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“STEPHENS HILLSIDE FARM”

Preliminary Technical Information Report

December 2017

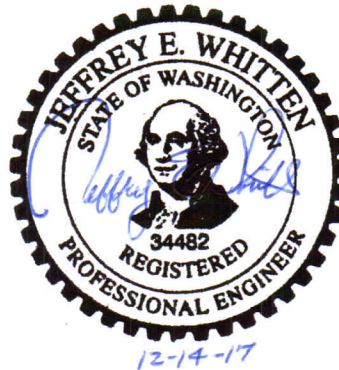


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VICINITY MAPS

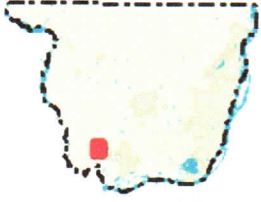
Vicinity Map

Soils Map





1955 Aerial Photo

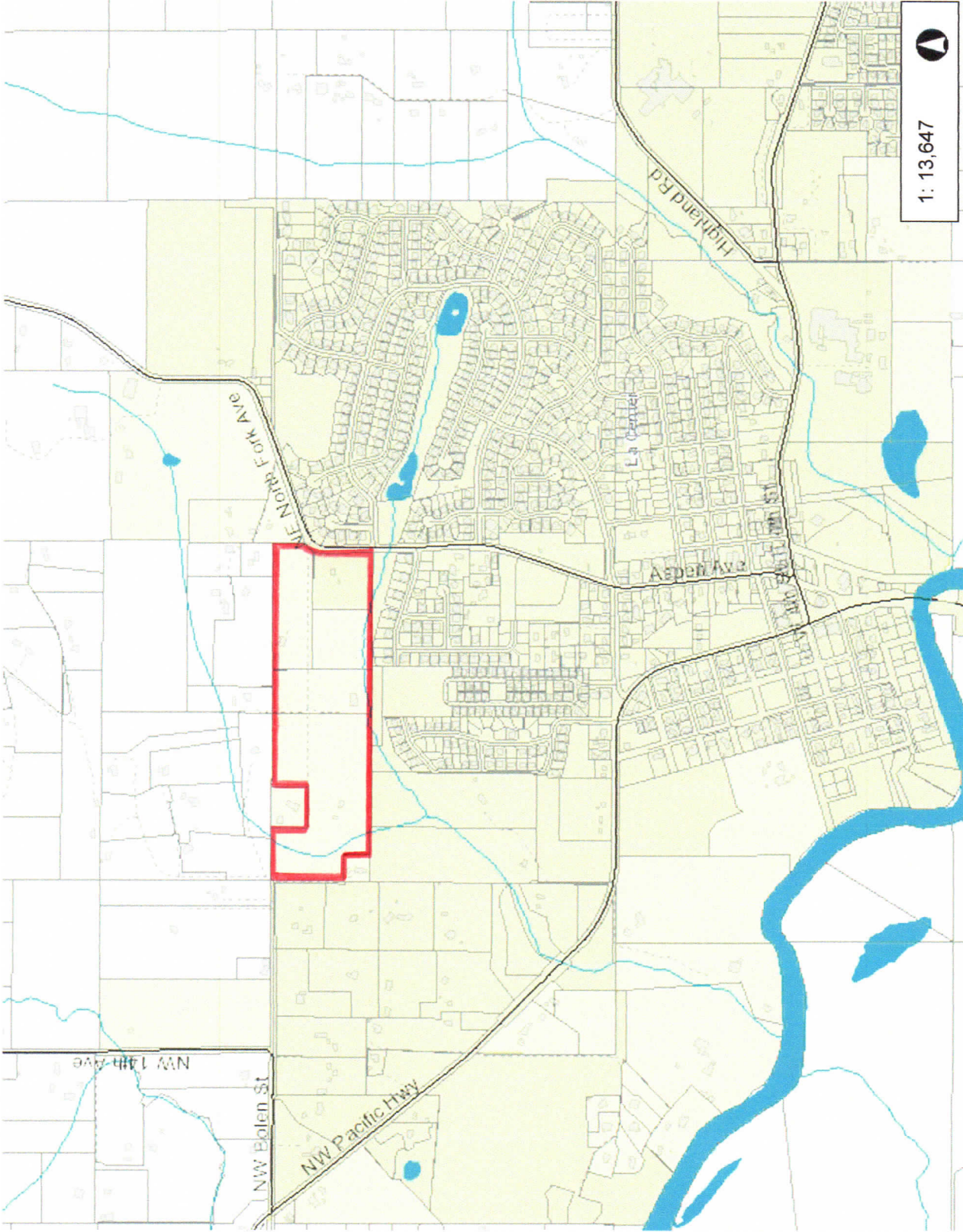


Vicinity Map



Legend

-  Building Footprints
-  Taxlots
-  Cities Boundaries
-  Urban Growth Boundaries



1: 13,647

2,274.5 Feet

1,137.27

0

2,274.5

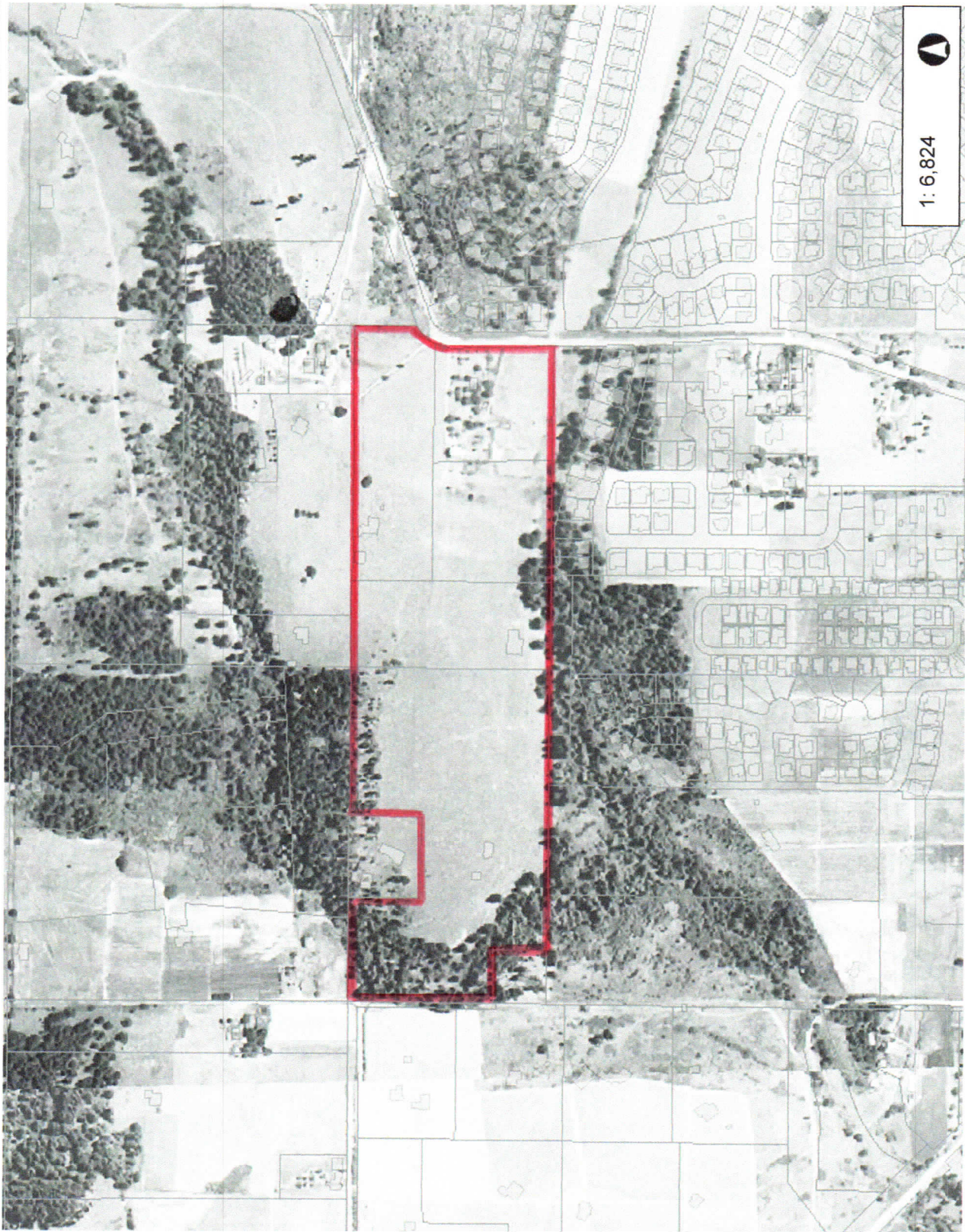
This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

WGS_1984_Web_Mercator_Auxiliary_Sphere
 Clark County, WA. GIS - <http://gis.clark.wa.gov>

Notes:



1955 Aerial Photo



1: 6,824

1,137.3 Feet

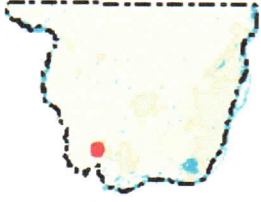
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1,137.3

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - <http://gis.clark.wa.gov>

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Legend

- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

Notes:

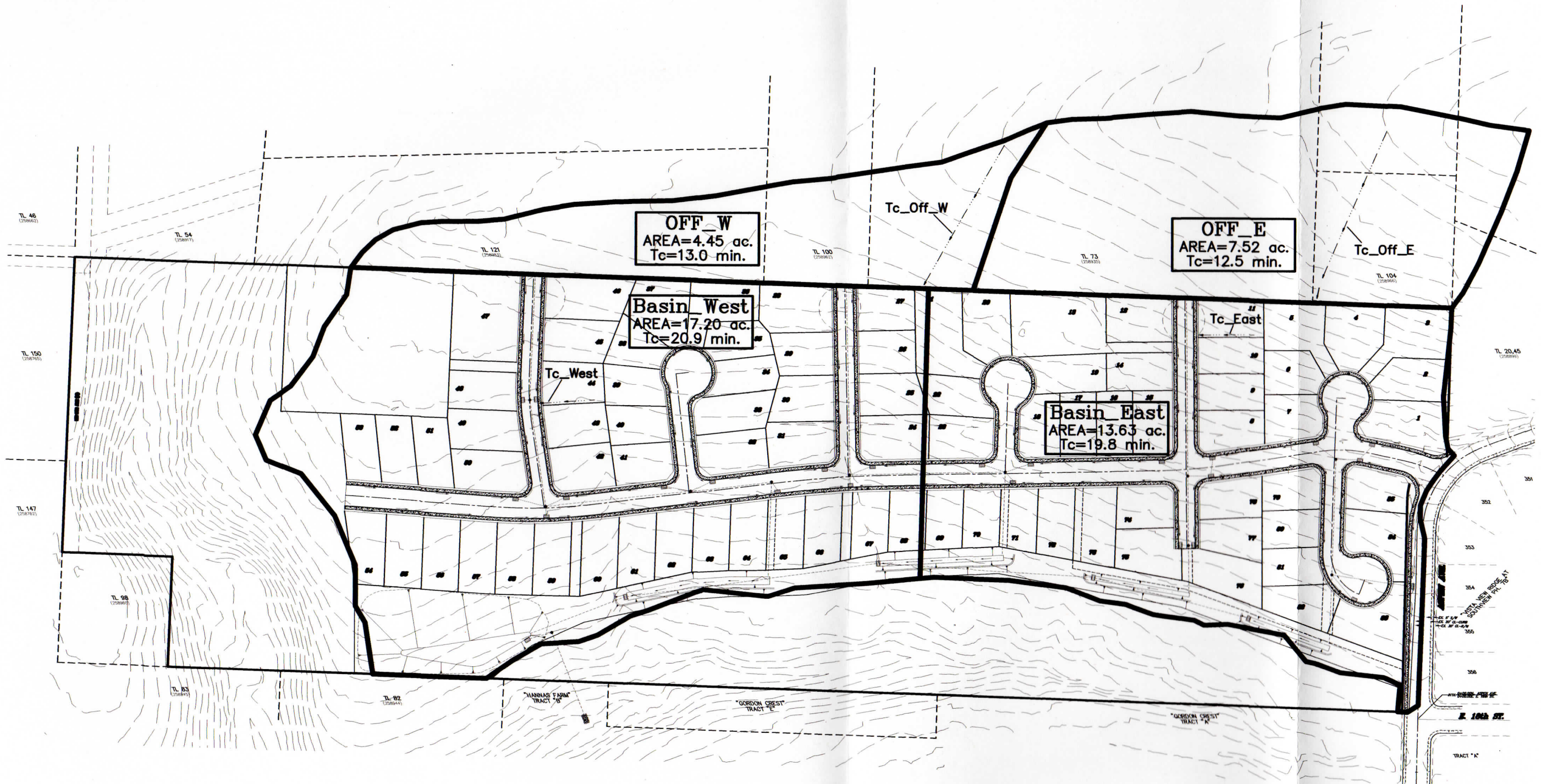
DEVELOPMENT PLAN

Drainage Basins

Flow Routes

"STEPHENS HILLSIDE FARM"

DEVELOPED DRAINAGE BASINS



SECTION A - PROJECT OVERVIEW

The project property consists of approximately 42 acres and lies west of Aspen Avenue just north of E. 18th Street. Aspen Avenue serves as the site's eastern boundary. The project site is bordered on the north by large undeveloped residential parcels. A private road known as N.W. 9th Avenue runs along the western boundary of the property. To the south of the project property are two large undeveloped parcels and tracts associated with the "Hanna's Farm" and "Gordon Crest" development projects. The majority of the property drains in a southerly manner towards a westward running stream along the south property boundary. The far western portion of the property drains westward to another stream that is running southward along the western property boundary. These two streams converge approximately 450' south of the property boundary. The entire developable site area is primarily in a field/pasture condition. The stream corridors mentioned above contain much vegetation and trees. Because of the stream corridors and associated buffer, the development site area is approximately 25 acres. There are very few trees or areas of large vegetation within the developable portion of the property.

An onsite storm water detention facility along with a series of biofiltration swales are proposed to treat and detain the stormwater runoff generated from the majority of the project site as well as the majority of any future development of parcel 258906000 that lies at the northwest corner of the development site. The proposed stormwater detention facility is preliminarily located at the southwest corner of the development. This facility will contain a live detention pond. A series of biofiltration swales are proposed to be located in the stream buffer area along the southern boundary of the development. Stormwater runoff from the project site is proposed to travel through a biofiltration swale prior to entering the detention facility. After treatment and detention, the stormwater runoff is proposed to be released to the existing stream along the southern property boundary.

In summary, the proposed onsite storm water facilities are to provide treatment and detention for the runoff generated from the development site and portions of future development that may occur nearby.

SECTION B – APPROVAL CONDITIONS SUMMARY

Not applicable for this preliminary report as no conditions are issued at this time.

SECTION C – DOWNSTREAM ANALYSIS

A downstream analysis is not warranted as there are no known obstructions downstream of the project site. The stormwater runoff is to be released into a free flowing stream that lies within a steep forested ravine.

SECTION D – QUANTITY CONTROL ANALYSIS & DESIGN

In computing the runoff volume and discharges from the site, the Santa Barbara Urban Hydrograph computer program used by the King County Public Works Dept. was utilized. In using this program, some assumptions had to be made regarding the particular runoff curve numbers to use. Because the hydrological soil groups present at the site are a mix of group “B” and “C” soils, pervious curve numbers ranging from 79 to 85 were determined to exist on the site. Pervious curve numbers from 81 to 82 have been used to represent the lawns, landscaped areas, and other open areas in the developed state. A curve number of 98 is used for the impervious surfaces which consist of the streets, sidewalks, driveways, and roofs. These curve numbers were obtained from Table III-1.3 of the Stormwater Management Manual for the Puget Sound Basin. The amounts of pervious and impervious acreage existing and predicted for the site are shown in **Tables 1 & 2.**

TABLE 1:

EXISTING AREA QUANTITIES (acres)							
Drainage Basin:	Total Area:	Streets & Sidewalks:	Driveways:	Roofs:	Contrib. Impervious Area: (Roofs incl.):	Contrib. Impervious Area: (no Roofs):	Contrib. Pervious Area:
Basin A	0.94	0.20	0.01	0.00	0.21	0.21	0.73
Basin B	5.13	0.00	0.16	0.04	0.20	0.16	4.93
Basin C	23.0	0.00	1.42	0.42	1.84	1.42	21.2
Basin D	11.54	0.00	0.20	0.08	0.28	0.20	11.26
Basin E	2.21	0.00	0.25	0.20	0.45	0.25	1.76
TOTALS:	6.07				TOTALS: 0.41	2.24	39.84

TABLE 2:

DEVELOPED AREA QUANTITIES (acres)							
Drainage Basin:	Total Area:	Streets & Sidewalks:	Driveways:	Roofs:	Contrib. Impervious Area: (Roofs incl.):	Contrib. Impervious Area: (no Roofs):	Contrib. Pervious Area:
Basin West	17.20	2.75	0.69	3.30	6.74	3.44	10.46
Basin East	13.63	2.85	0.53	2.53	5.91	3.38	7.72
Basin Off_W	4.45	0.00	0.06	0.12	0.18	0.06	4.27
Basin Off_E	7.52	0.00	0.53	0.24	0.77	0.53	6.75
TOTALS:	42.80				TOTALS: 13.60	7.41	29.20

Basin East roof area includes 0.23 ac. pond surface area.

Basin West roof area includes 0.32 ac. pond surface area.

The actual computer modeled runoff calculations are presented in appendix I. In **Tables 3 & 4**, the predicted and existing peak discharges from the project are tabulated by basin. The values presented in these tables have been obtained with the Santa Barbara Urban Hydrograph computer program by inputting those values listed in **Tables 1 & 2**.

TABLE 3: Developed Runoff Volumes/Discharge

DEVELOPED RUNOFF VOLUMES/DISCHARGE										
Drainage Basin	66% 2-Yr, 24-hr. storm (6 month storm)		2 yr., 24 hr. storm		10 yr., 24 hr. storm		25 yr., 24 hr. storm		100 yr., 24 hr. storm	
	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):
Basin West	2.10	42,700	4.15	78,300	7.23	130,500	8.87	158,000	12.27	214,600
Basin East	1.90	36,600	3.64	66,070	6.20	108,600	7.54	130,700	10.32	176,300
Basin Off_W	0.11	4,760	0.55	11,750	1.34	23,200	1.78	29,600	2.73	43,000
Basin Off_E	0.44	11,130	1.32	24,400	2.77	45,300	3.57	56,600	5.25	80,300
TOTALS:	4.55	95,190	9.66	180,520	17.54	307,600	21.76	374,900	30.57	514,200

TABLE 4: Existing Runoff Volumes/Discharge

EXISTING RUNOFF VOLUMES/DISCHARGE								
Drainage Basin	2-Yr, 24-hr. storm		10 yr., 24 hr. storm		25 yr., 24 hr. storm		100 yr., 24 hr. storm	
	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):
Basin A	0.31	4,850	0.46	7,100	0.57	8,600	0.79	11,700
Basin B	0.78	15,200	1.75	29,100	2.28	36,700	3.42	52,700
Basin C	2.86	65,300	6.61	125,400	8.72	158,500	13.23	228,500
Basin D	1.26	31,400	3.05	61,700	4.06	78,400	6.23	113,400
Basin E	0.50	9,200	0.93	15,900	1.16	19,400	1.63	26,700
TOTALS:	5.71	125,950	12.80	239,200	16.79	301,600	25.30	433,000

The detention facility proposed for the development consists of a proposed surface pond that will store live storage volumes to a depth of approximately 4 feet. The hydrographs for the various design storms for the site have been added together and routed through the proposed facility (see Appendix II). The results are shown in **Table 5**. The values shown in **Table 5** represent our final design values after the volume correction factor has been applied. The volume correction factor is based on the sites developed impervious cover and is calculated in Appendix II for the detention facility.

TABLE 5: PROPOSED DETENTION FACILITY PERFORMANCE

<u>Storm Event:</u>	<u>Release Rate:</u>	<u>Allowable Release Rate:</u>	<u>Peak Storage:</u>	<u>Peak Stage:</u>	<u>% of allowable release rate:</u>
2 yr., 24 hr.	5.18 cfs	5.71 cfs	14,770 ft ³	211.70'	91%
10 yr., 24 hr.	11.94 cfs	12.80 cfs	26,220 ft ³	212.80'	93%
25 yr., 24 hr.	14.31 cfs	16.79 cfs	33,080 ft ³	213.40'	85%
100 yr., 24 hr.	23.98 cfs	25.30 cfs	41,300 ft ³	214.10'	95%

Beginning stage elevation=210.0'

The stormwater facility locations and elevations are readily seen on the preliminary stormwater plan. All detailed information regarding the outlet structure and construction of the facility will be presented on the final engineering drawings.

SECTION E – CONVEYANCE SYSTEMS ANALYSIS & DESIGN

The stormwater conveyance system proposed for the project consists primarily of a series of inlets and storm piping that delivers the site stormwater runoff to the stormwater management facilities along the southern boundary of the development.

The capacity of each pipe will be analyzed during final design using Manning’s Equation for pipe flow with a Manning’s roughness coefficient of 0.012. Because of the project topography, there will be much slope within the storm conveyance system. Pipe sizes are expected to range from 12” to 18” in diameter.

SECTION F – WATER QUALITY DESIGN

A series of biofiltration swales have been proposed to provide necessary treatment for the stormwater runoff from the developed project site. Four biofiltration swales are preliminarily proposed to lie along the southern edge of the project site. Each of the swales have been preliminarily designed to provide a minimum of 9 minutes residence time during the peak flow of the treatment storm event defined as the 6-month storm event. Each of the biofiltration swales lies upstream of the detention pond. The preliminary design and layout of each proposed biofiltration swale can be readily seen on the preliminary stormwater plan. The biofiltration design criteria has been presented in the technical appendix.

The treatment requirements of the City of La Center Stormwater Ordinance have been met for all runoff generated from the site.

SECTION G- SOILS EVALUATION

The Soil Conservation Service maps the majority of soil on the site as Hillsboro silt loam (HoC, HoD, HoG) of hydrological soil group “B” and Gee silt loam (GeB) of hydrological soil group “C”. There are also areas of Hesson gravelly clay loam (HgD) of hydrologic soil group “C”. Due to the silty characteristics of all of the onsite soils, infiltration is not being proposed for this site. A geotechnical site investigation has been performed by Columbia West Engineering, Inc. Their study confirms the presence of the soils described above.

SECTION H - SPECIAL REPORTS AND STUDIES

A Geotechnical Site Investigation has been performed by Columbia West Engineering, Inc. A Critical Areas Report has been prepared by Cascadia Ecological Services, Inc.

SECTION I - OTHER PERMITS

An NPDES Permit from the Washington State Department of Ecology is required for this project and shall be obtained prior to construction. In conjunction with the NPDES permit, a Stormwater Pollution Prevention Plan (SWPPP) will also be prepared.

SECTION J – GROUNDWATER MONITORING

Not applicable

SECTION K – MAINTENANCE & OPERATIONS MANUAL

The city of La Center shall maintain the proposed stormwater facilities. At a minimum, the following maintenance items need to be performed periodically to insure proper operation of the stormwater facilities.

- Cleaning of debris/litter that may accumulate in or around stormwater facilities.
- Inspection of outfall structure (orifice/riser) to prevent plugging or clogging.
- Inspection of fences encompassing stormwater facilities to insure effectiveness.
- Removal of accumulated sediment in detention facility, biofiltration swales, & conveyance structures.

SECTION L - TECHNICAL APPENDIX

Appendix I

Runoff Calculations
Existing Conditions Basin Map
Developed Conditions Basin Map

Appendix II

Detention Calculations

Appendix III

Water Quality Calculations

Appendix I

Stormwater Runoff Calculations
Existing Conditions Basin Map
Developed Conditions Basin Map

DEVELOPED RUNOFF VOLUMES/DISCHARGE										
Drainage Basin	66% 2-Yr, 24-hr. storm (6 month storm)		2 yr., 24 hr. storm		10 yr., 24 hr. storm		25 yr., 24 hr. storm		100 yr., 24 hr. storm	
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	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):	Peak Discharge (cfs):	Total Volume (ft3):
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Basin C	2.86	65,300	6.61	125,400	8.72	158,500	13.23	228,500
Basin D	1.26	31,400	3.05	61,700	4.06	78,400	6.23	113,400
Basin E	0.50	9,200	0.93	15,900	1.16	19,400	1.63	26,700
TOTALS:	5.71	125,950	12.80	239,200	16.79	301,600	25.30	433,000

DEVELOPED AREA QUANTITIES (acres)							
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Basin East roof area includes 0.23 ac. pond surface area.

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Basin B	5.13	0.00	0.16	0.04	0.20	0.16	4.93
Basin C	23.0	0.00	1.42	0.42	1.84	1.42	21.2
Basin D	11.54	0.00	0.20	0.08	0.28	0.20	11.26
Basin E	2.21	0.00	0.25	0.20	0.45	0.25	1.76
TOTALS:	42.82				TOTALS: 2.98	2.24	39.84

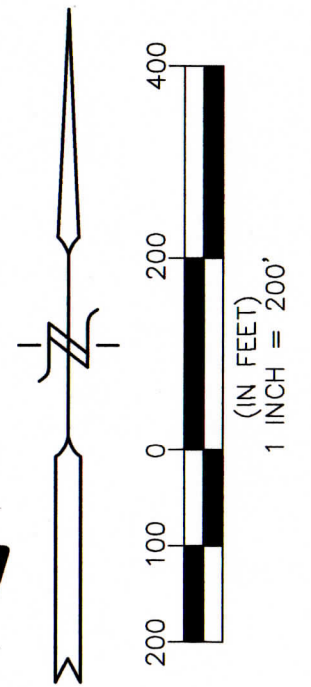
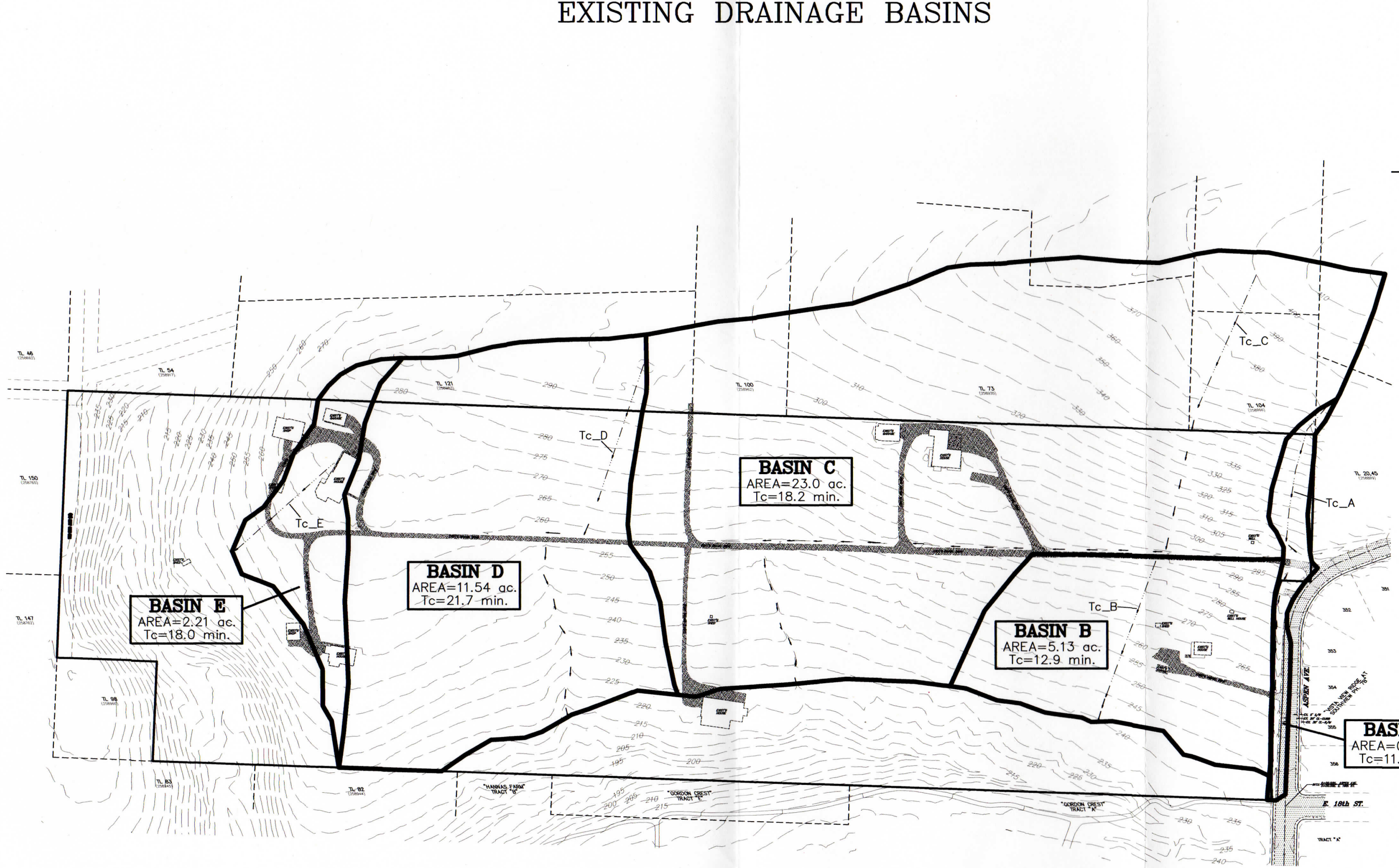
DEVELOPED TIME OF CONCENTRATION CALCULATIONS											
Drainage Basin:	Sheet Flow				Shallow Conc./Pipe Flow			Total Time of Conc. (min.)	Drainage Basin:		
	2 yr., 24 hr. rainfall total (inches) = 2.25										
	Flow Length (ft.):	Average Slope (ft./ft.):	Rough. Coeff. (n):	Overland Flow Time (min.):	Flow Length (ft.):	Average Slope (ft./ft.):	Shallow Conc. Flow Time (min.):				
Basin West	100	0.015	0.240	18.7	250	0.150	2.2	20.9	Basin West		
Basin East	100	0.015	0.240	18.7	200	0.150	1.1	19.8	Basin East		
Basin Off_W	300	0.130	0.150	13.0	0		0.0	13.0	Basin Off_W		
Basin Off_E	300	0.150	0.150	12.3	50	0.150	0.2	12.5	Basin Off_E		

EXISTING TIME OF CONCENTRATION CALCULATIONS											
Drainage Basin:	Sheet Flow				Shallow Conc./Channel Flow			Total Time of Conc. (min.)	Drainage Basin:		
	2 yr., 24 hr. rainfall total (inches) = 2.25										
	Flow Length (ft.):	Average Slope (ft./ft.):	Rough. Coeff. (n):	Overland Flow Time (min.):	Flow Length (ft.):	Average Slope (ft./ft.):	Shallow Conc. and Channel Flow Time (min.):				
Basin A	300	0.240	0.150	10.2	580	0.110	1.7	11.9	Basin A		
Basin B	300	0.140	0.150	12.6	50	0.080	0.3	12.9	Basin B		
Basin C	300	0.150	0.150	12.3	1,460	0.085	5.9	18.2	Basin C		
Basin D	300	0.110	0.230	19.6	550	0.100	2.1	21.7	Basin D		
Basin E	280	0.090	0.200	18.0	0		0.0	18.0	Basin E		

Existing Condition

"STEPHENS HILLSIDE FARM"

EXISTING DRAINAGE BASINS



EXISTING BASIN A (Actual)

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 .73 85 .21 98 11.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.9	.7	85.0	.2	98.0	11.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.31	7.83		4848		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 .73 85 .21 98 11.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.9	.7	85.0	.2	98.0	11.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.46	7.83		7063		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 .73 85 .21 98 11.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.9	.7	85.0	.2	98.0	11.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.57	7.83		8595		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 .73 85 .21 98 11.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.9	.7	85.0	.2	98.0	11.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.79	7.83		11743		

EXISTING BASIN B (Actual)

 ***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

 ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 4.93 81 .20 98 12.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
5.1	4.9	81.0	.2	98.0	12.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.78	7.83		15193		

 ***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

 ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 4.93 81 .20 98 12.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
5.1	4.9	81.0	.2	98.0	12.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.75	7.83		29137		

 ***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

 ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 4.93 81 .20 98 12.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
5.1	4.9	81.0	.2	98.0	12.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
2.28	7.83		36730		

 ***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

 ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 4.93 81 .20 98 12.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
5.1	4.9	81.0	.2	98.0	12.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
3.42	7.83		52690		

EXISTING BASIN C (Actual)

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 21.2 79 1.84 98 18.2

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
23.0	21.2	79.0	1.8	98.0	18.2
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
2.86	7.83		65261		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 21.2 79 1.84 98 18.2

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
23.0	21.2	79.0	1.8	98.0	18.2
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
6.61	7.83		125424		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 21.2 79 1.84 98 18.2

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
23.0	21.2	79.0	1.8	98.0	18.2
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
8.72	7.83		158523		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 21.2 79 1.84 98 18.2

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
23.0	21.2	79.0	1.8	98.0	18.2
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
13.23	7.83		228479		

EXISTING BASIN D (Actual)

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 2-YEAR 24-HOUR STORM **** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 11.26 80 .28 98 21.7

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
11.5	11.3	80.0	.3	98.0	21.7
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.26	7.83		31426		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 10-YEAR 24-HOUR STORM **** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 11.26 80 .28 98 21.7

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
11.5	11.3	80.0	.3	98.0	21.7
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
3.05	7.83		61720		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 25-YEAR 24-HOUR STORM **** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 11.26 80 .28 98 21.7

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
11.5	11.3	80.0	.3	98.0	21.7
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
4.06	7.83		78385		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 100-YEAR 24-HOUR STORM **** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 11.26 80 .28 98 21.7

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
11.5	11.3	80.0	.3	98.0	21.7
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
6.23	7.83		113378		

EXISTING BASIN E (Actual)

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 1.76 84 .45 98 18

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.8	84.0	.4	98.0	18.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.50	7.83		9184		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 1.76 84 .45 98 18

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.8	84.0	.4	98.0	18.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.93	7.83		15892		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 1.76 84 .45 98 18

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.8	84.0	.4	98.0	18.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.16	7.83		19431		

***** S.C.S. TYPE-1A DISTRIBUTION *****
 ***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
 1.76 84 .45 98 18

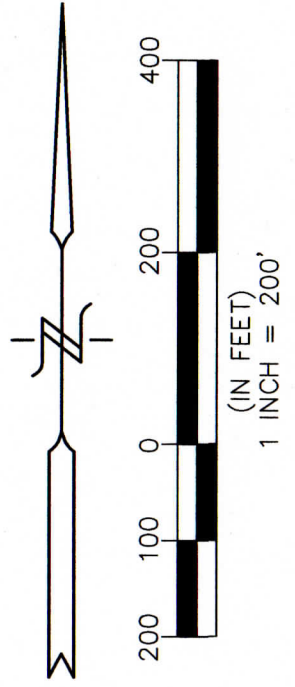
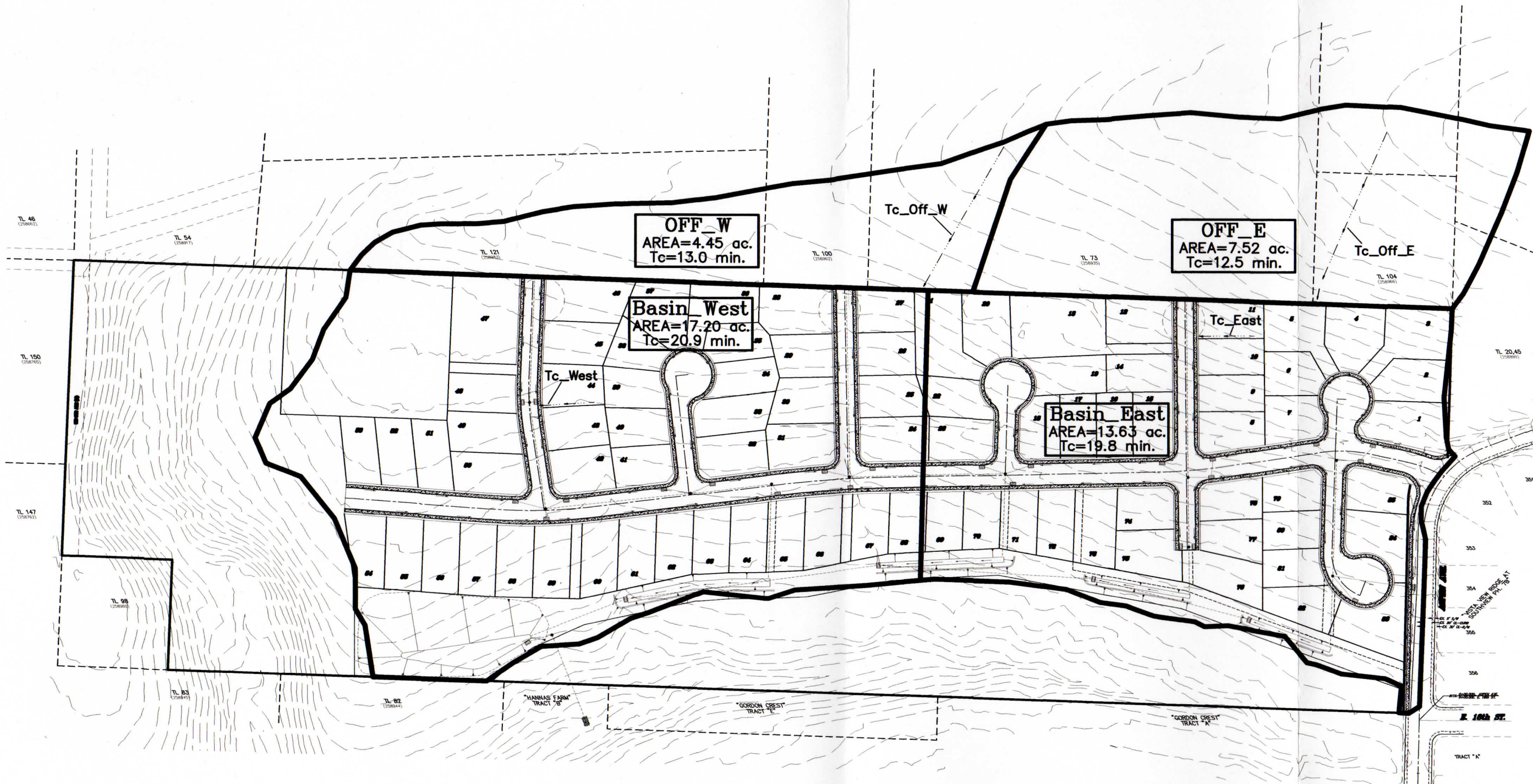
DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.8	84.0	.4	98.0	18.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.63	7.83		26730		

Developed Condition

"STEPHENS HILLSIDE FARM"

DEVELOPED DRAINAGE BASINS



Basin West (Developed)

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 6-MONTH 24-HOUR STORM ***** 1.49" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
10.46 81 6.74 98 20.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
17.2	10.5	81.0	6.7	98.0	20.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
2.10	7.83		42708		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:WEST_BIO

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
10.46 81 6.74 98 20.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
17.2	10.5	81.0	6.7	98.0	20.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
4.15	7.83		78307		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:WEST_2

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
10.46 81 6.74 98 20.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
17.2	10.5	81.0	6.7	98.0	20.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
7.23	7.83		130541		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:WEST_10

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
10.46 81 6.74 98 20.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
17.2	10.5	81.0	6.7	98.0	20.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
8.87	7.83		157998		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:WEST_25

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
10.46 81 6.74 98 20.9

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
17.2	10.5	81.0	6.7	98.0	20.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
12.27	7.83		214574		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:WEST_100

Basin Off w (Developed)

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 6-MONTH 24-HOUR STORM **** 1.49" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
4.27 79 .18 98 13

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS	IMPERVIOUS	TC(MINUTES)
	A CN	A CN	
4.4	4.3 79.0	.2 98.0	13.0
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
.11	7.83	4761	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_W_BIO

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 2-YEAR 24-HOUR STORM **** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
4.27 79 .18 98 13

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS	IMPERVIOUS	TC(MINUTES)
	A CN	A CN	
4.4	4.3 79.0	.2 98.0	13.0
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
.55	7.83	11754	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_W_2

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 10-YEAR 24-HOUR STORM **** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
4.27 79 .18 98 13

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS	IMPERVIOUS	TC(MINUTES)
	A CN	A CN	
4.4	4.3 79.0	.2 98.0	13.0
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
1.34	7.83	23233	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_W_10

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
4.27 79 .18 98 13

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS A CN	IMPERVIOUS A CN	TC(MINUTES)
4.4	4.3 79.0	.2 98.0	13.0
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
1.78	7.83	29567	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_W_25

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
4.27 79 .18 98 13

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS A CN	IMPERVIOUS A CN	TC(MINUTES)
4.4	4.3 79.0	.2 98.0	13.0
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
2.73	7.83	42991	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_W_00

Basin East (Developed)

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 6-MONTH 24-HOUR STORM ***** 1.49" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
7.72 82 5.91 98 19.8

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
13.6	7.7	82.0	5.9	98.0	19.8
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.90	7.83		36635		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:EAST_BIO

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
7.72 82 5.91 98 19.8

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
13.6	7.7	82.0	5.9	98.0	19.8
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
3.64	7.83		66068		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:EAST_2

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
7.72 82 5.91 98 19.8

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
13.6	7.7	82.0	5.9	98.0	19.8
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
6.20	7.83		108560		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:EAST_10

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
7.72 82 5.91 98 19.8

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS A CN	IMPERVIOUS A CN	TC(MINUTES)
13.6	7.7 82.0	5.9 98.0	19.8
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
7.54	7.83	130743	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:EAST_25

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
7.72 82 5.91 98 19.8

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS A CN	IMPERVIOUS A CN	TC(MINUTES)
13.6	7.7 82.0	5.9 98.0	19.8
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
10.32	7.83	176260	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:EAST_100

Basin Off E (Developed)

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 6-MONTH 24-HOUR STORM ***** 1.49" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
6.75 81 .77 98 12.5

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS	IMPERVIOUS	TC(MINUTES)
	A	A	
	CN	CN	
7.5	6.8	.8	12.5
	81.0	98.0	
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
.44	7.83	11126	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_E_BIO

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 2-YEAR 24-HOUR STORM ***** 2.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
6.75 81 .77 98 12.5

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS	IMPERVIOUS	TC(MINUTES)
	A	A	
	CN	CN	
7.5	6.8	.8	12.5
	81.0	98.0	
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
1.32	7.83	24444	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_E_2

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 10-YEAR 24-HOUR STORM ***** 3.25" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
6.75 81 .77 98 12.5

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS	IMPERVIOUS	TC(MINUTES)
	A	A	
	CN	CN	
7.5	6.8	.8	12.5
	81.0	98.0	
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
2.77	7.83	45328	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_E_10

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 25-YEAR 24-HOUR STORM ***** 3.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
6.75 81 .77 98 12.5

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS A CN	IMPERVIOUS A CN	TC(MINUTES)
7.5	6.8 81.0	.8 98.0	12.5
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
3.57	7.83	56623	

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_E_25

***** S.C.S. TYPE-1A DISTRIBUTION *****
***** 100-YEAR 24-HOUR STORM ***** 4.75" TOTAL PRECIP. *****

ENTER: A(PERV), CN(PERV), A(IMPERV), CN(IMPERV), TC FOR BASIN NO. 1
6.75 81 .77 98 12.5

DATA PRINT-OUT:

AREA(ACRES)	PERVIOUS A CN	IMPERVIOUS A CN	TC(MINUTES)
7.5	6.8 81.0	.8 98.0	12.5
PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)	
5.25	7.83	80272	

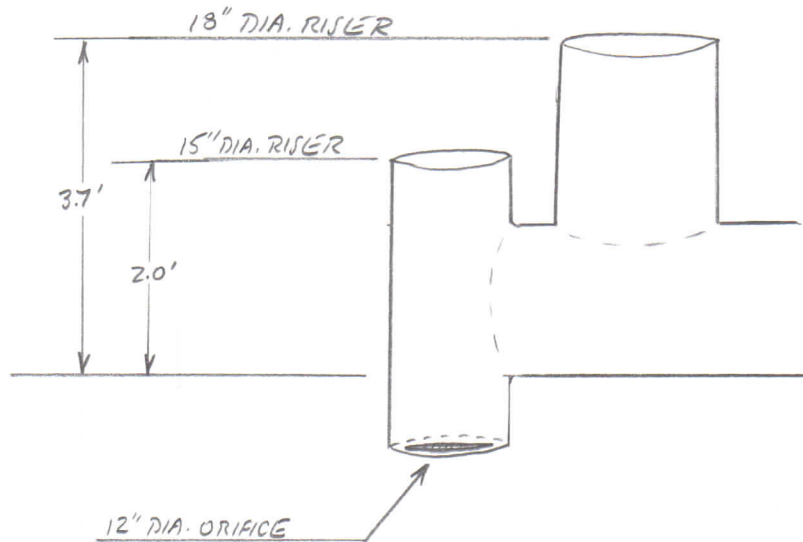
ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:OFF_E_00

Appendix II
Detention Calculations

INITIAL STORM DETENTION ROUTING DATA
(PRIOR TO VOLUME CORRECTION FACTOR)

N	ELEV	STAGE (FT.):	12"	15"/18"DIA.	STORAGE (CU.FT.):	PERC-AREA
			DIA. ORIF. ADISC (CFS):	RISER BDISC (CFS):		
1	.00	.00	.00	.00	.0	.0
2	.20	.20	1.78	.00	1200.0	.0
3	.40	.40	2.51	.00	2450.0	.0
4	.60	.60	3.08	.00	3750.0	.0
5	.80	.80	3.55	.00	5100.0	.0
6	1.00	1.00	3.97	.00	6450.0	.0
7	1.20	1.20	4.35	.00	7900.0	.0
8	1.40	1.40	4.70	.00	9350.0	.0
9	1.60	1.60	5.02	.00	10850.0	.0
10	1.80	1.80	5.33	.00	12350.0	.0
11	2.00	2.00	5.62	.00	13950.0	.0
12	2.20	2.20	5.89	1.09	15550.0	.0
13	2.40	2.40	6.15	3.08	17200.0	.0
14	2.60	2.60	6.40	4.58	18900.0	.0
15	2.80	2.80	6.64	5.29	20600.0	.0
16	3.00	3.00	6.88	5.91	22400.0	.0
17	3.20	3.20	7.10	6.47	24200.0	.0
18	3.40	3.40	7.32	6.99	26050.0	.0
19	3.60	3.60	7.53	7.47	27900.0	.0
20	3.80	3.80	7.74	13.09	29850.0	.0
21	4.00	4.00	7.94	15.48	31800.0	.0
22	4.20	4.20	8.14	16.83	33800.0	.0
23	4.40	4.40	8.33	18.07	35850.0	.0
24	4.60	4.60	8.52	19.23	37950.0	.0
25	4.80	4.80	8.70	20.31	40050.0	.0
26	5.00	5.00	8.88	21.34	42250.0	.0

INITIAL STAGE ELEV = 210.0'
 AVERAGE PERC-RATE = .0
 FILENAME: SHF_DAT1



2-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
(BEFORE APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA

SHF_DAT1

DISPLAY ROUTING DATA (Y or N)?

N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:

SHF_2

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)		OUTFLOW-VOL (CU-FT)	
	A	B	A	B
9.66	5.48	.00	1208229	169065

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.50	1.90

REQUIRED STORAGE: 13180 CU-FT

$Q_p \approx 5.48 \text{ CFS}$
ALLOWABLE $Q_p \approx 5.71 \text{ CFS}$
 $\Rightarrow \text{O.K.}$

10-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
(BEFORE APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA

SHF_DAT1

DISPLAY ROUTING DATA (Y or N)?

N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:

SHF_10

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)		OUTFLOW-VOL (CU-FT)	
	A	B	A	B
17.54	6.87	5.89	1493180	191807

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.17	2.99

REQUIRED STORAGE: 22340 CU-FT

$Q_p \approx 12.76 \text{ CFS}$
ALLOWABLE $Q_p \approx 12.80 \text{ CFS}$
 $\Rightarrow \text{O.K.}$

25-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
(BEFORE APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA

SHF_DAT1

DISPLAY ROUTING DATA (Y or N)?

N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:

SHF_25

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)		OUTFLOW-VOL(CU-FT)	
21.76	A 7.56	B 8.33	A 1824987	B 234892

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.17	3.63

REQUIRED STORAGE: 28190 CU-FT

$Q_p \approx 15.89 \text{ CFS}$
ALLOWABLE $Q_p \approx 16.79 \text{ CFS}$
 $\Rightarrow 0.1K.$

100-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
(BEFORE APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA

SHF_DAT1

DISPLAY ROUTING DATA (Y or N)?

N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:

SHF_100

INFLOW/OUTFLOW ANALYSIS:

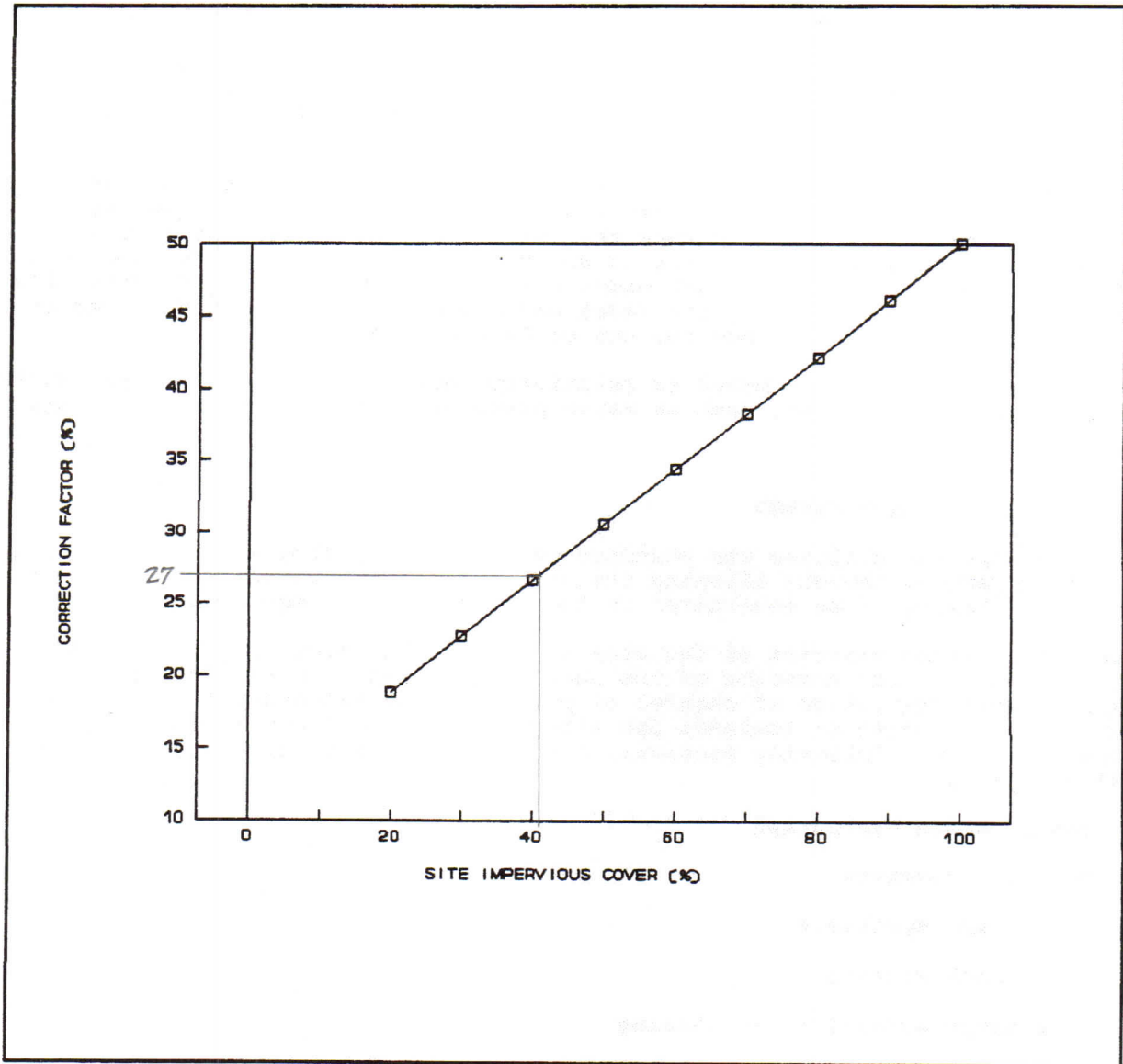
PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)		OUTFLOW-VOL(CU-FT)	
30.57	A 8.16	B 16.93	A 2230700	B 343319

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.00	4.22

REQUIRED STORAGE: 33960 CU-FT

$Q_p \approx 25.09 \text{ CFS}$
ALLOWABLE $Q_p \approx 25.30 \text{ CFS}$
 $\Rightarrow 0.1K.$

FIGURE III-1.1
Volume Correction Factor to be Applied to
Streambank Erosion Control BMPs
Based on Site Impervious Cover

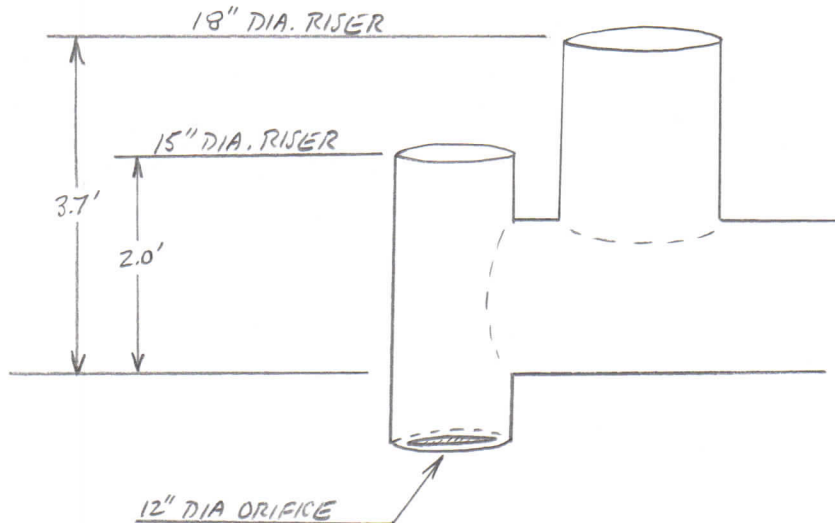


DEVELOPED SITE (BASIN WEST & BASIN EAST) TO BECOME APPROX. 41% IMPERVIOUS
⇒ VOLUME CORRECTION FACTOR = 27%

FINAL STORM DETENTION ROUTING DATA
(AFTER VOLUME CORRECTION FACTOR APPLIED)

N	ELEV	STAGE (FT.):	12"	15"/18"DIA.	STORAGE (CU. FT.):	PERC-AREA
			DIA. ORIF. ADISC (CFS):	RISER BDISC (CFS):		
1	.00	.00	.00	.00	.0	.0
2	.20	.20	1.78	.00	1550.0	.0
3	.40	.40	2.51	.00	3150.0	.0
4	.60	.60	3.08	.00	4800.0	.0
5	.80	.80	3.55	.00	6500.0	.0
6	1.00	1.00	3.97	.00	8200.0	.0
7	1.20	1.20	4.35	.00	10050.0	.0
8	1.40	1.40	4.70	.00	11900.0	.0
9	1.60	1.60	5.02	.00	13800.0	.0
10	1.80	1.80	5.33	.00	15700.0	.0
11	2.00	2.00	5.62	.00	17750.0	.0
12	2.20	2.20	5.89	1.09	19750.0	.0
13	2.40	2.40	6.15	3.08	21850.0	.0
14	2.60	2.60	6.40	4.58	24000.0	.0
15	2.80	2.80	6.64	5.29	26200.0	.0
16	3.00	3.00	6.88	5.91	28450.0	.0
17	3.20	3.20	7.10	6.47	30750.0	.0
18	3.40	3.40	7.32	6.99	33100.0	.0
19	3.60	3.60	7.53	7.47	35450.0	.0
20	3.80	3.80	7.74	13.09	37900.0	.0
21	4.00	4.00	7.94	15.48	40400.0	.0
22	4.20	4.20	8.14	16.83	42900.0	.0
23	4.40	4.40	8.33	18.07	45550.0	.0
24	4.60	4.60	8.52	19.23	48200.0	.0
25	4.80	4.80	8.70	20.31	50900.0	.0
26	5.00	5.00	8.88	21.34	53650.0	.0

INITIAL STAGE ELEV = 210.0'
 AVERAGE PERC-RATE = .0
 FILENAME: SHF_DAT2



2-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
(AFTER APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA
SHF_DAT2

DISPLAY ROUTING DATA (Y or N)?
N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:
SHF_2

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)	OUTFLOW-VOL(CU-FT)
9.66	A 5.18 B .00	A 180575 B 0

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.50	1.70

REQUIRED STORAGE: 14770 CU-FT

$Q_p \approx 5.18 \text{ CFS}$
ALLOWABLE $Q_p \approx 5.71 \text{ CFS}$
 $\Rightarrow \text{O.K.}$

10-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
(AFTER APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA
SHF_DAT2

DISPLAY ROUTING DATA (Y or N)?
N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:
SHF_10

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)	OUTFLOW-VOL(CU-FT)
17.54	A 6.64 B 5.30	A 286850 B 20841

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.17	2.80

REQUIRED STORAGE: 26220 CU-FT

$Q_p \approx 11.94 \text{ CFS}$
ALLOWABLE $Q_p \approx 12.80 \text{ CFS}$
 $\Rightarrow \text{O.K.}$

25-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
 (AFTER APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA

SHF_DAT2

DISPLAY ROUTING DATA (Y or N)?

N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:

SHF_25

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)	OUTFLOW-VOL(CU-FT)
21.76	^A 7.32 ^B 6.99	^A 620172 ^B 62409

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.17	3.40

REQUIRED STORAGE: 33080 CU-FT

$Q_p \approx 14.31 \text{ CFS}$
ALLOWABLE $Q_p \approx 16.79 \text{ CFS}$
 \Rightarrow O.K.

100-YR., 24-HR. STORM ROUTE THROUGH DETENTION FACILITY
 (AFTER APPLICATION OF VOLUME CORRECTION FACTOR)

RESERVOIR ROUTING ROUTINE W/SPLIT-OUTFLOW

SPECIFY [d:][path]filename[.ext] OF ROUTING DATA

SHF_DAT2

DISPLAY ROUTING DATA (Y or N)?

N

ENTER [d:][path]filename[.ext] OF COMPUTED HYDROGRAPH:

SHF_100

INFLOW/OUTFLOW ANALYSIS:

PEAK-INFLOW(CFS)	PEAK-OUTFLOW(CFS)	OUTFLOW-VOL(CU-FT)
30.57	^A 8.01 ^B 15.97	^A 1027653 ^B 169065

INITIAL-STAGE(FT)	TIME-OF-PEAK(HRS)	PEAK-STAGE-ELEV(FT)
.00	8.00	4.07

REQUIRED STORAGE: 41300 CU-FT

$Q_p \approx 23.98 \text{ CFS}$
ALLOWABLE $Q_p \approx 25.30 \text{ CFS}$
 \Rightarrow O.K.

Appendix III
Water Quality Calculations

BIOFILTRATION SWALE 1 CALCULATION

MAN-MADE CHANNELS

VARIABLES LIST:

Y - FLOW DEPTH
Q - FLOWRATE

B - CHANNEL BOTTOM WIDTH
M - CHANNEL SIDE SLOPE

S - CHANNEL SLOPE
N - CHANNEL ROUGHNESS

VARIABLE TO BE SOLVED (Y,Q,B,M,S OR N) ? Y

* Q (CFS) ? .82
B (FT) ? 10
M (FT/FT) ? 3
S (FT/FT) ? .01
N (FT^{1/6}) ? .24

RESULTS

Y=	0.29 FT	
A=	3.17 SF	
P=	11.85 FT	
V=	0.26 FPS	
F=	0.09	SUB-CRITICAL FLOW

PRELIMINARY SWALE LENGTH $\approx 150'$

$$\Rightarrow \text{RESIDENCE TIME} = \frac{L}{V} = \frac{150'}{0.26 \text{ FPS}} \approx 577 \text{ SEC.} \approx \underline{\underline{9.6 \text{ MIN.}}}$$

* BIOFILTRATION SWALE 1 IS PROPOSED TO RECEIVE STORMWATER FROM APPROX. 7.46 ACRES OF BASINS EAST, OFF E (35% OF THESE BASINS).

$$\Rightarrow \text{TREATMENT FLOWRATE} \approx (0.35)(2.34 \text{ CFS}) = \underline{\underline{0.82 \text{ CFS}}}$$

BIOFILTRATION SWALE 2 CALCULATION

MAN-MADE CHANNELS

VARIABLES LIST:

Y - FLOW DEPTH
Q - FLOWRATE

B - CHANNEL BOTTOM WIDTH
M - CHANNEL SIDE SLOPE

S - CHANNEL SLOPE
N - CHANNEL ROUGHNESS

VARIABLE TO BE SOLVED (Y,Q,B,M,S OR N) ? Y

* Q (CFS) ? .80
B (FT) ? 8
M (FT/FT) ? 3
S (FT/FT) ? .015
N (FT^{1/6}) ? .24

RESULTS

Y=	0.29 FT	
A=	2.57 SF	
P=	9.83 FT	
V=	0.31 FPS	
F=	0.11	SUB-CRITICAL FLOW

PRELIMINARY SWALE LENGTH $\approx 170'$

\Rightarrow RESIDENCE TIME = $L/V = 170' / 0.31 \text{ FPS} \approx 548 \text{ SEC} \approx \underline{\underline{9.1 \text{ MIN.}}}$

* BIOFILTRATION SWALE 2 RECEIVES STORMWATER FROM APPROX. 6.38 ACRES OF BASINS EAST, OFFE (31% OF THESE BASINS).

\Rightarrow TREATMENT FLOWRATE $\approx (0.31)(2.34 \text{ CFS}) = \underline{\underline{0.73 \text{ CFS (USE 0.80 CFS) - CONSERVATIVE}}}$

BIOFILTRATION SWALE 3 CALCULATION

MAN-MADE CHANNELS

VARIABLES LIST:

Y - FLOW DEPTH
Q - FLOWRATE

B - CHANNEL BOTTOM WIDTH
M - CHANNEL SIDE SLOPE

S - CHANNEL SLOPE
N - CHANNEL ROUGHNESS

VARIABLE TO BE SOLVED (Y,Q,B,M,S OR N) ? Y

* Q (CFS) ? 1.25
B (FT) ? 10
M (FT/FT) ? 4
S (FT/FT) ? .033
N (FT^{1/6}) ? .24

RESULTS

Y=	0.26 FT	
A=	2.90 SF	
P=	12.16 FT	
V=	0.43 FPS	
F=	0.16	SUB-CRITICAL FLOW

PRELIMINARY SWALE LENGTH = 235'

⇒ RESIDENCE TIME = $\frac{L}{V} = \frac{235'}{0.43 \text{ FPS}} \approx 547 \text{ SEC} \approx \underline{\underline{9.1 \text{ MIN.}}}$

* BIOFILTRATION SWALE 3 IS PROPOSED TO RECEIVE STORMWATER FROM APPROX. 4.82 ACRES OF BASIN EAST (36%), 3.20 ACRES OF BASIN WEST (19%), 2.17 ACRES OF BASIN OFF W (49%), & 2.04 ACRES OF BASIN OFF E (27%)

⇒ TREATMENT FLOWRATE $\approx (0.36)(1.90 \text{ CFS}) + (0.19)(2.10 \text{ CFS}) + (0.49)(0.11 \text{ CFS}) + (0.27)(0.44 \text{ CFS})$
= 1.25 CFS

BIOFILTRATION SWALE 4 CALCULATION

MAN-MADE CHANNELS

VARIABLES LIST:

Y - FLOW DEPTH
Q - FLOWRATE

B - CHANNEL BOTTOM WIDTH
M - CHANNEL SIDE SLOPE

S - CHANNEL SLOPE
N - CHANNEL ROUGHNESS

VARIABLE TO BE SOLVED (Y, Q, B, M, S OR N) ? Y

* Q (CFS) ? 1.78
B (FT) ? 15
M (FT/FT) ? 3
S (FT/FT) ? .038
N (FT^{1/6}) ? .24

RESULTS

=====		
Y=	0.25	FT
A=	3.88	SF
P=	16.56	FT
V=	0.46	FPS
F=	0.17	
		SUB-CRITICAL FLOW

PRELIMINARY SWALE LENGTH \approx 250'

\Rightarrow RESIDENCE TIME = $L/V = 250' / 0.46 \text{ FT/S} \approx 543 \text{ SEC.} \approx \underline{\underline{9.0 \text{ MIN.}}}$

* BIOFILTRATION SWALE 4 IS PROPOSED TO RECEIVE STORMWATER FROM APPROX. 82% OF BASIN WEST & 52% OF BASIN OFF W.

\Rightarrow TREATMENT FLOWRATE = $(0.82)(2.10 \text{ CFS}) + (0.52)(0.11 \text{ CFS}) = \underline{\underline{1.78 \text{ CFS}}}$