PHASE III DRAINAGE REPORT
FOR
CHERRYWOOD PARK FILING NO. 2--1ST AMENDMENT

Adams County, Colorado

JN: 1850

November 18, 2000
Revised December 26, 2000

Prepared for

Cherrywood Development Group, LLC
1380 Seventeenth Street
Denver, CO 80202
(Fax) 303-573-6916
303-573-0066

Prepared by

Ann K. Woods, P.E.

Carroll & Lange, Inc.
165 South Union Blvd., Suite 156
Lakewood, Colorado 80228
(Fax) 303-980-0917
303-980-0200

I hereby certify that this report for the Phase III drainage design of Cherrywood Park Filing No. 2--1st Amendment Subdivision was prepared by me (or under my direct supervision) in accordance with the provisions of the *City of Thornton Storm Drainage Design and Technical Criteria* for the Responsible Parties thereof. I understand that the City of Thornton does not and shall not assume liability for drainage facilities designed by others.

Ann K. Woods
Registered Professional Engineer
State of Colorado No. 28127

COLORADO REGISTERED ANN K. WOODS 28127 PROFESSIONAL ENGINEER

1-24-01

Cherrywood Development Group, L.L.C. hereby certifies that the drainage facilities for Cherrywood Park Filing No. 2--1st Amendment shall be constructed according to the design presented in this report. I understand that the City of Thornton does not and shall not assume liability for the drainage facilities designed and/or certified by my engineer. I understand that the City of Thornton reviews drainage plans but cannot, on behalf of Cherrywood Park Filing No. 2--1st Amendment, guarantee that final drainage design review shall absolve Cherrywood Development Group, L.L.C. and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Final Plat and/or Final Development Plan does not imply approval of my engineer's drainage design.

Cherrywood Development Group, L.L.C.

Attest: 1/29/01

Notary Public

Authorized Signature

My commission expires 8/19/2003.

CONNIE K. SATERMO
NOTARY PUBLIC
STATE OF COLORADO

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PHASE III DRAINAGE REPORT
FOR
CHERRYWOOD PARK FILING NO. 2--1ST AMENDMENT

Thornton, Colorado

I. GENERAL LOCATION AND DESCRIPTION

Cherrywood Park Filing No. 2 is located in the Southeast Quarter of Section 24, Township 1 South, Range 68 West of the Sixth Principal Meridian, in Thornton, Colorado. The site is bounded on the south by 136th Avenue, on the north by unplatted land, and on the east and west by land that was preliminarily platted with this subdivision as single family residential, commercial, and multi-family. Filing No. 2 will be developed into a single family residential development totaling 81.23 acres.

The onsite soil classification is Type C. Existing site conditions include vegetation consisting primarily of native short grasses and cultivated farmland.

Site drainage is from southeast to northwest at an approximate slope of 3.0% to 3.5%. Signal Creek irrigation ditch enters the site from the western boundary and exits at the northern boundary. Offsite water enters the site from the east and continues through to the northwest site corner. Part of the offsite water comes from the Shadow Ridge development located southeast of the site. Flow from Shadow Ridge comes in the form of discharge from an existing detention pond that is released at pre-development historic rates. The site lies within the drainage basin known as the Lake Erie Basin Tributary One and is tributary to Big Dry Creek.

This report presents onsite drainage basins and historic drainage basin analysis, detention, and storm sewer and conveyance element design. This report also updates the Tract D pond configuration. The pond was reconfigured to accommodate the school building site layout.

II. DRAINAGE BASINS AND SUB-BASINS

As stated previously, the site lies within the Big Dry Creek drainage basin. The basin was analyzed in the outfall system planning study for Big Dry Creek, dated 1987, revised in January 1989, by Muller Engineering. The study's recommended approach for the basin was a detention pond on the north side of Signal Ditch and an improved channel downstream of the pond to the north boundary line of the site. With the development of this site and the adjacent properties on the east and west, many of the assumptions that went into the study's recommendation were revised. This basin was re-analyzed by MMC Engineers in a report dated November 8, 1999. This new analysis looked at the revised basin contribution, a new detention pond location (upstream of Signal Ditch on the proposed school site), and the conveyance system downstream of the proposed pond changing to a storm sewer instead of an open channel. Another objective of the revised report was to look at the entire basin upstream of the railroad tracks that run north and south through the property just north of this project. This analysis was conducted to assess the impact of the overall Cherrywood Park development as presented in the planned unit development and the future development of the site north of Cherrywood Park known as Stonehocker Farms. These sites drain to a single culvert under the railroad tracks. The outfall systems planning study calls for maintaining a discharge of approximately 200 cfs through the culvert. This limitation is set to aid downstream drainage facilities that were not designed to convey future development flow. The revised outfall system planning study analyzes the impact of the overall basin and the detention requirements along the railroad track. For further information refer to the revised report.

The site lies within two historic basins that are designated as H1 and H2. Basin H1 drains to the northwest corner of the site and basin H2 sheet flows to the west.

The historic 100-year discharge of Basin H1 was found to be approximately 206.7 cfs and the historic 5-year discharge is 32.5 cfs.

The site is broken into three major developed basins: A, B, and C. Basin A is broken down into 28 sub-basins, includes the majority of the site that is south and/or east of the existing irrigation ditch, and is designed to flow to detention pond 1. Basin B includes the area west of the irrigation ditch, is broken down into nineteen sub-basins, and flows to detention pond 2. Basin C consists of the southeast corner of the site, is

broken into five sub-basins, and flows northeast to offsite facilities and combines with offsite flow that also goes to detention pond 1.

Two offsite basins contribute flow to the site. Both basins are located directly east and southeast of the site and are designated as OS1 and OS2.

The *Colorado Urban Hydrograph Procedure* and *Stormwater Management Modes* computer programs were used to assess the detention pond facilities. The programs were used to assess onsite and offsite flow that will enter the pond.

Discharge information from the Shadow Ridge Subdivision was obtained from the *Shadow Ridge Final Drainage Study* by Costin Engineers, dated August 10, 1983.

Due to concerns of the downstream property owner and to adhere to the FHAD Study limitation of discharge downstream of the railroad, the development will detain developed flows to 0.5 cfs per acre.

The assumption that went into the development of the model was that the entire upstream drainage basin, including undeveloped offsite area to the east will be required to release developed flows at 0.5 cfs per acre. Shadow Ridge will not change their current pond and their flows will be passed through downstream facilities.

Pond 1 will detain flow from the areas south of the signal ditch in Cherrywood Filing No. 2 and from the single family area in Cherrywood Park Filing No. 1. Pond 2 will detain flows from the north side of the signal ditch.

An additional concern of the downstream property owner was the nuisance flow that comes with development. To help mitigate these flows an additional outlet was placed in the pond to take minor flow westward to Cherrywood Filing No. 5 which discharges along the railroad tract.

The discharge calculations were based on 185-acre basin area, 21.6 acres basin at Shadow Ridge, for a total basin area of 163.4 acres. At 0.5 cfs per acre, the total discharge will be 81.7 cfs. Add back in 19 cfs for Shadow Ridge and subtract off the minor flows to Filing 5 (10.5 cfs), the discharge is 90.2 cfs.

This site was designed such that surface flow was assumed not to enter Signal Creek irrigation ditch. The ditch will go into a box culvert at two locations: under 140th Avenue on the north edge of the property and under Adams Street near the west edge of the property. The appendix contains the hydraulic calculations for the ditch.

III. DRAINAGE DESIGN CRITERIA

The City of Thornton Intensity-Duration-Frequency Curves were used for the Rational Method analysis onsite. The Rational Method was used to estimate storm water runoff amounts within the basins and to identify areas that require inlets and piping. This procedure equates the design flow to the total area, amount of rainfall on the area, and a multiplier that is determined by the physical characteristics of the area under study.

The design storm frequency will be the 5-year storm for minor storms. The major storm frequency will be the 100-year storm.

The Modified Rational Formula was used to compute storm runoff values for sizing storm sewer.

$$Q = CIA$$

Where
- Q = Storm runoff in cubic feet per second (cfs)
- A = Drainage area in acres
- I = Runoff intensity in inches per hour
- C = Runoff Coefficient

The runoff intensity is based on the time of concentration (storm duration) and was obtained from Figure I, "Time-Intensity-Frequency Curves." The times of concentration are composed of generally two components. The first component consists of overland flow across the site for runoff to reach the street or to form a channel. The second component consists of the flow time within the street or channel. Refer to Appendix A for runoff computations.

Storm sewer and inlets will be designed to intercept the minor storm. Inlets will be placed at low points and at locations where street capacity exceeds the allowable 5-year capacity.

Detention is required and two ponds are to be constructed, pond 1 north of the irrigation ditch and pond 2 at the northwest corner. The CUHP/SWMM computer model was used to size the ponds.

The figures provided in Section 400 of the *City of Thornton Standards and Specifications* were used to determine street and pipe capacity.

IV. DRAINAGE FACILITY DESIGN

The site was divided into three major basins and seven sub-basins that flow offsite.

Basin A

Basin A is the largest basin and was divided into 28 sub-basins. This basin flows to detention pond 1 by way of storm sewer for the 5-year return period and street flow for the 100-year. This basin has three storm sewer systems. The largest system conveys flow from sub-basins A-2 through A-15 and A-17 through A-19. It is a 5-year conveyance system until it reaches the low point in East 138th Place where inlets will collect the 100-year flow and a storm sewer will convey it to detention pond 1.

Sub-basin A-16 flows to an inlet at the end of the cul-de-sac where the storm will convey the 100-year flow to the detention pond.

Sub-basins A-20 through A-28 and B-11.2 flow to a storm sewer system on Madison Street. This system conveys the 5-year flow directly to detention pond 1. The 100-year flow is conveyed by streets to the low point in Madison Street where it is then transported to detention pond 1.

Basin B

Basin B flows to the northwest corner of the site. The 5-year flow is conveyed by street and storm sewer to the low point at the intersection of Adams Street and East 140th Avenue. The flow then combines with detention pond 1 outlet flow and is conveyed northwesterly by storm sewer to detention pond 2. The 100-year flow from Basin B is conveyed by street to the above-mentioned low point, combined with detention pond 1 flow, and is conveyed by storm sewer to pond 2.

Basin C

Basin C lies at the southeast portion of the site. This basin flows northeasterly along Garfield Street. The flow leaves the site and will combine with offsite flow. The offsite flow will enter detention pond 1 through a pipe that connects to the storm sewer for basin A-16.

Onsite Basins Flowing Offsite

There are seven sub-basins that flow from the site as either sheet flow from split draining lots or as street flow. Basins U-1 through U-4 and U-7 leave the site as street flow. U-5 and U-6 flow westerly in streets that will be conveyed by future development.

Appendix A contains the Rational Method calculations, street and inlet charts, and the StormCad hydraulic computer model runs.

Detention Pond Analysis

Sizing of the detention pond and the outlet/inlet structures was analyzed using CUHPE/SWMM. The pond was sized assuming that most of the basins to the east will be providing onsite detention of their own. The offsite commercial area east of Colorado Boulevard, the commercial area at the northwest corner of Colorado Boulevard, Shadow Ridge (existing detention), and the multi-family area just east of this site will be required to provide detention on site. The single family area to the east of this site will use the detention pond 1 on this site.

The pond was designed to release at a rate that will provide a discharge rate at the northwest corner of this site of 90.2 cfs. The release rate (100-year) from pond 1 is 66 cfs. The required release rate is based on 0.5 cfs per acre. The 5-year release rate is required to be 0.2 cfs per acre which computes to 37 cfs.

This report contains the reconfigured pond 1 analysis. Though the pond is a different configuration, the volume and outflow are still in compliance with the required outflow and volumes of the original report.

Appendix C contains the hydrologic and hydraulic calculations for this CUHP and SWMM run.

V. CONCLUSION

This drainage report was prepared in compliance with the City of Thornton and the UD&FCD criteria. The drainage design and concept are adequate to control storm runoff generated by the development of this site, along with contributing offsite basins, and adequately convey runoff to the onsite detention facility. Runoff is then discharged from the site at a rate that does not exceed historic conditions.

VI. REFERENCES

Standard Specifications for the Design and Construction of Public Improvements, City of Thornton, 1993.

Urban Storm Drainage Criteria Manual, Denver Regional Council of Governments, March 1969, revised May 1984.

Shadow Ridge Final Drainage Study, Costin Engineers, August 10, 1983.

Outfall Systems Planning Study for Big Dry Creek, Muller Engineering, August 1997, revised January 1998.

APPENDIX A

Hydrologic Calculations

APPENDIX B

Hydraulic Calculations

APPENDIX C

CUHP/SWMM Calculations

APPENDIX D

Signal Ditch Calculations

APPENDIX A

HYDROLOGIC CALCULATIONS

TABLE 3-1 (42)

RECOMMENDED RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY 2	5	10	100
Business:					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	70	.60	.65	.70	.80
Residential:					
Single-Family	*	.40	.45	.50	.60
Multi-Unit (detached)	50	.45	.50	.60	.70
Multi-Unit (attached)	70	.60	.65	.70	.80
1/2 Acre Lot or Larger	*	.30	.35	.40	.60
Apartments	70	.65	.70	.70	.80
Industrial:					
Light Areas	80	.71	.72	.76	.82
Heavy Acres	90	.80	.80	.85	.90
Parks, Cemetaries:	7	.10	.18	.25	.45
Playgrounds:	13	.15	.20	.30	.50
Schools:	50	.45	.50	.60	.70
Railroad Yard Areas	20	.20	.25	.35	.45
Undeveloped Areas:					
Historic Flow Analysis- Greenbelts, Agricultural	2	(See "Lawns")			
Offsite Flow Analysis (when land use not defined)	45	.43	.47	.55	.65
Streets:					
Paved	100	.87	.88	.90	.93
Gravel (Packed)	40	.40	.45	.50	.60
Drive and Walks:	96	.87	.87	.88	.89
Roofs:	90	.80	.85	.90	.90
Lawns, Sandy Soil	0	.00	.01	.05	.20
Lawns, Clayey Soil	0	.05	.15	.25	.50

NOTE: These Rational Formula coefficients may not be valid for large basins.

*See Figure 2-1 for percent impervious.

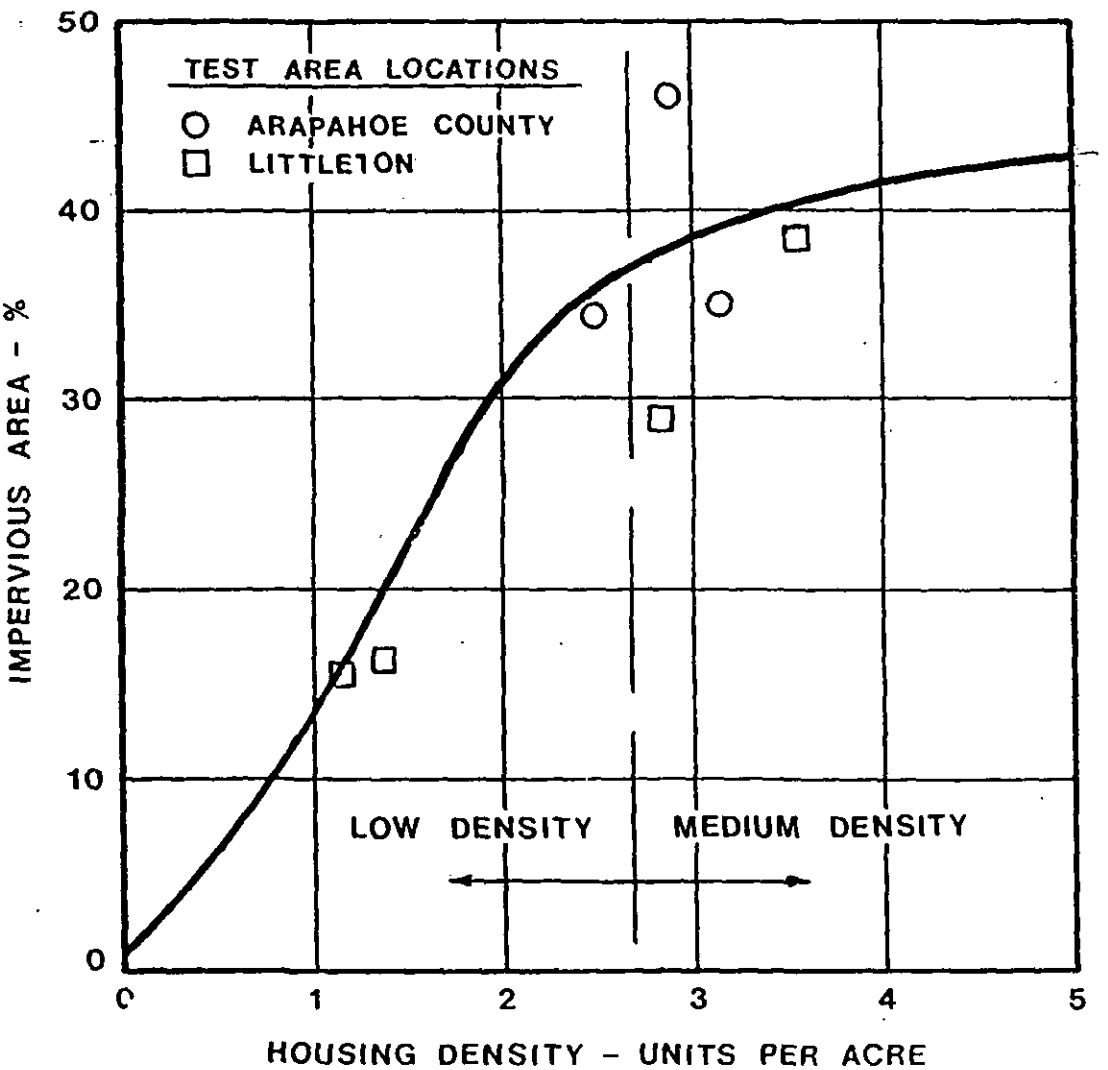
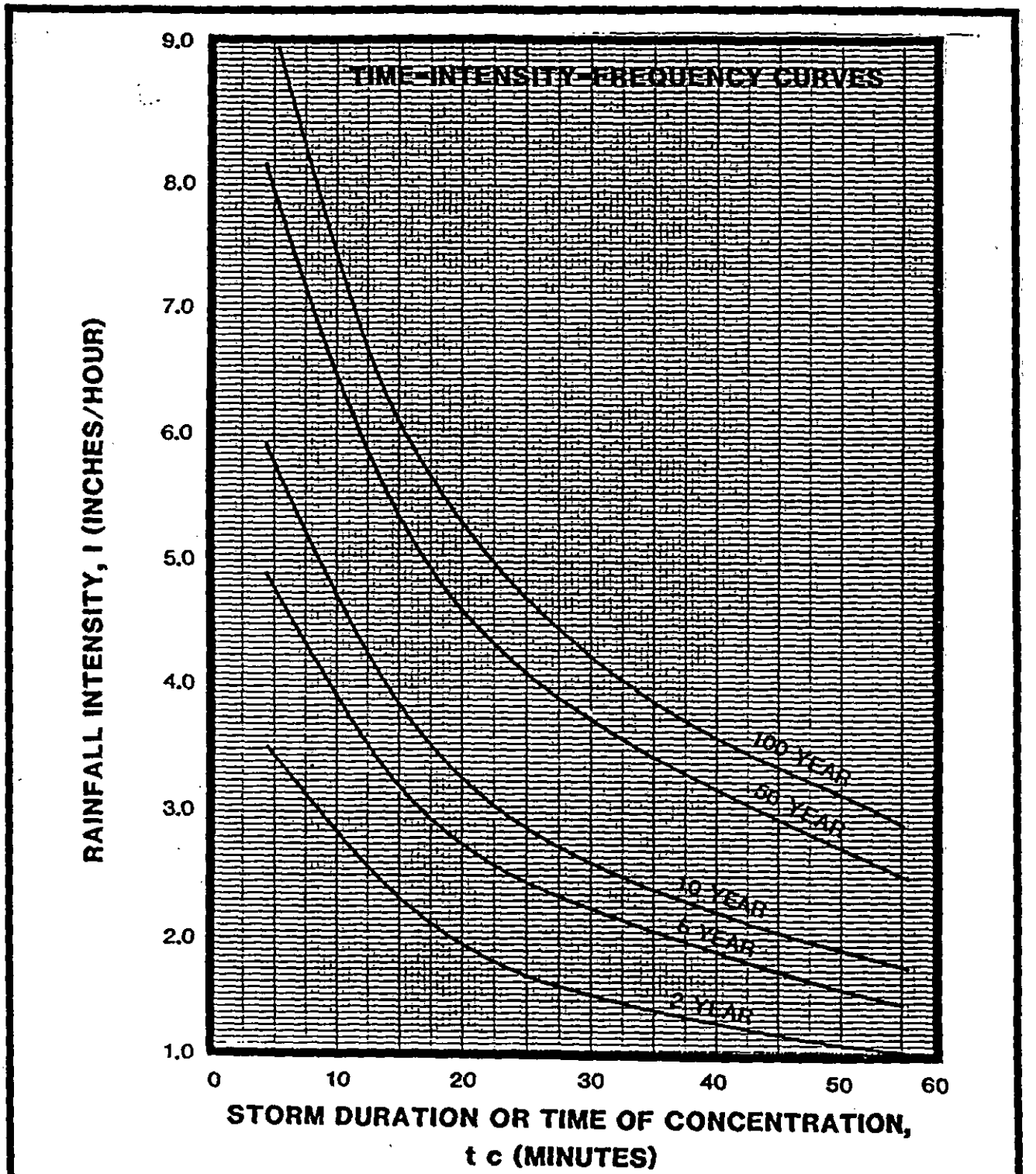


FIGURE 2-1. RESIDENTIAL HOUSING DENSITY
VS.
IMPERVIOUS AREA



N.T.S.

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

TIME–INTENSITY–FREQUENCY CURVES

ISSUED: April 1992

REVISED:
4/95 D.B.

DRAWING NO.
400–6

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

TIME–INTENSITY–FREQUENCY TABULATION

DURATION DURATION FACTORS	5 MIN 0.29		10 MIN 0.45		15 MIN 0.57		30 MIN 0.79		60 MIN 1.00	
FREQUENCY	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)
2 YR	0.29	3.48	0.45	2.70	0.57	2.28	0.79	1.58	1.00	1.00
5 YR	0.41	4.92	0.64	3.84	0.81	3.24	1.12	2.24	1.42	1.42
10 YR	0.49	5.83	0.76	4.56	0.96	3.84	1.33	2.66	1.68	1.68
50 YR	0.68	8.16	1.06	6.36	1.34	5.36	1.86	3.72	2.35	2.35
100 YR	0.79	9.43	1.22	7.32	1.54	6.16	2.14	4.28	2.71	2.71

NOTE:

1. DEPTH AT EACH DURATION = ONE HOUR RAINFALL DEPTH x RESPECTIVE DURATION
2. SEE FIGURE 400–6 FOR GRAPH OF THESE VALUES

ISSUED: April 1992
REVISED: 4/95 D.B.
DRAWING NO. 400–8
N.T.S.

Project 1850
Cherrywood Park Filing No. 2

ReD	Renohill Loam	C
UIC	ULM Loam	C
UFD	ULM Loam	C
PiC	Platner Loam	C
LW	Loamy Alluvial	C


(Joins sheet 2)
R. 68 W.
R. 67 W.
ReD
PIC
PIB
UID
UIC
SIGNAL DITCH
ReD
UID
ReD
PIC
UIC
PIC
PIC
PIB
PIB
PIB
PIC
PIC
UIC
(Joins sheet 7)
2 150 000 FEET
(Joins sheet 34)

SOIL SERIES OF COLORADO (continued)

SERIES	DEPTH (INS)	USDA TEXTURE	K	T	WEG	H
TYRONE	0- 7	SIL SICL CL	.32	5	4L	C
	7-27	SICL CL	.32			
	27-60	SIL SICL CL	.32			
UFFENS	0- 1	SIL L	.49	1	4L	B
	0- 1	FSL SL	.43	1	3	
	1-10	SCL CL SICL	.24			
	10-54	SCL SICL L	.24			
	54-57	SIC	.24			
	57-70	S COSL	.10			
UINTA	0- 2	SL FSL L	.28	5	3	B
	0- 2	GRSL	.10	5	3	
	2-12	GRSL SL	.15			
	12-20	GRSCL SCL GRCL	.15			
	20-43	GRSCL SCL GRCL	.15			
	43-70	GRSCL SCL CBVSL	.10			
ULA	0- 5	GRSL	.15	2	8	C
	0- 5	CBSL	.15	2	8	
	5-17	CBSL SL GRSL	.17			
	17-37	CBSCL GRSCL	.20			
	37-41	WB				
ULM	0- 9	L	.32	5	6	C
	0- 9	CL	.32	5	6	
	9-26	CL C	.37			
	26-60	CL	.37			
ULYSSES	0-10	SICL CL	.32	5	7	B
	0-10	SIL L VFSL	.32	5	6	
	10-30	SIL SICL	.43			
	30-60	SIL L	.43			
UMBARG	0-29	L	.28	5	4L	C
	29-60	CL L	.28			
UMPA	0- 3	STVSL STSL	.24	2	8	B
	3-11	GRSL GRL	.24			
	11-40	GRVSL GRVL	.20			
	40-60	UWB				
UNAWEEP	0-10	FSL SL	.15	5	3	B
	10-60	FSL SL	.20			
UNCOMPAHGRE	0-14	L CL	.24	5	5	B/D
	14-60	SR FSL CL	.24			

SOIL SERIES OF COLORADO (continued)

SERIES	DEPTH (INS)	USDA TEXTURE	K	T	WEG	H
REDRIDGE	0-10	GRSL GRCOSL	.15	3	5	B
	10-26	GRSCL	.17			
	26-60	GRVLS GRVS	.10			
REDROB	0-17	L	.32	5	5	C
	17-35	SR STL LS	.32			
	35-60	GRVS CBVS CBXLS	.10			
REDTHAYNE	0- 8	CNL	.28	5	8	B
	8-18	CNVL CNVCL	.32			
	18-60	CNVL	.32			
REDTOM	0-12	SL COSL	.15	5	3	B
	12-60	LCOS COSL LS	.10			
REGENT	0-10	SICL CL	.32	4	7	C
	0-10	SIC	.32	4	4	
	10-39	SICL SIC	.32			
	39-62	WB				
RELSOB	0-16	SCL	.28	5	3	B
	16-24	SL	.20			
	24-60	GRS	.02			
RENOHILL	0- 4	CL SICL	.37	3	6	C
	0- 4	FSL SL	.28	3	3	
	0- 4	L	.37	3	5	
	4-20	CL C	.32			
	20-30	CL	.37			
	30-34	UWB				
RENTSAC	0- 7	CNL CNSL	.20	1	5	D
	0- 7	CNVL CNVSL	.10	1	5	
	0- 7	FLVL FLVSL	.10	1	7	
	7-18	CNXL CNVSL FLXL	.10			
	18-22	UWB				
RESORT	0- 8	GRVSL	.10	1	8	D
	8-15	GRVLS GRVS	.10			
	15-19	WB				
RICHFIELD	0- 6	FSL	.20	4	3	B
	0- 6	SICL CL	.32	5	7	
	0- 6	SIL L VFSL	.32	5	6	
	6-20	SICL SIC	.43			
	20-60	SICL SIL CL	.43			

SOIL SERIES OF COLORADO (continued)

SERIES	DEPTH (INS)	USDA TEXTURE	K	T	WEG	H
PICEANCE	0-10	VFSL FSL	.20	2	3	C
	0-10	L	.24	2	4L	
	10-22	L SCL CL	.32			
	22-37	CNSL CNL CNSCL	.10			
	37-41	WB				
PIERIAN	0- 8	STVSL STSL	.10	5	8	B
	0- 8	GRSL	.15	5	8	
	8-60	STVLS CBVS CBVLS	.10			
PILTZ	0-14	L	.24	2	6	C
	0-14	GRL	.20	2	8	
	14-36	GRCL GRC	.24			
	36-40	WB				
PINEISLE	0- 5	L	.17	5	5	B
	5-32	L CL SCL	.15			
	32-60	L CL SCL	.15			
PINELLI	0- 3	L	.32	5	6	B
	0- 3	CL	.28	5	6	
	0- 3	SICL	.32	5	7	
	3-21	CL SICL C	.37			
	21-60	CL L SICL	.37			
PINKHAM	0- 4	STFSL STSL	.10	5	-	B
	4-60	STVSL	.10			
PINO	0-10	L	.37	2	6	C
	0-10	SIL	.43	2	6	
	10-16	CL	.32			
	16-40	C SIC CL	.32			
	40-44	UWB				
PLATNER	0-10	FSL SL	.20	5	3	C
	0-10	L	.24	5	4	
	10-18	C CL	.20			
	18-25	L CL	.32			
	25-60	GRSL SL SCL	.28			
PLATORO	0-18	L	.24	3	4L	B
	0-18	CL	.24	3	4L	
	0-18	GRCL	.24	3	4L	
	18-26	GRCL CL	.20			
	26-33	GRVL	.10			
	33-60	GRVLS GRVS GRXS	.05			

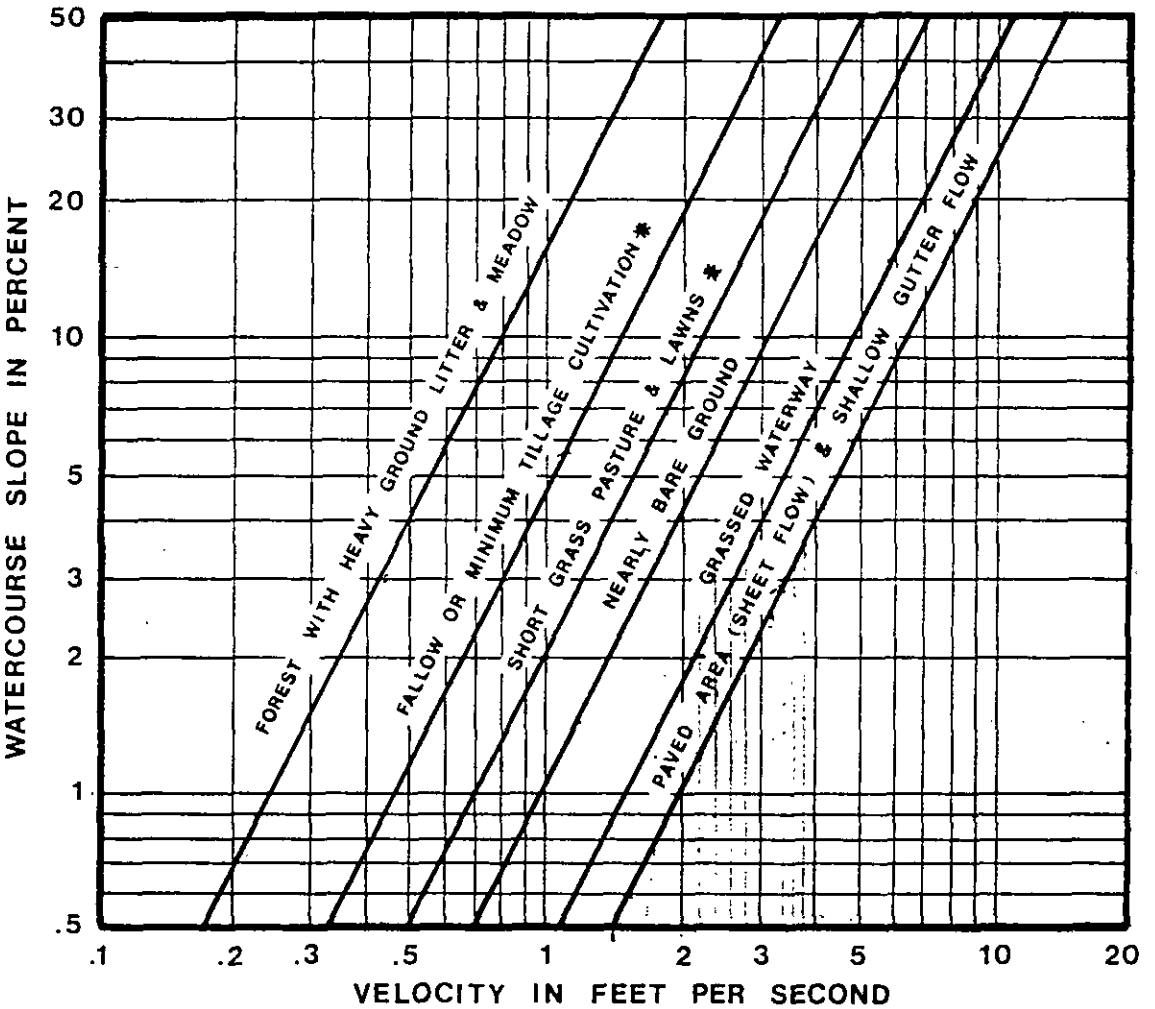


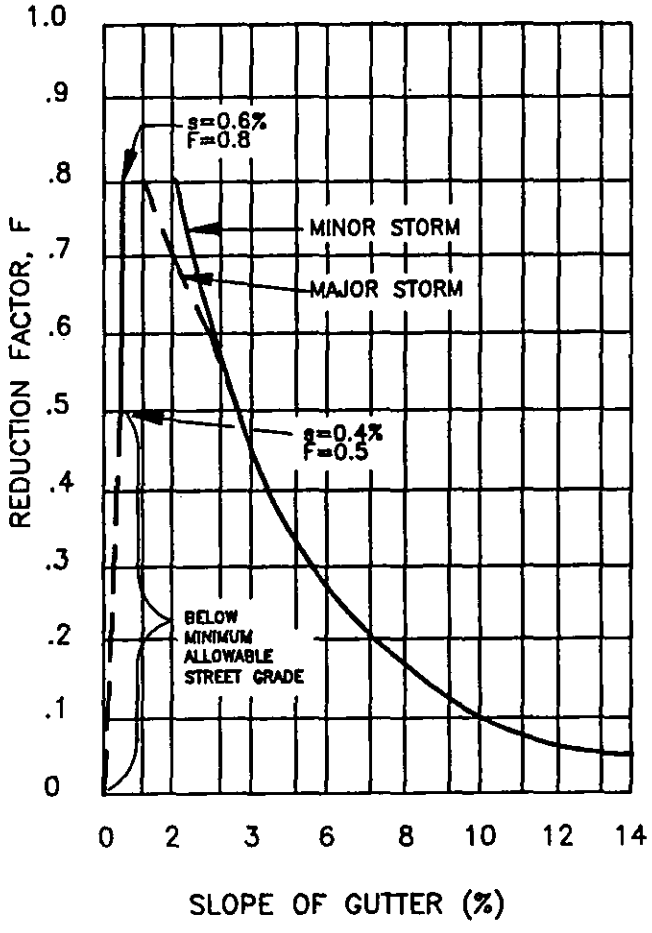
FIGURE 3-2. ESTIMATE OF AVERAGE FLOW VELOCITY FOR USE WITH THE RATIONAL FORMULA.

* MOST FREQUENTLY OCCURRING "UNDEVELOPED" LAND SURFACES IN THE DENVER REGION.

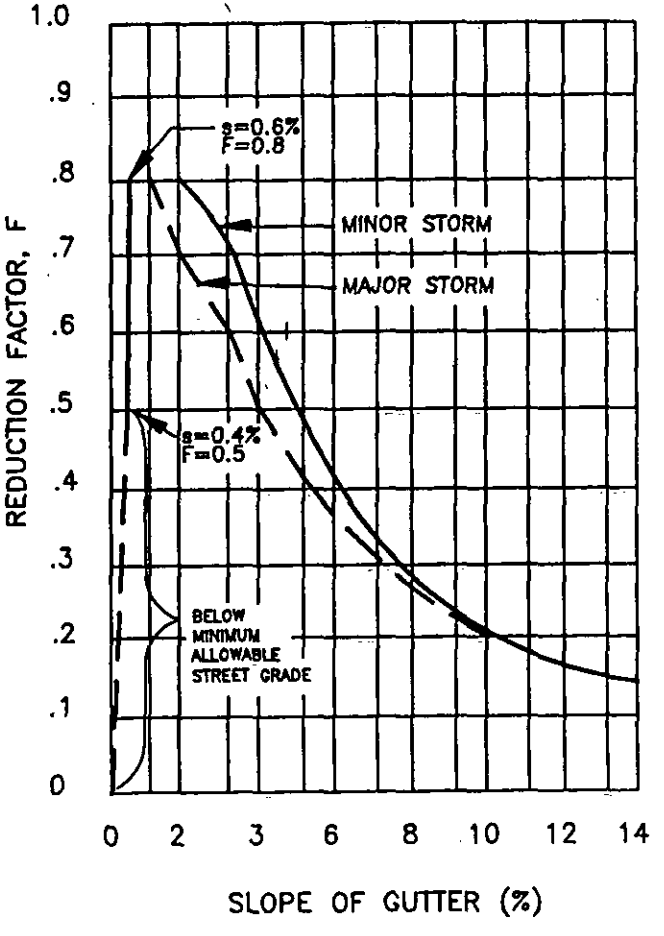
REFERENCE: "Urban Hydrology For Small Watersheds" Technical Release No. 55, USDA. SCS Jan. 1975.

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

GUTTER CAPACITY REDUCTION CURVES



REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY WHEN APPROACHING AN ARTERIAL STREET

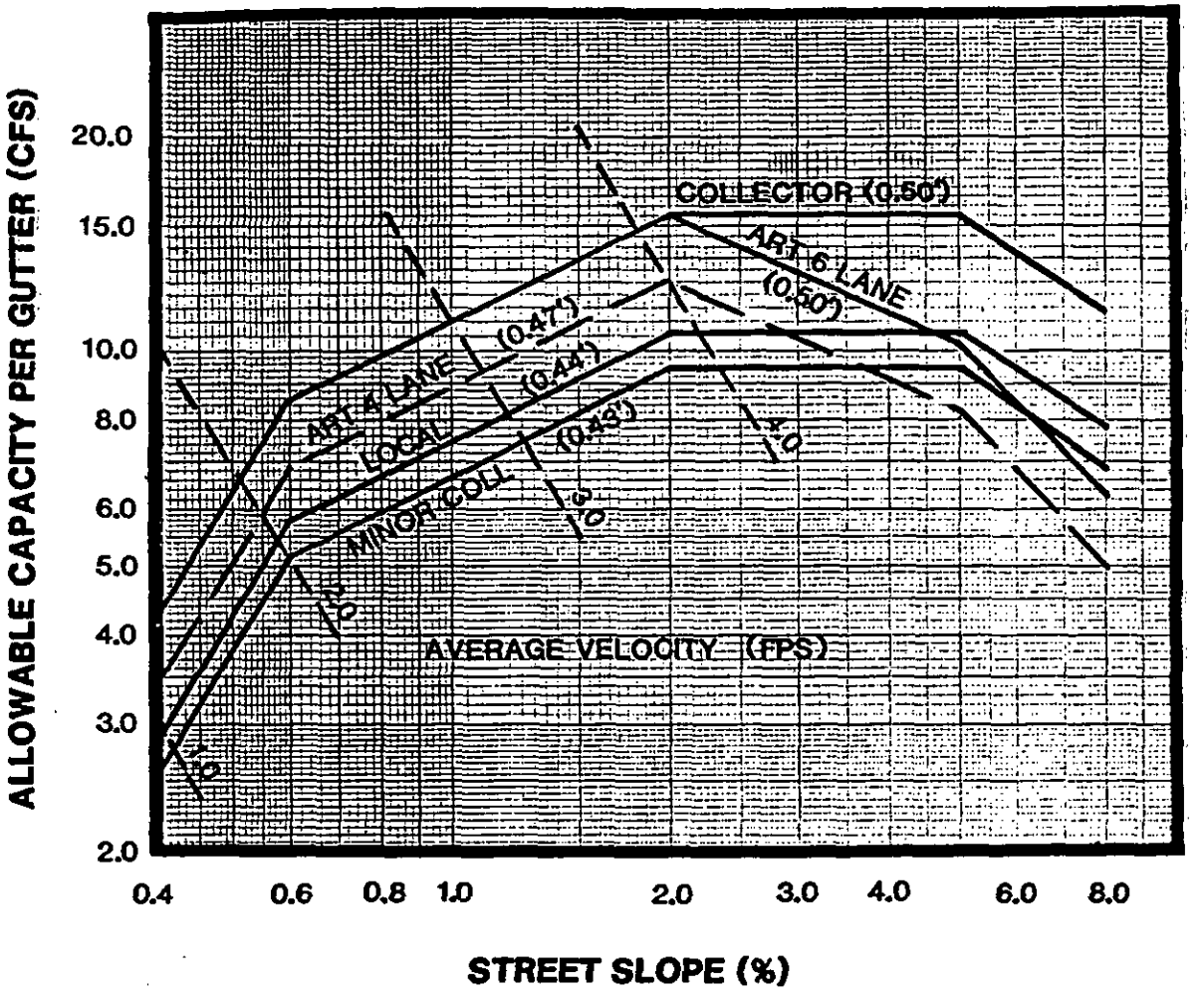


REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY LOCAL AND COLLECTOR STREETS

APPLY REDUCTION FACTOR FOR APPLICABLE SLOPE TO THE THEORETICAL GUTTER CAPACITY TO OBTAIN ALLOWABLE GUTTER CAPACITY APPROACHING ARTERIAL STREET

ISSUED: APRIL 1993
REVISED: 4/95 D.B.
DRAWING NO. 400-22
N.T.S.

MINOR STORM



NOTES: 1. DESIGN CONDITIONS
$Q=F(0.56(z/n)S^{1/2}d^{8/3})$
F=(FROM TABLE 6–2 SEC 8.2 OF US&FCD MANUAL)
n=0.016 FOR STREETS

2. FIGURE INCLUDES REDUCTION FACTOR FOR ALLOWABLE CAPACITY

N.T.S.

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

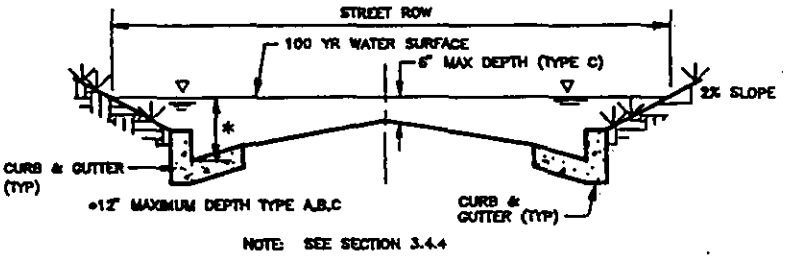
ALLOWABLE GUTTER CAPACITY

ISSUED: April 1992

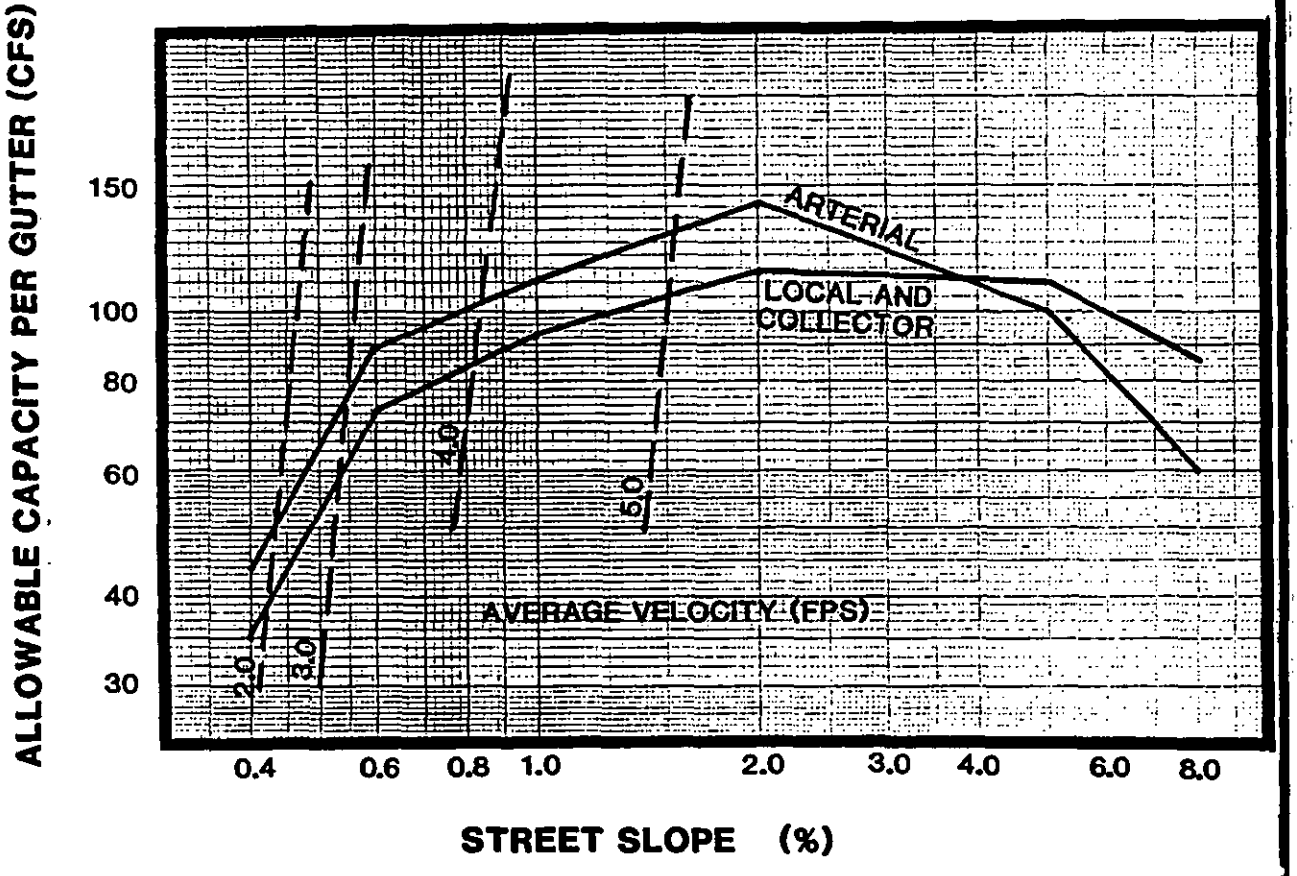
REVISED:
4/95 D.B.

DRAWING NO.
400–23

MAJOR STORM



NOTE: SEE SECTION 3.4.4



NOTES: 1. DESIGN CONDITIONS

$$Q=F\left(0.56\frac{z}{n}S^{1/2}y^{8/3}\right)$$

F=(FROM TABLE 6-2 SEC 8.2 OF US&FCD MANUAL)
n=0.016 FOR STREETS
n=0.025 FOR GRASS

N.T.S.

2. FIGURE INCLUDES REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

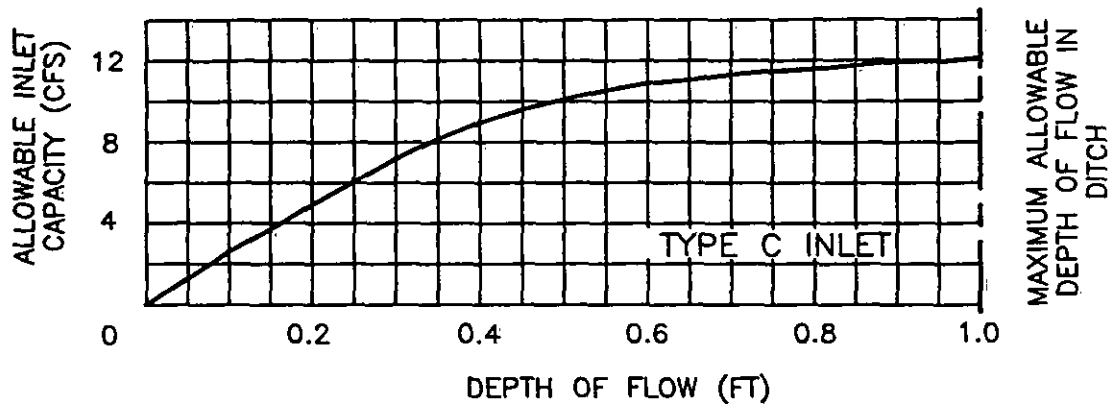
ALLOWABLE GUTTER CAPACITY

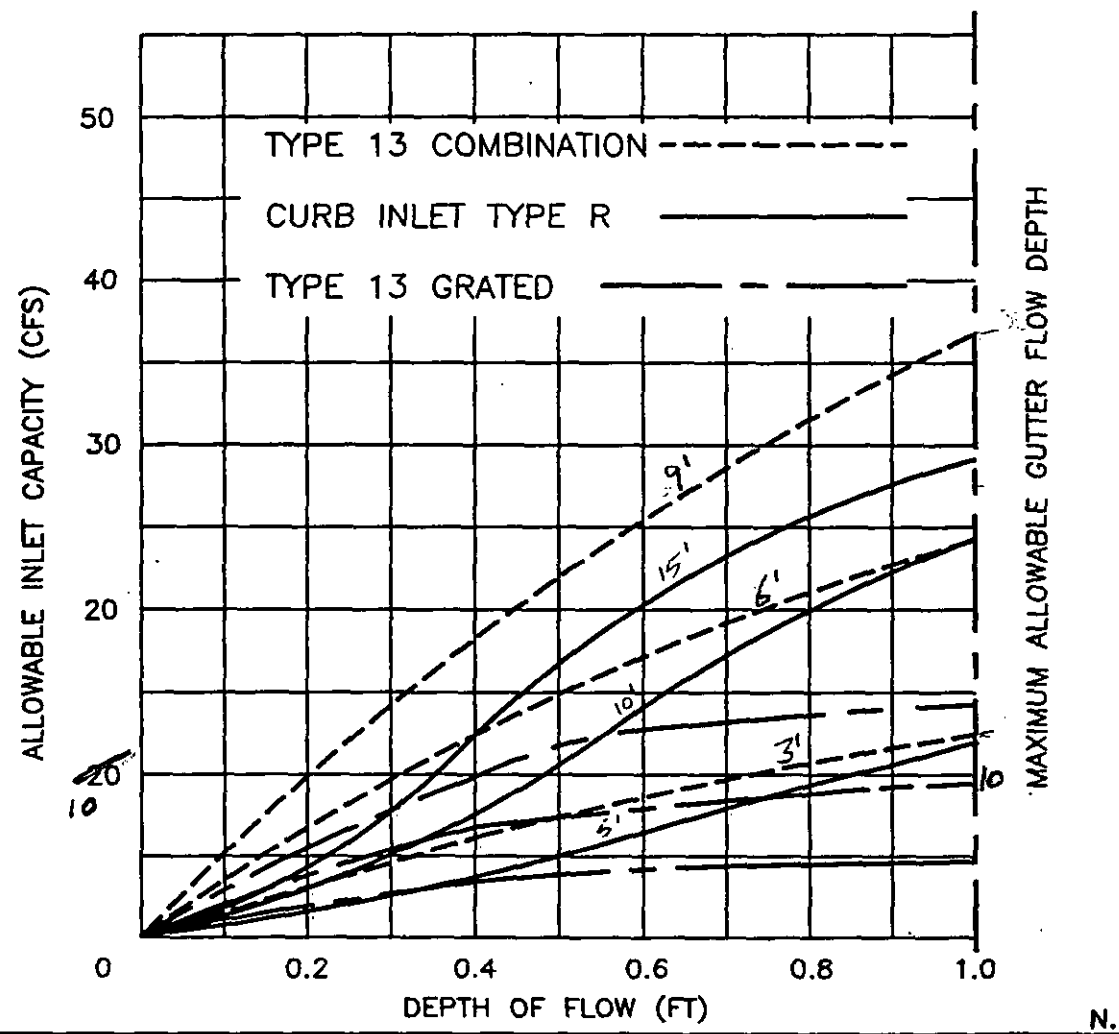
ISSUED: April 1992

REVISED: 4/95 D.B.

DRAWING NO. 400-24

SUMP CONDITIONS–ALL INLETS





N.T.S.

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

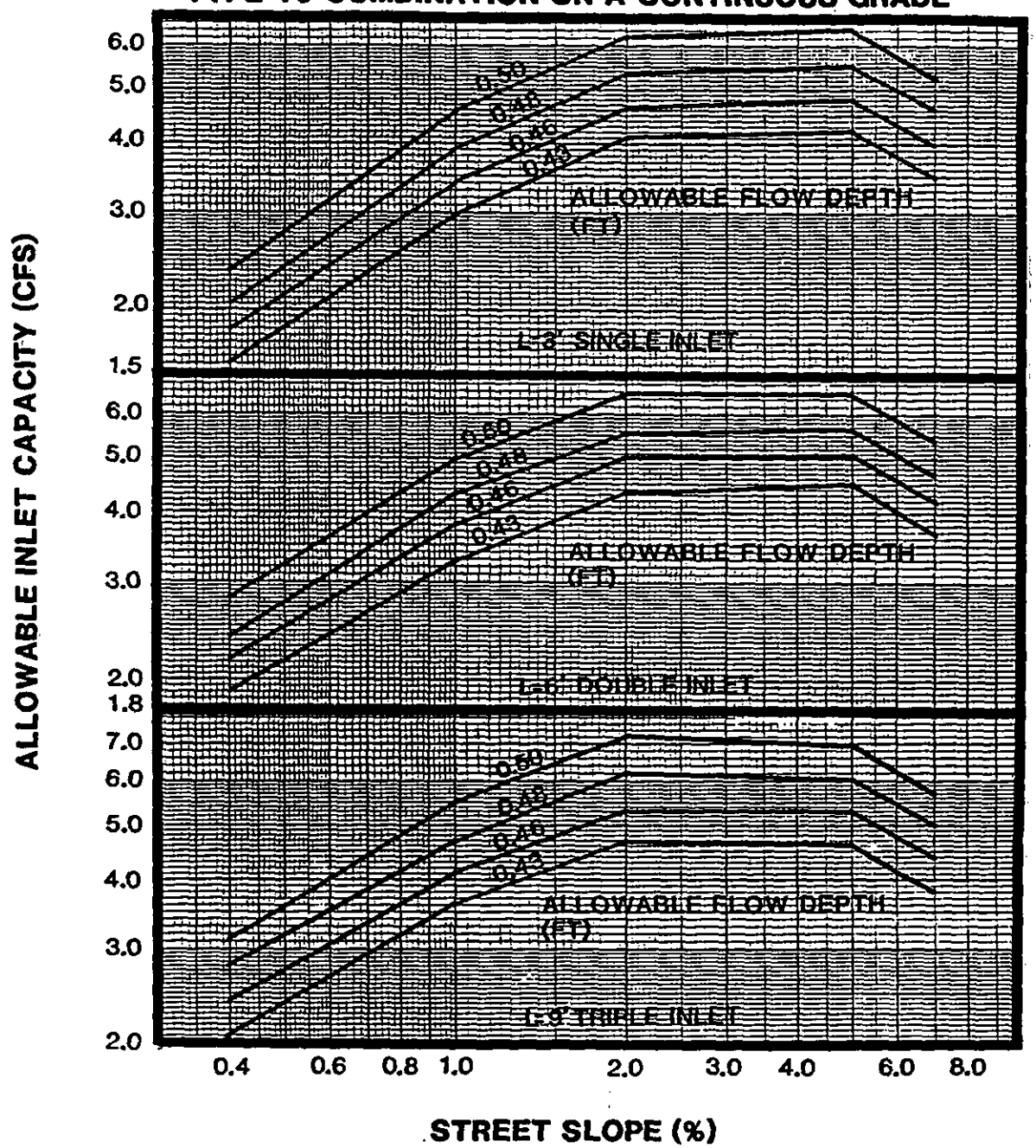
ALLOWABLE INLET CAPACITY

ISSUED: APRIL 1993

REVISED: 4/95 D.B.

DRAWING NO. 400–26

TYPE 13 COMBINATION ON A CONTINUOUS GRADE



NOTES:
1. ALLOWABLE CAPACITY = 66% THEORETICAL CAPACITY
2. MAXIMUM INLET CAPACITY AT MAXIMUM ALLOWABLE FLOW DEPTH. PROPORTIONALLY REDUCE FOR OTHER DEPTHS

N.T.S.

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

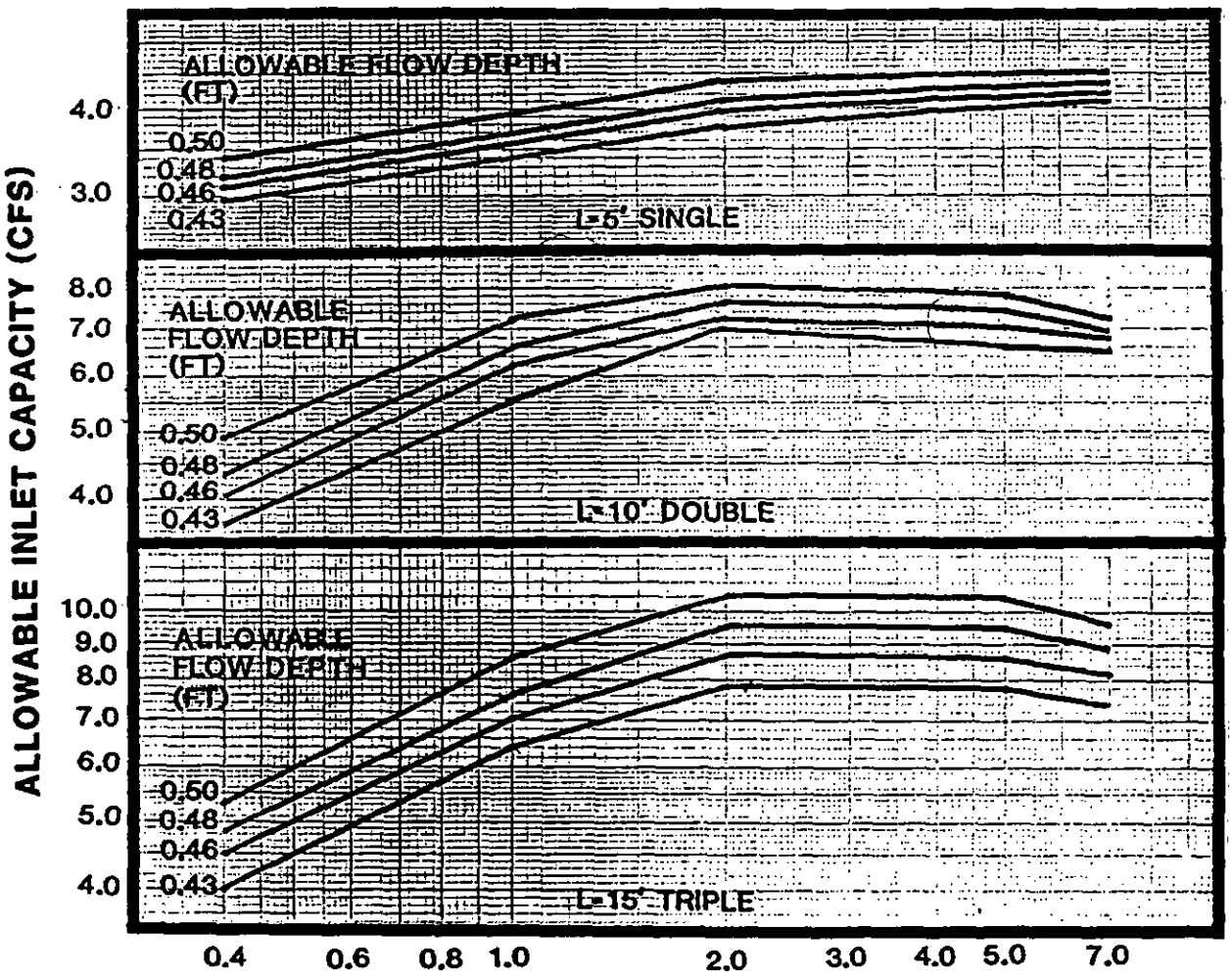
ALLOWABLE INLET CAPACITY

ISSUED: April 1992

REVISED: 4/95 D.B.

DRAWING NO. 400–27

TYPE R CURB OPENING ON A CONTINUOUS GRADE



NOTES:

1. MAXIMUM INLET CAPACITY AT MAXIMUM ALLOWABLE FLOW DEPTH. PROPORTIONALLY REDUCE FOR OTHER DEPTHS.
2. ALLOWABLE CAPACITY=
   88% (L=5') }
   92% (L=10') } THEORETICAL CAPACITY
   95% (L=15') }
3. INTERPOLATE FOR OTHER INLET LENGTHS.

N.T.S.

CITY OF THORNTON, COLORADO
STANDARDS & SPECIFICATIONS

ALLOWABLE INLET CAPACITY

ISSUED: April 1992

REVISED: 4/95 D.B.

DRAWING NO. 400-28

TIME OF CONCENTRATION
SUBDIVISION: Cherry Wood JN: 1850

05/25/00

SUB-BASIN DATA			INITIAL/OVERLAND TIME (T_i)			TRAVEL TIME (T_t)				Tc CHECK (URBANIZED BASINS)			FINAL T_c	REMARKS	
DESIGN:	AREA Ac	C_5	LENGTH Ft	SLOPE %	T_i	LENGTH Ft	SLOPE %	VEL. FPS	T_t	COMP. T_c	TOTAL LENGTH	T_c=(L/180)+10 MIN	MIN		C_{100}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		(3)
A2	2.5	0.45	55	2.0%	6.9	700	6.9%	5.3	2.2	9.1	755	14.2	9.1		0.6
A3	2.5	0.45	50	2.0%	6.6	650	6.9%	5.3	2.1	8.6	700	13.9	8.6		0.6
A4	2.1	0.45	60	2.0%	7.2	620	7.0%	5.3	2.0	9.1	680	13.8	9.1		0.6
A5	1.3	0.45	30	2.0%	5.1	620	7.0%	5.3	2.0	7.0	650	13.6	7.0		0.6
A6	1.1	0.45	55	2.0%	6.9	470	7.0%	5.3	1.5	8.4	525	12.9	8.4		0.6
A7	0.8	0.45	55	2.0%	6.9	420	7.0%	5.3	1.3	8.2	475	12.6	8.2		0.6
A8	1.8	0.45	35	2.0%	5.5	850	7.0%	5.3	2.7	8.2	885	14.9	8.2		0.6
A9	2.0	0.45	40	2.0%	5.9	850	7.0%	5.3	2.7	8.5	890	14.9	8.5		0.6
A10	2.7	0.45	40	2.0%	5.9	1020	6.9%	5.3	3.2	9.1	1060	15.9	9.1		0.6
A11	1.3	0.45	35	2.0%	5.5	820	6.9%	5.3	2.6	8.1	855	14.8	8.1		0.6
A12	2.6	0.45	45	2.0%	6.2	850	6.0%	4.9	2.9	9.1	895	15.0	9.1		0.6
A13	1.5	0.45	40	2.0%	5.9	715	6.0%	4.9	2.4	8.3	755	14.2	8.3		0.6
A14	1.7	0.45	40	2.0%	5.9	750	6.0%	4.9	2.6	8.4	790	14.4	8.4		0.6
A15	2.3	0.45	100	2.0%	9.3	440	6.0%	4.9	1.5	10.8	540	13.0	10.8		0.6
A16	2.3	0.45	70	2.0%	7.8	640	5.3%	4.6	2.3	10.1	710	13.9	10.1		0.6
A17	0.3	0.45	45	2.0%	6.2	190	1.0%	2.0	1.6	7.8	235	11.3	7.8		0.6
A18	0.8	0.45	50	2.0%	6.6	310	0.8%	1.8	2.9	9.5	360	12.0	9.5		0.6
A19	2.0	0.45	65	2.0%	7.5	400	0.8%	1.7	3.9	11.4	465	12.6	11.4		0.6
A20	0.2	0.85	60	2.0%	5.0	100	0.8%	1.8	0.9	5.9	160	10.9	5.9		0.75
A21	2.8	0.5	220	2.0%	12.7	630	0.8%	1.8	5.9	18.6	850	14.7	14.7		0.7
A22	0.5	0.85	25	2.0%	3.2	720	1.2%	2.2	5.5	8.7	745	14.1	8.7		0.8
A23	0.5	0.5	50	2.0%	6.1	290	0.8%	1.8	2.7	8.8	340	11.9	8.8		0.7
A24	0.3	0.88	18	2.0%	1.3	300	1.5%	2.4	2.0	3.4	318	11.8	5.0		0.93
A25.1	1.0	0.5	18	2.0%	3.6	500	2.4%	3.1	2.7	6.3	518	12.9	6.3		0.7
A25.2	0.9	0.5	35	2.0%	5.1	560	1.4%	2.4	4.0	9.0	595	13.3	9.0		0.7
A26	1.0	0.5	110	2.0%	9.0	150	1.5%	2.4	1.0	10.0	260	11.4	10.0		0.7
A27	0.3	0.88	18	2.0%	1.3	410	1.0%	2.0	3.4	4.8	428	12.4	5.0		0.93
A28	0.2	0.88	40	2.0%	2.0	460	0.8%	1.7	4.5	6.4	500	12.8	6.4		0.93
B1	1.5	0.5	40	2.0%	5.4	540	1.0%	2.0	4.5	9.9	580	13.2	9.9		0.7
B2.1	0.7	0.5	40	2.0%	5.4	330	2.4%	3.1	1.8	7.2	370	12.1	7.2		0.7
B2.2	0.8	0.5	100	2.0%	8.6	200	3.1%	3.5	0.9	9.5	300	11.7	9.5		0.7
B3.1	0.8	0.5	90	2.0%	8.1	300	2.4%	3.1	1.6	9.8	390	12.2	9.8		0.7
B3.2	0.5	0.5	46	2.0%	5.8	350	2.4%	3.1	1.9	7.7	396	12.2	7.7		0.7
B3.3	0.2	0.5	46	2.0%	5.8	175	3.1%	3.5	0.8	6.6	221	11.2	6.6		0.7
B4	1.7	0.5	40	2.0%	5.4	960	2.4%	3.1	5.2	10.6	1000	15.6	10.6		0.7
B5	2.9	0.5	40	2.0%	5.4	1215	2.3%	3.0	6.7	12.1	1255	17.0	12.1		0.7
B6.1	1.0	0.5	130	2.0%	9.8	420	1.5%	2.4	2.9	12.6	550	13.1	12.6		0.7
B6.2	1.1	0.5	40	2.0%	5.4	650	5.0%	4.5	2.4	7.8	690	13.8	7.8		0.7
B7.1	1.1	0.5	90	2.0%	8.1	310	3.2%	3.6	1.4	9.6	400	12.2	9.6		0.7
B7.2	0.9	0.5	45	2.0%	5.8	300	3.2%	3.6	1.4	7.2	345	11.9	7.2		0.7
B8.1	0.8	0.5	90	2.0%	8.1	300	1.6%	2.5	2.0	10.1	390	12.2	10.1		0.7
B8.2	0.3	0.5	35	2.0%	5.1	180	1.6%	2.5	1.2	6.3	215	11.2	6.3		0.7
B8.3	0.4	0.5	35	2.0%	5.1	260	1.6%	2.5	1.7	6.8	295	11.6	6.8		0.7
B9	1.2	0.5	45	2.0%	5.8	840	2.1%	2.9	4.8	10.6	885	14.9	10.6		0.7
B10	6.5	0.15	500	2.0%	30.4	500	3.3%	2.7	3.0	33.4	1000	15.6	15.6		0.5
B11.1	0.5	0.5	40	2.0%	5.4	430	1.5%	2.4	2.9	8.4	470	12.6	8.4		0.7
B11.2	1.2	0.5	30	2.0%	4.7	480	1.4%	2.4	3.4	8.1	510	12.8	8.1		0.7
C1	2.3	0.45	30	2.0%	5.1	700	3.9%	3.9	3.0	8.1	730	14.1	8.1		0.6
C2	2.4	0.45	40	2.0%	5.9	680	5.0%	4.5	2.5	8.4	720	14.0	8.4		0.6
C3	2.1	0.45	30	2.0%	5.1	950	3.9%	3.9	4.0	9.1	980	15.4	9.1		0.6
C5	0.5	0.45	35	2.0%	5.5	520	3.5%	4.0	0.6	6.1	180	11.0	6.1		0.6
C6	0.5	0.87	35	2.0%	5.5	1000	4.0%	4.0	0.6	6.1	180	11.0	6.1		0.93
OS1	67.0	0.15	500	6.0%	21.1	2130	4.1%	1.4	25.0	46.0	2630		46.0		0.5
OS2	9.2	0.15	500	1.8%	31.4	270	6.7%	1.8	2.5	33.9	770		33.9		0.5
OS3	1.0	0.15	390	3.6%	22.0	0	0.1%	0.2	0.0	22.0	390		22.0		0.5
H1	143.8	0.15	500	6.0%	21.1	2916.63	4.1%	1.4	34.2	55.2	3416.63		55.2		0.5
H2	28.2	0.15	500	3.5%	25.2	1897.27	3.5%	1.3	24.1	49.3	2397.27		49.3		0.5
U1	0.3	0.4	240	2.0%	15.5	0	4.1%	1.4	0.0	15.5	240		15.5		0.55
U2	0.2	0.4	240	2.0%	15.5	0	3.5%	1.3	0.0	15.5	240		15.5		0.55
U3	1.5	0.4	450	2.0%	21.2	0	3.5%	1.3	0.0	21.2	450		21.2		0.55
U4	1.0	0.4	100	2.0%	10.0	0	3.5%	1.3	0.0	10.0	100		10.0		0.55
U5	1.3	0.4	20	2.0%	4.5	0	3.5%	1.3	0.0	4.5	20		5.0		0.55
U6	1.6	0.4	100	2.0%	10.0	0	3.5%	1.3	0.0	10.0	100		10.0		0.55
U7	0.6	0.15	150	4.0%	13.2	0	3.5%	1.3	0.0	13.2	150		13.2		0.5

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Basin	A2	A2	2.5	0.45	9.1	1.13	4.0	4.5					2.6%	4.5				200	3.2	1.0	
Route A2-A2.1									10.1	1.13	3.8	4.3									
Basin/Comb/Route	A2.1	A3	2.5	0.45	8.6	1.14	3.88	4.41	10.1	2.27	3.8	8.7			8.7	0.3%	18	50	5.2	0.2	15' Type "R" Inlet
Basin/Combine	A3	A4	2.1	0.45	9.1	0.96	4.0	3.8	10.3	3.24	3.8	12.3			12.3	1.0%	21	21	7.3	0.0	10' Type "R" Inlet
Route A3-A3.1	A3.1								10.4	3.24	3.8	12.3									
Basin	A5	A5	1.3	0.45	7.0	0.58	4.4	2.5							2.5	4.0%	15	21	8.1	0.0	5' Type "R" Inlet
Route A5-A3.1	A3.1								7.1	0.58	4.4	2.5									
Combine	A3.1								10.4	3.82	3.8	14.5			14.5	60.0%	21	295	6.2	0.8	2-5' Type "R" Inlets
Route A3.1-A6.2	A6.2								11.1	3.82	3.7	14.0									
Basin	A6	A6	1.1	0.45	8.4	0.51	4.1	2.1							2.1	50.0%	15	40	3.6	0.2	
Route A6-A6.1	A6.1								8.6	0.51	4.1	2.1									
Basin	A7	A7	0.8	0.45	8.2	0.36	4.1	1.5							1.5	5.4%	15	21	7.1	0.0	5' Type "R" Inlet
Route A7-A6.1	A6.1								8.3	0.36	4.1	1.5									
Combine	A6.1								8.4	0.87	4.1	3.6			3.6	2.5%	15	46	7.4	0.1	
Route A6.1-A6.2	A6.2								8.5	0.87	4.1	3.6									
Combine	A6.2								11.1	4.69	3.7	17.2			17.2	2.5%	21	664	11.2	1.0	
Route A6.2-15.1	A15.1								12.1	4.69	3.5	16.6									
Basin	A15	A15	2.3	0.45	10.8	1.04	3.7	3.9							3.9	0.9%	15	22	5.3	0.1	5' Type "R" Inlet
Route A15- A15.1	A15.1								10.9	1.04	3.7	3.8									
Basin	A14	A14	1.7	0.45	8.4	0.79	4.1	3.2							3.2	1.0%	15	21	5.3	0.1	5' Type "R" Inlet
Rout A14-A15.1	A15.1								8.5	0.79	4.1	3.2									
Combine	A15.1								12.1	6.51	3.5	23.1			23.1	1.7%	30	38	10.5	0.1	
RouteA15.1-A13.1	A13.1								12.2	6.51	3.5	23.0									

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
~~RouteA15.1-A13.1~~	~~A13.1~~								~~12.2~~	~~6.51~~	~~3.5~~	~~23.0~~									
Basin	A13	A13	1.5	0.45	8.3	0.68	4.1	2.8													
															2.8	0.8%	15	21	4.7	0.1	5' Type "R" Inlet
RouteA13-A12.1	A12.1								8.4	0.68	4.1	2.8									
Basin	A12	A12	2.6	0.45	9.1	1.17	4.0	4.7													
															4.7	0.8%	18	21	5.3	0.1	10' Type "R" Inlet
Route A12-A12.1	A12.1								9.2	1.17	4.0	4.6									
Combine	A12.1								9.2	1.85	4.0	7.3									
															7.3	0.8%	21	36	5.9	0.1	
Route A12.1-A13.1	A13.1								9.3	1.85	4.0	7.3									
Combine	A13.1								12.2	8.36	3.5	29.6									
															29.6	0.8%	30	242	8.3	0.5	
Route A13.1 - A17.1	A17.1								12.7	8.36	3.5	29.1									
Basin	A17	A17	0.3	0.45	7.8	0.15	4.2	0.6													
															0.6	1.0%	15	36	3.3	0.2	5' Type "R" Inlet
Route A17-A11	A11								8.0	0.15	4.2	0.6									
Basin/Combine	A11	A11	1.3	0.45	8.1	0.57	4.2	2.4	8.1	0.72	4.2	3.0									
															3.0	1.0%	15	21	5.2	0.1	5' Type "R" Inlet
Route A11 - A10.1	A10.1								8.2	0.72	4.2	3.0									
Basin	A10	A10	2.7	0.45	9.1	1.22	4.0	4.9													
															4.9	1.0%	15	18	5.7	0.1	10' Type "R" Inlet
Route A10-A10.1	A10.1								9.2	1.22	4.0	4.9									
Combine	A10.1								9.2	1.95	4.0	7.7									
															7.7	1.2%	15	40	6.5	0.1	
Route A10.1-A17.1	A17.1								9.3	1.95	4.0	7.7									
Combine	A17.1								12.7	10.30	3.5	35.9									
															35.9	0.8%	30	400	8.4	0.8	
Route A17.1-A9.1	A9.1								13.5	10.30	3.4	34.9									
Basin	A9	A9	2.0	0.45	8.5	0.91	4.1	3.7													
Basin/Combine	A9	A18	0.8	0.45	9.5	0.35	3.9	1.4	9.5	1.26	3.9	5.0									
															5.0	1.0%	15	18	5.8	0.1	10' Type "R" Inlet
Route A9-A9.1	A9.1								9.5	1.26	3.9	5.0									

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Basin	A8	A8	1.8	0.45	8.2	0.79	4.2	3.3													
Route A8-A9.1	A9.1								8.4	0.79	4.1	3.3			3.3	0.8%	15	55	4.8	0.2	5' Type "R" Inlet
Combine	A9.1								13.5	12.36	3.4	41.9									
Route A9.1-A9.2	A9.2								13.8	12.36	3.4	41.4			41.9	0.8%	30	170	8.5	0.3	
Basin	A9.3	A19	2.0	0.45	11.4	0.90	3.6	3.3													
Basin	A9.3	A28	0.2	0.88	6.4	0.14	4.5	0.6													
Combine	A9.3								11.4	1.04	3.6	3.8									
RouteA9.3-A9.2	A9.2								11.4	1.04	3.6	3.8			3.8	0.8%	30	18	5.9	0.1	Triple Type 13 Inlet
Combine	A9.2								13.8	13.40	3.4	44.9									
RouteA9.2-A19.4	A9.4								13.8	13.40	3.3	44.9			44.9	1.0%	30	18	7.8	0.0	
Basin	A9.4	A22	0.5	0.65	8.7	0.33	4.1	1.3													
Basin/Combine	A9.4	A20	0.2	0.65	5.9	0.11	4.7	0.5	8.7	0.43	4.1	1.7									
Combine	A9.4								13.8	13.83	3.3	46.3									Triple Type 13 Inlet
Route to pond	A9.5								13.9	13.83	3.3	46.3			46.3	4.0%	30	45	17.9	0.0	
																					Basin a to Pond (lg basin)
Basin	A21	A21	2.8	0.50	14.7	1.41	3.3	4.6													
Route A21-A21.3	A21.3								16.0	1.41	3.1	4.4	0.9%	4.6				140	1.9	1.2	
Basin/Combine	A21.3	A23	0.5	0.50	8.8	0.25	4.0	1.0	16.0	1.66	3.1	5.2									
Route A21.3-A26.1	A26.1								16.1	1.66	3.1	5.2			5.2	0.5%	18	30	4.6	0.1	10' Type "R" Inlet
Basin	B11.1	B11.1	0.5	0.5	8.4	0.25	4.1	1.0													
Route B11.1-B11.2	B11.2								9.0	0.25	4.0	1.0	1.0%	1.0				80	2.0	0.7	

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Basin/Combine	B11.2	B11.2	1.2	0.50	8.1	0.60	4.2	2.5	9.0	0.85	4.0	3.4									
Route B11.2-A25	A25								10.9	0.85	3.7	3.1	1.0%	3.4				230	2.0	1.9	
Basin/Combine	A25	A25.2	0.9	0.50	9.0	0.45	4.0	1.8	10.9	1.30	3.7	4.8									
Basin/Combine	A25	A25.1	1.0	0.50	6.3	0.50	4.5	2.3	10.9	1.80	3.7	6.7									
Basin	A27	A26	1.0	0.5	10.0	0.50	3.8	1.9													
Route A27-A25	A25								10.6	0.50	3.8	1.9	1.5%	1.9				80	2.5	0.5	10' Type "R" Inlet
Combine	A25								10.9	2.30	3.7	8.5									
Route A25-A25.2	A25.2								11.0	2.30	3.7	8.5			8.5	0.5%	24	15	5.4	0.0	
Basin	A25.1	A27	0.3	0.88	5.0	0.26	4.9	1.3													
Basin/Combine	A25.1	A24	0.3	0.88	5.0	0.26	4.9	1.3	5.0	0.53	4.9	2.6									
Route A25.1-A25.2	A25.2								5.1	0.53	4.9	2.6			2.6	0.5%	15	15	3.9	0.1	5' Type "R" Inlet
Combine	A25.2								11.0	2.83	3.7	10.5									
Route A25.2-A26.1	A26.1								12.1	2.83	3.6	10.1			10.5	0.5%	24	360	5.6	1.1	
Combine	A26.1								16.1	4.49	3.1	14.1									
Route A26.1-A26.2	A26.2								16.3	4.49	3.1	14.0			14.1	0.5%	30	70	6.0	0.2	
																					To Pond
Basin	A16	A16	2.3	0.45	10.1	1.06	3.8	4.0													
Route A16-A16.1	A16.1								10.6	1.06	3.7	4.0			4.0	6.0%	15	350	10.9	0.5	5' Type "R" Inlet
																					To Pond From Cul-de-sac

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
~~Basin~~	~~C1~~	~~C1~~	~~2.3~~	~~0.45~~	~~8.1~~	~~1.04~~	~~4.2~~	~~4.3~~													
Route C1-C2	C2								8.7	1.04	4.1	4.2	2.0%	4.3				100	2.8	0.6	
Basin/Combine	C2	C2	2.4	0.45	8.4	1.10	4.1	4.5	8.7	2.14	4.1	8.7									
Route C2-C2.1	C2.1								8.5	2.14	4.1	8.7			8.7	1.0%	18	30	6.4	0.1	5' Type "R" Inlet
Basin	C2.2	C3	2.1	0.45	9.1	0.95	4.0	3.8													
Route C2.2-C2.1	C2.1								9.3	0.95	4.0	3.8			3.8	1.0%	15	50	4.6	0.2	
Combine	C2.1								9.3	3.09	4.0	12.2									
Route C2.1-C3.1	C3.1								9.8	3.09	3.9	11.9			12.2	4.0%	18	400	12.2	0.5	
Basin	C3	SCH1	1.0	0.45	6.1	0.45	4.6	2.1													C2.3 Overflow Inlet 10" type R
Basin/Combine	C3	C6	0.5	0.87	6.1	0.43	4.6	2.0	6.1	1.32	4.6	6.1									From Fig. 1 rpt
Route C3-C3.1	C3.1								6.2	1.32	4.6	6.1			6.1	1.0%	15	18	4.6	0.1	
Combine	C3.1								9.8	3.96	3.9	15.3									
Route C3.1-C3.2	C3.2								9.9	3.96	3.9	15.3			15.3	1.0%	18	18	7.5	0.0	
Basin/Combine	C3.2	SCH2	0.3	0.89	5.0	0.28	4.9	1.4													*From Fig. 1 rpt*
Basin/Combine	C3.2	C5	0.5	0.45	6.1	0.22	4.6	1.0	6.1	0.50	4.6	2.3									
Combine	C3.2								9.9	4.45	3.9	17.2									
Route C3.2-A16.1	16.1								10.4	4.45	3.8	16.8			17.2	3.0%	24	250	7.5	0.6	
Combine	16.1								10.6	5.51	3.7	20.7									
																					To Pond From Cul-de-sac and Garfield
Basin	B1	B1	1.5	0.50	9.9	0.75	3.8	2.9													
Basin/Combine	B1	B2.2	0.8	0.50	9.5	0.38	3.9	1.5	9.9	1.13	3.8	4.4									
Route B1 - B1.1	B1.1								10.1	1.13	3.8	4.3	5.0%	4.4				50	5.3	0.2	
Basin/Combine	B1.1	B3.3	0.2	0.50	6.6	0.10	4.5	0.5	9.9	1.23	3.8	4.7									

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Route B1.1 - B3	B3								11.2	1.23	3.7	4.5	1.3%	4.7				320	4.2	1.3	
Basin/Combine	B3	B3.1	0.8	0.50	9.8	0.41	3.9	1.6	11.2	1.65	3.7	6.0									
Basin	B2	B2.1	0.7	0.50	7.2	0.36	4.3	1.6					2.4%	1.6				350	1.6	3.6	
Route B2 - B3.1									10.8	0.36	3.7	1.3									
Basin/Comb	B3.1	B3.2	0.5	0.50	7.7	0.24	4.2	1.0	10.8	0.60	3.7	2.2			2.2	1.0%	15	30	4.2	0.1	5' Type "R" Inlet
Route B3.1- B3									10.8	0.60	3.7	2.2									
Combine	B3								11.2	2.25	3.7	8.2									
Route B3 - B4.1	B4.1								11.9	2.25	3.6	8.0			8.2	1.0%	18	270	6.5	0.7	15' Type "R" Inlet
Basin	B4	B4	1.7	0.50	10.6	0.85	3.8	3.2													
Basin/Comb	B4	B9	1.2	0.50	10.6	0.61	3.8	2.3	10.6	1.46	3.8	5.5									
Basin/Comb	B4	B10	6.5	0.15	15.6	0.98	3.2	3.1	15.6	2.44	3.2	7.7									
Route B4 - B4.1	B4.1								15.6	2.44	3.2	7.7			7.7	1.0%	18	25	6.6	0.1	Double Type 13 Inlet
																					5' Type "R" Inlet
Basin/Comb	B8	B8.2	0.3	0.50	6.3	0.16	4.6	0.7													
Basin	B7	B7.1	1.1	0.50	9.6	0.57	3.9	2.2													
Basin/Comb	B7	B7.2	0.9	0.50	7.2	0.44	4.4	1.9	9.6	1.01	3.9	3.9									
Route B7 - B7.1	B7.1								9.8	1.01	3.9	3.9	4.0%	3.9				50	3.5	0.2	
Basin/Comb	B7.1	B8.3	0.4	0.50	6.8	0.20	4.4	0.9	9.8	1.21	3.9	4.7									
Route B7.1 - B8.1	B8.1								11.2	1.21	3.7	4.4	4.0%	4.7				300	3.5	1.4	
Basin/Comb	B8.1	B8.1	0.8	0.50	10.1	0.38	3.8	1.5	11.2	1.97	3.7	7.2									

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
																1.0%	15	30	4.6	0.1	10' Type "R" Inlet
Route B8.1 - B8	B8.1								11.2	1.97	3.7	7.2									
Combine	B8								11.2	2.13	3.7	7.8									
															7.8	1.2%	18	280	4.3	1.1	
Route B8.1 - B4.1	B4.1								12.3	2.13	3.5	7.5									
Combine	B4.1								15.6	6.82	3.2	21.6									
															21.6	1.0%	54	36	4.3	0.1	
Route B4.1 - B5	B5								15.8	6.82	3.2	21.5									
Basin	B5	B5	2.9	0.50	12.1	1.45	3.5	5.1													
Basin	B6	B6.1	1.0	0.50	12.6	0.51	3.5	1.8													
													5.0%	1.8				700	5.3	2.2	
Route B6 - B5	B5								14.8	0.51	3.2	1.6									
BasinComb	B5	B6.2	1.1	0.50	7.8	0.57	4.2	2.4	14.8	1.08	3.2	3.5									
Combine	B5								14.8	2.53	3.2	8.2									
Combine	B5								15.8	9.35	3.2	29.5									
Basin	H1	H1	143.8	0.15	55.2	21.6	1.5	32.5													
Basin	H2	H2	28.2	0.15	49.3	4.2	1.6	6.9													
Basin	U1	U1	0.3	0.40	15.5	0.1	3.2	0.4													
Basin	U2	U2	0.2	0.40	15.5	0.1	3.2	0.3													
Basin	U3	U3	1.5	0.40	21.2	0.6	2.7	1.6													
Basin	U4	U4	1.0	0.40	10.0	0.4	3.8	1.5													
Basin	U5	U5	1.3	0.40	5.0	0.5	4.9	2.6													

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 5-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	UNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
~~Basin~~	~~UB~~	~~UB~~	~~1.8~~	~~0.40~~	~~10.0~~	~~0.8~~	~~3.8~~	~~2.5~~													

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 100-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	RUNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Basin	A2	A2	2.5	0.60	9.1	1.51	7.6	11.5													Street Cap=9.4 cfs
													2.6%	11.5				200	3.2	1.0	2.1 cfs overflow to north
Route A2-A3	A3								10.1	1.51	7.3	11.0									
Basin	A3	A3	2.5	0.60	8.6	1.52	7.8	11.8													
Basin/Combine	A3	A4	2.1	0.60	9.1	1.28	7.6	9.8	10.1	4.31	7.3	31.5									
													1.0%	31.5				18	2.0	0.2	
Route A3-A3.1	A3.1								10.3	4.31	7.2	31.3									
Basin	A5	A5	1.3	0.60	7.0	0.77	8.4	6.5													
													1.0%	6.5				18	2.0	0.2	
Route A5-A3.1	A3.1								7.2	0.77	8.3	6.4									
Combine	A3.1								10.3	5.09	7.2	36.9									
													4.0%	36.9				470	6.9	1.1	
Route A3.1-A12.1	A12.1								11.4	5.09	6.9	35.3									
Basin	A13	A13	1.5	0.60	8.3	0.90	7.9	7.1													
Basin/Combine	A13	A14	1.7	0.60	8.4	1.05	7.8	8.2	8.4	1.95	7.8	15.3									
													1.0%	15.3				18	2.0	0.2	
Route A13-A12.1	A12.1								8.6	1.95	7.8	15.2									
Combine	A12.1								11.4	7.04	6.9	48.8									
Basin	A6	A6	1.1	0.60	8.4	0.68	7.9	5.4													
													1.0%	5.4				18	2.0	0.2	
Route A6-A6.1	A6.1								8.5	0.68	7.8	5.3									
Basin	A7	A7	0.8	0.60	8.2	0.48	7.9	3.8													
													1.0%	3.8				18	2.0	0.2	
Route A7-A6.1	A6.1								8.4	0.48	7.9	3.8									
Combine	A6.1								8.5	1.16	7.8	9.1									
													4.0%	9.1				670	4.0	2.8	
Route A6.1-A15.1	A15.1								11.3	1.16	7.0	8.1									
Basin	A15	A15	2.3	0.60	10.8	1.38	7.1	9.8													
													1.0%	9.8				18	2.0	0.2	
Route A15-A15.1	A15.1								10.9	1.38	7.1	9.8									
Combine	A15.1								11.3	2.54	7.0	17.7									
													4.0%	17.7				670	4.0	2.8	

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 100-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	RUNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Route A15.1-A13.1	A13.1								14.1	2.54	6.3	16.1									
Combine	A13.1								14.1	9.58	6.3	60.7									
Route A13.1-A17.1	A17.1								16.5	9.58	5.9	56.5	0.8%	60.7				250	1.8	2.3	
Basin	A12	A12	2.6	0.60	9.1	1.56	7.6	11.9													
Basin/Combine	A17	A17	0.3	0.60	7.8	0.20	8.1	1.6	9.1	1.76	7.6	13.4									
Basin/Combine	A17	A11	1.3	0.60	8.1	0.76	8.0	6.1	9.1	2.52	7.6	19.2									
Route A17-A10.1	A10.1								9.3	2.52	7.6	19.0	0.8%	19.2				18	1.8	0.2	
Basin	A10	A10	2.7	0.60	9.1	1.63	7.6	12.4													
Route A10-A10.1	A10.1								9.3	1.63	7.6	12.3	1.0%	12.4				18	2.0	0.2	
Combine	A10.1								9.3	4.15	7.6	31.4									
Route A10.1-A17.1	A17.1								9.6	4.15	7.5	31.0	1.2%	31.4				40	2.2	0.3	
Combine	A17.1								16.5	13.73	5.9	80.9									
Route A17.1-A9.1	A9.1								20.2	13.73	5.3	73.1	0.8%	80.9				400	1.8	3.7	
Basin	A9	A9	2.0	0.60	8.5	1.22	7.8	9.5													
Basin/Combine	A9	A18	0.8	0.60	9.5	0.47	7.5	3.5	9.5	1.69	7.5	12.6									
Route A9-A9.1	A9.1								9.6	1.69	7.4	12.6	1.0%	12.6				18	2.0	0.2	
Basin	A8	A8	1.8	0.60	8.2	1.06	7.9	8.4													
Route A8-A9.1	A9.1								8.7	1.06	7.8	8.2	0.8%	8.4				55	1.8	0.5	
Combine	A9.1								20.2	16.48	5.3	87.7									
Route A9.1-A9.2	A9.2								23.6	16.48	4.9	80.8	0.8%	87.7				360	1.8	3.4	
Basin	A21	A21	2.8	0.70	14.7	1.98	3.3	6.4													
Route A21-A21.3	A21.3								16.0	1.98	3.1	6.2	0.9%	6.4				140	1.9	1.2	

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 100-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	RUNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Basin/Combine	A21.3	A23	0.5	0.70	8.8	0.35	4.0	1.4	16.0	2.33	3.1	7.3									
Route A21.3-A26.1	A26.1								16.1	2.33	3.1	7.3			7.3	0.5%	18	30	4.6	0.1	
Basin	B11.1	B11.1	0.5	0.7	8.4	0.35	4.1	1.4													
Route B11.1-B11.2	B11.2								9.0	0.35	4.0	1.4	1.0%	1.4				80	2.0	0.7	
Basin/Combine	B11.2	B11.2	1.2	0.70	8.1	0.84	4.2	3.5	9.0	1.19	4.0	4.8									
Route B11.2-A25	A25								10.9	1.19	3.7	4.4	1.0%	4.8				230	2.0	1.9	
Basin/Combine	A25	A25.2	0.9	0.70	9.0	0.63	4.0	2.5	10.9	1.82	3.7	6.7									
Basin/Combine	A25	A25.1	1.0	0.70	6.3	0.70	4.5	3.2	10.9	2.52	3.7	9.3									
Basin	A27	A26	1.0	0.70	10.0	1.03	3.8	4.0													
Route A27-A25	A25								10.6	1.03	3.8	3.9	1.5%	4.0				80	2.5	0.5	
Combine	A25								10.9	3.55	3.7	13.1									
Route A25-A25.2	A25.2								11.0	3.55	3.7	13.1			13.1	0.5%	24	15	5.4	0.0	
Basin	A25.1	A27	0.3	0.93	5.0	0.28	4.9	1.4													
Basin/Combine	A25.1	A24	0.3	0.93	5.0	0.28	4.9	1.4	5.0	0.56	4.9	2.7									
Route A25.1-A25.2	A25.2								5.1	0.56	4.9	2.7			2.7	0.5%	15	15	3.9	0.1	
Combine	A25.2								11.0	4.11	3.7	15.2									
Route A25.2-A26.1	A26.1								12.1	4.11	3.6	14.6			15.2	0.5%	24	360	5.6	1.1	
Combine	A26.1								16.1	6.44	3.1	20.1									
Route A26.1-A26.2	A26.2								16.3	6.44	3.1	20.0			20.1	0.5%	30	70	6.0	0.2	

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 100-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	RUNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Basin/Combine	A9.3	A28	0.2	0.93	6.4	0.15	8.7	1.3	16.3	0.43	5.9	2.6									
Basin/Combine	A9.3	A19	2.0	0.60	11.4	1.20	7.0	8.3	16.3	1.63	5.9	9.7									
Basin	A9.2	A20	0.2	0.75	5.9	0.12	8.9	1.1													
Basin/Combine	A9.2	A22	0.5	0.80	8.7	0.40	7.7	3.1	8.7	0.52	7.7	4.0									ToPond
Combine	A9--								23.6	18.35	4.9	90.0									
Basin	A16	A16	2.3	0.60	10.1	1.41	7.3	10.3													
Route A16-A16.1	A16.1								10.5	1.41	7.2	10.1			10.3	6.0%	15"	350	13.8	0.4	
Basin	C1	C1	2.3	0.60	8.1	1.38	8.0	11.0													
Route C1-C2	C2								8.7	1.38	7.8	10.7	2.0%	11.0				100	2.8	0.6	
Basin	C2	C2	2.4	0.60	8.4	1.46	7.8	11.5													
Basin/Combine	C2	C3	2.1	0.60	9.1	1.27	7.6	9.7	9.1	4.12	7.6	31.3									
Route C2-C3	C3								10.6	4.12	7.2	29.5	4.0%	31.3				350	4.0	1.5	
Basin/Combine	C3	C5	0.5	0.60	6.1	0.29	8.8	2.6	10.6	4.41	7.2	31.6									
Basin	C3	C6	0.5	0.93	6.1	0.46	8.8	4.0	10.6	4.87	7.2	34.9									To Off site inlets
Basin	c3	SCH1	1.0	0.93	6.1	0.93	8.8	8.2													
Basin/comb	C3	SCH2	0.3	0.93	5.0	0.28	9.4	2.6	10.6	6.07	7.2	43.6									
Combine									10.6	7.48	7.2	53.7									
Basin/Comb	OS1	OS1	67.0	0.50	46.0	33.50	3.3	109.1	46.0	65.77	3.3	214.3									
Basin	B6	B6.1	1.0	0.70	12.6	0.71	6.6	4.7													

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 100-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	RUNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Route B6-B5									17.8	0.71	5.7	4.0	4.0%	4.7				710	2.3	5.1	
Basin/Comb	B5	B6.2	1.1	0.70	7.8	0.80	8.1	6.4	17.8	1.51	5.7	8.6									
Basin/Comb	B5	B5	2.9	0.70	12.1	2.03	6.8	13.7	17.8	3.54	5.7	20.1									
Basin	B1	B1	1.5	0.70	9.9	1.05	7.3	7.7													
Basin/Comb	B1	B2.2	0.8	0.70	9.5	0.53	7.5	4.0	9.9	1.58	7.3	11.6									
Route B2 - B1.1	B1.1								10.1	1.58	7.3	11.6	4.0%	11.6				50	8.0	0.1	
Basin/Comb	B1.1	B3.3	0.2	0.70	6.6	0.14	8.6	1.2	10.1	1.73	7.3	12.6									
Route B1.1 - B3	B3								10.7	1.73	7.1	12.3	4.0%	12.6				300	8.0	0.6	
Basin/Comb	B3	B3.1	0.8	0.70	9.8	0.58	7.4	4.3	10.7	2.30	7.1	16.4									
Basin	B2	B2.1	0.7	0.70	7.2	0.50	8.3	4.2					1.0%	16.4				25	2.0	0.2	
Route B6-B5									8.2	0.50	7.9	4.0	2.4%	4.2				300	5.1	1.0	
Basin/Comb	B3.1	B3.2	0.5	0.70	7.7	0.34	8.1	2.8	8.2	0.85	7.9	6.7									
Combine	B3								10.7	3.15	7.1	22.5									
Route B3 - B4	B4								12.7	3.15	6.6	20.9	1.0%	22.5				240	2.0	2.0	
Basin	B4	B4	1.7	0.70	10.6	1.19	7.2	8.5	12.7	4.34	6.6	28.8									
Basin	B8	B8.2	0.3	0.70	6.3	0.23	8.7	2.0													
Basin	B7	B7.1	1.1	0.70	9.6	0.80	7.5	6.0													
Basin/comb	B7	B7.2	0.9	0.70	7.2	0.61	8.3	5.1	9.6	1.41	7.5	10.5									
Route B7- B7.1	B7.1								9.8	1.41	7.4	10.5	4.0%	10.5				50	4.0	0.2	
Basin/comb	B7.1	B8.3	0.4	0.70	6.8	0.28	8.5	2.3	9.8	1.69	7.4	12.5									
													4.0%	12.5				300	4.0	1.3	

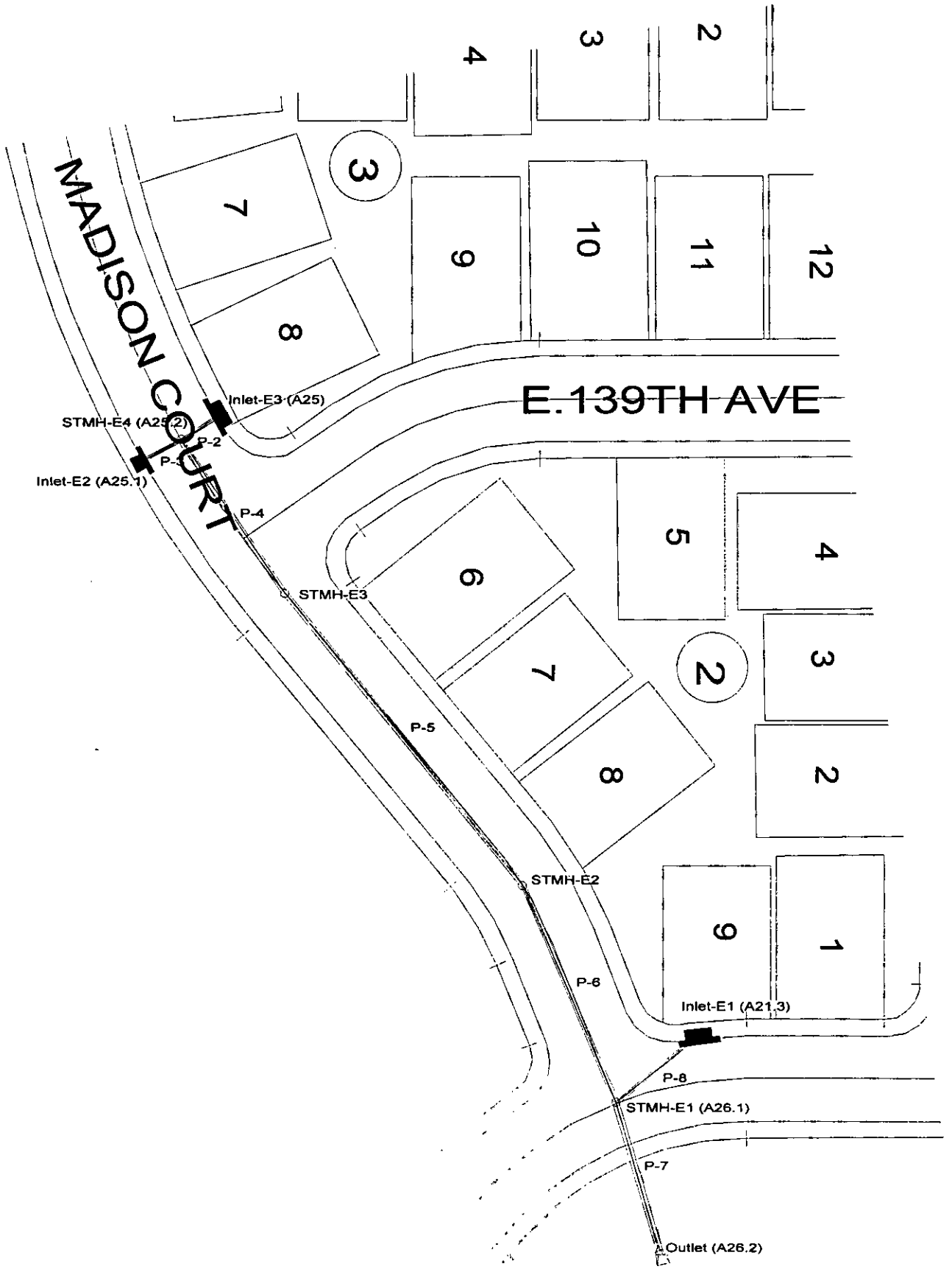
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY: AKW, JBM PROJECT: CHERRYWOOD
DATE: 25-May JN: 1850
CHECKED BY: DESIGN STORM: 100-YEAR

STREET	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIG.	AREA (Ac)	RUNOFF COEFF.	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	tc (min)	CA (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Velocity (fps)	tt (min)	
Route B7.1- B8.1	B8.1								11.0	1.69	7.0	11.9									
Basin/Comb	B8.1	B8.1	0.8	0.70	10.1	0.54	7.3	3.9	11.0	2.23	7.0	15.7									
Combine	B8.1								10.1	2.45	7.3	17.9									
Route B8.1- B4	B4								11.8	2.45	6.9	16.8	2.0%	17.9				280	2.8	1.7	
Basin/Comb	B4	B9	1.2	0.70	10.6	0.86	7.2	6.1	11.8	3.31	6.9	22.7									
Basin/Comb	B4	B10	6.5	0.50	15.6	3.25	6.1	19.7	15.6	6.56	6.1	39.7									
Combine	B4								15.6	10.90	6.1	65.9									
Combine	B5								17.8	14.44	5.7	81.9									
Basin	H1	H1	143.8	0.50	55.2	71.92	2.9	206.7													
Basin	H2	H2	28.2	0.50	49.3	14.10	3.1	43.8													
Basin	U1	U1	0.3	0.55	15.5	0.17	6.1	1.0													
Basin	U2	U2	0.2	0.55	15.5	0.12	6.1	0.7													
Basin	U3	U3	1.5	0.55	21.2	0.83	5.2	4.3													
Basin	U4	U4	1.0	0.55	10.0	0.55	7.3	4.0													
Basin	U5	U5	1.3	0.55	5.0	0.72	9.4	6.7													
Basin	U6	U6	1.6	0.55	10.0	0.88	7.3	6.5													

APPENDIX B

Hydraulic Calculations


MADISON COURT
E.139TH AVE
Inlet-E3 (A25)
STMH-E4 (A25.2)
P-2
P-3
Inlet-E2 (A25.1)
P-4
STMH-E3
P-5
STMH-E2
P-6
Inlet-E1 (A21.3)
P-8
STMH-E1 (A26.1)
P-7
Outlet (A26.2)
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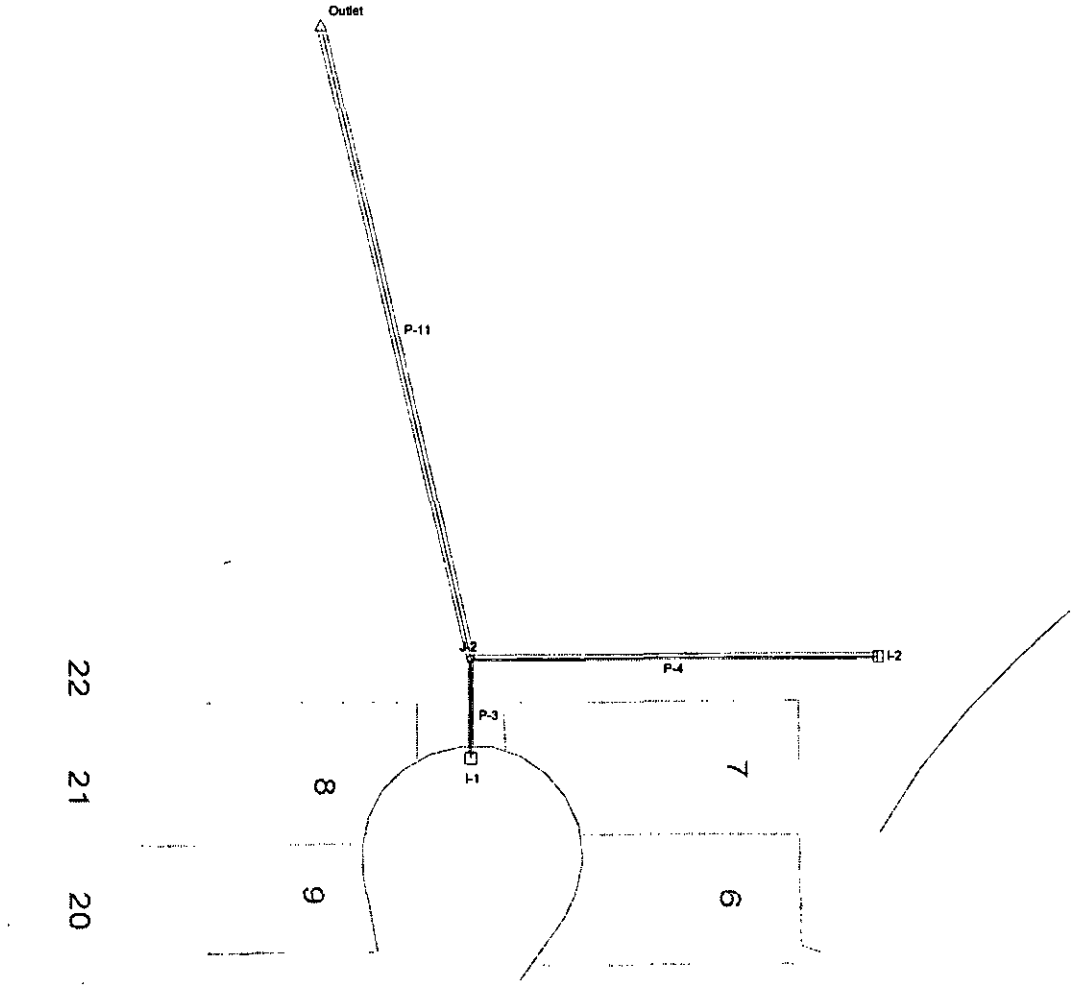
C&L Combined Pipe/Node Report

Pipe	Up Node	Down Node	Size	Length (ft)	Up Invert (ft)	Down Invert (ft)	Slope (%)	Q (cfs)	V avg (ft/s)	Up HGL (ft)	Down HGL (ft)
P-2	Inlet-E3 (A25)	STMH-E4 (A25.2)	18 inch	20.00	5,246.46	5,246.36	0.5000	15.2	8.60	5,248.54	5,248.12
P-3	Inlet-E2 (A25.1)	STMH-E4 (A25.2)	15 inch	20.00	5,246.71	5,246.61	0.5000	3.1	2.52	5,248.16	5,248.12
P-4	STMH-E4 (A25.2)	STMH-E3	30 inch	78.00	5,245.36	5,244.97	0.5000	17.2	3.51	5,247.94	5,247.60
P-5	STMH-E3	STMH-E2	30 inch	157.00	5,244.77	5,243.98	0.5032	17.0	3.46	5,247.71	5,247.44
P-6	STMH-E2	STMH-E1 (A26.1)	30 inch	100.00	5,243.78	5,243.28	0.5000	16.5	3.36	5,247.35	5,247.18
P-8	Inlet-E1 (A21.3)	STMH-E1 (A26.1)	15 inch	46.00	5,246.83	5,244.53	5.0000	7.3	6.22	5,247.91	5,247.18
P-7	STMH-E1 (A26.1)	Outlet (A26.2)	36 inch	66.00	5,242.78	5,242.45	0.5000	21.7	3.07	5,247.07	5,247.00


Outlet
P-11
J-2
J-2
P-4
P-3
I-1
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```
----------------- Beginning Calculation Cycle ------------------
Discharge: 10.10 cfs  at node I-1
Discharge: 43.60 cfs  at node I-2
Discharge: 52.98 cfs  at node J-2
Discharge: 52.19 cfs  at node Outlet
Beginning iteration 1
Discharge: 10.10 cfs  at node I-1
Discharge: 43.60 cfs  at node I-2
Discharge: 52.66 cfs  at node J-2
Discharge: 51.87 cfs  at node Outlet
Completed iteration 1
Current discharge convergence relative error:  0.60927712e-2
Target discharge convergence relative error:  0.001
Beginning iteration 2
Discharge: 10.10 cfs  at node I-1
Discharge: 43.60 cfs  at node I-2
Discharge: 52.66 cfs  at node J-2
Discharge: 51.87 cfs  at node Outlet
Discharge Convergence Achieved in 2 iterations: relative error:  0.28454799e-4
** Warning: Design constraints not met.
Violation: P-11 does not meet minimum cover constraint at downstream end.
--------------------- Calculations Complete ----------------------

** Analysis Options **
Friction method:  Manning's Formula
Hydraulic Grade Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Flow Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3
```

---------- Network Quick View ----------

				Hydraulic Grade	
Label	Length	Size	Discharge	Upstream	Downstream
P-3	45.00	24 inch	10.10	5,260.40	5,256.66
P-4	184.00	42 inch	43.60	5,258.79	5,256.66
P-11	296.00	42 inch	52.66	5,255.97	5,244.32

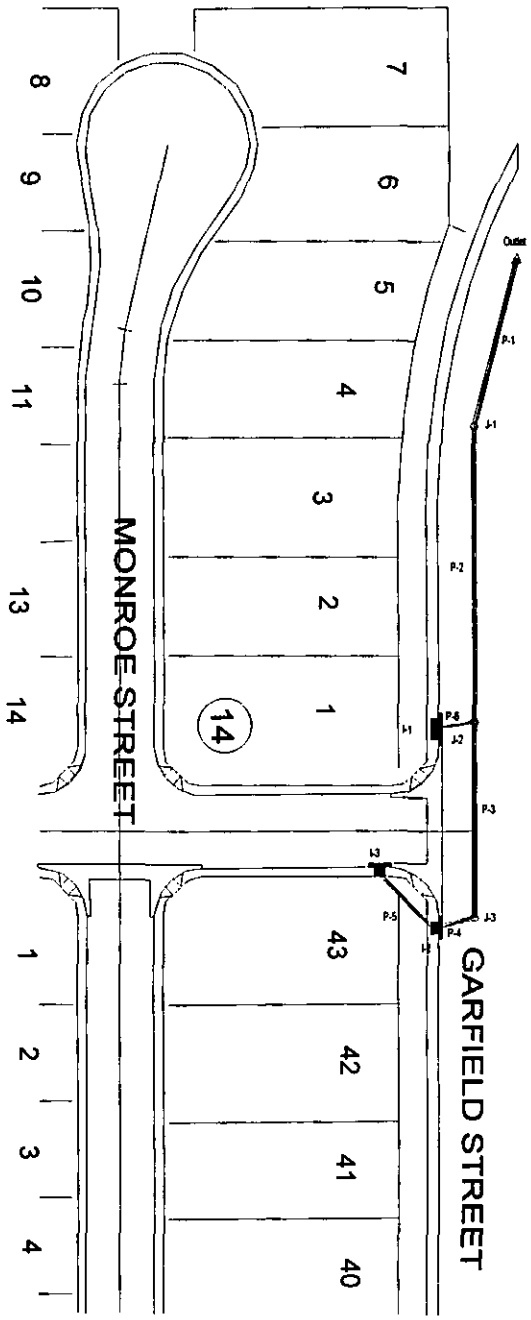
		Elevations		
Label	Discharge	Ground	Upstream HGL	Downstream HGL
J-2	52.66	5,264.50	5,256.66	5,255.97
I-1	10.10	5,268.80	5,260.63	5,260.40
I-2	43.60	5,265.00	5,259.21	5,258.79
Outlet	51.87	0.00	5,244.32	5,244.32

Elapsed: 0 minute(s) 2 second(s)

Combined Pipe/Node Report

Pipe	Upstream Node	Downstream Node	Length (ft)	Inlet Area (acres)	Section Size	Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (%)	Discharge (cfs)	Downstream HGL (ft)	Upstream HGL (ft)
P-3	I-1	J-2	45.00	2.34	24 inch	70.40	4.46	5,259.26	5,254.90	9.69	10.10	5,256.66	,260.40
P-4	I-2	J-2	84.00	10.13	42 inch	124.77	6.38	5,256.73	5,253.90	1.54	43.60	5,256.66	,258.79
P-11	J-2	Outlet	96.00	N/A	42 inch	190.74	12.46	5,253.70	5,243.06	3.59	52.66	5,244.32	,255.97

 Carroll & Lange Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666



Project Title: Cherrywood
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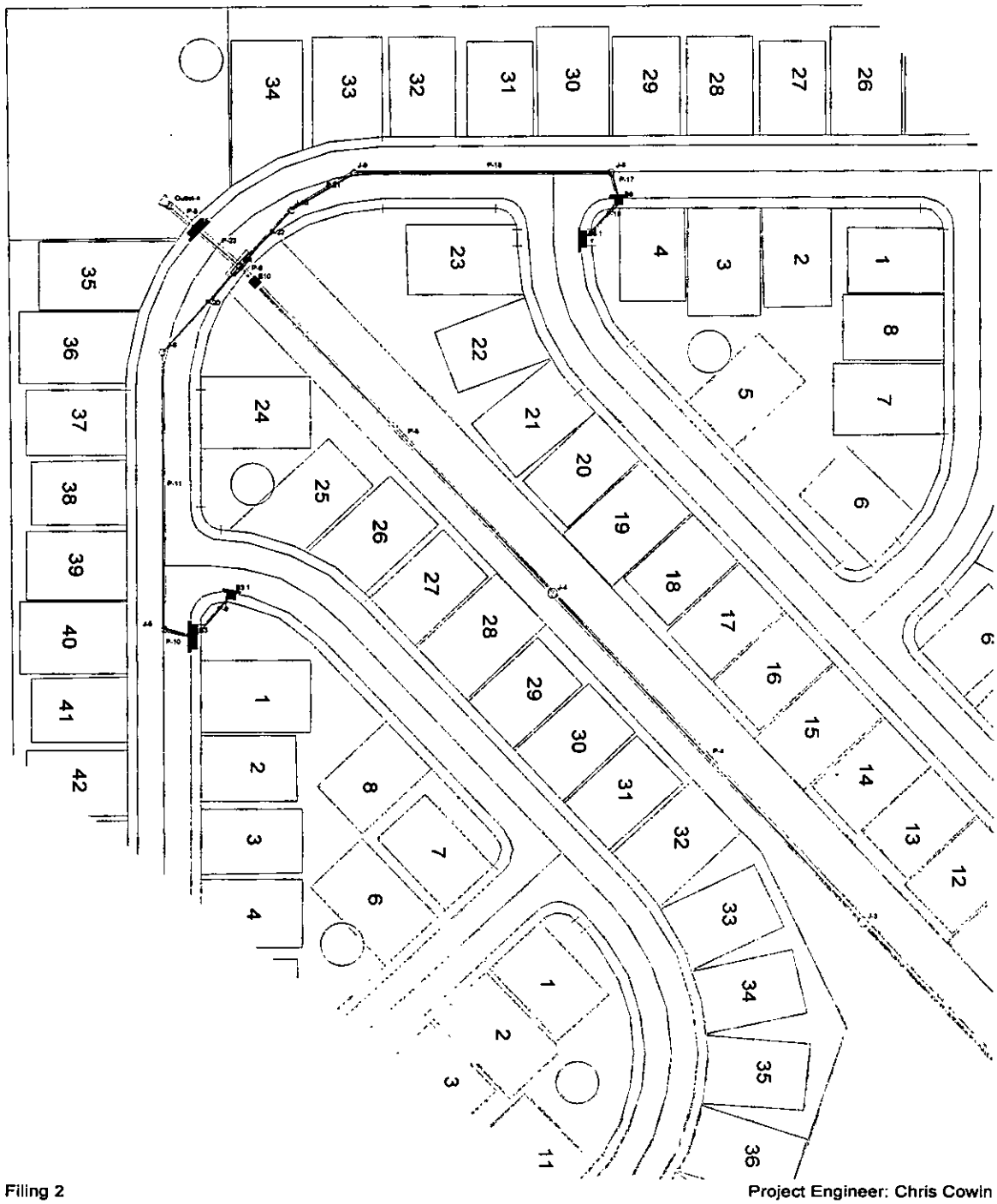
Carroll & Lange Inc
 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Project Engineer: Elaine Kaido
StormCAD v1.5 [158]

[redacted] Combined Pipe/Node Report

Pipe	Up Node	Down Node	Size	Length (ft)	Up Invert (ft)	Down Invert (ft)	Slope (%)	Q (cfs)	V avg (ft/s)	Up HGL (ft)	Down HGL (ft)
P-5	I-3	I-2	18 inch	42.00	5,281.82	5,281.40	1.00	4.70	5.21	5,282.65	5,282.11
P-4	I-2	J-3	24 inch	22.00	5,280.90	5,280.50	1.82	8.41	6.23	5,281.93	5,281.29
P-3	J-3	J-2	24 inch	102.00	5,280.30	5,277.90	2.35	8.39	5.07	5,281.33	5,278.95
P-6	I-1	J-2	15 inch	21.00	5,278.66	5,278.45	1.00	4.00	5.11	5,279.47	5,279.17
P-2	J-2	J-1	24 inch	152.00	5,277.70	5,271.20	4.28	12.14	9.19	5,278.95	5,271.90
P-1	J-1	Outlet	24 inch	89.00	5,271.00	5,268.00	3.37	12.00	8.55	5,272.24	5,268.74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P3
P2
P1
POND OUTLET
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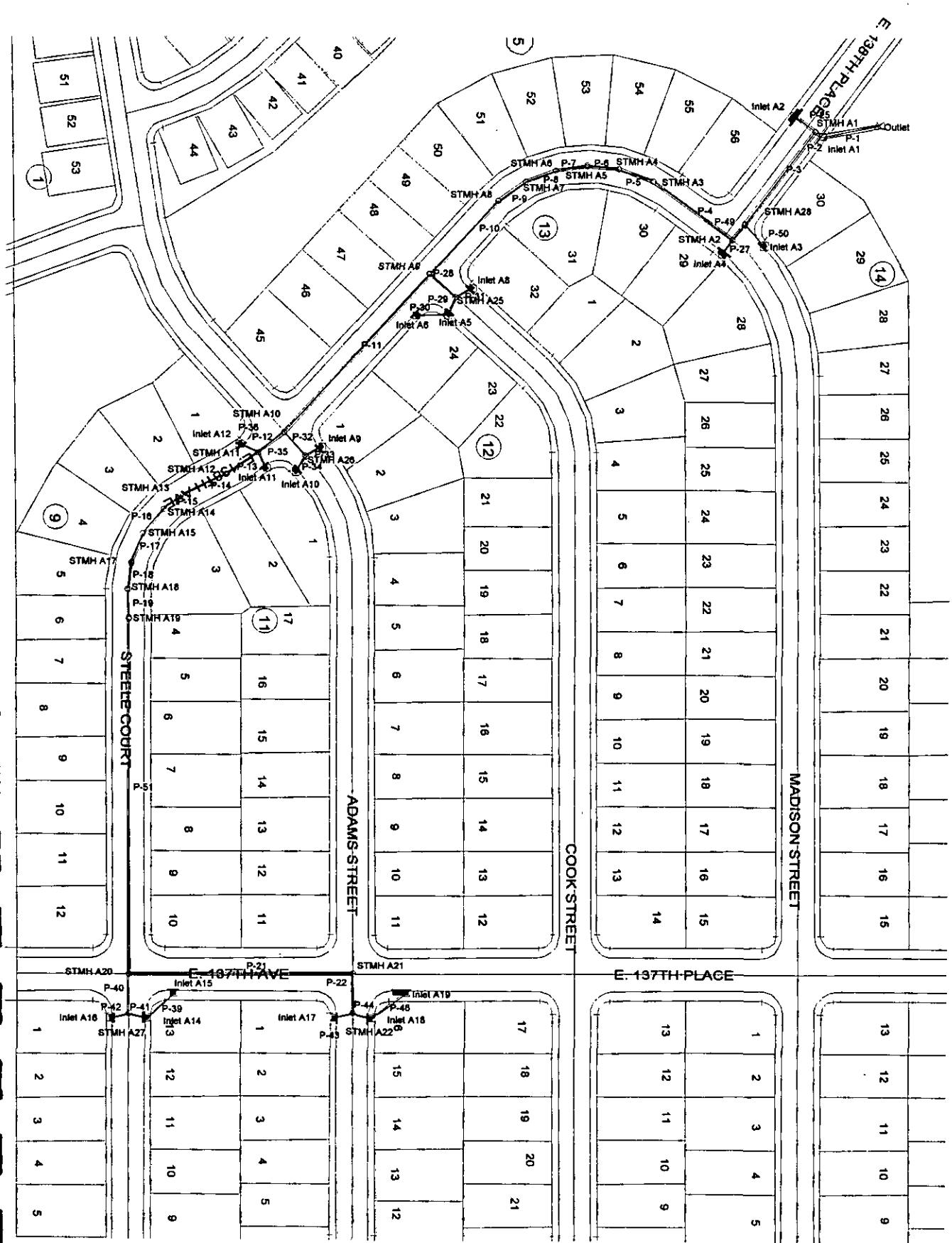
C&L Combined Pipe/Node Report

Pipe	Up Node	Down Node	Size	Length (ft)	Up Invert (ft)	Down Invert (ft)	Slope (%)	Q (cfs)	V avg (ft/s)	Up HGL (ft)	Down HGL (ft)
P-1	POND OUTLET	J-1	42 inch	145.00	39.00	37.89	0.77	0.00	0.00	39.00	37.89
P-16	B8.1	B8	15 inch	36.00	31.35	30.99	1.00	5.80	5.80	32.32	31.92
P-2	J-1	J-2	42 inch	104.00	37.69	35.63	1.98	0.00	0.00	37.69	35.63
P-17	B8	J-8	24 inch	20.00	30.24	30.14	0.50	6.34	4.46	31.13	31.10
P-9	B3.1	B3	15 inch	38.00	29.59	29.44	0.41	2.20	3.21	30.25	30.14
P-3	J-2	J-3	42 inch	304.00	35.43	30.87	1.50	0.00	0.00	35.43	30.87
P-18	J-8	J-9	24 inch	175.00	29.94	26.63	1.89	6.32	3.34	30.83	29.65
P-10	B3	J-5	24 inch	21.00	28.69	28.58	0.50	8.16	3.54	30.02	30.01
P-4	J-3	J-4	42 inch	311.00	30.67	26.01	1.50	0.00	0.00	30.67	29.57
P-21	J-9	J-10	24 inch	51.00	26.43	25.34	2.14	6.12	1.95	29.61	29.57
P-11	J-5	J-6	24 inch	192.00	28.38	25.73	1.38	8.13	2.91	29.88	29.69
P-5	J-4	B10	42 inch	296.00	25.81	24.72	0.37	0.00	0.00	29.57	29.57
P-22	J-10	B4	24 inch	52.00	25.14	24.50	1.23	6.02	1.92	29.57	29.54
P-20	J-6	B4	24 inch	79.00	25.53	24.50	1.30	7.81	2.49	29.63	29.54
P-6	B10	B4	42 inch	15.00	24.52	24.50	0.13	19.70	2.05	29.54	29.54
P-23	B4	B5	42 inch	40.00	24.30	24.26	0.10	59.44	6.18	29.24	29.10
P-8	B5	Outlet-4	48 inch	22.00	24.06	24.00	0.27	81.68	6.50	28.77	28.70

 Carroll & Lange Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666



Project Title: cherrywood park fig 2 storm system 5
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05/04/00 09:56:56 AM © Haestad Methods, Inc.

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Project Engineer: Steve Pangburn
StormCAD v1.5 [158]
Page 1 of 1

C&L Combined Pipe/Node Report

Pipe	Up Node	Down Node	Size	Length (ft)	Up Invert (ft)	Down Invert (ft)	Slope (%)	Q (cfs)	V avg (ft/s)	Up HGL (ft)	Down HGL (ft)
P-50	Inlet A3	STMH A28	15 inch	32.00	5,246.61	5,245.33	4.0000	3.30	3.55	5,247.34	5,247.18
P-25	Inlet A2	STMH A1	24 inch	29.00	5,245.17	5,243.72	5.0000	28.97	9.22	5,247.32	5,246.84
P-3	STMH A28	STMH A1	42 inch	132.00	5,243.08	5,242.42	0.5000	39.90	4.15	5,247.05	5,246.84
P-2	STMH A1	Inlet A1	42 inch	10.00	5,242.22	5,242.17	0.5000	60.17	6.25	5,246.48	5,246.44
P-1	Inlet A1	Outlet	42 inch	63.00	5,241.97	5,241.65	0.5079	89.04	9.26	5,245.64	5,245.15

C&L Combined Pipe/Node Report

Pipe	Up Node	Down Node	Size	Length (ft)	Up Invert (ft)	Down Invert (ft)	Slope (%)	Q (cfs)	V avg (ft/s)	Up HGL (ft)	Down HGL (ft)
P-46	Inlet A19	Inlet A18	18 inch	50.00	5,277.23	5,277.08	0.3000	8.70	4.92	5,280.41	5,280.07
P-44	Inlet A18	STMH A22	21 inch	21.00	5,276.83	5,276.63	0.9524	12.26	5.10	5,279.83	5,279.70
P-43	Inlet A17	STMH A22	15 inch	21.00	5,278.17	5,277.33	4.0000	2.50	2.04	5,279.73	5,279.70
P-39	Inlet A15	Inlet A14	15 inch	43.00	5,276.76	5,276.58	0.4070	1.05	2.45	5,277.19	5,277.11
P-22	STMH A22	STMH A21	21 inch	45.00	5,276.43	5,276.10	0.7333	14.37	5.98	5,279.37	5,279.00
P-42	Inlet A16	STMH A27	15 inch	21.00	5,277.36	5,276.23	5.3730	1.50	2.61	5,277.84	5,277.03
P-41	Inlet A14	STMH A27	15 inch	21.00	5,276.38	5,276.23	0.6905	2.07	2.89	5,277.01	5,277.03
P-21	STMH A21	STMH A20	21 inch	250.00	5,275.90	5,274.65	0.5000	14.30	5.95	5,278.56	5,276.52
P-40	STMH A27	STMH A20	15 inch	46.00	5,276.08	5,274.95	2.4565	3.52	3.70	5,276.84	5,276.52
P-51	STMH A20	STMH A19	21 inch	405.00	5,274.45	5,256.18	4.5111	17.11	7.42	5,275.97	5,260.46
P-19	STMH A19	STMH A18	21 inch	33.00	5,255.98	5,255.32	2.0000	16.54	6.88	5,260.10	5,259.74
P-18	STMH A18	STMH A17	21 inch	30.00	5,255.12	5,254.82	1.0000	16.49	6.86	5,259.37	5,259.05
P-17	STMH A17	STMH A15	21 inch	35.00	5,254.62	5,254.27	1.0000	16.45	6.84	5,258.68	5,258.31
P-16	STMH A15	STMH A14	21 inch	37.00	5,254.07	5,253.70	1.0000	16.40	6.82	5,257.95	5,257.55
P-15	STMH A14	STMH A13	21 inch	27.00	5,253.50	5,252.96	2.0000	16.35	6.80	5,257.19	5,256.90
P-14	STMH A13	STMH A12	21 inch	54.00	5,252.76	5,252.22	1.0000	16.31	6.78	5,256.55	5,255.97
P-30	Inlet A6	Inlet A5	15 inch	36.00	5,250.56	5,250.20	1.0000	0.60	0.49	5,253.64	5,253.64
P-34	Inlet A10	STMH A26	15 inch	21.00	5,251.64	5,251.48	0.7619	2.80	2.28	5,254.94	5,254.90
P-33	Inlet A9	STMH A26	18 inch	21.00	5,251.39	5,251.23	0.7619	4.70	2.66	5,254.95	5,254.90
P-36	Inlet A12	STMH A11	15 inch	22.00	5,252.30	5,252.10	0.9091	3.60	2.93	5,255.24	5,255.17
P-35	Inlet A11	STMH A11	15 inch	21.00	5,252.27	5,252.06	1.0000	3.20	2.61	5,255.22	5,255.17
P-13	STMH A12	STMH A11	21 inch	43.00	5,252.12	5,251.56	1.3023	16.23	6.75	5,255.62	5,255.17
P-31	Inlet A8	STMH A25	18 inch	21.00	5,250.36	5,249.94	2.0000	4.90	2.77	5,253.59	5,253.54
P-29	Inlet A5	STMH A25	15 inch	21.00	5,250.20	5,249.99	1.0000	2.87	2.34	5,253.59	5,253.54
P-32	STMH A26	STMH A10	21 inch	36.00	5,250.98	5,250.71	0.7500	7.35	3.06	5,254.82	5,254.74
P-12	STMH A11	STMH A10	30 inch	38.00	5,250.81	5,250.16	1.7105	22.21	4.53	5,254.85	5,254.74
P-28	STMH A25	STMH A9	18 inch	40.00	5,249.74	5,248.94	2.0000	7.71	4.36	5,253.37	5,253.15
P-11	STMH A10	STMH A9	30 inch	242.00	5,249.96	5,248.14	0.7521	28.50	5.81	5,254.32	5,253.15
P-10	STMH A9	STMH A8	30 inch	114.00	5,247.94	5,247.08	0.7544	34.37	7.00	5,252.69	5,251.89
P-9	STMH A8	STMH A7	30 inch	38.00	5,246.88	5,246.69	0.5000	34.06	6.94	5,251.48	5,251.22
P-8	STMH A7	STMH A6	30 inch	36.00	5,246.49	5,246.31	0.5000	33.96	6.92	5,250.81	5,250.56
P-7	STMH A6	STMH A5	30 inch	36.00	5,246.11	5,245.93	0.5000	33.86	6.90	5,250.16	5,249.91
P-6	STMH A5	STMH A4	30 inch	36.00	5,245.73	5,245.55	0.5000	33.77	6.88	5,249.51	5,249.26
P-5	STMH A4	STMH A3	30 inch	41.00	5,245.35	5,245.14	0.5122	33.67	6.86	5,248.86	5,248.59
P-27	Inlet A4	STMH A2	18 inch	20.00	5,245.49	5,245.39	0.5000	5.00	2.83	5,247.49	5,247.45
P-4	STMH A3	STMH A2	30 inch	110.00	5,244.94	5,244.39	0.5000	33.56	6.84	5,248.19	5,247.45
P-49	STMH A2	STMH A28	42 inch	22.00	5,243.39	5,243.28	0.5000	37.43	3.89	5,247.21	5,247.18

APPENDIX C

CUHP/SWMM Calculations

CUHP 5 Year Developed Calculations

Summary of Calculation to Stonehocker Property

100-Year

Total Historic Drainage Area	185 Acres
Shadow Ridge Area (Existing Detention) Subtract from Historic Drainage Area	21.6 Acres
Total Area for Detention Calculation	163.4 Acres
Allowable Discharge is .5 CFS/Acre	81.7 CFS
Shadow Ridge Area Discharge Detained discharge added in as a pass through	19 CFS
Minor flows diverted to west through Filing 5 From MMC Eng. (Feb. 23, 2000)	10.5 CFS
Total Discharge to Stonehocker	90.2 CFS

5-Year

Total Historic Drainage Area	185 Acres
Shadow Ridge Area (Existing Detention) Subtract from Historic Drainage Area	0 Acres
Total Area for Detention Calculation	185 Acres
Allowable Discharge is .2 CFS/Acre	37 CFS
Minor flows diverted to west through Filing 5 From MMC Eng. (Feb. 23, 2000)	9.2 CFS
Total Discharge to Stonehocker	27.8 CFS

Carroll & Lange inc
165 South Union Blvd., Suite 156
Lakewood, Colorado 80228
303/980-0200
Fax: 303/980-0917

Job. No. _____

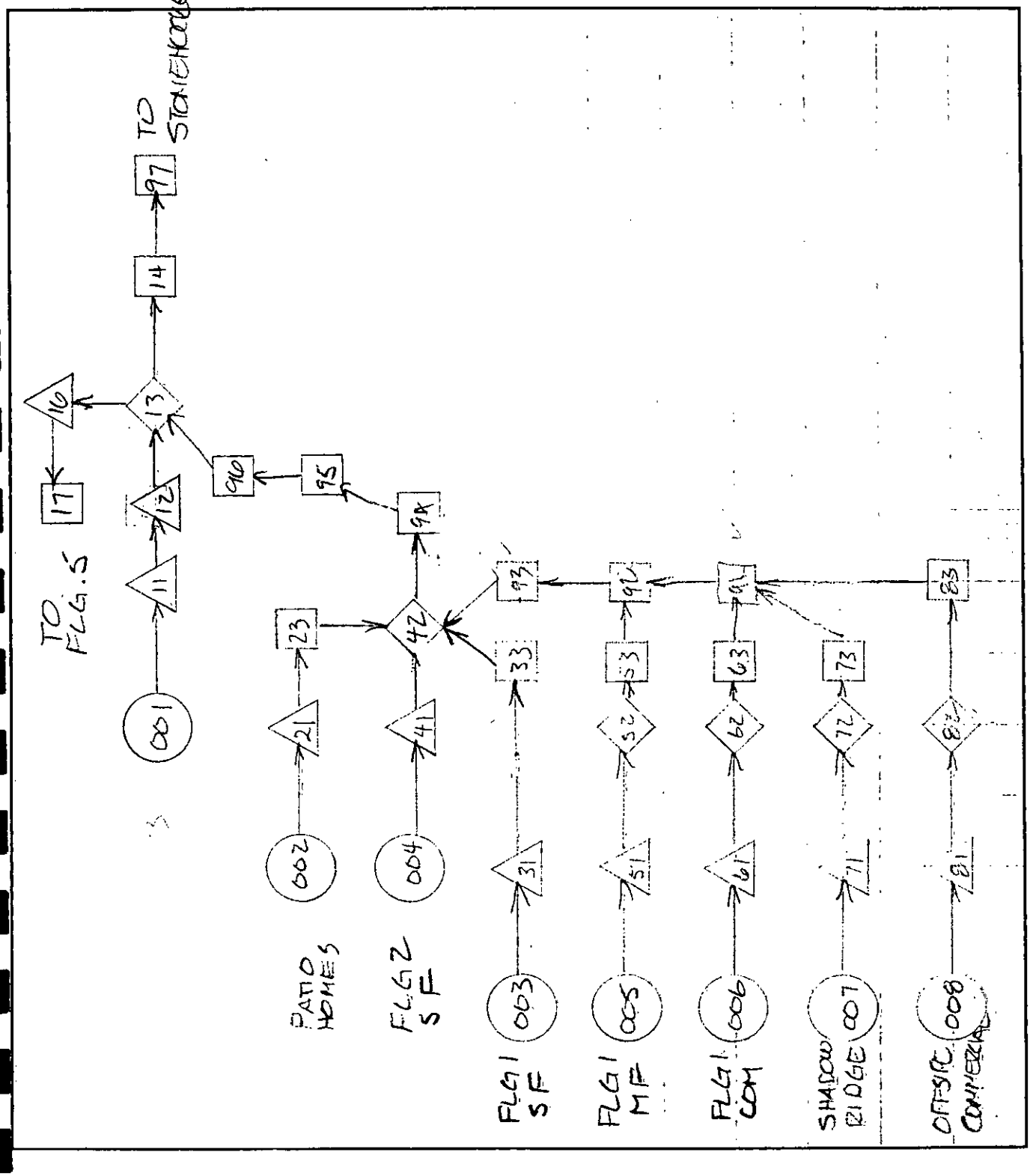
Date ____/____/____

Sheet ____ of ____

By _____

PROJECT _____

Subject _____



CUHP 5 Year Developed Calculations

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-F1 -- BASIN COMMENT: Single Family F1 PD Area F Patio Homes

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.04	.25	.19	50.00	.0254	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.088	.378

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
6.72	14.20	3444.56	123.66	1.91

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 5.43)

WIDTH AT 50 = 9. MIN. WIDTH AT 75 = 5. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	15.	46.	30.	9.
5.	102.	20.	27.	35.	0.
10.	85.	25.	15.	0.	0.

1 BASIN ID: SF-F1 -- BASIN COMMENT: Single Family F1 PD Area F Patio Homes

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	65.	.06	.034	11.
5.	.01	.000	0.	70.	.03	.013	8.
10.	.04	.003	0.	75.	.03	.013	6.
15.	.07	.031	3.	80.	.02	.008	4.
20.	.11	.054	8.	85.	.02	.008	3.
25.	.20	.094	16.	90.	.02	.008	3.
30.	.35	.235	35.	95.	.02	.008	2.

35.	.20	.170	44.	*	100.	.02	.008	2.	*
40.	.11	.088	38.	*	105.	.02	.008	2.	*
45.	.09	.064	30.	*	110.	.02	.008	2.	*
50.	.07	.048	23.	*	115.	.02	.008	2.	*
55.	.06	.034	17.	*	120.	.02	.008	2.	*
60.	.06	.034	13.	*	125.	.00	.000	1.	*

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = .990 INCHES
VOLUME OF EXCESS PRECIP = 2. ACRE-FEET
PEAK Q = 44. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .60
I = 3.3 INCHES/HOUR
A = 23.0 ACRES
Q = 46. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-F2 -- BASIN COMMENT: Single Family F2 PD Area F Patio Homes

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.01	.22	.16	50.00	.0105	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.088	.319

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
7.55	16.40	2423.92	27.63	.61

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 5.66)

WIDTH AT 50 = 12. MIN. WIDTH AT 75 = 6. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH		TIME	UNIT HYDROGRAPH		TIME	UNIT HYDROGRAPH	
0.	0.	*	15.	15.	*	30.	9.	*
5.	22.	*	20.	12.	*	35.	8.	*
10.	24.	*	25.	11.	*	40.	0.	*

1 BASIN ID: SF-F2 -- BASIN COMMENT: Single Family F2 PD Area F Patio Homes

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	.00	.000	0.	*	45.	.09	.064	11.	*
5.	.01	.000	0.	*	50.	.07	.048	10.	*
10.	.04	.003	0.	*	55.	.06	.034	9.	*
15.	.07	.031	1.	*	60.	.06	.034	8.	*
20.	.11	.054	2.	*	65.	.06	.034	6.	*
25.	.20	.094	4.	*	70.	.03	.013	4.	*
30.	.35	.235	9.	*	75.	.03	.013	3.	*
35.	.20	.170	12.	*	80.	.02	.008	2.	*
40.	.11	.088	12.	*	85.	.02	.008	2.	*

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = .990 INCHES
VOLUME OF EXCESS PRECIP = 1. ACRE-FEET
PEAK Q = 12. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .60
I = 3.1 INCHES/HOUR
A = 7.3 ACRES
Q = 14. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-A -- BASIN COMMENT: Single Family PD Area A

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.07	.44	.38	45.00	.0130	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.091	.391

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
9.60	22.80	2112.18	157.99	3.99

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 9.00)

WIDTH AT 50 = 14. MIN. WIDTH AT 75 = 7. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	20.	73.	40.	18.
5.	88.	25.	51.	45.	12.
10.	158.	30.	36.	50.	9.
15.	108.	35.	25.	55.	0.

1 BASIN ID: SF-A -- BASIN COMMENT: Single Family PD Area A

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	70.	.03	.012	25.
5.	.01	.000	0.	75.	.03	.012	19.
10.	.04	.003	0.	80.	.02	.007	14.
15.	.07	.028	3.	85.	.02	.007	10.
20.	.11	.049	9.	90.	.02	.007	8.
25.	.20	.085	18.	95.	.02	.007	6.
30.	.35	.224	41.	100.	.02	.007	5.
35.	.20	.168	64.	105.	.02	.007	5.
40.	.11	.086	68.	110.	.02	.007	5.
45.	.09	.062	60.	115.	.02	.007	4.
50.	.07	.046	52.	120.	.02	.007	4.
55.	.06	.032	43.	125.	.00	.000	4.
60.	.06	.032	36.	130.	.00	.000	2.
65.	.06	.032	31.	135.	.00	.000	2.

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = .937 INCHES
VOLUME OF EXCESS PRECIP = 4. ACRE-FEET
PEAK Q = 68. CFS TIME OF PEAK = 40. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .57
I = 2.6 INCHES/HOUR
A = 47.9 ACRES
Q = 71. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-E -- BASIN COMMENT: Single Family PD Area E

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.07	.53	.43	44.00	.0240	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)

.091 .383

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
9.65	23.20	2057.06	152.02	3.94

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 9.11)

WIDTH AT 50 = 15. MIN. WIDTH AT 75 = 8. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	20.	72.	40.	18.
5.	87.	25.	51.	45.	13.
10.	152.	30.	36.	50.	9.
15.	106.	35.	26.	55.	0.

1 BASIN ID: SF-E -- BASIN COMMENT: Single Family PD Area E

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	70.	.03	.012	25.
5.	.01	.000	0.	75.	.03	.012	19.
10.	.04	.003	0.	80.	.02	.007	14.
15.	.07	.027	3.	85.	.02	.007	10.
20.	.11	.047	9.	90.	.02	.007	8.
25.	.20	.083	17.	95.	.02	.007	6.
30.	.35	.222	39.	100.	.02	.007	5.
35.	.20	.168	62.	105.	.02	.007	5.
40.	.11	.086	66.	110.	.02	.007	4.
45.	.09	.062	59.	115.	.02	.007	4.
50.	.07	.045	50.	120.	.02	.007	4.
55.	.06	.032	42.	125.	.00	.000	3.
60.	.06	.032	35.	130.	.00	.000	2.
65.	.06	.032	30.	135.	.00	.000	2.

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = .927 INCHES
VOLUME OF EXCESS PRECIP = 4. ACRE-FEET
PEAK Q = 66. CFS TIME OF PEAK = 40. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .56
I = 2.6 INCHES/HOUR
A = 47.3 ACRES

Q = 69. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: MF-G -- BASIN COMMENT: Multi Family PD Area G

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.03	.21	.14	50.00	.0350	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.088	.360

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
4.76	9.00	6111.84	156.46	1.37

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 4.69)

WIDTH AT 50 = 5. MIN. WIDTH AT 75 = 3. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	10.	50.	20.	0.
5.	155.	15.	17.	0.	0.

1 BASIN ID: MF-G -- BASIN COMMENT: Multi Family PD Area G

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	60.	.06	.034	8.
5.	.01	.000	0.	65.	.06	.034	8.
10.	.04	.003	1.	70.	.03	.013	4.
15.	.07	.031	5.	75.	.03	.013	3.
20.	.11	.054	10.	80.	.02	.008	2.
25.	.20	.094	18.	85.	.02	.008	2.
30.	.35	.235	42.	90.	.02	.008	2.

35.	.20	.170	40.	*	95.	.02	.008	2.	*
40.	.11	.088	26.	*	100.	.02	.008	2.	*
45.	.09	.064	17.	*	105.	.02	.008	2.	*
50.	.07	.048	12.	*	110.	.02	.008	2.	*
55.	.06	.034	9.	*	115.	.02	.008	2.	*

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = .990 INCHES
VOLUME OF EXCESS PRECIP = 1. ACRE-FEET
PEAK Q = 42. CFS TIME OF PEAK = 30. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .60
I = 4.0 INCHES/HOUR
A = 16.4 ACRES
Q = 39. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: COM-I -- BASIN COMMENT: Commercial PD Area I

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.02	.18	.08	95.00	.0340	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.074	.473

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
4.33	10.00	9912.16	217.08	1.17

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 3.80)

WIDTH AT 50 = 3. MIN. WIDTH AT 75 = 2. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .10 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH		TIME	UNIT HYDROGRAPH		TIME	UNIT HYDROGRAPH	
0.	0.	*	10.	31.	*	0.	0.	*
5.	183.	*	15.	0.	*	0.	0.	*

1 BASIN ID: COM-I -- BASIN COMMENT: Commercial PD Area I

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	60.	.06	.052	11.
5.	.01	.000	0.	65.	.06	.052	11.
10.	.04	.000	0.	70.	.03	.026	6.
15.	.07	.020	4.	75.	.03	.026	5.
20.	.11	.103	19.	80.	.02	.015	4.
25.	.20	.179	36.	85.	.02	.015	3.
30.	.35	.327	65.	90.	.02	.015	3.
35.	.20	.187	44.	95.	.02	.015	3.
40.	.11	.106	25.	100.	.02	.015	3.
45.	.09	.082	18.	105.	.02	.015	3.
50.	.07	.065	14.	110.	.02	.015	3.
55.	.06	.052	12.	115.	.02	.015	3.

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = 1.415 INCHES
VOLUME OF EXCESS PRECIP = 2. ACRE-FEET
PEAK Q = 65. CFS TIME OF PEAK = 30. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .10 IN.

RATIONAL FORMULA C = .86
I = 3.8 INCHES/HOUR
A = 14.0 ACRES
Q = 46. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-SR -- BASIN COMMENT: Single Family Shadow Ridge

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.05	.22	.12	45.00	.0180	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.091	.362

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
6.99	15.40	3102.70	141.17	2.43

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 5.04)

WIDTH AT 50 = 10. MIN. WIDTH AT 75 = 5. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	15.	59.	30.	13.
5.	114.	20.	35.	35.	8.
10.	103.	25.	21.	40.	0.

1 BASIN ID: SF-SR -- BASIN COMMENT: Single Family Shadow Ridge

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	65.	.06	.032	14.
5.	.01	.000	0.	70.	.03	.012	10.
10.	.04	.003	0.	75.	.03	.012	7.
15.	.07	.028	3.	80.	.02	.007	5.
20.	.11	.049	9.	85.	.02	.007	4.
25.	.20	.085	17.	90.	.02	.007	3.
30.	.35	.224	38.	95.	.02	.007	3.
35.	.20	.168	50.	100.	.02	.007	3.
40.	.11	.086	45.	105.	.02	.007	3.
45.	.09	.062	37.	110.	.02	.007	3.
50.	.07	.046	29.	115.	.02	.007	3.
55.	.06	.032	22.	120.	.02	.007	3.
60.	.06	.032	18.	125.	.00	.000	2.

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = .937 INCHES.
VOLUME OF EXCESS PRECIP = 2. ACRE-FEET
PEAK Q = 50. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .57
I = 3.2 INCHES/HOUR
A = 29.1 ACRES
Q = 53. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-OC -- BASIN COMMENT: Offsite Commercial

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.01	.09	.04	95.00	.0210	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.074	.430

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
4.33	10.00	9010.94	104.53	.62

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 3.25)

WIDTH AT 50 = 3. MIN. WIDTH AT 75 = 2. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .10 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	10.	18.	0.	0.
5.	91.	15.	0.	0.	0.

1 BASIN ID: SF-OC -- BASIN COMMENT: Offsite Commercial

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 5-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	60.	.06	.052	6.
5.	.01	.000	0.	65.	.06	.052	6.
10.	.04	.000	0.	70.	.03	.026	3.
15.	.07	.020	2.	75.	.03	.026	3.
20.	.11	.103	10.	80.	.02	.015	2.
25.	.20	.179	18.	85.	.02	.015	2.
30.	.35	.327	33.	90.	.02	.015	2.
35.	.20	.187	23.	95.	.02	.015	2.
40.	.11	.106	13.	100.	.02	.015	2.
45.	.09	.082	9.	105.	.02	.015	2.
50.	.07	.065	7.	110.	.02	.015	2.
55.	.06	.052	6.	115.	.02	.015	2.

TOTAL PRECIP. = 1.64 (1-HOUR RAIN = 1.42) EXECESS PRECIP. = 1.415 INCHES
VOLUME OF EXCESS PRECIP = 1. ACRE-FEET
PEAK Q = 33. CFS TIME OF PEAK = 30. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .10 IN.

RATIONAL FORMULA C = .86
I = 3.8 INCHES/HOUR
A = 7.4 ACRES
Q = 25. CFS

1 U.D.F.C.D. CUHPD RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985 TO WRITE OUTPUT FILE OF STORM HYDROGRAPHS FOR SUBSEQUENT

USE WITH MULTI-PLAN RIVER ROUTING ROUTINES OF HEC-1

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

NO HYDROGRAPH VALUES WERE WRITTEN TO AN OUTPUTFILE FOR THIS RUN OF CUHPD.

A = 7.4 ACRES

Q = 25. CFS

1 U.D.F.C.D. CUHPD RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985 TO WRITE OUTPUT FILE OF STORM HYDROGRAPHS FOR SUBSEQUENT
USE WITH MULTI-PLAN RIVER ROUTING ROUTINES OF HEC-1

Cherrywood: 11/99 5-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,S

SWMM 5 Year Developed Calculations

1

ENVIRONMENTAL PROTECTION AGENCY - STORM WATER MANAGEMENT MODEL - VERSION PC.1

DEVELOPED BY METCALF + EDDY, INC.

UNIVERSITY OF FLORIDA

WATER RESOURCES ENGINEEERS, INC. (SEPTEMBER 1970)

UPDATED BY UNIVERSITY OF FLORIDA (JUNE 1973)

HYDROLOGIC ENGINEERING CENTER, CORPS OF ENGINEERS

MISSOURI RIVER DIVISION, CORPS OF ENGINEERS (SEPTEMBER 1974)

BOYLE ENGINEERING CORPORATION (MARCH 1985, JULY 1985)

0TAPE OR DISK ASSIGNMENTS

JIN(1)	JIN(2)	JIN(3)	JIN(4)	JIN(5)	JIN(6)	JIN(7)	JIN(8)	JIN(9)	JIN(10)
2	1	0	0	0	0	0	0	0	0

JOUT(1)	JOUT(2)	JOUT(3)	JOUT(4)	JOUT(5)	JOUT(6)	JOUT(7)	JOUT(8)	JOUT(9)	JOUT(10)
1	2	0	0	0	0	0	0	0	0

NSCRAT(1)	NSCRAT(2)	NSCRAT(3)	NSCRAT(4)	NSCRAT(5)
3	4	0	0	0

1

WATERSHED PROGRAM CALLED

*** ENTRY MADE TO RUNOFF MODEL ***

Cherrywood: 2/00 5-yr With .2 cfs discharge from property
CARROLL & LANGE, INC

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES), 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
1

Cherrywood: 2/00 5-yr With .2 cfs discharge from property
CARROLL & LANGE, INC

HYDROGRAPHS FROM CUHPE/PC ARE LISTED FOR THE FOLLOWING 8 SUBCATCHMENTS

TIME(HR/MIN)		1	2	3	4	5	6	7	8
0	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	5.	0.	0.	0.	0.	0.	0.	0.	0.
0	10.	0.	0.	0.	0.	1.	0.	0.	0.
0	15.	3.	1.	3.	3.	5.	4.	4.	2.
0	20.	8.	2.	9.	9.	10.	19.	9.	10.
0	25.	16.	4.	18.	17.	18.	36.	17.	18.
0	30.	35.	9.	41.	39.	42.	65.	38.	33.
0	35.	44.	12.	64.	62.	40.	44.	50.	23.
0	40.	38.	12.	68.	66.	26.	25.	45.	13.
0	45.	30.	11.	60.	59.	17.	18.	37.	9.
0	50.	23.	10.	52.	50.	12.	14.	29.	7.
0	55.	17.	9.	43.	42.	9.	12.	22.	6.
1	0.	13.	8.	36.	35.	8.	11.	18.	6.
1	5.	11.	6.	31.	30.	8.	11.	14.	6.
1	10.	8.	4.	25.	25.	4.	6.	10.	3.
1	15.	6.	3.	19.	19.	3.	5.	7.	3.
1	20.	4.	2.	14.	14.	2.	4.	5.	2.
1	25.	3.	2.	10.	10.	2.	3.	4.	2.
1	30.	3.	1.	8.	8.	2.	3.	3.	2.

1	35.	2.	0.	6.	6.	2.	3.	3.	2.
1	40.	2.	0.	5.	5.	2.	3.	3.	2.
1	45.	2.	0.	5.	5.	2.	3.	3.	2.
1	50.	2.	0.	5.	4.	2.	3.	3.	2.
1	55.	2.	0.	4.	4.	2.	3.	3.	2.
2	0.	2.	0.	4.	4.	2.	3.	3.	2.
2	5.	1.	0.	4.	3.	0.	0.	2.	0.
2	10.	0.	0.	2.	2.	0.	0.	0.	0.
2	15.	0.	0.	2.	2.	0.	0.	0.	0.

1

Cherrywood: 2/00 5-yr With .2 cfs discharge from property
CARROLL & LANGE, INC

GUTTER NUMBER	GUTTER CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N	OVERBANK/SURCHARGE DEPTH (FT)		JK
81	82	0	3		.0	1.	.0010	.0	.0	.001	10.00		0
82	83	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10		0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	.2	2.8	.5	3.7	.8	1.5	1.1	1.5	1.4	1.5
		1.7	1.5	2.0	1.5								
83	91	0	2	PIPE	2.0	1512.	.0100	.0	.0	.013	2.00		0
71	72	0	3		.0	1.	.0010	.0	.0	.001	10.00		0
72	73	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10		0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	.0	3.1	.6	4.3	1.6	4.3	2.1	4.3	3.2	4.3
		3.9	4.3	4.5	4.3								
73	91	0	2	PIPE	2.5	1300.	.0100	.0	.0	.013	2.50		0
61	62	0	3		.0	1.	.0010	.0	.0	.001	10.00		0
62	63	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10		0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	.4	2.8	.9	2.8	1.5	2.8	2.1	2.8	2.7	2.8
		3.3	2.8	3.9	2.8								
63	91	0	2	PIPE	2.5	50.	.0100	.0	.0	.013	2.50		0
91	92	0	2	PIPE	3.0	142.	.0100	.0	.0	.013	3.00		0
51	52	0	3		.0	1.	.0010	.0	.0	.001	10.00		0
52	53	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10		0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											

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                    .0      .0       .5     3.3      1.0     3.3      1.6     3.3      2.2     3.3      2.8     3.3
                   3.4     3.3      4.0     3.3
  53        92       0       2      PIPE              2.5    100.   .0100      .0     .0    .013      2.50       0
  92        93       0       2      PIPE              3.5    500.   .0100      .0     .0    .013      3.50       0
  93        42       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  31        33       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  33        42       0       2      PIPE              4.0    175.   .0250      .0     .0    .013      4.00       0
  41        42       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  21        23       0       2      PIPE              2.0    100.   .2500      .0     .0    .013      2.00       0
  23        42       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  42        94       7       2      PIPE               .1      1.   .0050      .0     .0    .013      2.00       0
              RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                    .0      .0       .1     6.3       .9    14.2      4.0    19.0      9.8    23.0     18.0    26.1
                    .0      .0
  94        95       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  95        96       0       2      PIPE              5.0   1390.   .0100      .0     .0    .013      5.00       0
  96        13       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  11        12       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  12        13       1       2      PIPE             15.0      1.   .0050      .2     .2    .033     15.00      16
              DIVERSION TO GUTTER NUMBER  16 - TOTAL Q VS DIVERTED Q IN CFS
                 171.0     4.0
  16        17       0       3                         .0      1.   .0010      .0     .0    .001     10.00       0
  13        14       6       2      PIPE               .1      1.   .0050      .0     .0    .013       .10       0
              RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                    .0      .0       .3    15.9       .7    24.4      1.2    30.5      1.8    35.6      2.5    40.1
  14        97       0       2      PIPE              3.5     50.   .0100      .0     .0    .013      3.50       0
OTOTAL NUMBER OF GUTTERS/PIPES,  29
1
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Cherrywood: 2/00 5-yr With .2 cfs discharge from property
CARROLL & LANGE, INC

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE										TRIBUTARY SUBAREA										D.A.(AC)
11	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	23.0
12	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23.0
13	96	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192.4
14	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192.4
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0
21	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	7.3
23	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.3

31	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	47.9
33	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47.9
41	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	47.3
42	93	33	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4
51	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	16.4
52	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.4
53	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.4
61	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	14.0
62	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.0
63	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.0
71	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	29.1
72	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.1
73	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.1
81	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	7.4
82	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.4
83	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.4
91	83	73	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50.6
92	91	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66.9
93	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66.9
94	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4
95	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4
96	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4

ORDER OF TREE STRUCTURE (NGUT VALUE) DECREASES THROUGH DIVERSION FROM GUTTER 25 TO GUTTER 16 COMP THROUGH DIVERSION WILL LAG ONE TIME STEP UNLESS GUTTER CARDS ARE MODIFIED TO REVERSE DIVERSION.
1

Cherrywood: 2/00 5-yr With .2 cfs discharge from property
CARROLL & LANGE, INC

HYDROGRAPHS ARE LISTED FOR THE FOLLOWING 29 CONVEYANCE ELEMENTS

THE UPPER NUMBER IS DISCHARGE IN CFS
THE LOWER NUMBER IS ONE OF THE FOLLOWING CASES:
( ) DENOTES DEPTH ABOVE INVERT IN FEET
(S) DENOTES STORAGE IN AC-FT FOR DETENSION DAM. DISCHARGE INCLUDES SPILLWAY OUTFLOW.
(I) DENOTES GUTTER INFLOW IN CFS FROM SPECIFIED INFLOW HYDROGRAPH
(D) DENOTES DISCHARGE IN CFS DIVERTED FROM THIS GUTTER
(O) DENOTES STORAGE IN AC-FT FOR SURCHARGED GUTTER

TIME(HR/MIN)	81 51 42	82 52 94	83 53 11	71 92 12	72 93 13	73 31 14	61 33 16	62 41 95	63 21 96	91 23
0 5.	0. .0( )	0. .0(S)	0. .0( )	0. .0( )	0. .0(S)	0. .0( )	0. .0( )	0. .0(S)	0. .0( )	0. .0( )
	0. .0( )	0. .0(S)	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
	0. .0(S)	0. .0( )	0. .0( )	0. .0(D)	0. .0(S)	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
0 10.	0. .0( )	0. .0(S)	0. .0( )	0. .0( )	0. .0(S)	0. .1( )	0. .0( )	0. .0(S)	0. .0( )	0. .0( )
	1. .0( )	0. .0(S)	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .1( )	0. .0( )	0. .0( )	0. .0( )
	0. .0(S)	0. .0( )	0. .0( )	0. .0(D)	0. .0(S)	0. .1( )	0. .0( )	0. .0( )	0. .0( )	
0 15.	2. .0( )	0. .0(S)	0. .0( )	4. .0( )	3. .0(S)	1. .3( )	4. .0( )	0. .0(S)	0. .1( )	1. .2( )
	5. .0( )	0. .0(S)	0. .1( )	0. .2( )	0. .0( )	3. .0( )	3. .3( )	3. .0( )	1. .1( )	1. .0( )
	2. .0(S)	2. .0( )	3. .0( )	3. .1(D)	1. .0(S)	1. .2( )	0. .0( )	0. .1( )	0. .0( )	
0 20.	10. .0( )	1. .0(S)	0. .1( )	9. .0( )	3. .0(S)	3. .4( )	19. .0( )	1. .1(S)	1. .2( )	3. .5( )
	10. .0( )	0. .1(S)	0. .2( )	3. .4( )	3. .0( )	9. .0( )	9. .5( )	9. .0( )	2. .2( )	2. .0( )
	6. .1(S)	6. .0( )	8. .0( )	8. .2(D)	3. .1(S)	3. .4( )	0. .0( )	3. .4( )	3. .0( )	

0	25.	18.	2.	1.	17.	3.	3.	36.	2.	2.	6.										
		.0( )	.1(S)	.2( )	.0( )	.1(S)	.5( )	.0( )	.3(S)	.4( )	.6( )										
		18.	1.	1.	6.	6.	18.	18.	17.	4.	4.										
		.0( )	.2(S)	.3( )	.6( )	.0( )	.0( )	.8( )	.0( )	.3( )	.0( )										
		8.	8.	16.	16.	7.	7.	0.	7.	7.											
		.3(S)	.0( )	.0( )	.4(D)	.1(S)	.6( )	.0( )	.6( )	.0( )											
0	30.	33.	3.	2.	38.	4.	3.	65.	3.	3.	8.										
		.0( )	*.3(S)*	*.4( )*	*.0( )*	*.3(S)*	*.5( )*	*.0( )*	*.6(S)*	*.4( )*	*.7( )*										
		42.	2.	2.	10.	10.	41.	40.	39.	9.	9.										
		.0( )	.4(S)	.4( )	.7( )	.0( )	.0( )	1.1( )	.0( )	.4( )	.0( )										
		12.	12.	35.	35.	14.	14.	1.	10.	10.											
		.7(S)	.0( )	.0( )	.8(D)	.3(S)	.9( )	.0( )	.7( )	.0( )											
0	35.	23.	4.	3.	50.	4.	4.	44.	3.	3.	10.										
		.0( )	.5(S)	.5( )	.0( )	.5(S)	.5( )	.0( )	1.0(S)	.4( )	.8( )										
		40.	3.	3.	13.	13.	64.	64.	62.	12.	12.										
		.0( )	.6(S)	.5( )	.8( )	.0( )	.0( )	1.5( )	.0( )	.4( )	.0( )										
		15.	15.	44.	44.	20.	20.	1.	14.	14.											
		1.5(S)	*.0( )*	*.0( )*	*1.0(D)*	*.5(S)*	*1.1( )*	*.0( )*	*.8( )*	*.0( )*											
0	40.	13.	3.	3.	45.	4.	4.	25.	3.	3.	10.										
		.0( )	.6(S)	.5( )	.0( )	.8(S)	.5( )	.0( )	1.2(S)	.4( )	.8( )										
		26.	3.	3.	14.	14.	68.	68.	66.	12.	12.										
		.0( )	.8(S)	.5( )	.9( )	.0( )	.0( )	1.5( )	.0( )	.4( )	.0( )										
		17.	17.	38.	38.	25.	25.	1.	16.	16.											
		2.4(S)	.0( )	.0( )	.9(D)	.7(S)	1.2( )	.0( )	.8( )	.0( )											
0	45.	9.	3.	3.	37.	4.	4.	18.	3.	3.	10.										
		.0( )	.6(S)	.5( )	.0( )	1.1(S)	.5( )	.0( )	1.3(S)	.4( )	.8( )										
		17.	3.	3.	14.	14.	60.	61.	59.	11.	11.										
		.0( )	*1.0(S)*	*.5( )*	*.9( )*	*.0( )*	*.0( )*	*1.4( )*	*.0( )*	*.4( )*	*.0( )*										
		18.	18.	30.	30.	27.	27.	1.	17.	17.											
		3.3(S)	.0( )	.0( )	.7(D)	.9(S)	1.2( )	.0( )	.9( )	.0( )											
0	50.	7.	3.	3.	29.	4.	4.	14.	3.	3.	10.										
		.0( )	.6(S)	.5( )	.0( )	1.3(S)	.5( )	.0( )	1.4(S)	.4( )	.8( )										
		12.	3.	3.	13.	13.	52.	52.	50.	10.	10.										
		.0( )	1.0(S)	.5( )	.9( )	.0( )	.0( )	1.3( )	.0( )	.4( )	.0( )										

		19. 4.1(S)	19. .0( )	23. .0( )	23. .5(D)	28. 1.0(S)	28. 1.3( )	1. .0( )	19. .9( )	19. .0( )									
0	55.	6. .0( )	2. .7(S)	3. .5( )	22. .0( )	4. 1.4(S)	4. .5( )	12. .0( )	3. 1.5(S)	3. .4( )	10. .8( )								
		9. .0( )	3. 1.1(S)	3. .5( )	13. .9( )	13. .0( )	43. .0( )	43. 1.2( )	42. .0( )	9. .4( )	9. .0( )								
		20. 4.8(S)	20. .0( )	17. .0( )	17. .4(D)	29. 1.1(S)	29. 1.3( )	0. .0( )	19. .9( )	19. .0( )									
1	0.	6. .0( )	2. .7(S)	2. .4( )	18. .0( )	4. 1.5(S)	4. .5( )	11. .0( )	3. 1.5(S)	3. .4( )	9. .8( )								
		8. .0( )	3. 1.1(S)	3. .5( )	13. .8( )	13. .0( )	36. .0( )	36. 1.1( )	35. .0( )	8. .3( )	8. .0( )								
		20. 5.3(S)	20. .0( )	13. .0( )	13. .3(D)	30. 1.1(S)	29. 1.3( )	0. .0( )	20. .9( )	20. .0( )									
1	5.	6. .0( )	2. .7(S)	2. .4( )	14. .0( )	4. 1.6(S)	4. .5( )	11. .0( )	3. 1.6(S)	3. .4( )	9. .8( )								
		8. .0( )	3. 1.1(S)	3. .5( )	13. .8( )	13. .0( )	31. .0( )	31. 1.0( )	30. .0( )	6. .3( )	6. .0( )								
		20. 5.8(S)	20. .0( )	11. .0( )	11. .3(D)	30. 1.1(S)	30. 1.3( )	0. .0( )	20. .9( )	20. .0( )									
1	10.	3. .0( )	2. .7(S)	2. .4( )	10. .0( )	4. 1.7(S)	4. .5( )	6. .0( )	3. 1.6(S)	3. .4( )	9. .8( )								
		4. .0( )	3. 1.2(S)	3. .5( )	12. .8( )	12. .0( )	25. .0( )	25. .9( )	25. .0( )	4. .3( )	4. .0( )								
		21. 6.2(S)	21. .0( )	8. .0( )	8. .2(D)	30. 1.1(S)	30. 1.3( )	0. .0( )	20. .9( )	20. .0( )									
1	15.	3. .0( )	2. .7(S)	2. .4( )	7. .0( )	4. 1.7(S)	4. .5( )	5. .0( )	3. 1.7(S)	3. .4( )	9. .7( )								
		3. .0( )	3. 1.2(S)	3. .5( )	12. .8( )	12. .0( )	19. .0( )	19. .8( )	19. .0( )	3. .2( )	3. .0( )								
		21. 6.4(S)	21. .0( )	6. .0( )	6. .1(D)	30. 1.1(S)	30. 1.3( )	0. .0( )	21. 1.0( )	21. .0( )									
1	20.	2. .0( )	2. .8(S)	2. .4( )	5. .0( )	4. 1.7(S)	4. .5( )	4. .0( )	3. 1.7(S)	3. .4( )	9. .7( )								
		2.	3.	3.	12.	12.	14.	14.	14.	2.	2.								

		.0( )	1.2(S)	.5( )	.8( )	.0( )	.0( )	.7( )	.0( )	.2( )	.0( )								
		21.	21.	4.	4.	29.	29.	0.	21.	21.									
		6.6(S)	.0( )	.0( )	.1(D)	1.1(S)	1.3( )	.0( )	1.0( )	.0( )									
1	25.	2.	2.	2.	4.	4.	4.	3.	3.	3.	9.								
		.0( )	.8(S)	.4( )	.0( )	1.7(S)	.5( )	.0( )	1.7(S)	.4( )	.7( )								
		2.	3.	3.	12.	12.	10.	10.	10.	2.	2.								
		.0( )	1.2(S)	.5( )	.8( )	.0( )	.0( )	.6( )	.0( )	.2( )	.0( )								
		21.	21.	3.	3.	29.	29.	0.	21.	21.									
		6.7(S)	.0( )	.0( )	.1(D)	1.1(S)	1.3( )	.0( )	1.0( )	.0( )									
1	30.	2.	2.	2.	3.	4.	4.	3.	3.	3.	9.								
		.0( )	.8(S)	.4( )	.0( )	1.7(S)	.5( )	.0( )	1.7(S)	.4( )	.7( )								
		2.	3.	3.	12.	12.	8.	8.	8.	1.	1.								
		.0( )	1.1(S)	.5( )	.8( )	.0( )	.0( )	.5( )	.0( )	.2( )	.0( )								
		21.	21.	3.	3.	28.	28.	0.	21.	21.									
		6.8(S)	.0( )	.0( )	.1(D)	1.0(S)	1.3( )	.0( )	1.0( )	.0( )									
1	35.	2.	2.	2.	3.	4.	4.	3.	3.	3.	9.								
		.0( )	.7(S)	.4( )	.0( )	1.7(S)	.5( )	.0( )	1.7(S)	.4( )	.7( )								
		2.	3.	3.	12.	12.	6.	6.	6.	0.	0.								
		.0( )	1.1(S)	.5( )	.8( )	.0( )	.0( )	.5( )	.0( )	.0( )	.0( )								
		21.	21.	2.	2.	28.	28.	0.	21.	21.									
		6.9(S)	.0( )	.0( )	.1(D)	1.0(S)	1.3( )	.0( )	1.0( )	.0( )									
1	40.	2.	2.	2.	3.	4.	4.	3.	3.	3.	9.								
		.0( )	.7(S)	.4( )	.0( )	1.7(S)	.5( )	.0( )	1.7(S)	.4( )	.7( )								
		2.	3.	3.	12.	12.	5.	6.	5.	0.	0.								
		.0( )	1.1(S)	.5( )	.8( )	.0( )	.0( )	.4( )	.0( )	.0( )	.0( )								
		21.	21.	2.	2.	28.	28.	0.	21.	21.									
		6.9(S)	.0( )	.0( )	.1(D)	1.0(S)	1.3( )	.0( )	1.0( )	.0( )									
1	45.	2.	2.	2.	3.	4.	4.	3.	3.	3.	9.								
		.0( )	.7(S)	.4( )	.0( )	1.7(S)	.5( )	.0( )	1.7(S)	.4( )	.7( )								
		2.	3.	3.	12.	12.	5.	5.	5.	0.	0.								
		.0( )	1.1(S)	.5( )	.8( )	.0( )	.0( )	.4( )	.0( )	.0( )	.0( )								
		21.	21.	2.	2.	27.	27.	0.	21.	21.									
		6.9(S)	.0( )	.0( )	.1(D)	.9(S)	1.2( )	.0( )	1.0( )	.0( )									
1	50.	2.	2.	2.	3.	4.	4.	3.	3.	3.	9.								
		.0( )	.7(S)	.4( )	.0( )	1.7(S)	.5( )	.0( )	1.7(S)	.4( )	.7( )								

		2. .0( )	3. 1.1(S)	3. .5( )	12. .8( )	12. .0( )	5. .0( )	5. .4( )	4. .0( )	0. .0( )	0. .0( )
		21. 6.9(S)	21. .0( )	2. .0( )	2. .1(D)	27. .9(S)	27. 1.2( )	0. .0( )	21. 1.0( )	21. .0( )	
1	55.	2. .0( )	2. .7(S)	2. .4( )	3. .0( )	4. 1.7(S)	4. .5( )	3. .0( )	3. 1.7(S)	3. .4( )	9. .7( )
		2. .0( )	3. 1.1(S)	3. .5( )	12. .8( )	12. .0( )	4. .0( )	4. .4( )	4. .0( )	0. .0( )	0. .0( )
		21. 6.9(S)	21. .0( )	2. .0( )	2. .1(D)	27. .9(S)	27. 1.2( )	0. .0( )	21. 1.0( )	21. .0( )	
2	0.	2. .0( )	2. .7(S)	2. .4( )	3. .0( )	4. 1.6(S)	4. .5( )	3. .0( )	3. 1.7(S)	3. .4( )	9. .7( )
		2. .0( )	3. 1.1(S)	3. .5( )	12. .8( )	12. .0( )	4. .0( )	4. .4( )	4. .0( )	0. .0( )	0. .0( )
		21. 6.9(S)	21. .0( )	2. .0( )	2. .1(D)	26. .9(S)	26. 1.2( )	0. .0( )	21. 1.0( )	21. .0( )	
2	5.	0. .0( )	2. .7(S)	2. .4( )	2. .0( )	4. 1.6(S)	4. .5( )	0. .0( )	3. 1.7(S)	3. .4( )	9. .7( )
		0. .0( )	3. 1.1(S)	3. .5( )	12. .8( )	12. .0( )	4. .0( )	4. .4( )	3. .0( )	0. .0( )	0. .0( )
		21. 6.9(S)	21. .0( )	1. .0( )	1. .0(D)	26. .8(S)	26. 1.2( )	0. .0( )	21. 1.0( )	21. .0( )	
2	10.	0. .0( )	2. .7(S)	2. .4( )	0. .0( )	4. 1.6(S)	4. .5( )	0. .0( )	3. 1.7(S)	3. .4( )	9. .7( )
		0. .0( )	3. 1.0(S)	3. .5( )	12. .8( )	12. .0( )	2. .0( )	2. .3( )	2. .0( )	0. .0( )	0. .0( )
		21. 6.9(S)	21. .0( )	0. .0( )	0. .0(D)	26. .8(S)	26. 1.2( )	0. .0( )	21. 1.0( )	21. .0( )	
2	15.	0. .0( )	2. .7(S)	2. .4( )	0. .0( )	4. 1.6(S)	4. .5( )	0. .0( )	3. 1.6(S)	3. .4( )	9. .8( )
		0. .0( )	3. 1.0(S)	3. .5( )	13. .8( )	13. .0( )	2. .0( )	2. .2( )	2. .0( )	0. .0( )	0. .0( )
		21. 6.8(S)	21. .0( )	0. .0( )	0. .0(D)	25. .8(S)	25. 1.2( )	0. .0( )	21. 1.0( )	21. .0( )	

2 20. 0. .0( ) 2. .7(S) 0. .0( ) 2. .4( ) 0. .0( ) 4. 1.5(S) 4. .5( ) 0. .0( ) 3. 1.6(S) 3. .4( ) 9. .8( )
0. .0( ) 3. 1.0(S) 3. .5( ) 13. .8( ) 13. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )
0. .0( ) 21. .0( ) 0. .0( ) 0. .0(D) 25. .8(S) 25. 1.2( ) 0. .0( ) 21. 1.0( ) 21. .0( )
21. 6.8(S) 2. .7(S) 0. .0( ) 2. .4( ) 0. .0( ) 4. 1.5(S) 4. .5( ) 0. .0( ) 3. 1.6(S) 3. .4( ) 9. .8( )
0. .0( ) 3. 1.0(S) 3. .5( ) 13. .8( ) 13. .0( ) 0. .0( ) 0. .0( ) 21. 1.0( ) 0. .0( )
2 25. 0. .0( ) 21. .0( ) 0. .0( ) 0. .0(D) 25. .7(S) 25. 1.2( ) 0. .0( ) 3. 1.6(S) 3. .4( ) 10. .8( )
21. 6.7(S) 0. .0( ) 2. .4( ) 0. .0( ) 4. 1.5(S) 4. .5( ) 0. .0( ) 21. 1.0( ) 21. .0( )
0. .0( ) 3. .7(S) 3. .5( ) 13. .8( ) 13. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )
2 30. 0. .0( ) 3. 1.0(S) 3. .5( ) 13. .8( ) 0. .0(D) 24. 1.2( ) 0. .0( ) 21. 1.0( ) 21. .0( )
21. 6.7(S) 0. .0( ) 0. .0( ) 0. .0(D) 24. .7(S) 24. 1.2( ) 0. .0( ) 3. 1.6(S) 3. .4( ) 10. .8( )
0. .0( ) 3. .6(S) 3. .5( ) 13. .8( ) 13. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )
2 35. 0. .0( ) 3. .9(S) 3. .5( ) 13. .8( ) 24. 1.2( ) 0. .0( ) 21. 1.0( ) 21. .0( )
21. 6.6(S) 0. .0( ) 3. .6(S) 0. .0( ) 0. .0( ) 4. 1.4(S) 4. .5( ) 0. .0( ) 3. 1.5(S) 3. .4( ) 10. .8( )
0. .0( ) 3. .9(S) 3. .5( ) 13. .9( ) 13. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )
2 40. 21. 6.6(S) 0. .0( ) 21. .0( ) 0. .0(D) 23. .7(S) 23. 1.1( ) 0. .0( ) 21. 1.0( ) 21. .0( )
0. .0( ) 3. .6(S) 3. .5( ) 0. .0( ) 0. .0(D) 4. 1.4(S) 4. .5( ) 0. .0( ) 3. 1.5(S) 3. .4( ) 10. .8( )
21. 6.6(S) 0. .0( ) 3. .9(S) 3. .5( ) 13. .9( ) 13. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )
2 45. 0. .0( ) 3. .6(S) 3. .5( ) 0. .0( ) 4. 1.4(S) 4. .5( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )
0. .0( ) 3. .9(S) 3. .5( ) 13. .9( ) 13. .0( ) 0. .0( ) 0. 21. 21.
21. 0. 23. 23.

		6.5(S)	.0( )	.0( )	.0(D)	.6(S)	1.1( )	.0( )	1.0( )	.0( )									
2	50.	0.	3.	3.	0.	4.	4.	0.	3.	3.	10.								
		.0( )	.6(S)	.5( )	.0( )	1.4(S)	.5( )	.0( )	1.5(S)	.4( )	.8( )								
		0.	3.	3.	13.	13.	0.	0.	0.	0.	0.								
		.0( )	.9(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )								
		21.	21.	0.	0.	23.	23.	0.	21.	21.									
		6.5(S)	.0( )	.0( )	.0(D)	.6(S)	1.1( )	.0( )	1.0( )	.0( )									
2	55.	0.	3.	3.	0.	4.	4.	0.	3.	3.	10.								
		.0( )	.6(S)	.5( )	.0( )	1.3(S)	.5( )	.0( )	1.5(S)	.4( )	.8( )								
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.								
		.0( )	.8(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )								
		21.	21.	0.	0.	22.	22.	0.	21.	21.									
		6.4(S)	.0( )	.0( )	.0(D)	.6(S)	1.1( )	.0( )	1.0( )	.0( )									
3	0.	0.	3.	3.	0.	4.	4.	0.	3.	3.	10.								
		.0( )	.5(S)	.5( )	.0( )	1.3(S)	.5( )	.0( )	1.5(S)	.4( )	.8( )								
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.								
		.0( )	.8(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )								
		21.	21.	0.	0.	22.	22.	0.	21.	21.									
		6.4(S)	.0( )	.0( )	.0(D)	.6(S)	1.1( )	.0( )	1.0( )	.0( )									
3	5.	0.	4.	4.	0.	4.	4.	0.	3.	3.	11.								
		.0( )	.5(S)	.5( )	.0( )	1.3(S)	.5( )	.0( )	1.5(S)	.4( )	.8( )								
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.								
		.0( )	.8(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )								
		21.	21.	0.	0.	22.	22.	0.	21.	21.									
		6.3(S)	.0( )	.0( )	.0(D)	.6(S)	1.1( )	.0( )	1.0( )	.0( )									
3	10.	0.	4.	4.	0.	4.	4.	0.	3.	3.	11.								
		.0( )	.5(S)	.5( )	.0( )	1.2(S)	.5( )	.0( )	1.4(S)	.4( )	.8( )								
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.								
		.0( )	.8(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )								
		21.	21.	0.	0.	22.	22.	0.	21.	21.									
		6.3(S)	.0( )	.0(-)—	.0(D)	.6(S)	1.1( )	.0( )	1.0( )	.0( )									
3	15.	0.	4.	4.	0.	4.	4.	0.	3.	3.	11.								
		.0( )	.5(S)	.5( )	.0( )	1.2(S)	.5( )	.0( )	1.4(S)	.4( )	.8( )								
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.								
		.0( )	.7(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )								

		21. 6.2(S)	21. .0( )	0. .0( )	0. .0(D)	22. .6(S)	22. 1.1( )	0. .0( )	21. 1.0( )	21. .0( )		
3	20.	0. .0( )	4. .4(S)	4. .5( )	0. .0( )	4. 1.2(S)	4. .5( )	0. .0( )	3. 1.4(S)	3. .4( )	11. .8( )	
		0. .0( )	3. .7(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		21. 6.2(S)	21. .0( )	0. .0( )	0. .0(D)	21. .6(S)	21. 1.1( )	0. .0( )	21. .9( )	21. .0( )		
3	25.	0. .0( )	3. .4(S)	3. .5( )	0. .0( )	4. 1.2(S)	4. .5( )	0. .0( )	3. 1.4(S)	3. .4( )	11. .8( )	
		0. .0( )	3. .7(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 6.1(S)	20. .0( )	0. .0( )	0. .0(D)	21. .6(S)	21. 1.1( )	0. .0( )	21. .9( )	21. .0( )		
3	30.	0. .0( )	3. .4(S)	3. .5( )	0. .0( )	4. 1.1(S)	4. .5( )	0. .0( )	3. 1.4(S)	3. .4( )	11. .8( )	
		0. .0( )	3. .7(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 6.1(S)	20. .0( )	0. .0( )	0. .0(D)	21. .6(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
3	35.	0. .0( )	3. .4(S)	3. .5( )	0. .0( )	4. 1.1(S)	4. .5( )	0. .0( )	3. 1.3(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .7(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 6.1(S)	20. .0( )	0. .0( )	0. .0(D)	21. .6(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
3	40.	0. .0( )	3. .3(S)	3. .5( )	0. .0( )	4. 1.1(S)	4. .5( )	0. .0( )	3. 1.3(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .6(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 6.0(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
3	45.	0. .0( )	3. .3(S)	3. .5( )	0. .0( )	4. 1.0(S)	4. .5( )	0. .0( )	3. 1.3(S)	3. .4( )	10. .8( )	

		0. .0( )	3. .6(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 6.0(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
3	50.	0. .0( )	3. .3(S)	3. .5( )	0. .0( )	4. 1.0(S)	4. .5( )	0. .0( )	3. 1.3(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .6(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 5.9(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
3	55.	0. .0( )	3. .3(S)	3. .5( )	0. .0( )	4. 1.0(S)	4. .5( )	0. .0( )	3. 1.3(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .6(S)	3. .5( )	14. .9( )	14. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 5.9(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
4	0.	0. .0( )	3. .3(S)	3. .5( )	0. .0( )	4. 1.0(S)	4. .5( )	0. .0( )	3. 1.2(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .5(S)	3. .5( )	13. .9( )	13. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 5.8(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
4	5.	0. .0( )	3. .2(S)	3. .5( )	0. .0( )	4. .9(S)	4. .5( )	0. .0( )	3. 1.2(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .5(S)	3. .5( )	13. .9( )	13. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 5.8(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
4	10.	0. .0( )	3. .2(S)	3. .5( )	0. .0( )	4. .9(S)	4. .5( )	0. .0( )	3. 1.2(S)	3. .4( )	10. .8( )	
		0. .0( )	3. .5(S)	3. .5( )	13. .9( )	13. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	
		20. 5.7(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )		
4	15.	0.	3.	3.	0.	4.	4.	0.	3.	3.	10.	

		.0( )	.2(S)	.5( )	.0( )	.9(S)	.5( )	.0( )	1.2(S)	.4( )	.8( )		
		0. .0( )	3. .5(S)	3. .5( )	13. .9( )	13. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		20. 5.7(S)	20. .0( )	0. .0( )	0. .0(D)	21. .5(S)	21. 1.1( )	0. .0( )	20. .9( )	20. .0( )			
4	20.	0. .0( )	2. .2(S)	3. .5( )	0. .0( )	4. .8(S)	4. .5( )	0. .0( )	3. 1.2(S)	3. .4( )	10. .8( )		
		0. .0( )	3. .5(S)	3. .5( )	13. .8( )	13. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		20. 5.6(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )			
4	25.	0. .0( )	2. .2(S)	2. .4( )	0. .0( )	4. .8(S)	4. .5( )	0. .0( )	3. 1.1(S)	3. .4( )	10. .8( )		
		0. .0( )	3. .4(S)	3. .4( )	12. .8( )	12. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		20. 5.6(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )			
4	30.	0. .0( )	2. .1(S)	2. .4( )	0. .0( )	4. .8(S)	4. .5( )	0. .0( )	3. 1.1(S)	3. .4( )	9. .8( )		
		0. .0( )	3. .4(S)	3. .4( )	12. .8( )	12. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		20. 5.5(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )			
4	35.	0. .0( )	2. .1(S)	2. .4( )	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	3. 1.1(S)	3. .4( )	9. .7( )		
		0. .0( )	3. .4(S)	3. .4( )	12. .8( )	12. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		20. 5.5(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )			
4	40.	0. .0( )	2. .1(S)	2. .4( )	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	3. 1.1(S)	3. .4( )	9. .7( )		
		0. .0( )	2. .4(S)	3. .4( )	12. .8( )	12. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		20. 5.4(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )			

4	45.	0. .0( )	2. .1(S)	2. .4( )	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	3. 1.1(S)	3. .4( )	9. .7( )
		0. .0( )	2. .4(S)	2. .4( )	11. .8( )	11. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
		20. 5.3(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
4	50.	0. .0( )	1. .1(S)	2. .4( )	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	3. 1.0(S)	3. .4( )	9. .7( )
		0. .0( )	2. .3(S)	2. .4( )	11. .8( )	11. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
		20. 5.3(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
4	55.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .6(S)	4. .5( )	0. .0( )	3. 1.0(S)	3. .4( )	8. .7( )
		0. .0( )	2. .3(S)	2. .4( )	11. .8( )	11. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
		20. 5.2(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5	0.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .6(S)	4. .5( )	0. .0( )	3. 1.0(S)	3. .4( )	8. .7( )
		0. .0( )	2. .3(S)	2. .4( )	10. .8( )	10. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
		20. 5.2(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5	5.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .6(S)	4. .5( )	0. .0( )	3. 1.0(S)	3. .4( )	8. .7( )
		0. .0( )	2. .3(S)	2. .4( )	10. .8( )	10. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
		20. 5.1(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5	10.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .5(S)	4. .5( )	0. .0( )	3. 1.0(S)	3. .4( )	8. .7( )
		0. .0( )	2. .3(S)	2. .4( )	10. .7( )	10. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )

	20. 5.0(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5 15.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .5(S)	4. .5( )	0. .0( )	3. .9(S)	3. .4( )	8. .7( )
	0. .0( )	2. .3(S)	2. .4( )	10. .7( )	10. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
	20. 5.0(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5 20.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .5(S)	4. .5( )	0. .0( )	3. .9(S)	3. .4( )	8. .7( )
	0. .0( )	2. .3(S)	2. .4( )	10. .7( )	10. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
	20. 4.9(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5 25.	0. .0( )	1. .1(S)	1. .3( )	0. .0( )	4. .5(S)	4. .5( )	0. .0( )	3. .9(S)	3. .4( )	8. .7( )
	0. .0( )	2. .3(S)	2. .3( )	9. .7( )	9. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
	20. 4.8(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5 30.	0. .0( )	1. .0(S)	1. .2( )	0. .0( )	4. .4(S)	4. .5( )	0. .0( )	3. .9(S)	3. .4( )	8. .7( )
	0. .0( )	2. .2(S)	2. .3( )	9. .7( )	9. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
	20. 4.8(S)	20. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5 35.	0. .0( )	1. .0(S)	1. .2( )	0. .0( )	4. .4(S)	4. .5( )	0. .0( )	3. .9(S)	3. .4( )	7. .7( )
	0. .0( )	2. .2(S)	2. .3( )	9. .7( )	9. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )
	19. 4.7(S)	19. .0( )	0. .0( )	0. .0(D)	20. .5(S)	20. 1.1( )	0. .0( )	20. .9( )	20. .0( )	
5 40.	0. .0( )	1. .0(S)	1. .2( )	0. .0( )	4. .4(S)	4. .5( )	0. .0( )	3. .9(S)	3. .4( )	7. .7( )
	0.	1.	1.	9.	9.	0.	0.	0.	0.	0.

		.0( )	.2(S)	.3( )	.7( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )										
		19.	19.	0.	0.	20.	20.	0.	19.	19.											
		4.6(S)	.0( )	.0( )	.0(D)	.5(S)	1.1( )	.0( )	.9( )	.0( )											
5	45.	0.	0.	1.	0.	4.	4.	0.	3.	3.	7.										
		.0( )	.0(S)	.2( )	.0( )	.3(S)	.5( )	.0( )	.8(S)	.4( )	.7( )										
		0.	1.	1.	9.	9.	0.	0.	0.	0.	0.										
		.0( )	.2(S)	.3( )	.7( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )										
		19.	19.	0.	0.	20.	20.	0.	19.	19.											
		4.5(S)	.0( )	.0( )	.0(D)	.5(S)	1.1( )	.0( )	.9( )	.0( )											
5	50.	0.	0.	0.	0.	4.	4.	0.	3.	3.	7.										
		.0( )	.0(S)	.2( )	.0( )	.3(S)	.5( )	.0( )	.8(S)	.4( )	.7( )										
		0.	1.	1.	8.	8.	0.	0.	0.	0.	0.										
		.0( )	.2(S)	.3( )	.7( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )										
		19.	19.	0.	0.	20.	20.	0.	19.	19.											
		4.5(S)	.0( )	.0( )	.0(D)	.5(S)	1.0( )	.0( )	.9( )	.0( )											
5	55.	0.	0.	0.	0.	4.	4.	0.	3.	3.	7.										
		.0( )	.0(S)	.2( )	.0( )	.3(S)	.5( )	.0( )	.8(S)	.4( )	.7( )										
		0.	1.	1.	8.	8.	0.	0.	0.	0.	0.										
		.0( )	.2(S)	.3( )	.7( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )										
		19.	19.	0.	0.	20.	20.	0.	19.	19.											
		4.4(S)	.0( )	.0( )	.0(D)	.5(S)	1.0( )	.0( )	.9( )	.0( )											
6	0.	0.	0.	0.	0.	4.	4.	0.	3.	3.	7.										
		.0( )	.0(S)	.2( )	.0( )	.3(S)	.5( )	.0( )	.8(S)	.4( )	.7( )										
		0.	1.	1.	8.	8.	0.	0.	0.	0.	0.										
		.0( )	.2(S)	.3( )	.7( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )										
		19.	19.	0.	0.	20.	20.	0.	19.	19.											
		4.3(S)	.0( )	.0( )	.0(D)	.5(S)	1.0( )	.0( )	.9( )	.0( )											

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Cherrywood: 2/00 5-yr With .2 cfs discharge from property
CARROLL & LANGE, INC

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENSION DAMS ***

CONVEYANCE	PEAK	STAGE	STORAGE	TIME

ELEMENT	(CFS)	(FT)	(AC-FT)	(HR/MIN)
61	65.	(DIRECT FLOW)		0 30.
71	50.	(DIRECT FLOW)		0 35.
81	33.	(DIRECT FLOW)		0 30.
51	42.	(DIRECT FLOW)		0 30.
62	3.	.1	1.7	2 0.
72	4.	.1	1.7	1 25.
82	2.	.1	.8	1 20.
52	3.	.1	1.2	1 15.
63	3.	.4		0 35.
73	4.	.5		1 5.
83	4.	.5		3 10.
53	3.	.5		0 40.
91	11.	.8		3 10.
21	12.	.4		0 35.
31	68.	(DIRECT FLOW)		0 40.
92	14.	.9		3 15.
23	12.	(DIRECT FLOW)		0 35.
41	66.	(DIRECT FLOW)		0 40.
33	68.	1.5		0 40.
93	14.	(DIRECT FLOW)		3 15.
42	21.	.1	6.9	1 55.
94	21.	(DIRECT FLOW)		1 55.
11	44.	(DIRECT FLOW)		0 35.
95	21.	1.0		1 55.
12	44.	1.8		0 35.
96	21.	(DIRECT FLOW)		1 55.
13	30.	.1	1.1	1 5.
14	30.	1.3		1 5.
16	1.	(DIRECT FLOW)		0 35.
97	30.	(DIRECT FLOW)		1 5.
17	1.	(DIRECT FLOW)		0 35.

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ENDPROGRAM PROGRAM CALLED

□5.

95	21.	1.0		1 55.
12	44.	1.8		0 35.
96	21.	(DIRECT F		

CUHP 100 Year Developed Calculations

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-F1 -- BASIN COMMENT: Single Family F1 PD Area F Patio Homes

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.04	.25	.19	50.00	.0254	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.088	.378

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
6.72	14.20	3444.56	123.66	1.91

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 5.43)

WIDTH AT 50 = 9. MIN. WIDTH AT 75 = 5. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	15.	46.	30.	9.
5.	102.	20.	27.	35.	0.
10.	85.	25.	15.	0.	0.

1 BASIN ID: SF-F1 -- BASIN COMMENT: Single Family F1 PD Area F Patio Homes

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	65.	.11	.085	26.
5.	.03	.000	0.	70.	.05	.032	20.
10.	.08	.028	3.	75.	.05	.032	14.
15.	.12	.059	8.	80.	.03	.015	10.
20.	.22	.103	17.	85.	.03	.015	7.
25.	.38	.251	38.	90.	.03	.015	6.
30.	.68	.634	93.	95.	.03	.015	5.

35.	.38	.346	105.	*	100.	.03	.015	5.	*
40.	.22	.189	87.	*	105.	.03	.015	4.	*
45.	.17	.142	68.	*	110.	.03	.015	4.	*
50.	.14	.111	53.	*	115.	.03	.015	4.	*
55.	.11	.084	40.	*	120.	.03	.015	4.	*
60.	.11	.085	31.	*	125.	.00	.000	3.	*

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.320 INCHES
VOLUME OF EXCESS PRECIP = 4. ACRE-FEET
PEAK Q = 105. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .74
I = 6.3 INCHES/HOUR
A = 23.0 ACRES
Q = 107. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-F2 -- BASIN COMMENT: Single Family F2 PD Area F Patio Homes

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.01	.22	.16	50.00	.0105	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.088	.319

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
7.55	16.40	2423.92	27.63	.61

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 5.66)

WIDTH AT 50 = 12. MIN. WIDTH AT 75 = 6. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	15.	15.	*	30.	9.	*
5.	22.	*	20.	12.	*	35.	8.	*
10.	24.	*	25.	11.	*	40.	0.	*

1 BASIN ID: SF-F2 -- BASIN COMMENT: Single Family F2 PD Area F Patio Homes

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	60.	.11	.085	18.
5.	.03	.000	0.	65.	.11	.085	13.
10.	.08	.028	1.	70.	.05	.032	9.
15.	.12	.059	2.	75.	.05	.032	7.
20.	.22	.103	4.	80.	.03	.015	5.
25.	.38	.251	9.	85.	.03	.015	4.
30.	.68	.634	23.	90.	.03	.015	3.
35.	.38	.346	29.	95.	.03	.015	2.
40.	.22	.189	27.	100.	.03	.015	2.
45.	.17	.142	25.	105.	.03	.015	2.
50.	.14	.111	23.	110.	.03	.015	2.
55.	.11	.084	21.	115.	.03	.015	2.

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.320 INCHES
VOLUME OF EXCESS PRECIP = 1. ACRE-FEET
PEAK Q = 29. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .74
I = 5.9 INCHES/HOUR
A = 7.3 ACRES
Q = 32. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-A -- BASIN COMMENT: Single Family PD Area A

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.07	.44	.38	45.00	.0130	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.091	.391

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
9.60	22.80	2112.18	157.99	3.99

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 9.00)

WIDTH AT 50 = 14. MIN. WIDTH AT 75 = 7. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	20.	73.	40.	18.
5.	88.	25.	51.	45.	12.
10.	158.	30.	36.	50.	9.
15.	108.	35.	25.	55.	0.

1 BASIN ID: SF-A -- BASIN COMMENT: Single Family PD Area A

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	70.	.05	.030	62.
5.	.03	.000	0.	75.	.05	.030	47.
10.	.08	.025	2.	80.	.03	.014	33.
15.	.12	.053	9.	85.	.03	.014	23.
20.	.22	.093	19.	90.	.03	.014	18.
25.	.38	.240	43.	95.	.03	.014	14.
30.	.68	.633	109.	100.	.03	.014	12.
35.	.38	.345	166.	105.	.03	.014	10.
40.	.22	.187	164.	110.	.03	.014	9.
45.	.17	.140	143.	115.	.03	.014	8.
50.	.14	.109	122.	120.	.03	.014	8.
55.	.11	.083	102.	125.	.00	.000	7.
60.	.11	.083	86.	130.	.00	.000	5.
65.	.11	.083	75.	135.	.00	.000	3.

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.259 INCHES
VOLUME OF EXCESS PRECIP = 9. ACRE-FEET
PEAK Q = 166. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .72
I = 5.0 INCHES/HOUR
A = 47.9 ACRES
Q = 171. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-E -- BASIN COMMENT: Single Family PD Area E

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.07	.53	.43	44.00	.0240	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.091	.383

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
9.65	23.20	2057.06	152.02	3.94

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 9.11)

WIDTH AT 50 = 15. MIN. WIDTH AT 75 = 8. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	20.	72.	40.	18.
5.	87.	25.	51.	45.	13.
10.	152.	30.	36.	50.	9.
15.	106.	35.	26.	55.	0.

1 BASIN ID: SF-E -- BASIN COMMENT: Single Family PD Area E

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	75.	.05	.030	47.
5.	.03	.000	0.	80.	.03	.014	33.
10.	.08	.024	2.	85.	.03	.014	23.
15.	.12	.052	8.	90.	.03	.014	18.
20.	.22	.091	18.	95.	.03	.014	14.
25.	.38	.238	42.	100.	.03	.014	12.
30.	.68	.633	105.	105.	.03	.014	10.
35.	.38	.344	161.	110.	.03	.014	9.
40.	.22	.187	159.	115.	.03	.014	8.
45.	.17	.140	139.	120.	.03	.014	8.
50.	.14	.108	120.	125.	.00	.000	7.
55.	.11	.082	101.	130.	.00	.000	5.
60.	.11	.082	86.	135.	.00	.000	3.
65.	.11	.083	75.	140.	.00	.000	2.
70.	.05	.030	62.	145.	.00	.000	1.

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.247 INCHES
VOLUME OF EXCESS PRECIP = 9. ACRE-FEET
PEAK Q = 161. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .72
I = 4.9 INCHES/HOUR
A = 47.3 ACRES
Q = 167. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: MF-G -- BASIN COMMENT: Multi Family PD Area G

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.03	.21	.14	50.00	.0350	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.088	.360

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
4.76	9.00	6111.84	156.46	1.37

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 4.69)

WIDTH AT 50 = 5. MIN. WIDTH AT 75 = 3. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	10.	50.	20.	0.
5.	155.	15.	17.	0.	0.

1 BASIN ID: MF-G -- BASIN COMMENT: Multi Family PD Area G

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	60.	.11	.085	19.
5.	.03	.000	0.	65.	.11	.085	19.
10.	.08	.028	4.	70.	.05	.032	11.

15.	.12	.059	11.	*	75.	.05	.032	8.	*
20.	.22	.103	19.	*	80.	.03	.015	5.	*
25.	.38	.251	45.	*	85.	.03	.015	4.	*
30.	.68	.634	113.	*	90.	.03	.015	3.	*
35.	.38	.346	90.	*	95.	.03	.015	3.	*
40.	.22	.189	58.	*	100.	.03	.015	3.	*
45.	.17	.142	38.	*	105.	.03	.015	3.	*
50.	.14	.111	28.	*	110.	.03	.015	3.	*
55.	.11	.084	21.	*	115.	.03	.015	3.	*

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.320 INCHES
VOLUME OF EXCESS PRECIP = 3. ACRE-FEET
PEAK Q = 113. CFS TIME OF PEAK = 30. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .74
I = 7.6 INCHES/HOUR
A = 16.4 ACRES
Q = 92. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: COM-I -- BASIN COMMENT: Commercial PD Area I

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.02	.18	.08	95.00	.0340	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.074	.473

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
4.33	10.00	9912.16	217.08	1.17

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 3.80)

WIDTH AT 50 = 3. MIN. WIDTH AT 75 = 2. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .10 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH

0.	0.	*	10.	31.	*	0.	0.	*
5.	183.	*	15.	0.	*	0.	0.	*

1 BASIN ID: COM-I -- BASIN COMMENT: Commercial PD Area I

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	.00	.000	0.	*	60.	.11	.101	22.	*
5.	.03	.000	0.	*	65.	.11	.101	22.	*
10.	.08	.008	1.	*	70.	.05	.050	12.	*
15.	.12	.113	21.	*	75.	.05	.050	11.	*
20.	.22	.196	39.	*	80.	.03	.029	7.	*
25.	.38	.350	70.	*	85.	.03	.029	6.	*
30.	.68	.643	128.	*	90.	.03	.029	6.	*
35.	.38	.359	85.	*	95.	.03	.029	6.	*
40.	.22	.204	48.	*	100.	.03	.029	6.	*
45.	.17	.158	35.	*	105.	.03	.029	6.	*
50.	.14	.127	28.	*	110.	.03	.029	6.	*
55.	.11	.101	22.	*	115.	.03	.029	6.	*

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.823 INCHES
VOLUME OF EXCESS PRECIP = 3. ACRE-FEET
PEAK Q = 128. CFS TIME OF PEAK = 30. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .10 IN.

RATIONAL FORMULA C = .90
I = 7.3 INCHES/HOUR
A = 14.0 ACRES
Q = 92. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-SR -- BASIN COMMENT: Single Family Shadow Ridge

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.05	.22	.12	45.00	.0180	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.091	.362

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
6.99	15.40	3102.70	141.17	2.43

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 5.04)

WIDTH AT 50 = 10. MIN. WIDTH AT 75 = 5. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .05 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	15.	59.	30.	13.
5.	114.	20.	35.	35.	8.
10.	103.	25.	21.	40.	0.

1 BASIN ID: SF-SR -- BASIN COMMENT: Single Family Shadow Ridge

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	65.	.11	.083	35.
5.	.03	.000	0.	70.	.05	.030	25.
10.	.08	.025	3.	75.	.05	.030	19.
15.	.12	.053	9.	80.	.03	.014	13.
20.	.22	.093	18.	85.	.03	.014	9.
25.	.38	.240	41.	90.	.03	.014	7.
30.	.68	.633	105.	95.	.03	.014	6.
35.	.38	.345	124.	100.	.03	.014	5.
40.	.22	.187	106.	105.	.03	.014	5.
45.	.17	.140	85.	110.	.03	.014	5.
50.	.14	.109	67.	115.	.03	.014	5.
55.	.11	.083	53.	120.	.03	.014	5.
60.	.11	.083	43.	125.	.00	.000	3.

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.259 INCHES
VOLUME OF EXCESS PRECIP = 5. ACRE-FEET
PEAK Q = 124. CFS TIME OF PEAK = 35. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .05 IN.

RATIONAL FORMULA C = .72
I = 6.1 INCHES/HOUR
A = 29.1 ACRES
Q = 127. CFS

1 U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

BASIN ID: SF-OC -- BASIN COMMENT: Offsite Commercial

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
.01	.09	.04	95.00	.0210	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
.074	.430

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	TIME OF CONCENTRATION (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
4.33	10.00	9010.94	104.53	.62

*** NOTE : THE TIME TO PEAK IS CALCULATED BASED ON THE TIME OF CONCENTRATION PROVIDED BY THE USER,
REPLACING THE ONE COMPUTED BY CUHPD (TP= 3.25)

WIDTH AT 50 = 3. MIN. WIDTH AT 75 = 2. MIN. K50 = .35 K75 = .45

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = .35 IN. MAX. IMPERVIOUS RET. = .10 IN.
INFILTRATION = 3.00 IN./HR. DECAY = .00180/SECOND FNINFL = .50 IN./HR.

TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH	TIME	UNIT HYDROGRAPH
0.	0.	10.	18.	0.	0.
5.	91.	15.	0.	0.	0.

1 BASIN ID: SF-OC -- BASIN COMMENT: Offsite Commercial

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)
0.	.00	.000	0.	60.	.11	.101	11.
5.	.03	.000	0.	65.	.11	.101	11.
10.	.08	.008	1.	70.	.05	.050	6.
15.	.12	.113	10.	75.	.05	.050	5.
20.	.22	.196	20.	80.	.03	.029	4.
25.	.38	.350	35.	85.	.03	.029	3.
30.	.68	.643	64.	90.	.03	.029	3.
35.	.38	.359	44.	95.	.03	.029	3.
40.	.22	.204	25.	100.	.03	.029	3.
45.	.17	.158	18.	105.	.03	.029	3.
50.	.14	.127	14.	110.	.03	.029	3.
55.	.11	.101	11.	115.	.03	.029	3.

TOTAL PRECIP. = 3.13 (1-HOUR RAIN = 2.71) EXECESS PRECIP. = 2.823 INCHES
VOLUME OF EXCESS PRECIP = 2. ACRE-FEET
PEAK Q = 64. CFS TIME OF PEAK = 30. MIN.
INFILT.= 3.00 IN/HR DECAY = .00180 FNINF = .50 IN/HR
MAX.PERV.RET.= .35 IN. MAX.IMP.RET.= .10 IN.

RATIONAL FORMULA C = .90
I = 7.3 INCHES/HOUR
A = 7.4 ACRES
Q = 49. CFS

1 U.D.F.C.D. CUHPD RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985 TO WRITE OUTPUT FILE OF STORM HYDROGRAPHS FOR SUBSEQUENT
USE WITH MULTI-PLAN RIVER ROUTING ROUTINES OF HEC-1

Cherrywood: 10/99 100-YR SF-F1,SF-F2,SF-A,SF-E,MF-G,COM-I,SF-SR basins

NO HYDROGRAPH VALUES WERE WRITTEN TO AN OUTPUTFILE FOR THIS RUN OF CUHPD.
A = 7.4 ACRE

SWMM 100 Year Developed Calculations

ENVIRONMENTAL PROTECTION AGENCY - STORM WATER MANAGEMENT MODEL - VERSION PC.1

DEVELOPED BY METCALF + EDDY, INC.

UNIVERSITY OF FLORIDA

WATER RESOURCES ENGINEEERS, INC. (SEPTEMBER 1970)

UPDATED BY UNIVERSITY OF FLORIDA (JUNE 1973)

HYDROLOGIC ENGINEERING CENTER, CORPS OF ENGINEERS

MISSOURI RIVER DIVISION, CORPS OF ENGINEERS (SEPTEMBER 1974)

BOYLE ENGINEERING CORPORATION (MARCH 1985, JULY 1985)

0TAPE OR DISK ASSIGNMENTS

JIN(1)	JIN(2)	JIN(3)	JIN(4)	JIN(5)	JIN(6)	JIN(7)	JIN(8)	JIN(9)	JIN(10)
2	1	0	0	0	0	0	0	0	0

JOUT(1)	JOUT(2)	JOUT(3)	JOUT(4)	JOUT(5)	JOUT(6)	JOUT(7)	JOUT(8)	JOUT(9)	JOUT(10)
1	2	0	0	0	0	0	0	0	0

NSCRAT(1)	NSCRAT(2)	NSCRAT(3)	NSCRAT(4)	NSCRAT(5)
3	4	0	0	0

1

WATERSHED PROGRAM CALLED

*** ENTRY MADE TO RUNOFF MODEL ***

Cherrywood: 2/00 100-yr With .5 cfs discharge from property
CARROLL & LANGE, INC

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES), 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
1

Cherrywood: 2/00 100-yr With .5 cfs discharge from property
CARROLL & LANGE, INC

HYDROGRAPHS FROM CUHPE/PC ARE LISTED FOR THE FOLLOWING 8 SUBCATCHMENTS

TIME(HR/MIN)		1	2	3	4	5	6	7	8
0	0.	0.	0.	0.	0.	0.	0.	0.	0.
0	5.	0.	0.	0.	0.	0.	0.	0.	0.
0	10.	3.	1.	2.	2.	4.	1.	3.	1.
0	15.	8.	2.	9.	8.	11.	21.	9.	10.
0	20.	17.	4.	19.	18.	19.	39.	18.	20.
0	25.	38.	9.	43.	42.	45.	70.	41.	35.
0	30.	93.	23.	109.	105.	113.	128.	105.	64.
0	35.	105.	29.	166.	161.	90.	85.	124.	44.
0	40.	87.	27.	164.	159.	58.	48.	106.	25.
0	45.	68.	25.	143.	139.	38.	35.	85.	18.
0	50.	53.	23.	122.	120.	28.	28.	67.	14.
0	55.	40.	21.	102.	101.	21.	22.	53.	11.
1	0.	31.	18.	86.	86.	19.	22.	43.	11.
1	5.	27.	13.	75.	75.	19.	22.	35.	11.
1	10.	20.	9.	62.	62.	11.	12.	25.	6.
1	15.	14.	7.	47.	47.	8.	11.	19.	5.
1	20.	10.	5.	33.	33.	5.	7.	13.	4.
1	25.	7.	4.	23.	23.	4.	6.	9.	3.
1	30.	6.	3.	18.	18.	3.	6.	7.	3.

1	35.	5.	2.	14.	14.	3.	6.	6.	3.
1	40.	5.	2.	12.	12.	3.	6.	5.	3.
1	45.	4.	2.	10.	10.	3.	6.	5.	3.
1	50.	4.	2.	9.	9.	3.	6.	5.	3.
1	55.	4.	2.	8.	8.	3.	6.	5.	3.
2	0.	4.	2.	8.	8.	3.	6.	5.	3.
2	5.	3.	0.	7.	7.	0.	0.	3.	0.
2	10.	1.	0.	5.	5.	0.	0.	2.	0.
2	15.	0.	0.	3.	3.	0.	0.	0.	0.
2	20.	0.	0.	2.	2.	0.	0.	0.	0.
2	25.	0.	0.	0.	1.	0.	0.	0.	0.

1

Cherrywood: 2/00 100-yr With .5 cfs discharge from property
CARROLL & LANGE, INC

GUTTER NUMBER	GUTTER CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	OVERBANK/SURCHARGE MANNING N	DEPTH (FT)	JK
81	82	0	3		.0	1.	.0010	.0	.0	.001	10.00	0
82	83	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10	0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW										
		.0	.0	.2	2.8	.5	3.7	.8	3.7	1.1	3.7	1.4	3.7
		1.7	3.7	2.0	3.7								
83	91	0	2	PIPE	2.0	1512.	.0100	.0	.0	.013	2.00	0
71	72	0	3		.0	1.	.0010	.0	.0	.001	10.00	0
72	73	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10	0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW										
		.0	.0	.0	3.1	.6	10.6	1.6	14.5	2.1	19.6	3.2	19.6
		3.9	19.6	4.5	19.6								
73	91	0	2	PIPE	2.5	1300.	.0100	.0	.0	.013	2.50	0
61	62	0	3		.0	1.	.0010	.0	.0	.001	10.00	0
62	63	8	2	PIPE	.1	1.	.0050	.0	.0	.013	.10	0
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW										
		.0	.0	.4	4.3	.9	7.0	1.5	7.0	2.1	7.0	2.7	7.0
		3.3	7.0	3.9	7.0								
63	91	0	2	PIPE	2.5	50.	.0100	.0	.0	.013	2.50	0

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  91        92        0         2      PIPE          3.0      142.     .0100      .0     .0      .013      3.00        0
  51        52        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  52        53        8         2      PIPE          .1        1.     .0050      .0     .0      .013       .10        0
                  RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                       .0      .0       .5     4.6      1.0      8.2      1.6     8.2      2.2     8.2      2.8      8.2
                      3.4     8.2      4.0     8.2
  53        92        0         2      PIPE          2.5      100.     .0100      .0     .0      .013      2.50        0
  92        93        0         2      PIPE          3.5      500.     .0100      .0     .0      .013      3.50        0
  93        42        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  31        33        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  33        42        0         2      PIPE          4.0      175.     .0250      .0     .0      .013      4.00        0
  41        42        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  21        23        0         2      PIPE          2.0      100.     .2500      .0     .0      .013      2.00        0
  23        42        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  42        94        7         2      PIPE          .1        1.     .0050      .0     .0      .013      2.00        0
                  RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                       .0      .0       .1     6.3      .9      14.2      4.0     19.0      9.8     32.2     13.7     66.2
                     18.0    69.9
  94        95        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  95        96        0         2      PIPE          5.0     1390.     .0100      .0     .0      .013      5.00        0
  96        13        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  11        12        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  12        13        1         2      PIPE         15.0        1.     .0050      .2     .2      .033     15.00       16
                  DIVERSION TO GUTTER NUMBER  16 - TOTAL Q VS DIVERTED Q IN CFS
                     171.0    10.5
  16        17        0         3                    .0        1.     .0010      .0     .0      .001     10.00        0
  13        14        7         2      PIPE          .1        1.     .0050      .0     .0      .013       .10        0
                  RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                       .0      .0       .3    15.9      .7      24.4      1.2     76.8      1.8     90.2      1.6     90.2
                      2.2    90.2
  14        97        0         2      PIPE          3.5       50.     .0100      .0     .0      .013      3.50        0
0TOTAL NUMBER OF GUTTERS/PIPES,  29
1


 Cherrywood: 2/00 100-yr With .5 cfs discharge from property
 CARROLL & LANGE, INC


 ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

      GUTTER     TRIBUTARY GUTTER/PIPE                                    TRIBUTARY SUBAREA                                  D.A.(AC)

        11        0    0    0    0    0    0    0    0    0    0         1    0    0    0    0    0    0    0    0    0      23.0

        12        11   0    0    0    0    0    0    0    0    0         0    0    0    0    0    0    0    0    0    0      23.0

        13        96   12   0    0    0    0    0    0    0    0         0    0    0    0    0    0    0    0    0    0     192.4

        14        13   0    0    0    0    0    0    0    0    0         0    0    0    0    0    0    0    0    0    0     192.4
```

16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0
21	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	7.3
23	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.3
31	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	47.9
33	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47.9
41	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	47.3
42	93	33	41	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4
51	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	16.4
52	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.4
53	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.4
61	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	14.0
62	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.0
63	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.0
71	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	29.1
72	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.1
73	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.1
81	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	7.4
82	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.4
83	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.4
91	83	73	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50.6
92	91	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66.9
93	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66.9
94	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4
95	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4
96	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169.4

ORDER OF TREE STRUCTURE (NGUT VALUE) DECREASES THROUGH DIVERSION FROM GUTTER 25 TO GUTTER 16 COMP THROUGH DIVERSION WILL LAG ONE TIME STEP UNLESS GUTTER CARDS ARE MODIFIED TO REVERSE DIVERSION.

1

Cherrywood: 2/00 100-yr With .5 cfs discharge from property
CARROLL & LANGE, INC

HYDROGRAPHS ARE LISTED FOR THE FOLLOWING 29 CONVEYANCE ELEMENTS

THE UPPER NUMBER IS DISCHARGE IN CFS
THE LOWER NUMBER IS ONE OF THE FOLLOWING CASES:
( ) DENOTES DEPTH ABOVE INVERT IN FEET
(S) DENOTES STORAGE IN AC-FT FOR DETENSION DAM. DISCHARGE INCLUDES SPILLWAY OUTFLOW.
(I) DENOTES GUTTER INFLOW IN CFS FROM SPECIFIED INFLOW HYDROGRAPH
(D) DENOTES DISCHARGE IN CFS DIVERTED FROM THIS GUTTER
(O) DENOTES STORAGE IN AC-FT FOR SURCHARGED GUTTER

TIME(HR/MIN)	81	82	83	71	72	73	61	62	63	91
	51	52	53	92	93	31	33	41	21	23
	42	94	11	12	13	14	16	95	96	
0 5.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	.0( )	.0(S)	.0( )	.0( )	.0(S)	.0( )	.0( )	.0(S)	.0( )	.0( )
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	.0( )	.0(S)	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )
	0.	0.	0.	0.	0.	0.	0.	0.	0.	
	.0(S)	.0( )	.0( )	.0(D)	.0(S)	.0( )	.0( )	.0( )	.0( )	
0 10.	1.	0.	0.	3.	3.	1.	1.	0.	0.	1.
	.0( )	.0(S)	.0( )	.0( )	.0(S)	.2( )	.0( )	.0(S)	.1( )	.2( )
	4.	0.	0.	0.	0.	2.	2.	2.	1.	1.
	.0( )	.0(S)	.1( )	.1( )	.0( )	.0( )	.3( )	.0( )	.1( )	.0( )
	1.	1.	3.	3.	0.	0.	0.	0.	0.	
	.0(S)	.0( )	.0( )	.2(D)	.0(S)	.2( )	.0( )	.1( )	.0( )	
0 15.	10.	1.	0.	9.	3.	3.	21.	1.	1.	3.
	.0( )	.0(S)	.1( )	.0( )	.0(S)	.4( )	.0( )	.1(S)	.2( )	.5( )
	11.	1.	1.	3.	3.	9.	8.	8.	2.	2.
	.0( )	.1(S)	.2( )	.4( )	.0( )	.0( )	.5( )	.0( )	.2( )	.0( )
	5.	5.	8.	8.	2.	2.	1.	2.	2.	
	.1(S)	.0( )	.0( )	.5(D)	.0(S)	.4( )	.0( )	.3( )	.0( )	
0 20.	20.	2.	1.	18.	4.	4.	39.	3.	3.	7.
	.0( )	.1(S)	.2( )	.0( )	.1(S)	.5( )	.0( )	.3(S)	.4( )	.7( )

		19.	1.	1.	7.	7.	19.	19.	18.	4.	4.
		.0( )	.2(S)	.3( )	.6( )	.0( )	.0( )	.8( )	.0( )	.3( )	.0( )
		8.	8.	17.	17.	6.	6.	1.	6.	6.	
		.3(S)	.0( )	.0( )	1.0(D)	.1(S)	.6( )	.0( )	.5( )	.0( )	
0	25.	35.	3.	2.	41.	6.	5.	70.	5.	5.	12.
		.0( )	.3(S)	.4( )	.0( )	.2(S)	.6( )	.0( )	.6(S)	.6( )	.9( )
		45.	3.	3.	14.	14.	43.	42.	42.	9.	9.
		.0( )	.4(S)	.5( )	.9( )	.0( )	.0( )	1.2( )	.0( )	.4( )	.0( )
		12.	12.	38.	38.	15.	15.	2.	10.	10.	
		.7(S)	.0( )	.0( )	2.3(D)	.3(S)	.9( )	.0( )	.7( )	.0( )	
0	30.	64.	4.	3.	105.	11.	9.	128.	7.	7.	18.
		.0( )	.6(S)	.5( )	.0( )	.7(S)	.8( )	.0( )	1.3(S)	.7( )	1.1( )
		113.	7.	7.	24.	24.	109.	106.	105.	23.	23.
		.0( )	.9(S)	.7( )	1.2( )	.0( )	.0( )	1.9( )	.0( )	.6( )	.0( )
		16.	16.	93.	93.	23.	23.	6.	14.	14.	
		1.9(S)	.0( )	.0( )	5.7(D)	.7(S)	1.1( )	.0( )	.8( )	.0( )	
0	35.	44.	4.	4.	124.	14.	13.	85.	7.	7.	23.
		.0( )	1.0(S)	.5( )	.0( )	1.4(S)	.9( )	.0( )	1.9(S)	.7( )	1.2( )
		90.	8.	8.	31.	31.	166.	166.	161.	29.	29.
		.0( )	1.5(S)	.8( )	1.3( )	.0( )	.0( )	2.5( )	.0( )	.7( )	.0( )
		19.	19.	105.	105.	66.	65.	6.	18.	18.	
		4.0(S)	.0( )	.0( )	6.4(D)	1.1(S)	2.0( )	.0( )	.9( )	.0( )	
0	40.	25.	4.	4.	106.	19.	17.	48.	7.	7.	27.
		.0( )	1.2(S)	.5( )	.0( )	2.1(S)	1.1( )	.0( )	2.4(S)	.7( )	1.3( )
		58.	8.	8.	35.	35.	164.	165.	159.	27.	27.
		.0( )	2.0(S)	.8( )	1.4( )	.0( )	.0( )	2.5( )	.0( )	.7( )	.0( )
		25.	25.	87.	87.	80.	81.	5.	22.	22.	
		6.5(S)	.0( )	.0( )	5.3(D)	1.3(S)	2.4( )	.0( )	1.0( )	.0( )	
0	45.	18.	4.	4.	85.	20.	20.	35.	7.	7.	30.
		.0( )	1.3(S)	.5( )	.0( )	2.6(S)	1.2( )	.0( )	2.6(S)	.7( )	1.4( )
		38.	8.	8.	38.	38.	143.	143.	139.	25.	25.
		.0( )	2.2(S)	.8( )	1.5( )	.0( )	.0( )	2.3( )	.0( )	.6( )	.0( )
		30.	30.	68.	68.	83.	82.	4.	28.	28.	
		8.8(S)	.0( )	.0( )	4.2(D)	1.5(S)	2.4( )	.0( )	1.1( )	.0( )	
0	50.	14.	4.	4.	67.	20.	20.	28.	7.	7.	30.

			.0( )	1.4(S)	.5( )	.0( )	3.0(S)	1.2( )	.0( )	2.8(S)	.7( )	1.4( )
			28.	8.	8.	39.	39.	122.	122.	120.	23.	23.
			.0( )	2.4(S)	.8( )	1.5( )	.0( )	.0( )	2.1( )	.0( )	.6( )	.0( )
			41.	41.	53.	53.	84.	84.	3.	37.	37.	
			10.8(S)	.0( )	.0( )	3.3(D)	1.5(S)	2.4( )	.0( )	1.3( )	.0( )	
0	55.		11.	4.	4.	53.	20.	20.	22.	7.	7.	30.
			.0( )	1.5(S)	.5( )	.0( )	3.3(S)	1.2( )	.0( )	2.9(S)	.7( )	1.4( )
			21.	8.	8.	38.	38.	102.	103.	101.	21.	21.
			.0( )	2.5(S)	.8( )	1.5( )	.0( )	.0( )	1.9( )	.0( )	.6( )	.0( )
			55.	55.	40.	40.	84.	84.	2.	51.	51.	
			12.4(S)	.0( )	.0( )	2.5(D)	1.5(S)	2.4( )	.0( )	1.5( )	.0( )	
1	0.		11.	4.	4.	43.	20.	20.	22.	7.	7.	30.
			.0( )	1.5(S)	.5( )	.0( )	3.5(S)	1.2( )	.0( )	3.0(S)	.7( )	1.4( )
			19.	8.	8.	39.	39.	86.	86.	86.	18.	18.
			.0( )	2.6(S)	.8( )	1.5( )	.0( )	.0( )	1.7( )	.0( )	.5( )	.0( )
			66.	66.	31.	31.	85.	86.	2.	63.	63.	
			13.7(S)	.0( )	.0( )	1.9(D)	1.6(S)	2.5( )	.0( )	1.7( )	.0( )	
1	5.		11.	4.	4.	35.	20.	20.	22.	7.	7.	30.
			.0( )	1.6(S)	.5( )	.0( )	3.6(S)	1.2( )	.0( )	3.1(S)	.7( )	1.4( )
			19.	8.	8.	38.	38.	75.	75.	75.	13.	13.
			.0( )	2.7(S)	.8( )	1.5( )	.0( )	.0( )	1.6( )	.0( )	.5( )	.0( )
			67.	67.	26.	27.	86.	86.	2.	68.	68.	
			14.7(S)	.0( )	.0( )	1.6(D)	1.6(S)	2.5( )	.0( )	1.7( )	.0( )	
1	10.		6.	4.	4.	25.	20.	20.	12.	7.	7.	30.
			.0( )	1.6(S)	.5( )	.0( )	3.7(S)	1.2( )	.0( )	3.2(S)	.7( )	1.4( )
			11.	8.	8.	39.	39.	62.	62.	62.	9.	9.
			.0( )	2.7(S)	.8( )	1.5( )	.0( )	.0( )	1.4( )	.0( )	.4( )	.0( )
			68.	68.	20.	20.	87.	87.	1.	67.	67.	
			15.6(S)	.0( )	.0( )	1.2(D)	1.6(S)	2.5( )	.0( )	1.7( )	.0( )	
1	15.		5.	4.	4.	19.	20.	20.	11.	7.	7.	30.
			.0( )	1.6(S)	.5( )	.0( )	3.7(S)	1.2( )	.0( )	3.2(S)	.7( )	1.4( )
			8.	8.	8.	39.	39.	47.	48.	47.	7.	7.
			.0( )	2.7(S)	.8( )	1.5( )	.0( )	.0( )	1.2( )	.0( )	.3( )	.0( )
			68.	68.	14.	14.	86.	86.	1.	68.	68.	
			16.2(S)	.0( )	.0( )	.9(D)	1.6(S)	2.5( )	.0( )	1.7( )	.0( )	

1	20.	4. .0( )	4. 1.6(S)	4. .5( )	13. .0( )	20. 3.7(S)	20. 1.2( )	7. .0( )	7. 3.2(S)	7. .7( )	30. 1.4( )
		5. .0( )	8. 2.7(S)	8. .8( )	39. 1.5( )	39. .0( )	33. .0( )	33. 1.0( )	33. .0( )	5. .3( )	5. .0( )
		69. 16.6(S)	69. .0( )	10. .0( )	10. .6(D)	85. 1.6(S)	86. 2.5( )	1. .0( )	69. 1.8( )	69. .0( )	
1	25.	3. .0( )	4. 1.6(S)	4. .5( )	9. .0( )	20. 3.6(S)	20. 1.2( )	6. .0( )	7. 3.2(S)	7. .7( )	30. 1.4( )
		4. .0( )	8. 2.7(S)	8. .8( )	39. 1.5( )	39. .0( )	23. .0( )	24. .9( )	23. .0( )	4. .3( )	4. .0( )
		69. 16.8(S)	69. .0( )	7. .0( )	7. .4(D)	84. 1.5(S)	84. 2.4( )	0. .0( )	69. 1.8( )	69. .0( )	
1	30.	3. .0( )	4. 1.6(S)	4. .5( )	7. .0( )	20. 3.5(S)	20. 1.2( )	6. .0( )	7. 3.2(S)	7. .7( )	30. 1.4( )
		3. .0( )	8. 2.7(S)	8. .8( )	39. 1.5( )	39. .0( )	18. .0( )	18. .8( )	18. .0( )	3. .2( )	3. .0( )
		69. 16.9(S)	69. .0( )	6. .0( )	6. .3(D)	83. 1.5(S)	83. 2.4( )	0. .0( )	69. 1.8( )	69. .0( )	
1	35.	3. .0( )	4. 1.6(S)	4. .5( )	6. .0( )	20. 3.4(S)	20. 1.2( )	6. .0( )	7. 3.2(S)	7. .7( )	30. 1.4( )
		3. .0( )	8. 2.6(S)	8. .8( )	39. 1.5( )	39. .0( )	14. .0( )	14. .7( )	14. .0( )	3. .2( )	3. .0( )
		69. 16.9(S)	69. .0( )	5. .0( )	5. .3(D)	81. 1.4(S)	81. 2.4( )	0. .0( )	69. 1.8( )	69. .0( )	
1	40.	3. .0( )	4. 1.6(S)	4. .5( )	5. .0( )	20. 3.3(S)	20. 1.2( )	6. .0( )	7. 3.2(S)	7. .7( )	30. 1.4( )
		3. .0( )	8. 2.6(S)	8. .8( )	39. 1.5( )	39. .0( )	12. .0( )	12. .6( )	12. .0( )	2. .2( )	2. .0( )
		69. 16.9(S)	69. .0( )	5. .0( )	5. .3(D)	80. 1.4(S)	81. 2.4( )	0. .0( )	69. 1.8( )	69. .0( )	
1	45.	3. .0( )	4. 1.6(S)	4. .5( )	5. .0( )	20. 3.2(S)	20. 1.2( )	6. .0( )	7. 3.2(S)	7. .7( )	30. 1.4( )
		3. .0( )	8. 2.6(S)	8. .8( )	39. 1.5( )	39. .0( )	10. .0( )	10. .6( )	10. .0( )	2. .2( )	2. .0( )

69. 69. 4. 79. 0. 69. 7. 7. 30.
16.8(S) .0( ) .0( ) .3(D) 1.3(S) 2.3( ) -0( ) 1.8( ) 3.2(S) .7( ) 1.4( )
1 50. 3. 4. 4. 4. 20. 20. 6. 69. 2. 30.
.0( ) 1.6(S) .5( ) .0( ) 3.1(S) 1.2( ) .0( ) 1.8( ) .2( ) .0( )
3. 8. 5. 20. 79. 0. 9. 9. 7. 7. 30.
.0( ) 2.5(S) .8( ) 1.5( ) .0( ) 1.3(S) 2.3( ) .0( ) .5( ) .0( ) 3.2(S) .7( ) 1.4( )
69. 69. 4. 39. 9. 0. 69. 2. 2.
16.8(S) .0( ) .0( ) .3(D) 1.3(S) 2.3( ) .0( ) 1.8( ) .2( ) .0( )
1 55. 3. 4. 5. 20. 6. 7. 7. 30.
.0( ) 1.6(S) .5( ) .0( ) 3.0(S) 1.2( ) .0( ) 3.2(S) .7( ) 1.4( )
3. 8. 8. 39. 8. 0. 69. 2. 2.
.0( ) 2.5(S) .8( ) 1.5( ) .0( ) .0( ) .5( ) .0( ) 1.8( ) .2( ) .0( )
69. 69. 4. 78. 77. 0. 69. 7. 7. 30.
16.7(S) .0( ) .0( ) .3(D) 1.2(S) 2.3( ) .0( ) 1.8( ) .7( ) 1.4( )
2 0. 3. 4. 4. 39. 8. 6. 8. 2. 69.
.0( ) 1.6(S) .5( ) .0( ) .0( ) .0( ) .5( ) .0( ) .2( ) .0( )
3. 8. 5. 20. 20. 6. 7. 7. 30.
.0( ) 2.5(S) .8( ) 2.9(S) 1.2( ) .0( ) .5( ) 3.2(S) .7( ) 1.4( )
69. 69. 4. 39. 8. 0. 69. 2. 2.
16.6(S) .0( ) .0( ) .3(D) .0( ) .0( ) .5( ) .0( ) 1.8( ) .2( ) .0( )
2 5. 0. 4. 4. 77. 77. 0. 7. 7. 30.
.0( ) 1.6(S) .5( ) 1.2(S) 2.3( ) .0( ) .5( ) 3.1(S) .7( ) 1.4( )
0. 8. 3. 20. 20. 0. 7. 0. 0.
.0( ) 2.4(S) .0( ) 2.8(S) 1.2( ) .0( ) .0( ) .0( )
69. 69. 8. 39. 39. 0. 69. 7. 7. 30.
16.5(S) .0( ) .8( ) 1.5( ) .0( ) 7. .5( ) 1.8( ) .7( ) 1.4( )
2 10. 0. 3. 3. 75. 74. 0. 7. 0. 0.
.0( ) 1.5(S) .0( ) .2(D) 1.2(S) 2.2( ) .0( ) .0( ) .0( )
0. 4. 2. 20. 20. 0. 69. 69.
.0( ) 2.4(S) .5( ) .0( ) 2.7(S) 1.2( ) .0( ) 1.8( ) .0( )
68. 8. 39. 39. 0. 7. 7. 30.
16.4(S) .0( ) .8( ) 1.5( ) .0( ) 5. .0( ) 3.1(S) .7( ) 1.4( )
2 15. 0. 1. 1. 72. 73. 5. 5. 0. 0.
.0( ) .0( ) .1(D) 1.2(S) 2.2( ) .0( ) .4( ) .0( ) .0( ) .0( )
0. 4. 4. 0. 0. 69. 69.
1.5(S) .5( ) .0( ) 20. 20. .0( ) 1.8( ) .0( )
8. 8. 2.6(S) 1.2( ) 0. 7. 7. 30.
39. 39. 3. .0( ) 3.0(S) .7( ) 1.4( )
3. 0. 0.

		.0( )	2.3(S)	.8( )	1.5( )	.0( )	.0( )	.3( )	.0( )	.0( )	.0( )				
		68.	68.	0.	0.	71.	71.	0.	68.	68.					
		16.2(S)	.0( )	.0( )	.0(D)	1.1(S)	2.2( )	.0( )	1.7( )	.0( )					
2	20.	0.	4.	4.	0.	20.	20.	0.	7.	7.	30.				
		.0( )	1.5(S)	.5( )	.0( )	2.4(S)	1.2( )	.0( )	3.0(S)	.7( )	1.4( )				
		0.	8.	8.	39.	39.	2.	2.	2.	0.	0.				
		.0( )	2.2(S)	.8( )	1.5( )	.0( )	.0( )	.3( )	.0( )	.0( )	.0( )				
		68.	68.	0.	0.	69.	70.	0.	68.	68.					
		16.1(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )					
2	25.	0.	4.	4.	0.	20.	20.	0.	7.	7.	30.				
		.0( )	1.5(S)	.5( )	.0( )	2.3(S)	1.2( )	.0( )	2.9(S)	.7( )	1.4( )				
		0.	8.	8.	39.	39.	0.	0.	1.	0.	0.				
		.0( )	2.2(S)	.8( )	1.5( )	.0( )	.0( )	.1( )	.0( )	.0( )	.0( )				
		68.	68.	0.	0.	69.	69.	0.	68.	68.					
		15.9(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )					
2	30.	0.	4.	4.	0.	20.	20.	0.	7.	7.	30.				
		.0( )	1.4(S)	.5( )	.0( )	2.2(S)	1.2( )	.0( )	2.9(S)	.7( )	1.4( )				
		0.	8.	8.	39.	39.	0.	0.	0.	0.	0.				
		.0( )	2.1(S)	.8( )	1.5( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )				
		68.	68.	0.	0.	68.	69.	0.	68.	68.					
		15.7(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )					
2	35.	0.	4.	4.	0.	19.	19.	0.	7.	7.	30.				
		.0( )	1.4(S)	.5( )	.0( )	2.0(S)	1.2( )	.0( )	2.9(S)	.7( )	1.4( )				
		0.	8.	8.	38.	38.	0.	0.	0.	0.	0.				
		.0( )	2.1(S)	.8( )	1.5( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )				
		68.	68.	0.	0.	68.	68.	0.	68.	68.					
		15.5(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )					
2	40.	0.	4.	4.	0.	18.	18.	0.	7.	7.	29.				
		.0( )	1.4(S)	.5( )	.0( )	1.9(S)	1.2( )	.0( )	2.8(S)	.7( )	1.4( )				
		0.	8.	8.	37.	37.	0.	0.	0.	0.	0.				
		.0( )	2.0(S)	.8( )	1.5( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )				
		68.	68.	0.	0.	68.	68.	0.	68.	68.					
		15.3(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )					
2	45.	0.	4.	4.	0.	17.	17.	0.	7.	7.	28.				
		.0( )	1.4(S)	.5( )	.0( )	1.8(S)	1.1( )	.0( )	2.8(S)	.7( )	1.3( )				

0. 8. 36. 36. 0. 0. 0. 0. 0. 0.
.0( ) 2.0(S) .9( ) 1.4( ) .0( ) .0( ) .0( ) .0( ) .0( ) .0( )
67. 67. 0. 0. 0. 68. 68. 0. 67. 0. 67. 0.
15.1(S) .0( ) .0( ) .0(D) 1.1(S) 2.1( ) .0( ) 1.7( ) .0( ) .0( )
0. 4. 4. 0. 15. 16. 0. 7. 7. 27.
.0( ) 1.3(S) .5( ) .0( ) 1.7(S) 1.1( ) .0( ) 2.7(S) .7( ) 1.3( )
0. 8. 8. 35. 35. 0. 0. 0. 0. 0.
.0( ) 1.9(S) .6( ) 1.4( ) .0( ) .0( ) .0( ) .0( ) .0( ) .0( )
67. 67. 0. 0. 67. 68. 0. 7. 7. 26.
14.8(S) .0( ) .0( ) .0(D) 1.1(S) 2.1( ) .0( ) 2.7(S) .7( ) 1.3( )
0. 4. 4. 0. 14. 15. 0. 0. 0. 0.
.0( ) 1.3(S) .5( ) .0( ) 1.6(S) 1.0( ) .0( ) .0( ) .0( ) .0( )
0. 8. 8. 34. 34. 0. 0. 7. 7. 26.
.0( ) 1.9(S) .8( ) 1.4( ) .0( ) .0( ) .0( ) 2.7(S) .7( ) 1.3( )
67. 67. 0. 0. 67. 67. 0. 0. 0. 0.
14.6(S) .0( ) .0( ) .0(D) 1.1(S) 2.1( ) .0( ) .0( ) .0( ) .0( )
0. 4. 4. 0. 14. 14. 0. 7. 7. 25.
.0( ) 1.3(S) .5( ) .0( ) 1.5(S) 1.0( ) .0( ) 2.6(S) .7( ) 1.3( )
0. 8. 8. 33. 33. 0. 0. 0. 0. 0.
.0( ) 1.8(S) .8( ) 1.4( ) .0( ) .0( ) .0( ) .0( ) .0( ) .0( )
67. 67. 0. 0. 67. 67. 0. 7. 7. 25.
14.4(S) .0( ) .0( ) .0(D) 1.1(S) 2.1( ) .0( ) 2.6(S) .7( ) 1.3( )
0. 4. 4. 0. 14. 14. 0. 0. 0. 0.
.0( ) 1.3(S) .5( ) .0( ) 1.4(S) 1.0( ) .0( ) .0( ) .0( ) .0( )
0. 8. 8. 33. 33. 0. 0. 7. 7. 25.
.0( ) 1.7(S) .6( ) 1.4( ) .0( ) .0( ) .0( ) 2.6(S) .7( ) 1.3( )
67. 67. 0. 0. 67. 67. 0. 0. 0. 0.
14.1(S) .0( ) .0( ) .0(D) 1.1(S) 2.1( ) .0( ) .0( ) .0( ) .0( )
0. 4. 4. 0. 13. 13. 0. 7. 7. 24.
.0( ) 1.2(S) .5( ) .0( ) 1.3(S) 1.0( ) .0( ) 2.5(S) .7( ) 1.2( )
0. 8. 8. 32. 32. 0. 0. 0. 0. 0.
.0( ) 1.7(S) .8( ) 1.4( ) .0( ) .0( ) .0( ) .0( ) .0( ) .0( )
66. 66. 0. 0. 67. 67. 0. 66. 66. 0.
13.9(S) .0( ) .0( ) .0(D) 1.1(S) 2.1( ) .0( ) 1.7( ) .0( ) .0( )

3	15.	0.	4.	4.	0.	13.	13.	0.	7.	7.	24.		
		.0( )	1.2(S)	.5( )	.0( )	1.2(S)	1.0( )	.0( )	2.5(S)	.7( )	1.2( )		
		0.	8.	8.	32.	32.	0.	0.	0.	0.	0.		
		.0( )	1.6(S)	.8( )	1.4( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )		
		66.	66.	0.	0.	67.	66.	0.	66.	66.			
		13.7(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )			
3	20.	0.	4.	4.	0.	13.	13.	0.	7.	7.	24.		
		.0( )	1.2(S)	.5( )	.0( )	1.1(S)	1.0( )	.0( )	2.4(S)	.7( )	1.2( )		
		0.	8.	8.	32.	32.	0.	0.	0.	0.	0.		
		.0( )	1.6(S)	.8( )	1.4( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )		
		64.	64.	0.	0.	66.	66.	0.	65.	65.			
		13.4(S)	.0( )	.0( )	.0(D)	1.1(S)	2.1( )	.0( )	1.7( )	.0( )			
3	25.	0.	4.	4.	0.	12.	12.	0.	7.	7.	23.		
		.0( )	1.2(S)	.5( )	.0( )	1.0(S)	.9( )	.0( )	2.4(S)	.7( )	1.2( )		
		0.	8.	8.	31.	31.	0.	0.	0.	0.	0.		
		.0( )	1.5(S)	.8( )	1.3( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )		
		62.	62.	0.	0.	65.	65.	0.	63.	63.			
		13.2(S)	.0( )	.0( )	.0(D)	1.1(S)	2.0( )	.0( )	1.7( )	.0( )			
3	30.	0.	4.	4.	0.	12.	12.	0.	7.	7.	23.		
		.0( )	1.1(S)	.5( )	.0( )	.9(S)	.9( )	.0( )	2.3(S)	.7( )	1.2( )		
		0.	8.	8.	31.	31.	0.	0.	0.	0.	0.		
		.0( )	1.5(S)	.8( )	1.3( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )		
		60.	60.	0.	0.	63.	63.	0.	61.	61.			
		13.0(S)	.0( )	.0( )	.0(D)	1.1(S)	2.0( )	.0( )	1.6( )	.0( )			
3	35.	0.	4.	4.	0.	12.	12.	0.	7.	7.	23.		
		.0( )	1.1(S)	.5( )	.0( )	.9(S)	.9( )	.0( )	2.3(S)	.7( )	1.2( )		
		0.	8.	8.	31.	31.	0.	0.	0.	0.	0.		
		.0( )	1.4(S)	.8( )	1.3( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )		
		59.	59.	0.	0.	62.	62.	0.	59.	59.			
		12.8(S)	.0( )	.0( )	.0(D)	1.1(S)	2.0( )	.0( )	1.6( )	.0( )			
3	40.	0.	4.	4.	0.	11.	11.	0.	7.	7.	22.		
		.0( )	1.1(S)	.5( )	.0( )	.8(S)	.9( )	.0( )	2.2(S)	.7( )	1.2( )		
		0.	8.	8.	30.	30.	0.	0.	0.	0.	0.		
		.0( )	1.3(S)	.8( )	1.3( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )		
		57.	57.	0.	0.	60.	60.	0.	58.	58.			

3 45. 12.6(S) 0. .0( ) 4. 1.1(S) .5( ) 8. 1.3(S) .8( ) 56. 12.5(S) .0( ) 4. 1.0(S) .5( ) 8. 1.2(S) .8( ) 54. 12.3(S) .0( ) 4. 1.0(S) .5( ) 8. 1.2(S) .8( ) 53. 12.1(S) .0( ) 4. 1.0(S) .5( ) 8. 1.1(S) .8( ) 51. 12.0(S) .0( ) 4. 1.0(S) .5( ) 8. 1.1(S) .8( ) 50. 11.8(S) .0( ) 4. .9(S) .5( ) 8. 1.0(S) .8( )

3 50. .0( ) 4. .5( ) 8. .8( ) 56. .0( ) 4. .5( ) 8. .8( ) 54. .0( ) 4. .5( ) 8. .8( ) 53. .0( ) 4. .5( ) 8. .8( ) 51. .0( ) 4. .5( ) 8. .8( ) 50. .0( ) 4. .5( ) 8. .8( ) 27. 1.2( )

3 55. .0( ) 30. 1.3( ) 30. 1.3( ) 30. 1.3( ) 29. 1.3( ) 29. 1.3( ) 28. 1.3( ) 28. 1.3( ) 27. .0( )

4 0. .0(D) 11. .6(S) 11. .6(S) 10. .6(S) 29. .0( ) 55. 1.0(S) 55. 1.0(S) 9. .5(S) 9. .4(S) 8. .4(S) 0. .0( )

4 5. .0( ) 58. 1.0(S) 58. 1.0(S) 57. 1.0(S) 57. 1.9( ) 10. .9( ) 0. .0( ) 54. 1.0(S) 54. 1.6( ) 9. .8( ) 0. .0( ) 52. 1.8( ) 0. .0( ) 52. 1.8( ) 8. .8( ) 0. .0( )

4 10. 1.0(S) 11. .7(S) 30. .0( ) 58. 1.9( ) 30. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )

1.9( ) 11. .9( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )

.0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( ) 0. .0( )

1.6( ) 7. 2.2(S) 0. .0( ) 0. .0( ) 56. 1.6( ) 7. 2.1(S) 0. .0( ) 55. 1.6( ) 7. 2.1(S) 0. .0( ) 53. 1.5( ) 7. 2.0(S) 0. .0( ) 52. 1.5( ) 7. 2.0(S) 0. .0( ) 50. 1.5( ) 7. 1.9(S) 0. .0( ) 0. .0( )

.7( ) 22. 1.2( ) 0. .0( ) 0. .0( ) 56. .0( ) 7. 22. 1.2( ) 0. .0( ) 0. .0( ) 55. .0( ) 7. 21. 1.2( ) 0. .0( ) 0. .0( ) 53. .0( ) 7. 20. 1.1( ) 0. .0( ) 0. .0( ) 52. .0( ) 7. 20. 1.1( ) 0. .0( ) 0. .0( ) 50. .0( ) 7. 19. 1.1( ) 0. .0( ) 0. .0( )

		49. 11.7(S)	49. .0( )	0. .0( )	0. .0(D)	51. 1.0(S)	51. 1.8( )	0. .0( )	49. 1.5( )	49. .0( )				
4	15.	0. .0( )	4. .9(S)	4. .5( )	0. .0( )	7. .3(S)	8. .7( )	0. .0( )	7. 1.9(S)	7. .7( )	18. 1.1( )			
		0. .0( )	8. .9(S)	8. .7( )	26. 1.2( )	26. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )			
		47. 11.5(S)	47. .0( )	0. .0( )	0. .0(D)	50. .9(S)	50. 1.7( )	0. .0( )	48. 1.5( )	48. .0( )				
4	20.	0. .0( )	4. .9(S)	4. .5( )	0. .0( )	7. .3(S)	7. .7( )	0. .0( )	7. 1.8(S)	7. .7( )	18. 1.1( )			
		0. .0( )	7. .9(S)	7. .7( )	25. 1.2( )	25. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )			
		46. 11.4(S)	46. .0( )	0. .0( )	0. .0(D)	48. .9(S)	48. 1.7( )	0. .0( )	47. 1.4( )	47. .0( )				
4	25.	0. .0( )	4. .9(S)	4. .5( )	0. .0( )	6. .2(S)	6. .7( )	0. .0( )	7. 1.8(S)	7. .7( )	17. 1.0( )			
		0. .0( )	7. .8(S)	7. .7( )	24. 1.2( )	24. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )			
		45. 11.2(S)	45. .0( )	0. .0( )	0. .0(D)	47. .9(S)	47. 1.7( )	0. .0( )	45. 1.4( )	45. .0( )				
4	30.	0. .0( )	4. .8(S)	4. .5( )	0. .0( )	6. .2(S)	6. .6( )	0. .0( )	7. 1.7(S)	7. .7( )	17. 1.0( )			
		0. .0( )	7. .8(S)	7. .7( )	23. 1.1( )	23. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )			
		44. 11.1(S)	44. .0( )	0. .0( )	0. .0(D)	46. .9(S)	46. 1.7( )	0. .0( )	44. 1.4( )	44. .0( )				
4	35.	0. .0( )	4. .8(S)	4. .5( )	0. .0( )	5. .2(S)	5. .6( )	0. .0( )	7. 1.7(S)	7. .7( )	16. 1.0( )			
		0. .0( )	6. .8(S)	6. .7( )	23. 1.1( )	23. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )			
		42. 11.0(S)	42. .0( )	0. .0( )	0. .0(D)	45. .9(S)	44. 1.6( )	0. .0( )	43. 1.4( )	43. .0( )				
4	40.	0. .0( )	4. .8(S)	4. .5( )	0. .0( )	5. .1(S)	5. .6( )	0. .0( )	7. 1.6(S)	7. .7( )	16. 1.0( )			

		0. .0( )	6. .7(S)	6. .7( )	22. 1.1( )	22. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		41. 10.8(S)	41. .0( )	0. .0( )	0. .0(D)	43. .9(S)	43. 1.6( )	0. .0( )	42. 1.4( )	42. .0( )			
4	45.	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	4. .1(S)	5. .6( )	0. .0( )	7. 1.6(S)	7. .7( )	15. 1.0( )		
		0. .0( )	6. .7(S)	6. .6( )	21. 1.1( )	21. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		40. 10.7(S)	40. .0( )	0. .0( )	0. .0(D)	42. .9(S)	42. 1.6( )	0. .0( )	41. 1.3( )	41. .0( )			
4	50.	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	4. .1(S)	4. .5( )	0. .0( )	7. 1.5(S)	7. .7( )	15. 1.0( )		
		0. .0( )	6. .6(S)	6. .6( )	21. 1.1( )	21. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		39. 10.6(S)	39. .0( )	0. .0( )	0. .0(D)	41. .9(S)	41. 1.6( )	0. .0( )	39. 1.3( )	39. .0( )			
4	55.	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	4. .0(S)	4. .5( )	0. .0( )	7. 1.5(S)	7. .7( )	15. 1.0( )		
		0. .0( )	5. .6(S)	5. .6( )	20. 1.1( )	20. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		38. 10.4(S)	38. .0( )	0. .0( )	0. .0(D)	40. .8(S)	40. 1.5( )	0. .0( )	38. 1.3( )	38. .0( )			
5	0.	0. .0( )	4. .7(S)	4. .5( )	0. .0( )	3. .0(S)	3. .5( )	0. .0( )	7. 1.5(S)	7. .7( )	14. .9( )		
		0. .0( )	5. .6(S)	5. .6( )	19. 1.0( )	19. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		37. 10.3(S)	37. .0( )	0. .0( )	0. .0(D)	39. .8(S)	39. 1.5( )	0. .0( )	37. 1.3( )	37. .0( )			
5	5.	0. .0( )	4. .6(S)	4. .5( )	0. .0( )	2. .0(S)	3. .4( )	0. .0( )	7. 1.4(S)	7. .7( )	13. .9( )		
		0. .0( )	5. .5(S)	5. .6( )	18. 1.0( )	18. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )	0. .0( )		
		36. 10.2(S)	36. .0( )	0. .0( )	0. .0(D)	38. .8(S)	38. 1.5( )	0. .0( )	36. 1.3( )	36. .0( )			
5	10.	0.	4.	4.	0.	0.	1.	0.	7.	7.	12.		

.0( ) .6(S) .5( ) .0( ) .0(S) .3( ) .0( ) 1.4(S) .7( ) .9( )
0. 5. 5. 17. 0. 0. 0. 0. 0. 0.
.0( ) .5(S) .6( ) 1.0( ) .0( ) .0( ) .0( ) .0( ) .0( ) .0( )
35. 35. 0. 0. 17. 37. 37. 0. 35. 7. 35.
10.1(S) .0( ) .0( ) .0(D) .8(S) 1.5( ) .0( ) 1.2( ) 1.3(S) .0( )
0. 4. 4. 0. 0. 0. 0. 0. 7. 0.
.0( ) .6(S) .5( ) .0( ) .0(S) .2( ) .0( ) .0( ) 1.3(S) .0( )
0. 4. 4. 15. 15. 0. 0. 0. 7. 11.
.0( ) .5(S) .5( ) .9( ) .0( ) .0( ) .0( ) .0( ) .7( ) .8( )
34. 34. 0. 0. 0. 36. 35. 0. 34. 34. 0.
9.9(S) .0( ) .0( ) .0(D) .8(S) 1.4( ) .0( ) 1.2( ) .0( )
0. 4. 4. 0. 0. 0. 0. 0. 7. 11.
.0( ) .6(S) .5( ) .0( ) .0(S) .1( ) .0( ) 1.3(S) .7( ) .8( )
0. 4. 4. 15. 15. 0. 0. 0. 7. 11.
.0( ) .4(S) .5( ) .9( ) .0( ) .0( ) .0( ) .0( ) .7( ) .8( )
33. 33. 0. 0. 0. 34. 34. 0. 33. 7. 0.
9.8(S) .0( ) .0( ) .0(D) .8(S) 1.4( ) .0( ) 1.2( ) .0( )
0. 4. 4. 0. 0. 0. 0. 0. 7. 11.
.0( ) .5(S) .5( ) .0( ) .0(S) .1( ) .0( ) 1.2(S) .7( ) .8( )
0. 4. 4. 15. 15. 0. 0. 0. 7. 11.
.0( ) .4(S) .5( ) .9( ) .0( ) .0( ) .0( ) .0( ) .7( ) .8( )
32. 32. 0. 0. 0. 33. 33. 0. 32. 7. 0.
9.7(S) .0( ) .0( ) .0(D) .8(S) 1.4( ) .0( ) 1.2( ) .0( )
0. 4. 4. 0. 0. 0. 0. 0. 7. 11.
.0( ) .5(S) .5( ) .0( ) .0(S) .1( ) .0( ) 1.2(S) .7( ) .8( )
0. 4. 4. 14. 14. 0. 0. 0. 7. 11.
.0( ) .4(S) .5( ) .9( ) .0( ) .0( ) .0( ) .0( ) .7( ) .8( )
32. 32. 0. 0. 0. 33. 33. 0. 32. 7. 0.
9.6(S) .0( ) .0( ) .0(D) .8(S) 1.4( ) .0( ) 1.2( ) .0( )
0. 4. 4. 0. 0. 0. 0. 0. 7. 11.
.0( ) .5(S) .5( ) .0( ) .0(S) .1( ) .0( ) 1.1(S) .7( ) .8( )
0. 3. 3. 14. 14. 0. 0. 0. 7. 11.
.0( ) .4(S) .5( ) .9( ) .0( ) .0( ) .0( ) .0( ) .7( ) .8( )
31. 31. 0. 0. 0. 32. 32. 0. 32. 7. 0.
9.5(S) .0( ) .0( ) .0(D) .8(S) 1.4( ) .0( ) 1.2( ) .0( )

5 15. 5 20. 5 25. 5 30. 5 35.

5	40.	0.	4.	4.	0.	0.	0.	0.	7.	7.	11.
		.0( )	.5(S)	.5( )	.0( )	.0(S)	.0( )	.0( )	1.1(S)	.7( )	.8( )
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.
		.0( )	.3(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )
		31.	31.	0.	0.	32.	32.	0.	31.	31.	
		9.3(S)	.0( )	.0( )	.0(D)	.8(S)	1.4( )	.0( )	1.2( )	.0( )	
5	45.	0.	4.	4.	0.	0.	0.	0.	7.	7.	11.
		.0( )	.4(S)	.5( )	.0( )	.0(S)	.0( )	.0( )	1.0(S)	.7( )	.8( )
		0.	3.	3.	14.	14.	0.	0.	0.	0.	0.
		.0( )	.3(S)	.5( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )
		31.	31.	0.	0.	31.	31.	0.	31.	31.	
		9.2(S)	.0( )	.0( )	.0(D)	.8(S)	1.3( )	.0( )	1.2( )	.0( )	
5	50.	0.	3.	4.	0.	0.	0.	0.	7.	7.	11.
		.0( )	.4(S)	.5( )	.0( )	.0(S)	.0( )	.0( )	1.0(S)	.7( )	.8( )
		0.	3.	3.	13.	13.	0.	0.	0.	0.	0.
		.0( )	.3(S)	.4( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )
		31.	31.	0.	0.	31.	31.	0.	31.	31.	
		9.1(S)	.0( )	.0( )	.0(D)	.8(S)	1.3( )	.0( )	1.2( )	.0( )	
5	55.	0.	3.	3.	0.	0.	0.	0.	7.	7.	10.
		.0( )	.4(S)	.5( )	.0( )	.0(S)	.0( )	.0( )	.9(S)	.7( )	.8( )
		0.	3.	3.	13.	13.	0.	0.	0.	0.	0.
		.0( )	.3(S)	.4( )	.9( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )
		30.	30.	0.	0.	31.	31.	0.	30.	30.	
		9.0(S)	.0( )	.0( )	.0(D)	.8(S)	1.3( )	.0( )	1.2( )	.0( )	
6	0.	0.	3.	3.	0.	0.	0.	0.	7.	7.	10.
		.0( )	.4(S)	.5( )	.0( )	.0(S)	.0( )	.0( )	.9(S)	.7( )	.8( )
		0.	2.	2.	13.	13.	0.	0.	0.	0.	0.
		.0( )	.3(S)	.4( )	.8( )	.0( )	.0( )	.0( )	.0( )	.0( )	.0( )
		30.	30.	0.	0.	31.	31.	0.	30.	30.	
		8.9(S)	.0( )	.0( )	.0(D)	.8(S)	1.3( )	.0( )	1.2( )	.0( )	

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Cherrywood: 2/00 100-yr With .5 cfs discharge from property
CARROLL & LANGE, INC

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENSION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
61	128.	(DIRECT FLOW)		0 30.
71	124.	(DIRECT FLOW)		0 35.
81	64.	(DIRECT FLOW)		0 30.
51	113.	(DIRECT FLOW)		0 30.
62	7.	.1	3.2	1 20.
72	20.	.1	3.7	1 15.
82	4.	.1	1.6	1 20.
52	8.	.1	2.7	1 15.
63	7.	.7		0 35.
73	20.	1.2		0 45.
83	4.	.5		1 5.
53	8.	.8		0 35.
91	30.	1.4		0 45.
21	29.	.7		0 35.
31	166.	(DIRECT FLOW)		0 35.
92	39.	1.5		0 50.
23	29.	(DIRECT FLOW)		0 35.
41	161.	(DIRECT FLOW)		0 35.
33	166.	2.5		0 35.
93	39.	(DIRECT FLOW)		0 50.
42	69.	.1	16.9	1 35.
94	69.	(DIRECT FLOW)		1 35.
11	105.	(DIRECT FLOW)		0 35.
95	69.	1.8		1 35.
12	105.	2.8		0 35.
96	69.	(DIRECT FLOW)		1 35.
13	87.	.1	1.6	1 10.
14	87.	2.5		1 10.
16	6.	(DIRECT FLOW)		0 35.
97	87.	(DIRECT FLOW)		1 10.
17	6.	(DIRECT FLOW)		0 35.

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ENDPROGRAM PROGRAM CALLED

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95	69.	1.8		1 35.
12	105.	2.8		0 35.

96	69.	(DIRECT FLOW)	1	35.
13	87.	.1 1.6	1	10.
14	87.	2.5	1	10.
16	6.	(DIRECT FLOW)	0	35.
97	87.	(DIRECT FLOW)	1	10.
17	6.	(DIRECT FLOW		

Pond Volume and Orifice Calculation

Outlet Structure for Detention Pond

Date: May-00
Revised:
By: J/N

Minor Flood Stage 47.5
Major Flood Stage 47.5

Gravity Flow Not Valid, Pressure Flow Must Be Checked

Minor Inlet:		**Major Inlet:**		**Discharge Pipe:**		**Gravity Flow Check:**	
Vertical Orifice		Grated Top		RCP			
Diameter, ft	0.00	*Length*	2.92	Dia. (ft)	2.2	Slope%	0.50
# weirs	0	Width	2.92	# pipes	1	n	0.013
Cd	0.00	Aperture L	0.15	Cd	0.65	**MaxQ**	**22.0**
Red. Fac.	1.00	Grate Thk. (in)	0.350	Inside Inv.	22.10		
		Cd	0.60				
		Red. Fac.	0.50				

Stage	**Discharge**	Minor	Major	Major	Total	Outlet
(ft)	(cfs)	Orifice	Weir	Orifice	Inlet Cap.	Orifice
47.5	**0.0**	0.0	0.0	0.0	0.0	97.2
48.0	**5.3**	0.0	5.3	9.4	5.3	98.2
48.5	**13.3**	0.0	15.1	13.3	13.3	99.2
49.0	**16.3**	0.0	27.7	16.3	16.3	100.2
49.5	**18.8**	0.0	42.7	18.8	18.8	101.2
50.0	**21.1**	0.0	59.7	21.1	21.1	102.1
50.5	**23.1**	0.0	78.5	23.1	23.1	103.1
51.0	**24.9**	0.0	98.9	24.9	24.9	104.0
51.5	**26.6**	0.0	120.8	26.6	26.6	104.9
52.0	**28.3**	0.0	144.2	28.3	28.3	105.8
52.5	**29.8**	0.0	168.8	29.8	29.8	106.8
53.0	**31.2**	0.0	194.8	31.2	31.2	107.7

Cherrywood Park Pond Volume (version 5 of the pond 11/18/00)

Elevation	Area (sf)	.333 (A1 + a2 + (A1*A2)^0.5) * D	TOTAL VOLUME (cu-ft)	TOTAL VOLUME (Acre-ft)	
5241	20.00				
		2038.77	2038.77	0.05	
5242	5,757.00				
		14393.38	16432.15	0.38	
5243	25,344.00				
		47429.08	63861.23	1.47	
5244	73,719.00				
		90268.12	154129.35	3.54	
5245	107,899.00				
		118876.99	273006.34	6.27	
5246	130,204.00				
		134876.70	407883.04	9.36	
5247	139,604.00				
		142548.29	550431.34	12.64	
5248	145,513.00				
		148508.36	698939.70	16.05	
5249	151,524.00				17.82
		154571.92	853511.61	19.59	
5250	157,640.00				

Outlet Structure Design at Northwest Corner of Site.
Pond 1 Outlet B Minor

Date: 2/28/00
Revised:
By: AKW
J/N 1850

Discharge Pipe:

Box Section
Area (s.f. 1.8
Height (ft 1.0
pipes 1
Cd 0.62
Inside Inv 41.0

Stage	ischargæquired Q	
41.4	#NUM!	
41.6	2.8	
41.8	4.9	
42.0	6.3	
42.2	7.5	
42.4	8.5	
42.6	9.4	
42.8	10.2	
43.0	11.0	
43.2	11.7	
43.4	12.3	
43.6	13.0	
43.8	13.6	
44.0	14.2	
44.2	14.7	
44.4	15.3	
44.6	15.8	
44.8	16.3	
45.0	16.8	
45.2	17.2	
45.4	17.7	
45.6	18.1	
45.8	18.6	
46.0	19.0	
46.2	19.4	
46.4	19.8	
46.6	20.2	
46.8	20.6	
47.0	21.0	
47.2	21.4	
47.4	21.8	
47.6	22.1	
47.8	22.5	
48.0	22.8	
48.2	23.2	
48.4	23.5	
48.6	23.9	
48.8	24.2	
49.0	24.5	
49.2	24.9	
49.4	25.2	
49.6	25.5	25.2
49.8	25.8	
50.0	26.1	
50.2	26.4	
50.4	26.7	
50.6	27.0	
50.8	27.3	
51.0	27.6	

Outlet Structure Design at Northwest Corner of Site.
Pond 1 Outlet Major

Date: 2/28/00
Revised:
By: AKW
J/N 1850

Discharge Pipe:
Box Section
Area (s.f. 4.5
Height (ft 2.5
pipes 1
Cd 0.62
Inside Inv 39.0

Stage	ischargæquired Q
41.0	19.4
41.2	21.8
41.4	24.0
41.6	26.0
41.8	27.9
42.0	29.6
42.2	31.3
42.4	32.8
42.6	34.3
42.8	35.8
43.0	37.1
43.2	38.5
43.4	39.7
43.6	41.0
43.8	42.2
44.0	43.4
44.2	44.5
44.4	45.6
44.6	46.7
44.8	47.8
45.0	48.8
45.2	49.8
45.4	50.8
45.6	51.8
45.8	52.7
46.0	53.7
46.2	54.6
46.4	55.5
46.6	56.4
46.8	57.3
47.0	58.2
47.2	59.0
47.4	59.9
47.6	60.7
47.8	61.5
48.0	62.3
48.2	63.1
48.4	63.9
48.6	64.7
48.8	65.5
49.0	66.2
49.2	67.0
49.4	67.7
49.6	68.5
49.8	69.2
50.0	69.9
50.2	70.6
50.4	71.3
50.6	72.0

POND 2

Cherrywood Park Pond Volume (downstream propty limit) Version #1

Elevation	Area (sf)	Average End Method	TOTAL VOLUME (cu-ft)	TOTAL VOLUME (Acre-ft)
5222	47.87			
		149.05	149.05	0.00
5223	250.23			
		3647.65	3796.70	0.09
5224	7,045.07			
		10242.90	14039.60	0.32
5225	13,440.73			
		16380.15	30419.75	0.70
5226	19,319.57			
		22103.90	52523.65	1.21
5227	24,888.23			
		26502.75	79026.40	1.81
5228	28,117.26			
		29777.72	108804.11	2.50
5229	31,438.17			

Discharge Pipe:		Gravity Flow Check:	
RCP			
Dia. (ft)	1.3	Slope%	0.50
# pipes	1	n	0.013
Cd	0.65	**MaxQ**	**4.9**
Inside Inv.	23.50		

Date: Feb-00
Revised:
By: akw
J/N 1850

Stage (ft)	Discharge (cfs)	Required Q
23.4	#NUM!	
23.6	#NUM!	
23.8	#NUM!	
24.0	#NUM!	
24.2	1.8	
24.4	3.4	
24.6	4.4	
24.8	5.3	
25.0	6.0	
25.2	6.6	
25.4	7.2	
25.6	7.8	
25.8	8.3	
26.0	8.8	
26.2	9.2	
26.4	9.7	
26.6	10.1	
26.8	10.5	10.5
27.0	10.9	
27.2	11.2	
27.4	11.6	
27.6	11.9	
27.8	12.3	
28.0	12.6	
28.2	12.9	
28.4	13.2	

Outlet Structure Design at Northwest Corner of Site.
Pond 2 Outlet B Minor

Date: 2/28/00
Revised:
By: AKW
J/N 1850

Discharge Pipe:

Box Section
Area (s.f. 3.7
Height (ft 1.5
pipes 1
Cd 0.62
Inside Inv 23.5

Stage	Discharge	Required Q
24.0	#NUM!	
24.3	0.0	
24.5	9.2	
24.8	13.0	
25.0	15.9	
25.3	18.4	
25.5	20.6	
25.8	22.5	
26.0	24.4	
26.3	26.0	
26.5	27.6	
26.8	29.1	
27.0	30.5	30.0
27.3	31.9	
27.5	33.2	
27.8	34.4	
28.0	35.6	
28.3	36.8	
28.5	38.0	
28.8	39.1	
29.0	40.1	
29.3	41.2	
29.5	42.2	
29.8	43.2	
30.0	44.1	
30.3	45.1	

Discharge Pipe:		Gravity Flow Check:	
RCP			
Dia. (ft)	2.5	Slope%	0.50
# pipes	2	n	0.013
Cd	0.65	**MaxQ**	**62.4**
Inside Inv.	23.50		

Date: Feb-00
Revised:
By: akw
J/N 1850

Stage (ft)	Discharge (cfs)	Required Q
23.4	#NUM!	
23.6	#NUM!	
23.8	#NUM!	
24.0	#NUM!	
24.2	#NUM!	
24.4	#NUM!	
24.6	#NUM!	
24.8	11.5	
25.0	25.6	
25.2	34.4	
25.4	41.3	
25.6	47.2	
25.8	52.5	
26.0	57.3	
26.2	61.7	
26.4	65.8	
26.6	69.7	
26.8	73.3	
27.0	76.8	
27.2	80.2	
27.4	83.4	
27.6	86.5	
27.8	89.4	
28.0	92.3	
28.2	95.1	90.5
28.4	97.8	

Emergency Spillway Calculations

Pond 2 Emergency Spilway
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickl1.fm2
Worksheet	Pond 2 Emergency Spillway
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Bottom Width

Input Data		
Mannings Coefficient	0.030	
Channel Slope	2.0000	%
Depth	0.50	ft
Left Side Slope	4.000000	H : V
Right Side Slope	4.000000	H : V
Discharge	182.00	cfs

Results		
Bottom Width	81.88	ft
Flow Area	41.94	ft^2
Wetted Perimeter	86.00	ft
Top Width	85.88	ft
Critical Depth	0.53	ft
Critical Slope	0.016366	ft/ft
Velocity	4.34	ft/s
Velocity Head	0.29	ft
Specific Energy	0.79	ft
Froude Number	1.09	
Flow is supercritical.		

Emergency Spilway Pond 1
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickl1.fm2
Worksheet	Pond 1 Emergency Spillway Trapizoidal
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.5000	%
Left Side Slope	83.000000	H : V
Right Side Slope	83.000000	H : V
Bottom Width	10.00	ft
Discharge	132.00	cfs

Results		
Depth	0.83	ft
Flow Area	65.01	ft²
Wetted Perimeter	147.26	ft
Top Width	147.25	ft
Critical Depth	0.63	ft
Critical Slope	0.018712	ft/ft
Velocity	2.03	ft/s
Velocity Head	0.06	ft
Specific Energy	0.89	ft
Froude Number	0.54	
Flow is subcritical.		

Riprap Calculations

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Fax: 303/980-0917

Job. No. 1850

Date 04 / 10 / 00

PROJECT Cherrywood Park Filing No. 2

Sheet 1 of 2

Subject Riprap Calculations Pond 7 Outlet B

By J. B. MORRIS

$Q_T = 90.2$ cfs

Diameter = 2.5' each

$n = 0.013$

Slope = 1.43%

Tailwater Depth (y_t) = 0.93 ft

$y_t < \frac{D}{3}$ $\quad 0.93 ft < \frac{2.5}{3.0}$ $\quad$ Low Tailwater

$Q_{full} = 49.05$ cfs each pipe

$Q_{full\ total} = 98.1$ cfs

$\frac{Q}{Q_{full}} = \frac{90.2}{98.1} = 0.92$ $\quad \frac{45.1}{49.05} = 0.92$

Fig. 2

$\frac{d}{D} = 0.84$

$F_r = \frac{Q}{D^{2.5}} = \frac{45.1}{(2.5)^{2.5}} = 4.56$

Fig. 3

$\frac{d}{D} = 0.75$

$d = 0.75(2.5) = 1.88$ ft.

Fig. 2

$\frac{A}{A_{full}} = 0.81$

$A = (0.81)(\pi (2.5)^2) = 15.9 ft^2$

$V = \frac{Q}{A} = \frac{45.1}{15.9} = 2.84$ ft/s

$P_d = (V^2 + gd)^{1/2} = [2.84^2 + 32.2(1.88)]^{1/2} = 8.28$

Fig. 4 Type 'L'

USE TYPE 'M' RipRap

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Sheet 2 of 2

By J.B. MORRIS

PROJECT Cherrywood Park Filing No. 2

Subject Riprap Calcs. Pond 2 Outlet B (cont.)

D_{50} = 12 inches

T = 1.75(12) = 21 inches

Minimum riprap thickness = 21 inches

$B = \frac{D}{2} + T = \frac{2.5}{2} + 1.75$

B = 3.0'

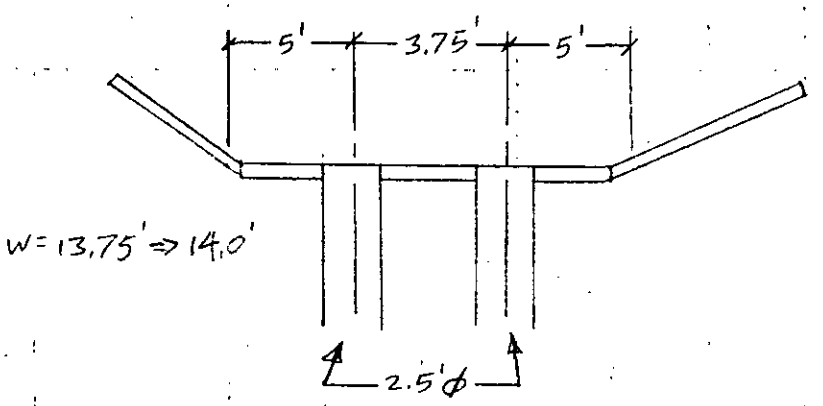
L = 4D = 4 (2.5) = 10.0 ft

$L = (D^{1/2})(V/2) = (2.5^{1/2})(\frac{2.84}{2}) = 2.25$ ft

L = 10.0 ft

W = 4 D = 4(2.5) = 10 ft

W = 10 ft. for 1 pipe w/2 = 5'



W = 13.75' ⇒ 14.0'

Total W = 14.0'

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PROJECT Pond 2 Riprap Outlet

Sheet ___ of ___

Subject LOCAL WATER

By ___

$$P_d = (V^2 + \frac{g}{\rho} \cdot d)^{1/2}$$

$V = 5.94$

$g = 32.2$

$d = 4$

$P_d = 12.8$

Rock: L USBM

$L = 12$

$W = 12$

Pond 2
Worksheet for Circular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\pipev.fm2
Worksheet	Pond 2 Outlet
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.2700	%
Diameter	48.00	in

Results		
Depth	48.0	in
Discharge	74.64	cfs
Flow Area	12.57	ft²
Wetted Perimeter	12.57	ft
Top Width	0.00	ft
Critical Depth	2.61	ft
Percent Full	100.00	
Critical Slope	0.004644	ft/ft
Velocity	5.94	ft/s
Velocity Head	0.55	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	80.29	cfs
Full Flow Capacity	74.64	cfs
Full Flow Slope	0.002700	ft/ft

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Job. No. _____

Date ____/____/____

Sheet ____ of ____

By _____

PROJECT POND 1

Subject OUTLET B 36"

$P_L = (V^2 + 5 \cdot d)$

$V^2 = 4.47$

$g = 32.2$

$d = 3$

$P_L = 11.88$

Req Type C

USE M

L = 12'

W = 12'

Detail D
Worksheet for Rectangular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickler.fm2
Worksheet	Detail
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.8000	%
Bottom Width	2.00	ft
Discharge	1.00	cfs

Results		
Depth	0.17	ft
Flow Area	0.35	ft^2
Wetted Perimeter	2.35	ft
Top Width	2.00	ft
Critical Depth	0.20	ft
Critical Slope	0.005376	ft/ft
Velocity	2.87	ft/s
Velocity Head	0.13	ft
Specific Energy	0.30	ft
Froude Number	1.21	
Flow is supercritical.		

Detail E
Worksheet for Rectangular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickler.fm2
Worksheet	Detail
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.8000	%
Bottom Width	5.00	ft
Discharge	10.00	cfs

Results		
Depth	0.40	ft
Flow Area	1.99	ft²
Wetted Perimeter	5.80	ft
Top Width	5.00	ft
Critical Depth	0.50	ft
Critical Slope	0.003957	ft/ft
Velocity	5.02	ft/s
Velocity Head	0.39	ft
Specific Energy	0.79	ft
Froude Number	1.40	
Flow is supercritical.		

Outlet B
Worksheet for Circular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\pipev.fm2
Worksheet	Outlet c
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.5000	%
Diameter	36.00	in

Results		
Depth	3.00	ft
Discharge	47.16	cfs
Flow Area	7.07	ft²
Wetted Perimeter	9.42	ft
Top Width	0.00	ft
Critical Depth	2.24	ft
Percent Full	100.00	
Critical Slope	0.006095	ft/ft
Velocity	6.67	ft/s
Velocity Head	0.69	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	50.73	cfs
Full Flow Capacity	47.16	cfs
Full Flow Slope	0.005000	ft/ft

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Job. No. _____

Date ____/____/____

Sheet ____ of ____

By _____

PROJECT RIPRAP POND 1

Subject OUTLET C 42"

LOW TAILWATER RIPRAP NOMOGRAPH

$P_d = (V^2 + g \cdot d)^{1/2}$

V = 7.39

g = 32.2 FT/S

d = 3.5

P_d = 12.93

D = 42"

Rock L

USBM

T = 1.75 · D50

= 74"

L = 4 D50 D"/2 1/2

= 14 or 6.9

W = 4 D = 14

Outlet C
Worksheet for Circular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\pipev.fm2
Worksheet	Outlet c
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.5000	%
Diameter	42.00	in

Results		
Depth	3.50	ft
Discharge	71.14	cfs
Flow Area	9.62	ft²
Wetted Perimeter	11.00	ft
Top Width	0.00	ft
Critical Depth	2.64	ft
Percent Full	100.00	
Critical Slope	0.005920	ft/ft
Velocity	7.39	ft/s
Velocity Head	0.85	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	76.52	cfs
Full Flow Capacity	71.14	cfs
Full Flow Slope	0.005000	ft/ft

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PROJECT POND 1 RIP RAP ENTRANCE

Date ____/____/____

Subject OUTLET A CHANNEL) 36"

Sheet ____ of ____

By _____

LOW TAILWATER RIPRAP BASIN

$$P_d = \left(V^2 + \frac{g}{2} \cdot d\right)^{1/2}$$

$V = 14.9$

$\frac{g}{2} = 32.2$

$d = 3.5'$

$P_d = 18.5$

TYP M

USE TYPE M

T = (THICKNESS OF RIPRAP

$= 1.75\ D_{50} = 1.75\ (12'')$

$T = 21''$

$L = 4D$ or $D^{1/2} \cdot \frac{V}{2}$

$= 12'$ 7.29

USE $12'$

$W = 12$

Outlet d
Worksheet for Circular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\pipev.fm2
Worksheet	Outlet c
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data		
Mannings Coefficient	0.013	
Channel Slope	2.0300	%
Diameter	42.00	in

Results		
Depth	3.50	ft
Discharge	143.34	cfs
Flow Area	9.62	ft²
Wetted Perimeter	11.00	ft
Top Width	0.00	ft
Critical Depth	3.37	ft
Percent Full	100.00	
Critical Slope	0.017711	ft/ft
Velocity	14.90	ft/s
Velocity Head	3.45	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	154.19	cfs
Full Flow Capacity	143.34	cfs
Full Flow Slope	0.020300	ft/ft

Signal Ditch Calculations

Communications Memo

Job No: 1850CM
Project: Cherrywood
Date: 5/29/98

Person	Representing
Mark McLean	RMC
Colby Hayden	RMC

Subject: Signal Creek Ditch Issues

Mark explained that in any roadway crossing there would need to be 2' or free clearance from the HWL to the bottom of the inside of the conduit. There can not be any change in the slope of the ditch at the crossings. The flow in the ditch is approximately 60cfs the slope is around 0.25% to 0.50%. Mark said the crossing most likely be a box culvert with wingwalls either side and rip-rap downstream and possibly upstream. All utility crossings must maintain a 3 foot minimum from ditch FL to TOP and be encased in concrete so that all maintanence can be handled by boring and not interrupt ditch flows. Crossings will cost about $1000 each and an agreement will need to be made between owner and ditch company. The lawyer is Lysle Dirrim in Brighton, 659-3171.

Colby Hayden said we may need to peform a HEC-RAS model if there are drop structures near the crossings.

Culvert Designer/Analyzer Report
UPSTREAM

sign:Trial-3

olve For: Headwater Elevation

ulvert Summary			
Allowable HW Elevation	5,250.89 ft	Storm Event	Design
mputed Headwater Elevation	5,249.41 ft	Discharge	60.00 cfs
eadwater Depth/ Height	0.50	Tailwater Elevation	5,249.12 ft
Inlet Control HW Elev	5,249.12 ft	Control Type	Outlet Control
utlet Control HW Elev	5,249.41 ft		

Grades			
stream Invert	5,246.89 ft	Downstream Invert	5,246.82 ft
ngth	70.00 ft	Constructed Slope	0.001000 ft/ft

Hydraulic Profile			
ofile	M1	Depth, Downstream	2.30 ft
ope Type	Mild	Normal Depth	1.80 ft
Flow Regime	Subcritical	Critical Depth	1.20 ft
ocity Downstream	3.26 ft/s	Critical Slope	0.003288 ft/ft

Section			
ction Shape	Box	Mannings Coefficient	0.013
ction Material	Concrete	Span	8.00 ft
Section Size	8 x 5 ft	Rise	5.00 ft
umber Sections	1		

utlet Control Properties			
utlet Control HW Elev	5,249.41 ft	Upstream Velocity Head	0.17 ft
	0.50	Entrance Loss	0.09 ft

nlet Control Properties			
t Control HW Elev	5,249.12 ft	Flow Control	Unsubmerged
let Type	90 and 15 ° wingwall flares	Area Full	40.0 ft²
	0.06100	HDS 5 Chart	8
	0.75000	HDS 5 Scale	2
	0.04000	Equation Form	1
	0.80000		

Culvert Designer/Analyzer Report
DOWNSTREAM

Warning: Model not calculated, variables shown may not represent current state.

Peak Discharge Method: User-Specified			
Design Discharge	60.00 cfs	Check Discharge	0.00 cfs
Grades Model: Inverts			
Invert Upstream	5,244.99 ft	Invert Downstream	5,244.90 ft
Length	70.00 ft	Slope	0.001286 ft/ft
Drop	0.09 ft		
Headwater Model: Maximum Allowable HW			
Headwater Elevation	5,248.99 ft		
Tailwater properties: Trapezoidal Channel			
Slope	0.001300 ft/ft	Mannings Coefficient	0.040
Depth	2.16 ft	Left Side Slope	4 H : V
Right Side Slope	4 H : V	Bottom Width	8.00 ft
Tailwater conditions for Design Storm.			
Discharge	60.00 cfs	Bottom Elevation	5,244.90 ft
Depth	2.16 ft	Velocity	1.67 ft/s

Name	Desc	Discharge	HW Elev	Velocity
Trial-2	1-8 x 5 ft Box	60.00 cfs	5,247.39 ft	3.47 ft/s

Culvert Designer/Analyzer Report
DOWNSTREAM

esign:Trial-2

Solve For: Headwater Elevation

ulvert Summary			
Allowable HW Elevation	5,248.99 ft	Storm Event	Design
omputed Headwater Elevation	5,247.39 ft	Discharge	60.00 cfs
eadwater Depth/ Height	0.48	Tailwater Elevation	5,247.06 ft
Inlet Control HW Elev	5,247.06 ft	Control Type	Outlet Control
utlet Control HW Elev	5,247.39 ft		

Grades			
pstream Invert	5,244.99 ft	Downstream Invert	5,244.90 ft
ength	70.00 ft	Constructed Slope	0.001286 ft/ft

Hydraulic Profile			
ofile	M1	Depth, Downstream	2.16 ft
ope Type	Mild	Normal Depth	1.65 ft
Flow Regime	Subcritical	Critical Depth	1.20 ft
locity Downstream	3.47 ft/s	Critical Slope	0.003288 ft/ft

Section			
ction Shape	Box	Mannings Coefficient	0.013
ction Material	Concrete	Span	8.00 ft
Section Size	8 x 5 ft	Rise	5.00 ft
Number Sections	1		

utlet Control Properties			
Outlet Control HW Elev	5,247.39 ft	Upstream Velocity Head	0.20 ft
k	0.50	Entrance Loss	0.10 ft

nlet Control Properties			
t Control HW Elev	5,247.06 ft	Flow Control	Unsubmerged
t Type	90 and 15 ° wingwall flares	Area Full	40.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
c	0.04000	Equation Form	1
Y	0.80000		

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Upst Box Culvert Normal Channel Depth
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\1850\engineering\final drainage\dnst-nd.fm2
Worksheet	Normal Depth for Upst Box Culvert
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

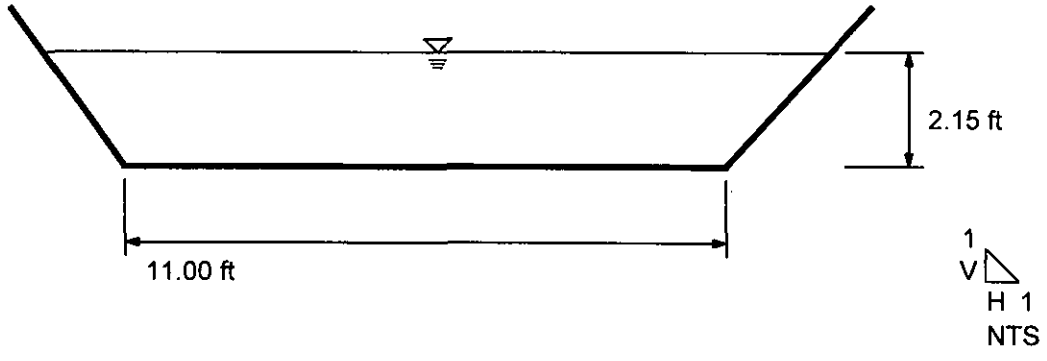
Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001000	ft/ft
Left Side Slope	0.700000	H : V
Right Side Slope	0.900000	H : V
Bottom Width	11.00	ft
Discharge	60.00	cfs

Results		
Depth	2.15	ft
Flow Area	27.36	ft^2
Wetted Perimeter	16.52	ft
Top Width	14.44	ft
Critical Depth	0.95	ft
Critical Slope	0.014965	ft/ft
Velocity	2.19	ft/s
Velocity Head	0.07	ft
Specific Energy	2.23	ft
Froude Number	0.28	
Flow is subcritical.		

Upst Box Culvert Normal Channel Depth
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\1850\engineering\final drainage\dnst-nd.fm2
Worksheet	Normal Depth for Upst Box Culvert
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.030	
Channel Slope	0.001000	ft/ft
Depth	2.15	ft
Left Side Slope	0.700000	H : V
Right Side Slope	0.900000	H : V
Bottom Width	11.00	ft
Discharge	60.00	cfs



Dnst Box Culvert Normal Channel Depth
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\1850\engineering\final drainage\dnst-nd.fm2
Worksheet	Norm Depth for Dnst Box Culvert
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

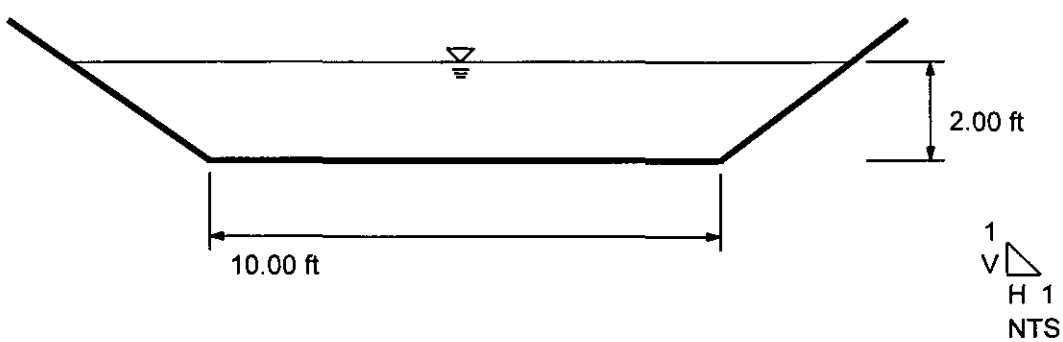
Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.001300	ft/ft
Left Side Slope	1.400000	H : V
Right Side Slope	1.300000	H : V
Bottom Width	10.00	ft
Discharge	60.00	cfs

Results		
Depth	2.00	ft
Flow Area	25.42	ft²
Wetted Perimeter	16.72	ft
Top Width	15.40	ft
Critical Depth	0.99	ft
Critical Slope	0.014601	ft/ft
Velocity	2.36	ft/s
Velocity Head	0.09	ft
Specific Energy	2.09	ft
Froude Number	0.32	
Flow is subcritical.		

Dnst Box Culvert, Normal Channel Depth
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\1850\engineering\final drainage\dnst-nd.fm2
Worksheet	Norm Depth for Dnst Box Culvert
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.030	
Channel Slope	0.001300	ft/ft
Depth	2.00	ft
Left Side Slope	1.400000	H : V
Right Side Slope	1.300000	H : V
Bottom Width	10.00	ft
Discharge	60.00	cfs



Trickle Channel Calculations

Detail B
Worksheet for Rectangular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickl1.fm2
Worksheet	DP26A
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.010000	ft/ft
Bottom Width	2.00	ft
Discharge	2.00	cfs

Results		
Depth	0.25	ft
Flow Area	0.51	ft^2
Wetted Perimeter	2.51	ft
Top Width	2.00	ft
Critical Depth	0.31	ft
Critical Slope	0.005214	ft/ft
Velocity	3.94	ft/s
Velocity Head	0.24	ft
Specific Energy	0.50	ft
Froude Number	1.38	
Flow is supercritical.		

Detail C
Worksheet for Rectangular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickl1.fm2
Worksheet	DP26A
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.010000	ft/ft
Bottom Width	3.00	ft
Discharge	4.00	cfs

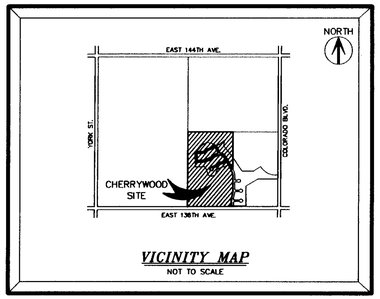
Results		
Depth	0.30	ft
Flow Area	0.89	ft^2
Wetted Perimeter	3.59	ft
Top Width	3.00	ft
Critical Depth	0.38	ft
Critical Slope	0.004594	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.32	ft
Specific Energy	0.61	ft
Froude Number	1.46	
Flow is supercritical.		

Detail D
Worksheet for Rectangular Channel

Project Description	
Project File	p:\1850\engineering\final drainage\trickl1.fm2
Worksheet	DP26A
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.010000	ft/ft
Bottom Width	3.00	ft
Discharge	3.00	cfs

Results		
Depth	0.25	ft
Flow Area	0.74	ft^2
Wetted Perimeter	3.49	ft
Top Width	3.00	ft
Critical Depth	0.31	ft
Critical Slope	0.004668	ft/ft
Velocity	4.06	ft/s
Velocity Head	0.26	ft
Specific Energy	0.50	ft
Froude Number	1.44	
Flow is supercritical.		



VICINITY MAP
NOT TO SCALE

HISTORIC DRAINAGE PATH

SHADOW RIDGE SUBDIVISION

SHADOW RIDGE POND
Q_5 RELEASE = 6.8 CFS, Tc = 58 min
Q_{100} RELEASE = 19.6 CFS, Tc = 40 min
(FROM SHADOW RIDGE FINAL DRAINAGE STUDY, COSTIN ENGINEERS, AUGUST 10, 1983.)

BASIN THAT GOES INTO SHADOW RIDGE POND

COLORADO BLVD.

136TH AVENUE

OS1	
73.5 AC.	0.87 / 0.93

OS2	
47.8 AC.	0.45 / 0.60

H1	
143.8 AC.	0.15 / 0.50

H2	
28.2 AC.	0.15 / 0.50

ON SITE DETENTION POND

206.7
32.5

43.8
6.9

LEGEND

- HISTORICAL BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- BASIN THAT GOES INTO SHADOW RIDGE POND
- DESIGN POINT
- PROPOSED FLOW DIRECTION
- BASIN (AREA AC. / C5 C100) — BASIN INFORMATION
- 100 YR / 5 YR — HISTORIC DISCHARGE
- HISTORIC BASIN
- OFFSITE BASIN

N

-200 0 100 200 400

SCALE: 1"=200'
ORIGINAL GRAPHIC SCALE

PRINTED
JAN 26 2001

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2 BUSINESS DAYS IN ADVANCE, BEFORE YOU DIG, GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

PREPARED UNDER THE DIRECT SUPERVISON OF
COLORADO REGISTERED PROFESSIONAL ENGINEER
ANN K. WILLIAMS
28127
7-21-00
COLORADO P.E. NO. FOR AND ON BEHALF OF CARROLL & LANGE, INC.

No.	Revisions	Date	By	Chk
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				

Carroll & Lange inc
Professional Engineers & Land Surveyors
165 South Union Blvd., Suite 156
Lakewood, Colorado 80228
(303) 980-0200

Project: **CHERRYWOOD PARK FILING NO. 2**
Title: **PHASE III DRAINAGE PLAN(HISTORIC & OFFSITE BASINS)**

Designed By:	Scale: 1" = 200'	Sheet 2 of 2
Drawn By: CLK		Job No. 1850
Checked By:	Date: 6/30/98	File No. DRNMAP2

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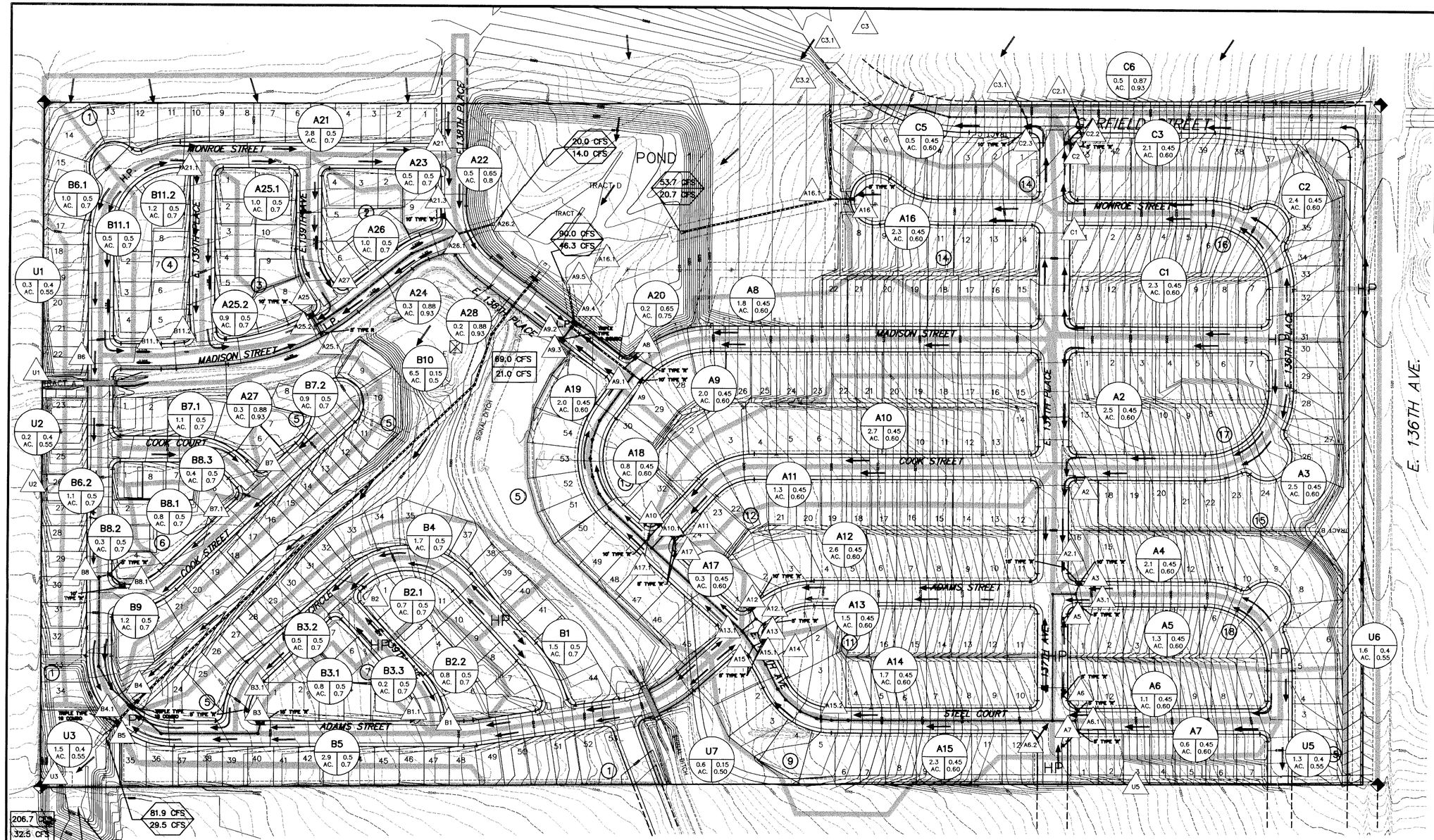
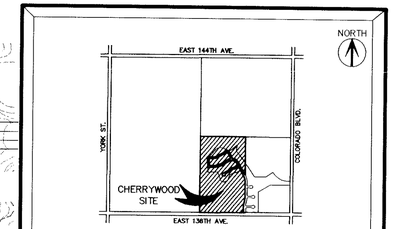




VICINITY MAP
NOT TO SCALE

LEGEND

- 9 — LOT NUMBER
- (17) — BLOCK NUMBER
- 5530 — EXISTING CONTOUR
- 5530 — PROPOSED CONTOUR
- OFF-SITE BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- PROPOSED STORM SEWER, INLET, FES
- CULVERT
- 1 — DESIGN POINT
- PROPOSED FLOW DIRECTION
- BASIN / AREA AC. / C5 C100 — SUB-BASIN INFORMATION
- ACF/CFS / ACF/CFS — 100 YR. VOLUME/ RELEASE RATE; 5 YR. VOLUME/ RELEASE RATE
- 100yr CFS / 5yr CFS — DETENTION POND IN FLOW
- 100 YR / 5 YR — HISTORIC DISCHARGE

SCALE: 1" = 100'
ORIGINAL GRAPHIC SCALE

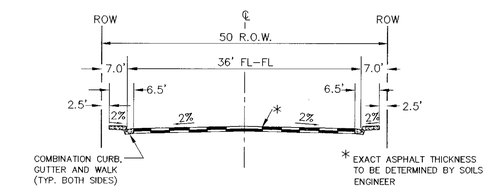
DESIGN POINT RUNOFF TABLE

DESIGN AREA	AREA (Acres)	Q_5 (cfs)	Q_{100} (cfs)
A2	2.5	4.5	11.5
A3	2.5	4.4	11.8
A4	2.1	3.8	9.8
A5	1.3	2.5	6.5
A6	1.1	2.1	5.4
A7	0.6	1.1	3.8
A8	1.8	3.3	8.4
A9	2.0	3.7	9.5
A10	2.7	4.9	12.4
A11.1	0.5	1.0	1.4
A11.2	1.2	2.5	3.5
A12	2.6	4.7	11.9
A13	1.5	2.8	7.1
A14	1.7	3.2	8.2

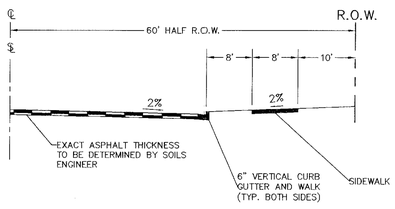
DESIGN AREA	AREA (Acres)	Q_5 (cfs)	Q_{100} (cfs)
A15	2.3	3.9	9.8
A16	2.3	4.0	10.3
A17	0.3	0.6	1.6
A18	0.6	1.4	3.5
A19	2.0	3.3	8.3
A20	0.2	0.5	1.1
A21	2.8	4.6	6.4
A22	0.5	1.3	3.1
A23	0.5	1.0	1.4
A24	0.3	1.3	1.4
A25.1	1.0	2.3	3.2
A25.2	0.9	1.8	2.5
A26	1.0	1.9	4.0
A27	0.3	1.3	1.4
A28	0.2	0.6	1.3

DESIGN AREA	AREA (Acres)	Q_5 (cfs)	Q_{100} (cfs)
B1	1.5	2.9	7.7
B2.1	0.7	1.6	4.2
B2.2	0.8	1.5	4.0
B3.1	0.8	1.6	4.3
B3.2	0.5	1.0	2.8
B3.3	0.2	0.5	1.2
B4	1.7	3.2	8.5
B5	2.8	5.0	13.4
B6.1	1.0	1.8	4.7
B6.2	1.1	0.7	6.4
B7.1	1.1	2.2	6.0
B7.2	0.9	1.9	5.1
B8.1	0.8	1.5	3.9
B8.2	0.3	0.7	2.0
B8.3	0.4	0.9	2.3
B9	1.2	2.3	6.1
B10	6.5	3.1	19.7
B11.1	0.9	1.9	2.6
B11.2	0.8	1.7	2.3

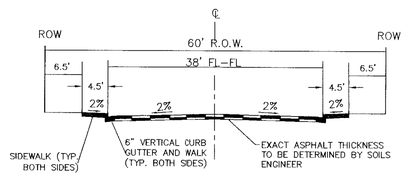
DESIGN AREA	AREA (Acres)	Q_5 (cfs)	Q_{100} (cfs)
C1	2.3	4.3	11.0
C2	2.4	4.5	11.5
C3	2.1	3.8	9.7
C5	0.5	1.0	2.6
C6	0.5	2.0	4.0
OS1	67.0	17.2	109.1
OS2	9.2	2.9	18.3
OS3	1.0	0.4	2.5
H1	143.8	32.5	206.7
H2	28.2	6.9	43.8
U1	0.3	0.4	1.0
U2	0.2	0.3	0.7
U3	1.1	1.2	3.2
U4	0.3	0.5	1.2
U5	1.0	1.5	4.0
U6	1.6	3.1	8.1
U7	0.6	0.9	2.5



LOCAL STREET SECTION
36' FLOW LINE TO FLOW LINE



136TH AVE HALF SECTION
(LOOKING WEST)



137th AVE & MONROE STREET (60' R.O.W.)

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COLORADO REGISTERED PROFESSIONAL ENGINEER
Jeffrey A. Wood
28127
1-26-01

No.	Revisions	Date	By	Chk
15	POND REVISIONS	11/17/00	CDC	
1	MISC. COMMENTS	5/24/00	AR	

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Professional Engineers & Land Surveyors
165 South Union Blvd., Suite 156
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(303) 980-0200
JAN 26 2001

Project: CHERRYWOOD PARK FILING NO. 2
Title: PHASE III DRAINAGE PLAN (ONSITE BASIN)
Designed By: AW,JM
Drawn By: SJB
Checked By:
Scale: 1"=100
Date: 11/23/99
Sheet 1 of 2
Job No. 1850
File No. DRNPHAS3

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