July 10, 2017

Mr. Craig Dixon

Chairman
New Bedford Conservation Commission
New Bedford City Hall
133 Williams Street
New Bedford, MA 02744

## RE: Response Letter <br> Notice of Intent - 100 Duchaine Blvd. <br> New Bedford, Massachusetts

Dear Mr. Nixon,
We have enclosed a response letter, revised HydroCAD calculations, revised Site Plan sheets and accompanying documentation in response to the comment letter prepared by Nitsch Engineering dated June 14, 2017 in regards to their review of the Site Plans and attached documents.

We trust the attachments noted above and included herewith will provide the necessary documentation to address their comments. If you should have any questions, please feel free to contact us.

Very Truly Yours,
FARLAND CORPORATION, INC.

## Chistian A. Farland

Christian A. Farland , P.E., LEED AP Principal Engineer and President

## Nitsch Engineering Comments

## Comment \#1:

Test holes were provided at the locations of the infiltration facilities. The test hole performed in the vicinity of the underground infiltration facility indicates seasonal high groundwater at approximately elevation 78.3. This elevation seems consistent with the surrounding wetlands elevations. The calculations and detail show the bottom of the system at elevation 78.5. Per the Standards, 2 feet of separation between the bottom of the infiltration facility and seasonal high groundwater is required. The Applicant has not revised this design.

The design of the roof recharge system has been revised to propose shorter chambers in an attempt to gain as much separation as possible. The system has been designed to the maximum extent practical, and improves on the predevelopment conditions by a significant amount.

## Comment \#2:

A CDS water quality unit was added to the plans to treat the water generated by the existing parking lot. The Applicant has not provided sizing information for this unit. Also, the unit was placed outside the existing parking lot adjacent to the wetlands pocket on the south side of the site. The unit is well within 25 feet of the wetlands line. A detail of this unit should be added to the plans. Sizing information should be provided.

> A detail of the CDS water quality unit has been added to the Details Sheet 8, and a specifications detail of the unit model provided by Contech has also been provided.

## Comment \#3:

The proposed discharge from the CDS unit, including rip-rap pads, should be shown on the plans. The current plan does not show a discharge pipe or rip-rap pad.

> The CDS unit will be placed along an existing drain line to allow for additional treatment before discharge to the existing detention pond. No additional rip rap or discharge pipes are proposed.

## Comment \#4:

Revised hydrologic calculations were submitted to include the reaches and ponds. With regards to the calculations we have the following comments:
a.) The existing conditions hydrologic calculations show the pipe flowing from CB-9 surcharged during the 10-year storm in the existing and proposed condition.
b.) In the proposed condition plans, stormwater from drainage areas S-1 and S-2 are directed towards the proposed detention basin on the west side of the parking lot. The calculations should be revised to direct that flow through the detention basin.
c.) The storm piping from existing CB-8 and CB-9 has been upgraded to 18-inch pipes on the plans. The calculations still show a surcharge from the pipe discharging from CB-9.
d.) There are errors in the hydrologic model associated with the southerly and northerly wetlands, apparently because of the surcharged piping upstream.
a.) The existing pipe from CB-9 has been upgraded and inverts revised to allow for the free flow of stormwater during the 10-yr storm.
b.) The hydrologic calculations have been revised to show the correct direction of flow throughout the proposed conditions.
c.) The pipe flowing from CB-9 will be upgraded to a size that can handle the expected flow of a 10-yr storm.
d.) The errors in the hydrologic model have been corrected by upgrading the components of the system to handle the expected storm flow.

## Comment \#5:

We recommend that the seasonal high groundwater elevation be added to the infiltration field detail. The applicant indicated that the seasonal high groundwater elevation has been added to the detail, but the detail was not included in the resubmission.

> As stated in the previous submission, the seasonal high groundwater elevation has been added to the infiltration field detail on Detail Sheet 8 with a detail reference number of $18 / 8$.

## Comment \#6:

Consistent with the Standards, we recommend that a foot of freeboard be provided between the 100-year storm peak elevation and/or overflow from the basins and the top of berm elevation in the basins. The calculations still show less than 1 foot of freeboard.

Farland Corp. has designed the top of berm elevations to meet the maximum extent practical for this project.

## Comment \#7:

Pipe sizing calculations were prepared using the Rational Method. However, the results of these calculations show all pipes flowing freely, which is not consistent with the hydrologic calculations submitted.

HydroCAD calculations have been revised to reflect upgraded conditions for the proposed stormwater treatment, and to allow for free flowing pipes.

If you have any questions or require any further information please contact this office at (508) 717-3479.


## Summary for Subcatchment S-1: Tributary to South Culvert

Runoff $=\quad 0.75 \mathrm{cfs} @ 12.14 \mathrm{hrs}$, Volume $=\quad 0.064$ af, Depth= $1.06{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"


## Summary for Subcatchment S-10: Tributary toward CB-8

Runoff $=\quad 2.83$ cfs @ 12.08 hrs, Volume $=\quad 0.226$ af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

|  | Area (sf) | CN |
| :--- | ---: | :--- | Description | * |
| :--- |
| 37,250 |
| 37,250 |$\quad$ Impervious Area $\quad$ Paved Paring


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- | Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-11: Tributary to Northerly Wetland

Runoff $=1.92$ cfs @ 12.09 hrs, Volume= 0.137 af, Depth= $1.63{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"


## Summary for Subcatchment S-2: Tributary to North Culvert

Runoff $=0.81$ cfs @ 12.12 hrs, Volume= $\quad 0.065$ af, Depth= $1.11^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"


## Summary for Subcatchment S-3: Tributary to Water Quality Inlet

Runoff $=\quad 2.03$ cfs @ 12.09 hrs, Volume $=\quad 0.145$ af, Depth= $2.26{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}$, $\mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 2-yr Rainfall=3.40"

|  | Area (sf) | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 7,500 | 98 | Water Quality Inlet |  |  |
| * | 14,700 | 98 | Roadway |  |  |
|  | 11,350 | 70 | Woods, Good, HSG C |  |  |
|  | 33,550 | 89 | Weighted Average |  |  |
|  | 11,350 |  | Pervious Area Impervious Area |  |  |
|  | 22,200 |  |  |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{aligned} & \text { Capacity } \\ & \text { (cfs) } \end{aligned}$ | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment S-3a: Tributary to Southerly Wetland

Runoff $=\quad 1.06$ cfs @ 12.09 hrs, Volume $=0.076$ af, Depth= $1.93^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 2-yr Rainfall=3.40"

|  | Area (sf) | CN | Description |
| :--- | ---: | ---: | :--- |
|  | 9,465 | 98 | Wetland |
| 1,527 | 98 | Roadway |  |
| 9,498 | 70 | Woods, Good, HSG C |  |
|  | 20,490 | 85 | Weighted Average |
| 9,498 |  | Pervious Area |  |
|  | 10,992 |  | Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- |

## Summary for Subcatchment S-4: Tributary to CB-1

Runoff $=\quad 0.11$ cfs @ 12.08 hrs, Volume= $\quad 0.009$ af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"


## Summary for Subcatchment S-5: Tributary to CB-2

Runoff $=\quad 0.11$ cfs @ 12.08 hrs, Volume $=\quad 0.008$ af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 2-yr Rainfall=3.40"


## Summary for Subcatchment S-6: Tributary Off-Site

Runoff $=1.12$ cfs @ 12.08 hrs, Volume $=\quad 0.087$ af, Depth= $3.06{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"

|  | Area (sf) | CN | Description |
| :---: | :---: | :---: | :---: |
| * | 14,625 | 98 | Paved Parking |
|  | 335 | 74 | >75\% Grass cover, Good, HSG C |
|  | 14,960 | 97 | Weighted Average |
|  | 335 |  | Pervious Area |
|  | 14,625 |  | Impervious Area |


| Tc | Length <br> $(\mathrm{min})$ | Slope <br> $(\mathrm{feeet})$ | Velocity <br> $(\mathrm{ft} / \mathrm{ft})$ |
| ---: | ---: | ---: | ---: |
| $(\mathrm{ft} / \mathrm{sec})$ |  |  |  | | Capacity |
| ---: |
| $(\mathrm{cfs})$ |$\quad$ Description

## Direct Entry, Min. Tc

## Summary for Subcatchment S-7: Tributary toward CB-7

Runoff $=\quad 1.07$ cfs @ 12.08 hrs , Volume $=0.086 \mathrm{af}$, Depth= $3.17^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"

|  | rea (sf) | CN Description |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 14,125 | 98 P | aved Park |  |  |
| 14,125 |  | Impervious Area |  |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\min ) \end{array}$ | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment S-8: Tributary to SRS-2

Runoff $=\quad 2.12$ cfs @ 12.08 hrs , Volume $=\quad 0.170$ af, Depth= $3.17^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 2-yr Rainfall=3.40"

|  | Area (sf) | CN | Description |
| :--- | ---: | :--- | :--- |
| 28,000 | 98 | Rooftop |  |
|  |  | Impervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- | Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-8a: Tributary toward WQI

Runoff $=0.99$ cfs @ 12.08 hrs, Volume= 0.076 af, Depth= $2.95{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"
$\left.\begin{array}{lrrll} & \text { Area (sf) } & \text { CN } & \text { Description } \\ * & 10,000 & 98 & \text { Paved Parking } \\ * & 940 & 74 & >75 \% \text { Grass cover, Good, HSG C } \\ 2,535 & 98 & \text { Water Quality Inlet }\end{array}\right]$

## Summary for Subcatchment S-9: Tributary toward CB-9

Runoff $=3.46$ cfs @ 12.08 hrs , Volume $=\quad 0.276$ af, Depth= $3.17^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 2-yr Rainfall=3.40"

| Area (sf) |  | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 45,550 | 98 P | aved Park |  |  |
|  | 45,550 |  | pervious | Area |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |

## Summary for Reach CB-1: Catch Basin

Inflow Area $=0.033 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=3.17$ " for 2 -yr event
Inflow $=0.11$ cfs @ 12.08 hrs, Volume= 0.009 af
Outflow = $0.11 \mathrm{cfs} @ 12.09 \mathrm{hrs}$, Volume $=0.009 \mathrm{af}$, Atten $=0 \%$, Lag= 0.1 min
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=1.52 \mathrm{fps}$, Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=0.51 \mathrm{fps}$, Avg. Travel Time $=0.5 \mathrm{~min}$
Peak Storage= 1 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.14'
Bank-Full Depth=1.25', Capacity at Bank-Full= 4.41 cfs
15.0" Diameter Pipe, $n=0.013$

Length= 15.0' Slope= 0.0047 '/'
Inlet Invert= 76.37', Outlet Invert= 76.30'


## Summary for Reach CB-2: Catch Basin



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity= 1.38 fps , Min. Travel Time $=0.6 \mathrm{~min}$
Avg. Velocity $=0.45 \mathrm{fps}$, Avg. Travel Time $=1.8 \mathrm{~min}$
Peak Storage $=4$ cf @ 12.09 hrs, Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.05 cfs
12.0" Diameter Pipe, $\mathrm{n}=0.025$ Corrugated metal Length=48.0' Slope= 0.0123 '/'
Inlet Invert= 76.09', Outlet Invert= 75.50'


## Summary for Reach CB-7: Catch Basin

Inflow Area $=0.324 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=3.17$ " for 2-yr event
Inflow $=1.07$ cfs @ 12.08 hrs, Volume= $\quad 0.086 \mathrm{af}$
Outflow = $1.07 \mathrm{cfs} @ 12.09 \mathrm{hrs}$, Volume $=0.086 \mathrm{af}$, Atten $=0 \%$, Lag= 0.1 min
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=6.43 \mathrm{fps}$, Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=2.10 \mathrm{fps}$, Avg. Travel Time $=0.5 \mathrm{~min}$
Peak Storage= 11 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.98 cfs
12.0" Diameter Pipe, $n=0.013$

Length=66.0' Slope= 0.0383 '/'
Inlet Invert= 78.71', Outlet Invert= 76.18'


## Summary for Reach CB-8: Catch Basin



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=3.89 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=1.51 \mathrm{fps}$, Avg. Travel Time $=0.8 \mathrm{~min}$
Peak Storage= 58 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 7.18 cfs
18.0" Diameter Pipe, n= 0.013

Length= 75.0' Slope= 0.0047 '/'
Inlet Invert= 75.45', Outlet Invert= 75.10'


## Summary for Reach CB-9: Catch Basin

Inflow Area $=3.234$ ac, $80.82 \%$ Impervious, Inflow Depth $=2.55$ " for 2-yr event
Inflow $=\quad 6.47$ cfs @ 12.09 hrs, Volume= 0.687 af
Outflow $=\quad 6.46$ cfs @ 12.09 hrs , Volume $=0.687 \mathrm{af}$, Atten $=0 \%$, Lag $=0.2 \mathrm{~min}$
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=4.71 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=1.79 \mathrm{fps}$, Avg. Travel Time $=0.7 \mathrm{~min}$
Peak Storage= 103 cf @ 12.09 hrs, Average Depth at Peak Storage= 1.09'
Bank-Full Depth=1.50', Capacity at Bank-Full= 7.38 cfs
18.0" Diameter Pipe, $n=0.013$

Length= 75.0 ' Slope $=0.0049$ '/'
Inlet Invert= 75.29', Outlet Invert= 74.92'


## Summary for Reach P-1: 18" Culvert

| Inflow Area $=$ | 0.725 ac, | $7.28 \%$ | Impervious, Inflow Depth $=1.06 " \mathrm{for} 2-\mathrm{yr}$ event |  |
| :--- | :--- | :--- | :--- | :--- |
| Inflow | $=$ | 0.75 cfs @ | 12.14 hrs, Volume $=$ | 0.064 af |
| Outflow | $=$ | $0.75 \mathrm{cfs} @$ | 12.14 hrs, Volume $=$ | 0.064 af , Atten= $0 \%$, Lag= 0.2 min |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity= 1.89 fps , Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=0.76 \mathrm{fps}$, Avg. Travel Time $=0.8 \mathrm{~min}$
Peak Storage= 15 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 4.49 cfs
18.0" Diameter Pipe, $\mathrm{n}=0.025$ Corrugated metal Length= 37.0' Slope= 0.0068 '/'
Inlet Invert= 84.57', Outlet Invert= 84.32'


## Summary for Reach P-2: 12" Culvert

| Inflow Area $=$ | 0.704 ac, | $7.91 \%$ | Impervious, Inflow Depth $=1.11 "$ | for $2-\mathrm{yr}$ event |
| :--- | :--- | :--- | :--- | :--- |
| Inflow | $=$ | $0.81 \mathrm{cfs} @$ | 12.12 hrs , Volume $=$ | 0.065 af |
| Outflow | $=$ | $0.81 \mathrm{cfs} @$ | 12.12 hrs , Volume $=$ | 0.065 af , Atten= $0 \%$, Lag= 0.1 min |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.62 fps , Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=1.44 \mathrm{fps}$, Avg. Travel Time $=0.5 \mathrm{~min}$
Peak Storage $=9$ cf @ 12.12 hrs, Average Depth at Peak Storage $=0.33^{\prime}$
Bank-Full Depth=1.00', Capacity at Bank-Full= 3.49 cfs
12.0" Diameter Pipe, $n=0.025$ Corrugated metal

Length=42.0' Slope= 0.0355 '/'
Inlet Invert= 84.18', Outlet Invert= 82.69'


## Summary for Pond SRS-2: Subsurface Recharge System

| Inflow Area = | $0.643 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 3.17" for 2-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 2.12 cfs @ | 12.08 hrs, Volume= | 0.170 af |  |
| Outflow | 1.58 cfs @ | 12.15 hrs , Volume= | 0.170 af, | Atten= 25\%, Lag= 4.2 min |
| Discarded | 0.02 cfs @ | 6.40 hrs , Volume= | 0.041 af |  |
| Primary | 1.57 cfs @ | 12.15 hrs , Volume= | 0.129 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 80.92' @ 12.15 hrs Surf.Area= 3,162 sf Storage= 956 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 49.1 $\min (804.2-755.1)$


```
Discarded OutFlow Max=0.02 cfs @ 6.40 hrs HW=80.32' (Free Discharge)
—1=Exfiltration (Exfiltration Controls 0.02 cfs )
Primary OutFlow Max=1.56 cfs @ 12.15 hrs HW=80.92' (Free Discharge)
L2=Culvert (Barrel Controls 1.56 cfs @ 2.37 fps )
```


## Summary for Pond WET-1: Sortherly Wetland



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 75.75' @ 12.30 hrs Surf.Area= 7,672 sf Storage= 9,533 cf
Plug-Flow detention time $=111.9$ min calculated for 0.825 af ( $94 \%$ of inflow)
Center-of-Mass det. time $=80.5 \mathrm{~min}$ ( 877.4-797.0)


Discarded OutFlow Max=0.05 cfs @ 12.30 hrs HW=75.75' (Free Discharge)
L1=Exfiltration (Exfiltration Controls 0.05 cfs )
Primary OutFlow Max=3.79 cfs @ 12.30 hrs HW=75.75' (Free Discharge)
②=Culvert (Barrel Controls 3.79 cfs @ 2.81 fps )

## Summary for Pond WET-2: Northerly Wetland

| Inflow Area = | $1.333 \mathrm{ac}, 53.47 \%$ Impervious, Inflow Depth = 2.00" for 2-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 2.99 cfs @ | 12.09 hrs , Volume= | 0.222 af |  |
| Outflow | 0.93 cfs @ | 12.51 hrs , Volume= | 0.222 af, | Atten $=69 \%$, Lag $=25.5 \mathrm{~min}$ |
| Discarded | 0.06 cfs @ | 12.43 hrs , Volume= | 0.037 af |  |
| Primary | 0.87 cfs @ | 12.51 hrs , Volume= | 0.185 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$

Peak Elev= 76.32' @ 12.43 hrs Surf.Area= 9,103 sf Storage= 2,793 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 29.7 min (835.0-805.4)


Discarded OutFlow Max=0.06 cfs @ 12.43 hrs HW=76.32' (Free Discharge)
—2=Exfiltration (Exfiltration Controls 0.06 cfs )
Primary OutFlow Max=0.87 cfs @ 12.51 hrs HW=76.32' TW=75.90' (Dynamic Tailwater)
L-1=Culvert (Outlet Controls 0.87 cfs @ 1.93 fps )

## Summary for Pond WQI-1: Water Quality Inlet



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 79.05' @ 13.22 hrs Surf.Area= 6,786 sf Storage= 6,252 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= $206.3 \min (1,041.9-835.6)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $78.00^{\prime}$ | $9,440 \mathrm{cf}$ | Custom Stage Data (Prismatic)Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 78.00 | 5,080 | 0 | 0 |
| 79.00 | 6,700 | 5,890 | 5,890 |
| 79.50 | 7,500 | 3,550 | 9,440 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Discarded | $78.00{ }^{\prime}$ | $0.270 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area |
| \#2 | Primary | $79.00{ }^{\prime}$ | 10.0' long x 10.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) $2.492 .562 .702 .692 .682 .692 .67 \quad 2.64$ |

Discarded OutFlow Max=0.04 cfs @ 13.22 hrs HW=79.05' (Free Discharge)
-1=Exfiltration (Exfiltration Controls 0.04 cfs)
Primary OutFlow Max=0.31 cfs @ 13.22 hrs HW=79.05' TW=75.40' (Dynamic Tailwater)
L-2=Broad-Crested Rectangular Weir (Weir Controls 0.31 cfs @ 0.58 fps )

## Summary for Pond WQI-2: Water Quality Inlet



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 77.91' @ 13.23 hrs Surf.Area= 2,478 sf Storage= $1,990 \mathrm{cf}$
Plug-Flow detention time $=371.9$ min calculated for 0.040 af ( $52 \%$ of inflow)
Center-of-Mass det. time= $257.2 \min (1,029.6-772.3)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | 77.00 | $3,564 \mathrm{cf}$ | Custom Stage Data (Prismatic)Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 77.00 | 1,892 | 0 | 0 |
| 78.00 | 2,535 | 2,214 | 2,214 |
| 78.50 | 2,866 | 1,350 | 3,564 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Discarded | 77.00 | $0.270 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area |
| \#2 | Primary | 77.90' | 20.0' long x 10.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) 2.492 .562 .702 .692 .682 .692 .672 .64 |

Discarded OutFlow Max=0.02 cfs @ 13.23 hrs HW=77.91' (Free Discharge)
-1=Exfiltration (Exfiltration Controls 0.02 cfs )
Primary OutFlow Max=0.06 cfs @ 13.23 hrs HW=77.91' TW=75.39' (Dynamic Tailwater)
L2=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.26 fps$)$

## Summary for Subcatchment S-1: Tributary to South Culvert

Runoff $=\quad 1.54$ cfs @ 12.13 hrs, Volume $=0.124$ af, Depth= $2.05^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

|  | Area (sf) | CN | Description |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 25,975 | 70 | Woods, Good, HSG C |  |  |  |
|  | 3,300 | $74>$ | >75\% Grass cover, Good, HSG C |  |  |  |
| * | 2,300 | 98 | Roadway |  |  |  |
|  | 31,575 | 72 | Weighted Average |  |  |  |
|  | 29,275 |  | Pervious Area |  |  |  |
|  | 2,300 |  | Impervious Area |  |  |  |
| Tc (min) | Length (feet) | Slope <br> (ft/ft) | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |  |
| 5.6 | 50 | 0.1360 | 0.15 |  | Sheet Flow, |  |
|  |  |  |  |  | Woods: Light underbrush $\mathrm{n}=0.400$ | $\mathrm{P} 2=3.40$ |
| 3.5 | 220 | 0.0430 | 1.04 |  | Shallow Concentrated Flow, Woodland $\mathrm{Kv}=5.0 \mathrm{fps}$ |  |
| 9.1 | 270 | Total |  |  |  |  |

## Summary for Subcatchment S-10: Tributary toward CB-8

Runoff $=\quad 4.01 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.325 \mathrm{af}$, Depth $=4.56{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

|  | Area (sf) | CN | Description |
| :--- | ---: | :--- | :--- |
| 37,250 | 98 | Paved Parking |  |
| 37,250 |  | Impervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- | Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-11: Tributary to Northerly Wetland

Runoff $=\quad 3.32$ cfs @ 12.09 hrs, Volume $=\quad 0.236$ af, Depth= $2.81{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

|  | Area (sf) | CN | Description |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 1,175 | 98 R | Roadway |  |
|  | 15,750 | 98 | Wetland |  |
|  | 27,025 | 70 | Woods, Good, HSG C |  |
|  | 43,950 | 81 | Weighted Average Pervious Area |  |
|  | 27,025 |  |  |  |
|  | 16,925 |  | Impervious Area |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) $\begin{array}{r}\text { Capacity } \\ \text { (cfs) }\end{array}$ | Description |
| 0.2 | 14 | 0.0200 | 0.96 | Sheet Flow, |
|  |  |  |  | Smooth surfaces $\mathrm{n}=0.011 \mathrm{P} 2=3.40$ ' |
| 4.7 | 36 | 0.1100 | 0.13 | Sheet Flow, <br> Woods: Light underbrush $n=0.400 \quad \mathrm{P} 2=3.40 "$ |
| 1.1 | 70 | 0.0420 | - 1.02 | Shallow Concentrated Flow, Woodland $\mathrm{Kv}=5.0 \mathrm{fps}$ |
| 6.0 | 120 | Total |  |  |

## Summary for Subcatchment S-2: Tributary to North Culvert

Runoff $=1.62$ cfs @ 12.12 hrs, Volume= $\quad 0.125$ af, Depth= $2.12{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"


## Summary for Subcatchment S-3: Tributary to Water Quality Inlet

Runoff $=3.15$ cfs @ 12.09 hrs, Volume= $\quad 0.230$ af, Depth= $3.58{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}$, $\mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"


## Summary for Subcatchment S-3a: Tributary to Southerly Wetland

Runoff $=\quad 1.74$ cfs @ 12.09 hrs, Volume $=\quad 0.125$ af, Depth= $3.18^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 10-yr Rainfall=4.80"

|  | Area (sf) | CN | Description |
| :--- | ---: | ---: | :--- |
| $*$ | 9,465 | 98 | Wetland |
| $*$ | 1,527 | 98 | Roadway |
| 9,498 | 70 | Woods, Good, HSG C |  |
|  | 20,490 | 85 | Weighted Average |
| 9,498 |  | Pervious Area |  |
|  | 10,992 |  | Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ |
| ---: | ---: | ---: | :--- | | Capacity |
| ---: |
| $(\mathrm{cfs})$ |$\quad$ Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-4: Tributary to CB-1

Runoff $=0.16$ cfs @ 12.08 hrs, Volume $=0.013$ af, Depth $=4.56{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"


## Summary for Subcatchment S-5: Tributary to CB-2

Runoff $=0.15$ cfs @ 12.08 hrs, Volume $=\quad 0.012$ af, Depth $=4.56{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

| Area (sf) | CN | Description |  |
| ---: | ---: | :--- | :--- |
| 1,400 | 98 | Paved parking \& roofs |  |
| 1,400 |  | Impervious Area |  |
| Tc  Length <br> (min) Slope <br> (feet) Velocity <br> (ft/ft) <br> (ft/sec)     | Capacity <br> (cfs) | Description |  |

## Summary for Subcatchment S-6: Tributary Off-Site

Runoff $=1.60$ cfs @ 12.08 hrs, Volume $=\quad 0.127$ af, Depth $=4.45{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"


## Direct Entry, Min. Tc

## Summary for Subcatchment S-7: Tributary toward CB-7

Runoff $=1.52$ cfs @ 12.08 hrs , Volume $=\quad 0.123 \mathrm{af}$, Depth= $4.56^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

| Area (sf) CN Description |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 14,125 | 98 P | aved Park |  |  |
|  | 14,125 |  | pervious | Area |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | $\begin{array}{r} \text { Length } \\ \text { (feet) } \end{array}$ | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \\ \hline \end{array}$ | Description |

## Summary for Subcatchment S-8: Tributary to SRS-2

Runoff $=\quad 3.02$ cfs @ 12.08 hrs, Volume $=\quad 0.244$ af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

|  | Area (sf) | CN | Description |
| :--- | ---: | :--- | :--- |
| 28,000 | 98 | Rooftop |  |
|  |  | Impervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- | Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-8a: Tributary toward WQI

Runoff $=1.43$ cfs @ 12.08 hrs, Volume $=0.112$ af, Depth= 4.33"
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

|  | Area (sf) | CN | Description |
| :--- | ---: | ---: | :--- | :--- |
| $*$ | 10,000 | 98 | Paved Parking |
| $*$ | 940 | 74 | >75\% Grass cover, Good, HSG C |
| 2,535 | 98 | Water Quality Inlet |  |

## Summary for Subcatchment S-9: Tributary toward CB-9

Runoff $=\quad 4.91$ cfs @ 12.08 hrs, Volume= 0.398 af, Depth= 4.56"
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 10-yr Rainfall=4.80"

| Area (sf) |  | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 45,550 | 98 P | aved Park |  |  |
|  | 45,550 |  | pervious | Area |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |

## Summary for Reach CB-1: Catch Basin



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=1.69 \mathrm{fps}$, Min. Travel Time $=0.1 \mathrm{~min}$
Avg. Velocity $=0.56 \mathrm{fps}$, Avg. Travel Time $=0.4 \mathrm{~min}$
Peak Storage $=1$ cf @ 12.08 hrs, Average Depth at Peak Storage $=0.16{ }^{\prime}$
Bank-Full Depth=1.25', Capacity at Bank-Full= 4.41 cfs
15.0" Diameter Pipe, $n=0.013$

Length=15.0' Slope= 0.0047 '/'
Inlet Invert= 76.37', Outlet Invert= 76.30'


## Summary for Reach CB-2: Catch Basin



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=1.53 \mathrm{fps}$, Min. Travel Time $=0.5 \mathrm{~min}$
Avg. Velocity $=0.50 \mathrm{fps}$, Avg. Travel Time $=1.6 \mathrm{~min}$
Peak Storage $=5$ cf @ 12.09 hrs, Average Depth at Peak Storage $=0.18^{\prime}$
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.05 cfs
12.0" Diameter Pipe, $n=0.025$ Corrugated metal Length= 48.0' Slope= 0.0123 '/'
Inlet Invert= 76.09', Outlet Invert= 75.50'


## Summary for Reach CB-7: Catch Basin

Inflow Area $=\quad 0.324 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=4.56$ " for 10-yr event
Inflow $=\quad 1.52$ cfs @ 12.08 hrs , Volume= $\quad 0.123 \mathrm{af}$
Outflow = 1.52 cfs @ 12.09 hrs , Volume $=\quad 0.123 \mathrm{af}$, Atten= $0 \%$, Lag= 0.1 min
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=7.10 \mathrm{fps}$, Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=2.34 \mathrm{fps}$, Avg. Travel Time $=0.5 \mathrm{~min}$
Peak Storage= 14 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.98 cfs
12.0" Diameter Pipe, $n=0.013$

Length=66.0' Slope= 0.0383 '/'
Inlet Invert= 78.71', Outlet Invert= 76.18'


## Summary for Reach CB-8: Catch Basin



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=4.26 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=1.71 \mathrm{fps}$, Avg. Travel Time $=0.7 \mathrm{~min}$
Peak Storage= 77 cf @ 12.10 hrs, Average Depth at Peak Storage= $0.85^{\prime}$
Bank-Full Depth= 1.50', Capacity at Bank-Full= 7.18 cfs
18.0" Diameter Pipe, $n=0.013$

Length= 75.0' Slope= 0.0047 '/'
Inlet Invert= 75.45', Outlet Invert= 75.10'


## Summary for Reach CB-9: Catch Basin

Inflow Area $=\quad 3.234$ ac, $80.82 \%$ Impervious, Inflow Depth $=3.83$ " for 10-yr event
Inflow $=9.26$ cfs @ 12.09 hrs , Volume= $\quad 1.033$ af
Outflow = 7.67 cfs @ 12.04 hrs , Volume= $\quad 1.033 \mathrm{af}$, Atten= $17 \%$, Lag= 0.0 min
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=4.76 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=2.01 \mathrm{fps}$, Avg. Travel Time $=0.6 \mathrm{~min}$
Peak Storage $=133$ cf @ 12.05 hrs, Average Depth at Peak Storage= 1.50'
Bank-Full Depth=1.50', Capacity at Bank-Full= 7.38 cfs
18.0" Diameter Pipe, $n=0.013$

Length= 75.0 ' Slope $=0.0049$ '/'
Inlet Invert= 75.29', Outlet Invert= 74.92'


## Summary for Reach P-1: 18" Culvert

| Inflow Area $=$ | 0.725 ac, | $7.28 \%$ | Impervious, Inflow Depth $=2.05 "$ | for $10-\mathrm{yr}$ event |
| :--- | :--- | :--- | :--- | :--- |
| Inflow | $=$ | $1.54 \mathrm{cfs} @$ | 12.13 hrs, Volume $=$ | 0.124 af |
| Outflow | $=$ | $1.54 \mathrm{cfs} @$ | 12.14 hrs, Volume $=$ | 0.124 af , Atten $=0 \%$, Lag= 0.2 min |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=2.30 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=0.88 \mathrm{fps}$, Avg. Travel Time $=0.7 \mathrm{~min}$
Peak Storage= 25 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 4.49 cfs
18.0" Diameter Pipe, $\mathrm{n}=0.025$ Corrugated metal Length= 37.0' Slope= 0.0068 '/'
Inlet Invert= 84.57', Outlet Invert= 84.32'


## Summary for Reach P-2: 12" Culvert



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=4.36 \mathrm{fps}$, Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=1.66 \mathrm{fps}$, Avg. Travel Time $=0.4 \mathrm{~min}$
Peak Storage= 16 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.49 cfs
12.0" Diameter Pipe, $n=0.025$ Corrugated metal

Length=42.0' Slope= 0.0355 '/'
Inlet Invert= 84.18', Outlet Invert= 82.69'


## Summary for Pond SRS-2: Subsurface Recharge System

| Inflow Area $=$ | $0.643 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth = 4.56" for 10-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 3.02 cfs @ | 12.08 hrs , Volume= | 0.244 af |  |
| Outflow | 2.23 cfs @ | 12.15 hrs , Volume= | 0.244 af, A | Atten= 26\%, Lag $=4.2 \mathrm{~min}$ |
| Discarded | 0.02 cfs @ | 4.36 hrs , Volume= | 0.043 af |  |
| Primary | 2.21 cfs @ | 12.15 hrs , Volume= | 0.202 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 81.04' @ 12.15 hrs Surf.Area= 3,162 sf Storage $=1,250 \mathrm{cf}$
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 40.4 min (789.1-748.7)


Discarded OutFlow Max=0.02 cfs @ 4.36 hrs HW=80.32' (Free Discharge)
L-1=Exfiltration (Exfiltration Controls 0.02 cfs )
Primary OutFlow Max=2.21 cfs @ 12.15 hrs HW=81.04' (Free Discharge)
—2=Culvert (Barrel Controls 2.21 cfs @ 2.60 fps )

## Summary for Pond WET-1: Sortherly Wetland

| Inflow Area = | $6.278 \mathrm{ac}, 61.12 \%$ Impervious, Inflow Depth = 2.89" for $10-\mathrm{yr}$ event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow = | 11.77 cfs @ | 12.26 hrs, Volume= | 1.510 af |  |
| Outflow | 7.62 cfs @ | 12.44 hrs , Volume= | 1.457 af, | Atten $=35 \%, L a g=10.6 \mathrm{~min}$ |
| Discarded | 0.06 cfs @ | 12.44 hrs , Volume= | 0.078 af |  |
| Primary | 7.56 cfs @ | 12.44 hrs, Volume= | 1.380 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 76.31' @ 12.44 hrs Surf.Area= 9,073 sf Storage= 14,184 cf
Plug-Flow detention time $=82.2$ min calculated for 1.457 af ( $97 \%$ of inflow)
Center-of-Mass det. time= 62.1 min ( 856.4-794.3)


Discarded OutFlow Max=0.06 cfs @ 12.44 hrs HW=76.31' (Free Discharge)
-1=Exfiltration (Exfiltration Controls 0.06 cfs )
Primary OutFlow Max=7.56 cfs @ 12.44 hrs HW=76.31' (Free Discharge)
$\leftarrow_{2=C u l v e r t ~(B a r r e l ~ C o n t r o l s ~} 7.56$ cfs @ 3.48 fps )

## Summary for Pond WET-2: Northerly Wetland

| Inflow Area = | $1.333 \mathrm{ac}, 53.47 \%$ Impervious, Inflow Depth $=3.24$ " for 10-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 4.84 cfs @ | 12.09 hrs , Volume= | 0.360 af |  |
| Outflow | 1.69 cfs @ | 12.46 hrs , Volume= | 0.360 af, | Atten $=65 \%, L a g=22.3 \mathrm{~min}$ |
| Discarded | 0.06 cfs @ | 12.38 hrs , Volume= | 0.049 af |  |
| Primary | 1.63 cfs @ | 12.46 hrs , Volume $=$ | 0.310 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs $/ 3$

Peak Elev= 76.52' @ 12.38 hrs Surf.Area= 9,612 sf Storage= 4,699 cf
Plug-Flow detention time $=$ (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=33.6 \min (829.8-796.2)$


Discarded OutFlow Max=0.06 cfs @ 12.38 hrs HW=76.52' (Free Discharge)
②=Exfiltration (Exfiltration Controls 0.06 cfs )
Primary OutFlow Max=1.63 cfs @ 12.46 hrs HW=76.52' TW=76.08' (Dynamic Tailwater)
—1=Culvert (Outlet Controls 1.63 cfs @ 2.29 fps )

## Summary for Pond WQI-1: Water Quality Inlet

| Inflow Area = | 2.199 ac, 28.11\% Impervious, Inflow Depth = 2.61" for 10-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 6.13 cfs @ | 12.10 hrs , Volume= | 0.478 af |  |
| Outflow | 2.96 cfs @ | 12.32 hrs , Volume= | 0.361 af, | Atten $=52 \%$, Lag $=12.9 \mathrm{~min}$ |
| Discarded | 0.04 cfs @ | 12.32 hrs , Volume= | 0.077 af |  |
| Primary | 2.91 cfs @ | 12.32 hrs , Volume= | 0.284 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev=79.24' @ 12.32 hrs Surf.Area= 7,081 sf Storage $=7,532 \mathrm{cf}$
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=101.4 \min (923.3-821.9)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $78.00^{\prime}$ | 9,440 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 78.00 | 5,080 | 0 | 0 |
| 79.00 | 6,700 | 5,890 | 5,890 |
| 79.50 | 7,500 | 3,550 | 9,440 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Discarded | $78.00{ }^{\prime}$ | $0.270 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area |
| \#2 | Primary | $79.00{ }^{\prime}$ | 10.0' long x 10.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) 2.492 .562 .702 .692 .682 .692 .672 .64 |

Discarded OutFlow Max=0.04 cfs @ 12.32 hrs HW=79.24' (Free Discharge)
L1=Exfiltration (Exfiltration Controls 0.04 cfs)
Primary OutFlow Max=2.91 cfs @ 12.32 hrs HW=79.24' TW=76.26' (Dynamic Tailwater)


## Summary for Pond WQI-2: Water Quality Inlet



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 77.96' @ 12.20 hrs Surf.Area= $2,510 \mathrm{sf}$ Storage= $2,117 \mathrm{cf}$
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=147.4 \min (910.7-763.4)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $77.00^{\prime}$ | 3,564 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> $(\mathrm{sq}-\mathrm{ft})$ | Inc.Store <br> (cubic-feet) | Cum. Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 77.00 | 1,892 | 0 | 0 |
| 78.00 | 2,535 | 2,214 | 2,214 |
| 78.50 | 2,866 | 1,350 | 3,564 |


| Device | Routing | Invert | Outlet Devices |  |  |
| :---: | :--- | :--- | :--- | :--- | :--- |
| \#1 | Discarded | $77.00^{\prime}$ | $\mathbf{0 . 2 7 0}$ in/hr Exfiltration over Surface area |  |  |
| \#2 | Primary | $77.90^{\prime}$ | $\mathbf{2 0 . 0}$ ' long x 10.0' breadth Broad-Crested Rectangular Weir |  |  |
|  |  |  | Head (feet) 0.20 | 0.40 | 0.60 |
|  |  |  | Coef. (English) 2.49 | 1.00 | 1.20 |
|  |  |  |  | 1.40 | 1.60 |

Discarded OutFlow Max=0.02 cfs @ 12.20 hrs HW=77.96' (Free Discharge)
-1=Exfiltration (Exfiltration Controls 0.02 cfs )
Primary OutFlow Max=0.76 cfs @ 12.20 hrs HW=77.96' TW=76.07' (Dynamic Tailwater)
—2=Broad-Crested Rectangular Weir (Weir Controls 0.76 cfs @ 0.62 fps )

## Summary for Subcatchment S-1: Tributary to South Culvert

Runoff $=\quad 2.93$ cfs @ 12.13 hrs, Volume $=\quad 0.231$ af, Depth= $3.83^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-10: Tributary toward CB-8

Runoff $=\quad 5.87$ cfs @ 12.08 hrs, Volume $=\quad 0.482$ af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

|  | Area (sf) | CN | Description |
| :--- | ---: | :--- | :--- |
| 37,250 | 98 | Paved Parking |  |
| 37,250 |  | Impervious Area |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- | Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-11: Tributary to Northerly Wetland

Runoff $=\quad 5.61$ cfs @ 12.09 hrs, Volume $=\quad 0.404$ af, Depth= 4.81"
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-2: Tributary to North Culvert

Runoff $=3.04$ cfs @ 12.11 hrs, Volume= $\quad 0.231$ af, Depth= 3.94"
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-3: Tributary to Water Quality Inlet

Runoff $=\quad 4.90$ cfs @ 12.08 hrs, Volume= $\quad 0.366$ af, Depth= $5.71^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span $=0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 100-yr Rainfall=7.00"

|  | Area (sf) | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 7,500 | 98 | Water Quality Inlet |  |  |
| * | 14,700 | 98 | Roadway |  |  |
|  | 11,350 | 70 | Woods, Good, HSG C |  |  |
|  | 33,550 | 89 | Weighted Average |  |  |
|  | 11,350 |  | Pervious Area Impervious Area |  |  |
|  | 22,200 |  |  |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{aligned} & \text { Capacity } \\ & \text { (cfs) } \end{aligned}$ | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment S-3a: Tributary to Southerly Wetland

Runoff $=\quad 2.82$ cfs @ 12.09 hrs, Volume $=0.206$ af, Depth= $5.25^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs Type III 24-hr 100-yr Rainfall=7.00"

|  | Area (sf) | CN | Description |
| :--- | ---: | ---: | :--- |
| $*$ | 9,465 | 98 | Wetland |
| $*$ | 1,527 | 98 | Roadway |
| 9,498 | 70 | Woods, Good, HSG C |  |
| 20,490 | 85 | Weighted Average |  |
| 9,498 |  | Pervious Area |  |
|  | Impervious Area |  |  |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ |
| ---: | ---: | ---: | :--- | | Capacity |
| ---: |
| $(\mathrm{cfs})$ |$\quad$ Description | Direct Entry, Min. Tc |
| :--- |

Summary for Subcatchment S-4: Tributary to CB-1
Runoff $=\quad 0.23$ cfs @ 12.08 hrs , Volume $=\quad 0.019$ af, Depth $=6.76{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-5: Tributary to CB-2

Runoff $=\quad 0.22 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.018 \mathrm{af}$, Depth= $6.76{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-6: Tributary Off-Site

Runoff $=\quad 2.35$ cfs @ 12.08 hrs, Volume= 0.190 af, Depth= $6.64{ }^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 100-yr Rainfall=7.00"

|  | Area (sf) | CN | Description |
| :---: | :---: | :---: | :---: |
| * | 14,625 | 98 | Paved Parking |
|  | 335 | 74 | >75\% Grass cover, Good, HSG C |
|  | 14,960 | 97 | Weighted Average |
|  | 335 |  | Pervious Area |
|  | 14,625 |  | Impervious Area |


| Tc <br> $(\mathrm{min})$ | Length <br> $(\mathrm{feet})$ | Slope <br> $(\mathrm{ft} / \mathrm{ft})$ | Velocity <br> $(\mathrm{ft} / \mathrm{sec})$ | Capacity <br> $(\mathrm{cfs})$ |
| ---: | ---: | ---: | ---: | :--- | Description | Direct Entry, Min. Tc |
| :--- |

## Summary for Subcatchment S-7: Tributary toward CB-7

Runoff $=\quad 2.23 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.183 \mathrm{af}$, Depth= $6.76^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-8: Tributary to SRS-2

Runoff $=\quad 4.41 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.362 \mathrm{af}$, Depth= $=6.76^{\prime \prime}$

Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$ Type III 24-hr 100-yr Rainfall=7.00"


## Summary for Subcatchment S-8a: Tributary toward WQI

Runoff $=\quad 2.11$ cfs @ 12.08 hrs, Volume= 0.168 af, Depth= 6.52"
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 100-yr Rainfall=7.00"

|  | Area (sf) | CN D | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 10,000 | 98 P | Paved Parking |  |  |
|  | 940 | $74>$ | >75\% Grass cover, Good, HSG C |  |  |
| * | 2,535 | 98 W | Water Quality Inlet |  |  |
|  | 13,475 | 96 W | Weighted Average |  |  |
|  | 940 |  | Pervious Area |  |  |
|  | 12,535 |  | Impervious Area |  |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \end{array}$ | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
| 6.0 |  |  |  |  | Direct Entry |

## Summary for Subcatchment S-9: Tributary toward CB-9

Runoff $=\quad 7.18$ cfs @ 12.08 hrs , Volume $=\quad 0.589$ af, Depth $=6.76{ }^{\prime \prime}$
Runoff by SCS TR-20 method, UH=SCS, Time Span= $0.00-30.00 \mathrm{hrs}, \mathrm{dt}=0.01 \mathrm{hrs}$
Type III 24-hr 100-yr Rainfall=7.00"

| Area (sf) |  | CN | Description |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| * | 45,550 | 98 P | aved Park |  |  |
|  | 45,550 |  | pervious | Area |  |
| $\begin{array}{r} \mathrm{Tc} \\ (\mathrm{~min}) \\ \hline \end{array}$ | Length (feet) | Slope $(\mathrm{ft} / \mathrm{ft})$ | Velocity (ft/sec) | $\begin{array}{r} \text { Capacity } \\ \text { (cfs) } \end{array}$ | Description |

[^0]
## Summary for Reach CB-1: Catch Basin

| Inflow Area $=$ | $0.033 \mathrm{ac}, 100.00 \%$ Impervious, Inflow Depth $=6.76 \mathrm{ct}$ for $100-\mathrm{yr}$ event |  |
| :--- | :--- | :--- |
| Inflow | $=$ | $0.23 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=$ |
| Outflow | $=$ | $0.23 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=$ |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=1.89 \mathrm{fps}$, Min. Travel Time $=0.1 \mathrm{~min}$
Avg. Velocity $=0.62 \mathrm{fps}$, Avg. Travel Time $=0.4 \mathrm{~min}$
Peak Storage $=2$ cf @ 12.08 hrs, Average Depth at Peak Storage $=0.19^{\prime}$
Bank-Full Depth=1.25', Capacity at Bank-Full= 4.41 cfs
15.0" Diameter Pipe, $n=0.013$

Length= 15.0' Slope= 0.0047 '/'
Inlet Invert= 76.37', Outlet Invert= 76.30'


## Summary for Reach CB-2: Catch Basin



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=1.71 \mathrm{fps}$, Min. Travel Time $=0.5 \mathrm{~min}$
Avg. Velocity $=0.56 \mathrm{fps}$, Avg. Travel Time $=1.4 \mathrm{~min}$
Peak Storage $=6$ cf @ 12.09 hrs, Average Depth at Peak Storage $=0.22^{\prime}$
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.05 cfs
12.0" Diameter Pipe, $n=0.025$ Corrugated metal Length= 48.0' Slope= 0.0123 '/'
Inlet Invert= 76.09', Outlet Invert= 75.50'


## Summary for Reach CB-7: Catch Basin

Inflow Area $=\quad 0.324$ ac, $100.00 \%$ Impervious, Inflow Depth $=6.76$ " for 100 -yr event
Inflow $=\quad 2.23$ cfs @ 12.08 hrs , Volume $=0.183 \mathrm{af}$
Outflow = $2.23 \mathrm{cfs} @ 12.08 \mathrm{hrs}$, Volume $=\quad 0.183 \mathrm{af}$, Atten= $0 \%$, Lag $=0.1 \mathrm{~min}$
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=7.89 \mathrm{fps}$, Min. Travel Time $=0.1 \mathrm{~min}$
Avg. Velocity $=2.64 \mathrm{fps}$, Avg. Travel Time $=0.4 \mathrm{~min}$
Peak Storage= 19 cf @ 12.08 hrs, Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.98 cfs
12.0" Diameter Pipe, $n=0.013$

Length=66.0' Slope= 0.0383 '/'
Inlet Invert= 78.71', Outlet Invert= 76.18'


## Summary for Reach CB-8: Catch Basin

| Inflow Area $=$ | $2.188 \mathrm{ac}, 71.65 \%$ Impervious, Inflow Depth $=5.51 " \mathrm{for} 100-\mathrm{yr}$ event |  |  |
| :--- | :--- | :--- | :--- |
| Inflow | $=$ | 6.60 cfs @ | 12.10 hrs, Volume $=$ |
| Outflow | $=$ | $6.60 \mathrm{cfs} @ 12.11 \mathrm{hrs}$, Volume $=$ | 1.005 af |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=4.61 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=1.94 \mathrm{fps}$, Avg. Travel Time $=0.6 \mathrm{~min}$
Peak Storage= 107 cf @ 12.11 hrs, Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 7.18 cfs
18.0" Diameter Pipe, $n=0.013$

Length= 75.0' Slope= 0.0047 '/'
Inlet Invert= 75.45', Outlet Invert= 75.10'


## Summary for Reach CB-9: Catch Basin

Inflow Area $=3.234$ ac, $80.82 \%$ Impervious, Inflow Depth $=5.91$ " for 100-yr event
Inflow $=13.69$ cfs @ 12.09 hrs , Volume= $\quad 1.594$ af
Outflow = $7.89 \mathrm{cfs} @ 11.99 \mathrm{hrs}$, Volume $=1.594 \mathrm{af}$, Atten $=42 \%$, Lag $=0.0 \mathrm{~min}$
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=4.76 \mathrm{fps}$, Min. Travel Time $=0.3 \mathrm{~min}$
Avg. Velocity $=2.26 \mathrm{fps}$, Avg. Travel Time $=0.6 \mathrm{~min}$
Peak Storage= 133 cf @ 12.00 hrs, Average Depth at Peak Storage= 1.50'
Bank-Full Depth=1.50', Capacity at Bank-Full= 7.38 cfs
18.0" Diameter Pipe, $n=0.013$

Length= 75.0 ' Slope $=0.0049$ '/'
Inlet Invert= 75.29', Outlet Invert= 74.92'


## Summary for Reach P-1: 18" Culvert



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Max. Velocity $=2.71 \mathrm{fps}$, Min. Travel Time $=0.2 \mathrm{~min}$
Avg. Velocity $=1.02 \mathrm{fps}$, Avg. Travel Time $=0.6 \mathrm{~min}$
Peak Storage= 40 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.88'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 4.49 cfs
18.0" Diameter Pipe, $\mathrm{n}=0.025$ Corrugated metal Length= 37.0' Slope= 0.0068 '/'
Inlet Invert= 84.57', Outlet Invert= 84.32'


## Summary for Reach P-2: 12" Culvert



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
Max. Velocity $=5.00 \mathrm{fps}$, Min. Travel Time $=0.1 \mathrm{~min}$
Avg. Velocity $=1.91 \mathrm{fps}$, Avg. Travel Time $=0.4 \mathrm{~min}$
Peak Storage $=26$ cf @ 12.12 hrs, Average Depth at Peak Storage= $0.72^{\prime}$
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.49 cfs
12.0" Diameter Pipe, $n=0.025$ Corrugated metal

Length=42.0' Slope= 0.0355 '/'
Inlet Invert= 84.18', Outlet Invert= 82.69'


## Summary for Pond SRS-2: Subsurface Recharge System



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 81.25 @ 12.16 hrs Surf.Area= 3,162 sf Storage= 1,768 cf
Plug-Flow detention time $=32.5 \mathrm{~min}$ calculated for 0.362 af ( $100 \%$ of inflow)
Center-of-Mass det. time= $32.6 \min (775.5-743.0)$


```
Discarded OutFlow Max=0.02 cfs @ 2.73 hrs HW=80.32' (Free Discharge)
L-1=Exfiltration (Exfiltration Controls 0.02 cfs )
Primary OutFlow Max=3.12 cfs @ 12.16 hrs HW=81.25' (Free Discharge)
\({ }^{4}-\) Culvert (Barrel Controls 3.12 cfs @ 3.18 fps )
```


## Summary for Pond WET-1: Sortherly Wetland

| Inflow Area = | 6.278 ac, 61.12\% Impervious, Inflow Depth = 4.90" for 100-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 20.39 cfs @ | 12.14 hrs , Volume= | 2.563 af |  |
| Outflow | 12.73 cfs @ | 12.48 hrs , Volume= | 2.509 af , | Atten $=38 \%, L$ ag $=20.8 \mathrm{~min}$ |
| Discarded | 0.07 cfs @ | 12.48 hrs , Volume= | 0.084 af |  |
| Primary | 12.66 cfs @ | 12.48 hrs , Volume= | 2.425 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 77.08' @ 12.48 hrs Surf.Area= 10,993 sf Storage= 21,890 cf
Plug-Flow detention time $=62.6$ min calculated for 2.509 af ( $98 \%$ of inflow)
Center-of-Mass det. time= 49.9 min ( 840.7-790.8)


Discarded OutFlow Max=0.07 cfs @ 12.48 hrs HW=77.08' (Free Discharge)
-1=Exfiltration (Exfiltration Controls 0.07 cfs)
Primary OutFlow Max=12.66 cfs @ 12.48 hrs HW=77.08' (Free Discharge)
—2=Culvert (Barrel Controls 12.66 cfs @ 4.13 fps )

## Summary for Pond WET-2: Northerly Wetland

| Inflow Area = | $1.333 \mathrm{ac}, 53.47 \%$ Impervious, Inflow Depth = 5.28" for 100-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 7.84 cfs @ | 12.09 hrs , Volume= | 0.587 af |  |
| Outflow | 3.13 cfs @ | 12.41 hrs, Volume= | 0.587 af, | Atten $=60 \%$, Lag= 19.3 min |
| Discarded | 0.06 cfs @ | 12.32 hrs , Volume= | 0.064 af |  |
| Primary | 3.06 cfs @ | 12.41 hrs, Volume= | 0.523 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$

Peak Elev= 76.83' @ 12.32 hrs Surf.Area= 10,382 sf Storage= 7,781 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=36.4 \min (822.5-786.1)$


Discarded OutFlow Max=0.06 cfs @ 12.32 hrs HW=76.83' (Free Discharge)
②=Exfiltration (Exfiltration Controls 0.06 cfs )
Primary OutFlow Max=3.06 cfs @ 12.41 hrs HW=76.82' TW=76.35' (Dynamic Tailwater)
—1=Culvert (Outlet Controls 3.06 cfs @ 2.70 fps )

## Summary for Pond WQI-1: Water Quality Inlet

| Inflow Area = | $2.199 \mathrm{ac}, 28.11 \%$ Impervious, Inflow Depth = 4.52" for 100-yr event |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Inflow | 10.58 cfs @ | 12.10 hrs , Volume= | 0.828 af |  |
| Outflow | 8.74 cfs @ | 12.17 hrs , Volume= | 0.711 af, | Atten= 17\%, Lag= 3.9 min |
| Discarded | 0.05 cfs @ | 12.17 hrs , Volume= | 0.082 af |  |
| Primary | 8.69 cfs @ | 12.17 hrs , Volume= | 0.629 af |  |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 79.48' @ 12.17 hrs Surf.Area= 7,468 sf Storage= $9,289 \mathrm{cf}$
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=61.9 \min (870.1-808.2)$

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $78.00^{\prime}$ | $9,440 \mathrm{cf}$ | Custom Stage Data (Prismatic)Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 78.00 | 5,080 | 0 | 0 |
| 79.00 | 6,700 | 5,890 | 5,890 |
| 79.50 | 7,500 | 3,550 | 9,440 |


| Device | Routing | Invert | Outlet Devices |
| :---: | :---: | :---: | :---: |
| \#1 | Discarded | $78.00{ }^{\prime}$ | $0.270 \mathrm{in} / \mathrm{hr}$ Exfiltration over Surface area |
| \#2 | Primary | $79.00{ }^{\prime}$ | 10.0' long x 10.0' breadth Broad-Crested Rectangular Weir |
|  |  |  | Head (feet) 0.200 .400 .600 .801 .001 .201 .401 .60 |
|  |  |  | Coef. (English) $2.492 .562 .702 .692 .682 .692 .67 \quad 2.64$ |

Discarded OutFlow Max=0.05 cfs @ 12.17 hrs HW=79.48' (Free Discharge)
_1=Exfiltration (Exfiltration Controls 0.05 cfs )
Primary OutFlow Max=8.69 cfs @ 12.17 hrs HW=79.48' TW=76.66' (Dynamic Tailwater)
$L_{\mathbf{2}}=$ Broad-Crested Rectangular Weir (Weir Controls 8.69 cfs @ 1.81 fps )

## Summary for Pond WQI-2: Water Quality Inlet



Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= $0.01 \mathrm{hrs} / 3$
Peak Elev= 78.02' @ 12.11 hrs Surf.Area= 2,546 sf Storage= $2,256 \mathrm{cf}$
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time $=101.6 \min$ ( 856.5-755.0)

| Volume | Invert | Avail.Storage | Storage Description |
| :---: | ---: | ---: | ---: |
| $\# 1$ | $77.00^{\prime}$ | 3,564 cf | Custom Stage Data (Prismatic)Listed below (Recalc) |


| Elevation <br> (feet) | Surf.Area <br> (sq-ft) | Inc.Store <br> (cubic-feet) | Cum.Store <br> (cubic-feet) |
| ---: | ---: | ---: | ---: |
| 77.00 | 1,892 | 0 | 0 |
| 78.00 | 2,535 | 2,214 | 2,214 |
| 78.50 | 2,866 | 1,350 | 3,564 |


| Device | Routing | Invert | Outlet Devices |  |  |
| :---: | :--- | :--- | :--- | :--- | :--- |
| \#1 | Discarded | $77.00^{\prime}$ | $\mathbf{0 . 2 7 0}$ in/hr Exfiltration over Surface area |  |  |
| \#2 | Primary | $77.90^{\prime}$ | $\mathbf{2 0 . 0}$ 'long x 10.0' breadth Broad-Crested Rectangular Weir |  |  |
|  |  |  | Head (feet) 0.20 | 0.40 | 0.60 |
|  |  |  | Coef. (English) 2.49 | 1.00 | 1.20 |
|  |  |  |  | 1.40 | 1.60 |

Discarded OutFlow Max=0.02 cfs @ 12.11 hrs HW=78.02' (Free Discharge)
-1=Exfiltration (Exfiltration Controls 0.02 cfs)
Primary OutFlow Max=1.99 cfs @ 12.11 hrs HW=78.02' TW=76.43' (Dynamic Tailwater)
—2=Broad-Crested Rectangular Weir (Weir Controls 1.99 cfs @ 0.85 fps )







[^0]:    6.0

    Direct Entry, Min. Tc

