

# DRAINAGE ANALYSIS

FOR  
Site Plan Modification  
275 Washington Street

LOCATED IN  
FRANKLIN, MASSACHUSETTS

PREPARED FOR  
Franklin Flex Space, LLC  
13 Clovelly Road  
Wellesley, MA

PREPARED BY  
UNITED CONSULTANTS, INC.  
850 FRANKLIN STREET, SUITE 11D  
WRENTHAM, MA. 02093

DATE: December 29, 2022  
Revised: September, 2024



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## APPENDIX A

#### PROJECT REVISIONS - 4

The project owners are proposing to make the following revisions to the project stormwater system.

1. Pond 3 will be constructed with Cultec recharger 360 HD units.
2. DMH 10 was relocated and the drainage piping was revised.
3. DMH13 was relocated and the drainage piping was revised.
4. Catch basin 10 piping was revised.
5. Catch basin 14 piping was revised.

## APPENDIX B

## Pre-Development vs. Post Development Rate and Volume of Runoff

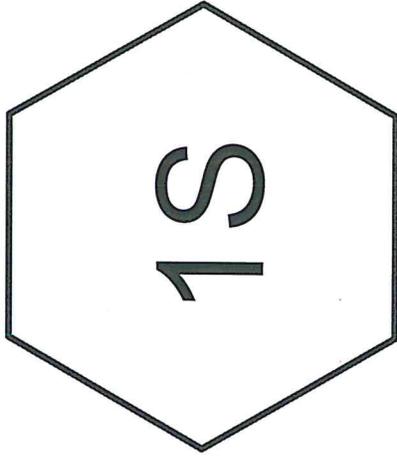
This analysis was prepared to show the summary of the pre-development and post development rate and volume of runoff as required by the Town of Franklin Storm-water Requirements.

The pre-development watershed areas were combined in Sub-catchment 1S and the post-development watersheds and ponds were combined in Link 1L. The below is a summary of the studied storm events:

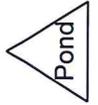
|                            |    |      |                             |    |       |
|----------------------------|----|------|-----------------------------|----|-------|
| 2 year storm event (CFS)   |    |      | 2 year storm event (A.F.)   |    |       |
| Pre                        |    | Post | Pre                         |    | Post  |
| 1S                         | vs | 1L   | 1S                          | vs | 1L    |
| 0.00                       |    | 0.00 | 0.000                       |    | 0.000 |
| 10 year storm event (CFS)  |    |      | 10 year storm event (A.F.)  |    |       |
| Pre                        |    | Post | Pre                         |    | Post  |
| 1S                         | vs | 1L   | 1S                          | vs | 1L    |
| 0.04                       |    | 0.00 | 0.031                       |    | 0.002 |
| 100 year storm event (CFS) |    |      | 100 year storm event (A.F.) |    |       |
| Pre                        |    | Post | Pre                         |    | Post  |
| 1S                         | vs | 1L   | 1S                          | vs | 1L    |
| 1.24                       |    | 1.13 | 0.353                       |    | 0.103 |

A reduction in the rate and volume of runoff has been realized with the proposed storm-water systems.

## APPENDIX C



1 S



Drainage Diagram for UC1502-PRE-mod-12-2022

Prepared by United Consultants, Inc.

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## 2 YR PRE-DEVELOPMENT

**Subcatchment 1S: 1 S**

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 17,166    | 98 | Paved parking & roofs         |
| 78,207    | 39 | >75% Grass cover, Good, HSG A |
| 388,572   | 30 | Woods, Good, HSG A            |
| 483,945   | 34 | Weighted Average              |
| 466,779   |    | Pervious Area                 |
| 17,166    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.4      | 50            | 0.1540        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25" |
| 1.9      | 223           | 0.1540        | 1.96              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.7      | 45            | 0.0444        | 1.05              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.3      | 23            | 0.0869        | 1.47              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.6      | 66            | 0.1212        | 1.74              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.4      | 54            | 0.1851        | 2.15              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.2      | 36            | 0.2777        | 2.63              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.3      | 39            | 0.1500        | 1.94              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 9.8      | 536           | Total         |                   |                |  |

# 10 YR PRE-DEVELOPMENT

**Subcatchment 1S: 1 S**

Runoff = 0.04 cfs @ 17.17 hrs, Volume= 0.031 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 17,166    | 98 | Paved parking & roofs         |
| 78,207    | 39 | >75% Grass cover, Good, HSG A |
| 388,572   | 30 | Woods, Good, HSG A            |
| 483,945   | 34 | Weighted Average              |
| 466,779   |    | Pervious Area                 |
| 17,166    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.4      | 50            | 0.1540        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25" |
| 1.9      | 223           | 0.1540        | 1.96              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.7      | 45            | 0.0444        | 1.05              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.3      | 23            | 0.0869        | 1.47              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.6      | 66            | 0.1212        | 1.74              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.4      | 54            | 0.1851        | 2.15              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.2      | 36            | 0.2777        | 2.63              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.3      | 39            | 0.1500        | 1.94              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 9.8      | 536           | Total         |                   |                |  |

# 100 YR PRE-DEVELOPMENT

**Subcatchment 1S: 1 S**

Runoff = 1.24 cfs @ 12.46 hrs, Volume= 0.353 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 17,166    | 98 | Paved parking & roofs         |
| 78,207    | 39 | >75% Grass cover, Good, HSG A |
| 388,572   | 30 | Woods, Good, HSG A            |
| 483,945   | 34 | Weighted Average              |
| 466,779   |    | Pervious Area                 |
| 17,166    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.4      | 50            | 0.1540        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25" |
| 1.9      | 223           | 0.1540        | 1.96              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.7      | 45            | 0.0444        | 1.05              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.3      | 23            | 0.0869        | 1.47              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.6      | 66            | 0.1212        | 1.74              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.4      | 54            | 0.1851        | 2.15              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.2      | 36            | 0.2777        | 2.63              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.3      | 39            | 0.1500        | 1.94              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 9.8      | 536           | Total         |                   |                |  |

## APPENDIX D



## 2 YR POST-DEVELOPMENT

**UC1502-POST-mod-6-2024**

Type III 24-hr 2YR Rainfall=3.25"

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**Subcatchment 1S: CB1**

Runoff = 0.15 cfs @ 12.14 hrs, Volume= 0.020 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 9,043     | 98 | Paved parking & roofs         |
| 18,146    | 39 | >75% Grass cover, Good, HSG A |
| 27,189    | 59 | Weighted Average              |
| 18,146    |    | Pervious Area                 |
| 9,043     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.3      | 79            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.3      | 79            | Total         |                   |                |  |

**Subcatchment 2S: CB2**

Runoff = 0.04 cfs @ 12.35 hrs, Volume= 0.008 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,842     | 98 | Paved parking & roofs         |
| 7,887     | 39 | >75% Grass cover, Good, HSG A |
| 3,942     | 30 | Woods, Good, HSG A            |
| 16,671    | 54 | Weighted Average              |
| 11,829    |    | Pervious Area                 |
| 4,842     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.1      | 48            | 0.1670        | 0.16              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 0.1      | 18            | 0.2220        | 2.36              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.2      | 22            | 0.0900        | 2.10              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.1      | 12            | 0.0420        | 1.43              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 70            | 0.0200        | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.1      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.2      | 48            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.2      | 218           | Total         |                   |                |  |

**Subcatchment 3S: CB3**

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 0.028 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,157     | 98 | Paved parking & roofs         |
| 3,103     | 39 | >75% Grass cover, Good, HSG A |
| 10,260    | 80 | Weighted Average              |
| 3,103     |    | Pervious Area                 |
| 7,157     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.0      | 10            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 10            | Total         |                   |                |  |

**Subcatchment 4S: CB4**

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.029 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 5,055     | 98 | Paved parking & roofs |
| 5,055     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.1      | 25            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 25            | Total         |                   |                |  |

**Subcatchment 5S: CB5**

Runoff = 0.16 cfs @ 12.13 hrs, Volume= 0.017 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,816     | 98 | Paved parking & roofs         |
| 2,985     | 39 | >75% Grass cover, Good, HSG A |
| 6,808     | 30 | Woods, Good, HSG A            |
| 17,609    | 62 | Weighted Average              |
| 9,793     |    | Pervious Area                 |
| 7,816     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.0      | 50            | 0.1830        | 0.17              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 0.7      | 92            | 0.1830        | 2.14              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.4      | 45            | 0.1360        | 1.84              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.0      | 10            | 1.0000        | 7.00              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 72            | 0.0200        | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.3      | 60            | 0.0320        | 3.63              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.1      | 30            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.9      | 359           | Total         |                   |                |  |

**Subcatchment 6S: CB6**

Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

**UC1502-POST-mod-6-2024**

Type III 24-hr 2YR Rainfall=3.25"

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| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 10,637    | 98 | Paved parking & roofs |
| 10,637    |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.4      | 122           | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.4      | 122           | Total         |                   |                |  |

**Subcatchment 7S: CB7**

Runoff = 0.52 cfs @ 12.08 hrs, Volume= 0.042 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 7,209     | 98 | Paved parking & roofs |
| 7,209     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.0      | 12            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 12            | Total         |                   |                |  |

**Subcatchment 8S: CB8**

Runoff = 0.09 cfs @ 12.38 hrs, Volume= 0.018 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 11,699    | 98 | Paved parking & roofs         |
| 8,994     | 39 | >75% Grass cover, Good, HSG A |
| 14,308    | 30 | Woods, Good, HSG A            |
| 35,001    | 55 | Weighted Average              |
| 23,302    |    | Pervious Area                 |
| 11,699    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.4      | 50            | 0.1540        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 2.1      | 248           | 0.1540        | 1.96              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.0      | 10            | 1.0000        | 7.00              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 1.2      | 73            | 0.0210        | 1.01              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 77            | 0.0270        | 3.34              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.4      | 99            | 0.0080        | 4.40              | 3.45           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 9.5      | 557           | Total         |                   |                |  |

**Subcatchment 9S: CB9**

Runoff = 0.64 cfs @ 12.08 hrs, Volume= 0.051 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 8,898     | 98 | Paved parking & roofs |
| 8,898     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.0      |               |               |                   |                | <b>Direct Entry, M IN. TC</b>   |
| 0.0      | 9             | 0.0400        | 11.79             | 9.26           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 6.0      | 9             | Total         |                   |                |   |

**Subcatchment 10S: CB10**

Runoff = 0.23 cfs @ 12.11 hrs, Volume= 0.023 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 10,611    | 98 | Paved parking & roofs         |
| 1,709     | 39 | >75% Grass cover, Good, HSG A |
| 9,781     | 30 | Woods, Good, HSG A            |
| 22,101    | 63 | Weighted Average              |
| 11,490    |    | Pervious Area                 |
| 10,611    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.0      | 17            | 0.0400        | 9.83              | 7.72           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 17            | Total         |                   |                |  |

**Subcatchment 11S: TR11**

Runoff = 0.23 cfs @ 12.16 hrs, Volume= 0.035 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 18,017    | 98 | Paved parking & roofs         |
| 25,172    | 39 | >75% Grass cover, Good, HSG A |
| 7,847     | 30 | Woods, Good, HSG A            |
| 51,036    | 58 | Weighted Average              |
| 33,019    |    | Pervious Area                 |
| 18,017    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 4.9      | 50            | 0.2020        | 0.17              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"  |
| 0.2      | 31            | 0.2020        | 2.25              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.2      | 30            | 0.1610        | 2.81              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 16            | 0.1250        | 2.47              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 15            | 0.0590        | 3.64              |                | <b>Shallow Concentrated Flow,</b><br>Grassed Waterway Kv= 15.0 fps  |
| 0.3      | 19            | 0.0590        | 1.21              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.1      | 19            | 0.3160        | 2.81              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.2      | 10            | 0.0100        | 0.70              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.0      | 7             | 0.1420        | 2.64              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.0      | 246           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe), TRENCH DRAIN 11</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.1      | 443           | Total         |                   |                |   |

**Subcatchment 12S: TR12**

Runoff = 0.08 cfs @ 12.44 hrs, Volume= 0.025 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 21,540    | 98 | Paved parking & roofs         |
| 27,521    | 39 | >75% Grass cover, Good, HSG A |
| 32,521    | 30 | Woods, Good, HSG A            |
| 81,582    | 51 | Weighted Average              |
| 60,042    |    | Pervious Area                 |
| 21,540    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC.</b>   |
| 1.1      | 274           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.1      | 274           | Total         |                   |                |   |

**Subcatchment 13S: TR13**

Runoff = 0.07 cfs @ 12.44 hrs, Volume= 0.022 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 19,790    | 98 | Paved parking & roofs         |
| 14,429    | 39 | >75% Grass cover, Good, HSG A |
| 36,229    | 30 | Woods, Good, HSG A            |
| 70,448    | 51 | Weighted Average              |
| 50,658    |    | Pervious Area                 |
| 19,790    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 2.8      | 50            | 0.1170        | 0.30              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.3      | 48            | 0.1170        | 2.39              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.8      | 185           | 0.1170        | 1.71              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.0      | 9             | 0.2220        | 3.30              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 18            | 0.1000        | 2.21              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>   |
| 1.0      | 250           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.0      | 560           | Total         |                   |                |   |

**Subcatchment 14S: CB14**

Runoff = 0.92 cfs @ 12.09 hrs, Volume= 0.066 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,656    | 98 | Paved parking & roofs         |
| 3,692     | 39 | >75% Grass cover, Good, HSG A |
| 18,348    | 86 | Weighted Average              |
| 3,692     |    | Pervious Area                 |
| 14,656    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.1      | 18            | 0.0140        | 5.81              | 4.57           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 18            | Total         |                   |                |  |

**Subcatchment 17S: S17**

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

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Type III 24-hr 2YR Rainfall=3.25"

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| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 21,239    | 39 | >75% Grass cover, Good, HSG A |
| 67,689    | 30 | Woods, Good, HSG A            |
| 88,928    | 32 | Weighted Average              |
| 88,928    |    | Pervious Area                 |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 11.1     | 50            | 0.0254        | 0.07              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25" |
| 0.3      | 13            | 0.0254        | 0.80              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.5      | 74            | 0.2160        | 2.32              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.7      | 49            | 0.0510        | 1.13              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 12.6     | 186           | Total         |                   |                |  |

**Subcatchment 18S: S18**

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR Rainfall=3.25"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,448     | 39 | >75% Grass cover, Good, HSG A |
| 10,309    | 30 | Woods, Good, HSG A            |
| 14,757    | 33 | Weighted Average              |
| 14,757    |    | Pervious Area                 |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.6      | 13            | 0.3080        | 0.34              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 1.2      | 17            | 0.1180        | 0.24              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.4      | 4             | 0.5000        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"  |
| 0.5      | 16            | 0.7690        | 0.51              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.1      | 57            | 0.8770        | 6.56              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 3.2      |               |               |                   |                | <b>Direct Entry, Min TC</b>   |
| 0.1      | 44            | 0.0250        | 7.77              | 6.10           | <b>Circular Channel (pipe), XCB1-XDMH1</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 151           | Total         |                   |                |   |

**Reach 1R: DMH1 - DMH3**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.242 ac, Inflow Depth = 0.54" for 2YR event  
 Inflow = 0.54 cfs @ 12.11 hrs, Volume= 0.056 af  
 Outflow = 0.54 cfs @ 12.12 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 3.25 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 1.37 fps, Avg. Travel Time= 1.1 min

Peak Storage= 14 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.26'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.54 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 87.0' Slope= 0.0084 '/'  
 Inlet Invert= 255.08', Outlet Invert= 254.35'



**Reach 2R: DMH 5-DMH6**

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 6% of Reach 4R bottom

Inflow Area = 3.449 ac, Inflow Depth = 0.27" for 2YR event  
 Inflow = 0.37 cfs @ 12.16 hrs, Volume= 0.077 af  
 Outflow = 0.37 cfs @ 12.35 hrs, Volume= 0.077 af, Atten= 0%, Lag= 11.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 2.92 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 1.68 fps, Avg. Travel Time= 0.7 min

Peak Storage= 9 cf @ 12.35 hrs, Average Depth at Peak Storage= 0.20'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 6.62 cfs

15.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 72.5' Slope= 0.0062 '/'  
 Inlet Invert= 254.60', Outlet Invert= 254.15'



**Reach 3R: DMH3-HEADER**

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 26% of Reach 1R bottom

Inflow Area = 1.358 ac, Inflow Depth = 0.75" for 2YR event  
 Inflow = 0.88 cfs @ 12.11 hrs, Volume= 0.085 af  
 Outflow = 0.88 cfs @ 12.11 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 4.71 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.60 fps, Avg. Travel Time= 0.3 min

Peak Storage= 5 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.29'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.88 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 27.0' Slope= 0.0111 '/'  
 Inlet Invert= 254.25', Outlet Invert= 253.95'



**Reach 4R: DMH4 DMH5**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 3.044 ac, Inflow Depth = 0.24" for 2YR event  
 Inflow = 0.27 cfs @ 12.36 hrs, Volume= 0.060 af  
 Outflow = 0.27 cfs @ 12.37 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 3.61 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 2.17 fps, Avg. Travel Time= 0.7 min

Peak Storage= 7 cf @ 12.37 hrs, Average Depth at Peak Storage= 0.15'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.46 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 88.0' Slope= 0.0200 '/'  
 Inlet Invert= 256.46', Outlet Invert= 254.70'



**Reach 6R: DMH6 MANIFOLD**

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 20% of Reach 2R bottom

Inflow Area = 3.449 ac, Inflow Depth = 0.27" for 2YR event  
 Inflow = 0.37 cfs @ 12.35 hrs, Volume= 0.077 af  
 Outflow = 0.37 cfs @ 12.36 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 3.23 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.87 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.36 hrs, Average Depth at Peak Storage= 0.19'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 7.67 cfs

15.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 12.0' Slope= 0.0083 '/'  
 Inlet Invert= 254.05', Outlet Invert= 253.95'



**Reach 8R: CB6-MANIFOLD**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.244 ac, Inflow Depth = 3.02" for 2YR event  
 Inflow = 0.76 cfs @ 12.09 hrs, Volume= 0.061 af  
 Outflow = 0.76 cfs @ 12.09 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 3.82 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.26 fps, Avg. Travel Time= 0.4 min

Peak Storage= 6 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.30'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 30.0' Slope= 0.0100 '/'  
 Inlet Invert= 251.60', Outlet Invert= 251.30'



**Reach 9R: DMH9 DMH10**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.617 ac, Inflow Depth = 0.16" for 2YR event  
Inflow = 0.07 cfs @ 12.44 hrs, Volume= 0.022 af  
Outflow = 0.07 cfs @ 12.46 hrs, Volume= 0.022 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 2.95 fps, Min. Travel Time= 0.7 min  
Avg. Velocity = 2.01 fps, Avg. Travel Time= 1.0 min

Peak Storage= 3 cf @ 12.45 hrs, Average Depth at Peak Storage= 0.07'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.35 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 119.0' Slope= 0.0362 '/'  
Inlet Invert= 256.56', Outlet Invert= 252.25'



**Reach 10R: DMH10 POND3**

[52] Hint: Inlet conditions not evaluated  
[61] Hint: Submerged 6% of Reach 9R bottom  
[61] Hint: Submerged 9% of Reach 14R bottom

Inflow Area = 2.625 ac, Inflow Depth = 0.42" for 2YR event  
Inflow = 0.65 cfs @ 12.11 hrs, Volume= 0.091 af  
Outflow = 0.65 cfs @ 12.11 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.67 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 1.85 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.23'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.46 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 2.0' Slope= 0.0200 '/'  
Inlet Invert= 252.29', Outlet Invert= 252.25'



**Reach 11R: DMH11-FES**

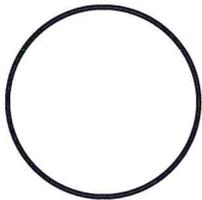
[52] Hint: Inlet conditions not evaluated

Inflow Area = 4.807 ac, Inflow Depth = 0.00" for 2YR event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.63 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 28.0' Slope= 0.0500 '/  
Inlet Invert= 247.40', Outlet Invert= 246.00'



**Reach 12R: DMH12-PIPE END**

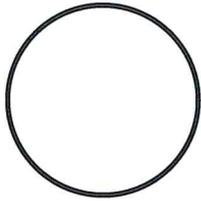
[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.410 ac, Inflow Depth = 0.00" for 2YR event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 20.0' Slope= 0.0400 '/'  
Inlet Invert= 244.80', Outlet Invert= 244.00'



**Reach 13R: DMH13-PIPE END**

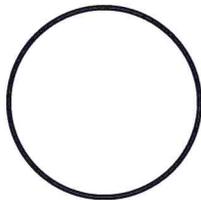
[52] Hint: Inlet conditions not evaluated

Inflow Area = 3.554 ac, Inflow Depth = 0.00" for 2YR event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 19.0' Slope= 0.0400 '/'  
Inlet Invert= 246.76', Outlet Invert= 246.00'



**Reach 14R: DMH8-DMH10**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.008 ac, Inflow Depth = 0.82" for 2YR event  
Inflow = 0.65 cfs @ 12.09 hrs, Volume= 0.069 af  
Outflow = 0.65 cfs @ 12.11 hrs, Volume= 0.069 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 3.95 fps, Min. Travel Time= 0.7 min  
Avg. Velocity = 1.43 fps, Avg. Travel Time= 2.0 min

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Type III 24-hr 2YR Rainfall=3.25"

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Peak Storage= 29 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.26'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.31 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 174.0' Slope= 0.0087 '/  
 Inlet Invert= 253.90', Outlet Invert= 252.39'



**Pond 1P: POND 1**

Inflow Area = 4.807 ac, Inflow Depth = 0.41" for 2YR event  
 Inflow = 1.19 cfs @ 12.13 hrs, Volume= 0.163 af  
 Outflow = 1.17 cfs @ 12.15 hrs, Volume= 0.163 af, Atten= 1%, Lag= 0.9 min  
 Discarded = 1.17 cfs @ 12.15 hrs, Volume= 0.163 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 249.83' @ 12.15 hrs Surf.Area= 0.098 ac Storage= 0.001 af

Plug-Flow detention time= 0.8 min calculated for 0.163 af (100% of inflow)  
 Center-of-Mass det. time= 0.8 min ( 894.4 - 893.6 )

| Volume | Invert  | Avail.Storage | Storage Description   |
|--------|---------|---------------|---|
| #1     | 249.80' | 0.144 af      | <b>27.30'W x 156.00'L x 5.50'H Prismatic</b><br>0.538 af Overall - 0.177 af Embedded = 0.361 af x 40.0% Voids |
| #2     | 251.05' | 0.177 af      | <b>48.0"D x 153.00'L Horizontal Cylinder</b> x 4 Inside #1  |
|        |         | 0.321 af      | Total Available Storage   |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 249.70' | <b>19.110 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0.000 ac |
| #2     | Primary   | 253.95' | <b>12.0" Vert. Orifice/Grate X 2.00</b> C= 0.600  |

**Discarded OutFlow** Max=1.88 cfs @ 12.15 hrs HW=249.83' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 1.88 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=249.80' (Free Discharge)  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Pond 2P: POND 2**

Inflow Area = 0.410 ac, Inflow Depth = 3.02" for 2YR event  
 Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.103 af  
 Outflow = 0.38 cfs @ 11.82 hrs, Volume= 0.103 af, Atten= 70%, Lag= 0.0 min  
 Discarded = 0.38 cfs @ 11.82 hrs, Volume= 0.103 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 248.70' @ 12.41 hrs Surf.Area= 1,092 sf Storage= 715 cf

Plug-Flow detention time= 8.4 min calculated for 0.103 af (100% of inflow)  
 Center-of-Mass det. time= 8.4 min ( 764.9 - 756.5 )

| Volume | Invert  | Avail.Storage | Storage Description  |
|--------|---------|---------------|--|
| #1     | 247.15' | 1,658 cf      | <b>27.30'W x 40.00'L x 5.50'H Prismatic</b><br>6,006 cf Overall - 1,860 cf Embedded = 4,146 cf x 40.0% Voids |
| #2     | 248.40' | 1,860 cf      | <b>48.0"D x 37.00'L Horizontal Cylinder</b> x 4 Inside #1  |
|        |         | 3,518 cf      | Total Available Storage  |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 247.10' | <b>15.200 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0 sf |
| #2     | Primary   | 251.30' | <b>12.0" Vert. Orifice/Grate X 3.00</b> C= 0.600  |

**Discarded OutFlow** Max=0.38 cfs @ 11.82 hrs HW=247.21' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 0.38 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=247.15' (Free Discharge)  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Pond 3P: POND 3**

Inflow Area = 3.554 ac, Inflow Depth = 0.61" for 2YR event  
 Inflow = 1.79 cfs @ 12.10 hrs, Volume= 0.180 af  
 Outflow = 1.11 cfs @ 12.04 hrs, Volume= 0.180 af, Atten= 38%, Lag= 0.0 min  
 Discarded = 1.11 cfs @ 12.04 hrs, Volume= 0.180 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 249.59' @ 12.22 hrs Surf.Area= 4,451 sf Storage= 346 cf

Plug-Flow detention time= 1.7 min calculated for 0.180 af (100% of inflow)  
 Center-of-Mass det. time= 1.7 min ( 850.1 - 848.4 )

| Volume | Invert  | Avail.Storage | Storage Description   |
|--------|---------|---------------|---|
| #1     | 249.40' | 4,601 cf      | <b>41.50'W x 107.26'L x 4.20'H Prismatic</b><br>18,695 cf Overall - 7,193 cf Embedded = 11,502 cf x 40.0% Voids |
| #2     | 250.60' | 7,193 cf      | <b>60.0"W x 36.0"H x 3.67'L Parabolic Arch</b> x 196 Inside #1  |
|        |         | 11,794 cf     | Total Available Storage   |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 249.30' | <b>10.800 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0 sf |
| #2     | Primary   | 252.25' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600   |

**Discarded OutFlow** Max=1.11 cfs @ 12.04 hrs HW=249.45' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 1.11 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=249.40' (Free Discharge)

↑2=Orifice/Grate ( Controls 0.00 cfs)

### Link 1L: COMBINE HYDROGRAPHS

Inflow Area = 11.151 ac, Inflow Depth = 0.00" for 2YR event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

## 10 YR POST-DEVELOPMENT

**Subcatchment 1S: CB1**

Runoff = 0.66 cfs @ 12.11 hrs, Volume= 0.056 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 9,043     | 98 | Paved parking & roofs         |
| 18,146    | 39 | >75% Grass cover, Good, HSG A |
| 27,189    | 59 | Weighted Average              |
| 18,146    |    | Pervious Area                 |
| 9,043     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.3      | 79            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.3      | 79            | Total         |                   |                |  |

**Subcatchment 2S: CB2**

Runoff = 0.25 cfs @ 12.12 hrs, Volume= 0.025 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,842     | 98 | Paved parking & roofs         |
| 7,887     | 39 | >75% Grass cover, Good, HSG A |
| 3,942     | 30 | Woods, Good, HSG A            |
| 16,671    | 54 | Weighted Average              |
| 11,829    |    | Pervious Area                 |
| 4,842     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.1      | 48            | 0.1670        | 0.16              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 0.1      | 18            | 0.2220        | 2.36              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.2      | 22            | 0.0900        | 2.10              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.1      | 12            | 0.0420        | 1.43              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 70            | 0.0200        | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.1      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.2      | 48            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.2      | 218           | Total         |                   |                |  |

**Subcatchment 3S: CB3**

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 0.052 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,157     | 98 | Paved parking & roofs         |
| 3,103     | 39 | >75% Grass cover, Good, HSG A |
| 10,260    | 80 | Weighted Average              |
| 3,103     |    | Pervious Area                 |
| 7,157     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.0      | 10            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 10            | Total         |                   |                |  |

**Subcatchment 4S: CB4**

Runoff = 0.53 cfs @ 12.08 hrs, Volume= 0.043 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 5,055     | 98 | Paved parking & roofs |
| 5,055     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.1      | 25            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 25            | Total         |                   |                |  |

**Subcatchment 5S: CB5**

Runoff = 0.52 cfs @ 12.11 hrs, Volume= 0.042 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,816     | 98 | Paved parking & roofs         |
| 2,985     | 39 | >75% Grass cover, Good, HSG A |
| 6,808     | 30 | Woods, Good, HSG A            |
| 17,609    | 62 | Weighted Average              |
| 9,793     |    | Pervious Area                 |
| 7,816     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.0      | 50            | 0.1830        | 0.17              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 0.7      | 92            | 0.1830        | 2.14              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.4      | 45            | 0.1360        | 1.84              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.0      | 10            | 1.0000        | 7.00              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 72            | 0.0200        | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.3      | 60            | 0.0320        | 3.63              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.1      | 30            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.9      | 359           | Total         |                   |                |  |

**Subcatchment 6S: CB6**

Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.091 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

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Type III 24-hr 10YR Rainfall=4.70"

Prepared by United Consultants, Inc.

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| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 10,637    | 98 | Paved parking & roofs |
| 10,637    |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.4      | 122           | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.4      | 122           | Total         |                   |                |  |

**Subcatchment 7S: CB7**

Runoff = 0.76 cfs @ 12.08 hrs, Volume= 0.062 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 7,209     | 98 | Paved parking & roofs |
| 7,209     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.0      | 12            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 12            | Total         |                   |                |  |

**Subcatchment 8S: CB8**

Runoff = 0.52 cfs @ 12.16 hrs, Volume= 0.056 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 11,699    | 98 | Paved parking & roofs         |
| 8,994     | 39 | >75% Grass cover, Good, HSG A |
| 14,308    | 30 | Woods, Good, HSG A            |
| 35,001    | 55 | Weighted Average              |
| 23,302    |    | Pervious Area                 |
| 11,699    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.4      | 50            | 0.1540        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 2.1      | 248           | 0.1540        | 1.96              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.0      | 10            | 1.0000        | 7.00              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 1.2      | 73            | 0.0210        | 1.01              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 77            | 0.0270        | 3.34              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.4      | 99            | 0.0080        | 4.40              | 3.45           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 9.5      | 557           | Total         |                   |                |  |

**Subcatchment 9S: CB9**

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.076 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 8,898     | 98 | Paved parking & roofs |
| 8,898     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.0      |               |               |                   |                | <b>Direct Entry, M IN. TC</b>   |
| 0.0      | 9             | 0.0400        | 11.79             | 9.26           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 6.0      | 9             | Total         |                   |                |   |

**Subcatchment 10S: CB10**

Runoff = 0.72 cfs @ 12.10 hrs, Volume= 0.056 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 10,611    | 98 | Paved parking & roofs         |
| 1,709     | 39 | >75% Grass cover, Good, HSG A |
| 9,781     | 30 | Woods, Good, HSG A            |
| 22,101    | 63 | Weighted Average              |
| 11,490    |    | Pervious Area                 |
| 10,611    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.0      | 17            | 0.0400        | 9.83              | 7.72           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 17            | Total         |                   |                |  |

**Subcatchment 11S: TR11**

Runoff = 1.11 cfs @ 12.12 hrs, Volume= 0.098 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 18,017    | 98 | Paved parking & roofs         |
| 25,172    | 39 | >75% Grass cover, Good, HSG A |
| 7,847     | 30 | Woods, Good, HSG A            |
| 51,036    | 58 | Weighted Average              |
| 33,019    |    | Pervious Area                 |
| 18,017    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 4.9      | 50            | 0.2020        | 0.17              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"  |
| 0.2      | 31            | 0.2020        | 2.25              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.2      | 30            | 0.1610        | 2.81              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 16            | 0.1250        | 2.47              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 15            | 0.0590        | 3.64              |                | <b>Shallow Concentrated Flow,</b><br>Grassed Waterway Kv= 15.0 fps  |
| 0.3      | 19            | 0.0590        | 1.21              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.1      | 19            | 0.3160        | 2.81              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.2      | 10            | 0.0100        | 0.70              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.0      | 7             | 0.1420        | 2.64              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.0      | 246           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe), TRENCH DRAIN 11</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.1      | 443           | Total         |                   |                |   |

**Subcatchment 12S: TR12**

Runoff = 0.78 cfs @ 12.14 hrs, Volume= 0.097 af, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 21,540    | 98 | Paved parking & roofs         |
| 27,521    | 39 | >75% Grass cover, Good, HSG A |
| 32,521    | 30 | Woods, Good, HSG A            |
| 81,582    | 51 | Weighted Average              |
| 60,042    |    | Pervious Area                 |
| 21,540    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | Direct Entry, MIN. TC.   |
| 1.1      | 274           | 0.0050        | 4.17              | 3.28           | Circular Channel (pipe),<br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.1      | 274           | Total         |                   |                |  |

**Subcatchment 13S: TR13**

Runoff = 0.68 cfs @ 12.14 hrs, Volume= 0.084 af, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 19,790    | 98 | Paved parking & roofs         |
| 14,429    | 39 | >75% Grass cover, Good, HSG A |
| 36,229    | 30 | Woods, Good, HSG A            |
| 70,448    | 51 | Weighted Average              |
| 50,658    |    | Pervious Area                 |
| 19,790    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 2.8      | 50            | 0.1170        | 0.30              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.3      | 48            | 0.1170        | 2.39              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.8      | 185           | 0.1170        | 1.71              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.0      | 9             | 0.2220        | 3.30              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 18            | 0.1000        | 2.21              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>   |
| 1.0      | 250           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.0      | 560           | Total         |                   |                |   |

**Subcatchment 14S: CB14**

Runoff = 1.55 cfs @ 12.09 hrs, Volume= 0.112 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,656    | 98 | Paved parking & roofs         |
| 3,692     | 39 | >75% Grass cover, Good, HSG A |
| 18,348    | 86 | Weighted Average              |
| 3,692     |    | Pervious Area                 |
| 14,656    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.1      | 18            | 0.0140        | 5.81              | 4.57           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 18            | Total         |                   |                |  |

**Subcatchment 17S: S17**

Runoff = 0.00 cfs @ 23.00 hrs, Volume= 0.002 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

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Type III 24-hr 10YR Rainfall=4.70"

Prepared by United Consultants, Inc.

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| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 21,239    | 39 | >75% Grass cover, Good, HSG A |
| 67,689    | 30 | Woods, Good, HSG A            |
| 88,928    | 32 | Weighted Average              |
| 88,928    |    | Pervious Area                 |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 11.1     | 50            | 0.0254        | 0.07              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25" |
| 0.3      | 13            | 0.0254        | 0.80              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.5      | 74            | 0.2160        | 2.32              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.7      | 49            | 0.0510        | 1.13              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 12.6     | 186           | Total         |                   |                |  |

**Subcatchment 18S: S18**

Runoff = 0.00 cfs @ 21.56 hrs, Volume= 0.001 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR Rainfall=4.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,448     | 39 | >75% Grass cover, Good, HSG A |
| 10,309    | 30 | Woods, Good, HSG A            |
| 14,757    | 33 | Weighted Average              |
| 14,757    |    | Pervious Area                 |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.6      | 13            | 0.3080        | 0.34              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 1.2      | 17            | 0.1180        | 0.24              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.4      | 4             | 0.5000        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"  |
| 0.5      | 16            | 0.7690        | 0.51              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.1      | 57            | 0.8770        | 6.56              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 3.2      |               |               |                   |                | <b>Direct Entry, Min TC</b>   |
| 0.1      | 44            | 0.0250        | 7.77              | 6.10           | <b>Circular Channel (pipe), XCB1-XDMH1</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 151           | Total         |                   |                |   |

**Reach 1R: DMH1 - DMH3**

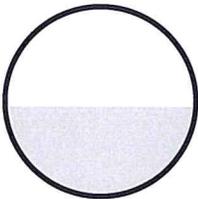
[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.242 ac, Inflow Depth = 1.28" for 10YR event  
Inflow = 1.62 cfs @ 12.10 hrs, Volume= 0.132 af  
Outflow = 1.62 cfs @ 12.11 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.40 fps, Min. Travel Time= 0.3 min  
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.9 min

Peak Storage= 32 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.48'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.54 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 87.0' Slope= 0.0084 '/  
Inlet Invert= 255.08', Outlet Invert= 254.35'



**Reach 2R: DMH 5-DMH6**

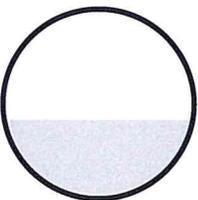
[52] Hint: Inlet conditions not evaluated  
[61] Hint: Submerged 24% of Reach 4R bottom

Inflow Area = 3.449 ac, Inflow Depth = 0.83" for 10YR event  
Inflow = 2.38 cfs @ 12.13 hrs, Volume= 0.238 af  
Outflow = 2.37 cfs @ 12.14 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.94 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 2.20 fps, Avg. Travel Time= 0.5 min

Peak Storage= 35 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.52'  
Bank-Full Depth= 1.25', Capacity at Bank-Full= 6.62 cfs

15.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
Length= 72.5' Slope= 0.0062 '/  
Inlet Invert= 254.60', Outlet Invert= 254.15'



**Reach 3R: DMH3-HEADER**

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 50% of Reach 1R bottom

Inflow Area = 1.358 ac, Inflow Depth = 1.55" for 10YR event  
 Inflow = 2.13 cfs @ 12.10 hrs, Volume= 0.175 af  
 Outflow = 2.13 cfs @ 12.11 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 6.00 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.92 fps, Avg. Travel Time= 0.2 min

Peak Storage= 10 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.46'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.88 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 27.0' Slope= 0.0111 '/'  
 Inlet Invert= 254.25', Outlet Invert= 253.95'



**Reach 4R: DMH4 DMH5**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 3.044 ac, Inflow Depth = 0.77" for 10YR event  
 Inflow = 1.87 cfs @ 12.13 hrs, Volume= 0.196 af  
 Outflow = 1.87 cfs @ 12.14 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 6.30 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.91 fps, Avg. Travel Time= 0.5 min

Peak Storage= 26 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.46 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 88.0' Slope= 0.0200 '/'  
 Inlet Invert= 256.46', Outlet Invert= 254.70'



**Reach 6R: DMH6 MANIFOLD**

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 84% of Reach 2R bottom

Inflow Area = 3.449 ac, Inflow Depth = 0.83" for 10YR event  
 Inflow = 2.37 cfs @ 12.14 hrs, Volume= 0.238 af  
 Outflow = 2.37 cfs @ 12.14 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 5.51 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 2.44 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.48'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 7.67 cfs

15.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 12.0' Slope= 0.0083 '/'  
 Inlet Invert= 254.05', Outlet Invert= 253.95'



**Reach 8R: CB6-MANIFOLD**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.244 ac, Inflow Depth = 4.46" for 10YR event  
 Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.091 af  
 Outflow = 1.11 cfs @ 12.09 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 4.24 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.41 fps, Avg. Travel Time= 0.4 min

Peak Storage= 8 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.37'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 30.0' Slope= 0.0100 '/'  
 Inlet Invert= 251.60', Outlet Invert= 251.30'



**Reach 9R: DMH9 DMH10**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.617 ac, Inflow Depth = 0.62" for 10YR event  
Inflow = 0.68 cfs @ 12.14 hrs, Volume= 0.084 af  
Outflow = 0.68 cfs @ 12.15 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 5.84 fps, Min. Travel Time= 0.3 min  
Avg. Velocity = 2.85 fps, Avg. Travel Time= 0.7 min

Peak Storage= 14 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.21'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.35 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 119.0' Slope= 0.0362 '/  
Inlet Invert= 256.56', Outlet Invert= 252.25'



**Reach 10R: DMH10 POND3**

[52] Hint: Inlet conditions not evaluated  
[61] Hint: Submerged 11% of Reach 9R bottom  
[61] Hint: Submerged 21% of Reach 14R bottom

Inflow Area = 2.625 ac, Inflow Depth = 0.99" for 10YR event  
Inflow = 1.99 cfs @ 12.14 hrs, Volume= 0.216 af  
Outflow = 1.99 cfs @ 12.14 hrs, Volume= 0.216 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 6.40 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 2.28 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.42'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.46 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 2.0' Slope= 0.0200 '/  
Inlet Invert= 252.29', Outlet Invert= 252.25'



**Reach 11R: DMH11-FES**

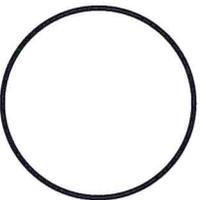
[52] Hint: Inlet conditions not evaluated

Inflow Area = 4.807 ac, Inflow Depth = 0.00" for 10YR event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.63 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 28.0' Slope= 0.0500 '/  
Inlet Invert= 247.40', Outlet Invert= 246.00'



**Reach 12R: DMH12-PIPE END**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.410 ac, Inflow Depth = 0.00" for 10YR event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 20.0' Slope= 0.0400 '/  
Inlet Invert= 244.80', Outlet Invert= 244.00'



**Reach 13R: DMH13-PIPE END**

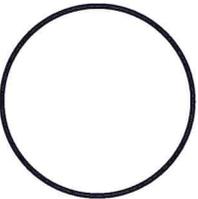
[52] Hint: Inlet conditions not evaluated

Inflow Area = 3.554 ac, Inflow Depth = 0.00" for 10YR event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 19.0' Slope= 0.0400 '/  
Inlet Invert= 246.76', Outlet Invert= 246.00'



**Reach 14R: DMH8-DMH10**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.008 ac, Inflow Depth = 1.57" for 10YR event  
Inflow = 1.34 cfs @ 12.11 hrs, Volume= 0.132 af  
Outflow = 1.34 cfs @ 12.12 hrs, Volume= 0.132 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.84 fps, Min. Travel Time= 0.6 min  
Avg. Velocity = 1.69 fps, Avg. Travel Time= 1.7 min

**UC1502-POST-mod-6-2024**

Type III 24-hr 10YR Rainfall=4.70"

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Peak Storage= 48 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.38'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.31 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 174.0' Slope= 0.0087 '/'  
 Inlet Invert= 253.90', Outlet Invert= 252.39'



**Pond 1P: POND 1**

Inflow Area = 4.807 ac, Inflow Depth = 1.03" for 10YR event  
 Inflow = 4.41 cfs @ 12.12 hrs, Volume= 0.413 af  
 Outflow = 1.88 cfs @ 12.03 hrs, Volume= 0.413 af, Atten= 57%, Lag= 0.0 min  
 Discarded = 1.88 cfs @ 12.03 hrs, Volume= 0.413 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 250.95' @ 12.47 hrs Surf.Area= 0.098 ac Storage= 0.045 af

Plug-Flow detention time= 4.7 min calculated for 0.413 af (100% of inflow)  
 Center-of-Mass det. time= 4.7 min ( 877.7 - 873.0 )

| Volume | Invert  | Avail.Storage | Storage Description   |
|--------|---------|---------------|---|
| #1     | 249.80' | 0.144 af      | <b>27.30'W x 156.00'L x 5.50'H Prismatic</b><br>0.538 af Overall - 0.177 af Embedded = 0.361 af x 40.0% Voids |
| #2     | 251.05' | 0.177 af      | <b>48.0"D x 153.00'L Horizontal Cylinder x 4 Inside #1</b>  |
|        |         | 0.321 af      | Total Available Storage   |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 249.70' | <b>19.110 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0.000 ac |
| #2     | Primary   | 253.95' | <b>12.0" Vert. Orifice/Grate X 2.00 C= 0.600</b>  |

**Discarded OutFlow** Max=1.88 cfs @ 12.03 hrs HW=249.86' (Free Discharge)  
 ↳ **1=Exfiltration** (Exfiltration Controls 1.88 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=249.80' (Free Discharge)  
 ↳ **2=Orifice/Grate** ( Controls 0.00 cfs)

**Pond 2P: POND 2**

Inflow Area = 0.410 ac, Inflow Depth = 4.46" for 10YR event  
 Inflow = 1.86 cfs @ 12.09 hrs, Volume= 0.152 af  
 Outflow = 0.38 cfs @ 11.71 hrs, Volume= 0.152 af, Atten= 79%, Lag= 0.0 min  
 Discarded = 0.38 cfs @ 11.71 hrs, Volume= 0.152 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 249.77' @ 12.51 hrs Surf.Area= 1,092 sf Storage= 1,480 cf

Plug-Flow detention time= 19.0 min calculated for 0.152 af (100% of inflow)  
 Center-of-Mass det. time= 19.0 min ( 768.5 - 749.5 )

| Volume | Invert  | Avail.Storage | Storage Description  |
|--------|---------|---------------|--|
| #1     | 247.15' | 1,658 cf      | <b>27.30'W x 40.00'L x 5.50'H Prismatic</b><br>6,006 cf Overall - 1,860 cf Embedded = 4,146 cf x 40.0% Voids |
| #2     | 248.40' | 1,860 cf      | <b>48.0"D x 37.00'L Horizontal Cylinder</b> x 4 Inside #1  |
|        |         | 3,518 cf      | Total Available Storage  |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 247.10' | <b>15.200 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0 sf |
| #2     | Primary   | 251.30' | <b>12.0" Vert. Orifice/Grate X 3.00</b> C= 0.600  |

**Discarded OutFlow** Max=0.38 cfs @ 11.71 hrs HW=247.21' (Free Discharge)  
 ↑**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=247.15' (Free Discharge)  
 ↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**Pond 3P: POND 3**

Inflow Area = 3.554 ac, Inflow Depth = 1.30" for 10YR event  
 Inflow = 4.13 cfs @ 12.11 hrs, Volume= 0.384 af  
 Outflow = 1.11 cfs @ 11.93 hrs, Volume= 0.384 af, Atten= 73%, Lag= 0.0 min  
 Discarded = 1.11 cfs @ 11.93 hrs, Volume= 0.384 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 250.83' @ 12.56 hrs Surf.Area= 4,451 sf Storage= 3,020 cf

Plug-Flow detention time= 14.0 min calculated for 0.384 af (100% of inflow)  
 Center-of-Mass det. time= 14.0 min ( 857.9 - 843.9 )

| Volume | Invert  | Avail.Storage | Storage Description   |
|--------|---------|---------------|---|
| #1     | 249.40' | 4,601 cf      | <b>41.50'W x 107.26'L x 4.20'H Prismatic</b><br>18,695 cf Overall - 7,193 cf Embedded = 11,502 cf x 40.0% Voids |
| #2     | 250.60' | 7,193 cf      | <b>60.0"W x 36.0"H x 3.67'L Parabolic Arch</b> x 196 Inside #1  |
|        |         | 11,794 cf     | Total Available Storage   |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 249.30' | <b>10.800 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0 sf |
| #2     | Primary   | 252.25' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600   |

**Discarded OutFlow** Max=1.11 cfs @ 11.93 hrs HW=249.44' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 1.11 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=249.40' (Free Discharge)  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Link 1L: COMBINE HYDROGRAPHS**

Inflow Area = 11.151 ac, Inflow Depth = 0.00" for 10YR event  
 Inflow = 0.00 cfs @ 22.75 hrs, Volume= 0.002 af  
 Primary = 0.00 cfs @ 22.75 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

# 100 YR POST-DEVELOPMENT

**Subcatchment 1S: CB1**

Runoff = 1.65 cfs @ 12.10 hrs, Volume= 0.123 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 9,043     | 98 | Paved parking & roofs         |
| 18,146    | 39 | >75% Grass cover, Good, HSG A |
| 27,189    | 59 | Weighted Average              |
| 18,146    |    | Pervious Area                 |
| 9,043     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.0      |               |               |                   |                | Direct Entry, Min TC  |
| 0.3      | 79            | 0.0100        | 4.91              | 3.86           | Circular Channel (pipe),<br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.3      | 79            | Total         |                   |                |   |

**Subcatchment 2S: CB2**

Runoff = 0.78 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,842     | 98 | Paved parking & roofs         |
| 7,887     | 39 | >75% Grass cover, Good, HSG A |
| 3,942     | 30 | Woods, Good, HSG A            |
| 16,671    | 54 | Weighted Average              |
| 11,829    |    | Pervious Area                 |
| 4,842     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.1      | 48            | 0.1670        | 0.16              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 0.1      | 18            | 0.2220        | 2.36              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.2      | 22            | 0.0900        | 2.10              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.1      | 12            | 0.0420        | 1.43              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 70            | 0.0200        | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.1      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.2      | 48            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.2      | 218           | Total         |                   |                |  |

**Subcatchment 3S: CB3**

Runoff = 1.24 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,157     | 98 | Paved parking & roofs         |
| 3,103     | 39 | >75% Grass cover, Good, HSG A |
| 10,260    | 80 | Weighted Average              |
| 3,103     |    | Pervious Area                 |
| 7,157     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.0      | 10            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 10            | Total         |                   |                |  |

**Subcatchment 4S: CB4**

Runoff = 0.77 cfs @ 12.08 hrs, Volume= 0.063 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 5,055     | 98 | Paved parking & roofs |
| 5,055     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.1      | 25            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 25            | Total         |                   |                |  |

**Subcatchment 5S: CB5**

Runoff = 1.19 cfs @ 12.11 hrs, Volume= 0.089 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,816     | 98 | Paved parking & roofs         |
| 2,985     | 39 | >75% Grass cover, Good, HSG A |
| 6,808     | 30 | Woods, Good, HSG A            |
| 17,609    | 62 | Weighted Average              |
| 9,793     |    | Pervious Area                 |
| 7,816     |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.0      | 50            | 0.1830        | 0.17              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 0.7      | 92            | 0.1830        | 2.14              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.4      | 45            | 0.1360        | 1.84              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.0      | 10            | 1.0000        | 7.00              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 72            | 0.0200        | 2.87              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.3      | 60            | 0.0320        | 3.63              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.1      | 30            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.9      | 359           | Total         |                   |                |  |

**Subcatchment 6S: CB6**

Runoff = 1.61 cfs @ 12.09 hrs, Volume= 0.134 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

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Type III 24-hr 100YR Rainfall=6.80"

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| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 10,637    | 98 | Paved parking & roofs |
| 10,637    |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.4      | 122           | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.4      | 122           | Total         |                   |                |  |

**Subcatchment 7S: CB7**

Runoff = 1.10 cfs @ 12.08 hrs, Volume= 0.090 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 7,209     | 98 | Paved parking & roofs |
| 7,209     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>  |
| 0.0      | 12            | 0.0100        | 4.91              | 3.86           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 12            | Total         |                   |                |  |

**Subcatchment 8S: CB8**

Runoff = 1.54 cfs @ 12.15 hrs, Volume= 0.134 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 11,699    | 98 | Paved parking & roofs         |
| 8,994     | 39 | >75% Grass cover, Good, HSG A |
| 14,308    | 30 | Woods, Good, HSG A            |
| 35,001    | 55 | Weighted Average              |
| 23,302    |    | Pervious Area                 |
| 11,699    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.4      | 50            | 0.1540        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"   |
| 2.1      | 248           | 0.1540        | 1.96              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps  |
| 0.0      | 10            | 1.0000        | 7.00              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 1.2      | 73            | 0.0210        | 1.01              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 0.4      | 77            | 0.0270        | 3.34              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.4      | 99            | 0.0080        | 4.40              | 3.45           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 9.5      | 557           | Total         |                   |                |  |

**Subcatchment 9S: CB9**

Runoff = 1.36 cfs @ 12.08 hrs, Volume= 0.112 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description           |
|-----------|----|-----------------------|
| 8,898     | 98 | Paved parking & roofs |
| 8,898     |    | Impervious Area       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.0      |               |               |                   |                | <b>Direct Entry, M IN. TC</b>   |
| 0.0      | 9             | 0.0400        | 11.79             | 9.26           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 6.0      | 9             | Total         |                   |                |   |

**Subcatchment 10S: CB10**

Runoff = 1.61 cfs @ 12.09 hrs, Volume= 0.116 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 10,611    | 98 | Paved parking & roofs         |
| 1,709     | 39 | >75% Grass cover, Good, HSG A |
| 9,781     | 30 | Woods, Good, HSG A            |
| 22,101    | 63 | Weighted Average              |
| 11,490    |    | Pervious Area                 |
| 10,611    |    | Impervious Area               |

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Type III 24-hr 100YR Rainfall=6.80"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.0      | 17            | 0.0400        | 9.83              | 7.72           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.0      | 17            | Total         |                   |                |  |

**Subcatchment 11S: TR11**

Runoff = 2.86 cfs @ 12.11 hrs, Volume= 0.222 af, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 18,017    | 98 | Paved parking & roofs         |
| 25,172    | 39 | >75% Grass cover, Good, HSG A |
| 7,847     | 30 | Woods, Good, HSG A            |
| 51,036    | 58 | Weighted Average              |
| 33,019    |    | Pervious Area                 |
| 18,017    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 4.9      | 50            | 0.2020        | 0.17              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"  |
| 0.2      | 31            | 0.2020        | 2.25              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.2      | 30            | 0.1610        | 2.81              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 16            | 0.1250        | 2.47              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 15            | 0.0590        | 3.64              |                | <b>Shallow Concentrated Flow,</b><br>Grassed Waterway Kv= 15.0 fps  |
| 0.3      | 19            | 0.0590        | 1.21              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.1      | 19            | 0.3160        | 2.81              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.2      | 10            | 0.0100        | 0.70              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.0      | 7             | 0.1420        | 2.64              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.0      | 246           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe), TRENCH DRAIN 11</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.1      | 443           | Total         |                   |                |   |

**Subcatchment 12S: TR12**

Runoff = 3.03 cfs @ 12.12 hrs, Volume= 0.256 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 21,540    | 98 | Paved parking & roofs         |
| 27,521    | 39 | >75% Grass cover, Good, HSG A |
| 32,521    | 30 | Woods, Good, HSG A            |
| 81,582    | 51 | Weighted Average              |
| 60,042    |    | Pervious Area                 |
| 21,540    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC.</b>   |
| 1.1      | 274           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.1      | 274           | Total         |                   |                |   |

**Subcatchment 13S: TR13**

Runoff = 2.63 cfs @ 12.11 hrs, Volume= 0.221 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 19,790    | 98 | Paved parking & roofs         |
| 14,429    | 39 | >75% Grass cover, Good, HSG A |
| 36,229    | 30 | Woods, Good, HSG A            |
| 70,448    | 51 | Weighted Average              |
| 50,658    |    | Pervious Area                 |
| 19,790    |    | Impervious Area               |

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Type III 24-hr 100YR Rainfall=6.80"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 2.8      | 50            | 0.1170        | 0.30              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.3      | 48            | 0.1170        | 2.39              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.8      | 185           | 0.1170        | 1.71              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps   |
| 0.0      | 9             | 0.2220        | 3.30              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 0.1      | 18            | 0.1000        | 2.21              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 1.0      |               |               |                   |                | <b>Direct Entry, Min TC</b>   |
| 1.0      | 250           | 0.0050        | 4.17              | 3.28           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.010 PVC, smooth interior |
| 7.0      | 560           | Total         |                   |                |   |

**Subcatchment 14S: CB14**

Runoff = 2.47 cfs @ 12.09 hrs, Volume= 0.182 af, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,656    | 98 | Paved parking & roofs         |
| 3,692     | 39 | >75% Grass cover, Good, HSG A |
| 18,348    | 86 | Weighted Average              |
| 3,692     |    | Pervious Area                 |
| 14,656    |    | Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 6.0      |               |               |                   |                | <b>Direct Entry, MIN. TC</b>   |
| 0.1      | 18            | 0.0140        | 5.81              | 4.57           | <b>Circular Channel (pipe),</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 18            | Total         |                   |                |  |

**Subcatchment 17S: S17**

Runoff = 0.09 cfs @ 12.58 hrs, Volume= 0.046 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

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Type III 24-hr 100YR Rainfall=6.80"

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| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 21,239    | 39 | >75% Grass cover, Good, HSG A |
| 67,689    | 30 | Woods, Good, HSG A            |
| 88,928    | 32 | Weighted Average              |
| 88,928    |    | Pervious Area                 |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 11.1     | 50            | 0.0254        | 0.07              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25" |
| 0.3      | 13            | 0.0254        | 0.80              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.5      | 74            | 0.2160        | 2.32              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 0.7      | 49            | 0.0510        | 1.13              |                | <b>Shallow Concentrated Flow,</b><br>Woodland Kv= 5.0 fps        |
| 12.6     | 186           | Total         |                   |                |  |

**Subcatchment 18S: S18**

Runoff = 0.03 cfs @ 12.44 hrs, Volume= 0.009 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR Rainfall=6.80"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,448     | 39 | >75% Grass cover, Good, HSG A |
| 10,309    | 30 | Woods, Good, HSG A            |
| 14,757    | 33 | Weighted Average              |
| 14,757    |    | Pervious Area                 |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.6      | 13            | 0.3080        | 0.34              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 1.2      | 17            | 0.1180        | 0.24              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.4      | 4             | 0.5000        | 0.15              |                | <b>Sheet Flow,</b><br>Woods: Light underbrush n= 0.400 P2= 3.25"  |
| 0.5      | 16            | 0.7690        | 0.51              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.25"   |
| 0.1      | 57            | 0.8770        | 6.56              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 3.2      |               |               |                   |                | <b>Direct Entry, Min TC</b>   |
| 0.1      | 44            | 0.0250        | 7.77              | 6.10           | <b>Circular Channel (pipe), XCB1-XDMH1</b><br>Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.012 Concrete pipe, finished |
| 6.1      | 151           | Total         |                   |                |   |

**Reach 1R: DMH1 - DMH3**

[52] Hint: Inlet conditions not evaluated

[55] Hint: Peak inflow is 103% of Manning's capacity

|               |            |                |         |                                   |
|---------------|------------|----------------|---------|-----------------------------------|
| Inflow Area = | 1.242 ac,  | Inflow Depth = | 2.63"   | for 100YR event                   |
| Inflow =      | 3.65 cfs @ | 12.10 hrs,     | Volume= | 0.273 af                          |
| Outflow =     | 3.64 cfs @ | 12.11 hrs,     | Volume= | 0.273 af, Atten= 0%, Lag= 0.6 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 5.13 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 1.91 fps, Avg. Travel Time= 0.8 min

Peak Storage= 62 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.85'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.54 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 87.0' Slope= 0.0084 '/'  
 Inlet Invert= 255.08', Outlet Invert= 254.35'



**Reach 2R: DMH 5-DMH6**

[52] Hint: Inlet conditions not evaluated

[55] Hint: Peak inflow is 106% of Manning's capacity

[61] Hint: Submerged 58% of Reach 4R bottom

|               |            |                |         |                                   |
|---------------|------------|----------------|---------|-----------------------------------|
| Inflow Area = | 3.449 ac,  | Inflow Depth = | 1.98"   | for 100YR event                   |
| Inflow =      | 7.03 cfs @ | 12.12 hrs,     | Volume= | 0.568 af                          |
| Outflow =     | 7.02 cfs @ | 12.13 hrs,     | Volume= | 0.568 af, Atten= 0%, Lag= 0.5 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 6.15 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.63 fps, Avg. Travel Time= 0.5 min

Peak Storage= 84 cf @ 12.12 hrs, Average Depth at Peak Storage= 1.12'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 6.62 cfs

15.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 72.5' Slope= 0.0062 '/'  
 Inlet Invert= 254.60', Outlet Invert= 254.15'



**Reach 3R: DMH3-HEADER**

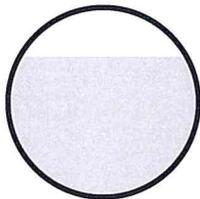
[52] Hint: Inlet conditions not evaluated  
 [61] Hint: Submerged 88% of Reach 1R bottom

Inflow Area = 1.358 ac, Inflow Depth = 2.97" for 100YR event  
 Inflow = 4.39 cfs @ 12.10 hrs, Volume= 0.336 af  
 Outflow = 4.38 cfs @ 12.10 hrs, Volume= 0.336 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 7.03 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.27 fps, Avg. Travel Time= 0.2 min

Peak Storage= 17 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.74'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.88 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 27.0' Slope= 0.01111 '/  
 Inlet Invert= 254.25', Outlet Invert= 253.95'



**Reach 4R: DMH4 DMH5**

[52] Hint: Inlet conditions not evaluated  
 [55] Hint: Peak inflow is 108% of Manning's capacity

Inflow Area = 3.044 ac, Inflow Depth = 1.89" for 100YR event  
 Inflow = 5.89 cfs @ 12.11 hrs, Volume= 0.478 af  
 Outflow = 5.86 cfs @ 12.12 hrs, Volume= 0.478 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 7.92 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.53 fps, Avg. Travel Time= 0.4 min

Peak Storage= 67 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.93'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.46 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 88.0' Slope= 0.0200 '/  
Inlet Invert= 256.46', Outlet Invert= 254.70'



**Reach 6R: DMH6 MANIFOLD**

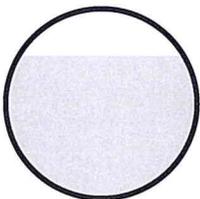
[52] Hint: Inlet conditions not evaluated  
[62] Warning: Submerged 31% of Reach 2R inlet

Inflow Area = 3.449 ac, Inflow Depth = 1.98" for 100YR event  
Inflow = 7.02 cfs @ 12.13 hrs, Volume= 0.568 af  
Outflow = 7.02 cfs @ 12.13 hrs, Volume= 0.568 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 7.08 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 2.93 fps, Avg. Travel Time= 0.1 min

Peak Storage= 12 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.94'  
Bank-Full Depth= 1.25', Capacity at Bank-Full= 7.67 cfs

15.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
Length= 12.0' Slope= 0.0083 '/  
Inlet Invert= 254.05', Outlet Invert= 253.95'



**Reach 8R: CB6-MANIFOLD**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.244 ac, Inflow Depth = 6.56" for 100YR event  
Inflow = 1.61 cfs @ 12.09 hrs, Volume= 0.134 af  
Outflow = 1.60 cfs @ 12.09 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 4.69 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 1.59 fps, Avg. Travel Time= 0.3 min

Peak Storage= 10 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.45'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 30.0' Slope= 0.0100 '/'  
Inlet Invert= 251.60', Outlet Invert= 251.30'



**Reach 9R: DMH9 DMH10**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 1.617 ac, Inflow Depth = 1.64" for 100YR event  
Inflow = 2.63 cfs @ 12.11 hrs, Volume= 0.221 af  
Outflow = 2.62 cfs @ 12.12 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 8.57 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 3.62 fps, Avg. Travel Time= 0.5 min

Peak Storage= 36 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.41'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.35 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 119.0' Slope= 0.0362 '/'  
Inlet Invert= 256.56', Outlet Invert= 252.25'



**Reach 10R: DMH10 POND3**

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 20% of Reach 9R bottom

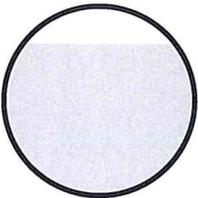
[61] Hint: Submerged 46% of Reach 14R bottom

Inflow Area = 2.625 ac, Inflow Depth = 2.13" for 100YR event  
Inflow = 5.35 cfs @ 12.12 hrs, Volume= 0.467 af  
Outflow = 5.35 cfs @ 12.12 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 7.92 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 2.73 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.80'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.46 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 2.0' Slope= 0.0200 '/'  
Inlet Invert= 252.29', Outlet Invert= 252.25'



**Reach 11R: DMH11-FES**

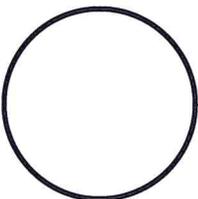
[52] Hint: Inlet conditions not evaluated

Inflow Area = 4.807 ac, Inflow Depth = 0.00" for 100YR event  
Inflow = 0.01 cfs @ 12.72 hrs, Volume= 0.000 af  
Outflow = 0.01 cfs @ 12.73 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 1.53 fps, Min. Travel Time= 0.3 min  
Avg. Velocity = 1.34 fps, Avg. Travel Time= 0.3 min

Peak Storage= 0 cf @ 12.73 hrs, Average Depth at Peak Storage= 0.02'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.63 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 28.0' Slope= 0.0500 '/'  
Inlet Invert= 247.40', Outlet Invert= 246.00'



**Reach 12R: DMH12-PIPE END**

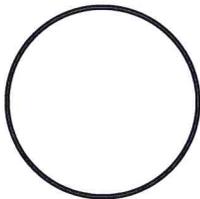
[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.410 ac, Inflow Depth = 0.00" for 100YR event  
Inflow = 0.01 cfs @ 12.58 hrs, Volume= 0.000 af  
Outflow = 0.01 cfs @ 12.59 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 1.71 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 1.43 fps, Avg. Travel Time= 0.2 min

Peak Storage= 0 cf @ 12.59 hrs, Average Depth at Peak Storage= 0.03'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 20.0' Slope= 0.0400 '/'  
Inlet Invert= 244.80', Outlet Invert= 244.00'



**Reach 13R: DMH13-PIPE END**

[52] Hint: Inlet conditions not evaluated

Inflow Area = 3.554 ac, Inflow Depth = 0.16" for 100YR event  
Inflow = 1.01 cfs @ 12.57 hrs, Volume= 0.048 af  
Outflow = 1.01 cfs @ 12.57 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Max. Velocity= 6.80 fps, Min. Travel Time= 0.0 min  
Avg. Velocity = 4.40 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.57 hrs, Average Depth at Peak Storage= 0.24'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 19.0' Slope= 0.0400 '/'  
Inlet Invert= 246.76', Outlet Invert= 246.00'



**Reach 14R: DMH8-DMH10**

[52] Hint: Inlet conditions not evaluated

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Type III 24-hr 100YR Rainfall=6.80"

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Inflow Area = 1.008 ac, Inflow Depth = 2.92" for 100YR event  
 Inflow = 2.74 cfs @ 12.11 hrs, Volume= 0.245 af  
 Outflow = 2.73 cfs @ 12.13 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Max. Velocity= 5.81 fps, Min. Travel Time= 0.5 min  
 Avg. Velocity = 1.98 fps, Avg. Travel Time= 1.5 min

Peak Storage= 82 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.58'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.31 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 174.0' Slope= 0.0087 '/'  
 Inlet Invert= 253.90', Outlet Invert= 252.39'



**Pond 1P: POND 1**

[61] Hint: Submerged 7% of Reach 3R bottom  
 [61] Hint: Submerged 20% of Reach 6R bottom

Inflow Area = 4.807 ac, Inflow Depth = 2.26" for 100YR event  
 Inflow = 11.31 cfs @ 12.12 hrs, Volume= 0.904 af  
 Outflow = 1.89 cfs @ 12.72 hrs, Volume= 0.904 af, Atten= 83%, Lag= 36.4 min  
 Discarded = 1.88 cfs @ 11.83 hrs, Volume= 0.904 af  
 Primary = 0.01 cfs @ 12.72 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 253.97' @ 12.72 hrs Surf.Area= 0.098 ac Storage= 0.246 af

Plug-Flow detention time= 40.1 min calculated for 0.904 af (100% of inflow)  
 Center-of-Mass det. time= 40.1 min ( 893.7 - 853.6 )

| Volume | Invert  | Avail.Storage | Storage Description  |
|--------|---------|---------------|--|
| #1     | 249.80' | 0.144 af      | <b>27.30'W x 156.00'L x 5.50'H Prismaticoid</b><br>0.538 af Overall - 0.177 af Embedded = 0.361 af x 40.0% Voids |
| #2     | 251.05' | 0.177 af      | <b>48.0"D x 153.00'L Horizontal Cylinder x 4 Inside #1</b>   |
|        |         | 0.321 af      | Total Available Storage  |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 249.70' | <b>19.110 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0.000 ac |
| #2     | Primary   | 253.95' | <b>12.0" Vert. Orifice/Grate X 2.00 C= 0.600</b>  |

**Discarded OutFlow** Max=1.88 cfs @ 11.83 hrs HW=249.86' (Free Discharge)  
 ↖1=Exfiltration (Exfiltration Controls 1.88 cfs)

**Primary OutFlow** Max=0.00 cfs @ 12.72 hrs HW=253.97' (Free Discharge)  
 ↖2=Orifice/Grate (Orifice Controls 0.00 cfs @ 0.48 fps)

**Pond 2P: POND 2**

[61] Hint: Submerged 8% of Reach 8R bottom

Inflow Area = 0.410 ac, Inflow Depth = 6.56" for 100YR event  
 Inflow = 2.71 cfs @ 12.09 hrs, Volume= 0.224 af  
 Outflow = 0.39 cfs @ 12.58 hrs, Volume= 0.224 af, Atten= 85%, Lag= 29.7 min  
 Discarded = 0.38 cfs @ 11.63 hrs, Volume= 0.224 af  
 Primary = 0.01 cfs @ 12.58 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 251.32' @ 12.58 hrs Surf.Area= 1,092 sf Storage= 2,698 cf

Plug-Flow detention time= 39.5 min calculated for 0.224 af (100% of inflow)  
 Center-of-Mass det. time= 39.5 min ( 783.3 - 743.8 )

| Volume | Invert  | Avail.Storage | Storage Description  |
|--------|---------|---------------|--|
| #1     | 247.15' | 1,658 cf      | <b>27.30'W x 40.00'L x 5.50'H Prismatic</b><br>6,006 cf Overall - 1,860 cf Embedded = 4,146 cf x 40.0% Voids |
| #2     | 248.40' | 1,860 cf      | <b>48.0"D x 37.00'L Horizontal Cylinder</b> x 4 Inside #1  |
|        |         | 3,518 cf      | Total Available Storage  |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 247.10' | <b>15.200 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0 sf |
| #2     | Primary   | 251.30' | <b>12.0" Vert. Orifice/Grate X 3.00</b> C= 0.600  |

**Discarded OutFlow** Max=0.38 cfs @ 11.63 hrs HW=247.21' (Free Discharge)  
 ↖1=Exfiltration (Exfiltration Controls 0.38 cfs)

**Primary OutFlow** Max=0.01 cfs @ 12.58 hrs HW=251.32' (Free Discharge)  
 ↖2=Orifice/Grate (Orifice Controls 0.01 cfs @ 0.53 fps)

**Pond 3P: POND 3**

[63] Warning: Exceeded Reach 10R inflow depth by 0.15' @ 12.64 hrs

Inflow Area = 3.554 ac, Inflow Depth = 2.58" for 100YR event  
 Inflow = 9.22 cfs @ 12.11 hrs, Volume= 0.765 af  
 Outflow = 2.12 cfs @ 12.57 hrs, Volume= 0.765 af, Atten= 77%, Lag= 27.9 min  
 Discarded = 1.11 cfs @ 11.72 hrs, Volume= 0.717 af  
 Primary = 1.01 cfs @ 12.57 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

**UC1502-POST-mod-6-2024**

Type III 24-hr 100YR Rainfall=6.80"

Prepared by United Consultants, Inc.

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Peak Elev= 252.77' @ 12.57 hrs Surf.Area= 4,451 sf Storage= 9,686 cf

Plug-Flow detention time= 58.5 min calculated for 0.765 af (100% of inflow)

Center-of-Mass det. time= 58.5 min ( 892.5 - 834.0 )

| Volume | Invert  | Avail.Storage | Storage Description   |
|--------|---------|---------------|---|
| #1     | 249.40' | 4,601 cf      | <b>41.50'W x 107.26'L x 4.20'H Prismaoid</b><br>18,695 cf Overall - 7,193 cf Embedded = 11,502 cf x 40.0% Voids |
| #2     | 250.60' | 7,193 cf      | <b>60.0"W x 36.0"H x 3.67'L Parabolic Arch</b> x 196 Inside #1  |
|        |         | 11,794 cf     | Total Available Storage   |

| Device | Routing   | Invert  | Outlet Devices  |
|--------|-----------|---------|---|
| #1     | Discarded | 249.30' | <b>10.800 in/hr Exfiltration over Surface area above invert</b><br>Excluded Surface area = 0 sf |
| #2     | Primary   | 252.25' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600   |

**Discarded OutFlow** Max=1.11 cfs @ 11.72 hrs HW=249.44' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 1.11 cfs)**Primary OutFlow** Max=1.01 cfs @ 12.57 hrs HW=252.77' (Free Discharge)↳ **2=Orifice/Grate** (Orifice Controls 1.01 cfs @ 2.45 fps)**Link 1L: COMBINE HYDROGRAPHS**

Inflow Area = 11.151 ac, Inflow Depth = 0.11" for 100YR event  
 Inflow = 1.13 cfs @ 12.57 hrs, Volume= 0.103 af  
 Primary = 1.13 cfs @ 12.57 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

## APPENDIX E



# CULTEC Recharger® 360HD Stormwater Chamber

The Recharger® 360HD is a 36" (914 mm) tall, high capacity chamber. Typically when using this model, fewer chambers are required resulting in less labor and a smaller installation area. The Recharger® 360HD has the side portal internal manifold feature. HVLV® FC-48 Feed Connectors are inserted into the side portals to create the internal manifold.



Recharger 360HD Chamber



Recharger 360HD End Cap

| Recharger 360HD Chamber                                 |   |
|---|---|
| Size (L x W x H)  | 4.17' x 60" x 36"<br>1.27 m x 1525 mm x 914 mm            |
| Installed Length  | 3.67'   |
|   | 1.12 m  |
| Length Adjustment per Row - with two end caps installed | 2.5'  |
|   | 0.76 m  |
| Length Adjustment per Row - when not using end caps     | 0.5'  |
|   | 0.15 m  |
| Chamber Storage   | 10.00 ft <sup>3</sup> /ft                                 |
|   | 0.929 m <sup>3</sup> /m                                   |
|   | 36.66 ft <sup>3</sup> /unit<br>1.038 m <sup>3</sup> /unit |
| Min. Installed Storage                                  | 15.199 ft <sup>3</sup> /ft                                |
|   | 1.412 m <sup>3</sup> /m                                   |
|   | 55.73 ft <sup>3</sup> /unit<br>1.58 m <sup>3</sup> /unit  |
| Min. Area Required                                      | 21.08 ft <sup>2</sup>                                     |
|   | 1.96 m <sup>2</sup>                                       |
| Chamber Weight  | 57.0 lbs  |
|   | 25.85 kg  |
| Shipping  | 20 chambers/skid  |
|   | 1,265 lbs/skid  |
|   | 11 skids/48' flatbed                                      |
| Min. Center-to-Center Spacing                           | 5.75'   |
|   | 1.75 m  |
| Max. Allowable Cover                                    | 12'   |
|   | 3.66 m  |
| Max. Allowable O.D. in Side Portal                      | 10" HDPE, 12" PVC   |
|   | 250 mm HDPE, 300 mm PVC                                   |
| Compatible Feed Connector                               | HVLV FC-48 Feed Connector                                 |

Calculations are based on installed chamber length.  
All above values are nominal.  
Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 5.75' (1.75 m) center-to-center spacing.

|                                       | Stone Foundation Depth                       |  |  |
|---------------------------------------|--|--|--|
|                                       | 6"<br>152 mm                                 | 12"<br>305 mm                                | 18"<br>457 mm                                |
| Chamber and Stone Storage Per Chamber | 55.73 ft <sup>3</sup><br>1.58 m <sup>3</sup> | 59.95 ft <sup>3</sup><br>1.70 m <sup>3</sup> | 64.17 ft <sup>3</sup><br>1.82 m <sup>3</sup> |
| Min. Effective Depth                  | 4.00'<br>1.22 m                              | 4.50'<br>1.37 m                              | 5.0'<br>1.52 m                               |
| Stone Required Per Chamber            | 1.77 yd <sup>3</sup><br>1.35 m <sup>3</sup>  | 2.16 yd <sup>3</sup><br>1.65 m <sup>3</sup>  | 2.55 yd <sup>3</sup><br>1.95 m <sup>3</sup>  |

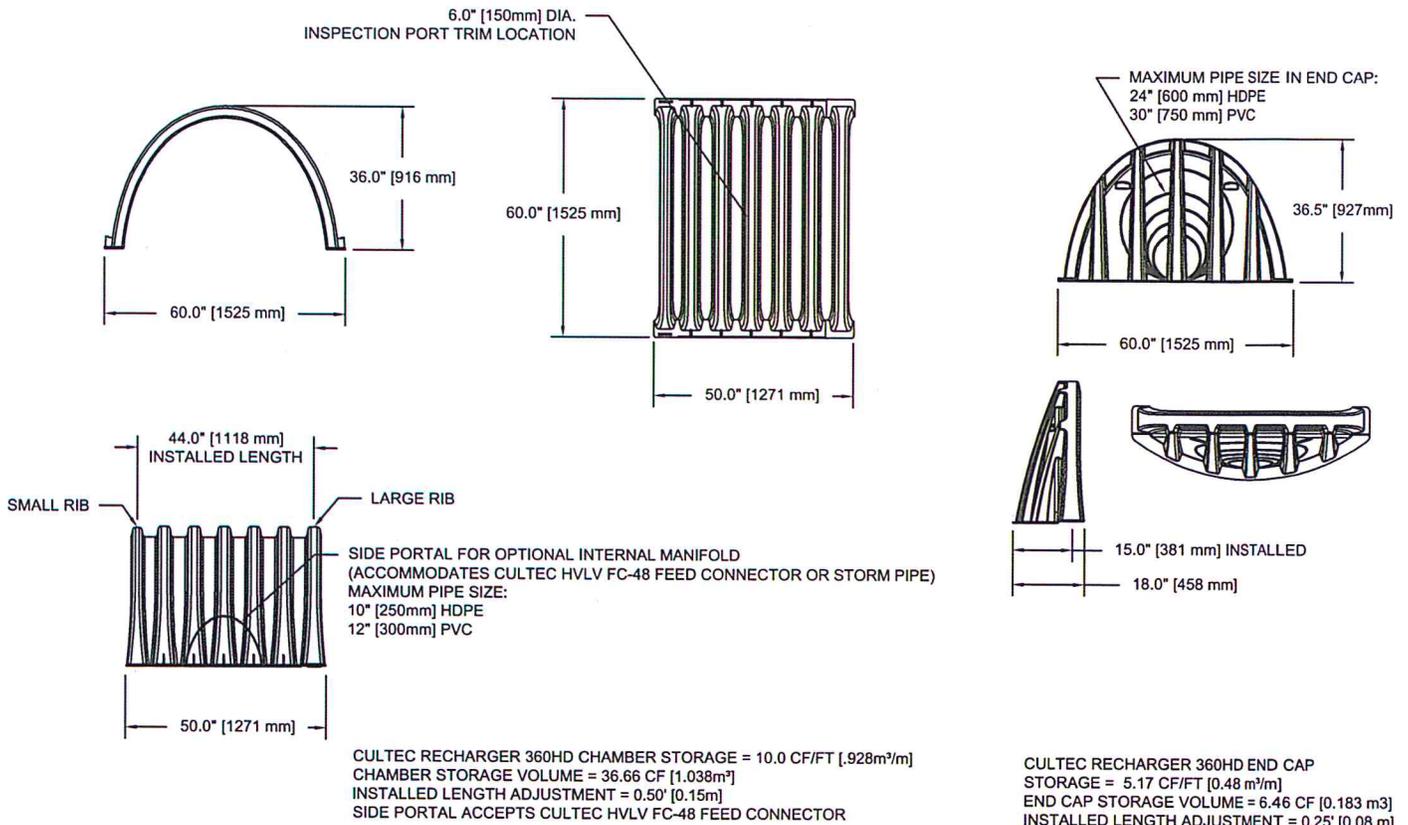
| Recharger 360HD End Cap       |  |
|-------------------------------|--|
| Size (L x W x H)              | 18" x 60" x 36.5"<br>458 mm x 1525 mm x 927 mm                                       |
| Installed Length              | 15"  |
|                               | 381 mm   |
| End Cap Storage               | 5.17 ft <sup>3</sup> /ft   |
|                               | 0.48 m <sup>3</sup> /m   |
|                               | 6.46 ft <sup>3</sup> /unit (interlocked)<br>0.183 m <sup>3</sup> /unit (interlocked) |
| Min. Installed Storage        | 12.40 ft <sup>3</sup> /ft  |
|                               | 1.15 m <sup>3</sup> /m   |
|                               | 15.50 ft <sup>3</sup> /unit<br>0.44 m <sup>3</sup> /unit                             |
| End Cap Weight                | 22.0 lbs   |
|                               | 9.98 kg  |
| Shipping                      | 20 end caps/skid   |
|                               | 565 lbs/skid   |
|                               | 11 skids/48' flatbed   |
| Max. Inlet Opening in End Cap | 24" HDPE, 30" PVC<br>600 mm HDPE, 750 mm PVC   |

Calculations are based on installed chamber length.  
Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 5.75' (1.75 m) center-to-center spacing and stone foundation as listed in table.  
Stone void calculated at 40%.



# CULTEC Recharger® 360HD Stormwater Chamber

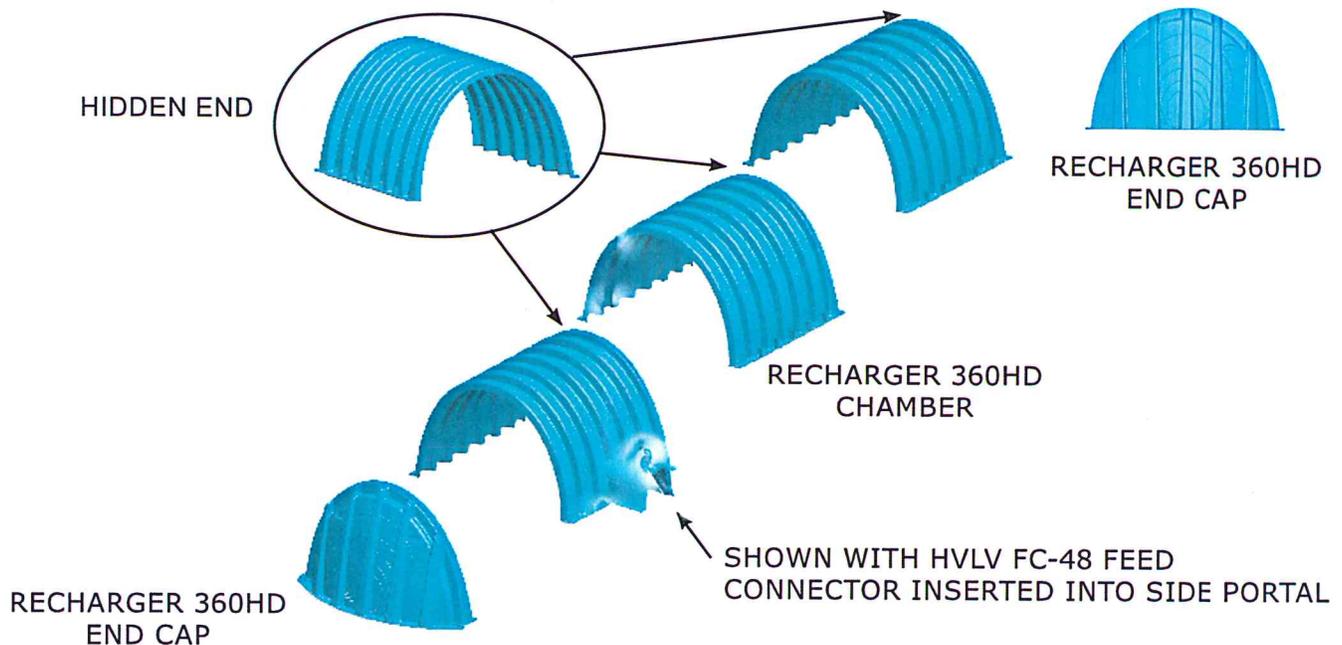
## Three View Drawing



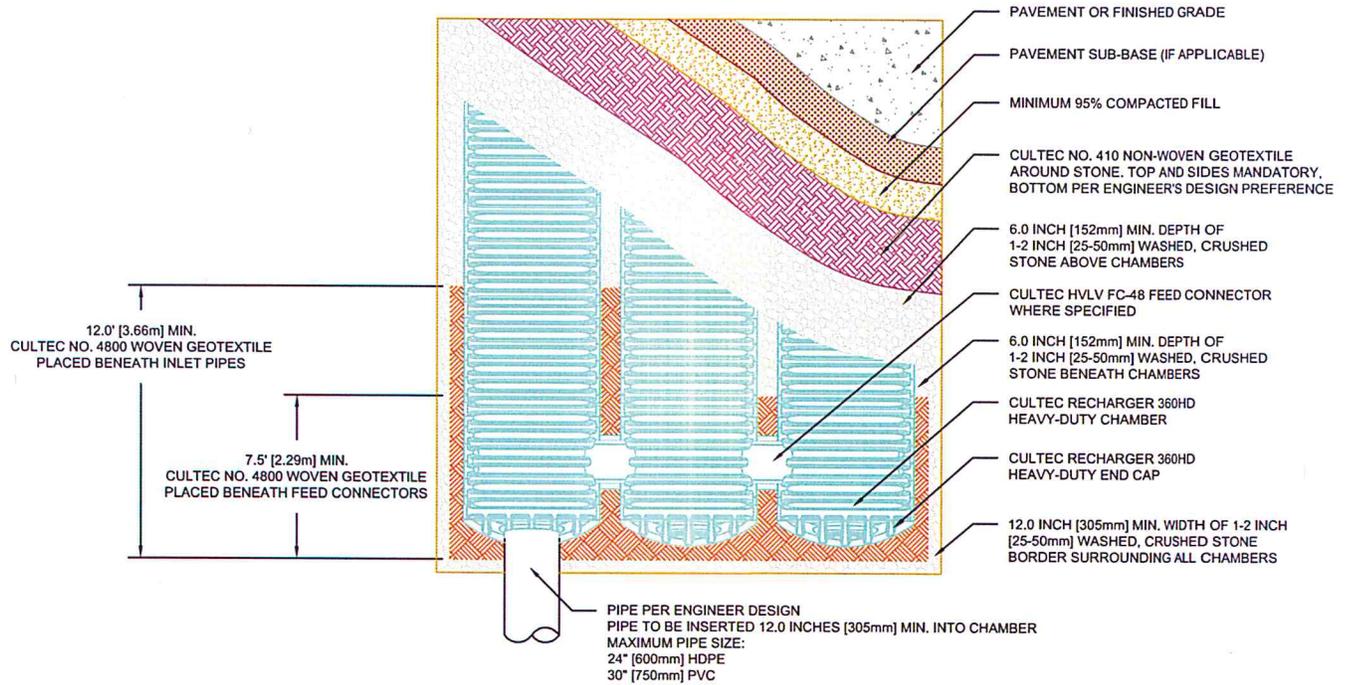
Recharger 360HD Chamber

Recharger 360HD End Cap

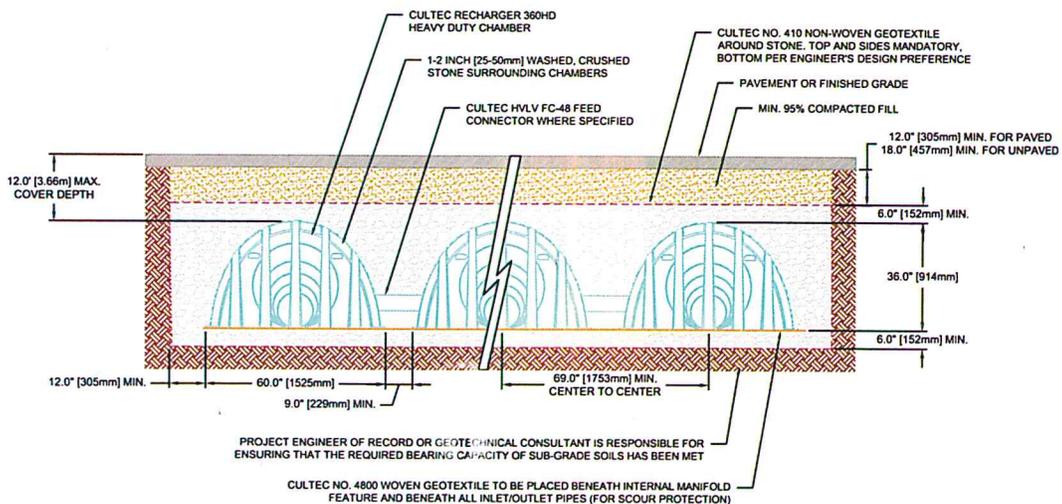
## Typical Interlock Installation



## Plan View Drawing



## Typical Cross Section for Traffic Application



**NOTES:**

1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
  - 1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
  - 1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
  - 1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
  - 3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
  - 3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
  - 3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95



# CULTEC Recharger® 360HD Stormwater Chamber

**Recharger® 360HD Bare Chamber Storage Volumes**

| Elevation    |     | Incremental Storage Volume |                   |                 |                | Cumulative Storage |                |
|--------------|-----|----------------------------|-------------------|-----------------|----------------|--------------------|----------------|
| in.          | mm  | ft <sup>3</sup> /ft        | m <sup>3</sup> /m | ft <sup>3</sup> | m <sup>3</sup> | ft <sup>3</sup>    | m <sup>3</sup> |
| 36           | 914 | 0.022                      | 0.002             | 0.08            | 0.002          | 3.3658             | 1.038          |
| 35           | 889 | 0.046                      | 0.004             | 0.17            | 0.005          | 36.577             | 1.036          |
| 34           | 864 | 0.069                      | 0.006             | 0.25            | 0.007          | 36.407             | 1.031          |
| 33           | 838 | 0.117                      | 0.011             | 0.43            | 0.012          | 36.154             | 1.024          |
| 32           | 813 | 0.148                      | 0.014             | 0.54            | 0.015          | 35.726             | 1.012          |
| 31           | 787 | 0.171                      | 0.016             | 0.63            | 0.018          | 35.185             | 0.996          |
| 30           | 762 | 0.190                      | 0.018             | 0.70            | 0.020          | 34.560             | 0.979          |
| 29           | 737 | 0.206                      | 0.019             | 0.76            | 0.021          | 33.864             | 0.959          |
| 28           | 711 | 0.221                      | 0.021             | 0.81            | 0.023          | 33.108             | 0.938          |
| 27           | 686 | 0.234                      | 0.022             | 0.86            | 0.024          | 32.298             | 0.915          |
| 26           | 660 | 0.246                      | 0.023             | 0.90            | 0.026          | 31.441             | 0.890          |
| 25           | 635 | 0.257                      | 0.024             | 0.94            | 0.027          | 30.539             | 0.865          |
| 24           | 609 | 0.267                      | 0.025             | 0.98            | 0.028          | 29.598             | 0.838          |
| 23           | 584 | 0.276                      | 0.026             | 1.01            | 0.029          | 28.620             | 0.811          |
| 22           | 559 | 0.284                      | 0.026             | 1.04            | 0.030          | 27.608             | 0.782          |
| 21           | 533 | 0.292                      | 0.027             | 1.07            | 0.031          | 26.565             | 0.752          |
| 20           | 508 | 0.300                      | 0.028             | 1.10            | 0.032          | 25.493             | 0.722          |
| 19           | 483 | 0.307                      | 0.028             | 1.12            | 0.033          | 24.394             | 0.691          |
| 18           | 457 | 0.313                      | 0.029             | 1.15            | 0.033          | 23.239             | 0.659          |
| 17           | 432 | 0.319                      | 0.030             | 1.17            | 0.033          | 22.121             | 0.626          |
| 16           | 406 | 0.325                      | 0.030             | 1.19            | 0.034          | 20.950             | 0.593          |
| 15           | 381 | 0.331                      | 0.031             | 1.21            | 0.034          | 19.757             | 0.560          |
| 14           | 356 | 0.336                      | 0.031             | 1.23            | 0.035          | 18.545             | 0.525          |
| 13           | 330 | 0.341                      | 0.032             | 1.25            | 0.035          | 17.313             | 0.490          |
| 12           | 305 | 0.345                      | 0.032             | 1.27            | 0.036          | 16.064             | 0.455          |
| 11           | 279 | 0.350                      | 0.032             | 1.28            | 0.036          | 14.798             | 0.419          |
| 10           | 254 | 0.354                      | 0.033             | 1.30            | 0.037          | 13.516             | 0.383          |
| 9            | 229 | 0.358                      | 0.033             | 1.31            | 0.037          | 12.219             | 0.346          |
| 8            | 203 | 0.361                      | 0.034             | 1.32            | 0.038          | 10.908             | 0.309          |
| 7            | 178 | 0.365                      | 0.034             | 1.34            | 0.038          | 9.584              | 0.271          |
| 6            | 152 | 0.368                      | 0.034             | 1.35            | 0.038          | 8.247              | 0.234          |
| 5            | 127 | 0.371                      | 0.034             | 1.36            | 0.039          | 6.898              | 0.195          |
| 4            | 102 | 0.374                      | 0.035             | 1.37            | 0.039          | 5.538              | 0.157          |
| 3            | 76  | 0.376                      | 0.035             | 1.38            | 0.039          | 4.168              | 0.118          |
| 2            | 51  | 0.379                      | 0.035             | 1.39            | 0.039          | 2.787              | 0.079          |
| 1            | 25  | 0.381                      | 0.035             | 1.40            | 0.040          | 1.398              | 0.040          |
| <b>Total</b> |     | <b>9.998</b>               | <b>0.929</b>      | <b>36.66</b>    | <b>1.038</b>   | <b>36.658</b>      | <b>1.038</b>   |

Calculations are based on installed chamber length of 3.67' (1.12 m).

**Recharger® 360HD Bare End Cap Storage Volumes**

| Elevation    |     | Incremental Storage Volume |                   |                 |                | Cumulative Storage |                |
|--------------|-----|----------------------------|-------------------|-----------------|----------------|--------------------|----------------|
| in.          | mm  | ft <sup>3</sup> /ft        | m <sup>3</sup> /m | ft <sup>3</sup> | m <sup>3</sup> | ft <sup>3</sup>    | m <sup>3</sup> |
| 36           | 914 | 0.008                      | 0.0007            | 0.01            | 0.000          | 6.460              | 0.183          |
| 35           | 889 | 0.016                      | 0.0015            | 0.02            | 0.001          | 6.450              | 0.183          |
| 34           | 864 | 0.024                      | 0.0022            | 0.03            | 0.001          | 6.430              | 0.182          |
| 33           | 838 | 0.032                      | 0.0030            | 0.04            | 0.001          | 6.400              | 0.181          |
| 32           | 813 | 0.040                      | 0.0037            | 0.05            | 0.001          | 6.360              | 0.180          |
| 31           | 787 | 0.048                      | 0.0045            | 0.06            | 0.002          | 6.310              | 0.179          |
| 30           | 762 | 0.056                      | 0.0052            | 0.07            | 0.002          | 6.250              | 0.177          |
| 29           | 737 | 0.064                      | 0.0059            | 0.08            | 0.002          | 6.180              | 0.175          |
| 28           | 711 | 0.072                      | 0.0067            | 0.09            | 0.003          | 6.100              | 0.173          |
| 27           | 686 | 0.080                      | 0.0074            | 0.10            | 0.003          | 6.010              | 0.170          |
| 26           | 660 | 0.088                      | 0.0082            | 0.11            | 0.003          | 5.910              | 0.167          |
| 25           | 635 | 0.096                      | 0.0089            | 0.12            | 0.003          | 5.800              | 0.164          |
| 24           | 609 | 0.112                      | 0.0104            | 0.14            | 0.004          | 5.680              | 0.161          |
| 23           | 584 | 0.120                      | 0.0111            | 0.15            | 0.004          | 5.540              | 0.157          |
| 22           | 559 | 0.128                      | 0.0119            | 0.16            | 0.005          | 5.390              | 0.153          |
| 21           | 533 | 0.136                      | 0.0126            | 0.17            | 0.005          | 5.230              | 0.148          |
| 20           | 508 | 0.144                      | 0.0134            | 0.18            | 0.005          | 5.060              | 0.143          |
| 19           | 483 | 0.152                      | 0.0141            | 0.19            | 0.005          | 4.880              | 0.138          |
| 18           | 457 | 0.160                      | 0.0149            | 0.20            | 0.006          | 4.690              | 0.133          |
| 17           | 432 | 0.160                      | 0.0149            | 0.20            | 0.006          | 4.490              | 0.127          |
| 16           | 406 | 0.168                      | 0.0156            | 0.21            | 0.006          | 4.290              | 0.121          |
| 15           | 381 | 0.176                      | 0.0164            | 0.22            | 0.006          | 4.080              | 0.116          |
| 14           | 356 | 0.184                      | 0.0171            | 0.23            | 0.007          | 3.860              | 0.109          |
| 13           | 330 | 0.192                      | 0.0178            | 0.24            | 0.007          | 3.630              | 0.103          |
| 12           | 305 | 0.192                      | 0.0178            | 0.24            | 0.007          | 3.390              | 0.096          |
| 11           | 279 | 0.200                      | 0.0186            | 0.25            | 0.007          | 3.150              | 0.089          |
| 10           | 254 | 0.208                      | 0.0193            | 0.26            | 0.007          | 2.900              | 0.082          |
| 9            | 229 | 0.208                      | 0.0193            | 0.26            | 0.007          | 2.640              | 0.075          |
| 8            | 203 | 0.216                      | 0.0201            | 0.27            | 0.008          | 2.380              | 0.067          |
| 7            | 178 | 0.224                      | 0.0208            | 0.28            | 0.008          | 2.110              | 0.060          |
| 6            | 152 | 0.232                      | 0.0216            | 0.29            | 0.008          | 1.830              | 0.052          |
| 5            | 127 | 0.232                      | 0.0216            | 0.29            | 0.008          | 1.540              | 0.044          |
| 4            | 102 | 0.240                      | 0.0223            | 0.30            | 0.008          | 1.250              | 0.035          |
| 3            | 76  | 0.240                      | 0.0223            | 0.30            | 0.008          | 0.950              | 0.027          |
| 2            | 51  | 0.248                      | 0.0230            | 0.31            | 0.009          | 0.650              | 0.018          |
| 1            | 25  | 0.272                      | 0.0253            | 0.34            | 0.010          | 0.340              | 0.010          |
| <b>Total</b> |     | <b>5.168</b>               | <b>0.480</b>      | <b>6.46</b>     | <b>0.183</b>   | <b>6.460</b>       | <b>0.183</b>   |

Calculations are based on installed end cap length of 15" (381 mm).



## CULTEC Recharger® 360HD Specifications

### GENERAL

CULTEC Recharger® 360HD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

### CHAMBER PARAMETERS

1. The chambers shall be manufactured in the U.S.A. or Canada by CULTEC of Brookfield, CT (cultec.com, 203-775-4416).
2. The chambers shall be designed and tested in accordance with ASTM F2787 "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers". The load configuration shall include:
  - a. Instantaneous AASHTO Design Truck live load at minimum cover
  - b. Maximum permanent (50-year) cover load
  - c. 1-week parked AASHTO design truck load
3. The chambers shall meet the requirements of ASTM F3430-20 "Standard Specification for Cellular Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers".
4. The installed chamber system shall provide resistance to the loads and load factors as defined in the AASHTO LRFD Bridge Design Specifications Section 12.12, when installed according to CULTEC's recommended installation instructions. The structural design of the chambers shall include the following:
  - a. The Creep Modulus shall be 50-year as specified in ASTM F3430
  - b. The minimum safety factor for live loads shall be 1.75
  - c. The minimum safety factor for dead loads shall be 1.95
5. The installed chamber system shall be structurally designed to provide resistance to live loads as defined by the AASHTO H-20/HL-93 specification when installed according to CULTEC's recommended installation instructions.
6. The chamber shall be structural foam injection molded of blue virgin high molecular weight impact-modified polypropylene.
7. The chamber shall be arched in shape.
8. The chamber shall be open-bottomed.
9. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings.
10. The nominal chamber dimensions of the CULTEC Recharger® 360HD shall be 36 inches (915 mm) tall, 60 inches (1525 mm) wide and 50 inches (1275 mm) long. The installed length of a joined Recharger 360HD shall be 3.67 feet (1.12 m).
11. Multiple chambers may be connected to form different length rows. Each row shall begin and end with a separately formed CULTEC Recharger® 360HD End Cap. Maximum inlet opening on the end cap is 24 inches (600 mm) HDPE or 30 inches (750 mm) PVC.
12. The chamber shall have two side portals to accept CULTEC HVLV™ FC-48 Feed Connectors to create an internal manifold. Maximum allowable pipe size in the side portal is 10 inches (250 mm) HDPE or 12 inches (300 mm) PVC.
13. The nominal chamber dimensions of the CULTEC HVLV™ FC-48 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 49 inches (1245 mm) long.
14. The nominal storage volume of the Recharger 360HD chamber shall be 10.0 ft<sup>3</sup> / ft (0.928 m<sup>3</sup> / m) - without stone. The nominal storage volume of a joined Recharger 360HD shall be 36.66 ft<sup>3</sup> / unit (1.038 m<sup>3</sup> / unit) - without stone.
15. The nominal storage volume of the HVLV™ FC-48 Feed Connector shall be 0.913 ft<sup>3</sup> / ft (0.085 m<sup>3</sup> / m) - without stone.
16. The Recharger 360HD chamber shall have 7 corrugations.
17. The chamber shall be manufactured in a facility employing CULTEC's Quality Control and Assurance Procedures.
18. Maximum allowable cover over the top of the chamber shall be 12 feet (3.66 m).

### END CAP PARAMETERS

1. The CULTEC Recharger® 360HD End Cap (referred to as 'end cap') shall be manufactured in the U.S.A. or Canada by CULTEC of Brookfield, CT (cultec.com, 203-775-4416).
2. The end cap shall be structural foam injection molded of blue virgin high molecular weight impact-modified polypropylene.
3. The end cap shall be arched in shape.
4. The end cap shall be joined at the beginning and end of each row of chambers using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings.
5. The nominal dimensions of the end cap shall be 36.5 inches (927 mm) tall, 60 inches (1525 mm) wide and 18 inches (458 mm) long. When joined with a Recharger 360HD Chamber, the installed length of the end cap shall be 15 inches (381 mm).
6. The nominal storage volume of the end cap shall be 5.17 ft<sup>3</sup> / ft (0.48 m<sup>3</sup> / m) - without stone. The nominal storage volume of an interlocked end cap shall be 6.46 ft<sup>3</sup> / unit (0.183 m<sup>3</sup> / unit) - without stone.
7. Maximum inlet opening on the end cap is 24 inches (600 mm) HDPE or 30 inches (750 mm) PVC.
8. The end cap shall be manufactured in a facility employing CULTEC's Quality Control and Assurance Procedures.
9. The end cap shall provide resistance to the loads and load factors as defined in the AASHTO LRFD Bridge Design Specifications Section 12.12.