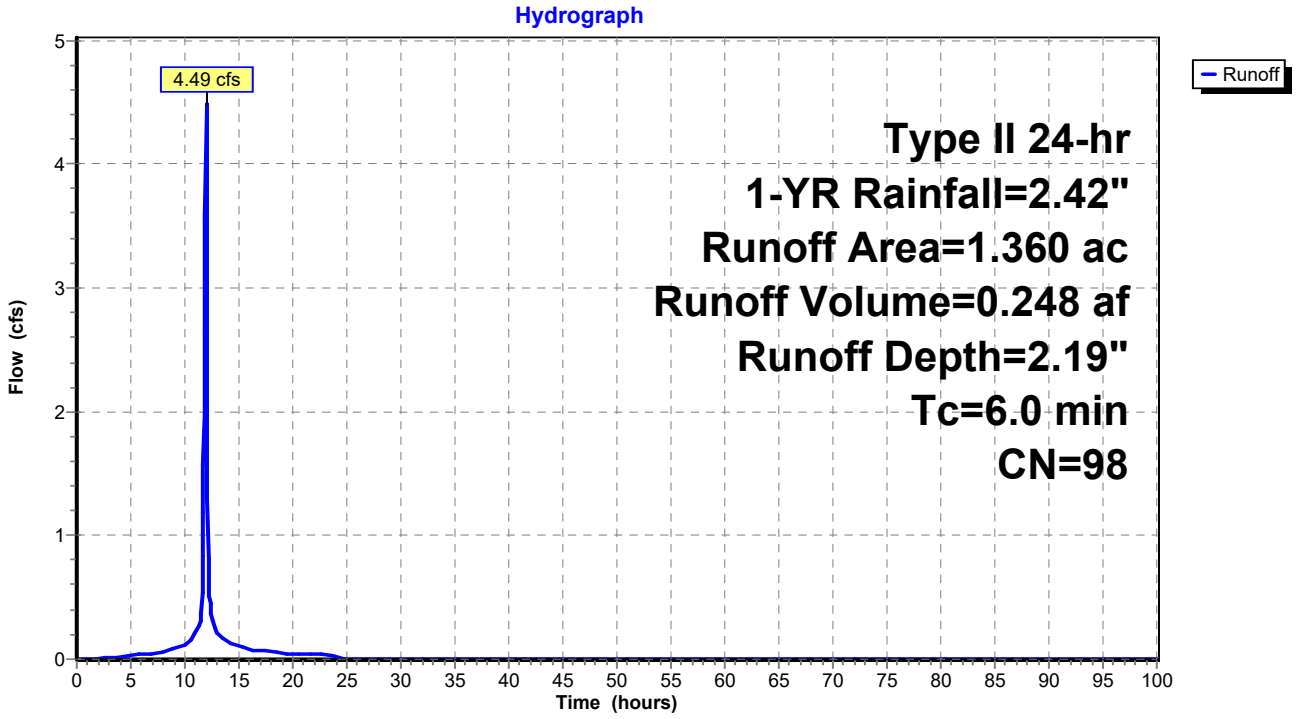
Runoff = 4.49 cfs @ 11.96 hrs, Volume= 0.248 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-YR Rainfall=2.42"

	Area (ac)	CN	Description
*	1.360	98	Building Addition
	1.360		100.00% Impervious Area

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

Subcatchment PR: Proposed Roof



Summary for Pond WATT: CONTROLLED FLOW WATTS

Inflow Area = 1.360 ac,100.00% Impervious, Inflow Depth = 2.19" for 1-YR event
Inflow = 4.49 cfs @ 11.96 hrs, Volume= 0.248 af
Outflow = 0.74 cfs @ 12.17 hrs, Volume= 0.248 af, Atten= 83%, Lag= 12.5 min
Primary = 0.74 cfs @ 12.17 hrs, Volume= 0.248 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 100.56' @ 12.17 hrs Surf.Area= 18,699 sf Storage= 3,480 cf

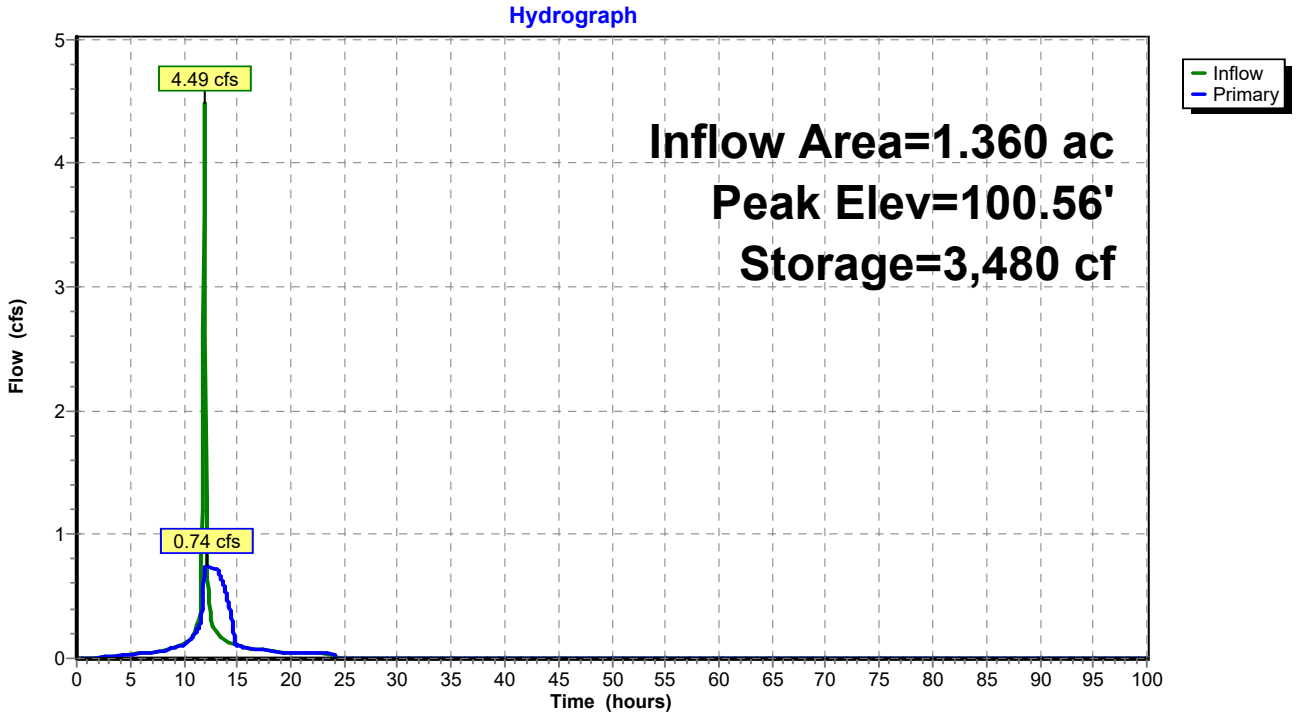
Plug-Flow detention time= 28.7 min calculated for 0.248 af (100% of inflow)
Center-of-Mass det. time= 28.7 min (787.6 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	20,000 cf	**1.00'H Prismatoid Z=50.0** x 6

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**6.0" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#2	Device 1	100.00'	**2 - 5GPM NOTCH PER FIXTURE X 6.00** Head (feet) 0.00 0.08 0.42 Disch. (cfs) 0.000 0.022 0.110
#3	Device 1	100.42'	**1.2" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	100.80'	**6.0" Horiz. OVERFLOW X 6.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.74 cfs @ 12.17 hrs HW=100.56' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.74 cfs of 4.24 cfs potential flow)
  - **2=2 - 5GPM NOTCH PER FIXTURE** (Custom Controls 0.66 cfs)
  - **3=Orifice/Grate** (Orifice Controls 0.08 cfs @ 1.79 fps)
- **4=OVERFLOW** (Controls 0.00 cfs)

Pond WATT: CONTROLLED FLOW WATTS

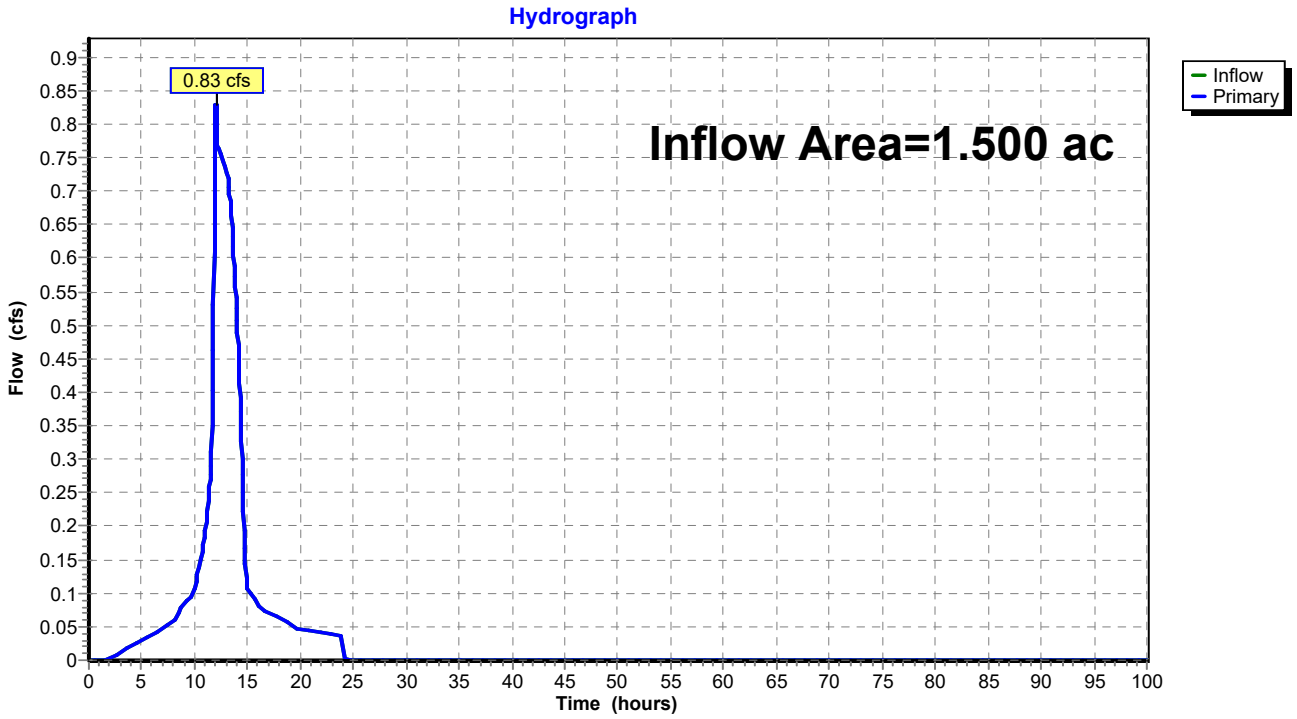


Summary for Link OUT: OUTLET

Inflow Area = 1.500 ac, 90.67% Impervious, Inflow Depth = 2.03" for 1-YR event
Inflow = 0.83 cfs @ 12.01 hrs, Volume= 0.254 af
Primary = 0.83 cfs @ 12.01 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link OUT: OUTLET



Summary for Subcatchment GREEN: Disturbed Green Area

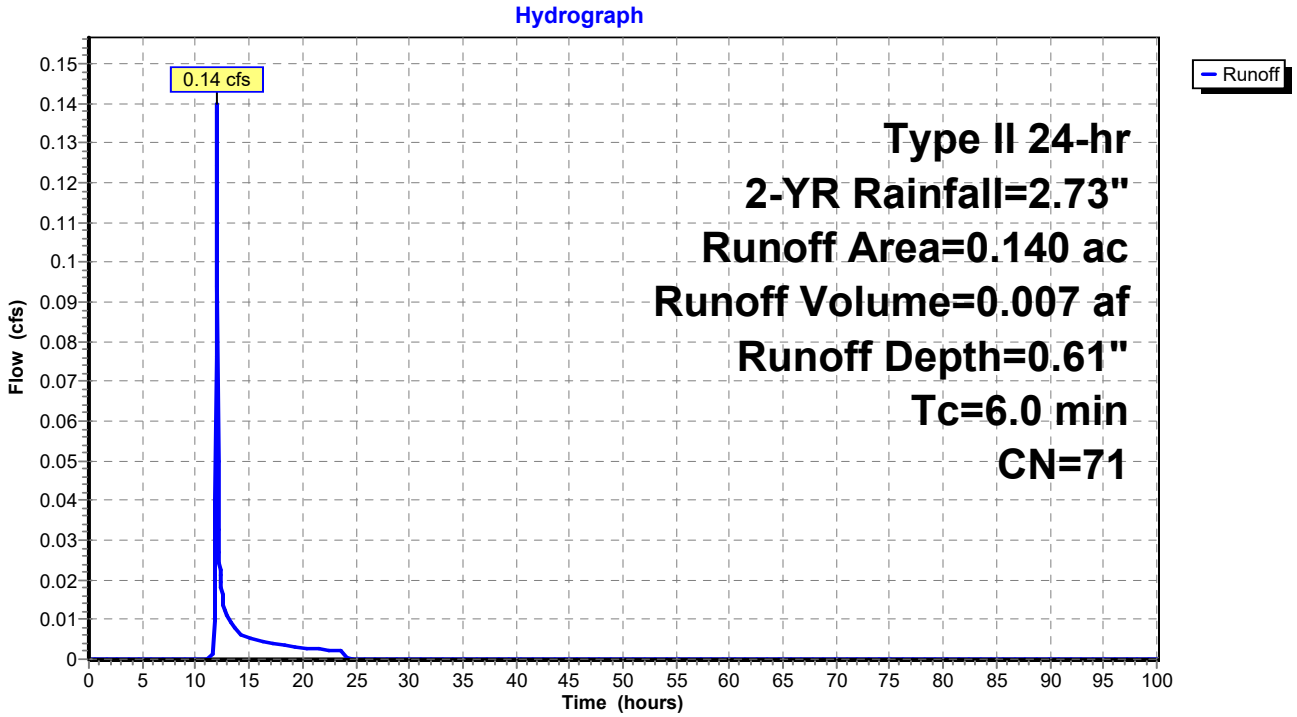
Runoff = 0.14 cfs @ 11.99 hrs, Volume= 0.007 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.73"

	Area (ac)	CN	Description
*	0.140	71	Grassland, HSG C
	0.140		100.00% Pervious Area

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

Subcatchment GREEN: Disturbed Green Area



Summary for Subcatchment PR: Proposed Roof

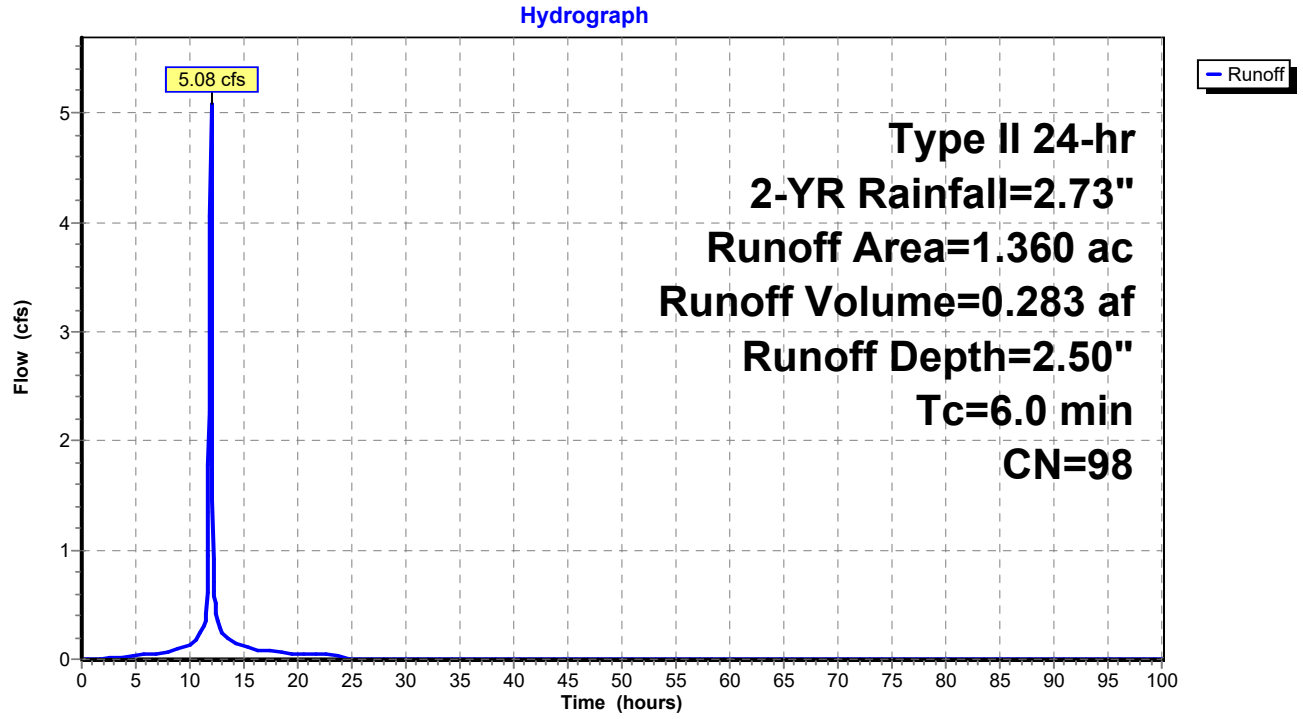
Runoff = 5.08 cfs @ 11.96 hrs, Volume= 0.283 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=2.73"

	Area (ac)	CN	Description
*	1.360	98	Building Addition
	1.360		100.00% Impervious Area

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

Subcatchment PR: Proposed Roof



Summary for Pond WATT: CONTROLLED FLOW WATTS

Inflow Area = 1.360 ac,100.00% Impervious, Inflow Depth = 2.50" for 2-YR event
Inflow = 5.08 cfs @ 11.96 hrs, Volume= 0.283 af
Outflow = 0.75 cfs @ 12.20 hrs, Volume= 0.283 af, Atten= 85%, Lag= 14.0 min
Primary = 0.75 cfs @ 12.20 hrs, Volume= 0.283 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 100.59' @ 12.20 hrs Surf.Area= 20,829 sf Storage= 4,091 cf

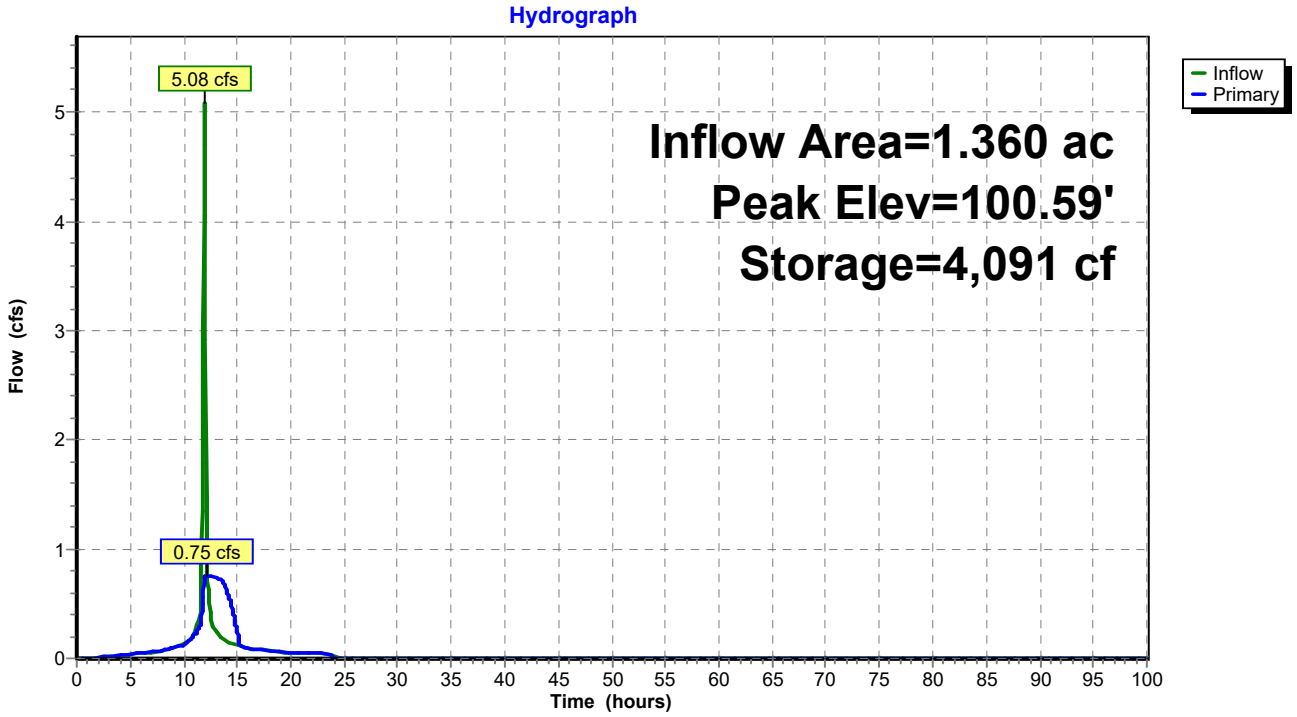
Plug-Flow detention time= 33.8 min calculated for 0.283 af (100% of inflow)
Center-of-Mass det. time= 33.8 min (789.8 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	20,000 cf	**1.00'H Prismatoid Z=50.0** x 6

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**6.0" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#2	Device 1	100.00'	**2 - 5GPM NOTCH PER FIXTURE X 6.00** Head (feet) 0.00 0.08 0.42 Disch. (cfs) 0.000 0.022 0.110
#3	Device 1	100.42'	**1.2" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	100.80'	**6.0" Horiz. OVERFLOW X 6.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.75 cfs @ 12.20 hrs HW=100.59' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.75 cfs of 4.35 cfs potential flow)
  - **2=2 - 5GPM NOTCH PER FIXTURE** (Custom Controls 0.66 cfs)
  - **3=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.98 fps)
- **4=OVERFLOW** (Controls 0.00 cfs)

Pond WATT: CONTROLLED FLOW WATTS

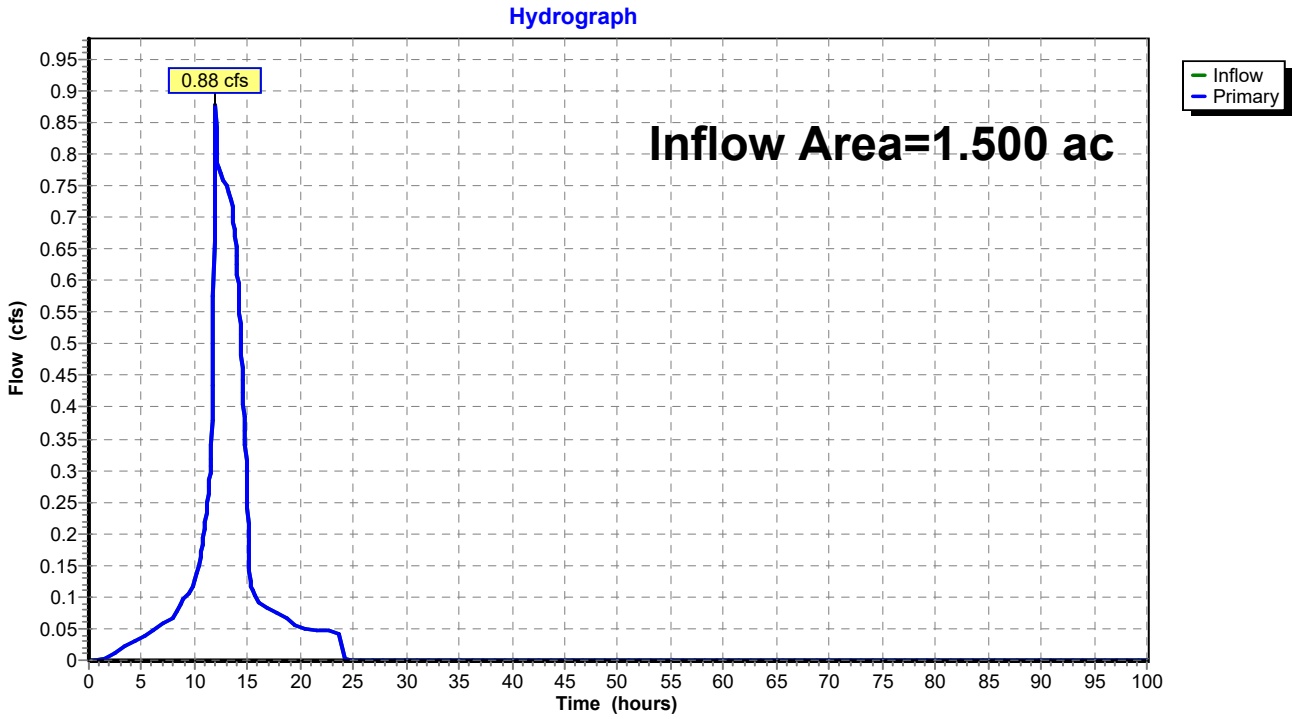


Summary for Link OUT: OUTLET

Inflow Area = 1.500 ac, 90.67% Impervious, Inflow Depth = 2.32" for 2-YR event
Inflow = 0.88 cfs @ 12.00 hrs, Volume= 0.290 af
Primary = 0.88 cfs @ 12.00 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link OUT: OUTLET



Summary for Subcatchment GREEN: Disturbed Green Area

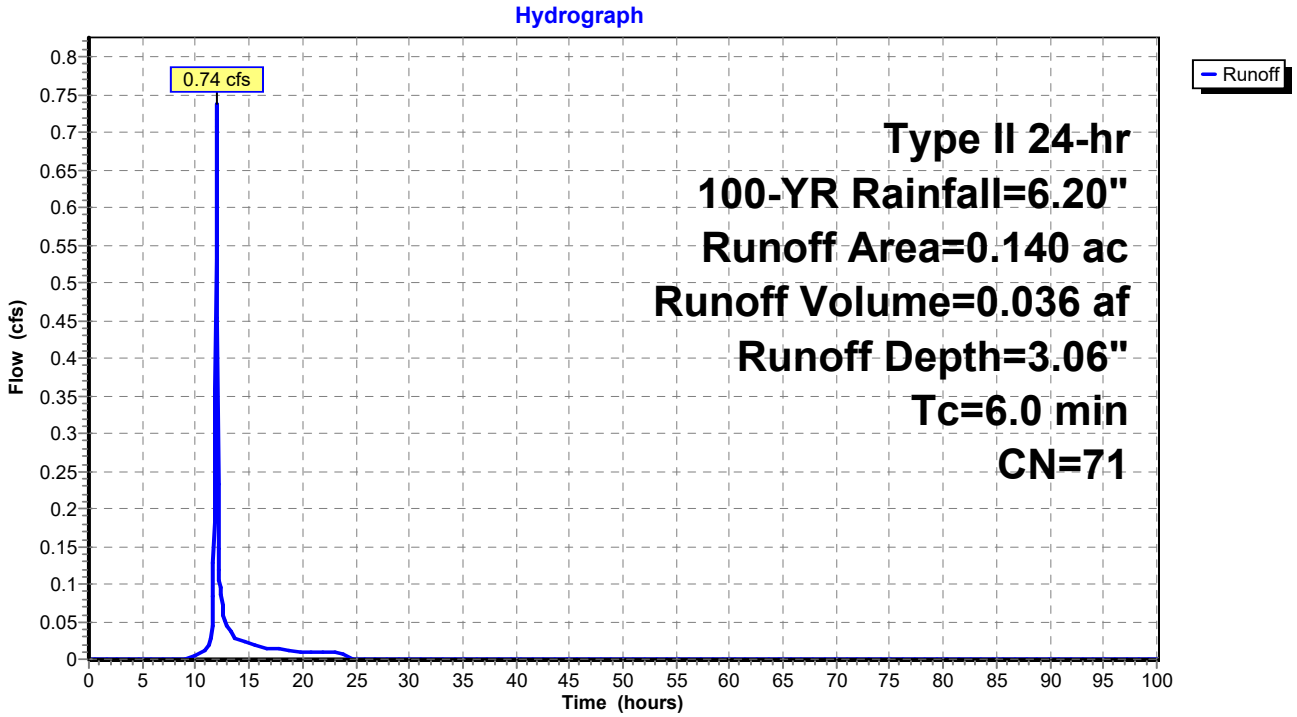
Runoff = 0.74 cfs @ 11.97 hrs, Volume= 0.036 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=6.20"

	Area (ac)	CN	Description
*	0.140	71	Grassland, HSG C
	0.140		100.00% Pervious Area

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

Subcatchment GREEN: Disturbed Green Area



Summary for Subcatchment PR: Proposed Roof

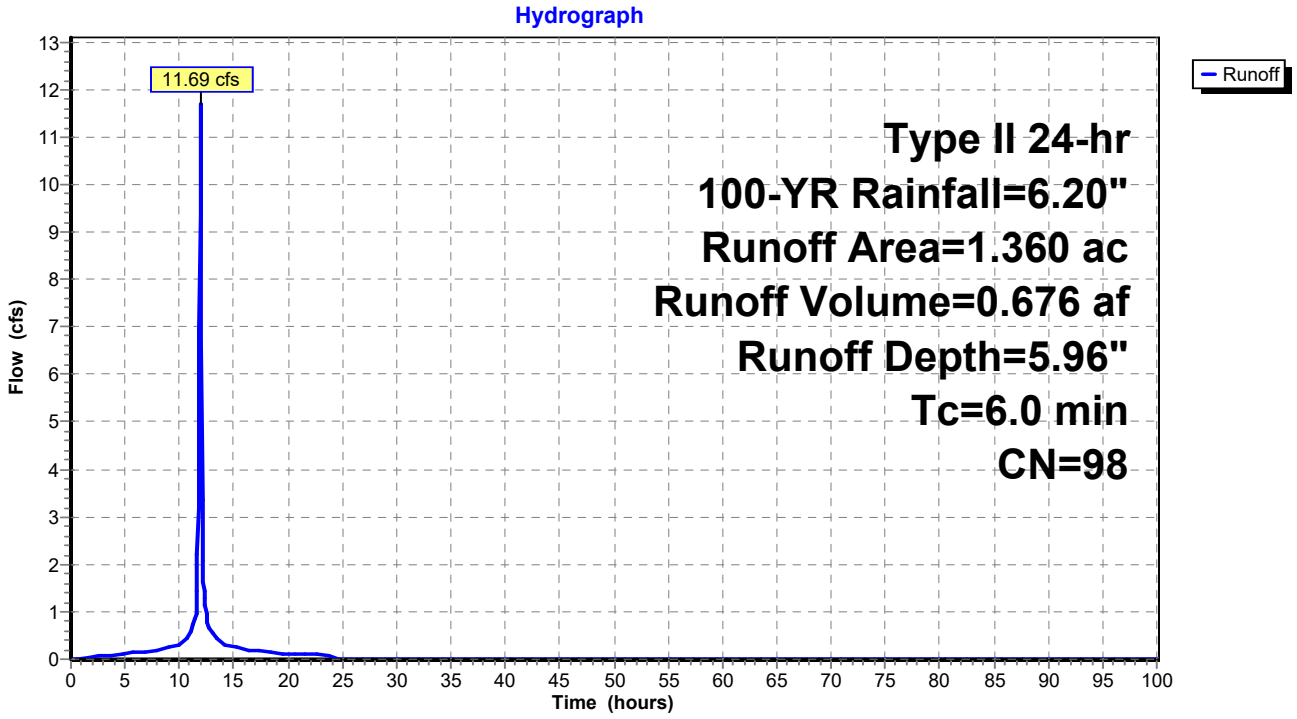
Runoff = 11.69 cfs @ 11.96 hrs, Volume= 0.676 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=6.20"

	Area (ac)	CN	Description
*	1.360	98	Building Addition
	1.360		100.00% Impervious Area

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

Subcatchment PR: Proposed Roof



Summary for Pond WATT: CONTROLLED FLOW WATTS

Inflow Area = 1.360 ac,100.00% Impervious, Inflow Depth = 5.96" for 100-YR event
Inflow = 11.69 cfs @ 11.96 hrs, Volume= 0.676 af
Outflow = 1.02 cfs @ 12.45 hrs, Volume= 0.676 af, Atten= 91%, Lag= 29.1 min
Primary = 1.02 cfs @ 12.45 hrs, Volume= 0.676 af

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs
Peak Elev= 100.84' @ 12.45 hrs Surf.Area= 41,984 sf Storage= 11,706 cf

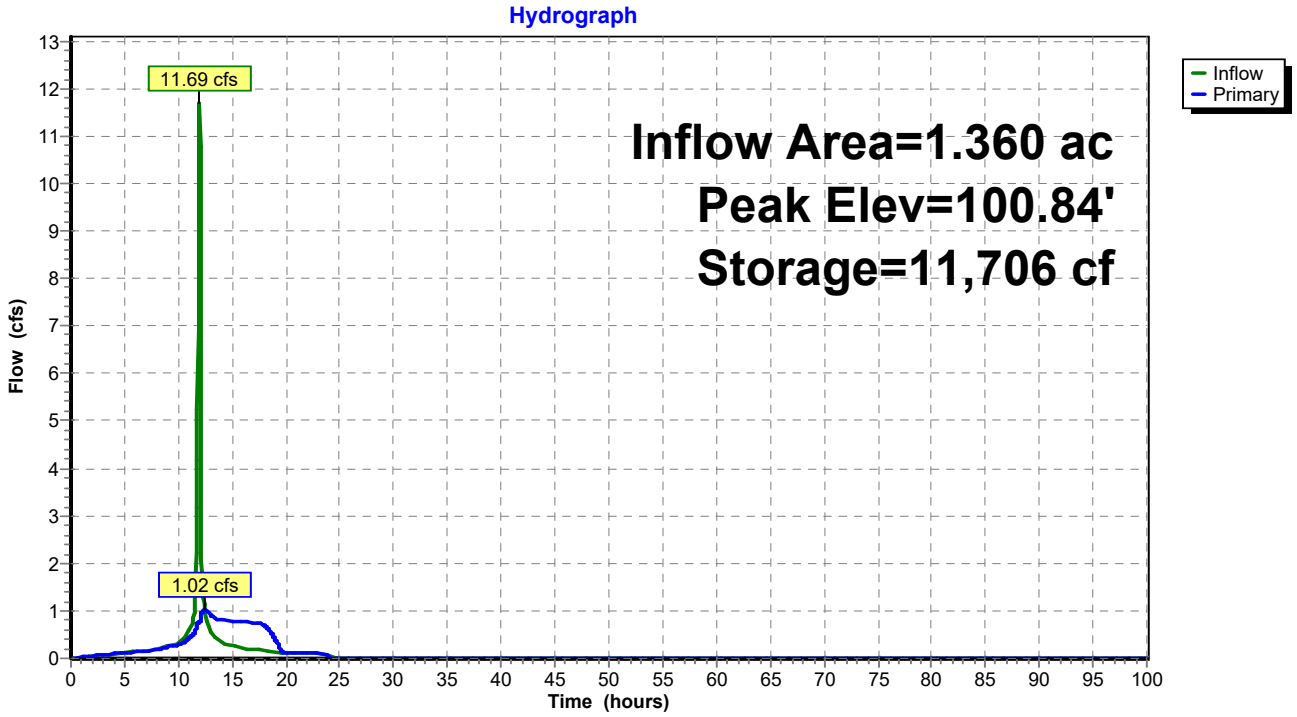
Plug-Flow detention time= 99.2 min calculated for 0.675 af (100% of inflow)
Center-of-Mass det. time= 99.2 min (839.7 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	20,000 cf	**1.00'H Prismatoid Z=50.0** x 6

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**6.0" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#2	Device 1	100.00'	**2 - 5GPM NOTCH PER FIXTURE X 6.00** Head (feet) 0.00 0.08 0.42 Disch. (cfs) 0.000 0.022 0.110
#3	Device 1	100.42'	**1.2" Horiz. Orifice/Grate X 6.00** C= 0.600 Limited to weir flow at low heads
#4	Primary	100.80'	**6.0" Horiz. OVERFLOW X 6.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 12.45 hrs HW=100.84' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.81 cfs of 5.19 cfs potential flow)
  - **2=2 - 5GPM NOTCH PER FIXTURE** (Custom Controls 0.66 cfs)
  - **3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 3.11 fps)
- **4=OVERFLOW** (Weir Controls 0.21 cfs @ 0.62 fps)

Pond WATT: CONTROLLED FLOW WATTS



Summary for Link OUT: OUTLET

Inflow Area = 1.500 ac, 90.67% Impervious, Inflow Depth = 5.69" for 100-YR event
Inflow = 1.53 cfs @ 11.98 hrs, Volume= 0.711 af
Primary = 1.53 cfs @ 11.98 hrs, Volume= 0.711 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.05 hrs

Link OUT: OUTLET