DRAINAGE REPORT AND STORM WATER SYSTEM DESIGN FOR

SHADOW BLUFF ESTATES

Darmstadt, Indiana

Report by: SITECON, Inc. 600 SE 8th Street, Suite 2 Evansville, IN 47713-1774

May 13, 1996



Shadow Bluff Estates Drainage Plan

Project Name and Location

Shadow Bluff Estates Subdivision 0.42 miles west of the intersection of Hoing Road and Boonville-New Harmony Road. Scott Township, Section 7, T 5 S, R 10 W Darmstadt, IN

Landowner Name and Address

John Elpers, Jr. 4700 St. Wendel-Cynthiana Road Wadesville, IN 47638 (812) 963-8000

Drainage Plan Preparer

SITECON, Inc. 600 SE 8th Street, Suite 2 Evansville, IN 47713-1774 (812) 423-2320

Site Location:

The proposed 26 lot residential subdivision is a 32 acre site located in Darmstadt, Indiana approximately 0.42 miles west of the intersection of Hoing Road and Boonville-New Harmony Road. The majority of the site, approximately 26.14 acres, is currently, and historically, cultivated. A portion of the site, approximately 5.40 acres, is wooded. The remainder of the site, approximately 0.46 acres, is used for an existing residence and access. The current zoning of the site agricultural.

Existing Site Conditions:

The site is divided by an existing ridge running approximately north-south. The ridge divides the site roughly 64% to the east, 36% to the west.

The portion east of the ridge drains entirely to an existing sizable ditch immediately east of the site's east boundary line. Approximately 15.4 acres of this eastern watershed is cultivated, 4.9 acres wooded.

The portion west of the ridge drains in two patterns. The north portion of the "western ridge area", approximately 5.9 acres and all cultivated, drains to an existing flowline and exits the site along the west boundary line. The south portion of the "western ridge area", approximately 5.6 acres (0.70 acres cultivated) leaves the property in sheet flow to the west and to the south. These flows eventually reach the roadside ditch along Boonville-New Harmony Road and flow to the west.

The entire site is comprised of gently rolling terrain at both 2-5% and 5-10% grades. Wooded areas exist at the southern portion of the property, at the proposed entrance area, and south of the north boundary line (approximately centered east-west). It is the intent of the developer to keep disturbance of the wooded areas at a practical minimum. All cultivated areas, as well as cleared areas, not improved, will be "converted to grassy lawns. According to the Soil Survey of Vanderburgh County, Indiana, issued June, 1976, the site consists of Hosmer silt loam (HoB2, HoC2, HoC3), Stendal silt loam (St), and Zanesville silt loam (ZaC3). See locations and details of soil types on Erosion Control Plan.

Significant Existing or Anticipated Drainage Problems:

No new significant drainage problems are anticipated by the development of the proposed residential subdivision once the new drainage system is operational. This is due in part to the relative size of the lots in comparison to the proposed impervious improvements. All lots will be in excess of 1 acre. In reality,

approximately 22.1 acres of cultivated land will be converted to grassy lawn areas and should result in a ±10% reduction in runoff. This should assist in offsetting runoff resulting from approximately 4.5 acres of proposed improvements. Some calculations may, however, show an increase of runoff resulting from the comparison of a 25 year "post-developed" storm, to a 10 year "pre-developed storm". This comparison is in accordance with the current Vanderburgh County Drainage Ordinance, adopted November 1994.

Analysis Procedure:

The Rational Method, valid for watershed areas up to 200 acres, was used for computations of storm water runoff. The post development controlled peak release rate of storm water runoff during a twenty-five (25) year return period storm from the project was designed to not exceed the peak release rate during a ten (10) year return period storm from the same land area in its existing condition.

A 3,000 sf footprint was used for the proposed structures, 120 sf for patios, 840 sf for drives, 29' width for pavement. On almost every lot, one half of the house is proposed to drain to the street.

Assumptions and Special Conditions:

Under the twenty-five (25) year developed conditions, the assumption was made that all of the proposed improvements would be 100% developed. For simplicity, all impervious slopes were assumed to be between 2-5% with an average coefficient of 0.94 for all undeveloped and developed calculations.

For undeveloped drainage analysis, the site was divided into twelve (12) individual drainage basins, weighted on the percentage of terrain slope, and cover, and analyzed for storm water detention requirements. Both undeveloped, and developed, watershed maps are available in the attached calculations.

There is a significant off-site watershed, undeveloped Basin #1, that passes through the extreme northeast corner of the site. An undeveloped flowrate of 44.70 cfs enters the site, then exits, some 80' later, at an undeveloped flowrate of 45.77 cfs. This flow will not be controlled or "passed through" any proposed drainage feature of this subdivision. See "Offsite Pass-Thru" section for undeveloped flow calculations.

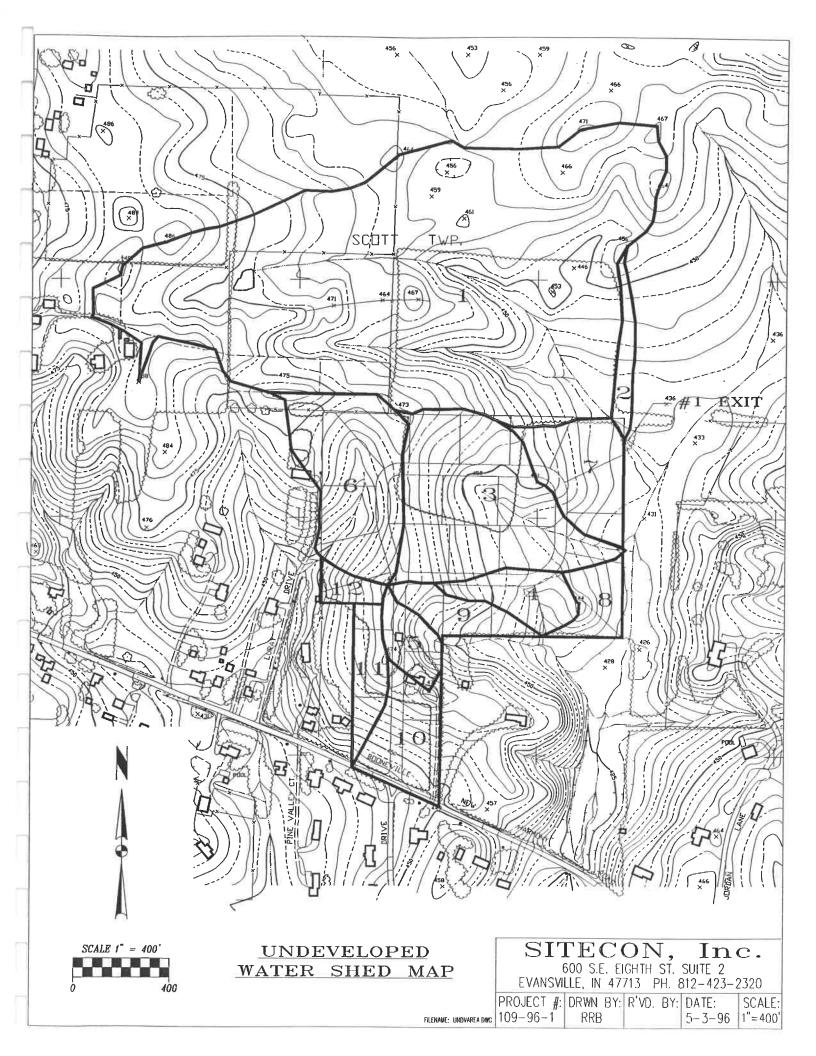
Proposed Design:

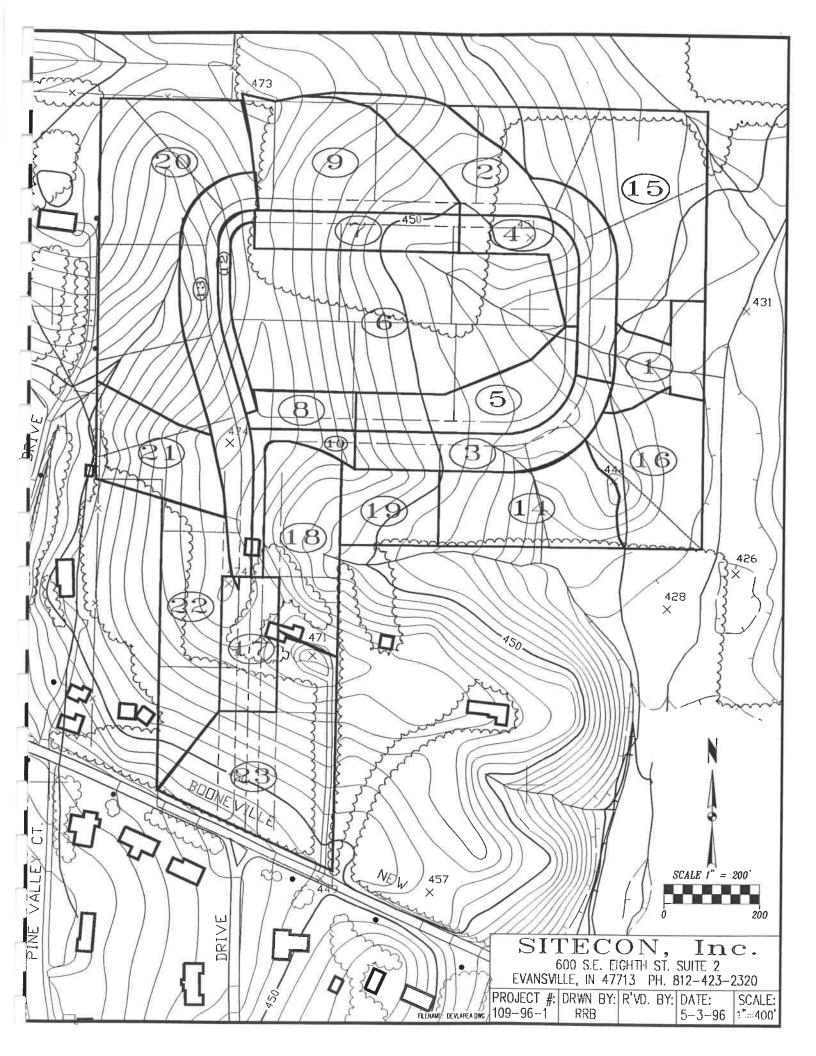
The majority of stormwater runoff will be conveyed to the retention area by sloping lawns and pavement, reinforced concrete pipe, or a series of swales and ditches.

Detention basins will be located on site "downstream" from the proposed improvements. The basins will provide the necessary storm water storage capacity, and predeveloped release rate, for the majority of developed site. The detention basin capacities are summarized in TABLE 1 of this report.

It should be noted that portions of lots 1 thru 7, 20, 10-12, and 14-16 are proposed to release undetained. The developed area that runs off to Basin #1 is larger than the predeveloped area. This, for the most part, is due to proposed grade changes and the inclusion of "1/2 of the house" and area between the house and proposed street. The reduction in area, combined with the conversion of cultivated ground to grass, resulted in a decrease of runoff for the majority of the watershed comparisons related to the areas proposed for release.

Stabilized earthen fill dams will be constructed with an outlet releasing at a rate not to exceed the combined total of the required 10-year release rate. A ten foot (10') wide emergency spillway will allow release for extreme events over the design. The spillway elevations are typically 0.5 feet lower than the basin berm elevation. The developer proposes to build Basin #1 with vertical wall on three sides. These walls will be constructed of portland cement concrete and faced with decorative stone. Refer to the storm drainage details for basin detail.





Results:

The following tables have been provided to summarize the most significant figures mentioned in this repor

TABLE 1
DETENTION REQUIREMENTS

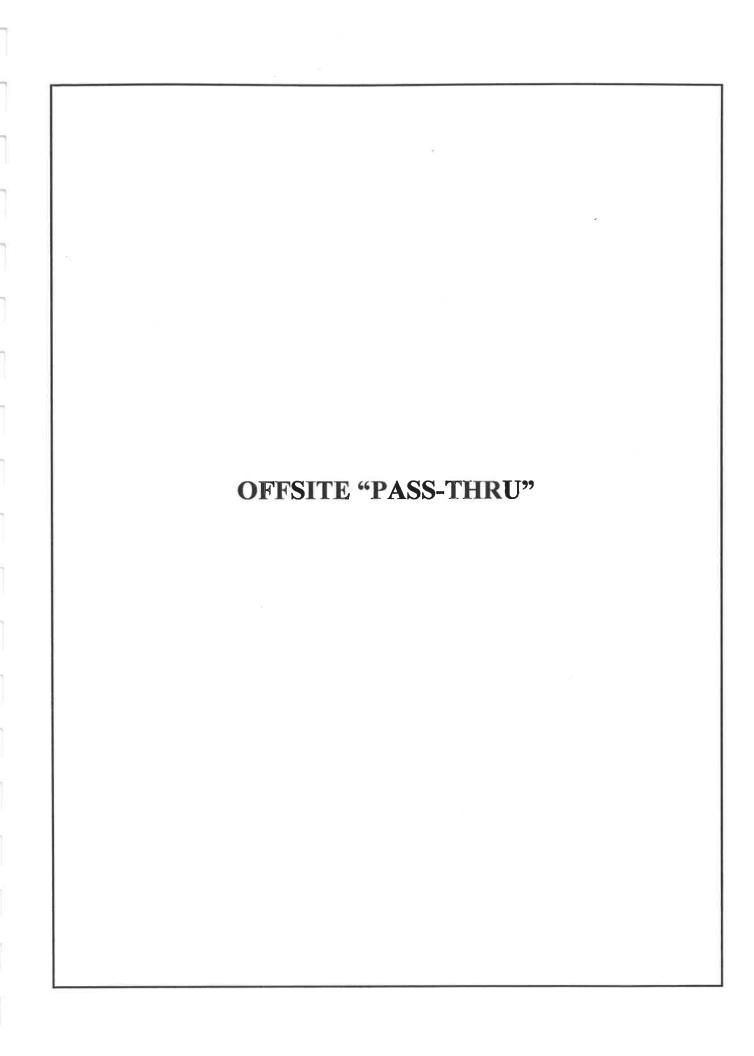
10 year Undev. Release Rate		25 year Dev. Release Rate	Required Storage	Available Storage	
Basin #1	12.52 cfs	12.00 cfs	25,073.00 cf	30,995.00 cf	
Basin #2	3.31 cfs	3.30 cfs	1,694.00 cf	4,458.00 cf	

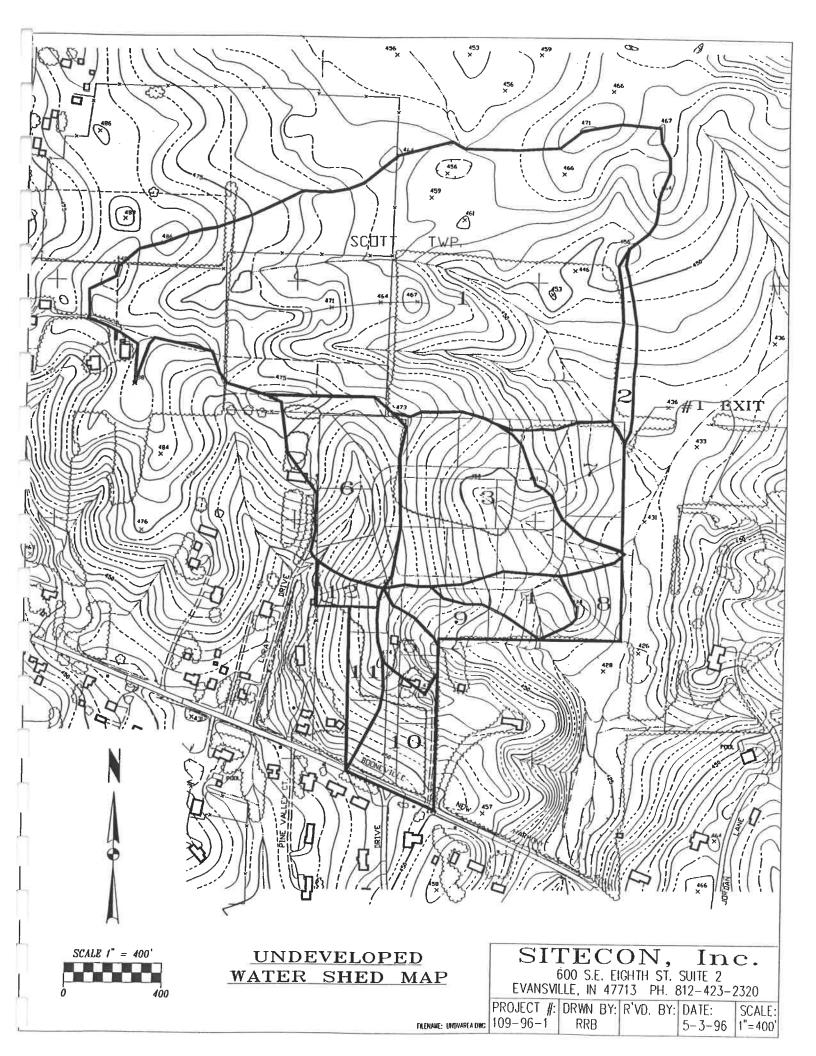
TABLE 2 (Undetained Areas) "East Ridge Released Areas"

UNDEVELOPED BASIN		CORRESPON	CORRESPONDING DEVELOPED BASIN		
10 year Undev.		25	25 year Dev.		
	Release Rate	Rei	lease Rate		
Basin #9	3.67 cfs	Basin #19	1.63 cfs		
Basin #4	3.84 cfs	Basin #14	2.17 cfs		
Basin #7	7.23 cfs	Basin #15	3.64 cfs		
Basin #8	3.91 cfs	Basin #16	2.76 cfs		

TABLE 3 (Undetained Areas) "West Ridge Released Areas"

UNDEVELO	PED BASIN	CORRESPO	ONDING DEVELOPE	D BASIN
	10 year Undev.		25 year Dev.	
1	Release Rate		Release Rate	
Basin #6	13.04 cfs	Basin #20	5.83 cfs	
Basin #12	2.01 cfs	Basin #21	2.26 cfs	
Basin #11	3.03 cfs	Basin #22	2.80 cfs	
Basin #10	5.01 cfs	Basin #23	5.08 cfs	





Job Name/Basin #:	Shadow Bluff Ba	asin #1 Entry		1,966,595 Total SF 45.15 AC
Importions surface	~ (2 59/) C-0.04			
Impervious surfaces Structures	0 Total	ÜSF		0 Total SF 0.00 AC
Drives	0 Total	0 SF		0 Total SF 0.00 AC
Pavement	0 Width (f			0 Total SF 0.00 AC
Patios	0 Total	d SF		0 Total SF 0.00 AC
Sidewalks	0 Width (f	NAME AND ADDRESS OF TAXABLE PARTY.		0 Total SF 0.00 AC
		~		0 TOTAL 0.00 AC
For cultivated fields	s:			o rome older
0-2% slope	C=0.20	0 SF		0 Total SF 0.00 AC
2-5% slope	C=0.35	693,212 SF		693,212 Total SF 15.91 AC
5-10% slope	C=0.50	460,567 SF		460,567 Total SF 10.57 AC
10+% slope	C=0.65	0 SF		0 Total SF 0.00 AC
		The state of the s		1,153,779 TOTAL 26.49 AC
				, ,
For woodland areas	:			
0-2% slope	C=0.12	0 SF		0 Total SF 0.00 AC
2-5% slope	C=0.24	29,130 SF		29,130 Total SF 0.67 AC
5-10% slope	C=0.36	783,684 SF	.:	783,684 Total SF 17.99 AC
10+% slope	C=0.48	0 SF		0 Total SF 0.00 AC
				812,814 TOTAL 18.66 AC
			Check	1 066 503 CT

Check 1,966,593 **GT**

	Wt'dC =	0,39	
	Wt'dN =	0.37	
	High Pt El 49	1.00 A	
	Inlet El 43	5.00 A	
	Length 2,20	D.00 A	
	Slope 0.0	255	
	tc 4	4.30 min	
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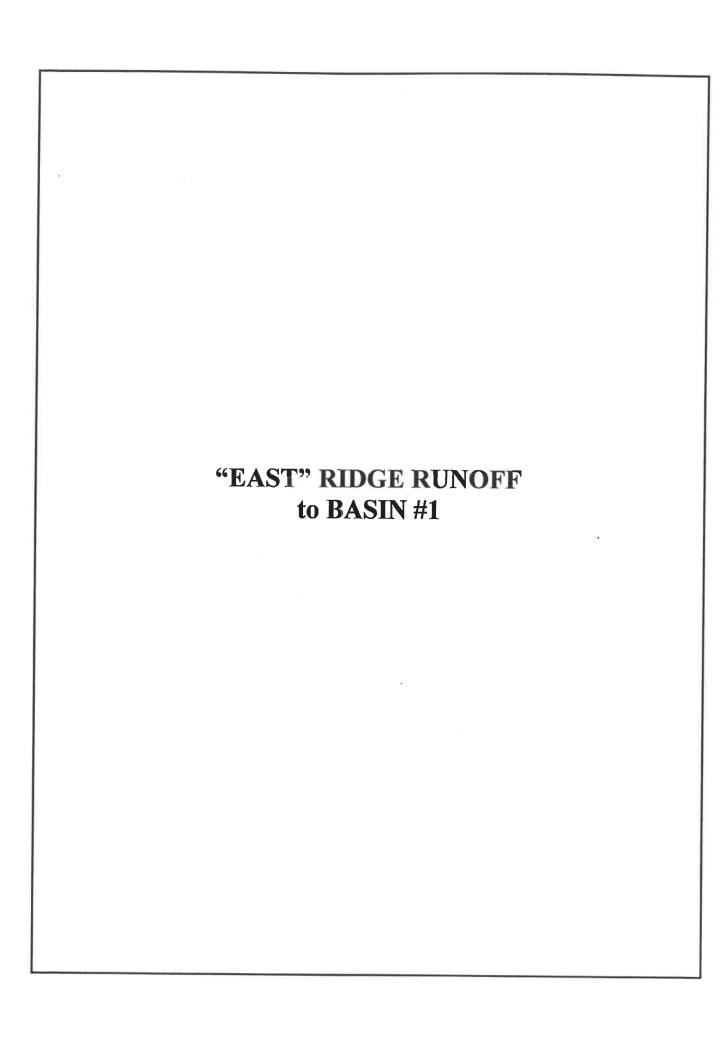
Q10= 44.70 cfs

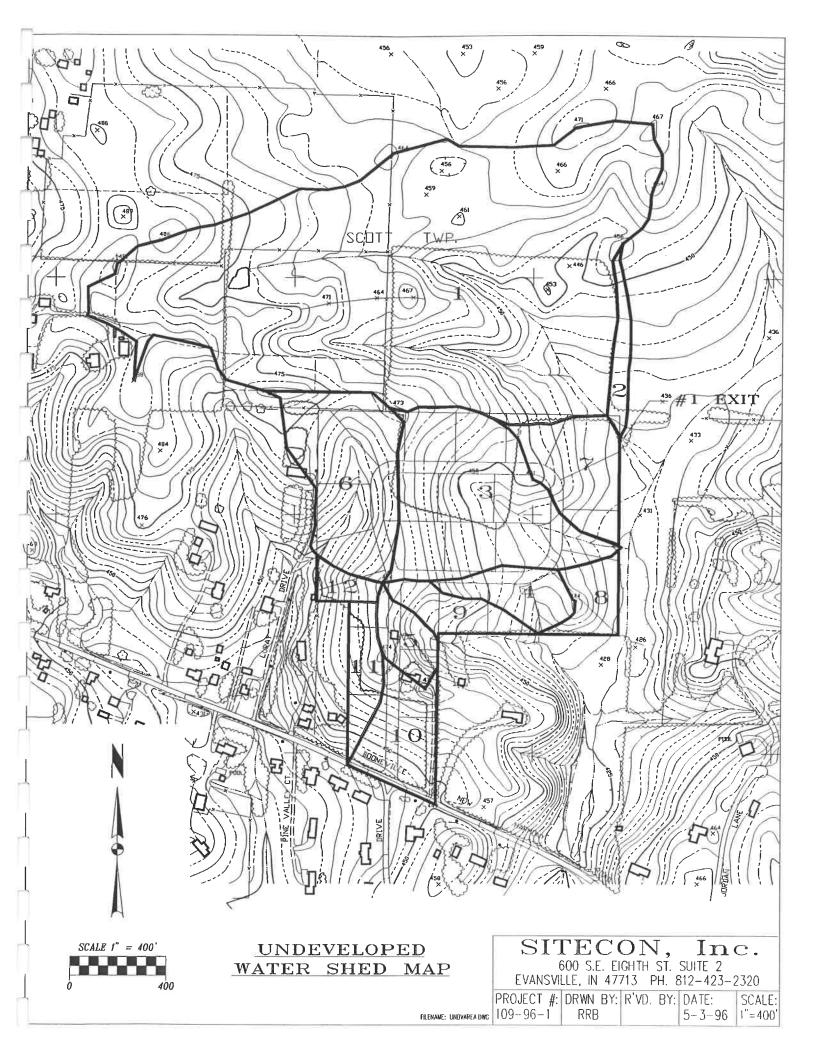
Job Name/Basin #:	Shadow Bluff Bas	in #1 Exit	2,038,828 Total SF 46.81 AC
Impervious surface	es (2-5%) C=0.94		
Structures	0 Total	0 SF	0 Total SF 0.00 AC
Drives	0 Total	0 SF	0 Total SF 0.00 AC
Pavement	0 Width (ft)	The state of the s	0 Total SF 0.00 AC
Patios	0 Total	0 SF	0 Total SF 0.00 AC
Sidewalks	0 Width (ft)	Production of the Production o	0 Total SF 0.00 AC
			0 TOTAL 0.00 AC
For cultivated field	s:		o round office
0-2% slope	C=0.20	0 SF	0 Total SF 0.00 AC
2-5% slope	C=0.35	739,746 SF	739,746 Total SF 16.98 AC
5-10% slope	C=0.50	474,169 SF	474,169 Total SF 10.89 AC
10+% slope	C=0.65	0 SF	0 Total SF 0.00 AC
_		The state of the s	1,213,915 TOTAL 27.87 AC
For woodland areas	S:		
0-2% slope	C=0.12	0 SF	0 Total SF 0.00 AC
2-5% slope	C=0.24	39,161 SF	39,161 Total SF 0.90 AC
5-10% slope	C=0.36	785,752 SF	785,752 Total SF 18.04 AC
10+% slope	C=0.48	0 SF	0 Total SF 0.00 AC
_			824,913 TOTAL 18.94 AC
			, , , , , , , , , , , , , , , , , , , ,

Check 2,038,828 GT

	Wt'dC =	0.39		
	Wt'dN =	0.36		
	High Pt El	491.00	ft	
	Inlet El	433.00	ft	
	Length	2,280.00	ft	
	Slope	0.0254		
	tc	44.85	min	
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Q10= 45.77 cfs

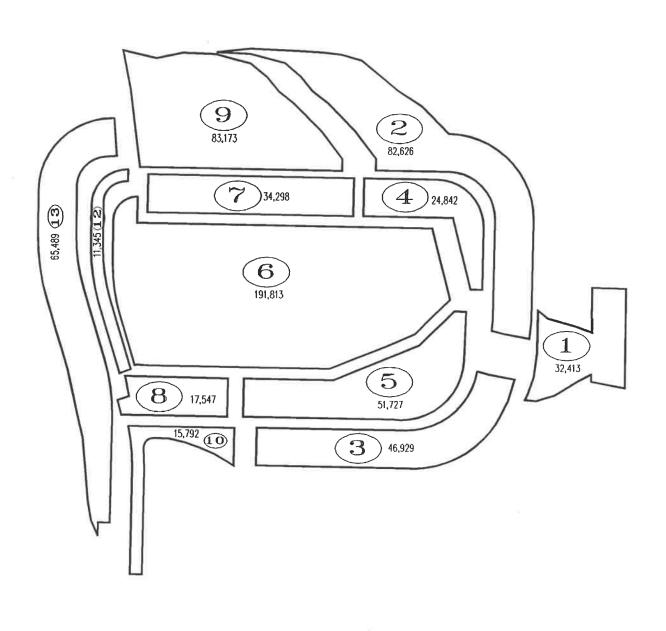


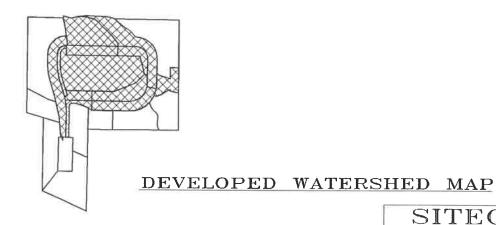


Job Name/Basin #:	Shadow Blu	ff Basin #3	4		5,442,687 Total SF	10.16 AC
Impervious surface Structures Drives Pavement Patios	s (2-5%) C=0 0 Tota 0 Tota 0 Wid 0 "Tota	1 1 th (ft)	0 SF 0 SF 0 L (ft) 0 SF		0 Total SF 0 Total SF 0 Total SF 0 Total SF	0.00 AC 0.00 AC 0.00 AC 0.00 AC
Sidewalks	0 Wid	th (ft)			0 Total SF	0.00 AC
					0 TOTAL	0.00 AC
For cultivated field			Wilan		0.77.1.57	
0-2% slope	C=0.20		0 SF		0 Total SF	0.00 AC
2-5% slope 5-10% slope	C=0.35 C=0.50	126,99 107,40			126,991 Total SF 107,408 Total SF	2.92 AC 2.47 AC
10+% slope	C=0.50 C=0.65		0 SF		0 Total SF	0.00 AC
10 · /u slope	C=0.05	No. of Concession, Name of Street, or other Persons, Name of Street, or ot	V ISI		234,399 TOTAL	5.38 AC
					231,377 101712	J.50 11C
For woodland areas	s:					
0-2% slope	C=0.12		0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	46,35	6 SF		46,356 Total SF	1.06 AC
5-10% slope	C=0.36	161,93	3 SF		161,933 Total SF	3.72 AC
10+% slope	C=0.48		0 SF		0 Total SF	0.00 AC
					208,289 TOTAL	4.78 AC
				Check	442,688 GT	
		d C = 0.3				
		d N = 0.3				
		n Pt El 473.0 nlet El 429.0				
		ength 1,100.0	2010			
		Slope 0.040	- 15-25E-3			
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Q10=

12.52 cfs





SITECON, Inc. 600 S.E. EIGHTH ST. SUITE 2 EVANSVILLE, IN 47713 PH. 812-423-2320

PROJECT #: DRWN BY: R'VD. BY: DATE: 109-96-1 RRB

5-10-96 1"=200"

Job Name/Basin	#: Basin #1			32,413 Total SF	0.74 AC
Exist. Impervious	surfaces (2-5%) C=0.94				
Structures	Total	0 SF		0 Total SF	0.00 AC
Drives	① Total	0 SF		0 Total SF	0.00 AC
Pavement	(i) Width (ft)	0 L (ft)		0 Total SF	0.00 AC
	37.000			0 TOTAL	0.00 AC
	ous surfaces (2-5%) C=0				
Structures	1 Total	1,500 SF		1,500 Total SF	0.03 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
Patios	1 Total	120 SF		120 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
Exist cultivated fi	alde.			1,620 TOTAL	0.04 AC
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
10.70 Stope	C 0.05	U SI		0 TOTAL	
For lawn areas:				0 IUIAL	0.00 AC
0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC
2-5% slope	ET GEORGE	16,093 SF		16,093 Total SF	0.37 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC
	ACCOUNT.		9	16,093 TOTAL	0.37 AC
				,	
Lake areas	C=1.00	14,700 SF		14,700 TOTAL	0.34 AC
T					
For woodland area	ACCORDING TO A STATE OF THE PARTY OF THE PAR	O GD			
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 TOTAL	0.00 AC
			Check	32,413 GT	
	Wt'dC =	0.62	CHOCK	52,415 G 1	
•	Wt'd N =	0.20			
		140.00 ft			
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	01 <u>#</u> _	1 00 ac		D	
	Q25=	2.88 cfs		Date: 5/8/96	

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM						
Job Name/Basin #	: Shadow Bluff Basin #2	82,626 Total SF 1.90 AC				
Exist Impervious	ourfaces (2-5%) C=0.94					
Structures	0 Total 0 SF	0 Total SF 0.00 AC				
Drives	0 Total 0 SF	0 Total SF 0.00 AC 0 Total SF 0.00 AC				
Pavement	0 Width (ft) 0 L (ft)	0 Total SF 0.00 AC				
1 to volitorit	Within (it)	0 TOTAL 0.00 AC				
Proposed Impervio	us surfaces (2-5%) C=0.94	O TOTAL 0,00 AC				
Structures	5 Total 1,650 SF	8,250 Total SF 0.19 AC				
Drives	4 Total 840 SF	3,360 Total SF 0.08 AC				
Pavement	14.5 Width (ft) 562 L (ft)	8,149 Total SF 0.19 AC				
Patios	1 Total 120 SF	120 Total SF 0.00 AC				
Sidewalks	0 Width (ft)	0 Total SF 0.00 AC				
	Editable Company of the Company of t	19,879 TOTAL 0.46 AC				
Exist cultivated fiel	ds:	, =				
0-2% slope	C=0.20 0 SF	0 Total SF 0.00 AC				
2-5% slope	C=0.35 0 SF	0 Total SF 0.00 AC				
5-10% slope	C=0.50 0 SF	0 Total SF 0.00 AC				
10+% slope	C=0.65 0 SF	0 Total SF 0.00 AC				
-	2	0 TOTAL 0.00 AC				
For lawn areas:						
0-2% slope	C=0.15 0 SF	0 Total SF 0.00 AC				
2-5% slope	C=0.25 27,036 SF	27,036 Total SF 0.62 AC				
5-10% slope	C=0.40 11,574 SF	11,574 Total SF 0.27 AC				
10+% slope	C=0.55 0 SF	0 Total SF 0.00 AC				
		38,610 TOTAL 0.89 AC				
For woodland areas						
0-2% slope	C=0.12 0 SF C=0.24 463 SF	0 Total SF 0.00 AC				
2-5% slope	0.21	463 Total SF 0.01 AC				
5-10% slope	C=0.36 23,675 SF	23,675 Total SF 0.54 AC				
10+% slope	C=0.48 0 SF	0 Total SF 0.00 AC				
		24,138 TOTAL 0.55 AC				
	Wt'd $C = 0.47$	Check 82,627 GT				
	Wt'd N = 0.37					
	High Pt El 473.00 ft					
	Inlet El 440,00 ft					
	Length 917.00 ft					
	Slope 0.0360					
	tc 27.21 min					
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Q25=

Is 30<tc<60?

10

3.47 cfs

i 25=

0.00 in/hr

	DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM						
Job Name/Basin	#: Shadow Bluff Basin	#3		46,928 Total SF	1.08 AC		
Exist Impervious	s surfaces (2-5%) C=0.9)A					
Structures	0 Total	0 SF		0 Total SF	0.00.40		
Drives	0 Total	0 SF		0 Total SF	0.00 AC 0.00 AC		
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC		
	(10)	L (II)		0 TOTAL	0.00 AC		
Proposed Impervi	ous surfaces (2-5%) C=	0.94		o TOTALL	0.00 AC		
Structures	4 Total	1.500*SF		6,000 Total SF	0.14 AC		
Drives	4 Total	840 SF		3,360 Total SF	0.08 AC		
Pavement	14.5 Width (ft)	563 L (ft)		8,164 Total SF	0.19 AC		
Patios	0 Total	.01SF		0 Total SF	0.00 AC		
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC		
				17,524 TOTAL	0.40 AC		
Exist cultivated fi		Management and					
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC		
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC		
E 1				0 TOTAL	0.00 AC		
For lawn areas:	C-0.15	0.00					
0-2% slope 2-5% slope	C=0.15	0 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.25 C=0.40	20,729 SF		20,729 Total SF	0.48 AC		
10+% slope	C=0.40 C=0.55	8,674 SF 0 SF		8,674 Total SF	0.20 AC		
10 1 70 Stope	C-0.55	USF		0 Total SF	0.00 AC		
For woodland area	oe.			29,403 TOTAL	0.68 AC		
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC		
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC		
	. 1115	ST.		0 TOTAL	0.00 AC		
				OTOTAL	0.00 AC		
			Check	46,927 GT			
	Wt'd C = Wt'd N =	0.54 0.26					
	High Pt El	458.00 ft					
	Inlet El	440.00 ft					
	Length	563.00 ft					
	Slope	0.0320					
	tc	18.90 min					
	0 1 Is 5 <tc<10?< td=""><td>i 25=</td><td>0.00 in/hr</td><td></td><td></td></tc<10?<>	i 25=	0.00 in/hr				
	0 1 In 10/to/159	: 25	0.00 :/1				

Q25= 2.69 cfs

i 25=

i 25=

i 25=

0.00 in/hr

4.67 in/hr

0.00 in/hr

Is 10<tc<15?

Is 15<tc<30?

Is 30<tc<60?

0 1

1 1

10

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM						
Job Name/Basin #	: Shadow Bluff Bas	in #4			24,842 Total SF	0.57 AC
	surfaces (2-5%) C=0).94				
Structures	0 Total	0 SF			0 Total SF	0.00 AC
Drives	0 Total	0 SF			0 Total SF	0.00 AC
Pavement	Width (ft)	0 L (ft)		-1	0 Total SF	0.00 AC
					0 TOTAL	0.00 AC
	us surfaces (2-5%)					
Structures	1 Total	1,500 SF			1,500 Total SF	0.03 AC
Drives	1 Total	840 SF			840 Total SF	0.02 AC
Pavement	14.5 Width (ft)	518 L (ft)			7,511 Total SF	0.17 AC
Patios	0 Total	0 SF			0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			-	0 Total SF	0.00 AC
Enter colding of all Col	1				9,851 TOTAL	0.23 AC
Exist cultivated fiel		OCE				
0-2% slope 2-5% slope	C=0.20	0 SF			0 Total SF	0.00 AC
5-10% slope	C=0.35 C=0.50	0 SF 0 SF			0 Total SF	0.00 AC
10+% slope	C=0.65	\$15 1 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			0 Total SF	0.00 AC
10+76 Stope	C-0.03	0 SF		2	.0 Total SF	0.00 AC
For lawn areas:					0 TOTAL	0.00 AC
0-2% slope	C=0.15	0 SF			0 Total SF	0.00 AC
2-5% slope	C=0.25	6,880 SF			6,880 Total SF	0.16 AC
5-10% slope	C=0.40	6,872 SF			6,872 Total SF	0.16 AC
10+% slope	C=0.55	0 SF			0 Total SF	0.00 AC
•		TO COLUMN TO STATE OF THE PARTY		-	13,752 TOTAL	0.32 AC
For woodland areas	:					
0-2% slope	C=0.12	0 SF			0 Total SF	0.00 AC
2-5% slope	C=0.24	1,033 SF			1,033 Total SF	0.02 AC
5-10% slope	C=0.36	206 SF			206 Total SF	0.00 AC
10+% slope	C=0.48	0 SF			0 Total SF	0.00 AC
					1,239 TOTAL	0.03 AC
	Wt'd C = Wt'd N = High Pt El Inlet El	0.26 448.50 ft		Check	24,842 GT	

			Cneck	24,842 GT
	Wt'dC =	0.57		
	Wt'dN =	0.26		
	High Pt El	448.50 ft		
	Inlet El	440.00 ft		
	Length	518.00 ft		
	Slope	0.0164		
	tc	21.29 min		
0 1	Is 5 <tc<10?< td=""><td>i 25=</td><td>0.00 in/hr</td><td></td></tc<10?<>	i 25=	0.00 in/hr	
0 1	Is 10 <tc<15?< td=""><td>i 25=</td><td>0.00 in/hr</td><td></td></tc<15?<>	i 25=	0.00 in/hr	
1 1	Is 15 <tc<30?< td=""><td>i 25=</td><td>4.45 in/hr</td><td></td></tc<30?<>	i 25=	4.45 in/hr	
10	Is 30 <tc<60?< td=""><td>i 25=</td><td>0.00 in/hr</td><td></td></tc<60?<>	i 25=	0.00 in/hr	

Date: 5/9/96

1.44 cfs

Q25=

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM						
Job Name/Basin #	: Shadow Bluff Ba	sin #5		51,727 Total SF	1.19 AC	
Exist. Impervious	surfaces (2-5%) C=	=0.94				
Structures	0 Total	0 SF		0 Total SF	0.00 AC	
Drives	0 Total	0 SF 0 SF		0 Total SF	0.00 AC	
Pavement	0 Width (f	t) 0 L (ft)		0 Total SF	0.00 AC	
	promise and a second			0 TOTAL	0.00 AC	
Proposed Impervio	us surfaces (2-5%)	C=0.94				
Structures	2 Total	2,250 SF		4,500 Total SF	0.10 AC	
Drives	2 Total	840 SF		1,680 Total SF	0.04 AC	
Pavement	14.5 Width (f	t) 514 L (ft)		7,453 Total SF	0.17 AC	
Patios	0 Total	0 SF		0 Total SF	0.00 AC	
Sidewalks	0 Width (f	t)		0 Total SF	0.00 AC	
	. 0000000000000000000000000000000000000	•		13,633 TOTAL	0.31 AC	
Exist cultivated fie	elds:					
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC	
2-5% slope	C=0.35	o SF		0 Total SF	0.00 AC	
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC	
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC	
10 / / U D-0 F U	-	CONTRACTOR OF THE PARTY OF THE		0 TOTAL	0.00 AC	
For lawn areas:						
0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC	
2-5% slope	C=0.25	25,396 SF		25,396 Total SF	0.58 AC	
5-10% slope	C=0.40	12,698 SF		12,698 Total SF	0.29 AC	
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC	
10 · 70 biopo	0 0.00	THE RESIDENCE OF THE PARTY OF T		38,094 TOTAL	0.87 AC	
For woodland area	is:			•		
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC	
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC	
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC	
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC	
20 · / 0 Diopo		acategorica con con		0 TOTAL	0.00 AC	
	Wt'd C	C = 0.47	Check	51,727 GT		
	Wt'd N	I = 0.30				
	High Pt	El. 458.00 ft				
	Inlet	El 440,00 ft				
	Leng	gth 514.00 ft				
	Slo	pe 0,0350				
		tc 19.02 min				
	Λ 1 Ta Ε / 4 - 4	109 : 05-	= 0.00 in/hr			
	0 1 Is 5 <tc<< td=""><td></td><td></td><td></td><td></td></tc<<>					
	0 1 Is 10 <tc< td=""><td></td><td></td><td></td><td></td></tc<>					
	1 1 Is 15 <tc< td=""><td></td><td></td><td></td><td></td></tc<>					

2.59 cfs Q25=

i 25=

Is 30<tc<60?

10

Date: 5/9/96

4.66 in/hr 0.00 in/hr

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM					
Job Name/Basin #	Shadow Bluff Bas	sin #6		191,813 Total SF	4.40 AC
Exist. Impervious s	urfaces (2-5%) C=	n 94			
Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	THE RESERVE OF THE PARTY OF THE		0 Total SF	
T WYOMONE	Width (It)	The (II)		0 TOTAL	0.00 AC
Proposed Imperviou	is surfaces (2-5%)	C=0.94		0 IUIAL	0.00 AC
Structures	5 Total	1,500 SF		7,500 Total SF	0.17.40
Drives	0 Total	0 SF		•	0.17 AC
Pavement	0 :Width (ft)	The state of the s		0 Total SF	0.00 AC
Patios	5 Total	120 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			600 Total SF	0.01 AC
DIUCWAIRS	o width (It)		18	0 Total SF	0.00 AC
Exist cultivated field	da			8,100 TOTAL	0.19 AC
0-2% slope	C=0.20	0 SF		0.00 4.100	0.00 1.00
2-5% slope	C=0.20 C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
_		TO AND RESIDENCE OF THE PARTY O		0 Total SF	0.00 AC
10+% slope	C=0.65	0,SF	35	0 Total SF	0.00 AC
For lown orace				0 TOTAL	0.00 AC
For lawn areas:	C-0.15	O CD		0.571 . 1.67	
0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.25	55,290 SF		55,290 Total SF	1.27 AC
5-10% slope	C=0.40	76,968 SF		76,968 Total SF	1.77 AC
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC
T				132,258 TOTAL	3.04 AC
For woodland areas:		a cp			
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	24,901 SF		24,901 Total SF	0.57 AC
5-10% slope	C=0.36	26,554 SF		26,554 Total SF	0.61 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				51,455 TOTAL	1.18 AC
			Check	191,813 GT	
	Wt'd C =				
	Wt'd N =	Company of the Compan			
	High Pt E				
	Inlet E	14 TH 1 TH			
	Length	1 700.00 ft			

			Check	191,813 GT
Wt'dC =	0.35			, -
Wt'dN =	0.44			
High Pt El	460.00	ft		
Inlet El	437.00	ft		
Length	700.00	ft		
Slope	0.0329			
tc	26.60	min		
Is 5 <tc<10?< td=""><td></td><td>i 25=</td><td>0.00 in/hr</td><td></td></tc<10?<>		i 25=	0.00 in/hr	
Is 10 <tc<157< td=""><td>?</td><td>i 25=</td><td>0.00 in/hr</td><td></td></tc<157<>	?	i 25=	0.00 in/hr	
Is 15 <tc<30%< td=""><td>?</td><td>i 25=</td><td>3.96 in/hr</td><td></td></tc<30%<>	?	i 25=	3.96 in/hr	
Is 30 <tc<607< td=""><td>?</td><td>i 25=</td><td>0.00 in/hr</td><td></td></tc<607<>	?	i 25=	0.00 in/hr	

Q25= 6.16 cfs

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM					
Job Name/Basin #	#: Shadow Bluff Basin #7	34,298 Total SF	0.79 AC		
Exist. Impervious	surfaces (2-5%) C=0.94				
Structures	0 Total 0 SF	0 Total SF	0.00 AC		
Drives	0 Total 0 SF	0 Total SF	0.00 AC		
Pavement	0 Width (ft) 0 L (ft)	0 Total SF	0.00 AC		
	The second secon	0 TOTAL	0.00 AC		
	ous surfaces (2-5%) C=0.94		0.00 110		
Structures	2 Total 1,500 SF	3,000 Total SF	0.07 AC		
Drives	2 Total 840 SF	1,680 Total SF	0.04 AC		
Pavement	14.5 Width (ft) 416 L (ft)	6,032 Total SF	0.14 AC		
Patios .	0 Total 0 SF	0 Total SF	0.00 AC		
Sidewalks	0 Width (ft)	0 Total SF	0.00 AC		
-		10,712 TOTAL	0.25 AC		
Exist cultivated fie					
0-2% slope	C=0.20 0 SF	0 Total SF	0.00 AC		
2-5% slope	C=0.35	0 Total SF	0.00 AC		
5-10% slope	C=0.50 0 SF	0 Total SF	0.00 AC		
10+% slope	C=0.65 0 SF	0 Total SF	0.00 AC		
For lawn areas:		0 TOTAL	0.00 AC		
0-2% slope	C=0.15 0 SF	0.70.4.1.00	0.00 1.0		
2-5% slope	C=0.13 0 SF C=0.25 5.987 SF	0 Total SF	0.00 AC		
5-10% slope	C=0.40 12,490 SF	5,987 Total SF	0.14 AC		
10+% slope	C=0.40 C=0.55 0 SF	12,490 Total SF	0.29 AC		
10 1 70 Stope	C-0.55	0 Total SF	0.00 AC		
For woodland areas	s:	18,477 TOTAL	0.42 AC		
0-2% slope	C=0.12 0 SF	0 Total SF	0.00 AC		
2-5% slope	C=0.24 1,656 SF	1,656 Total SF	0.00 AC 0.04 AC		
5-10% slope	C=0.36 3,453 SF	3,453 Total SF	0.04 AC 0.08 AC		
10+% slope	C=0.48 0 SF	0 Total SF	0.00 AC		
		5,109 TOTAL	0.00 AC 0.12 AC		
		S,IV) IVIAL	0.12 AC		
	Wt'd C = 0.53	eck 34,298 GT			

		Chec	k 34,298 GT
0.53			,
0.31			
467.00	ft		
448.50	ft		
416.00	ft		
0.0445			
16.58	min		
	i 25=	0.00 in/hr	
	i 25=	0.00 in/hr	
	i 25=	4.89 in/hr	
	i 25=	0.00 in/hr	
	0,31 467,00 448,50 416,00 0,0445	0.31 467.00 ft 448.50 ft 416.00 ft 0.0445 16.58 min i 25= i 25= i 25=	0.31 467.00 ft 448.50 ft 416.00 ft 0.0445 16.58 min i 25= 0.00 in/hr i 25= 0.00 in/hr i 25= 4.89 in/hr

Q25= 2.04 cfs

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM					
Job Name/Basin #	Shadow Bluff Basin	n #8		17,548 Total SF	0.40 AC
Exist. Impervious s	surfaces (2-5%) C=0.	94			
Structures	Total	0.SF		0 Total SF	0.00 AC
Drives	Total	0-SF		0 Total SF	0.00 AC
Pavement	Width (ft)	0 L (ft)		0 Total SF	0.00 AC
	Second Communication of the St.	attacks and a species		0 TOTAL	0.00 AC
	us surfaces (2-5%) C	=0.94		- 101111	0.00 110
Structures	. 1 Total	1,500 SF		1,500 Total SF	0.03 AC
Drives	1 Total	840 SF		840 Total SF	0.02 AC
Pavement	14.5 Width (ft)	220 L (ft)		3,190 Total SF	0.07 AC
Patios	0 Total	* 0 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				5,530 TOTAL	0.13 AC
Exist cultivated fiel					
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 TOTAL	0.00 AC
For lawn areas:					
0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	12,018 SF		12,018 Total SF	0.28 AC
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC
				12,018 TOTAL	0.28 AC
For woodland areas		and the first of the same			
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 TOTAL	0.00 AC
	Wt'd C =	0,57	Check	17,548 GT	

			Ch	eck	17,548	GT
Wt'dC =	0.57				,	
Wt'dN =	0.28					
High Pt El	468.90	ft				
Inlet El	458.00	ft				
Length 1	220.00	ft				
Slope	0.0495					
tc	11.43	min				
Is 5 <tc<10?< td=""><td></td><td>i 25=</td><td>0.00 in/l</td><td>hr</td><td></td><td></td></tc<10?<>		i 25=	0.00 in/l	hr		
Is 10 <tc<15?< td=""><td></td><td>i 25=</td><td>5.67 in/l</td><td>hr</td><td></td><td></td></tc<15?<>		i 25=	5.67 in/l	hr		
Is 15 <tc<30?< td=""><td></td><td>i 25=</td><td>0.00 in/</td><td>hr</td><td></td><td></td></tc<30?<>		i 25=	0.00 in/	hr		
Is 30 <tc<60?< td=""><td></td><td>i 25=</td><td>0.00 in/</td><td>հո</td><td></td><td></td></tc<60?<>		i 25=	0.00 in/	հո		

Q25= 1.30 cfs

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM					
Job Name/Basin #	Shadow Bluff Basin #9		83,173 Total SF	1.91 AC	
Exist. Impervious	urfaces (2-5%) C=0.94				
Structures	0 Total 0 S		0 Total SF	0.00 AC	
Drives	0 Total 0 S	F	0 Total SF	0.00 AC	
Pavement	Width (ft) 0 L	(ft)	0 Total SF	0.00 AC	
			0 TOTAL	0.00 AC	
	us surfaces (2-5%) C=0.94				
Structures	2 Total 2,250 S		4,500 Total SF	0.10 AC	
Drives	2 Total 840 S		1,680 Total SF	0.04 AC	
Pavement	14.5 Width (ft) 416 L		6,032 Total SF	0.14 AC	
Patios	0 Total 0 S	F	0 Total SF	0.00 AC	
Sidewalks	0 Width (ft)		0 Total SF	0.00 AC	
			12,212 TOTAL	0.28 AC	
Exist cultivated fie					
0-2% slope	C=0.20 0 S		0 Total SF	0.00 AC	
2-5% slope	C=0.35		0 Total SF	0.00 AC	
5-10% slope	C=0.50		0 Total SF	0.00 AC	
10+% slope	C=0.65 0 S	7	0 Total SF	0.00 AC	
			0 TOTAL	0.00 AC	
For lawn areas:	0.015		0	0.00 4.50	
0-2% slope	C=0.15 0 Si		0 Total SF	0.00 AC	
2-5% slope	C=0.25 0 SI		0 Total SF	0.00 AC	
5-10% slope	C=0.40 16,609 SI		16,609 Total SF	0.38 AC	
10+% slope	C=0.55 0 S	•	0 Total SF	0.00 AC	
For woodland areas			16,609 TOTAL	0.38 AC	
0-2% slope	C=0.12 0 Si	7	0 Total SF	0.00 AC	
2-5% slope	C=0.12 0 Si		0 Total SF	0.00 AC	
5-10% slope	C=0.24 C=0.36 54,352 Si		54,352 Total SF	1.25 AC	
10+% slope	C=0.48 0 Si		0 Total SF		
10+76 Stope	C-0.48		54,352 TOTAL	0.00 AC 1.25 AC	
			34,332 IUIAL	1.25 AC	
		Check	83,173 GT		
	Wt'dC = 0.45				
	Wt'd N = 0.47				
	High Pt El 473.00 ft				
	Inlet El 448.50 ft				
	Length 500.00 ft				
	Slope 0.0490				
	to 21.51 m	:			

0 1	Is 5 <tc<10?< td=""><td>i 25=</td><td>0.00 in/hr</td></tc<10?<>	i 25=	0.00 in/hr
0 1	Is 10 <tc<15?< td=""><td>i 25=</td><td>0.00 in/hr</td></tc<15?<>	i 25=	0.00 in/hr
1 1	Is 15 <tc<30?< td=""><td>i 25=</td><td>4.43 in/hr</td></tc<30?<>	i 25=	4.43 in/hr
10	Is 30 <tc<60?< td=""><td>i 25=</td><td>0.00 in/hr</td></tc<60?<>	i 25=	0.00 in/hr

tc

21.51 min

Q25= 3.83 cfs

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM					
Job Name/Basin #	: Shadow Bluff Ba	sin #10	15,792 Total SF	0.36 AC	
Exist. Impervious s	surfaces (2-5%) C=	:0,94			
Structures	0 Total	0 SF	0 Total SF	0.00 AC	
Drives	0 Total	0 SF	0 Total SF	0.00 AC	
Pavement	0 Width (ft	AND THE RESIDENCE OF THE PARTY	0 Total SF	0.00 AC	
			0 TOTAL	0.00 AC	
Proposed Impervio	us surfaces (2-5%)	C=0.94			
Structures	0 Total	0 SF	0 Total SF	0.00 AC	
Drives	1 Total	840 SF	840 Total SF	0.02 AC	
Pavement	14.5 Width (ft)	520 L (ft)	7,540 Total SF	0.17 AC	
Patios	0 Total	0 SF	0 Total SF	0.00 AC	
Sidewalks	0 Width (ft)		0 Total SF	0.00 AC	
			8,380 TOTAL	0.19 AC	
Exist cultivated fiel					
0-2% slope	C=0.20	0 SF	0 Total SF	0.00 AC	
2-5% slope	C=0.35	0 SF	0 Total SF	0.00 AC	
5-10% slope	C=0.50	0 SF	0 Total SF	0.00 AC	
10+% slope	C=0.65	0 SF	0 Total SF	0.00 AC	
			0 TOTAL	0.00 AC	
For lawn areas:	.				
0-2% slope	C=0.15	0 SF	0 Total SF	0.00 AC	
2-5% slope	C=0.25	0 SF	0 Total SF	0.00 AC	
5-10% slope	C=0.40	7,412 SF	7,412 Total SF	0.17 AC	
10+% slope	C=0.55	0 SF	0 Total SF	0.00 AC	
E			7,412 TOTAL	0.17 AC	
For woodland areas					
0-2% slope	C=0.12	0 SF	0 Total SF	0.00 AC	
2-5% slope	C=0.24	0 SF	0 Total SF	0.00 AC	
5-10% slope	C=0.36	0 SF	0 Total SF	0.00 AC	
10+% slope	C=0.48	0 SF	0 Total SF	0.00 AC	
			0 TOTAL	0.00 AC	

Wt'd C = Wt'd N = High Pt El Inlet El Length Slope tc	0.69 0.20 471.00 ft 458.00 ft 520.00 ft 0.0250 17.06 min	Check	15,792 GT
Is 5 <tc<10? 10<tc<15?="" 15<tc<30?="" 30<tc<60?<="" is="" td=""><td>i 25= i 25= i 25= i 25=</td><td>0.00 in/hr 0.00 in/hr 4.84 in/hr 0.00 in/hr</td><td></td></tc<10?>	i 25= i 25= i 25= i 25=	0.00 in/hr 0.00 in/hr 4.84 in/hr 0.00 in/hr	

Q25= 1.21 cfs

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STURY							
Job Name/Basi	n#: Shadow Bluff	Basin #12		11,345 Total SF	0.26 AC		
Structures Drives	us surfaces (2-5%) (0 Total 0 Total	0.SF 0.SF		0 Total SF 0 Total SF	0.00 AC 0.00 AC		
Pavement	0 Width	(ft) 0 L (ft)		0 Total SF	0.00 AC		
Proposed Imper	vious surfaces (2-5%	() C=0.04		0 TOTAL	0.00 AC		
Structures	0 Total	0 SF		0 T-4-1 CE	0.00 4.0		
Drives	0 Total	0 SF		0 Total SF	0.00 AC		
Pavement	14.5 Width	Philipping State of the Control of t		0 Total SF	0.00 AC		
Patios	0 Total	0 SF		6,975 Total SF 0 Total SF	0.16 AC		
Sidewalks	0 Width			0 Total SF	0.00 AC		
DIGCWAIKS	a valdin	(11)		6,975 TOTAL	0.00 AC		
Exist cultivated:	fields:			0,973 TOTAL	0.16 AC		
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC		
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC		
				0 TOTAL	0.00 AC		
For lawn areas:				• 101112	0.00 710		
0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.25	4,367 SF		4,367 Total SF	0.10 AC		
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC		
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC		
•		The state of the s		4,367 TOTAL	0.10 AC		
For woodland ar							
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC		
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC		
				0 TOTAL	0.00 AC		
	Wt'd (C = 0.67	Check	11,342 GT			
	Wt'd 1						
High Pt El 467.00 ft							
	Inle	THE REAL PROPERTY AND ADDRESS OF THE PARTY AND					
	Len	gth 279.00 ft					
Slope 0.0251							
tc 11.73 min							
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	1 1 Is 10 <to< td=""><td>· ·</td><td>5.62 in/hr</td><td></td><td></td></to<>	· ·	5.62 in/hr				
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Q25= 0.99 cfs

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM						
Job Name/Basin #: Shadow Bluff Basin #13			65,489 Total SF	1.50 AC		
Exist. Impervious surfaces (2-5%) C=0.94						
Structures Drives	0 Total 0 Total	0 SF 0 SF		0 Total SF	0.00 AC	
Pavement	0 Width (fi			0 Total SF	0.00 AC	
1 avenent	With (1)	UL (II)		0 Total SF 0 TOTAL	0.00 AC	
Proposed Impervio	ous surfaces (2-5%)	C=0.94		0 IOIAL	0.00 AC	
Structures	6 Total	1,375 SF		8,250 Total SF	0.19 AC	
Drives	6 Total	770 SF		4,620 Total SF	0.19 AC 0.11 AC	
Pavement	14.5 Width (fi			13,036 Total SF	0.11 AC 0.30 AC	
Patios	5.5 Total	120 SF		660 Total SF	0.30 AC 0.02 AC	
Sidewalks	0 Width (ft			0 Total SF	0.02 AC	
	(2)	7		26,566 TOTAL	0.61 AC	
Exist cultivated fie	elds:			20,500 101712	o.or Ac	
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC	
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC	
5-10% slope	C=0.50	0.SF		0 Total SF	0.00 AC	
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC	
				0 TOTAL	0.00 AC	
For lawn areas:						
0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC	
2-5% slope	C=0.25	38,923 SF		38,923 Total SF	0.89 AC	
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC	
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC	
				38,923 TOTAL	0.89 AC	
For woodland area		SM				
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC	
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC	
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC	
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC	
				0 TOTAL	0.00 AC	
			Check	65,489 GT		
	Wt'd C	= 0.53	CHOCK	00, 10 7 G I		
•	Wt'd N					
	High Pt I	A STATE OF THE PARTY OF THE PAR				
	Inlet E					
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	Siol	to 22.00 min				

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10	Is 30 <tc<60?< td=""><td>i 25=</td><td>0.00 in/hr</td></tc<60?<>	i 25=	0.00 in/hr

tc

22.00 min

Q25= 3.49 cfs

DEVELOTED CALCULATIONS FLOW FOR A 25 FEAR STORM							
Job Name/Basii	n #: Basin #'s 1-10	, 12, & 13		657,994 Total SF	15.11 AC		
Exist. Imperviou	Exist. Impervious surfaces (2-5%) C=0.94						
Structures	0 Total	0 SF		0 Total SF	0.00 AC		
Drives	0 Total	0 SF		0 Total SF	0.00 AC		
Pavement	0 Width	(ft) 0 L (ft)		0 Total SF			
				0 TOTAL	0.00 AC		
	rious surfaces (2-59						
Structures	29 Total	1,603 SF		46,487 Total SF	1.07 AC		
Drives	23 Total	822 SF		18,906 Total SF	0.43 AC		
Pavement	14.5 Width	The state of the s		74,081 Total SF	1.70 AC		
Patios	12,5 Total	120 SF		1,500 Total SF	0.03 AC		
Sidewalks	0 Width	(ft)		0 Total SF			
				140,974 TOTAL	3.24 AC		
Exist cultivated f		o or		0 F . 1 CF			
0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC		
10+% slope	C=0,65	0 SF		0 Total SF			
For lawn areas:				0 TOTAL	0.00 AC		
0-2% slope	C=0.15	0 SF		O Total CE	0.00 4.0		
2-5% slope	C=0.15 C=0.25	200,712 SF		0 Total SF	0.00 AC		
5-10% slope	C=0.23 C=0.40	165,315 SF		200,712 Total SF			
10+% slope	C=0.40 C=0.55	0 SF		165,315 Total SF			
10+76 Stope	C-0.55	USF		0 Total SF 366,027 TOTAL	0.00 AC 8.40 AC		
				300,027 TOTAL	0,40 AC		
Lake areas	C=1.00	14,700 SF		14,700 TOTAL	0.34 AC		
For woodland are	295,						
0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC		
2-5% slope	C=0.24	28,053 SF		28,053 Total SF			
5-10% slope	C=0.36	108,240 SF		108,240 Total SF			
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC		
10.70 Slope	C 0.40	CARROLL CO.		136,293 TOTAL	3.13 AC		
				130,233 TOTAL	3.13 AC		
			Check	657,994 GT			
	Wt'd	C = 0.47	CHOOK	037,774 GI			
	Wt'd			••			
	High F	And there was a second					
		et El 100.00 ft					
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	0 1 Is 10<	i 25=	0.00 in/hr				
	0 1 Is 15<		0.00 in/hr				
	0 1 Is 30<	i 25=	0.00 in/hr				
	Q	25= 0.00 cfs		Date: 5/9/96			
	•						

Vanderburgh County Drainage Board Form 800

Computation Sheet for Detention Storage Using the Rational Method

Project: Basin #1	
Detention Facility Design Return Period	25 years
Release Rate Return Period	10 years
Watershed Area Undeveloped Time of Concentration	15.11 acres 29.67 minutes
Undeveloped Rainfall Intensity (iu) Weighted Undeveloped Runoff Coefficient (Cu)	3.25 inches/hour 0.26
Undeveloped Runoff Rate (O=Cu x iu x Au) Developed Runoff Coefficient (Cd)	12.52 cfs 0.47

Storm Duration td	Rainfall Intensity id	Inflow Rate I(td)	Outflow Rate O	Storage Rate	Required Storage
		Cd x id x Ad	Cu x iu x Au	(I x td) - O	[I(td)-O]x[td/12]
min	inches/hr	cfs	cfs	cfs	acre-ft
5	7.208	51.06	12.52	38.54	0.2676
10	5.925	41.97	12.52	29.45	0.4090
15	5.033	35.65	12.52	23.13	0.4819
20	4.571	32.38	12.52	19.86	0.5516
25	4.108	29.10	12.52	16.58	0.5756
30	3.646	25.83	12.52	13,30	0.5543
40	3.123	22.12	12.52	9.60	0.5333
50	2.601	18.42	12.52	5.90	0.4099
60	2.078	14.72	12.52	2.20	0.1831
90	1.578	11.18	12.52	-1.34	-0.1681
Require	d Storage =	0.5756	x 43,560 sf/ac=	25,073	cubic feet

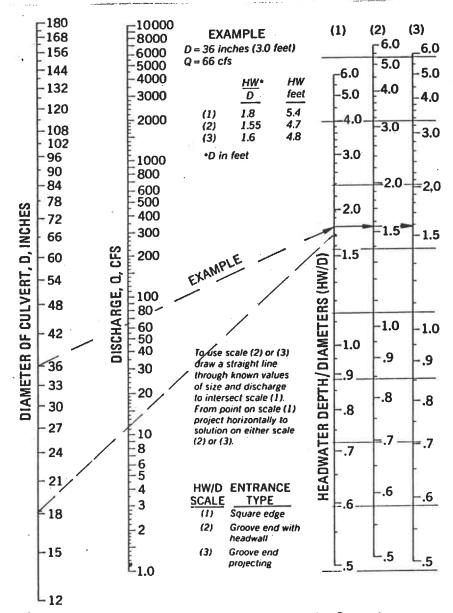


Figure 3.25. Headwater Depth for Circular Concrete Pipe Culverts with Inlet Control.

DISCHARGE = ±12.0 CFS

BLUFF PROJECT SHADOW

C. Weil

Ö DATE 5/196 SHEET

MANNINGS # 싫 8 DESIGN STORM

Pipe Cover Upstrema Pipe Pover Dover 23 Ħ Invert Elevation Downstream 77 Invert Elevation Opstream 28 Rim Elevation Devrastrem ,013 2 Rier Elevador = Storm Sewer Design Sheet - Rational Method 35 200 1 HAI 233 20. ,67 5 53 0 2 1521 3,30 650 585 3 43 5 6 12.39 20.0 3.21 (fysec) Velocity 5.85 4.45 P8 1 58.9 18.37 2.09 Capacity (GB) 259 5 5 25'2 3.49 5,20 3691 Figure 7.2.1 19 19 13 ૭ (FROT BASIN 24 2.96 9 296 2,29 9 3 to 12 1.16 9 53 , 57 213 .A.C. 2 Ŋ Pipe Diameter (aches) 24 1830 1.L 51 152 00 1 20 Pl 20 Pl 25 721 4.45 1391 124 52 18.40 18.40 12.69 12. 1.20 16.50 12.61 14.42 565 115 17 . 48 11.43 17.36 4.81 1231112 17 1836 1777 3.49 1,2,1 6.10 3,83 ଙ୍କି Beche 4.42 4.38 25 1700 1700 4.84 439 15:12 185 21.29 21.29 0.22 lî 1.22 = 22.0 11.73 25 - ĵ • ∑CjAj SH .860 97 Ì • ENGINEER 795 156 28 125 36 35. .23 CJ∳J 42 26 40 19 A₁ 36 .79 54 lob 15 16 רצי • .47 15 35. ģ 5 B 6 -ټي 190 622 BO Length 4 615 613 211 U 8 00 29 € 67 267 624 626 5 29 050 510 020 625 Downstreen Manhole 525 619 613 120 050 623 520 619 210 614 618 120 Manhole 10 Upstream 1.the Number 3 0 4

Flow Calculations for:

Line #1

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 3.49 cfs

Pipe Size = 12 Inches Slope = 0.0096 ft/ft Capacity = 3.49 cfs Velocity = 4.45 fps

Flow Calculations for:

Line #2

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 4.24 cfs

Pipe Size = 12 Inches Slope = 0.0213 ft/ft Capacity = 5.20 cfs Velocity = 6.62 fps

Flow Calculations for:

Line #3

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 1.21 cfs

Pipe Size = 12 Inches Slope = 0.0050 ft/ft Capacity = 2.52 cfs Velocity = 3.21 fps

Flow Calculations for:

Line #4

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 2.31 cfs

Pipe Size = 12 Inches
Slope = 0.0209 ft/ft
Capacity = 5.15 cfs
Velocity = 6.56 fps

Flow Calculations for:

Line #5

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 3.83 ;cfs

Pipe Size = 12 Inches Slope = 0.0116 ft/ft Capacity = 3.84 cfs Velocity = 4.89 fps

Flow Calculations for:

Line #6

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 5.65 cfs

Pipe Size = 15 Inches Slope = 0.0096 ft/ft Capacity = 6.33 cfs Velocity = 5.16 fps

Flow Calculations for:

Line #7

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 18.36 cfs

Pipe Size = 24 Inches Slope = 0.0066 ft/ft Capacity = 18.37 cfs Velocity = 5.85 fps

Flow Calculations for:

Line #8

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Reg'd Cap 18.36 cfs

Pipe Size = 21 Inches Slope = 0.0264 ft/ft Capacity = 25.74 cfs Velocity = 10.71 fps Flow Calculations for:

Line #9

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 2.59 cfs

Pipe Size = 12 Inches Slope = 0.0053 ft/ft Capacity = 2.59 cfs Velocity = 3.30 fps

Flow Calculations for:

Line #10

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 2.69 cfs

Pipe Size = 12 Inches Slope = 0.0057 ft/ft Capacity = 2.69 cfs Velocity = 3.43 fps

Flow Calculations for:

Line #11

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 3.91 cfs

Pipe Size = 24 Inches 0.0296 ft/ft Slope = Capacity = 38.91 cfs Velocity = 12.39 fps

Flow Calculations for:

Line #12

Mannings Flow Calculations, Pipes Flowing Full V=0.59/n (D^2/3) (S^1/2)

Mannings = 0.013

Req'd Cap 21.83 cfs

Pipe Size = 24 Inches Slope = 0.0296 ft/ft Capacity = 38.91 cfs Velocity = 12.39 fps