HOLLOWBROOK OFFICE PARK

MASTER DRAINAGE PLAN AND REPORT

Prepared for:

THE SCHUCK DEVELOPMENT CORPORATION
105 East Kiowa Street
Colorado Springs, Colorado 80901

Prepared by:

FINN AND ASSOCIATES
615 North Nevada Suite 4
Colorado Springs, Colorado 80903

March 1984
(Revised April 1984)

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Consulting Services Architectural, Planning, Engineering, Surveying

April 9, 1984

City of Colorado Springs
Department of Public Works
Engineering Division
30 South Nevada Avenue Suite 403
Colorado Springs, Colorado 80903

ATTN: Mr. Gary Haynes

RE: Hollowbrook Office Park Master Drainage

Gary:

Transmitted herewith is the Master Drainage Plan and Report for Hollowbrook Office Park which includes Hollowbrook Office Park Filing No. 2, a subdivision located in the northeastern portion of Colorado Springs, Colorado.

If you have any questions or desire further information, please feel free to call.

Sincerely,

FINN AND ASSOCIATES

Lawrence A. Finnerty, P.E.

Enclosures

CERTIFICATIONS

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 for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability attributable directly to any negligent acts, errors or omissions on my part in preparing this report.

Lawrence A. Finnerty
Registered Professional Engineer
State of Colorado #19461

Developer's Statement:

The developer and/or his representative has read and will comply with all the requirements specified in this drainage plan and report.

BUSINESS NAME: Hollowbrook Office Group, Ltd.
The Schuck [redacted] Corporation, General Partner

BY: _____ DATE: 3-16-84

TITLE: V.P.

ADDRESS: 105 East Kiowa Street Colorado Springs, Colorado 80901

CITY OF COLORADO SPRINGS:

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

_____ 4/20/84
City Engineer Date

HOLLOWBROOK OFFICE PARK

DRAINAGE REPORT

I. General Description

Hollowbrook Office Park is located in a portion of the West one-half of Section 16, Township 14 South, Range 66 West, of the Sixth Principal Meridian in the City of Colorado Springs, El Paso County, Colorado, and contains approximately 7.204 acres. The site is bordered on the west by Lehman Drive, on the north by single-family residences, and on the south and east by Hollowbrook Drive. The entire subdivision lies within the Cottonwood Creek Drainage Basin.

Planned development for Hollowbrook Office Park, which is zoned O C (Office Complex), is an office park. General terrain within the subdivision slopes southwest, toward Hollowbrook Drive. Hydrologic soil group A (Blakeland Soil) as classified by the Soil Conservation Service is encountered on the site.

Drainage calculations were completed using the City of Colorado Springs Determination of Storm Runoff Criteria for the 5-year and 100-year storms. The drainage plan reflects the 5-year flows for all on-site runoff.

II. Existing Drainage Characteristics

A. Exterior Drainage

Overland flow enters the site from Quail Meadows Filing No. 3 and Filing No. 6 from the north. All other existing exterior

flows are directed away from the site by the curb and gutter in Lehman Drive and Hollowbrook Drive.

B. Interior Drainage

Runoff exits the site as sheetflow onto Hollowbrook Drive and Lehman Drive. Some of this flow is carried by the existing curb and gutter to catch basins located in Lehman Drive. The remaining runoff is diverted by a cross-pan onto Hollow Tree Court where it is carried to catch basins located in Hollow Tree Court, as shown and calculated in the Hollow Brook Corner Filing No. 4 Drainage Report by Weiss Consulting Engineers, Inc. in December of 1981.

III. Proposed Drainage Improvements

A. Exterior Drainage

All proposed exterior flows are directed away from the site by the curb and gutter in Lehman and Hollowbrook Drive, with the exeption of some overland flow entering the site from Quail Meadows Filing No. 3 and Filing No. 6 to the north. This overland flow is accounted for in the interior drainage calculations. A flow of 6.5 cfs flows from north to south in the curb and gutter of Lehman Drive, while 42 cfs flows southeast in the curb and gutter of Hollowbrook Drive.

B. Interior Drainage

Proposed flows generated within the subdivision are

tabulated in the hydrologic calculations (Appendix A). The enclosed drainage plan shows the direction of flow and the calculated runoff quantities for the 5-year storm. Accumulated surface runoff was calculated using these individual subbasin flows.

Interior drainage has been divided into six different subbasins. Flow from subbasin A1 (1.10 cfs) exits onto Hollowbrook Drive at the southeast curb opening of the site and combines with the flow of 42 cfs from Quail Meadows No. 6. The total flow of 43.10 cfs is diverted into an existing cross-pan which crosses Hollowbrook Drive and onto Hollow Tree Court which in turn carries the runoff to two 10' catch basins (Appendix B) located 300 feet south of Hollowbrook Drive. The two 10' catch basins discharge their flow into an adequately sized concrete lined channel directly below the inlets (Appendix C).

Flow from subbasin C1 (0.97 cfs) exits onto Lehman Drive where it combines with an existing flow of 6.5 cfs from Quail Meadows Filing No. 3. This flow travels south and combines with the flow from subbasin C2 (0.68 cfs) as it exits the site through the southwest curb opening. Subbasins B1, B2 and B3 (2.73 cfs, 1.99 cfs and 0.07 cfs respectively) all exit onto Hollowbrook Drive where they combine and flow northwest to Lehman Drive. The flows on the two streets combine and are carried south on Lehman Drive toward four 6' catch basins (Appendix B) located 550 feet to the south. At the catch basins, the total flow of 12.94 cfs traveling south combines with a flow of 14 cfs traveling north, as calculated in the Hollow Brook Corner Filing No. 2 by Weiss

Consulting Engineers, Inc. in May of 1980. The catch basins discharge their flow into an adequately sized concrete box culvert directly below (Appendix D).

IV. General Discussion

A 5-year flow of 21.4 cfs was calculated for the site in the Drainage Report for Hollow Brook Corner Filing No. 4 by Weiss Consulting Engineers, Inc. in December of 1981, using estimates for planned land use. The actual value of 7.54 cfs for the 5-year flow is smaller due to a change in the areas of landscaping in comparison to the planned areas.

Financial Analysis

No public or private improvements are required.

Drainage and Bridge Fees

Cottonwood Creek Drainage Basin

Drainage Fees

7.204 Acres @ $2,987/Acre = $21,518.35

Bridge Fees

7.204 Acres @ $137/Acre = $986.95

Total Fees

$22,505.30

Hollowbrook Office Group, Ltd. has a drainage fee credit in the Cottonwood Drainage Basin. This credit is larger than the fees required for this filing.

HOLLOWBROOD OFFICE PARK DRAINAGE REPORT
83-146
3/8/84

APPENDIX A

DRAINAGE CALCULATIONS

PROPOSED INTERIOR DRAINAGE

HYDROLOGIC SOIL GROUP-- BLAKELAND A

BASIN	AREA SQ.IN.	AREA SQ.MI.	W.C. LENGTH (MI.)	ELEV. DIFF. (FT.)	TIME CONC. (HRS.)	PEAK FACTOR	CN	P5 (IN.)	P100 (IN.)	Q5 (CFS)	Q100 (CFS)
A 1	59.50	0.00192	0.112	25.0	0.060	1280	75.4	0.45	1.33	1.10	3.27
B 1	126.24	0.00408	0.094	45.0	0.039	1280	77.6	0.52	1.47	2.73	7.65
B 2	69.52	0.00224	0.077	21.0	0.041	1280	81.5	0.69	1.74	1.99	5.01
B 3	19.70	0.00064	0.034	10.0	0.022	1280	60.2	0.08	0.54	0.07	0.44
C 1	40.23	0.00130	0.087	30.0	0.042	1280	79.1	0.58	1.57	0.97	2.61
C 2	67.25	0.00217	0.082	21.0	0.045	1280	68.6	0.24	0.93	0.68	2.59
TOTAL	382.43	0.01234580									

APPENDIX A1

Calculation of Curve Numbers

	Curve Number
Hydrologic Soil Group A	
Residential (average lot size 1/5 acre)	65
Open Space in fair condition	49
Paved Parking, Roofs, etc.	98

Basin	%Residential	%Open Spaces	%Pavmt, Roof	CN
A1	34.52	22.79	42.69	75.44
B1	3.95	39.08	56.97	77.55
B2	0	33.69	66.31	81.49
B3	0	77.23	22.77	60.16
C1	17.05	27.20	55.75	79.05
C2	0	59.96	40.04	68.62

Note: The weighted curve numbers are based on building sizes shown on the plan of approximatly 4100 sq. ft.

APPENDIX B

Catch Basins Calculations

Hollow Tree Court

5-Year Flow = 43.10 cfs

10' catch basin capacity in sump condition = 23.0 cfs
From Table 6, Determination of Storm Runoff Criteria

Two 10' catch basins in sump condition = 46.0 cfs

46.0 cfs > 43.1 cfs

OK

Lehman Drive

5-Year Flow = 12.94 cfs

6' catch basin capacity in sump condition = 12.8 cfs
From Table 6, Determination of Storm Runoff Criteria

Four (4) 6' catch basins in sump condition = 51.2 cfs

51.2 cfs > 12.94 cfs

OK

APPENDIX C

Channel Calculations

10' X 6' Trapezoidal Channel flowing at a depth of 4.8' at the Hollow Tree Court crossing.

$$Q = \frac{1.486}{n} A R^{(0.667)} S^{(0.5)}$$

n=0.015
S=0.019 ft/ft
A=66.24 sq ft
R=2.611 ft

$$Q = \frac{1.486}{0.015} (66.24) (2.611)^{(0.667)} (0.010)^{(0.5)}$$

Q = 1,717.9 cfs

Existing 100-year flow in channel = 1,400 cfs
From Hollow Brook Corner Filing No. 4 Drainage Report

Proposed flow = 1,394.7 cfs

1,717.9 cfs > 1,394.7 cfs

OK

APPENDIX D

Box Culvert Calculations

6' X 14' Concrete Box Culvert flowing at a depth of 4.5' at the Lehman Drive crossing.

$$Q = \frac{1.486}{n} A R^{(0.667)} S^{(0.5)}$$

n = 0.015
S = 0.019 ft/ft
A = 63.0 sq. ft
R = 2.739 ft

$$Q = \frac{1.486}{0.015} (63.0) (2.739)^{(0.667)} (0.019)^{(0.5)}$$

Q = 1,684.7 cfs

Existing 100-year flow in culvert = 1,520 cfs
From Hollow Brook Corner Filing No. 2 Drainage Report

Proposed flow = 1,510.94 cfs

1,684.7 cfs > 1,510.94 cfs

OK

APPENDIX E

Street Flow Capacity

Hollowbrook Drive

Eastern Section

40' Residential
Slope = 5.0 %
Capacity = 95.3 cfs
From Table 5, Determination of Storm Runoff Criteria

95.3 cfs > 43.10 cfs

OK

Western Section

40' Residential
Slope = 0.5 %
Capacity = 15.05 cfs
From Table 5, Determination of Storm Runoff Criteria

15.05 cfs > 4.79 cfs

OK

Lehman Drive

40' Residential
Slope = 6.0 %
Capacity = 52.15 cfs
From Table 5, Determination of Storm Runoff Criteria

52.15 cfs > 12.94 cfs

OK