

**Drainage Report**  
**For**  
**21 Duck Pond Road**  
**Westport, CT**

*Prepared for Jennifer Strom Simonte  
July 30, 2020 (Proposed Pool)*

WPL-11068-20  
Filed: 09/03/20  
Rec'd: N/A  
Inspection & As-Built: Yes/Yes

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SEP - 3 2020

TOWN OF WESTPORT  
CONSERVATION DEPARTMENT

*Ochman Associates Inc.  
Engineers & Surveyors  
P.O. Box 76, Easton, CT 06612  
PH: 203 268 9194*



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1. Site Description:

The subject property is a 21,982 square foot parcel of land located on the east side of Duck Pond Road in Westport, Connecticut. The property is located within the C.A.M boundary and a portion of the property is located within the W.P.L.O. boundary. The property is in Firm Zone AE (Elev. 13).

2. Existing Conditions:

Currently there is an existing 2 story residence on the property with gravel/asphalt driveway and rear decks. The property is served by municipal sewer & public water. Slopes on the property are in the range of 1% - 5%. Existing soils on the property are listed as Udorthents-urban complex, Soil Type B, as per the NRCS Soil Survey Maps. A deep test hole and percolation test was performed by Ochman Associates Inc on July 2, 2020 and their results are on the Site Plan prepared by Ochman Associates Inc.

3. Proposed Conditions:

The client is proposing to construct a 14' x 28' inground pool (392 sf) with autocover, pool coping (112 sf) and elevated pool equipment pad (208 sf). The pool equipment pad will be set above the flood elevation (El.: 13) and will be constructed of wood with open spaces between the decking. In order to attenuate runoff from the new impervious surfaces and to provide groundwater recharge, a system of underground infiltration galleries will be utilized to detain the runoff from the pool overflow.

4. Design Objectives:

In order to meet or exceed the Town of Westport requirements, the retention system will be designed to accommodate the 25-year, 24-hour, Type III storm (6.4 inches). Exfiltration was considered in our design based on a percolation rate of 1" in 10 minutes. A factor of safety of 1.5 was applied against the percolation rate determined in the field. The post-construction peak flow rate will be less than or equal to the pre-construction peak flow rate. Section 5 of the report is a summary of pre and post development peak flows from the site for the 25-year storm event.

5. Summary of Peak Flow Rates & Volume of Runoff

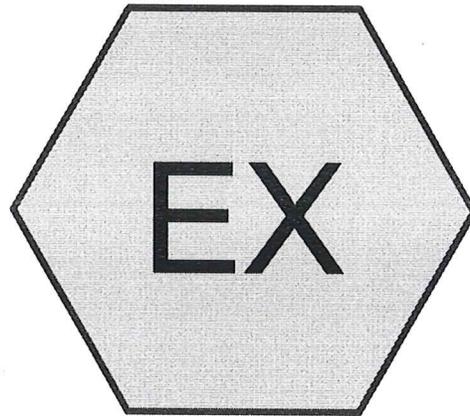
Storm Event	25 Year
24 hour rainfall (in)	<b>6.4</b>
Pre Dev. Peak Flow (cfs)	0.03
Post Dev. Peak Flow (cfs)	0.02

6. Conclusion:

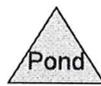
The use of (2) 18" High H-20 Concrete galleries units will be more than sufficient to meet the design objectives. The pool overflow will be routed through the proposed detention system. A 4" overflow grate from the detention system is proposed for larger storm events. The increase in impervious area from the pool coping (112 sq. ft.) is minimal and with the inclusion of the proposed stormwater detention system for the pool overflow, the post-construction peak flow rate will be less than the pre-construction peak flow rate for new impervious surfaces on the site (See Section 5). Besides the pool, the proposed impervious area is minimal and the scattered location of the coping around the pool makes it difficult to capture the storm water runoff from the pool coping to meet the water quality volume requirements. The grass area with minimal slope around the pool coping will provide the pre-treatment of pollutants and filtering of sediment instead for these areas. The storage volume of the detention system is 91 cf while the WQV for the pool coping is 9.3 cf (112 sf x 0.083'). The wood pool equipment pad has open joints in the decking which will allow the runoff to infiltrate into the ground surface underneath.

An additional detention system is being proposed to help control existing water ponding at the northeast corner of the property. It is a low point on the property in which runoff from the subject property along with adjacent properties drain to. We are proposing a 12" x 12" area drain to collect this runoff and direct it to (4) 12" high underground galleries. The system is being proposed to help control an existing problem and is not part of the drainage design for the proposed development of the pool.

**APPENDIX A – HydroCAD Analysis  
(Pre-Construction  
25 Year Type III Storm Event)**



**PRE-CONSTRUCTION  
(PROPOSED  
IMPERVIOUS  
TREATED AS LAWN)**



**Routing Diagram for DUCK POND RD-21\_PRE**  
Prepared by {enter your company name here}, Printed 8/1/2020  
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**DUCK POND RD-21\_PRE**

Prepared by {enter your company name here}

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Ochman Associates Inc

Type III 24-hr 25 yr storm Rainfall=6.40"

Printed 8/1/2020

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**Summary for Subcatchment EX: PRE-CONSTRUCTION (PROPOSED IMPERVIOUS TREATED AS LAWN)**

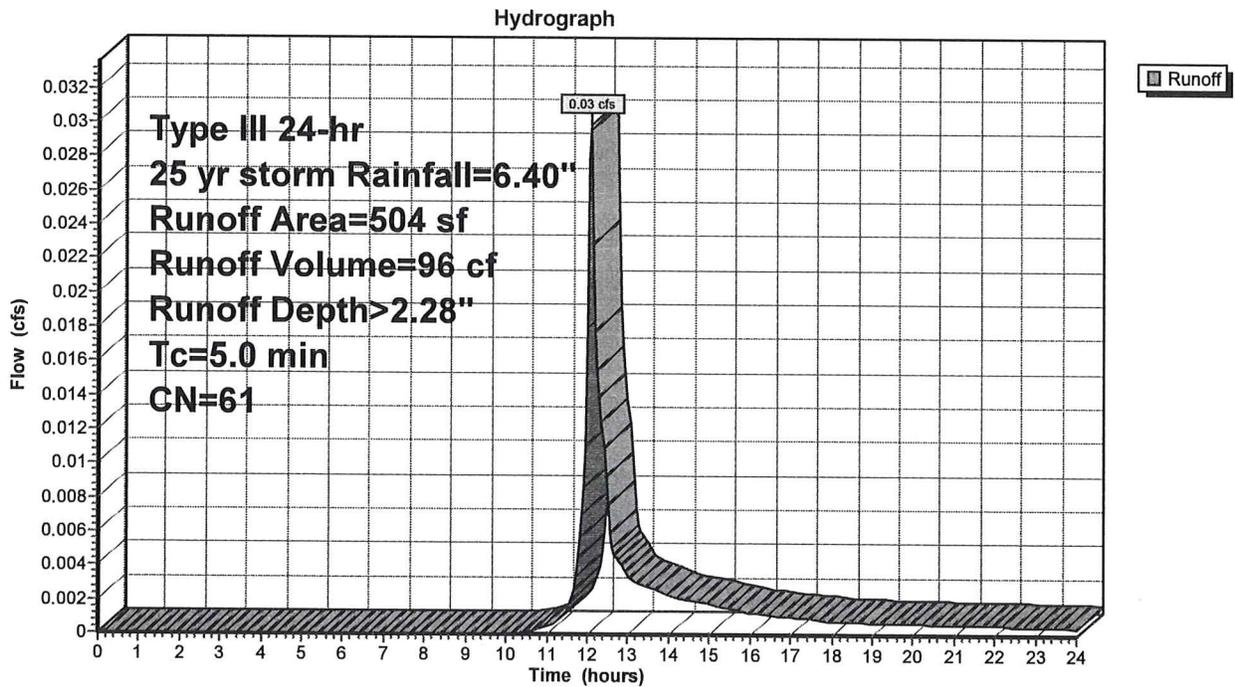
Runoff = 0.03 cfs @ 12.09 hrs, Volume= 96 cf, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 yr storm Rainfall=6.40"

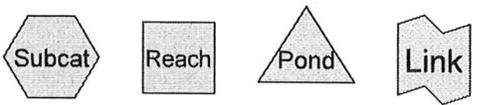
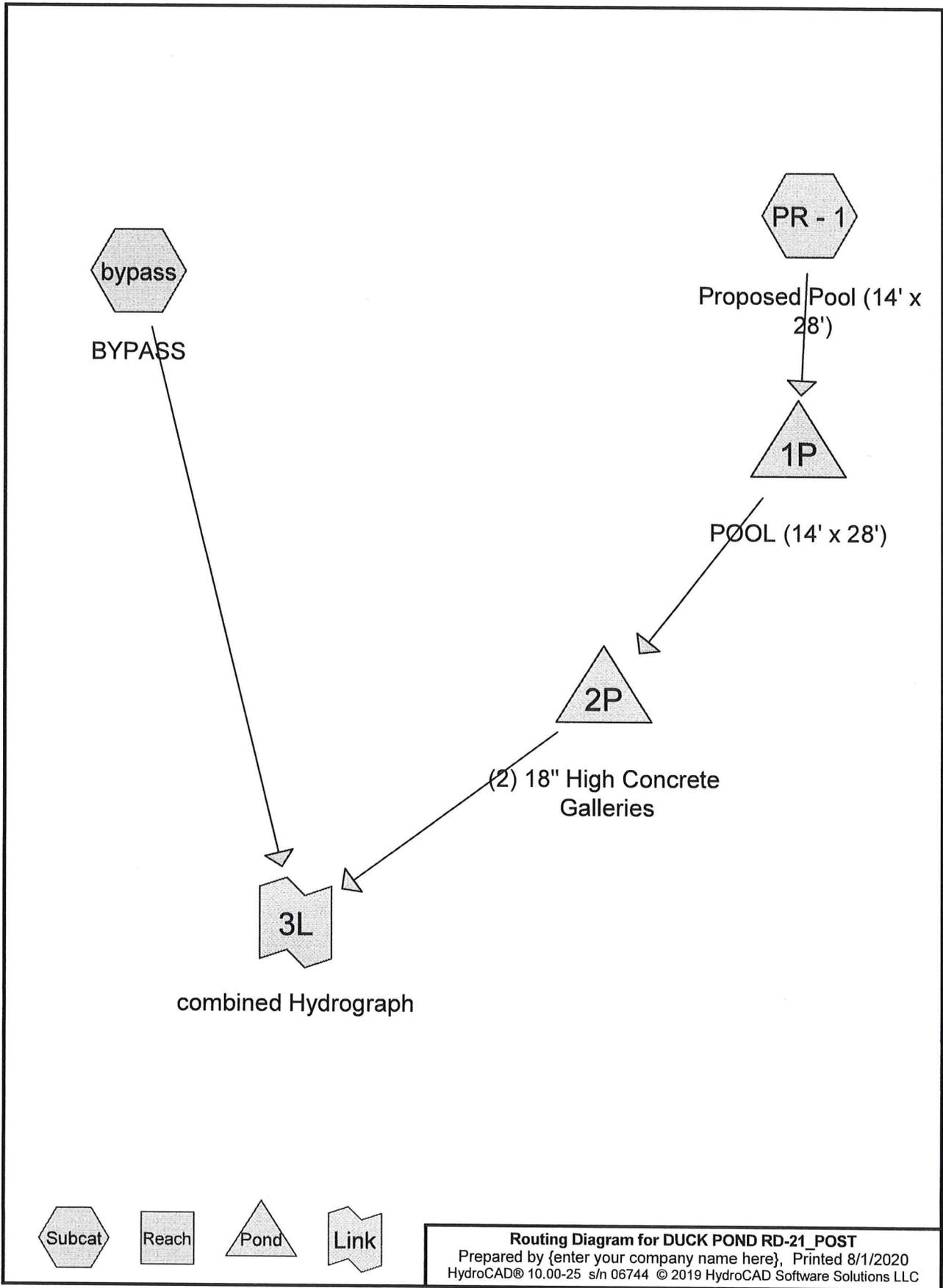
Area (sf)	CN	Description
504	61	>75% Grass cover, Good, HSG B
504		100.00% Pervious Area

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

**Subcatchment EX: PRE-CONSTRUCTION (PROPOSED IMPERVIOUS TREATED AS LAWN)**



**APPENDIX B – HydroCAD Analysis  
(Post-Construction With Retention  
25 Year Type III Storm Event)**



**Routing Diagram for DUCK POND RD-21\_POST**  
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Type III 24-hr 25 yr storm Rainfall=6.40"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment bypass: BYPASS**

Runoff Area=112 sf 100.00% Impervious Runoff Depth>6.16"  
Tc=3.0 min CN=98 Runoff=0.02 cfs 57 cf

**Subcatchment PR - 1: Proposed Pool (14' x**

Runoff Area=392 sf 100.00% Impervious Runoff Depth>6.16"  
Tc=3.0 min CN=98 Runoff=0.06 cfs 201 cf

**Pond 1P: POOL (14' x 28')**

Peak Elev=9.40' Storage=127 cf Inflow=0.06 cfs 201 cf  
Outflow=0.01 cfs 94 cf

**Pond 2P: (2) 18" High Concrete Galleries**

Peak Elev=6.02' Storage=1 cf Inflow=0.01 cfs 94 cf  
Outflow=0.01 cfs 93 cf

**Link 3L: combined Hydrograph**

Inflow=0.02 cfs 57 cf  
Primary=0.02 cfs 57 cf

**Total Runoff Area = 504 sf Runoff Volume = 259 cf Average Runoff Depth = 6.16"**  
**0.00% Pervious = 0 sf 100.00% Impervious = 504 sf**

**DUCK POND RD-21\_POST**

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Type III 24-hr 25 yr storm Rainfall=6.40"

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**Summary for Subcatchment bypass: BYPASS**

Runoff = 0.02 cfs @ 12.05 hrs, Volume= 57 cf, Depth> 6.16"

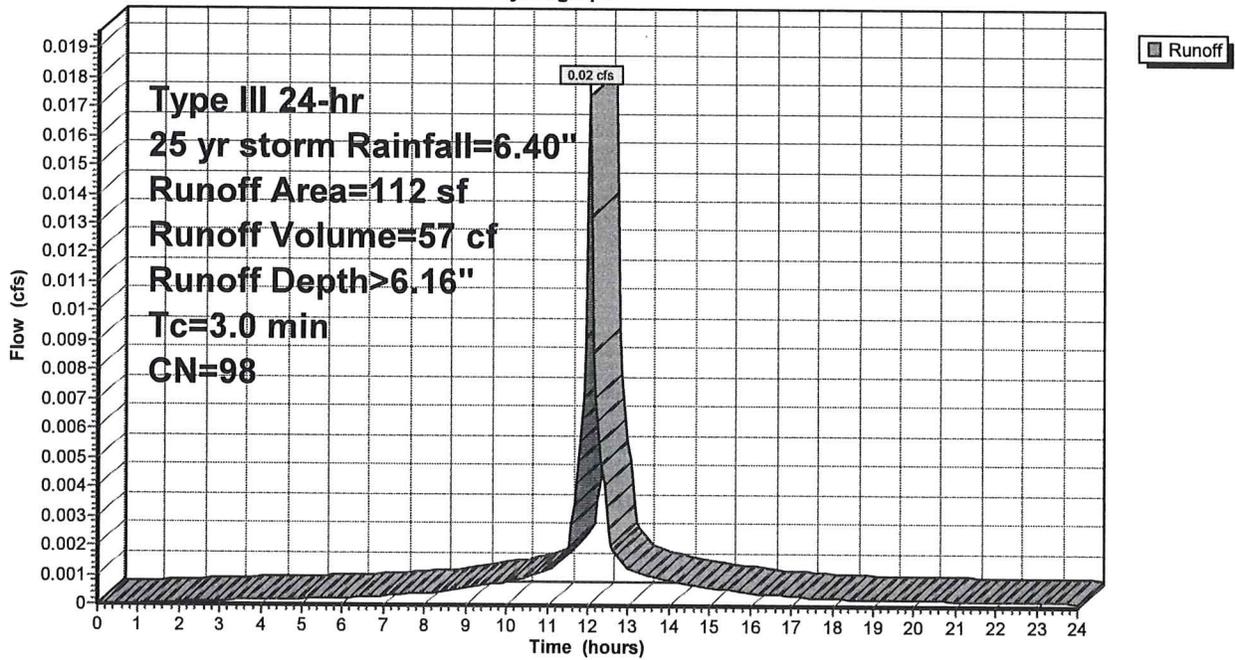
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25 yr storm Rainfall=6.40"

Area (sf)	CN	Description
* 112	98	Pool Coping, HSG B
112		100.00% Impervious Area

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

**Subcatchment bypass: BYPASS**

Hydrograph



**DUCK POND RD-21\_POST**

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Type III 24-hr 25 yr storm Rainfall=6.40"

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**Summary for Subcatchment PR - 1: Proposed Pool (14' x 28')**

Runoff = 0.06 cfs @ 12.05 hrs, Volume= 201 cf, Depth> 6.16"

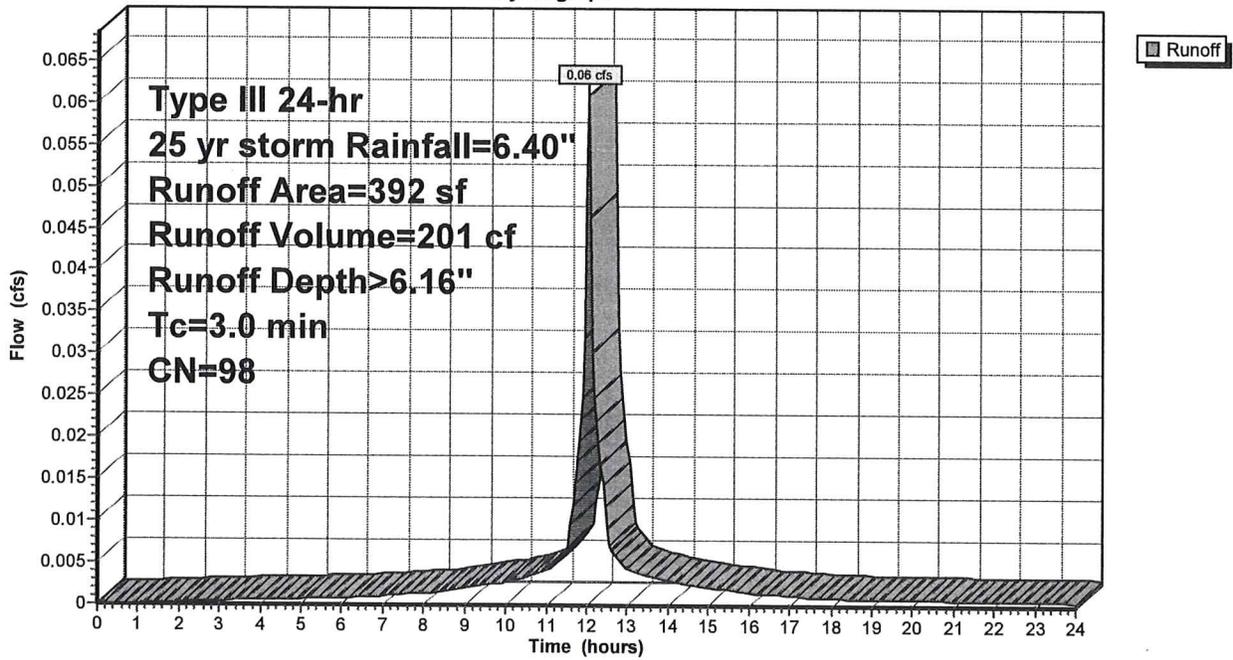
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25 yr storm Rainfall=6.40"

Area (sf)	CN	Description
* 392	98	Surface Water, HSG B
392		100.00% Impervious Area

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

**Subcatchment PR - 1: Proposed Pool (14' x 28')**

Hydrograph



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Type III 24-hr 25 yr storm Rainfall=6.40"

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**Summary for Pond 1P: POOL (14' x 28')**

Inflow Area = 392 sf, 100.00% Impervious, Inflow Depth > 6.16" for 25 yr storm event  
 Inflow = 0.06 cfs @ 12.05 hrs, Volume= 201 cf  
 Outflow = 0.01 cfs @ 12.48 hrs, Volume= 94 cf, Atten= 83%, Lag= 25.9 min  
 Primary = 0.01 cfs @ 12.48 hrs, Volume= 94 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 9.40' @ 12.48 hrs Surf.Area= 392 sf Storage= 127 cf

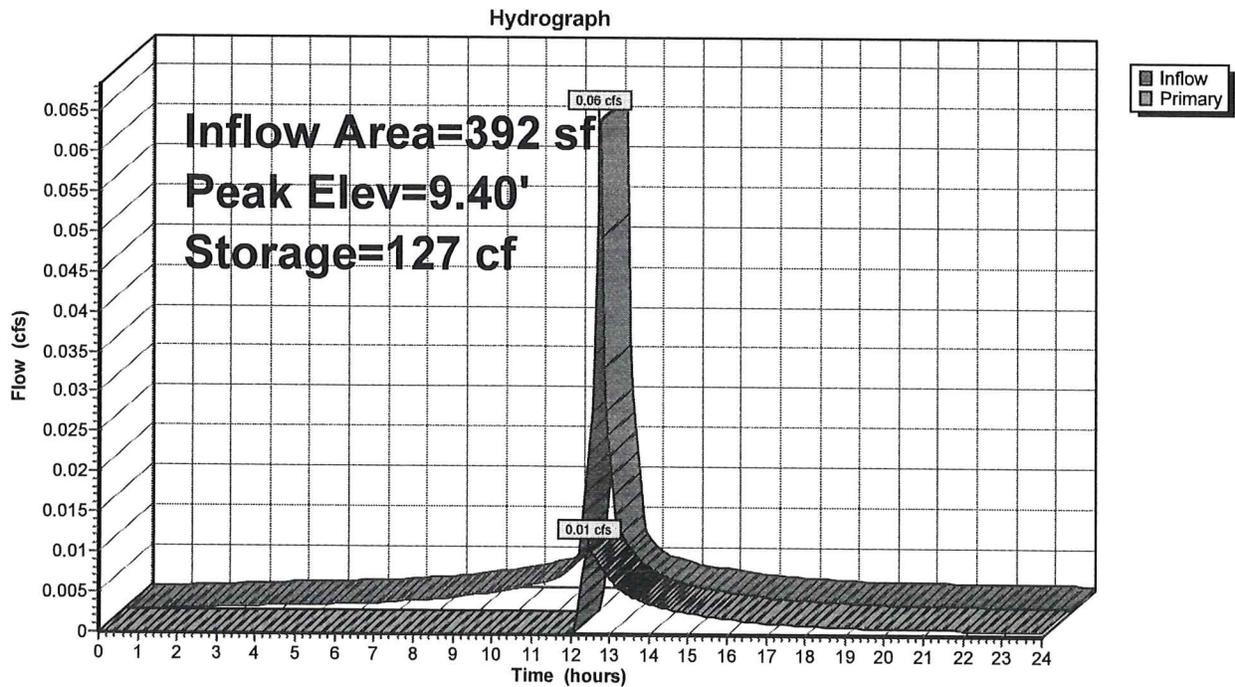
Plug-Flow detention time= 318.0 min calculated for 94 cf (46% of inflow)  
 Center-of-Mass det. time= 178.3 min ( 919.5 - 741.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	9.07'	129 cf	14.00'W x 28.00'L x 0.33'H POOL

Device	Routing	Invert	Outlet Devices
#1	Primary	9.33'	4.0" Vert. Orifice/Grate C= 0.600

**Primary OutFlow** Max=0.01 cfs @ 12.48 hrs HW=9.40' (Free Discharge)  
 ↳1=Orifice/Grate (Orifice Controls 0.01 cfs @ 0.87 fps).

**Pond 1P: POOL (14' x 28')**



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Type III 24-hr 25 yr storm Rainfall=6.40"

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**Summary for Pond 2P: (2) 18" High Concrete Galleries**

Inflow Area = 392 sf, 100.00% Impervious, Inflow Depth > 2.86" for 25 yr storm event  
 Inflow = 0.01 cfs @ 12.48 hrs, Volume= 94 cf  
 Outflow = 0.01 cfs @ 12.45 hrs, Volume= 93 cf, Atten= 4%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 12.45 hrs, Volume= 93 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 6.02' @ 12.57 hrs Surf.Area= 108 sf Storage= 1 cf

Plug-Flow detention time= 1.8 min calculated for 93 cf (100% of inflow)  
 Center-of-Mass det. time= 1.4 min ( 921.0 - 919.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	26 cf	<b>6.00'W x 18.00'L x 1.50'H Field A</b> 162 cf Overall - 96 cf Embedded = 66 cf x 40.0% Voids
#2A	6.00'	64 cf	<b>Concrete Galley 4x8x1.5</b> x 2 Inside #1 Inside= 42.0"W x 15.0"H => 4.29 sf x 7.50'L = 32.2 cf Outside= 48.0"W x 18.0"H => 6.00 sf x 8.00'L = 48.0 cf
		91 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	<b>4.000 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.01 cfs @ 12.45 hrs HW=6.02' (Free Discharge)  
 ↑ **1=Exfiltration** (Exfiltration Controls 0.01 cfs)

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**Pond 2P: (2) 18" High Concrete Galleries - Chamber Wizard Field A**

**Chamber Model = Concrete Galley 4x8x1.5 (Concrete Galley, UCPI 18" Low Profile Galley or equivalent)**

Inside= 42.0"W x 15.0"H => 4.29 sf x 7.50'L = 32.2 cf

Outside= 48.0"W x 18.0"H => 6.00 sf x 8.00'L = 48.0 cf

2 Chambers/Row x 8.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

1 Rows x 48.0" Wide + 12.0" Side Stone x 2 = 6.00' Base Width

18.0" Chamber Height = 1.50' Field Height

2 Chambers x 32.2 cf = 64.3 cf Chamber Storage

2 Chambers x 48.0 cf = 96.0 cf Displacement

162.0 cf Field - 96.0 cf Chambers = 66.0 cf Stone x 40.0% Voids = 26.4 cf Stone Storage

Chamber Storage + Stone Storage = 90.8 cf = 0.002 af

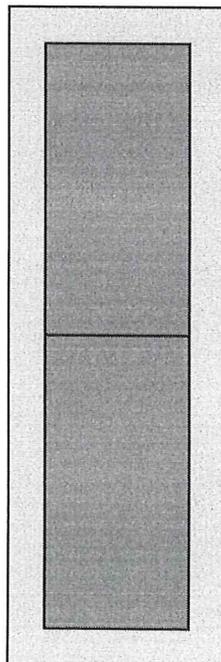
Overall Storage Efficiency = 56.0%

Overall System Size = 18.00' x 6.00' x 1.50'

2 Chambers

6.0 cy Field

2.4 cy Stone



**DUCK POND RD-21\_POST**

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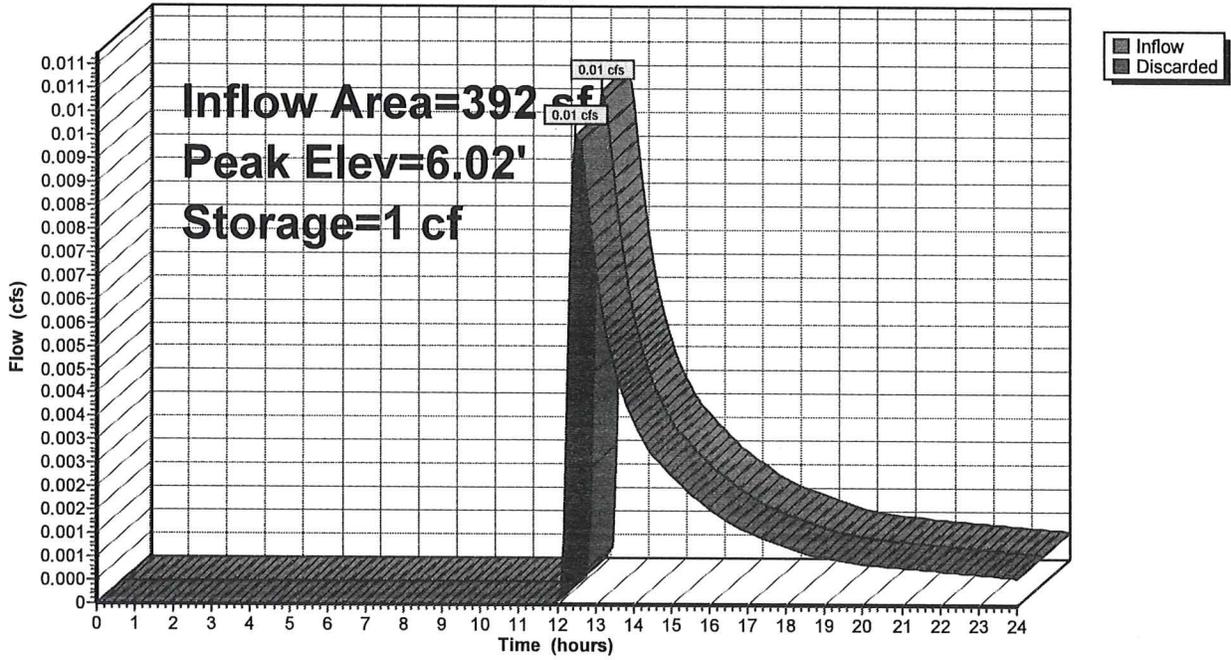
Type III 24-hr 25 yr storm Rainfall=6.40"

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**Pond 2P: (2) 18" High Concrete Galleries**

Hydrograph



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Type III 24-hr 25 yr storm Rainfall=6.40"

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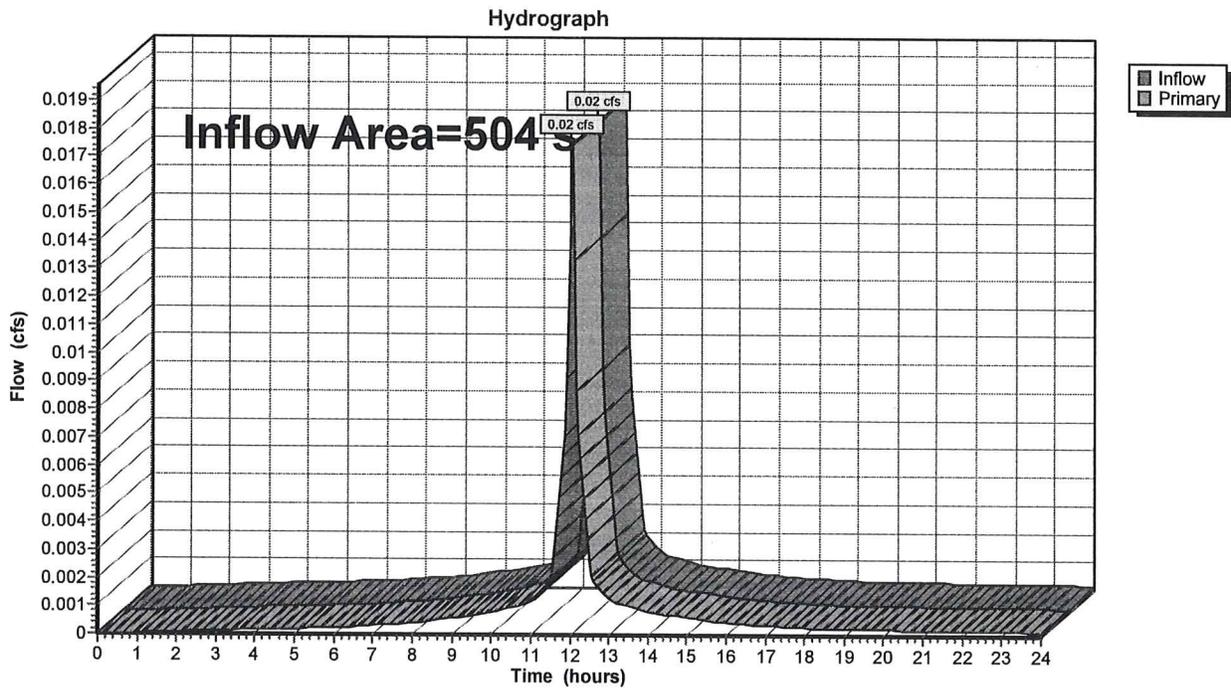
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**Summary for Link 3L: combined Hydrograph**

Inflow Area = 504 sf, 100.00% Impervious, Inflow Depth > 1.37" for 25 yr storm event  
Inflow = 0.02 cfs @ 12.05 hrs, Volume= 57 cf  
Primary = 0.02 cfs @ 12.05 hrs, Volume= 57 cf, Atten= 0%, Lag= 0.0 min

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

**Link 3L: combined Hydrograph**



**APPENDIX C**  
**NRCS Soils Map**

Soil Map—State of Connecticut  
(21 Duck Pond Road)



Soil Map may not be valid at this scale.

Map Scale: 1:1,240 if printed on A landscape (11" x 8.5") sheet



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
38C	Hinckley loamy sand, 3 to 15 percent slopes	1.1	15.1%
229B	Agawam-Urban land complex, 0 to 8 percent slopes	0.5	7.0%
306	Udorthents-Urban land complex	5.2	71.6%
W	Water	0.5	6.3%
<b>Totals for Area of Interest</b>		<b>7.3</b>	<b>100.0%</b>