

File... C:\Program Files\Haestad\PPKW\PPW\  
Title... Project Date: 4/16/2009  
Project Engineer: Curtis Jones  
Project Title: Watershed  
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Litchfield Co.

Storm Tag Name = 2 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 2 yr  
Total Rainfall Depth= 3.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 10 yr  
Total Rainfall Depth= 4.7000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 25 yr  
Total Rainfall Depth= 5.5000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 50 yr  
Total Rainfall Depth= 6.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 100 yr  
Total Rainfall Depth= 7.0000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Type.... Design Storms  
Name.... Litchfield Co.  
File.... C:\Program Files\Haestad\PPKW\PPW\  
Storm... TypeIII 24hr Tag: 2 YR

Page 2.02  
Event: 2 yr

DESIGN STORMS SUMMARY

Design Storm File, ID = Litchfield Co.

Storm Tag Name = 2 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 2 yr  
Total Rainfall Depth= 3.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 10 yr  
Total Rainfall Depth= 4.7000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 25 yr  
Total Rainfall Depth= 5.5000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 50 yr  
Total Rainfall Depth= 6.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 100 yr  
Total Rainfall Depth= 7.0000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

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Segment #1: Tc: TR-55 Sheet

Mannings n .3000  
Hydraulic Length 250.00 ft  
2yr, 24hr P 3.2000 in  
Slope .056000 ft/ft

Avg.Velocity .18 ft/sec

Segment #1 Time: .3920 hrs

-----

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 865.00 ft  
Slope .175000 ft/ft  
Unpaved

Avg.Velocity 6.75 ft/sec

Segment #2 Time: .0356 hrs

-----

Segment #3: Tc: TR-55 Channel

Flow Area 2.5000 sq.ft  
Wetted Perimeter 5.50 ft  
Hydraulic Radius .45 ft  
Slope .028000 ft/ft  
Mannings n .0400  
Hydraulic Length 410.00 ft

Avg.Velocity 3.68 ft/sec

Segment #3 Time: .0309 hrs

-----

=====  
Total Tc: .4585 hrs  
=====

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

-----  
Tc Equations used...  
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==== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))$$

Where: Tc = Time of concentration, hrs  
n = Mannings n  
Lf = Flow length, ft  
P = 2yr, 24hr Rain depth, inches  
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:  
V = 16.1345 \* (Sf\*\*0.5)

Paved surface:  
V = 20.3282 \* (Sf\*\*0.5)

$$Tc = (Lf / V) / (3600sec/hr)$$

Where: V = Velocity, ft/sec  
Sf = Slope, ft/ft  
Tc = Time of concentration, hrs  
Lf = Flow length, ft

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

==== SCS Channel Flow =====

$$R = Aq / Wp$$
$$V = (1.49 * (R^{2/3}) * (Sf^{-0.5})) / n$$
$$Tc = (Lf / V) / (3600\text{sec/hr})$$

Where: R = Hydraulic radius  
Aq = Flow area, sq.ft.  
Wp = Wetted perimeter, ft  
V = Velocity, ft/sec  
Sf = Slope, ft/ft  
n = Mannings n  
Tc = Time of concentration, hrs  
Lf = Flow length, ft

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

RUNOFF CURVE NUMBER DATA

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-----

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Soil Type B - Wooded	55	5.820			55.00
Soil Type B - Grass/Meadow	60	1.060			60.00
Soil Type C - Wooded	70	2.120			70.00
Soil Type C - Grass/Meadow	72	.390			72.00
Impervious	98	.200			98.00

COMPOSITE AREA & WEIGHTED CN --->                    9.590                    60.46 (60)  
.....

Name....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

SCS UNIT HYDROGRAPH METHOD  
(Computational Notes)

DEFINITION OF TERMS: -----

At = Total area (acres):  $At = Ai + Ap$   
 Ai = Impervious area (acres)  
 Ap = Pervious area (acres)  
 CNi = Runoff curve number for impervious area  
 CNp = Runoff curve number for pervious area  
 fLoss = f loss constant infiltration (depth/time)  
 gKs = Saturated Hydraulic Conductivity (depth/time)  
 Md = Volumetric Moisture Deficit  
 Psi = Capillary Suction (length)  
 hK = Horton Infiltration Decay Rate ( $time^{-1}$ )  
 fo = Initial Infiltration Rate (depth/time)  
 fc = Ultimate (capacity) Infiltration Rate (depth/time)  
 Ia = Initial Abstraction (length)  
 dt = Computational increment (duration of unit excess rainfall)  
 Default dt is smallest value of  $0.1333Tc$ ,  $r_{tm}$ , and  $t_h$   
 (Smallest dt is then adjusted to match up with  $T_p$ )  
 Uddt = User specified override computational main time increment  
 (only used if Uddt is  $\Rightarrow .1333Tc$ )  
 D(t) = Point on distribution curve (fraction of P) for time step t  
  
 K =  $2 / (1 + (Tr/Tp))$ : default K = 0.75: (for  $Tr/Tp = 1.67$ )  
 Ks = Hydrograph shape factor  
 = Unit Conversions \* K:  
 =  $((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K$   
 Default Ks =  $645.333 * 0.75 = 484$   
  
 Lag = Lag time from center of excess runoff (dt) to  $T_p$ :  $Lag = 0.6Tc$   
 P = Total precipitation depth, inches  
 Pa(t) = Accumulated rainfall at time step t  
 Pi(t) = Incremental rainfall at time step t  
 qp = Peak discharge (cfs) for lin. runoff, for 1hr, for 1 sq.mi.  
 =  $(Ks * A * Q) / T_p$  (where Q = lin. runoff, A=sq.mi.)  
 Qu(t) = Unit hydrograph ordinate (cfs) at time step t  
 Q(t) = Final hydrograph ordinate (cfs) at time step t  
 Rai(t) = Accumulated runoff (inches) at time step t for impervious area  
 Rap(t) = Accumulated runoff (inches) at time step t for pervious area  
 Rii(t) = Incremental runoff (inches) at time step t for impervious area  
 Rip(t) = Incremental runoff (inches) at time step t for pervious area  
 R(t) = Incremental weighted total runoff (inches)  
 Rtm = Time increment for rainfall table  
 Si = S for impervious area:  $Si = (1000/CNi) - 10$   
 Sp = S for pervious area:  $Sp = (1000/CNp) - 10$   
 t = Time step (row) number  
 Tc = Time of concentration  
 Tb = Time (hrs) of entire unit hydrograph:  $Tb = T_p + Tr$   
 Tp = Time (hrs) to peak of a unit hydrograph:  $Tp = (dt/2) + Lag$   
 Tr = Time (hrs) of receding limb of unit hydrograph:  $Tr = ratio\ of\ T_p$

Name....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

SCS UNIT HYDROGRAPH METHOD  
(Computational Notes)

PRECIPITATION: -----

Column (1): Time for time step t  
 Column (2): D(t) = Point on distribution curve for time step t  
 Column (3): Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)  
 Column (4): Pa(t) = D(t) x P: Col.(2) x P

PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) -----

Column (5): Rap(t) = Accumulated pervious runoff for time step t  
 If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0  
 If (Pa(t) is > 0.2Sp) then use:  

$$\text{Rap}(t) = (\text{Col.}(4) - 0.2\text{Sp})^{**2} / (\text{Col.}(4) + 0.8\text{Sp})$$
  
 Column (6): Rip(t) = Incremental pervious runoff for time step t  

$$\text{Rip}(t) = \text{Rap}(t) - \text{Rap}(t-1)$$
  
 Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF -----

Column (7 & 8)... Did not specify to use impervious areas.

INCREMENTAL WEIGHTED RUNOFF: -----

Column (9):  $R(t) = (A_p/A_t) \times \text{Rip}(t) + (A_i/A_t) \times \text{Rii}(t)$   
 $R(t) = (A_p/A_t) \times \text{Col.}(6) + (A_i/A_t) \times \text{Col.}(8)$

SCS UNIT HYDROGRAPH METHOD: -----

Column (10): Q(t) is computed with the SCS unit hydrograph method  
 using R() and Qu().



SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.2000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - PRDA 1 2 YR

Tc = .4585 hrs

Drainage Area = 9.590 acres Runoff CN= 60

```

=====
Computational Time Increment = .06114 hrs
Computed Peak Time          = 12.4716 hrs
Computed Peak Flow          = 1.74 cfs

```

```

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.5000 hrs
Peak Flow, Interpolated Output = 1.73 cfs
=====

```

DRAINAGE AREA

```

-----
ID:PRDA 1
CN = 60
Area = 9.590 acres
S = 6.6667 in
0.2S = 1.3333 in

```

Cumulative Runoff

```

-----
.4083 in
.326 ac-ft

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HYG Volume... .326 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .45852 hrs (ID: PRDA 1)  
Computational Incr, Tm = .06114 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 23.70 cfs  
Unit peak time Tp = .30568 hrs  
Unit receding limb, Tr = 1.22271 hrs  
Total unit time, Tb = 1.52839 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm

Duration = 24.0000 hrs Rain Depth = 4.7000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - PRDA 1 10 YR

Tc = .4585 hrs

Drainage Area = 9.590 acres Runoff CN= 60

=====  
Computational Time Increment = .06114 hrs

Computed Peak Time = 12.4105 hrs

Computed Peak Flow = 6.45 cfs

Time Increment for HYG File = .0500 hrs

Peak Time, Interpolated Output = 12.4000 hrs

Peak Flow, Interpolated Output = 6.45 cfs  
=====

DRAINAGE AREA

-----  
ID:PRDA 1

CN = 60

Area = 9.590 acres

S = 6.6667 in

0.2S = 1.3333 in

Cumulative Runoff

-----  
1.1297 in

.903 ac-ft

HYG Volume... .903 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .45852 hrs (ID: PRDA 1)

Computational Incr, Tm = .06114 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)

K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))

Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 23.70 cfs

Unit peak time Tp = .30568 hrs

Unit receding limb, Tr = 1.22271 hrs

Total unit time, Tb = 1.52839 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm

Duration = 24.0000 hrs Rain Depth = 5.5000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - PRDA 1 25 YR

Tc = .4585 hrs

Drainage Area = 9.590 acres Runoff CN= 60

=====  
Computational Time Increment = .06114 hrs

Computed Peak Time = 12.3494 hrs

Computed Peak Flow = 9.67 cfs

Time Increment for HYG File = .0500 hrs

Peak Time, Interpolated Output = 12.3500 hrs

Peak Flow, Interpolated Output = 9.66 cfs  
=====

DRAINAGE AREA

-----  
ID:PRDA 1

CN = 60

Area = 9.590 acres

S = 6.6667 in

0.2S = 1.3333 in

Cumulative Runoff

-----  
1.6026 in

1.281 ac-ft

HYG Volume... 1.281 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .45852 hrs (ID: PRDA 1)

Computational Incr, Tm = .06114 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)

K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))

Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 23.70 cfs

Unit peak time, Tp = .30568 hrs

Unit receding limb, Tr = 1.22271 hrs

Total unit time, Tb = 1.52839 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm  
 Duration = 24.0000 hrs Rain Depth = 6.2000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 1 50 YR  
 Tc = .4585 hrs  
 Drainage Area = 9.590 acres Runoff CN= 60

=====  
 Computational Time Increment = .06114 hrs  
 Computed Peak Time = 12.3494 hrs  
 Computed Peak Flow = 12.75 cfs

Time Increment for HYG File = .0500 hrs  
 Peak Time, Interpolated Output = 12.3500 hrs  
 Peak Flow, Interpolated Output = 12.74 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 1  
 CN = 60  
 Area = 9.590 acres  
 S = 6.6667 in  
 0.2S = 1.3333 in

Cumulative Runoff

-----  
 2.0536 in  
 1.641 ac-ft

HYG Volume... 1.641 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .45852 hrs (ID: PRDA 1)  
 Computational Incr, Tm = .06114 hrs = 0.20000 Tp  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
 Unit peak, qp = 23.70 cfs  
 Unit peak time Tp = .30568 hrs  
 Unit receding limb, Tr = 1.22271 hrs  
 Total unit time, Tb = 1.52839 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm  
 Duration = 24.0000 hrs Rain Depth = 7.0000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 1 100 YR  
 Tc = .4585 hrs  
 Drainage Area = 9.590 acres Runoff CN= 60

=====  
 Computational Time Increment = .06114 hrs  
 Computed Peak Time = 12.3494 hrs  
 Computed Peak Flow = 16.48 cfs  
  
 Time Increment for HYG File = .0500 hrs  
 Peak Time, Interpolated Output = 12.3500 hrs  
 Peak Flow, Interpolated Output = 16.47 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 1  
 CN = 60  
 Area = 9.590 acres  
 S = 6.6667 in  
 0.2S = 1.3333 in

Cumulative Runoff  
 -----  
 2.6036 in  
 2.081 ac-ft

HYG Volume... 2.081 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .45852 hrs (ID: PRDA 1)  
 Computational Incr, Tm = .06114 hrs = 0.20000 Tp  
  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
 Unit peak, qp = 23.70 cfs  
 Unit peak time, Tp = .30568 hrs  
 Unit receding limb, Tr = 1.22271 hrs  
 Total unit time, Tb = 1.52839 hrs

Type.... Node: Addition Summary  
 Name.... DP 1  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW  
 Storm... TypeIII 24hr Tag: 2 YR

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 Event: 2 yr

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 1

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP 1           PRDA 1                PRDA 1        2 YR
=====
  
```

INFLOWS TO: DP 1

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
-----
                PRDA 1        2 YR          .326        12.5000        1.73
-----
  
```

TOTAL FLOW INTO: DP 1

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
-----
                DP 1          2 YR          .326        12.5000        1.73
-----
  
```

TOTAL NODE INFLOW...

HYG file =  
 HYG ID = DP 1  
 HYG Tag = 2 YR

-----  
 Peak Discharge = 1.73 cfs  
 Time to Peak = 12.5000 hrs  
 HYG Volume = .326 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs  
 Time on left represents time for first value in each row.

Time hrs					
11.9000	.00	.01	.04	.11	.25
12.1500	.47	.75	1.04	1.30	1.51
12.4000	1.65	1.72	1.73	1.69	1.62
12.6500	1.52	1.41	1.30	1.19	1.10
12.9000	1.02	.95	.89	.84	.79
13.1500	.75	.72	.69	.66	.64
13.4000	.62	.60	.59	.58	.57
13.6500	.56	.55	.54	.53	.53
13.9000	.52	.51	.50	.49	.49
14.1500	.48	.47	.47	.46	.45
14.4000	.45	.44	.44	.43	.43
14.6500	.43	.42	.42	.41	.41
14.9000	.41	.40	.40	.39	.39
15.1500	.39	.38	.38	.37	.37
15.4000	.36	.36	.36	.35	.35
15.6500	.34	.34	.33	.33	.32
15.9000	.32	.31	.31	.30	.30
16.1500	.29	.29	.28	.28	.27
16.4000	.27	.27	.27	.26	.26
16.6500	.26	.26	.25	.25	.25
16.9000	.25	.24	.24	.24	.24
17.1500	.23	.23	.23	.23	.23
17.4000	.22	.22	.22	.22	.21
17.6500	.21	.21	.21	.20	.20
17.9000	.20	.20	.19	.19	.19
18.1500	.19	.18	.18	.18	.18
18.4000	.18	.18	.18	.17	.17
18.6500	.17	.17	.17	.17	.17
18.9000	.17	.17	.17	.17	.17
19.1500	.17	.17	.16	.16	.16
19.4000	.16	.16	.16	.16	.16

HYDROGRAPH ORDINATES (cfs)  
Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

---

Time hrs						
19.6500		.16	.16	.16	.16	.16
19.9000		.16	.15	.15	.15	.15
20.1500		.15	.15	.15	.15	.15
20.4000		.15	.15	.15	.15	.15
20.6500		.15	.15	.14	.14	.14
20.9000		.14	.14	.14	.14	.14
21.1500		.14	.14	.14	.14	.14
21.4000		.14	.14	.14	.14	.14
21.6500		.13	.13	.13	.13	.13
21.9000		.13	.13	.13	.13	.13
22.1500		.13	.13	.13	.13	.13
22.4000		.13	.13	.12	.12	.12
22.6500		.12	.12	.12	.12	.12
22.9000		.12	.12	.12	.12	.12
23.1500		.12	.12	.12	.12	.11
23.4000		.11	.11	.11	.11	.11
23.6500		.11	.11	.11	.11	.11
23.9000		.11	.11	.11	.10	.10
24.1500		.09	.08	.07	.06	.05
24.4000		.04	.03	.02	.02	.01
24.6500		.01	.01	.01	.00	.00
24.9000		.00	.00	.00	.00	.00



SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 1

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP 1           PRDA 1                PRDA 1       10 YR
=====

```

INFLOWS TO: DP 1

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft        hrs          cfs
-----
                PRDA 1      10 YR        .903        12.4000        6.45

```

TOTAL FLOW INTO: DP 1

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-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft        hrs          cfs
-----
                DP 1        10 YR        .903        12.4000        6.45

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TOTAL NODE INFLOW...

HYG file =  
 HYG ID = DP 1  
 HYG Tag = 10 YR

-----  
 Peak Discharge = 6.45 cfs  
 Time to Peak = 12.4000 hrs  
 HYG Volume = .903 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs  
 Time on left represents time for first value in each row.

Time hrs					
11.4500	.00	.00	.01	.02	.04
11.7000	.08	.14	.23	.37	.57
11.9500	.87	1.30	1.90	2.73	3.70
12.2000	4.66	5.48	6.08	6.42	6.45
12.4500	6.29	5.99	5.61	5.17	4.72
12.7000	4.27	3.84	3.46	3.12	2.83
12.9500	2.60	2.41	2.24	2.09	1.96
13.2000	1.85	1.76	1.68	1.61	1.55
13.4500	1.50	1.46	1.43	1.39	1.36
13.7000	1.34	1.31	1.29	1.27	1.24
13.9500	1.22	1.20	1.18	1.16	1.14
14.2000	1.12	1.10	1.08	1.07	1.05
14.4500	1.04	1.03	1.01	1.00	.99
14.7000	.98	.97	.96	.95	.94
14.9500	.93	.92	.91	.90	.88
15.2000	.87	.86	.85	.84	.83
15.4500	.82	.81	.79	.78	.77
15.7000	.76	.75	.74	.72	.71
15.9500	.70	.69	.68	.66	.65
16.2000	.64	.63	.62	.61	.61
16.4500	.60	.59	.58	.58	.57
16.7000	.57	.56	.56	.55	.54
16.9500	.54	.53	.53	.52	.52
17.2000	.51	.51	.50	.50	.49
17.4500	.49	.48	.47	.47	.46
17.7000	.46	.45	.45	.44	.44
17.9500	.43	.42	.42	.41	.41
18.2000	.40	.40	.39	.39	.39
18.4500	.38	.38	.38	.38	.38
18.7000	.37	.37	.37	.37	.37
18.9500	.37	.36	.36	.36	.36

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

---

Time hrs					
19.2000	.36	.36	.35	.35	.35
19.4500	.35	.35	.35	.34	.34
19.7000	.34	.34	.34	.34	.33
19.9500	.33	.33	.33	.33	.33
20.2000	.32	.32	.32	.32	.32
20.4500	.32	.32	.31	.31	.31
20.7000	.31	.31	.31	.31	.31
20.9500	.30	.30	.30	.30	.30
21.2000	.30	.30	.30	.29	.29
21.4500	.29	.29	.29	.29	.29
21.7000	.29	.28	.28	.28	.28
21.9500	.28	.28	.28	.28	.27
22.2000	.27	.27	.27	.27	.27
22.4500	.27	.27	.26	.26	.26
22.7000	.26	.26	.26	.26	.26
22.9500	.25	.25	.25	.25	.25
23.2000	.25	.25	.24	.24	.24
23.4500	.24	.24	.24	.24	.24
23.7000	.23	.23	.23	.23	.23
23.9500	.23	.22	.22	.21	.20
24.2000	.18	.15	.13	.10	.08
24.4500	.06	.04	.03	.03	.02
24.7000	.02	.01	.01	.01	.01
24.9500	.00	.00	.00	.00	.00
25.2000	.00				

Type.... Node: Addition Summary Page 6.07  
 Name.... DP 1 Event: 25 yr  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW  
 Storm... TypeIII 24hr Tag: 25 YR

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 1

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP 1          PRDA 1          PRDA 1          PRDA 1      25 YR
=====
  
```

```

INFLOWS TO:  DP 1
-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft        hrs          cfs
-----
          PRDA 1          25 YR        1.281       12.3500       9.66
  
```

```

TOTAL FLOW INTO:  DP 1
-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft        hrs          cfs
-----
          DP 1          25 YR        1.281       12.3500       9.66
  
```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 1

HYG Tag = 25 YR

-----  
 Peak Discharge = 9.66 cfs  
 Time to Peak = 12.3500 hrs  
 HYG Volume = 1.281 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time |  
 hrs | Time on left represents time for first value in each row.

Time hrs					
11.0000	.00	.00	.01	.01	.02
11.2500	.04	.06	.08	.11	.14
11.5000	.17	.22	.27	.35	.45
11.7500	.58	.76	1.03	1.38	1.87
12.0000	2.56	3.48	4.71	6.10	7.44
12.2500	8.55	9.31	9.66	9.59	9.25
12.5000	8.73	8.10	7.42	6.73	6.05
12.7500	5.43	4.86	4.37	3.95	3.62
13.0000	3.34	3.09	2.88	2.70	2.54
13.2500	2.41	2.30	2.20	2.11	2.04
13.5000	1.98	1.93	1.89	1.85	1.81
13.7500	1.77	1.74	1.71	1.68	1.65
14.0000	1.62	1.59	1.56	1.53	1.50
14.2500	1.48	1.45	1.43	1.41	1.39
14.5000	1.37	1.36	1.34	1.33	1.31
14.7500	1.30	1.28	1.27	1.25	1.24
15.0000	1.22	1.21	1.19	1.18	1.16
15.2500	1.15	1.13	1.12	1.10	1.09
15.5000	1.07	1.06	1.04	1.02	1.01
15.7500	.99	.98	.96	.94	.93
16.0000	.91	.90	.88	.86	.85
16.2500	.84	.82	.81	.80	.79
16.5000	.78	.77	.76	.76	.75
16.7500	.74	.73	.73	.72	.71
17.0000	.70	.70	.69	.68	.68
17.2500	.67	.66	.65	.65	.64
17.5000	.63	.62	.62	.61	.60
17.7500	.60	.59	.58	.57	.57
18.0000	.56	.55	.54	.54	.53
18.2500	.52	.52	.51	.51	.51
18.5000	.50	.50	.50	.49	.49

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

---

Time hrs					
18.7500		.49	.49	.48	.48
19.0000		.48	.48	.47	.47
19.2500		.47	.46	.46	.46
19.5000		.46	.45	.45	.45
19.7500		.44	.44	.44	.44
20.0000		.43	.43	.43	.43
20.2500		.42	.42	.42	.42
20.5000		.41	.41	.41	.41
20.7500		.41	.40	.40	.40
21.0000		.40	.40	.39	.39
21.2500		.39	.39	.39	.38
21.5000		.38	.38	.38	.38
21.7500		.37	.37	.37	.37
22.0000		.36	.36	.36	.36
22.2500		.35	.35	.35	.35
22.5000		.35	.34	.34	.34
22.7500		.34	.34	.33	.33
23.0000		.33	.33	.33	.32
23.2500		.32	.32	.32	.31
23.5000		.31	.31	.31	.31
23.7500		.30	.30	.30	.30
24.0000		.29	.29	.28	.26
24.2500		.20	.16	.13	.10
24.5000		.06	.04	.03	.03
24.7500		.02	.01	.01	.01
25.0000		.00	.00	.00	.00
25.2500		.00			

Type.... Node: Addition Summary

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Name.... DP 1

Event: 50 yr

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 1.PPW

Storm... TypeIII 24hr Tag: 50 YR

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 1

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```
=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP 1          PRDA 1          PRDA 1        PRDA 1      50 YR
=====
```

INFLOWS TO: DP 1

```
-----
HYG file      HYG ID      HYG tag      Volume      Peak Time    Peak Flow
ac-ft        hrs         cfs
-----
PRDA 1        50 YR       1.641        12.3500     12.74
-----
```

TOTAL FLOW INTO: DP 1

```
-----
HYG file      HYG ID      HYG tag      Volume      Peak Time    Peak Flow
ac-ft        hrs         cfs
-----
DP 1          50 YR       1.641        12.3500     12.74
-----
```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 1

HYG Tag = 50 YR

-----  
 Peak Discharge = 12.74 cfs

Time to Peak = 12.3500 hrs

HYG Volume = 1.641 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

Time hrs					
10.5500	.00	.00	.00	.01	.01
10.8000	.02	.04	.05	.07	.09
11.0500	.11	.14	.16	.19	.22
11.3000	.26	.30	.35	.40	.45
11.5500	.52	.60	.71	.86	1.07
11.8000	1.33	1.71	2.21	2.88	3.80
12.0500	5.03	6.63	8.42	10.11	11.48
12.3000	12.37	12.74	12.55	12.04	11.30
12.5500	10.43	9.52	8.60	7.72	6.90
12.8000	6.16	5.53	4.99	4.56	4.19
13.0500	3.88	3.61	3.38	3.18	3.01
13.3000	2.86	2.74	2.63	2.54	2.46
13.5500	2.40	2.34	2.29	2.24	2.19
13.8000	2.15	2.11	2.07	2.03	2.00
14.0500	1.96	1.92	1.89	1.85	1.82
14.3000	1.79	1.76	1.74	1.71	1.69
14.5500	1.67	1.65	1.63	1.61	1.59
14.8000	1.57	1.55	1.54	1.52	1.50
15.0500	1.48	1.46	1.44	1.42	1.41
15.3000	1.39	1.37	1.35	1.33	1.31
15.5500	1.29	1.27	1.25	1.23	1.21
15.8000	1.19	1.17	1.15	1.13	1.11
16.0500	1.09	1.08	1.06	1.04	1.02
16.3000	1.01	.99	.98	.96	.95
16.5500	.94	.93	.92	.91	.90
16.8000	.89	.89	.88	.87	.86
17.0500	.85	.84	.83	.82	.81
17.3000	.81	.80	.79	.78	.77
17.5500	.76	.75	.74	.73	.72
17.8000	.72	.71	.70	.69	.68
18.0500	.67	.66	.65	.64	.64



HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

---

Time hrs					
18.3000	.63	.62	.62	.61	.61
18.5500	.61	.60	.60	.60	.59
18.8000	.59	.59	.59	.58	.58
19.0500	.58	.57	.57	.57	.57
19.3000	.56	.56	.56	.56	.55
19.5500	.55	.55	.55	.54	.54
19.8000	.54	.53	.53	.53	.53
20.0500	.52	.52	.52	.52	.51
20.3000	.51	.51	.51	.50	.50
20.5500	.50	.50	.50	.49	.49
20.8000	.49	.49	.48	.48	.48
21.0500	.48	.48	.47	.47	.47
21.3000	.47	.47	.46	.46	.46
21.5500	.46	.46	.45	.45	.45
21.8000	.45	.45	.44	.44	.44
22.0500	.44	.44	.43	.43	.43
22.3000	.43	.43	.42	.42	.42
22.5500	.42	.41	.41	.41	.41
22.8000	.41	.40	.40	.40	.40
23.0500	.40	.39	.39	.39	.39
23.3000	.38	.38	.38	.38	.38
23.5500	.37	.37	.37	.37	.37
23.8000	.36	.36	.36	.36	.35
24.0500	.35	.33	.31	.28	.24
24.3000	.20	.16	.12	.09	.07
24.5500	.05	.04	.03	.02	.02
24.8000	.01	.01	.01	.01	.00
25.0500	.00	.00	.00	.00	.00

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 1

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP 1           PRDA 1                PRDA 1        100 YR
=====

```

INFLOWS TO: DP 1

```

-----
HYG file          HYG ID          HYG tag        Volume      Peak Time     Peak Flow
ac-ft            hrs              cfs
-----
                PRDA 1          100 YR         2.081       12.3500      16.47

```

TOTAL FLOW INTO: DP 1

```

-----
HYG file          HYG ID          HYG tag        Volume      Peak Time     Peak Flow
ac-ft            hrs              cfs
-----
                DP 1            100 YR         2.081       12.3500      16.47

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 1

HYG Tag = 100 YR

-----  
 Peak Discharge = 16.47 cfs  
 Time to Peak = 12.3500 hrs  
 HYG Volume = 2.081 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time |  
 hrs | Time on left represents time for first value in each row.

10.1000	.00	.00	.00	.01	.01
10.3500	.02	.03	.05	.06	.08
10.6000	.10	.12	.14	.17	.19
10.8500	.22	.25	.28	.31	.34
11.1000	.38	.42	.46	.50	.55
11.3500	.61	.68	.75	.83	.92
11.6000	1.04	1.19	1.40	1.69	2.06
11.8500	2.58	3.25	4.15	5.36	6.95
12.1000	9.01	11.27	13.37	15.05	16.10
12.3500	16.47	16.14	15.40	14.39	13.24
12.6000	12.04	10.85	9.71	8.66	7.72
12.8500	6.90	6.22	5.67	5.21	4.82
13.1000	4.47	4.18	3.92	3.71	3.53
13.3500	3.37	3.24	3.12	3.02	2.94
13.6000	2.87	2.80	2.74	2.69	2.64
13.8500	2.59	2.54	2.49	2.44	2.39
14.1000	2.35	2.30	2.26	2.22	2.18
14.3500	2.15	2.12	2.09	2.06	2.04
14.6000	2.01	1.99	1.96	1.94	1.92
14.8500	1.89	1.87	1.85	1.82	1.80
15.1000	1.78	1.76	1.73	1.71	1.69
15.3500	1.66	1.64	1.62	1.59	1.57
15.6000	1.54	1.52	1.50	1.47	1.45
15.8500	1.42	1.40	1.38	1.35	1.33
16.1000	1.30	1.28	1.26	1.24	1.22
16.3500	1.20	1.18	1.17	1.15	1.14
16.6000	1.13	1.12	1.11	1.09	1.08
16.8500	1.07	1.06	1.05	1.04	1.03
17.1000	1.02	1.01	1.00	.98	.97
17.3500	.96	.95	.94	.93	.92
17.6000	.91	.90	.89	.88	.86

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

---

Time hrs					
17.8500	.85	.84	.83	.82	.81
18.1000	.80	.79	.78	.77	.76
18.3500	.75	.75	.74	.74	.73
18.6000	.73	.72	.72	.72	.71
18.8500	.71	.71	.70	.70	.70
19.1000	.69	.69	.69	.68	.68
19.3500	.68	.67	.67	.67	.66
19.6000	.66	.66	.65	.65	.65
19.8500	.64	.64	.64	.63	.63
20.1000	.63	.62	.62	.62	.61
20.3500	.61	.61	.61	.60	.60
20.6000	.60	.60	.59	.59	.59
20.8500	.59	.58	.58	.58	.58
21.1000	.57	.57	.57	.57	.56
21.3500	.56	.56	.56	.55	.55
21.6000	.55	.55	.54	.54	.54
21.8500	.54	.53	.53	.53	.53
22.1000	.52	.52	.52	.52	.51
22.3500	.51	.51	.51	.50	.50
22.6000	.50	.50	.49	.49	.49
22.8500	.49	.48	.48	.48	.48
23.1000	.47	.47	.47	.46	.46
23.3500	.46	.46	.45	.45	.45
23.6000	.45	.44	.44	.44	.44
23.8500	.43	.43	.43	.42	.42
24.1000	.40	.38	.33	.29	.24
24.3500	.19	.15	.11	.08	.06
24.6000	.05	.04	.03	.02	.02
24.8500	.01	.01	.01	.01	.00
25.1000	.00	.00	.00	.00	.00

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## **Existing Flows – DP2**

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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Litchfield Co.

Return Event	Total Depth in	Rainfall Type	RNF ID
2 YR	3.2000	Synthetic Curve	TypeIII 24hr
10 YR	4.7000	Synthetic Curve	TypeIII 24hr
25 YR	5.5000	Synthetic Curve	TypeIII 24hr
50 YR	6.2000	Synthetic Curve	TypeIII 24hr
100 YR	7.0000	Synthetic Curve	TypeIII 24hr

MASTER NETWORK SUMMARY  
SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DP 2	JCT	2	.789		12.4000	4.97		
*DP 2	JCT	10	2.062		12.3000	16.52		
*DP 2	JCT	25	2.881		12.3000	24.08		
*DP 2	JCT	50	3.656		12.3000	31.18		
*DP 2	JCT	100	4.596		12.3000	39.73		
EXDA 2	AREA	2	.789		12.4000	4.97		
EXDA 2	AREA	10	2.062		12.3000	16.52		
EXDA 2	AREA	25	2.881		12.3000	24.08		
EXDA 2	AREA	50	3.656		12.3000	31.18		
EXDA 2	AREA	100	4.596		12.3000	39.73		

File.... C:\Program Files\Haestad\PPKW\PPW\  
Title... Project Date: 4/16/2009  
Project Engineer: Curtis Jones  
Project Title: Watershed  
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Litchfield Co.

Storm Tag Name = 2 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 2 yr  
Total Rainfall Depth= 3.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 10 yr  
Total Rainfall Depth= 4.7000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 25 yr  
Total Rainfall Depth= 5.5000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 50 yr  
Total Rainfall Depth= 6.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 100 yr  
Total Rainfall Depth= 7.0000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

DESIGN STORMS SUMMARY

Design Storm File, ID = Litchfield Co.

Storm Tag Name = 2 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 2 yr  
Total Rainfall Depth= 3.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 10 yr  
Total Rainfall Depth= 4.7000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 25 yr  
Total Rainfall Depth= 5.5000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 50 yr  
Total Rainfall Depth= 6.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 100 yr  
Total Rainfall Depth= 7.0000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

-----  
Segment #1: Tc: TR-55 Sheet

Mannings n .4000  
Hydraulic Length 225.00 ft  
2yr, 24hr P 3.2000 in  
Slope .120000 ft/ft

Avg.Velocity .19 ft/sec

Segment #1 Time: .3344 hrs  
-----

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 250.00 ft  
Slope .152000 ft/ft  
Unpaved

Avg.Velocity 6.29 ft/sec

Segment #2 Time: .0110 hrs  
-----

Segment #3: Tc: TR-55 Channel

Flow Area 2.5000 sq.ft  
Wetted Perimeter 5.50 ft  
Hydraulic Radius .45 ft  
Slope .115000 ft/ft  
Mannings n .0400  
Hydraulic Length 800.00 ft

Avg.Velocity 7.47 ft/sec

Segment #3 Time: .0298 hrs  
-----

=====  
Total Tc: .3752 hrs  
=====

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

-----  
Tc Equations used..  
-----

==== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))$$

Where: Tc = Time of concentration, hrs  
n = Mannings n  
Lf = Flow length, ft  
P = 2yr, 24hr Rain depth, inches  
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:

$$V = 16.1345 * (Sf**0.5)$$

Paved surface:

$$V = 20.3282 * (Sf**0.5)$$

$$Tc = (Lf / V) / (3600sec/hr)$$

Where: V = Velocity, ft/sec  
Sf = Slope, ft/ft  
Tc = Time of concentration, hrs  
Lf = Flow length, ft

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

==== SCS Channel Flow =====

$$R = Aq / Wp$$
$$V = (1.49 * (R^{2/3}) * (Sf^{-0.5})) / n$$
$$Tc = (Lf / V) / (3600\text{sec/hr})$$

Where: R = Hydraulic radius  
Aq = Flow area, sq.ft.  
Wp = Wetted perimeter, ft  
V = Velocity, ft/sec  
Sf = Slope, ft/ft  
n = Mannings n  
Tc = Time of concentration, hrs  
Lf = Flow length, ft

Type.... Runoff CN-Area  
Name.... EXDA 2

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

RUNOFF CURVE NUMBER DATA

.....

-----

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Soil Type B - Wooded	55	10.670			55.00
Soil Type B - Grass/Meadow	60	2.540			60.00
Soil Type C - Wooded	70	3.900			70.00
Soil Type C - Grass/Meadow	72	.270			72.00
Soil Type D - Wooded	79	1.810			79.00
Impervious	98	.500			98.00

COMPOSITE AREA & WEIGHTED CN --->                    19.690                    62.15 (62)  
.....

Name....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

SCS UNIT HYDROGRAPH METHOD  
(Computational Notes)

DEFINITION OF TERMS: -----

At = Total area (acres):  $At = Ai + Ap$   
 Ai = Impervious area (acres)  
 Ap = Pervious area (acres)  
 CNi = Runoff curve number for impervious area  
 CNp = Runoff curve number for pervious area  
 fLoss = f loss constant infiltration (depth/time)  
 gKs = Saturated Hydraulic Conductivity (depth/time)  
 Md = Volumetric Moisture Deficit  
 Psi = Capillary Suction (length)  
 hK = Horton Infiltration Decay Rate ( $time^{-1}$ )  
 fo = Initial Infiltration Rate (depth/time)  
 fc = Ultimate(capacity)Infiltration Rate (depth/time)  
 Ia = Initial Abstraction (length)  
 dt = Computational increment (duration of unit excess rainfall)  
 Default dt is smallest value of  $0.1333Tc$ ,  $r_{tm}$ , and  $t_h$   
 (Smallest dt is then adjusted to match up with  $T_p$ )  
 UDDt = User specified override computational main time increment  
 (only used if UDDt is  $\Rightarrow .1333Tc$ )  
 D(t) = Point on distribution curve (fraction of P) for time step t  
  
 K =  $2 / (1 + (Tr/Tp))$ : default K = 0.75: (for  $Tr/Tp = 1.67$ )  
 Ks = Hydrograph shape factor  
 = Unit Conversions \* K:  
 =  $((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K$   
 Default Ks =  $645.333 * 0.75 = 484$   
  
 Lag = Lag time from center of excess runoff (dt) to  $T_p$ : Lag =  $0.6Tc$   
 P = Total precipitation depth, inches  
 Pa(t) = Accumulated rainfall at time step t  
 Pi(t) = Incremental rainfall at time step t  
 qp = Peak discharge (cfs) for lin. runoff, for 1hr, for 1 sq.mi.  
 =  $(Ks * A * Q) / T_p$  (where Q = lin. runoff, A=sq.mi.)  
 Qu(t) = Unit hydrograph ordinate (cfs) at time step t  
 Q(t) = Final hydrograph ordinate (cfs) at time step t  
 Rai(t) = Accumulated runoff (inches) at time step t for impervious area  
 Rap(t) = Accumulated runoff (inches) at time step t for pervious area  
 Rii(t) = Incremental runoff (inches) at time step t for impervious area  
 Rip(t) = Incremental runoff (inches) at time step t for pervious area  
 R(t) = Incremental weighted total runoff (inches)  
 Rtm = Time increment for rainfall table  
 Si = S for impervious area:  $Si = (1000/CNi) - 10$   
 Sp = S for pervious area:  $Sp = (1000/CNp) - 10$   
 t = Time step (row) number  
 Tc = Time of concentration  
 Tb = Time (hrs) of entire unit hydrograph:  $Tb = T_p + Tr$   
 Tp = Time (hrs) to peak of a unit hydrograph:  $Tp = (dt/2) + Lag$   
 Tr = Time (hrs) of receding limb of unit hydrograph: Tr = ratio of  $T_p$



Name....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

SCS UNIT HYDROGRAPH METHOD  
(Computational Notes)

PRECIPITATION: -----

Column (1): Time for time step t  
 Column (2):  $D(t)$  = Point on distribution curve for time step t  
 Column (3):  $P_i(t) = P_a(t) - P_a(t-1)$ : Col.(4) - Preceding Col.(4)  
 Column (4):  $P_a(t) = D(t) \times P$ : Col.(2) x P

PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) -----

Column (5):  $R_{ap}(t)$  = Accumulated pervious runoff for time step t  
 If  $(P_a(t) \text{ is } \leq 0.2Sp)$  then use:  $R_{ap}(t) = 0.0$   
 If  $(P_a(t) \text{ is } > 0.2Sp)$  then use:

$$R_{ap}(t) = (Col.(4) - 0.2Sp)^2 / (Col.(4) + 0.8Sp)$$

Column (6):  $R_{ip}(t)$  = Incremental pervious runoff for time step t  
 $R_{ip}(t) = R_{ap}(t) - R_{ap}(t-1)$   
 $R_{ip}(t) = Col.(5) \text{ for current row} - Col.(5) \text{ for preceding row.}$

IMPERVIOUS AREA RUNOFF -----

Column (7 & 8)... Did not specify to use impervious areas.

INCREMENTAL WEIGHTED RUNOFF: -----

Column (9):  $R(t) = (A_p/A_t) \times R_{ip}(t) + (A_i/A_t) \times R_{ii}(t)$   
 $R(t) = (A_p/A_t) \times Col.(6) + (A_i/A_t) \times Col.(8)$

SCS UNIT HYDROGRAPH METHOD: -----

Column (10):  $Q(t)$  is computed with the SCS unit hydrograph method  
 using  $R(t)$  and  $Q_u(t)$ .

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.2000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - EXDA 2 2 YR

Tc = .3752 hrs

Drainage Area = 19.690 acres Runoff CN= 62

```

=====
Computational Time Increment = .05002 hrs
Computed Peak Time          = 12.4060 hrs
Computed Peak Flow          = 4.97 cfs

```

```

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.4000 hrs
Peak Flow, Interpolated Output = 4.97 cfs
=====

```

DRAINAGE AREA

```

-----
ID:EXDA 2
CN = 62
Area = 19.690 acres
S = 6.1290 in
0.2S = 1.2258 in

```

Cumulative Runoff

```

-----
.4810 in
.789 ac-ft

```

HYG Volume... .789 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37518 hrs (ID: EXDA 2)  
Computational Incr, Tm = .05002 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 59.46 cfs  
Unit peak time Tp = .25012 hrs  
Unit receding limb, Tr = 1.00048 hrs  
Total unit time, Tb = 1.25060 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm  
 Duration = 24.0000 hrs Rain Depth = 4.7000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - EXDA 2 10 YR  
 Tc = .3752 hrs  
 Drainage Area = 19.690 acres Runoff CN= 62

=====  
 Computational Time Increment = .05002 hrs  
 Computed Peak Time = 12.3059 hrs  
 Computed Peak Flow = 16.57 cfs  
  
 Time Increment for HYG File = .0500 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = 16.52 cfs  
 =====

DRAINAGE AREA

-----  
 ID:EXDA 2  
 CN = 62  
 Area = 19.690 acres  
 S = 6.1290 in  
 0.2S = 1.2258 in

Cumulative Runoff

-----  
 1.2569 in  
 2.062 ac-ft

HYG Volume... 2.062 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37518 hrs (ID: EXDA 2)  
 Computational Incr, Tm = .05002 hrs = 0.20000 Tp  
  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
 Unit peak, qp = 59.46 cfs  
 Unit peak time Tp = .25012 hrs  
 Unit receding limb, Tr = 1.00048 hrs  
 Total unit time, Tb = 1.25060 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm  
 Duration = 24.0000 hrs Rain Depth = 5.5000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - EXDA 2 25 YR  
 Tc = .3752 hrs  
 Drainage Area = 19.690 acres Runoff CN= 62

=====  
 Computational Time Increment = .05002 hrs  
 Computed Peak Time = 12.3059 hrs  
 Computed Peak Flow = 24.12 cfs  
  
 Time Increment for HYG File = .0500 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = 24.08 cfs  
 =====

DRAINAGE AREA

-----  
 ID:EXDA 2  
 CN = 62  
 Area = 19.690 acres  
 S = 6.1290 in  
 0.2S = 1.2258 in

Cumulative Runoff

-----  
 1.7561 in  
 2.881 ac-ft

HYG Volume... 2.881 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37518 hrs (ID: EXDA 2)  
 Computational Incr, Tm = .05002 hrs = 0.20000 Tp  
  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
 Unit peak, qp = 59.46 cfs  
 Unit peak time Tp = .25012 hrs  
 Unit receding limb, Tr = 1.00048 hrs  
 Total unit time, Tb = 1.25060 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm

Duration = 24.0000 hrs Rain Depth = 6.2000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - EXDA 2 50 YR

Tc = .3752 hrs

Drainage Area = 19.690 acres Runoff CN= 62

Computational Time Increment = .05002 hrs

Computed Peak Time = 12.3059 hrs

Computed Peak Flow = 31.21 cfs

Time Increment for HYG File = .0500 hrs

Peak Time, Interpolated Output = 12.3000 hrs

Peak Flow, Interpolated Output = 31.18 cfs

DRAINAGE AREA

ID:EXDA 2

CN = 62

Area = 19.690 acres

S = 6.1290 in

0.2S = 1.2258 in

Cumulative Runoff

2.2284 in

3.656 ac-ft

HYG Volume... 3.656 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37518 hrs (ID: EXDA 2)

Computational Incr, Tm = .05002 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)

K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))

Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 59.46 cfs

Unit peak time Tp = .25012 hrs

Unit receding limb, Tr = 1.00048 hrs

Total unit time, Tb = 1.25060 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm  
Duration = 24.0000 hrs Rain Depth = 7.0000 in  
Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
Rain File -ID = - TypeIII 24hr  
Unit Hyd Type = Default Curvilinear  
HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
HYG File - ID = - EXDA 2 100 YR  
Tc = .3752 hrs  
Drainage Area = 19.690 acres Runoff CN= 62

=====  
Computational Time Increment = .05002 hrs  
Computed Peak Time = 12.3059 hrs  
Computed Peak Flow = 39.73 cfs

Time Increment for HYG File = .0500 hrs  
Peak Time, Interpolated Output = 12.3000 hrs  
Peak Flow, Interpolated Output = 39.73 cfs  
=====

DRAINAGE AREA

-----  
ID:EXDA 2  
CN = 62  
Area = 19.690 acres  
S = 6.1290 in  
0.2S = 1.2258 in

Cumulative Runoff

-----  
2.8010 in  
4.596 ac-ft

HYG Volume... 4.596 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37518 hrs (ID: EXDA 2)  
Computational Incr, Tm = .05002 hrs = 0.20000 Tp  
  
Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
Unit peak, qp = 59.46 cfs  
Unit peak time Tp = .25012 hrs  
Unit receding limb, Tr = 1.00048 hrs  
Total unit time, Tb = 1.25060 hrs

Type.... Node: Addition Summary

Page 6.01

Name.... DP 2

Event: 2 yr

File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW

Storm... TypeIII 24hr Tag: 2 YR

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP 2           EXDA 2                EXDA 2        2 YR
=====

```

INFLOWS TO: DP 2

```

-----
HYG file          HYG ID          HYG tag          Volume          Peak Time        Peak Flow
                   ac-ft          hrs              cfs
-----
                   EXDA 2          2 YR              .789            12.4000          4.97
-----

```

TOTAL FLOW INTO: DP 2

```

-----
HYG file          HYG ID          HYG tag          Volume          Peak Time        Peak Flow
                   ac-ft          hrs              cfs
-----
                   DP 2            2 YR              .789            12.4000          4.97
-----

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 2 YR

-----  
 Peak Discharge = 4.97 cfs

Time to Peak = 12.4000 hrs

HYG Volume = .789 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time |  
 hrs | Time on left represents time for first value in each row.

Time hrs					
11.8000	.00	.00	.02	.09	.29
12.0500	.73	1.46	2.38	3.36	4.16
12.3000	4.68	4.93	4.97	4.84	4.61
12.5500	4.31	3.96	3.58	3.21	2.88
12.8000	2.61	2.38	2.21	2.06	1.94
13.0500	1.83	1.73	1.65	1.58	1.51
13.3000	1.46	1.42	1.39	1.36	1.34
13.5500	1.32	1.30	1.28	1.26	1.24
13.8000	1.22	1.21	1.19	1.17	1.15
14.0500	1.13	1.11	1.09	1.08	1.06
14.3000	1.05	1.04	1.02	1.01	1.00
14.5500	.99	.98	.98	.97	.96
14.8000	.95	.94	.93	.92	.91
15.0500	.90	.89	.88	.87	.86
15.3000	.85	.84	.83	.81	.80
15.5500	.79	.78	.77	.76	.75
15.8000	.74	.72	.71	.70	.69
16.0500	.68	.66	.65	.64	.63
16.3000	.63	.62	.61	.60	.60
16.5500	.59	.59	.58	.58	.57
16.8000	.57	.56	.56	.55	.54
17.0500	.54	.53	.53	.52	.52
17.3000	.51	.51	.50	.50	.49
17.5500	.49	.48	.47	.47	.46
17.8000	.46	.45	.45	.44	.43
18.0500	.43	.42	.42	.41	.41
18.3000	.41	.40	.40	.40	.40
18.5500	.39	.39	.39	.39	.39
18.8000	.39	.38	.38	.38	.38
19.0500	.38	.38	.37	.37	.37
19.3000	.37	.37	.37	.36	.36



Type.... Node: Addition Summary  
 Name.... DP 2  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW  
 Storm... TypeIII 24hr Tag: 2 YR

Page 6.03  
 Event: 2 yr

HYDROGRAPH ORDINATES (cfs)  
 Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

Time hrs					
19.5500	.36	.36	.36	.36	.36
19.8000	.35	.35	.35	.35	.35
20.0500	.35	.34	.34	.34	.34
20.3000	.34	.34	.33	.33	.33
20.5500	.33	.33	.33	.33	.33
20.8000	.32	.32	.32	.32	.32
21.0500	.32	.32	.32	.31	.31
21.3000	.31	.31	.31	.31	.31
21.5500	.31	.30	.30	.30	.30
21.8000	.30	.30	.30	.30	.29
22.0500	.29	.29	.29	.29	.29
22.3000	.29	.28	.28	.28	.28
22.5500	.28	.28	.28	.28	.27
22.8000	.27	.27	.27	.27	.27
23.0500	.27	.26	.26	.26	.26
23.3000	.26	.26	.26	.25	.25
23.5500	.25	.25	.25	.25	.25
23.8000	.25	.24	.24	.24	.24
24.0500	.23	.22	.20	.16	.13
24.3000	.10	.07	.05	.04	.03
24.5500	.02	.01	.01	.01	.00
24.8000	.00	.00	.00	.00	.00

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP 2           EXDA 2                EXDA 2        10 YR
=====

```

INFLOWS TO: DP 2

```

-----
HYG file          HYG ID          HYG tag        Volume      Peak Time    Peak Flow
                   ac-ft          hrs            ac-ft       hrs           cfs
-----
                   EXDA 2          10 YR          2.062       12.3000      16.52
-----

```

TOTAL FLOW INTO: DP 2

```

-----
HYG file          HYG ID          HYG tag        Volume      Peak Time    Peak Flow
                   ac-ft          hrs            ac-ft       hrs           cfs
-----
                   DP 2            10 YR          2.062       12.3000      16.52
-----

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 10 YR

```

-----
Peak Discharge =      16.52 cfs
Time to Peak   =      12.3000 hrs
HYG Volume     =        2.062 ac-ft
-----

```

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time | Time on left represents time for first value in each row.

Time hrs					
11.2000	.00	.00	.01	.03	.06
11.4500	.10	.15	.21	.30	.42
11.7000	.59	.85	1.20	1.69	2.34
11.9500	3.27	4.64	6.64	9.21	11.95
12.2000	14.37	15.94	16.52	16.30	15.55
12.4500	14.50	13.34	12.11	10.85	9.61
12.7000	8.47	7.48	6.68	6.02	5.51
12.9500	5.09	4.74	4.43	4.17	3.94
13.2000	3.74	3.58	3.44	3.33	3.24
13.4500	3.17	3.10	3.04	2.99	2.94
13.7000	2.89	2.84	2.79	2.74	2.70
13.9500	2.65	2.60	2.55	2.51	2.46
14.2000	2.42	2.38	2.35	2.31	2.28
14.4500	2.26	2.23	2.21	2.18	2.16
14.7000	2.13	2.11	2.09	2.06	2.04
14.9500	2.02	1.99	1.97	1.94	1.92
15.2000	1.89	1.87	1.84	1.82	1.79
15.4500	1.77	1.74	1.72	1.69	1.67
15.7000	1.64	1.61	1.59	1.56	1.53
15.9500	1.51	1.48	1.45	1.43	1.40
16.2000	1.38	1.36	1.34	1.32	1.31
16.4500	1.29	1.28	1.26	1.25	1.24
16.7000	1.23	1.22	1.20	1.19	1.18
16.9500	1.17	1.16	1.14	1.13	1.12
17.2000	1.11	1.10	1.08	1.07	1.06
17.4500	1.05	1.04	1.02	1.01	1.00
17.7000	.99	.98	.96	.95	.94
17.9500	.93	.91	.90	.89	.88
18.2000	.87	.86	.85	.84	.84
18.4500	.83	.83	.82	.82	.82
18.7000	.81	.81	.81	.80	.80

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

Time hrs					
18.9500	.79	.79	.79	.78	.78
19.2000	.78	.77	.77	.77	.76
19.4500	.76	.76	.75	.75	.74
19.7000	.74	.74	.73	.73	.73
19.9500	.72	.72	.72	.71	.71
20.2000	.71	.70	.70	.70	.69
20.4500	.69	.69	.68	.68	.68
20.7000	.68	.67	.67	.67	.66
20.9500	.66	.66	.66	.65	.65
21.2000	.65	.65	.64	.64	.64
21.4500	.63	.63	.63	.63	.62
21.7000	.62	.62	.61	.61	.61
21.9500	.61	.60	.60	.60	.60
22.2000	.59	.59	.59	.58	.58
22.4500	.58	.57	.57	.57	.57
22.7000	.56	.56	.56	.56	.55
22.9500	.55	.55	.54	.54	.54
23.2000	.53	.53	.53	.53	.52
23.4500	.52	.52	.51	.51	.51
23.7000	.51	.50	.50	.50	.49
23.9500	.49	.49	.47	.45	.40
24.2000	.34	.27	.20	.14	.10
24.4500	.07	.05	.04	.03	.02
24.7000	.01	.01	.01	.00	.00
24.9500	.00	.00	.00		

Type.... Node: Addition Summary  
 Name.... DP 2  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW  
 Storm... TypeIII 24hr Tag: 25 YR

Page 6.07  
 Event: 25 yr

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP 2           EXDA 2                EXDA 2        25 YR
=====

```

INFLOWS TO: DP 2

```

----- Volume      Peak Time      Peak Flow
HYG file  HYG ID        HYG tag        ac-ft         hrs            cfs
-----
          EXDA 2          25 YR          2.881         12.3000       24.08

```

TOTAL FLOW INTO: DP 2

```

----- Volume      Peak Time      Peak Flow
HYG file  HYG ID        HYG tag        ac-ft         hrs            cfs
-----
          DP 2          25 YR          2.881         12.3000       24.08

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 25 YR

-----  
 Peak Discharge = 24.08 cfs  
 Time to Peak = 12.3000 hrs  
 HYG Volume = 2.881 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time | | | | |  
 hrs | | | | |  
 -----  
 Time on left represents time for first value in each row.

Time hrs					
10.6500	.00	.00	.01	.02	.03
10.9000	.05	.08	.12	.15	.20
11.1500	.24	.30	.36	.43	.51
11.4000	.59	.69	.80	.93	1.08
11.6500	1.31	1.62	2.07	2.69	3.49
11.9000	4.52	5.95	7.99	10.90	14.56
12.1500	18.36	21.59	23.56	24.08	23.49
12.4000	22.20	20.52	18.74	16.91	15.08
12.6500	13.29	11.68	10.28	9.14	8.22
12.9000	7.49	6.90	6.41	5.99	5.62
13.1500	5.30	5.03	4.80	4.61	4.46
13.4000	4.34	4.23	4.14	4.06	3.98
13.6500	3.91	3.84	3.78	3.71	3.65
13.9000	3.58	3.52	3.45	3.39	3.32
14.1500	3.26	3.20	3.15	3.10	3.06
14.4000	3.02	2.98	2.95	2.91	2.88
14.6500	2.85	2.82	2.78	2.75	2.72
14.9000	2.69	2.65	2.62	2.59	2.56
15.1500	2.52	2.49	2.46	2.42	2.39
15.4000	2.36	2.32	2.29	2.25	2.22
15.6500	2.18	2.15	2.11	2.08	2.04
15.9000	2.01	1.97	1.94	1.90	1.87
16.1500	1.83	1.80	1.78	1.75	1.73
16.4000	1.71	1.69	1.67	1.65	1.64
16.6500	1.62	1.60	1.59	1.57	1.56
16.9000	1.54	1.52	1.51	1.49	1.48
17.1500	1.46	1.45	1.43	1.41	1.40
17.4000	1.38	1.37	1.35	1.33	1.32
17.6500	1.30	1.29	1.27	1.25	1.24
17.9000	1.22	1.21	1.19	1.17	1.16
18.1500	1.14	1.13	1.12	1.11	1.10

Type.... Node: Addition Summary  
 Name.... DP 2  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW  
 Storm... TypeIII 24hr Tag: 25 YR

Page 6.09  
 Event: 25 yr

HYDROGRAPH ORDINATES (cfs)  
 Output Time increment = .0500 hrs  
 Time on left represents time for first value in each row.

Time hrs					
18.4000	1.09	1.08	1.08	1.07	1.07
18.6500	1.06	1.06	1.05	1.05	1.04
18.9000	1.04	1.03	1.03	1.02	1.02
19.1500	1.01	1.01	1.00	1.00	.99
19.4000	.99	.98	.98	.98	.97
19.6500	.97	.96	.96	.95	.95
19.9000	.94	.94	.93	.93	.92
20.1500	.92	.91	.91	.91	.90
20.4000	.90	.89	.89	.89	.88
20.6500	.88	.88	.87	.87	.86
20.9000	.86	.86	.85	.85	.85
21.1500	.84	.84	.84	.83	.83
21.4000	.82	.82	.82	.81	.81
21.6500	.81	.80	.80	.79	.79
21.9000	.79	.78	.78	.78	.77
22.1500	.77	.77	.76	.76	.75
22.4000	.75	.75	.74	.74	.74
22.6500	.73	.73	.72	.72	.72
22.9000	.71	.71	.71	.70	.70
23.1500	.69	.69	.69	.68	.68
23.4000	.67	.67	.67	.66	.66
23.6500	.66	.65	.65	.64	.64
23.9000	.64	.63	.63	.61	.58
24.1500	.52	.43	.34	.26	.19
24.4000	.13	.10	.07	.05	.04
24.6500	.03	.02	.01	.01	.01
24.9000	.00	.00	.00	.00	.00

Type.... Node: Addition Summary  
 Name.... DP 2  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 2.PPW  
 Storm... TypeIII 24hr Tag: 50 YR

Page 6.10  
 Event: 50 yr

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP 2           EXDA 2                EXDA 2        50 YR
=====

```

INFLOWS TO: DP 2

```

----- Volume      Peak Time      Peak Flow
HYG file  HYG ID        HYG tag        ac-ft         hrs           cfs
-----
          EXDA 2          50 YR          3.656         12.3000       31.18

```

TOTAL FLOW INTO: DP 2

```

----- Volume      Peak Time      Peak Flow
HYG file  HYG ID        HYG tag        ac-ft         hrs           cfs
-----
          DP 2           50 YR          3.656         12.3000       31.18

```



TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 50 YR

-----  
 Peak Discharge = 31.18 cfs  
 Time to Peak = 12.3000 hrs  
 HYG Volume = 3.656 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time | Time on left represents time for first value in each row.  
 hrs |

Time hrs					
10.2500	.00	.00	.01	.02	.04
10.5000	.06	.09	.13	.16	.21
10.7500	.25	.30	.35	.40	.45
11.0000	.51	.57	.63	.70	.78
11.2500	.87	.97	1.08	1.21	1.34
11.5000	1.49	1.67	1.90	2.21	2.66
11.7500	3.30	4.16	5.28	6.67	8.57
12.0000	11.25	15.01	19.68	24.45	28.43
12.2500	30.74	31.18	30.22	28.40	26.12
12.5000	23.75	21.36	18.99	16.69	14.63
12.7500	12.84	11.39	10.23	9.31	8.56
13.0000	7.94	7.41	6.95	6.54	6.20
13.2500	5.91	5.68	5.49	5.33	5.20
13.5000	5.09	4.98	4.89	4.80	4.71
13.7500	4.63	4.55	4.47	4.39	4.31
14.0000	4.22	4.14	4.06	3.99	3.92
14.2500	3.85	3.79	3.74	3.69	3.64
14.5000	3.60	3.55	3.51	3.47	3.43
14.7500	3.39	3.35	3.31	3.27	3.23
15.0000	3.19	3.15	3.11	3.07	3.03
15.2500	2.99	2.95	2.90	2.86	2.82
15.5000	2.78	2.74	2.69	2.65	2.61
15.7500	2.57	2.52	2.48	2.44	2.39
16.0000	2.35	2.31	2.26	2.22	2.19
16.2500	2.15	2.12	2.09	2.07	2.04
16.5000	2.02	2.00	1.98	1.96	1.94
16.7500	1.92	1.90	1.88	1.86	1.84
17.0000	1.83	1.81	1.79	1.77	1.75
17.2500	1.73	1.71	1.69	1.67	1.65
17.5000	1.63	1.61	1.59	1.57	1.55
17.7500	1.53	1.52	1.50	1.48	1.46

HYDROGRAPH ORDINATES (cfs)

Time | Output Time increment = .0500 hrs

hrs | Time on left represents time for first value in each row.

Time hrs	1.44	1.42	1.40	1.38	1.36
18.0000	1.44	1.42	1.40	1.38	1.36
18.2500	1.35	1.34	1.32	1.32	1.31
18.5000	1.30	1.29	1.29	1.28	1.27
18.7500	1.27	1.26	1.26	1.25	1.24
19.0000	1.24	1.23	1.23	1.22	1.22
19.2500	1.21	1.20	1.20	1.19	1.19
19.5000	1.18	1.18	1.17	1.16	1.16
19.7500	1.15	1.15	1.14	1.14	1.13
20.0000	1.12	1.12	1.11	1.11	1.10
20.2500	1.10	1.09	1.09	1.08	1.08
20.5000	1.07	1.07	1.06	1.06	1.05
20.7500	1.05	1.04	1.04	1.04	1.03
21.0000	1.03	1.02	1.02	1.01	1.01
21.2500	1.01	1.00	1.00	.99	.99
21.5000	.98	.98	.97	.97	.96
21.7500	.96	.96	.95	.95	.94
22.0000	.94	.93	.93	.92	.92
22.2500	.92	.91	.91	.90	.90
22.5000	.89	.89	.88	.88	.88
22.7500	.87	.87	.86	.86	.85
23.0000	.85	.84	.84	.83	.83
23.2500	.82	.82	.81	.81	.81
23.5000	.80	.80	.79	.79	.78
23.7500	.78	.77	.77	.76	.76
24.0000	.75	.74	.69	.62	.52
24.2500	.41	.31	.22	.16	.11
24.5000	.08	.06	.04	.03	.02
24.7500	.02	.01	.01	.01	.00
25.0000	.00	.00	.00		

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP 2          EXDA 2
=====

```

INFLOWS TO: DP 2

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time     Peak Flow
ac-ft         hrs           cfs
-----
              EXDA 2        100 YR       4.596       12.3000      39.73
-----

```

TOTAL FLOW INTO: DP 2

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time     Peak Flow
ac-ft         hrs           cfs
-----
              DP 2          100 YR       4.596       12.3000      39.73
-----

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 100 YR

-----  
 Peak Discharge = 39.73 cfs  
 Time to Peak = 12.3000 hrs  
 HYG Volume = 4.596 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time hrs	Time on left represents time for first value in each row.				
9.7500	.00	.00	.00	.01	.02
10.0000	.04	.06	.09	.12	.15
10.2500	.19	.23	.27	.32	.36
10.5000	.41	.47	.52	.58	.64
10.7500	.70	.77	.83	.90	.98
11.0000	1.05	1.13	1.21	1.31	1.41
11.2500	1.53	1.67	1.82	1.99	2.18
11.5000	2.39	2.63	2.93	3.37	3.98
11.7500	4.86	6.02	7.52	9.36	11.83
12.0000	15.28	20.07	25.94	31.87	36.71
12.2500	39.40	39.73	38.29	35.82	32.80
12.5000	29.73	26.65	23.63	20.72	18.12
12.7500	15.88	14.07	12.61	11.45	10.52
13.0000	9.74	9.08	8.51	8.00	7.58
13.2500	7.22	6.93	6.69	6.50	6.34
13.5000	6.20	6.07	5.95	5.84	5.73
13.7500	5.63	5.53	5.43	5.33	5.23
14.0000	5.13	5.03	4.93	4.84	4.75
14.2500	4.67	4.59	4.53	4.47	4.41
14.5000	4.36	4.30	4.25	4.20	4.15
14.7500	4.10	4.05	4.00	3.95	3.90
15.0000	3.86	3.81	3.76	3.71	3.66
15.2500	3.61	3.56	3.50	3.45	3.40
15.5000	3.35	3.30	3.25	3.20	3.14
15.7500	3.09	3.04	2.99	2.94	2.88
16.0000	2.83	2.78	2.73	2.68	2.63
16.2500	2.59	2.55	2.52	2.49	2.46
16.5000	2.43	2.41	2.38	2.36	2.33
16.7500	2.31	2.29	2.26	2.24	2.22
17.0000	2.19	2.17	2.15	2.12	2.10
17.2500	2.08	2.05	2.03	2.01	1.98

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .0500 hrs

Time on left represents time for first value in each row.

---

Time hrs					
17.5000	1.96	1.94	1.91	1.89	1.87
17.7500	1.84	1.82	1.79	1.77	1.75
18.0000	1.72	1.70	1.68	1.65	1.63
18.2500	1.62	1.60	1.59	1.58	1.57
18.5000	1.56	1.55	1.54	1.53	1.53
18.7500	1.52	1.51	1.51	1.50	1.49
19.0000	1.48	1.48	1.47	1.46	1.46
19.2500	1.45	1.44	1.44	1.43	1.42
19.5000	1.42	1.41	1.40	1.39	1.39
19.7500	1.38	1.37	1.37	1.36	1.35
20.0000	1.34	1.34	1.33	1.32	1.32
20.2500	1.31	1.31	1.30	1.29	1.29
20.5000	1.28	1.28	1.27	1.27	1.26
20.7500	1.25	1.25	1.24	1.24	1.23
21.0000	1.23	1.22	1.22	1.21	1.21
21.2500	1.20	1.20	1.19	1.19	1.18
21.5000	1.18	1.17	1.16	1.16	1.15
21.7500	1.15	1.14	1.14	1.13	1.13
22.0000	1.12	1.12	1.11	1.11	1.10
22.2500	1.09	1.09	1.08	1.08	1.07
22.5000	1.07	1.06	1.06	1.05	1.05
22.7500	1.04	1.03	1.03	1.02	1.02
23.0000	1.01	1.01	1.00	1.00	.99
23.2500	.98	.98	.97	.97	.96
23.5000	.96	.95	.95	.94	.94
23.7500	.93	.92	.92	.91	.91
24.0000	.90	.88	.83	.74	.62
24.2500	.49	.37	.27	.19	.14
24.5000	.10	.07	.05	.04	.03
24.7500	.02	.01	.01	.01	.00
25.0000	.00	.00	.00		

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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Litchfield Co.

Return Event	Total Depth in	Rainfall Type	RNF ID
2 YR	3.2000	Synthetic Curve	TypeIII 24hr
10 YR	4.7000	Synthetic Curve	TypeIII 24hr
25 YR	5.5000	Synthetic Curve	TypeIII 24hr
50 YR	6.2000	Synthetic Curve	TypeIII 24hr
100 YR	7.0000	Synthetic Curve	TypeIII 24hr

MASTER NETWORK SUMMARY  
SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DP 2	JCT	2	.764		12.4000	4.73		
*DP 2	JCT	10	2.019		12.3000	15.62		
*DP 2	JCT	25	2.826		12.3000	22.70		
*DP 2	JCT	50	3.589		12.3000	29.31		
*DP 2	JCT	100	4.515		12.3000	37.24		
JUNCTION	JCT	2	.764		12.4000	4.73		
JUNCTION	JCT	10	2.019		12.3000	15.62		
JUNCTION	JCT	25	2.826		12.3000	22.70		
JUNCTION	JCT	50	3.589		12.3000	29.31		
JUNCTION	JCT	100	4.515		12.3000	37.24		
POND 1	IN POND	2	.108		12.3000	.85		
POND 1	IN POND	10	.230		12.3000	1.94		
POND 1	IN POND	25	.302		12.3000	2.57		
POND 1	IN POND	50	.368		12.3000	3.15		
POND 1	IN POND	100	.447		12.3000	3.82		

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
POND 1	OUT POND	2	.041		12.7000	.30	1306.39	.025
POND 1	OUT POND	10	.129		12.7000	.74	1306.87	.059
POND 1	OUT POND	25	.185		12.7000	.91	1307.18	.083
POND 1	OUT POND	50	.237		12.8000	1.04	1307.46	.107
POND 1	OUT POND	100	.301		12.8000	1.34	1307.75	.134
PRDA 2D	AREA	2	.108		12.3000	.85		
PRDA 2D	AREA	10	.230		12.3000	1.94		
PRDA 2D	AREA	25	.302		12.3000	2.57		
PRDA 2D	AREA	50	.368		12.3000	3.15		
PRDA 2D	AREA	100	.447		12.3000	3.82		
PRDA 2ND	AREA	2	.724		12.4000	4.55		
PRDA 2ND	AREA	10	1.891		12.3000	15.10		
PRDA 2ND	AREA	25	2.642		12.3000	22.02		
PRDA 2ND	AREA	50	3.352		12.3000	28.52		
PRDA 2ND	AREA	100	4.213		12.3000	36.34		

Type.... Design Storms  
Name.... Litchfield Co.

File.... C:\Program Files\Haestad\PPKW\PPW\  
Title... Project Date: 4/16/2009  
Project Engineer: Curtis Jones  
Project Title: Watershed  
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Litchfield Co.

Storm Tag Name = 2 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 2 yr  
Total Rainfall Depth= 3.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 10 yr  
Total Rainfall Depth= 4.7000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 25 yr  
Total Rainfall Depth= 5.5000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 50 yr  
Total Rainfall Depth= 6.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 100 yr  
Total Rainfall Depth= 7.0000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Type... Design Storms  
Name... Litchfield Co.  
File... C:\Program Files\Haestad\PPKW\PPW\  
Storm... TypeIII 24hr Tag: 2 YR

Page 2.02  
Event: 2 yr

DESIGN STORMS SUMMARY

Design Storm File, ID = Litchfield Co.

Storm Tag Name = 2 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 2 yr  
Total Rainfall Depth= 3.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 10 yr  
Total Rainfall Depth= 4.7000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 25 yr  
Total Rainfall Depth= 5.5000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 50 yr  
Total Rainfall Depth= 6.2000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 100 YR

-----  
Data Type, File, ID = Synthetic Storm TypeIII 24hr  
Storm Frequency = 100 yr  
Total Rainfall Depth= 7.0000 in  
Duration Multiplier = 1  
Resulting Duration = 24.0000 hrs  
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

::  
TIME OF CONCENTRATION CALCULATOR  
::

-----

Segment #1: Tc: TR-55 Sheet

Mannings n .4000  
Hydraulic Length 225.00 ft  
2yr, 24hr P 3.2000 in  
Slope .115000 ft/ft

Avg.Velocity .18 ft/sec

Segment #1 Time: .3401 hrs

-----

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 1550.00 ft  
Slope .103000 ft/ft  
Paved

Avg.Velocity 6.52 ft/sec

Segment #2 Time: .0660 hrs

-----

=====  
Total Tc: .4061 hrs  
=====

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

-----  
Tc Equations used..  
-----

==== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))$$

Where: Tc = Time of concentration, hrs  
n = Mannings n  
Lf = Flow length, ft  
P = 2yr, 24hr Rain depth, inches  
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:

$$V = 16.1345 * (Sf**.5)$$

Paved surface:

$$V = 20.3282 * (Sf**.5)$$

$$Tc = (Lf / V) / (3600sec/hr)$$

Where: V = Velocity, ft/sec  
Sf = Slope, ft/ft  
Tc = Time of concentration, hrs  
Lf = Flow length, ft



File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

-----

Segment #1: Tc: TR-55 Sheet

Mannings n .4000  
Hydraulic Length 225.00 ft  
2yr, 24hr P 3.2000 in  
Slope .120000 ft/ft

Avg.Velocity .19 ft/sec

Segment #1 Time: .3344 hrs

-----

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 250.00 ft  
Slope .125000 ft/ft  
Unpaved

Avg.Velocity 5.70 ft/sec

Segment #2 Time: .0122 hrs

-----

Segment #3: Tc: TR-55 Channel

Flow Area 2.5000 sq.ft  
Wetted Perimeter 5.50 ft  
Hydraulic Radius .45 ft  
Slope .115000 ft/ft  
Mannings n .0400  
Hydraulic Length 800.00 ft

Avg.Velocity 7.47 ft/sec

Segment #3 Time: .0298 hrs

-----

=====  
Total Tc: .3763 hrs  
=====

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

-----  
Tc Equations used...  
-----

==== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))$$

Where: Tc = Time of concentration, hrs  
n = Mannings n  
Lf = Flow length, ft  
P = 2yr, 24hr Rain depth, inches  
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:  
V = 16.1345 \* (Sf\*\*0.5)

Paved surface:  
V = 20.3282 \* (Sf\*\*0.5)

$$Tc = (Lf / V) / (3600sec/hr)$$

Where: V = Velocity, ft/sec  
Sf = Slope, ft/ft  
Tc = Time of concentration, hrs  
Lf = Flow length, ft

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

==== SCS Channel Flow =====

$$R = Aq / Wp$$
$$V = (1.49 * (R^{2/3}) * (Sf^{-0.5})) / n$$
$$Tc = (Lf / V) / (3600\text{sec/hr})$$

Where: R = Hydraulic radius  
Aq = Flow area, sq.ft.  
Wp = Wetted perimeter, ft  
V = Velocity, ft/sec  
Sf = Slope, ft/ft  
n = Mannings n  
Tc = Time of concentration, hrs  
Lf = Flow length, ft

Type.... Runoff CN-Area  
Name.... PRDA 2D

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

RUNOFF CURVE NUMBER DATA

.....

-----

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Soil Type B - Grass/Meadow	60	.040			60.00
Soil Type B - Wooded	55	.600			55.00
Soil Type C - Grass/Meadow	72	.330			72.00
Impervious Area	98	.430			98.00

COMPOSITE AREA & WEIGHTED CN --->                    1.400                    72.36 (72)  
.....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

RUNOFF CURVE NUMBER DATA

.....

---

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Soil Type B - Wooded	55	9.760			55.00
Soil Type B - Grass/Meadow	60	2.570			60.00
Soil Type C - Wooded	70	3.510			70.00
Soil Type C - Grass/Meadow	72	.110			72.00
Soil Type D - Wooded	79	1.810			79.00
Impervious	98	.290			98.00

COMPOSITE AREA & WEIGHTED CN --->                    18.050                    61.83 (62)  
.....

Name....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

SCS UNIT HYDROGRAPH METHOD  
(Computational Notes)

DEFINITION OF TERMS: -----

At = Total area (acres):  $A_t = A_i + A_p$   
 Ai = Impervious area (acres)  
 Ap = Pervious area (acres)  
 CNi = Runoff curve number for impervious area  
 CNp = Runoff curve number for pervious area  
 fLoss = f loss constant infiltration (depth/time)  
 gKs = Saturated Hydraulic Conductivity (depth/time)  
 Md = Volumetric Moisture Deficit  
 Psi = Capillary Suction (length)  
 hK = Horton Infiltration Decay Rate (time<sup>-1</sup>)  
 fo = Initial Infiltration Rate (depth/time)  
 fc = Ultimate(capacity)Infiltration Rate (depth/time)  
 Ia = Initial Abstraction (length)  
 dt = Computational increment (duration of unit excess rainfall)  
 Default dt is smallest value of  $0.1333T_c$ ,  $r_{tm}$ , and  $t_h$   
 (Smallest dt is then adjusted to match up with  $T_p$ )  
 UDdt = User specified override computational main time increment  
 (only used if UDdt is =>  $.1333T_c$ )  
 D(t) = Point on distribution curve (fraction of P) for time step t  
  
 K =  $2 / (1 + (T_r/T_p))$ : default K = 0.75: (for  $T_r/T_p = 1.67$ )  
 Ks = Hydrograph shape factor  
 = Unit Conversions \* K:  
 =  $((1\text{hr}/3600\text{sec}) * (1\text{ft}/12\text{in}) * ((5280\text{ft})^2/\text{sq.mi})) * K$   
 Default Ks =  $645.333 * 0.75 = 484$   
  
 Lag = Lag time from center of excess runoff (dt) to  $T_p$ : Lag =  $0.6T_c$   
 P = Total precipitation depth, inches  
 Pa(t) = Accumulated rainfall at time step t  
 Pi(t) = Incremental rainfall at time step t  
 qp = Peak discharge (cfs) for lin. runoff, for 1hr, for 1 sq.mi.  
 =  $(K_s * A * Q) / T_p$  (where Q = lin. runoff, A=sq.mi.)  
 Qu(t) = Unit hydrograph ordinate (cfs) at time step t  
 Q(t) = Final hydrograph ordinate (cfs) at time step t  
 Rai(t) = Accumulated runoff (inches) at time step t for impervious area  
 Rap(t) = Accumulated runoff (inches) at time step t for pervious area  
 Rii(t) = Incremental runoff (inches) at time step t for impervious area  
 Rip(t) = Incremental runoff (inches) at time step t for pervious area  
 R(t) = Incremental weighted total runoff (inches)  
 Rtm = Time increment for rainfall table  
 Si = S for impervious area:  $S_i = (1000/CN_i) - 10$   
 Sp = S for pervious area:  $S_p = (1000/CN_p) - 10$   
 t = Time step (row) number  
 Tc = Time of concentration  
 Tb = Time (hrs) of entire unit hydrograph:  $T_b = T_p + T_r$   
 Tp = Time (hrs) to peak of a unit hydrograph:  $T_p = (dt/2) + \text{Lag}$   
 Tr = Time (hrs) of receding limb of unit hydrograph: Tr = ratio of  $T_p$

Name....

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

SCS UNIT HYDROGRAPH METHOD  
(Computational Notes)

PRECIPITATION: -----

Column (1): Time for time step t  
 Column (2):  $D(t)$  = Point on distribution curve for time step t  
 Column (3):  $P_i(t) = P_a(t) - P_a(t-1)$ : Col.(4) - Preceding Col.(4)  
 Column (4):  $P_a(t) = D(t) \times P$ : Col.(2) x P

PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) -----

Column (5):  $R_{ap}(t)$  = Accumulated pervious runoff for time step t  
 If  $(P_a(t) \text{ is } \leq 0.2Sp)$  then use:  $R_{ap}(t) = 0.0$   
 If  $(P_a(t) \text{ is } > 0.2Sp)$  then use:  

$$R_{ap}(t) = (Col.(4) - 0.2Sp)^2 / (Col.(4) + 0.8Sp)$$
  
 Column (6):  $R_{ip}(t)$  = Incremental pervious runoff for time step t  
 $R_{ip}(t) = R_{ap}(t) - R_{ap}(t-1)$   
 $R_{ip}(t) = Col.(5) \text{ for current row} - Col.(5) \text{ for preceding row.}$

IMPERVIOUS AREA RUNOFF -----

Column (7 & 8)... Did not specify to use impervious areas.

INCREMENTAL WEIGHTED RUNOFF: -----

Column (9):  $R(t) = (A_p/A_t) \times R_{ip}(t) + (A_i/A_t) \times R_{ii}(t)$   
 $R(t) = (A_p/A_t) \times Col.(6) + (A_i/A_t) \times Col.(8)$

SCS UNIT HYDROGRAPH METHOD: -----

Column (10):  $Q(t)$  is computed with the SCS unit hydrograph method  
 using  $R(t)$  and  $Q_u(t)$ .

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.2000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2D 2 YR  
 Tc = .4061 hrs  
 Drainage Area = 1.400 acres Runoff CN= 72

=====  
 Computational Time Increment = .05415 hrs  
 Computed Peak Time = 12.3460 hrs  
 Computed Peak Flow = .86 cfs  
  
 Time Increment for HYG File = .1000 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = .85 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 2D  
 CN = 72  
 Area = 1.400 acres  
 S = 3.8889 in  
 0.2S = .7778 in

Cumulative Runoff

-----  
 .9297 in  
 .108 ac-ft

HYG Volume... .108 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .40612 hrs (ID: PRDA 2D)  
 Computational Incr, Tm = .05415 hrs = 0.20000 Tp  
  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
 Unit peak, qp = 3.91 cfs  
 Unit peak time Tp = .27075 hrs  
 Unit receding limb, Tr = 1.08299 hrs  
 Total unit time, Tb = 1.35373 hrs



SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm  
 Duration = 24.0000 hrs Rain Depth = 4.7000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2D 10 YR  
 Tc = .4061 hrs  
 Drainage Area = 1.400 acres Runoff CN= 72

=====  
 Computational Time Increment = .05415 hrs  
 Computed Peak Time = 12.2919 hrs  
 Computed Peak Flow = 1.94 cfs

Time Increment for HYG File = .1000 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = 1.94 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 2D  
 CN = 72  
 Area = 1.400 acres  
 S = 3.8889 in  
 0.2S = .7778 in

Cumulative Runoff

-----  
 1.9695 in  
 .230 ac-ft

HYG Volume... .230 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .40612 hrs (ID: PRDA 2D)  
 Computational Incr, Tm = .05415 hrs = 0.20000 Tp  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
 Unit peak, qp = 3.91 cfs  
 Unit peak time Tp = .27075 hrs  
 Unit receding limb, Tr = 1.08299 hrs  
 Total unit time, Tb = 1.35373 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm  
 Duration = 24.0000 hrs Rain Depth = 5.5000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2D 25 YR  
 Tc = .4061 hrs  
 Drainage Area = 1.400 acres Runoff CN= 72

=====  
 Computational Time Increment = .05415 hrs  
 Computed Peak Time = 12.2919 hrs  
 Computed Peak Flow = 2.58 cfs

Time Increment for HYG File = .1000 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = 2.57 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 2D  
 CN = 72  
 Area = 1.400 acres  
 S = 3.8889 in  
 0.2S = .7778 in

Cumulative Runoff

-----  
 2.5896 in  
 .302 ac-ft

HYG Volume... .302 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .40612 hrs (ID: PRDA 2D)  
 Computational Incr, Tm = .05415 hrs = 0.20000 Tp  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
 Unit peak, qp = 3.91 cfs  
 Unit peak time Tp = .27075 hrs  
 Unit receding limb, Tr = 1.08299 hrs  
 Total unit time, Tb = 1.35373 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm  
 Duration = 24.0000 hrs Rain Depth = 6.2000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2D 50 YR  
 Tc = .4061 hrs  
 Drainage Area = 1.400 acres Runoff CN= 72

```

=====
Computational Time Increment = .05415 hrs
Computed Peak Time           = 12.2919 hrs
Computed Peak Flow           = 3.16 cfs

Time Increment for HYG File  = .1000 hrs
Peak Time, Interpolated Output = 12.3000 hrs
Peak Flow, Interpolated Output = 3.15 cfs
=====
  
```

DRAINAGE AREA

```

-----
ID:PRDA 2D
CN = 72
Area = 1.400 acres
S = 3.8889 in
0.2S = .7778 in
  
```

```

Cumulative Runoff
-----
3.1576 in
.368 ac-ft
  
```

HYG Volume... .368 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .40612 hrs (ID: PRDA 2D)  
 Computational Incr, Tm = .05415 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 3.91 cfs  
 Unit peak time Tp = .27075 hrs  
 Unit receding limb, Tr = 1.08299 hrs  
 Total unit time, Tb = 1.35373 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm

Duration = 24.0000 hrs Rain Depth = 7.0000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - PRDA 2D 100 YR

Tc = .4061 hrs

Drainage Area = 1.400 acres Runoff CN= 72

Computational Time Increment = .05415 hrs

Computed Peak Time = 12.2919 hrs

Computed Peak Flow = 3.84 cfs

Time Increment for HYG File = .1000 hrs

Peak Time, Interpolated Output = 12.3000 hrs

Peak Flow, Interpolated Output = 3.82 cfs

DRAINAGE AREA

ID:PRDA 2D

CN = 72

Area = 1.400 acres

S = 3.8889 in

0.2S = .7778 in

Cumulative Runoff

3.8291 in

.447 ac-ft

HYG Volume... .447 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .40612 hrs (ID: PRDA 2D)

Computational Incr, Tm = .05415 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)

K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))

Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 3.91 cfs

Unit peak time Tp = .27075 hrs

Unit receding limb, Tr = 1.08299 hrs

Total unit time, Tb = 1.35373 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm  
 Duration = 24.0000 hrs Rain Depth = 3.2000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2ND 2 YR  
 Tc = .3763 hrs  
 Drainage Area = 18.050 acres Runoff CN= 62

=====  
 Computational Time Increment = .05018 hrs  
 Computed Peak Time = 12.3933 hrs  
 Computed Peak Flow = 4.56 cfs  
  
 Time Increment for HYG File = .1000 hrs  
 Peak Time, Interpolated Output = 12.4000 hrs  
 Peak Flow, Interpolated Output = 4.55 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 2ND  
 CN = 62  
 Area = 18.050 acres  
 S = 6.1290 in  
 0.2S = 1.2258 in

Cumulative Runoff

-----  
 .4810 in  
 .723 ac-ft

HYG Volume... .724 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37631 hrs (ID: PRDA 2ND)  
 Computational Incr, Tm = .05018 hrs = 0.20000 Tp  
  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
 Unit peak, qp = 54.35 cfs  
 Unit peak time Tp = .25088 hrs  
 Unit receding limb, Tr = 1.00351 hrs  
 Total unit time, Tb = 1.25438 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm

Duration = 24.0000 hrs Rain Depth = 4.7000 in

Rain Dir = C:\Program Files\Haestad\PPKW\PPW\

Rain File -ID = - TypeIII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Program Files\Haestad\PPKW\PPW\

HYG File - ID = - PRDA 2ND 10 YR

Tc = .3763 hrs

Drainage Area = 18.050 acres Runoff CN= 62

=====  
Computational Time Increment = .05018 hrs

Computed Peak Time = 12.2929 hrs

Computed Peak Flow = 15.12 cfs

Time Increment for HYG File = .1000 hrs

Peak Time, Interpolated Output = 12.3000 hrs

Peak Flow, Interpolated Output = 15.10 cfs  
=====

DRAINAGE AREA

-----  
ID:PRDA 2ND

CN = 62

Area = 18.050 acres

S = 6.1290 in

0.2S = 1.2258 in

Cumulative Runoff

-----  
1.2569 in

1.891 ac-ft

HYG Volume... 1.891 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37631 hrs (ID: PRDA 2ND)

Computational Incr, Tm = .05018 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)

K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))

Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 54.35 cfs

Unit peak time Tp = .25088 hrs

Unit receding limb, Tr = 1.00351 hrs

Total unit time, Tb = 1.25438 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm  
 Duration = 24.0000 hrs Rain Depth = 5.5000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2ND 25 YR  
 Tc = .3763 hrs  
 Drainage Area = 18.050 acres Runoff CN= 62

=====  
 Computational Time Increment = .05018 hrs  
 Computed Peak Time = 12.2929 hrs  
 Computed Peak Flow = 22.08 cfs  
  
 Time Increment for HYG File = .1000 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = 22.02 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 2ND  
 CN = 62  
 Area = 18.050 acres  
 S = 6.1290 in  
 0.2S = 1.2258 in

Cumulative Runoff

-----  
 1.7561 in  
 2.641 ac-ft

HYG Volume... 2.642 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37631 hrs (ID: PRDA 2ND)  
 Computational Incr, Tm = .05018 hrs = 0.20000 Tp  
  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
 Unit peak, qp = 54.35 cfs  
 Unit peak time Tp = .25088 hrs  
 Unit receding limb, Tr = 1.00351 hrs  
 Total unit time, Tb = 1.25438 hrs

Type.... Unit Hyd. Summary Page 5.11  
Name.... PRDA 2ND Tag: 50 YR Event: 50 yr  
File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW  
Storm... TypeIII 24hr Tag: 50 YR

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm  
Duration = 24.0000 hrs Rain Depth = 6.2000 in  
Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
Rain File -ID = - TypeIII 24hr  
Unit Hyd Type = Default Curvilinear  
HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
HYG File - ID = - PRDA 2ND 50 YR  
Tc = .3763 hrs  
Drainage Area = 18.050 acres Runoff CN= 62

=====  
Computational Time Increment = .05018 hrs  
Computed Peak Time = 12.2929 hrs  
Computed Peak Flow = 28.63 cfs

Time Increment for HYG File = .1000 hrs  
Peak Time, Interpolated Output = 12.3000 hrs  
Peak Flow, Interpolated Output = 28.52 cfs  
=====

DRAINAGE AREA

-----  
ID:PRDA 2ND  
CN = 62  
Area = 18.050 acres  
S = 6.1290 in  
0.2S = 1.2258 in

Cumulative Runoff

-----  
2.2284 in  
3.352 ac-ft

HYG Volume... 3.352 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37631 hrs (ID: PRDA 2ND)  
Computational Incr, Tm = .05018 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 54.35 cfs  
Unit peak time Tp = .25088 hrs  
Unit receding limb, Tr = 1.00351 hrs  
Total unit time, Tb = 1.25438 hrs



SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm  
 Duration = 24.0000 hrs Rain Depth = 7.0000 in  
 Rain Dir = C:\Program Files\Haestad\PPKW\PPW\  
 Rain File -ID = - TypeIII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\Program Files\Haestad\PPKW\PPW\  
 HYG File - ID = - PRDA 2ND 100 YR  
 Tc = .3763 hrs  
 Drainage Area = 18.050 acres Runoff CN= 62

=====  
 Computational Time Increment = .05018 hrs  
 Computed Peak Time = 12.2929 hrs  
 Computed Peak Flow = 36.50 cfs

Time Increment for HYG File = .1000 hrs  
 Peak Time, Interpolated Output = 12.3000 hrs  
 Peak Flow, Interpolated Output = 36.34 cfs  
 =====

DRAINAGE AREA

-----  
 ID:PRDA 2ND  
 CN = 62  
 Area = 18.050 acres  
 S = 6.1290 in  
 0.2S = 1.2258 in

Cumulative Runoff

-----  
 2.8010 in  
 4.213 ac-ft

HYG Volume... 4.213 ac-ft (area under HYG curve)

\*\*\*\*\* SCS UNIT HYDROGRAPH PARAMETERS \*\*\*\*\*

Time Concentration, Tc = .37631 hrs (ID: PRDA 2ND)  
 Computational Incr, Tm = .05018 hrs = 0.20000 Tp  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
 Unit peak, qp = 54.35 cfs  
 Unit peak time Tp = .25088 hrs  
 Unit receding limb, Tr = 1.00351 hrs  
 Total unit time, Tb = 1.25438 hrs

Type.... Node: Addition Summary  
 Name.... DP 2  
 File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW  
 Storm... TypeIII 24hr Tag: 2 YR

Page 6.01  
 Event: 2 yr

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP2           JUNCTION           JUNCTION      2 YR
=====
  
```

INFLOWS TO: DP 2

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft        hrs          cfs
-----
                JUNCTION      2 YR          .764        12.4000        4.73
  
```

TOTAL FLOW INTO: DP 2

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft        hrs          cfs
-----
                DP 2          2 YR          .764        12.4000        4.73
  
```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 2 YR

```

-----
Peak Discharge =      4.73 cfs
Time to Peak   =      12.4000 hrs
HYG Volume     =       .764 ac-ft
-----

```

HYDROGRAPH ORDINATES (cfs)

Time | Output Time increment = .1000 hrs  
hrs | Time on left represents time for first value in each row.

Time hrs					
11.5000	.00	.00	.00	.00	.02
12.0000	.29	1.35	3.10	4.38	4.73
12.5000	4.47	3.92	3.25	2.69	2.31
13.0000	2.04	1.83	1.66	1.54	1.45
13.5000	1.39	1.33	1.28	1.24	1.19
14.0000	1.15	1.10	1.06	1.03	1.00
14.5000	.98	.95	.93	.91	.89
15.0000	.86	.84	.82	.80	.78
15.5000	.76	.73	.71	.69	.67
16.0000	.65	.62	.60	.59	.57
16.5000	.56	.55	.54	.53	.52
17.0000	.51	.50	.49	.48	.47
17.5000	.46	.45	.44	.43	.42
18.0000	.41	.40	.39	.38	.37
18.5000	.37	.37	.36	.36	.36
19.0000	.35	.35	.35	.35	.34
19.5000	.34	.34	.33	.33	.33
20.0000	.32	.32	.32	.32	.31
20.5000	.31	.31	.31	.30	.30
21.0000	.30	.30	.29	.29	.29
21.5000	.29	.28	.28	.28	.28
22.0000	.27	.27	.27	.27	.26
22.5000	.26	.26	.26	.25	.25
23.0000	.25	.25	.24	.24	.24
23.5000	.24	.23	.23	.23	.23
24.0000	.22	.21	.16	.09	.05
24.5000	.03	.01	.01	.00	.00
25.0000	.00	.00			

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP2           JUNCTION                JUNCTION      10 YR
=====

```

INFLOWS TO: DP 2

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time     Peak Flow
              HYG ID        HYG tag      ac-ft       hrs           cfs
-----
              JUNCTION      10 YR        2.019       12.3000      15.62

```

TOTAL FLOW INTO: DP 2

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time     Peak Flow
              HYG ID        HYG tag      ac-ft       hrs           cfs
-----
              DP 2          10 YR        2.019       12.3000      15.62

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 10 YR

```

-----
Peak Discharge =      15.62 cfs
Time to Peak   =      12.3000 hrs
HYG Volume     =        2.019 ac-ft
-----

```

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs					
10.2000	.00	.00	.00	.00	.00
10.7000	.00	.00	.00	.01	.01
11.2000	.01	.02	.06	.15	.29
11.7000	.56	1.12	2.18	4.33	8.56
12.2000	13.42	15.62	14.89	12.93	10.70
12.7000	8.53	6.88	5.79	5.06	4.51
13.2000	4.08	3.77	3.56	3.39	3.25
13.7000	3.12	2.98	2.84	2.71	2.59
14.2000	2.48	2.39	2.31	2.25	2.18
14.7000	2.13	2.07	2.02	1.96	1.91
15.2000	1.86	1.80	1.75	1.69	1.64
15.7000	1.59	1.53	1.48	1.43	1.37
16.2000	1.32	1.28	1.25	1.22	1.19
16.7000	1.16	1.14	1.11	1.09	1.06
17.2000	1.04	1.02	.99	.97	.95
17.7000	.92	.90	.88	.85	.83
18.2000	.81	.79	.78	.77	.77
18.7000	.76	.75	.74	.74	.73
19.2000	.72	.72	.71	.70	.70
19.7000	.69	.68	.68	.67	.66
20.2000	.66	.65	.65	.64	.63
20.7000	.63	.62	.62	.61	.61
21.2000	.60	.60	.59	.59	.58
21.7000	.58	.57	.57	.56	.56
22.2000	.55	.55	.54	.54	.53
22.7000	.53	.52	.51	.51	.50
23.2000	.50	.49	.49	.48	.48
23.7000	.47	.47	.46	.45	.42
24.2000	.32	.19	.10	.05	.03
24.7000	.02	.01	.01	.00	.00
25.2000	.00	.00	.00		

Type.... Node: Addition Summary

Page 6.05

Name.... DP 2

Event: 25 yr

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

Storm... TypeIII 24hr Tag: 25 YR

SUMMARY FOR HYDROGRAPH ADDITION  
at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP2           JUNCTION           JUNCTION      25 YR
=====

```

INFLOWS TO: DP 2

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
              ac-ft       hrs          cfs
-----
              JUNCTION    25 YR        2.826       12.3000       22.70

```

TOTAL FLOW INTO: DP 2

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
              ac-ft       hrs          cfs
-----
              DP 2        25 YR        2.826       12.3000       22.70

```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 25 YR

```

-----
Peak Discharge =      22.70 cfs
Time to Peak   =      12.3000 hrs
HYG Volume     =       2.826 ac-ft
-----

```

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .1000 hrs

Time | Output Time increment = .1000 hrs

hrs | Time on left represents time for first value in each row.

Time hrs	0.00	0.00	0.00	0.00	0.00
9.6000	.00	.00	.00	.00	.00
10.1000	.00	.00	.00	.00	.01
10.6000	.01	.01	.02	.06	.12
11.1000	.19	.29	.41	.56	.75
11.6000	1.02	1.52	2.51	4.22	7.48
12.1000	13.59	20.22	22.70	21.13	18.05
12.6000	14.74	11.64	9.31	7.78	6.77
13.1000	6.02	5.45	5.04	4.75	4.54
13.6000	4.36	4.20	4.05	3.89	3.74
14.1000	3.58	3.44	3.30	3.17	3.06
14.6000	2.96	2.87	2.79	2.71	2.63
15.1000	2.55	2.47	2.40	2.33	2.25
15.6000	2.18	2.11	2.03	1.96	1.89
16.1000	1.82	1.75	1.69	1.65	1.61
16.6000	1.57	1.54	1.50	1.47	1.44
17.1000	1.41	1.37	1.34	1.31	1.28
17.6000	1.24	1.21	1.18	1.14	1.11
18.1000	1.08	1.05	1.03	1.02	1.01
18.6000	.99	.98	.98	.97	.96
19.1000	.95	.94	.93	.92	.91
19.6000	.90	.90	.89	.88	.87
20.1000	.86	.85	.84	.84	.83
20.6000	.82	.81	.81	.80	.79
21.1000	.79	.78	.77	.77	.76
21.6000	.75	.75	.74	.73	.73
22.1000	.72	.71	.71	.70	.69
22.6000	.68	.68	.67	.66	.66
23.1000	.65	.64	.64	.63	.62
23.6000	.61	.61	.60	.59	.58
24.1000	.54	.41	.25	.13	.07
24.6000	.04	.02	.01	.01	.00

Type.... Node: Addition Summary

Page 6.07

Name.... DP 2

Event: 25 yr

File.... C:\Program Files\Haestad\PPKW\PPW\3092 PRDA 2.PPW

Storm... TypeIII 24hr Tag: 25 YR

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs					
25.1000	.00	.00	.00	.00	.00



SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID      HYG tag
-----
TO DP2            JUNCTION      JUNCTION      50 YR
=====
  
```

INFLOWS TO: DP 2

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft         hrs          cfs
-----
                JUNCTION      50 YR        3.589        12.3000        29.31
  
```

TOTAL FLOW INTO: DP 2

```

-----
HYG file      HYG ID      HYG tag      Volume      Peak Time      Peak Flow
ac-ft         hrs          cfs
-----
                DP 2          50 YR        3.589        12.3000        29.31
  
```

TOTAL NODE INFLOW...

HYG file =

HYG ID = DP 2

HYG Tag = 50 YR

-----  
 Peak Discharge = 29.31 cfs  
 Time to Peak = 12.3000 hrs  
 HYG Volume = 3.589 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .1000 hrs

Time hrs	Time on left represents time for first value in each row.				
9.2000	.00	.00	.00	.00	.00
9.7000	.00	.00	.00	.01	.01
10.2000	.01	.01	.03	.07	.13
10.7000	.20	.28	.38	.48	.60
11.2000	.73	.91	1.13	1.40	1.78
11.7000	2.50	3.90	6.26	10.57	18.44
12.2000	26.58	29.31	26.94	22.78	18.46
12.7000	14.48	11.51	9.59	8.31	7.38
13.2000	6.67	6.16	5.81	5.56	5.35
13.7000	5.15	4.97	4.79	4.61	4.43
14.2000	4.25	4.11	3.97	3.86	3.74
14.7000	3.63	3.52	3.39	3.28	3.16
15.2000	3.06	2.97	2.87	2.77	2.68
15.7000	2.59	2.49	2.40	2.31	2.22
16.2000	2.14	2.07	2.02	1.96	1.92
16.7000	1.88	1.83	1.79	1.75	1.71
17.2000	1.68	1.64	1.60	1.56	1.52
17.7000	1.48	1.44	1.40	1.36	1.32
18.2000	1.28	1.25	1.23	1.22	1.20
18.7000	1.19	1.18	1.17	1.16	1.14
19.2000	1.13	1.12	1.11	1.10	1.09
19.7000	1.08	1.07	1.06	1.05	1.03
20.2000	1.02	1.02	1.01	1.00	.99
20.7000	.98	.97	.96	.96	.95
21.2000	.94	.93	.92	.91	.91
21.7000	.90	.89	.88	.87	.87
22.2000	.86	.85	.84	.83	.82
22.7000	.81	.81	.80	.79	.78
23.2000	.77	.76	.75	.75	.74
23.7000	.73	.72	.71	.70	.65
24.2000	.49	.29	.16	.08	.05

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

---

Time hrs					
24.7000	.03	.01	.01	.00	.00
25.2000	.00	.00	.00	.00	.00

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: DP 2

HYG Directory: C:\Program Files\Haestad\PPKW\PPW\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
TO DP2           JUNCTION                JUNCTION      100 YR
=====
  
```

INFLOWS TO: DP 2

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time    Peak Flow
-----
              JUNCTION      100 YR       4.515       12.3000     37.24
-----
  
```

TOTAL FLOW INTO: DP 2

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time    Peak Flow
-----
              DP 2          100 YR       4.515       12.3000     37.24
-----
  
```