Worksheet
Worksheet for Trapezoidal Channel

PDS #2 TO CB STA. 18+70 L

Project Description	
Worksheet	PDS 2
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	080000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	1.59	cfs

Results		
Depth	0.28	ft
Flow Area	0.4	ft²
Wetted Perim	2.27	ft
Top Width	2.14	ft
Critical Depth	0.34	ft
Critical Slope	0.040862	ft/ft
Velocity	3.56	ft/s
Velocity Head	0.20	ft
Specific Energ	0.48	ft
Froude Numb	1.37	
Flow Type	Supercritical	

← USE MOD. RIPRAP

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37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Wind Colebrook South
Flagg Hill Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT CONVEYANCE SWALE #1 (PCS 1) TO CB 1+00 R (TURBINE 1 ACCESS ROAD)

10-YEAR DESIGN STORM
8-26-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 0.70 ac.
Proposed Land Cover
Grass = 0.15 ac.
Wooded = 0.41 ac.
Impervious = 0.14 ac.

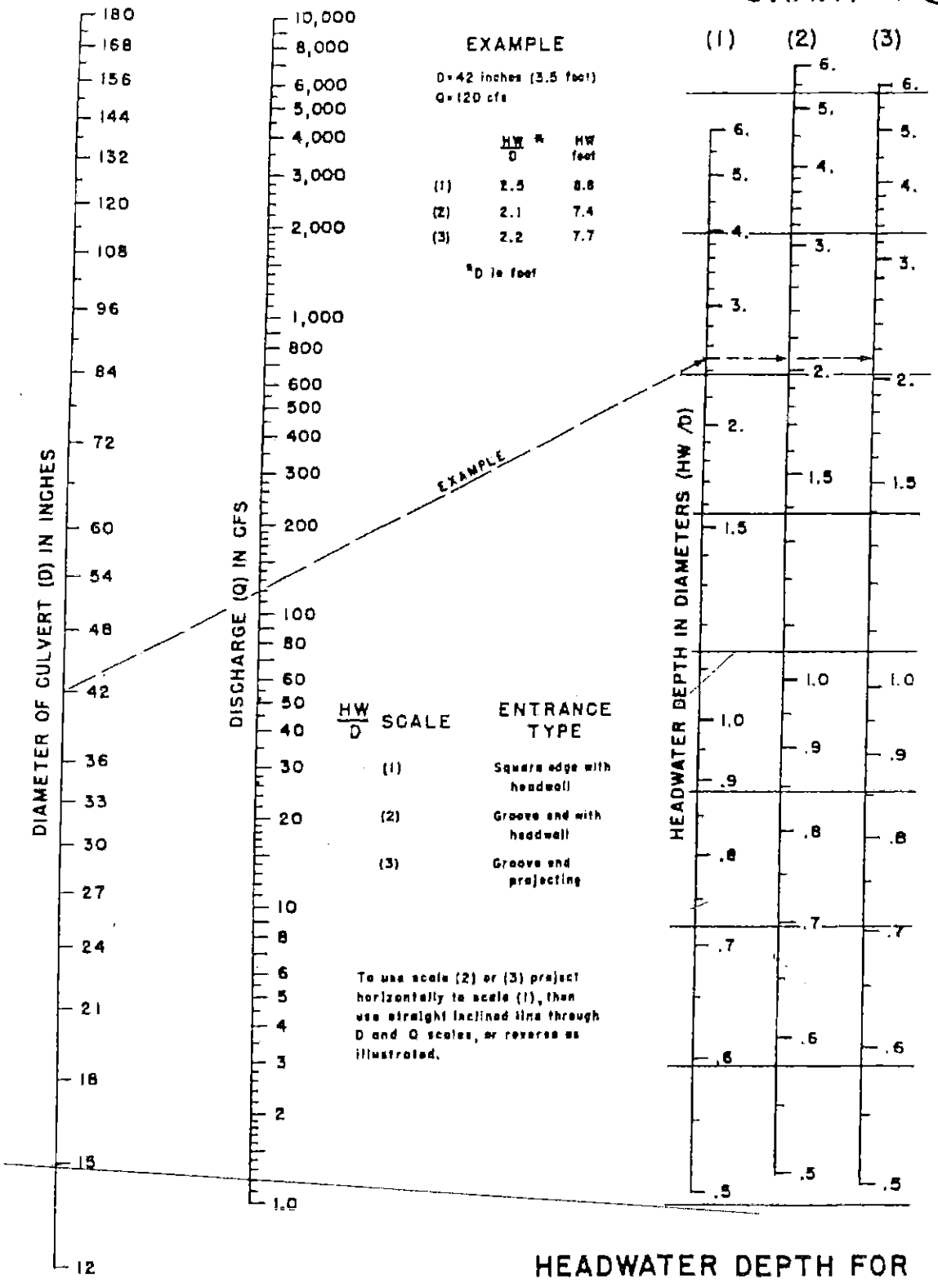
C = [(.9*0.14) + (.3*0.15) + (.2*0.41)]/0.70 = 0.36
Time of Concentration = 10 minutes ∴ I = 4.8 in/hr

Q = C*I*A = .36 * 4.8 * 0.70 = 1.21 cfs

HW/D for 15" RCP = 0.50

Velocity in riprap-lined swale at 9.5% slope = 3.49 fps.

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2 & 3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CB 1100R - TURBINE 1
ACCESS ROAD

Worksheet
Worksheet for Trapezoidal Channel

PCS #1 TO CB 1+00R (TURBINE #1 ACCESS ROAD)

Project Description	
Worksheet	PCS 1
Flow Element	Trapezoidal Cha
Method	Manning's Formi
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	095000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	1.21	cfs

Results		
Depth	0.24	ft
Flow Area	0.3	ft²
Wetted Perimi	2.05	ft
Top Width	1.94	ft
Critical Depth	0.29	ft
Critical Slope	0.042501	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energ	0.43	ft
Froude Numb	1.46	
Flow Type	Supercritical	

← USE MODIFIED RIPRAP

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Wind Colebrook South
Flagg Hill Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT CONVEYANCE SWALE #2 (PCS 2) AND CB 28+20 R

10-YEAR DESIGN STORM
8-26-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 1.49 ac.
Proposed Land Cover
Grass = 1.04 ac.
Wooded = 0.20 ac.
Impervious = 0.25 ac.

C = [(.9*0.25) + (.3*1.04) + (.2*0.20)]/1.49 = 0.39
Time of Concentration = 15 minutes ∴ I = 4.0 in/hr

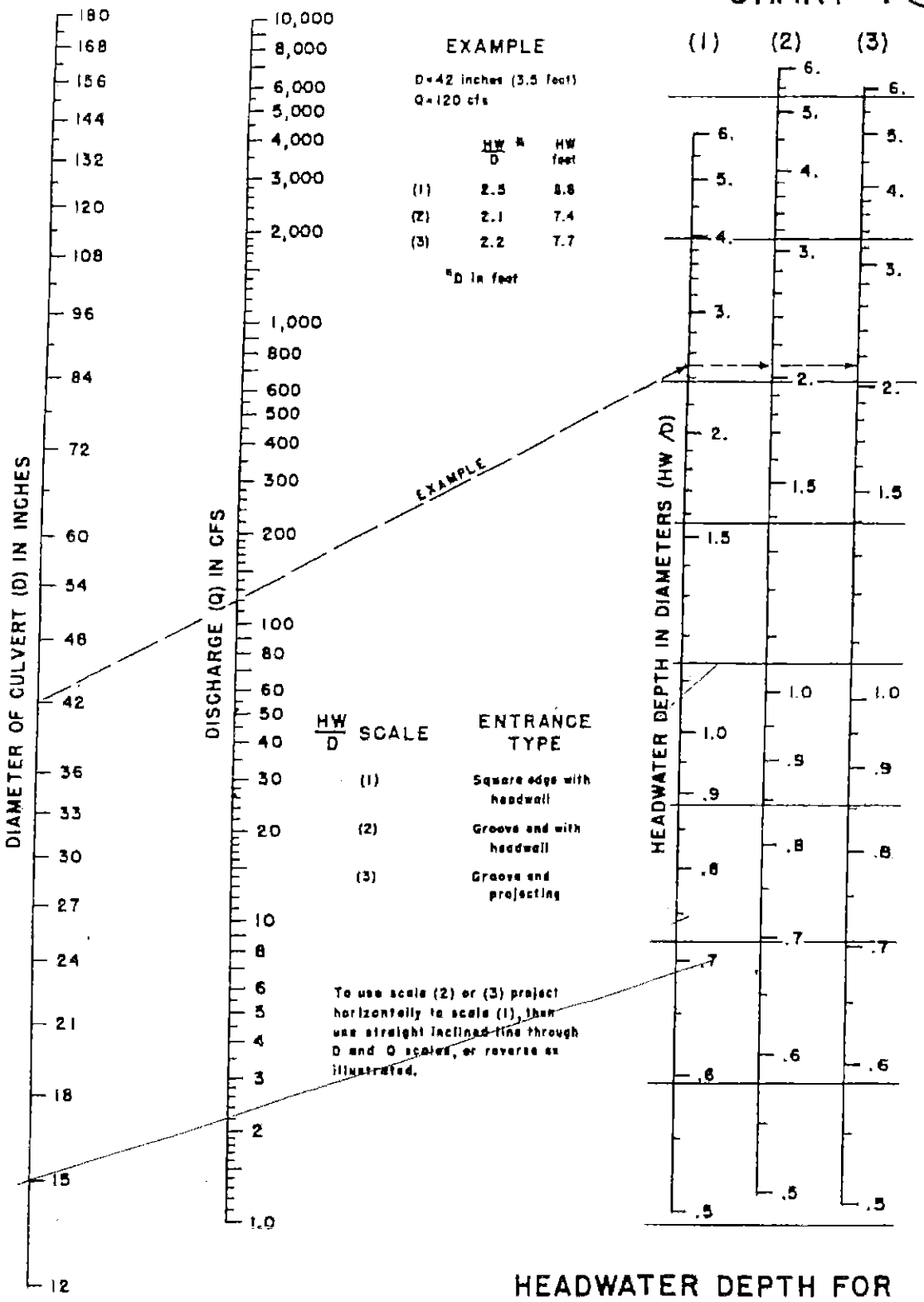
Q = C*I*A = .39 * 4.0 * 1.49 = 2.32 cfs

HW/D for 15" RCP = 0.70

Velocity in riprap-lined swale at 8.2% slope = 3.98 fps.

Velocity in dry grass-lined swale at 3.4% slope = 2.74 fps.

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2 B 3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CFS 28+20 R

Worksheet
Worksheet for Trapezoidal Channel

PCS 2 - RIPRAP

Project Description	
Worksheet	PCS 2-Riprap
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	082000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	2.32	cfs

Results		
Depth	0.34	ft
Flow Area	0.6	ft²
Wetted Perim	2.54	ft
Top Width	2.38	ft
Critical Depth	0.42	ft
Critical Slope	0.038953	ft/ft
Velocity	3.98	ft/s
Velocity Head	0.25	ft
Specific Ener	0.59	ft
Froude Numb	1.42	
Flow Type	Supercritical	

← USE MODIFIED RIPRAP

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Worksheet
Worksheet for Trapezoidal Channel

PCS 2 - GRASS WQ SWALE

Project Description	
Worksheet	PCS 2-Grass WC
Flow Element	Trapezoidal Char
Method	Manning's Formu
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	034000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	2.32	cfs

Results		
Depth	0.19	ft
Flow Area	0.8	ft²
Wetted Perim	5.18	ft
Top Width	5.12	ft
Critical Depth	0.21	ft
Critical Slope	0.023418	ft/ft
Velocity	2.74	ft/s
Velocity Head	0.12	ft
Specific Energ	0.30	ft
Froude Numb	1.18	
Flow Type	Supercritical	

← NON EROSIVE - GRASS LINED SWALE OK.

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Wind Colebrook South
Flagg Hill Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT DIVERSION SWALE #3 (PDS 3) AND CB 28+10 L

10-YEAR DESIGN STORM
8-26-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 1.65 ac.
Proposed Land Cover
Grass = 0.94 ac.
Wooded = 0.66 ac.
Impervious = 0.05 ac.

C = [(.9*0.05) + (.3*0.94) + (.2*0.66)]/1.65 = 0.28
Time of Concentration = 15 minutes ∴ I = 4.0 in/hr

Q = C*I*A = .28 * 4.0 * 1.65 = 1.85 cfs

HW/D for 15" RCP = 0.65

Velocity in riprap-lined swale at 2.7% slope = 2.50 fps.

Worksheet
Worksheet for Trapezoidal Channel

PDS #3 To
CB 2841OL

Project Description	
Worksheet	PDS 3
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	027000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	1.85	cfs

Results		
Depth	0.41	ft
Flow Area	0.7	ft²
Wetted Perim	2.82	ft
Top Width	2.63	ft
Critical Depth	0.37	ft
Critical Slope	0.040003	ft/ft
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energ	0.50	ft
Froude Numb	0.83	
Flow Type	Subcritical	

← USE MODIFIED RIPRAP

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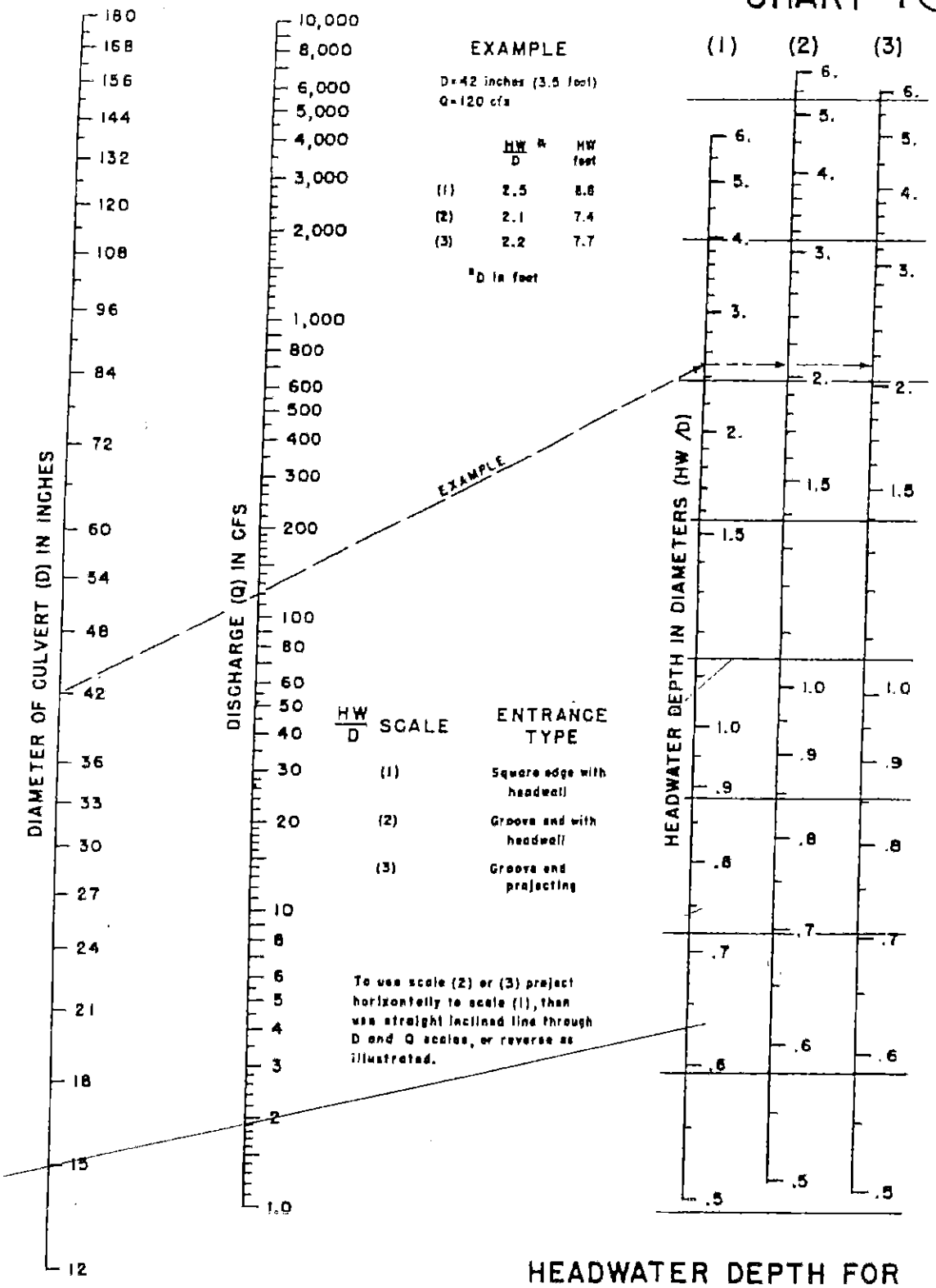
CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CB 28+10L

Wind Colebrook South
Flagg Hill Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT DIVERSION SWALE #4 (PDS 4) AND CB 33+70 L

10-YEAR DESIGN STORM
8-26-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 1.56 ac.
Proposed Land Cover
Grass = 0.28 ac.
Wooded = 1.23 ac.
Impervious = 0.05 ac.

C = [(.9*0.05) + (.3*0.28) + (.2*1.23)]/1.56 = 0.24
Time of Concentration = 20 minutes ∴ I = 3.6 in/hr

Q = C*I*A = .24 * 3.6 * 1.56 = 1.35 cfs

HW/D for 15" RCP = <.5

Velocity in riprap-lined swale at 8.2% slope = 3.43 fps.

Worksheet
Worksheet for Trapezoidal Channel

PDS #4 TO CB 33+70L

Project Description	
Worksheet	PDS 4
Flow Element	Trapezoidal Cha
Method	Manning's Formi
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	082000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	1.35	cfs

Results		
Depth	0.26	ft
Flow Area	0.4	ft²
Wetted Perim	2.16	ft
Top Width	2.04	ft
Critical Depth	0.31	ft
Critical Slope	0.041757	ft/ft
Velocity	3.43	ft/s
Velocity Head	0.18	ft
Specific Energ	0.44	ft
Froude Numb	1.37	
Flow Type	Supercritical	

← USE MODIFIED RIPRAP

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Wind Colebrook South
Flagg Hill Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT CONVEYANCE SWALE #3 (PCS 3) AND CB 39+20 L

10-YEAR DESIGN STORM
8-26-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 1.77 ac.
Proposed Land Cover
Grass = 1.32 ac
Impervious = 0.45

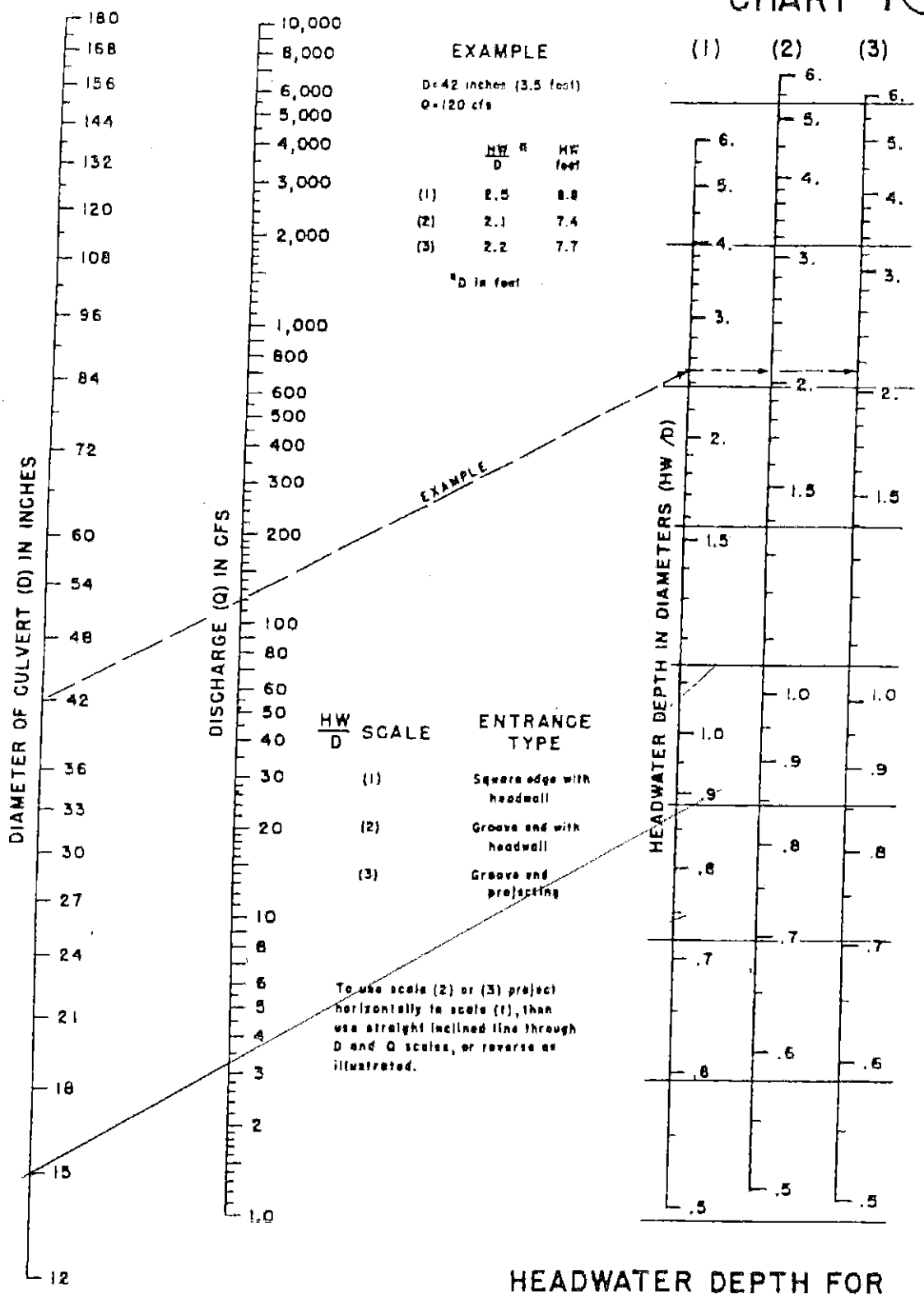
C = [(.9*0.45) + (.3*1.32)]/1.77 = 0.45
Time of Concentration = 15 minutes ∴ I = 4.0 in/hr

Q = C*I*A = .45 * 4.0 * 1.77 = 3.19 cfs

HW/D for 15" RCP = 0.90

Velocity in dry grass-lined swale at 1.0% slope = 2.74 fps.

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 283
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CB 39+20 L

Worksheet
Worksheet for Trapezoidal Channel

PCS #2 TO CB 34+20L

Project Description	
Worksheet	PCS 3-Grass WC
Flow Element	Trapezoidal Char
Method	Manning's Formu
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	010000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	3.19	cfs

Results		
Depth	0.32	ft
Flow Area	1.6	ft²
Wetted Perim	6.01	ft
Top Width	5.91	ft
Critical Depth	0.25	ft
Critical Slope	0.022270	ft/ft
Velocity	2.03	ft/s
Velocity Head	0.06	ft
Specific Energ	0.38	ft
Froude Numb	0.69	
Flow Type	Subcritical	

← NON-EROSIVE VELOCITY GRASS LINED SWALE OR

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Water Quality Volume Calculations

WATER QUALITY VOLUME CALCULATIONS FOR ACCESS ROAD STATION 1+10 TO STATION 4+20 (PER DEP 2004 STORMWATER QUALITY MANUAL)

8-26-11

Water Quality Volume (WQV) = 1" x R x A/ 12

Where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
I = Percent impervious cover
A = Site area in acres

A = 0.19 acres
I = 0.11 ac = 57.8%
R = 0.05 + 0.009 x 57.8 = 0.570
WQV (Drainage Area) = 1" x 0.570 x 0.19 / 12 = .009 ac-ft = 393 CF

Total WQV Required = 393 CF

Volume provided in Bio-retention Area #1 = 400 CF (10' x 40' x 1' Deep)

Total WQV provided = 400 CF

WATER QUALITY VOLUME CALCULATIONS FOR ACCESS ROAD STATION 4+20 TO STATION 15+20 (PER DEP 2004 STORMWATER QUALITY MANUAL)

8-26-11

Water Quality Volume (WQV) = 1" x R x A/ 12

Where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
I = Percent impervious cover
A = Site area in acres

A = 0.65 acres
I = 0.38 ac = 58.5%
R = 0.05 + 0.009 x 58.5 = 0.577
WQV (Drainage Area) = 1" x 0.577 x .65 / 12 = .031 ac-ft = 1,361 CF

Total WQV Required = 1,361 CF

Volume provided in Bio-retention Area #2 = 1,500 CF (15' x 100' x 1' Deep)

Total WQV provided = 1,500 CF

WATER QUALITY VOLUME CALCULATIONS FOR ACCESS ROAD STATION 15+20 TO 21+70 AND TOWER 1 ACCESS ROAD (PER DEP 2004 STORMWATER QUALITY MANUAL)

8-26-11

Water Quality Volume (WQV) = 1" x R x A/ 12

Where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
I = Percent impervious cover
A = Site area in acres

A = 3.63 acres
I = 0.60 ac = 16.5%
R = 0.05 + 0.009 x 16.5 = 0.198
WQV (Drainage Area) = 1" x 0.198 x 3.63 / 12 = .060 ac-ft = 2,610 CF

Total WQV Required = 2,610 CF

Pre-treatment provided in Forebay area above Basin #3 = 660 CF (25.2% of WQV)

Volume provided in Dry Water Quality Swales = 625 LF x 4.7 SF = 2,938 CF

Volume provided in Bottom of Infiltration Basin #3 = 1,195 CF

Total WQV provided = 4,133 CF

WATER QUALITY VOLUME CALCULATIONS FOR ACCESS ROAD STATION 21+70 TO STATION 35+20 (PER DEP 2004 STORMWATER QUALITY MANUAL)

8-26-11

Water Quality Volume (WQV) = 1" x R x A/ 12

Where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
I = Percent impervious cover
A = Site area in acres

A = 2.18 acres
I = 0.53 ac = 24.3%
R = 0.05 + 0.009 x 24.3 = 0.269
WQV (Drainage Area) = 1" x 0.269 x 2.18 / 12 = .049 ac-ft = 2,128 CF

Total WQV Required = 2,218 CF

Pre-treatment provided in Forebay area above Water Quality Swale = 660 CF (29.7% of WQV)

Volume provided in Dry Water Quality Swale = 300 LF x 7.5 SF = 2,250 CF

Total WQV provided = 2,250 CF

WATER QUALITY VOLUME CALCULATIONS FOR ACCESS ROAD STATION 39+20 TO TOWER #3 LOCATION (PER DEP 2004 STORMWATER QUALITY MANUAL)

8-26-11

Water Quality Volume (WQV) = 1" x R x A/ 12

Where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
I = Percent impervious cover
A = Site area in acres

A = 1.77 acres
I = 0.35 ac = 19.8%
R = 0.05 + 0.009 x 19.8 = 0.228
WQV (Drainage Area) = 1" x 0.228 x 1.77 / 12 = .034 ac-ft = 1,465 CF

Total WQV Required = 1,465 CF

Volume provided in Dry Water Quality Swale = 510 LF x 5.3 SF = 2,703 CF

Total WQV provided = 2,703 CF

WATER QUALITY VOLUME CALCULATIONS FOR ROADSIDE INFILTRATION TRENCH NEAR WETLANDS CROSSING (PER DEP 2004 STORMWATER QUALITY MANUAL)

8-26-11

Water Quality Volume (WQV) = 1" x R x A/ 12

Where R = Volumetric Runoff Coefficient = 0.05 + 0.009 x I
I = Percent impervious cover
A = Site area in acres

TYPICAL SIZING FOR 100 LF ROAD TO 100 LF OF INFILTRATION TRENCH AT TOE OF SLOPE ON BOTH SIDES OF ROAD (STATION 35+50 TO STATION 36+50 ACCESS ROAD)

A = 0.06 acres
I = 0.06 ac = 83.3%
R = 0.05 + 0.009 x 83.3 = 0.800
WQV (Drainage Area) = 1" x 0.800 x .06 / 12 = .004 ac-ft = 174 CF
WQV Required = 174 CF

Total Volume provided in 200 LF of 2' x 2' stone trench = 280 CF (assumes 35% void ratio in stone trench comprised of 2" crushed stone).
Total Volume provided by Infiltration Trench = 280 CF

Specify 2'w x 2'd stone infiltration trench at toe of slope below roadway where appropriate on Site Plans.

Existing Flows – DP1

Table of Contents

Table of Contents (continued)

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 1	JCT	2	.361		12.5500	1.83		
*DP 1	JCT	10	.999		12.4500	6.75		
*DP 1	JCT	25	1.417		12.4000	10.13		
*DP 1	JCT	50	1.816		12.4000	13.35		
*DP 1	JCT	100	2.302		12.4000	17.25		
EXDA 1	AREA	2	.361		12.5500	1.83		
EXDA 1	AREA	10	.999		12.4500	6.75		
EXDA 1	AREA	25	1.417		12.4000	10.13		
EXDA 1	AREA	50	1.816		12.4000	13.35		
EXDA 1	AREA	100	2.302		12.4000	17.25		

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

Name.... Litchfield Co.
File.... C:\Program Files\Haestad\PPKW\PPW\
Storm... TypeIII 24hr Tag: 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 EXDA 1.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet

Mannings n	.4000	
Hydraulic Length	250.00	ft
2yr, 24hr P	3.2000	in
Slope	.064000	ft/ft
Avg.Velocity	.15	ft/sec

Segment #1 Time: .4678 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	1030.00	ft
Slope	.184000	ft/ft
Unpaved		
Avg.Velocity	6.92	ft/sec

Segment #2 Time: .0413 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	140.00	ft
Avg.Velocity	3.68	ft/sec

Segment #3 Time: .0106 hrs

Total Tc: .5197 hrs

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

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

R = Aq / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

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

Name.... EXDA 1

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

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Soil Type B - Wooded	55	6.740			55.00
Soil Type B - Grass/Meadow	60	1.160			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 --->		10.610			59.98 (60)

Name....
File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 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, rtm, and th
(Smallest dt is then adjusted to match up with Tp)
UDdt = User specified override computational main time increment
(only used if UDdt is => .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 Tp: 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 1in. runoff, for 1hr, for 1 sq.mi.
= (Ks * A * Q) / Tp (where Q = 1in. 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 = Tp + 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 Tp

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

$$Rap(t) = (Col.(4)-0.2Sp)^{**}2 \;/\; (Col.(4)+0.8Sp)$$

Column (6): Rip(t) = Incremental pervious runoff for time step t
Rip(t) = Rap(t) - 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) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t)
R(t) = (Ap/At) x Col.(6) + (Ai/At) x 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 = - EXDA 1 2 YR
Tc = .5197 hrs
Drainage Area = 10.610 acres Runoff CN= 60

Computational Time Increment = .06929 hrs
Computed Peak Time = 12.5417 hrs
Computed Peak Flow = 1.84 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.5500 hrs
Peak Flow, Interpolated Output = 1.83 cfs

DRAINAGE AREA
ID:EXDA 1
CN = 60
Area = 10.610 acres
S = 6.6667 in
0.2S = 1.3333 in

Cumulative Runoff
.4083 in
.361 ac-ft

HYG Volume... .361 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .51968 hrs (ID: EXDA 1)
Computational Incr, Tm = .06929 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 = 23.13 cfs
Unit peak time Tp = .34646 hrs
Unit receding limb, Tr = 1.38582 hrs
Total unit time, Tb = 1.73228 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 1 10 YR
Tc = .5197 hrs
Drainage Area = 10.610 acres Runoff CN= 60

==========
Computational Time Increment = .06929 hrs
Computed Peak Time = 12.4031 hrs
Computed Peak Flow = 6.76 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.4500 hrs
Peak Flow, Interpolated Output = 6.75 cfs
==========

DRAINAGE AREA

ID:EXDA 1
CN = 60
Area = 10.610 acres
S = 6.6667 in
0.2S = 1.3333 in

Cumulative Runoff

1.1297 in
.999 ac-ft

HYG Volume... .999 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .51968 hrs (ID: EXDA 1)
Computational Incr, Tm = .06929 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 = 23.13 cfs
Unit peak time Tp = .34646 hrs
Unit receding limb, Tr = 1.38582 hrs
Total unit time, Tb = 1.73228 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 1 25 YR
Tc = .5197 hrs
Drainage Area = 10.610 acres Runoff CN= 60

==========

Computational Time Increment	=	.06929 hrs
Computed Peak Time	=	12.4031 hrs
Computed Peak Flow	=	10.15 cfs
Time Increment for HYG File	=	.0500 hrs
Peak Time, Interpolated Output	=	12.4000 hrs
Peak Flow, Interpolated Output	=	10.13 cfs

==========

DRAINAGE AREA

ID:EXDA 1
CN = 60
Area = 10.610 acres
S = 6.6667 in
0.2S = 1.3333 in

Cumulative Runoff

1.6026 in
1.417 ac-ft

HYG Volume... 1.417 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .51968 hrs (ID: EXDA 1)
Computational Incr, Tm = .06929 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 =	23.13 cfs
Unit peak time	Tp =	.34646 hrs
Unit receding limb,	Tr =	1.38582 hrs
Total unit time,	Tb =	1.73228 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 1 50 YR
Tc = .5197 hrs
Drainage Area = 10.610 acres Runoff CN= 60

==========

Computational Time Increment	=	.06929 hrs
Computed Peak Time	=	12.4031 hrs
Computed Peak Flow	=	13.37 cfs
Time Increment for HYG File	=	.0500 hrs
Peak Time, Interpolated Output	=	12.4000 hrs
Peak Flow, Interpolated Output	=	13.35 cfs

==========

DRAINAGE AREA

ID:EXDA 1
CN = 60
Area = 10.610 acres
S = 6.6667 in
0.2S = 1.3333 in

Cumulative Runoff

2.0536 in
1.816 ac-ft

HYG Volume... 1.816 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .51968 hrs (ID: EXDA 1)
Computational Incr, Tm = .06929 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 =	23.13 cfs
Unit peak time	Tp =	.34646 hrs
Unit receding limb,	Tr =	1.38582 hrs
Total unit time,	Tb =	1.73228 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 1 100 YR
Tc = .5197 hrs
Drainage Area = 10.610 acres Runoff CN= 60
Calc.Increment= .06929 hrs Out.Incr.= .0500 hrs
HYG Volume = 2.302 ac-ft

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

Time hrs					
10.1000	.00	.00	.00	.01	.01
10.3500	.02	.03	.04	.06	.07
10.6000	.09	.12	.14	.16	.19
10.8500	.22	.25	.28	.31	.35
11.1000	.39	.42	.47	.52	.57
11.3500	.63	.69	.77	.85	.94
11.6000	1.06	1.20	1.40	1.68	2.04
11.8500	2.49	3.14	4.01	5.12	6.60
12.1000	8.53	10.63	12.81	14.70	16.06
12.3500	16.94	17.25	16.89	16.20	15.25
12.6000	14.08	12.88	11.69	10.53	9.50
12.8500	8.56	7.72	7.01	6.42	5.91
13.1000	5.46	5.08	4.76	4.47	4.22
13.3500	4.01	3.83	3.67	3.54	3.43
13.6000	3.32	3.23	3.14	3.07	3.00
13.8500	2.93	2.87	2.82	2.76	2.70
14.1000	2.65	2.60	2.55	2.51	2.46
14.3500	2.42	2.38	2.35	2.32	2.28
14.6000	2.26	2.23	2.20	2.17	2.15
14.8500	2.12	2.09	2.07	2.04	2.02
15.1000	1.99	1.97	1.94	1.92	1.89
15.3500	1.86	1.84	1.81	1.79	1.76
15.6000	1.73	1.71	1.68	1.66	1.63
15.8500	1.60	1.58	1.55	1.52	1.49
16.1000	1.47	1.44	1.42	1.39	1.37
16.3500	1.35	1.33	1.31	1.30	1.28
16.6000	1.27	1.25	1.24	1.22	1.21
16.8500	1.20	1.19	1.17	1.16	1.15
17.1000	1.14	1.13	1.11	1.10	1.09
17.3500	1.08	1.06	1.05	1.04	1.03

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

Time hrs					
17.6000	1.02	1.00	.99	.98	.97
17.8500	.96	.94	.93	.92	.91
18.1000	.89	.88	.87	.86	.85
18.3500	.84	.84	.83	.82	.82
18.6000	.81	.81	.80	.80	.79
18.8500	.79	.78	.78	.78	.77
19.1000	.77	.77	.76	.76	.76
19.3500	.75	.75	.74	.74	.74
19.6000	.73	.73	.73	.72	.72
19.8500	.72	.71	.71	.70	.70
20.1000	.70	.69	.69	.69	.68
20.3500	.68	.68	.67	.67	.67
20.6000	.67	.66	.66	.66	.65
20.8500	.65	.65	.65	.64	.64
21.1000	.64	.63	.63	.63	.63
21.3500	.62	.62	.62	.62	.61
21.6000	.61	.61	.60	.60	.60
21.8500	.60	.59	.59	.59	.59
22.1000	.58	.58	.58	.57	.57
22.3500	.57	.57	.56	.56	.56
22.6000	.55	.55	.55	.55	.54
22.8500	.54	.54	.53	.53	.53
23.1000	.53	.52	.52	.52	.51
23.3500	.51	.51	.51	.50	.50
23.6000	.50	.49	.49	.49	.49
23.8500	.48	.48	.48	.47	.47
24.1000	.45	.43	.39	.35	.30
24.3500	.25	.21	.16	.13	.10
24.6000	.08	.06	.05	.04	.03
24.8500	.02	.02	.01	.01	.01
25.1000	.01	.01	.00	.00	.00
25.3500	.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	EXDA 1		EXDA 1	2 YR

INFLOWS TO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	EXDA 1	2 YR	.361	12.5500	1.83

TOTAL FLOW INTO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DP 1	2 YR	.361	12.5500	1.83

TOTAL NODE INFLOW...
HYG file =
HYG ID = DP 1
HYG Tag = 2 YR

Peak Discharge =	1.83 cfs
Time to Peak =	12.5500 hrs
HYG Volume =	.361 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	.03	.09	.22
12.1500	.40	.64	.92	1.18	1.43
12.4000	1.62	1.75	1.81	1.83	1.78
12.6500	1.71	1.61	1.51	1.40	1.30
12.9000	1.21	1.12	1.05	.99	.93
13.1500	.89	.84	.80	.77	.74
13.4000	.72	.70	.68	.66	.65
13.6500	.64	.62	.61	.60	.59
13.9000	.58	.57	.57	.56	.55
14.1500	.54	.53	.52	.52	.51
14.4000	.50	.50	.49	.49	.48
14.6500	.48	.47	.47	.46	.46
14.9000	.45	.45	.45	.44	.44
15.1500	.43	.43	.42	.42	.41
15.4000	.41	.40	.40	.39	.39
15.6500	.38	.38	.37	.37	.36
15.9000	.36	.35	.34	.34	.33
16.1500	.33	.32	.32	.31	.31
16.4000	.30	.30	.30	.29	.29
16.6500	.29	.29	.28	.28	.28
16.9000	.27	.27	.27	.27	.26
17.1500	.26	.26	.26	.25	.25
17.4000	.25	.25	.24	.24	.24
17.6500	.24	.23	.23	.23	.23
17.9000	.22	.22	.22	.21	.21
18.1500	.21	.21	.20	.20	.20
18.4000	.20	.20	.20	.19	.19
18.6500	.19	.19	.19	.19	.19
18.9000	.19	.19	.19	.19	.18
19.1500	.18	.18	.18	.18	.18
19.4000	.18	.18	.18	.18	.18

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

Time hrs					
19.6500	.18	.18	.17	.17	.17
19.9000	.17	.17	.17	.17	.17
20.1500	.17	.17	.17	.17	.17
20.4000	.17	.16	.16	.16	.16
20.6500	.16	.16	.16	.16	.16
20.9000	.16	.16	.16	.16	.16
21.1500	.16	.16	.15	.15	.15
21.4000	.15	.15	.15	.15	.15
21.6500	.15	.15	.15	.15	.15
21.9000	.15	.15	.15	.14	.14
22.1500	.14	.14	.14	.14	.14
22.4000	.14	.14	.14	.14	.14
22.6500	.14	.14	.14	.14	.13
22.9000	.13	.13	.13	.13	.13
23.1500	.13	.13	.13	.13	.13
23.4000	.13	.13	.13	.13	.12
23.6500	.12	.12	.12	.12	.12
23.9000	.12	.12	.12	.12	.11
24.1500	.11	.10	.09	.08	.06
24.4000	.05	.04	.03	.03	.02
24.6500	.02	.01	.01	.01	.01
24.9000	.00	.00	.00	.00	.00
25.1500	.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	EXDA 1		EXDA 1	10 YR

INFLOWS TO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	EXDA 1	10 YR	.999	12.4500	6.75

TOTAL FLOW INTO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DP 1	10 YR	.999	12.4500	6.75

TOTAL NODE INFLOW...
HYG file =
HYG ID = DP 1
HYG Tag = 10 YR

Peak Discharge =	6.75 cfs
Time to Peak =	12.4500 hrs
HYG Volume =	.999 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	.07	.12	.21	.32	.51
11.9500	.79	1.17	1.72	2.49	3.37
12.2000	4.31	5.21	5.91	6.44	6.74
12.4500	6.75	6.61	6.34	5.94	5.50
12.7000	5.05	4.60	4.19	3.81	3.46
12.9500	3.17	2.93	2.71	2.52	2.36
13.2000	2.22	2.10	1.99	1.90	1.82
13.4500	1.76	1.70	1.65	1.60	1.56
13.7000	1.53	1.49	1.46	1.43	1.41
13.9500	1.38	1.36	1.33	1.31	1.28
14.2000	1.26	1.24	1.22	1.20	1.18
14.4500	1.17	1.15	1.14	1.12	1.11
14.7000	1.10	1.09	1.07	1.06	1.05
14.9500	1.04	1.03	1.01	1.00	.99
15.2000	.98	.97	.95	.94	.93
15.4500	.92	.90	.89	.88	.87
15.7000	.85	.84	.83	.81	.80
15.9500	.79	.77	.76	.75	.74
16.2000	.72	.71	.70	.69	.68
16.4500	.67	.66	.66	.65	.64
16.7000	.63	.63	.62	.62	.61
16.9500	.60	.60	.59	.58	.58
17.2000	.57	.57	.56	.55	.55
17.4500	.54	.54	.53	.52	.52
17.7000	.51	.51	.50	.49	.49
17.9500	.48	.48	.47	.46	.46
18.2000	.45	.45	.44	.44	.43
18.4500	.43	.43	.42	.42	.42
18.7000	.42	.41	.41	.41	.41
18.9500	.41	.40	.40	.40	.40

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

Time hrs					
19.2000	.40	.40	.39	.39	.39
19.4500	.39	.39	.38	.38	.38
19.7000	.38	.38	.38	.37	.37
19.9500	.37	.37	.37	.36	.36
20.2000	.36	.36	.36	.36	.35
20.4500	.35	.35	.35	.35	.35
20.7000	.35	.34	.34	.34	.34
20.9500	.34	.34	.34	.33	.33
21.2000	.33	.33	.33	.33	.33
21.4500	.32	.32	.32	.32	.32
21.7000	.32	.32	.31	.31	.31
21.9500	.31	.31	.31	.31	.31
22.2000	.30	.30	.30	.30	.30
22.4500	.30	.29	.29	.29	.29
22.7000	.29	.29	.29	.29	.28
22.9500	.28	.28	.28	.28	.28
23.2000	.27	.27	.27	.27	.27
23.4500	.27	.27	.26	.26	.26
23.7000	.26	.26	.26	.26	.25
23.9500	.25	.25	.25	.24	.23
24.2000	.21	.19	.16	.13	.11
24.4500	.09	.07	.05	.04	.03
24.7000	.03	.02	.02	.01	.01
24.9500	.01	.01	.00	.00	.00
25.2000	.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	EXDA 1		EXDA 1	25 YR

INFLOWS TO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	EXDA 1	25 YR	1.417	12.4000	10.13

TOTAL FLOW INTO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DP 1	25 YR	1.417	12.4000	10.13

TOTAL NODE INFLOW...
HYG file =
HYG ID = DP 1
HYG Tag = 25 YR

Peak Discharge =	10.13 cfs
Time to Peak =	12.4000 hrs
HYG Volume =	1.417 ac-ft

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

Time hrs					
11.0000	.00	.00	.01	.01	.02
11.2500	.03	.05	.07	.10	.13
11.5000	.16	.21	.26	.33	.42
11.7500	.56	.73	.96	1.30	1.77
12.0000	2.39	3.23	4.38	5.66	7.01
12.2500	8.24	9.17	9.82	10.13	10.03
12.5000	9.73	9.24	8.60	7.91	7.23
12.7500	6.55	5.93	5.37	4.87	4.44
13.0000	4.08	3.77	3.50	3.27	3.07
13.2500	2.89	2.73	2.60	2.49	2.40
13.5000	2.31	2.24	2.18	2.12	2.07
13.7500	2.02	1.98	1.94	1.90	1.86
14.0000	1.83	1.79	1.76	1.73	1.69
14.2500	1.66	1.64	1.61	1.59	1.56
14.5000	1.54	1.52	1.50	1.49	1.47
14.7500	1.45	1.43	1.42	1.40	1.38
15.0000	1.37	1.35	1.34	1.32	1.30
15.2500	1.29	1.27	1.25	1.24	1.22
15.5000	1.20	1.18	1.17	1.15	1.13
15.7500	1.11	1.10	1.08	1.06	1.04
16.0000	1.03	1.01	.99	.97	.96
16.2500	.94	.93	.91	.90	.89
16.5000	.88	.87	.86	.85	.84
16.7500	.83	.82	.81	.80	.80
17.0000	.79	.78	.77	.76	.76
17.2500	.75	.74	.73	.72	.72
17.5000	.71	.70	.69	.68	.67
17.7500	.67	.66	.65	.64	.63
18.0000	.63	.62	.61	.60	.59
18.2500	.59	.58	.57	.57	.56
18.5000	.56	.56	.55	.55	.55

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

Time hrs					
18.7500	.54	.54	.54	.54	.53
19.0000	.53	.53	.53	.52	.52
19.2500	.52	.52	.51	.51	.51
19.5000	.51	.50	.50	.50	.50
19.7500	.49	.49	.49	.49	.48
20.0000	.48	.48	.48	.48	.47
20.2500	.47	.47	.47	.46	.46
20.5000	.46	.46	.46	.45	.45
20.7500	.45	.45	.45	.44	.44
21.0000	.44	.44	.44	.44	.43
21.2500	.43	.43	.43	.43	.42
21.5000	.42	.42	.42	.42	.41
21.7500	.41	.41	.41	.41	.41
22.0000	.40	.40	.40	.40	.40
22.2500	.39	.39	.39	.39	.39
22.5000	.38	.38	.38	.38	.38
22.7500	.38	.37	.37	.37	.37
23.0000	.37	.36	.36	.36	.36
23.2500	.36	.35	.35	.35	.35
23.5000	.35	.34	.34	.34	.34
23.7500	.34	.33	.33	.33	.33
24.0000	.33	.32	.31	.29	.27
24.2500	.24	.21	.17	.14	.11
24.5000	.09	.07	.05	.04	.03
24.7500	.03	.02	.02	.01	.01
25.0000	.01	.01	.00	.00	.00
25.2500	.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	EXDA 1		EXDA 1	50 YR

INFLOWS TO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	EXDA 1	50 YR	1.816	12.4000	13.35

TOTAL FLOW INTO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DP 1	50 YR	1.816	12.4000	13.35

Name.... DP 1 Event: 50 yr
File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 1.PPW
Storm... TypeIII 24hr Tag: 50 YR

TOTAL NODE INFLOW...
HYG file =
HYG ID = DP 1
HYG Tag = 50 YR

Peak Discharge =	13.35 cfs
Time to Peak =	12.4000 hrs
HYG Volume =	1.816 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	.03	.05	.06	.08
11.0500	.11	.13	.16	.19	.22
11.3000	.26	.30	.35	.40	.45
11.5500	.52	.61	.71	.85	1.05
11.8000	1.31	1.63	2.11	2.76	3.60
12.0500	4.73	6.23	7.89	9.62	11.15
12.3000	12.28	13.03	13.35	13.14	12.66
12.5500	11.97	11.09	10.17	9.26	8.36
12.8000	7.56	6.82	6.17	5.61	5.15
13.0500	4.75	4.39	4.10	3.84	3.61
13.3000	3.41	3.25	3.11	2.98	2.88
13.5500	2.79	2.70	2.63	2.56	2.50
13.8000	2.45	2.39	2.35	2.30	2.25
14.0500	2.21	2.17	2.13	2.09	2.05
14.3000	2.02	1.98	1.95	1.92	1.90
14.5500	1.87	1.85	1.83	1.81	1.78
14.8000	1.76	1.74	1.72	1.70	1.68
15.0500	1.66	1.64	1.62	1.60	1.58
15.3000	1.56	1.53	1.51	1.49	1.47
15.5500	1.45	1.43	1.41	1.39	1.36
15.8000	1.34	1.32	1.30	1.28	1.25
16.0500	1.23	1.21	1.19	1.17	1.15
16.3000	1.13	1.11	1.10	1.08	1.07
16.5500	1.06	1.04	1.03	1.02	1.01
16.8000	1.00	.99	.98	.97	.96
17.0500	.95	.94	.93	.92	.91
17.3000	.90	.89	.88	.87	.86
17.5500	.85	.84	.83	.82	.81
17.8000	.80	.79	.78	.77	.76
18.0500	.75	.74	.73	.72	.71

Name.... DP 1 Event: 50 yr
File.... C:\Program Files\Haestad\PPKW\PPW\3092 EXDA 1.PPW
Storm... TypeIII 24hr Tag: 50 YR

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

Time hrs					
18.3000	.71	.70	.69	.69	.68
18.5500	.68	.67	.67	.66	.66
18.8000	.66	.65	.65	.65	.64
19.0500	.64	.64	.64	.63	.63
19.3000	.63	.62	.62	.62	.61
19.5500	.61	.61	.61	.60	.60
19.8000	.60	.59	.59	.59	.59
20.0500	.58	.58	.58	.57	.57
20.3000	.57	.57	.56	.56	.56
20.5500	.56	.55	.55	.55	.55
20.8000	.54	.54	.54	.54	.53
21.0500	.53	.53	.53	.53	.52
21.3000	.52	.52	.52	.51	.51
21.5500	.51	.51	.50	.50	.50
21.8000	.50	.50	.49	.49	.49
22.0500	.49	.48	.48	.48	.48
22.3000	.48	.47	.47	.47	.47
22.5500	.46	.46	.46	.46	.45
22.8000	.45	.45	.45	.44	.44
23.0500	.44	.44	.44	.43	.43
23.3000	.43	.43	.42	.42	.42
23.5500	.42	.41	.41	.41	.41
23.8000	.40	.40	.40	.40	.39
24.0500	.39	.38	.36	.33	.29
24.3000	.25	.21	.17	.14	.11
24.5500	.08	.07	.05	.04	.03
24.8000	.03	.02	.02	.01	.01
25.0500	.01	.01	.00	.00	.00
25.3000	.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	EXDA 1		EXDA 1	100 YR

INFLOWS TO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	EXDA 1	100 YR	2.302	12.4000	17.25

TOTAL FLOW INTO: DP 1

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DP 1	100 YR	2.302	12.4000	17.25

TOTAL NODE INFLOW...
HYG file =
HYG ID = DP 1
HYG Tag = 100 YR

Peak Discharge =	17.25 cfs
Time to Peak =	12.4000 hrs
HYG Volume =	2.302 ac-ft

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

Time hrs					
10.1000	.00	.00	.00	.01	.01
10.3500	.02	.03	.04	.06	.07
10.6000	.09	.12	.14	.16	.19
10.8500	.22	.25	.28	.31	.35
11.1000	.39	.42	.47	.52	.57
11.3500	.63	.69	.77	.85	.94
11.6000	1.06	1.20	1.40	1.68	2.04
11.8500	2.49	3.14	4.01	5.12	6.60
12.1000	8.53	10.63	12.81	14.70	16.06
12.3500	16.94	17.25	16.89	16.20	15.25
12.6000	14.08	12.88	11.69	10.53	9.50
12.8500	8.56	7.72	7.01	6.42	5.91
13.1000	5.46	5.08	4.76	4.47	4.22
13.3500	4.01	3.83	3.67	3.54	3.43
13.6000	3.32	3.23	3.14	3.07	3.00
13.8500	2.93	2.87	2.82	2.76	2.70
14.1000	2.65	2.60	2.55	2.51	2.46
14.3500	2.42	2.38	2.35	2.32	2.28
14.6000	2.26	2.23	2.20	2.17	2.15
14.8500	2.12	2.09	2.07	2.04	2.02
15.1000	1.99	1.97	1.94	1.92	1.89
15.3500	1.86	1.84	1.81	1.79	1.76
15.6000	1.73	1.71	1.68	1.66	1.63
15.8500	1.60	1.58	1.55	1.52	1.49
16.1000	1.47	1.44	1.42	1.39	1.37
16.3500	1.35	1.33	1.31	1.30	1.28
16.6000	1.27	1.25	1.24	1.22	1.21
16.8500	1.20	1.19	1.17	1.16	1.15
17.1000	1.14	1.13	1.11	1.10	1.09
17.3500	1.08	1.06	1.05	1.04	1.03
17.6000	1.02	1.00	.99	.98	.97

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

Time hrs					
17.8500	.96	.94	.93	.92	.91
18.1000	.89	.88	.87	.86	.85
18.3500	.84	.84	.83	.82	.82
18.6000	.81	.81	.80	.80	.79
18.8500	.79	.78	.78	.78	.77
19.1000	.77	.77	.76	.76	.76
19.3500	.75	.75	.74	.74	.74
19.6000	.73	.73	.73	.72	.72
19.8500	.72	.71	.71	.70	.70
20.1000	.70	.69	.69	.69	.68
20.3500	.68	.68	.67	.67	.67
20.6000	.67	.66	.66	.66	.65
20.8500	.65	.65	.65	.64	.64
21.1000	.64	.63	.63	.63	.63
21.3500	.62	.62	.62	.62	.61
21.6000	.61	.61	.60	.60	.60
21.8500	.60	.59	.59	.59	.59
22.1000	.58	.58	.58	.57	.57
22.3500	.57	.57	.56	.56	.56
22.6000	.55	.55	.55	.55	.54
22.8500	.54	.54	.53	.53	.53
23.1000	.53	.52	.52	.52	.51
23.3500	.51	.51	.51	.50	.50
23.6000	.50	.49	.49	.49	.49
23.8500	.48	.48	.48	.47	.47
24.1000	.45	.43	.39	.35	.30
24.3500	.25	.21	.16	.13	.10
24.6000	.08	.06	.05	.04	.03
24.8500	.02	.02	.01	.01	.01
25.1000	.01	.01	.00	.00	.00
25.3500	.00	.00	.00		

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