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February 4, 2022

Mr. Tom Cummings, PE
CLA Engineers, Inc.
317 Main Street
Norwich, CT 06360

RE: Bluewater Campground
IWWC #2021-12
CLA-5918R

Dear Mr. Cummings:

Following please find our review of your comments, dated January 12, 2022, for the above-mentioned project. Our responses are included in **bold**.

1. Detention Pond #2 is designed for 100% infiltration, permeability testing must be done in the pond area. A test hole located at the proposed pond was performed in mid August and is at the extreme end of the pond. If testing is delayed to the time of installation, the Town must be involved.

   Response: On January 19, 2022, Benesch performed two (2) perc tests in the area of Detention Pond #2. The results indicated a percolation rate of approximately 12 inches per hour. Backup of these tests is provided to this letter.

2. Flow calculations must be provided for the several swales shown on the plans.

   Response: The drainage swales have been given designations that can be seen on the Sheet C-3 series. We have performed a hydraulic analysis of these swales and the results indicate 100-year design flows will easily be conveyed by these swales without overtopping.

3. Grading is shown on the plans within 25' of the wetlands limit lines. Also, new plantings, outlets and rip rap outlet protection is shown within 25' of the wetlands.

   Response: The plans have been revised so that all disturbance within 25' of the wetlands has been removed, other than that associated with the temporary wetlands crossing to the NW tent area.

4. Temporary sediment traps must follow DEEP guidelines and capture runoff from all the disturbed areas, the volume calculations must be provided. The grading must be checked in the two "tent" areas and in the newly shown park model site.

   Response: Each of the permanent stormwater management areas will be utilized as a temporary sediment trap and temporary diversion swales will convey runoff to the traps, both of which are shown on the C-1 series (erosion control plans). The temporary sediment traps have been designed per DEEP requirements with a minimum volume of 134 cubic yards per acre tributary area. The detail and volume table is shown on Sheet C-1.5. Grading in the three (3) peninsula areas has been modified and can be see on the Sheet C-3 series.

5. The utility installation and dewatering must be detailed in the narrow area between the wetlands leading to the easterly safari tent area.

   Response: A dewatering basin is shown on Sheet C-1.3 and the detail can be seen on Sheet C-1.5.

If you have any questions about this information, please call or e-mail me at 860-494-4359 or wwalter@benesch.com.

Sincerely,
Alfred Benesch & Company

Will Walter, PE
Senior Project Manager

Attachments Attachment A – Perc Tests
Attachment B – Swale Computations

Attachment A
Percolation Tests

TP # 1 ~approx. 20"

Time (mins)	Depth to water (feet)
0	0.6'
3	0.7'
6	0.75'
9	0.8'
12	0.85'
15	0.9'
18	0.95'
21	1.0'
24	1.05'
27	1.1'
30	1.125'
35	1.15
40	1.175

TP #2 ~ approx. 28"

Time (mins)	Depth to water (feet)
0	1.0'
3	1.1'
6	1.15'
9	1.20'
12	1.275'
15	1.35'
18	1.4'
21	1.45'
24	1.5'
27	1.55'
30	1.575'

Pre-Soak Min. 30mins each

TP1

6 mins	~~.1~~ .05	avg
	.05	.6"
	.05	/ 3min
3min int.	.05	
	.05	
	.05	
	.05	
27 mins	.05	
	~~.025~~	

0.6" over 3 mins

0.6" x 20

= 12" / hr

Perc Test # 1

TP 2

6 mins	~~.1~~ .05	avg
	.05	0.675"
	.075	/ 3min
	.075	
3min int.	.05	
	.05	
	.05	
27 mins	.05	
	~~.025~~	

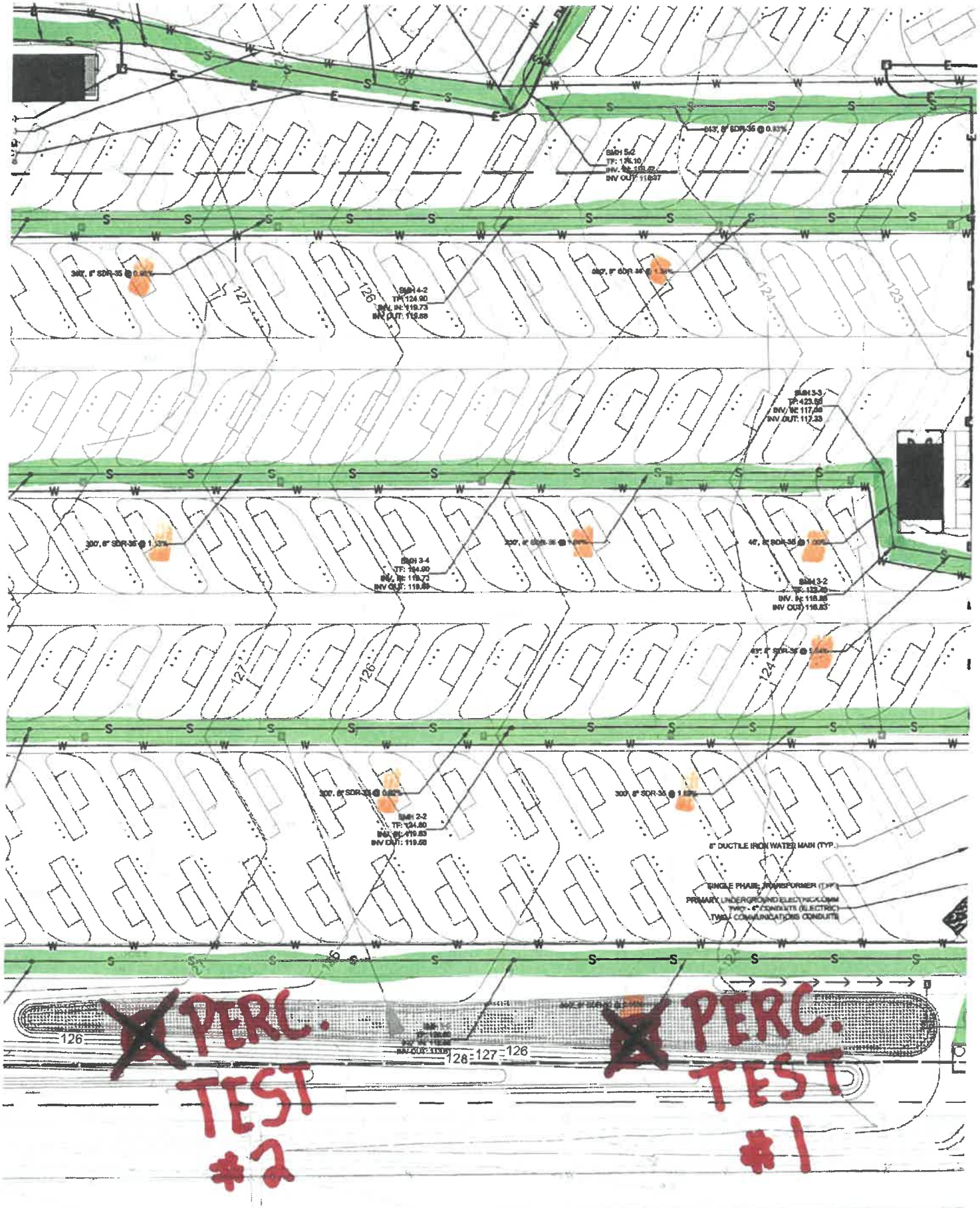
0.675" over 3 mins

0.675" x 20

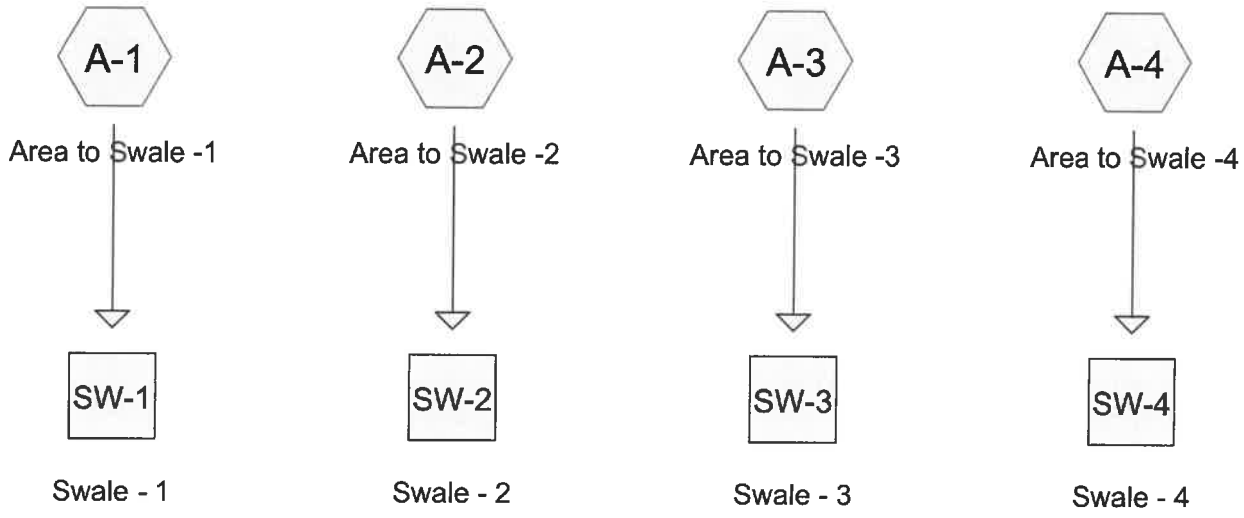
= 13.5" / hr

Perc Test # 2

w/ 30 min Presoak


6" DUCTILE IRON WATER MAIN (TYP.)
SINGLE PHASE TRANSFORMER (TYP.)
PRIMARY UNDERGROUND ELECTRIC/COMM
TWO - 4" CONDUITS (ELECTRIC)
TWO COMMUNICATIONS CONDUITS
PERC. TEST #2
PERC. TEST #1

Attachment B
Swale Computations



Subcat Reach Pond Link

Routing Diagram for 2022-02-01 Drainage Swales
Prepared by {enter your company name here}, Printed 2/3/2022

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-Year	Type III 24-hr		Default	24.00	1	7.74	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.300	83	(A-1, A-2, A-3, A-4)
3.300	**83**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
3.300	Other	A-1, A-2, A-3, A-4
3.300		**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	0.000	0.000	0.000	3.300	3.300		A-1, A-2, A-3, A-4
0.000	**0.000**	**0.000**	**0.000**	**3.300**	**3.300**	**TOTAL AREA**	

Summary for Subcatchment A-1: Area to Swale -1

Runoff = 6.67 cfs @ 12.09 hrs, Volume= 0.487 af, Depth= 5.73"
Routed to Reach SW-1 : Swale - 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=7.74"

	Area (ac)	CN	Description
*	1.020	83	
	1.020		100.00% Pervious Area

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

Summary for Subcatchment A-2: Area to Swale -2

Runoff = 2.22 cfs @ 12.09 hrs, Volume= 0.162 af, Depth= 5.73"
Routed to Reach SW-2 : Swale - 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=7.74"

	Area (ac)	CN	Description
*	0.340	83	
	0.340		100.00% Pervious Area

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

Summary for Subcatchment A-3: Area to Swale -3

Runoff = 7.98 cfs @ 12.09 hrs, Volume= 0.582 af, Depth= 5.73"
Routed to Reach SW-3 : Swale - 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=7.74"

	Area (ac)	CN	Description
*	1.220	83	
	1.220		100.00% Pervious Area

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

Summary for Subcatchment A-4: Area to Swale -4

Runoff = 4.71 cfs @ 12.09 hrs, Volume= 0.344 af, Depth= 5.73"
Routed to Reach SW-4 : Swale - 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=7.74"

	Area (ac)	CN	Description
*	0.720	83	
	0.720		100.00% Pervious Area

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

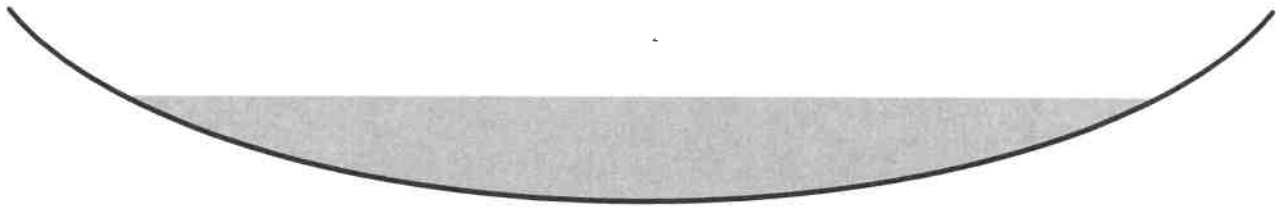
Summary for Reach SW-1: Swale - 1

Inflow Area = 1.020 ac, 0.00% Impervious, Inflow Depth = 5.73" for 100-Year event
Inflow = 6.67 cfs @ 12.09 hrs, Volume= 0.487 af
Outflow = 6.59 cfs @ 12.11 hrs, Volume= 0.487 af, Atten= 1%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.43 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 2.2 min

Peak Storage= 273 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.55' , Surface Width= 7.43'
Bank-Full Depth= 1.00' Flow Area= 6.7 sf, Capacity= 23.89 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 1.00', Outlet Invert= 0.50'



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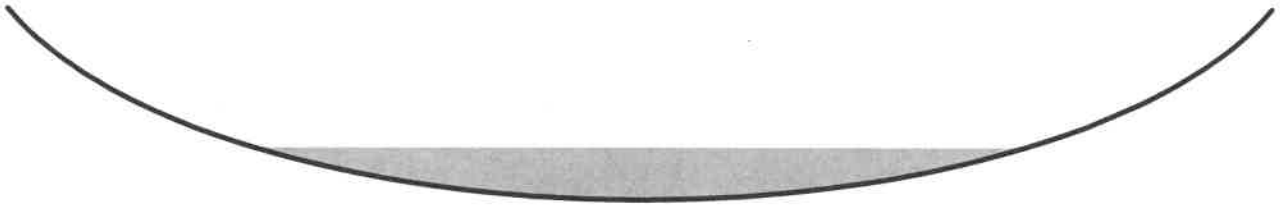
Summary for Reach SW-2: Swale - 2

Inflow Area = 0.340 ac, 0.00% Impervious, Inflow Depth = 5.73" for 100-Year event
Inflow = 2.22 cfs @ 12.09 hrs, Volume= 0.162 af
Outflow = 2.20 cfs @ 12.11 hrs, Volume= 0.162 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.29 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 2.3 min

Peak Storage= 97 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 5.25'
Bank-Full Depth= 1.00' Flow Area= 6.7 sf, Capacity= 35.59 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.0111 '/'
Inlet Invert= 2.00', Outlet Invert= 0.89'



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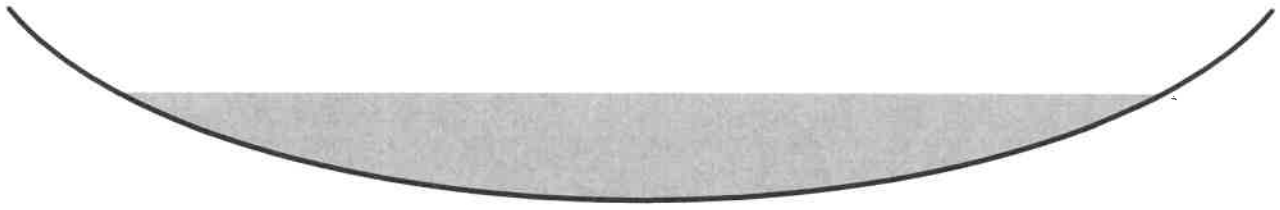
Summary for Reach SW-3: Swale - 3

Inflow Area = 1.220 ac, 0.00% Impervious, Inflow Depth = 5.73" for 100-Year event
Inflow = 7.98 cfs @ 12.09 hrs, Volume= 0.582 af
Outflow = 7.89 cfs @ 12.10 hrs, Volume= 0.582 af, Atten= 1%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.81 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.88 fps, Avg. Travel Time= 1.9 min

Peak Storage= 283 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.56' , Surface Width= 7.51'
Bank-Full Depth= 1.00' Flow Area= 6.7 sf, Capacity= 27.23 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.0065 '/'
Inlet Invert= 1.00', Outlet Invert= 0.35'



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Summary for Reach SW-4: Swale - 4

Inflow Area = 0.720 ac, 0.00% Impervious, Inflow Depth = 5.73" for 100-Year event
Inflow = 4.71 cfs @ 12.09 hrs, Volume= 0.344 af
Outflow = 4.65 cfs @ 12.11 hrs, Volume= 0.344 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.18 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 2.4 min

Peak Storage= 214 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.47' , Surface Width= 6.85'
Bank-Full Depth= 1.00' Flow Area= 6.7 sf, Capacity= 23.89 cfs

10.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 1.00', Outlet Invert= 0.50'

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