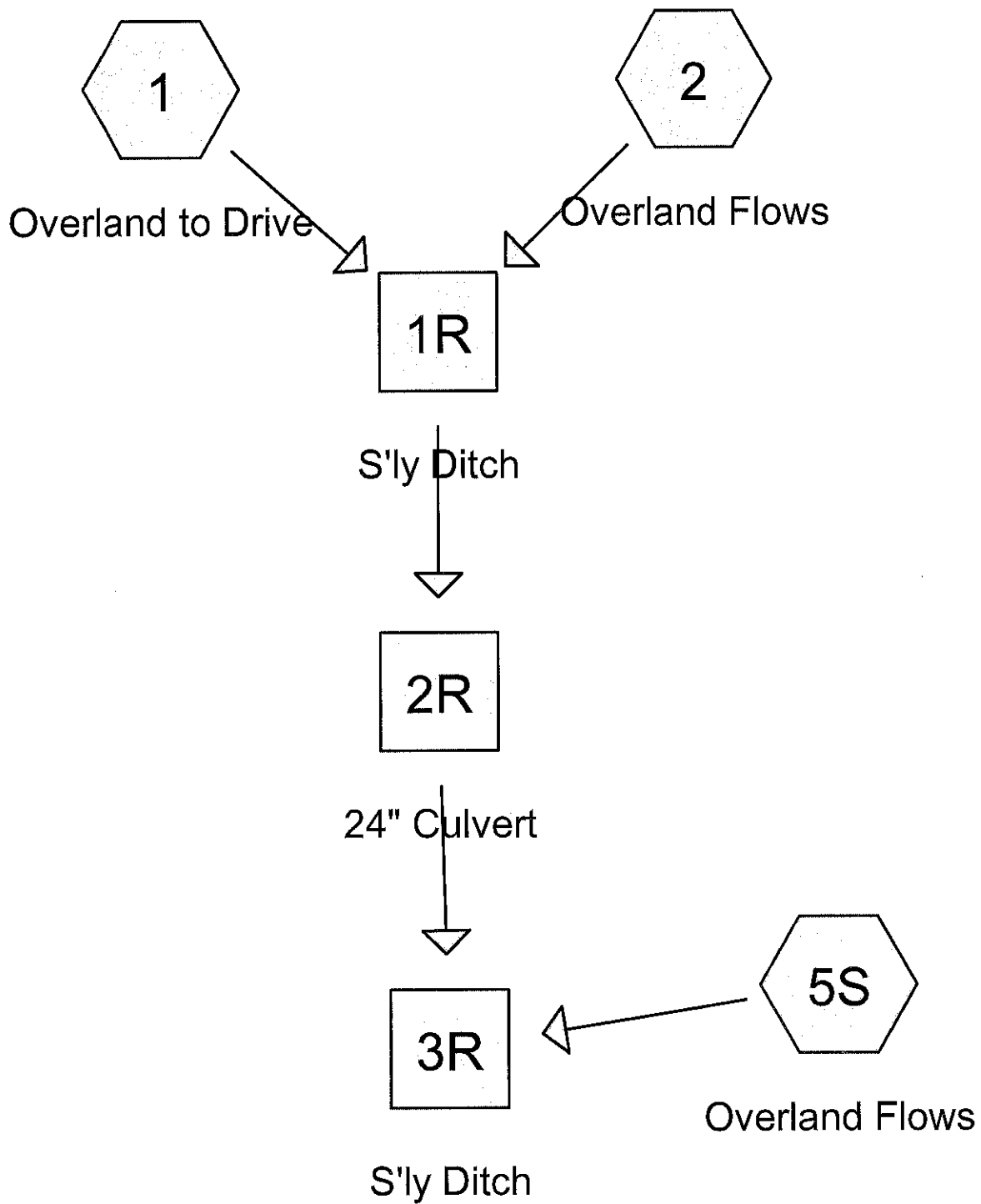


# HydroCAD Data



# PRE-DEVELOPMENT DRAINAGE CALCULATIONS



**5554 VMD Pre- Development**

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**Rainfall Events Listing (selected events)**

| Event# | Event Name | Storm Type | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 2-Year     | NRCC 24-hr | D     | Default | 24.00            | 1   | 3.09           | 2   |
| 2      | 10-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 4.65           | 2   |
| 3      | 25-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 5.87           | 2   |
| 4      | 100-Year   | NRCC 24-hr | D     | Default | 24.00            | 1   | 8.36           | 2   |

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**Area Listing (all nodes)**

| Area<br>(sq-ft) | CN        | Description<br>(subcatchment-numbers) |
|-----------------|-----------|---------------------------------------|
| 9,500           | 39        | >75% Grass cover, Good, HSG A (1, 2)  |
| 279,675         | 48        | Brush, Poor, HSG A (1, 2, 5S)         |
| 5,325           | 72        | Dirt roads, HSG A (1, 2, 5S)          |
| 71,115          | 36        | Woods, Fair, HSG A (1, 2, 5S)         |
| <b>365,615</b>  | <b>46</b> | <b>TOTAL AREA</b>                     |

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**Soil Listing (all nodes)**

| Area<br>(sq-ft) | Soil<br>Group | Subcatchment<br>Numbers |
|-----------------|---------------|-------------------------|
| 365,615         | HSG A         | 1, 2, 5S                |
| 0               | HSG B         |                         |
| 0               | HSG C         |                         |
| 0               | HSG D         |                         |
| 0               | Other         |                         |
| <b>365,615</b>  |               | <b>TOTAL AREA</b>       |

**5554 VMD Pre- Development**

NRCC 24-hr D 2-Year Rainfall=3.09"

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Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment 1: Overland to Drive</b>  | Runoff Area=39,730 sf 0.00% Impervious Runoff Depth=0.06"<br>Flow Length=195' Tc=6.0 min CN=47 Runoff=0.01 cfs 190 cf                                      |
| <b>Subcatchment 2: Overland Flows</b>   | Runoff Area=190,495 sf 0.00% Impervious Runoff Depth=0.04"<br>Flow Length=230' Tc=6.1 min CN=46 Runoff=0.02 cfs 701 cf                                     |
| <b>Subcatchment 5S: Overland Flows</b>  | Runoff Area=135,390 sf 0.00% Impervious Runoff Depth=0.03"<br>Flow Length=390' Tc=10.1 min CN=45 Runoff=0.01 cfs 365 cf                                    |
| <b>Reach 1R: S'ly Ditch</b>   | Avg. Flow Depth=0.10' Max Vel=0.09 fps Inflow=0.03 cfs 891 cf<br>n=0.100 L=750.0' S=0.0007 '/' Capacity=58.69 cfs Outflow=0.03 cfs 811 cf                  |
| <b>Reach 2R: 24" Culvert</b>  | Avg. Flow Depth=0.07' Max Vel=0.78 fps Inflow=0.03 cfs 811 cf<br>24.0" Round Pipe n=0.012 L=105.0' S=0.0023 '/' Capacity=11.72 cfs Outflow=0.03 cfs 809 cf |
| <b>Reach 3R: S'ly Ditch</b>   | Avg. Flow Depth=0.15' Max Vel=0.07 fps Inflow=0.04 cfs 1,175 cf<br>n=0.100 L=700.0' S=0.0003 '/' Capacity=38.78 cfs Outflow=0.03 cfs 783 cf                |
| <b>Total Runoff Area = 365,615 sf Runoff Volume = 1,256 cf Average Runoff Depth = 0.04"</b><br><b>100.00% Pervious = 365,615 sf 0.00% Impervious = 0 sf</b> |  |

**5554 VMD Pre- Development**

NRCC 24-hr D 2-Year Rainfall=3.09"

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**Summary for Subcatchment 1: Overland to Drive**

Runoff = 0.01 cfs @ 21.62 hrs, Volume= 190 cf, Depth= 0.06"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,875     | 36 | Woods, Fair, HSG A            |
| 30,260    | 48 | Brush, Poor, HSG A            |
| 5,075     | 39 | >75% Grass cover, Good, HSG A |
| 1,520     | 72 | Dirt roads, HSG A             |
| 39,730    | 47 | Weighted Average              |
| 39,730    |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft)                            | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|--|-------------------|----------------|--|
| 3.9      | 50            | 0.0060                                   | 0.21              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.1      | 95            | 0.0200                                   | 1.41              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.3      | 50            | 0.0200                                   | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps                  |
| 5.3      | 195           | Total, Increased to minimum Tc = 6.0 min |                   |                |  |

**Summary for Subcatchment 2: Overland Flows**

Runoff = 0.02 cfs @ 24.01 hrs, Volume= 701 cf, Depth= 0.04"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 38,225    | 36 | Woods, Fair, HSG A            |
| 144,680   | 48 | Brush, Poor, HSG A            |
| 4,425     | 39 | >75% Grass cover, Good, HSG A |
| 3,165     | 72 | Dirt roads, HSG A             |
| 190,495   | 46 | Weighted Average              |
| 190,495   |    | 100.00% Pervious Area         |



**5554 VMD Pre- Development**

NRCC 24-hr D 2-Year Rainfall=3.09"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.2      | 50            | 0.0240        | 0.37              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.7      | 115           | 0.0120        | 1.10              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 2.1      | 45            | 0.0013        | 0.36              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1      | 20            | 0.2700        | 5.20              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 6.1      | 230           | Total         |                   |                |  |

**Summary for Subcatchment 5S: Overland Flows**

Runoff = 0.01 cfs @ 24.02 hrs, Volume= 365 cf, Depth= 0.03"  
Routed to Reach 3R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 30,015    | 36 | Woods, Fair, HSG A    |
| 104,735   | 48 | Brush, Poor, HSG A    |
| 640       | 72 | Dirt roads, HSG A     |
| 135,390   | 45 | Weighted Average      |
| 135,390   |    | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.4      | 50            | 0.0200        | 0.35              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 0.2      | 30            | 0.1100        | 3.32              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 7.4      | 280           | 0.0040        | 0.63              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1      | 30            | 0.1600        | 4.00              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 10.1     | 390           | Total         |                   |                |  |

**Summary for Reach 1R: S'ly Ditch**

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth = 0.05" for 2-Year event  
Inflow = 0.03 cfs @ 24.01 hrs, Volume= 891 cf  
Outflow = 0.03 cfs @ 26.46 hrs, Volume= 811 cf, Atten= 3%, Lag= 146.8 min  
Routed to Reach 2R : 24" Culvert

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.09 fps, Min. Travel Time= 145.5 min  
Avg. Velocity = 0.07 fps, Avg. Travel Time= 179.0 min

## 5554 VMD Pre- Development

NRCC 24-hr D 2-Year Rainfall=3.09"

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Peak Storage= 238 cf @ 24.03 hrs

Average Depth at Peak Storage= 0.10' , Surface Width= 3.30'

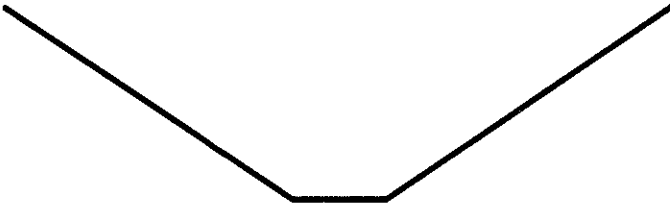
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 58.69 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage

Side Slope Z-value= 1.5 ' / ' Top Width= 21.00'

Length= 750.0' Slope= 0.0007 ' / '

Inlet Invert= 224.00', Outlet Invert= 223.46'



### Summary for Reach 2R: 24" Culvert

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth > 0.04" for 2-Year event  
Inflow = 0.03 cfs @ 26.46 hrs, Volume= 811 cf  
Outflow = 0.03 cfs @ 26.51 hrs, Volume= 809 cf, Atten= 0%, Lag= 3.0 min  
Routed to Reach 3R : S'ly Ditch

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.78 fps, Min. Travel Time= 2.3 min

Avg. Velocity = 0.63 fps, Avg. Travel Time= 2.8 min

Peak Storage= 4 cf @ 26.47 hrs

Average Depth at Peak Storage= 0.07' , Surface Width= 0.74'

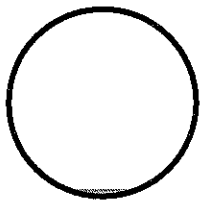
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 11.72 cfs

24.0" Round Pipe

n= 0.012 Concrete pipe, finished

Length= 105.0' Slope= 0.0023 ' / '

Inlet Invert= 223.46', Outlet Invert= 223.22'



### Summary for Reach 3R: S'ly Ditch

Inflow Area = 365,615 sf, 0.00% Impervious, Inflow Depth > 0.04" for 2-Year event  
Inflow = 0.04 cfs @ 24.02 hrs, Volume= 1,175 cf  
Outflow = 0.03 cfs @ 26.88 hrs, Volume= 783 cf, Atten= 14%, Lag= 171.3 min

**5554 VMD Pre- Development**

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Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.07 fps, Min. Travel Time= 165.0 min

Avg. Velocity = 0.06 fps, Avg. Travel Time= 212.0 min

Peak Storage= 334 cf @ 24.13 hrs

Average Depth at Peak Storage= 0.15' , Surface Width= 3.44'

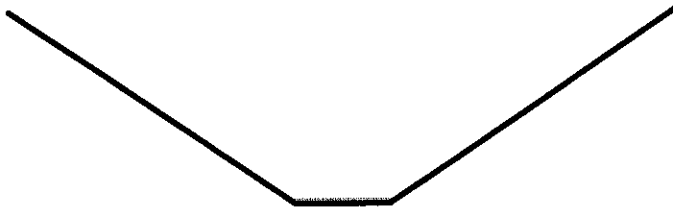
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 38.78 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage

Side Slope Z-value= 1.5 ' / ' Top Width= 21.00'

Length= 700.0' Slope= 0.0003 ' / '

Inlet Invert= 223.22', Outlet Invert= 223.00'



**5554 VMD Pre- Development**

NRCC 24-hr D 10-Year Rainfall=4.65"

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Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Overland to Drive**

Runoff Area=39,730 sf 0.00% Impervious Runoff Depth=0.42"  
 Flow Length=195' Tc=6.0 min CN=47 Runoff=0.16 cfs 1,389 cf

**Subcatchment 2: Overland Flows**

Runoff Area=190,495 sf 0.00% Impervious Runoff Depth=0.38"  
 Flow Length=230' Tc=6.1 min CN=46 Runoff=0.52 cfs 5,992 cf

**Subcatchment 5S: Overland Flows**

Runoff Area=135,390 sf 0.00% Impervious Runoff Depth=0.34"  
 Flow Length=390' Tc=10.1 min CN=45 Runoff=0.23 cfs 3,804 cf

**Reach 1R: S'ly Ditch**

Avg. Flow Depth=0.39' Max Vel=0.19 fps Inflow=0.67 cfs 7,381 cf  
 n=0.100 L=750.0' S=0.0007 '/ Capacity=58.69 cfs Outflow=0.26 cfs 7,290 cf

**Reach 2R: 24" Culvert**

Avg. Flow Depth=0.20' Max Vel=1.52 fps Inflow=0.26 cfs 7,290 cf  
 24.0" Round Pipe n=0.012 L=105.0' S=0.0023 '/ Capacity=11.72 cfs Outflow=0.26 cfs 7,288 cf

**Reach 3R: S'ly Ditch**

Avg. Flow Depth=0.55' Max Vel=0.15 fps Inflow=0.37 cfs 11,092 cf  
 n=0.100 L=700.0' S=0.0003 '/ Capacity=38.78 cfs Outflow=0.31 cfs 10,706 cf

**Total Runoff Area = 365,615 sf Runoff Volume = 11,185 cf Average Runoff Depth = 0.37"**  
**100.00% Pervious = 365,615 sf 0.00% Impervious = 0 sf**

**Summary for Subcatchment 1: Overland to Drive**

Runoff = 0.16 cfs @ 12.16 hrs, Volume= 1,389 cf, Depth= 0.42"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,875     | 36 | Woods, Fair, HSG A            |
| 30,260    | 48 | Brush, Poor, HSG A            |
| 5,075     | 39 | >75% Grass cover, Good, HSG A |
| 1,520     | 72 | Dirt roads, HSG A             |
| 39,730    | 47 | Weighted Average              |
| 39,730    |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft)                            | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|--|-------------------|----------------|--|
| 3.9      | 50            | 0.0060                                   | 0.21              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.1      | 95            | 0.0200                                   | 1.41              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.3      | 50            | 0.0200                                   | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps                  |
| 5.3      | 195           | Total, Increased to minimum Tc = 6.0 min |                   |                |  |

**Summary for Subcatchment 2: Overland Flows**

Runoff = 0.52 cfs @ 12.17 hrs, Volume= 5,992 cf, Depth= 0.38"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 38,225    | 36 | Woods, Fair, HSG A            |
| 144,680   | 48 | Brush, Poor, HSG A            |
| 4,425     | 39 | >75% Grass cover, Good, HSG A |
| 3,165     | 72 | Dirt roads, HSG A             |
| 190,495   | 46 | Weighted Average              |
| 190,495   |    | 100.00% Pervious Area         |

**5554 VMD Pre- Development**

NRCC 24-hr D 10-Year Rainfall=4.65"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.2      | 50            | 0.0240        | 0.37              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.7      | 115           | 0.0120        | 1.10              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 2.1      | 45            | 0.0013        | 0.36              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1      | 20            | 0.2700        | 5.20              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 6.1      | 230           | Total         |                   |                |  |

**Summary for Subcatchment 5S: Overland Flows**

Runoff = 0.23 cfs @ 12.36 hrs, Volume= 3,804 cf, Depth= 0.34"  
Routed to Reach 3R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 30,015    | 36 | Woods, Fair, HSG A    |
| 104,735   | 48 | Brush, Poor, HSG A    |
| 640       | 72 | Dirt roads, HSG A     |
| 135,390   | 45 | Weighted Average      |
| 135,390   |    | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.4      | 50            | 0.0200        | 0.35              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 0.2      | 30            | 0.1100        | 3.32              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 7.4      | 280           | 0.0040        | 0.63              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1      | 30            | 0.1600        | 4.00              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 10.1     | 390           | Total         |                   |                |  |

**Summary for Reach 1R: S'ly Ditch**

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth = 0.38" for 10-Year event  
Inflow = 0.67 cfs @ 12.17 hrs, Volume= 7,381 cf  
Outflow = 0.26 cfs @ 14.60 hrs, Volume= 7,290 cf, Atten= 62%, Lag= 145.9 min  
Routed to Reach 2R : 24" Culvert

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.19 fps, Min. Travel Time= 67.4 min  
Avg. Velocity = 0.13 fps, Avg. Travel Time= 96.6 min

## 5554 VMD Pre- Development

NRCC 24-hr D 10-Year Rainfall=4.65"

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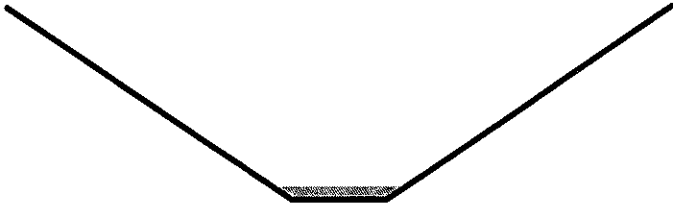
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Peak Storage= 1,042 cf @ 13.48 hrs  
Average Depth at Peak Storage= 0.39' , Surface Width= 4.16'  
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 58.69 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage  
Side Slope Z-value= 1.5 '/' Top Width= 21.00'  
Length= 750.0' Slope= 0.0007 '/'  
Inlet Invert= 224.00', Outlet Invert= 223.46'



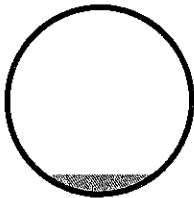
### Summary for Reach 2R: 24" Culvert

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth > 0.38" for 10-Year event  
Inflow = 0.26 cfs @ 14.60 hrs, Volume= 7,290 cf  
Outflow = 0.26 cfs @ 14.64 hrs, Volume= 7,288 cf, Atten= 0%, Lag= 2.0 min  
Routed to Reach 3R : S'ly Ditch

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 1.52 fps, Min. Travel Time= 1.2 min  
Avg. Velocity = 1.13 fps, Avg. Travel Time= 1.5 min

Peak Storage= 18 cf @ 14.62 hrs  
Average Depth at Peak Storage= 0.20' , Surface Width= 1.21'  
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 11.72 cfs

24.0" Round Pipe  
n= 0.012 Concrete pipe, finished  
Length= 105.0' Slope= 0.0023 '/'  
Inlet Invert= 223.46', Outlet Invert= 223.22'



### Summary for Reach 3R: S'ly Ditch

Inflow Area = 365,615 sf, 0.00% Impervious, Inflow Depth > 0.36" for 10-Year event  
Inflow = 0.37 cfs @ 14.53 hrs, Volume= 11,092 cf  
Outflow = 0.31 cfs @ 17.24 hrs, Volume= 10,706 cf, Atten= 15%, Lag= 162.6 min

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NRCC 24-hr D 10-Year Rainfall=4.65"

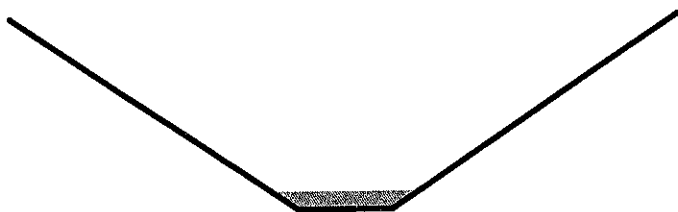
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Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.15 fps, Min. Travel Time= 78.8 min  
Avg. Velocity = 0.12 fps, Avg. Travel Time= 101.0 min

Peak Storage= 1,466 cf @ 15.93 hrs  
Average Depth at Peak Storage= 0.55' , Surface Width= 4.64'  
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 38.78 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage  
Side Slope Z-value= 1.5 '/' Top Width= 21.00'  
Length= 700.0' Slope= 0.0003 '/'  
Inlet Invert= 223.22', Outlet Invert= 223.00'





# 25-YEAR Pre-Development - Detailed

**5554 VMD Pre- Development**

NRCC 24-hr D 25-Year Rainfall=5.87"

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Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Overland to Drive**

Runoff Area=39,730 sf 0.00% Impervious Runoff Depth=0.88"  
 Flow Length=195' Tc=6.0 min CN=47 Runoff=0.65 cfs 2,905 cf

**Subcatchment 2: Overland Flows**

Runoff Area=190,495 sf 0.00% Impervious Runoff Depth=0.81"  
 Flow Length=230' Tc=6.1 min CN=46 Runoff=2.71 cfs 12,904 cf

**Subcatchment 5S: Overland Flows**

Runoff Area=135,390 sf 0.00% Impervious Runoff Depth=0.75"  
 Flow Length=390' Tc=10.1 min CN=45 Runoff=1.32 cfs 8,461 cf

**Reach 1R: S'ly Ditch**

Avg. Flow Depth=0.77' Max Vel=0.27 fps Inflow=3.36 cfs 15,809 cf  
 n=0.100 L=750.0' S=0.0007 '/ Capacity=58.69 cfs Outflow=0.87 cfs 15,715 cf

**Reach 2R: 24" Culvert**

Avg. Flow Depth=0.37' Max Vel=2.18 fps Inflow=0.87 cfs 15,715 cf  
 24.0" Round Pipe n=0.012 L=105.0' S=0.0023 '/ Capacity=11.72 cfs Outflow=0.87 cfs 15,713 cf

**Reach 3R: S'ly Ditch**

Avg. Flow Depth=1.01' Max Vel=0.20 fps Inflow=1.32 cfs 24,174 cf  
 n=0.100 L=700.0' S=0.0003 '/ Capacity=38.78 cfs Outflow=0.93 cfs 23,803 cf

**Total Runoff Area = 365,615 sf Runoff Volume = 24,270 cf Average Runoff Depth = 0.80"**  
**100.00% Pervious = 365,615 sf 0.00% Impervious = 0 sf**

**5554 VMD Pre- Development**

NRCC 24-hr D 25-Year Rainfall=5.87"

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**Summary for Subcatchment 1: Overland to Drive**

Runoff = 0.65 cfs @ 12.14 hrs, Volume= 2,905 cf, Depth= 0.88"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,875     | 36 | Woods, Fair, HSG A            |
| 30,260    | 48 | Brush, Poor, HSG A            |
| 5,075     | 39 | >75% Grass cover, Good, HSG A |
| 1,520     | 72 | Dirt roads, HSG A             |
| 39,730    | 47 | Weighted Average              |
| 39,730    |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft)                            | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|--|-------------------|----------------|--|
| 3.9      | 50            | 0.0060                                   | 0.21              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.1      | 95            | 0.0200                                   | 1.41              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.3      | 50            | 0.0200                                   | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps                  |
| 5.3      | 195           | Total, Increased to minimum Tc = 6.0 min |                   |                |  |

**Summary for Subcatchment 2: Overland Flows**

Runoff = 2.71 cfs @ 12.15 hrs, Volume= 12,904 cf, Depth= 0.81"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 38,225    | 36 | Woods, Fair, HSG A            |
| 144,680   | 48 | Brush, Poor, HSG A            |
| 4,425     | 39 | >75% Grass cover, Good, HSG A |
| 3,165     | 72 | Dirt roads, HSG A             |
| 190,495   | 46 | Weighted Average              |
| 190,495   |    | 100.00% Pervious Area         |

**5554 VMD Pre- Development**

NRCC 24-hr D 25-Year Rainfall=5.87"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.2      | 50            | 0.0240        | 0.37              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.7      | 115           | 0.0120        | 1.10              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 2.1      | 45            | 0.0013        | 0.36              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1      | 20            | 0.2700        | 5.20              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 6.1      | 230           | Total         |                   |                |  |

**Summary for Subcatchment 5S: Overland Flows**

Runoff = 1.32 cfs @ 12.20 hrs, Volume= 8,461 cf, Depth= 0.75"  
Routed to Reach 3R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 30,015    | 36 | Woods, Fair, HSG A    |
| 104,735   | 48 | Brush, Poor, HSG A    |
| 640       | 72 | Dirt roads, HSG A     |
| 135,390   | 45 | Weighted Average      |
| 135,390   |    | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.4      | 50            | 0.0200        | 0.35              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 0.2      | 30            | 0.1100        | 3.32              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 7.4      | 280           | 0.0040        | 0.63              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1      | 30            | 0.1600        | 4.00              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 10.1     | 390           | Total         |                   |                |  |

**Summary for Reach 1R: S'ly Ditch**

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth = 0.82" for 25-Year event  
Inflow = 3.36 cfs @ 12.15 hrs, Volume= 15,809 cf  
Outflow = 0.87 cfs @ 13.41 hrs, Volume= 15,715 cf, Atten= 74%, Lag= 75.7 min  
Routed to Reach 2R : 24" Culvert

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.27 fps, Min. Travel Time= 46.4 min  
Avg. Velocity = 0.16 fps, Avg. Travel Time= 78.4 min

## 5554 VMD Pre- Development

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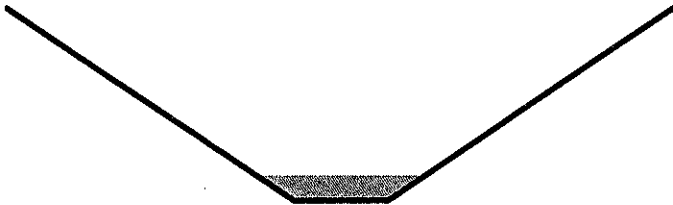
NRCC 24-hr D 25-Year Rainfall=5.87"

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Peak Storage= 2,414 cf @ 12.64 hrs  
Average Depth at Peak Storage= 0.77' , Surface Width= 5.32'  
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 58.69 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage  
Side Slope Z-value= 1.5 '/' Top Width= 21.00'  
Length= 750.0' Slope= 0.0007 '/'  
Inlet Invert= 224.00', Outlet Invert= 223.46'



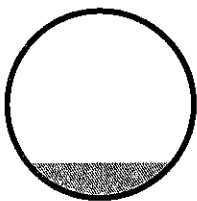
### Summary for Reach 2R: 24" Culvert

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth > 0.82" for 25-Year event  
Inflow = 0.87 cfs @ 13.41 hrs, Volume= 15,715 cf  
Outflow = 0.87 cfs @ 13.43 hrs, Volume= 15,713 cf, Atten= 0%, Lag= 1.4 min  
Routed to Reach 3R : S'ly Ditch

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 2.18 fps, Min. Travel Time= 0.8 min  
Avg. Velocity = 1.36 fps, Avg. Travel Time= 1.3 min

Peak Storage= 42 cf @ 13.42 hrs  
Average Depth at Peak Storage= 0.37' , Surface Width= 1.55'  
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 11.72 cfs

24.0" Round Pipe  
n= 0.012 Concrete pipe, finished  
Length= 105.0' Slope= 0.0023 '/'  
Inlet Invert= 223.46', Outlet Invert= 223.22'



### Summary for Reach 3R: S'ly Ditch

Inflow Area = 365,615 sf, 0.00% Impervious, Inflow Depth > 0.79" for 25-Year event  
Inflow = 1.32 cfs @ 12.20 hrs, Volume= 24,174 cf  
Outflow = 0.93 cfs @ 15.23 hrs, Volume= 23,803 cf, Atten= 30%, Lag= 181.6 min

**5554 VMD Pre- Development**

NRCC 24-hr D 25-Year Rainfall=5.87"

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Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.20 fps, Min. Travel Time= 57.0 min

Avg. Velocity = 0.14 fps, Avg. Travel Time= 80.8 min

Peak Storage= 3,175 cf @ 14.28 hrs

Average Depth at Peak Storage= 1.01' , Surface Width= 6.02'

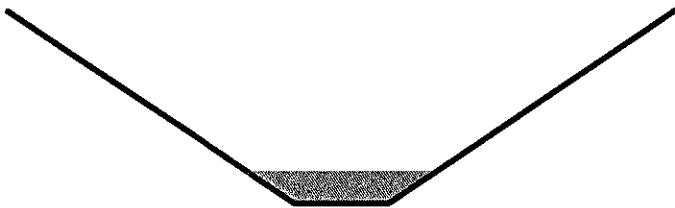
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 38.78 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage

Side Slope Z-value= 1.5 ' / ' Top Width= 21.00'

Length= 700.0' Slope= 0.0003 ' / '

Inlet Invert= 223.22', Outlet Invert= 223.00'



**5554 VMD Pre- Development**

NRCC 24-hr D 100-Year Rainfall=8.36"

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Time span=1.00-30.00 hrs, dt=0.01 hrs, 2901 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: Overland to Drive**

Runoff Area=39,730 sf 0.00% Impervious Runoff Depth=2.14"  
 Flow Length=195' Tc=6.0 min CN=47 Runoff=2.03 cfs 7,099 cf

**Subcatchment 2: Overland Flows**

Runoff Area=190,495 sf 0.00% Impervious Runoff Depth=2.04"  
 Flow Length=230' Tc=6.1 min CN=46 Runoff=9.07 cfs 32,325 cf

**Subcatchment 5S: Overland Flows**

Runoff Area=135,390 sf 0.00% Impervious Runoff Depth=1.93"  
 Flow Length=390' Tc=10.1 min CN=45 Runoff=5.02 cfs 21,768 cf

**Reach 1R: S'ly Ditch**

Avg. Flow Depth=1.72' Max Vel=0.41 fps Inflow=11.10 cfs 39,423 cf  
 n=0.100 L=750.0' S=0.0007 '/ Capacity=58.69 cfs Outflow=3.94 cfs 39,322 cf

**Reach 2R: 24" Culvert**

Avg. Flow Depth=0.80' Max Vel=3.36 fps Inflow=3.94 cfs 39,322 cf  
 24.0" Round Pipe n=0.012 L=105.0' S=0.0023 '/ Capacity=11.72 cfs Outflow=3.93 cfs 39,320 cf

**Reach 3R: S'ly Ditch**

Avg. Flow Depth=2.03' Max Vel=0.30 fps Inflow=5.09 cfs 61,088 cf  
 n=0.100 L=700.0' S=0.0003 '/ Capacity=38.78 cfs Outflow=3.64 cfs 60,715 cf

**Total Runoff Area = 365,615 sf Runoff Volume = 61,191 cf Average Runoff Depth = 2.01"**  
**100.00% Pervious = 365,615 sf 0.00% Impervious = 0 sf**

**5554 VMD Pre- Development**

NRCC 24-hr D 100-Year Rainfall=8.36"

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**Summary for Subcatchment 1: Overland to Drive**

Runoff = 2.03 cfs @ 12.14 hrs, Volume= 7,099 cf, Depth= 2.14"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,875     | 36 | Woods, Fair, HSG A            |
| 30,260    | 48 | Brush, Poor, HSG A            |
| 5,075     | 39 | >75% Grass cover, Good, HSG A |
| 1,520     | 72 | Dirt roads, HSG A             |
| 39,730    | 47 | Weighted Average              |
| 39,730    |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft)                            | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|--|-------------------|----------------|--|
| 3.9      | 50            | 0.0060                                   | 0.21              |                | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.1      | 95            | 0.0200                                   | 1.41              |                | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.3      | 50            | 0.0200                                   | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps                  |
| 5.3      | 195           | Total, Increased to minimum Tc = 6.0 min |                   |                |  |

**Summary for Subcatchment 2: Overland Flows**

Runoff = 9.07 cfs @ 12.14 hrs, Volume= 32,325 cf, Depth= 2.04"  
 Routed to Reach 1R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 38,225    | 36 | Woods, Fair, HSG A            |
| 144,680   | 48 | Brush, Poor, HSG A            |
| 4,425     | 39 | >75% Grass cover, Good, HSG A |
| 3,165     | 72 | Dirt roads, HSG A             |
| 190,495   | 46 | Weighted Average              |
| 190,495   |    | 100.00% Pervious Area         |



**5554 VMD Pre- Development**

NRCC 24-hr D 100-Year Rainfall=8.36"

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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description  |
|-------------|------------------|------------------|----------------------|-------------------|--|
| 2.2         | 50               | 0.0240           | 0.37                 |                   | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 1.7         | 115              | 0.0120           | 1.10                 |                   | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 2.1         | 45               | 0.0013           | 0.36                 |                   | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1         | 20               | 0.2700           | 5.20                 |                   | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 6.1         | 230              | Total            |                      |                   |  |

**Summary for Subcatchment 5S: Overland Flows**

Runoff = 5.02 cfs @ 12.18 hrs, Volume= 21,768 cf, Depth= 1.93"  
Routed to Reach 3R : S'ly Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 30,015    | 36 | Woods, Fair, HSG A    |
| 104,735   | 48 | Brush, Poor, HSG A    |
| 640       | 72 | Dirt roads, HSG A     |
| 135,390   | 45 | Weighted Average      |
| 135,390   |    | 100.00% Pervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description  |
|-------------|------------------|------------------|----------------------|-------------------|--|
| 2.4         | 50               | 0.0200           | 0.35                 |                   | <b>Sheet Flow,</b><br>Fallow n= 0.050 P2= 3.00"                          |
| 0.2         | 30               | 0.1100           | 3.32                 |                   | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 7.4         | 280              | 0.0040           | 0.63                 |                   | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 0.1         | 30               | 0.1600           | 4.00                 |                   | <b>Shallow Concentrated Flow,</b><br>Nearly Bare & Untilled Kv= 10.0 fps |
| 10.1        | 390              | Total            |                      |                   |  |

**Summary for Reach 1R: S'ly Ditch**

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth = 2.05" for 100-Year event  
Inflow = 11.10 cfs @ 12.14 hrs, Volume= 39,423 cf  
Outflow = 3.94 cfs @ 12.84 hrs, Volume= 39,322 cf, Atten= 65%, Lag= 41.8 min  
Routed to Reach 2R : 24" Culvert

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.41 fps, Min. Travel Time= 30.5 min  
Avg. Velocity = 0.20 fps, Avg. Travel Time= 63.6 min

## 5554 VMD Pre- Development

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Peak Storage= 7,197 cf @ 12.33 hrs

Average Depth at Peak Storage= 1.72' , Surface Width= 8.16'

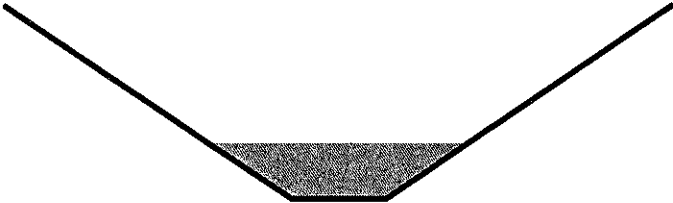
Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 58.69 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage

Side Slope Z-value= 1.5 ' / ' Top Width= 21.00'

Length= 750.0' Slope= 0.0007 ' / '

Inlet Invert= 224.00', Outlet Invert= 223.46'



### Summary for Reach 2R: 24" Culvert

Inflow Area = 230,225 sf, 0.00% Impervious, Inflow Depth > 2.05" for 100-Year event

Inflow = 3.94 cfs @ 12.84 hrs, Volume= 39,322 cf

Outflow = 3.93 cfs @ 12.85 hrs, Volume= 39,320 cf, Atten= 0%, Lag= 0.9 min

Routed to Reach 3R : S'ly Ditch

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.36 fps, Min. Travel Time= 0.5 min

Avg. Velocity = 1.65 fps, Avg. Travel Time= 1.1 min

Peak Storage= 123 cf @ 12.84 hrs

Average Depth at Peak Storage= 0.80' , Surface Width= 1.96'

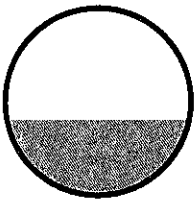
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 11.72 cfs

24.0" Round Pipe

n= 0.012 Concrete pipe, finished

Length= 105.0' Slope= 0.0023 ' / '

Inlet Invert= 223.46', Outlet Invert= 223.22'



### Summary for Reach 3R: S'ly Ditch

Inflow Area = 365,615 sf, 0.00% Impervious, Inflow Depth > 2.00" for 100-Year event

Inflow = 5.09 cfs @ 12.18 hrs, Volume= 61,088 cf

Outflow = 3.64 cfs @ 13.97 hrs, Volume= 60,715 cf, Atten= 28%, Lag= 106.9 min

**5554 VMD Pre- Development**

NRCC 24-hr D 100-Year Rainfall=8.36"

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Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.30 fps, Min. Travel Time= 39.4 min

Avg. Velocity = 0.18 fps, Avg. Travel Time= 65.8 min

Peak Storage= 8,610 cf @ 13.31 hrs

Average Depth at Peak Storage= 2.03' , Surface Width= 9.10'

Bank-Full Depth= 6.00' Flow Area= 72.0 sf, Capacity= 38.78 cfs

3.00' x 6.00' deep channel, n= 0.100 Earth, dense brush, high stage

Side Slope Z-value= 1.5 ' / ' Top Width= 21.00'

Length= 700.0' Slope= 0.0003 ' / '

Inlet Invert= 223.22', Outlet Invert= 223.00'

