## *SECTION 12: Stormwater Management*

Kingfish Maine, Inc. proposes to construct a Recirculating Aquaculture System (RAS) land based aquaculture facility on a parcel on Mason Bay Road in Jonesport, Maine. The property is 93.2 acres, and contains developed areas from previous land use activities consisting of gravel roads, yards and buildings.

The development occurs on one parcel, and is adjacent to the tidal waters of Chandler Bay. The proposed development includes construction of access and circulation roads, multiple buildings for the RAS facility and its supporting infrastructure, offices, residential space for staff, security building, and a store and welcome center. This project develops approximately 28.1 acres of land, including 21.9 acres of planned impervious surface and 6.2 acres of landscaped and other non-impervious developed area. Development approximates 30 percent of the parcel area. Based on the scale of the development and its adjacency to tidal waters, treatment is provided to meet the standards in Chapter 500 of the Stormwater Law as applicable.

The level of activity proposed to develop the project requires review under the Site Location of Development law and its attendant stormwater management requirements derived from the Stormwater Management Law, predicated in the project developing land area in excess of 20 acres and creates more than 3 acres of new structure. Site Law requires that projects subject to review adhere to the requirements of the Stormwater Law for applicable standards (to wit: basic standards (500.4.B), general standards (500.4.C), phosphorus standard (500.4.D), urban impaired stream standard (500.4.E), and flooding standard (500.4.E). Basic standards are addressed in Section 14. This section addressed general standards, however as this development discharges to tidal waters, some provisions are excepted as further described herein. The site is not in a lake watershed, so the phosphorus standard does not apply. Similarly, the site is not in the watershed of an urban impaired stream (section 13). The project discharges stormwater directly to tidal waters from developed areas on the property, the flooding standards are eligible for waiver. The bulk of the property and the newly developed area, discharges to tidal waters via conveyances, stable watercourses, and new drainage structures. The rules specify that projects designed to convey stormwater directly into the ocean (excluding estuarine tidewaters) from the project exclusively in sheet flow, in a manmade open channel, or in a piped system directly to the resource are waiver eligible (500.4.F.3.a). The project is subject to the Maintenance, Housekeeping, and recertification provisions of the Stormwater Law.

General Standards

The stormwater runoff will be managed by utilizing BMPs specified by MEDEP in 'Stormwater Management for Maine, Best Management Practices. The proposed permanent BMPs are Wet Ponds (Chapter 4) and Grassed Underdrained Soil Filters (Chapter 7.1). The wet pond is configured to treat the bulk of the developed area, and utilizes two ponds in series to optimize the available land and reduce the permanent pool requirement. Grassed underdrained soil filters will be placed directly down gradient of several remote elements of the development, such as the entrance, and the residential and lower lying structures. The total impervious treatment for the proposed development will exceed 95%. The total landscaped area treatment will exceed 80%. Kindly refer to the required documentation, including narrative, attached plans and calculations for additional details.

A. Narrative:

1. Development Location: The proposed development is located on a single parcel of land of 93.2 acres on the East side of Mason Bay Road, in Jonesport Maine. The proposed site development will encompass ~30% of the parcel. The development is located at the base of its watershed, fronting directly on tidal waters of Chandler Bay. Its attendant watershed designation is Maine Coastal (HUC Code 01050002).
2. Surface water on or abutting the site: There are no lakes or ponds on the site, however there are delineated wetlands and NRPA streams, depicted in the Boundary and Topographic Survey, on the site plan, and further depicted and described in this submission. Abutting the site are tidal waters of Chandler Bay.
3. Downstream ponds and lakes: There are no downstream ponds or lakes, discharging to tidal waters, Chandler Bay.
4. General topography: The site is located at the base of its watershed in an area with slopes ranging from 0% to 8%. The site slopes west to east to drain to the shore.
5. Flooding: There are no areas, buildings, or facilities on this site that historically flood or that will be affected by site runoff. A VE15 floodzone is identified along the shoreline and is depicted on the plans. A FEMA Flood Insurance Rate Map is provided in Section 19.
6. Alterations to natural drainage ways: Streams and major wetland segments are not altered by the proposal. There are small isolated natural swales within the development area that will be filled or changed by the construction. As appropriate, existing drainage patterns will be redirected around the proposed facility core and redirected to stable areas. Stormwater management is provided for development area that complies with the standards, and releases treated stormwater to stable receiving areas that are consistent with the original drainage pattern.
7. Alterations to land cover: The existing site consists of woods, cleared land grown up as field, and a central development area which consists of outbuildings, driveways, a cottage, and unmaintained lawn and field areas. The parcel also contains delineated wetlands around the site's north and south periphery. The existing buildings, driveways and yards will be removed and replaced with approximately 13.6 acres of building, and 7.5 acres of driveway, parking and yard area. Wetland areas will be altered and are the subject of a Natural Resources Protection Act application that accompanies the Site Law application.
8. Modeling Assumptions: The underlying soils in the area of development are Kinsman sands and Colton gravelly sandy loams, along with other soil types in the undeveloped areas. Development footprint soils are in Hydrologic Soil Group is A and A/D for the predominance of the developed areas. Stormwater modeling assumed Hydrologic Group A soils, and a runoff curve numbers established by MDEP in "Stormwater Management for Maine: Best Management Practices". Type III costal storms were used for modeling, and rainfall values determined for the 24-hour storm event as enumerated in "Stormwater Management for Maine: Best Management Practices.".
9. Water Quantity Control: As the project discharges directly to tidal waters, the waiver for discharges to tidal waters is applicable (500.4.F.3.a).
10. Water quality treatment (Chapter 500 General Standards): The proposed development will comply with quality standards as required. In excess of 95% of new impervious and in excess of 80% of new landscaped and other non-impervious developed areas will be treated with one BMPs promulgated by DEP in 'Stormwater Management for Maine,

Best Management Practices. Treatment measures will include a wet pond and five (5) grassed underdrained soil filters (USF). The wetpond is sized to accommodate permanent pool storage greater than 1.0 inch times the subcatchment's impervious area, plus 0.4 inch times the subcatchment's landscaped area. The wet pond utilizes two ponds in series, to best utilize the landform, and to reduce the required permanent pool volume as outlined in 500.4.C.3.a. The wet pond discharges to coastal waters and does not discharge to the direct watershed of a stream, so the exceptions from general standards outlined in 500.4.C.5.b are applicable. As such, the underdrain and associated bench are not required. As a measure of preservation for all conditions, an amount of storage equal to the required channel protection volume is provided above the permanent pool. In a similar vein, the grassed underdrained soil filters are sized to store and filter a volume in excess of 1.0 inch times the subcatchment's impervious area, plus 0.4 inch times the subcatchment's landscaped area. The general standards require that the project treat no less than 95% of the impervious area and no less than 80% of the other developed area. The proposed stormwater management plan will treat stormwater runoff in excess of the standards. Stormwater treatment calculations are provided within the application.

11. Offsite Credits: This section is not applicable. No total suspended solids or phosphorus offset credits are required, the site discharges to the coastal wetland.
12. Compensation fees: This Section is not applicable. The project is not subject to the phosphorus standard.
13. Developed impacts: The development impacts on down gradient waters, properties streams and control structures will be minimized onsite prior to discharge.

B. Maps

1. Topographic Map: U.S.G.S. map with site boundaries: Included in Section 1 is a United States Geological Survey seven-and-one-half minute topographic map showing the site location. Additionally, a base survey and relevant plans are provided with topographic information.
2. NRCS Soils Map: A medium intensity soil survey map is provided in Section 11.

C. Drainage Plans: Appended to this Section are a drainage exhibit and Site Plans are enclosed with the submission.

D. Runoff analysis: Appended to this section are post-development runoff analysis.

E. Flooding Standards: Not applicable

F. General Standards Submissions are provided in this section. The narrative is included on the first page of this section. Stormwater quality treatment plan and a spreadsheet of treated areas and ground covers is appended. Volumes are provided in the HydroCAD derived stormwater calculations.

G. Maintenance plan: Please refer to the appended attached provided Stormwater Management System Maintenance Plan and Inspection Logs.

H. Maintenance by a Homeowner Association: This section is not applicable. The entirety of the facility will be owned and operated by Kingfish Maine, Inc.

I. Maintenance of Facilities by a municipality: This section is not applicable.

J. General Inspection and Maintenance Requirements: These elements are addressed in the appended maintenance plan. No easements are required. Sections pertaining to infiltration, proprietary devices, buffers and maintenance contracts are not applicable.

***APPENDIX 12A***

Maps


Gartley & Dorsky
ENGINEERING SURVEYING
CAMDEN, MAINE (207) 236-4365
WWW.GARTLEYDORSKY.COM

# SITE LOCATION MAP
## KINGFISH MAINE
JONESPORT, MAINE

MARCH, 2021 | PROJ. NO 2019-412 | SITE LAW SECTION 1

LEGEND

SUBJECT PARCEL PROPERTY LINE

APPROXIMATE PROPERTY LINE

SETBACK LINE

RECOMMENDED SITE REFERENCE POINT
N:325500.00
E:1225000.00

CAMPBELL

AREA DRAINAGE LEGEND

- AREA POND 1 TOTAL
- AREA POND 2 TOTAL
- AREA FILTER 1 TOTAL
- AREA FILTER 2 TOTAL
- AREA FILTER 3 TOTAL
- AREA FILTER 4A TOTAL
- AREA FILTER 4B TOTAL
- AREA FILTER 5 TOTAL
- AREA NOT TREATED
- AREA NOT TREATED IMPERVIOUS

GRAPHIC SCALE

100 0 50 100 200 400

( IN FEET )
1 inch = 100 ft.

| NO. | REVISIONS | DATE |
|---|---|---|
| | | |

SHEET TITLE: **DRAINAGE EXHIBIT**

SCALE: 1" = 100'

DRAWN BY: AM

CHECKED BY:

DATE: MARCH 25, 2021

CLIENT/PROJECT: **KINGFISH MAINE**

LOCATION: ROUTE 187

TOWN: JONESPORT COUNTY: WASHINGTON STATE: MAINE


Gartley & Dorsky ENGINEERING SURVEYING

59 Union Street, Unit 1, P.O. Box 1031 Camden, ME 04843-1031
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STATE OF MAINE
WILLIAM J. LAKE
No. 7577
LICENSED PROFESSIONAL ENGINEER

PROJ. NO. 2019-412

**EX4**

***APPENDIX 12B***

Calculations

# KINGFISH MAINE
## STORMWATER COMPLIANCE CHECK

| Development Area Tally | Roof | Sanded Surface | Impervious | Landscaped and Unvegetated | All Categories |
|---|---|---|---|---|---|
| Collected & Treated (Ponds), SF | 524292 | 235059 | 759351 | 58010 | 817361 |
| Collected & Treated (Filters), SF | 45121 | 72064 | 117185 | 144017 | 261202 |
| | | | | | |
| Total Collected & Treated, SF | 569413 | 307123 | 876536 | 202027 | 1078563 |
| Uncollected & Untreated, SF | 6305 | 35897 | 42202 | 50317 | 92519 |
| Total Development Areas, SF | 575718 | 343020 | 918738 | 252344 | 1171082 |
| | | | | | |
| % Treated vs Overall | | | 95.4% | 80.1% | |
| Standard per Ch 500 | | | 95% | 80% | |
| % Overtreat (+) or Shortfall (-) | | | 0.4% | 0.1% | |
| | | | **OK** | **OK** | |

Developed areas as defined in Chapter 500

G&D

KINGFISH MAINE

Wet Pond 1 and 2 Sizing Per Stormwater BMP Manual Chapter 4

| | Tributary Impervious SF | Tributary Landscaped/ Unrevegetated SF | Tributary Undeveloped SF | Tributary Overall SF |
|---|---|---|---|---|
| Pond 1 (including pond surface) | 737204 | 54634 | 107104 | 898942 |
| Pond 2 (including pond surface) | 22147 | 3376 | 9345 | 34868 |
| Total | 759351 | 58010 | | |

| Impervious Perm Pool Required Volume (2.0 in/sf), cf | Developed Perm Pool Volume (0.8 in/sf), cf | | Permanent Pool Permissible Mean Depth |
|---|---|---|---|
| 126,559 | 3,867 | | 3 to 10 feet |
| Single Pond Permanent Pool Requirement, cf | 130,426 | cf | |
| Single Pond Permanent Pool Requirement, af | 2.99 | acre-feet | |
| Two pond in series | | | |
| Permanent Pool reduction percentage | 20% | | |
| 2 Series Permanent Pool Volume Requirement, cf | 104,341 | cf | |
| 2 Series Perm Pool Volume Requirement, af | 2.40 | acre-feet | |
| Pond 1 Volume at Permanent Pool Depth (6.25') | 60,790 | cf | |
| Pond 2 Volume at Permanent Pool Depth (7.1') | 49,770 | cf | |
| Evenly Distributed Check (Must Be <25%) | 22.1% | | **OK** |
| Total Permanent Pool Volume, cf | 110,560 | cf | **OK** |
| Total Permanent Pool Volume, acre-feet | 2.54 | acre-feet | **OK** |

| Channel Protection Req'd Volume (1 in/sf), cf | Channel Protection Req'd Volume (.4 in/sf), cf | | |
|---|---|---|---|
| 63,279 | 1,934 | | |
| Channel Protection Volume Requirement, cf | 65,213 | cf | |
| Channel Protection Volume Requirement, af | 1.50 | acre-feet | |
| Pond 1 Volume at 8.5' depth | 103,214 | cf | |
| Pond 2 Volume at 9.2' depth | 75,282 | cf | |
| Pond 1 Channel Protection Volume, cf | 42,424 | cf | |
| Pond 2 Channel Protection Volume, cf | 25,512 | cf | |
| Total Channel Protection Volume, cf | 67,936 | cf | **OK** |
| Total Channel Protection Volume, acre-feet | 1.56 | acre-feet | **OK** |

| Pond 1 Sediment Basin Sizing | | |
|---|---|---|
| Plowed and Sanded Area Trib to Pond 1 | 5.14 | acres |
| Storms Per year | 10 | storms |
| Sanding Rate pounds per acre per storm | 500 | #/acre |
| Unit weight of sand, pcf | 90 | pcf |
| Sediment Volume Requirement, cf | 285 | cf |
| Depth in 8' Basin | 5.68 | lf |

| Pond 2 Sediment Basin Sizing | | |
|---|---|---|
| Plowed and Sanded Area Trib to Pond 2 | 0.26 | acres |
| Storms Per year | 10 | storms |
| Sanding Rate pounds per acre per storm | 500 | #/acre |
| Unit weight of sand, pcf | 90 | pcf |
| Sediment Volume Requirement, cf | 14 | cf |
| Depth in 4' Basin | 1.14 | lf |

G&D

KINGFISH MAINE

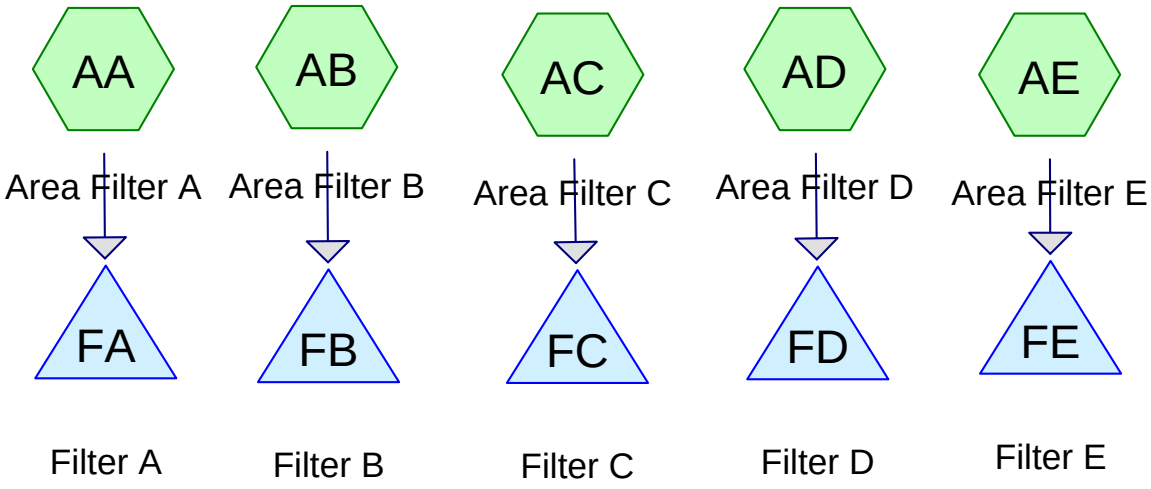
Stormwater Filter Sizing Per Stormwater BMP Manual Chapter 7.1

## UNDERDRAINED SOIL FILTER SIZING

| Area Descriptor | Tributary Roof Impervious Area SF | Tributary Sanded Impervious Area SF | Total Tributary Impervious Area SF | Tributary Landscaped Area SF | Impervious Ch. Prot. Vol. Sizing (1 ") FT | Landscaped Ch. Prot. Vol. Sizing (0.4") FT | Required Impervious Ch. Prot. Volume CF | Required Landscaped Ch. Prot. Volume CF | Total Required Ch. Prot. Volume CF | Water Depth FT | Minimum Filter Area BMP 7.1.3.2 SF | Provided Volume CF | Provided Filter Area SF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grassed Filter A | 6520 | 19895 | 26415 | 33698 | 0.0833 | 0.0333 | 2201 | 1123 | 3325 | 1.3 | 1995 | **3396** | **2093** |
| Grassed Filter B | 175 | 21363 | 21538 | 33698 | 0.0833 | 0.0333 | 1795 | 1123 | 2918 | 1.4 | 1751 | **3171** | **1769** |
| Grassed Filter C | 2572 | 8922 | 11494 | 21755 | 0.0833 | 0.0333 | 958 | 725 | 1683 | 1.3 | 1010 | **1734** | **1069** |
| Grassed Filter D | 21049 | 10404 | 31453 | 12108 | 0.0833 | 0.0333 | 2621 | 404 | 3025 | 1.25 | 1815 | **3109** | **2115** |
| Grassed Filter E | 14805 | 11480 | 26285 | 42758 | 0.0833 | 0.0333 | 2190 | 1425 | 3616 | 1.4 | 2169 | **3626** | **2206** |

## SEDIMENT FOREBAY SIZING

| Area Descriptor | Tributary Sanded Impervious SF | Required storms per year - | | Sanded area acre | | 500 lbs per acre per storm lbs | | 1cf/90 lbs sand CF/lb | | Req'd Storage CF | Provided Storage CF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Grassed Filter A | 19895 | 10 | x | 0.457 | x | 500 | x | 0.0111 | = | 25.4 | **31.4** |
| Grassed Filter B | 21363 | 10 | x | 0.490 | x | 500 | x | 0.0111 | = | 27.2 | **31.4** |
| Grassed Filter C | 8922 | 10 | x | 0.205 | x | 500 | x | 0.0111 | = | 11.4 | **25.1** |
| Grassed Filter D | 10404 | 10 | x | 0.239 | x | 500 | x | 0.0111 | = | 13.3 | **25.1** |
| Grassed Filter E | 11480 | 10 | x | 0.264 | x | 500 | x | 0.0111 | = | 14.6 | **25.1** |




Subcat Reach Pond Link

**Routing Diagram for Kingfish Maine - Stormwater - Filters**
Prepared by Gartley & Dorsky - Camden

## Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 122,426 | 49 | 50-75% Grass cover, Fair, HSG A (AA, AB, AC, AD, AE) |
| 72,064 | 98 | Paved parking, HSG A (AA, AB, AC, AD, AE) |
| 45,120 | 98 | Roofs, HSG A (AA, AB, AC, AD, AE) |
| **239,610** | **73** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (sq-ft) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 239,610 | HSG A | AA, AB, AC, AD, AE |
| 0 | HSG B | |
| 0 | HSG C | |
| 0 | HSG D | |
| 0 | Other | |
| **239,610** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (sq-ft) | HSG-B (sq-ft) | HSG-C (sq-ft) | HSG-D (sq-ft) | Other (sq-ft) | Total (sq-ft) | Ground Cover | Sub Num |
|---|---|---|---|---|---|---|---|
| 122,426 | 0 | 0 | 0 | 0 | 122,426 | 50-75% Grass cover, Fair | |
| 72,064 | 0 | 0 | 0 | 0 | 72,064 | Paved parking | |
| 45,120 | 0 | 0 | 0 | 0 | 45,120 | Roofs | |
| **239,610** | **0** | **0** | **0** | **0** | **239,610** | **TOTAL AREA** | |

## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Diam/Width (inches) | Height (inches) | Inside-Fill (inches) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AA | 0.00 | 0.00 | 83.0 | 0.0050 | 0.013 | 15.0 | 0.0 | 0.0 |
| 2 | AA | 0.00 | 0.00 | 120.0 | 0.0050 | 0.013 | 15.0 | 0.0 | 0.0 |
| 3 | AC | 0.00 | 0.00 | 165.0 | 0.0145 | 0.013 | 15.0 | 0.0 | 0.0 |
| 4 | AD | 0.00 | 0.00 | 45.0 | 0.0100 | 0.013 | 15.0 | 0.0 | 0.0 |
| 5 | AE | 0.00 | 0.00 | 40.0 | 0.0100 | 0.013 | 15.0 | 0.0 | 0.0 |
| 6 | AE | 0.00 | 0.00 | 75.0 | 0.0100 | 0.013 | 15.0 | 0.0 | 0.0 |

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment AA: Area Filter A** Runoff Area=60,113 sf 43.94% Impervious Runoff Depth>1.81"
Flow Length=408' Tc=13.2 min CN=71 Runoff=2.45 cfs 9,048 cf

**Subcatchment AB: Area Filter B** Runoff Area=33,645 sf 64.02% Impervious Runoff Depth>2.53"
Flow Length=120' Slope=0.0400 '/' Tc=11.8 min CN=80 Runoff=2.02 cfs 7,102 cf

**Subcatchment AC: Area Filter C** Runoff Area=33,249 sf 34.57% Impervious Runoff Depth>1.45"
Flow Length=325' Tc=12.3 min CN=66 Runoff=1.08 cfs 4,018 cf

**Subcatchment AD: Area Filter D** Runoff Area=43,560 sf 72.20% Impervious Runoff Depth>2.89"
Flow Length=365' Tc=13.0 min CN=84 Runoff=2.85 cfs 10,494 cf

**Subcatchment AE: Area Filter E** Runoff Area=69,043 sf 38.07% Impervious Runoff Depth>1.60"
Flow Length=215' Tc=1.3 min CN=68 Runoff=3.43 cfs 9,184 cf

**Pond FA: Filter A** Peak Elev=54.21' Storage=3,762 cf Inflow=2.45 cfs 9,048 cf
Outflow=1.25 cfs 5,587 cf

**Pond FB: Filter B** Peak Elev=59.40' Storage=3,164 cf Inflow=2.02 cfs 7,102 cf
Outflow=1.12 cfs 4,198 cf

**Pond FC: Filter C** Peak Elev=24.35' Storage=1,815 cf Inflow=1.08 cfs 4,018 cf
Outflow=0.39 cfs 2,274 cf

**Pond FD: Filter D** Peak Elev=19.42' Storage=3,609 cf Inflow=2.85 cfs 10,494 cf
Outflow=2.58 cfs 7,354 cf

**Pond FE: Filter E** Peak Elev=16.92' Storage=3,626 cf Inflow=3.43 cfs 9,184 cf
Outflow=1.50 cfs 5,810 cf

**Total Runoff Area = 239,610 sf Runoff Volume = 39,846 cf Average Runoff Depth = 2.00"**
**51.09% Pervious = 122,426 sf 48.91% Impervious = 117,184 sf**

## Summary for Subcatchment AA: Area Filter A

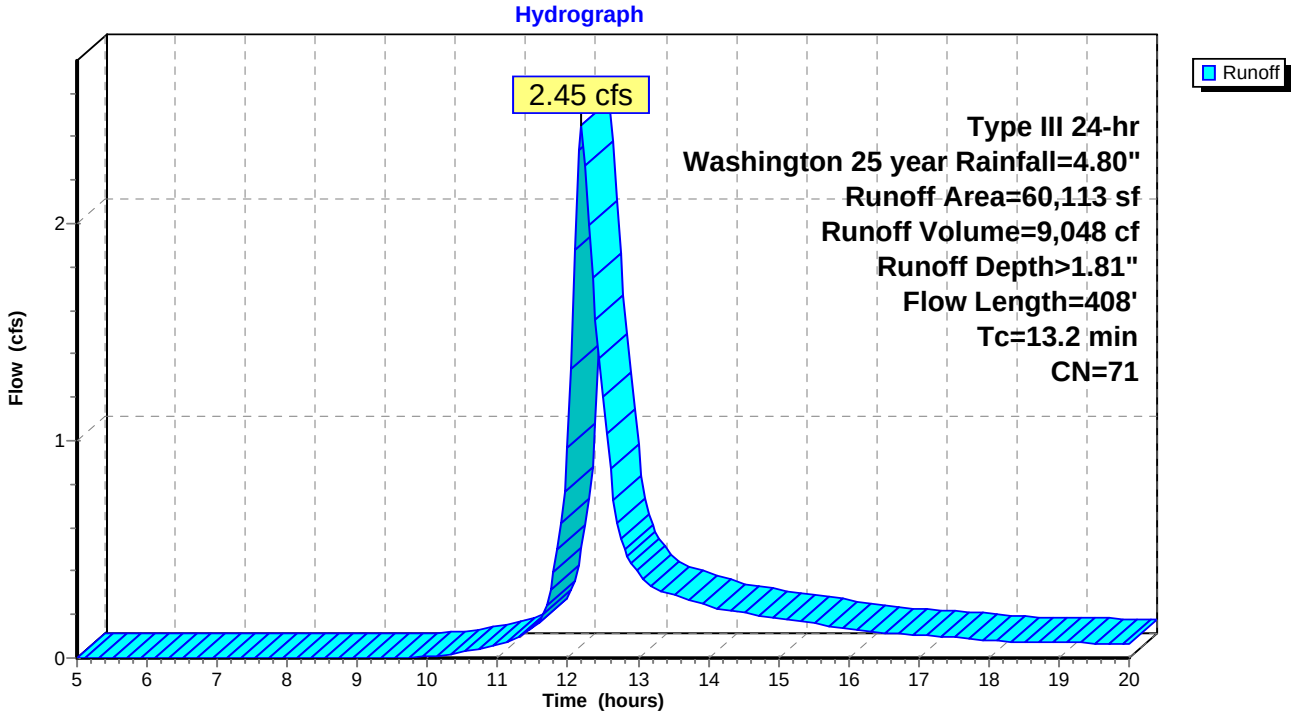
Runoff = 2.45 cfs @ 12.19 hrs, Volume= 9,048 cf, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Washington 25 year Rainfall=4.80"

| Area (sf) | CN | Description |
|---|---|---|
| 6,520 | 98 | Roofs, HSG A |
| 19,895 | 98 | Paved parking, HSG A |
| 33,698 | 49 | 50-75% Grass cover, Fair, HSG A |
| 60,113 | 71 | Weighted Average |
| 33,698 | | 56.06% Pervious Area |
| 26,415 | | 43.94% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.5 | 100 | 0.0200 | 0.16 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.80" |
| 1.8 | 105 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 83 | 0.0050 | 3.72 | 4.57 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 0.5 | 120 | 0.0050 | 3.72 | 4.57 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 13.2 | 408 | Total | | | |

## Subcatchment AA: Area Filter A



## Summary for Subcatchment AB: Area Filter B

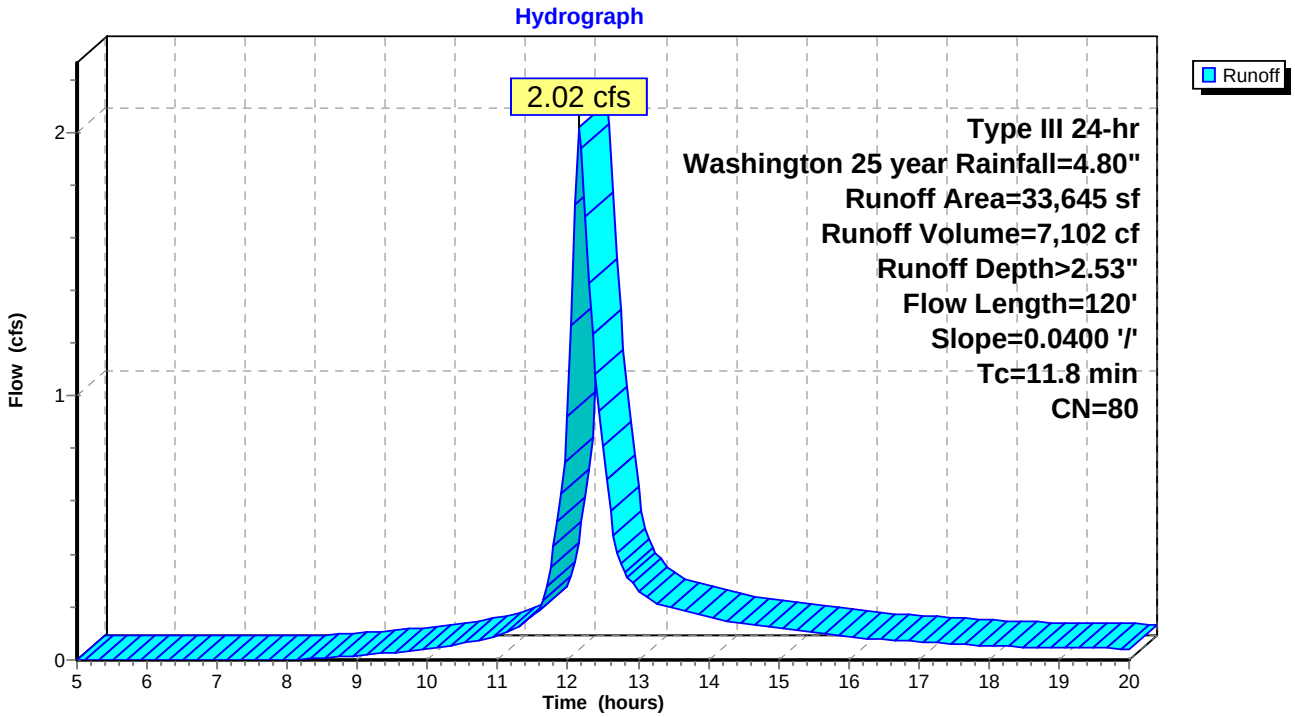
Runoff = 2.02 cfs @ 12.17 hrs, Volume= 7,102 cf, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Washington 25 year Rainfall=4.80"

| Area (sf) | CN | Description |
|---|---|---|
| 175 | 98 | Roofs, HSG A |
| 21,363 | 98 | Paved parking, HSG A |
| 12,107 | 49 | 50-75% Grass cover, Fair, HSG A |
| 33,645 | 80 | Weighted Average |
| 12,107 | | 35.98% Pervious Area |
| 21,538 | | 64.02% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.6 | 100 | 0.0400 | 0.14 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80" |
| 0.2 | 20 | 0.0400 | 1.40 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.8 | 120 | Total | | | |

## Subcatchment AB: Area Filter B



## Summary for Subcatchment AC: Area Filter C

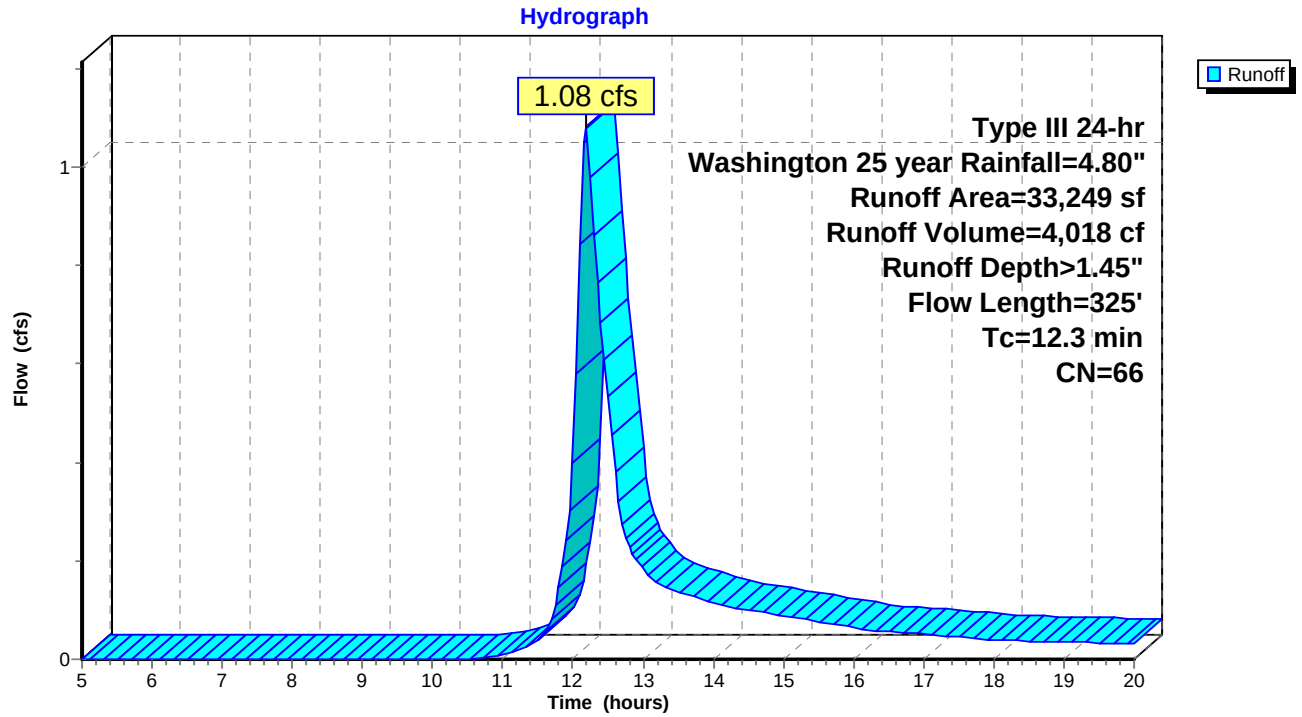
Runoff = 1.08 cfs @ 12.19 hrs, Volume= 4,018 cf, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Washington 25 year Rainfall=4.80"

| Area (sf) | CN | Description |
|---|---|---|
| 2,572 | 98 | Roofs, HSG A |
| 8,922 | 98 | Paved parking, HSG A |
| 21,755 | 49 | 50-75% Grass cover, Fair, HSG A |
| 33,249 | 66 | Weighted Average |
| 21,755 | | 65.43% Pervious Area |
| 11,494 | | 34.57% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.9 | 100 | 0.0180 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.80" |
| 1.0 | 60 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 165 | 0.0145 | 6.34 | 7.78 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 12.3 | 325 | Total | | | |

## Subcatchment AC: Area Filter C



## Summary for Subcatchment AD: Area Filter D

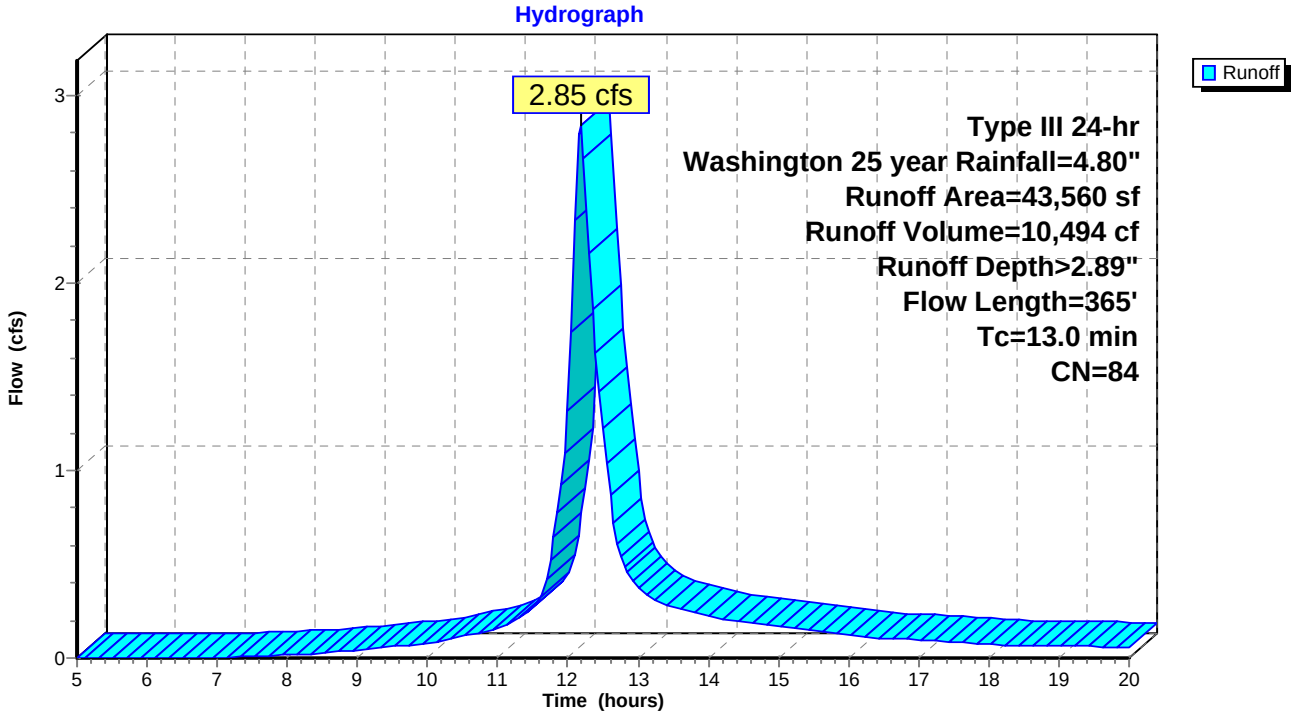
Runoff = 2.85 cfs @ 12.18 hrs, Volume= 10,494 cf, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Washington 25 year Rainfall=4.80"

| Area (sf) | CN | Description |
|---|---|---|
| 21,048 | 98 | Roofs, HSG A |
| 10,404 | 98 | Paved parking, HSG A |
| 12,108 | 49 | 50-75% Grass cover, Fair, HSG A |
| 43,560 | 84 | Weighted Average |
| 12,108 | | 27.80% Pervious Area |
| 31,452 | | 72.20% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.3 | 100 | 0.0167 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.80" |
| 0.7 | 50 | 0.0285 | 1.18 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.9 | 170 | 0.0250 | 3.21 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.1 | 45 | 0.0100 | 5.26 | 6.46 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 13.0 | 365 | Total | | | |

## Subcatchment AD: Area Filter D



## Summary for Subcatchment AE: Area Filter E

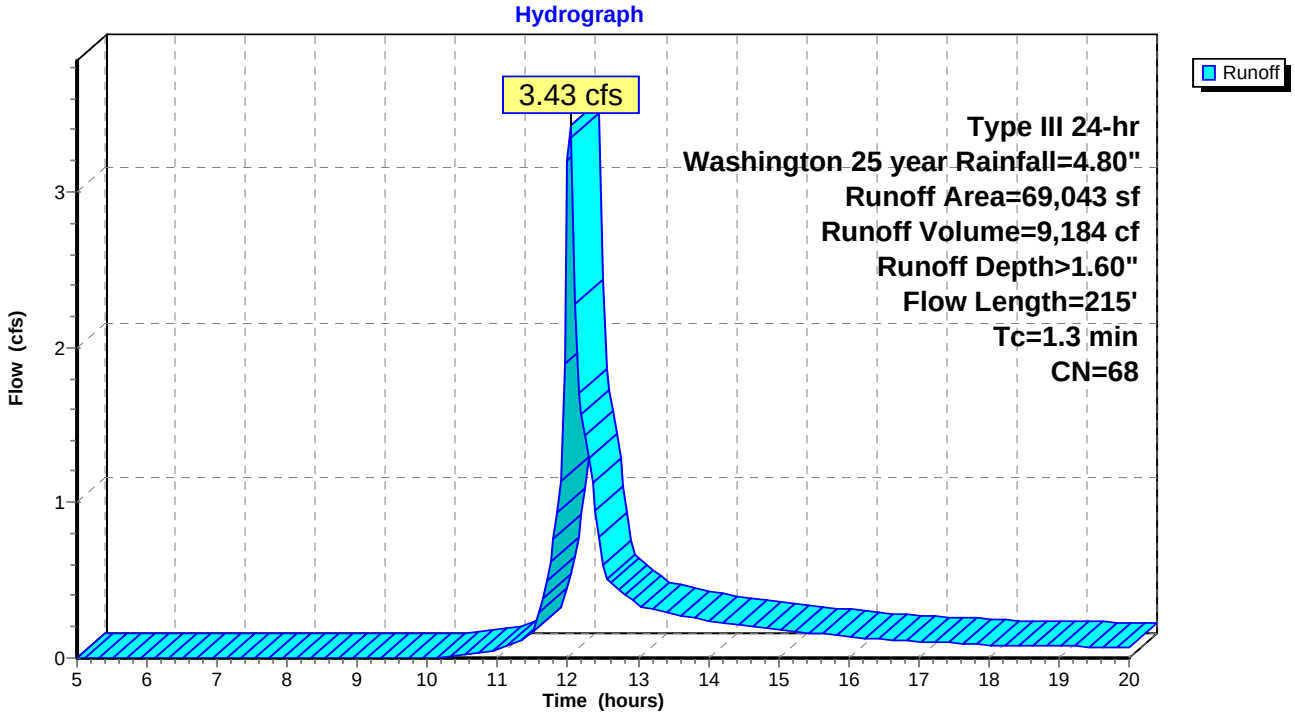
Runoff = 3.43 cfs @ 12.03 hrs, Volume= 9,184 cf, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Washington 25 year Rainfall=4.80"

| Area (sf) | CN | Description |
|---|---|---|
| 14,805 | 98 | Roofs, HSG A |
| 11,480 | 98 | Paved parking, HSG A |
| 42,758 | 49 | 50-75% Grass cover, Fair, HSG A |
| 69,043 | 68 | Weighted Average |
| 42,758 | | 61.93% Pervious Area |
| 26,285 | | 38.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.0 | 100 | 0.0400 | 1.70 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80" |
| 0.1 | 40 | 0.0100 | 5.26 | 6.46 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 0.2 | 75 | 0.0100 | 5.26 | 6.46 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 1.3 | 215 | Total | | | |

## Subcatchment AE: Area Filter E



## Summary for Pond FA: Filter A

Inflow Area = 60,113 sf, 43.94% Impervious, Inflow Depth > 1.81" for Washington 25 year event
Inflow = 2.45 cfs @ 12.19 hrs, Volume= 9,048 cf
Outflow = 1.25 cfs @ 12.50 hrs, Volume= 5,587 cf, Atten= 49%, Lag= 18.2 min
Primary = 1.25 cfs @ 12.50 hrs, Volume= 5,587 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 54.21' @ 12.50 hrs Surf.Area= 3,274 sf Storage= 3,762 cf
Flood Elev= 54.60' Surf.Area= 3,544 sf Storage= 4,926 cf

Plug-Flow detention time= 137.6 min calculated for 5,587 cf (62% of inflow)
Center-of-Mass det. time= 60.4 min ( 873.2 - 812.7 )

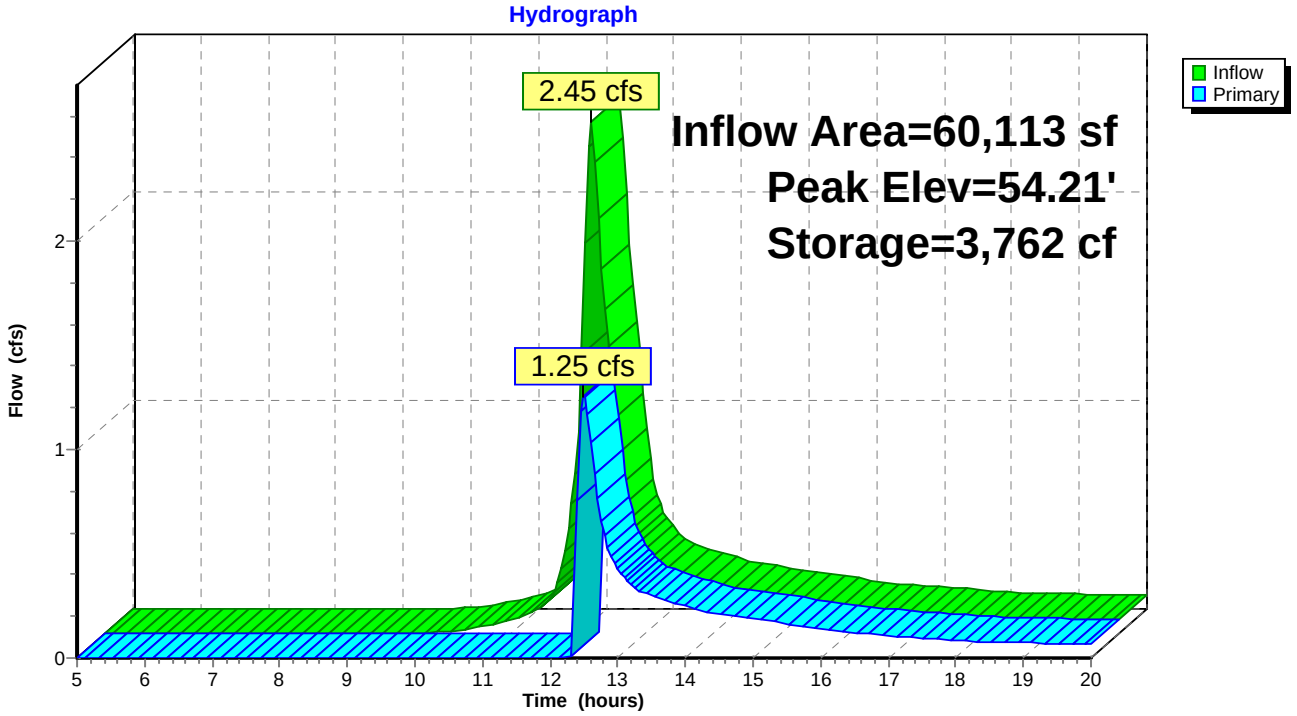
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 52.80' | 4,926 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 52.80 | 2,093 | 260.0 | 0 | 0 | 2,093 |
| 53.55 | 2,694 | 274.0 | 1,790 | 1,790 | 2,721 |
| 54.10 | 3,214 | 284.4 | 1,623 | 3,413 | 3,208 |
| 54.30 | 3,327 | 288.0 | 654 | 4,067 | 3,381 |
| 54.55 | 3,544 | 293.0 | 859 | 4,926 | 3,624 |

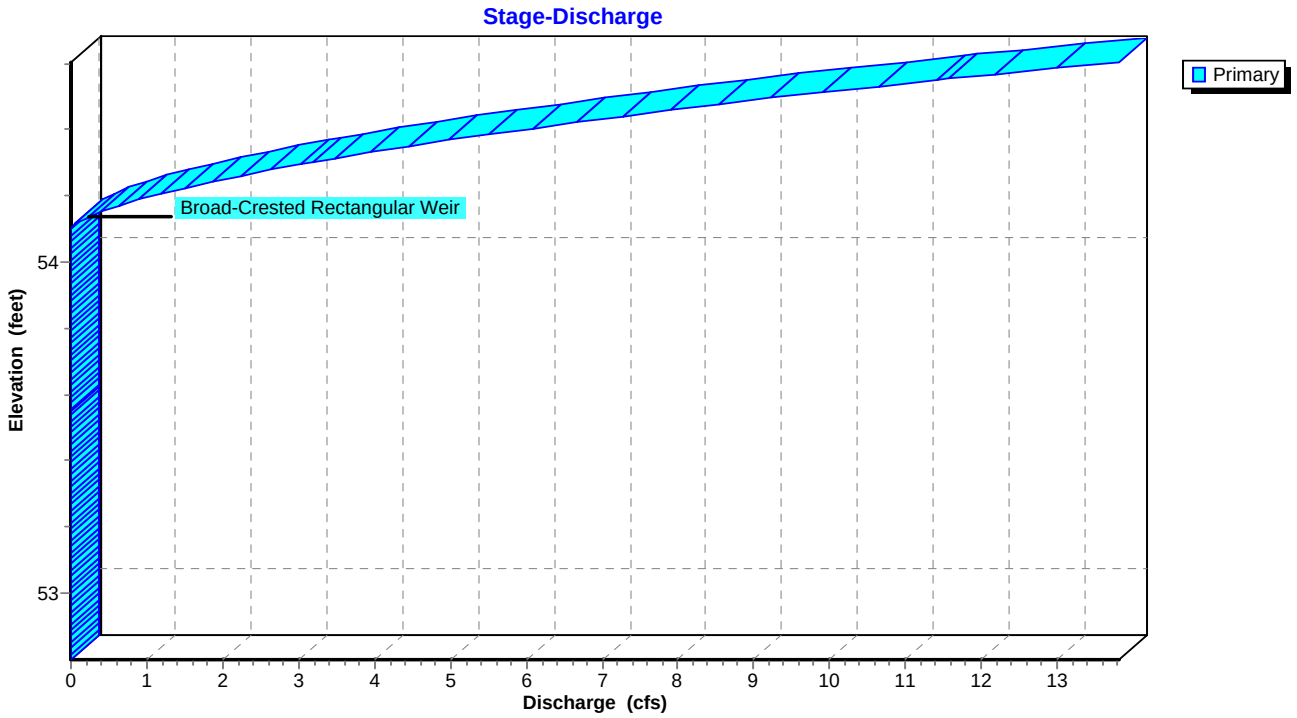
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 54.10' | **15.0' long x 6.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83 |

**Primary OutFlow** Max=1.25 cfs @ 12.50 hrs HW=54.21' (Free Discharge)
**1=Broad-Crested Rectangular Weir** (Weir Controls 1.25 cfs @ 0.78 fps)

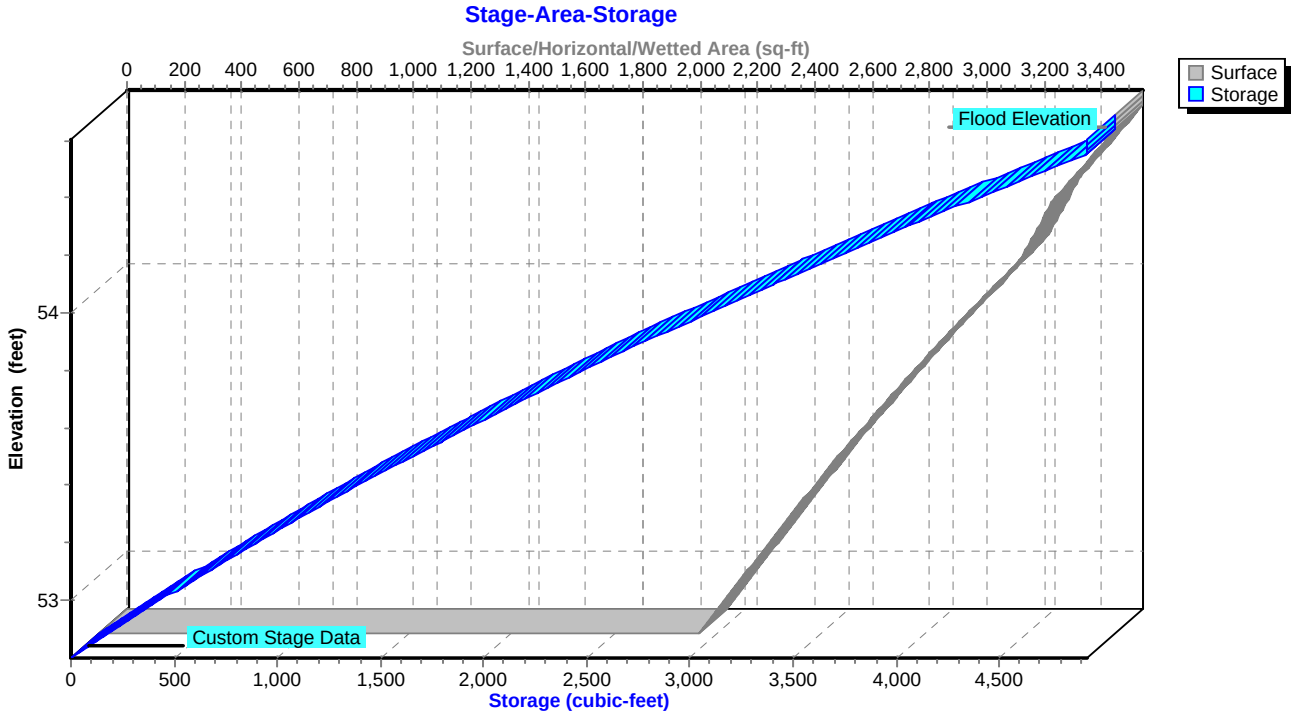
## Pond FA: Filter A




## Pond FA: Filter A



## Pond FA: Filter A



## Stage-Area-Storage for Pond FA: Filter A

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 52.80 | 2,093 | 0 |
| 52.82 | 2,108 | 42 |
| 52.84 | 2,123 | 84 |
| 52.86 | 2,138 | 127 |
| 52.88 | 2,153 | 170 |
| 52.90 | 2,169 | 213 |
| 52.92 | 2,184 | 257 |
| 52.94 | 2,199 | 300 |
| 52.96 | 2,215 | 345 |
| 52.98 | 2,230 | 389 |
| 53.00 | 2,246 | 434 |
| 53.02 | 2,261 | 479 |
| 53.04 | 2,277 | 524 |
| 53.06 | 2,293 | 570 |
| 53.08 | 2,309 | 616 |
| 53.10 | 2,324 | 662 |
| 53.12 | 2,340 | 709 |
| 53.14 | 2,356 | 756 |
| 53.16 | 2,372 | 803 |
| 53.18 | 2,388 | 851 |
| 53.20 | 2,404 | 899 |
| 53.22 | 2,420 | 947 |
| 53.24 | 2,436 | 996 |
| 53.26 | 2,453 | 1,044 |
| 53.28 | 2,469 | 1,094 |
| 53.30 | 2,485 | 1,143 |
| 53.32 | 2,502 | 1,193 |
| 53.34 | 2,518 | 1,243 |
| 53.36 | 2,535 | 1,294 |
| 53.38 | 2,551 | 1,345 |
| 53.40 | 2,568 | 1,396 |
| 53.42 | 2,584 | 1,447 |
| 53.44 | 2,601 | 1,499 |
| 53.46 | 2,618 | 1,551 |
| 53.48 | 2,635 | 1,604 |
| 53.50 | 2,652 | 1,657 |
| 53.52 | 2,669 | 1,710 |
| 53.54 | 2,685 | 1,763 |
| 53.56 | 2,703 | 1,817 |
| 53.58 | 2,721 | 1,872 |
| 53.60 | 2,739 | 1,926 |
| 53.62 | 2,758 | 1,981 |
| 53.64 | 2,776 | 2,037 |
| 53.66 | 2,794 | 2,092 |
| 53.68 | 2,813 | 2,148 |
| 53.70 | 2,831 | 2,205 |
| 53.72 | 2,850 | 2,262 |
| 53.74 | 2,868 | 2,319 |
| 53.76 | 2,887 | 2,376 |
| 53.78 | 2,906 | 2,434 |
| 53.80 | 2,925 | 2,493 |
| 53.82 | 2,944 | 2,551 |
| 53.84 | 2,962 | 2,610 |
| 53.86 | 2,981 | 2,670 |
| 53.88 | 3,000 | 2,730 |
| 53.90 | 3,020 | 2,790 |
| 53.92 | 3,039 | 2,850 |
| 53.94 | 3,058 | 2,911 |
| 53.96 | 3,077 | 2,973 |
| 53.98 | 3,097 | 3,034 |
| 54.00 | 3,116 | 3,096 |
| 54.02 | 3,136 | 3,159 |
| 54.04 | 3,155 | 3,222 |
| 54.06 | 3,175 | 3,285 |
| 54.08 | 3,194 | 3,349 |
| 54.10 | 3,214 | 3,413 |
| 54.12 | 3,225 | 3,477 |
| 54.14 | 3,236 | 3,542 |
| 54.16 | 3,248 | 3,607 |
| 54.18 | 3,259 | 3,672 |
| 54.20 | 3,270 | 3,737 |
| 54.22 | 3,282 | 3,803 |
| 54.24 | 3,293 | 3,868 |
| 54.26 | 3,304 | 3,934 |
| 54.28 | 3,316 | 4,001 |
| 54.30 | 3,327 | 4,067 |
| 54.32 | 3,344 | 4,134 |
| 54.34 | 3,361 | 4,201 |
| 54.36 | 3,378 | 4,268 |
| 54.38 | 3,396 | 4,336 |
| 54.40 | 3,413 | 4,404 |
| 54.42 | 3,430 | 4,472 |
| 54.44 | 3,448 | 4,541 |
| 54.46 | 3,465 | 4,610 |
| 54.48 | 3,483 | 4,680 |
| 54.50 | 3,500 | 4,750 |
| 54.52 | 3,518 | 4,820 |
| 54.54 | **3,535** | **4,890** |
| 54.56 | **3,544** | **4,926** |
| 54.58 | 3,544 | 4,926 |
| 54.60 | 3,544 | 4,926 |

## Summary for Pond FB: Filter B

Inflow Area = 33,645 sf, 64.02% Impervious, Inflow Depth > 2.53" for Washington 25 year event
Inflow = 2.02 cfs @ 12.17 hrs, Volume= 7,102 cf
Outflow = 1.12 cfs @ 12.40 hrs, Volume= 4,198 cf, Atten= 45%, Lag= 14.3 min
Primary = 1.12 cfs @ 12.40 hrs, Volume= 4,198 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 59.40' @ 12.40 hrs Surf.Area= 2,975 sf Storage= 3,164 cf
Flood Elev= 59.90' Surf.Area= 3,747 sf Storage= 4,848 cf

Plug-Flow detention time= 140.1 min calculated for 4,184 cf (59% of inflow)
Center-of-Mass det. time= 65.5 min ( 858.6 - 793.0 )

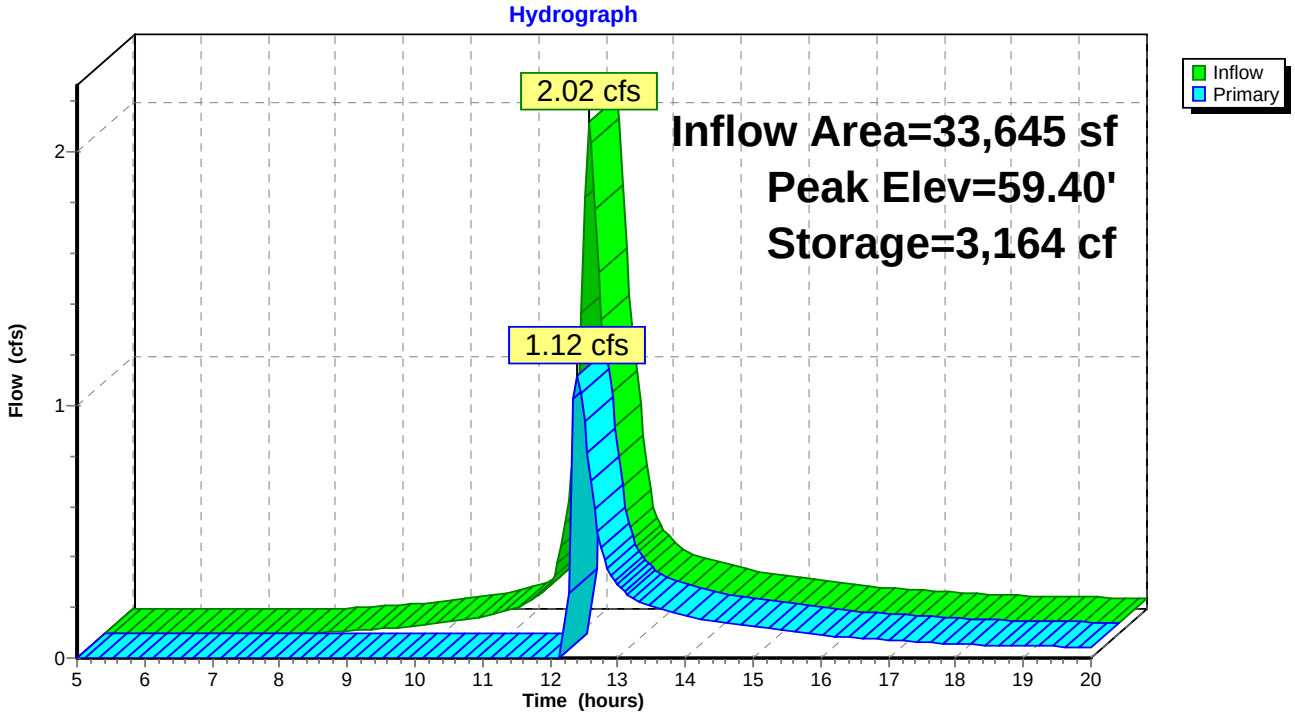
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 58.00' | 5,231 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 58.00 | 1,769 | 209.7 | 0 | 0 | 1,769 |
| 58.75 | 2,257 | 223.8 | 1,506 | 1,506 | 2,282 |
| 59.00 | 2,427 | 228.5 | 585 | 2,091 | 2,460 |
| 60.00 | 3,911 | 266.0 | 3,140 | 5,231 | 3,956 |

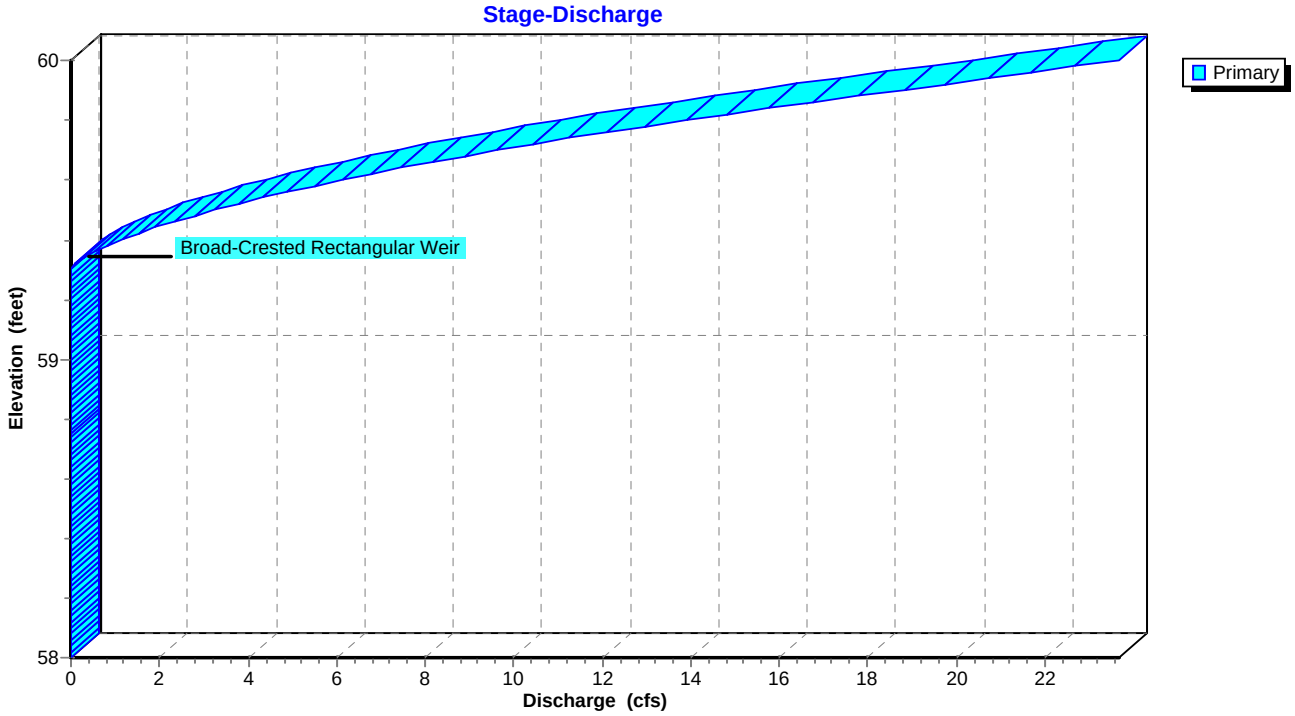
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 59.30' | **15.0' long x 8.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74 |

**Primary OutFlow** Max=1.11 cfs @ 12.40 hrs HW=59.40' (Free Discharge)
**1=Broad-Crested Rectangular Weir** (Weir Controls 1.11 cfs @ 0.76 fps)

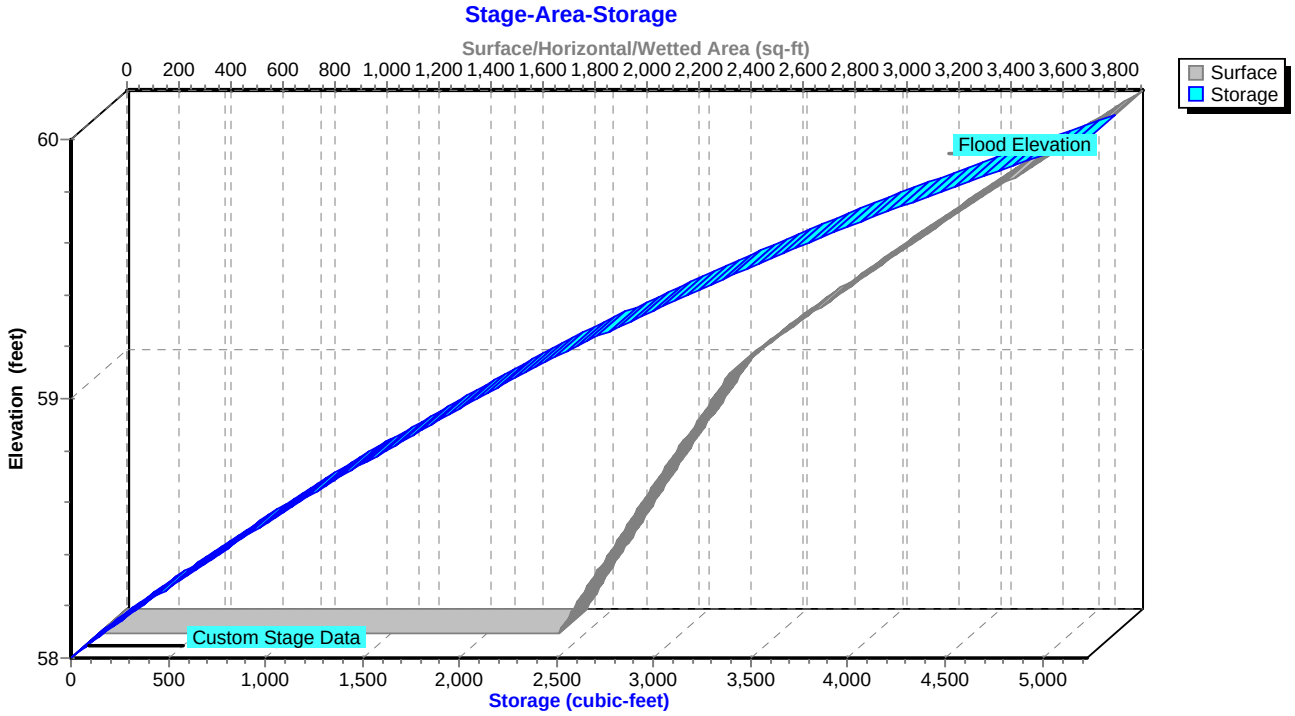
## Pond FB: Filter B




## Pond FB: Filter B



## Pond FB: Filter B



## Stage-Area-Storage for Pond FB: Filter B

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 58.00 | 1,769 | 0 |
| 58.02 | 1,781 | 36 |
| 58.04 | 1,794 | 71 |
| 58.06 | 1,806 | 107 |
| 58.08 | 1,818 | 143 |
| 58.10 | 1,831 | 180 |
| 58.12 | 1,843 | 217 |
| 58.14 | 1,856 | 254 |
| 58.16 | 1,868 | 291 |
| 58.18 | 1,881 | 328 |
| 58.20 | 1,893 | 366 |
| 58.22 | 1,906 | 404 |
| 58.24 | 1,919 | 442 |
| 58.26 | 1,931 | 481 |
| 58.28 | 1,944 | 520 |
| 58.30 | 1,957 | 559 |
| 58.32 | 1,970 | 598 |
| 58.34 | 1,983 | 637 |
| 58.36 | 1,996 | 677 |
| 58.38 | 2,009 | 717 |
| 58.40 | 2,022 | 758 |
| 58.42 | 2,035 | 798 |
| 58.44 | 2,048 | 839 |
| 58.46 | 2,061 | 880 |
| 58.48 | 2,074 | 921 |
| 58.50 | 2,088 | 963 |
| 58.52 | 2,101 | 1,005 |
| 58.54 | 2,114 | 1,047 |
| 58.56 | 2,128 | 1,090 |
| 58.58 | 2,141 | 1,132 |
| 58.60 | 2,155 | 1,175 |
| 58.62 | 2,168 | 1,218 |
| 58.64 | 2,182 | 1,262 |
| 58.66 | 2,195 | 1,306 |
| 58.68 | 2,209 | 1,350 |
| 58.70 | 2,223 | 1,394 |
| 58.72 | 2,236 | 1,439 |
| 58.74 | 2,250 | 1,484 |
| 58.76 | 2,264 | 1,529 |
| 58.78 | 2,277 | 1,574 |
| 58.80 | 2,291 | 1,620 |
| 58.82 | 2,304 | 1,666 |
| 58.84 | 2,317 | 1,712 |
| 58.86 | 2,331 | 1,758 |
| 58.88 | 2,345 | 1,805 |
| 58.90 | 2,358 | 1,852 |
| 58.92 | 2,372 | 1,899 |
| 58.94 | 2,386 | 1,947 |
| 58.96 | 2,399 | 1,995 |
| 58.98 | 2,413 | 2,043 |
| 59.00 | 2,427 | 2,091 |
| 59.02 | 2,453 | 2,140 |
| 59.04 | 2,480 | 2,190 |
| 59.06 | 2,506 | 2,239 |
| 59.08 | 2,533 | 2,290 |
| 59.10 | 2,560 | 2,341 |
| 59.12 | 2,586 | 2,392 |
| 59.14 | 2,614 | 2,444 |
| 59.16 | 2,641 | 2,497 |
| 59.18 | 2,668 | 2,550 |
| 59.20 | 2,696 | 2,603 |
| 59.22 | 2,723 | 2,658 |
| 59.24 | 2,751 | 2,712 |
| 59.26 | 2,779 | 2,768 |
| 59.28 | 2,807 | 2,824 |
| 59.30 | 2,835 | 2,880 |
| 59.32 | 2,864 | 2,937 |
| 59.34 | 2,892 | 2,994 |
| 59.36 | 2,921 | 3,053 |
| 59.38 | 2,949 | 3,111 |
| 59.40 | 2,978 | 3,171 |
| 59.42 | 3,007 | 3,230 |
| 59.44 | 3,037 | 3,291 |
| 59.46 | 3,066 | 3,352 |
| 59.48 | 3,095 | 3,414 |
| 59.50 | 3,125 | 3,476 |
| 59.52 | 3,155 | 3,539 |
| 59.54 | 3,185 | 3,602 |
| 59.56 | 3,215 | 3,666 |
| 59.58 | 3,245 | 3,731 |
| 59.60 | 3,275 | 3,796 |
| 59.62 | 3,306 | 3,862 |
| 59.64 | 3,336 | 3,928 |
| 59.66 | 3,367 | 3,995 |
| 59.68 | 3,398 | 4,063 |
| 59.70 | 3,429 | 4,131 |
| 59.72 | 3,460 | 4,200 |
| 59.74 | 3,491 | 4,269 |
| 59.76 | 3,523 | 4,339 |
| 59.78 | 3,554 | 4,410 |
| 59.80 | 3,586 | 4,482 |
| 59.82 | 3,618 | 4,554 |
| 59.84 | 3,650 | 4,626 |
| 59.86 | 3,682 | 4,700 |
| 59.88 | 3,714 | 4,774 |
| 59.90 | 3,747 | 4,848 |
| 59.92 | 3,779 | 4,923 |
| 59.94 | 3,812 | 4,999 |
| 59.96 | 3,845 | 5,076 |
| 59.98 | 3,878 | 5,153 |
| 60.00 | **3,911** | **5,231** |

## Summary for Pond FC: Filter C

Inflow Area = 33,249 sf, 34.57% Impervious, Inflow Depth > 1.45" for Washington 25 year event
Inflow = 1.08 cfs @ 12.19 hrs, Volume= 4,018 cf
Outflow = 0.39 cfs @ 12.61 hrs, Volume= 2,274 cf, Atten= 64%, Lag= 25.7 min
Primary = 0.39 cfs @ 12.61 hrs, Volume= 2,274 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 24.35' @ 12.61 hrs Surf.Area= 1,683 sf Storage= 1,815 cf
Flood Elev= 24.80' Surf.Area= 1,913 sf Storage= 2,626 cf

Plug-Flow detention time= 158.3 min calculated for 2,274 cf (57% of inflow)
Center-of-Mass det. time= 73.8 min ( 895.9 - 822.0 )

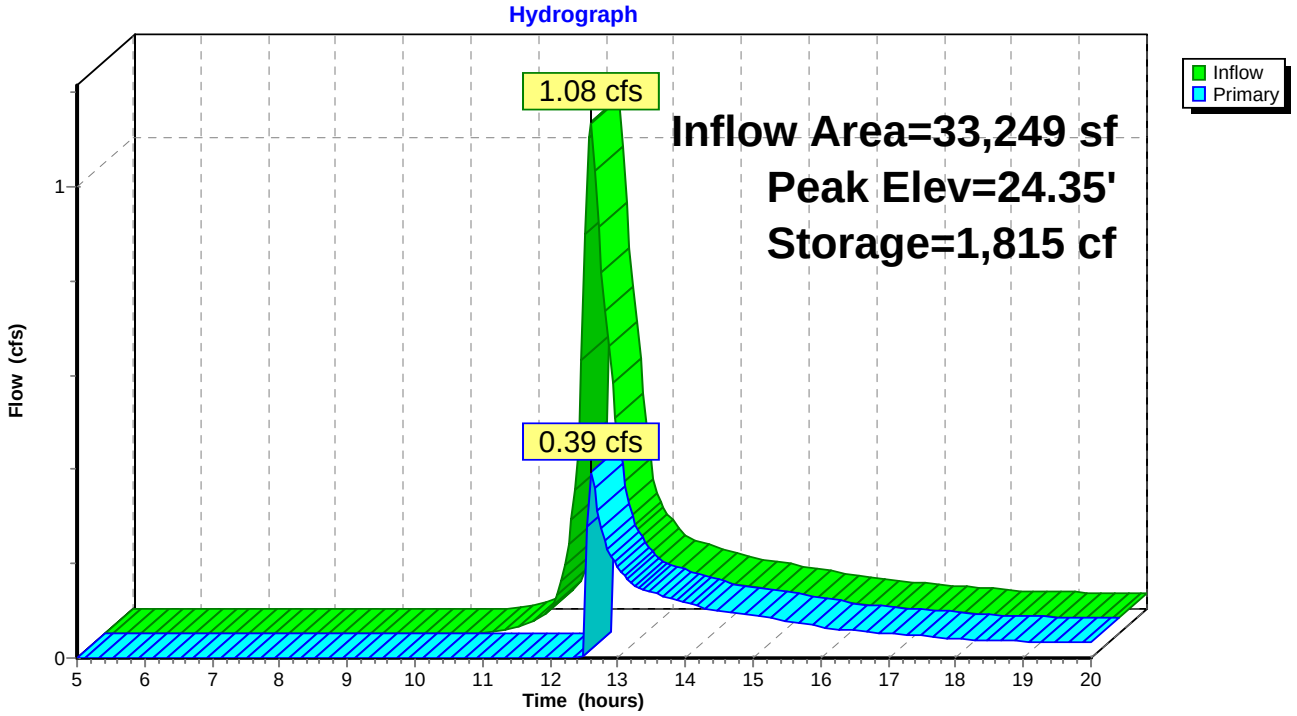
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 23.00' | 3,020 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 23.00 | 1,069 | 139.7 | 0 | 0 | 1,069 |
| 23.75 | 1,339 | 153.8 | 901 | 901 | 1,416 |
| 24.00 | 1,516 | 158.5 | 357 | 1,258 | 1,539 |
| 25.00 | 2,020 | 177.4 | 1,762 | 3,020 | 2,072 |

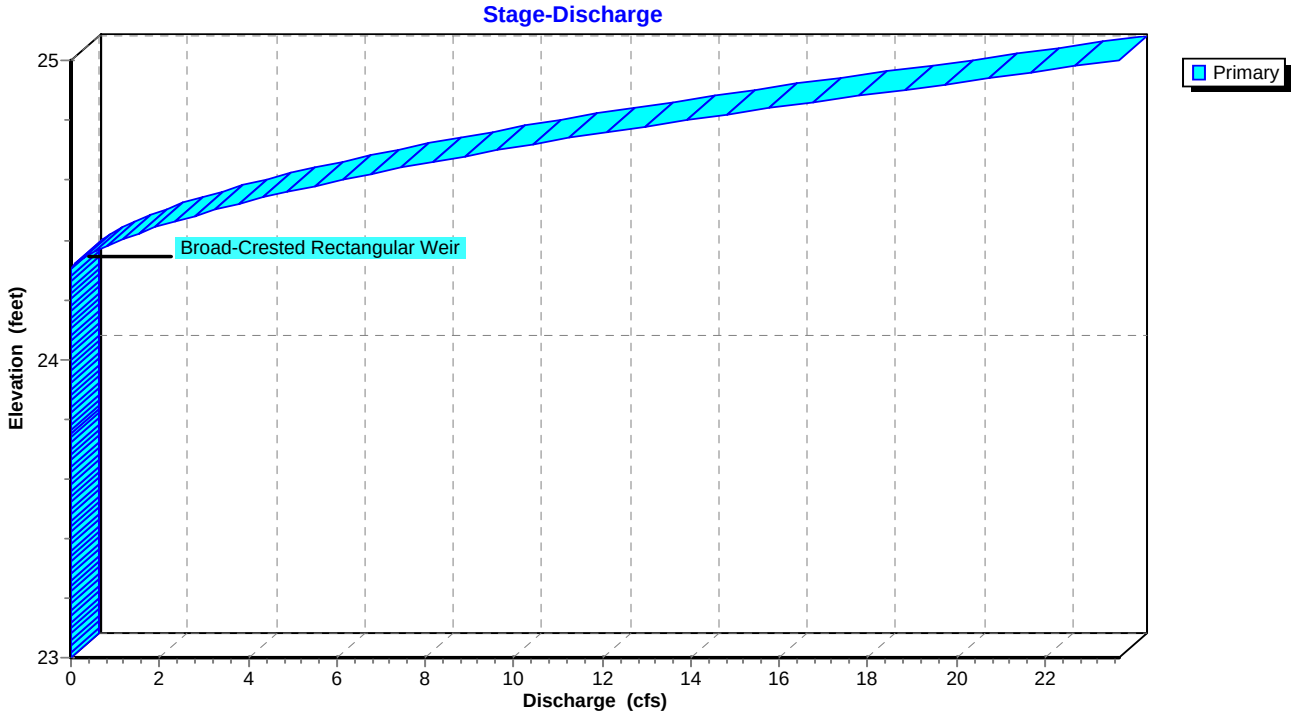
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 24.30' | **15.0' long x 8.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74 |

**Primary OutFlow** Max=0.37 cfs @ 12.61 hrs HW=24.35' (Free Discharge)
**1=Broad-Crested Rectangular Weir** (Weir Controls 0.37 cfs @ 0.53 fps)

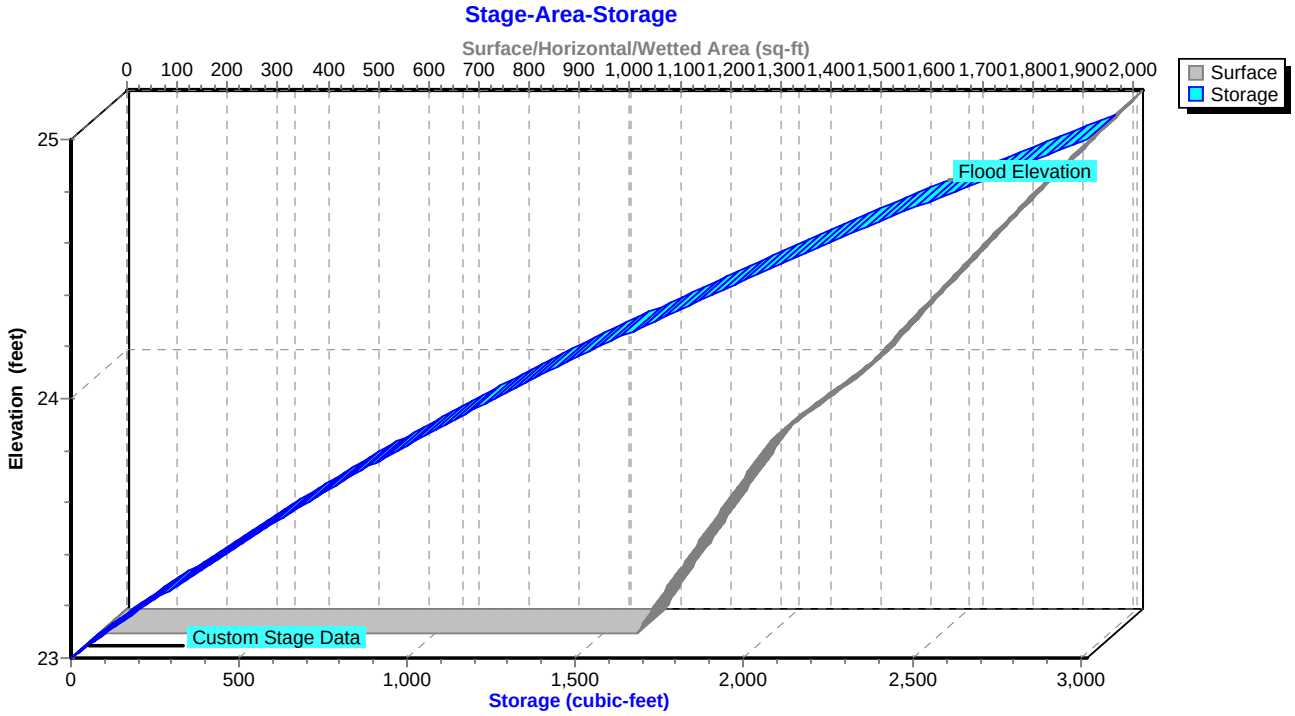
## Pond FC: Filter C




## Pond FC: Filter C



## Pond FC: Filter C



## Stage-Area-Storage for Pond FC: Filter C

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 23.00 | 1,069 | 0 |
| 23.02 | 1,076 | 21 |
| 23.04 | 1,083 | 43 |
| 23.06 | 1,089 | 65 |
| 23.08 | 1,096 | 87 |
| 23.10 | 1,103 | 109 |
| 23.12 | 1,110 | 131 |
| 23.14 | 1,117 | 153 |
| 23.16 | 1,124 | 175 |
| 23.18 | 1,131 | 198 |
| 23.20 | 1,138 | 221 |
| 23.22 | 1,145 | 243 |
| 23.24 | 1,152 | 266 |
| 23.26 | 1,159 | 290 |
| 23.28 | 1,166 | 313 |
| 23.30 | 1,173 | 336 |
| 23.32 | 1,180 | 360 |
| 23.34 | 1,188 | 383 |
| 23.36 | 1,195 | 407 |
| 23.38 | 1,202 | 431 |
| 23.40 | 1,209 | 455 |
| 23.42 | 1,216 | 480 |
| 23.44 | 1,224 | 504 |
| 23.46 | 1,231 | 529 |
| 23.48 | 1,238 | 553 |
| 23.50 | 1,246 | 578 |
| 23.52 | 1,253 | 603 |
| 23.54 | 1,260 | 628 |
| 23.56 | 1,268 | 653 |
| 23.58 | 1,275 | 679 |
| 23.60 | 1,283 | 704 |
| 23.62 | 1,290 | 730 |
| 23.64 | 1,297 | 756 |
| 23.66 | 1,305 | 782 |
| 23.68 | 1,313 | 808 |
| 23.70 | 1,320 | 835 |
| 23.72 | 1,328 | 861 |
| 23.74 | 1,335 | 888 |
| 23.76 | 1,346 | 915 |
| 23.78 | 1,360 | 942 |
| 23.80 | 1,374 | 969 |
| 23.82 | 1,387 | 997 |
| 23.84 | 1,401 | 1,024 |
| 23.86 | 1,416 | 1,053 |
| 23.88 | 1,430 | 1,081 |
| 23.90 | 1,444 | 1,110 |
| 23.92 | 1,458 | 1,139 |
| 23.94 | 1,473 | 1,168 |
| 23.96 | 1,487 | 1,198 |
| 23.98 | 1,501 | 1,228 |
| 24.00 | 1,516 | 1,258 |
| 24.02 | 1,525 | 1,288 |
| 24.04 | 1,535 | 1,319 |
| 24.06 | 1,544 | 1,350 |
| 24.08 | 1,554 | 1,381 |
| 24.10 | 1,563 | 1,412 |
| 24.12 | 1,573 | 1,443 |
| 24.14 | 1,582 | 1,475 |
| 24.16 | 1,592 | 1,506 |
| 24.18 | 1,601 | 1,538 |
| 24.20 | 1,611 | 1,570 |
| 24.22 | 1,621 | 1,603 |
| 24.24 | 1,630 | 1,635 |
| 24.26 | 1,640 | 1,668 |
| 24.28 | 1,650 | 1,701 |
| 24.30 | 1,660 | 1,734 |
| 24.32 | 1,669 | 1,767 |
| 24.34 | 1,679 | 1,801 |
| 24.36 | 1,689 | 1,834 |
| 24.38 | 1,699 | 1,868 |
| 24.40 | 1,709 | 1,902 |
| 24.42 | 1,719 | 1,937 |
| 24.44 | 1,729 | 1,971 |
| 24.46 | 1,739 | 2,006 |
| 24.48 | 1,749 | 2,041 |
| 24.50 | 1,759 | 2,076 |
| 24.52 | 1,769 | 2,111 |
| 24.54 | 1,779 | 2,147 |
| 24.56 | 1,789 | 2,182 |
| 24.58 | 1,800 | 2,218 |
| 24.60 | 1,810 | 2,254 |
| 24.62 | 1,820 | 2,290 |
| 24.64 | 1,830 | 2,327 |
| 24.66 | 1,841 | 2,364 |
| 24.68 | 1,851 | 2,401 |
| 24.70 | 1,861 | 2,438 |
| 24.72 | 1,872 | 2,475 |
| 24.74 | 1,882 | 2,513 |
| 24.76 | 1,892 | 2,550 |
| 24.78 | 1,903 | 2,588 |
| 24.80 | 1,913 | 2,626 |
| 24.82 | 1,924 | 2,665 |
| 24.84 | 1,935 | 2,703 |
| 24.86 | 1,945 | 2,742 |
| 24.88 | 1,956 | 2,781 |
| 24.90 | 1,966 | 2,820 |
| 24.92 | 1,977 | 2,860 |
| 24.94 | 1,988 | 2,900 |
| 24.96 | 1,998 | 2,939 |
| 24.98 | 2,009 | 2,979 |
| 25.00 | **2,020** | **3,020** |

## Summary for Pond FD: Filter D

Inflow Area = 43,560 sf, 72.20% Impervious, Inflow Depth > 2.89" for Washington 25 year event
Inflow = 2.85 cfs @ 12.18 hrs, Volume= 10,494 cf
Outflow = 2.58 cfs @ 12.26 hrs, Volume= 7,354 cf, Atten= 10%, Lag= 4.8 min
Primary = 2.58 cfs @ 12.26 hrs, Volume= 7,354 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 19.42' @ 12.26 hrs Surf.Area= 2,985 sf Storage= 3,609 cf
Flood Elev= 19.80' Surf.Area= 3,237 sf Storage= 4,789 cf

Plug-Flow detention time= 112.2 min calculated for 7,329 cf (70% of inflow)
Center-of-Mass det. time= 47.9 min ( 832.5 - 784.6 )

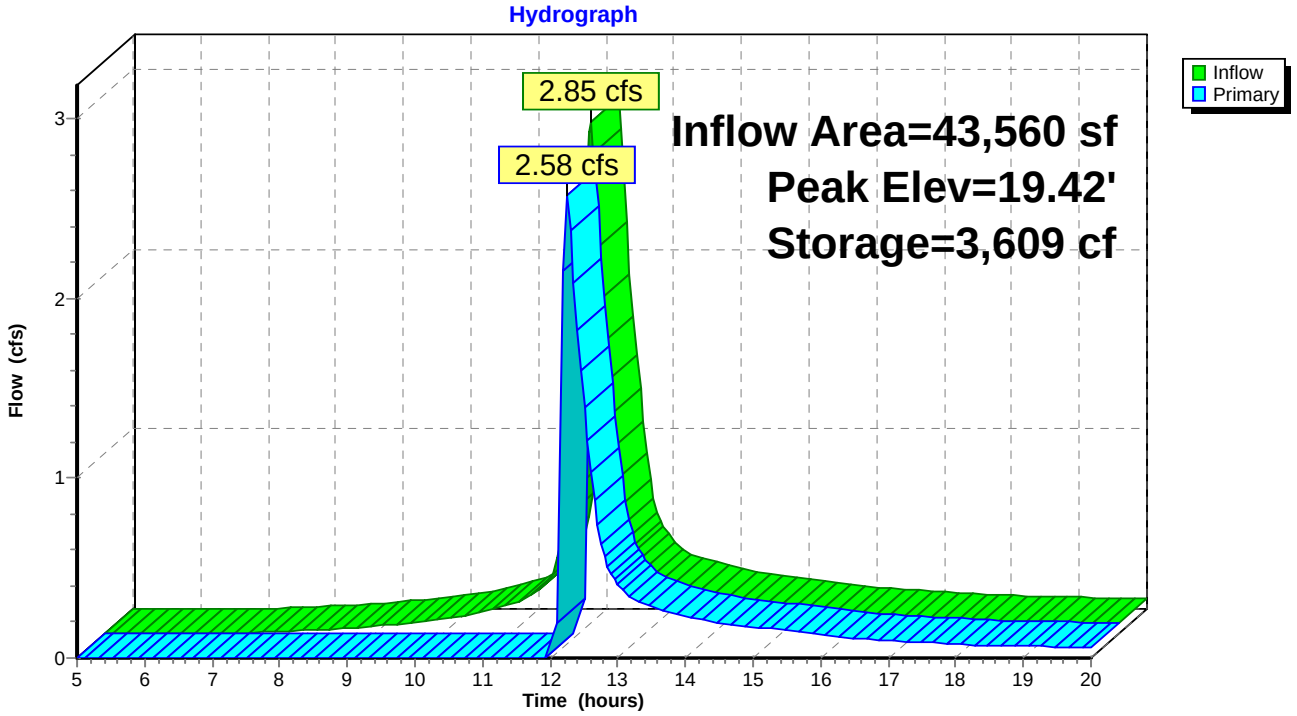
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 18.00' | 6,855 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 18.00 | 2,115 | 191.0 | 0 | 0 | 2,115 |
| 18.75 | 2,561 | 205.3 | 1,751 | 1,751 | 2,590 |
| 19.00 | 2,716 | 210.0 | 660 | 2,410 | 2,754 |
| 20.00 | 3,375 | 228.8 | 3,040 | 5,450 | 3,446 |
| 20.40 | 3,654 | 236.4 | 1,405 | 6,855 | 3,742 |

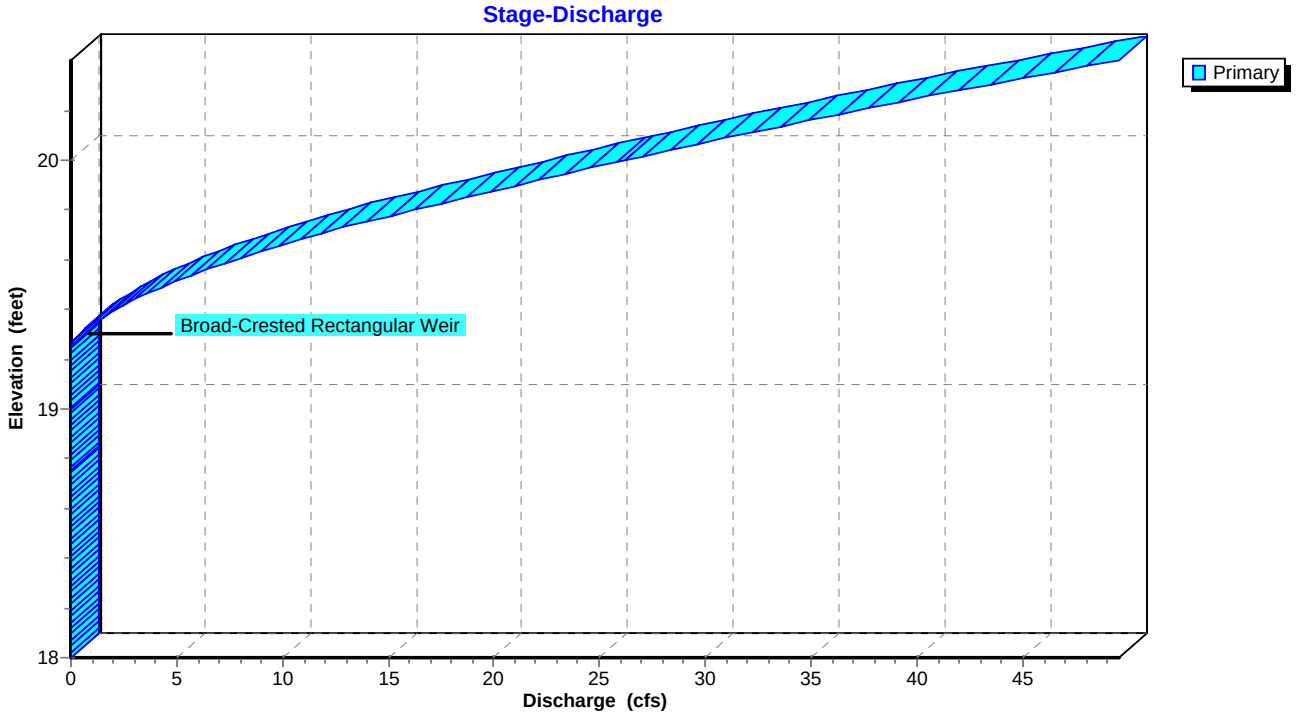
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 19.25' | **15.0' long x 8.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74 |

**Primary OutFlow** Max=2.53 cfs @ 12.26 hrs HW=19.42' (Free Discharge)
**1=Broad-Crested Rectangular Weir** (Weir Controls 2.53 cfs @ 1.00 fps)

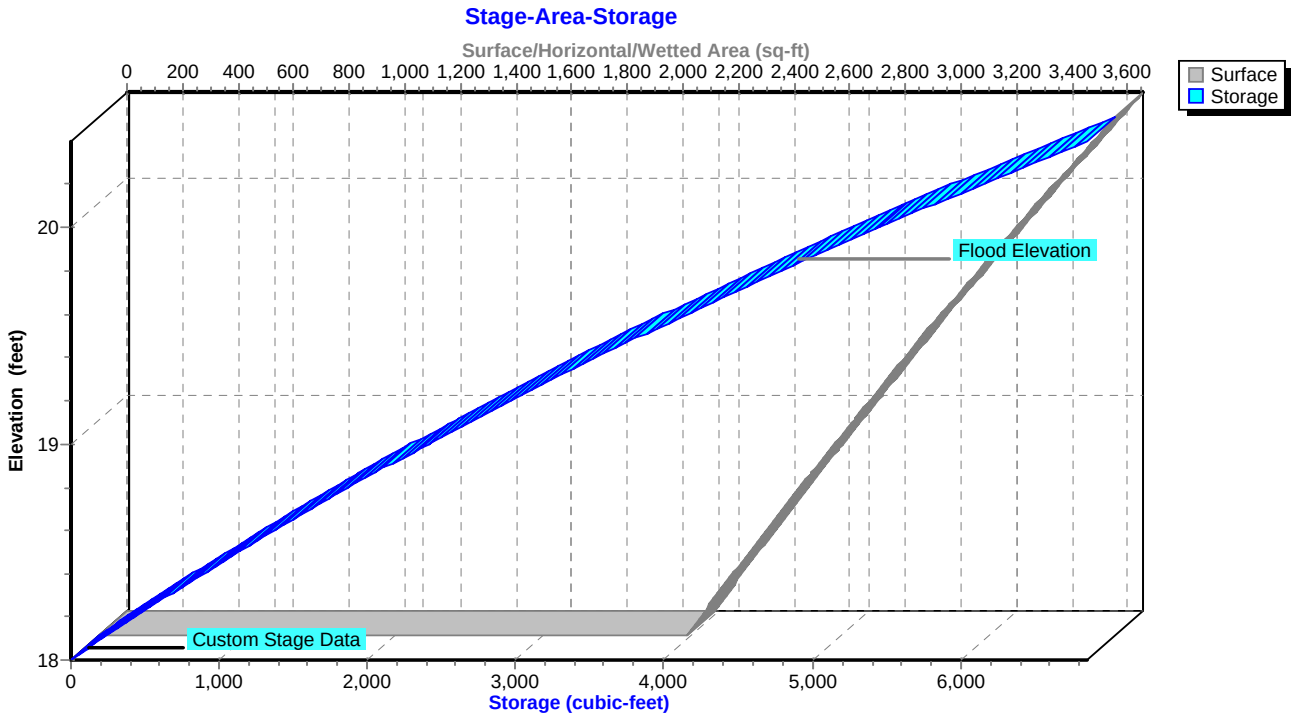
## Pond FD: Filter D




## Pond FD: Filter D



## Pond FD: Filter D



## Stage-Area-Storage for Pond FD: Filter D

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.00 | 2,115 | 0 |
| 18.05 | 2,143 | 106 |
| 18.10 | 2,172 | 214 |
| 18.15 | 2,201 | 324 |
| 18.20 | 2,230 | 434 |
| 18.25 | 2,259 | 547 |
| 18.30 | 2,288 | 660 |
| 18.35 | 2,318 | 775 |
| 18.40 | 2,348 | 892 |
| 18.45 | 2,377 | 1,010 |
| 18.50 | 2,408 | 1,130 |
| 18.55 | 2,438 | 1,251 |
| 18.60 | 2,468 | 1,374 |
| 18.65 | 2,499 | 1,498 |
| 18.70 | 2,530 | 1,624 |
| 18.75 | 2,561 | 1,751 |
| 18.80 | 2,592 | 1,880 |
| 18.85 | 2,622 | 2,010 |
| 18.90 | 2,653 | 2,142 |
| 18.95 | 2,685 | 2,275 |
| 19.00 | 2,716 | 2,410 |
| 19.05 | 2,747 | 2,547 |
| 19.10 | 2,779 | 2,685 |
| 19.15 | 2,810 | 2,825 |
| 19.20 | 2,842 | 2,966 |
| 19.25 | 2,874 | 3,109 |
| 19.30 | 2,906 | 3,254 |
| 19.35 | 2,939 | 3,400 |
| 19.40 | 2,971 | 3,547 |
| 19.45 | 3,004 | 3,697 |
| 19.50 | 3,037 | 3,848 |
| 19.55 | 3,070 | 4,000 |
| 19.60 | 3,103 | 4,155 |
| 19.65 | 3,136 | 4,311 |
| 19.70 | 3,170 | 4,468 |
| 19.75 | 3,204 | 4,628 |
| 19.80 | 3,237 | 4,789 |
| 19.85 | 3,272 | 4,951 |
| 19.90 | 3,306 | 5,116 |
| 19.95 | 3,340 | 5,282 |
| 20.00 | 3,375 | 5,450 |
| 20.05 | 3,409 | 5,620 |
| 20.10 | 3,444 | 5,791 |
| 20.15 | 3,478 | 5,964 |
| 20.20 | 3,513 | 6,139 |
| 20.25 | 3,548 | 6,315 |
| 20.30 | 3,583 | 6,493 |
| 20.35 | 3,619 | 6,674 |
| 20.40 | **3,654** | **6,855** |

## Summary for Pond FE: Filter E

Inflow Area = 69,043 sf, 38.07% Impervious, Inflow Depth > 1.60" for Washington 25 year event
Inflow = 3.43 cfs @ 12.03 hrs, Volume= 9,184 cf
Outflow = 1.50 cfs @ 12.30 hrs, Volume= 5,810 cf, Atten= 56%, Lag= 16.1 min
Primary = 1.50 cfs @ 12.30 hrs, Volume= 5,810 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 16.92' @ 12.30 hrs Surf.Area= 2,994 sf Storage= 3,626 cf
Flood Elev= 15.90' Surf.Area= 2,419 sf Storage= 924 cf

Plug-Flow detention time= 136.6 min calculated for 5,791 cf (63% of inflow)
Center-of-Mass det. time= 58.7 min ( 868.3 - 809.6 )

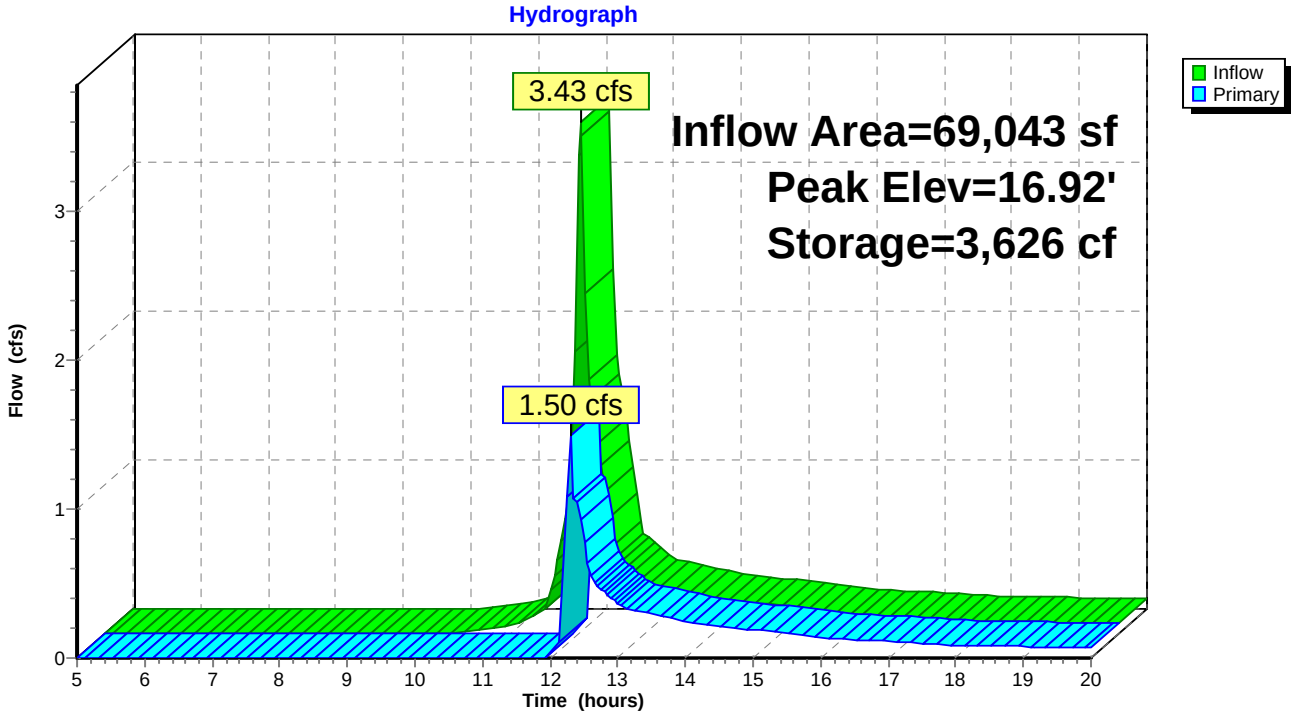
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 15.50' | 3,626 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 15.50 | 2,205 | 174.6 | 0 | 0 | 2,205 |
| 16.00 | 2,474 | 184.0 | 1,169 | 1,169 | 2,488 |
| 16.25 | 2,614 | 188.8 | 636 | 1,805 | 2,638 |
| 16.90 | 2,994 | 2,994.3 | 1,821 | 3,626 | 713,280 |

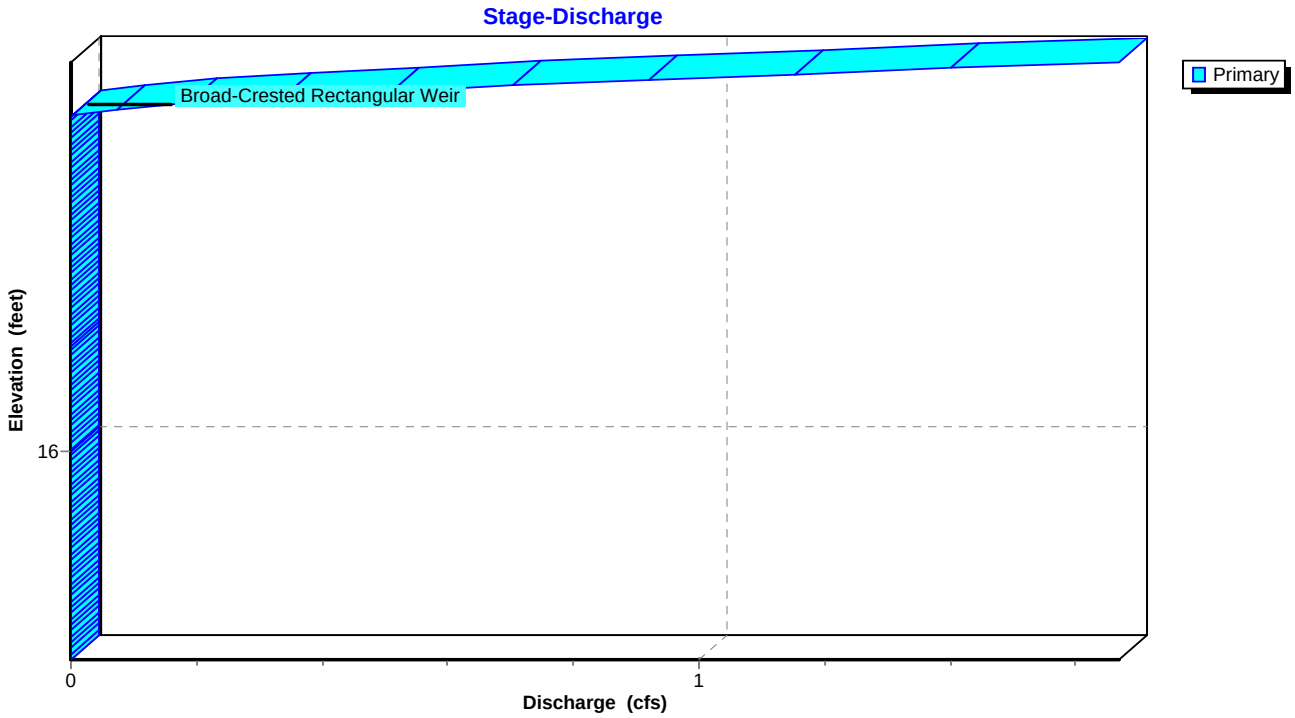
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 16.80' | **15.0' long x 8.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74 |

**Primary OutFlow** Max=1.49 cfs @ 12.30 hrs HW=16.92' (Free Discharge)
**1=Broad-Crested Rectangular Weir** (Weir Controls 1.49 cfs @ 0.84 fps)

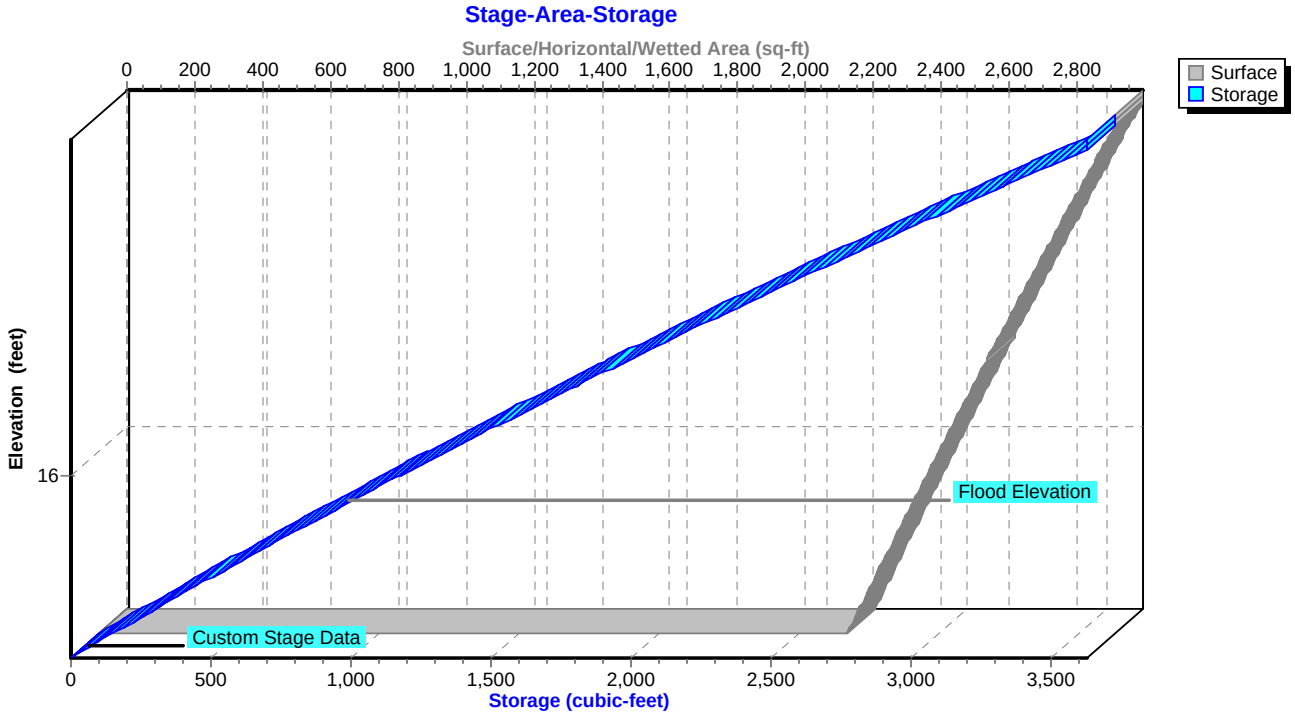
## Pond FE: Filter E




## Pond FE: Filter E

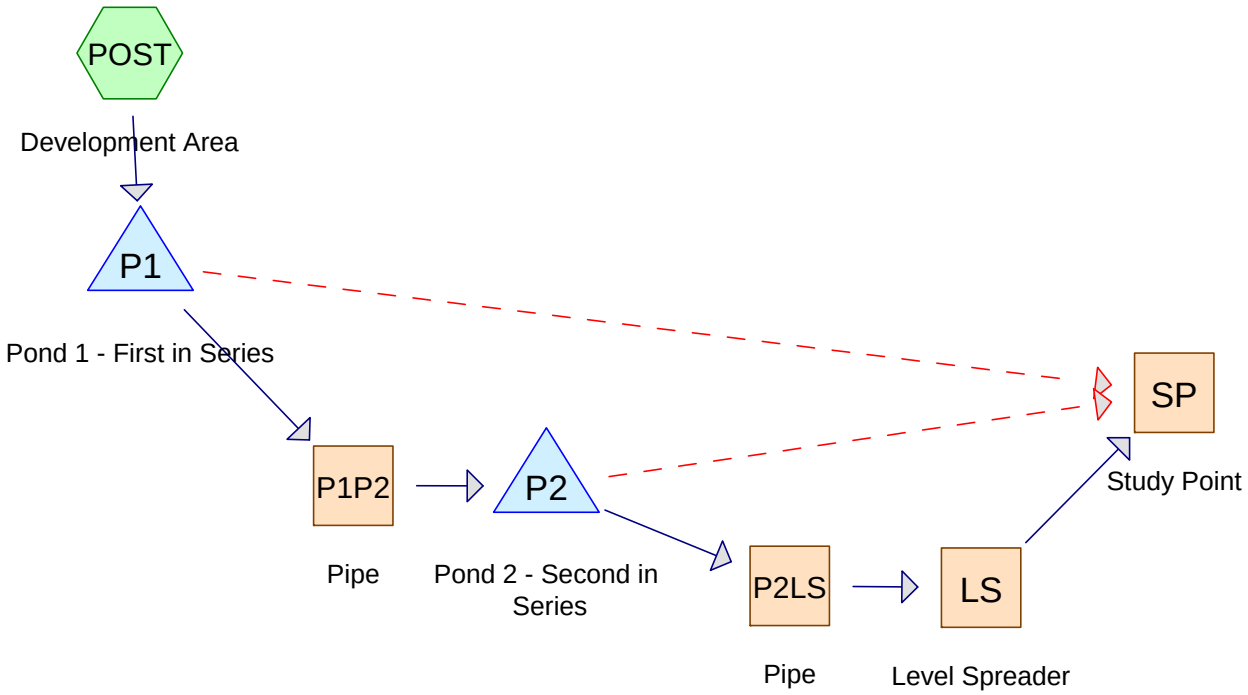


## Pond FE: Filter E



## Stage-Area-Storage for Pond FE: Filter E

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 15.50 | 2,205 | 0 |
| 15.52 | 2,215 | 44 |
| 15.54 | 2,226 | 89 |
| 15.56 | 2,236 | 133 |
| 15.58 | 2,247 | 178 |
| 15.60 | 2,258 | 223 |
| 15.62 | 2,268 | 268 |
| 15.64 | 2,279 | 314 |
| 15.66 | 2,289 | 360 |
| 15.68 | 2,300 | 405 |
| 15.70 | 2,311 | 452 |
| 15.72 | 2,321 | 498 |
| 15.74 | 2,332 | 544 |
| 15.76 | 2,343 | 591 |
| 15.78 | 2,354 | 638 |
| 15.80 | 2,365 | 685 |
| 15.82 | 2,375 | 733 |
| 15.84 | 2,386 | 780 |
| 15.86 | 2,397 | 828 |
| 15.88 | 2,408 | 876 |
| 15.90 | 2,419 | 924 |
| 15.92 | 2,430 | 973 |
| 15.94 | 2,441 | 1,022 |
| 15.96 | 2,452 | 1,071 |
| 15.98 | 2,463 | 1,120 |
| 16.00 | 2,474 | 1,169 |
| 16.02 | 2,485 | 1,219 |
| 16.04 | 2,496 | 1,269 |
| 16.06 | 2,507 | 1,319 |
| 16.08 | 2,518 | 1,369 |
| 16.10 | 2,530 | 1,419 |
| 16.12 | 2,541 | 1,470 |
| 16.14 | 2,552 | 1,521 |
| 16.16 | 2,563 | 1,572 |
| 16.18 | 2,574 | 1,623 |
| 16.20 | 2,586 | 1,675 |
| 16.22 | 2,597 | 1,727 |
| 16.24 | 2,608 | 1,779 |
| 16.26 | 2,620 | 1,831 |
| 16.28 | 2,631 | 1,884 |
| 16.30 | 2,642 | 1,936 |
| 16.32 | 2,654 | 1,989 |
| 16.34 | 2,665 | 2,043 |
| 16.36 | 2,676 | 2,096 |
| 16.38 | 2,688 | 2,150 |
| 16.40 | 2,699 | 2,204 |
| 16.42 | 2,711 | 2,258 |
| 16.44 | 2,722 | 2,312 |
| 16.46 | 2,734 | 2,367 |
| 16.48 | 2,746 | 2,421 |
| 16.50 | 2,757 | 2,476 |
| 16.52 | 2,769 | 2,532 |
| 16.54 | 2,780 | 2,587 |
| 16.56 | 2,792 | 2,643 |
| 16.58 | 2,804 | 2,699 |
| 16.60 | 2,815 | 2,755 |
| 16.62 | 2,827 | 2,811 |
| 16.64 | 2,839 | 2,868 |
| 16.66 | 2,851 | 2,925 |
| 16.68 | 2,862 | 2,982 |
| 16.70 | 2,874 | 3,039 |
| 16.72 | 2,886 | 3,097 |
| 16.74 | 2,898 | 3,155 |
| 16.76 | 2,910 | 3,213 |
| 16.78 | 2,922 | 3,271 |
| 16.80 | 2,934 | 3,330 |
| 16.82 | 2,946 | 3,389 |
| 16.84 | 2,958 | 3,448 |
| 16.86 | 2,970 | 3,507 |
| 16.88 | 2,982 | 3,566 |
| 16.90 | **2,994** | **3,626** |
| 16.92 | 2,994 | 3,626 |




Subcat Reach Pond Link

**Routing Diagram for Kingfish Maine - Stormwater - Wet Pond**
Prepared by Gartley & Dorsky - Camden

## Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 66,916 | 49 | 50-75% Grass cover, Fair, HSG A (POST) |
| 800,996 | 98 | Unconnected pavement, HSG A (POST) |
| **867,912** | **94** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (sq-ft) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 867,912 | HSG A | POST |
| 0 | HSG B | |
| 0 | HSG C | |
| 0 | HSG D | |
| 0 | Other | |
| **867,912** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (sq-ft) | HSG-B (sq-ft) | HSG-C (sq-ft) | HSG-D (sq-ft) | Other (sq-ft) | Total (sq-ft) | Ground Cover | Sub Num |
|---|---|---|---|---|---|---|---|
| 66,916 | 0 | 0 | 0 | 0 | 66,916 | 50-75% Grass cover, Fair | |
| 800,996 | 0 | 0 | 0 | 0 | 800,996 | Unconnected pavement | |
| **867,912** | **0** | **0** | **0** | **0** | **867,912** | **TOTAL AREA** | |

**Kingfish Maine - Stormwater - Wet Pond**

Prepared by Gartley & Dorsky - Camden





## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Diam/Width (inches) | Height (inches) | Inside-Fill (inches) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | P1P2 | 28.95 | 27.25 | 85.0 | 0.0200 | 0.012 | 15.0 | 0.0 | 0.0 |
| 2 | P2LS | 27.50 | 27.00 | 72.0 | 0.0069 | 0.012 | 15.0 | 0.0 | 0.0 |
| 3 | POST | 0.00 | 0.00 | 189.0 | 0.0070 | 0.013 | 15.0 | 0.0 | 0.0 |
| 4 | POST | 0.00 | 0.00 | 245.0 | 0.0070 | 0.013 | 15.0 | 0.0 | 0.0 |
| 5 | POST | 0.00 | 0.00 | 100.0 | 0.0070 | 0.013 | 15.0 | 0.0 | 0.0 |
| 6 | POST | 0.00 | 0.00 | 79.0 | 0.0070 | 0.013 | 15.0 | 0.0 | 0.0 |
| 7 | POST | 0.00 | 0.00 | 94.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 8 | POST | 0.00 | 0.00 | 95.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 9 | POST | 0.00 | 0.00 | 59.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 10 | POST | 0.00 | 0.00 | 107.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 11 | POST | 0.00 | 0.00 | 124.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 12 | POST | 0.00 | 0.00 | 100.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 13 | POST | 0.00 | 0.00 | 85.0 | 0.0070 | 0.013 | 18.0 | 0.0 | 0.0 |
| 14 | POST | 0.00 | 0.00 | 210.0 | 0.0070 | 0.013 | 24.0 | 0.0 | 0.0 |
| 15 | POST | 0.00 | 0.00 | 348.0 | 0.0070 | 0.013 | 24.0 | 0.0 | 0.0 |
| 16 | POST | 0.00 | 0.00 | 52.0 | 0.0097 | 0.013 | 24.0 | 0.0 | 0.0 |

Time span=5.00-90.00 hrs, dt=0.05 hrs, 1701 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Reach LS: Level Spreader** Avg. Flow Depth=0.12' Max Vel=2.46 fps Inflow=5.98 cfs 165,266 cf
n=0.069 L=3.0' S=0.0167 '/' Capacity=73.86 cfs Outflow=5.98 cfs 165,266 cf

**Pond P1: Pond 1 - First in Series** Peak Elev=36.41' Storage=110,447 cf Inflow=56.55 cfs 295,973 cf
Primary=23.78 cfs 215,036 cf Secondary=20.14 cfs 20,012 cf Outflow=43.91 cfs 235,048 cf

**Reach P1P2: Pipe** Avg. Flow Depth=1.25' Max Vel=9.19 fps Inflow=23.78 cfs 215,036 cf
15.0" Round Pipe n=0.012 L=85.0' S=0.0200 '/' Capacity=9.90 cfs Outflow=9.90 cfs 215,036 cf

**Pond P2: Pond 2 - Second in Series** Peak Elev=30.65' Storage=55,961 cf Inflow=9.90 cfs 215,036 cf
Primary=9.90 cfs 165,266 cf Secondary=0.00 cfs 0 cf Outflow=9.90 cfs 165,266 cf

**Reach P2LS: Pipe** Avg. Flow Depth=1.25' Max Vel=5.41 fps Inflow=9.90 cfs 165,266 cf
15.0" Round Pipe n=0.012 L=72.0' S=0.0069 '/' Capacity=5.83 cfs Outflow=5.98 cfs 165,266 cf

**Subcatchment POST: Development Area** Runoff Area=867,912 sf 92.29% Impervious Runoff Depth>4.09"
Flow Length=2,057' Tc=23.8 min CN=94 Runoff=56.55 cfs 295,973 cf

**Reach SP: Study Point** Inflow=20.14 cfs 185,278 cf
Outflow=20.14 cfs 185,278 cf

**Total Runoff Area = 867,912 sf Runoff Volume = 295,973 cf Average Runoff Depth = 4.09"**
**7.71% Pervious = 66,916 sf 92.29% Impervious = 800,996 sf**

## Summary for Reach LS: Level Spreader

Inflow Area = 867,912 sf, 92.29% Impervious, Inflow Depth = 2.29" for Washington 25 year event
Inflow = 5.98 cfs @ 13.40 hrs, Volume= 165,266 cf
Outflow = 5.98 cfs @ 13.40 hrs, Volume= 165,266 cf, Atten= 0%, Lag= 0.0 min

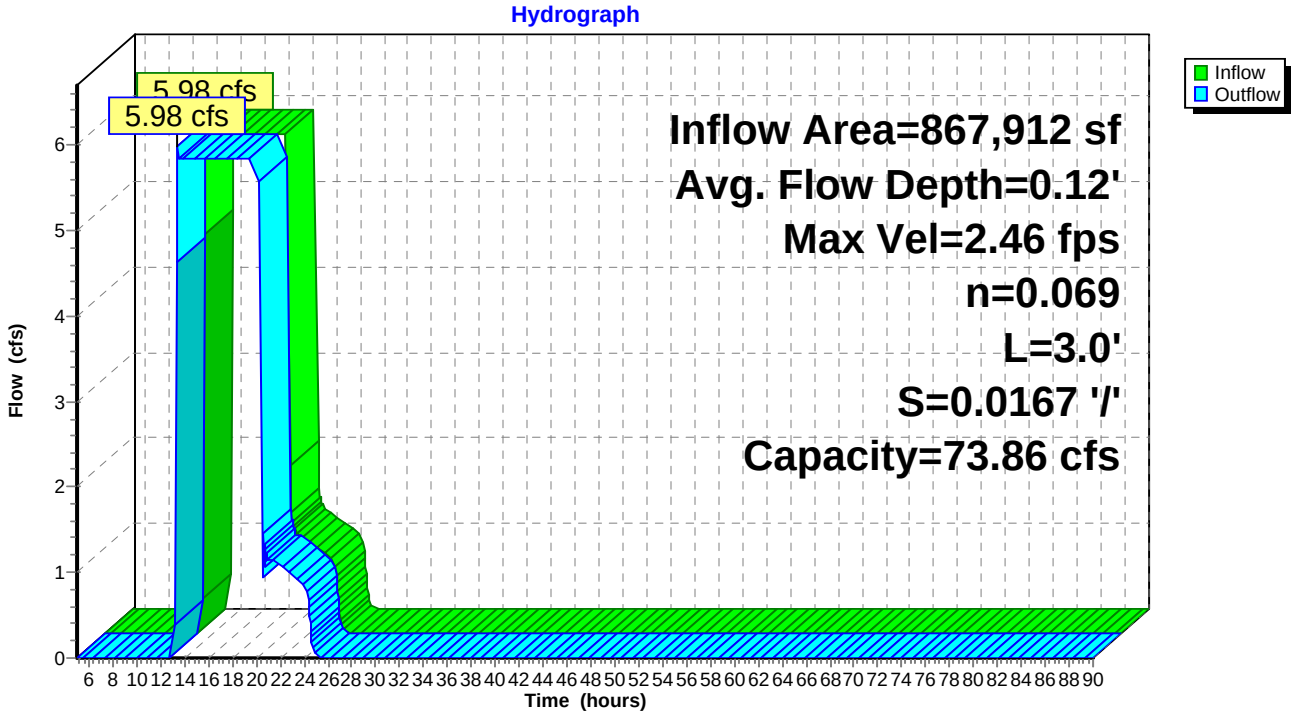
Routing by Stor-Ind+Trans method, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.46 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.46 fps, Avg. Travel Time= 0.0 min

Peak Storage= 7 cf @ 13.40 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 1.50' Flow Area= 30.0 sf, Capacity= 73.86 cfs

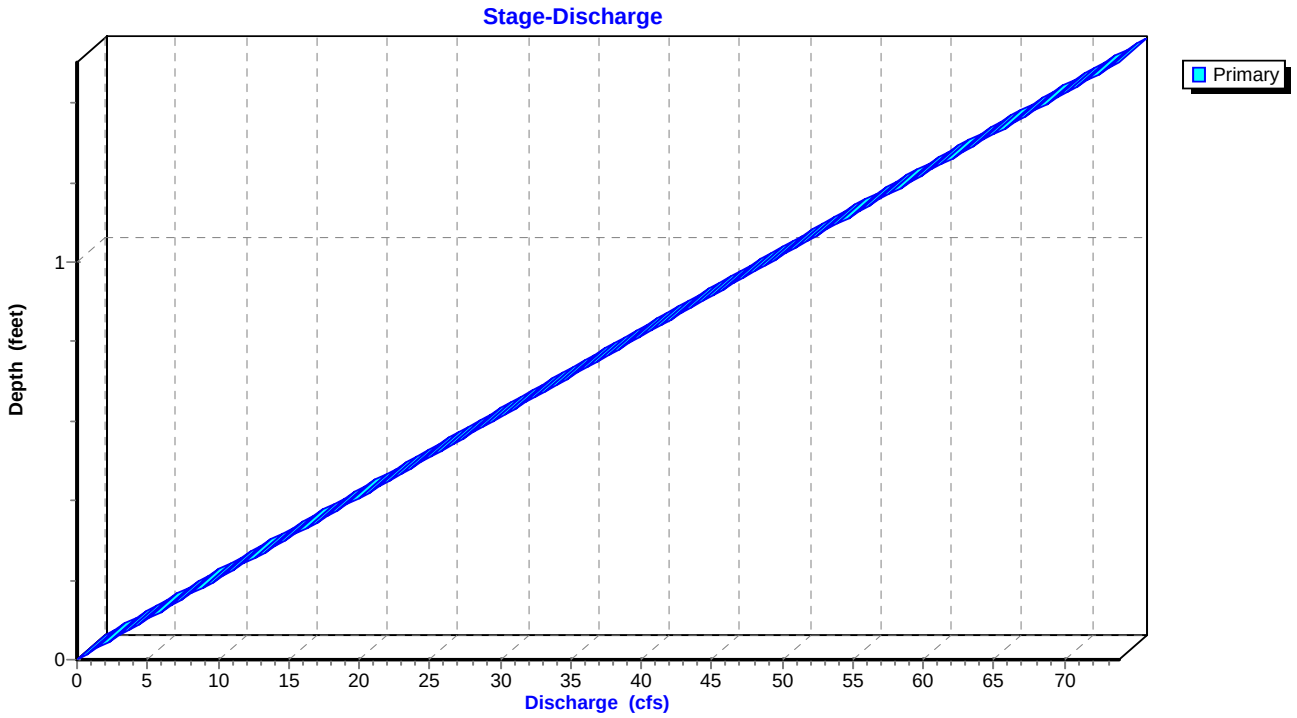
Custom stage-perimeter table, n= 0.069 Riprap, 6-inch
100 Intermediate values determined by Multi-point interpolation
Length= 3.0' Slope= 0.0167 '/'
Inlet Invert= 26.05', Outlet Invert= 26.00'

| Depth (feet) | End Area (sq-ft) | Perim. (feet) | Storage (cubic-feet) | Discharge (cfs) |
|---|---|---|---|---|
| 0.00 | 0.0 | 0.0 | 0 | 0.00 |
| 1.50 | 30.0 | 36.0 | 90 | 73.86 |

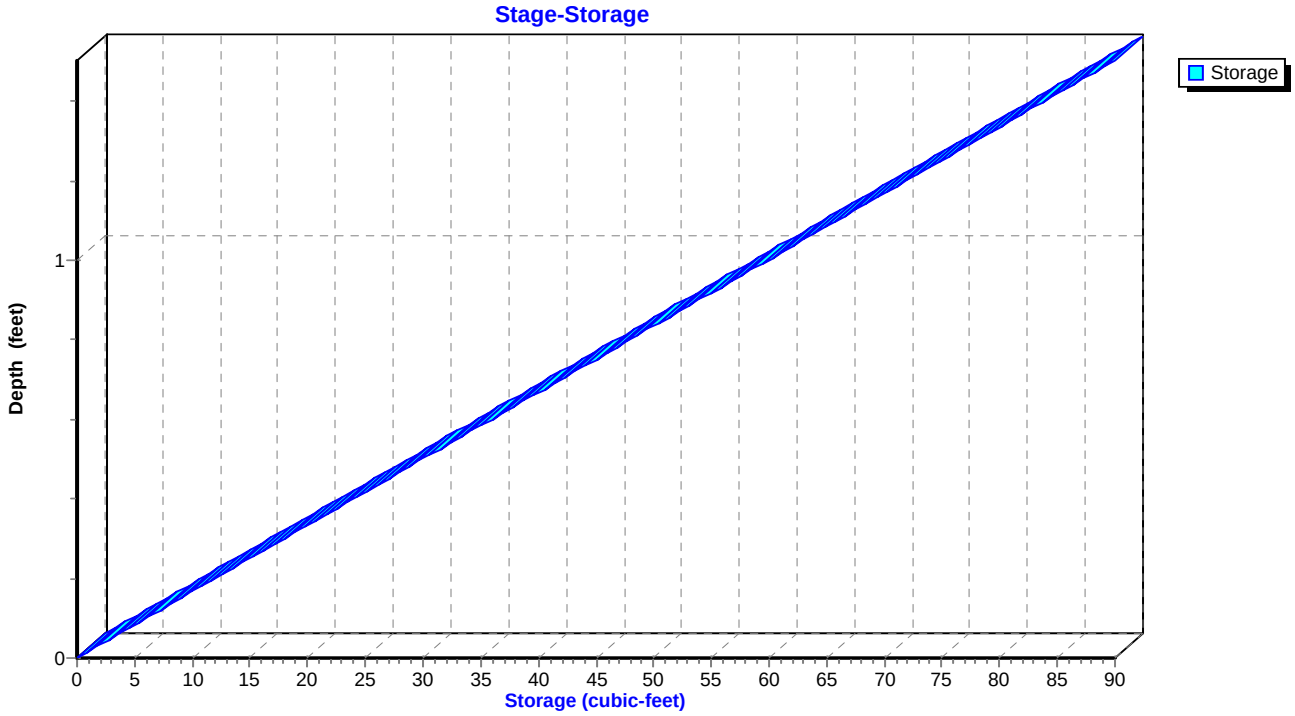
## Reach LS: Level Spreader




## Reach LS: Level Spreader



## Reach LS: Level Spreader



## Stage-Area-Storage for Reach LS: Level Spreader

| Elevation (feet) | End-Area (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 26.05 | 0.0 | 0 |
| 26.07 | 0.4 | 1 |
| 26.09 | 0.8 | 2 |
| 26.11 | 1.2 | 4 |
| 26.13 | 1.6 | 5 |
| 26.15 | 2.0 | 6 |
| 26.17 | 2.4 | 7 |
| 26.19 | 2.8 | 8 |
| 26.21 | 3.2 | 10 |
| 26.23 | 3.6 | 11 |
| 26.25 | 4.0 | 12 |
| 26.27 | 4.4 | 13 |
| 26.29 | 4.8 | 14 |
| 26.31 | 5.2 | 16 |
| 26.33 | 5.6 | 17 |
| 26.35 | 6.0 | 18 |
| 26.37 | 6.4 | 19 |
| 26.39 | 6.8 | 20 |
| 26.41 | 7.2 | 22 |
| 26.43 | 7.6 | 23 |
| 26.45 | 8.0 | 24 |
| 26.47 | 8.4 | 25 |
| 26.49 | 8.8 | 26 |
| 26.51 | 9.2 | 28 |
| 26.53 | 9.6 | 29 |
| 26.55 | 10.0 | 30 |
| 26.57 | 10.4 | 31 |
| 26.59 | 10.8 | 32 |
| 26.61 | 11.2 | 34 |
| 26.63 | 11.6 | 35 |
| 26.65 | 12.0 | 36 |
| 26.67 | 12.4 | 37 |
| 26.69 | 12.8 | 38 |
| 26.71 | 13.2 | 40 |
| 26.73 | 13.6 | 41 |
| 26.75 | 14.0 | 42 |
| 26.77 | 14.4 | 43 |
| 26.79 | 14.8 | 44 |
| 26.81 | 15.2 | 46 |
| 26.83 | 15.6 | 47 |
| 26.85 | 16.0 | 48 |
| 26.87 | 16.4 | 49 |
| 26.89 | 16.8 | 50 |
| 26.91 | 17.2 | 52 |
| 26.93 | 17.6 | 53 |
| 26.95 | 18.0 | 54 |
| 26.97 | 18.4 | 55 |
| 26.99 | 18.8 | 56 |
| 27.01 | 19.2 | 58 |
| 27.03 | 19.6 | 59 |
| 27.05 | 20.0 | 60 |
| 27.07 | 20.4 | 61 |
| 27.09 | 20.8 | 62 |
| 27.11 | 21.2 | 64 |
| 27.13 | 21.6 | 65 |
| 27.15 | 22.0 | 66 |
| 27.17 | 22.4 | 67 |
| 27.19 | 22.8 | 68 |
| 27.21 | 23.2 | 70 |
| 27.23 | 23.6 | 71 |
| 27.25 | 24.0 | 72 |
| 27.27 | 24.4 | 73 |
| 27.29 | 24.8 | 74 |
| 27.31 | 25.2 | 76 |
| 27.33 | 25.6 | 77 |
| 27.35 | 26.0 | 78 |
| 27.37 | 26.4 | 79 |
| 27.39 | 26.8 | 80 |
| 27.41 | 27.2 | 82 |
| 27.43 | 27.6 | 83 |
| 27.45 | 28.0 | 84 |
| 27.47 | 28.4 | 85 |
| 27.49 | 28.8 | 86 |
| 27.51 | 29.2 | 88 |
| 27.53 | 29.6 | 89 |
| 27.55 | **30.0** | **90** |

## Summary for Pond P1: Pond 1 - First in Series

Inflow Area = 867,912 sf, 92.29% Impervious, Inflow Depth > 4.09" for Washington 25 year event
Inflow = 56.55 cfs @ 12.31 hrs, Volume= 295,973 cf
Outflow = 43.91 cfs @ 12.51 hrs, Volume= 235,048 cf, Atten= 22%, Lag= 11.5 min
Primary = 23.78 cfs @ 12.51 hrs, Volume= 215,036 cf
Secondary = 20.14 cfs @ 12.51 hrs, Volume= 20,012 cf

Routing by Stor-Ind method, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs
Peak Elev= 36.41' @ 12.51 hrs Surf.Area= 17,952 sf Storage= 110,447 cf
Flood Elev= 37.00' Surf.Area= 18,914 sf Storage= 121,318 cf

Plug-Flow detention time= 145.2 min calculated for 235,013 cf (79% of inflow)
Center-of-Mass det. time= 68.3 min ( 861.9 - 793.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 27.00' | 121,318 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

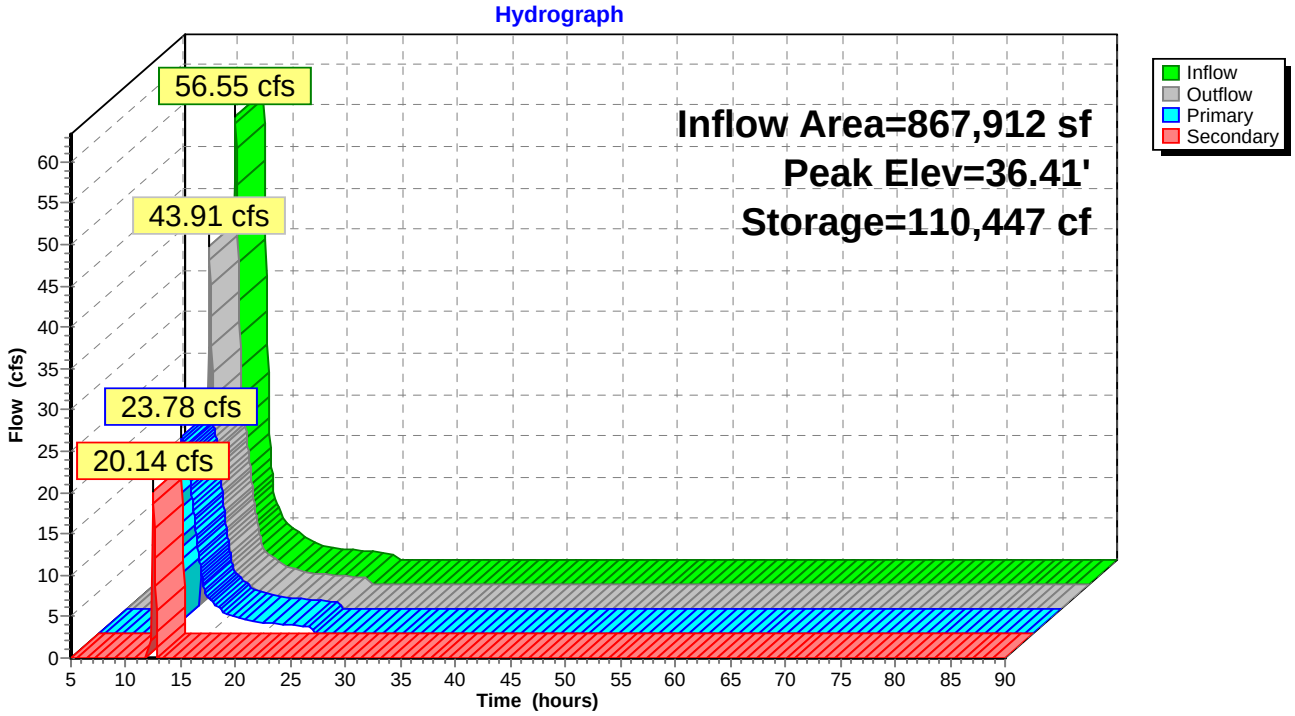
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 27.00 | 6,422 | 318.9 | 0 | 0 | 6,422 |
| 33.25 | 13,508 | 488.8 | 60,925 | 60,925 | 17,630 |
| 36.00 | 17,327 | 436.9 | 42,289 | 103,214 | 21,660 |
| 36.25 | 17,695 | 493.5 | 4,378 | 107,592 | 25,852 |
| 37.00 | 18,914 | 508.5 | 13,726 | 121,318 | 27,106 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 33.25' | **2.0" x 2.0" Horiz. Orifice/Grate X 10.00 columns**<br>X 10 rows C= 0.600 Limited to weir flow at low heads |
| #2 | Secondary | 36.00' | **30.0' long x 8.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74 |

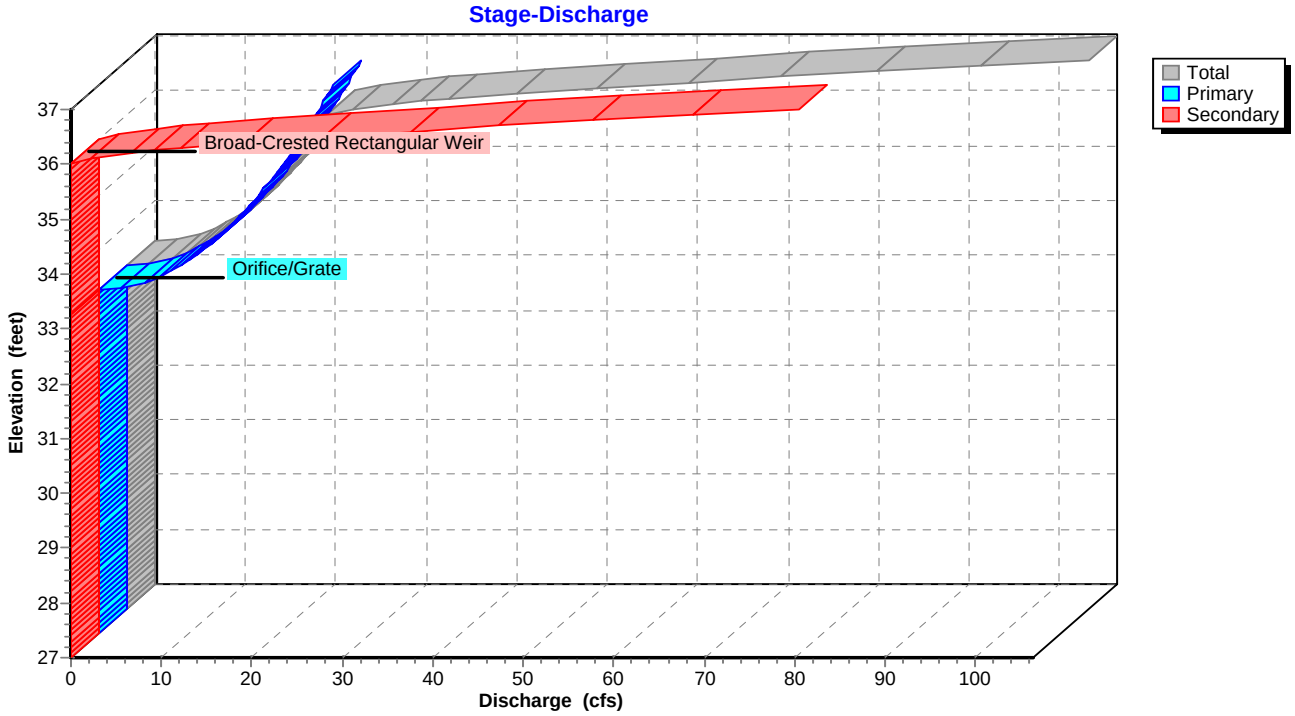
**Primary OutFlow** Max=23.77 cfs @ 12.51 hrs HW=36.41' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 23.77 cfs @ 8.56 fps)

**Secondary OutFlow** Max=19.89 cfs @ 12.51 hrs HW=36.41' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 19.89 cfs @ 1.63 fps)

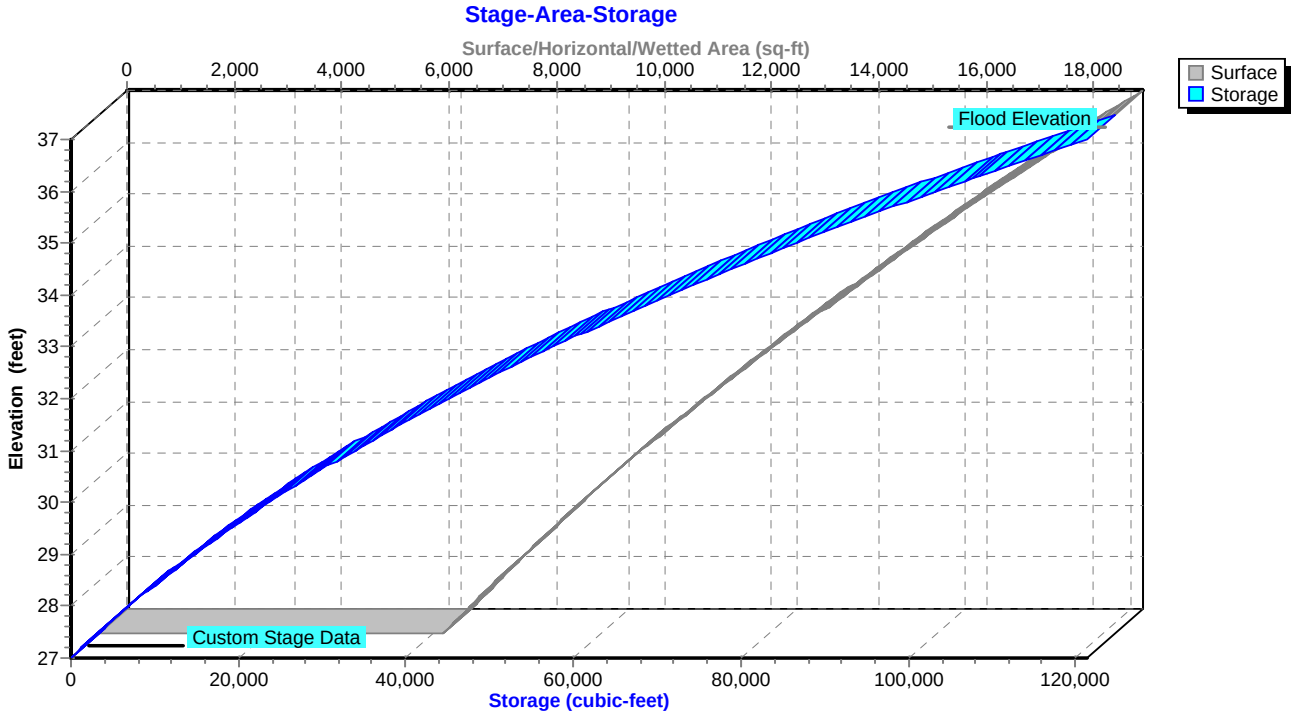
## Pond P1: Pond 1 - First in Series




## Pond P1: Pond 1 - First in Series



## Pond P1: Pond 1 - First in Series



## Stage-Area-Storage for Pond P1: Pond 1 - First in Series

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 27.00 | 6,422 | 0 |
| 27.10 | 6,515 | 647 |
| 27.20 | 6,608 | 1,303 |
| 27.30 | 6,703 | 1,969 |
| 27.40 | 6,797 | 2,644 |
| 27.50 | 6,893 | 3,328 |
| 27.60 | 6,989 | 4,022 |
| 27.70 | 7,086 | 4,726 |
| 27.80 | 7,184 | 5,439 |
| 27.90 | 7,282 | 6,163 |
| 28.00 | 7,381 | 6,896 |
| 28.10 | 7,480 | 7,639 |
| 28.20 | 7,580 | 8,392 |
| 28.30 | 7,681 | 9,155 |
| 28.40 | 7,783 | 9,928 |
| 28.50 | 7,885 | 10,712 |
| 28.60 | 7,988 | 11,505 |
| 28.70 | 8,092 | 12,309 |
| 28.80 | 8,196 | 13,124 |
| 28.90 | 8,301 | 13,948 |
| 29.00 | 8,406 | 14,784 |
| 29.10 | 8,512 | 15,630 |
| 29.20 | 8,619 | 16,486 |
| 29.30 | 8,727 | 17,353 |
| 29.40 | 8,835 | 18,232 |
| 29.50 | 8,944 | 19,121 |
| 29.60 | 9,053 | 20,020 |
| 29.70 | 9,164 | 20,931 |
| 29.80 | 9,274 | 21,853 |
| 29.90 | 9,386 | 22,786 |
| 30.00 | 9,498 | 23,730 |
| 30.10 | 9,611 | 24,686 |
| 30.20 | 9,725 | 25,653 |
| 30.30 | 9,839 | 26,631 |
| 30.40 | 9,954 | 27,620 |
| 30.50 | 10,069 | 28,622 |
| 30.60 | 10,185 | 29,634 |
| 30.70 | 10,302 | 30,659 |
| 30.80 | 10,420 | 31,695 |
| 30.90 | 10,538 | 32,743 |
| 31.00 | 10,657 | 33,802 |
| 31.10 | 10,777 | 34,874 |
| 31.20 | 10,897 | 35,958 |
| 31.30 | 11,018 | 37,053 |
| 31.40 | 11,139 | 38,161 |
| 31.50 | 11,261 | 39,281 |
| 31.60 | 11,384 | 40,414 |
| 31.70 | 11,508 | 41,558 |
| 31.80 | 11,632 | 42,715 |
| 31.90 | 11,757 | 43,885 |
| 32.00 | 11,882 | 45,067 |
| 32.10 | 12,009 | 46,261 |
| 32.20 | 12,136 | 47,468 |
| 32.30 | 12,263 | 48,688 |
| 32.40 | 12,391 | 49,921 |
| 32.50 | 12,520 | 51,167 |
| 32.60 | 12,650 | 52,425 |
| 32.70 | 12,780 | 53,696 |
| 32.80 | 12,911 | 54,981 |
| 32.90 | 13,042 | 56,279 |
| 33.00 | 13,175 | 57,590 |
| 33.10 | 13,307 | 58,914 |
| 33.20 | 13,441 | 60,251 |
| 33.30 | 13,573 | 61,602 |
| 33.40 | 13,704 | 62,966 |
| 33.50 | 13,836 | 64,343 |
| 33.60 | 13,968 | 65,733 |
| 33.70 | 14,100 | 67,136 |
| 33.80 | 14,234 | 68,553 |
| 33.90 | 14,368 | 69,983 |
| 34.00 | 14,502 | 71,426 |
| 34.10 | 14,638 | 72,883 |
| 34.20 | 14,774 | 74,354 |
| 34.30 | 14,910 | 75,838 |
| 34.40 | 15,047 | 77,336 |
| 34.50 | 15,185 | 78,848 |
| 34.60 | 15,323 | 80,373 |
| 34.70 | 15,462 | 81,912 |
| 34.80 | 15,602 | 83,466 |
| 34.90 | 15,742 | 85,033 |
| 35.00 | 15,883 | 86,614 |
| 35.10 | 16,025 | 88,210 |
| 35.20 | 16,167 | 89,819 |
| 35.30 | 16,310 | 91,443 |
| 35.40 | 16,453 | 93,081 |
| 35.50 | 16,597 | 94,734 |
| 35.60 | 16,742 | 96,401 |
| 35.70 | 16,887 | 98,082 |
| 35.80 | 17,033 | 99,778 |
| 35.90 | 17,180 | 101,489 |
| 36.00 | 17,327 | 103,214 |
| 36.10 | 17,474 | 104,954 |
| 36.20 | 17,621 | 106,709 |
| 36.30 | 17,775 | 108,478 |
| 36.40 | 17,936 | 110,264 |
| 36.50 | 18,097 | 112,066 |
| 36.60 | 18,259 | 113,883 |
| 36.70 | 18,422 | 115,717 |
| 36.80 | 18,585 | 117,568 |
| 36.90 | 18,749 | 119,434 |
| 37.00 | **18,914** | **121,318** |

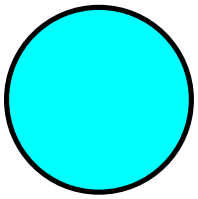
## Summary for Reach P1P2: Pipe

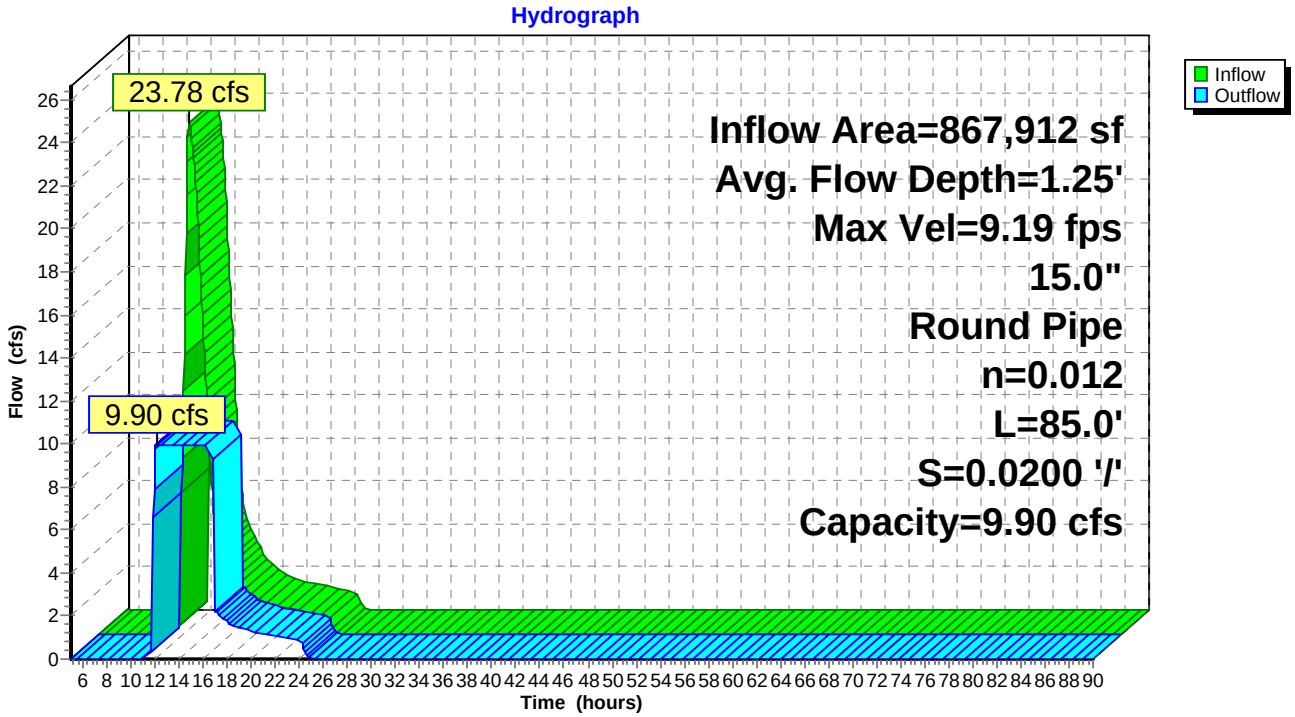
Inflow Area = 867,912 sf, 92.29% Impervious, Inflow Depth = 2.97" for Washington 25 year event
Inflow = 23.78 cfs @ 12.51 hrs, Volume= 215,036 cf
Outflow = 9.90 cfs @ 12.10 hrs, Volume= 215,036 cf, Atten= 58%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.19 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 6.17 fps, Avg. Travel Time= 0.2 min

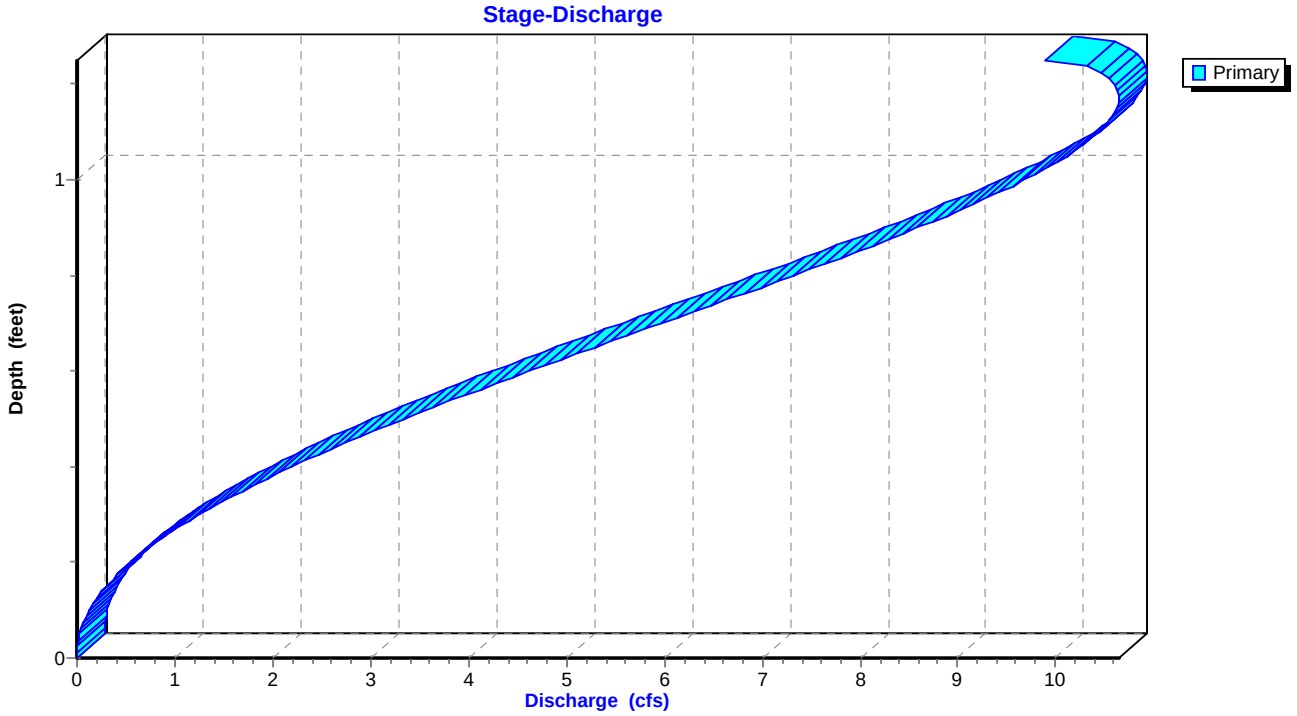
Peak Storage= 104 cf @ 12.05 hrs
Average Depth at Peak Storage= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 9.90 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 85.0' Slope= 0.0200 '/'
Inlet Invert= 28.95', Outlet Invert= 27.25'

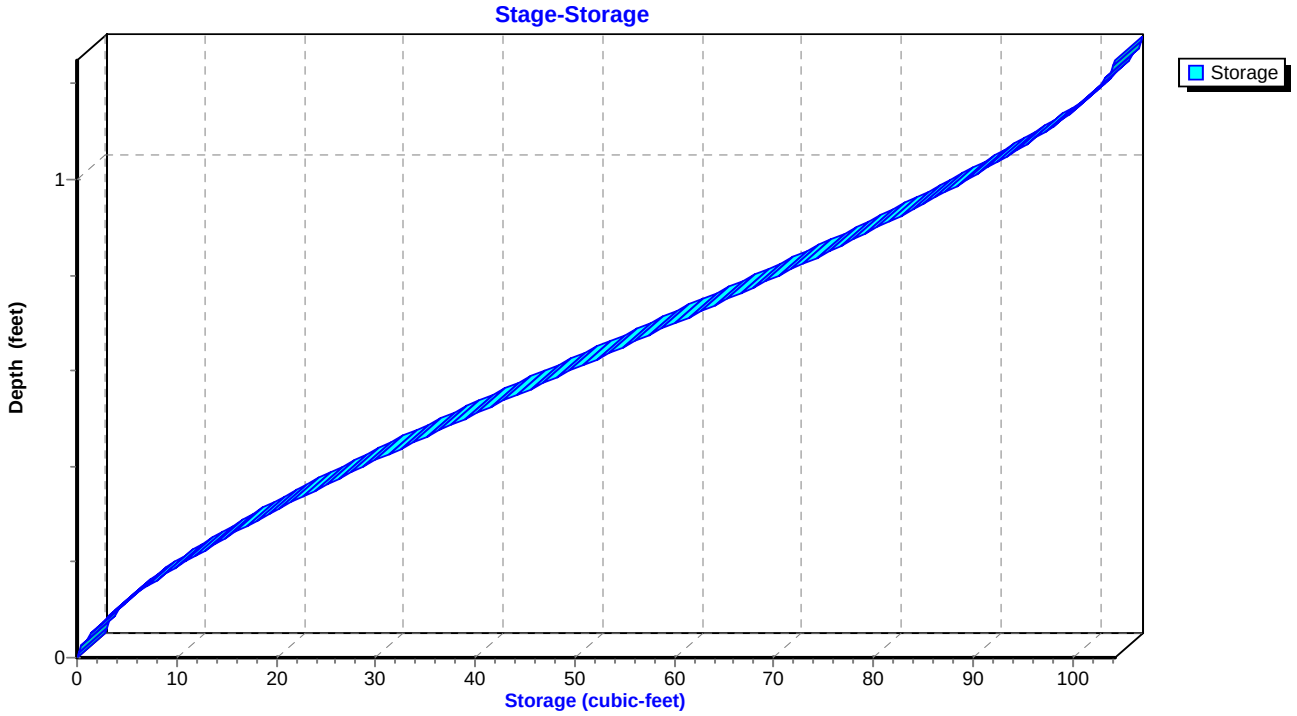




## Reach P1P2: Pipe




## Reach P1P2: Pipe



## Stage-Area-Storage for Reach P1P2: Pipe

| Elevation (feet) | End-Area (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 28.95 | 0.0 | 0 |
| 28.97 | 0.0 | 0 |
| 28.99 | 0.0 | 1 |
| 29.01 | 0.0 | 2 |
| 29.03 | 0.0 | 3 |
| 29.05 | 0.0 | 4 |
| 29.07 | 0.1 | 5 |
| 29.09 | 0.1 | 6 |
| 29.11 | 0.1 | 8 |
| 29.13 | 0.1 | 9 |
| 29.15 | 0.1 | 11 |
| 29.17 | 0.1 | 12 |
| 29.19 | 0.2 | 14 |
| 29.21 | 0.2 | 16 |
| 29.23 | 0.2 | 17 |
| 29.25 | 0.2 | 19 |
| 29.27 | 0.2 | 21 |
| 29.29 | 0.3 | 23 |
| 29.31 | 0.3 | 25 |
| 29.33 | 0.3 | 27 |
| 29.35 | 0.3 | 29 |
| 29.37 | 0.4 | 31 |
| 29.39 | 0.4 | 33 |
| 29.41 | 0.4 | 35 |
| 29.43 | 0.4 | 37 |
| 29.45 | 0.5 | 39 |
| 29.47 | 0.5 | 41 |
| 29.49 | 0.5 | 43 |
| 29.51 | 0.5 | 45 |
| 29.53 | 0.6 | 47 |
| 29.55 | 0.6 | 49 |
| 29.57 | 0.6 | 52 |
| 29.59 | 0.6 | 54 |
| 29.61 | 0.7 | 56 |
| 29.63 | 0.7 | 58 |
| 29.65 | 0.7 | 60 |
| 29.67 | 0.7 | 62 |
| 29.69 | 0.8 | 64 |
| 29.71 | 0.8 | 66 |
| 29.73 | 0.8 | 68 |
| 29.75 | 0.8 | 71 |
| 29.77 | 0.9 | 73 |
| 29.79 | 0.9 | 75 |
| 29.81 | 0.9 | 77 |
| 29.83 | 0.9 | 78 |
| 29.85 | 0.9 | 80 |
| 29.87 | 1.0 | 82 |
| 29.89 | 1.0 | 84 |
| 29.91 | 1.0 | 86 |
| 29.93 | 1.0 | 88 |
| 29.95 | 1.1 | 89 |
| 29.97 | 1.1 | 91 |
| 29.99 | 1.1 | 93 |
| 30.01 | 1.1 | 94 |
| 30.03 | 1.1 | 96 |
| 30.05 | 1.1 | 97 |
| 30.07 | 1.2 | 99 |
| 30.09 | 1.2 | 100 |
| 30.11 | 1.2 | 101 |
| 30.13 | 1.2 | 102 |
| 30.15 | 1.2 | 103 |
| 30.17 | 1.2 | 104 |
| 30.19 | **1.2** | **104** |

## Summary for Pond P2: Pond 2 - Second in Series

Inflow Area = 867,912 sf, 92.29% Impervious, Inflow Depth = 2.97" for Washington 25 year event
Inflow = 9.90 cfs @ 12.10 hrs, Volume= 215,036 cf
Outflow = 9.90 cfs @ 16.90 hrs, Volume= 165,266 cf, Atten= 0%, Lag= 288.0 min
Primary = 9.90 cfs @ 16.90 hrs, Volume= 165,266 cf
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs
Peak Elev= 30.65' @ 16.90 hrs Surf.Area= 11,624 sf Storage= 55,961 cf
Flood Elev= 33.00' Surf.Area= 14,769 sf Storage= 86,926 cf

Plug-Flow detention time= 127.0 min calculated for 165,266 cf (77% of inflow)
Center-of-Mass det. time= 58.5 min ( 978.8 - 920.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 23.00' | 102,405 cf | **Custom Stage Data (Irregular)** Listed below (Recalc) |

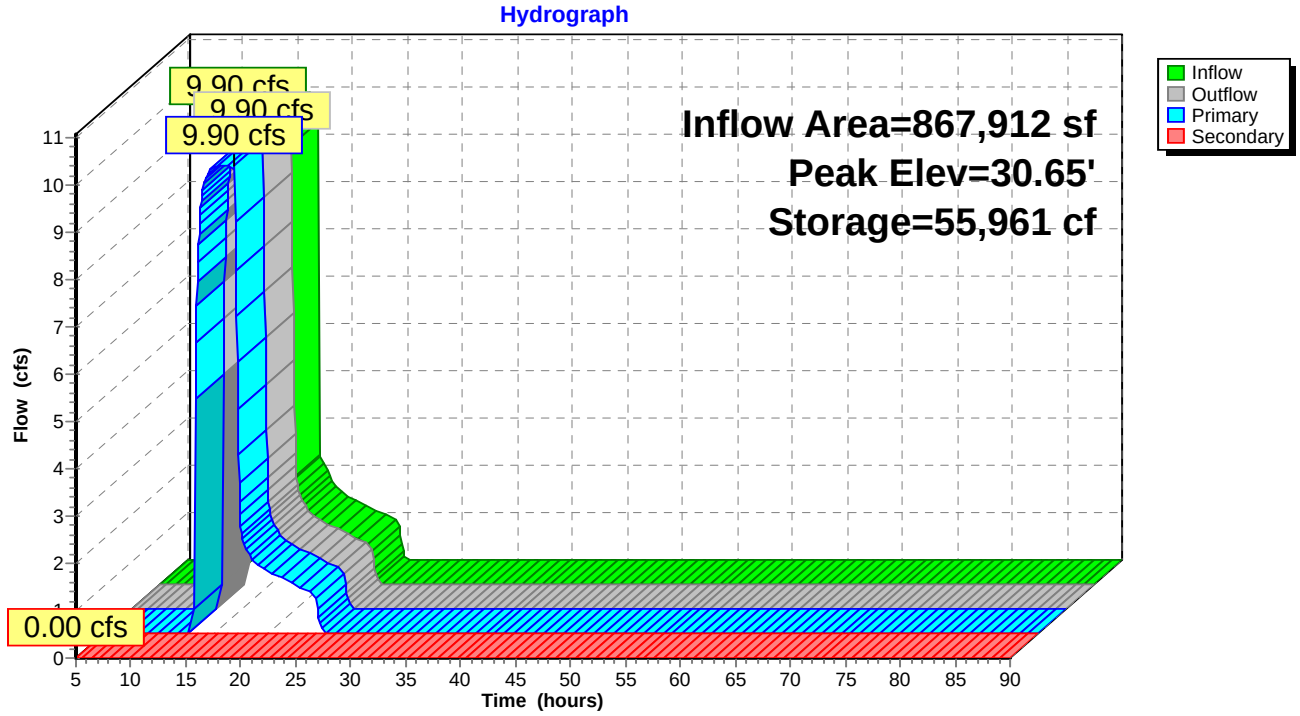
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 23.00 | 3,562 | 279.3 | 0 | 0 | 3,562 |
| 24.00 | 4,428 | 298.2 | 3,987 | 3,987 | 4,477 |
| 25.00 | 5,351 | 317.0 | 4,882 | 8,869 | 5,448 |
| 26.00 | 6,330 | 335.9 | 5,834 | 14,703 | 6,483 |
| 27.00 | 7,366 | 354.7 | 6,841 | 21,544 | 7,572 |
| 28.00 | 8,459 | 373.6 | 7,906 | 29,451 | 8,726 |
| 29.00 | 9,608 | 392.4 | 9,027 | 38,478 | 9,934 |
| 30.00 | 10,813 | 411.3 | 10,205 | 48,683 | 11,208 |
| 31.00 | 12,075 | 430.1 | 11,438 | 60,121 | 12,536 |
| 32.00 | 13,394 | 449.0 | 12,729 | 72,850 | 13,929 |
| 33.00 | 14,769 | 467.8 | 14,076 | 86,926 | 15,375 |
| 34.00 | 16,201 | 486.7 | 15,479 | 102,405 | 16,888 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 30.10' | **2.0" x 2.0" Horiz. Orifice/Grate X 10.00 columns**<br>X 10 rows C= 0.600 Limited to weir flow at low heads |
| #2 | Secondary | 32.20' | **20.0' long x 8.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74 |

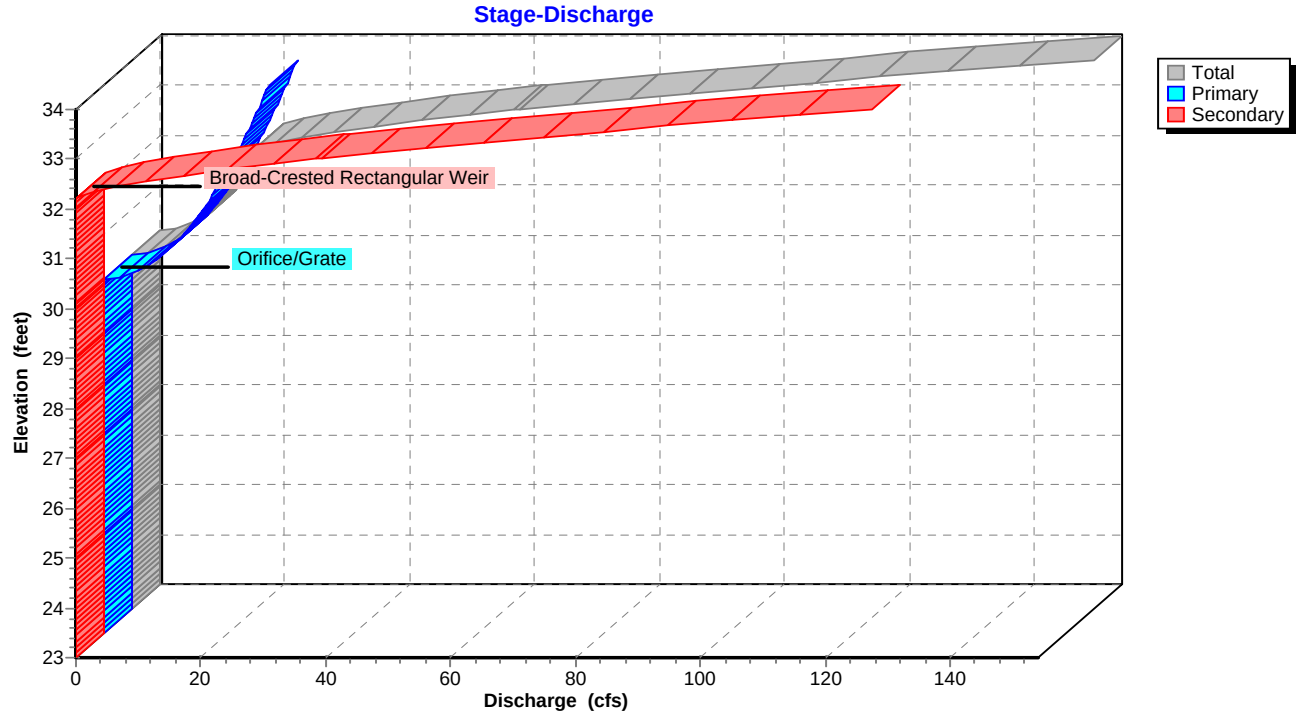
**Primary OutFlow** Max=9.91 cfs @ 16.90 hrs HW=30.65' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 9.91 cfs @ 3.57 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=23.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

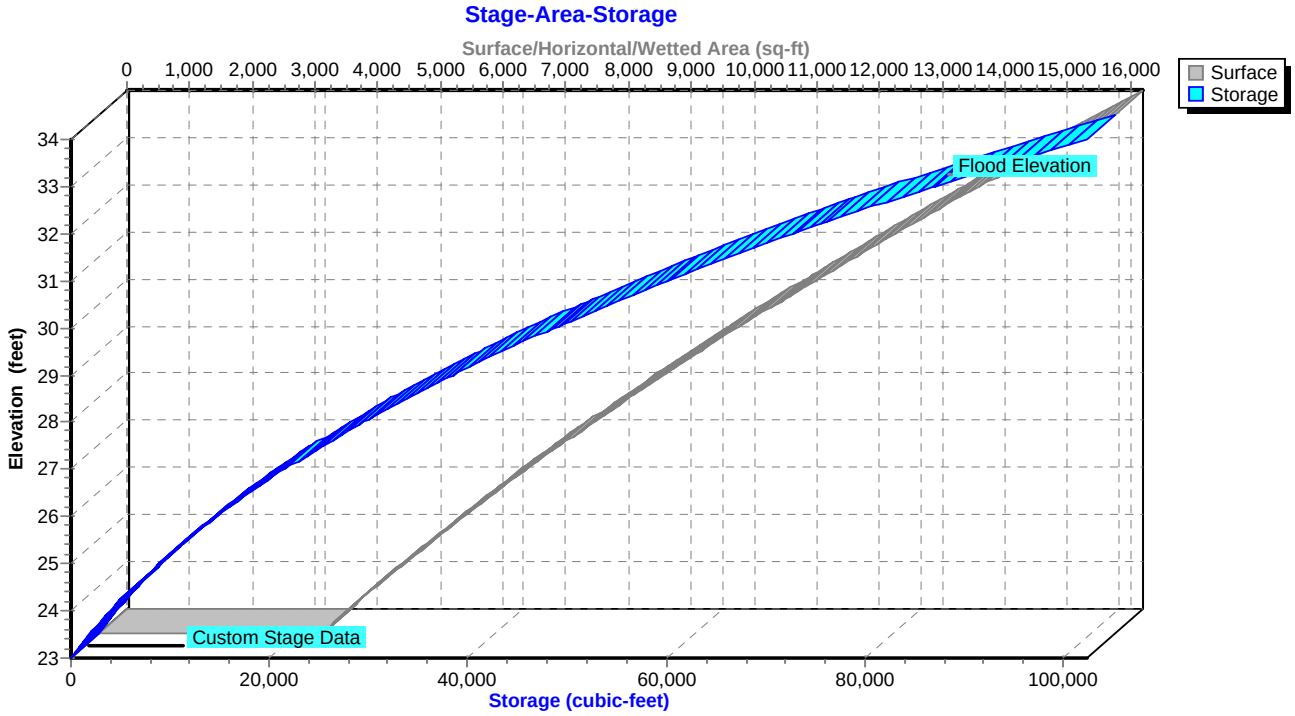
## Pond P2: Pond 2 - Second in Series




## Pond P2: Pond 2 - Second in Series



## Pond P2: Pond 2 - Second in Series



## Stage-Area-Storage for Pond P2: Pond 2 - Second in Series

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 23.00 | 3,562 | 0 |
| 23.15 | 3,686 | 544 |
| 23.30 | 3,812 | 1,106 |
| 23.45 | 3,940 | 1,687 |
| 23.60 | 4,070 | 2,288 |
| 23.75 | 4,203 | 2,908 |
| 23.90 | 4,337 | 3,549 |
| 24.05 | 4,472 | 4,210 |
| 24.20 | 4,606 | 4,890 |
| 24.35 | 4,741 | 5,591 |
| 24.50 | 4,879 | 6,313 |
| 24.65 | 5,018 | 7,055 |
| 24.80 | 5,159 | 7,818 |
| 24.95 | 5,303 | 8,603 |
| 25.10 | 5,445 | 9,409 |
| 25.25 | 5,588 | 10,237 |
| 25.40 | 5,733 | 11,086 |
| 25.55 | 5,879 | 11,957 |
| 25.70 | 6,028 | 12,850 |
| 25.85 | 6,178 | 13,765 |
| 26.00 | 6,330 | 14,703 |
| 26.15 | 6,480 | 15,664 |
| 26.30 | 6,633 | 16,647 |
| 26.45 | 6,786 | 17,654 |
| 26.60 | 6,942 | 18,683 |
| 26.75 | 7,100 | 19,736 |
| 26.90 | 7,259 | 20,813 |
| 27.05 | 7,419 | 21,914 |
| 27.20 | 7,579 | 23,039 |
| 27.35 | 7,740 | 24,188 |
| 27.50 | 7,903 | 25,361 |
| 27.65 | 8,068 | 26,559 |
| 27.80 | 8,234 | 27,781 |
| 27.95 | 8,403 | 29,029 |
| 28.10 | 8,571 | 30,302 |
| 28.25 | 8,739 | 31,600 |
| 28.40 | 8,910 | 32,924 |
| 28.55 | 9,082 | 34,273 |
| 28.70 | 9,256 | 35,649 |
| 28.85 | 9,431 | 37,050 |
| 29.00 | 9,608 | 38,478 |
| 29.15 | 9,784 | 39,932 |
| 29.30 | 9,962 | 41,413 |
| 29.45 | 10,141 | 42,921 |
| 29.60 | 10,322 | 44,456 |
| 29.75 | 10,505 | 46,018 |
| 29.90 | 10,689 | 47,608 |
| 30.05 | 10,874 | 49,225 |
| 30.20 | 11,060 | 50,870 |
| 30.35 | 11,247 | 52,543 |
| 30.50 | 11,435 | 54,244 |
| 30.65 | 11,625 | 55,974 |
| 30.80 | 11,817 | 57,732 |
| 30.95 | 12,010 | 59,519 |
| 31.10 | 12,204 | 61,335 |
| 31.25 | 12,398 | 63,180 |
| 31.40 | 12,594 | 65,054 |
| 31.55 | 12,792 | 66,958 |
| 31.70 | 12,991 | 68,892 |
| 31.85 | 13,192 | 70,856 |
| 32.00 | 13,394 | 72,850 |
| 32.15 | 13,596 | 74,874 |
| 32.30 | 13,799 | 76,929 |
| 32.45 | 14,004 | 79,014 |
| 32.60 | 14,211 | 81,130 |
| 32.75 | 14,419 | 83,277 |
| 32.90 | 14,628 | 85,456 |
| 33.05 | 14,839 | 87,666 |
| 33.20 | 15,050 | 89,907 |
| 33.35 | 15,263 | 92,181 |
| 33.50 | 15,477 | 94,486 |
| 33.65 | 15,692 | 96,824 |
| 33.80 | 15,909 | 99,194 |
| 33.95 | **16,128** | **101,597** |

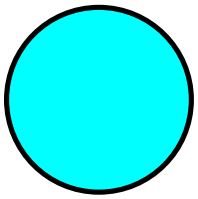
## Summary for Reach P2LS: Pipe

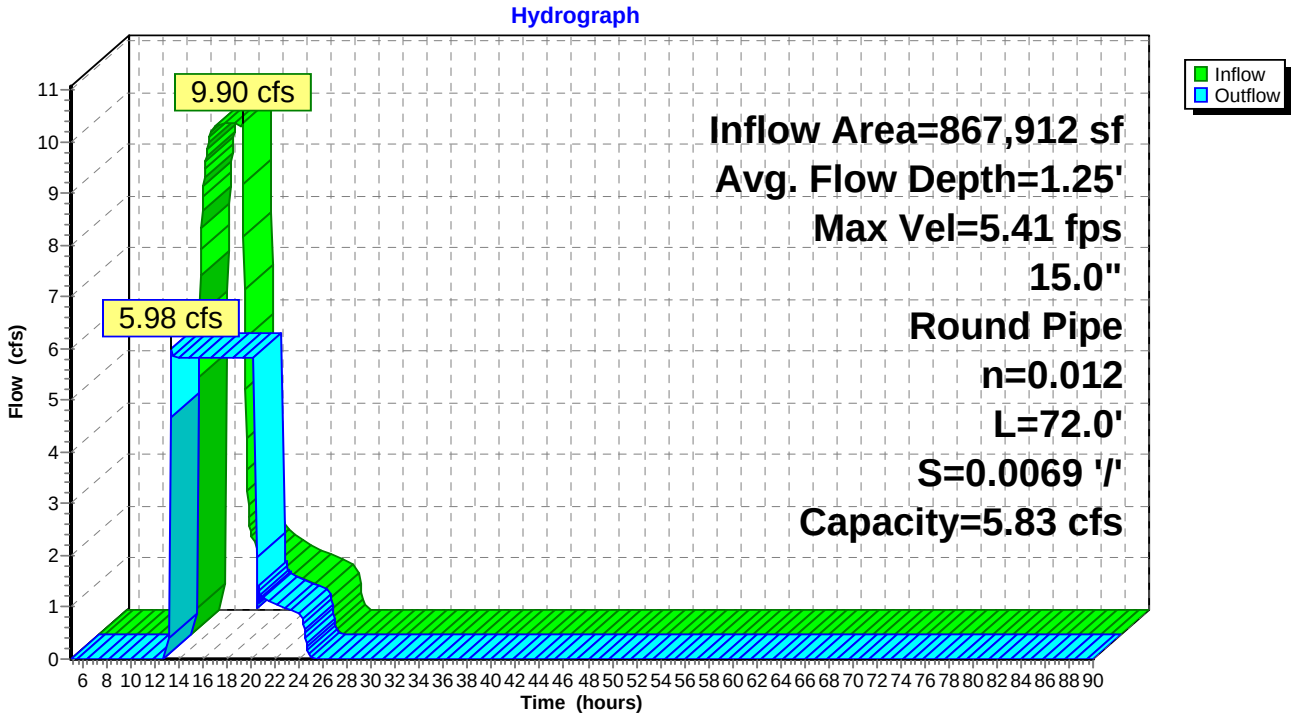
Inflow Area = 867,912 sf, 92.29% Impervious, Inflow Depth = 2.29" for Washington 25 year event
Inflow = 9.90 cfs @ 16.90 hrs, Volume= 165,266 cf
Outflow = 5.98 cfs @ 13.40 hrs, Volume= 165,266 cf, Atten= 40%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.41 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.00 fps, Avg. Travel Time= 0.3 min

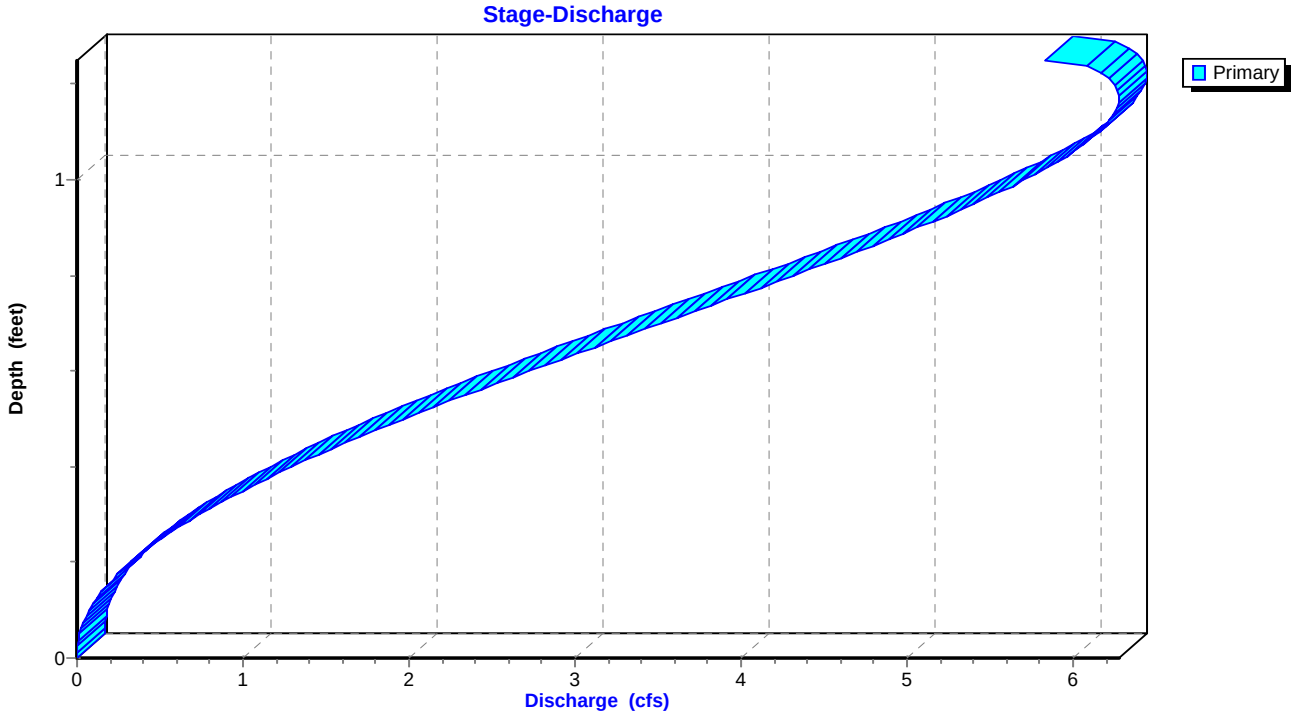
Peak Storage= 88 cf @ 13.45 hrs
Average Depth at Peak Storage= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.83 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 72.0' Slope= 0.0069 '/'
Inlet Invert= 27.50', Outlet Invert= 27.00'

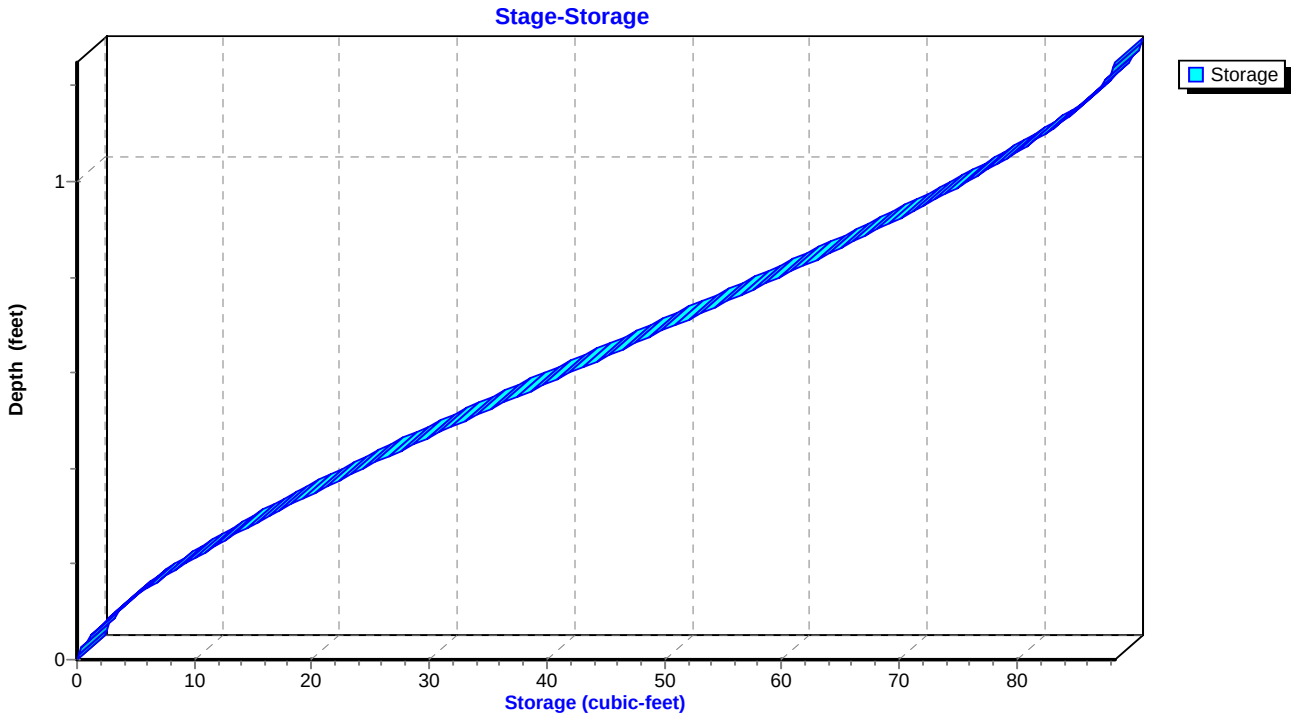




## Reach P2LS: Pipe




## Reach P2LS: Pipe



## Stage-Area-Storage for Reach P2LS: Pipe

| Elevation (feet) | End-Area (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 27.50 | 0.0 | 0 |
| 27.52 | 0.0 | 0 |
| 27.54 | 0.0 | 1 |
| 27.56 | 0.0 | 2 |
| 27.58 | 0.0 | 2 |
| 27.60 | 0.0 | 3 |
| 27.62 | 0.1 | 4 |
| 27.64 | 0.1 | 5 |
| 27.66 | 0.1 | 7 |
| 27.68 | 0.1 | 8 |
| 27.70 | 0.1 | 9 |
| 27.72 | 0.1 | 10 |
| 27.74 | 0.2 | 12 |
| 27.76 | 0.2 | 13 |
| 27.78 | 0.2 | 15 |
| 27.80 | 0.2 | 16 |
| 27.82 | 0.2 | 18 |
| 27.84 | 0.3 | 19 |
| 27.86 | 0.3 | 21 |
| 27.88 | 0.3 | 23 |
| 27.90 | 0.3 | 24 |
| 27.92 | 0.4 | 26 |
| 27.94 | 0.4 | 28 |
| 27.96 | 0.4 | 30 |
| 27.98 | 0.4 | 31 |
| 28.00 | 0.5 | 33 |
| 28.02 | 0.5 | 35 |
| 28.04 | 0.5 | 37 |
| 28.06 | 0.5 | 38 |
| 28.08 | 0.6 | 40 |
| 28.10 | 0.6 | 42 |
| 28.12 | 0.6 | 44 |
| 28.14 | 0.6 | 46 |
| 28.16 | 0.7 | 47 |
| 28.18 | 0.7 | 49 |
| 28.20 | 0.7 | 51 |
| 28.22 | 0.7 | 53 |
| 28.24 | 0.8 | 54 |
| 28.26 | 0.8 | 56 |
| 28.28 | 0.8 | 58 |
| 28.30 | 0.8 | 60 |
| 28.32 | 0.9 | 61 |
| 28.34 | 0.9 | 63 |
| 28.36 | 0.9 | 65 |
| 28.38 | 0.9 | 66 |
| 28.40 | 0.9 | 68 |
| 28.42 | 1.0 | 70 |
| 28.44 | 1.0 | 71 |
| 28.46 | 1.0 | 73 |
| 28.48 | 1.0 | 74 |
| 28.50 | 1.1 | 76 |
| 28.52 | 1.1 | 77 |
| 28.54 | 1.1 | 79 |
| 28.56 | 1.1 | 80 |
| 28.58 | 1.1 | 81 |
| 28.60 | 1.1 | 82 |
| 28.62 | 1.2 | 83 |
| 28.64 | 1.2 | 85 |
| 28.66 | 1.2 | 86 |
| 28.68 | 1.2 | 86 |
| 28.70 | 1.2 | 87 |
| 28.72 | 1.2 | 88 |
| 28.74 | **1.2** | **88** |

## Summary for Subcatchment POST: Development Area

Runoff = 56.55 cfs @ 12.31 hrs, Volume= 295,973 cf, Depth> 4.09"

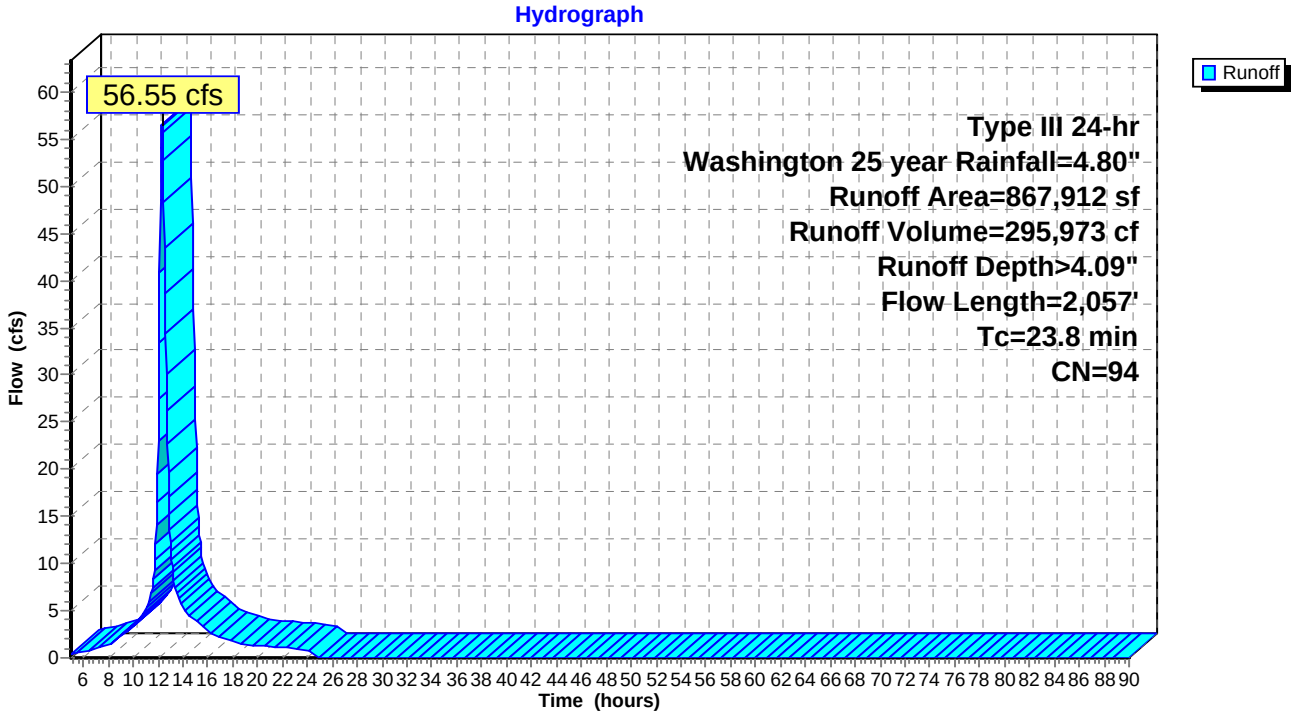
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs
Type III 24-hr Washington 25 year Rainfall=4.80"

| Area (sf) | CN | Description |
|---|---|---|
| 800,996 | 98 | Unconnected pavement, HSG A |
| 66,916 | 49 | 50-75% Grass cover, Fair, HSG A |
| 867,912 | 94 | Weighted Average |
| 66,916 | | 7.71% Pervious Area |
| 800,996 | | 92.29% Impervious Area |
| 800,996 | | 100.00% Unconnected |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.1 | 100 | 0.0150 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80" |
| 0.5 | 70 | 0.0150 | 2.49 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.7 | 189 | 0.0070 | 4.40 | 5.40 | **Pipe Channel, Pipe 76 to CB 36** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 0.9 | 245 | 0.0070 | 4.40 | 5.40 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 0.4 | 100 | 0.0070 | 4.40 | 5.40 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 0.3 | 79 | 0.0070 | 4.40 | 5.40 | **Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior |
| 0.3 | 94 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior |
| 0.3 | 95 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior |
| 0.2 | 59 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior |
| 0.4 | 107 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior |
| 0.4 | 124 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior |
| 0.3 | 100 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior |

| | | | | | |
|---|---|---|---|---|---|
| 0.3 | 85 | 0.0070 | 4.97 | 8.79 | **Pipe Channel,**<br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.6 | 210 | 0.0070 | 6.02 | 18.93 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 1.0 | 348 | 0.0070 | 6.02 | 18.93 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 52 | 0.0097 | 7.09 | 22.28 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 23.8 | 2,057 | Total | | | |

## Subcatchment POST: Development Area

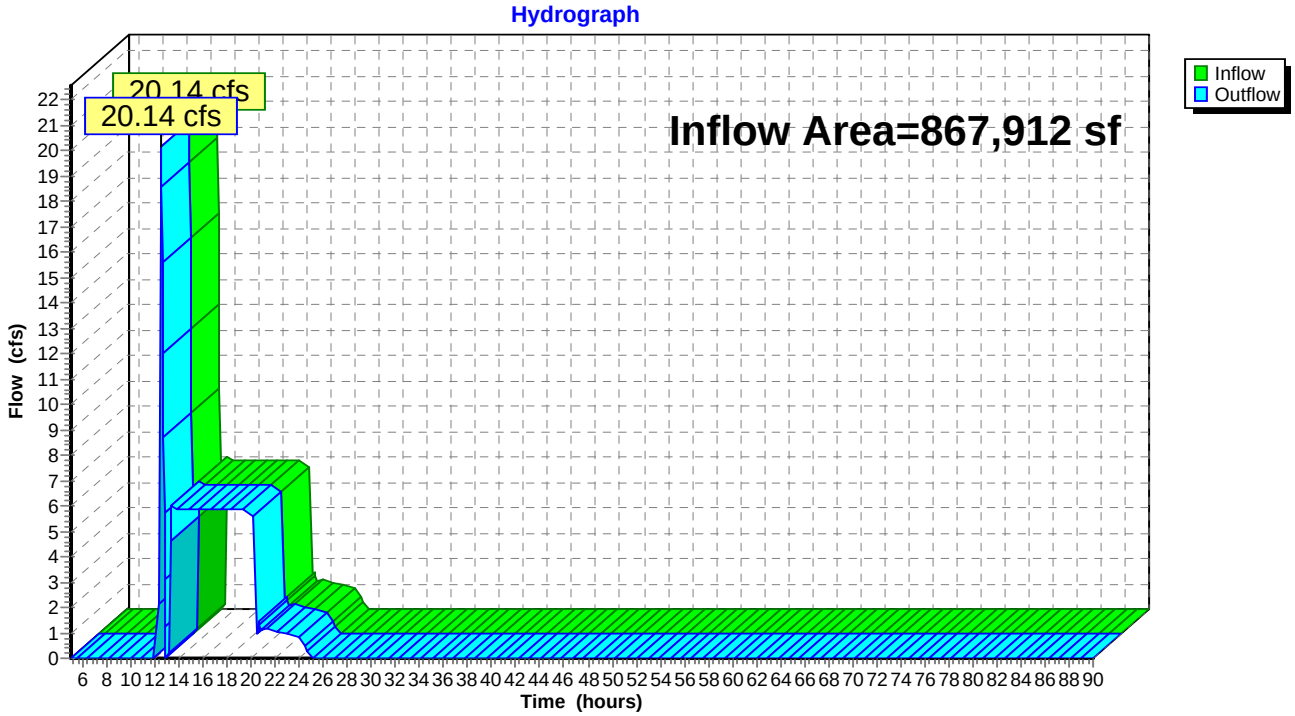


## Summary for Reach SP: Study Point

Inflow Area = 867,912 sf, 92.29% Impervious, Inflow Depth = 2.56" for Washington 25 year event
Inflow = 20.14 cfs @ 12.51 hrs, Volume= 185,278 cf
Outflow = 20.14 cfs @ 12.51 hrs, Volume= 185,278 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-90.00 hrs, dt= 0.05 hrs

## Reach SP: Study Point



***APPENDIX 12C***

Maintenance Plan

# KINGFISH MAINE

## STORMWATER MANAGEMENT SYSTEM MAINTENANCE

### PART 1: RESPONSIBILITY FOR MAINTENANCE

The Owner of the project, Kingfish Maine, Inc. assumes responsibility for inspecting and maintaining the stormwater management system. For the purposes of this maintenance plan, the term 'owner' will be used for the responsible entity/entities accordingly.

### PART 2: INSPECTIONS

- Catch Basins and Sediment Structures:
  The owner will regularly inspect the inlet and outlet of each catch basin for blockage or impaired capacity to pass flow. Inspections will be performed on a monthly basis from March to November and quarterly during the remainder of the year.
- Pipe System:
  The owner will inspect the stormwater pipes at the time the catch basins are inspected. Inspection of the pipe system shall consist of assessing silt accumulation or debris accumulation in each pipe segment. The connecting pipes between catch basins shall be observed through manholes by direct observation, mirror, or scope to characterize condition of the system.
- Grassed Underdrained Soil Filter and Wet Pond:
  The owner will regularly inspect basins for adequate and appropriate ground cover on basin interior slopes and for silt and debris accumulation. The capacity of the outlet structure to convey flow will be assured. Inspections will be performed on a monthly basis from March to November and quarterly during the remainder of the year.
- Wet Pond Basin Outlet Pipe, Outfall, and adjacent area:
  The owner will inspect the ground cover over the detention basin outlet pipe for stable and appropriate ground cover over the pipe. The owner will inspect the outfall and the area adjacent to the outfall for erosion. Inspections will be performed semi-annually in late spring and late fall.
- Outlets and Riprap Areas:
  The owner will inspect all basin and pipe outlets on the same schedule as has been established for the entire system. The well of the plunge pool shall be cleaned when inspection reveals that sediment, silt, or other material has accumulated to a depth of eight inches.

A record of inspections and maintenance or corrective measures shall be kept by the owner (see Part 4).

### PART 3: MAINTENANCE AND CLEANING

The owner will regularly inspect for sediment accumulation, obstructions, debris, and other potential causes for operational difficulty in the conveyance and detention system as described in Part 2. Immediate action shall be taken to remedy detrimental obstructions. The owner or owner's contractor shall maintain the system during construction. Maintenance will be required when inspections determine it necessary during construction. A mandatory scheduled maintenance will be performed every six weeks for a period of eighteen weeks (3 maintenances) and will begin after final earthwork is completed (satisfactory completion and acceptance of landscape construction). Ongoing maintenance will be required as necessary, and as noted.

Elements of maintenance include:

- Catch Basins:
  Sediment and debris accumulated within catch basins shall be removed annually. Additional cleaning should be commensurate with the extent of accumulation of sediment in the basins. Catch basins should be maintained by vac-truck or similar means when the sump depth is reduced to 6" below any invert elevation.
- Pipes/Culverts:
  Pipe should be maintained when accumulated sediment reaches a depth of 3"-5" in the pipe. Removal shall be by spraying, jetting, pressure washing, vacuum truck, handwork, rodding, or other suitable means.
- Detention Basin:
  Sediment and debris accumulated in the detention basin shall be removed at least every five years. Additional basin cleaning shall be performed when the silt accumulates to a depth of 6" above the vegetated bottom. Removal shall be by machine, with adequate overcut and replacement of loam and seed or wildflower mix on the basin bottom to assure re-vegetation.
- Riprap Outlets:
  The material should be hand shoveled from the apron or plunge pool basin area and removed. Cleanout should not occur immediately after any rain event in order to allow the disturbed sediment to settle/drain down.

## PART 4: RECORD KEEPING

The owner will maintain inspection records, with recordings of condition of basins, pipes, and spreaders, dates of maintenance work performed, and annotation of the elements maintained. It is advisable to record substantial precipitation events or mitigating circumstances (such as new earthwork or failed erosion control) in the intervening time for trending to develop an effective preventive maintenance schedule.

# KINGFISH MAINE
## STORMWATER INSPECTION AND MAINTENANCE LOG

How to Complete:

1. Inspect on a monthly basis from March to November and quarterly during the remainder of the year unless otherwise noted.
2. Initial All areas that are satisfactory or Initial which maintenance performed
3. Note any deficiencies or required maintenance items
4. Submit to Owner

**INSPECTION**

| Location/Structure | Areas of Concern | Date/Initial | Date/Initial | Date/Initial | Date/Initial |
|---|---|---|---|---|---|
| Drainage Ways | Erosion<br>Loss of Ground Cover | | | | |
| Road<br>Surfaces | Excess Solids/Sand<br>Settlement | | | | |
| Culverts &<br>Storm Lines | Blockage<br>Sediment Accumulation | | | | |
| Catch Basins &<br>Sediment Structures | Blockage<br>Sediment Accumulation | | | | |
| Pond and Filter<br>Interior Slopes<br>Outfall Pipe Run | Ground Cover/<br>Need For Mowing | | | | |
| Pond and Filter<br>Embankment | Erosion<br>Settlement<br>Loss of Ground Cover | | | | |
| Riprap Outlet Areas | Erosion<br>Blockage | | | | |
| Riprap Outlet Areas | Sediment Accumulation<br>Apron: >4 to 6 Inches<br>Plunge Pool: > 8 Inches | | | | |
| Wetland Adjacent<br>To Outlet | Erosion<br>(Inspect semi-annually in late spring and late fall) | | | | |
| Other | Indications of Erosion<br>Indications of Soil Migration | | | | |

Notes:

_____

**MAINTENANCE**

| Work Task | Frequency | Date/Initial | Date/Initial | Date/Initial | Date/Initial |
|---|---|---|---|---|---|
| Restabilize<br>Drainage Ways | As Needed | | | | |
| Sweep/Clean<br>Road Surface | As Needed | | | | |
| Remove Sediment<br>Culverts &<br>Storm Lines | As Needed | | | | |
| Remove Sediment from<br>Catch Basins & Sediment<br>Control Structures | At 50% Capacity<br>At Least Annually | | | | |
| Mow Pond<br>and Filter Slopes | At Least Annually | | | | |
| Mow Outfall Pipe Run | At Least Annually | | | | |
| Remove Sediment<br>Detention Basin | As Needed<br>At Least Every Five Years | | | | |
| Restabilize<br>Basin Embankment | As Needed | | | | |
| Restabilize<br>Riprap Outlet Areas | As Needed | | | | |
| Remove Sediment/Clean<br>Riprap Outlet Areas | As Needed<br>At Least Semiannually | | | | |
| Other (Specify) | As Needed | | | | |

Notes:

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**REVIEWED AND ACKNOWLEDGED BY OWNER:**

BY: _____