MASTER DEVELOPMENT DRAINAGE PLAN

FOR

THE RIDGE AT WOODMEN

COLORADO SPRINGS, COLORADO

February 6, 2004
March 2, 2004 (rev)

LAW & MARIOTTI
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Prepared for:

Evelyn Reel / Reel Family Trust
1610 W. 3rd Street
Florence, CO 81226

Prepared by:

Law & Mariotti Consultants, Inc.
619 North Cascade Avenue, Suite 206
Colorado Springs, CO 80903
(719) 442-1541

LMCI PN 02-016

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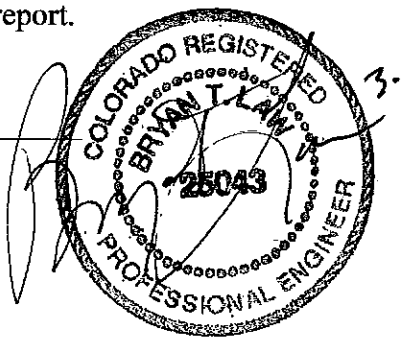
THE RIDGE AT WOODMEN

ENGINEERS STATEMENT:

The attached Master Development Drainage Plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.



3.12.04

Bryan Law, PE No. 25043 CO

~~DEVELOPERS~~ Landowner STATEMENT:

I, the ~~developer~~ landowner have read and will comply with all of the requirements specified in this drainage report and plan.

N/A
Business Name

By: Evelyn Reed

Title: Landowner-/General Partner

Address: 1610 W. Third

Florence, CO. 81226

CITY OF COLORADO SPRINGS ONLY:

Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

City Engineer

April 1, 2004
Date

Conditions: Future developers should be made aware that further MDDP level report(s) and preliminary/final drainage reports will be required to study site specific affects on onsite and offsite drainage at the time of platting.

Purpose

The intent of the owner is to annex The Ridge at Woodmen together with other properties consisting of the CSU tank site, Woodmen Road (frontage), and the commercial property at the northwest corner of Woodmen Rd. and Black Forest Road. The purpose of this Master Development Drainage Plan, as part of the annexation process, is to assess onsite and offsite drainage impacts under historic and developed conditions, develop and show necessary improvements, and establish maintenance responsibilities.

Property description and location

The property to be annexed is located north of Woodmen Road, west of Black Forest Road, and east of the proposed Powerwood 2 Addition and the Powers Boulevard Extension Corridor. The area to be annexed is approximately 122 acres that includes the The Ridge at Woodmen (95.3 acres) and the balance as described above being approximately 26.7 acres. The annexation parcel lies in Section 6, Township 13 South, Range 65 West of the 6th PM, County of El Paso, State of Colorado.

Existing drainage characteristics and facilities

This parcel consists primarily of grassland with slopes ranging from one to eleven percent and greater in its northwestern sector. Currently the ground is undeveloped. The area in the Cottonwood Creek Drainage Basin generally is divided by a ridge line running east-west thus shedding runoff to the north and south as shown on the attached drainage basin map. The area in the Sand Creek Drainage basin generally slopes to the east and south. Approximately 52% of the site lies within the Sand Creek Drainage Basin and drains to the east and south.

The remainder of the site lies within the Cottonwood Creek Drainage Basin and drains to Cottonwood Creek, which flows roughly half a mile north and west of the western boundary of The Ridge at Woodmen. Since the site is situated upon the basin divide between the Cottonwood and Sand Creek Drainage Basins, none of it lies within any currently designated flood zones, per FEMA Map 08041C0529F, dated March 17, 1997, as shown in the Appendix.

Review of the Soil Conservation Service Soil Survey for El Paso County indicates that the soils in the area are the Stapleton Bernal sandy loams (about 95% of the site) and the Blakeland loamy sands (in the southwest sector along Woodmen Road). The site falls mainly within types B and D hydrological soil groups.

Reports, drawings and other documents reviewed in preparation of this study include:

1) Cottonwood Creek Drainage Basin Planning Study, City of Colorado Springs and El Paso County, prepared by URS Consultants, June 9, 1994.
2) Cottonwood Creek Drainage Basin Planning Study, prepared by Ayers Associates, revised February, 1999.
3) Sand Creek Master Drainage Planning Study, City of Colorado Springs and El Paso County, prepared by Simons, Li & Associates, July 1985.
4) Sand Creek Drainage Basin Planning Study Preliminary Design Report, City of Colorado Springs and El Paso County, prepared by Kiowa Engineering Corporation, January 1993, latest revision March 1996.
5) Master Development Drainage Plan for Powerwood Addition No.2, prepared by Associated Design Professionals, Inc., August 1, 2003.
6) Master Development Drainage Plan for Powerwood/Greenbriar, prepared by Associated Design Professional, Inc., Revised May 22, 2003.
7) Flood Plain Information. Cottonwood Creek, El Paso County, Colorado, prepared for Pikes Peak Area Council of Government by the Department of Army, Albuquerque District, Corp of Engineers, Albuquerque, New Mexico, September 1976.
8) Federal Emergency Management Agency, Washington D.C. 20472, revision to effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for El Paso County, Colorado and Incorporated Areas effective May 24, 2001.

The Cottonwood Creek study was based on 100-year developed flows. The Sand Creek study was based on 5-year and 100-year developed flows

Proposed drainage characteristics and facilities

The attached drainage plan shows the site to be developed as regional commercial use over most of the property with community commercial use on the eastern edge. Proposed grading or building concepts are not shown, as these elements are unknown at this time. Tutt Boulevard, however, is shown as a developed element as well as the CSU tank site.

This report addresses the on-site drainage for the proposed development and off-site areas, which have drained to the proposed site. Basin and sub-basin areas, showing 100-year and 5-year developed and historical rainfall events appear on the Drainage Plan Sheet Tables. Design Point capacities are also shown in these Tables on the Drainage Plan Sheets.

This report contemplates offsite regional detention facilities in Sand Creek Basin and implementation of the Streamside Guidelines in Cottonwood Creek Basin. At the time of platting, within The Ridge at Woodmen, offsite conditions should be

reassessed as to how onsite drainage facilities (in place or not) may impact offsite drainage facilities. At this point in time, however, the timing of regional detention construction or other types of drainage facilities are not in place upto The Ridge at Woodmen, therefore, this report recommends private onsite detention to maintain runoff to historical levels at the edges of the property. The attached plan indicates approximate locations for the proposed private onsite detention facilities and estimated volumes for each of the facilities. It should be understood that the pond volumes, areas, and locations shown should be used as planning tools only. Final onsite pond sizing and location are subject to many variables which will be addressed at the final plat stage.

The private onsite detention ponds are contemplated to be owned and maintained by the individual land owners. All ponds and outlet structures should be sized to release under staged conditions for the 2yr, 5yr, 10yr, 50yr, and 100yr storms.

On-site Design Points

Design Point 1 – This represents the total flow from on-site sub-basin CC-D1 having a 5-year flow of 18.8 cfs and a 100-year flow of 38.7 cfs that will be directed into a detention pond which will constrain these flows to their historic levels of 3.8 cfs and 9.7 cfs, respectively. From thence, flow will exit the northwestern corner of the property via a proposed storm sewer system and into a proposed storm sewer system included in the proposed Powerwood No. 2 Addition, where it has gone historically.

Design Point 2 – This represents the total flow from on-site sub-basin CC-D2 having a 5-year flow of 12.7 cfs and a 100-year flow of 26.1 cfs that will be collected in a detention pond which will constrain these flows to their historic levels of 2.5 cfs and 6.5 cfs, respectively. From thence, flow will drain onto adjacent property to the north, where it has gone historically. The pond and flow should be situated in a way as not to direct release into any existing structure. Further, additional pond volume should be contemplated in order to dampen peak historic flows.

Design Point 3 – This represents the total flow from on-site sub-basin CC-D3 having a 5-year flow of 18.6 cfs and a 100-year flow of 38.1 cfs that will be collected in a detention pond which will constrain these flows to their historic levels of 3.7 cfs and 9.5 cfs, respectively. From thence, flow will drain onto adjacent property to the north, where it has gone historically. The pond and flow should be situated in a way as not to direct release into any existing structure. Further, additional pond volume should be contemplated in order to dampen peak historic flows.

Design Point 4 – This represents the total flow from on-site sub-basin CC-D4 having a 5-year flow of 23.3 cfs and a 100-year flow of 47.9 cfs that will be collected in a detention pond which will constrain these flows to their historic

levels of 4.7 cfs and 12.0 cfs, respectively. From thence, flow will drain onto adjacent property to the north, where it has gone historically. The pond and flow should be situated in a way as not to direct release into any existing structure. Further, additional pond volume should be contemplated in order to dampen peak historic flows.

Design Point 5 – This represents the total flow from on-site sub-basin CC-D5 having a 5-year flow of 7.0 cfs and a 100-year flow of 14.3 cfs that will ultimately be collected in the same detention pond which will service Design Point 6. Flow from this point will exit the site and enter Woodmen right of way, where it has gone historically.

Design Point 6 – This represents the total flow from on-site sub-basins CC-D5 and CC-D6 having a 5-year flow of 42.0 cfs and a 100-year flow of 86.3 cfs that will be directed into a detention pond which will constrain these flows to their historic levels of 8.4 cfs and 21.6 cfs, respectively. Flow from this point will convey to the interceptor ditch along Woodmen Road From thence, flow will be conveyed westward within the northern ditch along Woodmen Road towards an eventual outfall into the Cottonwood Creek system.

Note: At the time of this study Woodmen Road design (EA) is being prepared but not available for the public, therefore, no discussion is available for Woodmen Road drainage improvements. However, once available, Woodmen Road design documents including the associated drainage report are required for review and incorporation into any plat and/or development plan documents undertaken as a part of any future development within The Ridge at Woodmen. On another note, CDOT has designed and is in process of constructing an interchange at Woodmen and Powers. A storm sewer collection system is planned as part of the interchange a part of which will collect flow generated from The Ridge at Woodmen (see attached map). Future developers should be made aware that connection to these downstream facilities may be warranted at the time of platting.

Design Point 7 – This represents the total flow from on-site sub-basin SC-D1 having a 5-year flow of 23.9 cfs and a 100-year flow of 49.1 cfs that will be collected in a detention pond which will constrain these flows to their historic levels of 4.8 cfs and 12.3 cfs, respectively. From thence flow will be conveyed south to an existing 36" CMP under Woodmen Road. Flow then continues southwards where it has gone historically, through lands which are part of the proposed Greenbriar North Annexation Parcel.

Design Point 8 – This represents the total flow from on-site sub-basin SC-D3 having a 5-year flow of 6.9 cfs and a 100-year flow of 14.3 cfs that will be directed into sub-basin SC-D2 and ultimately be collected in the same detention pond which will service Design Point 10.

Design Point 10 – Combined flow from on-site sub-basins SC-D2, SC-D3 and off-site sub-basin SC-D4 produce a 5-year flow of 102.2 cfs and a 100 year flow of 210.0 cfs that will be collected in a detention pond which will constrain these flows to their historic levels of 20.5 cfs and 52.5 cfs, respectively. Flow will then be conveyed east via triple proposed 48" RCP culverts under Black Forest Road that have been recently constructed as part of the El Paso County Woodmen Expansion Plan. From thence, flow continues off-site eastwardly via an existing stream bed to proposed Detention Pond #6, as per the Sand Creek Drainage Basin Planning Study.

Note: Again this report contemplates private onsite detention, however, if at the time of future development to the eastern portion of The Ridge at Woodmen the regional pond is in place and conveyance facilities are in place from DP 10 to the pond, then the private pond could be eliminated or modified to meet these conditions.

Off-site Design Points

Design Point 9 – This represents the total flow from off-site sub-basin SC-D4 having a 5-year flow of 11.3 cfs and a 100-year flow of 25.0 cfs which will be conveyed via ditch flow northwards along Black Forest Road to DP 10.

Drainage Fees / Drainage Improvements

Drainage Improvements

At the time of the compiling of this Master Development Drainage Plan, there were no public on-site drainage improvements planned for the Subject Project. Specific drainage reports for particular development will address in detail the required onsite drainage systems. These onsite systems including storm sewer and detention ponds are anticipated to be **private** and must be coordinated with specific onsite and offsite constraints.

Drainage, bridge, and pond fees currently for 2004 are as follows:

	Cottonwood Creek Basin	Sand Creek Basin
Drainage Fee/acre	$8,341	$7,362
Bridge Fee/acre	$ 696	$ 437
Tutt Bridge Fee/acre	$2,361	$2,361
Detention Pond Fee/acre	-	$2,131

Construction Cost Estimate (Not Applicable)

APPENDIX

HYDROLOGIC DATA AND CALCULATIONS

HISTORIC CONDITIONS

Rational Method

Given Input Data:
Description ..... THE RIDGE AT WOODMEN (REEL ADDITION) - 100 YR HISTORIC

Design Point	Areas Included	Total ac	Coef	Tc min	Intensity in/hr	Flow cfs
SUB-BASINS WITHIN COTTONWOOD CREEK DRAINAGE BASIN:						
DP-1	CC-H1	8.3200	0.20	15.51	5.61	9.7
DP-2	CC-H2	5.3900	0.20	13.66	6.16	6.5
DP-3	CC-H3	8.1500	0.20	15.29	5.85	9.5
DP-4	CC-H4	10.6300	0.20	16.52	5.63	12.0
DP-5	CC-H5	2.9000	0.20	13.59	6.18	3.6
DP-6	CC-H6,CC-H5	20.7200	0.20	19.32	5.21	21.6
SUB-BASINS WITHIN SAND CREEK DRAINAGE BASIN:						
DP-7	SC-H1	9.9100	0.20	13.52	6.19	12.3
DP-8	SC-H3	2.9600	0.20	14.36	6.02	3.6
DP-9 OS	SC-H4	5.6300	0.75	14.98	5.91	25.0
DP-10	SC-H2,SC-H3,SC-H4	54.8800	0.20	22.67	4.78	52.5

Rational Method

Given Input Data:
Description ..... THE RIDGE AT WOODMEN (REEL ADDITION) - 5 YR HISTORIC

Design Point	Areas Included	Total ac	Coef	Tc min	Intensity in/hr	Flow cfs
SUB-BASINS WITHIN COTTONWOOD CREEK DRAINAGE BASIN:						
DP-1	CC-H1	8.3200	0.15	15.51	3.02	3.8
DP-2	CC-H2	5.3900	0.15	13.66	3.20	2.5
DP-3	CC-H3	8.1500	0.15	15.29	3.04	3.7
DP-4	CC-H4	10.6300	0.15	16.52	2.93	4.7
DP-5	CC-H5	2.9000	0.15	13.59	3.21	1.4
DP-6	CC-H6,CC-H5	20.7200	0.15	19.32	2.70	8.4
SUB-BASINS WITHIN SAND CREEK DRAINAGE BASIN:						
DP-7	SC-H1	9.9100	0.15	13.52	3.22	4.8
DP-8	SC-H3	2.9600	0.15	14.36	3.13	1.4
DP-9 OS	SC-H4	5.6300	0.66	14.98	3.07	11.3
DP-10	SC-H2,SC-H3,SC-H4	54.8800	0.15	22.67	2.48	20.5

TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY 10 A&B*	10 C&D*	100 A&B*	100 C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.80
1/4 Acre	40	0.50	0.60	0.60	0.70
1/3 Acre	30	0.40	0.50	0.55	0.60
1/2 Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45

* Hydrologic Soil Group

9/30/90

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H1

I. Catchment Hydrologic Data

Catchment ID = CC-H1
Area = 8.32 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

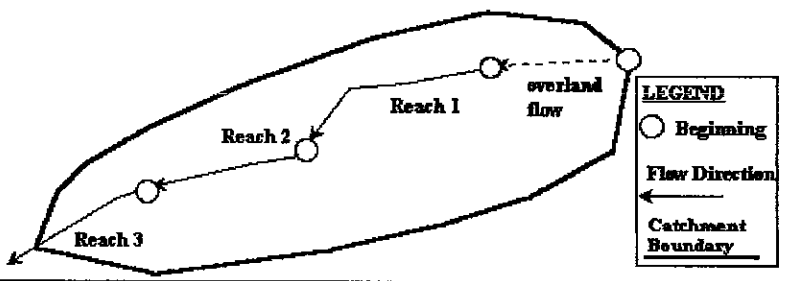
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0698	129	0.15		0.21	10.26
1	0.0719	862		2.50	0.67	21.43
2						
3						
4						
5						
Sum		991				

Computed Tc = 31.69
Regional Tc = 15.51

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 2.05 inch/hr	Rainfall Intensity at Tc, I = 3.02 inch/hr
Peak Flowrate, Qp = 2.56 cfs	Peak Flowrate, Qp = 3.77 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H2

I. Catchment Hydrologic Data

Catchment ID = CC-H2
Area = 5.29 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

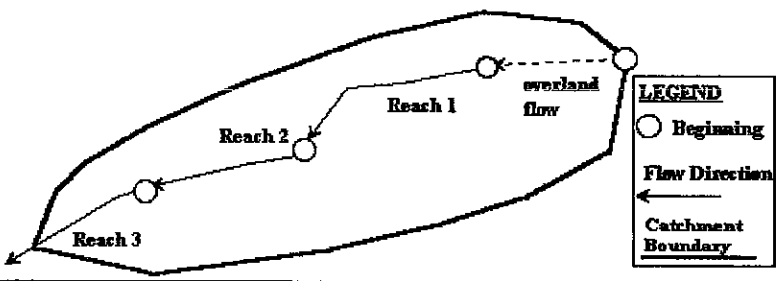
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft	C-5		fps	minutes
	input	input	output	input	output	output
Overland	0.1124	169	0.15		0.28	10.03
1	0.0818	489		2.50	0.72	11.40
2						
3						
4						
5						
Sum		658			Computed Tc =	21.43
					Regional Tc =	13.66

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 2.56 inch/hr
Peak Flowrate, Qp = 2.03 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.20 inch/hr
Peak Flowrate, Qp = 2.54 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H3

I. Catchment Hydrologic Data

Catchment ID = CC-H3
Area = 8.15 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

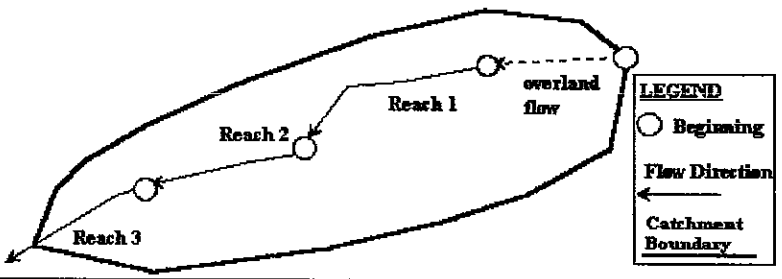
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0529	208	0.15		0.24	14.28
1	0.0605	744		2.50	0.61	20.17
2						
3						
4						
5						
Sum		952				

Computed Tc = 34.44
Regional Tc = 15.29

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 1.95 inch/hr	Rainfall Intensity at Tc, I = 3.04 inch/hr
Peak Flowrate, Qp = 2.38 cfs	Peak Flowrate, Qp = 3.71 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H4

I. Catchment Hydrologic Data

Catchment ID = CC-H4
Area = 10.63 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

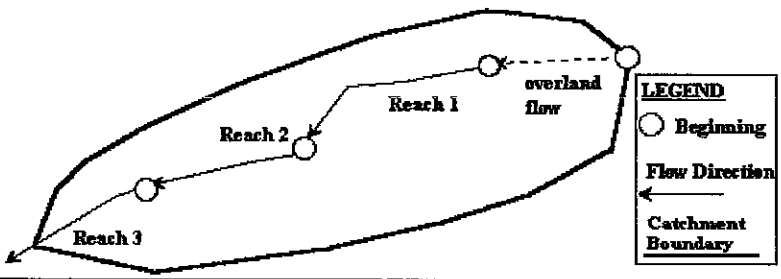
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	5 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	1.35 inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0297	236	0.15		0.21	18.40
1	0.0423	938		2.50	0.51	30.40
2						
3						
4						
5						
Sum		1,174				

Computed Tc = 48.80
Regional Tc = 16.52

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 1.56 inch/hr	Rainfall Intensity at Tc, I = 2.93 inch/hr
Peak Flowrate, Qp = 2.49 cfs	Peak Flowrate, Qp = 4.66 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H5

I. Catchment Hydrologic Data

Catchment ID = CC-H5
Area = 2.90 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

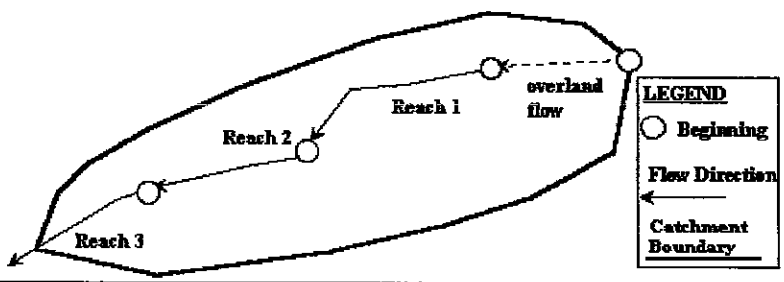
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0455	154	0.15		0.20	12.91
1	0.0730	493		2.50	0.68	12.16
2						
3						
4						
5						
Sum		647				

Computed Tc = 25.07
Regional Tc = 13.59

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 2.35 inch/hr
Peak Flowrate, Qp = 1.02 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.21 inch/hr
Peak Flowrate, Qp = 1.40 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC H5 & CC-H6

I. Catchment Hydrologic Data

Catchment ID = CC-H5,H6
Area = 20.72 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

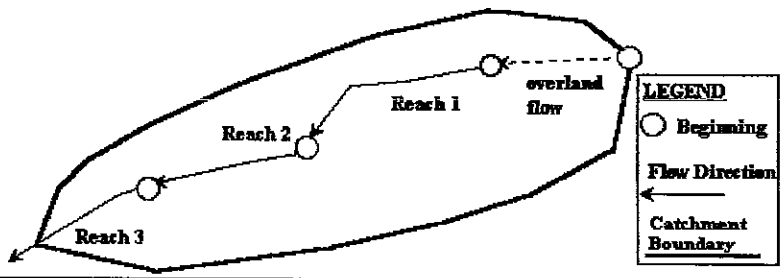
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	5 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	1.35 inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0362	138	0.15		0.17	13.18
1	0.0483	621		2.50	0.55	18.84
2	0.0349	918		15.00	2.80	5.46
3						
4						
5						
Sum		1,677				

Computed Tc = 37.48
Regional Tc = 19.32

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 1.85 inch/hr	Rainfall Intensity at Tc, I = 2.70 inch/hr
Peak Flowrate, Qp = 5.75 cfs	Peak Flowrate, Qp = 8.40 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H1

I. Catchment Hydrologic Data

Catchment ID = SC-H1
Area = 9.91 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

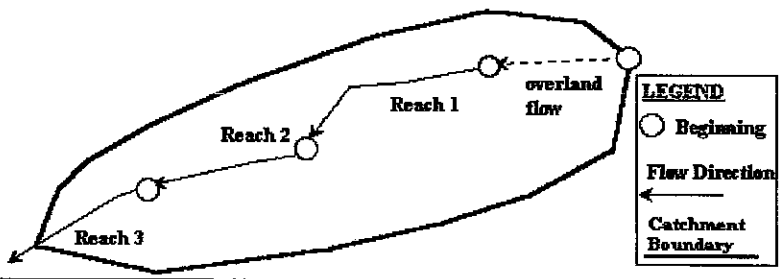
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	5 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	1.35 inches	(input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0323	248	0.15		0.23	18.34
1	0.0570	386		2.50	0.60	10.78
2						
3						
4						
5						
Sum		634				

Computed Tc = 29.12
Regional Tc = 13.52

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 2.16 inch/hr	Rainfall Intensity at Tc, I = 3.22 inch/hr
Peak Flowrate, Qp = 3.20 cfs	Peak Flowrate, Qp = 4.78 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H2, SC H3, SC H4

I. Catchment Hydrologic Data

Catchment ID = H2,H3,H4
Area = 54.88 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

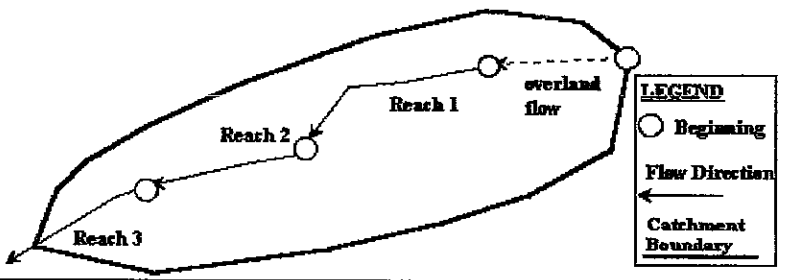
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	5 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	1.35 inches	(input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0367	300	0.15		0.26	19.34
1	0.0515	1,029		2.50	0.57	30.23
2	0.0421	951		15.00	3.08	5.15
3						
4						
5						
Sum		2,280				

Computed Tc = 54.72
Regional Tc = 22.67

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 1.45 inch/hr	Rainfall Intensity at Tc, I = 2.48 inch/hr
Peak Flowrate, Qp = 11.95 cfs	Peak Flowrate, Qp = 20.45 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H3

I. Catchment Hydrologic Data

Catchment ID = SC-H3
Area = 2.96 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

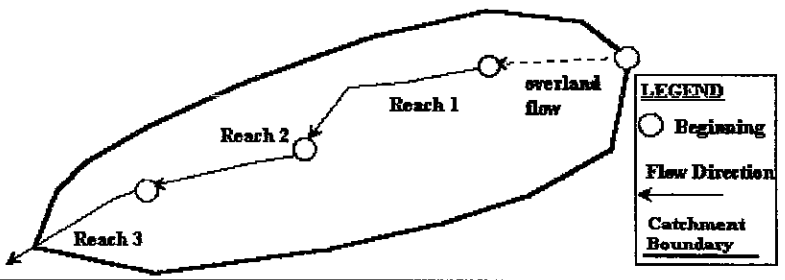
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.15 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0519	154	0.15		0.21	12.36
1	0.0792	631		2.50	0.70	14.95
2						
3						
4						
5						
Sum		785				

Computed Tc = 27.31
Regional Tc = 14.36

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 2.24 inch/hr	Rainfall Intensity at Tc, I = 3.13 inch/hr
Peak Flowrate, Qp = 0.99 cfs	Peak Flowrate, Qp = 1.39 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H4

I. Catchment Hydrologic Data

Catchment ID = SC-H4
Area = 5.63 Acres
Percent Imperviousness = 85.00 %
NRCS Soil Type = B A, B, C, or D

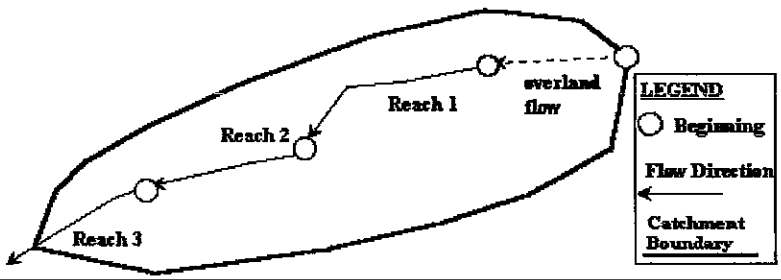
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.66
Overide Runoff Coefficient, C = (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.66
Overide 5-yr. Runoff Coefficient, C = (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0811	74	0.66		0.36	3.45
1	0.0365	822		15.00	2.87	4.78
2						
3						
4						
5						
Sum		896			Computed Tc =	8.23
					Regional Tc =	14.98

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.93 inch/hr	Rainfall Intensity at Tc, I = 3.07 inch/hr
Peak Flowrate, Qp = 14.51 cfs	Peak Flowrate, Qp = 11.33 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H1

I. Catchment Hydrologic Data

Catchment ID = CC-H1
Area = 8.32 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

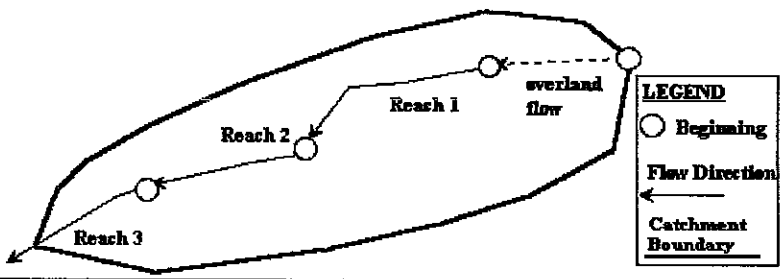
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100	years	(input return period for design storm)
C1 =	28.50		(input the value of C1)
C2=	10.00		(input the value of C2)
C3=	0.786		(input the value of C3)
P1=	2.60	inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0698	129	0.15		0.21	10.26
1	0.0719	862		2.50	0.67	21.43
2						
3						
4						
5						
Sum		991				

Computed Tc = 31.69
Regional Tc = 15.51

IV.

Peak Runoff Prediction using Computed Tc		Peak Runoff Prediction using Regional Tc	
Rainfall Intensity at Tc, I =	3.95 inch/hr	Rainfall Intensity at Tc, I =	5.81 inch/hr
Peak Flowrate, Qp =	6.57 cfs	Peak Flowrate, Qp =	9.67 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H2

I. Catchment Hydrologic Data

Catchment ID = CC-H2
Area = 5.29 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

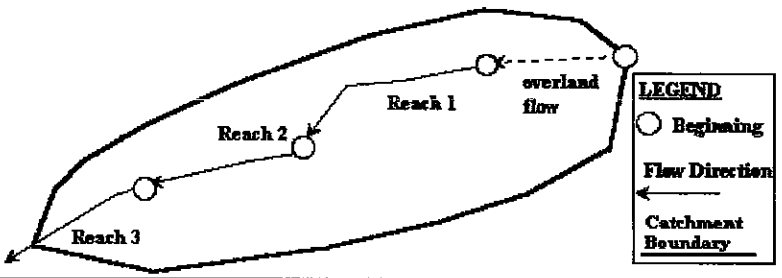
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.1124	169	0.15		0.28	10.03
1	0.0818	489		2.50	0.72	11.40
2						
3						
4						
5						
Sum		658				

Computed Tc = 21.43
Regional Tc = 13.66

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 4.93 inch/hr
Peak Flowrate, Qp = 5.22 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 6.16 inch/hr
Peak Flowrate, Qp = 6.52 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H3

I. Catchment Hydrologic Data

Catchment ID = CC-H3
Area = 8.15 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

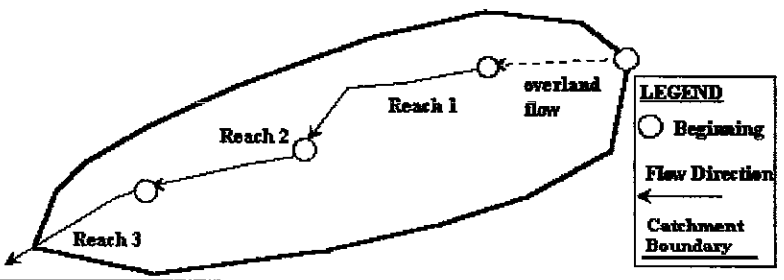
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0529	208	0.15		0.24	14.28
1	0.0605	744		2.50	0.61	20.17
2						
3						
4						
5						
Sum		952				

Computed Tc = 34.44
Regional Tc = 15.29

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 3.76 inch/hr
Peak Flowrate, Qp = 6.12 cfs

Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 5.85 inch/hr
Peak Flowrate, Qp = 9.53 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H4

I. Catchment Hydrologic Data

Catchment ID = CC-H4
Area = 10.63 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

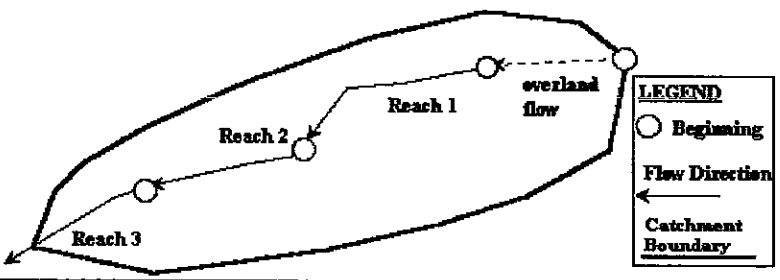
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	2.60 inches	(input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0297	236	0.15		0.21	18.40
1	0.0423	938		2.50	0.51	30.40
2						
3						
4						
5						
Sum		1,174				

Computed Tc = 48.80
Regional Tc = 16.52

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 3.01 inch/hr	Rainfall Intensity at Tc, I = 5.63 inch/hr
Peak Flowrate, Qp = 6.41 cfs	Peak Flowrate, Qp = 11.98 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-H5

I. Catchment Hydrologic Data

Catchment ID = CC-H5
Area = 2.90 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

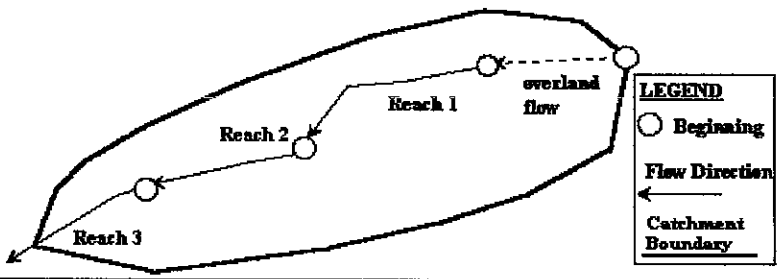
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100	years	(input return period for design storm)
C1 =	28.50		(input the value of C1)
C2=	10.00		(input the value of C2)
C3=	0.786		(input the value of C3)
P1=	2.60	inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0455	154	0.15		0.20	12.91
1	0.0730	493		2.50	0.68	12.16
2						
3						
4						
5						
Sum		647				

Computed Tc = 25.07
Regional Tc = 13.59

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 4.52 inch/hr	Rainfall Intensity at Tc, I = 6.18 inch/hr
Peak Flowrate, Qp = 2.62 cfs	Peak Flowrate, Qp = 3.58 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC H5 & CC-H6

I. Catchment Hydrologic Data

Catchment ID = CC-H5,H6
Area = 20.72 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

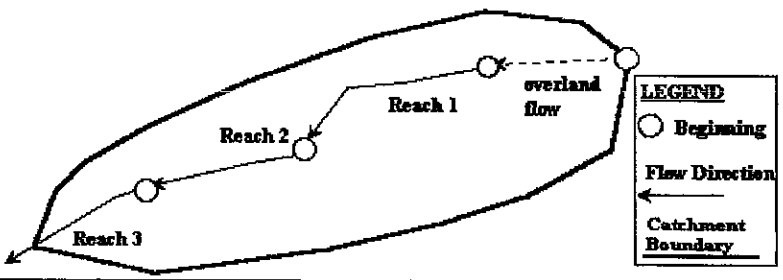
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	2.60 inches	(input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft	C-5		fps	minutes
	input	input	output	input	output	output
Overland	0.0362	138	0.15		0.17	13.18
1	0.0483	621		2.50	0.55	18.84
2	0.0349	918		15.00	2.80	5.46
3						
4						
5						
Sum		1,677				

Computed Tc = 37.48
Regional Tc = 19.32

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.57 inch/hr	Rainfall Intensity at Tc, I = 5.21 inch/hr
Peak Flowrate, Qp = 14.77 cfs	Peak Flowrate, Qp = 21.58 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H1

I. Catchment Hydrologic Data

Catchment ID = SC-H1
Area = 9.91 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

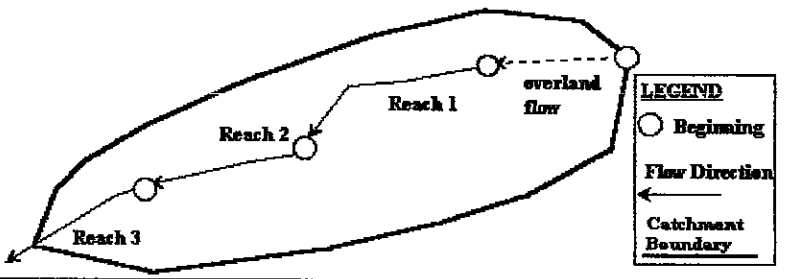
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100	years	(input return period for design storm)
C1 =	28.50		(input the value of C1)
C2=	10.00		(input the value of C2)
C3=	0.786		(input the value of C3)
P1=	2.60	inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0323	248	0.15		0.23	18.34
1	0.0570	386		2.50	0.60	10.78
2						
3						
4						
5						
Sum		634				

Computed Tc = 29.12
Regional Tc = 13.52

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 4.15 inch/hr	Rainfall Intensity at Tc, I = 6.19 inch/hr
Peak Flowrate, Qp = 8.23 cfs	Peak Flowrate, Qp = 12.27 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H2, SC H3, SC H4

I. Catchment Hydrologic Data

Catchment ID = H2,H3,H4
Area = 54.88 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

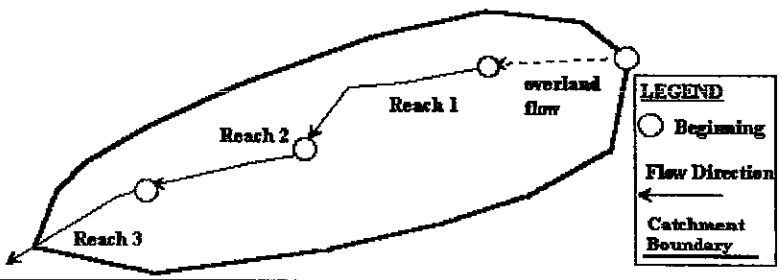
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	2.60 inches	(input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0367	300	0.15		0.26	19.34
1	0.0515	1,029		2.50	0.57	30.23
2	0.0421	951		15.00	3.08	5.15
3						
4						
5						
Sum		2,280				

Computed Tc = 54.72
Regional Tc = 22.67

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 2.79 inch/hr	Rainfall Intensity at Tc, I = 4.78 inch/hr
Peak Flowrate, Qp = 30.67 cfs	Peak Flowrate, Qp = 52.50 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H3

I. Catchment Hydrologic Data

Catchment ID = SC-H3
Area = 2.96 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

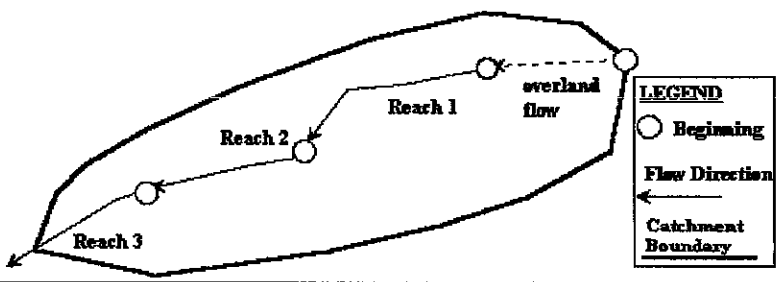
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.20 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.15 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0519	154	0.15		0.21	12.36
1	0.0792	631		2.50	0.70	14.95
2						
3						
4						
5						
Sum		785				

Computed Tc = 27.31
Regional Tc = 14.36

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 4.31 inch/hr	Rainfall Intensity at Tc, I = 6.02 inch/hr
Peak Flowrate, Qp = 2.55 cfs	Peak Flowrate, Qp = 3.57 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H4

I. Catchment Hydrologic Data

Catchment ID = SC-H4
Area = 5.63 Acres
Percent Imperviousness = 85.00 %
NRCS Soil Type = B A, B, C, or D

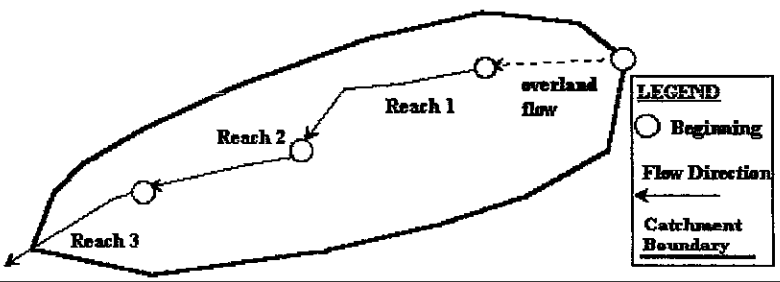
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.75
Overide Runoff Coefficient, C = (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.66
Overide 5-yr. Runoff Coefficient, C = (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0811	74	0.66		0.36	3.45
1	0.0365	822		15.00	2.87	4.78
2						
3						
4						
5						
Sum		896				

Computed Tc = 8.23
Regional Tc = 14.98

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 7.56 inch/hr
Peak Flowrate, Qp = 31.98 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 5.91 inch/hr
Peak Flowrate, Qp = 24.97 cfs

DEVELOPED CONDITIONS

Rational Method

Given Input Data:
Description ..... THE RIDGE AT WOODMEN (REEL ADDITION) - 100 YR DEVELOPED

Design Point	Areas Included	Total ac	Coef	Tc min	Intensity in/hr	Flow cfs
SUB-BASINS WITHIN COTTONWOOD CREEK DRAINAGE BASIN:						
DP-1	CC-D1	8.3200	0.80	15.51	5.81	38.7
DP-2	CC-D2	5.3900	0.80	13.66	6.16	26.1
DP-3	CC-D3	8.1500	0.80	15.29	5.85	38.1
DP-4	CC-D4	10.6300	0.80	16.52	5.63	47.9
DP-5	CC-D5	2.9000	0.80	13.59	6.18	14.3
DP-6	CC-D6,CC-D5	20.7200	0.80	19.32	5.21	86.3
SUB-BASINS WITHIN SAND CREEK DRAINAGE BASIN:						
DP-7	SC-D1	9.9100	0.80	13.52	6.19	49.1
DP-8	SC-D3	2.9600	0.80	14.36	6.02	14.3
DP-9 OS	SC-D4	5.6300	0.75	14.98	5.91	25.0
DP-10	SC-D2,SC-D3,SC-D4	54.8800	0.80	22.67	4.78	210.0

Rational Method

Given Input Data:
Description ..... THE RIDGE AT WOODMEN (REEL ADDITION) - 5 YR DEVELOPED

Design Point	Areas Included	Total ac	Coef	Tc min	Intensity in/hr	Flow cfs
SUB-BASINS WITHIN COTTONWOOD CREEK DRAINAGE BASIN:						
DP-1	CC-D1	8.3200	0.75	15.51	3.02	18.8
DP-2	CC-D2	5.3900	0.75	13.66	3.20	12.7
DP-3	CC-D3	8.1500	0.75	15.29	3.04	18.6
DP-4	CC-D4	10.6300	0.75	16.52	2.93	23.3
DP-5	CC-D5	2.9000	0.75	13.59	3.21	7.0
DP-6	CC-D6,CC-D5	20.7200	0.75	19.32	2.70	42.0
SUB-BASINS WITHIN SAND CREEK DRAINAGE BASIN:						
DP-7	SC-D1	9.9100	0.75	13.52	3.22	23.9
DP-8	SC-D3	2.9600	0.75	14.36	3.13	6.9
DP-9 OS	SC-D4	5.6300	0.66	14.98	3.07	11.3
DP-10	SC-D2,SC-D3,SC-D4	54.8800	0.75	22.67	2.48	102.2

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D1

I. Catchment Hydrologic Data

Catchment ID = CC-D1
Area = 8.32 Acres
Percent Imperviousness = 95.00 %
NRCS Soil Type = B A, B, C, or D

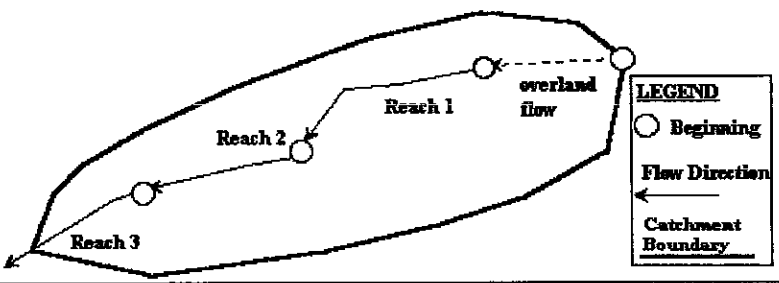
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.81
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.81
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0698	129	0.75		0.57	3.78
1	0.0719	862		2.50	0.67	21.43
2						
3						
4						
5						
Sum		991				

Computed Tc = 25.21
Regional Tc = 15.51

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 2.34 inch/hr
Peak Flowrate, Qp = 14.61 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.02 inch/hr
Peak Flowrate, Qp = 18.83 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D2

I. Catchment Hydrologic Data

Catchment ID = CC-D2
Area = 5.29 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

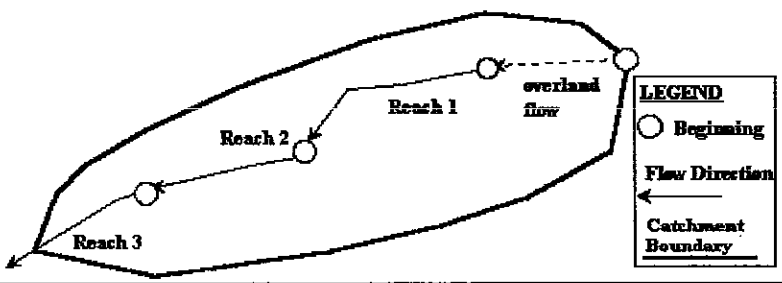
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.1124	169	0.75		0.76	3.70
1	0.0818	489		2.50	0.72	11.40
2						
3						
4						
5						
Sum		658			Computed Tc =	15.10
					Regional Tc =	13.66

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 3.06 inch/hr	Rainfall Intensity at Tc, I = 3.20 inch/hr
Peak Flowrate, Qp = 12.12 cfs	Peak Flowrate, Qp = 12.70 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D3

I. Catchment Hydrologic Data

Catchment ID = CC-D3
Area = 8.15 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

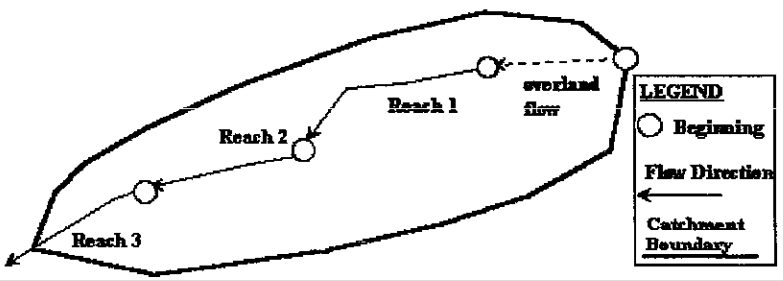
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0529	208	0.75		0.66	5.26
1	0.0605	744		2.50	0.61	20.17
2						
3						
4						
5						
Sum		952				

Computed Tc = 25.42
Regional Tc = 15.29

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 2.33 inch/hr
Peak Flowrate, Qp = 14.24 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.04 inch/hr
Peak Flowrate, Qp = 18.56 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D4

I. Catchment Hydrologic Data

Catchment ID = CC-D4
Area = 10.63 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

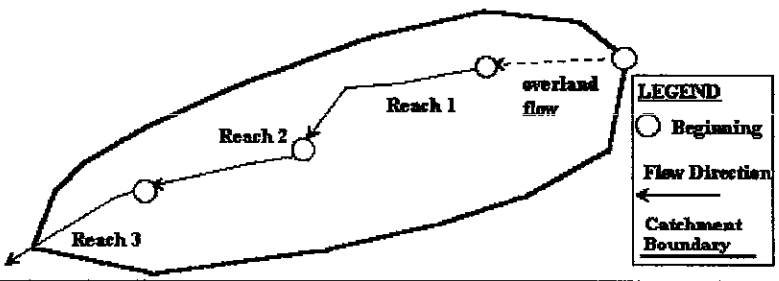
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0297	236	0.75		0.58	6.78
1	0.0423	938		2.50	0.51	30.40
2						
3						
4						
5						
Sum		1,174				

Computed Tc = 37.18
Regional Tc = 16.52

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 1.86 inch/hr	Rainfall Intensity at Tc, I = 2.93 inch/hr
Peak Flowrate, Qp = 14.83 cfs	Peak Flowrate, Qp = 23.32 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D5

I. Catchment Hydrologic Data

Catchment ID = CC-D5
Area = 2.90 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

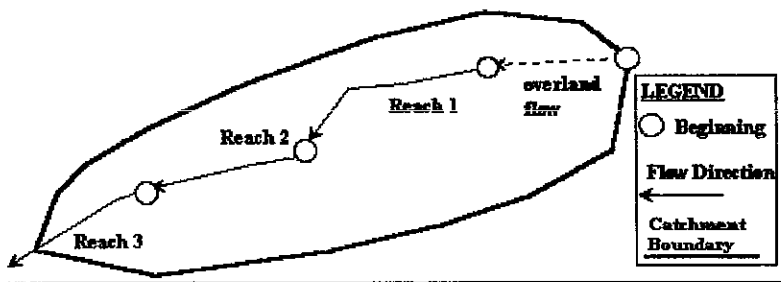
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0455	154	0.75		0.54	4.76
1	0.0730	493		2.50	0.68	12.16
2						
3						
4						
5						
Sum		647				

Computed Tc = 16.92
Regional Tc = 13.59

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 2.89 inch/hr	Rainfall Intensity at Tc, I = 3.21 inch/hr
Peak Flowrate, Qp = 6.29 cfs	Peak Flowrate, Qp = 6.98 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC H5 & CC-H6

I. Catchment Hydrologic Data

Catchment ID = CC-H5,H6
Area = 20.72 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

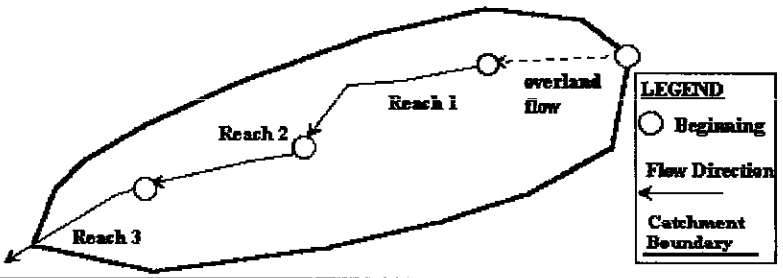
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	5 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	1.35 inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0362	138	0.75		0.47	4.86
1	0.0483	621		2.50	0.55	18.84
2	0.0349	918		15.00	2.80	5.46
3						
4						
5						
Sum		1,677			Computed Tc =	29.15
					Regional Tc =	19.32

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 2.15 inch/hr	Rainfall Intensity at Tc, I = 2.70 inch/hr
Peak Flowrate, Qp = 33.47 cfs	Peak Flowrate, Qp = 42.02 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H1

I. Catchment Hydrologic Data

Catchment ID = SC-H1
Area = 9.91 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

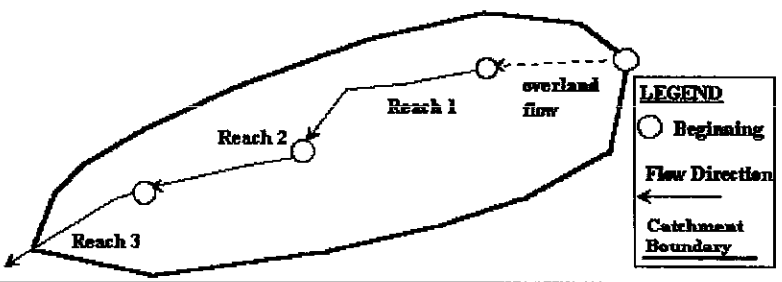
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0323	248	0.75		0.61	6.76
1	0.0570	386		2.50	0.60	10.78
2						
3						
4						
5						
Sum		634				

Computed Tc = 17.54
Regional Tc = 13.52

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 2.84 inch/hr
Peak Flowrate, Qp = 21.11 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 3.22 inch/hr
Peak Flowrate, Qp = 23.90 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H3

I. Catchment Hydrologic Data

Catchment ID = SC-H3
Area = 2.96 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

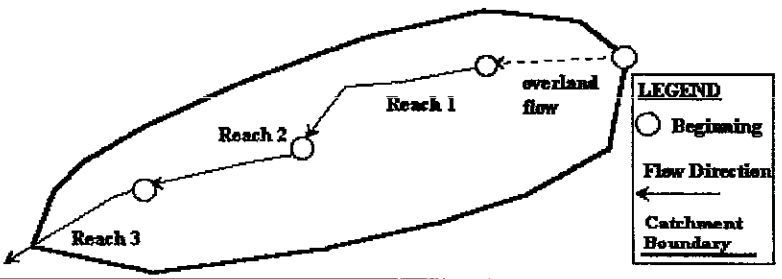
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0519	154	0.75		0.56	4.55
1	0.0792	631		2.50	0.70	14.95
2						
3						
4						
5						
Sum		785				

Computed Tc = 19.50
Regional Tc = 14.36

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 2.69 inch/hr	Rainfall Intensity at Tc, I = 3.13 inch/hr
Peak Flowrate, Qp = 5.97 cfs	Peak Flowrate, Qp = 6.94 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H4

I. Catchment Hydrologic Data

Catchment ID = SC-H4
Area = 5.63 Acres
Percent Imperviousness = 85.00 %
NRCS Soil Type = B A, B, C, or D

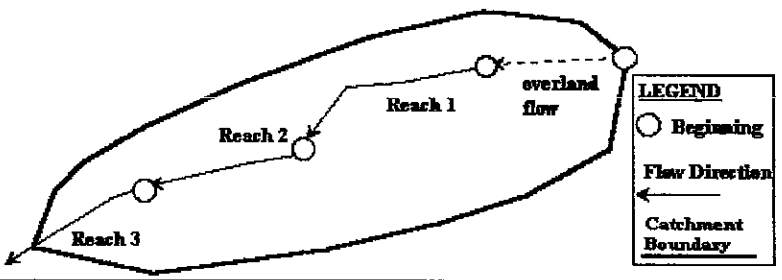
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 5 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 1.35 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.66
Overide Runoff Coefficient, C = _____ (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.66
Overide 5-yr. Runoff Coefficient, C = _____ (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0811	74	0.66		0.36	3.45
1	0.0365	822		15.00	2.87	4.78
2						
3						
4						
5						
Sum		896				

Computed Tc = 8.23
Regional Tc = 14.98

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 3.93 inch/hr	Rainfall Intensity at Tc, I = 3.07 inch/hr
Peak Flowrate, Qp = 14.51 cfs	Peak Flowrate, Qp = 11.33 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H2, SC H3, SC H4

I. Catchment Hydrologic Data

Catchment ID = H2,H3,H4
Area = 54.88 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

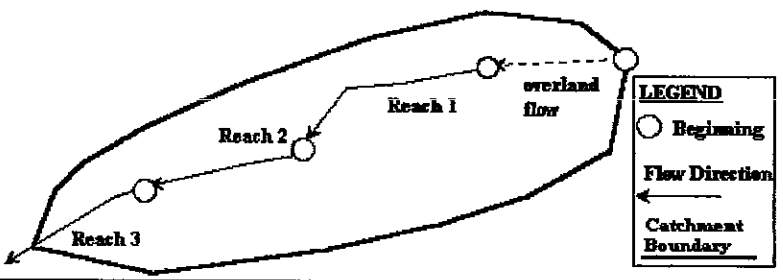
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	5 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	1.35 inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.08
Overide Runoff Coefficient, C = 0.75 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0367	300	0.75		0.70	7.13
1	0.0515	1,029		2.50	0.57	30.23
2	0.0421	951		15.00	3.08	5.15
3						
4						
5						
Sum		2,280				

Computed Tc = 42.51
Regional Tc = 22.67

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 1.71 inch/hr	Rainfall Intensity at Tc, I = 2.48 inch/hr
Peak Flowrate, Qp = 70.40 cfs	Peak Flowrate, Qp = 102.23 cfs

DP 3

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	80	percent
Catchment Drainage Area	A =	8.10	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	15	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches

Design Rainfall IDF Formula I = C1* P1/(C2+Tc)^C3

Coefficient One	C1 =	28.50
Coefficient Two	C2 =	10.00
Coefficient Three	C3 =	0.79

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70	
Inflow Peak Runoff	Qp-in =	33.04	cfs
Allowable Peak Outflow Rate	Qp-out =	6.89	cfs
Ratio of Qp-out/Qp-in	Ratio =	0.21	

Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall duration must be entered in ascending order.

Rainfall Duration minutes (input)	Rainfall Intensity inches/hr (output)	Inflow Volume cubic feet (output)	Adjustment Factor (output)	Average Outflow cfs (output)	Outflow Volume cubic feet (output)	Storage Volume cubic feet (output)
5.00	8.72	14,839	1.00	6.89	2,066	12,774
10.00	6.95	23,645	1.00	6.89	4,131	19,514
15.00	5.83	29,735	1.00	6.89	6,197	23,539
20.00	5.05	34,329	0.88	6.02	7,229	27,099
25.00	4.47	37,991	0.80	5.51	8,262	29,729
30.00	4.02	41,025	0.75	5.16	9,295	31,730
35.00	3.66	43,610	0.71	4.92	10,328	33,282
40.00	3.37	45,859	0.69	4.73	11,360	34,499
45.00	3.13	47,850	0.67	4.59	12,393	35,457
50.00	2.92	49,634	0.65	4.48	13,426	36,209
55.00	2.74	51,252	0.64	4.38	14,459	36,794
60.00	2.58	52,732	0.63	4.30	15,491	37,241
65.00	2.45	54,096	0.62	4.24	16,524	37,572
70.00	2.32	55,362	0.61	4.18	17,557	37,805
75.00	2.22	56,542	0.60	4.13	18,590	37,953
80.00	2.12	57,649	0.59	4.09	19,622	38,027
85.00	2.03	58,691	0.59	4.05	20,655	38,036
90.00	1.95	59,675	0.58	4.02	21,688	37,988
95.00	1.88	60,609	0.58	3.99	22,721	37,888
100.00	1.81	61,497	0.58	3.96	23,753	37,744
105.00	1.75	62,343	0.57	3.93	24,786	37,557
110.00	1.69	63,153	0.57	3.91	25,819	37,334
115.00	1.63	63,928	0.57	3.89	26,852	37,077
120.00	1.58	64,672	0.56	3.87	27,884	36,788
125.00	1.54	65,388	0.56	3.86	28,917	36,471
130.00	1.49	66,078	0.56	3.84	29,950	36,128
135.00	1.45	66,743	0.56	3.83	30,983	35,760
140.00	1.41	67,386	0.55	3.81	32,015	35,371
145.00	1.38	68,008	0.55	3.80	33,048	34,960
150.00	1.34	68,610	0.55	3.79	34,081	34,529
155.00	1.31	69,195	0.55	3.78	35,114	34,081
160.00	1.28	69,762	0.55	3.77	36,146	33,616
165.00	1.25	70,313	0.55	3.76	37,179	33,134
170.00	1.23	70,849	0.54	3.75	38,212	32,638
175.00	1.20	71,372	0.54	3.74	39,245	32,127
180.00	1.17	71,880	0.54	3.73	40,277	31,603
185.00	1.15	72,376	0.54	3.72	41,310	31,066

Stormwater Detention Volume (Cubic Feet) = 38,036
Stormwater Detention Volume (Acre Feet) = 0.8732

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

DP 4

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	80	percent
Catchment Drainage Area	A =	10.60	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	17	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches

Design Rainfall IDF Formula I = C1* P1/(C2+Tc)*C3

Coefficient One	C1 =	28.50
Coefficient Two	C2 =	10.00
Coefficient Three	C3 =	0.79

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70	
Inflow Peak Runoff	Qp-in =	40.89	cfs
Allowable Peak Outflow Rate	Qp-out =	9.01	cfs
Ratio of Qp-out/Qp-in	Ratio =	0.22	

Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall duration must be entered in ascending order.

Rainfall Duration minutes (input)	Rainfall Intensity inches/hr (output)	Inflow Volume cubic feet (output)	Adjustment Factor (output)	Average Outflow cfs (output)	Outflow Volume cubic feet (output)	Storage Volume cubic feet (output)
5.00	8.72	19,419	1.00	9.01	2,703	16,716
10.00	6.95	30,943	1.00	9.01	5,406	25,537
15.00	5.83	38,913	1.00	9.01	8,109	30,804
20.00	5.05	44,924	0.93	8.33	10,001	34,923
25.00	4.47	49,716	0.84	7.57	11,353	38,364
30.00	4.02	53,687	0.78	7.06	12,704	40,983
35.00	3.66	57,089	0.74	6.69	14,056	43,014
40.00	3.37	60,013	0.71	6.42	15,407	44,606
45.00	3.13	62,618	0.69	6.21	16,759	45,859
50.00	2.92	64,954	0.67	6.04	18,110	46,844
55.00	2.74	67,071	0.65	5.90	19,462	47,609
60.00	2.58	69,008	0.64	5.78	20,813	48,195
65.00	2.45	70,793	0.63	5.68	22,165	48,628
70.00	2.32	72,449	0.62	5.60	23,516	48,933
75.00	2.22	73,994	0.61	5.53	24,868	49,126
80.00	2.12	75,442	0.61	5.46	26,219	49,223
85.00	2.03	76,805	0.60	5.41	27,571	49,235
90.00	1.95	78,094	0.59	5.36	28,922	49,172
95.00	1.88	79,315	0.59	5.31	30,274	49,042
100.00	1.81	80,477	0.59	5.27	31,625	48,852
105.00	1.75	81,585	0.58	5.23	32,977	48,609
110.00	1.69	82,644	0.58	5.20	34,328	48,316
115.00	1.63	83,659	0.57	5.17	35,680	47,979
120.00	1.58	84,633	0.57	5.14	37,031	47,602
125.00	1.54	85,570	0.57	5.12	38,383	47,187
130.00	1.49	86,472	0.57	5.09	39,734	46,738
135.00	1.45	87,343	0.56	5.07	41,086	46,257
140.00	1.41	88,184	0.56	5.05	42,437	45,747
145.00	1.38	88,998	0.56	5.03	43,789	45,209
150.00	1.34	89,786	0.56	5.02	45,140	44,646
155.00	1.31	90,551	0.55	5.00	46,492	44,059
160.00	1.28	91,293	0.55	4.98	47,843	43,450
165.00	1.25	92,015	0.55	4.97	49,195	42,820
170.00	1.23	92,716	0.55	4.96	50,546	42,170
175.00	1.20	93,400	0.55	4.94	51,898	41,502
180.00	1.17	94,066	0.55	4.93	53,249	40,816
185.00	1.15	94,715	0.55	4.92	54,601	40,114

Stormwater Detention Volume (Cubic Feet) = 49,235
Stormwater Detention Volume (Acre Feet) = 1.1303

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D1

I. Catchment Hydrologic Data

Catchment ID = CC-D1
Area = 8.32 Acres
Percent Imperviousness = 95.00 %
NRCS Soil Type = B A, B, C, or D

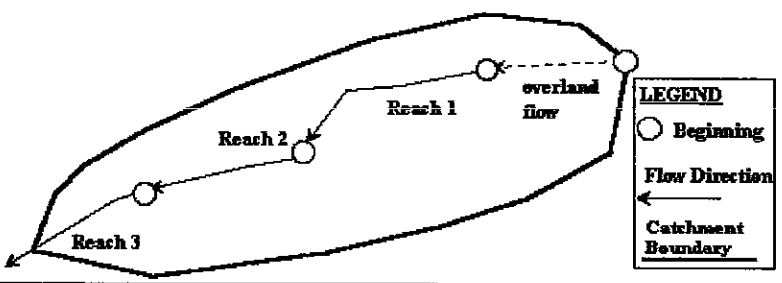
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.88
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.81
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0698	129	0.75		0.57	3.78
1	0.0719	862		2.50	0.67	21.43
2						
3						
4						
5						
Sum		991				

Computed Tc = 25.21
Regional Tc = 15.51

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 4.51 inch/hr
Peak Flowrate, Qp = 30.01 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 5.81 inch/hr
Peak Flowrate, Qp = 38.67 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D2

I. Catchment Hydrologic Data

Catchment ID = CC-D2
Area = 5.29 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

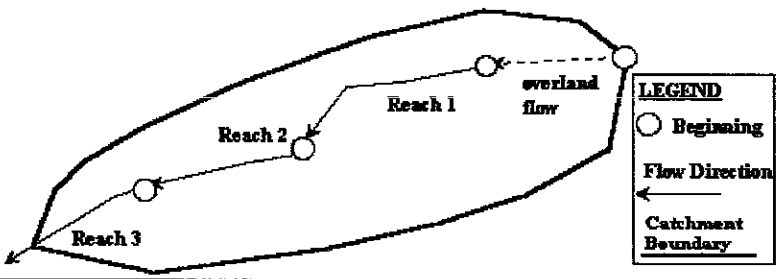
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.1124	169	0.75		0.76	3.70
1	0.0818	489		2.50	0.72	11.40
2						
3						
4						
5						
Sum		658				

Computed Tc = 15.10
Regional Tc = 13.66

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 5.88 inch/hr	Rainfall Intensity at Tc, I = 6.16 inch/hr
Peak Flowrate, Qp = 24.90 cfs	Peak Flowrate, Qp = 26.09 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D3

I. Catchment Hydrologic Data

Catchment ID = CC-D3
Area = 8.15 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

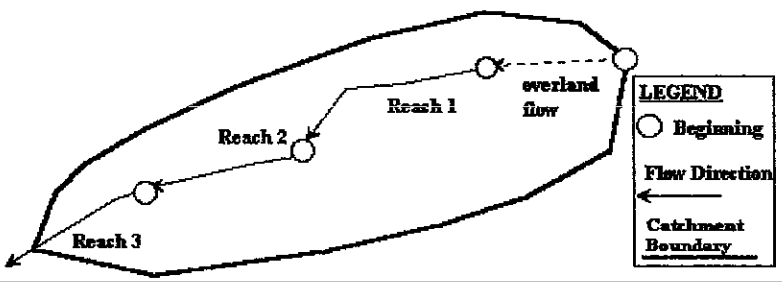
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0529	208	0.75		0.66	5.26
1	0.0605	744		2.50	0.61	20.17
2						
3						
4						
5						
Sum		952				

Computed Tc = 25.42
Regional Tc = 15.29

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 4.49 inch/hr
Peak Flowrate, Qp = 29.26 cfs

Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 5.85 inch/hr
Peak Flowrate, Qp = 38.14 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H4

I. Catchment Hydrologic Data

Catchment ID = SC-H4
Area = 5.63 Acres
Percent Imperviousness = 85.00 %
NRCS Soil Type = B A, B, C, or D

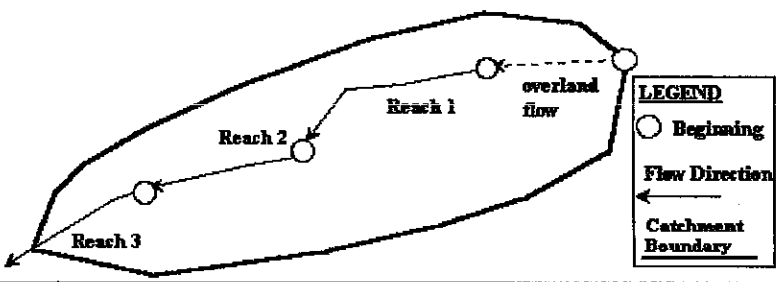
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.75
Overide Runoff Coefficient, C = (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.66
Overide 5-yr. Runoff Coefficient, C = (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0811	74	0.66		0.36	3.45
1	0.0365	822		15.00	2.87	4.78
2						
3						
4						
5						
Sum		896			Computed Tc =	8.23
					Regional Tc =	14.98

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 7.56 inch/hr
Peak Flowrate, Qp = 31.98 cfs

Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 5.91 inch/hr
Peak Flowrate, Qp = 24.97 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D4

I. Catchment Hydrologic Data

Catchment ID = CC-D4
Area = 10.63 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

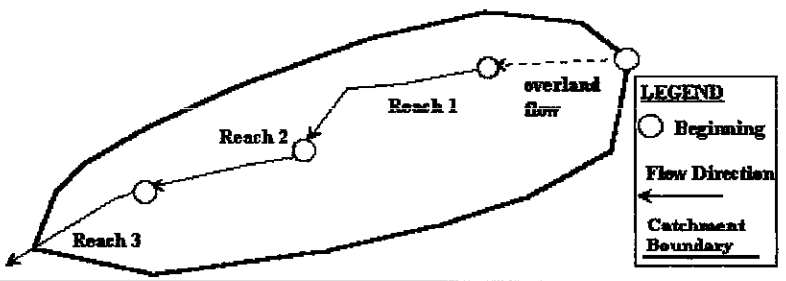
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0297	236	0.75		0.58	6.78
1	0.0423	938		2.50	0.51	30.40
2						
3						
4						
5						
Sum		1,174				

Computed Tc = 37.18
Regional Tc = 16.52

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 3.58 inch/hr
Peak Flowrate, Qp = 30.47 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 5.63 inch/hr
Peak Flowrate, Qp = 47.92 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC-D5

I. Catchment Hydrologic Data

Catchment ID = CC-D5
Area = 2.90 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

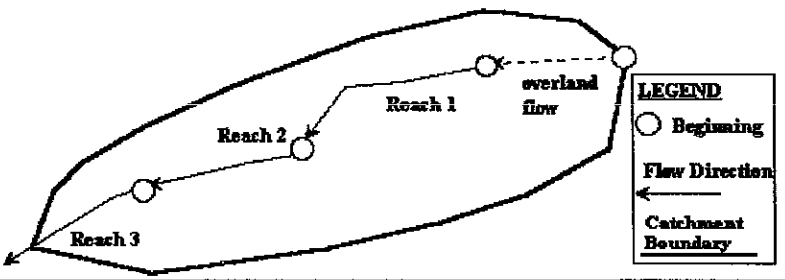
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation–see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0455	154	0.75		0.54	4.76
1	0.0730	493		2.50	0.68	12.16
2						
3						
4						
5						
Sum		647				

Computed Tc = 16.92
Regional Tc = 13.59

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 5.57 inch/hr
Peak Flowrate, Qp = 12.92 cfs

ediction using Regional Tc
Rainfall Intensity at Tc, I = 6.18 inch/hr
Peak Flowrate, Qp = 14.33 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: CC H5 & CC-H6

I. Catchment Hydrologic Data

Catchment ID = CC-H5,H6
Area = 20.72 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

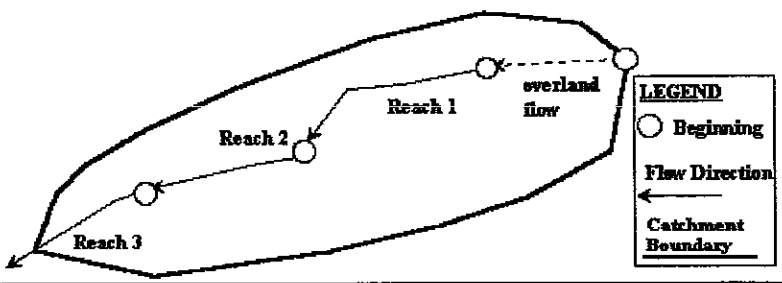
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft	C-5		fps	minutes
	input	input	output	input	output	output
Overland	0.0362	138	0.75		0.47	4.86
1	0.0483	621		2.50	0.55	18.84
2	0.0349	918		15.00	2.80	5.46
3						
4						
5						
Sum		1,677				

Computed Tc = 29.15
Regional Tc = 19.32

IV.

Peak Runoff Prediction using Computed Tc
Rainfall Intensity at Tc, I = 4.15 inch/hr
Peak Flowrate, Qp = 68.77 cfs

Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 5.21 inch/hr
Peak Flowrate, Qp = 86.33 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H1

I. Catchment Hydrologic Data

Catchment ID = SC-H1
Area = 9.91 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

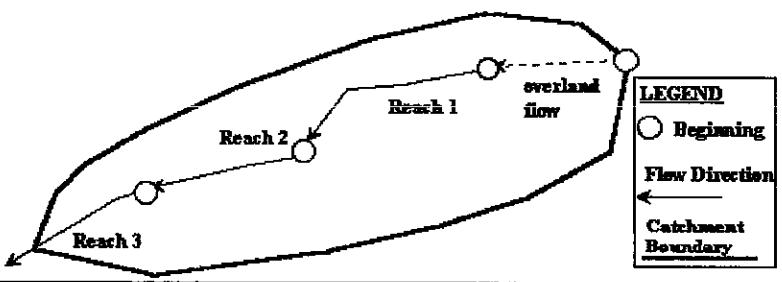
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100	years	(input return period for design storm)
C1 =	28.50		(input the value of C1)
C2=	10.00		(input the value of C2)
C3=	0.786		(input the value of C3)
P1=	2.60	inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0323	248	0.75		0.61	6.76
1	0.0570	386		2.50	0.60	10.78
2						
3						
4						
5						
Sum		634				

Computed Tc = 17.54
Regional Tc = 13.52

IV.

Peak Runoff Prediction using Computed Tc	ediction using Regional Tc
Rainfall Intensity at Tc, I = 5.47 inch/hr	Rainfall Intensity at Tc, I = 6.19 inch/hr
Peak Flowrate, Qp = 43.37 cfs	Peak Flowrate, Qp = 49.09 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H3

I. Catchment Hydrologic Data

Catchment ID = SC-H3
Area = 2.96 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

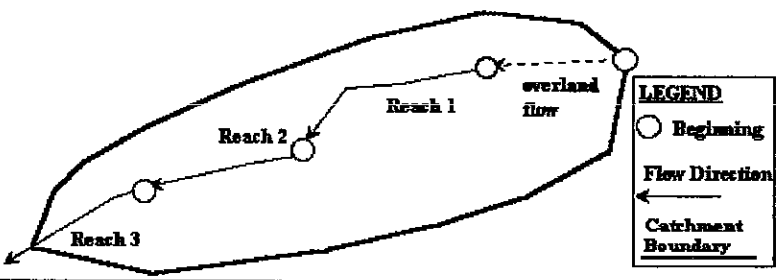
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2= 10.00 (input the value of C2)
C3= 0.786 (input the value of C3)
P1= 2.60 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0519	154	0.75		0.56	4.55
1	0.0792	631		2.50	0.70	14.95
2						
3						
4						
5						
Sum		785			Computed Tc =	19.50
					Regional Tc =	14.36

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 5.18 inch/hr	Rainfall Intensity at Tc, I = 6.02 inch/hr
Peak Flowrate, Qp = 12.27 cfs	Peak Flowrate, Qp = 14.26 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: THE RIDGE AT WOODMEN (Reel Addition)
Catchment ID: SC-H2, SC H3, SC H4

I. Catchment Hydrologic Data

Catchment ID = H2,H3,H4
Area = 54.88 Acres
Percent Imperviousness = 2.00 %
NRCS Soil Type = B A, B, C, or D

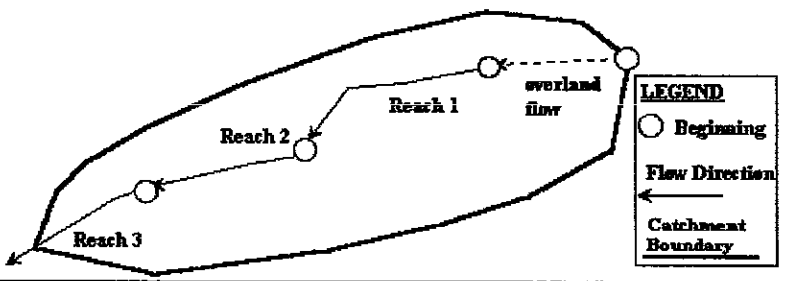
II. Rainfall Information I (inch/hr) = C1 * P1 /(C2 + Td)^C3

Design Storm Return Period, Tr =	100 years	(input return period for design storm)
C1 =	28.50	(input the value of C1)
C2=	10.00	(input the value of C2)
C3=	0.786	(input the value of C3)
P1=	2.60 inches	(input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.36
Overide Runoff Coefficient, C = 0.80 (enter an overide C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.08
Overide 5-yr. Runoff Coefficient, C = 0.75 (enter an overide C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Convey-ance	Flow Velocity V	Flow Time Tf
	ft/ft	ft			fps	minutes
	input	input	output	input	output	output
Overland	0.0367	300	0.75		0.70	7.13
1	0.0515	1,029		2.50	0.57	30.23
2	0.0421	951		15.00	3.08	5.15
3						
4						
5						
Sum		2,280			Computed Tc =	42.51
					Regional Tc =	22.67

IV.

Peak Runoff Prediction using Computed Tc	Peak Runoff Prediction using Regional Tc
Rainfall Intensity at Tc, I = 3.29 inch/hr	Rainfall Intensity at Tc, I = 4.78 inch/hr
Peak Flowrate, Qp = 144.62 cfs	Peak Flowrate, Qp = 210.01 cfs

DETENTION POND CALCULATIONS

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

DP 1

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	80	percent
Catchment Drainage Area	A =	8.30	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	16	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches

Design Rainfall IDF Formula I = C1* P1/(C2+Tc)^C3

Coefficient One	C1 =	28.50
Coefficient Two	C2 =	10.00
Coefficient Three	C3 =	0.79

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70	
Inflow Peak Runoff	Qp-in =	32.82	cfs
Allowable Peak Outflow Rate	Qp-out =	7.06	cfs
Ratio of Qp-out/Qp-in	Ratio =	0.21	

Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall duration must be entered in ascending order.

Rainfall Duration minutes (input)	Rainfall Intensity inches/hr (output)	Inflow Volume cubic feet (output)	Adjustment Factor (output)	Average Outflow cfs (output)	Outflow Volume cubic feet (output)	Storage Volume cubic feet (output)
5.00	8.72	15,206	1.00	7.06	2,117	13,089
10.00	6.95	24,229	1.00	7.06	4,233	19,996
15.00	5.83	30,469	1.00	7.06	6,350	24,120
20.00	5.05	35,176	0.90	6.35	7,619	27,557
25.00	4.47	38,929	0.82	5.79	8,678	30,251
30.00	4.02	42,038	0.77	5.41	9,736	32,302
35.00	3.66	44,686	0.73	5.14	10,794	33,892
40.00	3.37	46,991	0.70	4.94	11,852	35,139
45.00	3.13	49,031	0.68	4.78	12,911	36,120
50.00	2.92	50,860	0.66	4.66	13,969	36,891
55.00	2.74	52,518	0.65	4.55	15,027	37,491
60.00	2.58	54,034	0.63	4.47	16,085	37,948
65.00	2.45	55,432	0.62	4.40	17,144	38,288
70.00	2.32	56,729	0.61	4.33	18,202	38,527
75.00	2.22	57,938	0.61	4.28	19,260	38,678
80.00	2.12	59,072	0.60	4.23	20,318	38,754
85.00	2.03	60,140	0.59	4.19	21,377	38,763
90.00	1.95	61,149	0.59	4.15	22,435	38,714
95.00	1.88	62,105	0.58	4.12	23,493	38,612
100.00	1.81	63,015	0.58	4.09	24,551	38,464
105.00	1.75	63,883	0.58	4.07	25,610	38,273
110.00	1.69	64,712	0.57	4.04	26,668	38,044
115.00	1.63	65,507	0.57	4.02	27,726	37,780
120.00	1.58	66,269	0.57	4.00	28,784	37,485
125.00	1.54	67,003	0.56	3.98	29,843	37,160
130.00	1.49	67,709	0.56	3.96	30,901	36,808
135.00	1.45	68,391	0.56	3.95	31,959	36,432
140.00	1.41	69,050	0.56	3.93	33,017	36,032
145.00	1.38	69,687	0.56	3.92	34,076	35,611
150.00	1.34	70,304	0.55	3.90	35,134	35,170
155.00	1.31	70,903	0.55	3.89	36,192	34,711
160.00	1.28	71,484	0.55	3.88	37,250	34,234
165.00	1.25	72,049	0.55	3.87	38,309	33,741
170.00	1.23	72,599	0.55	3.86	39,367	33,232
175.00	1.20	73,134	0.55	3.85	40,425	32,709
180.00	1.17	73,655	0.54	3.84	41,483	32,172
185.00	1.15	74,163	0.54	3.83	42,542	31,622

Stormwater Detention Volume (Cubic Feet) = 38,763
Stormwater Detention Volume (Acre Feet) = 0.8899

DP 2

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	80	percent
Catchment Drainage Area	A =	5.40	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	14	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches
Design Rainfall IDF Formula I = C1* P1/(C2+Tc)^C3			
Coefficient One	C1 =	28.50	
Coefficient Two	C2 =	10.00	
Coefficient Three	C3 =	0.79	

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70	
Inflow Peak Runoff	Qp-in =	22.75	cfs
Allowable Peak Outflow Rate	Qp-out =	4.59	cfs
Ratio of Qp-out/Qp-in	Ratio =	0.20	

Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall duration must be entered in ascending order.

Rainfall Duration minutes (input)	Rainfall Intensity inches/hr (output)	Inflow Volume cubic feet (output)	Adjustment Factor (output)	Average Outflow cfs (output)	Outflow Volume cubic feet (output)	Storage Volume cubic feet (output)
5.00	8.72	9,893	1.00	4.59	1,377	8,516
10.00	6.95	15,763	1.00	4.59	2,754	13,009
15.00	5.83	19,823	0.97	4.44	3,993	15,830
20.00	5.05	22,886	0.85	3.90	4,682	18,204
25.00	4.47	25,327	0.78	3.58	5,370	19,957
30.00	4.02	27,350	0.73	3.37	6,059	21,291
35.00	3.66	29,073	0.70	3.21	6,747	22,326
40.00	3.37	30,573	0.68	3.10	7,436	23,137
45.00	3.13	31,900	0.66	3.01	8,124	23,775
50.00	2.92	33,090	0.64	2.94	8,813	24,277
55.00	2.74	34,158	0.63	2.88	9,501	24,667
60.00	2.58	35,155	0.62	2.83	10,190	24,965
65.00	2.45	36,064	0.61	2.79	10,878	25,186
70.00	2.32	36,908	0.60	2.75	11,567	25,341
75.00	2.22	37,695	0.59	2.72	12,255	25,440
80.00	2.12	38,433	0.59	2.70	12,944	25,489
85.00	2.03	39,127	0.58	2.67	13,632	25,495
90.00	1.95	39,784	0.58	2.65	14,321	25,463
95.00	1.88	40,406	0.57	2.63	15,009	25,397
100.00	1.81	40,998	0.57	2.62	15,698	25,300
105.00	1.75	41,562	0.57	2.60	16,386	25,176
110.00	1.69	42,102	0.56	2.59	17,075	25,027
115.00	1.63	42,619	0.56	2.57	17,763	24,855
120.00	1.58	43,115	0.56	2.56	18,452	24,663
125.00	1.54	43,592	0.56	2.55	19,140	24,452
130.00	1.49	44,052	0.55	2.54	19,829	24,223
135.00	1.45	44,495	0.55	2.53	20,517	23,978
140.00	1.41	44,924	0.55	2.52	21,206	23,718
145.00	1.38	45,339	0.55	2.52	21,894	23,444
150.00	1.34	45,740	0.55	2.51	22,583	23,157
155.00	1.31	46,130	0.55	2.50	23,271	22,858
160.00	1.28	46,508	0.54	2.50	23,960	22,548
165.00	1.25	46,875	0.54	2.49	24,648	22,227
170.00	1.23	47,233	0.54	2.48	25,337	21,896
175.00	1.20	47,581	0.54	2.48	26,025	21,556
180.00	1.17	47,920	0.54	2.47	26,714	21,206
185.00	1.15	48,251	0.54	2.47	27,402	20,849

Stormwater Detention Volume (Cubic Feet) = 25,495
Stormwater Detention Volume (Acre Feet) = 0.5853

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

DP6

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	80	percent
Catchment Drainage Area	A =	20.70	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	20	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches

Design Rainfall IDF Formula I = C1* P1/(C2+Tc)^C3

Coefficient One	C1 =	28.50
Coefficient Two	C2 =	10.00
Coefficient Three	C3 =	0.79

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70	
Inflow Peak Runoff	Qp-in =	73.11	cfs
Allowable Peak Outflow Rate	Qp-out =	17.60	cfs
Ratio of Qp-out/Qp-in	Ratio =	0.24	

Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall duration must be entered in ascending order.

Rainfall Duration minutes (input)	Rainfall Intensity inches/hr (output)	Inflow Volume cubic feet (output)	Adjustment Factor (output)	Average Outflow cfs (output)	Outflow Volume cubic feet (output)	Storage Volume cubic feet (output)
5.00	8.72	37,922	1.00	17.60	5,279	32,644
10.00	6.95	60,426	1.00	17.60	10,557	49,869
15.00	5.83	75,990	1.00	17.60	15,836	60,155
20.00	5.05	87,729	1.00	17.60	21,114	66,615
25.00	4.47	97,088	0.90	15.84	23,753	73,334
30.00	4.02	104,841	0.83	14.66	26,393	78,449
35.00	3.66	111,447	0.79	13.82	29,032	82,415
40.00	3.37	117,196	0.75	13.20	31,671	85,525
45.00	3.13	122,282	0.72	12.71	34,310	87,972
50.00	2.92	126,844	0.70	12.32	36,950	89,894
55.00	2.74	130,978	0.68	12.00	39,589	91,389
60.00	2.58	134,760	0.67	11.73	42,228	92,532
65.00	2.45	138,246	0.65	11.50	44,867	93,379
70.00	2.32	141,480	0.64	11.31	47,507	93,973
75.00	2.22	144,497	0.63	11.14	50,146	94,351
80.00	2.12	147,325	0.63	11.00	52,785	94,540
85.00	2.03	149,988	0.62	10.87	55,424	94,563
90.00	1.95	152,504	0.61	10.75	58,064	94,440
95.00	1.88	154,889	0.61	10.65	60,703	94,187
100.00	1.81	157,158	0.60	10.56	63,342	93,816
105.00	1.75	159,322	0.60	10.47	65,981	93,341
110.00	1.69	161,390	0.59	10.40	68,621	92,770
115.00	1.63	163,372	0.59	10.33	71,260	92,112
120.00	1.58	165,274	0.58	10.26	73,899	91,375
125.00	1.54	167,103	0.58	10.21	76,538	90,565
130.00	1.49	168,865	0.58	10.15	79,178	89,688
135.00	1.45	170,565	0.57	10.10	81,817	88,749
140.00	1.41	172,208	0.57	10.05	84,456	87,752
145.00	1.38	173,798	0.57	10.01	87,095	86,702
150.00	1.34	175,337	0.57	9.97	89,735	85,603
155.00	1.31	176,831	0.56	9.93	92,374	84,457
160.00	1.28	178,280	0.56	9.90	95,013	83,267
165.00	1.25	179,689	0.56	9.86	97,652	82,037
170.00	1.23	181,060	0.56	9.83	100,292	80,768
175.00	1.20	182,394	0.56	9.80	102,931	79,463
180.00	1.17	183,694	0.56	9.78	105,570	78,124
185.00	1.15	184,962	0.55	9.75	108,209	76,753

Stormwater Detention Volume (Cubic Feet) = 94,563
Stormwater Detention Volume (Acre Feet) = 2.1709

DP 7

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	80	percent
Catchment Drainage Area	A =	9.90	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	14	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches

Design Rainfall IDF Formula I = C1* P1/(C2+Tc)^C3

Coefficient One	C1 =	28.50
Coefficient Two	C2 =	10.00
Coefficient Three	C3 =	0.79

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70	
Inflow Peak Runoff	Qp-in =	41.70	cfs
Allowable Peak Outflow Rate	Qp-out =	8.42	cfs
Ratio of Qp-out/Qp-in	Ratio =	0.20	

Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall duration must be entered in ascending order.

Rainfall Duration minutes	Rainfall Intensity inches/hr	Inflow Volume cubic feet	Adjustment Factor	Average Outflow cfs	Outflow Volume cubic feet	Storage Volume cubic feet
5.00	8.72	16,137	1.00	8.42	2,525	15,612
10.00	6.95	28,899	1.00	8.42	5,049	23,850
15.00	5.83	36,343	0.97	8.13	7,321	29,022
20.00	5.05	41,957	0.85	7.15	8,583	33,374
25.00	4.47	46,433	0.78	6.56	9,846	36,588
30.00	4.02	50,141	0.73	6.17	11,108	39,034
35.00	3.66	53,301	0.70	5.89	12,370	40,931
40.00	3.37	56,050	0.68	5.68	13,632	42,418
45.00	3.13	58,483	0.66	5.52	14,895	43,588
50.00	2.92	60,664	0.64	5.39	16,157	44,508
55.00	2.74	62,642	0.63	5.28	17,419	45,223
60.00	2.58	64,451	0.62	5.19	18,681	45,769
65.00	2.45	66,118	0.61	5.11	19,944	46,174
70.00	2.32	67,664	0.60	5.05	21,206	46,459
75.00	2.22	69,107	0.59	4.99	22,468	46,639
80.00	2.12	70,460	0.59	4.94	23,730	46,729
85.00	2.03	71,733	0.58	4.90	24,993	46,741
90.00	1.95	72,937	0.58	4.86	26,255	46,682
95.00	1.88	74,078	0.57	4.83	27,517	46,561
100.00	1.81	75,163	0.57	4.80	28,779	46,383
105.00	1.75	76,197	0.57	4.77	30,042	46,156
110.00	1.69	77,187	0.56	4.74	31,304	45,883
115.00	1.63	78,134	0.56	4.72	32,566	45,568
120.00	1.58	79,044	0.56	4.70	33,828	45,216
125.00	1.54	79,919	0.56	4.68	35,091	44,828
130.00	1.49	80,762	0.55	4.66	36,353	44,409
135.00	1.45	81,575	0.55	4.64	37,615	43,960
140.00	1.41	82,360	0.55	4.63	38,877	43,483
145.00	1.38	83,121	0.55	4.61	40,140	42,981
150.00	1.34	83,857	0.55	4.60	41,402	42,455
155.00	1.31	84,571	0.55	4.59	42,664	41,907
160.00	1.28	85,264	0.54	4.58	43,926	41,338
165.00	1.25	85,938	0.54	4.56	45,189	40,750
170.00	1.23	86,594	0.54	4.55	46,451	40,143
175.00	1.20	87,232	0.54	4.54	47,713	39,519
180.00	1.17	87,854	0.54	4.53	48,975	38,878
185.00	1.15	88,460	0.54	4.53	50,238	38,222

Stormwater Detention Volume (Cubic Feet) = 46,741
Stormwater Detention Volume (Acre Feet) = 1.0730

DP 10

DETENTION VOLUME BY MODIFIED FAA METHOD

(See USDCM Volume I Runoff Chapter for description of method)

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing methods)
(Note: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

Design Information (Input):

Catchment Drainage Imperviousness	I_a =	60	percent
Catchment Drainage Area	A =	49.30	acres
Predevelopment NRCS Soil Group	Type =	B	A, B, C, or D
Return Period for Detention Control	T =	100	years (2, 5, 10, 25, 50, or 100)
Time of Concentration of Watershed	Tc =	23	minutes
Allowable Unit Release Rate (See Table A)	q =	0.85	cfs/acre
One-hour Precipitation	P1 =	2.60	inches
Design Rainfall IDF Formula I = C1* P1/(C2+Tc)^C3			
Coefficient One	C1 =	28.50	
Coefficient Two	C2 =	10.00	
Coefficient Three	C3 =	0.79	

Determination of Average Outflow from the Basin (Calculated):

Runoff Coefficient	C =	0.70
Inflow Peak Runoff	Qp-in =	161.49 cfs
Allowable Peak Outflow Rate	Qp-out =	41.91 cfs
Ratio of Qp-out/Qp-in	Ratio =	0.26

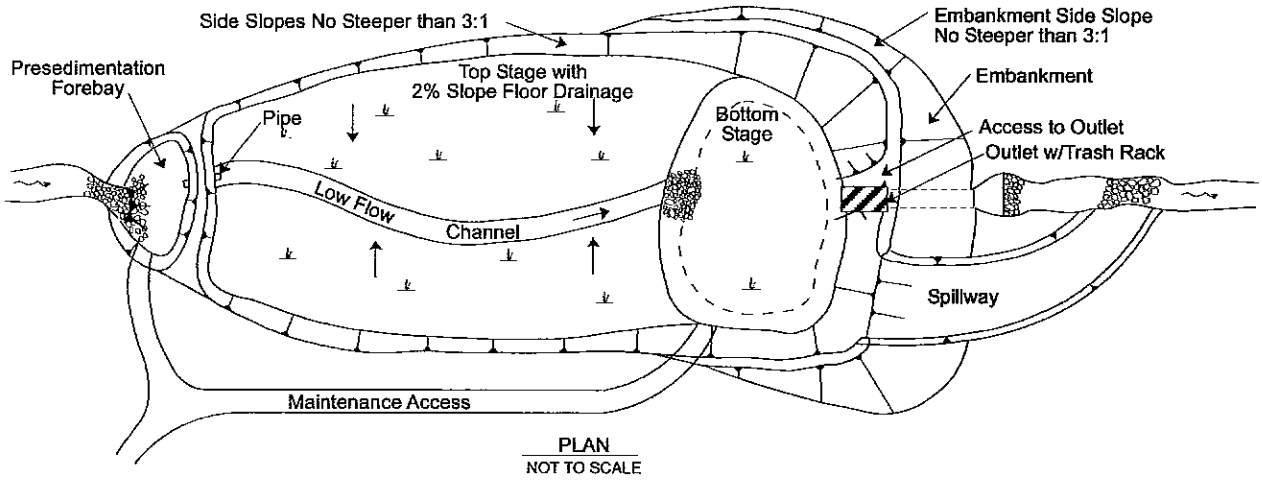
Table A Recommended Unit Flow Release Rate in cfs/acre of tributary catchment within UDFCD boundaries.

Design Frequency	NRCS (SCS) Hydrologic Soil Group		
	A	B	C & D
2-year	0.02	0.03	0.04
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
50-year	0.33	0.56	0.68
100-year	0.50	0.85	1.00

Determination of Detention Volume Using Modified FAA Method

Rainfall Duration minutes	Rainfall Intensity inches/hr	Inflow Volume cubic feet	Adjustment Factor	Average Outflow cfs	Outflow Volume cubic feet	Storage Volume cubic feet
5.00	8.72	90,318	1.00	41.91	12,572	77,746
10.00	6.95	143,913	1.00	41.91	25,143	118,770
15.00	5.83	180,981	1.00	41.91	37,715	143,267
20.00	5.05	208,939	1.00	41.91	50,286	158,653
25.00	4.47	231,228	0.96	40.23	60,343	170,885
30.00	4.02	249,694	0.88	37.02	66,629	183,065
35.00	3.66	265,427	0.83	34.72	72,915	192,512
40.00	3.37	279,118	0.79	33.00	79,200	199,918
45.00	3.13	291,233	0.76	31.66	85,486	205,747
50.00	2.92	302,096	0.73	30.59	91,772	210,324
55.00	2.74	311,943	0.71	29.71	98,058	213,886
60.00	2.58	320,951	0.69	28.98	104,343	216,607
65.00	2.45	329,253	0.68	28.37	110,629	218,624
70.00	2.32	336,955	0.66	27.84	116,915	220,040
75.00	2.22	344,140	0.65	27.38	123,201	220,939
80.00	2.12	350,875	0.64	26.98	129,486	221,389
85.00	2.03	357,217	0.64	26.62	135,772	221,444
90.00	1.95	363,209	0.63	26.31	142,058	221,151
95.00	1.88	368,891	0.62	26.03	148,344	220,548
100.00	1.81	374,295	0.62	25.77	154,629	219,666
105.00	1.75	379,448	0.61	25.54	160,915	218,533
110.00	1.69	384,374	0.60	25.33	167,201	217,173
115.00	1.63	389,093	0.60	25.14	173,487	215,606
120.00	1.58	393,623	0.60	24.97	179,772	213,850
125.00	1.54	397,980	0.59	24.81	186,058	211,921
130.00	1.49	402,176	0.59	24.66	192,344	209,832
135.00	1.45	406,226	0.59	24.52	198,630	207,596
140.00	1.41	410,138	0.58	24.39	204,915	205,223
145.00	1.38	413,924	0.58	24.28	211,201	202,723
150.00	1.34	417,591	0.58	24.17	217,487	200,104
155.00	1.31	421,147	0.57	24.06	223,773	197,374
160.00	1.28	424,600	0.57	23.96	230,058	194,541
165.00	1.25	427,955	0.57	23.87	236,344	191,611
170.00	1.23	431,219	0.57	23.78	242,630	188,589
175.00	1.20	434,397	0.57	23.71	248,916	185,481
180.00	1.17	437,493	0.56	23.63	255,201	182,292
185.00	1.15	440,513	0.56	23.56	261,487	179,026

Stormwater Detention Volume (Cubic Feet) = 221,444
Stormwater Detention Volume (Acre Feet) = 5.0837



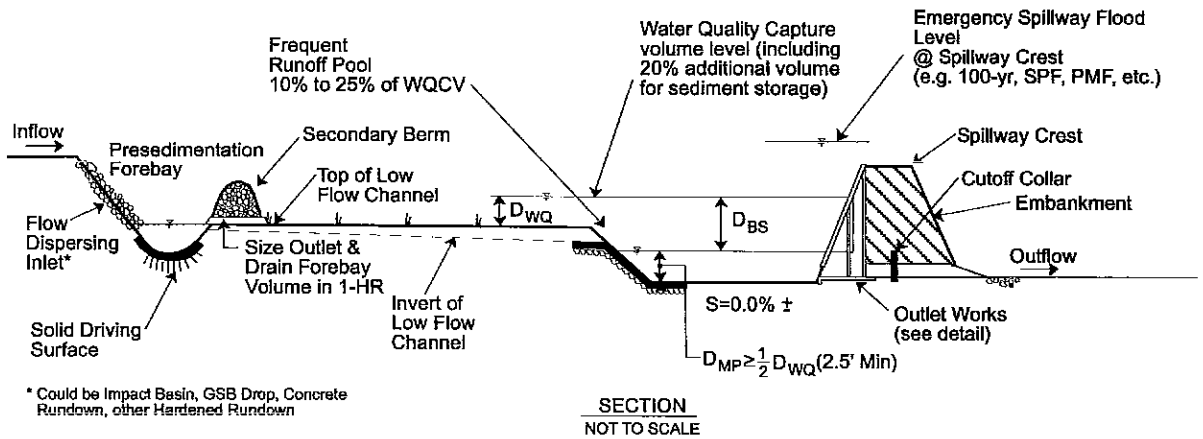


FIGURE EDB-1
Plan and Section of an Extended Detention Basin Sedimentation Facility

FIRM/FEMA Flood Zone Considerations

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

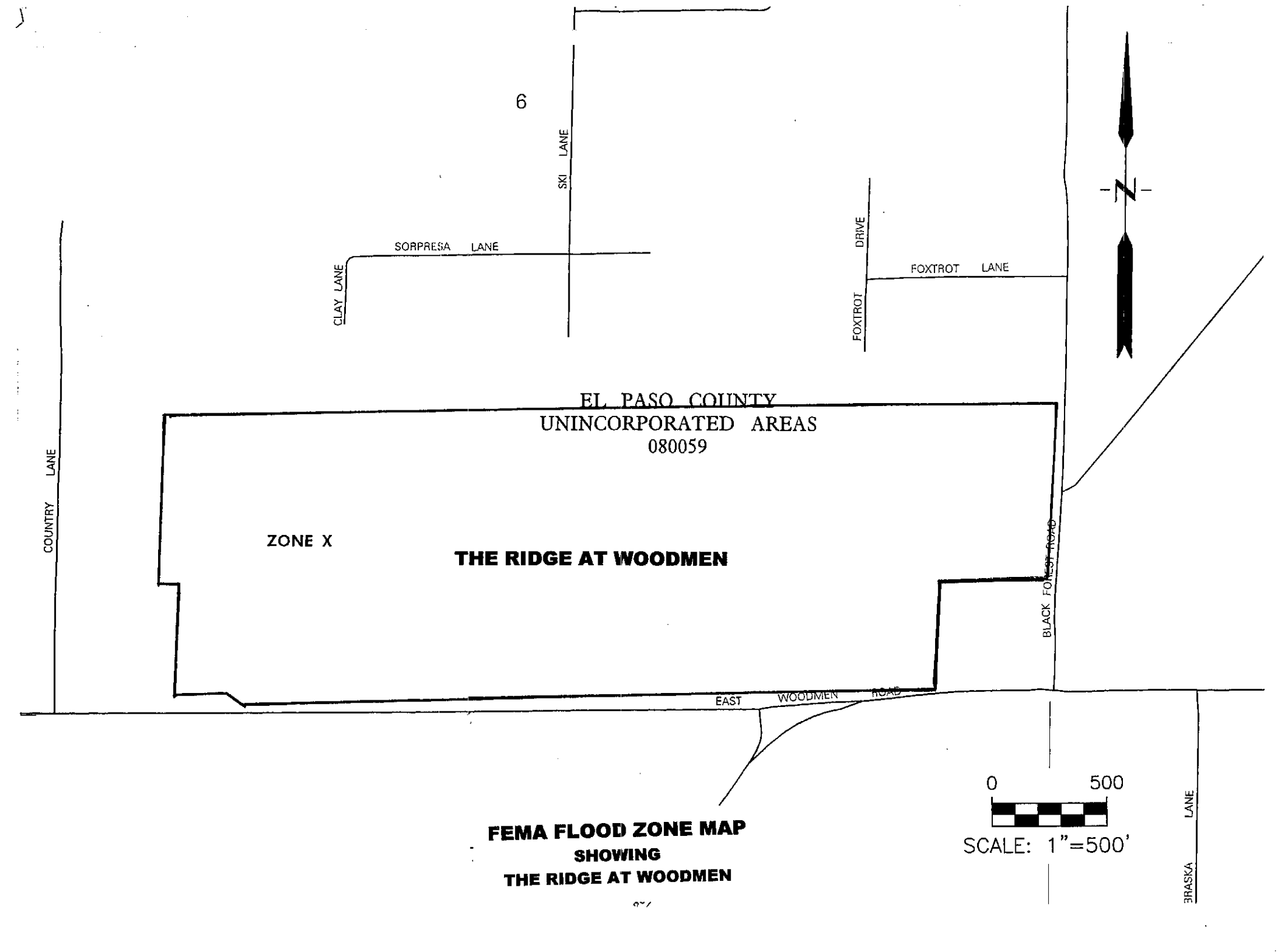
PANEL 529 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0529	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0529	F

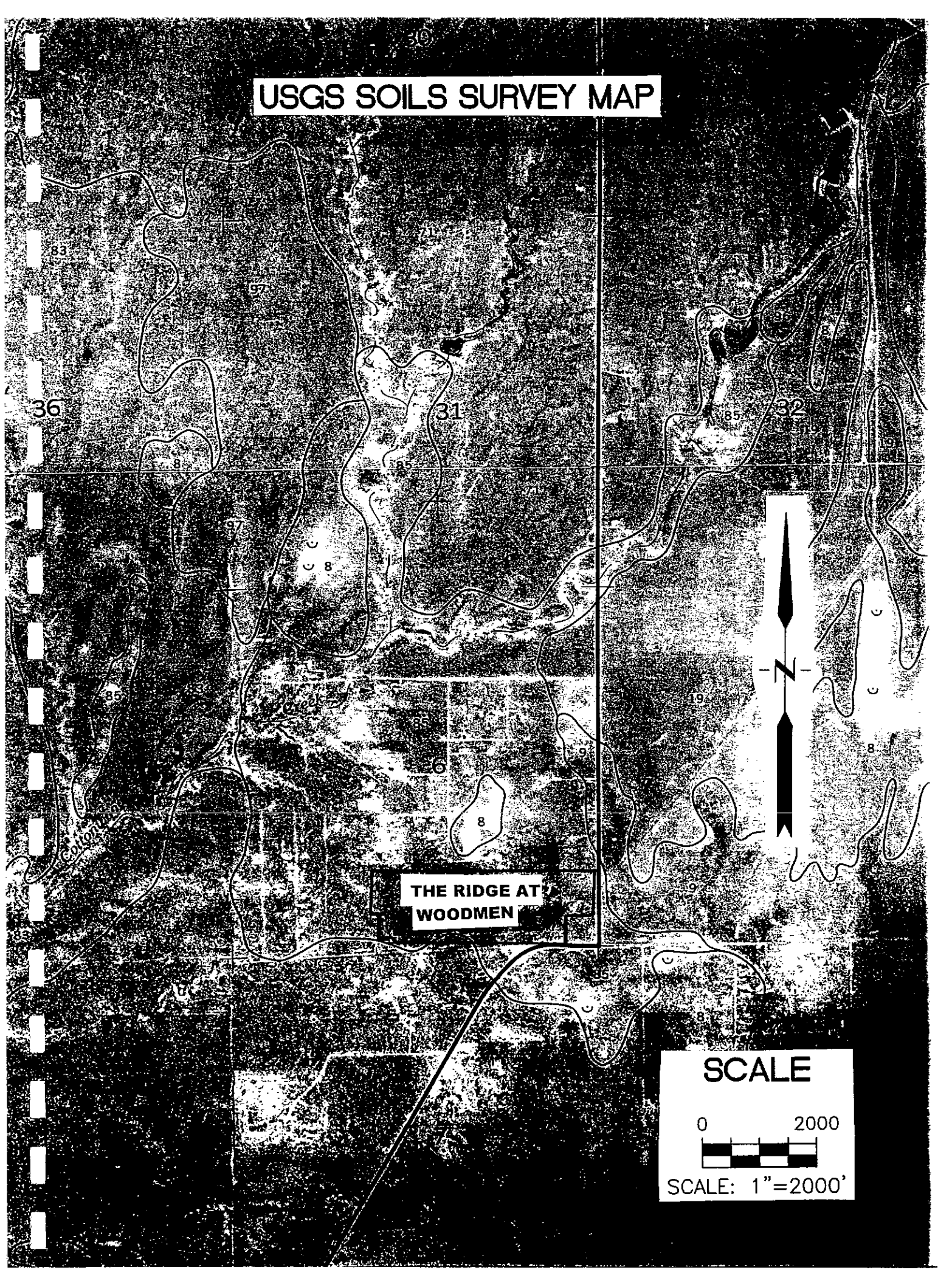
MAP NUMBER
08041C0529 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency



FEMA FLOOD ZONE MAP
SHOWING
THE RIDGE AT WOODMEN


USGS SOILS SURVEY MAP
36
31
32
6
N
THE RIDGE AT WOODMEN
SCALE
0
2000
SCALE: 1"=2000'

DRAINAGE PLAN