

NPDES\_Stormwater-REV1.1 Prepared by Keystone Consulting Engineers HydroCAD® 10.20-2b s/n 02767 © 2021 HydroCAD Software Solutions LLC

Printed 11/16/2022 Page 2

# Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.230	40	>75% Grass cover, Good, HSG A (19S, 24S)
3.499	61	>75% Grass cover, Good, HSG B (24S)
1.374	74	>75% Grass cover, Good, HSG C (19S, 24S)
0.069	40	Meadow, non-grazed, HSG A (19S)
1.017	58	Meadow, non-grazed, HSG B (24S)
0.633	71	Meadow, non-grazed, HSG C (19S, 24S)
4.710	98	Paved parking & roofs (19S, 24S)
1.502	40	Woods, Good, HSG A (19S, 24S)
0.153	70	Woods, Good, HSG C (19S)
14.187	71	TOTAL AREA

Runoff = 10.39 cfs @ 11.98 hrs, Volume= 0.497 af, Depth= 1.46" Routed to Pond 16P : seepage pit with chambers #3A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.36"

A	rea (ac)	CN	Description								
	2.361	98	Paved parking	& roofs							
*	0.069	40	Meadow, non-	grazed, HS	GΑ						
	0.059	71	Meadow, non-	grazed, HS	GC						
*	0.485	40	>75% Grass c	over, Good	, HSG	A					
	0.485	74	>75% Grass c	over, Good	, HSG	С					
*	0.477	40	Woods, Good,	HSG A							
	0.153	70	Woods, Good,	HSG C							
	4.089	79	Weighted Aver	age							
	1.728		42.26% Pervio	us Area							
	2.361		57.74% Imper	∕ious Area							
	<b>-</b> .			<b>A</b>	_						
(m	IC Leng	ith S	(ft/ft) (ft/coo)	Capacity	Desc	ription					
(11		el)		(CIS)	Diroc	t Entry					
	0.0				Direc	t ⊑ntry,					
			Subcatchm	ont 195.	SEED		ר #ז∆ (	RMP #1	1)		
			Ouscaterini						•)		
				Hydro	graph						
											Runoff
	11	10.3	39 cfs								
	10-							Type	<b>I 24</b> -	hr	
						2-Y	ear R	ainfall	=3 3	6"	
	9									¥ _	
	8					Run	IOTT AI	rea=4.	089	ac	
						Runof	f Volu	me=0	.497	af	
fs)							10055	Donth		<b>C</b> 11	
ن د	6					RI	Inon	Deptn	I <b>− I .</b> 4	<b>0</b>	
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			Hannin								
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	0240		12 11 10 10 20 22 24	Time	(hours)		00 02 04 00				

Page 3

## Summary for Subcatchment 24S: bio-retention basin #3b(BMP #12)

Page 4

5.51 cfs @ 12.30 hrs, Volume= 0.650 af, Depth= 0.77" Runoff = Routed to Pond 26P : bio-retention basin #3b

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.36"

	Area	(ac)	CN	Desc	cription		
	2.	349	98	Pave	ed parking	& roofs	
	1.	017	58	Mea	dow, non-g	grazed, HS	G B
	0.	574	71	Mea	dow, non-g	grazed, HS	GC
	3.	499	61	>75%	% Grass co	over, Good,	, HSG B
	0.	126	74	>75%	% Grass co	over, Good,	, HSG C
*	1.	025	40	Woo	ds, Good,	HSG A	
*	0.	745	40	>75%	% Grass co	over, Good,	, HSG A
	0.	763	74	>75%	% Grass co	over, Good,	, HSG C
	10.	098	67	Weig	ghted Aver	age	
	7.	749		76.74	4% Pervio	us Area	
	2.	349		23.20	6% Imperv	∕ious Area	
	Тс	Lengt	h :	Slope	Velocity	Capacity	Description
	(min)	(feet	:)	(ft/ft)	(ft/sec)	(cfs)	
	25.1	15	0 0	.0300	0.10		Sheet Flow,
							Woods: Light underbrush n= 0.400 P2= 3.23"
	5.8	42	5 0	.0300	1.21		Shallow Concentrated Flow,
_							Short Grass Pasture Kv= 7.0 fps
	30.9	57	5 T	otal			



### Subcatchment 24S: bio-retention basin #3b(BMP #12)

#### Summary for Pond 16P: seepage pit with chambers #3A

Inflow Area	a =	4.08	9 ac, 5	7.74% In	npe	ervious,	Inflow	Depth =	1.46	6" fo	r 2-Ye	ar event	
Inflow	=	10.39	cfs @	11.98 hr	s,	Volume	=	0.497	af				
Outflow	=	0.55	cfs @	11.70 hr	s,	Volume	=	0.497	af, A	Atten=	95%,	Lag= 0.0	) min
Discarded	=	0.55	cfs @	11.70 hr	s,	Volume	=	0.497	af			-	
Primary	=	0.00	cfs @	0.00 hr	s,	Volume	=	0.000	af				
Routed	to Pond	126P :	bio-ret	ention ba	asir	ר#3b							

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,901.71' @ 13.19 hrs Surf.Area= 26,640 sf Storage= 9,810 cf

Plug-Flow detention time= 166.6 min calculated for 0.496 af (100% of inflow) Center-of-Mass det. time= 166.5 min (1,006.6 - 840.1)

Volume	Invert	Avail.Sto	rage Sto	torage Description						
#1	1,901.00	26,37	73 cf <b>Cu</b>	ustom Stage Data (Prismatic) Listed below (Recalc)						
			106	106,560 cf Overall - 40,628 cf Embedded = 65,932 cf x 40.0% Voids						
#2	1,901.50	40,62	28 cf <b>Cu</b> l	ultec R-360HD x 1102 Inside #1						
			Effe	Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf						
			110	Verall Size= 60.0 W X 36.0 H X 4.17 L with 0.50 Overlap						
			Ca	an Storage = 6.5 of $x = 2 \times 10$ rows = 245.5 of						
		67.00	Ua 1 of Tot	$\frac{a p}{b} \frac{b}{b} $						
		07,00		Jai Available Stolage						
Elevatio	n S	urf.Area	Inc.Sto	ore Cum.Store						
(feet	t)	(sq-ft)	(cubic-fee	eet) (cubic-feet)						
1,901.0	0	26,640								
1,905.0	0	26,640	106,56	560 106,560						
Device	Routing	Invert	Outlet De	Devices						
#1	Primary	1,901.00'	24.0" Re	Round Culvert						
			L= 120.0	.0' CPP, mitered to conform to fill, Ke= 0.700						
			Inlet / Ou	)utlet Invert= 1,901.00' / 1,898.00' S= 0.0250 '/' Cc= 0.900						
		4 000 001	n= 0.013	3 Corrugated PE, smooth interior, Flow Area= 3.14 sf						
#2	Device 1	1,902.00	12.0" W	<b>V x 6.0" H Vert. Orifice/Grate</b> C= 0.600						
#2	Discordod	1 001 00'		to well now at low neads						
#3	Discalueu	1,901.00	0.500 11/							
Discarde	ed OutFlow	Max=0.55 cf Exfiltration Cor	s @ 11.70 htrols 0.55	'0 hrs  HW=1,901.05'   (Free Discharge) 5 cfs)						

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=1,901.00' (Free Discharge)

**2=Orifice/Grate** (Controls 0.00 cfs)



# Pond 16P: seepage pit with chambers #3A

Inflow Area	a =	14.187 ac, 3	3.20% Impe	ervious,	Inflow	Depth =	0.5	5" for	2-Ye	ar event	
Inflow	=	5.51 cfs @	12.30 hrs,	Volume	=	0.650	af				
Outflow	=	0.66 cfs @	14.22 hrs,	Volume	=	0.650	af,	Atten=	88%,	Lag= 11	5.2 min
Discarded	=	0.66 cfs @	14.22 hrs,	Volume	=	0.650	af			•	
Primary	=	0.00 cfs @	0.00 hrs,	Volume	=	0.000	af				
Routed	to Link 3	37L : Dischar	ae 001								

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,891.50' @ 14.22 hrs Surf.Area= 23,671 sf Storage= 11,493 cf

Plug-Flow detention time= 185.9 min calculated for 0.650 af (100% of inflow) Center-of-Mass det. time= 185.9 min (1,088.9 - 903.1)

Volume	Invert	Avail.Sto	rage Storag	e Description	
#1	1,891.00'	218,37	79 cf Custo	m Stage Data (Pr	ismatic) Listed below (Recalc)
Elevatio (fee	n Sı t)	urf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
1,891.0 1,892.0 1,894.0 1,896.0 1,898.0	0 0 0 0 0	22,485 24,866 29,797 34,953 40,337	0 23,676 54,663 64,750 75,290	0 23,676 78,339 143,089 218,379	
Device	Routing	Invert	Outlet Devic	ces	
#1	Primary Device 1	1,891.00' 1,892.00'	<b>24.0" Rour</b> L= 120.0' ( Inlet / Outle n= 0.013 C <b>3.0" Horiz.</b> (	nd Culvert CPP, mitered to co t Invert= 1,891.00 orrugated PE, sm Orifice/Grate C=	onform to fill, Ke= 0.700 ' / 1,889.80' S= 0.0100 '/' Cc= 0.900 ooth interior, Flow Area= 3.14 sf = 0.600 Limited to weir flow at low heads
#3 #4	Discarded Device 1	1,896.60'	45.0" x 24.0 Limited to w	<b>P' Horiz. Orifice/G</b> veir flow at low hea	Grate C= 0.600 ads

**Discarded OutFlow** Max=0.66 cfs @ 14.22 hrs HW=1,891.50' (Free Discharge) **Galaxies and Controls 1.66 cfs**)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=1,891.00' (Free Discharge) -1=Culvert (Controls 0.00 cfs) **2=Orifice/Grate** (Controls 0.00 cfs) **4=Orifice/Grate** (Controls 0.00 cfs)



# Pond 26P: bio-retention basin #3b

Post BMPs 11-12

#### Summary for Subcatchment 19S: SEEPAGE BED #3A (BMP #11)

1.037 af, Depth= 3.04" Runoff = 21.24 cfs @ 11.97 hrs, Volume= Routed to Pond 16P : seepage pit with chambers #3A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.28"

	Area (ac)	CN	Description
	2.361	98	Paved parking & roofs
*	0.069	40	Meadow, non-grazed, HSG A
	0.059	71	Meadow, non-grazed, HSG C
*	0.485	40	>75% Grass cover, Good, HSG A
	0.485	74	>75% Grass cover, Good, HSG C
*	0.477	40	Woods, Good, HSG A
	0.153	70	Woods, Good, HSG C
	4.089	79	Weighted Average
	1.728		42.26% Pervious Area
	2.361		57.74% Impervious Area
	To leng	uth (	Slope Velocity Canacity Description
	(min) (fee	ni v st)	(ft/ft) (ft/sec) (cfs)
		51)	

6.0

Direct Entry,

## Subcatchment 19S: SEEPAGE BED #3A (BMP #11)



## Summary for Subcatchment 24S: bio-retention basin #3b(BMP #12)

Runoff = 16.47 cfs @ 12.27 hrs, Volume= 1.684 af, Depth= 2.00" Routed to Pond 26P : bio-retention basin #3b

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.28"

	Area (	(ac)	CN	Desc	cription		
	2.3	349	98	Pave	ed parking	& roofs	
	1.0	017	58	Mead	dow, non-g	grazed, HS0	GB
	0.	574	71	Mead	dow, non-g	grazed, HS	GC
	3.4	499	61	>75%	6 Grass co	over, Good,	HSG B
	0.	126	74	>75%	6 Grass co	over, Good,	HSG C
*	1.0	025	40	Woo	ds, Good,	HSG A	
*	0.	745	40	>75%	6 Grass co	over, Good,	HSG A
	0.	763	74	>75%	6 Grass co	over, Good,	HSG C
	10.	098	67	Weig	phted Aver	age	
	7.	749		76.74	, 4% Pervio	us Area	
	2.3	349		23.26	6% Imperv	/ious Area	
	Tc	Lengtl	h S	Slope	Velocity	Capacity	Description
	(min)	(feet	:)	(ft/ft)	(ft/sec)	(cfs)	
	25.1	150	0 0.	0300	0.10		Sheet Flow,
							Woods: Light underbrush n= 0.400 P2= 3.23"
	5.8	42	50.	0300	1.21		Shallow Concentrated Flow,
							Short Grass Pasture Kv= 7.0 fps
	30.9	57	5 To	otal			

#### Hydrograph Runoff 18 16.47 cfs 17 Type II 24-hr 16 15 10-Year Rainfall=5.28" 14 Runoff Area=10.098 ac 13-12 Runoff Volume=1.684 af 11 **(sj**) 10-Runoff Depth=2.00" Flow 9 Flow Length=575 8-Slope=0.0300 '/' 7. 6 Tc=30.9 min 5-4 **CN=67** 3-2 1 0-0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)

# Subcatchment 24S: bio-retention basin #3b(BMP #12)

Inflow Area	a =	4.089 ac, 5	7.74% Impe	ervious,	Inflow Depth =	3.04"	for 10-Y	ear event
Inflow	=	21.24 cfs @	11.97 hrs,	Volume=	= 1.037	af		
Outflow	=	1.10 cfs @	13.09 hrs,	Volume=	= 1.037	af, Att	ten= 95%,	Lag= 67.0 min
Discarded	=	0.55 cfs @	11.25 hrs,	Volume=	= 0.883	af		•
Primary	=	0.54 cfs @	13.09 hrs,	Volume=	= 0.154	af		
Routed	to Pon	d 26P : bio-ret	ention basir	ר#3b				

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,902.31' @ 13.09 hrs Surf.Area= 26,640 sf Storage= 22,614 cf

Plug-Flow detention time= 319.2 min calculated for 1.037 af (100% of inflow) Center-of-Mass det. time= 319.2 min (1,138.2 - 819.0)

Volume	Invert	Avail.Stor	age Stor	age Description
#1	1,901.00'	26,37	3 cf <b>Cus</b> 106	tom Stage Data (Prismatic) Listed below (Recalc) 560 cf Overall - 40,628 cf Embedded = 65,932 cf x 40.0% Voids
#2	1,901.50'	67.00	3 cf <b>Cult</b> Effe Ove 1102 Cap	<b>EEC R-360HD</b> x 1102 Inside #1 ctive Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf rall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 2 Chambers in 19 Rows Storage= 6.5 cf x 2 x 19 rows = 245.5 cf
Elevatio (fee	n Sı t)	urf.Area (sq-ft)	Inc.Stor	e Cum.Store ;) (cubic-feet)
1,901.0	0	26,640 26,640	106 56	0 0 0 106 560
Device	Routing	Invert	Outlet De	vices
#1	Primary	1,901.00'	<b>24.0" Ro</b> L= 120.0' Inlet / Out n= 0.013	und Culvert CPP, mitered to conform to fill, Ke= 0.700 tlet Invert= 1,901.00' / 1,898.00' S= 0.0250 '/' Cc= 0.900 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	1,902.00'	12.0" W >	<b>6.0" H Vert. Orifice/Grate</b> C= 0.600
#3	Discarded	1,901.00'	0.900 in/h	nr Exfiltration over Surface area
Discardo 1──3=Ex	ed OutFlow filtration(E	Max=0.55 cf xfiltration Cor	@ 11.25 rols 0.55 (	hrs HW=1,901.04' (Free Discharge) cfs)

Primary OutFlow Max=0.54 cfs @ 13.09 hrs HW=1,902.31' (Free Discharge) 1=Culvert (Passes 0.54 cfs of 7.46 cfs potential flow) 2=Orifice/Grate (Orifice Controls 0.54 cfs @ 1.77 fps)



# Pond 16P: seepage pit with chambers #3A

Post BMPs 11-12

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### Summary for Pond 26P: bio-retention basin #3b

Inflow Area	a =	14.187 ac, 3	3.20% Imp	ervious,	Inflow Depth =	1.55	5" for 1	0-Year e	event
Inflow	=	16.81 cfs @	12.27 hrs,	Volume	= 1.838	af			
Outflow	=	0.98 cfs @	16.60 hrs,	Volume	= 1.838	af, A	Atten= 94	%, Lag	= 259.6 min
Discarded	=	0.75 cfs @	16.60 hrs,	Volume	= 1.594	af		•	
Primary	=	0.23 cfs @	16.60 hrs,	Volume	= 0.244	af			
Routed	to Link	37L : Dischar	ae 001						

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,892.92' @ 16.60 hrs Surf.Area= 27,142 sf Storage= 47,684 cf

Plug-Flow detention time= 585.7 min calculated for 1.836 af (100% of inflow) Center-of-Mass det. time= 586.0 min (1,457.0 - 871.0)

Volume	Invert	Avail.Sto	rage Storag	e Description	
#1	1,891.00'	218,37	79 cf Custo	m Stage Data (Pr	smatic) Listed below (Recalc)
Elevatior (feet	n Si )	urf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
1,891.00 1,892.00 1,894.00 1,896.00 1,898.00	) ) ) )	22,485 24,866 29,797 34,953 40,337	0 23,676 54,663 64,750 75,290	0 23,676 78,339 143,089 218,379	
Device	Routing	Invert	Outlet Devic	ces	
#1	Primary	1,891.00'	<b>24.0" Rour</b> L= 120.0' ( Inlet / Outlet n= 0.013 C	<b>nd Culvert</b> CPP, mitered to co t Invert= 1,891.00' orrugated PE, smo	onform to fill, Ke= 0.700 / 1,889.80' S= 0.0100 '/' Cc= 0.900 poth interior, Flow Area= 3.14 sf
#2 #3 #4	Device 1 Discarded Device 1	1,892.00' 1,891.00' 1,896.60'	3.0" Horiz. 1.200 in/hr 45.0" x 24.0 Limited to w	Orifice/Grate C= Exfiltration over S )" Horiz. Orifice/G veir flow at low hea	0.600 Limited to weir flow at low heads Surface area rate C= 0.600 ds

**Discarded OutFlow** Max=0.75 cfs @ 16.60 hrs HW=1,892.92' (Free Discharge) **Galaxies** (Exfiltration Controls 0.75 cfs)

**Primary OutFlow** Max=0.23 cfs @ 16.60 hrs HW=1,892.92' (Free Discharge) -1=Culvert (Passes 0.23 cfs of 12.92 cfs potential flow) **2=Orifice/Grate** (Orifice Controls 0.23 cfs @ 4.63 fps) **4=Orifice/Grate** (Controls 0.00 cfs)



#### Pond 26P: bio-retention basin #3b

#### Summary for Subcatchment 19S: SEEPAGE BED #3A (BMP #11)

1.625 af, Depth= 4.77" Runoff = 32.68 cfs @ 11.97 hrs, Volume= Routed to Pond 16P : seepage pit with chambers #3A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 50-Year Rainfall=7.20"

	Area (ac)	CN	Description							
	2.361	98	Paved parking & roofs							
*	0.069	40	Meadow, non-grazed, HSG A							
	0.059	71	Meadow, non-grazed, HSG C							
*	0.485	40	>75% Grass cover, Good, HSG A							
	0.485	74	Grass cover, Good, HSG C							
*	0.477	40	Woods, Good, HSG A							
	0.153	70	Woods, Good, HSG C							
	4.089	4.089 79 Weighted Average								
	1.728		42.26% Pervious Area							
	2.361		57.74% Impervious Area							
	Tc Leng	gth S	Slope Velocity Capacity Description							
	(min) (fe	et)	(ft/ft) (ft/sec) (cfs)							
	6.0		Direct Entry,							

#### Subcatchment 19S: SEEPAGE BED #3A (BMP #11)



## Summary for Subcatchment 24S: bio-retention basin #3b(BMP #12)

Runoff = 29.45 cfs @ 12.26 hrs, Volume= 2.918 af, Depth= 3.47" Routed to Pond 26P : bio-retention basin #3b

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 50-Year Rainfall=7.20"

	Area (	(ac)	CN	Desc	cription		
	2.3	349	98	Pave	ed parking	& roofs	
	1.	017	58	Mea	dow, non-g	grazed, HS	G B
	0.	574	71	Mea	dow, non-g	grazed, HS	GC
	3.4	499	61	>75%	6 Grass co	over, Good,	, HSG B
	0.	126	74	>75%	6 Grass co	over, Good,	HSG C
*	1.	025	40	Woo	ds, Good,	HSG A	
*	0.	745	40	>75%	6 Grass co	over, Good,	, HSG A
	0.	763	74	>75%	6 Grass co	over, Good,	, HSG C
	10.	098	67	Weig	ghted Aver	age	
	7.	749		76.74	4% Pervio	us Area	
	2.3	349		23.20	6% Imperv	vious Area	
	Тс	Lengt	h S	Slope	Velocity	Capacity	Description
	(min)	(feet	:)	(ft/ft)	(ft/sec)	(cfs)	
	25.1	15	0 0.	.0300	0.10		Sheet Flow,
							Woods: Light underbrush n= 0.400 P2= 3.23"
	5.8	42	50.	.0300	1.21		Shallow Concentrated Flow,
							Short Grass Pasture Kv= 7.0 fps
	30.9	57	5 T	otal			



## Subcatchment 24S: bio-retention basin #3b(BMP #12)

#### Summary for Pond 16P: seepage pit with chambers #3A

Inflow Area	a =	4.089 ac,	57.74% Imp	ervious,	Inflow Depth =	4.77"	for 50-Y	ear event		
Inflow	=	32.68 cfs @	11.97 hrs,	Volume	= 1.625	af				
Outflow	=	2.45 cfs @	12.57 hrs,	Volume	= 1.625	af, Atte	en= 93%,	Lag= 36.0 min		
Discarded	=	0.55 cfs @	10.50 hrs,	Volume	= 1.026	af				
Primary	=	1.89 cfs @	12.57 hrs,	Volume	= 0.599	af				
Routed to Pond 26P : bio-retention basin #3b										

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,902.88' @ 12.57 hrs Surf.Area= 26,640 sf Storage= 34,342 cf

Plug-Flow detention time= 277.9 min calculated for 1.623 af (100% of inflow) Center-of-Mass det. time= 278.1 min (1,084.3 - 806.2)

Volume	Invert	Avail.Sto	rage	Storage De	escription	
Volume         Invert           #1         1,901.00'           #2         1,901.50'           Elevation         Su (feet)           1,901.00         1,905.00		26,3	73 cf	Custom S	tage Data (Pr	ismatic) Listed below (Recalc)
	4 00 4 50	10.0	~~ <i>c</i>	106,560 cf	Overall - 40,	$628 \text{ cf Embedded} = 65,932 \text{ cf } \times 40.0\% \text{ Voids}$
#2	1,901.50'	40,6	28 cf	C <b>ultec R-3</b> Effective S	60HD x 1102 6ize= 54.9"W	2 Inside #1 x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf
				Overall Siz	e= 60.0"W x	36.0"H x 4.17'L with 0.50' Overlap
				1102 Char	nbers in 19 R	ows
				Cap Storag	ge= 6.5 cf x 2	x 19 rows = 245.5 cf
		67,0	01 cf	Total Avail	able Storage	
Elevatio	n Si	urf.Area	Inc.S	Store	Cum.Store	
(fee	t)	(sq-ft)	(cubic-	feet)	(cubic-feet)	
1,901.0	0	26,640		0	0	
1,905.0	0	26,640	106	,560	106,560	
Device	Routing	Invert	Outle	Devices		
#1	Primary	1,901.00'	<b>24.0"</b> L= 12 Inlet /	Round C 0.0' CPP Outlet Inv	ulvert , mitered to co ert= 1,901.00 nated PE_sm	onform to fill, Ke= 0.700 ' / 1,898.00' S= 0.0250 '/' Cc= 0.900 ooth interior
#2	Device 1	1,902.00'	<b>12.0</b> "	W x 6.0" I	H Vert. Orific	e/Grate C= 0.600
#3	Discarded	1,901.00'	0.900	in/hr Exfi	Itration over	Surface area
Discarde 1──3=Ext	ed OutFlow filtration(E	Max=0.55 c xfiltration Co	fs @ 10 ntrols 0.	.50 hrs H\ .55 cfs)	W=1,901.04'	(Free Discharge)

Primary OutFlow Max=1.89 cfs @ 12.57 hrs HW=1,902.88' (Free Discharge) -1=Culvert (Passes 1.89 cfs of 12.60 cfs potential flow) -2=Orifice/Grate (Orifice Controls 1.89 cfs @ 3.79 fps)



# Pond 16P: seepage pit with chambers #3A

Post BMPs 11-12

#### Summary for Pond 26P: bio-retention basin #3b

Inflow Area	a =	14.187 ac, 3	3.20% Imp	ervious, Infl	ow Depth = 2	2.97" for	50-Year event	
Inflow	=	31.26 cfs @	12.26 hrs,	Volume=	3.517 at	f		
Outflow	=	1.29 cfs @	18.43 hrs,	Volume=	3.517 at	f, Atten= 9	6%, Lag= 370.	.3 min
Discarded	=	0.89 cfs @	18.43 hrs,	Volume=	2.745 at	f	-	
Primary	=	0.40 cfs @	18.43 hrs,	Volume=	0.772 at	f		
Routed	to Link	37L : Dischar	ae 001					

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,894.85' @ 18.43 hrs Surf.Area= 31,977 sf Storage= 104,463 cf

Plug-Flow detention time= 937.6 min calculated for 3.514 af (100% of inflow) Center-of-Mass det. time= 938.2 min (1,796.5 - 858.3)

Volume	Invert	Avail.Sto	rage Storage	Description	
#1	1,891.00'	218,37	79 cf Custom	Stage Data (Pr	ismatic) Listed below (Recalc)
Elevation (feet) 1,891.00 1,892.00 1,894.00 1,896.00 1,898.00	Si	urf.Area (sq-ft) 22,485 24,866 29,797 34,953 40,337	Inc.Store (cubic-feet) 0 23,676 54,663 64,750 75,290	Cum.Store (cubic-feet) 0 23,676 78,339 143,089 218,379	
Device	Routing	Invert	Outlet Device	S	
#1 #2 #3 #4	Primary Device 1 Discarded Device 1	1,891.00' 1,892.00' 1,891.00' 1,896.60'	24.0" Round L= 120.0' CF Inlet / Outlet I n= 0.013 Cor 3.0" Horiz. O 1.200 in/hr E: 45.0" x 24.0" Limited to we	PP, mitered to co nvert= 1,891.00' rrugated PE, smo rifice/Grate C= xfiltration over \$ Horiz. Orifice/G ir flow at low hea	onform to fill, Ke= 0.700 / 1,889.80' S= 0.0100 '/' Cc= 0.900 both interior, Flow Area= 3.14 sf = 0.600 Limited to weir flow at low heads <b>Surface area</b> <b>Grate</b> C= 0.600 ads

**Discarded OutFlow** Max=0.89 cfs @ 18.43 hrs HW=1,894.85' (Free Discharge) **Galaxies and Controls 18.43 hrs HW=1,894.85'** (Free Discharge)

Primary OutFlow Max=0.40 cfs @ 18.43 hrs HW=1,894.85' (Free Discharge) 1=Culvert (Passes 0.40 cfs of 22.52 cfs potential flow) 2=Orifice/Grate (Orifice Controls 0.40 cfs @ 8.12 fps) 4=Orifice/Grate (Controls 0.00 cfs)



### Pond 26P: bio-retention basin #3b

#### Summary for Subcatchment 19S: SEEPAGE BED #3A (BMP #11)

Runoff = 39.88 cfs @ 11.97 hrs, Volume= 2.004 af, Depth= 5.88" Routed to Pond 16P : seepage pit with chambers #3A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=8.40"

_	Area (ac)	CN	Description					
	2.361	98	Paved parking	g & roofs				
*	0.069	40	Meadow, non	-grazed, HS	SG A			
	0.059	71	Meadow, non	-grazed, HS	SG C			
*	0.485	40	>75% Grass (	cover, Good	I, HSG A			
	0.485	74	>75% Grass (	cover, Good	I, HSG C			
*	0.477	40	Woods, Good	l, HSG A				
	0.153	70	Woods, Good	I, HSG C				
	4.089	79	Weighted Ave	erage				
	1.728		42.26% Pervi	ous Area				
	2.361		57.74% Imper	57.74% Impervious Area				
	Tc Leng	gth	Slope Velocity	Capacity	Description			
_	(min) (fee	et)	(ft/ft) (ft/sec)	(cfs)				
	~ ~				Dive of Fratma			

6.0

Direct Entry,

#### Subcatchment 19S: SEEPAGE BED #3A (BMP #11)



## Summary for Subcatchment 24S: bio-retention basin #3b(BMP #12)

Runoff = 38.09 cfs @ 12.26 hrs, Volume= 3.749 af, Depth= 4.46" Routed to Pond 26P : bio-retention basin #3b

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=8.40"

	Area (	(ac)	CN	Desc	cription		
	2.3	349	98	Pave	ed parking	& roofs	
	1.	017	58	Mea	dow, non-g	grazed, HS0	G B
	0.	574	71	Mea	dow, non-g	grazed, HS	GC
	3.4	499	61	>75%	6 Grass co	over, Good,	, HSG B
	0.	126	74	>75%	6 Grass co	over, Good,	, HSG C
*	1.0	025	40	Woo	ds, Good,	HSG A	
*	0.	745	40	>75%	6 Grass co	over, Good,	, HSG A
	0.	763	74	>75%	6 Grass co	over, Good,	HSG C
	10.	098	67	Weig	phted Aver	age	
	7.	749		76.74	, 4% Pervio	us Area	
	2.	349		23.2	6% Imperv	/ious Area	
					-		
	Тс	Lengt	h 🕄	Slope	Velocity	Capacity	Description
	(min)	(feet	:)	(ft/ft)	(ft/sec)	(cfs)	
	25.1	15	0 0.	.0300	0.10		Sheet Flow,
							Woods: Light underbrush n= 0.400 P2= 3.23"
	5.8	42	5 0.	.0300	1.21		Shallow Concentrated Flow,
							Short Grass Pasture Kv= 7.0 fps
	30.9	57	5 T	otal			

#### Hydrograph 42 Runoff 40-38.09 cfs 38 Type II 24-hr 36 100-Year Rainfall=8.40" 34 32 Runoff Area=10.098 ac 30-28-Runoff Volume=3,749 af 26 (sj) 24 22 Runoff Depth=4.46" 22· 8 20· 18· Flow Length=575 18-Slope=0.0300 '/' 16-14-Tc=30.9 min 12-10-CN=67 8 6 4 2 0 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 Time (hours)

# Subcatchment 24S: bio-retention basin #3b(BMP #12)

#### Summary for Pond 16P: seepage pit with chambers #3A

Inflow Area	a =	4.089 ac, 🗄	57.74% Impe	ervious,	Inflow Depth =	5.88"	for	100-`	Year event	
Inflow	=	39.88 cfs @	11.97 hrs,	Volume	= 2.004	af				
Outflow	=	3.04 cfs @	12.55 hrs,	Volume	= 2.004	af, At	ten= 9	2%,	Lag= 35.0	min
Discarded	=	0.55 cfs @	10.05 hrs,	Volume	= 1.093	af			-	
Primary	=	2.49 cfs @	12.55 hrs,	Volume	= 0.911	af				
Routed to Pond 26P : bio-retention basin #3b										

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,903.32' @ 12.55 hrs Surf.Area= 26,640 sf Storage= 43,007 cf

Plug-Flow detention time= 264.4 min calculated for 2.003 af (100% of inflow) Center-of-Mass det. time= 264.6 min (1,064.8 - 800.3)

Volume	Invert	Avail.Sto	rage Sto	Storage Description
#1	1,901.00'	26,37	73 cf <b>Cu</b>	Custom Stage Data (Prismatic) Listed below (Recalc)
			10	06,560 cf Overall - 40,628 cf Embedded = 65,932 cf x 40.0% Voids
#2	1,901.50'	40,62	28 cf <b>Cu</b>	Cultec R-360HD x 1102 Inside #1
			Efi	-ffective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67 L = 36.6 cf
			11	Jverall Size= 60.0 W X 36.0 H X 4.17 L with 0.50 Overlap
				TOZ CHAMBERS IN THE ROWS San Storage = 6.5 of x 2 x 10 rows = $245.5$ of
		67.00	$\frac{0}{10}$	$\frac{1}{24} \operatorname{Storage} = 0.3 \operatorname{Cr} \times 2 \times 13 \operatorname{Torows} = 243.3 \operatorname{Cr}$
		07,00		olai Avallable Slolage
Elevatio	on Si	urf.Area	Inc.Sto	store Cum.Store
(fee	et)	(sq-ft)	(cubic-fe	feet) (cubic-feet)
1,901.0	00	26,640	•	0 0
1,905.0	00	26,640	106,5	,560 106,560
Device	Routing	Invert	Outlet D	Devices
#1	Primary	1,901.00'	24.0" R	Round Culvert
			L= 120.0	0.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / O	Outlet Invert= 1,901.00' / 1,898.00' S= 0.0250 '/' Cc= 0.900
40	Davias 1	4 000 001	n= 0.01	13 Corrugated PE, smooth interior, Flow Area = 3.14 st
#2	Device 1	1,902.00	12.0" W	W X 6.0" H Vert. Orifice/Grate C= 0.600
#3	Discarded	1 901 00'	0 900 in	in/hr Exfiltration over Surface area
#3	Discalueu	1,901.00	0.300 m	
	ed OutFlow	Max=0.55 cf	s @ 10.0	05 hrs HW=1,901.04' (Free Discharge)
U-LX			1000 0.00	

Primary OutFlow Max=2.49 cfs @ 12.55 hrs HW=1,903.32' (Free Discharge) -1=Culvert (Passes 2.49 cfs of 15.34 cfs potential flow) -2=Orifice/Grate (Orifice Controls 2.49 cfs @ 4.97 fps)



# Pond 16P: seepage pit with chambers #3A

Inflow Area	a =	14.187 ac, 3	3.20% Impe	ervious,	Inflow Depth =	3.9	4" for	100-	Year event	
Inflow	=	40.51 cfs @	12.26 hrs,	Volume	= 4.660	) af				
Outflow	=	1.45 cfs @	19.24 hrs,	Volume	= 4.660	) af,	Atten= 9	96%,	Lag= 418.8	min
Discarded	=	0.97 cfs @	19.24 hrs,	Volume	= 3.511	af			-	
Primary	=	0.48 cfs @	19.24 hrs,	Volume	= 1.150	) af				
Routed	to Link	37L : Dischar	ae 001							

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Peak Elev= 1,896.05' @ 19.24 hrs Surf.Area= 35,078 sf Storage= 144,709 cf

Plug-Flow detention time= 1,136.0 min calculated for 4.657 af (100% of inflow) Center-of-Mass det. time= 1,136.9 min (1,993.4 - 856.5)

Volume	Invert	Avail.Sto	rage Storage	e Description	
#1	1,891.00'	218,37	79 cf Custor	n Stage Data (Pri	smatic) Listed below (Recalc)
Elevation (feet) 1,891.00 1,892.00 1,894.00 1,896.00 1,898.00	Si	urf.Area (sq-ft) 22,485 24,866 29,797 34,953 40,337	Inc.Store (cubic-feet) 0 23,676 54,663 64,750 75,290	Cum.Store (cubic-feet) 0 23,676 78,339 143,089 218,379	
Device F	Routing	Invert	Outlet Devic	es	
#1 F #2 C #3 C #4 C	Primary Device 1 Discarded Device 1	1,891.00' 1,892.00' 1,891.00' 1,896.60'	<ul> <li>24.0" Round Culvert</li> <li>L= 120.0' CPP, mitered to conform to fill, Ke= 0.700</li> <li>Inlet / Outlet Invert= 1,891.00' / 1,889.80' S= 0.0100 '/' Cc= 0.900</li> <li>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf</li> <li>3.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads</li> <li>1.200 in/hr Exfiltration over Surface area</li> <li>45.0" x 24.0" Horiz. Orifice/Grate C= 0.600</li> <li>Limited to weir flow at low heads</li> </ul>		

**Discarded OutFlow** Max=0.97 cfs @ 19.24 hrs HW=1,896.05' (Free Discharge) **Galaxies** (Exfiltration Controls 0.97 cfs)

**Primary OutFlow** Max=0.48 cfs @ 19.24 hrs HW=1,896.05' (Free Discharge) -1=Culvert (Passes 0.48 cfs of 26.85 cfs potential flow) **2=Orifice/Grate** (Orifice Controls 0.48 cfs @ 9.69 fps) **4=Orifice/Grate** (Controls 0.00 cfs)



#### Pond 26P: bio-retention basin #3b