NOTE CALCS REVISED 12/09/03 sheets noted

FILE

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWB
Checked by:
Sheet No: 1 of 12

BELLEAU SUBSTATION - AMEREN UE
STORM SEWERS Detention

STATE OF MISSOURI
MARK W. BIRCHLER
NUMBER E-19143
REGISTERED PROFESSIONAL ENGINEER
12/9/03

DRAINAGE AREAS

EXISTING SUBSTATION	2.53 AC.
EXPANSION AREA *	5.50 AC
DRAINAGE SWALES	1.39 AC
	9.42 AC

* INCLUDES AREA FOR FUTURE GROWTH AT SOUTHWEST CORNER OF SUBSTATION.

CI FACTORS

FOR AREAS COVERED IN CRUSHED STONE USE 40% IMPERVIOUS.

FOR DRAINAGE SWALE AREAS USE 5% IMPERVIOUS.

STORM		CI * 5% IMPERV	CI * 40% IMPERV.
2 YEAR	20 MIN.	1.26	1.83
5 YR	20 MIN.	1.87	2.64
25 YR	20 MIN.	2.31	3.25
50 YR	20 MIN.	2.62	3.68
100 YR	20 MIN	2.95	4.17

* INCLUDES GROUND SATURATION FACTORS

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWR
Checked by: /
Sheet No: 2/12

BELLEAU SUBSTATION

ALLOWABLE FLOWS.

2 YEAR 20 MIN STORM.

TOTAL AREA = 9.42 AC

40% IMPERV — 8.03 AC × 1.83 = 14.69 CFS
5% " — 1.39 AC × 1.26 = 1.75 CFS
16.44 CFS

16.44 CFS FLOW INTO BASIN.

5.50 AC ARE NOW BEING COVERED BY CRUSHED STONE

ΔPI FROM 5% TO 40% IMP.

(1.83 - 1.26)(5.50) = 3.13 CFS ΔQ

16.44 - 3.13 = 13.31 CFS ALLOWABLE FROM BASIN.

15 YEAR 20 MIN. STORM

TOTAL AREA = 9.42 AC.

40% IMP 8.03 AC × 2.64 = 21.20 CFS
5% IMP 1.39 AC × 1.87 = 2.60 CFS.
23.80 CFS.

23.80 CFS FLOW INTO BASIN.

5.50 AC ARE NOW BEING COVERED BY CRUSHED STONE.

ΔPI FROM 5% TO 40% IMP
(2.64 - 1.87)(5.50) = 4.23 CFS Δ Q

23.80 - 4.23 = 19.57 cfs. ALLOWABLE FROM BASIN.

25 YR. 20 MIN STORM

TOTAL AREA = 9.42 AC

40 % IMP.	8.03 × 3.25 =	26.10	cfs
5 % IMP.	1.39 × 2.31 =	3.21	cfs
		29.31	cfs.

29.31 cfs FLOW INTO BASIN.

Δ PI FROM 5% TO 40% IMP

(3.25 - 2.31)(5.50) = 5.17 cfs ΔQ

29.31 - 5.17 = 24.14 cfs. ALLOWABLE FROM BASIN.

50 YR 20 MIN STORM.

TOTAL AREA = 9.42 AC

40 % IMP	8.03 × 3.68 =	29.55	cfs
	1.39 × 2.62 =	3.64	cfs.
		33.19	cfs

33.19 cfs FLOW INTO BASIN.

Δ PI FROM. 5% TO 40% IMP.

(3.68 - 2.62)(5.50) = 5.83 cfs ΔQ

33.19 - 5.83 = 27.36 cfs. ALLOWABLE FLOW FROM BASIN.

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWB
Checked by:
Sheet No: 4/12

100YR 20 MIN STORM.

TOTAL AREA = 9.42

40% IMP. 8.03 × 4.17 = 33.48
1.39 × 2.95 = 4.10
37.58 cfs.

37.58 cfs FLOW INTO BASIN.

ΔPI FROM 5% TO 40% IMP.

(4.17 - 2.95)(5.50) = 6.71 cfs Δ Q.

37.58 - 6.71 = 30.87 cfs ALLOWABLE FROM BASIN.

FLOW SUMMARY

STORM FREQUENCY	TOTAL FLOW INTO BASIN CFS	TOTAL ALLOWABLE DISCHARGE CFS
2YR 20MIN	16.44	13.31
15YR 20MIN	23.8	19.57
25 YR 20 MIN	29.31	24.14
50 YR 20 MIN	33.19	27.36
100 YR 20 MIN	37.58	30.87

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 12/09/03
Designed by:
Checked by:
Sheet No: 5/12

ORIGINAL 09/30/03

BASIN CHARACTERISTICS

VOLUME OF BASIN PER DRAWINGS WITH 4' DIA DRAINAGE STRUCTURE

ELEV	AREA PER CONTOUR SF	VOLUME BETWEEN CONTOUR CF	VOL OF DRAINAGE STRUCTURE CF	COR. VOL PER CONTOUR CF	TOTAL VOLUME CF
498	260	0			
499	4,085.50	2,172.75	(19.63)	2,153.12	2,153
500	5,072.50	4,579.00	(19.63)	4,559.37	4,559
501	6,104.50	5,588.50	(19.63)	5,568.87	10,128
502	7,298.50	6,701.50	(19.63)	6,681.87	16,810
503	8,510.50	7,904.50	(19.63)	7,884.87	24,695
504	9,731.50	9,121.00	(19.63)	9,101.37	33,796
505	11,924.50	10,828.00	(19.63)	10,808.37	44,605
				46,758	

FINAL BASIN DATA WITHOUT SEDIMENT STORAGE

ELEV	VOLUME BETWEEN CONTOUR CF	TOTAL VOLUME CF
498		
499	2153	2,153.00
500	4,559	6,712.00
501	5,569	12,281.00
502	6,682	18,963.00
503	7,885	26,848.00
504	9,101	35,949.00
505	10,809	46,758.00

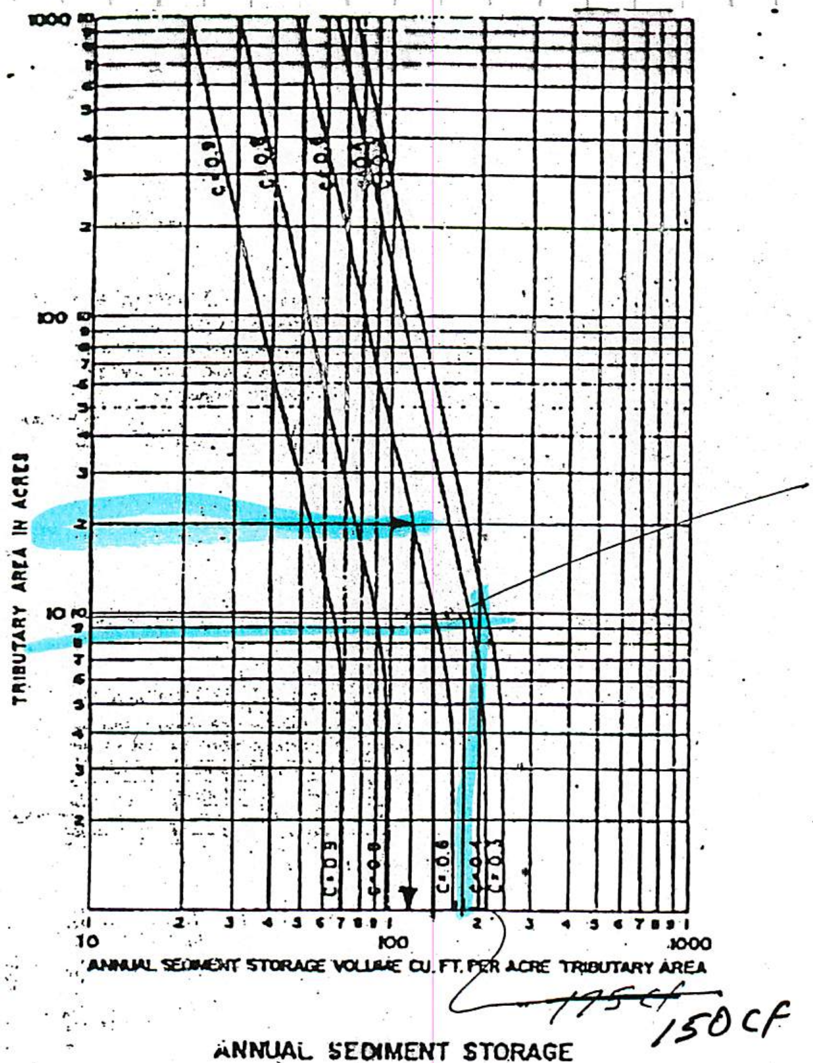
STARTING SILL ELEV OF WEIR = 498

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWB
Checked by:
Sheet No: 6/12
REV. 12/09/03

SEDIMENT STORAGE

C = ~~0.51~~ 0.60 40% IMPERV.
AREA 9.42 ACRES



ANNUAL SEDIMENT STORAGE

TOTAL STORAGE REQUIRED FOR 5 YEARS

(~~175~~ 150)(9.42)(5) = ~~8242.5~~

≈ ~~8243 CF~~

7065 CF

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 12/09/03
Designed by:
Checked by:
Sheet No: 7/12

ORIGINAL 09/30/03

BASIN DATA WITH SEDIMENT STORAGE DEFINED

BEGINNING ELEVATION OF WIER IS 498

BASIN DATA WITH SEDIMENT STORAGE DEFINED

ELEV	VOLUME BETWEEN CONTOUR CF	TOTAL VOLUME CF
498	0.00	0.00
499	2,153.00	2,153.00
500	4,559.00	6,712.00
500.06	3,684.00	7,065.00
501	5,216	12,281.00
502	6,682	18,963.00
503	7,885	26,848.00
504	9,101	35,949.00
505	10,809	46,757.63

VOL REQUIRED FOR SEDIMENT STORAGE

FINAL BASIN DATA WITH SEDIMENT STORAGE
BEGINNING ELEVATION OF WIER IS 500.06 ASSUME BASIN IS FILLED WITH SEDIMENT

ELEV	VOLUME BETWEEN CONTOUR CF	TOTAL VOLUME CF
500.06	0.00	0.00
501	5,216	5,216.00
502	6,682	11,898.00
503	7,885	19,783.00
504	9,101	28,884.00
505	10,809	39,693.00

CDG Engineers
Architects Planners, Inc.

File No:
Date: 12/09/03
Designed by:
Checked by:
Sheet No: 8/12

ORIGINAL 09/30/03

SUMMARY OF FLOWS FROM DETENTION BASIN *

	WITHOUT SEDIMENT			WITH 5 YRS SEDIMENT	
STORM FREQUENCY	MAX ALLOW DISCHARGE CFS	MAX DISCHARGE CFS	MAX WATER ELEV	MAX DISCHARGE CFS	MAX WATER ELEV
2YR 20 MIN	13.31	13.25	500.53	10.34	502.24
15YR 20MIN	19.57	19.19	501.26	15.55	502.95
25YR 20MIN	24.14	23.13	501.69	19.54	503.4
50YR 20MIN	27.36	26.64	502.08	22.33	503.72
100YR 20MIN	30.87	30.08	502.41	26.02	504.08

SLC 504.50 OK
12/12/03

*see back of Report for Hydrograph runs.

100 YEAR 20 MIN POND overflow check

Assume weir is blocked water is at ELEV. ~~504.10~~ 504.50

what is ELEVATION of water flow into 48" DIA open manhole (Drain structure)

use ORFice EQUATION $Q = CA\sqrt{2gH}$

Q = Flow
C = Coef (use 0.6)
G = 32.2
H = Ht of water over sill
A = cross sectional AREA

Q = 37.58 cfs
A = $(4/2)^2\pi$ = 12.56 FT^2
C = 0.6

$37.58 = (0.6)(12.56)\sqrt{2(32.2)H}$

$37.58 = 7.54\sqrt{64.4H}$

$4.98 = \sqrt{64.4H}$

$24.84 = 64.4H$

$\frac{24.84}{64.4} = H$

$0.38' = H$

SILL ELEV ~~504.18~~ 504.50

HT of WATER 0.38

~~504.56~~ ELEV of WATER

504.88

TOP of DAM ELEV 505.00 ✓

NO OVERTOP.

PIPE HYDRAULICS

DS #1 TO FE #2

$Q = 37.58$ 100 YR 24 HR.

PIPE CAPACITY 30" RCP @ 1.0 % = 41.01 CFS

ASSUME PIPE FULL $V = \frac{Q}{A} = \frac{41.01}{4.909} = 8.35$ FPS

$V^2/2G \quad (8.35)^2/2(32.2) = 1.08.$

HYDRAULIC GRADE $Sh = \left(\frac{Q}{K_N}\right)^2 = \left(\frac{37.58}{4410.1}\right)^2$

$= 0.0084$

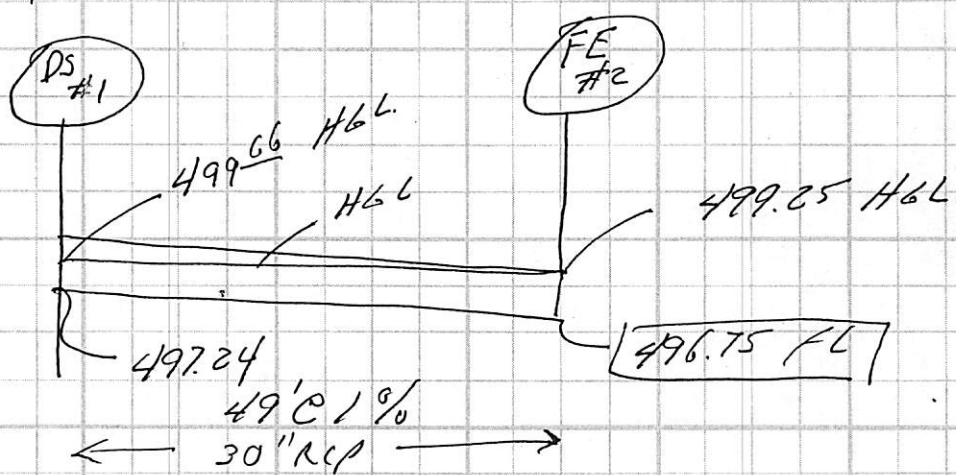
CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWB
Checked by:
Sheet No: 10/12

FRICTION HEAD = Sh x L = (0.0084)(49)
= 0.41.

FL of 30" pipe @ FE #2. 496.75
top of pipe 2.50
STARTING HGL ELEV. 499.25

HGL start + FRICTION HEAD 499.25
.41
HGL @ DS #1 499.66.
FL of DS #1 497.24



FE #3 + FE #4

DRAINAGE AREA 0.30 AC 5.0% IMPERVIOUS
PI = 2.62 50 yr 20 MIN.

Q = PIA = (2.62)(.30) = 0.79 cfs.

PIPE SIZE 24" CMP CAPACITY 24.99 cfs
4.17 %

PIPE SIZE OK

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWB
Checked by:
Sheet No: 10A/12.

$PI = 1.87$ 15yr 20 MIN

$Q = PIA = (1.87)(.30) = 0.561$ cfs

$PI = 2.31$ 25yr 20 MIN

$Q = PIA = (2.31)(.30) = 0.69$ cfs.

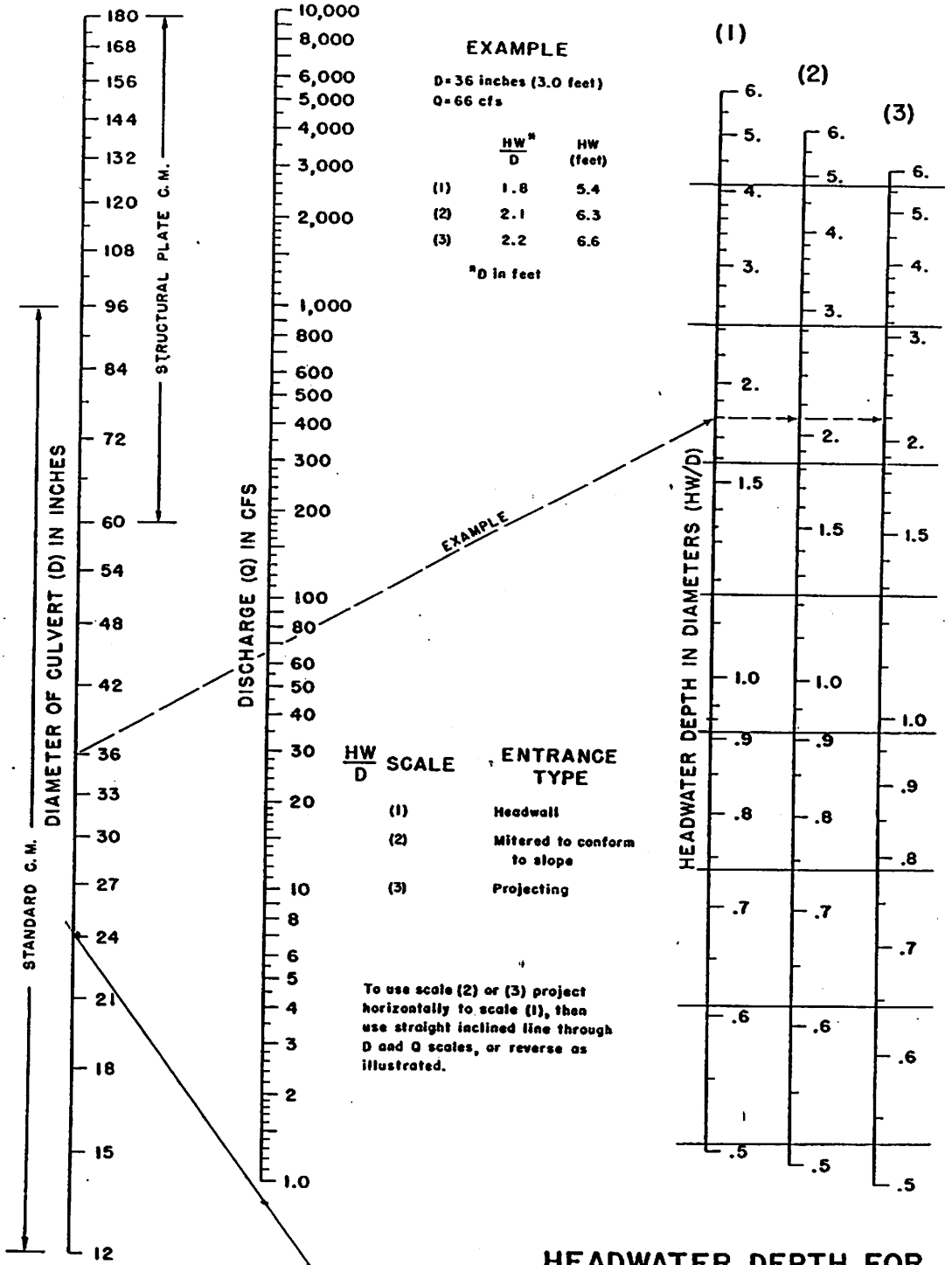
$PI = 2.95$ 100yr 20 MIN

$Q = PIA = (2.95)(0.30) = 0.88$ cfs

03649
09/30/03
MWB

11/12

CHART 5



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

Not applicable.

CDG Engineers
Architects Planners, Inc.

File No: 03049
Date: 09/30/03
Designed by: MWB
Checked by:
Sheet No: 12/12

HYDRAULIC GRADE LINE CALCULATION.

ASSUME PIPE FULL $V = \frac{Q}{A} = \frac{0.30}{3.14} = 0.095$ CFS

$\frac{V^2}{2G} \quad \frac{(0.095)^2}{64.4} = .00014$

HYDRAULIC GRADE $Sh = \left(\frac{Q}{KN}\right)^2 \quad \left(\frac{0.30}{122.5}\right)^2 = .000006$ (NEG.)

DETENTION POND CALCULATIONS

09/23/03
12/09/03

BELLEAU SUBSTATION

2yr 20 min

DETENTION POND WITH 5 YEARS SEDIMENT

POND INFORMATION

ELEVATION	TOTAL STORAGE CF
500.06	0.0
501	5,216.0
502	11,898.0
503	19,783.0
504	28,884.0
505	36,693.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL	500.06
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR	weir
WIDTH(FT)	1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	500.06
	3.00	1.00	501.06
	8.49	2.00	502.06
	15.59	3.00	503.06
	24.00	4.00	504.06
	33.54	5.00	505.06
	44.09	6.00	506.06
	55.56	7.00	507.06
	67.88	8.00	508.06

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	2	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	16.44	986.4	–		0.00	0.00	0.00	500.06
1	16.44	986.4	986.40	32.00	0.53	16.00	970.40	500.23
2	16.44	986.4	1956.80	63.48	1.06	47.74	1,909.06	500.40
3	16.44	986.4	2895.46	93.92	1.57	78.70	2,816.76	500.57
4	16.44	986.4	3803.16	123.37	2.06	108.65	3,694.52	500.73
5	16.44	986.4	4680.92	151.84	2.53	137.61	4,543.31	500.88
6	16.44	986.4	5529.71	177.65	2.96	164.75	5,364.96	501.02
7	16.44	986.4	6351.36	216.17	3.60	196.91	6,154.45	501.14
8	16.44	986.4	7140.85	255.06	4.25	235.62	6,905.23	501.25
9	16.44	986.4	7891.63	292.04	4.87	273.55	7,618.08	501.36
10	16.44	986.4	8604.48	327.15	5.45	309.59	8,294.89	501.46
11	16.44	986.4	9281.29	360.49	6.01	343.82	8,937.47	501.56
12	16.44	986.4	9923.87	392.14	6.54	376.31	9,547.56	501.65
13	16.44	986.4	10533.96	422.19	7.04	407.16	10,126.80	501.73
14	16.44	986.4	11113.20	450.72	7.51	436.45	10,676.75	501.82
15	16.44	986.4	11663.15	477.80	7.96	464.26	11,198.89	501.90
16	16.44	986.4	12185.29	501.36	8.36	489.58	11,695.71	501.97
17	16.44	986.4	12682.11	525.93	8.77	513.64	12,168.47	502.03
18	16.44	986.4	13154.87	551.48	9.19	538.70	12,616.16	502.09
19	16.44	986.4	13602.56	575.68	9.59	563.58	13,038.98	502.14
20	16.44	986.4	14025.38	598.53	9.98	587.11	13,438.28	502.20
21	0	0	14424.68	620.11	10.34	609.32	13,815.35	502.24
22	0	0	13815.35	587.18	9.79	603.65	13,211.71	502.17
23	0	0	13211.71	554.55	9.24	570.87	12,640.84	502.09
24	0	0	12640.84	523.70	8.73	539.12	12,101.72	502.03
25	0	0	12101.72	497.87	8.30	510.78	11,590.93	501.95
26	0	0	11590.93	474.25	7.90	486.06	11,104.87	501.88
27	0	0	11104.87	450.30	7.51	462.28	10,642.60	501.81
28	0	0	10642.60	427.54	7.13	438.92	10,203.68	501.75
29	0	0	10203.68	405.92	6.77	416.73	9,786.95	501.68
30	0	0	9786.95	385.39	6.42	395.65	9,391.30	501.62
31	0	0	9391.30	365.90	6.10	375.65	9,015.65	501.57
32	0	0	9015.65	347.40	5.79	356.65	8,658.99	501.52
33	0	0	8658.99	329.84	5.50	338.62	8,320.38	501.46
34	0	0	8320.38	313.16	5.22	321.50	7,998.88	501.42
35	0	0	7998.88	297.32	4.96	305.24	7,693.64	501.37
36	0	0	7693.64	282.29	4.70	289.80	7,403.84	501.33
37	0	0	7403.84	268.01	4.47	275.15	7,128.69	501.29
38	0	0	7128.69	254.46	4.24	261.24	6,867.45	501.25
39	0	0	6867.45	241.59	4.03	248.03	6,619.42	501.21
40	0	0	6619.42	229.38	3.82	235.49	6,383.94	501.17
41	0	0	6383.94	217.78	3.63	223.58	6,160.36	501.14
42	0	0	6160.36	206.77	3.45	212.27	5,948.09	501.11
43	0	0	5948.09	196.31	3.27	201.54	5,746.55	501.08
44	0	0	5746.55	186.38	3.11	191.35	5,555.20	501.05
45	0	0	5555.20	178.34	2.97	182.36	5,372.84	501.02
46	0	0	5372.84	173.42	2.89	175.88	5,196.96	501.00
47	0	0	5196.96	168.58	2.81	171.00	5,025.95	500.97
48	0	0	5025.95	163.04	2.72	165.81	4,860.14	500.94
49	0	0	4860.14	157.66	2.63	160.35	4,699.80	500.91
50	0	0	4699.80	152.46	2.54	155.06	4,544.74	500.88
51	0	0	4544.74	147.43	2.46	149.94	4,394.80	500.85
52	0	0	4394.80	142.56	2.38	144.99	4,249.81	500.83
53	0	0	4249.81	137.86	2.30	140.21	4,109.60	500.80
54	0	0	4109.60	133.31	2.22	135.58	3,974.02	500.78
55	0	0	3974.02	128.91	2.15	131.11	3,842.90	500.75
56	0	0	3842.90	124.66	2.08	126.79	3,716.12	500.73
57	0	0	3716.12	120.55	2.01	122.60	3,593.52	500.71
58	0	0	3593.52	116.57	1.94	118.56	3,474.96	500.69
59	0	0	3474.96	112.72	1.88	114.65	3,360.31	500.67
60	0	0	3360.31	109.00	1.82	110.86	3,249.45	500.65
61	0	0	3249.45	105.41	1.76	107.21	3,142.24	500.63
62	0	0	3142.24	101.93	1.70	103.67	3,038.58	500.61
63	0	0	3038.58	98.57	1.64	100.25	2,938.33	500.59
64	0	0	2938.33	95.32	1.59	96.94	2,841.39	500.57
65	0	0	2841.39	92.17	1.54	93.74	2,747.64	500.56
66	0	0	2747.64	89.13	1.49	90.65	2,656.99	500.54
67	0	0	2656.99	86.19	1.44	87.66	2,569.33	500.52
68	0	0	2569.33	83.35	1.39	84.77	2,484.56	500.51
69	0	0	2484.56	80.60	1.34	81.97	2,402.59	500.49
70	0	0	2402.59	77.94	1.30	79.27	2,323.33	500.48
71	0	0	2323.33	75.37	1.26	76.65	2,246.68	500.46
72	0	0	2246.68	72.88	1.21	74.12	2,172.55	500.45
73	0	0	2172.55	70.47	1.17	71.68	2,100.88	500.44
74	0	0	2100.88	68.15	1.14	69.31	2,031.57	500.43
75	0	0	2031.57	65.90	1.10	67.03	1,964.54	500.41
76	0	0	1964.54	63.73	1.06	64.81	1,899.73	500.40
77	0	0	1899.73	61.62	1.03	62.68	1,837.05	500.39
78	0	0	1837.05	59.59	0.99	60.61	1,776.44	500.38
79	0	0	1776.44	57.63	0.96	58.61	1,717.83	500.37
80	0	0	1717.83	55.72	0.93	56.67	1,661.16	500.36
85	0	0	1661.16	53.89	0.90	274.02	1,387.13	500.31
90	0	0	1387.13	45.00	0.75	247.21	1,139.93	500.27
95	0	0	1139.93	36.98	0.62	204.94	934.99	500.23
100	0	0	934.99	30.33	0.51	168.27	766.72	500.20
105	0	0	766.72	24.87	0.41	138.00	628.72	500.17
110	0	0	628.72	20.39	0.34	113.17	515.55	500.15
120	0	0	515.55	16.72	0.28	185.59	329.96	500.12
143	0	0	329.96	10.70	0.18	315.41	14.55	500.06

DETENTION POND CALCULATIONS

2-YEAR STORM 20 MIN

BELLEAU SUBSTATION

09/23/2009
12'09/03

DETENTION POND
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
498	0.0
499	2,153.0
500	6,712.0
501	12,281.0
502	18,963.0
503	26,848.0
504	35,949.0
505	46,758.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL: 498
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR: weir
WIDTH(FT): 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	498.00
	3.00	1.00	499.00
	8.49	2.00	500.00
	15.59	3.00	501.00
	24.00	4.00	502.00
	33.54	5.00	503.00
	44.09	6.00	504.00
	55.56	7.00	505.00
	67.88	8.00	506.00

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	2	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	16.44	986.4	--		0.00	0.00	0.00	498.00
2	16.44	986.4	986.40	82.47	1.37	82.47	903.93	498.42
3	16.44	986.4	1890.33	158.04	2.63	120.25	1,770.08	498.82
4	16.44	986.4	2756.48	223.57	3.73	190.80	2,565.68	499.09
5	16.44	986.4	3552.08	281.00	4.68	252.28	3,299.79	499.25
6	16.44	986.4	4286.19	334.00	5.57	307.50	3,978.70	499.40
7	16.44	986.4	4965.10	383.01	6.38	358.50	4,606.59	499.54
8	16.44	986.4	5592.99	428.34	7.14	405.67	5,187.32	499.67
9	16.44	986.4	6173.72	470.26	7.84	449.30	5,724.43	499.78
10	16.44	986.4	6710.83	509.03	8.48	489.65	6,221.18	499.89
11	16.44	986.4	7207.58	547.04	9.12	528.04	6,679.54	499.99
12	16.44	986.4	7665.94	582.12	9.70	564.58	7,101.36	500.07
13	16.44	986.4	8087.76	614.40	10.24	598.26	7,489.50	500.14
14	16.44	986.4	8475.90	644.11	10.74	629.25	7,846.64	500.20
15	16.44	986.4	8833.04	671.44	11.19	657.77	8,175.27	500.26
16	16.44	986.4	9161.67	696.59	11.61	684.01	8,477.66	500.32
17	16.44	986.4	9464.06	719.73	12.00	708.16	8,755.90	500.37
18	16.44	986.4	9742.30	741.02	12.35	730.38	9,011.92	500.41
19	16.44	986.4	9998.32	760.62	12.68	750.82	9,247.50	500.46
20	16.44	986.4	10233.90	778.65	12.98	769.63	9,464.27	500.49
21	0	0	10450.67	795.23	13.25	786.94	9,663.73	500.53
22	0	0	9663.73	735.01	12.25	765.12	8,898.61	500.39
23	0	0	8898.61	676.46	11.27	705.73	8,192.88	500.27
24	0	0	8192.88	622.45	10.37	649.45	7,543.43	500.15
25	0	0	7543.43	572.75	9.55	597.60	6,945.83	500.04
26	0	0	6945.83	527.01	8.78	549.88	6,395.95	499.93
27	0	0	6395.95	486.30	8.11	506.66	5,889.30	499.82
28	0	0	5889.30	449.73	7.50	468.01	5,421.28	499.72
29	0	0	5421.28	415.94	6.93	432.83	4,988.45	499.62
30	0	0	4988.45	384.69	6.41	400.32	4,588.13	499.53
31	0	0	4588.13	355.79	5.93	370.24	4,217.89	499.45
32	0	0	4217.89	329.07	5.48	342.43	3,875.46	499.38
33	0	0	3875.46	304.35	5.07	316.71	3,558.76	499.31
34	0	0	3558.76	281.48	4.69	292.91	3,265.84	499.24
35	0	0	3265.84	260.34	4.34	270.91	2,994.93	499.18
36	0	0	2994.93	240.78	4.01	250.56	2,744.37	499.13
37	0	0	2744.37	222.69	3.71	231.74	2,512.64	499.08
38	0	0	2512.64	205.96	3.43	214.33	2,298.31	499.03
39	0	0	2298.31	190.49	3.17	198.23	2,100.08	498.98
40	0	0	2100.08	175.58	2.93	183.03	1,917.05	498.89
41	0	0	1917.05	160.27	2.67	167.92	1,749.13	498.81
42	0	0	1749.13	146.23	2.44	153.25	1,595.87	498.74
43	0	0	1595.87	133.42	2.22	139.83	1,456.04	498.68
44	0	0	1456.04	121.73	2.03	127.58	1,328.47	498.62
45	0	0	1328.47	111.07	1.85	116.40	1,212.07	498.56
46	0	0	1212.07	101.33	1.69	106.20	1,105.87	498.51
47	0	0	1105.87	92.46	1.54	96.89	1,008.97	498.47
48	0	0	1008.97	84.35	1.41	88.41	920.57	498.43
49	0	0	920.57	76.96	1.28	80.66	839.91	498.39
50	0	0	839.91	70.22	1.17	73.59	766.32	498.36
51	0	0	766.32	64.07	1.07	67.14	699.17	498.32
52	0	0	699.17	58.45	0.97	61.26	637.91	498.30
53	0	0	637.91	53.33	0.89	55.89	582.02	498.27
54	0	0	582.02	48.66	0.81	51.00	531.03	498.25
55	0	0	531.03	44.40	0.74	46.53	484.50	498.23
56	0	0	484.50	40.51	0.68	42.45	442.05	498.21
57	0	0	442.05	36.96	0.62	38.73	403.31	498.19
58	0	0	403.31	33.72	0.56	35.34	367.98	498.17
59	0	0	367.98	30.76	0.51	32.24	335.74	498.16
60	0	0	335.74	28.07	0.47	29.42	306.32	498.14
61	0	0	306.32	25.61	0.43	26.84	279.48	498.13
62	0	0	279.48	23.37	0.39	24.49	254.99	498.12
63	0	0	254.99	21.32	0.36	22.34	232.65	498.11
64	0	0	232.65	19.45	0.32	20.38	212.27	498.10
65	0	0	212.27	17.75	0.30	18.60	193.67	498.09
66	0	0	193.67	16.19	0.27	16.97	176.70	498.08
67	0	0	176.70	14.77	0.25	15.48	161.22	498.07
68	0	0	161.22	13.48	0.22	14.13	147.09	498.07
69	0	0	147.09	12.30	0.20	12.89	134.20	498.06
70	0	0	134.20	11.22	0.19	11.76	122.44	498.06
75	0	0	122.44	10.24	0.17	53.64	68.80	498.03
78	0	0	68.80	5.75	0.10	23.98	44.82	498.02
80	0	0	44.82	3.75	0.06	9.50	35.32	498.02
85	0	0	35.32	2.95	0.05	16.75	18.57	498.01
90	0	0	18.57	1.55	0.03	11.26	7.31	498.00

DETENTION POND CALCULATIONS

09/23/03
12'09/03

BELLEAU SUBSTATION

15yr 20 min

DETENTION POND WITH 5 YEARS SEDIMENT
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
500.06	0.0
501	5,216.0
502	11,898.0
503	19,783.0
504	28,884.0
505	36,693.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 500.06
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	500.06
	3.00	1.00	501.06
	8.49	2.00	502.06
	15.59	3.00	503.06
	24.00	4.00	504.06
	33.54	5.00	505.06
	44.09	6.00	506.06
	55.56	7.00	507.06
	67.88	8.00	508.06

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	15	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	23.8	1428	–		0.00	0.00	0.00	500.06
1	23.8	1428	1428.00	46.32	0.77	23.16	1,404.84	500.31
2	23.8	1428	2832.84	91.89	1.53	69.11	2,763.73	500.56
3	23.8	1428	4191.73	135.97	2.27	113.93	4,077.80	500.79
4	23.8	1428	5505.80	177.01	2.95	156.49	5,349.31	501.02
5	23.8	1428	6777.31	237.15	3.95	207.08	6,570.23	501.20
6	23.8	1428	7998.23	297.29	4.95	267.22	7,731.00	501.38
7	23.8	1428	9159.00	354.46	5.91	325.88	8,833.13	501.54
8	23.8	1428	10261.13	408.75	6.81	381.60	9,879.52	501.70
9	23.8	1428	11307.52	460.29	7.67	434.52	10,873.01	501.85
10	23.8	1428	12301.01	506.19	8.44	483.24	11,817.77	501.99
11	23.8	1428	13245.77	556.39	9.27	531.29	12,714.48	502.10
12	23.8	1428	14142.48	604.86	10.08	580.63	13,561.85	502.21
13	23.8	1428	14989.85	650.66	10.84	627.76	14,362.09	502.31
14	23.8	1428	15790.09	693.92	11.57	672.29	15,117.80	502.41
15	23.8	1428	16545.80	734.76	12.25	714.34	15,831.46	502.50
16	23.8	1428	17259.46	773.34	12.89	754.05	16,505.41	502.58
17	23.8	1428	17933.41	809.76	13.50	791.55	17,141.86	502.67
18	23.8	1428	18569.86	844.16	14.07	826.96	17,742.89	502.74
19	23.8	1428	19170.89	876.65	14.61	860.41	18,310.49	502.81
20	23.8	1428	19738.49	907.33	15.12	891.99	18,846.50	502.88
21	0	0	20274.50	932.75	15.55	920.04	19,354.45	502.95
22	0	0	19354.45	886.57	14.78	909.66	18,444.79	502.83
23	0	0	18444.79	837.40	13.96	861.99	17,582.80	502.72
24	0	0	17582.80	790.81	13.18	814.11	16,768.69	502.62
25	0	0	16768.69	746.81	12.45	768.81	15,999.88	502.52
26	0	0	15999.88	705.26	11.75	726.03	15,273.85	502.43
27	0	0	15273.85	666.01	11.10	685.63	14,588.22	502.34
28	0	0	14588.22	628.95	10.48	647.48	13,940.73	502.26
29	0	0	13940.73	593.96	9.90	611.46	13,329.28	502.18
30	0	0	13329.28	560.91	9.35	577.43	12,751.84	502.11
31	0	0	12751.84	529.70	8.83	545.30	12,206.54	502.04
32	0	0	12206.54	502.25	8.37	515.97	11,690.57	501.97
33	0	0	11690.57	479.15	7.99	490.70	11,199.87	501.90
34	0	0	11199.87	454.98	7.58	467.07	10,732.80	501.83
35	0	0	10732.80	431.98	7.20	443.48	10,289.32	501.76
36	0	0	10289.32	410.14	6.84	421.06	9,868.26	501.70
37	0	0	9868.26	389.40	6.49	399.77	9,468.50	501.64
38	0	0	9468.50	369.71	6.16	379.55	9,088.94	501.58
39	0	0	9088.94	351.01	5.85	360.36	8,728.59	501.53
40	0	0	8728.59	333.26	5.55	342.14	8,386.45	501.47
41	0	0	8386.45	316.41	5.27	324.84	8,061.61	501.43
42	0	0	8061.61	300.41	5.01	308.41	7,753.20	501.38
43	0	0	7753.20	285.22	4.75	292.82	7,460.38	501.34
44	0	0	7460.38	270.80	4.51	278.01	7,182.37	501.29
45	0	0	7182.37	257.11	4.29	263.95	6,918.42	501.25
46	0	0	6918.42	244.10	4.07	250.60	6,667.82	501.22
47	0	0	6667.82	231.76	3.86	237.93	6,429.88	501.18
48	0	0	6429.88	220.04	3.67	225.90	6,203.98	501.15
49	0	0	6203.98	208.92	3.48	214.48	5,989.50	501.12
50	0	0	5989.50	198.35	3.31	203.63	5,785.87	501.09
51	0	0	5785.87	188.32	3.14	193.34	5,592.53	501.06
52	0	0	5592.53	179.34	2.99	183.83	5,408.70	501.03
53	0	0	5408.70	174.39	2.91	176.87	5,231.84	501.00
54	0	0	5231.84	169.63	2.83	172.01	5,059.83	500.97
55	0	0	5059.83	164.13	2.74	166.88	4,892.95	500.94
56	0	0	4892.95	158.72	2.65	161.43	4,731.52	500.91
57	0	0	4731.52	153.48	2.56	156.10	4,575.42	500.88
58	0	0	4575.42	148.42	2.47	150.95	4,424.46	500.86
59	0	0	4424.46	143.52	2.39	145.97	4,278.49	500.83
60	0	0	4278.49	138.79	2.31	141.16	4,137.34	500.81
61	0	0	4137.34	134.21	2.24	136.50	4,000.84	500.78
62	0	0	4000.84	129.78	2.16	132.00	3,868.84	500.76
63	0	0	3868.84	125.50	2.09	127.64	3,741.20	500.73
64	0	0	3741.20	121.36	2.02	123.43	3,617.77	500.71
65	0	0	3617.77	117.36	1.96	119.36	3,498.41	500.69
66	0	0	3498.41	113.48	1.89	115.42	3,382.99	500.67
67	0	0	3382.99	109.74	1.83	111.61	3,271.38	500.65
68	0	0	3271.38	106.12	1.77	107.93	3,163.45	500.63
69	0	0	3163.45	102.62	1.71	104.37	3,059.08	500.61
70	0	0	3059.08	99.23	1.65	100.93	2,958.16	500.59
71	0	0	2958.16	95.96	1.60	97.60	2,860.56	500.58
72	0	0	2860.56	92.79	1.55	94.38	2,766.19	500.56
73	0	0	2766.19	89.73	1.50	91.26	2,674.93	500.54
74	0	0	2674.93	86.77	1.45	88.25	2,586.67	500.53
75	0	0	2586.67	83.91	1.40	85.34	2,501.33	500.51
76	0	0	2501.33	81.14	1.35	82.52	2,418.81	500.50
77	0	0	2418.81	78.46	1.31	79.80	2,339.01	500.48
78	0	0	2339.01	75.87	1.26	77.17	2,261.84	500.47
79	0	0	2261.84	73.37	1.22	74.62	2,187.22	500.45
80	0	0	2187.22	70.95	1.18	72.16	2,115.06	500.44
85	0	0	2115.06	68.61	1.14	348.90	1,766.16	500.38
90	0	0	1766.16	57.29	0.95	314.75	1,451.40	500.32
95	0	0	1451.40	47.08	0.78	260.93	1,190.47	500.27
100	0	0	1190.47	38.62	0.64	214.25	976.22	500.24
105	0	0	976.22	31.67	0.53	175.71	800.51	500.20
110	0	0	800.51	25.97	0.43	144.09	656.42	500.18
120	0	0	656.42	21.29	0.35	236.31	420.12	500.14
143	0	0	420.12	13.63	0.23	401.60	18.52	500.06

DETENTION POND CALCULATIONS 15-YEAR STORM 20 MIN

BELLEAU SUBSTATION 09/23/2009
12/09/03

DETENTION POND
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
498	0.0
499	2,153.0
500	6,712.0
501	12,281.0
502	18,963.0
503	26,848.0
504	35,949.0
505	46,758.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL	498
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR	weir
WIDTH(FT)	1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	498.00
	3.00	1.00	499.00
	8.49	2.00	500.00
	15.59	3.00	501.00
	24.00	4.00	502.00
	33.54	5.00	503.00
	44.09	6.00	504.00
	55.56	7.00	505.00
	67.88	8.00	506.00

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	15	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR+IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV FT
0	23.8	1428	–		0.00	0.00	0.00	498.00
2	23.8	1428	1428.00	119.39	1.99	119.39	1,308.61	498.61
3	23.8	1428	2736.61	222.13	3.70	170.76	2,565.85	499.09
4	23.8	1428	3993.85	312.89	5.21	267.51	3,726.34	499.35
5	23.8	1428	5154.34	396.67	6.61	354.78	4,799.56	499.58
6	23.8	1428	6227.56	474.14	7.90	435.41	5,792.15	499.80
7	23.8	1428	7220.15	548.01	9.13	511.08	6,709.08	500.00
8	23.8	1428	8137.08	618.18	10.30	583.09	7,553.99	500.15
9	23.8	1428	8981.99	682.84	11.38	650.51	8,331.48	500.29
10	23.8	1428	9759.48	742.34	12.37	712.59	9,046.89	500.42
11	23.8	1428	10474.89	797.09	13.28	769.71	9,705.18	500.54
12	23.8	1428	11133.18	847.47	14.12	822.28	10,310.90	500.65
13	23.8	1428	11738.90	893.82	14.90	870.64	10,868.26	500.75
14	23.8	1428	12296.26	936.46	15.61	915.14	11,381.12	500.84
15	23.8	1428	12809.12	975.20	16.25	955.83	11,853.29	500.92
16	23.8	1428	13281.29	1010.86	16.85	993.03	12,288.26	501.00
17	23.8	1428	13716.26	1043.71	17.40	1027.29	12,688.98	501.06
18	23.8	1428	14116.98	1073.98	17.90	1058.85	13,058.13	501.12
19	23.8	1428	14486.13	1101.86	18.36	1087.92	13,398.21	501.17
20	23.8	1428	14826.21	1127.55	18.79	1114.70	13,711.51	501.21
21	0	0	15139.51	1151.21	19.19	1139.38	14,000.13	501.26
22	0	0	14000.13	1065.15	17.75	1108.18	12,891.95	501.09
23	0	0	12891.95	981.45	16.36	1023.30	11,868.64	500.93
24	0	0	11868.64	903.75	15.06	942.60	10,926.04	500.76
25	0	0	10926.04	831.61	13.86	867.68	10,058.36	500.60
26	0	0	10058.36	765.21	12.75	798.41	9,259.95	500.46
27	0	0	9259.95	704.11	11.74	734.66	8,525.29	500.33
28	0	0	8525.29	647.89	10.80	676.00	7,849.29	500.20
29	0	0	7849.29	596.15	9.94	622.02	7,227.27	500.09
30	0	0	7227.27	548.55	9.14	572.35	6,654.92	499.99
31	0	0	6654.92	505.00	8.42	526.77	6,128.15	499.87
32	0	0	6128.15	466.97	7.78	485.98	5,642.16	499.77
33	0	0	5642.16	431.88	7.20	449.43	5,192.74	499.67
34	0	0	5192.74	399.44	6.66	415.66	4,777.07	499.58
35	0	0	4777.07	369.43	6.16	384.44	4,392.64	499.49
36	0	0	4392.64	341.68	5.69	355.56	4,037.08	499.41
37	0	0	4037.08	316.01	5.27	328.85	3,708.23	499.34
38	0	0	3708.23	292.27	4.87	304.14	3,404.09	499.27
39	0	0	3404.09	270.32	4.51	281.30	3,122.80	499.21
40	0	0	3122.80	250.01	4.17	260.16	2,862.63	499.16
41	0	0	2862.63	231.23	3.85	240.62	2,622.01	499.10
42	0	0	2622.01	213.86	3.56	222.54	2,399.47	499.05
43	0	0	2399.47	197.79	3.30	205.83	2,193.64	499.01
44	0	0	2193.64	182.93	3.05	190.36	2,003.28	498.93
45	0	0	2003.28	167.48	2.79	175.21	1,828.07	498.85
46	0	0	1828.07	152.83	2.55	160.16	1,667.91	498.77
47	0	0	1667.91	139.44	2.32	146.14	1,521.77	498.71
48	0	0	1521.77	127.23	2.12	133.34	1,388.44	498.64
49	0	0	1388.44	116.08	1.93	121.65	1,266.78	498.59
50	0	0	1266.78	105.91	1.77	110.99	1,155.79	498.54
51	0	0	1155.79	96.63	1.61	101.27	1,054.52	498.49
52	0	0	1054.52	88.16	1.47	92.40	962.13	498.45
53	0	0	962.13	80.44	1.34	84.30	877.83	498.41
54	0	0	877.83	73.39	1.22	76.91	800.91	498.37
55	0	0	800.91	66.96	1.12	70.17	730.74	498.34
56	0	0	730.74	61.09	1.02	64.03	666.71	498.31
57	0	0	666.71	55.74	0.93	58.42	608.29	498.28
58	0	0	608.29	50.86	0.85	53.30	555.00	498.26
59	0	0	555.00	46.40	0.77	48.63	506.37	498.24
60	0	0	506.37	42.33	0.71	44.37	462.00	498.21
61	0	0	462.00	38.63	0.64	40.48	421.52	498.20
62	0	0	421.52	35.24	0.59	36.93	384.59	498.18
63	0	0	384.59	32.15	0.54	33.70	350.89	498.16
64	0	0	350.89	29.34	0.49	30.74	320.15	498.15
65	0	0	320.15	26.77	0.45	28.05	292.10	498.14
66	0	0	292.10	24.42	0.41	25.59	266.50	498.12
67	0	0	266.50	22.28	0.37	23.35	243.15	498.11
68	0	0	243.15	20.33	0.34	21.30	221.85	498.10
69	0	0	221.85	18.55	0.31	19.44	202.41	498.09
70	0	0	202.41	16.92	0.28	17.73	184.67	498.09
71	0	0	184.67	15.44	0.26	16.18	168.49	498.08
72	0	0	168.49	14.09	0.23	14.76	153.73	498.07
73	0	0	153.73	12.85	0.21	13.47	140.26	498.07
74	0	0	140.26	11.73	0.20	12.29	127.97	498.06
75	0	0	127.97	10.70	0.18	11.21	116.76	498.05
76	0	0	116.76	9.76	0.16	10.23	106.53	498.05
77	0	0	106.53	8.91	0.15	9.33	97.19	498.05
80	0	0	97.19	8.13	0.14	25.55	71.65	498.03
90	0	0	71.65	5.99	0.10	70.58	1.07	498.00

DETENTION POND CALCULATIONS

09/23/03
12/09/03

BELLEAU SUBSTATION

25yr 20 min

DETENTION POND WITH 5 YEARS SEDIMENT
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
500.06	0.0
501	5,216.0
502	11,898.0
503	19,783.0
504	28,884.0
505	36,693.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 500.06
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	500.06
	3.00	1.00	501.06
	8.49	2.00	502.06
	15.59	3.00	503.06
	24.00	4.00	504.06
	33.54	5.00	505.06
	44.09	6.00	506.06
	55.56	7.00	507.06
	67.88	8.00	508.06

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	25	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR-HF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	29.31	1758.6	--		0.00	0.00	0.00	500.06
1	29.31	1758.6	1758.60	57.05	0.95	28.52	1,730.08	500.37
2	29.31	1758.6	3488.68	113.17	1.89	85.11	3,403.57	500.67
3	29.31	1758.6	5162.17	167.45	2.79	140.31	5,021.86	500.97
4	29.31	1758.6	6780.46	237.31	3.96	202.38	6,578.08	501.20
5	29.31	1758.6	8336.68	313.96	5.23	275.63	8,061.04	501.43
6	29.31	1758.6	9819.64	387.00	6.45	350.48	9,469.16	501.64
7	29.31	1758.6	11227.76	456.36	7.61	421.68	10,806.08	501.84
8	29.31	1758.6	12564.68	519.58	8.66	487.97	12,076.71	502.02
9	29.31	1758.6	13835.31	588.26	9.80	553.92	13,281.39	502.18
10	29.31	1758.6	15039.99	653.37	10.89	620.82	14,419.18	502.32
11	29.31	1758.6	16177.78	714.87	11.91	684.12	15,493.66	502.46
12	29.31	1758.6	17252.26	772.95	12.88	743.91	16,508.35	502.58
13	29.31	1758.6	18266.95	827.79	13.80	800.37	17,466.58	502.71
14	29.31	1758.6	19225.18	879.59	14.66	853.69	18,371.49	502.82
15	29.31	1758.6	20130.09	925.99	15.43	902.79	19,227.30	502.93
16	29.31	1758.6	20985.90	971.73	16.20	948.86	20,037.04	503.03
17	29.31	1758.6	21795.64	1016.64	16.94	994.18	20,801.46	503.11
18	29.31	1758.6	22560.06	1059.03	17.65	1037.83	21,522.22	503.19
19	29.31	1758.6	23280.82	1099.00	18.32	1079.01	22,201.81	503.27
20	29.31	1758.6	23960.41	1136.68	18.94	1117.84	22,842.57	503.34
21	0	0	24601.17	1172.22	19.54	1154.45	23,446.72	503.40
22	0	0	23446.72	1108.20	18.47	1140.21	22,306.52	503.28
23	0	0	22306.52	1044.97	17.42	1076.58	21,229.94	503.16
24	0	0	21229.94	985.27	16.42	1015.12	20,214.82	503.05
25	0	0	20214.82	929.96	15.50	957.61	19,257.21	502.93
26	0	0	19257.21	881.32	14.69	905.64	18,351.57	502.82
27	0	0	18351.57	832.37	13.87	856.84	17,494.73	502.71
28	0	0	17494.73	786.05	13.10	809.21	16,685.52	502.61
29	0	0	16685.52	742.31	12.37	764.18	15,921.34	502.51
30	0	0	15921.34	701.01	11.68	721.66	15,199.67	502.42
31	0	0	15199.67	662.00	11.03	681.51	14,518.17	502.33
32	0	0	14518.17	625.17	10.42	643.59	13,874.58	502.25
33	0	0	13874.58	590.38	9.84	607.77	13,266.81	502.17
34	0	0	13266.81	557.53	9.29	573.96	12,692.85	502.10
35	0	0	12692.85	526.51	8.78	542.02	12,150.83	502.03
36	0	0	12150.83	499.92	8.33	513.22	11,637.62	501.96
37	0	0	11637.62	476.54	7.94	488.23	11,149.38	501.89
38	0	0	11149.38	452.50	7.54	464.52	10,684.86	501.82
39	0	0	10684.86	429.62	7.16	441.06	10,243.80	501.75
40	0	0	10243.80	407.89	6.80	418.76	9,825.05	501.69
41	0	0	9825.05	387.27	6.45	397.58	9,427.47	501.63
42	0	0	9427.47	367.69	6.13	377.48	9,049.99	501.57
43	0	0	9049.99	349.09	5.82	358.39	8,691.60	501.52
44	0	0	8691.60	331.44	5.52	340.27	8,351.33	501.47
45	0	0	8351.33	314.68	5.24	323.06	8,028.27	501.42
46	0	0	8028.27	298.77	4.98	306.73	7,721.55	501.37
47	0	0	7721.55	283.66	4.73	291.22	7,430.33	501.33
48	0	0	7430.33	269.32	4.49	276.49	7,153.84	501.29
49	0	0	7153.84	255.70	4.26	262.51	6,891.33	501.25
50	0	0	6891.33	242.77	4.05	249.24	6,642.10	501.21
51	0	0	6642.10	230.49	3.84	236.63	6,405.47	501.18
52	0	0	6405.47	218.84	3.65	224.67	6,180.80	501.14
53	0	0	6180.80	207.77	3.46	213.31	5,967.49	501.11
54	0	0	5967.49	197.27	3.29	202.52	5,764.97	501.08
55	0	0	5764.97	187.29	3.12	192.28	5,572.69	501.05
56	0	0	5572.69	178.81	2.98	183.05	5,389.64	501.03
57	0	0	5389.64	173.88	2.90	176.34	5,213.30	501.00
58	0	0	5213.30	169.11	2.82	171.49	5,041.80	500.97
59	0	0	5041.80	163.55	2.73	166.33	4,875.47	500.94
60	0	0	4875.47	158.15	2.64	160.85	4,714.62	500.91
61	0	0	4714.62	152.94	2.55	155.54	4,559.08	500.88
62	0	0	4559.08	147.89	2.46	150.41	4,408.66	500.85
63	0	0	4408.66	143.01	2.38	145.45	4,263.21	500.83
64	0	0	4263.21	138.29	2.30	140.65	4,122.56	500.80
65	0	0	4122.56	133.73	2.23	136.01	3,986.55	500.78
66	0	0	3986.55	129.32	2.16	131.52	3,855.02	500.75
67	0	0	3855.02	125.05	2.08	127.19	3,727.84	500.73
68	0	0	3727.84	120.93	2.02	122.99	3,604.85	500.71
69	0	0	3604.85	116.94	1.95	118.93	3,485.92	500.69
70	0	0	3485.92	113.08	1.88	115.01	3,370.91	500.67
71	0	0	3370.91	109.35	1.82	111.21	3,259.70	500.65
72	0	0	3259.70	105.74	1.76	107.54	3,152.15	500.63
73	0	0	3152.15	102.25	1.70	104.00	3,048.16	500.61
74	0	0	3048.16	98.88	1.65	100.56	2,947.59	500.59
75	0	0	2947.59	95.62	1.59	97.25	2,850.35	500.57
76	0	0	2850.35	92.46	1.54	94.04	2,756.31	500.56
77	0	0	2756.31	89.41	1.49	90.94	2,665.37	500.54
78	0	0	2665.37	86.46	1.44	87.94	2,577.44	500.52
79	0	0	2577.44	83.61	1.39	85.03	2,492.40	500.51
80	0	0	2492.40	80.85	1.35	82.23	2,410.17	500.49
85	0	0	2410.17	78.18	1.30	397.58	2,012.59	500.42
90	0	0	2012.59	65.29	1.09	358.67	1,653.92	500.36
100	0	0	1653.92	53.65	0.89	594.68	1,059.24	500.25
124	0	0	1059.24	34.36	0.57	1056.13	3.10	500.06

DETENTION POND CALCULATIONS 25-YEAR STORM 20 MIN

BELLEAU SUBSTATION 09/23/2009
12/09/03

DETENTION POND
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
498	0.0
499	2,153.0
500	6,712.0
501	12,281.0
502	18,963.0
503	26,848.0
504	35,949.0
505	46,758.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 498
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	498.00
	3.00	1.00	499.00
	8.49	2.00	500.00
	15.59	3.00	501.00
	24.00	4.00	502.00
	33.54	5.00	503.00
	44.09	6.00	504.00
	55.56	7.00	505.00
	67.88	8.00	506.00

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	25	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	29.31	1758.6	–		0.00	0.00	0.00	498.00
2	29.31	1758.6	1758.60	147.03	2.45	147.03	1,611.57	498.75
3	29.31	1758.6	3370.17	267.87	4.46	207.45	3,162.73	499.22
4	29.31	1758.6	4921.33	379.85	6.33	323.86	4,597.47	499.54
5	29.31	1758.6	6356.07	483.42	8.06	431.63	5,924.43	499.83
6	29.31	1758.6	7683.03	583.43	9.72	533.43	7,149.61	500.08
7	29.31	1758.6	8908.21	677.19	11.29	630.31	8,277.90	500.28
8	29.31	1758.6	10036.50	763.54	12.73	720.36	9,316.13	500.47
9	29.31	1758.6	11074.73	842.99	14.05	803.27	10,271.47	500.64
10	29.31	1758.6	12030.07	916.10	15.27	879.55	11,150.52	500.80
11	29.31	1758.6	12909.12	982.75	16.38	949.43	11,959.69	500.94
12	29.31	1758.6	13718.29	1043.87	17.40	1013.31	12,704.99	501.06
13	29.31	1758.6	14463.59	1100.16	18.34	1072.01	13,391.57	501.17
14	29.31	1758.6	15150.17	1152.02	19.20	1126.09	14,024.09	501.26
15	29.31	1758.6	15782.69	1199.79	20.00	1175.90	14,606.78	501.35
16	29.31	1758.6	16365.38	1243.80	20.73	1221.80	15,143.59	501.43
17	29.31	1758.6	16902.19	1284.35	21.41	1264.07	15,638.11	501.50
18	29.31	1758.6	17396.71	1321.70	22.03	1303.02	16,093.69	501.57
19	29.31	1758.6	17852.29	1356.11	22.60	1338.90	16,513.39	501.63
20	29.31	1758.6	18271.99	1387.81	23.13	1371.96	16,900.03	501.69
21	0	0	18658.63	1417.01	23.62	1402.41	17,256.22	501.74
22	0	0	17256.22	1311.09	21.85	1364.05	15,892.17	501.54
23	0	0	15892.17	1208.06	20.13	1259.57	14,632.60	501.35
24	0	0	14632.60	1112.92	18.55	1160.49	13,472.11	501.18
25	0	0	13472.11	1025.27	17.09	1069.10	12,403.01	501.02
26	0	0	12403.01	944.52	15.74	984.90	11,418.11	500.85
27	0	0	11418.11	869.27	14.49	906.90	10,511.21	500.68
28	0	0	10511.21	799.87	13.33	834.57	9,676.64	500.53
29	0	0	9676.64	736.00	12.27	767.93	8,908.71	500.39
30	0	0	8908.71	677.23	11.29	706.61	8,202.10	500.27
31	0	0	8202.10	623.15	10.39	650.19	7,551.91	500.15
32	0	0	7551.91	573.39	9.56	598.27	6,953.63	500.04
33	0	0	6953.63	527.61	8.79	550.50	6,403.13	499.93
34	0	0	6403.13	486.82	8.11	507.21	5,895.92	499.82
35	0	0	5895.92	450.20	7.50	468.51	5,427.41	499.72
36	0	0	5427.41	416.38	6.94	433.29	4,994.11	499.62
37	0	0	4994.11	385.10	6.42	400.74	4,593.37	499.54
38	0	0	4593.37	356.17	5.94	370.64	4,222.74	499.45
39	0	0	4222.74	329.42	5.49	342.79	3,879.94	499.38
40	0	0	3879.94	304.67	5.08	317.04	3,562.90	499.31
41	0	0	3562.90	281.78	4.70	293.23	3,269.67	499.24
42	0	0	3269.67	260.61	4.34	271.20	2,998.48	499.19
43	0	0	2998.48	241.04	4.02	250.82	2,747.65	499.13
44	0	0	2747.65	222.93	3.72	231.98	2,515.67	499.08
45	0	0	2515.67	206.18	3.44	214.55	2,301.12	499.03
46	0	0	2301.12	190.69	3.18	198.44	2,102.68	498.98
47	0	0	2102.68	175.79	2.93	183.24	1,919.44	498.89
48	0	0	1919.44	160.47	2.67	168.13	1,751.30	498.81
49	0	0	1751.30	146.42	2.44	153.44	1,597.86	498.74
50	0	0	1597.86	133.59	2.23	140.00	1,457.86	498.68
51	0	0	1457.86	121.88	2.03	127.74	1,330.12	498.62
52	0	0	1330.12	111.20	1.85	116.54	1,213.58	498.56
53	0	0	1213.58	101.46	1.69	106.33	1,107.25	498.51
54	0	0	1107.25	92.57	1.54	97.02	1,010.23	498.47
55	0	0	1010.23	84.46	1.41	88.52	921.72	498.43
56	0	0	921.72	77.06	1.28	80.76	840.96	498.39
57	0	0	840.96	70.31	1.17	73.68	767.27	498.36
58	0	0	767.27	64.15	1.07	67.23	700.04	498.33
59	0	0	700.04	58.53	0.98	61.34	638.71	498.30
60	0	0	638.71	53.40	0.89	55.96	582.75	498.27
61	0	0	582.75	48.72	0.81	51.06	531.69	498.25
62	0	0	531.69	44.45	0.74	46.59	485.10	498.23
63	0	0	485.10	40.56	0.68	42.50	442.60	498.21
64	0	0	442.60	37.00	0.62	38.78	403.82	498.19
65	0	0	403.82	33.76	0.56	35.38	368.43	498.17
66	0	0	368.43	30.80	0.51	32.28	336.15	498.16
67	0	0	336.15	28.10	0.47	29.45	306.70	498.14
68	0	0	306.70	25.64	0.43	26.87	279.83	498.13
69	0	0	279.83	23.39	0.39	24.52	255.31	498.12
70	0	0	255.31	21.34	0.36	22.37	232.94	498.11
71	0	0	232.94	19.47	0.32	20.41	212.53	498.10
72	0	0	212.53	17.77	0.30	18.62	193.91	498.09
73	0	0	193.91	16.21	0.27	16.99	176.92	498.08
74	0	0	176.92	14.79	0.25	15.50	161.42	498.07
75	0	0	161.42	13.50	0.22	14.14	147.27	498.07
76	0	0	147.27	12.31	0.21	12.90	134.37	498.06
77	0	0	134.37	11.23	0.19	11.77	122.60	498.06
80	0	0	122.60	10.25	0.17	32.23	90.37	498.04
90	0	0	90.37	7.56	0.13	89.02	1.35	498.00

SEE SHEET 8/12
OFF.05 OK

DETENTION POND CALCULATIONS

09/23/03
12/09/03

BELLEAU SUBSTATION

50yr 20 min

DETENTION POND
POND INFORMATION

WITH 5 YEARS SEDIMENT

ELEVATION	TOTAL STORAGE CF
500.06	0.0
501	5,216.0
502	11,898.0
503	19,783.0
504	28,884.0
505	36,693.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 500.06
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	500.06
	3.00	1.00	501.06
	8.49	2.00	502.06
	15.59	3.00	503.06
	24.00	4.00	504.06
	33.54	5.00	505.06
	44.09	6.00	506.06
	55.56	7.00	507.06
	67.88	8.00	508.06

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	50	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +F)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	33.19	1991.4	–		0.00	0.00	0.00	500.06
1	33.19	1991.4	1991.40	64.60	1.08	32.30	1,959.10	500.41
2	33.19	1991.4	3950.50	128.15	2.14	96.37	3,854.13	500.75
3	33.19	1991.4	5845.53	191.26	3.19	159.70	5,685.82	501.07
4	33.19	1991.4	7677.22	281.48	4.69	236.37	7,440.85	501.33
5	33.19	1991.4	9432.25	367.92	6.13	324.70	9,107.55	501.58
6	33.19	1991.4	11098.95	450.01	7.50	408.97	10,689.99	501.82
7	33.19	1991.4	12681.39	525.89	8.76	487.95	12,193.44	502.04
8	33.19	1991.4	14184.84	607.15	10.12	566.52	13,618.32	502.22
9	33.19	1991.4	15609.72	684.17	11.40	645.66	14,964.06	502.39
10	33.19	1991.4	16955.46	756.91	12.62	720.54	16,234.92	502.55
11	33.19	1991.4	18226.32	825.60	13.76	791.25	17,435.07	502.70
12	33.19	1991.4	19426.47	890.47	14.84	858.03	18,568.44	502.85
13	33.19	1991.4	20559.84	948.11	15.80	919.29	19,640.55	502.98
14	33.19	1991.4	21631.95	1007.56	16.79	977.83	20,654.12	503.10
15	33.19	1991.4	22645.52	1063.77	17.73	1035.66	21,609.86	503.20
16	33.19	1991.4	23601.26	1116.77	18.61	1090.27	22,510.99	503.30
17	33.19	1991.4	24502.39	1166.74	19.45	1141.75	23,360.64	503.39
18	33.19	1991.4	25352.04	1213.86	20.23	1190.30	24,161.75	503.48
19	33.19	1991.4	26153.15	1258.28	20.97	1236.07	24,917.08	503.56
20	33.19	1991.4	26908.48	1300.17	21.67	1279.22	25,629.25	503.64
21	0	0	27620.65	1339.66	22.33	1319.91	26,300.74	503.72
22	0	0	26300.74	1266.46	21.11	1303.06	24,997.68	503.57
23	0	0	24997.68	1194.20	19.90	1230.33	23,767.34	503.44
24	0	0	23767.34	1125.98	18.77	1160.09	22,607.25	503.31
25	0	0	22607.25	1061.64	17.69	1093.81	21,513.44	503.19
26	0	0	21513.44	1000.99	16.68	1031.32	20,482.13	503.08
27	0	0	20482.13	943.80	15.73	972.39	19,509.74	502.97
28	0	0	19509.74	894.97	14.92	919.38	18,590.36	502.85
29	0	0	18590.36	845.27	14.09	870.12	17,720.24	502.74
30	0	0	17720.24	798.24	13.30	821.76	16,898.48	502.63
31	0	0	16898.48	753.83	12.56	776.03	16,122.45	502.54
32	0	0	16122.45	711.88	11.86	732.85	15,389.59	502.44
33	0	0	15389.59	672.27	11.20	692.07	14,697.52	502.36
34	0	0	14697.52	634.86	10.58	653.57	14,043.95	502.27
35	0	0	14043.95	599.54	9.99	617.20	13,426.75	502.19
36	0	0	13426.75	566.18	9.44	582.86	12,843.90	502.12
37	0	0	12843.90	534.67	8.91	550.42	12,293.47	502.05
38	0	0	12293.47	505.88	8.43	520.27	11,773.20	501.98
39	0	0	11773.20	483.22	8.05	494.55	11,278.65	501.91
40	0	0	11278.65	458.86	7.65	471.04	10,807.61	501.84
41	0	0	10807.61	435.66	7.26	447.26	10,360.34	501.77
42	0	0	10360.34	413.63	6.89	424.65	9,935.69	501.71
43	0	0	9935.69	392.72	6.55	403.18	9,532.52	501.65
44	0	0	9532.52	372.86	6.21	382.79	9,149.73	501.59
45	0	0	9149.73	354.01	5.90	363.43	8,786.30	501.53
46	0	0	8786.30	336.11	5.60	345.06	8,441.24	501.48
47	0	0	8441.24	319.11	5.32	327.61	8,113.63	501.43
48	0	0	8113.63	302.97	5.05	311.04	7,802.59	501.39
49	0	0	7802.59	287.65	4.79	295.31	7,507.28	501.34
50	0	0	7507.28	273.11	4.55	280.38	7,226.90	501.30
51	0	0	7226.90	259.30	4.32	266.20	6,960.69	501.26
52	0	0	6960.69	246.19	4.10	252.74	6,707.95	501.22
53	0	0	6707.95	233.74	3.90	239.96	6,467.99	501.19
54	0	0	6467.99	221.92	3.70	227.83	6,240.16	501.15
55	0	0	6240.16	210.70	3.51	216.31	6,023.85	501.12
56	0	0	6023.85	200.04	3.33	205.37	5,818.48	501.09
57	0	0	5818.48	189.93	3.17	194.99	5,623.50	501.06
58	0	0	5623.50	180.32	3.01	185.13	5,438.37	501.03
59	0	0	5438.37	175.19	2.92	177.76	5,260.61	501.01
60	0	0	5260.61	170.40	2.84	172.80	5,087.82	500.98
61	0	0	5087.82	165.04	2.75	167.72	4,920.10	500.95
62	0	0	4920.10	159.60	2.66	162.32	4,757.77	500.92
63	0	0	4757.77	154.34	2.57	156.97	4,600.81	500.89
64	0	0	4600.81	149.24	2.49	151.79	4,449.02	500.86
65	0	0	4449.02	144.32	2.41	146.78	4,302.23	500.84
66	0	0	4302.23	139.56	2.33	141.94	4,160.30	500.81
67	0	0	4160.30	134.95	2.25	137.26	4,023.04	500.79
68	0	0	4023.04	130.50	2.18	132.73	3,890.31	500.76
69	0	0	3890.31	126.20	2.10	128.35	3,761.96	500.74
70	0	0	3761.96	122.03	2.03	124.11	3,637.85	500.72
71	0	0	3637.85	118.01	1.97	120.02	3,517.83	500.69
72	0	0	3517.83	114.11	1.90	116.06	3,401.77	500.67
73	0	0	3401.77	110.35	1.84	112.23	3,289.54	500.65
74	0	0	3289.54	106.71	1.78	108.53	3,181.01	500.63
75	0	0	3181.01	103.19	1.72	104.95	3,076.06	500.61
76	0	0	3076.06	99.78	1.66	101.49	2,974.57	500.60
77	0	0	2974.57	96.49	1.61	98.14	2,876.44	500.58
78	0	0	2876.44	93.31	1.56	94.90	2,781.54	500.56
79	0	0	2781.54	90.23	1.50	91.77	2,689.77	500.54
80	0	0	2689.77	87.25	1.45	88.74	2,601.03	500.53
85	0	0	2601.03	84.37	1.41	429.07	2,171.96	500.45
90	0	0	2171.96	70.46	1.17	387.07	1,784.89	500.38
95	0	0	1784.89	57.90	0.96	320.89	1,464.00	500.32
100	0	0	1464.00	47.49	0.79	263.47	1,200.53	500.28
105	0	0	1200.53	38.94	0.65	216.08	984.44	500.24
110	0	0	984.44	31.93	0.53	177.19	807.25	500.21
120	0	0	807.25	26.19	0.44	290.60	516.65	500.15
143	0	0	516.65	16.76	0.28	493.87	22.78	500.06

DETENTION POND CALCULATIONS 50-YEAR STORM 20 MIN

BELLEAU SUBSTATION 09/23/2009
12/09/03

DETENTION POND
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
498	0.0
499	2,153.0
500	6,712.0
501	12,281.0
502	18,963.0
503	26,848.0
504	35,949.0
505	46,758.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 498
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	498.00
	3.00	1.00	499.00
	8.49	2.00	500.00
	15.59	3.00	501.00
	24.00	4.00	502.00
	33.54	5.00	503.00
	44.09	6.00	504.00
	55.56	7.00	505.00
	67.88	8.00	506.00

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	50	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	33.19	1991.4	--		0.00	0.00	0.00	498.00
2	33.19	1991.4	1991.40	166.49	2.77	166.49	1,824.91	498.85
3	33.19	1991.4	3816.31	300.08	5.00	233.28	3,583.03	499.31
4	33.19	1991.4	5574.43	426.99	7.12	363.54	5,210.89	499.67
5	33.19	1991.4	7202.29	546.64	9.11	486.82	6,715.48	500.00
6	33.19	1991.4	8706.88	661.78	11.03	604.21	8,102.67	500.25
7	33.19	1991.4	10094.07	767.94	12.80	714.86	9,379.20	500.48
8	33.19	1991.4	11370.60	865.64	14.43	816.79	10,553.81	500.69
9	33.19	1991.4	12545.21	955.26	15.92	910.45	11,634.76	500.88
10	33.19	1991.4	13626.16	1036.91	17.28	996.09	12,630.08	501.05
11	33.19	1991.4	14621.48	1112.08	18.53	1074.50	13,546.98	501.19
12	33.19	1991.4	15538.38	1181.34	19.69	1146.71	14,391.67	501.32
13	33.19	1991.4	16383.07	1245.14	20.75	1213.24	15,169.83	501.43
14	33.19	1991.4	17161.23	1303.91	21.73	1274.52	15,886.71	501.54
15	33.19	1991.4	17878.11	1358.06	22.63	1330.99	16,547.12	501.64
16	33.19	1991.4	18538.52	1407.94	23.47	1383.00	17,155.52	501.73
17	33.19	1991.4	19146.92	1453.35	24.22	1430.65	17,716.28	501.81
18	33.19	1991.4	19707.68	1494.06	24.90	1473.71	18,233.97	501.89
19	33.19	1991.4	20225.37	1531.65	25.53	1512.86	18,712.51	501.96
20	33.19	1991.4	20703.91	1566.39	26.11	1549.02	19,154.89	502.02
21	0	0	21146.29	1598.51	26.64	1582.45	19,563.84	502.08
22	0	0	19563.84	1483.62	24.73	1541.07	18,022.77	501.86
23	0	0	18022.77	1368.98	22.82	1426.30	16,596.47	501.65
24	0	0	16596.47	1261.26	21.02	1315.12	15,281.35	501.45
25	0	0	15281.35	1161.92	19.37	1211.59	14,069.76	501.27
26	0	0	14069.76	1070.41	17.84	1116.17	12,953.59	501.10
27	0	0	12953.59	986.11	16.44	1028.26	11,925.33	500.94
28	0	0	11925.33	908.09	15.13	947.10	10,978.23	500.77
29	0	0	10978.23	835.61	13.93	871.85	10,106.39	500.61
30	0	0	10106.39	768.89	12.81	802.25	9,304.14	500.47
31	0	0	9304.14	707.49	11.79	738.19	8,565.95	500.33
32	0	0	8565.95	651.00	10.85	679.24	7,886.71	500.21
33	0	0	7886.71	599.02	9.98	625.01	7,261.70	500.10
34	0	0	7261.70	551.18	9.19	575.10	6,686.60	499.99
35	0	0	6686.60	507.28	8.45	529.23	6,157.36	499.88
36	0	0	6157.36	469.08	7.82	488.18	5,669.18	499.77
37	0	0	5669.18	433.84	7.23	451.46	5,217.73	499.67
38	0	0	5217.73	401.24	6.69	417.54	4,800.19	499.58
39	0	0	4800.19	371.10	6.19	386.17	4,414.01	499.50
40	0	0	4414.01	343.22	5.72	357.16	4,056.85	499.42
41	0	0	4056.85	317.44	5.29	330.33	3,726.52	499.35
42	0	0	3726.52	293.59	4.89	305.52	3,421.00	499.28
43	0	0	3421.00	271.54	4.53	282.57	3,138.44	499.22
44	0	0	3138.44	251.14	4.19	261.34	2,877.10	499.16
45	0	0	2877.10	232.27	3.87	241.71	2,635.39	499.11
46	0	0	2635.39	214.82	3.58	223.55	2,411.84	499.06
47	0	0	2411.84	198.69	3.31	206.76	2,205.09	499.01
48	0	0	2205.09	183.76	3.06	191.22	2,013.87	498.94
49	0	0	2013.87	168.37	2.81	176.06	1,837.80	498.85
50	0	0	1837.80	153.65	2.56	161.01	1,676.79	498.78
51	0	0	1676.79	140.19	2.34	146.92	1,529.88	498.71
52	0	0	1529.88	127.90	2.13	134.05	1,395.83	498.65
53	0	0	1395.83	116.70	1.94	122.30	1,273.53	498.59
54	0	0	1273.53	106.47	1.77	111.58	1,161.94	498.54
55	0	0	1161.94	97.14	1.62	101.81	1,060.14	498.49
56	0	0	1060.14	88.63	1.48	92.89	967.25	498.45
57	0	0	967.25	80.87	1.35	84.75	882.50	498.41
58	0	0	882.50	73.78	1.23	77.32	805.18	498.37

59	0	0	805.18	67.32	1.12	70.55	734.63	498.34
60	0	0	734.63	61.42	1.02	64.37	670.26	498.31
61	0	0	670.26	56.04	0.93	58.73	611.53	498.28
62	0	0	611.53	51.13	0.85	53.58	557.95	498.26
63	0	0	557.95	46.65	0.78	48.89	509.06	498.24
64	0	0	509.06	42.56	0.71	44.60	464.46	498.22
65	0	0	464.46	38.83	0.65	40.70	423.77	498.20
66	0	0	423.77	35.43	0.59	37.13	386.64	498.18
67	0	0	386.64	32.32	0.54	33.88	352.76	498.16
68	0	0	352.76	29.49	0.49	30.91	321.85	498.15
69	0	0	321.85	26.91	0.45	28.20	293.65	498.14
70	0	0	293.65	24.55	0.41	25.73	267.92	498.12
71	0	0	267.92	22.40	0.37	23.47	244.45	498.11
72	0	0	244.45	20.44	0.34	21.42	223.03	498.10
73	0	0	223.03	18.65	0.31	19.54	203.49	498.09
74	0	0	203.49	17.01	0.28	17.83	185.66	498.09
75	0	0	185.66	15.52	0.26	16.27	169.39	498.08
76	0	0	169.39	14.16	0.24	14.84	154.55	498.07
77	0	0	154.55	12.92	0.22	13.54	141.01	498.07
80	0	0	141.01	11.79	0.20	37.06	103.94	498.05
90	0	0	103.94	8.69	0.14	102.39	1.55	498.00

DETENTION POND CALCULATIONS 100-YEAR STORM 20 MIN

BELLEAU SUBSTATION 09/23/2009
12/09/03

DETENTION POND
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
498	0.0
499	2,153.0
500	6,712.0
501	12,281.0
502	18,963.0
503	26,848.0
504	35,949.0
505	46,758.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 498
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	498.00
	3.00	1.00	499.00
	8.49	2.00	500.00
	15.59	3.00	501.00
	24.00	4.00	502.00
	33.54	5.00	503.00
	44.09	6.00	504.00
	55.56	7.00	505.00
	67.88	8.00	506.00

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	100	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR +IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	37.58	2254.8	--		0.00	0.00	0.00	498.00
2	37.58	2254.8	2254.80	187.35	3.12	187.35	2,067.45	498.96
3	37.58	2254.8	4322.25	336.60	5.61	261.97	4,060.28	499.42
4	37.58	2254.8	6315.08	480.46	8.01	408.53	5,906.55	499.82
5	37.58	2254.8	8161.35	620.03	10.33	550.25	7,611.10	500.16
6	37.58	2254.8	9865.90	750.48	12.51	685.26	9,180.64	500.44
7	37.58	2254.8	11435.44	870.60	14.51	810.54	10,624.90	500.70
8	37.58	2254.8	12879.70	980.53	16.34	925.56	11,954.14	500.94
9	37.58	2254.8	14208.94	1080.92	18.02	1030.73	13,178.21	501.13
10	37.58	2254.8	15433.01	1173.38	19.56	1127.15	14,305.86	501.30
11	37.58	2254.8	16560.66	1258.55	20.98	1215.97	15,344.69	501.46
12	37.58	2254.8	17599.49	1337.01	22.28	1297.78	16,301.71	501.60
13	37.58	2254.8	18556.51	1409.30	23.49	1373.16	17,183.36	501.73
14	37.58	2254.8	19438.16	1474.50	24.57	1441.90	17,996.26	501.86
15	37.58	2254.8	20251.06	1533.51	25.56	1504.01	18,747.05	501.97
16	37.58	2254.8	21001.85	1588.02	26.47	1560.77	19,441.08	502.06
17	37.58	2254.8	21695.88	1638.41	27.31	1613.22	20,082.67	502.14
18	37.58	2254.8	22337.47	1684.99	28.08	1661.70	20,675.77	502.22
19	37.58	2254.8	22930.57	1728.05	28.80	1706.52	21,224.05	502.29
20	37.58	2254.8	23478.85	1767.86	29.46	1747.95	21,730.89	502.35
21	0	0	23985.69	1804.65	30.08	1786.26	22,199.44	502.41
22	0	0	22199.44	1674.97	27.92	1739.81	20,459.63	502.19
23	0	0	20459.63	1548.66	25.81	1611.81	18,847.81	501.98
24	0	0	18847.81	1431.30	23.85	1489.98	17,357.83	501.76
25	0	0	17357.83	1318.76	21.98	1375.03	15,982.80	501.55
26	0	0	15982.80	1214.91	20.25	1266.83	14,715.97	501.36
27	0	0	14715.97	1119.22	18.65	1167.06	13,548.91	501.19
28	0	0	13548.91	1031.07	17.18	1075.15	12,473.76	501.03
29	0	0	12473.76	949.87	15.83	990.47	11,483.29	500.86
30	0	0	11483.29	874.26	14.57	912.06	10,571.23	500.69
31	0	0	10571.23	804.46	13.41	839.36	9,731.87	500.54
32	0	0	9731.87	740.22	12.34	772.34	8,959.52	500.40
33	0	0	8959.52	681.12	11.35	710.67	8,248.85	500.28
34	0	0	8248.85	626.73	10.45	653.92	7,594.93	500.16
35	0	0	7594.93	576.69	9.61	601.71	6,993.22	500.05
36	0	0	6993.22	530.64	8.84	553.66	6,439.56	499.94
37	0	0	6439.56	489.45	8.16	510.04	5,929.51	499.83
38	0	0	5929.51	452.63	7.54	471.04	5,458.48	499.73
39	0	0	5458.48	418.62	6.98	435.63	5,022.85	499.63
40	0	0	5022.85	387.18	6.45	402.90	4,619.95	499.54
41	0	0	4619.95	358.09	5.97	372.63	4,247.32	499.46
42	0	0	4247.32	331.19	5.52	344.64	3,902.68	499.38
43	0	0	3902.68	306.31	5.11	318.75	3,583.93	499.31
44	0	0	3583.93	283.30	4.72	294.80	3,289.12	499.25
45	0	0	3289.12	262.02	4.37	272.66	3,016.46	499.19
46	0	0	3016.46	242.33	4.04	252.18	2,764.29	499.13
47	0	0	2764.29	224.13	3.74	233.23	2,531.06	499.08
48	0	0	2531.06	207.29	3.45	215.71	2,315.34	499.04
49	0	0	2315.34	191.72	3.20	199.51	2,115.84	498.98
50	0	0	2115.84	176.89	2.95	184.31	1,931.53	498.90
51	0	0	1931.53	161.48	2.69	169.19	1,762.34	498.82
52	0	0	1762.34	147.34	2.46	154.41	1,607.93	498.75
53	0	0	1607.93	134.43	2.24	140.88	1,467.05	498.68
54	0	0	1467.05	122.65	2.04	128.54	1,338.51	498.62
55	0	0	1338.51	111.90	1.87	117.28	1,221.23	498.57
56	0	0	1221.23	102.10	1.70	107.00	1,114.23	498.52
57	0	0	1114.23	93.15	1.55	97.63	1,016.60	498.47
58	0	0	1016.60	84.99	1.42	89.07	927.53	498.43

59	0	0	927.53	77.55	1.29	81.27	846.26	498.39
60	0	0	846.26	70.75	1.18	74.15	772.11	498.36
61	0	0	772.11	64.55	1.08	67.65	704.46	498.33
62	0	0	704.46	58.90	0.98	61.72	642.73	498.30
63	0	0	642.73	53.74	0.90	56.32	586.42	498.27
64	0	0	586.42	49.03	0.82	51.38	535.04	498.25
65	0	0	535.04	44.73	0.75	46.88	488.16	498.23
66	0	0	488.16	40.81	0.68	42.77	445.39	498.21
67	0	0	445.39	37.24	0.62	39.02	406.36	498.19
68	0	0	406.36	33.97	0.57	35.60	370.76	498.17
69	0	0	370.76	31.00	0.52	32.49	338.27	498.16
70	0	0	338.27	28.28	0.47	29.64	308.63	498.14
71	0	0	308.63	25.80	0.43	27.04	281.59	498.13
72	0	0	281.59	23.54	0.39	24.67	256.92	498.12
73	0	0	256.92	21.48	0.36	22.51	234.41	498.11
74	0	0	234.41	19.60	0.33	20.54	213.87	498.10
75	0	0	213.87	17.88	0.30	18.74	195.13	498.09
76	0	0	195.13	16.31	0.27	17.10	178.03	498.08
77	0	0	178.03	14.88	0.25	15.60	162.43	498.08
80	0	0	162.43	13.58	0.23	42.70	119.74	498.06
90	0	0	119.74	10.01	0.17	117.95	1.78	498.00

DETENTION POND CALCULATIONS

09/23/03
100YR 20 MIN 12/09/03

BELLEAU SUBSTATION

DETENTION POND WITH 5 YEARS SEDIMENT
POND INFORMATION

ELEVATION	TOTAL STORAGE CF
500.06	0.0
501	5,216.0
502	11,898.0
503	19,783.0
504	28,884.0
505	36,693.0

DISCHARGE ORIFICE CHARACTERISTICS

F L ELEVATION OF DISCHARGE PIPE OR SILL 500.06
PIPE SIZE (INCHES) OR AI (4 SIDES OPEN) OR WEIR weir
WIDTH(FT) 1

HW/D FT	FLOW RATE CFS	HW FT	ELEVATION
-	0	0	500.06
	3.00	1.00	501.06
	8.49	2.00	502.06
	15.59	3.00	503.06
	24.00	4.00	504.06
	33.54	5.00	505.06
	44.09	6.00	506.06
	55.56	7.00	507.06
	67.88	8.00	508.06

INFLOW	HY. GRAPH	CFS	STORM FREQUENCY	100	YEARS
PIPE SIZE	weir	INCHES	DURATION	20	MIN

TIME MIN	INFLOW CFS	INFLOW CFM	ADJUSTED INFLOW (CF) (STOR+IF)	OUTFLOW CFM	OUTFLOW CFS	AVG OUTFLOW(CF)	STORAGE CF	ELEV
0	37.58	2254.8	--		0.00	0.00	0.00	500.06
1	37.58	2254.8	2254.80	73.14	1.22	36.57	2,218.23	500.46
2	37.58	2254.8	4473.03	145.10	2.42	109.12	4,363.91	500.85
3	37.58	2254.8	6618.71	229.34	3.82	187.22	6,431.49	501.18
4	37.58	2254.8	8686.29	331.18	5.52	280.26	8,406.03	501.48
5	37.58	2254.8	10660.83	428.43	7.14	379.81	10,281.02	501.76
6	37.58	2254.8	12535.82	518.02	8.63	473.23	12,062.59	502.02
7	37.58	2254.8	14317.39	614.32	10.24	566.17	13,751.22	502.24
8	37.58	2254.8	16006.02	705.59	11.76	659.95	15,346.07	502.44
9	37.58	2254.8	17600.87	791.79	13.20	748.69	16,852.18	502.63
10	37.58	2254.8	19106.98	873.20	14.55	832.49	18,274.49	502.81
11	37.58	2254.8	20529.29	946.41	15.77	909.80	19,619.49	502.98
12	37.58	2254.8	21874.29	1021.00	17.02	983.70	20,890.58	503.12
13	37.58	2254.8	23145.38	1091.49	18.19	1056.24	22,089.14	503.25
14	37.58	2254.8	24343.94	1157.95	19.30	1124.72	23,219.22	503.38
15	37.58	2254.8	25474.02	1220.62	20.34	1189.29	24,284.74	503.49
16	37.58	2254.8	26539.54	1279.71	21.33	1250.16	25,289.37	503.61
17	37.58	2254.8	27544.17	1335.42	22.26	1307.56	26,236.61	503.71
18	37.58	2254.8	28491.41	1387.95	23.13	1361.68	27,129.73	503.81
19	37.58	2254.8	29384.53	1442.34	24.04	1415.15	27,969.38	503.90
20	37.58	2254.8	30224.18	1503.90	25.06	1473.12	28,751.06	503.99
21	0	0	31005.86	1561.20	26.02	1532.55	29,473.31	504.08
22	0	0	29473.31	1448.85	24.15	1505.03	27,968.28	503.90
23	0	0	27968.28	1358.94	22.65	1403.90	26,564.39	503.75
24	0	0	26564.39	1281.09	21.35	1320.01	25,244.38	503.60
25	0	0	25244.38	1207.88	20.13	1244.48	23,999.89	503.46
26	0	0	23999.89	1138.87	18.98	1173.38	22,826.51	503.33
27	0	0	22826.51	1073.80	17.90	1106.34	21,720.18	503.21
28	0	0	21720.18	1012.45	16.87	1043.13	20,677.05	503.10
29	0	0	20677.05	954.61	15.91	983.53	19,693.52	502.99
30	0	0	19693.52	904.90	15.08	929.75	18,763.77	502.87
31	0	0	18763.77	854.65	14.24	879.77	17,884.00	502.76
32	0	0	17884.00	807.09	13.45	830.87	17,053.13	502.65
33	0	0	17053.13	762.18	12.70	784.64	16,268.49	502.55
34	0	0	16268.49	719.77	12.00	740.98	15,527.51	502.46
35	0	0	15527.51	679.72	11.33	699.75	14,827.76	502.37
36	0	0	14827.76	641.90	10.70	660.81	14,166.95	502.29
37	0	0	14166.95	606.18	10.10	624.04	13,542.90	502.21
38	0	0	13542.90	572.45	9.54	589.32	12,953.59	502.13
39	0	0	12953.59	540.60	9.01	556.53	12,397.06	502.06
40	0	0	12397.06	510.52	8.51	525.56	11,871.50	502.00
41	0	0	11871.50	488.06	8.13	499.29	11,372.21	501.92
42	0	0	11372.21	463.47	7.72	475.77	10,896.44	501.85
43	0	0	10896.44	440.04	7.33	451.76	10,444.68	501.78
44	0	0	10444.68	417.79	6.96	428.91	10,015.77	501.72
45	0	0	10015.77	396.66	6.61	407.22	9,608.54	501.66
46	0	0	9608.54	376.60	6.28	386.63	9,221.91	501.60
47	0	0	9221.91	357.56	5.96	367.08	8,854.83	501.54
48	0	0	8854.83	339.48	5.66	348.52	8,506.31	501.49
49	0	0	8506.31	322.31	5.37	330.90	8,175.41	501.44
50	0	0	8175.41	306.02	5.10	314.17	7,861.24	501.40
51	0	0	7861.24	290.54	4.84	298.28	7,562.96	501.35
52	0	0	7562.96	275.85	4.60	283.20	7,279.77	501.31
53	0	0	7279.77	261.90	4.37	268.88	7,010.89	501.27
54	0	0	7010.89	248.66	4.14	255.28	6,755.61	501.23
55	0	0	6755.61	236.09	3.93	242.37	6,513.24	501.19
56	0	0	6513.24	224.15	3.74	230.12	6,283.12	501.16
57	0	0	6283.12	212.81	3.55	218.48	6,064.64	501.13
58	0	0	6064.64	202.05	3.37	207.43	5,857.21	501.10
59	0	0	5857.21	191.84	3.20	196.94	5,660.27	501.07
60	0	0	5660.27	182.13	3.04	186.99	5,473.28	501.04
61	0	0	5473.28	176.13	2.94	179.13	5,294.15	501.01
62	0	0	5294.15	171.31	2.86	173.72	5,120.43	500.98
63	0	0	5120.43	166.10	2.77	168.70	4,951.73	500.95
64	0	0	4951.73	160.63	2.68	163.36	4,788.36	500.92
65	0	0	4788.36	155.33	2.59	157.98	4,630.39	500.89
66	0	0	4630.39	150.20	2.50	152.77	4,477.62	500.87
67	0	0	4477.62	145.25	2.42	147.73	4,329.89	500.84
68	0	0	4329.89	140.46	2.34	142.85	4,187.04	500.81
69	0	0	4187.04	135.82	2.26	138.14	4,048.90	500.79
70	0	0	4048.90	131.34	2.19	133.58	3,915.32	500.77
71	0	0	3915.32	127.01	2.12	129.17	3,786.15	500.74
72	0	0	3786.15	122.82	2.05	124.91	3,661.23	500.72
73	0	0	3661.23	118.77	1.98	120.79	3,540.44	500.70
74	0	0	3540.44	114.85	1.91	116.81	3,423.64	500.68
75	0	0	3423.64	111.06	1.85	112.95	3,310.68	500.66
76	0	0	3310.68	107.39	1.79	109.23	3,201.46	500.64
77	0	0	3201.46	103.85	1.73	105.62	3,095.84	500.62
78	0	0	3095.84	100.42	1.67	102.14	2,993.70	500.60
79	0	0	2993.70	97.11	1.62	98.77	2,894.93	500.58
80	0	0	2894.93	93.91	1.57	95.51	2,799.42	500.56
85	0	0	2799.42	90.81	1.51	461.79	2,337.63	500.48
90	0	0	2337.63	75.83	1.26	416.60	1,921.03	500.41
95	0	0	1921.03	62.32	1.04	345.36	1,575.67	500.34
100	0	0	1575.67	51.11	0.85	283.57	1,292.10	500.29
105	0	0	1292.10	41.91	0.70	232.57	1,059.53	500.25
110	0	0	1059.53	34.37	0.57	190.71	868.82	500.22
120	0	0	868.82	28.18	0.47	312.77	556.06	500.16
143	0	0	556.06	18.04	0.30	531.54	24.51	500.06