29-7

12/20/68

Site Hydrology - Detailed Calculations

PAGE

I. Probable Maximum Precipitation

A. Flow Determination

1. Tidal
2. Run off
3. Dam Failure

B. Determination of Water Elevation

1. Slope of Channel Bottom
2. Roughness Coefficient "n"
3. Trial & Error Solution of Wate Elev.

II Probable Maximum Hurricane

A. Development of Wind Field

1. Hurricane Characteristics
2. Construction of Wind Isohvets

B. Wind Stress Development

C. Hurricane Surge

1. Continental Shelf Depths
2. Hurricane Surge Calculations

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BY VE DATE _____ CHKD. BY _____ DATE _____ SHEET NO. _____ OF _____ JOB NO. 115-8

SUBJECT _____

FLOW DETERMINATION

TIDAL FLOW

AVG FLOW = 175000 CFS

MAX → MULTIPLY BY π/2

π/2 × 175 000 = 275 000 CFS ←

DAM FAILURE

A. COMBINED SACANDAGA = 50 × 10⁹ cuft

B. ASHOKAN = 18 × 10⁹ Cuft

EMPTYING TIME ≅ ONE DAY (FOLLOWING FIGURE)

FLOW A. SACANDAGA = 50 × 10⁹ / 8.64 × 10⁴ SEC

= 5.79 × 10⁵ CFS

B. ASHOKAN = 18 × 10⁹ / 8.64 × 10⁴ SEC

= 2.06 × 10⁵ CFS

TOTAL FLOW = 785 000 CFS ←

RAINFALL - RUNOFF

14"/72 hr × 10500 SQ MILES

= 1,320,000 CFS

× 0.5 ← RUNOFF COEF

660 000 CFS ←

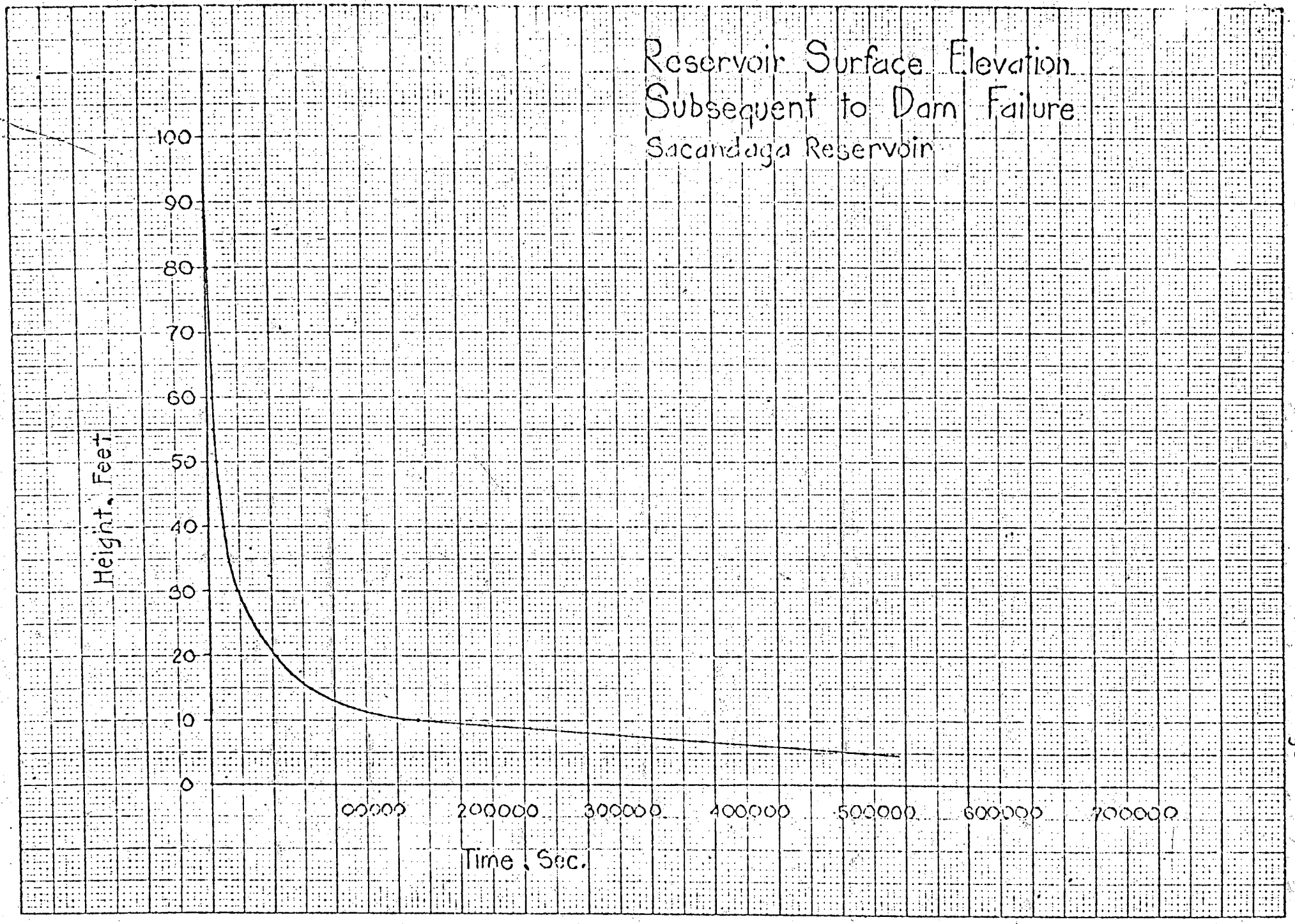
Reservoir Surface Elevation
Subsequent to Dam Failure
Sacandaga Reservoir
Height, Feet
100
90
80
70
60
50
40
30
20
10
0
00000
200000
300000
400000
500000
600000
700000
Time, Sec.

Figure 9

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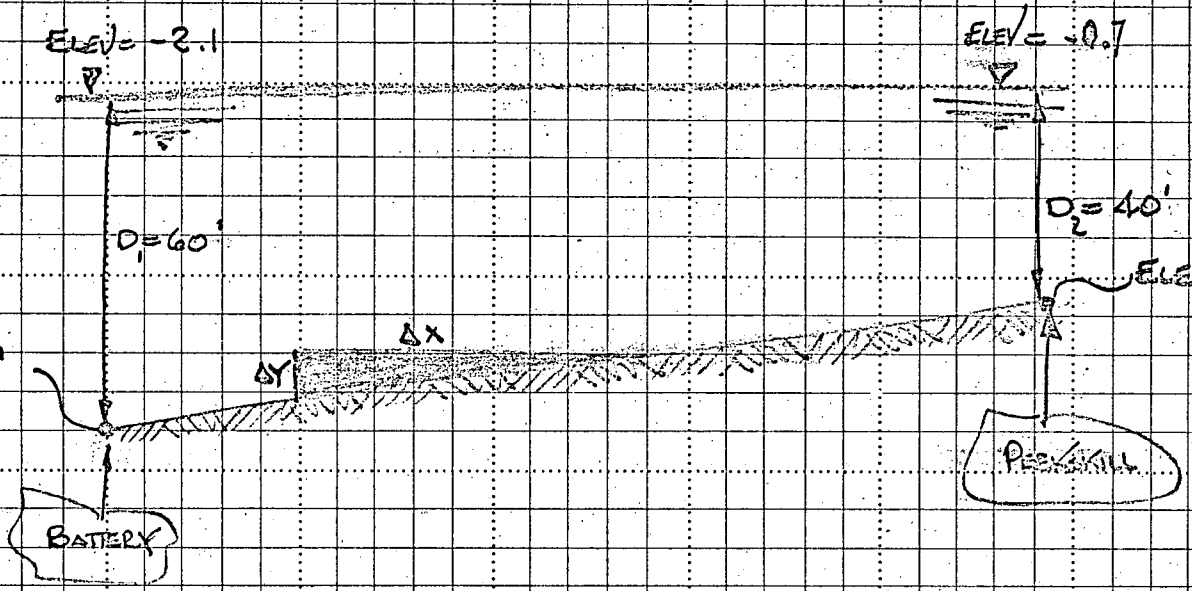
CHANNEL CHARACTERISTICS

CHANNEL SLOPE

SLOPE OF CHANNEL BOTTOM FROM PEEKSKILL TO BATTERY



$ELEV_1 = 2.1 + 60 = 62.1$

$ELEV_2 = 0.7 + 40 = 40.7$

$$\frac{\Delta Y}{\Delta X} = \frac{21.4'}{40 \times 5280'} = 0.0009$$

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CHANNEL CHARACTERISTICS

CHANNEL ROUGHNESS

NATURAL CHANNEL, CLEAN & STRAIGHT

ASSUME $n = 0.03$ ← GOOD VALUE

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WATER ELEVATIONS

For $n = 0.03$

$S = 0.0001$

Width = 4000 ft

Manning Equation → $Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

Solve For d (depth) Trial & Error

$$Q = \frac{1.49}{n} w \cdot d \left(\frac{wd}{2d+w}\right)^{2/3} S^{1/2}$$

$$f(x) = \frac{Qn}{1.49 (S)^{1/2}} = wd\left(\frac{wd}{2d+w}\right)^{2/3}$$

$$f(x) = \frac{1.72 \times 10^6 (0.03)}{1.49 \times 0.01} = 3.46 \times 10^6$$

$f(x)$	w (FT)	d (FT)	wd	2d+w	$\left(\frac{wd}{2d+w}\right)^{2/3}$	$f(x)$	
3.46×10^6	4000	50	200000	4100	13.3	2.66×10^6	NG
		55	220000	4110	14.2	3.12×10^6	NG
		57	228000	4114	14.5	3.31×10^6	NG
		58	232000	4116	14.75	3.42×10^6	NG
		58.5	234000	4117	14.8	3.46×10^6	OK

DEPTH = 58.5'

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PROBABLE MAXIMUM HURRICANE - CHARACTERISTICS

I CENTRAL PRESSURE

FOR 41° N LATITUDE

C.P. = 27.26" Hg.

II RADIUS TO MAXIMUM WINDS

MEAN RADIUS = 24 NAUT MILES

III FOWARD SPEED

MEAN SPEED = 34 KNOTS

= 40 MPH

IV MAXIMUM THEORETICAL GRADIENT WIND

→ 123 MPH

ESTIMATED MAXIMUM 30 FT WIND SPEED

$V_x = 0.865\, V_{Gx} + 0.5\, T$

T = F.S.

V_x = 127 MPH ←

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BY JP DATE 10/31/63 SHEET NO. ____ OF ____

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SUBJECT HURRICANE SURGE PREDICTION

P.M. HURRICANE RADIUS → 24 N. MILES F.S. = 34 KNOTS

CONSTRUCTION OF PMH WIND FIELDS

r/R	V/Vx	Vx	V	FACTOR	F.S. x → 59 MPH
1	1	124	124	0.05	2
2	0.795		99	0.15	6
3	0.65		81	0.2	8
4	0.555		69	0.3	12
5	0.485		60	0.4	16
6	0.425		53	0.6	23
7	0.375		46.5	0.8	31
8	0.33		41	0.9	35
9	0.29		36	0.98	38
10	0.255		32		
11	0.225		28		
12	0.20		25		
13	0.18		22		
14	0.165		20		

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SUBJECT HURRICANE SURGE DETERMINATION

LINE 11 TO MOVEMENT — WIND STRESS DEVELOPMENT — $\Delta X = 5$

1/2R FROM EYE

X (NAUT MI)	U MPH	U FT/SEC	U^2 (FT^3/SEC^2)	θ (°)	$\cos\theta$	$U^2 \cos\theta$	$K/gU^2 \cos\theta \Delta X$
35	87	127	16100	88°	0.034	545	1.54
30	94	138	19050	85	0.088	1680	4.13
25	99	145	21050	82	0.14	2810	6.9
20	105	154	23700	78	0.21	4980	12.25
15	106	155	24000	70	0.34	8160	20.1
10	106	155	24000	43	0.67	16100	39.6
5	106	155	24000	30	0.87	21000	51.6
0	105	154	23700	5	0.99	24400	60.0
5	110	161	25900	25	0.91	23600	58.0
10	114	167	27850	27	0.89	24800	61.0
15	117	171	29200	28	0.88	25500	62.7
20	120	176	31000	50	0.64	19850	48.8
25	115	169	28600	55	0.57	16300	40
30	112	164	26900	57	0.54	14540	35.7
35	106	155	24000	50	0.64	15350	37.8
40	100	147	22600	49	0.65	14700	36.1
45	96	141	19900	50	0.64	12740	31.4
50	91	133	17700	53	0.60	10640	26.2
55	86	126	15900	55	0.57	9050	22.2
60	83	122	14900	57	0.54	8050	19.8
65	78	114	13000	60	0.5	6500	16.0
70	75	110	12100	58	0.53	6400	15.7
75	72	105	11000	59	0.52	5720	14.1
80	68	100	10000	57	0.54	5400	13.3
85	65	95	9020	57	0.54	4360	11.9
90	63	93	8650	58	0.53	4530	11.1
95	62	91	8280	59	0.55	4550	11.2
100	59	87	7560	60	0.5	3780	9.3
105	57	84	7050	58	0.53	3730	9.2
110	55	81	6550	58	0.53	3470	8.5
115	54	79	6250	60	0.5	3125	7.7
120	52	76	5775	62	0.47	2770	6.8
125	49	72	5180	61	0.49	2480	6.1
130	47	69	4760	61	0.48	2380	5.9
135	46	67	4490	61	0.48	2160	5.3
140	45	66	4350	61	0.48	2085	5.1
145	43	63	3970	62	0.47	1900	4.7
150	43	63	3970	62	0.47	1865	4.6

$K/\rho \Delta x = 2.46 \times 10^{-3}$

$\frac{3 \times 10^{-6}}{32.2 \text{ FT/SEC}^2} \times 5 \times 5280 =$

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BY _____ DATE _____ SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____ JOB NO. 115-8

SUBJECT WIND STRESS DEVELOPMENT

LINE PARALLEL TO MOVEMENT; PASSING THRU "R"

$K/g\Delta x = 2.46 \times 10^{-3}$

X (NAUT. MI.)	U (MPH)	U (FT/SEC)	U^2 $(FT/SEC)^2$	ϕ (DEGREE)	Cos ϕ	$U^2 \cos\phi$	$K/g\, U^2 \cos\phi\, \Delta x$ $(FEET)^2$
40	82	120	14400	88	0.035	505	1.24
35	87	127	16110	85	0.087	1400	3.46
30	92	135	18210	83	0.122	2220	5.45
25	96	140.5	19720	77°	0.225	4440	10.9
20	98	143.5	20600	73°	0.292	6020	14.8
15	111	162.5	26400	58°	0.53	14000	34.4
10	116	170	28900	42°	0.744	21500	52.9
5	120	176	31000	24°	0.914	28350	69.6
0	122	179	32000	7°	0.993	31800	78.2
5	123	180	32400	8°	0.99	32100	79.
10	123	180	32400	17	0.956	31000	76.2
15	119	174	30250	22	0.929	27050	66.5
20	116	170	28900	26	0.899	26000	64
25	114	167	27850	29	0.875	24400	60
30	110	161	25900	33	0.840	21700	53.4
35	106	155	24000	39	0.777	18650	45.9
40	102	149	22200	41	0.755	16750	41.2
45	97	142	20200	43	0.731	14780	36.3
50	91	133	17700	45	0.707	12500	30.8
55	87	127	16120	46	0.695	11200	27.6
60	82	120	14400	48	0.67	9650	23.8
65	78	114	13000	49	0.656	8530	21.0
70	75	110	12100	50	0.6425	7770	19.1
75	72	105.5	11100	51	0.63	7000	17.2
80	68	99.5	9900	52	0.616	6100	15.0
85	65	95	9020	53	0.602	5430	13.3
90	62	91	8280	54	0.588	4860	11.7
95	59	86.5	7480	54	"	4400	10.8
100	57	83.5	6960	54	"	4100	10.1
105	55	80.5	6480	55	0.574	3720	9.25
110	53	77.5	6000	55	"	3440	8.45
115	52	76	5770	56	0.56	3230	7.95
120	50	73	5330	57	0.545	2900	7.14
125	48	70	4900	56	0.56	2740	6.74
130	47	69	4760	57	0.545	2600	6.4
135	45	66	4350	58	0.53	2300	5.66
140	44	64.5	4160	58	"	2200	5.41
145	43	63	3970	58	"	2100	5.16
150	42	61.5	3780	59	0.515	1945	4.79
155	41	60	3600	59	"	1854	4.56

BY SP DATE 11/5/68

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SHEET NO. ____ OF ____

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SUBJECT WIND STRESS DEVELOPMENT

$K/g \Delta x = 2.46 \times 10^{-3}$

LINE PARALLEL TO MOVEMENT - 1½ R FROM EYE

X (Nut. M.)	U (MPH)	U (FPS)	U^2 $(FPS)^2$	ϕ (DEGREES & ')	Cos ϕ	$U^2 \cos\phi$	$K/g\, U^2 \cos\phi\, \Delta X$ $(FEET)^2$
45	70	102.5	10500	82	0.139	1460	3.59
40	77	113	12780	78	0.208	2660	6.55
35	83	121.7	14800	75	0.259	3830	9.42
30	87	127.5	16250	68	0.374	6080	14.9
25	92	134.9	18200	64	0.438	7970	19.6
20	95	139.1	19350	59	0.515	9950	24.5
15	99	145	21000	51	0.630	13200	32.5
10	104	152.4	23200	49	0.656	15200	37.4
5	110	161.1	25980	39	0.777	20200	49.6
0	112	164.1	26900	25	0.906	24400	60
5	112	164.1	26900	14	0.970	26100	64.2
10	112	164.1	26900	6	0.995	26800	65.9
15	110	161.1	25980	2	0.999	25950	63.8
20	108	158.3	25050	10	0.985	24700	60.7
25	106	155.3	24100	15	0.966	23250	57.2
30	105	154	23700	20	0.940	22300	54.9
35	103	151	22800	26	0.90	20500	50.5
40	99	145	21000	30 ✓		18200	44.7
45	95	139.1	19330	32 ✓		16400	40.4
50	91	133.3	17780	34 ✓		14700	36.2
55	86	126	15870	37 ✓		12700	31.2
60	83	121.7	14800	38		11670	28.7
65	79	115.9	13410	41		10100	24.8
70	75	110	12100	42		9000	22.1
75	72	105.6	11150	43		8160	20
80	68	99.6	9920	45		7010	17.2
85	66	96.7	9350	46		6500	16
90	63	92.4	8540	47		5830	14.3
95	60	88	7740	47		5280	13.0
100	58	85	7220	48		4840	11.9
105	56	82	6720	50		4320	10.6
110	55	80.6	6500	50		4180	10.3
115	53	77.6	6020	50		3880	9.55
120	51	74.7	5575	51		3510	8.64
125	49	71.8	5150	52		3170	7.8
130	47	68.9	4750	52		2920	7.2
135	46	67.5	4560	53		2740	6.74
140	45	66	4350	53		2620	6.45
145	44	64.5	4150	53		2500	6.15
150	43	63	3960	54		2330	5.73
155	42	61.5	3780	55		2170	5.33
160	40	58.6	3440	55		1970	4.85

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FOR LINE "AE"

X (MILES)	di (Fr)	d_2 (Fr)	$\bar{d}$ (Fr)
300	250	240	245
295	240	250	245
290	250	260	255
285	260	270	265
280	270	310	290
275	310	350	330
270	350	360	355
265	360	360	360
260	360	370	365
255	370	410	390
250	410	520	465
245	520	620	570
240	620	600	610
235	600	510	555
230	510	410	460
225	410	390	400
220	390	380	385
215	380	380	380
210	380	425	402
205	450	550	500
200	550	570	560
195	570	400	485
190	400	370	385
185	370	340	355
180	340	290	315
175	290	220	255
170	220	210	215
165	210	200	205
160	200	200	200
155	200	190	195
150	190	180	185
145	180	150	165
140	150	120	135

CONTINUED

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FOR LINE "A E"

X (MILES)	di (Fr)	d_2 (Fr)	$\bar{d}$ (Fr)
135	120	130	125
130	130	140	135
125	140	140	140
120	140	140	140
115	140	145	143
110	140	150	145
105	150	148	149
100	150	140	145
95	140	125	133
90	125	115	120
85	115	100	108
80	100	90	95
75	90	75	83
70	75	75	75
65	65	75	70
60	65	65	65
55	65	65	65
50	60	65	63
45	60	65	63
40	60	60	60
35	55	60	58
30	60	65	63
25	65	70	68
20	70	65	68
15	60	55	58
10	60	60	60
5	60	65	63
0			

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TRACK AE

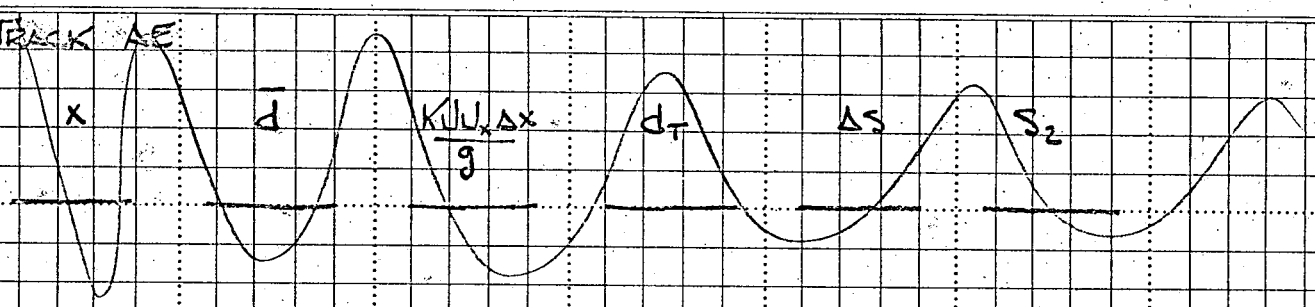

TABLE 1

TRACK AE

FOR THE HURRICANE EYE POSITIONED 20 MILES OFF SHORE

X	$\bar{d}$	$\frac{K U U_x \Delta x}{g}$	d_T	ΔS	S_2
175	255	—			
170	215	4.80	215	0.021	0.021
165	205	4.79	205	0.023	0.044
160	200	5.16	200	0.026	0.070
155	195	5.41	195	0.028	0.098
150	185	5.66	185	0.031	0.139
145	165	6.4	165.1	0.039	0.178
140	135	6.74	135.2	0.05	0.228
135	125	7.14	125.2	0.057	0.285
130	135	7.95	135.3	0.059	0.344
125	140	8.45	140.3	0.06	0.404
120	140	9.25	140.4	0.066	0.470
115	143	10.1	143.5	0.07	0.54
110	145	10.8	145.5	0.074	0.614

BY JP DATE 11/27/68 | QUIRK, LAWLER & MATUSKY ENGINEERS | SHEET NO. 2 OF 2

CHKD. BY _____ DATE _____ | ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS | JOB NO. 115-8

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SUBJECT HURRICANE SURGE

TRACK AE

WIND STRESSES

	x	d	$\frac{K W_1 \Delta x}{g}$	d_f	ΔS	S_2
						0.614
	105	149	11.7	149.6	0.078	0.692
	100	145	13.3	145.7	0.091	0.783
	95	133	15	133.8	0.112	0.895
	90	120	17.2	120.9	0.143	1.038
	85	108	19.1	109.	0.18	1.22
	80	95	21	96.2	0.22	1.44
	75	83	23.8	84.4	0.28	1.72
	70	75	27.6	76.7	0.36	2.08
	65	70	30.8	72.1	0.43	2.51
	60	65	36.3	67.5	0.54	3.05
	55	65	41.2	68	0.60	3.65
	50	63	45.9	69.7	0.66	4.31
	45	63	53.4	67.3	0.79	5.10
	40	60	60	65.1	0.92	6.02
	35	58	64	64	1.0	7.02
	30	62	66.5	70	0.95	7.97
	25	68	76.2	76	1.0	8.97
	20	68	79	77	1.03	10.00
	15	58	78.2	68	1.15	11.15
	10	60	69.6	71.2	0.98	12.13
	5	63	52.9	75	0.7	12.83
81	0	63	27.8	75.8	0.37	13.20
81	5	45	12.0	58.2	0.20	13.4
64	10	30	7	43.4	0.16	13.56
64	15	53	3.5	66.6	0.05	13.61
58	20	60	1.72	73.6	0.02	13.63
50	25	48	.63	61.6	0.01	13.64
	30	51	.5	64.6	0.01	13.65
	35	43	.25		—	
	40	37	.1		—	
	45	36	—		—	
	50	33	—		—	
	55	31	—			
	60	45	—			

WIND COMPONENT → 13.65

PRESSURE REDUCTION → + 0.75

TOTAL RISE 14.40

BY JP DATE 11/27/68

QUIRK, LAWLER & MATUSKY ENGINEERS
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SHEET NO. ____ OF ____

CHKD. BY ____ DATE ____

JOB NO. 115-8

SUBJECT HURRICANE SURGE

TRACK AE

X	$\overline{d}$	$\frac{KU^2\Delta x}{g}$	d_T	ΔS	S
160	200	4.56	200	0.023	0.023
155	195	4.79	195	0.025	0.048
150	185	5.16	185	0.027	0.075
145	165	5.41	165	0.033	0.108
140	135	5.66	135.1	0.042	0.150
135	125	6.4	125.1	0.051	0.201
130	135	6.74	135.2	0.05	0.251
125	140	7.14	140.3	0.051	0.302
120	140	7.95	140.3	0.057	0.359
115	143	8.45	143.4	0.059	.418
110	145	9.25	145.4	0.063	.481

BY JP DATE 11/27/68

CHKD. BY ____ DATE ____

SUBJECT HURRICANE SURGE

QUIRK, LAWLER & MATUSKY ENGINEERS
ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS
505 FIFTH AVENUE
NEW YORK, NEW YORK 10017

SHEET NO. ____ OF ____

JOB NO. 65-3

TRACK AE

	x	$\bar{d}$	$K\bar{U}_2\Delta x / g$	d_T	ΔS	S
						0.431
	105	149	10.1	149.5	0.069	0.549
	100	145	10.8	145.5	0.074	0.623
	95	133	11.7	133.6	0.088	0.711
	90	120	13.3	120.7	0.11	0.82
	85	108	15	108.8	0.14	0.96
	80	95	17.2	95.96	0.18	1.04
	75	83	19.1	84.	0.23	1.27
	70	75	21	76.25	0.28	1.55
	65	70	23.8	71.6	0.33	1.88
	60	65	27.6	66.9	0.41	2.29
	55	65	30.8	67.3	0.46	2.75
	50	63	36.3	65.75	0.55	3.30
	45	63	41.2	66.3	0.62	3.92
	40	60	45.9	63.9	0.72	4.64
	35	62	53.4	62.6	0.85	5.49
	30	603	60	68.5	0.88	6.37
	25	68	64	74.4	0.86	7.23
	20	68	66.5	75.23	0.88	8.11
	15	653	76.2	66.1	1.15	9.26
	10	60	79	69.25	1.14	10.40
	5	63	78.2	73.4	1.07	11.47
81 →	0	63	56.4	74.5	0.76	12.23
81 →	5	45	41.8	57.25	0.73	12.96
64 —	10	30	22.0	43	0.51	13.47
64 —	15	53	9.5	66.5	0.14	13.61
50 —	20	60	5.5	73.6	0.07	13.68
50 —	25	48	2.7	61.7	0.04	13.72
50 —	30	51	1.7	64.7	0.03	13.75
50 —	35	43	.62	56.75	0.01	13.76
	40	37	.5	50.8	0.01	13.77
	45	36	.25	49.8		
	50	33	.12			
	55	31	—			
	60	45	—			

13.8
+ 0.85
14.65

BY JP DATE 11/26/68

CHKD. BY _____ DATE _____

QUIRK, LAWLER & MATUSKY ENGINEERS

ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS

505 FIFTH AVENUE

NEW YORK, NEW YORK 10017

SHEET NO. _____ OF _____

JOB NO. 115-8

SUBJECT HURRICANE SURGE

A

TRACK AE

X	d	$\frac{K U_s \Delta x}{g}$	d_T	ΔS	S_c
125	140				
120	140				
115	143				
110	145				
105	149				
100	145				
95	133				
90	120				
85	108				
80	95				
75	83				
70	75				
65	70				
60	65				
55	65				
50	63				
45	63				
40	60				
35	58				
30	63				
25	68				
20	68				
15	58				
10	60				
5	63	76.2	71.6	1.06	9.64
0	63	64.0	72.6	.88	10.52
5	45	63.4	55.5	1.14	11.66
10	30	44.5	41.7	1.07	12.73
15	53	33.5	65.75	0.51	13.24
20	60	17.2	73.25	0.23	13.47
25	48	1.4	61.5	0.12	13.59
30	51	5.45	64.6	0.08	13.67
35	43	2.75	56.7	0.05	13.72
40	37	1.73	50.75	0.03	13.75
45	36	.762	49.75	0.01	13.76
50	33	.5	46.76	0.01	13.77
55	31				
60	45				

81 —
81 —
64 —
64 —
50 —
50 —
50 —

+ 0.94

14.71

BY JP DATE 11/27/68

CHKD. BY _____ DATE _____

SUBJECT HURRICANE SURGE

QUIRK, LAWLER & MATUSKY ENGINEERS
ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS
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NEW YORK, NEW YORK 10017

SHEET NO. _____ OF _____

JOB NO. 68-3

TRACK AE

x	d	$\frac{KU^2\Delta x}{g}$	d_T	ΔS	S
145	165	4.56	165	0.028	0.028
140	135	4.79	135	0.035	0.063
135	125	5.14	125	0.041	0.104
130	135	5.41	135.1	0.04	0.144
125	140	5.66	140.1	0.04	0.184
120	140	6.4	140.2	0.046	0.230
115	143	6.74	143.2	0.047	0.277
110	145	7.14	145.3	0.049	0.326

(CONT'D)
OVER

BY JP DATE 11/27/68 CHKD. BY _____ DATE _____

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ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS
505 FIFTH AVENUE
NEW YORK, NEW YORK 10017

SHEET NO. _____ OF _____

JOB NO. 115-8

SUBJECT HURRICANE SURGE

TRACK AE

	X	d	$K_u W_1 \Delta x / g$	d_T	ΔS	S
						0.326
	105	149	7.95	149.3	0.053	0.379
	100	145	8.45	145.4	0.058	0.437
	95	133	9.25	133.4	0.069	0.506
	90	120	10.1	120.5	0.084	0.590
	85	108	10.8	108.6	0.1	0.69
	80	95	11.7	95.7	0.12	0.81
	75	83	13.3	83.8	0.16	0.97
	70	75	15	76	0.20	1.17
	65	70	17.2	71.2	0.24	1.41
	60	65	19.1	66.4	0.3	1.71
	55	65	21	66.7	0.32	2.03
	50	63	23.8	65	0.37	2.40
	45	63	27.6	65.4	0.42	2.82
	40	60	30.8	62.8	0.49	3.31
	35	58	36.3	61.3	0.59	3.90
	30	63	41.2	66.9	0.62	4.52
	25	68	45.2	72.5	0.62	5.14
	20	68	53.2	73.1	0.73	5.87
	15	58	60	63.9	0.94	6.81
	10	60	64	66.8	0.96	7.77
	5	63	66.5	70.8	0.94	8.71
81	0	63	61.7	71.7	0.86	9.57
81	5	45	64	53.6	1.19	10.76
64	10	30	50	40.75	1.22	11.98
64	15	53	44.6	65	0.68	12.66
50	20	60	26.4	72.7	0.36	13.02
50	25	48	17.2	61	0.28	13.30
50	30	51	7.4	64.3	0.12	13.42
	35	43	5.45	56.4	0.1	13.52
	40	37	2.7	50.5	0.05	13.57
	45	36	1.7	49.6	0.03	13.60
	50	33	1.00	46.6	0.01	13.61
	55	31	.5	44.6	0.01	13.62
	60	45	.25			13.63

+ 1.00

14.63

551

BY JP DATE 11/26/68

CHKD. BY ____ DATE ____

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NEW YORK, NEW YORK 10017

SHEET NO. ____ OF ____

JOB NO. 115-8

SUBJECT HURRICANE SURGE

B

TRACK AE

X	$\bar{d}$	$\frac{K U U_* \Delta x}{g}$	d_T	ΔS	S_L
125	140				
120	140				
115	143				
110	145				
105	149				
100	145				
95	133				
90	120				
85	108				
80	95				
75	83				
70	75				
65	70				
60	65				
55	65				
50	63				
45	63				
40	60				
35	58				
30	63				
25	68				
20	68				
15	58				
10	60				
5	63				
0	63				
5	45				
10	30				
15	53				
20	60				
25	48				
30	51				
35	43				
40	37				
45	36				
50	33				
55	31				
60	45				

81 —
81 —
64 —
64 —
58 —
50 —
50 —

BY JR DATE 11/26/68 CHKD. BY _____ DATE _____

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NEW YORK, NEW YORK 10017

SHEET NO. _____ OF _____
JOB NO. 115-8

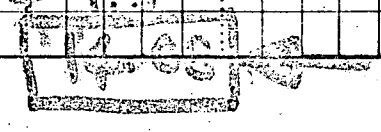
SUBJECT HURRICANE SURGE

C

TRACK AE

X	d	$\frac{KU^2\Delta x}{g}$	d_T	ΔS	S_ℓ
125	140				
120	140				
115	143				
110	145				
105	149				
100	145				
95	133				
90	120				
85	108				
80	95				
75	83				
70	75				
65	70				
60	65				
55	65				
50	63				
45	63				
40	60				
35	58				
30	63				
25	68				
20	68				
15	58				
10	60				
5	63	[illegible]	67.9	0.68	[illegible]
0	63	[illegible]	63.1	0.63	6.2 [illegible]
5	45	[illegible]	51.3	0.95	7.2 [illegible]
10	30	[illegible]	37.25	1.1	[illegible]
15	53	[illegible]	61.3	[illegible]	[illegible]
20	60	[illegible]	[illegible]	[illegible]	[illegible]
25	48	39.5	[illegible]	[illegible]	[illegible]
30	51	39.1	61.25	[illegible]	[illegible]
35	43	[illegible]	[illegible]	[illegible]	[illegible]
40	37	[illegible]	[illegible]	[illegible]	[illegible]
45	36	[illegible]	[illegible]	[illegible]	[illegible]
50	33	[illegible]	[illegible]	[illegible]	[illegible]
55	31	5.4	[illegible]	[illegible]	[illegible]
60	45	2.72	51.75	[illegible]	[illegible]

81 —
81 —
64 —
64 —
50 —
50 —
50 —



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NEW YORK, NEW YORK 10017

SHEET NO. _____ OF _____
JOB NO. 115-8

SUBJECT HURRICANE SURGE

D

TRACK AE

X	d	$\frac{K U U_x \Delta x}{g}$	d_T	ΔS	S_2	
110	145	4.56	145	0.031	0.031	
105	149	4.79	149	0.032	0.063	
100	145	5.16	145	0.036	0.099	
95	133	5.41	133.1	0.042	0.141	
90	120	5.66	120.1	0.047	0.188	
85	108	6.4	108.2	0.059	0.247	
80	95	6.74	95.25	0.071	0.318	
75	83	7.14	83.3	0.086	0.404	
70	75	7.95	75.4	0.105	0.509	
65	70	8.45	70.5	0.12	0.63	
60	65	9.25	65.6	0.14	0.77	
55	65	10.1	65.8	0.15	0.92	
50	63	10.8	63.9	0.17	1.09	
45	63	11.7	64.1	0.18	1.27	
40	60	13.3	61.25	0.22	1.49	
35	58	15	59.5	0.25	1.74	
30	63	17.2	64.75	0.27	2.01	
25	68	19.2	70	0.27	2.28	
20	68	21	70.3	0.3	2.58	
15	58	23.8	60.6	0.39	2.97	
10	60	27.6	63	0.44	3.41	
05	63	30.8	66.4	0.46	3.87	A
0	63	31.0	66.9	0.46	4.33	
5	45	33	49.3	0.67	5.00	
10	30	37	35	1.05	6.05	
15	53	43	59.05	0.73	6.78	
20	60	39	66.8	0.58	7.36	
25	48	32	55.4	0.58	7.94	
30	51	33.2	59	0.56	8.50	
35	43	38.1	51.5	0.74	9.24	
40	37	39.5	46.25	0.85	10.09	
45	36	39.0	46.1	0.85	10.94	
50	33	34.8	44	0.79	11.73	
55	31	26.4	43.75	0.6	12.33	
60	45	18.2	51.3	0.32	12.65	A
					+1.64	
					14.29	

BY JP DATE 11/27/68 CHKD. BY _____ DATE _____

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SHEET NO. _____ OF _____
JOB NO. 115-8

SUBJECT HURRICANE SURGE

E

TRACK AE

	X	$\bar{d}$	$\frac{K_U U_x \Delta x}{g}$	d_T	ΔS	S_2
	125	140				
	120	140				
	115	143				
	110	145				
	105	149				
	100	145				
	95	133				
	90	120				
	85	108				
	80	95				
	75	83				
	70	75				
	65	70				
	60	65				
	55	65				
	50	63				
	45	63				
	40	60				
	35	58				
	30	63				
	25	68				
	20	68				
	15	58				
	10	60				
	5	63	21	65.5	0.32	2.80
81 —	0	63	19.3	65.8	0.29	3.09
81 —	5	45	22.4	48.1	0.46	3.55
64 —	10	30	19.7	33.6	0.59	4.14
64 —	15	53	23.1	57.1	0.41	4.55
50 —	20	60	20.6	64.6	0.32	4.87
50 —	25	43	22.9	52.9	0.43	5.30
50 —	30	51	26.7	56.3	0.47	5.77
	35	43	30	48.8	0.62	6.39
	40	37	32	43.4	0.74	7.13
	45	36	33.25	43.1	0.77	7.90
	50	33	38.1	40.9	0.93	8.83
	55	31	39.5	39.8	0.99	9.82
	60	45	39.1	54.8	0.71	10.53
						+ 1.88
						12.41

BY JP DATE 11/6/68

CHKD. BY _____ DATE _____

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505 FIFTH AVENUE
NEW YORK, NEW YORK 10017

SHEET NO. _____ OF _____

JOB NO. 115-8

SUBJECT HURRICANE SURGE PREDICTION

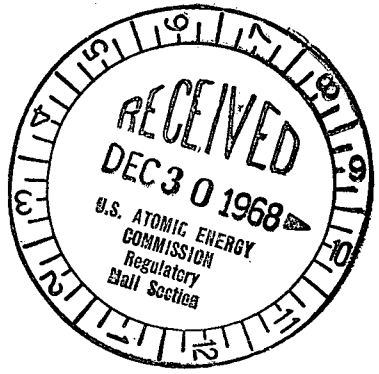
T.R. # 4 CERC

WATER RISE - PRESSURE DIFFERENCE

$$\Delta P = 29.92 - 27.26 = 2.66$$

$$S_1 = \Delta P (1.14)(1 - e^{-R/r})$$

	R	r	R/r	$e^{-R/r}$	$(1-e^{-R/r})$	1.14(2.66)	Rise
0	24	24	1	0.37	0.63	3.03	1.91
5		24.5	0.98	0.38	0.62		1.88
10		26	0.92	0.4	0.6		1.82
15		28.3	0.85	0.43	0.57		1.73
20		31.25	0.78	0.46	0.54		1.64
25		34.7	0.69	0.5	0.5		1.52
30		38.4	0.625	0.535	0.465		1.41
35		42.4	0.566	0.57	0.43		1.3
40		46.6	0.515	0.60	0.4		1.21
45		51	0.47	0.625	0.375		1.14
50		55.4	0.433	0.65	0.35		1.06
55		60	0.40	0.67	0.33		1.00
60		64.6	0.371	0.69	0.31		0.94
65		69.3	0.346	0.71	0.29		0.88
70		74	0.324	0.72	0.28		0.85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