

MASTER DRAINAGE STUDY FOR
WILSON UMC SUBDIVISION
COLORADO SPRINGS, COLORADO
March, 1992

Including the FINAL STUDY
WILSON UMC SUBDIVISION, FILING NO.1

Prepared for:

THE WILSON UNITED METHODIST CHURCH, INC.

Prepared by:

KLH Engineering, Inc.
208 Sutton Lane
Colorado Springs, CO 80907

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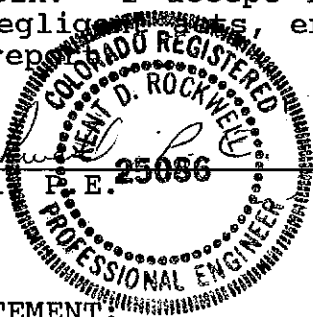
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DRAINAGE PLAN STATEMENTS

ENGINEER'S STATEMENT:

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

Kent D. Rockwell
Kent D. Rockwell P. E. 25086



DEVELOPER'S STATEMENT:

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

BY: _____ Date: 3/13/92
TITLE: Theresa J. Keljon Board of Trustees
ADDRESS: 6460 FLYING "W" RANCH ROAD
COLORADO SPRINGS, CO 80919

CITY OF COLORADO SPRINGS

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

[Signature]
CITY ENGINEER

3-30-92
DATE

**WILSON UMC SUBDIVISION
MASTER DRAINAGE STUDY
March, 1992**

I. INTRODUCTION

This study, titled the Master Drainage Study for the "WILSON UMC SUBDIVISION", including "WILSON UMC SUBDIVISION FILING No. 1", was authorized by The Wilson United Methodist Church, Inc. This study has been prepared and submitted in conjunction with the approval process for this development, and fulfills the drainage and flood plain management requirements for the City of Colorado Springs.

FLOOD PLAIN

Flood Insurance Rate Map (FIRM) Community Panel Number 080060- 0145 B, indicates that a portion of this site is located within the 100 year flood hazard area, Zone A. There will be no development within this zone.

SUMMARY OF DATA

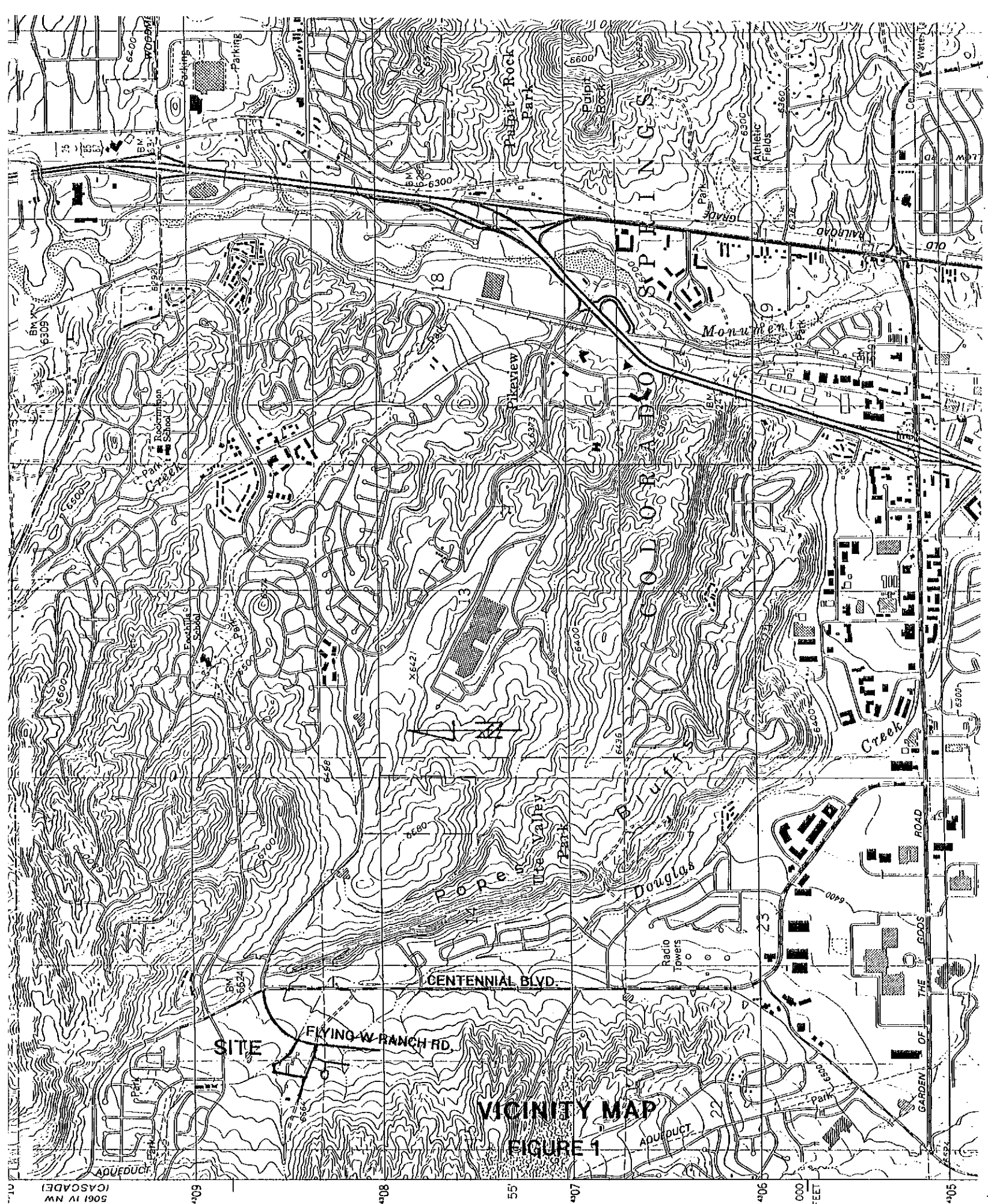
The sources of information used in the development of this study are listed below:

1. City of Colorado Springs and El Paso County "Drainage Criteria Manual", October 1987.
2. Soil Survey for El Paso County, Colorado, U.S. Department of Agriculture, Soil Conservation Service, June 1980.
3. "Flood Insurance Studies for Colorado Springs and El Paso County, Colorado", prepared by the Federal Emergency Management Agency (FEMA), 1985.
4. "Drainage Report for Mountain Shadows Filing No. 8 & 9", prepared by URS Consultants, May 13, 1985.
5. "Douglas Creek Drainage Basin" report prepared by Leigh Whitehead and Associates, March, 1981.
6. "Drainage Report for Mountain Shadows Filing No. 23" prepared by URS Consultants, February, 1992.

MAPPING AND SURVEYING

The sources of mapping and field information used in this study are listed below:

1. "Pikeview" 7.5 Minute Series Quadrangle Maps prepared by the U.S. Geological Survey (USGS), dated 1986.
2. Topographic Map, scale 1"=30', provided by KLH Engineering, Inc. on December, 1991.
3. "Douglas Creek Drainage Basin" report prepared by Leigh Whitehead and Associates, March, 1981.



VICINITY MAP
FIGURE 1

5061 IV NW
 (CASCADE)

409

408

55

407

406

390 000
 FEET

405

II. HYDROLOGIC ANALYSIS

STUDY AREA DESCRIPTION

The site is located within the southwest quarter of Section 10 and the southeast quarter of section 11, Township 13 South, Range 67 West of the 6th P.M., City of Colorado Springs, El Paso County, Colorado (see Vicinity Map, Figure 1). The site is bounded on the west by unplatted/undeveloped land, on the south by Douglas Creek Drive, on the east by Flying "W" Ranch Road, and on the north by North Douglas Creek. The site is located within the City of Colorado Springs and contains 5.63 acres; Filing No. 1 contains 3.03 acres. The area is drained by North Douglas Creek and is zoned "AGRICULTURAL-Hillside Overlay" (A-HS).

SOILS DESCRIPTION

According to the Soil Survey of El Paso County, the underlying soils on the site consists of the Chaseville series (No. 16). This soil type falls within the hydrological group A.

CLIMATE

This area of El Paso County can be described as the foot-hills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

DRAINAGE CRITERIA

The current City of Colorado Springs/El Paso County Drainage Criteria was utilized in the preparation of this study. Calculations were performed to determine the runoff quantities generated during the 10 year and 100 year frequency storms for both the historic and developed conditions. The Rational Method was used according to criteria for basins less than 100 acres.

EXISTING DRAINAGE PATTERNS

ON-SITE FLOWS:

Currently, the terrain of the site slopes gently to the southeast with approximate slopes of three to seven percent (3% - 7%), see Drainage Plan, Exhibit 1. The site is situated on the south side of North Douglas Creek. A portion of the site has existing farm buildings that will be removed during development.

For the historic condition runoff calculations, the site is described by two on-site basins and two off-site basins (see Drainage Plan, Exhibit 1). The existing basins are described with designators (OS-1, Offsite-1) (S-1, Onsite-1). See Table 1, Historic Sub-basin Flow Summary, for more hydrologic sub-basin information.

The existing flows are discharged from the site at two primary locations. Approximately 70% of the on-site flow (S-2) discharges at the southeast corner of the site (at the northwest corner of Flying W Ranch Road and Douglas Creek Drive). Historic sub-basin S-2 flows to this corner and goes over the curb onto Flying W Ranch Road. The 10/100 year flows are 3.6/7.2 cubic feet per second (cfs). The remaining 30% of the on-site flows (S-1) sheets north into the North Douglas Creek Channel with 10/100 year flows of 1.6/3.2 cfs.

OFF-SITE FLOWS:

Runoff from the west, sub-basin OS-1, sheet flows onto the site and proceeds to the southeast corner of the site and goes over the curb onto Flying W Ranch Road. The 10/100 year flows are 2.9/6.7 cfs. Runoff from the northwest, sub-basin OS-2, is taken from the "Douglas Creek Drainage Basin" report prepared by Leigh Whitehead & Associates which shows a proposed developed 100 year flow of 1196 cfs. This flow crosses the northwest corner of this site through an existing natural channel. This off-site area of the development will remain natural and undeveloped.

PROPOSED DRAINAGE PATTERNS

The proposed development of this site will consist of a single church building, being constructed in two or three phases with the parking being phased with the building. Sub-basins E and OS-1 will be intersected along the west side of the proposed parking, diverted to the north with a swale and directed into North Douglas Creek west of the proposed building (see Drainage Plan, Exhibit 1).

Sub-basin C flows to the exit driveway onto Douglas Creek Drive then east to Flying W Ranch Road; the 10/100 year cfs is 1.5/2.7.

Sub-basin B sheet flows onto Flying W Ranch Road; the 10/100 year cfs is 0.2/0.4. Sub-basin A sheet flows to the southeast corner of the parking lot, collects and flows onto Flying W Ranch Road; the 10/100 year cfs is 0.7/1.8.

Sub-basin D consists of the north half of the proposed building and the northwest parking area. The roof drains will be directed north to the North Douglas Creek Channel. The water from the parking area will sheet flow north into the channel with the 10/100 year cfs being 3.2/5.4.

Sub-basin F will remain natural and undeveloped, the 10/100 year cfs is 0.1/2.0 and is part of the 1399 cfs flow shown from the northwest (see Drainage Plan, Exhibit 1).

Sub-basin G consists of the south half of the proposed building and the roof drains will be directed onto the parking area, the parking area sheet flows to the northeast corner of the parking and is conveyed north in a concrete lined swale to the North Douglas Creek Channel; the 10/100 year cfs is 7.8/13.

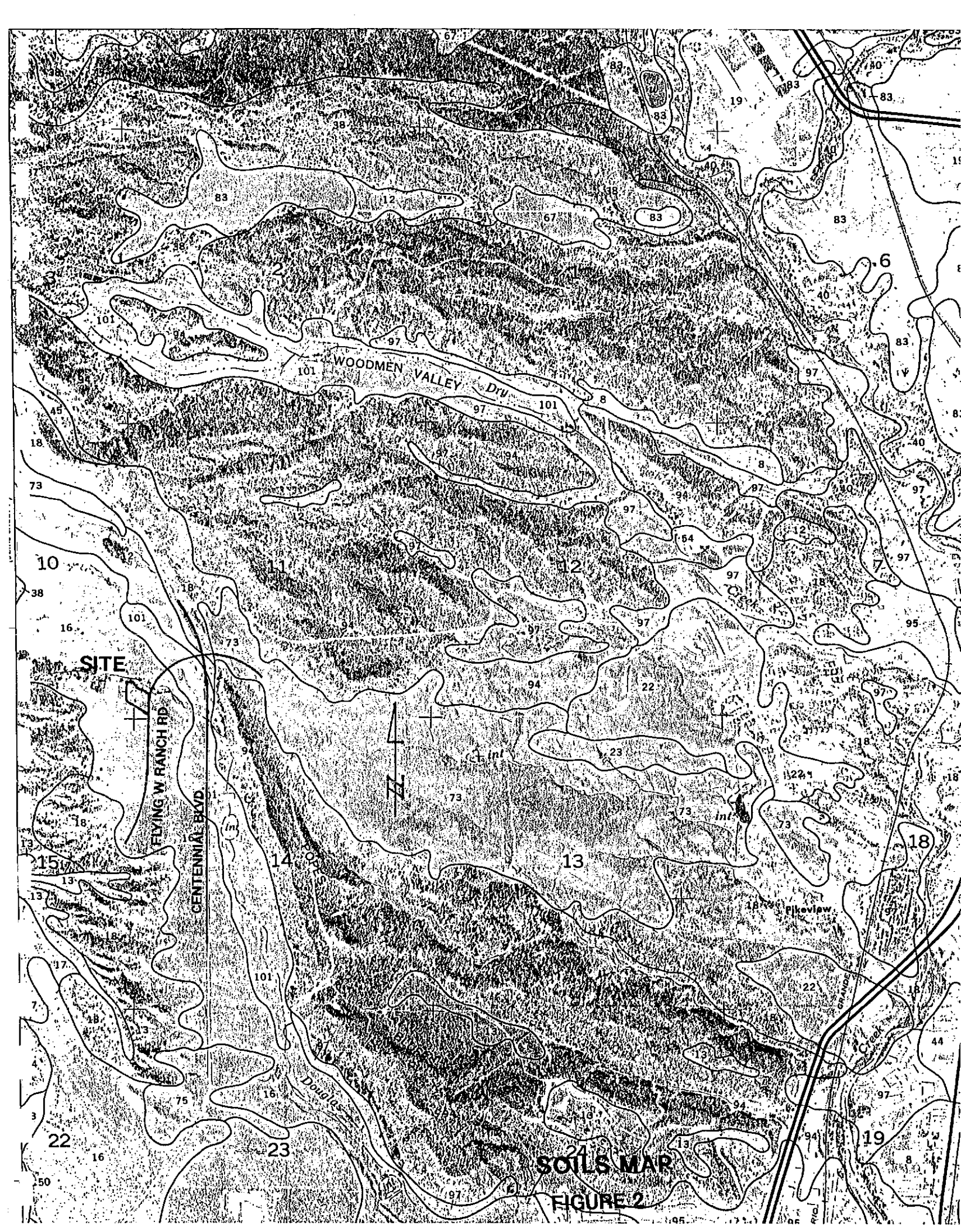
The total amount of water conveyed to Flying W Ranch Road is 2.4/4.9 10/100 year cfs. This amount is less than the 3/6 cfs shown on the Drainage Report for "Mountain Shadows Filing No. 23" by URS Consultants, February, 1992.

The "Douglas Creek Drainage Basin" report, prepared by Leigh Whitehead and Associates, proposes a concrete channel with an 8 foot bottom, 4 feet deep with a Z of 1.5 for the area in the northwest corner of this site. This proposed channel was designed to convey the 1196 cfs proposed from basin OS-2. (see Figure 3 in Appendix)

An alternative to the concrete channel is a rip-rap channel with a 15 foot bottom, 5 feet deep with a Z of 2.5. The type of channel construction will be determined prior to expansion west of Filing No.1. (see Figure 4 in Appendix)

The existing condition of the above described drainage way shows no erosion from past storm occurrences. There are existing grasses and vegetation in the drainage way that stabilize the erosion at this time. However, the velocities of the 100 year storm are in the 9 to 11 feet per second range, and will require improvement when the next Phase is platted.

The drainage patterns and flows for "WILSON UMC SUBDIVISION Filing No. 1" conform to the Master Drainage Report for WILSON UMC SUBDIVISION.



WOODMEN VALLEY DR

FLYING W RANCH RD

CENTENNIAL BLVD

DODD CREEK

SITE

SOILS MAP

FIGURE 2

III. HYDRAULIC ANALYSIS

There are no existing pipes or improved channels that contribute water to this site.

The 3' wide low flow channel on the east side of the building carries the 10/100 year flows at 0.6/0.75 feet of depth with an additional 1 to 2 feet of freeboard berm on the east side of the channel.

IV. EROSION CONTROL

The areas outside of the proposed building or parking that are disturbed during construction will be reseeded.

Hay bales will be placed at points of concentrated flow until such time that vegetation is stabilized.

Cost Estimate: Filing No. 1	Reseeding = \$750.00
	Hay bales = \$350.00
	Total = \$1100.00

MASTER	Reseeding = \$750.00
	Hay Bales = \$350.00
	Total = \$1100.00

V. COST ESTIMATE

CONSTRUCTION COST ESTIMATE

PRIVATE:

The construction cost estimate for the Private low flow channel is \$1,250.00. (Will be constructed during Phase 1.)

PUBLIC:

ALTERNATE 1:

The construction cost estimate for the future concrete channel is as follows:

185 c.y. concrete @ \$150.00/c.y.	=	27,750
1,500 c.y. grading @ \$1.00/c.y.	=	1,500
0.5 acre reseeding @ \$1,000/ac	=	500
rip-rap	=	500
15% for engineering & contingencies	=	<u>4,500</u>
Total Estimated Cost		\$34,750.00

ALTERNATE 2:

The construction cost estimate for the future rip-rap channel is as follows:

1,480 c.y. rip-rap @ \$38.00/c.y.	=	56,240
1,500 c.y. grading @ \$1.00/c.y.	=	1,500
0.5 acre reseeding @ \$1,000/ac	=	500
15% for engineering & contingencies	=	<u>8,700</u>
Total Estimated Cost		\$66,940.00

The public facilities will be designed and constructed at the time of future platting and expansion of the site. The Alternative which will be constructed will be in the future will be determined at that time. The future public facilities will qualify for reimbursement from the basin when funds become available.

DRAINAGE FEES

Drainage Fees and Bridge fees for this subdivision are computed below using the Douglas Creek Basin fees. There is no reimbursement for the low flow channel since it is private.

TOTAL SITE:

Drainage fees: 5.63 acres @ \$4981/ac = \$28,043.00
Bridge fees: 5.63 acres @ \$114/ac = \$641.82

PHASE 1 (Filing No. 1):

Drainage fees: 3.03 acres @ \$4981/ac = \$15,092.43
Bridge fees: 3.03 acres @ \$114/ac = \$345.42

APPENDIX

HYDROLOGIC AND HYDRAULIC DESIGN INFORMATION

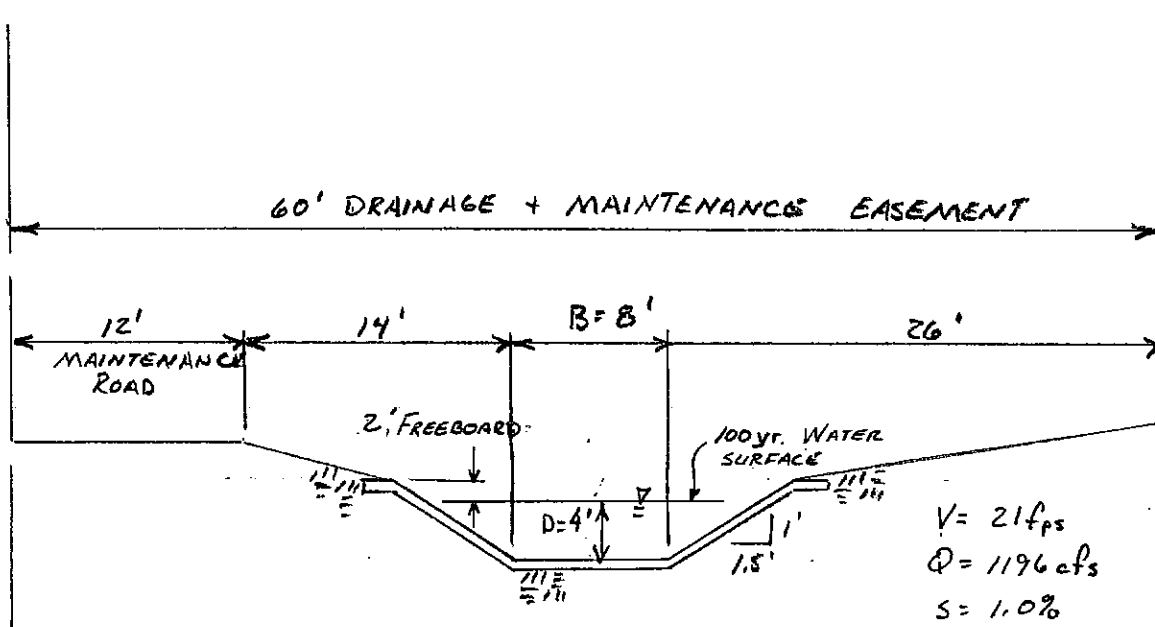


FIGURE 3

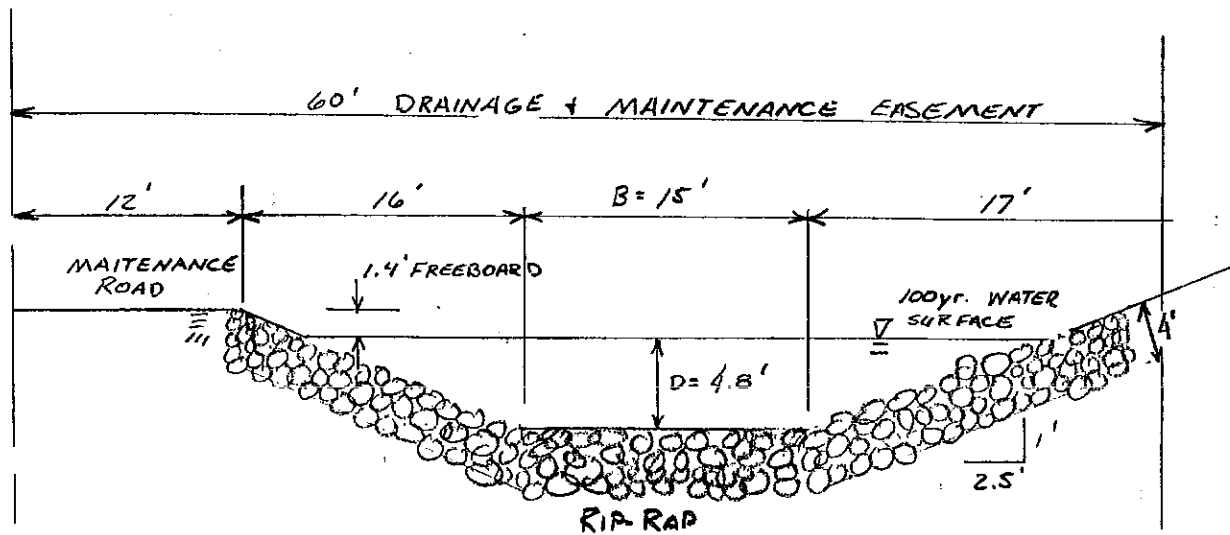


FIGURE 4

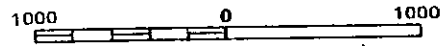
FIGURES 3 and 4

COUNTY, COLORADO FIRM panel numbers. For adjoining areas, refer to the EL PASO COUNTY FIRM published separately.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.



APPROXIMATE SCALE IN FEET



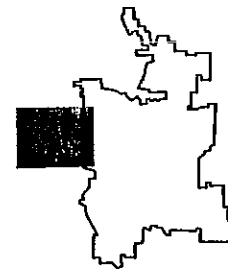
JOINS PANEL 0163

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM
FLOOD INSURANCE RATE MAP**

CITY OF
COLORADO
SPRINGS,
COLORADO
EL PASO COUNTY

PANEL 145 OF 625
(SEE MAP INDEX FOR PANELS NOT PRINTED)



PANEL LOCATION

**COMMUNITY-PANEL NUMBER
080060 0145 C**

**MAP REVISED:
MARCH 2, 1989**

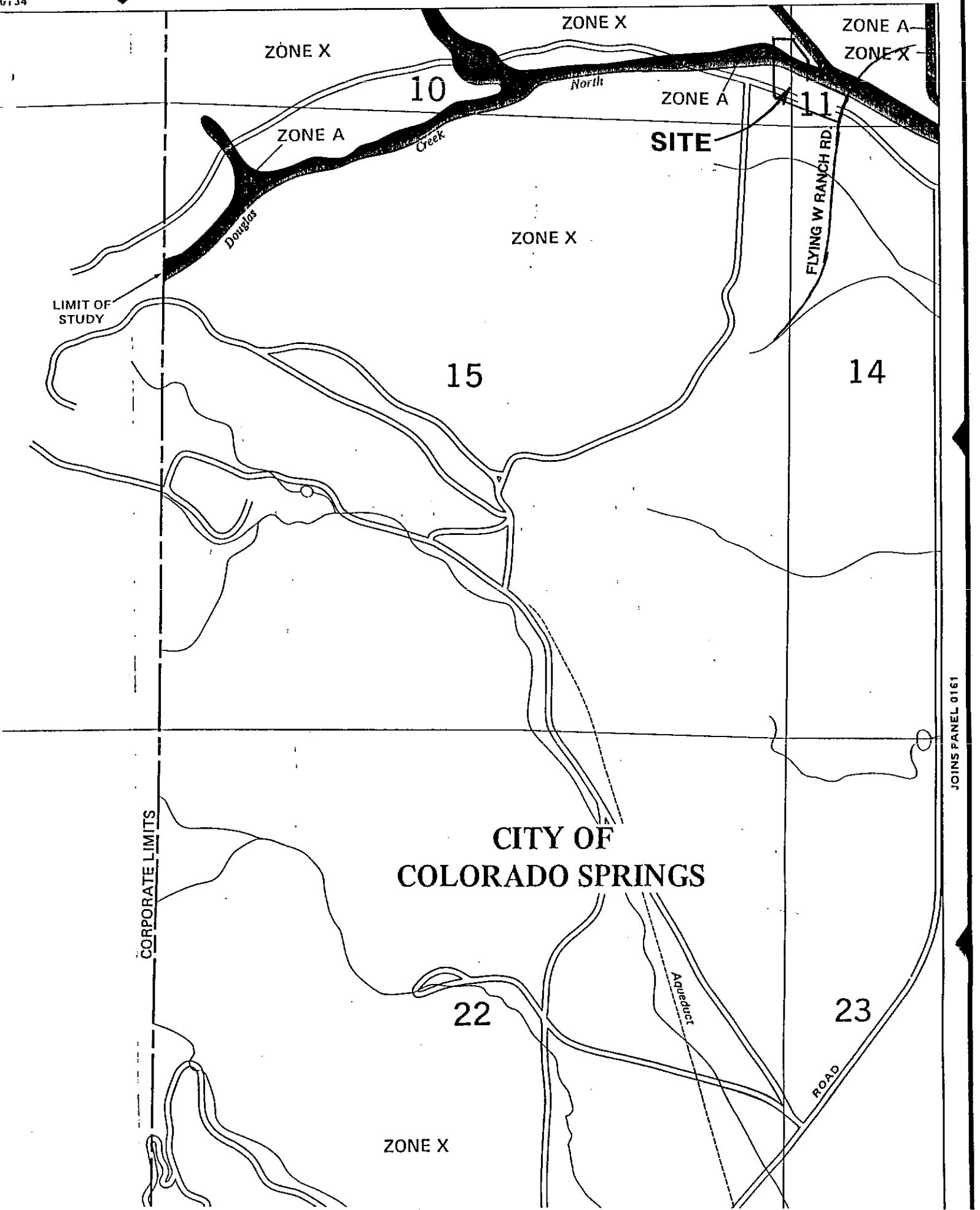


Federal Emergency Management Agency

H

J

Gr 34



ZONE X

ZONE X

ZONE A
ZONE X

10

North

ZONE A

11

ZONE A

Creek

SITE

Douglas

ZONE X

FLYING W RANCH RD

LIMIT OF STUDY

15

14

CITY OF
COLORADO SPRINGS

CORPORATE LIMITS

22

Aqueduct

23

ROAD

ZONE X

JOINS PANEL 0161

MAJOR BASIN	SUB BASIN	AREA		BASIN		Tc Min.	I	SOIL GROUP	DEV. TYPE	C	FLOW		RETURN PERIOD	
		PLANIMETER READING	Ac.	LENGTH	HEIGHT						Q	q _p		
HISTORIC	OS-1		4.6	1100'	62	30 30	2.5 4.15	A	HISTORIC RANGELAND	0.25 0.35	2.9 6.7		10 100	
	S-1		1.6	200'	6'	15 15	3.9 5.8	A	HISTORIC RANGELAND	0.25 0.35	1.6 3.2			
	S-2		4.0	580'	30'	22 22	3.3 4.8	A	HISTORIC RANGELAND	0.22 0.37	3.6 7.2			
DEVELOPED	OS-1		4.6	1100	62	21 21	3.4 4.9	A	1/4 Acre PRESIDENTIAL	0.5 0.6	7.8 13.5		10 100	
	A		0.21	90	6	5 5	6 9		LAWN PARKING	0.53 0.66	0.7 1.8		10 100	
	B		0.13	17	6	5 5	6 9	A	LAWN	0.25 0.35	0.2 0.4		10 100	
	C		0.43	260	14	7 7	5.1 7.6	A	LAWN PARKING	0.69 0.82	1.5 2.7		10 100	
	D		0.94	90	6	5 5	6 9	A	LAWN ROOT PARKING	0.57 0.64	3.2 5.4		10 100	
	E		0.55	180	4	14 14	4.0 6.0	A	LAWN PARKING	0.35 0.44	0.8 1.5		10 100	
	F		0.90	180	6	12 12	4.3 6.5	A	RANGELAND	0.25 0.35	0.1 2		10 100	
	G		2.47	420	15	10 10	4.6 7.0	A	ROOF PARKING LAWN	0.69 0.75	7.8 13		10 100	
	OS-2 *		1267									1399		100
	* FROM DOUGLAS CREEK BASIN REPORT													

HYDROLOGIC COMPUTATION - BASIC DATA
RATIONAL METHOD Q=CIA

PAGE 1 of 1

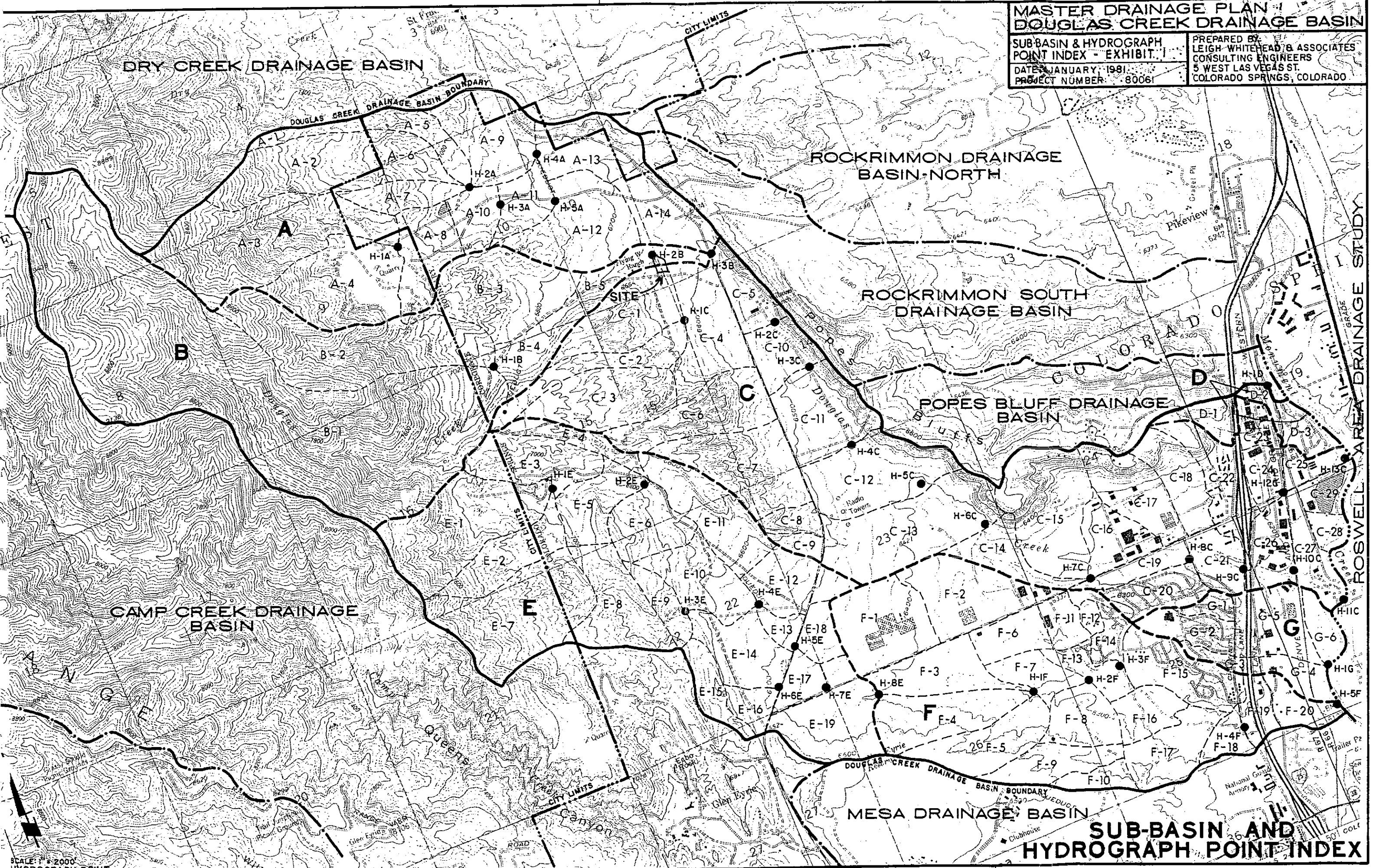
KLH Engineering Consultants, Inc.
PROJECT: WILSON UMC

By: DAM
Date: 2-22-22

**MASTER DRAINAGE PLAN
DOUGLAS CREEK DRAINAGE BASIN**

**SUB-BASIN & HYDROGRAPH
POINT INDEX - EXHIBIT 1**
DATE: JANUARY, 1981
PROJECT NUMBER: 80061

PREPARED BY:
**LEIGH WHITEHEAD & ASSOCIATES
CONSULTING ENGINEERS**
5 WEST LAS VEGAS ST.
COLORADO SPRINGS, COLORADO



SCALE: 1" = 2000'
HYDROGRAPH POINT

**SUB-BASIN AND
HYDROGRAPH POINT INDEX**

SUB BASIN	AREA		T _c (Hr.)	T _{po} (Hr.)	T _b (Hr.)	CURVE NUMBER (CN)	PEAK DISCHARGE (CSM/IN.)	RUNOFF (Inches)		PEAK FLOW (c.f.s.)	
	Acres	Sq.Miles						5 YR.	100 YR.	5 YR.	100 YR.
A 14	79	0.123	0.273	1.664	4.443	88	950	1.05	2.27	123	265
B 1	865	1.350	0.518	1.811	4.835	67	715	0.205	0.85	198	822
2	199	0.311	0.262	1.657	4.424	68	970	0.23	0.90	69	272
3	133	0.208	0.182	1.609	4.296	68	1100	0.23	0.90	53	206
4	36	0.056	0.190	1.614	4.309	75	1080	0.435	1.30	26	79
5	34	0.053	0.266	1.660	4.432	82	960	0.71	1.78	36	91
C 1	87	0.136	0.192	1.615	4.312	68	1080	0.23	0.90	34	132
2	75	0.117	0.269	1.661	4.435	60	955	0.08	0.53	9	59
3	94	0.147	0.212	1.627	4.344	60	1055	0.08	0.53	12	82
4	93	0.145	0.208	1.625	4.339	86	1050	0.92	2.10	140	320
5	41	0.064	0.220	1.632	4.357	81	1035	0.665	1.71	44	113

SUMMARY OF HYDROLOGIC COMPUTATIONS-DOUGLAS CREEK DRAINAGE BASIN
EXHIBIT 6a. SUB-BASIN RUNOFF

SHEET 2 OF 8

POINT NUMBER	AREA		Tc (Hr.)	COMMENTS	COMPOSITE CURVE NUMBER (CN)	PEAK DISCHARGE (CSM/IN.)	RUNOFF (In.)		PEAK FLOW (c.f.s.)	
	Acres	Sq.Miles					5 YR.	100 YR.	5 YR.	100 YR.
H-1A	335	0.523	0.185	North Fork enters City from Pikeview A-3 & A-4	71.4	1095	0.322	1.087	184	623
H-2A	242	0.378	0.202	Oak Valley N. Property Line A-1, A-2, A-5, A-6, A-7	63.4	1060	0.131	0.683	53	274
H-3A	671	1.048	0.219	Oak Valley Junction A-1 Thru A-8 & A-10	69.5	1040	0.2675	0.9825	292	1071
H-4A	99	0.155	0.165	Oak Valley N. Property Line A-9	78	1130	0.54	1.50	95	263
H-5A	822	1.284	0.242	Oak Valley Junction A-1 Thru A-11	71.1	1005	0.313	1.0705	404	1381
H-1B	1064	1.663	0.518	Main Fork Enters City Limits B-1 & B-2	67.2	715	0.210	0.860	250	1023
H-2B	2200	3.438	0.579	Junction Main & N. Branch A-1 Thru A-12 & B-1 Thru B-5	69.5	675	0.2675	0.9825	621	2280
H-3B	2344	3.663	0.598	Main Fork @ Wilson Rd. A-1 Thru A-14 & B-1 Thru B-5	70.7	665	0.301	1.0485	733	2554
H-1C	256	0.400	0.269	Mtn. Shadows Road C-1 Thru C-3	60.5	955	0.0875	0.5525	33	211
H-2C	2734	4.272	0.617	Wilson Ranch/Pinon A-1 Thru A-14 (A's) B-1 Thru B-5 (B's) C-1 Thru C-5	70.4	655	0.292	1.032	817	2888
H-3C	2861	4.470	0.629	Pinon Valley A, B, & C-1 Thru C-6, & C-10	70.8	645	0.304	1.054	877	3039

SUMMARY OF HYDROLOGIC COMPUTATIONS - DOUGLAS CREEK DRAINAGE BASIN
EXHIBIT 6b. ACCUMULATIVE RUNOFF

SHEET 1 OF 4

4/24/92
DAM

WILSON LMC

H-1

LOCATION: BASIN "S-1" (HISTORIC, ONSITE, NORTH 30% A SIDE)

AREA = 1.6 ACRES

FLOWS INTO EXISTING CHANNEL

SOIL: "A" SOIL RANGELAND

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	RANGELAND	.25	.35	100%

TIME OF CONCENTRATION: T_C (MINUTES)

LENGTH = 200'

HEIGHT = 6' SCOPE 3%

$$T_C = 1.87(1.1 - 0.25)(200)^.5(3)^{-.33} = 15.6 \text{ min}$$

INTENSITY: I (IN/HR) FIG. 5-1

$$I_{10} = 3.9$$

$$I_{100} = 5.8$$

PEAK FLOW: Q = CIA

$$Q_{10} = 0.25 \times 3.9 \times 1.6 = 1.6 \text{ cfs}$$

$$Q_{100} = 0.35 \times 5.8 \times 1.6 = 3.2 \text{ cfs}$$

1/24/92
DAM

Wilson Linc

H-2

LOCATION: BASIN "S-2" (HISTORIC, ONSITE, SOUTH 70% OF SITE)

AREA = 4.03 ACES

SOIL: "A" SOIL, RANGE = 3.99 AC.
ROOF = 0.14/AC

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	RANGELAND	0.25	0.35	97%
	ROOF	0.90	0.95	3%
	Adjusted "C"	0.27	0.37	100%

TIME OF CONCENTRATION: T_c (minutes)

LENGTH = 580' SLOPE = 5.2%

HEIGHT = 30'

$$T_c = 1.87 (1.1 - 0.27) (580)^{.5} (5.2)^{-.33}$$

$$T_c = 22 \text{ min}$$

INTENSITY: I (in/hr) FIG. 5-1

$$I_{10} = 3.3$$

$$I_{100} = 4.8$$

PEAK FLOW: Q = CIA

$$Q_{10} = 0.27 \times 3.3 \times 4.03 = 3.6 \text{ cfs}$$

$$Q_{100} = 0.37 \times 4.8 \times 4.03 = 7.2 \text{ cfs}$$

1/22/92

WILSON UMC

H-3

LOCATION: BASIN "OS-1" (HISTORIC, OFFSITE, WEST OF SITE)

AREA = 4.6 AC

SOIL: "A TYPE" RANGELAND

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	RANGELAND	0.25	0.35	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH = 1100'

HEIGHT = 62'

SLOPE = 5.6%

T_c = 30 min

INTENSITY: I (in/hr) FIG. 5-1

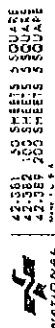
$$I_{10} = 2.5$$

$$I_{100} = 4.15$$

PEAK FLOW: Q = CIA

$$Q_{10} = 0.25 \times 2.5 \times 4.6 = 2.9 \text{ cfs}$$

$$Q_{100} = 0.35 \times 4.15 \times 4.6 = 6.7 \text{ cfs}$$



1/22/92
DAM

WILSON UMC

D-1

LOCATION: BASIN "OS-1" (DEVELOPED, OFFSITE, WEST OF SITE)

AREA = 4.6 AC.

SOIL: "A TYPE" RESIDENTIAL 1/4 ACRE

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	RES. 1/4 AC.	0.5	0.6	100%

TIME OF CONCENTRATION: T_C (MINUTES)

LENGTH = 1100'
 HEIGHT = 62' SLOPE = 5.6%
 T_C = 21 minutes

INTENSITY: I (IN/HR) FIG. 5-1

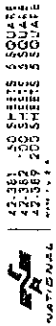
I₁₀ = 3.4

I₁₀₀ = 4.9

PEAK FLOW: Q = CIA

Q₁₀ = 0.5 x 3.4 x 4.6 = 7.8 cfs

Q₁₀₀ = 0.6 x 4.9 x 4.6 = 13.5 cfs



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DM

WILSON LIME

LOCATION: "A"

DEVELOPED . . . SOUTHEAST CORNER OF SITE

AREA = 0.21 ACRE

SOIL: A

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	LAWN	0.25	0.35	49
	PARKING- ASPHALT	0.90	0.95	51
	ADJUSTED "C"	0.58	0.66	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH = 90'

HEIGHT = 6'

S = 6.7%

T_c = 5 min

INTENSITY: I (IN/HR) FIG. 5-1

I₁₀ = 6

I₁₀₀ = 9

PEAK FLOW: Q = CIA

$Q_{10} = 0.58 \times 6 \times 0.21 = 0.7 \text{ cfs}$

$Q_{100} = 0.66 \times 9 \times 0.21 = 1.3 \text{ cfs}$

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WILSON LMC

LOCATION: B

DEVELOPED - LAWN AREA ALONG
FWRR

AREA = 0.13 ACRES

SOIL: A

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	LAWN	0.25	0.35	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH: 17

S: 35

HEIGHT 6

5 min

INTENSITY: I (in/hr)

FIG. 5-1

$$I_{10} = 6$$

$$I_{100} = 9$$

PEAK FLOW: $Q = CIA$

$$Q_{10} = 0.25 \times 6 \times 0.13 = 0.2$$

$$Q_{100} = 0.35 \times 9 \times 0.13 = 0.4$$

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WILSON UMC

LOCATION: "C"

DEVELOPER - PARKING ALONG DOUGLAS
CREEK DR

AREA = 0.43 ACRES

SOIL: A

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	LAWN	0.25	0.35	22
	PARKING-ASPHALT	0.90	0.95	78
	ADJUST "C"	0.69	0.82	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH: 260' S = 5.4%

HEIGHT = 14'

T_c = 7 min

INTENSITY: I (IN/HR) FIG. 5-1

I₁₀ = 5.1

I₁₀₀ = 7.6

PEAK FLOW: Q = CIA

Q₁₀ = 0.69 x 5.1 x 0.43 = 1.5 cfs

Q₁₀₀ = 0.82 x 7.6 x 0.43 = 2.7 cfs

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LOCATION: "D"

AREA = 0.94 ACRES

SOIL: A

DEVELOPED - ALONG DOUGLAS CREEK

CHANNEL & WEST PARKING LOT

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	LAWN	0.25	0.35	51
	ROOF	0.90	0.95	15
	PARKING - ASPHALT	0.90	0.95	34
	ADJUSTED "C"	0.57	0.64	100%

TIME OF CONCENTRATION: T_C (MINUTES)

LENGTH = 90'

HEIGHT = 6'

S = 6.67%

T_C = 5 MIN

INTENSITY: I (IN/HR)

FIG. 5-1

I₁₀ = 6.0

I₁₀₀ = 9.0

PEAK FLOW: Q = CIA

Q₁₀ = 0.57 x 6.0 x 0.94 = 3.2 cfs

Q₁₀₀ = 0.64 x 9.0 x 0.94 = 5.4 cfs

2/22/92

LOCATION: "E"

DEVELOPED ALONG WEST PROP. LINE

AREA = 0.55 ACRES

SOIL:

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	WALKS (TENNIS COURT)	0.90	0.95	15
	LAWN	0.25	0.35	85
	ADJUSTED "C"	0.35	0.44	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH = 180'

S = 2%

HEIGHT = 4'

T_c = 14 min

INTENSITY: I (in/hr)

FIG. 5-1

I₁₀ = 4.0

I₁₀₀ = 6.0

PEAK FLOW: Q = CIA

Q₁₀ = 0.35 x 4.0 x 0.55 = 0.8 cfs

Q₁₀₀ = 0.44 x 6.0 x 0.55 = 1.5 cfs

-1/24/92
OR

LOCATION: "F"

(NORTHWEST CORNER OF SITE, WILL BE LEFT NATURAL.)

AREA = 0.90 ACRES

SOIL: A

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	RANGELAND	0.25	0.35	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH = 140'
HEIGHT = 6' S = 4.3

T_c = 12 min

INTENSITY: I (in/hr) FIG. 5-1

I₁₀ = 4.3

I₁₀₀ = 6.5

PEAK FLOW: Q = CIA

Q₁₀ = 0.25 x 4.3 x 0.9 = 0.1 cfs

Q₁₀₀ = 0.35 x 6.5 x 0.9 = 2 cfs

4281 SQUARE FEET
4282 SQUARE FEET
4283 SQUARE FEET
4284 SQUARE FEET
4285 SQUARE FEET
4286 SQUARE FEET
4287 SQUARE FEET
4288 SQUARE FEET
4289 SQUARE FEET
4290 SQUARE FEET
4291 SQUARE FEET
4292 SQUARE FEET
4293 SQUARE FEET
4294 SQUARE FEET
4295 SQUARE FEET
4296 SQUARE FEET
4297 SQUARE FEET
4298 SQUARE FEET
4299 SQUARE FEET
4300 SQUARE FEET
NATIONAL

2/24/92

LOCATION: "6"

DEVELOPED - MAIN PARKING + BLDG.

AREA = 2.47 ACRES

SOIL: A

RUNOFF COEFFICIENT "C":	LAND TYPE	C ₁₀	C ₁₀₀	% AREA
	ROOF	0.90	0.95	10
	PARKING- ASPHALT	0.90	0.95	57
	LAWN AREA	0.25	0.35	33
	ADJUSTED "C"	0.69	0.75	100%

TIME OF CONCENTRATION: T_c (MINUTES)

LENGTH 420' S = 3.6%

HEIGHT 15'

T_c = 10 min

INTENSITY: I (in/hr)

FIG. 5-1

I₁₀ = 4.6

I₁₀₀ = 7.0

PEAK FLOW: Q = CIA

Q₁₀ = 0.69 x 4.6 x 2.47 = 7.8 cfs

Q₁₀₀ = 0.75 x 7.0 x 2.47 = 13 cfs

