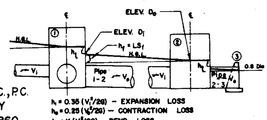
SHONEYS (#8611-08), FIRST VIRGINIA BANK (#8610-45)

STORM DRAINAGE

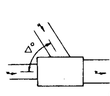
LOCATION: PROPOSED AND FUTURE DEVELOPMENT CROSSINGS SOUTH (LEE PLAZA) PRINCE GEORGE COUNTY

DATE: 4-8-87 CALC. _____ CHKD. _____ P.N. 8610-45 & 8611-08 REV.

J.K. TIMMONS & ASSOC., P.C.
411 E. BROADWAY
HOPEWELL, VA. 23860
458-8685



$h_e = 0.35\,(V_1^2/2g)$ – EXPANSION LOSS
$h_c = 0.25\,(V_2^2/2g)$ – CONTRACTION LOSS
$h_b = K\,(V_2^2/2g)$ – BEND LOSS
$h_j = h_e + h_c + h_b$ – TOTAL JUNCTION LOSS



90° K=0.70	90° K=0.38	90° K=0.28
80° K=0.80	80° K=0.38	80° K=0.28
70° K=0.90	70° K=0.38	70° K=0.28
60° K=0.95	60° K=0.38	60° K=0.28
50° K=0.97	50° K=0.38	50° K=0.28

THE ENERGY LOSS FOR THE INITIAL INLET OF A STORM SEWER SYSTEM IS $0.5\,(V_2^2/2g)$.

WHEN MORE THAN ONE LINE ENTERS AN INLET DETERMINE LINE EXERTING GREATEST MOMENTUM (QV) FOR h_j

USE LINE WITH GREATEST "K" VALUE FOR DETERMINING h_b

IF INLET SHAPING IS USED REDUCE "h_c" BY 50%

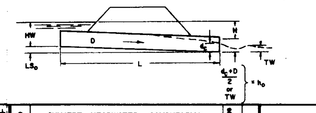
IF SURFACE INFLOW OCCURS INCREASE "h_e" BY 50%

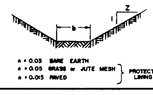
BEGIN HYDRAULIC GRADE LINE AT PIPE OUTFALL USING 0.8 PIPE DIA. OR TW WHICHEVER IS GREATER.

HYDRAULIC GRADE LINE								
JUNCTION LOSSES								PIPE INVERT LOSSES
.35	V_1	$V_1^2/2g$	hj	L3	50%	$\Sigma h_L t$	ELEV. D_2	
.25	V_2	$V_2^2/2g$	ho				Σ_j	
TYPE	Δ	K_b	$V_2^2/2g$	h_b			h_j	
				ht			ELEV. D_1	

n SPECIAL CONDITIONS REQUIRING USE OF CORRUGATED METAL PIPE:

CONCRETE OR V.C.	- 0.013
PLAIN or FULLY COATED	- 0.024
PAVED INVERT (25%)	- 0.021
FULLY RUTTED	- 0.01
FULLY PAVED	- 0.013





INLETS (CURB INLET W/LOCAL DEP.)	
SLOPE	SAG (WEIR)
$L_T = .60\,S_o^{.42}\,S_x^{.3}\,(1/n\,S_w)^{.6}$ 100%	$d = (Q/12.3L)^{1.5}$
$E = 1 - (1 - L/L_T)^{1.8}$	$L = (Q/d^{1.5})/2.3) - 3.6$
$S_e = S_x + S_w\,E_o$	$a = VCL/S_o - S_x$
$E_o = 1.33 + .47\,[\ln(W/T)]\,1/4\,T^{1}$	$L_x = (200\,d/k)^{.3}$
$E_o = 1.26 + .46\,[\ln(W/T)]\,1/4\,T^{1}$	$T = d/S_x$

Sw	W	a	Eo	L/L_T	Sw	W	P
Sx	T	K	Se	E	Sx	1.8W	L
S_w/S_x	W/T	Sw	L	Qb	h	d	T

STREET OR LOCATION	STRUCT. NO.	DROP INLET TYPE	DROP INLET L	AREA NO.	ACRES	C Δ	C Σ CA	C Σ CA	C TRIB CA	C TOT CA	OVER-LAND L So	OVER-LAND Tc	CHANNEL L So	CHANNEL Tc	PIPE	TOTAL Tc	I IN/HR 10YR	Q cfs Δ Q	Q cfs Σ Q	Q cfs CARRY-OVER Qb	Q cfs TOTAL Q	REMARKS
WAKE HOLMES				58	4.17		0.90	3.72		3.72	65' 3.6	10	250' 18.0	1.6		11.6	5.9	22				
EBL OAKLAWN				59	0.21	0.5	0.19	0.19														
	24 / 69			60	1.35	0.9	1.25	2.47		5.47	60' 6.3	9	700' 1.0	9.3		18.7	5.6		30.6			
				61	0.13	0.9	0.12	0.12														
	26 / 67			62 A	1.04	0.9	0.94	5.63		5.63				0.11		11.8	5.4		31.5			
	28 / 69			62 B	1.05	0.9	0.94	5.85		5.85				0.24		12	5.4		31.8			
	31 / 32			63 A	0.18	0.9	0.16	0.16														
	33 / 34			63 B	0.6	0.9	0.5	0.67														
	50 / 59									5.97				0.32		12.3	5.5		32.8			
	14 / 15			64	0.32	0.5	0.29															
	54			64	1.21	0.9	1.09	1.37									5.5					
				65	0.16	0.90	0.14	0.14														
	57 / 39			66 C	1.07	0.9	0.96			8.40				12.3			5.5		46			
				66 A	1.4	0.9	1.3	0.13														
EBL OAKLAWN	16 / 16			67	0.25	0.5	0.25			8.82												
	39 / 40									8.82				12.3			5.5		48			
CROSSINGS SH 3 OF 3	13 / 14			72	0.22	0.9	0.20	0.20		5.55				12.5			4.7		61			
				70	1.10	0.9	0.99	9.02		14.57												
	41 / 42 A			77	0.46	0.9	0.41	1.40						12.6			4.2		5.9			
	42 / 48									15.97				5.30		2.43	4.1		6.7			
	49 / 50									15.97				0.14		2.59	4.1		6.7			
				72	0.60	0.9	0.56															
EBL OAKLAWN				72 A	0.09	0.5	0.09	0.56														
				73	0.55	0.9	0.50															
EBL OAKLAWN				73 A	0.09	0.9	0.08															
				74	0.84	0.9	0.76															
EBL OAKLAWN				79 A	0.12	0.9	0.11															
	51 / 68			79 A	0.17	0.9	0.15	2.04														
	61 / 62			75	1.4	0.9	1.26															
	53 / 60			76	0.74	0.9	0.67															
				77	0.81	0.9	0.73															
	55 / 64			77 A	0.53	0.9	0.48	5.14		21.15												
	60 / 69									21.15				.22		23.1	4.2		89			
	60 / 61									21.15				.25		23.4	4.2		89			
	62 / 63			87	0.73	0.9	0.66															
	64 / 65			80	0.63	0.9	0.57															
	66 / 67			87	0.71	0.9	0.64															
	63 / 69			87	0.66	0.9	0.59	2.64														
AREAS 1 THRU 24	15 / 19			1-24				11.44	2.04	14.08	FROM AREA 1 THRU 24						3.5		19			
	19 / 14								32.23							32	3.5					
				88 B	0.17	0.9	0.15										4.0		100			
EBL OAKLAWN				89 C	0.20	0.9	0.23															
	70 / 71			89	1.6	0.9	1.44	1.92								10	6		8.5			

| STREET OR LOCATION | STRUCT. NO. | PIPE D | PIPE L | PIPE S_o | PIPE n | PIPE | PIPE | PIPE | FULL FLOW Q | FULL FLOW V | CULVERT HEADWATER COMPUTATION | | | | | | | | | | | | | | |