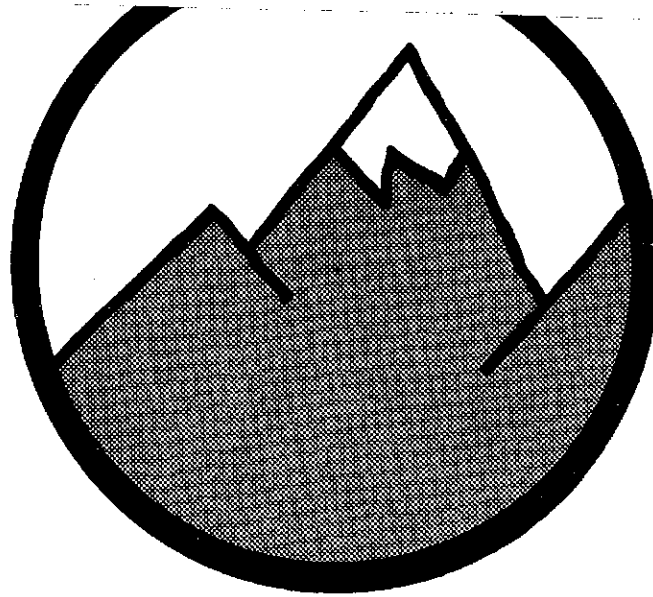


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— Master Drainage Report —

— Cragmor Area —

— Colorado Springs, Colorado —

— October 1972 —

— Peak Engineering Co. —

— Consulting Engineers —

— Construction Inspection And Supervision —

— Colorado Springs —

— Colorado —

MASTER DRAINAGE REPORT
CRAGMOR AREA
COLORADO SPRINGS, COLORADO

OCTOBER, 1972

Peak Engineering Co.
Consulting Engineers
Construction Inspection and Supervision
Colorado Springs
Colorado

Mr. DeWitt Miller
Director of Public Works
City of Colorado Springs
Colorado Springs, Colorado

Dear Mr. Miller:

Transmitted herein is the Master Drainage Report for the Cragmor Drainage Study located in the northern portion of the City of Colorado Springs, as authorized by the City of Colorado Springs Engineering Department in June, 1972.

It is our belief that this report is self-explanatory in its contents. However, if any questions arise from your examination of this report, please feel free to contact us at your convenience.

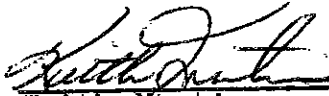
Respectfully yours,



Peak Engineering Co.
W.C. Barker, Design Engineer

Master Drainage Report
Cragmor Area

I, Keith Martin, a registered engineer in the state of Colorado, hereby certify that the attached Drainage Plan and Report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. I further certify that said Drainage Report is in accordance with all City of Colorado Springs ordinances, specifications and criteria.



Keith Martin
Colorado P.E. No. 5497



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GENERAL:

The Cragmor Drainage Study is of the area located in the north central portion of the city. The area is bounded on the north by Eagle Rock Road, on the west by Nevada Avenue (Highway 85-87), on the south by the Chicago Rock Island and Pacific Railroad and on the east by Templeton Gap Road. The area of study is broken into two (2) major areas by the Templeton Gap Floodway. These two areas shall be referred to as PHASE I and PHASE II, PHASE I begin the area south of Templeton Gap Floodway and PHASE II being north of Templeton Gap Floodway.

PHASE I: General

PHASE I of the Cragmor Drainage Study contains some 781 acres more or less. The utilization of land in this area has been for three (3) different categories of development. The area between the Chicago Rock Island and Pacific Railroad on the south, the Templeton Floodway on the north, and west of El Paso Street to Nevada Avenue is of commercial and industrial type development. The remaining area within PHASE I is residential type development.

The necessity for a storm sewer system for this area has long been known to all those who have been involved with the area during or after a localized rain storm. The runoff from these recurring storms creates

both a nuisance and a danger to those persons who live or work in the Cragmor area. The areas of flooding in PHASE I occur in many different areas. The area of Nichols Blvd. from Jon Street to El Paso Street creates standing water in almost every storm which occurs, the area of Fourth Street from Arcadia Street to El Paso Street creates numerous flooding conditions, the area of Second Street and Virginia Avenue has such a large amount of runoff that the unpaved roads within this area are under constant need of repair. This is also true of the area around First Street and Arcadia Street.

The area of First Street and Century Street is inundated for one (1) to two (2) days after a storm. This area is a virtual swamp for two (2) to three (3) days after each storm, thus the area is a health hazzard as well as being a nuisance and a danger to those in the area.

PHASE II: General

PHASE II of the Cragmor Drainage Study contains some 1016 acres more or less. The utilization of land in this area is of two (2) different catagories. The area north of Cragmor Campus between Nevada Avenue and Templeton Gap Road and south of Eagle Rock Road is primarily undeveloped, while the utilization of land in the area south of Cragmor Campus between Nevada Avenue and Templeton Gap Road is residential type development.

The PHASE II Area is of a different nature and the problems in this area are primarily of rapid runoff, while the terrain in PHASE I is primarily flat, the terrain in PHASE II is more rolling hills and steeper slopes. After a storm occurs much expense and man hours are devoted to the cleaning of silt, rocks, and other foreign debris from the street in this area by the city crews.

These are but a minute few of the problems in the Cragmor Area. However, it is felt that these examples are sufficient to show the need for a storm sewer within the Cragmor Area.

PURPOSE AND SCOPE:

In light of the problems which occur in the Cragmor Area, it is the purpose of this study to propose multiple storm sewer systems which will give the greatest relief for the area with regard to economic phasing and feasibility of construction. Since this method was used, it was felt that alternate systems were not required. The systems shown were arrived at through a complete investigation of numerous systems and existing conditions. Thus, it is our belief that the systems shown will accomplish the greatest amount of relief from flooding conditions for the least expenditure.

In this report each system will be shown and discussed separately. Each system is separated into construction

phases with complete estimated construction cost. The Drainage Plan indicates each system to be installed and also denotes where additional facilities such as curb, gutter and paving are recommended.

DESIGN CRITERIA:

In an analysis of the area to be studied by this report, the following design criteria were established:
Design Storm-50 year frequency with one (1) hour intensity
(2 inches per hour)

Method of Computation-Rational Method

$$Q = ACI$$

Q = Peak discharge of area in cubic feet per second (C.F.S.)

A = Area in acres

C = Coefficient of runoff

I = Intensity of rainfall in inches per hour based on concentration time

Storm Sewer Capacities-Manning's Formula

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$

Q = Maximum discharge of structure

A = Area of flow in structure

R = Hydraulic radius

S = Slope of structure in Ft/Ft

n = Coefficient of roughness for material of structure

Values of "n" used for design

Concrete pipe or ditch = 0.013

Corrugated metal pipe = 0.024

Note: Storm sewer and catch basin sizes were calculated in consideration of all streets being paved with curb and gutter. PHASE I pipes sized with 1% average slope and PHASE II pipes sized with 2% average slope.

BUDGET ALLOCATIONS:

The following is a list of budgeted amounts set forth by the City of Colorado Springs Engineering Department to accomplish the construction of storm sewer for the Cragmor Area.

<u>YEAR</u>	<u>BUDGETED AMOUNT</u>
1972	\$200,000.00
1973	\$200,000.00
1974	\$550,000.00
1975	\$500,000.00

It will be evident that the amounts required for construction exceed the amounts budgeted as progression through this report continues.

TABLE OF COST ESTIMATE

YEAR	SYSTEM	COLOR CODE	CONSTRUCTION COST	CONSTRUCTION COST PLUS INFLATION	ENGINEERING DESIGN SURVEYING AND CONSTRUCTION SUPERVISION	ESTIMATED CONSTRUCTION COST	FUNDS ALLOTTED
1972	Ia	Brown	\$227,150.00			\$227,150.00	\$200,000.00
1973	Ia	Brown	\$217,950.00	\$228,848.00	\$21,008.00	\$249,856.00	\$200,000.00
1974	Ib	Orange	\$212,050.00	\$233,891.00	\$21,518.00	\$255,409.00	\$550,000.00
1974	IIa	Red	\$200,650.00	\$221,317.00	\$20,251.00	\$241,568.00	
1974	IIb	Green	\$115,310.00	\$127,187.00	\$13,126.00	\$140,313.00	
1975	Id	Green	\$367,300.00	\$425,333.00	\$36,153.00	\$461,486.00	\$500,000.00
1975	Ic	Blue	\$129,200.00	\$149,614.00	\$14,258.00	\$163,872.00	
1975	Ie	Red	\$ 47,200.00	\$ 54,658.00	\$ 6,231.00	\$ 60,889.00	
1976	IIc	Brown	\$147,700.00	\$179,603.00	\$17,242.00	\$196,845.00	
1976	IIId	Orange	\$ 96,150.00	\$116,918.00	\$12,066.00	\$128,984.00	
1976	IIe	Blue	\$ 84,000.00	\$102,114.00	\$11,083.00	\$113,197.00	
1976	IIIf	Yellow	\$ 12,100.00	\$ 14,714.00	\$ 1,758.00	\$ 16,472.00	
TOTALS			\$1,856,760.00		\$174,694.00	\$2,256,041.00	\$1,450,000.00

NOTE: COST FOR RELOCATION OF UTILITIES HAS NOT BEEN INCLUDED IN THIS ESTIMATE.

PHASE I

System Ia Brown

1972

Funds Allotted \$200,000.00

Location	Item	Quantity	Unit	Unit Price	Amount
EL PASO STREET:					
Van Buren Ditch to Fillmore St.	72" RCP	1600	L.F.	64.00	102,400.00
	Manhole	3	Ea.	300.00	900.00
Fillmore and El Paso	4' Catch Basin	6	Ea.	750.00	4,500.00
	18" RCP Lateral	400	L.F.	13.00	5,200.00
Fillmore to Second Street	72" RCP	800	L.F.	64.00	51,200.00
	Manhole	1	Ea.	300.00	300.00
Fillmore and Second Street	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
FIRST STREET:					
El Paso to Century	24" RCP	400	L.F.	16.00	6,400.00
First and Century	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
CENTURY STREET:					
First to Railroad	18" RCP	300	L.F.	13.00	3,900.00

PHASE I

System Ia Brown, Con't.

1972

Funds Allotted \$200,000.00

Location	Item	Quantity	Unit	Unit Price	Amount
Century and Railroad	4' Catch Basin	2	Ea.	750.00	1,500.00
	18" RCP Lateral	300	L.F.	13.00	3,900.00
EL PASO STREET:					
Second St. to Fourth St.	66" RCP	700	L.F.	54.00	37,800.00

Estimated Construction Cost 1972 \$227,150.00 Sub-Total

Design Underway By City Engineering Department

Estimated Construction Cost \$227,150.00 Total

NOTE: COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE I

1973

Funds Allotted \$200,000.00

System Ia Brown

Location	Item	Quantity	Unit	Unit Price	Amount
Fourth Street and El Paso	Manhole	2	Ea.	300.00	600.00
	4' Catch Basins	4	Ea.	750.00	3,000.00
	18" RCP Lateral	400	L.F.	16.00	6,400.00
FOURTH STREET:					
El Paso to Prospect	48" RCP	600	L.F.	34.00	20,400.00
	Manhole	1	Ea.	300.00	300.00
Prospect and Fourth	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
Prospect to Arcadia	42" RCP	300	L.F.	28.00	8,400.00
	8' Catch Basins	3	Ea.	1050.00	3,150.00
Arcadia and Fourth	24" RCP Lateral	200	L.F.	16.00	3,200.00
	Manhole	1	Ea.	300.00	300.00
Arcadia to Institute	30" RCP	550	L.F.	19.00	10,450.00
	4' Catch Basins	2	Ea.	750.00	1,500.00
Institute and Fourth	18" RCP Lateral	200	L.F.	13.00	2,600.00
	Manhole	1	Ea.	300.00	300.00

PHASE I

1973

Funds Allotted \$200,000.00

System Ia Brown, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
Institute to Pennsylvania	24" RCP	600	L.F.	16.00	9,600.00
Pennsylvania and Fourth	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
 EL PASO STREET:					
Fourth to Nichols	60" RCP	1300	L.F.	45.00	58,500.00
	Manhole	2	Ea.	300.00	600.00
Nichols and El Paso	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
	12' Catch Basin	1	Ea.	1500.00	1,500.00
	30" RCP Lateral	100	L.F.	16.00	1,600.00
 NICHOLS BLVD.:					
El Paso to Winters Drive	48" RCP	450	L.F.	34.00	15,300.00
Winters Drive and Nichols	4' Catch Basin	1	Ea.	750.00	750.00
	18" RCP Lateral	50	L.F.	13.00	650.00
	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00

PHASE I

1973

Funds Allotted \$200,000.00

System Ia Brown, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
Winters Drive to Nichols, Con't.	24" RCP Lateral	100	L.F.	16.00	1,600.00
	*12' Catch Basin	1	Ea.	1500.00	1,500.00
	30" RCP Lateral	100	L.F.	19.00	1,900.00
 NICHOLS BLVD.:					
Winters Drive to Jon	33" RCP	700	L.F.	22.00	15,400.00
Jon and Nichols	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	*10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00
 EL PASO STREET:					
Nichols to Winters	30" RCP	1200	L.F.	19.00	22,800.00
	Manhole	1	Ea.	300.00	300.00
Winters and El Paso	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
	*10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00

PHASE I

System Ia Brown, Con't.

1973

Funds Allotted \$200,000.00

Estimated Construction Cost Based on 1972 Prices	217,950.00 Sub-Total
5% Inflation 1972-1973 (1.05 x 217,950)	228,848.00 Sub-Total
Engineering Design, Surveying and Construction Supervision @ 9.18%	21,008.00
Estimated Construction Cost System Ia Brown	\$249,856.00 Total

- NOTE: 1. * DENOTES CATCH BASINS TO HAVE MANHOLE ACCESS COVER.
2. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE I

1974

Funds Allotted \$550,000.00

System Ib Orange

Location	Item	Quantity	Unit	Unit Price	Amount
PROSPECT STREET:					
Alley @ Van Buren Ditch to Prospect Street	66" RCP	200	L.F.	54.00	10,800.00
ALLEY:					
Prospect to Arcadia	42" RCP	450	L.F.	28.00	12,600.00
Arcadia and Alley	2' x 4' Grat. Inlet	1	Ea.	800.00	800.00
Arcadia to Jon	33" RCP	350	L.F.	21.00	7,350.00
Jon and Alley	2' x 4' Grat. Inlet	1	Ea.	800.00	800.00
PROSPECT STREET:					
Harrison to Clinton	60" RCP	900	L.F.	45.00	40,500.00
	Manhole	2	Ea.	300.00	600.00
CLINTON:					
Prospect to Arcadia	42" RCP	400	L.F.	28.00	11,200.00
Arcadia and Clinton	8' Catch Basins	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00
Arcadia to Institute	30" RCP	600	L.F.	19.00	11,400.00
	Manhole	1	Ea.	300.00	300.00

PHASE I

1974

Funds Allotted \$550,000.00

System Ib Orange

Location	Item	Quantity	Unit	Unit Price	Amount
Institute and Clinton	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
PROSPECT STREET:					
Clinton to Fillmore	48" RCP	800	L.F.	34.00	27,200.00
	Manhole	1	Ea.	250.00	250.00
Fillmore and Prospect	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
	6' Catch Basins	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
FILLMORE STREET:					
Prospect to Arcadia	48" RCP	400	L.F.	34.00	13,600.00
	Manhole	1	Ea.	200.00	200.00
ARCADIA:					
Fillmore to First Street	33" RCP	250	L.F.	21.00	5,250.00

PHASE I

1974

Funds Allotted \$550,000.00

System Ib Orange, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
First and Arcadia	6' Catch Basin	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
	10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00
FILLMORE STREET:					
Arcadia to Virginia Avenue	33" RCP	900	L.F.	21.00	18,900.00
	Manhole	1	Ea.	200.00	200.00
Virginia and Fillmore	4' Catch Basin	1	Ea.	750.00	750.00
	18" RCP Lateral	100	L.F.	13.00	1,300.00
	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
VIRGINIA AVENUE:					
Fillmore to Second Street	30" RCP	700	L.F.	19.00	13,300.00
	Manhole	1	Ea.	250.00	250.00
Second and Virginia	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00

PHASE I

1974

System Ib Orange, Con't.

Estimated Construction Cost Based on 1972 Price

10.3% Inflation 1972-1974 (1.103 x 212,050)

Engineering Design, Surveying and Construction Supervision @ 9.2%

Estimated Construction Cost System Ib Orange

Funds Allotted \$550,000.00

212,050.00 Sub-Total

233,891.00 Sub-Total

21,518.00

\$255,409.00 Total

NOTE: COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE II

1974

Funds Allotted \$550,000.00

System IIa Red

Location	Item	Quantity	Unit	Unit Price	Amount
MALLOW:					
Floodway to Mountview	66" RCP	300	L.F.	54.00	16,200.00
	Manhole	1	Ea.	300.00	300.00
Mountview to Cragmor	66" RCP	400	LF.	54.00	21,600.00
	Manhole	1	Ea.	300.00	300.00
Cragmor and Mallow	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
	*10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00
CRAGMOR DRIVE:					
Mallow to Stanton	60" RCP	750	L.F.	45.00	33,750.00
	Manhole	2	Ea.	300.00	600.00
Stanton and Cragmor	8' Catch Basins	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00
	*10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00

PHASE II

1974

Funds Allotted \$550,000.00

System IIA Red

Location	Item	Quantity	Unit	Unit Price	Amount
Stanton to Acacia	54" RCP	450	L.F.	40.00	18,000.00
	Manholes	2	Ea.	300.00	600.00
Ditch on north side from Acacia Drive to Mountview Lane	Concrete "V" Ditch	2600	L.F.	15.00	39,000.00
	48" RCP	100	L.F.	34.00	3,400.00
	54" CMP	250	L.F.	28.00	7,000.00
	36" CMP	150	L.F.	17.00	2,550.00
ACACIA DRIVE:					
Cragmor Rd. to Jasmine St.	30" RCP	150	L.F.	19.00	2,850.00
Jasmine and Acacia Drive	4' Catch Basins	3	Ea.	750.00	2,250.00
	18" RCP Lateral	300	L.F.	13.00	3,900.00
Jasmine St. to Edgewood Drive	24" RCP	350	L.F.	16.00	5,600.00
	Manhole	1	Ea.	300.00	300.00
Edgewood and Jasmine	6' Catch Basins	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
STANTON STREET:					
Cragmor to Maplewood	27" RCP	600	L.F.	17.00	10,200.00
	Manhole	1	Ea.	300.00	300.00

PHASE II

1974

Funds Allotted \$550,000.00

System IIa Red, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
Maplewood and Stanton	6' Catch Basins	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
	4' Catch Basin	1	Ea.	750.00	750.00
	18" RCP Lateral	100	L.F.	13.00	1,300.00
	24" RCP	100	L.F.	16.00	1,600.00
MOUNTVIEW LANE: Mallow to Azalea Azalea and Mountview	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	750.00	750.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00

200,650.00 Sub-Total
 221,317.00 Sub-Total
 20,251.00
 \$241,568.00 Total

Estimated Construction Cost Based on 1972 Prices

10.3% Inflation 1972-1974 (1.103 x 200,650)

Engineering Design, Surveying and Construction Supervision @ 9.15%

Estimated Construction Cost System IIa Red

- NOTE: 1. * DENOTES CATCH BASINS TO HAVE MANHOLE ACCESS COVER.
 2. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE II

1974

Funds Allotted \$550,000.00

System I Ib Green

Location	Item	Quantity	Unit	Unit Price	Amount
LOCUST:					
Elmwood Circle to North Weber	54" RCP	450	L.F.	40.00	18,000.00
North Weber and Locust	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
	*10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00
NORTH WEBER:					
Edgewood to Locust	27" RCP	300	L.F.	17.00	5,100.00
Edgewood and North Weber	4' Catch Basin	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
Locust to Maplewood	27" RCP	300	L.F.	17.00	5,100.00
Maplewood and North Weber	8' Catch Basins	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00
LOCUST:					
North Weber to Mallow	42" RCP	800	L.F.	28.00	22,400.00
	Manhole	1	Ea.	300.00	300.00

PHASE II

1974

Funds Allotted \$550,000.00

System IIb Green, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
Locust and Mallow	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
MALLOW DRIVE:					
Locust to Edgewood	27" RCP	400	L.F.	17.00	6,800.00
Edgewood and Mallow	4' Catch Basin	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
	Manhole	1	Ea.	300.00	300.00
Edgewood to Redwood	21" RCP	300	L.F.	15.00	4,500.00
Redwood to Mallow	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
MALLOW DRIVE:					
Locust to Maplewood	36" RCP	350	L.F.	22.00	7,700.00
Maplewood and Mallow	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
Maplewood to vacant lot	30" RCP	400	L.F.	19.00	7,600.00
North of Elmwood Drive	Asphalt "V" Ditch	700	L.F.	2.80	1,960.00

PHASE II

System I Ib Green, Con't.

1974

Funds Allotted \$550,000.00

Estimated Construction Cost Based on 1972 Prices

115,310.00 Sub-Total

10.3% Inflation 1972-1974 (1.103 x 115,310)

127,187.00 Sub-Total

Engineering Design, Surveying and Construction Supervision @ 10.32%

13,126.00

Estimated Construction Cost System I Ib Green

\$140,313.00 Total

- NOTE: 1. * DENOTES CATCH BASINS TO HAVE MANHOLE ACCESS COVER.
 2. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE I

1975

Funds Allotted \$500,000.00

System Id Green

Location	Item	Quantity	Unit	Unit Price	Amount
TEMPLETON GAP ROAD: Van Buren Ditch to Hancock Ave.	72" RCP	1300	L.F.	64.00	83,200.00
	Manholes	2	Ea.	300.00	600.00
Templeton Gap and Hancock	4' Catch Basins	3	Ea.	750.00	2,250.00
	18" RCP Lateral	300	L.F.	13.00	3,900.00
	42" RCP	1600	L.F.	28.00	44,800.00
Templeton Gap to Fillmore Street	Manholes	3	Ea.	300.00	900.00
	8' Catch Basins	2	Ea.	1050.00	2,100.00
Templeton Gap and Fillmore	24" RCP Lateral	400	L.F.	16.00	6,400.00
	30" RCP	900	L.F.	19.00	17,100.00
Fillmore to Columbine	Manhole	1	Ea.	300.00	300.00
	6' Catch Basin	1	Ea.	900.00	900.00
Columbine and Templeton Gap	21" RCP Lateral	100	L.F.	15.00	1,500.00
	*10' Catch Basin	1	Ea.	1200.00	1,200.00
	27" RCP Lateral	100	L.F.	18.00	1,800.00

HANCOCK AVENUE:

PHASE I

1975

Funds Allotted \$500,000.00

System Id Green, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
Templeton Gap to Ute	60" RCP	450	L.F.	45.00	20,250.00
	Manhole	1	Ea.	300.00	300.00
Ute and Hancock	6' Catch Basins	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
Ute to South Lane Columbine	60" RCP	1250	L.F.	45.00	56,250.00
	Manholes	2	Ea.	300.00	600.00
South Lane of Columbine and Hancock	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
North Lane Columbine and Hancock	4' Catch Basin	1	Ea.	750.00	750.00
	18" RCP Lateral	100	L.F.	13.00	1,300.00
HANCOCK:					
South Lane of Columbine to North Lane of Columbine	54" RCP	200	L.F.	40.00	8,000.00
North Lane Columbine and Hancock	4' Catch Basin	1	Ea.	750.00	750.00
	18" RCP Lateral	100	L.F.	13.00	1,300.00
NORTH LANE COLUMBINE:					
Hancock to 1st intersection	36" RCP	500	L.F.	22.00	11,000.00
	Manhole	1	Ea.	300.00	300.00

PHASE I

1975

Funds Allotted \$500,000.00

System Id Green, Con't.

Location	Item	Quantity	Unit	Unit Price	Amount
1st intersection and North Lane of Columbine	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
	8' Catch Basins	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00
1st intersection to Poinsetta Dr.	30" RCP	450	L.F.	19.00	8,550.00
	4' Catch Basins	2	Ea.	750.00	1,500.00
Poinsetta Drive and North Lane of Columbine	18" RCP Lateral	200	L.F.	13.00	2,600.00
	8' Catch Basins	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00
	4' Catch Basins	2	Ea.	750.00	1,500.00
HANCOCK AVENUE:					
North Lane of Columbine to Primrose	48" RCP	500	L.F.	34.00	17,000.00
	Manhole	1	Ea.	300.00	300.00
Primrose and Hancock	4' Catch Basins	3	Ea.	750.00	2,250.00
	18" RCP Lateral	300	L.F.	13.00	3,900.00

PRIMROSE:

PHASE I

1975

Funds Allotted \$500,000.00

System Id Green, Con't.

Hancock to Alley	33" RCP	500	L.F.	21.00	10,500.00
Alley and Primrose	*10' Catch Basins	2	Ea.	1200.00	2,400.00
	27" RCP Lateral	200	L.F.	18.00	3,600.00
HANCOCK:					
Primrose to Fourth	33" RCP	750	L.F.	21.00	15,750.00
	Manhole	1	Ea.	300.00	300.00
	4' Catch Basin	1	Ea.	750.00	750.00
Fourth and Hancock	18" RCP Lateral	100	L.F.	13.00	1,300.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	6' Catch Basin	1	Ea.	900.00	900.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,800.00

Estimated Construction Cost, Based on 1972 Prices

15.8% Inflation 1972-1975 (1.158 x 367,300)

Engineering Design, Surveying and Construction Supervision @ 8.5%

Estimated Construction Cost System Id Green

NOTE: 1. * DENOTES CATCH BASINS TO HAVE MANHOLE ACCESS COVER.

2. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

367,300.00 Sub-Total

425,333.00 Sub-Total

36,153.00

\$461,486.00 Total

PHASE I

1975

Funds Allotted \$500,000.00

System Ic Blue

Location	Item	Quantity	Unit	Unit Price	Amount
EAST SIDE OF RAILROAD R.O.W.:					
Van Buren Ditch to Fourth St.	Concrete "V" Ditch	2400	L.F.	18.00	43,200.00
Fillmore Street	48" RCP	200	L.F.	34.00	6,800.00
Railroad R.O.W. to Stone	48" RCP	500	L.F.	34.00	17,000.00
	Manhole	1	Ea.	300.00	300.00
NORTH STONE:					
South of Fourth Street	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
Fourth to mid block	42" RCP	600	L.F.	28.00	16,800.00
	Manhole	1	Ea.	300.00	300.00
Mid block between Nichols and Fourth	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
	Manhole	1	Ea.	300.00	300.00

PHASE I

1975

Funds Allotted \$500,000.00

System Ic Blue

Location	Item	Quantity	Unit	Unit Price	Amount
Mid block to Nichols	36" RCP	600	L.F.	22.00	13,200.00
Nichols and Stone	Manhole	1	Ea.	300.00	300.00
	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
Nichols to mid block between Winters and Nichols	27" RCP	650	L.F.	17.00	11,050.00
	6' Catch Basin	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
Estimated Construction Cost Based on 1972 Prices					129,200.00 Sub-Total
15.8% Inflation 1972-1975 (1.158 x 129,200)					149,614.00 Sub-Total
Engineering Design, Surveying and Construction Supervision @ 9.53%					14,258.00
Estimated Construction Cost System Ic Blue					\$163,872.00 Total

NOTE: 1. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE I

System Ie Red

1975

Funds Allotted \$500,000.00

Location	Item	Quantity	Unit	Unit Price	Amount
NEVADA AVENUE:					
Van Buren Ditch to Polk Street	36" RCP	450	L.F.	22.00	9,900.00
Polk to Fillmore	30" RCP	850	L.F.	19.00	16,150.00
	Manhole	2	Ea.	300.00	600.00
	6' Catch Basin	2	Ea.	900.00	1,800.00
	21" RCP Lateral	300	L.F.	15.00	4,500.00
	4' Catch Basin	2	Ea.	750.00	1,500.00
	18" RCP Lateral	300	L.F.	13.00	3,900.00
POLK STREET:					
Nevada to Alley	24" RCP	300	L.F.	16.00	4,800.00
Alley and Polk Street	6' Catch Basin	2	Ea.	900.00	1,800.00
	21" RCP Lateral	150	L.F.	15.00	2,250.00
Estimated Construction Cost Based on 1972 Prices				47,200.00	Sub-Total
15.8% Inflation 1972-1975 (1.158 x 47,200)				54,658.00	Sub-Total
Engineering Design, Surveying and Construction Supervision @ 11.4%				6,231.00	
Estimated Construction Cost System Ie Red				\$60,889.00	Total

NOTE: 1. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE II

1976

System IIC Brown

Location	Item	Quantity	Funds Allotted		
			Unit	Unit Price	Amount
MARIPOSA:					
Floodway to Westmoreland	60" RCP	200	L.F.	45.00	9,000.00
Westmoreland and Mariposa	4' Catch Basin	4	Ea.	750.00	3,000.00
	18" RCP Lateral	400	L.F.	13.00	5,200.00
Westmoreland to Magnolia	54" RCP	200	L.F.	40.00	8,000.00
	Manhole	1	Ea.	300.00	300.00
Magnolia and Mariposa	4' Catch Basins	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
Magnolia to Mountview	48" RCP	500	L.F.	34.00	17,000.00
	Manhole	1	Ea.	300.00	300.00
MOUNTVIEW LANE:					
Mariposa to Stanton	48" RCP	200	L.F.	34.00	6,800.00
Stanton and Mountview	8' Catch Basins	3	Ea.	1050.00	3,150.00
	24" RCP Lateral	300	L.F.	16.00	4,800.00
Stanton to Acacia	42" RCP	1700	L.F.	28.00	47,600.00
	Manhole	3	Ea.	300.00	900.00
Mountview and Acacia	8' Catch Basin	3	Ea.	1050.00	3,150.00
	24" RCP Lateral	300	L.F.	16.00	4,800.00

PHASE II

System IIc Brown, Con't.

1976

Funds Allotted

Location	Item	Quantity	Unit	Unit Price	Amount
ACACIA DRIVE:					
Mountview to Meadow Lane	33" RCP	900	L.F.	21.00	18,900.00
	Manhole	2	Ea.	300.00	600.00
Meadow Lane and Acacia	6' Catch Basins	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
	8' Catch Basin	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00

Estimated Construction Cost Based on 1972 Prices

147,700.00 Sub-Total

21.6% Inflation 1972-1976 (1.216 x 147,700)

179,603.00 Sub-Total

Engineering Design, Surveying and Construction Supervision @ 9.6%

17,242.00

Estimated Construction Cost System IIc Brown

\$196,845.00 Total

NOTE: 1. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE II

1976

System IId Orange

Funds Allotted

Location	Item	Quantity	Unit	Unit Price	Amount
Floodway to Westmoreland	48" RCP	300	L.F.	34.00	10,200.00
WESTMORELAND ROAD:					
Westmoreland and Somerset	4' Catch Basin	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
Somerset to Hancock Avenue	42" RCP	1100	L.F.	28.00	30,800.00
	Manholes	2	Ea.	300.00	600.00
Hancock and Westmoreland	6' Catch Basins	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00
	8' Catch Basin	2	Ea.	1050.00	2,100.00
	24" RCP Lateral	200	L.F.	16.00	3,200.00
Hancock to Acacia	33" RCP	1400	L.F.	21.00	29,400.00
	Manhole	2	Ea.	300.00	600.00
Acacia and Westmoreland	8' Catch Basins	3	Ea.	1050.00	3,150.00
	24" RCP Lateral	300	L.F.	16.00	4,800.00

PHASE II

System IId Orange, Con't.

1976

Funds Allotted _____

Estimated Construction Cost Based on 1972 Prices

96,150.00 Sub-Total

21.6% Inflation 1972-1976 (1.216 x 96,150)

116,918.00 Sub-Total

Engineering Design, Surveying and Construction Supervision @ 10.32%

12,066.00

Estimated Construction Cost System IId Orange

\$128,984.00 Total

NOTE: 1. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE II

1976

System Iie Blue

Location	Item	Quantity	Unit	Funds Allotted	
				Unit Price	Amount
NEWCASTLE:					
Floodway to Newcastle	48" RCP	200	L.F.	34.00	6,800.00
Newcastle and Hancock	6' Catch Basin	3	Ea.	900.00	2,700.00
	21" RCP Lateral	300	L.F.	15.00	4,500.00
	8' Catch Basin	1	Ea.	1050.00	1,050.00
	24" RCP Lateral	100	L.F.	16.00	1,600.00
Hancock to Lancashire	42" RCP	800	L.F.	28.00	22,400.00
	Manholes	2	Ea.	300.00	600.00
Lancashire and Newcastle	6' Catch Basin	1	Ea.	900.00	900.00
	21" RCP Lateral	100	L.F.	15.00	1,500.00
	8' Catch Basins	3	Ea.	1050.00	3,150.00
	24" RCP Lateral	300	L.F.	16.00	4,800.00
Lancashire to Acacia	27" RCP	1400	L.F.	18.00	25,200.00
	Manhole	2	Ea.	300.00	600.00
Newcastle and Acacia	4' Catch Basins	4	Ea.	750.00	3,000.00
	18" RCP Lateral	400	L.F.	13.00	5,200.00

PHASE II

1976

Funds Allotted _____

84,000.00 Sub-Total

102,114.00 Sub-Total

11,083.00

\$113,197.00 Total

System Ile Blue, Con't.

Estimated Construction Cost Based on 1972 Prices

21.6% Inflation 1972-1976 (1.216 x 84,000)

Engineering Design, Surveying and Construction Supervision @ 10.85%

Estimated Construction Cost System Ile Blue

NOTE: 1. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE II

1976

System IIf Yellow

Location	Item	Quantity	Unit	Unit Price	Amount
NORTH WEBER:					
Floodway to Mountview	24" RCP	200	L.F.	16.00	3,200.00
Mountview, Weber and Cragmor	4' Catch Basin	2	Ea.	750.00	1,500.00
	18" RCP Lateral	200	L.F.	13.00	2,600.00
	6' Catch Basin	2	Ea.	900.00	1,800.00
	21" RCP Lateral	200	L.F.	15.00	3,000.00

12,100.00 Sub-Total

14,714.00 Sub-Total

1,758.00

\$16,472.00 Total

Estimated Construction Cost Based on 1972 Prices

21.6% Inflation 1972-1976 (1.216 x 12,100)

Engineering Design, Surveying and Construction Supervision @11.95%

Estimated Construction Cost System IIf Yellow

NOTE: 1. COST FOR RELOCATION OF UTILITIES NOT INCLUDED IN ESTIMATE.

PHASE I
CALCULATIONS

ZONE	ACRES	C	I	CFS
A	62	.57	3.6	127
B	98	.57	3.1	173
C	45	.57	3.1	80
D	69	.57	3.0	122
E	37	.57	3.2	63
F	28	.57	3.1	49
G	21	.57	3.1	37
H	42	.57	3.1	74
I	32	.57	3.1	56
J	63	.57	2.6	93
K	25	.57	3.7	53
L	29	.57	3.0	50
M	30	.57	3.3	56
N	17	.57	3.1	30
O	46	.57	3.1	81
P	43	.57	2.8	69
Q	74	.57	3.0	127
R	20	.57	2.5	29

$Q = ACI$

Q = Runoff of area in cubic feet per second

A = Area in acres

C = Coefficient of runoff

I = Intensity of rainfall in inches per hour

NOTE: Acres and C.F.S. rounded to nearest acre or cubic foot.

PHASE II
CALCULATIONS

ZONE	ACRES	C	I	CFS
A	51	.57	3.6	105
B	90	.57	3.4	174
C	47	.57	4.0	106
D	29	.57	3.8	62
E	60	.57	3.5	119
F	20	.57	3.5	39
G	54	.57	3.4	104
H	38	.57	3.4	75
J	38	.57	3.8	83
K	28	.57	3.5	55
L	27	.57	4.1	63
M	27	.57	4.2	65
N	35	.57	3.5	70
O	32	.57	3.6	66
P	58	.57	2.8	93
Q	80	.57	2.6	118
R	66	.57	2.8	106
S	53	.57	3.0	90
T	46	.57	2.7	71
U	57	.57	3.0	98
V	49	.57	2.8	77
W	31	.57	3.5	61

PHASE II
CALCULATIONS, Con't.

$$Q = ACI$$

Q = Runoff of area in cubic feet per second

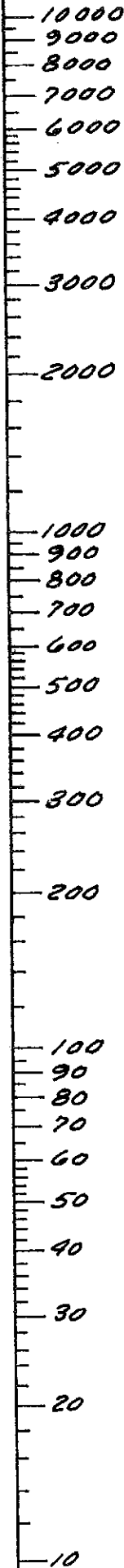
A = Area in acres

C = Coefficient of runoff

I = Intensity of rainfall in inches per hour

NOTE: Acres and C.F.S. rounded to nearest acre or cubic foot.

LENGTH (L), IN FEET
OVERLAND FLOW TIME



CHARACTER OF GROUND COVER

PAVED

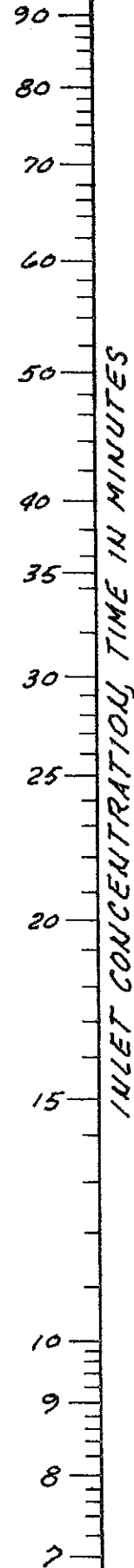
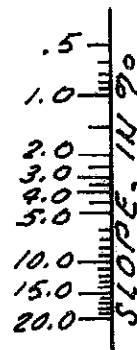
BARE
SOIL

POOR
GRASS

AVERAGE
GRASS

DENSE
GRASS

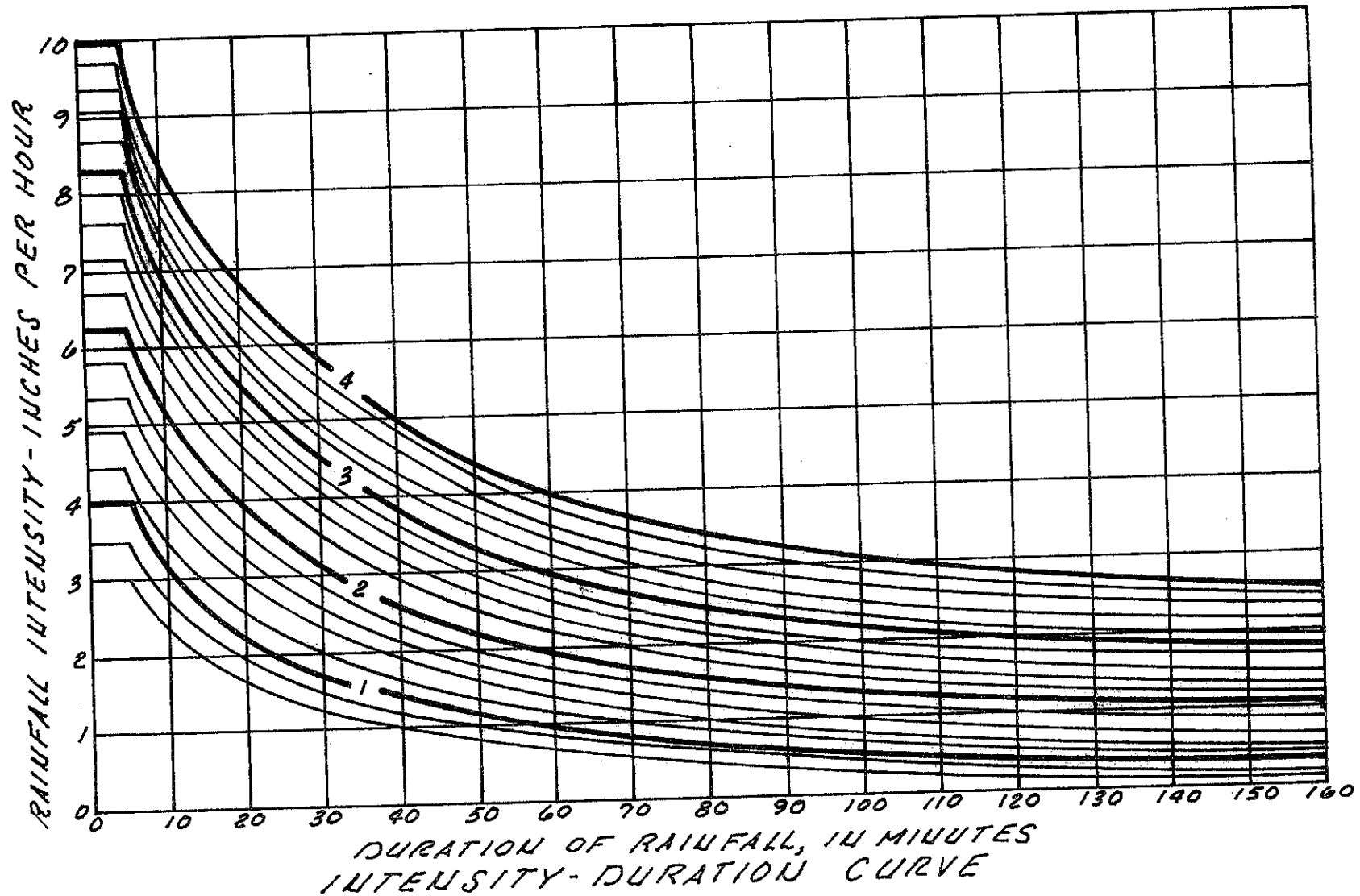
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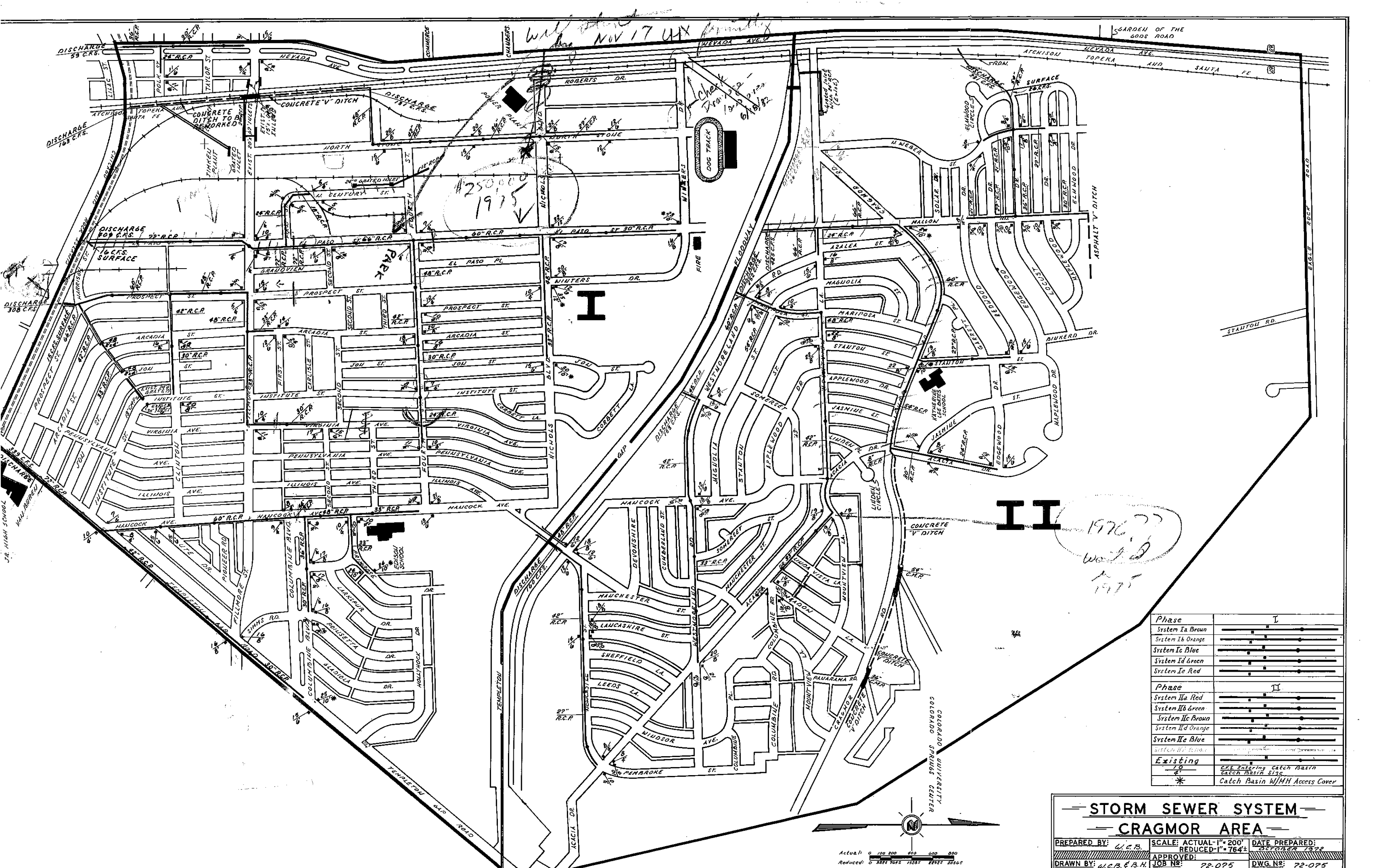
Peak Engineering Co.
Colorado Springs, Colo.



Peak Engineering Co.
Colorado Springs, Colo.



INTENSITY-DURATION CURVE



1250000
1975

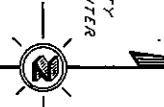
1976??
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1975

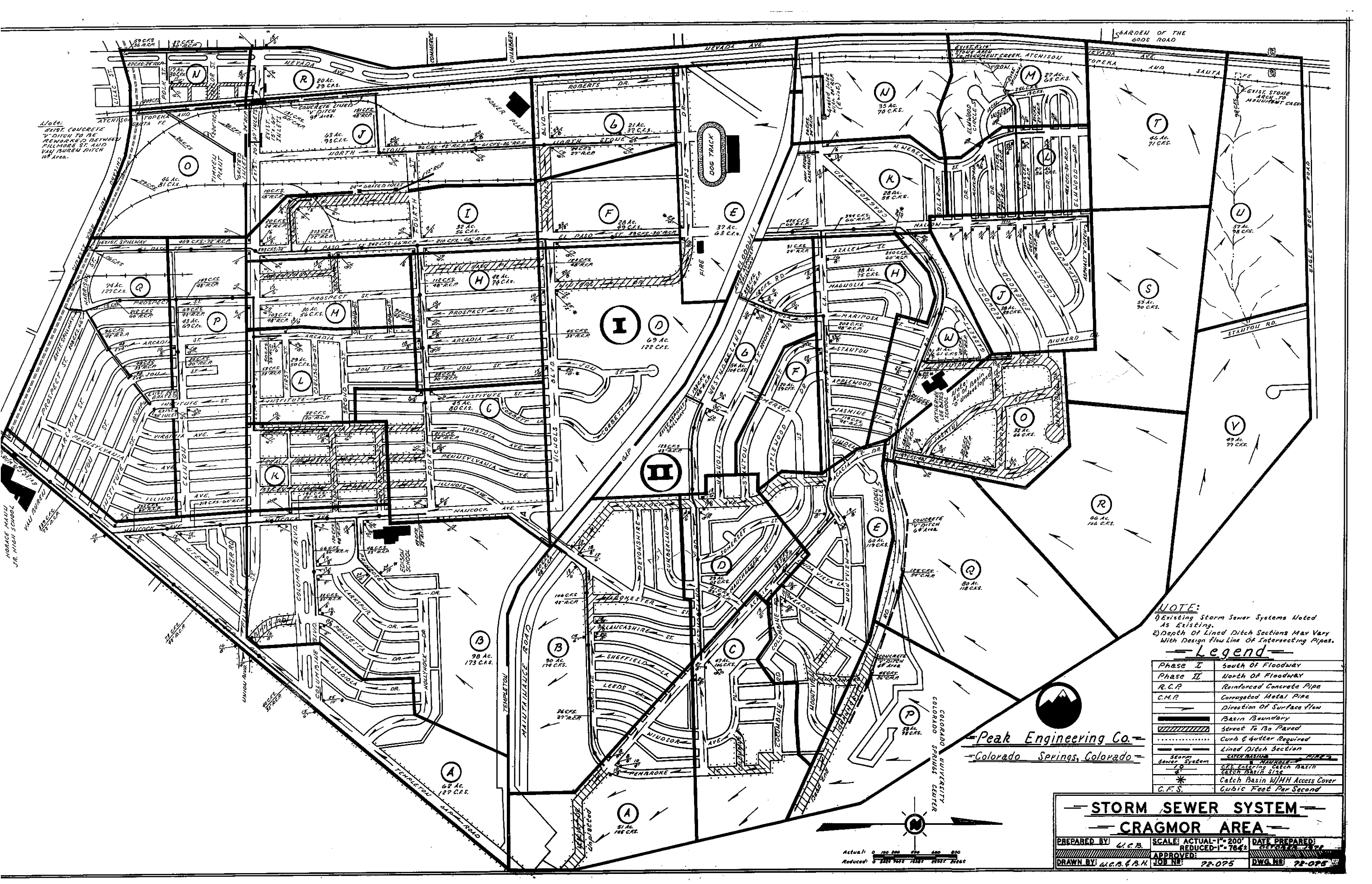
Phase	I
System Ia Brown	—●—
System Ib Orange	—●—
System Ic Blue	—●—
System Id Green	—●—
System Ie Red	—●—
Phase	II
System IIa Red	—●—
System IIb Green	—●—
System IIc Brown	—●—
System IId Orange	—●—
System IIe Blue	—●—
Existing	—●—
1/0	CBS Entering Catch Basin
4/1	Catch Basin Sign
*	Catch Basin W/HH Access Cover

STORM SEWER SYSTEM
CRAGMOR AREA

Prepared by: *W.C.B.* Scale: ACTUAL-1"=200'
 Reduced-1"=764'
 Date Prepared: *October 1972*

Drawn by: *W.C.B. & B.M.* Job No: *72-075* Dwg. No: *72-075*





Note:
EXIST. CONCRETE
DITCH TO BE
REMOVED BETWEEN
FILLMORE ST. AND
VAN BUREN DITCH
10' Area.

NOTE:
1) Existing Storm Sewer Systems Noted
As Existing.
2) Depth Of Lined Ditch Sections May Vary
With Design Flow Line Of Intersecting Pipes.

Legend

Phase I	South Of Floodway
Phase II	North Of Floodway
R.C.P.	Reinforced Concrete Pipe
C.M.P.	Corrugated Metal Pipe
→	Direction Of Surface Flow
---	Basin Boundary
	Street To Be Paved
.....	Curb & Gutter Required
---	Lined Ditch Section
---*	Catch Basin
---	Storm Sewer System
---	C.F.S. Entering Catch Basin
---	Catch Basin Size
*	Catch Basin W/MH Access Cover
C.F.S.	Cubic Feet Per Second

Peak Engineering Co.
Colorado Springs, Colorado

STORM SEWER SYSTEM
CRAGMOR AREA

PREPARED BY: U.C.B. SCALE: ACTUAL-1"=200'
REDUCED-1"=764'
DATE PREPARED: SEP 22 1922
DRAWN BY: U.C.B. & B.H. APPROVED: JOB NO: 72-075
DWG. NO: 72-075

Actual: 0 100 200 300 400 500
Reduced: 0 100 200 300 400 500