

RETURN TO:
Land Development
105 West Castilla
Colorado Springs, CO 80903

PRELIMINARY
MASTER DRAINAGE REPORT
FOR
SOUTHERLY PARCEL OF THE HOUCK ESTATE



— DREXEL, BARRELL & CO. —

ENGINEERS — SURVEYORS

1700 38TH STREET

BOULDER, COLORADO 80301

(303) 442-4338

PRELIMINARY
MASTER DRAINAGE REPORT
FOR
SOUTHERLY PARCEL OF THE HOUCK ESTATE

PREPARED BY:

DREXELL, BARRELL & CO.
1700 38TH STREET
BOULDER, COLORADO 80301

RECEIVED
PUBLIC WORK ENGINEERING
COLORADO SPRINGS, COLO.

SEP 28 1983

AMM
7 8 9 10 11 12 1 2 3 4 5 6
PWF

CITY OF COLORADO SPRINGS

The "America the Beautiful" City

DEPARTMENT OF PUBLIC WORKS

CITY ENGINEERING DIVISION (303) 578-6606

30 S. NEVADA SUITE 403 P.O. BOX 1575
COLORADO SPRINGS, COLORADO 80901

October 21, 1983

Mr. George Miners
Drexel, Barrel & Company
1700 38th Street
Boulder, CO 80301

Re: The Houck Estate Preliminary Master Drainage Reports

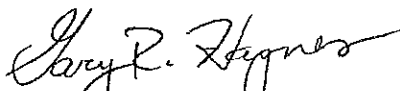
Dear Mr. Miners:

This office has reviewed your preliminary master drainage reports for the northerly parcel and the southerly parcel of the Houck Estates. We find that the reports are acceptable as preliminary reports and they are only conceptual in nature. Several details must be addressed in the final drainage reports and with the individual subdivision reports. Some of the details are, but not limited to, the following: adequate outfall facilities for all points of discharge from the master planned area; consideration of the potential erosion to natural channels downstream of this development; design of proper storm sewer facilities so that street capacities are not exceeded; all other items covered by the City of Colorado Springs Criteria Manual for Storm Runoff Determination.

It also should be brought to your attention that this office has been made aware of a serious underground water problem in the southerly portion of the Houck Estate in the vicinity of Templeton Gap Road. Although it is out of the scope of this Division's requirements, I am simply pointing this out so that you may take measures to reduce the impact of the underground water problem to the existing neighborhoods southwesterly of the Houck Estate's southern portion.

If you have any questions concerning this matter, please contact this office.

Sincerely,



Gary R. Haynes
City Engineer

GRH/ro

cc: DeWitt Miller, Director of Public Works
Bob Wolcott, City Planning
Chris Smith, Subdivision Development Administrator
Bev Dustin, Land Development Technician
Mark Norton, Civil Engineer II

PRELIMINARY
MASTER DRAINAGE REPORT
FOR THE
SOUTHERLY PARCEL OF THE HOUCK ESTATE

I. INTRODUCTION

The southerly parcel of the Houck Estate is located in sections 28, 32, and 33 of T13S, R66W of the 6th P.M., City of Colorado Springs, County of El Paso. More particularly, it is situated east of Templeton Gap Road and west of Palmer Park as well as surrounding the Fillmore of the Union Boulevard intersection. The parcel is approximately 150 acres in size excluding the Golf Course property, and is being proposed as a residential/commercial development.

II. PURPOSE

This drainage study was undertaken to analyze the run-off patterns for the site, and to determine a rough idea of the major facilities required to handle the drainage, based on a conceptual land use plan. The type of development that may take place on the property has yet to be determined. The City of Colorado Springs is in the process of reviewing the proposed land use plan for zoning and development. Consequently this report does not attempt an indepth study of the surrounding areas, ground water problems, or existing facilities.

III. STUDY METHODOLOGY

The modified S.C.S. methodology was used to develop basin flows. This methodology was taken from the Colorado Springs Storm Run-off Criteria Manual, March 1977. The design storm is the 5-year occurrence.

IV. MAJOR BASINS

The parcel lies within two drainage basins. The area north of the Golf Course is in the Templeton Gap Basin, and the area south of the Golf Course is in a basin designated miscellaneous. Although the Golf Course will not be altered, it has been included in the study due to its contribution to the run-off to the area lying south.

V. OFFSITE RUN-OFF

As mentioned above the Golf Course between the two developable parcels contributes approximately 47 c.f.s. run-off to the southerly portion of the site. In the north, the Palmer Park area contributes to the run-off in the north and any facilities installed will have to be sized to deliver the Palmer Park drainage to the Templeton Gap Floodway.

VI. BASIN DRAINAGE

Basins I & II shown on the enclosed plan are in the Templeton Gap Drainage Basin. The run-off from these two basins, and the run-off from Palmer Park will be delivered to the Templeton Gap Floodway. Conceptual facilities are sized on the enclosed plan and conform to the Templeton Gap Floodway Basin Study.

Basins III, IV, and V form the Golf Course drainage and Basins VI and VII are the commercial/residential areas in the Fillmore at Union intersection area. It is anticipated at this time that the existing major drainage facilities will collect the run-off from these five basins. However, at the time of specific site development, it will be necessary to review the adequacy of those facilities to insure there is no overlodaing of the System.

VII. BASIN FEES

As indicated above, Bains I and II are in the Templeton Gap Drainage Basin. Combined they comprise an area of approximately 49 acres and therefore are responsible for \$2143/acre or \$104,878.00 worth of drainage basin fees. (\$2119 basin fee and \$24 bridge fee)

The remaining area exclusive of the Golf Course is in an area designated miscellaneous and will be responsible for \$1873/acre in fees for a total of \$187,038.

VIII. FACILITY COST ESTIMATE

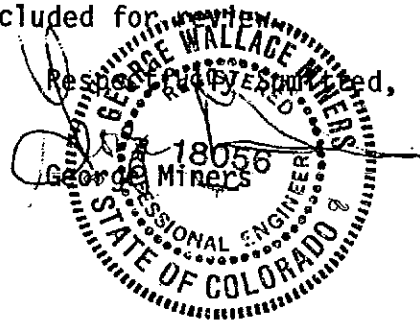
The estimate for the drainage facilities shown on the attached plan is \$264,000, all of which would be related to the Templeton Gap Drainage Basin. This estimate does not include any collection facilities, or improvement of existing facilities which may be necessary. When development plans are finalized it will be necessary to do an indepth study of the area drainage to determine the required improvements.

IV. CONCLUSIONS

Facilities conforming to the Templeton Gap Drainage Basin Study will be adequate to handle the drainage in the northerly portion of the property. It is anticipated at this time that either the existing facilities, or improvements to the existing facilities will be adequate to handle the drainage in the south. A collection system design will be necessary when development plans are finalized to insure street capacity is not exceeded.

Due to the conceptual nature of this study no certification statements are included. The facilities indicated on the Master Drainage Plan are not under design at this time and are only approximations of the system ultimately required.

An estimated cost for the facilities shown on the attached Master Plan a vicinity map, and calculations are included for review.





Project		Job No	
DRAINAGE STUDY & COST ESTIMATE		E-2714	
Client	By	Date	
THE HOLLAND ESTATE	ELW	6/6/63	

So. PARCEL TRIBUTARY TO THE TEMPLETON GAP FLOODWAY

<u>PIPE SIZE</u>	<u>LENGTH</u>	<u>COST/FOOT</u>	<u>TOTAL</u>
24"	1200'	36 ⁰⁰	43200
36"	300'	52 ⁰⁰	15600
42"	1500	63 ⁰⁰	94500
60"	550'	90 ⁰⁰	49500

202800⁰⁰

CONTINGENCIES @ 15%

30420

ENGINEERING @ 15%

30420

\$ 263640⁰⁰

Project

Master Drainage Study

Job No

E-2714

Client

Speer (Houch Estate)

By

SWM

Date

2/18/83

Soil Groups Present within the Houch Estate (South)

Map Designation	Name	Hydrologic Soil Group
10	Blendon Sandy Loam	B
94	Travessilla Rock	D

Curve Number By Land Use

Density	Soil Group	CN
1/8 Acre or less	B	85
	D	92
1/4 Acre	B	75
Commercial	B	92
Open Space	B	69
	D	84

Project		Master Drainage Study		Job No	E-2714
Client		By	Date		
Speer (Houch Estate)		GSW	2/18/83		

- Basin I = 32.98 acres

	Soil Group	%	CN	Product
Residential $\frac{1}{8}$ Acre (28.76 ac.)	B	87	85	7395
Open Space (4.22 ac.)	B	13	69	897
				<u>8292</u>

Weighted CN = 83

- Basin II = 15.96 Acres

R $\frac{1}{8}$ (9.88 ac.)	B	62	85	5270
R $\frac{1}{8}$ (1.59 ac.)	D	10	92	920
D.S. (2.94 ac.)	B	18	69	1242
D.S. (1.55 ac.)	D	10	81	810
				<u>8272</u>

Weighted CN = 83

- Basin III = 17.21 Acres

D.S. (7.85 ac.)	D	46	84	3864
D.S. (7.17 ac.)	B	42	69	2898
R $\frac{1}{8}$ (2.19 ac.)	B	12	85	1020
				<u>7782</u>

Weighted CN = 78

Project Master Drainage Study		Job No E-2714	
Client Speer (Houck Estate)		By G.M.	Date 2/18/83

- Basin IV 69.12 Ac.

	Soil Group	%	CN	Product
O.S.	B	98	69	6762
R $\frac{1}{4}$ (1.63 Ac.)	B	2	85	170
				6932

Weighted CN = 69

- Basin V 32.30 Ac.

O.S. (30.43)	B	94	69	6486
R $\frac{1}{8}$ (1.87 Ac.)	B	6	85	510
				6996

Weighted CN = 70

- Basin VI - 62.80 Ac.

Office (27.22 Ac)	B	45	92	4140
R $\frac{1}{8}$ (19.07)	B	30	85	2550
R $\frac{1}{4}$ (3.69 Ac)	B	5	75	375
O.S. (12.82 Ac)	B	20	69	1380
				8445

Weighted CN = 84

Project

Master Drainage Study

Job No

E-2714

Client

Speer (Honeck Estate)

By

Date

Burn

2/18/83

- Basin	Area	Soil Group	%	CN	Product
Basin VII	37.06 Ac.				
R 1/4	(10.41 Ac.)	B	28	75	2100
R 1/8	(18.53 Ac.)	B	50	85	4250
Office	(7.0 Ac.)	B	19	92	1748
O.S.	(1.12 Ac.)	B	3	69	207
Weighted CN = 83					8305

Project

Master Drainage Study

Job No

E-2714

Client

Speer (Home Estate)

By

Date

SWM

2/18/83

Basin I - 32.98 Acres

$$L = 150'$$

$$H = 50'$$

$$CN = 83$$

$$T_c = 0.06 \text{ Hrs.}$$

$$Q_s = 0.77 \text{ in.}$$

$$q_p = 1320 \text{ csm/in.}$$

$$q_{fs} = 1320 (.77) \times \frac{32.98}{640} = 52.38 \text{ cfs}$$

$$t_b = \frac{1290 \times 32.98 \times .77}{52.38 \times 640} = 0.98 \text{ Hr.}$$

$$t_p = 0.37 \text{ Hr.}$$

$$D = 0.01 \text{ Hr.}$$

$$q_{100} = 138 \text{ cfs}$$

Project		Job No	
Master Drainage Study		E-2714	
Client		By	Date
Speer (Houch Estate)		KWM	2/18/83

Basin II

Area = 15.96 Acres

Reach ① = 250'

H_① = 50'

Reach ② = 800'

H_② = 50'

T_c = 0.02 + 0.06 = 0.08 Hr.

CN = 83

q_p = 1300 csm/in

Q = 0.77

$$q_{15} = \frac{1300 (0.77) \times 15.96}{640} = 24.96 \text{ cfs}$$

$$t_b = \frac{1290 \times .77 \times 15.96}{24.96 \times 640} = 0.99 \text{ Hrs.}$$

t_p = 0.37 Hr.

D = 0.01 Hr.

q₁₀₀ = 59.6

Project

Master Drainage Study

Job No

E-2714

Client

Speer (Houch Estate)

By

KJW

Date

2/19/83

- Basin III

$$A = 17.21 \text{ Acres}$$

$$Reach_0 = 400'$$

$$H_0 = 110'$$

$$Reach_1 = 400'$$

$$H_1 = 30'$$

$$T_c = 0.02 \text{ to } 0.04 = 0.06 \text{ hr.}$$

$$q_p = 1320 \text{ csm/in.}$$

$$CH = 78$$

$$Q_s = 0.54 \text{ in.}$$

$$q_{15} = \frac{1320 \times .54 \times 17.21}{640} = 19.17 \text{ cfs}$$

$$t_b = \frac{1290 \times 17.21 \times .54}{19.17 \times 640} = 0.98 \text{ hr.}$$

$$t_p = 0.37 \text{ hr.}$$

$$D = 0.01 \text{ hr.}$$

$$q_{100} = 53 \text{ cfs}$$

Project

Job No

Master Drainage Study
Speer (Huck Estate)

E-2714

Client

By

Date

GWM

2/18/83

Basin IV

$$A = 69.12 \text{ Acres}$$

$$\text{Reach ①} = 400'$$

$$H_0 = 100'$$

$$\text{Reach ②} = 1900'$$

$$H_{②} = 60'$$

$$T_c = 0.02 + 0.16 = 0.18 \text{ hrs.}$$

$$q = 1100 \text{ csm/in.}$$

$$CN = 69$$

$$Q = 0.26 \text{ in.}$$

$$q = 1100 \times 0.26 \times \frac{69.12}{640} = 30.89 \text{ cfs}$$

$$t_b = \frac{1290 \times 69.12 \times 0.26}{30.89 \times 640} = 6.17 \text{ hrs.}$$

$$t_B = 0.44 \text{ hrs.}$$

$$D = 0.02 \text{ hrs.}$$

$$q_{\text{flow}} = 49 \text{ cfs}$$

Project

Master Drainage Study

Job No

E-2714

Client

Speer (Houch Estate)

By

Date

GSW

2/18/83

Basin V

$$A = 32.30 \text{ Acres}$$

$$L = 2100'$$

$$H = 60'$$

$$T_c = 0.19 \text{ Hr.}$$

$$CN = 70$$

$$Q_s = 0.28$$

$$q_p = 1100 \text{ csm/in.}$$

$$Q_s = \frac{1100 \times 0.28 \times 32.30}{640} = 15.54 \text{ cfs}$$

$$t_b = \frac{1290 \times 32.30 \times 0.28}{15.54 \times 640} = 1.17 \text{ Hr.}$$

$$t_p = 0.44 \text{ Hr.}$$

$$D = 0.03 \text{ Hr.}$$

$$q_{100} = 56 \text{ cfs}$$

Project Master Drainage Study		Job No E-2914	
Client Speer (Houch Estate)		By GWM	Date 2/18/83

Basin VI

$$A = 62.80 \text{ Ac.}$$

$$L = 2300'$$

$$H = 50'$$

$$T_c = 0.20 \text{ hr.}$$

$$CN = 84$$

$$Q = 0.82 \text{ in.}$$

$$q_p = 1050 \text{ csm/in.}$$

$$q_s = \frac{1050 \times 0.82 \times 62.80}{640} = 84.49$$

$$t_b = \frac{1290 \times 62.80 \times 0.82}{84.49 \times 640} = 1.23 \text{ hr.}$$

$$t_p = 0.46 \text{ hr.}$$

$$D = 0.03 \text{ hr.}$$

$$q_{100} = 200 \text{ cfs}$$

Project

Master Drainage Study

Job NR

E-2714

Client

Spear (Hoveler Estates)

By

Date

GWM

2/18/83

Basin VII

$$A = 37.06 \text{ Ac}$$

$$L = 2000'$$

$$H = 40'$$

$$T_c = 0.21$$

$$q_p = 1050 \text{ csm/in}$$

$$CN = 83$$

$$Q_s = 0.77 \text{ in.}$$

$$q_p = 1050 \times .77 \times \frac{37.06}{640} = 46.82 \text{ cfs}$$

$$t_b = \frac{1290 \times 37.06 \times .77}{46.82 \times 640} = 1.23 \text{ Hr.}$$

$$t_p = 0.46 \text{ Hr.}$$

$$D = 0.03 \text{ Hr.}$$

$$q_{60} = 111.8 \text{ cfs}$$