

DRAINAGE REPORT
FOR
HAVENTREE STREET
(A Portion of Spring Creek Development Phase I)

PREPARED BY:

K L H Engineering Consultants, Inc.
206-208 Sutton Lane
Colorado Springs, CO 80907
KLH J.N. 85 585 13

PREPARED FOR:

The Schuck Corporation
25 N. Cascade
Colorado Springs, CO 80903

RECEIVED
PUBLIC WORKS/ENGINEERING
COLORADO SPRINGS, COLO.

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January 1987

GENERAL

Haventree Street is located in the SE 1/4 of Section 28, Township 14 South, Range 66 West of the 6th P.M., City of Colorado Springs, County of El Paso, State of Colorado. More specifically, it abuts the Southwesterly side of the Southeast Loop Road at either end. It has a length of 850 feet consisting of a 60 foot right-of-way which contains approximately 1.17 acres. Presently, this street lies within a Public Utility and Roadway Easement and will eventually be platted with the platting of adjacent property. There is also a private drive teeing from Haventree Street which travels in a Southwesterly manner to the Northwesterly property line of Spring Creek Filing No. 2, whose Drainage Report (by KLH Engineering) was filed with the City of Colorado Springs, March 14, 1986. Both streets are to be used for commercial site access.

The site is located on moderate slopes dropping generally in a Southwesterly manner. The entire street is located within a Miscellaneous Drainage Basin that flows to Fountain Creek. No part of the site lies within a designated F.E.M.A. 100-year floodplain.

Soils located on site were determined from the Soil Conservation Service Maps of El Paso County and consist of a Schamber-Razor Complex; S.C.S. Soil Number 82 and Hydrologic Soil Groups A and C. Group C was used based on the S.C.S. detailed description and site inspection.

This site is a portion of the "Drainage Report and Plan for Spring Creek Development Phase I" by URS/NES, January 1985. Said report was filed with the City on March 27, 1985. This Drainage Report for Haventree Street is consistent (in philosophy of methods for handling runoff flows) with the "Drainage Report and Plan for Spring Creek Development Phase I." The reader is referred to that report for background information and to obtain an overview of approximate drainage facilities required upon full development of Spring Creek Phase I.

METHODS OF COMPUTATION

Peak runoff flows were computed using the Modified S.C.S. Methodology as specified in the "City of Colorado Springs Determination of Storm Runoff Criteria" manual. Peak runoff for both 5-year and 100-year storms were computed.

Per City of Colorado Springs criteria, all drainage facilities have been sized for the 5-year storm for peak 100-year flows less than 500 c.f.s and for the 100-year storm for peak 100-year flows in excess of 500 c.f.s.

The site has been divided into three (3) sub-basins which are portions of Basins 13 and 14 of the Spring Creek Phase I report. These sub-basins were determined from the topography of the site. A weighted curve number was utilized in computing runoff flows. Runoff computations are tabulated in the back of this report.

EXTERIOR DRAINAGE

All exterior drainage will be intercepted before it enters the site.

Sub-basin 5 consists of Basins 11 and 12 of the Spring Creek Phase I report. Runoff from this sub-basin will flow overland to the Southeast Loop Road and as pipe flow (pipe not yet in place) to an existing curb inlet located in the curb return of a future street which lies on the Northeast side of the Southeast Loop Road. Runoff will then continue Southerly along the Southeast Loop Road as street flow and as pipe flow to two curb inlets located on either side of said Southeast Loop Road at its intersection with Hancock Expressway.

Sub-basin 6 consists of Basin 15 of the Spring Creek Phase I report. Runoff from this sub-basin will flow overland to the Southeast Loop Road where a portion of it will be picked up by an existing curb inlet located on the East side of said Southeast Loop Road. Runoff will then continue as street flow and as pipe flow to the aforementioned curb inlets at the intersection of Hancock Expressway and the Southeast Loop Road.

Sub-basin 7 consists of Basin 19 of the Spring Creek Phase I report. Runoff from this sub-basin will flow overland to the Southeast Loop Road and then as street flow South to said inlets at the intersection of Hancock Expressway and the Southeast Loop Road.

Sub-basin 4 consists of a portion of the Southeast Loop Road. A portion of this street flow will be picked up by an existing curb inlet on the West side of the Southeast Loop Road just North of its intersection with the proposed Haventree Street. Runoff will continue as street flow and pipe flow to the previously mentioned intersection.

Sub-basin 8 consists of a portion of the Southeast Loop Road lying between Haventree Street and Hancock Expressway. This street flow will again flow to the intersection of the Southeast Loop Road and Hancock Expressway.

INTERIOR DRAINAGE

The site has been divided into three (3) sub-basins.

Runoff from Sub-basin 1 will flow from rooftops and grassed areas into parking lots and then flow into Haventree Street and continue Southeasterly along Haventree Street to its intersection with the Southeast Loop Road.

Sub-basin 2 consists of the major portion of Haventree Street. This street flow will again proceed Southeasterly to the Southeast Loop Road where a portion will be picked up by a curb inlet, proposed by this report, located just South of the intersection of the Southeast Loop Road and Haventree Street (exact location to be determined at the time of design).

Runoff from Sub-basin 3 will flow Northeasterly to the Southeast Loop Road and thence to the asphalt drainage channel along the East side of South Circle Drive.

Runoff from both Sub-basins 1 and 2, along with Sub-basins 4, 5, 6, 7 and 8 will all be routed to the intersection of the Southeast Loop Road and Hancock Expressway. The existing 30" R.C.P. flowing into the most Westerly inlet at said intersection has a capacity of 48.5 c.f.s. The pipe flow determined from this report is 56.1 c.f.s. per 5-year accumulative flow calculations. This will result in 0.2 feet pressure flow in the pipe. From this point runoff will flow Easterly along Hancock Expressway through a proposed 36" R.C.P. to the existing deep sump inlet near the bridge at South Circle Drive, thence to the outfall at Fountain Creek.

DRAINAGE FACILITIES

Public - Reimbursable

6' D-10R Curb Inlet	1 Ea. @ \$2,500/Ea.	=	\$ 2,500.00
18" R.C.P.	20 L.F.@ \$ 27/L.F.	=	<u>\$ 540.00</u>
			\$ 3,040.00
	Plus 10% Engineering	=	\$ 304.00
	Plus 5% Contingency	=	<u>\$ 167.00</u>
	TOTAL	=	\$ 3,511.00

DRAINAGE AND BRIDGE FEES

Miscellaneous Drainage Basin:

1987 Drainage Fee:	1.17 Ac. @ \$3,078/Acre	=	\$ 3,601.26
1987 Bridge Fee:		=	\$ 0.00

The Drainage Report and Plan for Spring Creek Development Phase I indicates that the total drainage facilities cost estimate exceeds the total Miscellaneous Drainage Basin fees, therefore, the developer requests that the drainage fee for this site be credited to him for facilities constructed in the Miscellaneous Basin.

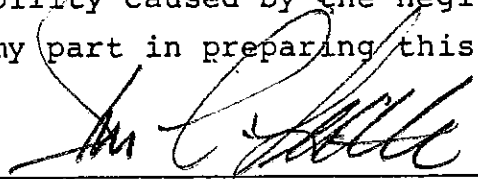
The developer will post a letter of credit for the construction of the storm drain facilities required for this site.

HAVENTREE STREET (A Portion of Spring Creek Development Phase I)

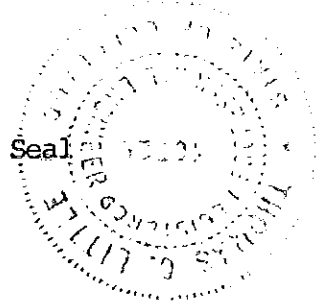
DRAINAGE REPORT STATEMENTS

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



Name



Developer's Statement:

The developer has read and will comply with all of the requirements specified in this drainage report.

THE SCHUCK CORPORATION

Business Name

By: 

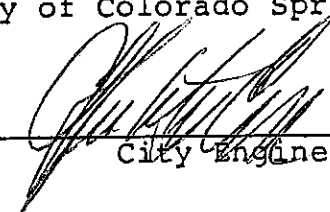
Title: Project Manager.

Address: 25 N. Cascade Avenue

Colorado Springs, CO 80903

City of Colorado Springs:

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


City Engineer

3/6/87
Date

Conditions:

APPENDIX



KLH ENGINEERING CONSULTANTS, INC.

ENGINEERING • SURVEYING • PLANNING • CONSTRUCTION MANAGEMENT
206-208 Sutton Lane • Colorado Springs, Colorado 80907 • (303) 594-4200
111 East Fifth Street • P.O. Box 234 • Pueblo, Colorado 81002 • (303) 544-6823

January 28, 1987
KLH # 85 585 13

City of Colorado Springs
Department of Public Works
Engineering Division
30 S. Nevada Avenue - Suite 403
Colorado Springs, CO 80903

Attention: Chris Smith.

Subject: Drainage Basin Determination
Spring Creek Development Phase I

Dear Chris:

The purpose of this letter is to document the conclusions of our meeting on January 22, 1987. At this meeting it was determined that the drainage basin separation line for Spring Creek Development Phase I should be as shown on the attached exhibit. This line is for separation of drainage fees and facility reimbursements, and does not necessarily dictate the outfall direction of storm drainage.

If you have any questions concerning this matter, please give me a call.

Sincerely,

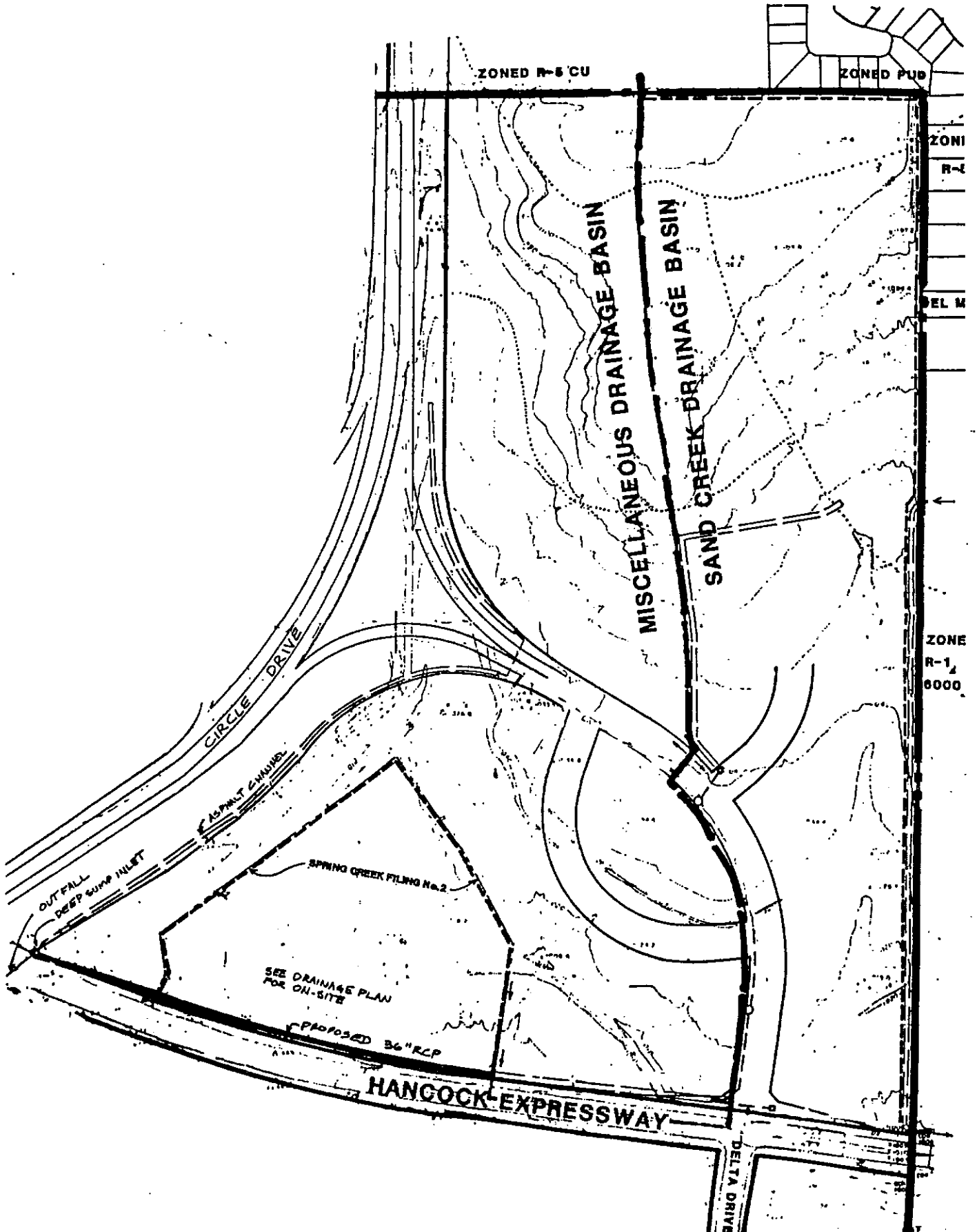
K L H ENGINEERING CONSULTANTS, INC.

Thomas A. McClernan, P.E.

bjm

Enc.

cc: Pat Hartmann, The Schuck Corp.



EXHIBIT

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASIN

HATREE- 1

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
2.9		COMMERCIAL / R&D	C	94	89.7	8433.6
.3		STREETS & WALKS	C	98	10.3	1007.5
3.2	.005				100.0	9441.1
						WEIGHTED CN = 94.4

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	306	13	.020			
STREET	447	7	.026			
	753	20	.046	1.53	1300	9.9 (5yr FLOW)
				2.88		18.8 (100yr FLOW)

BASIN

HATREE- 2

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
.6		COMMERCIAL / R&D	C	94	63.9	6008.2
.4		STREETS & WALKS	C	98	36.1	3536.1
1.0	.002				100.0	9544.3
						WEIGHTED CN = 95.4

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	30	1	.002			
STREET	791	13	.047			
	821	14	.049	1.62	1300	3.2 (5yr FLOW)
				2.99		5.9 (100yr FLOW)

BASIN

HATREE- 3

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
.2		COMMERCIAL / R&D	C	94	73.9	6947.8
.1		STREETS & WALKS	C	98	26.1	2556.5
.2	.000				100.0	9504.3
						WEIGHTED CN = 95.0

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	150	4	.013			
STREET	60	1	.007			
	210	5	.020	1.58	1300	.7 (5yr FLOW)
				2.94		1.4 (100yr FLOW)

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASIN

HATREE- 4

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
.1		COMMERCIAL / R&D	C	94	22.4	2110.2
.4		STREETS & WALKS	C	98	77.6	7600.0
.5	.001				100.0	9710.2
						WEIGHTED CN = 97.1

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	12	1	.001			
STREET	540	17	.043			
	552	17	.044	1.78	1300	1.8 (5yr FLOW)
				3.17		3.2 (100yr FLOW)

BASIN

HATREE- 5

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
20.8		BUS/PARK/RES	C	82	100.0	8247.0
20.8	.033				100.0	8247.0
						WEIGHTED CN = 82.5

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	1200	30	.104			
PIPE	550	29	.010			
	1750	59	.114	.74	1230	29.5 (5yr FLOW)
				1.82		72.7 (100yr FLOW)

BASIN

HATREE- 6

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
5.5		COMMERCIAL / R&D	C	94	100.0	9400.0
5.5	.009				100.0	9400.0
						WEIGHTED CN = 94.0

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	800	30	.070			
	800	30	.070	1.49	1300	16.6 (5yr FLOW)
				2.84		31.7 (100yr FLOW)

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASIN

HATREE- 7

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
2.9		COMM/ST/OPEN	C	90	100.0	9040.0
2.9	.005				100.0	9040.0

WEIGHTED CN = 90.4

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	450	10	.060			
	450	10	.060	1.21	1300	7.1 (5yr FLOW)
				2.48		14.6 (100yr FLOW)

BASIN

HATREE- 8

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
.3		COMMERCIAL / R&D	C	94	60.0	5640.0
.2		STREETS & WALKS	C	98	40.0	3920.0
.5	.001				100.0	9560.0

WEIGHTED CN = 95.6

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	30	1	.002			
STREET	340	6	.013			
	370	7	.015	1.63	1300	1.7 (5yr FLOW)
				3.00		3.0 (100yr FLOW)

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASINS

HATREE- 5 ,6

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
20.8		BUS/PARK/RES	C	82	79.1	6522.3
5.5		COMMERCIAL / R&D	C	94	20.9	1965.8
26.3	.041				100.0	8488.1
						WEIGHTED CN = 84.9

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	1200	30	.104			
PIPE	550	29	.010			
PIPE	435	14	.008			
	2185	73	.122	.86	1210	42.9 (5yr FLOW)
				2.01		99.8 (100yr FLOW)

BASINS

HATREE- 5 ,6 ,7

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
20.8		BUS/PARK/RES	C	82	71.2	5874.6
2.9		COMM/ST/OPEN	C	90	9.9	897.8
5.5		COMMERCIAL / R&D	C	94	18.8	1770.5
29.2	.046				100.0	8542.9
						WEIGHTED CN = 85.4

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	1200	30	.104			
PIPE	550	29	.010			
PIPE	435	14	.008			
PIPE	300	6	.006			
	2485	79	.128	.89	1200	48.9 (5yr FLOW)
				2.05		112.3 (100yr FLOW)

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASINS

HATREE- 1 ,2

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
3.5		COMMERCIAL / R&D	C	94	83.7	7870.8
.7		STREETS & WALKS	C	98	16.3	1594.3
4.2	.007				100.0	9465.1
						WEIGHTED CN = 94.7

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	30	1	.002			
STREET	791	13	.047			
	821	14	.049	1.55	1300	13.1 (5yr FLOW)
				2.90		24.6 (100yr FLOW)

BASINS

HATREE- 1 ,2 ,4

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
3.6		COMMERCIAL / R&D	C	94	77.3	7266.4
1.1		STREETS & WALKS	C	98	22.7	2224.4
4.7	.007				100.0	9490.8
						WEIGHTED CN = 94.9

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
STREET	791	13	.047			
SHEET	30	1	.002			
	821	14	.049	1.57	1300	14.9 (5yr FLOW)
				2.93		27.8 (100yr FLOW)

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASINS

HATREE- 1 ,2 ,4 ,5 ,6

ACREAGE	SQ. MI.	LAND USE	SOIL	CN	%	% x CN
20.8		BUS/PARK/RES	C	82	67.2	5538.8
9.1		COMMERCIAL / R&D	C	94	29.4	2765.1
1.1		STREETS & WALKS	C	98	3.4	335.4
31.0	.048				100.0	8639.3
						WEIGHTED CN = 86.4

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	1200	30	.104			
PIPE	985	43	.018			
	2185	73	.122	.95	1210	55.5 (5yr FLOW)
				2.13		124.8 (100yr FLOW)

RUNOFF CALCS FOR HAVENTREE ST. 12-18-86

BASINS

HATREE- 1 ,2 ,4 ,5 ,6 ,7 ,8

ACREAGE	SQ.MI.	LAND USE	SOIL	CN	%	% x CN
20.8		BUS/PARK/RES	C	82	60.5	4990.9
2.9		COMM/ST/OPEN	C	90	8.4	762.8
9.4		COMMERCIAL / R&D	C	94	27.4	2573.6
1.3		STREETS & WALKS	C	98	3.7	359.3
34.4	.054				100.0	8686.5
						WEIGHTED CN = 86.9

FLOW TYPE	L(ft)	H(ft)	Tc(hrs)	RUNOFF(in)	qp(CSM/in)	Q (cfs)
SHEET	30	1200	.104			
PIPE	49	1285	.024			
	79		.128	.98	1200	62.9 (5yr FLOW)
				2.17		139.9 (100yr FLOW)