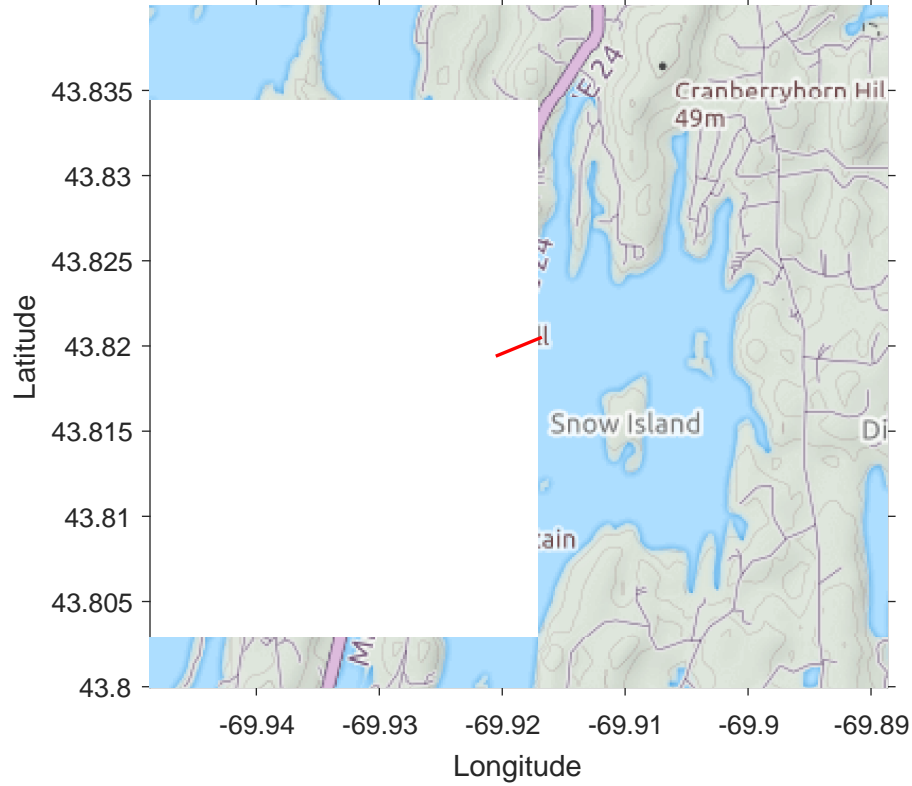
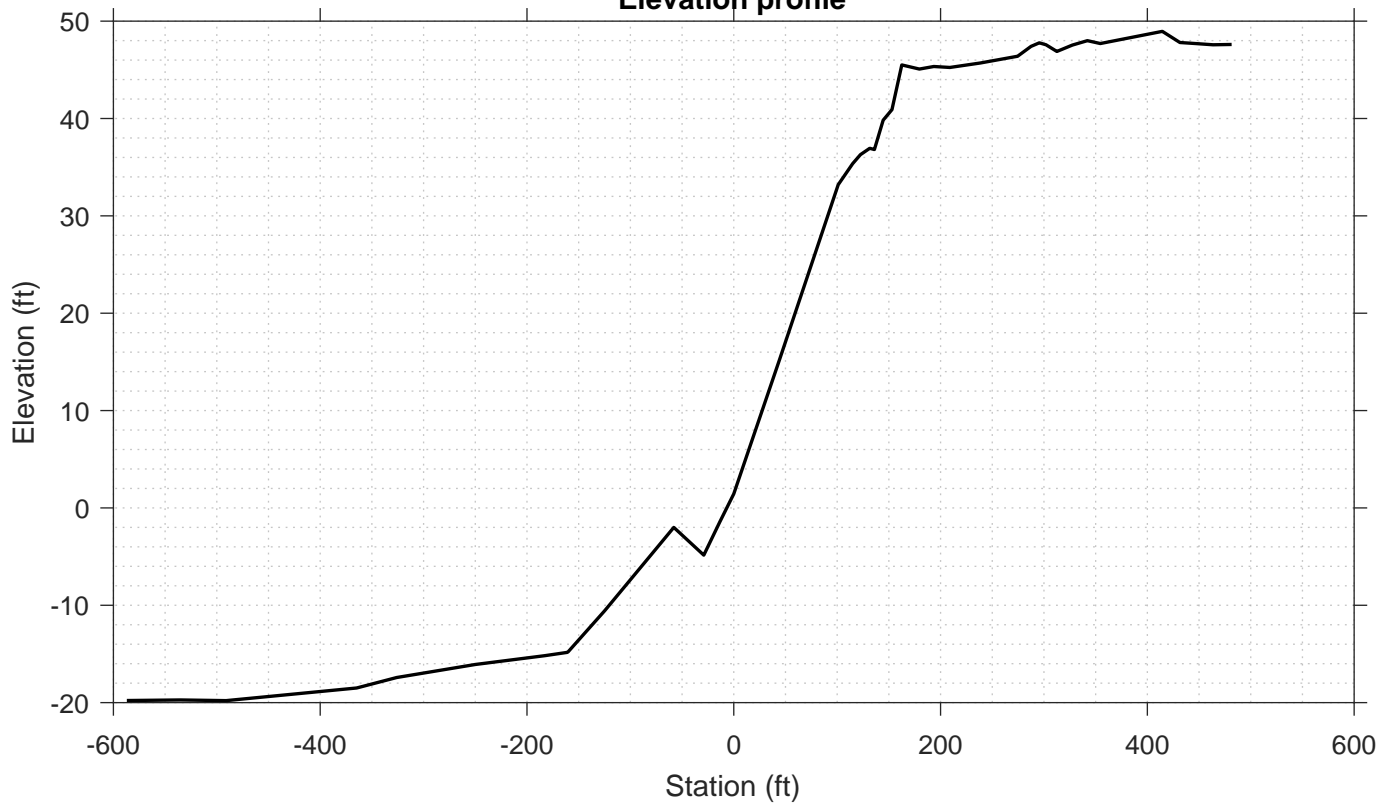


**Transect Number: CM-150-1**



**Elevation profile**



---

DATA LOG FOR TRANSECT ID: CM-150-1

---

---

PART 1: USER INPUT

SWAN 1-D / WHAFIS input

---

station: -256 ft  
LON: -69.9179 deg E  
LAT: 43.8202 deg N  
Bottom ELEV: -16.1875 ft-NAVD88  
TWL: 8.9195 ft-NAVD88  
HS: 1.499 ft  
TP: 2.3 sec  
Wave Direction bin: 180 deg CCW from East (90 deg sector)  
Transect Direction: 196.5249 deg CCW from East

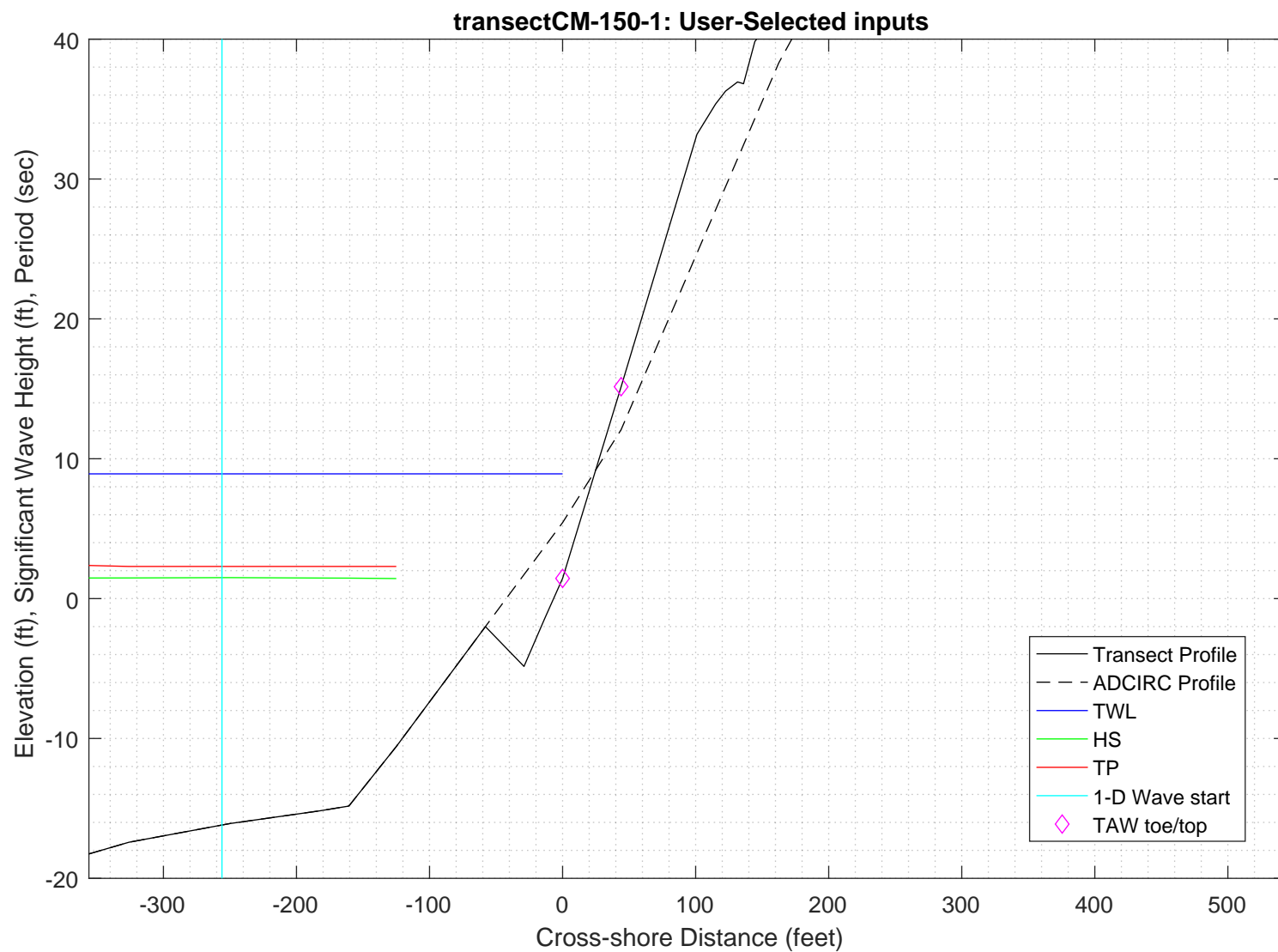
TAW/RUNUP input

---

toe sta: 0 ft  
toe elev: 1.4436 ft-NAVD88  
top sta: 44 ft  
top elev: 15.1509 ft-NAVD88  
\*Wave and water level conditions at toe to be calculated in SWAN 1-D\*

PART 1 COMPLETE

---



---

PART 2: SWAN 1-D

swan input grid name: 2\_swan/gridfiles/CM-150-1zmeters\_xmeters.grd  
swan file name: 2\_swan/swanfiles/CM-150-1.swn  
swan output name: 2\_swan/swanfiles/CM-150-1.dat

Boundary Conditions:  
TWL- 2.7187 meters  
HS- 0.45689 meters  
PER- 2.3 seconds

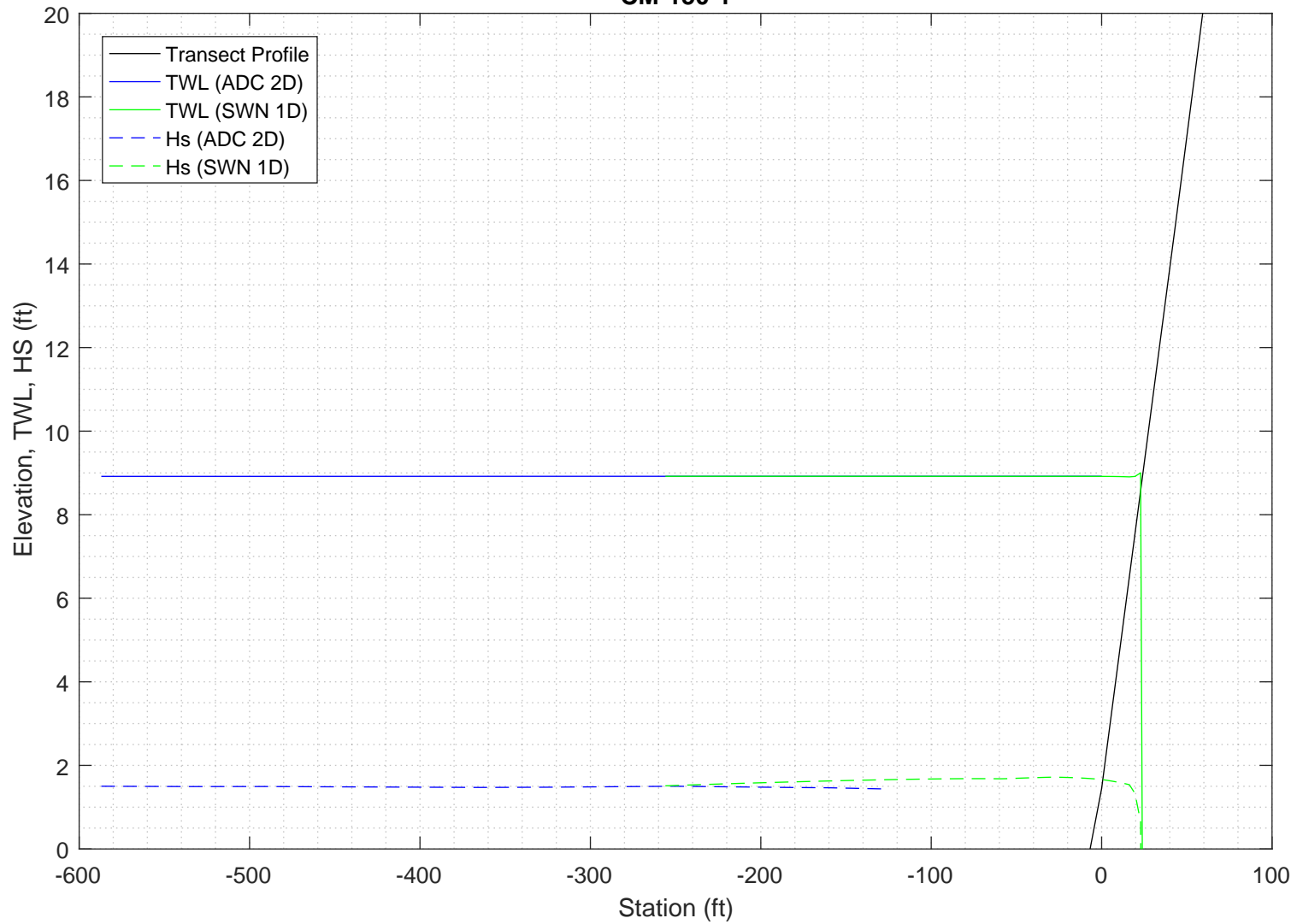
Batch File: 2\_swan/swanfiles/runswan.dat

SWAN maximum additional wave setup: 0.082149 feet  
SWAN output at toe:  
SETUP- -0.0022605 feet  
HS- 1.6621 feet  
PER- 2.2768 seconds

PART 2 COMPLETE

---

**2-D ADCIRC+SWAN and SWAN 1-D results, Transect:  
CM-150-1**



Execution started at 20200220.141950

```

-----
                        SWAN
SIMULATION OF WAVES IN NEAR SHORE AREAS
VERSION NUMBER 41.20A
-----

```

```

PROJECT '2018FemaAppeal' '1'
    '100-year Wind and Wave conditions'
! -- SET commands -----
SET DEPMIN=0.01 MAXMES=999 MAXERR=3 PWTAIL=4
SET LEVEL 0
SET CARTESIAN
! -- MODE commands -----
MODE STATIONARY ONED
!-- COORDINATES commands-----
COORDINATES CART
!
! -- computational (CGRID) grid commands -----
!
!                               xlenc=length of grid in meters
! mxc = number of mesh cells (one less than number of grid points)
!CGRID REGular [xpc] [ypc] [alpc] [xlenc] [ylenc] [mxc] [myc] &
!      [ CIRCle|SECTor[dir1] [dir2] ] [mdc] [flow] [fhigh] [msc]
CGRID REGULAR    0      0      0      91      0.  91      0      &
CIRCLE           36      0.03  0.8      30
Resolution in sigma-space: df/f = 0.1157
! -- READgrid ---- not used in 1-D mode -----
! -- INPgrid commands -----
!INPgrid BOTtom REGular [xpinp] [ypinp] [alpinp] [mxinp] [myinp] [dxinp] [dyinp]
!
INPGRID BOTTOM REGULAR    0      0      0      91  0      1      1
!READinp BOTtom [fac] 'fname1' [idla] [nhedf] [FREe|FORmat[form]|UNFormatted]
READ    BOTTOM    -1. '../gridfiles/CM-150-1zmeters_xmeters.grd' 1      0      FREE
!-----
! -- WIND [vel] [dir]
WIND      25.1  0
! -- BOUNd SHAPespec
BOUND SHAPE JONSWAP 3.3  PEAK DSPR POWER
! -- BOUNdspec
! BOU SIDE W CCW CON FILE 'swanspec.txt' 1
BOUN SIDE W CCW CONSTANT PAR    0.45689      2.3      0  2
!-- BOUNdnest1 - optional for boundary from parent run
!-- BOUNdnest2
!-- BOUNdnest3
!-- INITIAL -- usest to specify initial values
!

```

```

!----- P H Y S I C S -----
!-- GEN1 [cf10] [cf20] [cf30] [cf40] [edmlpm] [cdrag] [umin] [cfpm]
!-- GEN2 [cf10] [cf20] [cf30] [cf40] [cf50] [cf60] [edmlpm] [cdrag] [umin] [cfpm]
    GEN3 KOMEN
!   whitecapping ( on by default)
!-- WCAPping KOMen [cds2] [stpm] [powst] [delta] [powk]
    WCAP KOM
!   quadruplet wave interactions
!-- QUADrupl [iquad] [lambda] [Cnl4] [Csh1] [Csh2]
! -- BREaking CONstant [alpha] [gamma]
    BREAK    CON        1.        0.73
!-- FRIction JONswap CONstant [cfjon]
    FRIC      JONSWAP CON        0.038
!-- TRIad [itriad] [trfac] [cutfr]   [a] [b] [urcrit] [urslim]
! TRIAD      1        0.65    2.5    0.95 -0.75  0.2        0.01
    TRIAD
!-- VEGETation [height] [diamtr] [nstems] [drag]
!-- MUD [layer] [rhom] [viscm]
!- LIMiter [ursell] [qb] deactivates quadruplets with Ursell number exceeds ursell
!-- OBSTacle -- not in 1-D
!-- SETUP [supcor]
    SETUP     0
!
! ----- N U M E R I C S -----
!
!-- PROP  can use BBST or GSE instead of default
! -- NUMeric -- lots of options
!   NUM ACCUR npnts=100. stat 30
    NUMeric STOPC
!
! -----O U T P U T -----
!
!OUTPut OPTIOns "comment' (TABLE [field]) (BLOck [ndec] [len]) (SPEC [ndec])
OUTPUT OPTIONS '%' TABLE 16
$BLOCK 9 1000 SPEC 8
!CURve 'sname' [xpl] [yp1] <[int]   [xp]   [yp] >
CURVE 'curve' 0      0      91 91    0
!TABLE 'sname' < HEADER|NOHEAdER|INDEXed > 'fname' <output parameters> (output time)
Table 'curve'   HEADER 'CM-150-1.dat' XP YP HSIGN TPS RTP TMM10 DIR &
DSPR DEPTH SETUP
!QUANTITY XP hexp=99999
!
!-----
COMPUTE STATIONARY
-----
COMPUTATIONAL PART OF SWAN
-----

```

```

One-dimensional mode of SWAN is activated
Gridresolution      : MXC          92 MYC          1
                   : MCGRD         93
                   : MSC           31 MDC          36
                   : MTC           1
                   : NSTATC        0 ITERMX       50
Propagation flags   : ITFRE         1 IREFR        1
Source term flags   : IBOT          1 ISURF        1
                   : IWCAP         1 IWIND        3
                   : ITRIAD        1 IQUAD        2
                   : IVEG          0 ITURBV       0
                   : IMUD          0
Spatial step        : DX           0.1000E+01 DY      0.1000E+01
Spectral bin        : df/f         0.1157E+00 DDIR    0.1000E+02
Physical constants   : GRAV         0.9810E+01 RHO     0.1025E+04
Wind input          : WSPEED       0.2510E+02 DIR      0.0000E+00
Tail parameters     : E(f)         0.4000E+01 E(k)     0.2500E+01
                   : A(f)         0.5000E+01 A(k)     0.3000E+01
Accuracy parameters : DREL         0.1000E-01 NPNTS    0.9950E+02
                   : DHABS        0.0000E+00 CURVAT   0.5000E-02
                   : GRWMX        0.1000E+00
Drying/flooding     : LEVEL        0.0000E+00 DEPMIN   0.1000E-01
The Cartesian convention for wind and wave directions is used
Scheme for geographic propagation is SORDUP
Scheme geogr. space : PROPSC        2 ICMAX        7
Scheme spectral space: CSS          0.5000E+00 CDD      0.5000E+00
Current is off
Quadruplets         : IQUAD        2
                   : LAMBDA       0.2500E+00 CNL4      0.3000E+08
                   : CSH1         0.5500E+01 CSH2      0.8330E+00
                   : CSH3        -0.1250E+01
Maximum Ursell nr for Snl4 : 0.1000E+02
Triads              : ITRIAD        1 TRFAC      0.8000E+00
                   : CUTFR        0.2500E+01 URCRI    0.2000E+00
Minimum Ursell nr for Snl3 : 0.1000E-01
JONSWAP ('73)       : GAMMA       0.3800E-01
Vegetation is off
Turbulence is off
Fluid mud is off
W-cap Komen ('84)   : EMPCOF (CDS2): 0.2360E-04
W-cap Komen ('84)   : APM (STPM)   : 0.3020E-02
W-cap Komen ('84)   : POWST        : 0.2000E+01
W-cap Komen ('84)   : DELTA        : 0.1000E+01
W-cap Komen ('84)   : POWK         : 0.1000E+01
Wind drag is fit
Snyder/Komen wind input
Battjes&Janssen ('78): ALPHA      0.1000E+01 GAMMA    0.7300E+00
Set-up              : SUPCOR       0.0000E+00
Diffraction is off
Janssen ('89,'90)   : ALPHA      0.1000E-01 KAPPA    0.4100E+00
Janssen ('89,'90)   : RHOA       0.1280E+01 RHOW     0.1025E+04

1st and 2nd gen. wind: CF10       0.1880E+03 CF20      0.5900E+00
                   : CF30       0.1200E+00 CF40      0.2500E+03
                   : CF50       0.2300E-02 CF60     -0.2230E+00
                   : CF70       0.0000E+00 CF80     -0.5600E+00
                   : RHOAW      0.1249E-02 EDMLEPM   0.3600E-02
                   : CDRAG      0.1230E-02 UMIN      0.1000E+01
                   : LIM_PM     0.1300E+00

```

-----

First guess by 2nd generation model flags for first iteration:

```

ITER      1 GRWMX      0.1000E+23 ALFA      0.0000E+00
IWIND     2 IWCAP      0 IQUAD      0
ITRIAD    1 IBOT      1 ISURF      1
IVEG      0 ITURBV     0 IMUD      0

```

```

iteration   1; sweep 1
iteration   1; sweep 2
iteration   1; sweep 3
iteration   1; sweep 4
not possible to compute, first iteration

```

-----

Options given by user are activated for proceeding calculation:

```

ITER      2 GRWMX      0.1000E+00 ALFA      0.0000E+00
IWIND     3 IWCAP      1 IQUAD      2
ITRIAD    1 IBOT      1 ISURF      1
IVEG      0 ITURBV     0 IMUD      0

```

```

iteration   2; sweep 1
iteration   2; sweep 2
iteration   2; sweep 3
iteration   2; sweep 4
accuracy OK in 3.49 % of wet grid points ( 99.50 % required)

iteration   3; sweep 1
iteration   3; sweep 2
iteration   3; sweep 3

```



```
iteration    3; sweep 4
accuracy OK in 1.17 % of wet grid points ( 99.50 % required)

iteration    4; sweep 1
iteration    4; sweep 2
iteration    4; sweep 3
iteration    4; sweep 4
accuracy OK in 4.66 % of wet grid points ( 99.50 % required)

iteration    5; sweep 1
iteration    5; sweep 2
iteration    5; sweep 3
iteration    5; sweep 4
accuracy OK in 40.70 % of wet grid points ( 99.50 % required)

iteration    6; sweep 1
iteration    6; sweep 2
iteration    6; sweep 3
iteration    6; sweep 4
accuracy OK in 47.68 % of wet grid points ( 99.50 % required)

iteration    7; sweep 1
iteration    7; sweep 2
iteration    7; sweep 3
iteration    7; sweep 4
accuracy OK in 55.82 % of wet grid points ( 99.50 % required)

iteration    8; sweep 1
iteration    8; sweep 2
iteration    8; sweep 3
iteration    8; sweep 4
accuracy OK in 61.63 % of wet grid points ( 99.50 % required)

iteration    9; sweep 1
iteration    9; sweep 2
iteration    9; sweep 3
iteration    9; sweep 4
accuracy OK in 73.26 % of wet grid points ( 99.50 % required)

iteration   10; sweep 1
iteration   10; sweep 2
iteration   10; sweep 3
iteration   10; sweep 4
accuracy OK in 96.52 % of wet grid points ( 99.50 % required)

iteration   11; sweep 1
iteration   11; sweep 2
iteration   11; sweep 3
iteration   11; sweep 4
accuracy OK in 98.84 % of wet grid points ( 99.50 % required)

iteration   12; sweep 1
iteration   12; sweep 2
iteration   12; sweep 3
iteration   12; sweep 4
accuracy OK in 98.84 % of wet grid points ( 99.50 % required)

iteration   13; sweep 1
iteration   13; sweep 2
iteration   13; sweep 3
iteration   13; sweep 4
accuracy OK in 98.84 % of wet grid points ( 99.50 % required)

iteration   14; sweep 1
iteration   14; sweep 2
iteration   14; sweep 3
iteration   14; sweep 4
accuracy OK in 98.84 % of wet grid points ( 99.50 % required)

iteration   15; sweep 1
iteration   15; sweep 2
iteration   15; sweep 3
iteration   15; sweep 4
accuracy OK in 100.00 % of wet grid points ( 99.50 % required)
```

STOP

Run: 1

Table:curve

SWAN version:41.20A

Xp [m]	Yp [m]	Hsig [m]	TPsmoo [sec]	RTpeak [sec]	Tm_10 [sec]	Dir [degr]	Dspr [degr]	Depth [m]	Setup [m]
0.	0.	0.46033	2.2941	2.4105	2.0530	0.000	31.6130	7.6500	0.000000
1.	0.	0.46181	2.2940	2.4105	2.0498	0.000	31.6640	7.6400	-0.000002
2.	0.	0.46326	2.2939	2.4105	2.0467	0.000	31.7144	7.6200	-0.000005
3.	0.	0.46469	2.2937	2.4105	2.0438	0.000	31.7644	7.6000	-0.000007
4.	0.	0.46610	2.2936	2.4105	2.0410	0.000	31.8139	7.5900	-0.000009
5.	0.	0.46749	2.2935	2.4105	2.0384	0.000	31.8630	7.5800	-0.000012
6.	0.	0.46886	2.2934	2.4105	2.0358	0.000	31.9115	7.5600	-0.000014
7.	0.	0.47020	2.2933	2.4105	2.0334	0.000	31.9596	7.5500	-0.000017
8.	0.	0.47153	2.2933	2.4105	2.0312	0.000	32.0072	7.5400	-0.000019
9.	0.	0.47283	2.2932	2.4105	2.0290	0.000	32.0543	7.5200	-0.000021
10.	0.	0.47412	2.2931	2.4105	2.0269	0.000	32.1009	7.5100	-0.000024
11.	0.	0.47539	2.2931	2.4105	2.0249	0.000	32.1469	7.5000	-0.000026
12.	0.	0.47664	2.2930	2.4105	2.0230	0.000	32.1925	7.4800	-0.000029
13.	0.	0.47788	2.2930	2.4105	2.0212	0.000	32.2375	7.4700	-0.000031
14.	0.	0.47910	2.2929	2.4105	2.0195	0.000	32.2819	7.4600	-0.000033
15.	0.	0.48031	2.2929	2.4105	2.0179	0.000	32.3258	7.4400	-0.000036
16.	0.	0.48150	2.2928	2.4105	2.0164	0.000	32.3691	7.4300	-0.000038
17.	0.	0.48267	2.2928	2.4105	2.0149	0.000	32.4119	7.4200	-0.000041
18.	0.	0.48383	2.2928	2.4105	2.0135	0.000	32.4539	7.4000	-0.000043
19.	0.	0.48498	2.2928	2.4105	2.0122	0.000	32.4955	7.3900	-0.000046
20.	0.	0.48612	2.2927	2.4105	2.0109	0.000	32.5363	7.3800	-0.000048
21.	0.	0.48724	2.2927	2.4105	2.0097	0.000	32.5765	7.3599	-0.000050
22.	0.	0.48834	2.2927	2.4105	2.0086	0.000	32.6161	7.3499	-0.000053
23.	0.	0.48943	2.2927	2.4105	2.0075	0.000	32.6549	7.3299	-0.000055
24.	0.	0.49051	2.2927	2.4105	2.0065	0.000	32.6931	7.3199	-0.000058
25.	0.	0.49158	2.2927	2.4105	2.0055	0.000	32.7306	7.2999	-0.000060
26.	0.	0.49263	2.2927	2.4105	2.0046	0.000	32.7675	7.2899	-0.000062
27.	0.	0.49367	2.2927	2.4105	2.0038	0.000	32.8036	7.2699	-0.000065
28.	0.	0.49470	2.2927	2.4105	2.0030	0.000	32.8380	7.2599	-0.000067
29.	0.	0.49571	2.2928	2.4105	2.0023	0.000	32.8707	7.2399	-0.000070
30.	0.	0.49669	2.2927	2.4105	2.0015	0.000	32.9027	7.1299	-0.000072
31.	0.	0.49765	2.2927	2.4105	2.0008	0.000	32.9337	7.0099	-0.000075
32.	0.	0.49859	2.2927	2.4105	2.0001	0.000	32.9637	6.8899	-0.000078
33.	0.	0.49951	2.2927	2.4105	1.9994	0.000	32.9927	6.7699	-0.000080
34.	0.	0.50042	2.2927	2.4105	1.9988	0.000	33.0206	6.6499	-0.000083
35.	0.	0.50130	2.2926	2.4105	1.9982	0.000	33.0474	6.5299	-0.000086
36.	0.	0.50218	2.2926	2.4105	1.9976	0.000	33.0731	6.4099	-0.

60.	0.	0.51188	2.2823	2.4105	1.9799	359.993	33.1089	3.3697	-0.000277
61.	0.	0.51277	2.2825	2.4105	1.9805	359.992	33.1375	3.3897	-0.000279
62.	0.	0.51432	2.2834	2.4105	1.9823	359.991	33.1956	3.4897	-0.000272
63.	0.	0.51583	2.2843	2.4105	1.9840	359.990	33.2592	3.5897	-0.000265
64.	0.	0.51729	2.2851	2.4105	1.9857	359.990	33.3197	3.6897	-0.000260
65.	0.	0.51867	2.2860	2.4105	1.9872	359.990	33.3723	3.7897	-0.000256
66.	0.	0.51993	2.2867	2.4105	1.9886	359.989	33.4184	3.8797	-0.000253
67.	0.	0.52120	2.2874	2.4105	1.9900	359.989	33.4599	3.9798	-0.000250
68.	0.	0.52239	2.2882	2.4105	1.9914	359.989	33.4970	4.0798	-0.000248
69.	0.	0.52344	2.2887	2.4105	1.9925	359.988	33.4997	4.1798	-0.000246
70.	0.	0.52325	2.2879	2.4105	1.9915	359.989	33.4650	4.0197	-0.000259
71.	0.	0.52252	2.2864	2.4105	1.9896	359.989	33.3962	3.7997	-0.000278
72.	0.	0.52147	2.2847	2.4105	1.9874	359.990	33.3017	3.5797	-0.000303
73.	0.	0.52007	2.2829	2.4105	1.9849	359.990	33.1823	3.3597	-0.000334
74.	0.	0.51827	2.2811	2.4105	1.9820	359.991	33.0357	3.1396	-0.000374
75.	0.	0.51605	2.2794	2.4105	1.9788	359.992	32.8653	2.9196	-0.000426
76.	0.	0.51349	2.2777	2.1606	1.9755	359.993	32.6672	2.7095	-0.000490
77.	0.	0.51046	2.2766	2.1606	1.9721	359.993	32.4104	2.4994	-0.000573
78.	0.	0.50662	2.2768	2.1606	1.9684	359.994	32.0127	2.2793	-0.000689
79.	0.	0.50074	2.2797	2.4105	1.9641	359.994	31.4014	1.9791	-0.000908
80.	0.	0.49386	2.2841	2.4105	1.9620	359.994	30.4906	1.6587	-0.001277
81.	0.	0.48667	2.2900	2.4105	1.9658	359.995	29.1159	1.3481	-0.001871
82.	0.	0.47842	2.2972	2.4105	1.9812	0.142	26.8026	1.0371	-0.002897
83.	0.	0.46861	2.2978	2.4105	1.9641	0.975	22.9191	0.7258	-0.004246
84.	0.	0.40449	2.2668	2.1606	1.9078	1.647	18.9835	0.4189	-0.001052
85.	0.	0.19852	2.3037	2.4105	1.9271	354.800	21.1466	0.1350	0.025039
86.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000
87.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000
88.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000
89.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000
90.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000
91.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000

---

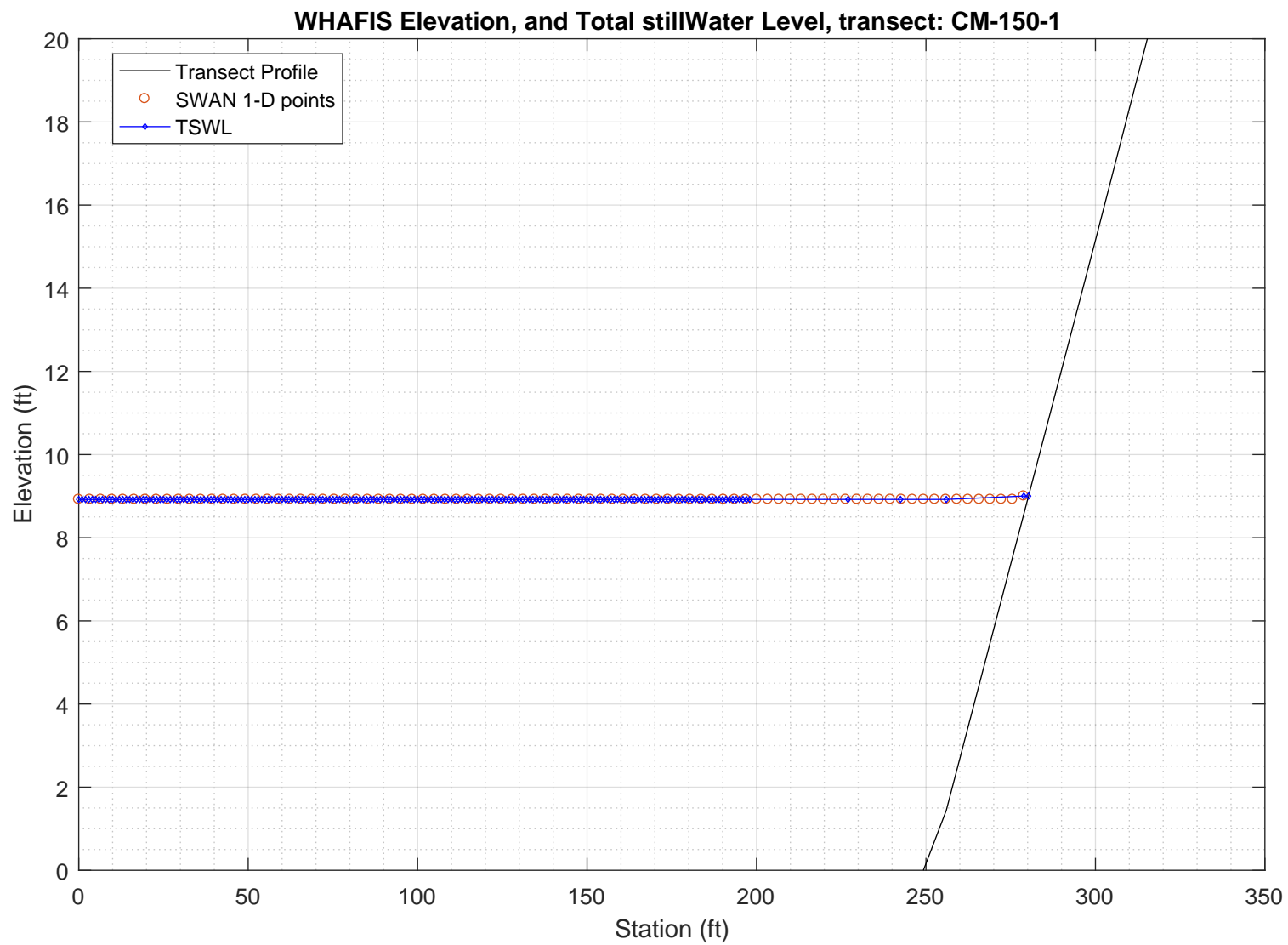
PART 3: WHAFIS

WHAFIS input: CM-150-1.dat

WHAFIS output: CM-150-1.out

PART 3 COMPLETE

---



WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08\_2007)

Executed on: Thu Feb 20 14:57:37 2020

Input file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Harpswell\3\_whafis\whafis4\CM-150-1.dat

Output file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Harpswell\3\_whafis\whafis4\CM-150-1.out

header

THIS IS A 100-YEAR CASE  
THE FOLLOWING NON-DEFAULT WIND SPEEDS ARE BEING USED  
WINDIF 56.14 WINDOF 56.14 WINDVH 60.00

PART1 INPUT

IE	0.000	-16.187	1.000	1.000	8.920	2.398	2.300	56.140	0.018	0.000
OF	1.000	-16.169	0.000	8.920	0.000	0.000	0.000	0.000	0.018	0.000
OF	2.000	-16.152	0.000	8.920	0.000	0.000	0.000	0.000	0.018	0.000
OF	3.000	-16.134	0.000	8.920	0.000	0.000	0.000	0.000	0.018	0.000
OF	4.000	-16.117	0.000	8.920	0.000	0.000	0.000	0.000	0.018	0.000
OF	5.000	-16.099	0.000	8.920	0.000	0.000	0.000	0.000	0.018	0.000
OF	6.000	-16.082	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	7.000	-16.068	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	8.000	-16.055	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	9.000	-16.041	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	10.000	-16.028	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
OF	11.000	-16.015	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	12.000	-16.001	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	13.000	-15.988	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	14.000	-15.974	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	15.000	-15.961	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	16.000	-15.947	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	17.000	-15.934	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	18.000	-15.920	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	19.000	-15.907	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	20.000	-15.893	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	21.000	-15.880	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	22.000	-15.866	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	23.000	-15.853	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
OF	24.000	-15.840	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	25.000	-15.826	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	26.000	-15.813	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	27.000	-15.799	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	28.000	-15.786	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	29.000	-15.772	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	30.000	-15.759	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	31.000	-15.745	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	32.000	-15.732	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	33.000	-15.718	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	34.000	-15.705	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	35.000	-15.691	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	36.000	-15.678	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
OF	37.000	-15.665	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	38.000	-15.651	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	39.000	-15.638	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	40.000	-15.624	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	41.000	-15.611	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	42.000	-15.597	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	43.000	-15.584	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	44.000	-15.570	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	45.000	-15.557	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	46.000	-15.543	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	47.000	-15.530	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	48.000	-15.516	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	49.000	-15.503	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
OF	50.000	-15.490	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	51.000	-15.476	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	52.000	-15.463	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	53.000	-15.449	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	54.000	-15.436	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	55.000	-15.422	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	56.000	-15.409	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	57.000	-15.395	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	58.000	-15.382	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	59.000	-15.368	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	60.000	-15.355	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	61.000	-15.341	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	62.000	-15.328	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
OF	63.000	-15.315	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	64.000	-15.301	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	65.000	-15.288	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	66.000	-15.274	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	67.000	-15.261	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	68.000	-15.247	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	69.000	-15.234	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	70.000	-15.220	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	71.000	-15.207	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	72.000	-15.193	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	73.000	-15.180	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
OF	74.000	-15.165	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	75.000	-15.149	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	76.000	-15.134	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	77.000	-15.118	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	78.000	-15.103	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	79.000	-15.087	0.000	8.920	0.000	0.000	0.000	0.000	0.016	0.000
OF	80.000	-15.071	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	81.000	-15.056	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	82.000	-15.040	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	83.000	-15.025	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	84.000	-15.009	0.000	8.920	0.000	0.000	0.000	0.000	0.016	0.000
OF	85.000	-14.993	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	86.000	-14.978	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	87.000	-14.962	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	88.000	-14.947	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	89.000	-14.931	0.000	8.920	0.000	0.000	0.000	0.000	0.016	0.000
OF	90.000	-14.915	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	91.000	-14.900	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	92.000	-14.884	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000

OF	93.000	-14.869	0.000	8.920	0.000	0.000	0.000	0.000	0.015	0.000
OF	94.000	-14.853	0.000	8.920	0.000	0.000	0.000	0.000	0.016	0.000
OF	95.000	-14.837	0.000	8.920	0.000	0.000	0.000	0.000	0.049	0.000
OF	96.000	-14.756	0.000	8.920	0.000	0.000	0.000	0.000	0.100	0.000
OF	97.000	-14.637	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	98.000	-14.517	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	99.000	-14.398	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	100.000	-14.278	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	101.000	-14.159	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	102.000	-14.040	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	103.000	-13.920	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	104.000	-13.801	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	105.000	-13.682	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	106.000	-13.562	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	107.000	-13.443	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	108.000	-13.323	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	109.000	-13.204	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	110.000	-13.085	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	111.000	-12.965	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	112.000	-12.846	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	113.000	-12.726	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	114.000	-12.607	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	115.000	-12.488	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	116.000	-12.368	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	117.000	-12.249	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	118.000	-12.129	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	119.000	-12.010	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	120.000	-11.891	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	121.000	-11.771	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	122.000	-11.652	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	123.000	-11.533	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	124.000	-11.413	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	125.000	-11.294	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	126.000	-11.175	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	127.000	-11.055	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	128.000	-10.936	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	129.000	-10.816	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	130.000	-10.697	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
OF	131.000	-10.578	0.000	8.920	0.000	0.000	0.000	0.000	0.123	0.000
OF	132.000	-10.452	0.000	8.920	0.000	0.000	0.000	0.000	0.127	0.000
OF	133.000	-10.324	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	134.000	-10.195	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	135.000	-10.068	0.000	8.920	0.000	0.000	0.000	0.000	0.127	0.000
OF	136.000	-9.940	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	137.000	-9.812	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	138.000	-9.684	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	139.000	-9.556	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	140.000	-9.428	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	141.000	-9.300	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	142.000	-9.172	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	143.000	-9.044	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	144.000	-8.916	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	145.000	-8.788	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	146.000	-8.660	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	147.000	-8.532	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	148.000	-8.404	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	149.000	-8.276	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	150.000	-8.148	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	151.000	-8.020	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	152.000	-7.892	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	153.000	-7.764	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	154.000	-7.636	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	155.000	-7.508	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	156.000	-7.380	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	157.000	-7.252	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	158.000	-7.124	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	159.000	-6.996	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	160.000	-6.868	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	161.000	-6.740	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	162.000	-6.612	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	163.000	-6.484	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	164.000	-6.356	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	165.000	-6.228	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	166.000	-6.100	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	167.000	-5.972	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	168.000	-5.844	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	169.000	-5.716	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	170.000	-5.588	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	171.000	-5.460	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	172.000	-5.332	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	173.000	-5.204	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	174.000	-5.076	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	175.000	-4.948	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	176.000	-4.820	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	177.000	-4.692	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	178.000	-4.564	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	179.000	-4.436	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	180.000	-4.308	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	181.000	-4.180	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	182.000	-4.052	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	183.000	-3.924	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	184.000	-3.796	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	185.000	-3.667	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	186.000	-3.539	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	187.000	-3.411	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	188.000	-3.283	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	189.000	-3.155	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	190.000	-3.027	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	191.000	-2.898	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	192.000	-2.770	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	193.000	-2.642	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
OF	194.000	-2.514	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000

[illegible]

	END STATION	END ELEVATION	FETCH LENGTH	SURGE 10-YEAR	ELEV 1.000	SURGE 100-YEAR	ELEV 1.000	INITIAL WAVE HEIGHT	INITIAL W. PERIOD		BOTTOM SLOPE	AVERAGE A-ZONES
IE	0.000	-16.187	1.000	1.000	8.920			2.398	2.300	56.140	0.018	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	1.000	-16.169	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.018	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	2.000	-16.152	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.018	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	3.000	-16.134	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.018	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	4.000	-16.117	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.018	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	5.000	-16.099	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.018	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	6.000	-16.082	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.015	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	7.000	-16.068	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	8.000	-16.055	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	9.000	-16.041	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	10.000	-16.028	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.013	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	11.000	-16.015	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	12.000	-16.001	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	13.000	-15.988	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	14.000	-15.974	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	15.000	-15.961	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	16.000	-15.947	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	17.000	-15.934	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	18.000	-15.920	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	19.000	-15.907	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	20.000	-15.893	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	21.000	-15.880	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	22.000	-15.866	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	23.000	-15.853	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.013	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	24.000	-15.840	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	25.000	-15.826	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	26.000	-15.813	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	27.000	-15.799	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	28.000	-15.786	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE
OF	29.000	-15.772	0.000	8.920	0.000	0.000	0.000	0.000	0.000		0.014	0.000
	END	END	NEW SURGE	NEW SURGE							BOTTOM	AVERAGE



	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	30.000	-15.759	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	31.000	-15.745	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	32.000	-15.732	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	33.000	-15.718	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	34.000	-15.705	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	35.000	-15.691	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	36.000	-15.678	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	37.000	-15.665	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	38.000	-15.651	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	39.000	-15.638	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	40.000	-15.624	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	41.000	-15.611	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	42.000	-15.597	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	43.000	-15.584	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	44.000	-15.570	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	45.000	-15.557	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	46.000	-15.543	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	47.000	-15.530	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	48.000	-15.516	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	49.000	-15.503	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	50.000	-15.490	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	51.000	-15.476	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	52.000	-15.463	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	53.000	-15.449	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	54.000	-15.436	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	55.000	-15.422	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	56.000	-15.409	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	57.000	-15.395	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	58.000	-15.382	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	59.000	-15.368	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	60.000	-15.355	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	61.000	-15.341	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	62.000	-15.328	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	63.000	-15.315	0.000	8.920	0.000	0.000	0.000	0.000	0.014	0.000
	END		NEW SURGE	NEW SURGE					BOTTOM	AVERAGE



	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	98.000	-14.517	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	99.000	-14.398	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	100.000	-14.278	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	101.000	-14.159	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	102.000	-14.040	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	103.000	-13.920	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	104.000	-13.801	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	105.000	-13.682	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	106.000	-13.562	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	107.000	-13.443	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	108.000	-13.323	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	109.000	-13.204	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	110.000	-13.085	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	111.000	-12.965	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	112.000	-12.846	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	113.000	-12.726	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	114.000	-12.607	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	115.000	-12.488	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	116.000	-12.368	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	117.000	-12.249	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	118.000	-12.129	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	119.000	-12.010	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	120.000	-11.891	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	121.000	-11.771	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	122.000	-11.652	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	123.000	-11.533	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	124.000	-11.413	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	125.000	-11.294	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	126.000	-11.175	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	127.000	-11.055	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	128.000	-10.936	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	129.000	-10.816	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	130.000	-10.697	0.000	8.920	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	131.000	-10.578	0.000	8.920	0.000	0.000	0.000	0.000	0.123	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	132.000	-10.452	0.000	8.920	0.000	0.000	0.000	0.000	0.127	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	133.000	-10.324	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
OF	134.000	-10.195	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	135.000	-10.068	0.000	8.920	0.000	0.000	0.000	0.000	0.127	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	136.000	-9.940	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	137.000	-9.812	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	138.000	-9.684	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	139.000	-9.556	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	140.000	-9.428	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	141.000	-9.300	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	142.000	-9.172	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	143.000	-9.044	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	144.000	-8.916	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	145.000	-8.788	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	146.000	-8.660	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	147.000	-8.532	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	148.000	-8.404	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	149.000	-8.276	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	150.000	-8.148	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	151.000	-8.020	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	152.000	-7.892	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	153.000	-7.764	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	154.000	-7.636	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	155.000	-7.508	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	156.000	-7.380	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	157.000	-7.252	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	158.000	-7.124	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	159.000	-6.996	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	160.000	-6.868	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	161.000	-6.740	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	162.000	-6.612	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	163.000	-6.484	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	164.000	-6.356	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	165.000	-6.228	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	166.000	-6.100	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	167.000	-5.972	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	168.000	-5.844	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	169.000	-5.716	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	170.000	-5.588	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	171.000	-5.460	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	172.000	-5.332	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	173.000	-5.204	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	174.000	-5.076	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	175.000	-4.948	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	176.000	-4.820	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	177.000	-4.692	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	178.000	-4.564	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	179.000	-4.436	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	180.000	-4.308	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	181.000	-4.180	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	182.000	-4.052	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	183.000	-3.924	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	184.000	-3.796	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	185.000	-3.667	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	186.000	-3.539	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	187.000	-3.411	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	188.000	-3.283	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	189.000	-3.155	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	190.000	-3.027	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	191.000	-2.898	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	192.000	-2.770	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	193.000	-2.642	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	194.000	-2.514	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	195.000	-2.386	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	196.000	-2.258	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	197.000	-2.129	0.000	8.920	0.000	0.000	0.000	0.000	0.128	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES	
OF	198.000	-2.001	0.000	8.920	0.000	0.000	0.000	0.000	-0.091	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	
OF	227.000	-4.849	0.000	8.920	0.000	0.000	0.000	0.000	0.013	0.000	
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE	

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	242.500	-1.437	0.000	8.920	0.000	0.000	0.000	0.000	0.217	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
IF	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
	256.000	1.444	0.000	8.920	0.000	0.000	0.000	0.000	0.275	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
IF	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
	278.900	8.568	0.000	9.002	0.000	0.000	0.000	0.000	0.311	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
IF	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
	280.300	9.002	0.000	9.002	0.000	0.000	0.000	0.000	0.309	0.000

-----END OF TRANSECT-----

NOTE:

SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.

1

PART2: CONTROLLING WAVE HEIGHTS, SPECTRAL PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS			
LOCATION	CONTROLLING WAVE HEIGHT	SPECTRAL PEAK WAVE PERIOD	WAVE CREST ELEVATION
IE	0.00	2.40	2.30
OF	1.00	2.40	2.30
OF	2.00	2.40	2.30
OF	3.00	2.40	2.30
OF	4.00	2.40	2.30
OF	5.00	2.40	2.30
OF	6.00	2.40	2.30
OF	7.00	2.40	2.30
OF	8.00	2.40	2.30
OF	9.00	2.40	2.30
OF	10.00	2.40	2.30
OF	11.00	2.40	2.30
OF	12.00	2.41	2.30
OF	13.00	2.41	2.30
OF	14.00	2.41	2.30
OF	15.00	2.41	2.30
OF	16.00	2.41	2.30
OF	17.00	2.41	2.30
OF	18.00	2.41	2.30
OF	19.00	2.41	2.30
OF	20.00	2.41	2.30
OF	21.00	2.41	2.30
OF	22.00	2.41	2.30
OF	23.00	2.41	2.30
OF	24.00	2.41	2.30
OF	25.00	2.41	2.30
OF	26.00	2.41	2.30
OF	27.00	2.42	2.30
OF	28.00	2.42	2.30
OF	29.00	2.42	2.30
OF	30.00	2.42	2.31
OF	31.00	2.42	2.31
OF	32.00	2.42	2.31
OF	33.00	2.42	2.31
OF	34.00	2.42	2.31
OF	35.00	2.42	2.31
OF	36.00	2.42	2.31
OF	37.00	2.42	2.31
OF	38.00	2.42	2.31
OF	39.00	2.42	2.31
OF	40.00	2.42	2.31
OF	41.00	2.42	2.31
OF	42.00	2.42	2.31
OF	43.00	2.43	2.31
OF	44.00	2.43	2.31
OF	45.00	2.43	2.31
OF	46.00	2.43	2.31
OF	47.00	2.43	2.31
OF	48.00	2.43	2.31
OF	49.00	2.43	2.31
OF	50.00	2.43	2.31
OF	51.00	2.43	2.31
OF	52.00	2.43	2.31
OF	53.00	2.43	2.31
OF	54.00	2.43	2.31
OF	55.00	2.43	2.31
OF	56.00	2.43	2.31
OF	57.00	2.43	2.31
OF	58.00	2.43	2.31
OF	59.00	2.44	2.31
OF	60.00	2.44	2.31
OF	61.00	2.44	2.31
OF	62.00	2.44	2.31
OF	63.00	2.44	2.31
OF	64.00	2.44	2.31
OF	65.00	2.44	2.31
OF	66.00	2.44	2.31
OF	67.00	2.44	2.31
OF	68.00	2.44	2.31
OF	69.00	2.44	2.31
OF	70.00	2.44	2.31
OF	71.00	2.44	2.31
OF	72.00	2.44	2.31
OF	73.00	2.44	2.31
OF	74.00	2.44	2.31
OF	75.00	2.45	2.31
OF	76.00	2.45	2.31
OF	77.00	2.45	2.31
OF	78.00	2.45	2.31
OF	79.00	2.45	2.31
OF	80.00	2.45	2.31
OF	81.00	2.45	2.31
OF	82.00	2.45	2.31

OF	83.00	2.45	2.31	10.64
OF	84.00	2.45	2.31	10.64
OF	85.00	2.45	2.31	10.64
OF	86.00	2.45	2.31	10.64
OF	87.00	2.45	2.31	10.64
OF	88.00	2.45	2.32	10.64
OF	89.00	2.45	2.32	10.64
OF	90.00	2.45	2.32	10.64
OF	91.00	2.45	2.32	10.64
OF	92.00	2.46	2.32	10.64
OF	93.00	2.46	2.32	10.64
OF	94.00	2.46	2.32	10.64
OF	95.00	2.46	2.32	10.64
OF	96.00	2.46	2.32	10.64
OF	97.00	2.46	2.32	10.64
OF	98.00	2.46	2.32	10.64
OF	99.00	2.46	2.32	10.64
OF	100.00	2.46	2.32	10.64
OF	101.00	2.46	2.32	10.64
OF	102.00	2.46	2.32	10.64
OF	103.00	2.46	2.32	10.64
OF	104.00	2.46	2.32	10.64
OF	105.00	2.46	2.32	10.64
OF	106.00	2.46	2.32	10.65
OF	107.00	2.47	2.32	10.65
OF	108.00	2.47	2.32	10.65
OF	109.00	2.47	2.32	10.65
OF	110.00	2.47	2.32	10.65
OF	111.00	2.47	2.32	10.65
OF	112.00	2.47	2.32	10.65
OF	113.00	2.47	2.32	10.65
OF	114.00	2.47	2.32	10.65
OF	115.00	2.47	2.32	10.65
OF	116.00	2.47	2.32	10.65
OF	117.00	2.47	2.32	10.65
OF	118.00	2.47	2.32	10.65
OF	119.00	2.47	2.32	10.65
OF	120.00	2.47	2.32	10.65
OF	121.00	2.47	2.32	10.65
OF	122.00	2.48	2.32	10.65
OF	123.00	2.48	2.32	10.65
OF	124.00	2.48	2.32	10.65
OF	125.00	2.48	2.32	10.65
OF	126.00	2.48	2.32	10.65
OF	127.00	2.48	2.32	10.65
OF	128.00	2.48	2.32	10.66
OF	129.00	2.48	2.32	10.66
OF	130.00	2.48	2.32	10.66
OF	131.00	2.48	2.32	10.66
OF	132.00	2.48	2.32	10.66
OF	133.00	2.48	2.32	10.66
OF	134.00	2.48	2.32	10.66
OF	135.00	2.48	2.32	10.66
OF	136.00	2.48	2.32	10.66
OF	137.00	2.48	2.32	10.66
OF	138.00	2.48	2.32	10.66
OF	139.00	2.49	2.32	10.66
OF	140.00	2.49	2.32	10.66
OF	141.00	2.49	2.32	10.66
OF	142.00	2.49	2.32	10.66
OF	143.00	2.49	2.32	10.66
OF	144.00	2.49	2.32	10.66
OF	145.00	2.49	2.32	10.66
OF	146.00	2.49	2.32	10.66
OF	147.00	2.49	2.32	10.66
OF	148.00	2.49	2.33	10.66
OF	149.00	2.49	2.33	10.66
OF	150.00	2.49	2.33	10.66
OF	151.00	2.49	2.33	10.66
OF	152.00	2.49	2.33	10.66
OF	153.00	2.49	2.33	10.66
OF	154.00	2.49	2.33	10.66
OF	155.00	2.49	2.33	10.66
OF	156.00	2.49	2.33	10.66
OF	157.00	2.49	2.33	10.67
OF	158.00	2.49	2.33	10.67
OF	159.00	2.49	2.33	10.67
OF	160.00	2.49	2.33	10.67
OF	161.00	2.49	2.33	10.67
OF	162.00	2.49	2.33	10.67
OF	163.00	2.49	2.33	10.67
OF	164.00	2.49	2.33	10.67
OF	165.00	2.49	2.33	10.67
OF	166.00	2.49	2.33	10.67

OF	185.00	2.49	2.33	10.66
OF	186.00	2.48	2.33	10.66
OF	187.00	2.48	2.33	10.66
OF	188.00	2.48	2.33	10.66
OF	189.00	2.48	2.33	10.66
OF	190.00	2.48	2.33	10.66
OF	191.00	2.48	2.33	10.65
OF	192.00	2.48	2.33	10.65
OF	193.00	2.48	2.33	10.65
OF	194.00	2.47	2.33	10.65
OF	195.00	2.47	2.33	10.65
OF	196.00	2.47	2.33	10.65
OF	197.00	2.47	2.33	10.65
OF	198.00	2.47	2.33	10.65
OF	227.00	2.52	2.34	10.69
OF	242.50	2.48	2.34	10.65
IF	256.00	2.39	2.34	10.60
IF	278.90	0.33	2.35	9.23
IF	280.30	0.01	2.35	9.01

PART3 LOCATION OF AREAS ABOVE 100-YEAR SURGE  
 NO AREAS ABOVE 100-YEAR SURGE IN THIS TRANSECT

PART4 LOCATION OF SURGE CHANGES

STATION	10-YEAR SURGE	100-YEAR SURGE
278.90	1.00	9.00

PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	FHF
0.00	10.60		
		A19 EL=11	95
256.00	10.60	A19 EL=11	95
257.60	10.50	A19 EL=10	95
274.42	9.50	A19 EL= 9	95
278.90	9.23	A19 EL= 9	95
280.30	9.01		

ZONE TERMINATED AT END OF TRANSECT

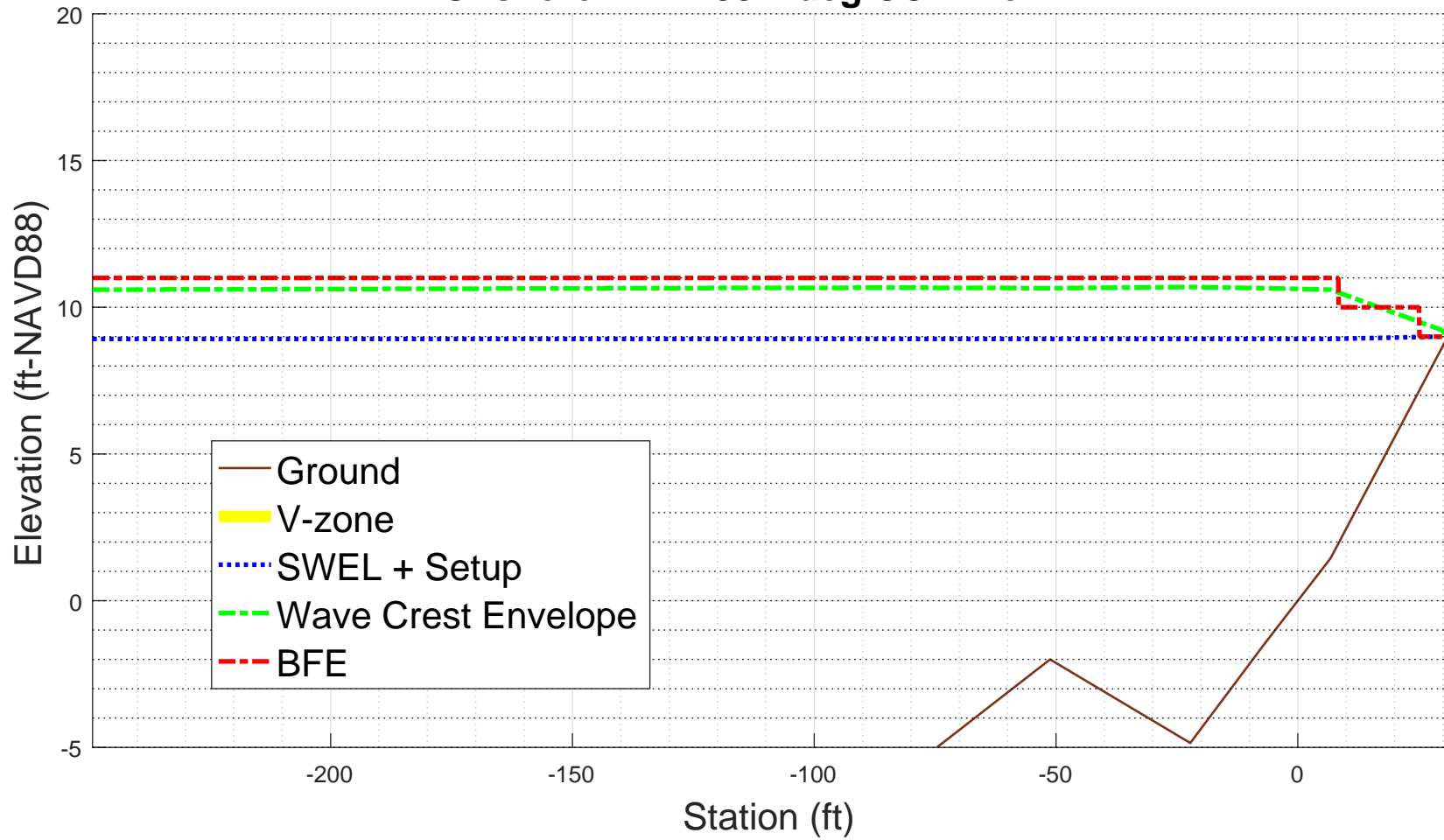
PART 7 POSTSCRIPT NOTES

PS# 1 START(426182.7858,4852308.8626)  
 PS# 2 END(426097.7935,4852275.1333)

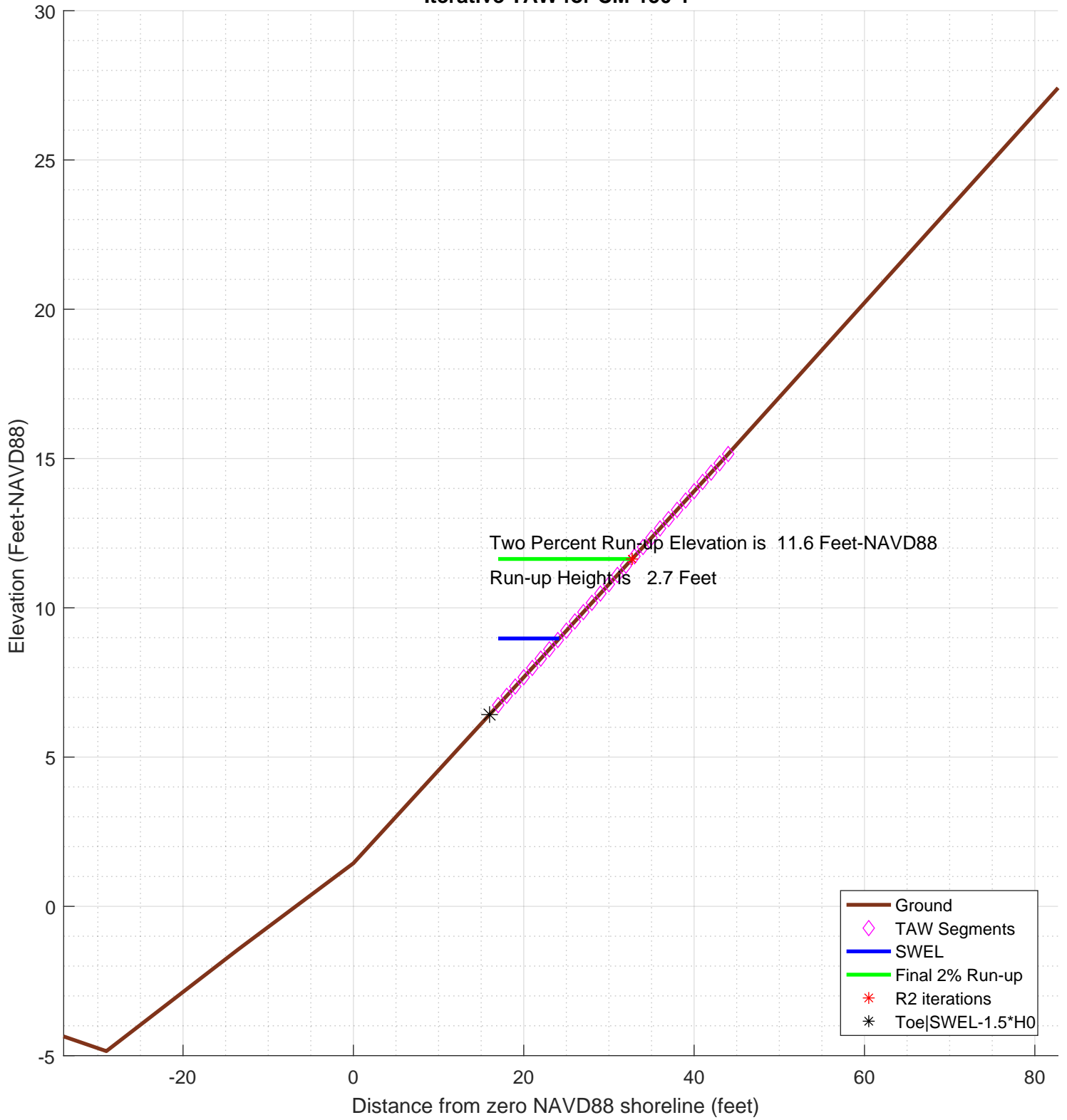
-1.000000e+00



**CM-150-1**  
**100-year WHAFIS Output**  
**Zero Station: -69.91881567, 43.81990706**  
**Onshore Dir: -158.4 deg CCW from E**



# Iterative TAW for CM-150-1



```

diary on          % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-150-1
% calculation by SJH, Ransom Consulting, Inc. 20-Feb-2020
% 100-year wave runup using TAW methodology
% including berm and weighted average with foreshore if necessary
%
% chk nld 20200220
%
% This script assumes that the incident wave conditions provided
% as input in the configuration section below are the
% appropriate values located at the end of the foreshore
% or toe of the slope on which the run-up is being calculated
% the script does not attempt to apply a depth limit or any other
% transformation to the incident wave conditions other than
% conversion of the peak wave period to the spectral mean wave
% as recommended in the references below
%
% references:
%
% Van der Meer, J.W., 2002. Technical Report Wave Run-up and
% Wave Overtopping at Dikes. TAW Technical Advisory Committee on
% Flood Defence, The Netherlands.
%
% FEMA. 2007, Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update
%
%
%-----
% CONFIG
%-----
fname='inpfiles/CM-150-1sta_ele_include.csv'; % file with station, elevation, include
% third column is 0 for excluded points
imgname='logfiles/CM-150-1-runup';
SWEL=8.9195; % 100-yr still water level including wave setup.
H0=1.6621; % significant wave height at toe of structure
Tp=2.2768; % peak period, 1/fma,
T0=Tp/1.1;

gamma_berm=1; % this may get changed automatically below
gamma_rough=0.8;
gamma_beta=1;
gamma_perm=1;

setupAtToe=-0.0022605;
maxSetup=0.082149; % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-150-1'

plotTitle =

Iterative TAW for CM-150-1

% END CONFIG
%-----

SWEL=SWEL+setupAtToe

SWEL =

8.9172395

SWEL_fore=SWEL+maxSetup

SWEL_fore =

8.9993885

% FIND WAVELENGTH USING DEEPWATER DISPERSION RELATION
% using English units
L0=32.15/(2*pi)*T0^2

L0 =

21.9212595438823

% Find Hb (Munk, 1949)
%Hb=H0/(3.3*(H0/L0)^(1/3))
%Db=-Hb/.78+SWEL; % depth at breaking

% The toe elevation here is only used to determine the average
% structure slope, it is not used to depth limit the wave height.
% Any depth limiting or other modification of the wave height

```

```

% to make it consistent with TAW guidance should be performed
% prior to the input of the significant wave height given above.
Ztoe=SWEL-1.5*H0

Ztoe =

        6.4240895

% read the transect
[sta,dep,inc] = textread(fname,'%n%n%n%[^\\n]','delimiter',' ','headerlines',0);

% remove unselected points
k=find(inc==0);
sta(k)=[];
dep(k)=[];

sta_org=sta; % used for plotting purposes
dep_org=dep;

% initial guess at maximum run-up elevation to estimate slope
Z2=SWEL+1.5*H0

Z2 =

        11.4103895

% determine station at the max runup and -1.5*H0 (i.e. the toe)
top_sta=-999;
toe_sta=-999;
for kk=1:length(sta)-1
    if ((Z2 > dep(kk)) & (Z2 <= dep(kk+1))) % here is the intersection of z2 with profile
        top_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Z2)
    end
    if ((Ztoe > dep(kk)) & (Ztoe <= dep(kk+1))) % here is the intersection of Ztoe with profile
        toe_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Ztoe)
    end
end

toe_sta =

        15.9872548390203

top_sta =

        31.9930616856749

% check to make sure we got them, if not extend the end slopes outward
S=diff(dep)./diff(sta);
if toe_sta== -999
    dy=dep(1)-Ztoe;
    toe_sta=sta(1)-dy/S(1)
end
if top_sta== -999
    dy=Z2-dep(end);
    top_sta=sta(end)+dy/S(end)
end

% just so the reader can tell the values aren't -999 anymore
top_sta

top_sta =

        31.9930616856749

toe_sta

toe_sta =

        15.9872548390203

% check for case where the toe of slope is below SWL-1.5*H0
% in this case interpolate setup from the setupAtToe(really setup as first station), and the max setup
% also un-include points seaward of SWL-1.5*H0
if Ztoe > dep(1)
    dd=SWEL_fore-dep;
    k=find(dd<0,1); % k is index of first land point
    staAtSWL=interp1(dep(k-1:k),sta(k-1:k),SWEL_fore);
    dsta=staAtSWL-sta(1);
    dsetup=maxSetup-setupAtToe;
    dsetdsta=dsetup/dsta;
    setup=setupAtToe+dsetdsta*(toe_sta-sta(1));
    sprintf('!!- Location of SWEL-1.5*H0 is %4.1f ft landward of toe of slope',dsta)
    sprintf('!!- Setup is interpolated between setup at toe of slope and max setup')

```

```

    sprintf('!!!-      setup is adjusted to %4.2f feet',setup)
    SWEL=SWEL-setupAtToe+setup;
    sprintf('!!!-      SWEL is adjusted to %4.2f feet',SWEL)
    k=find(dep < SWEL-1.5*H0)
    sta(k)=[];
    dep(k)=[];
else
    sprintf('!!!- The User has selected a starting point that is %4.2f feet above the elevation of SWEL-1.5H0\n',dep(1)
    sprintf('!!!- This may be reasonable for some cases. However the user may want to consider:\n')
    sprintf('!!!-      1) Selecting a starting point that is at or below %4.2f feet elevation, or\n', Ztoe)
    sprintf('!!!-      2) Reducing the incident wave height to a depth limited condition.\n')
end

ans =

-!!!- Location of SWEL-1.5*H0 is 24.3 ft landward of toe of slope

ans =

-!!!- Setup is interpolated between setup at toe of slope and max setup

ans =

-!!!-      setup is adjusted to 0.05 feet

ans =

-!!!-      SWEL is adjusted to 8.97 feet

k =

    1
    2
    3
    4
    5
    6
    7
    8
    9
   10
   11
   12
   13
   14
   15
   16
   17

% now iterate converge on a runup elevation
tol=0.01; % convergence criteria
R2del=999;
R2_new=3*H0; %initial guess
R2=R2_new;
iter=0;
R2_all=[];
topStaAll=[];
Berm_Segs=[];
TAW_ALWAYS_VALID=1;
while(abs(R2del) > tol && iter <= 25)
    iter=iter+1;
    sprintf('!----- STARTING ITERATION %d -----!',iter)
    % elevation of toe of slope
    Ztoe
    % station of toe slope (relative to 0-NAVD88 shoreline)
    toe_sta
    % station of top of slope/extent of 2% run-up
    top_sta
    % elevation of top of slope/extent of 2% run-up
    Z2
    % incident significant wave height
    H0
    % incident spectral peak wave period
    Tp
    % incident spectral mean wave period
    T0

    R2=R2_new
    Z2=R2+SWEL
    % determine slope for this iteration
    top_sta=-999;
    for kk=1:length(sta)-1
        if ((Z2 > dep(kk)) & (Z2 <= dep(kk+1))) % here is the intersection of z2 with profile

```

```

        top_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Z2)
        break;
    end
end
if top_sta== -999
    dy=Z2-dep(end);
    top_sta=sta(end)+dy/S(end)
end

% get the length of the slope (not accounting for berm)
Lslope=top_sta-toe_sta

% loop over profile segments to determine berm factor
% re-calculate influence of depth of berm based on this run-up elevation
% check for berm, berm width, berm height
berm_width=0;
rdh_sum=0;
Berm_Segs=[];
Berm_Heights=[];
for kk=1:length(sta)-1
    ddep=dep(kk+1)-dep(kk);
    dsta=sta(kk+1)-sta(kk);
    s=ddep/dsta;
    if (s < 1/15) % count it as a berm if slope is flatter than 1:15 (see TAW manual)
        sprintf('Berm Factor Calculation: Iteration %d, Profile Segment: %d',iter, kk)
        berm_width=berm_width+dsta; % tally the width of all berm segments
        % compute the rdh for this segment and weight it by the segment length
        dh=SWEL-(dep(kk)+dep(kk+1))/2
        if dh < 0
            chi=R2;
        else
            chi=2* H0;
        end
        if (dh <= R2 & dh >=-2*H0)
            rdh=(0.5-0.5*cos(3.14159*dh/chi)) ;
        else
            rdh=1;
        end
        rdh_sum=rdh_sum + rdh * dsta
        Berm_Segs=[Berm_Segs, kk];
        Berm_Heights=[Berm_Heights, (dep(kk)+dep(kk+1))/2];
    end
    if dep(kk) >= Z2 % jump out of loop if we reached limit of run-up for this iteration
        break
    end
end
sprintf('!----- End Berm Factor Calculation, Iter: %d -----!',iter)
berm_width
rB=berm_width/Lslope
if (berm_width > 0)
    rdh_mean=rdh_sum/berm_width
else
    rdh_mean=1
end
gamma_berm=1- rB * (1-rdh_mean)
if gamma_berm > 1
    gamma_berm=1
end
if gamma_berm < 0.6
    gamma_berm =0.6
end
% Iribarren number
slope=(Z2-Ztoe)/(Lslope-berm_width)
Irb=(slope/(sqrt(H0/L0)))
% runup height
gamma_berm
gamma_perm
gamma_beta
gamma_rough
gamma=gamma_berm*gamma_perm*gamma_beta*gamma_rough

% check validity
TAW_VALID=1;
if (Irb*gamma_berm < 0.5 | Irb*gamma_berm > 10 )
    sprintf('!!! - - Iribarren number: %6.2f is outside the valid range (0.5-10), TAW NOT VALID - - !!!\n', Irb*gamma_berm)
    TAW_VALID=0;
else
    sprintf('!!! - - Iribarren number: %6.2f is in the valid range (0.5-10), TAW RECOMMENDED - - !!!\n', Irb*gamma_berm)
end
islope=1/slope;
if (slope < 1/8 | slope > 1)
    sprintf('!!! - - slope: 1:%3.1f V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!\n', islope)
    TAW_VALID=0;
else
    sprintf('!!! - - slope: 1:%3.1f V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!\n', islope)
end
if TAW_VALID == 0
    TAW_ALWAYS_VALID=0;
end
end

```

```

if (Irb*gamma_berm < 1.8)
    R2_new=gamma*H0*1.77*Irb
else
    R2_new=gamma*H0*(4.3-(1.6/sqrt(Irb)))
end

% check to see if we need to evaluate a shallow foreshore
if berm_width > 0.25 * L0;
    disp('!   Berm_width is greater than 1/4 wave length')
    disp('!   Runup will be weighted average with foreshore calculation assuming depth limited wave height on berm')
    % do the foreshore calculation
    fore_H0=0.78*(SWEL_fore-min(Berm_Heights))
    % get upper slope
    fore_toe_sta=-999;
    fore_toe_dep=-999;
    for kk=length(dep)-1:-1:1
        ddep=dep(kk+1)-dep(kk);
        dsta=sta(kk+1)-sta(kk);
        s=ddep/dsta;
        if s < 1/15
            break
        end
        fore_toe_sta=sta(kk);
        fore_toe_dep=dep(kk);
        upper_slope=(Z2-fore_toe_dep)/(top_sta-fore_toe_sta)
    end
    fore_Irb=upper_slope/(sqrt(fore_H0/L0));
    fore_gamma=gamma_perm*gamma_beta*gamma_rough;
    if (fore_Irb < 1.8)
        fore_R2=fore_gamma*fore_H0*1.77*fore_Irb;
    else
        fore_R2=fore_gamma*fore_H0*(4.3-(1.6/sqrt(fore_Irb)));
    end
    if berm_width >= L0
        R2_new=fore_R2
        disp('berm is wider than one wavelength, use full shallow foreshore solution');
    else
        w2=(berm_width-0.25*L0)/(0.75*L0)
        w1=1-w2
        R2_new=w2*fore_R2 + w1*R2_new
    end
end % end berm width check
% convergence criterion
R2del=abs(R2-R2_new)
R2_all(iter)=R2_new;
% get the new top station (for plot purposes)
Z2=R2_new+SWEL
top_sta=-999;
for kk=1:length(sta)-1
    if ((Z2 > dep(kk)) & (Z2 <= dep(kk+1))) % here is the intersection of z2 with profile
        top_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Z2)
        break;
    end
end
if top_sta== -999
    dy=Z2-dep(end);
    top_sta=sta(end)+dy/S(end);
end
topStaAll(iter)=top_sta;

end
ans =
!----- STARTING ITERATION 1 -----!
Ztoe =
        6.4240895
toe_sta =
        15.9872548390203
top_sta =
        31.9930616856749
Z2 =
        11.4103895
H0 =
        1.6621
Tp =
        2.2768
T0 =
        2.06981818181818
R2 =
        4.9863
Z2 =
        13.9591791645678
top_sta =
        40.1745674252892
Lslope =
        24.1873125862689
ans =
!----- End Berm Factor Calculation, Iter: 1 -----!
berm_width =
    0
rB =

```

```

0
rdh_mean =
1
gamma_berm =
1
slope =
0.311530668721147
Irb =
1.13137084937306
gamma_berm =
1
gamma_perm =
1
gamma_beta =
1
gamma_rough =
0.8
gamma =
0.8
ans =
!!! - - Iribaren number: 1.13 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.2 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
2.66271930806004
R2del =
2.32358069193996
Z2 =
11.6355984726278
top_sta =
32.7159719983815
ans =
!----- STARTING ITERATION 2 -----!
Ztoe =
6.4240895
toe_sta =
15.9872548390203
top_sta =
32.7159719983815
Z2 =
11.6355984726278
H0 =
1.6621
Tp =
2.2768
T0 =
2.06981818181818
R2 =
2.66271930806004
Z2 =
11.6355984726278
top_sta =
32.7159719983815
Lslope =
16.7287171593612
ans =
!----- End Berm Factor Calculation, Iter: 2 -----!
berm_width =
0
rB =
0
rdh_mean =
1
gamma_berm =
1
slope =
0.311530700350893
Irb =
1.13137096424128
gamma_berm =
1
gamma_perm =
1
gamma_beta =
1
gamma_rough =
0.8
gamma =
0.8
ans =
!!! - - Iribaren number: 1.13 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.2 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
2.66271957840624
R2del =
2.70346205422101e-07
Z2 =
11.635598742974
top_sta =

```



```
32.7159728661803
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 = 11.635598742974
diary off
-1.000000e+00
-1.000000e+00
```

---

PART 5: RUNUP2

for transect: CM-150-1

Station locations shifted by: -6.77 feet from their  
original location to set the shoreline to  
elevation 0 for RUNUP2 input

---

RUNUP2 INPUT CONVERSIONS

for transect: CM-150-1

Incident significant wave height: 1.50 feet

Peak wave period: 2.30 seconds

Mean wave height: 0.94 feet

Local Depth below SWEL: 25.11 feet

Mean wave height deshoaled using Hunt approximation for  
celerity assuming constant wave energy flux.

References: R.G. Dean and R.A. Dalrymple. 2000. Water

Wave Mechanics for Engineers and Scientists. World  
Scientific Publishing Company, River Edge New Jersey

USACE (1985), Direct Methods for Calculating Wavelength, CETN-1-17  
US Army Engineer Waterways Experiment Station Coastal Engineering  
Research Center, Vicksburg, MS

also see Coastal Engineering Manual Part II-3  
for discussion of shoaling coefficient

Depth,  $D = 25.11$

Period,  $T = 1.95$

Waveheight,  $H = 0.94$

Deep water wavelength,  $L_0$  (ft)

$L_0 = g \cdot T^2 / 2\pi$

$L_0 = 32.17 \cdot 1.95^2 / 6.28 = 19.57$

Deep water wave celerity,  $C_0$  (ft/s)

$C_0 = L_0 / T$

$C_0 = 19.57 / 1.95 = 10.01$

Angular frequency,  $\sigma$  (rad/s)

$\sigma = 2\pi / T$

$\sigma = 6.28 / 1.95 = 3.21$

Hunts (1979) approximation for Celerity  $C_{1H}$  (ft/s) at Depth  $D$  (ft)

$y = \sigma \cdot \sigma \cdot D / g$

$y = 3.21 \cdot 3.21 \cdot 25.11 / 32.17 = 8.06$

$C_{1H} = \sqrt{g \cdot D / (y + 1 / (1 + 0.6522 \cdot y + 0.4622 \cdot y^2 + 0.0864 \cdot y^4 + 0.0675 \cdot y^5))}$

$C_{1H} = 10.01$

Shoaling Coefficient  $K_{sH}$

$K_{sH} = \sqrt{C_0 / C_{1H}}$

$K_{sH} = \sqrt{10.01 / 10.01} = 1.00$

Deepwater Wave Height  $H_{0_H}$  (ft)

$H_{0_H} = H / K_{sH}$

$H_{0_H} = 0.94 / 1.00 = 0.94$

Deepwater mean wave height: 0.94 feet

---

END RUNUP2 CONVERSIONS

---

RUNUP2 RESULTS

for transect: CM-150-1

RUNUP2 SWEL:

8.90

8.90

8.90

8.90

8.90  
8.90  
8.90  
8.90  
8.90

RUNUP2 deepwater mean wave heights:

0.89  
0.89  
0.89  
0.94  
0.94  
0.94  
0.99  
0.99  
0.99

RUNUP2 mean wave periods:

1.86  
1.95  
2.05  
1.86  
1.95  
2.05  
1.86  
1.95  
2.05

RUNUP2 runup above SWEL:

0.82  
0.85  
0.90  
0.84  
0.88  
0.92  
0.86  
0.90  
0.95

RUNUP2 Mean runup height above SWEL: 0.88 feet

RUNUP2 2-percent runup height above SWEL: 1.94 feet

RUNUP2 2-percent runup elevation: 10.84 feet-NAVD88

RUNUP2 Messages:

No Messages

---

END RUNUP2 RESULTS

---

ACES BEACH RUNUP

Incident significant wave height: 1.50 feet

Significant wave height deshoaled using Hunt equation

Deepwater significant wave height: 1.31 feet

Peak wave period: 2.30 seconds

Average beach Slope: 1:9.57 (H:V)

ACES RUNUP CALCULATED USING 'Aces\_Beach\_Runup.m'

ACES Beach 2-percent runup height above SWEL: 1.44 feet

ACES Beach 2-percent runup elevation: 10.34 feet-NAVD88

ACES BEACH RUNUP is valid

\_\_\_\_\_END ACES BEACH RESULTS\_\_\_\_\_

PART 5 COMPLETE\_\_\_\_\_

FEMA  
RUNUP2 transect: CM-150-1

sjh

job 2  
1

3.00  
-16.19 -249.2 0.8  
-16.08 -243.2 0.8  
-15.18 -176.2 0.8  
-15.17 -175.2 0.8  
-14.84 -154.2 0.8  
-14.76 -153.2 0.8  
-14.16 -148.2 0.8  
-12.49 -134.2 0.8  
-10.58 -118.2 0.8  
-10.45 -117.2 0.8  
-9.30 -108.2 0.8  
-7.38 -93.2 0.8  
-6.74 -88.2 0.8  
-4.82 -73.2 0.8  
-3.92 -66.2 0.8  
-2.00 -51.2 0.8  
-2.00 -22.2 0.8  
-1.44 -6.7 0.8  
1.44 6.8 0.8  
1 15.15 50.8 0.8  
8.9 0.89 1.86  
8.9 0.89 1.95  
8.9 0.89 2.05  
8.9 0.94 1.86  
8.9 0.94 1.95  
8.9 0.94 2.05  
8.9 0.99 1.86  
8.9 0.99 1.95  
8.9 0.99 2.05



CLIENT- FEMA  
PROJECT-RUNUP2 transect: CM-150-1

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JOB job 2  
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CROSS SECTION PROFILE

	LENGTH	ELEV.	SLOPE	ROUGHNESS
1	-249.0	-16.1		
2	-243.0	-16.0	.00	.80
3	-176.0	-15.1	74.44	.80
4	-175.0	-15.1	FLAT	.80
5	-154.0	-14.8	70.00	.80
6	-153.0	-14.7	10.00	.80
7	-148.0	-14.1	8.33	.80
8	-134.0	-12.4	8.24	.80
9	-118.0	-10.5	8.42	.80
10	-117.0	-10.4	10.00	.80
11	-108.2	-9.3	8.00	.80
12	-93.2	-7.4	7.81	.80
13	-88.2	-6.7	7.81	.80
14	-73.2	-4.8	7.81	.80
15	-66.2	-3.9	7.78	.80
16	-51.2	-2.0	7.81	.80
17	-22.2	-2.0	FLAT	.80
18	-6.7	-1.4	27.68	.80
19	6.8	1.5	4.69	.80
20	50.8	15.2	3.21	.80
	LAST SLOPE		3.00	LAST ROUGHNESS .80

CLIENT- FEMA  
PROJECT-RUNUP2 transect: CM-150-1

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JOB job 2  
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OUTPUT TABLE

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INPUT PARAMETERS			RUNUP RESULTS			
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WATER LEVEL ABOVE DATUM (FT.)	DEEP WATER WAVE HEIGHT (FT.)	WAVE PERIOD (SEC.)	BREAKING SLOPE NUMBER	RUNUP SLOPE NUMBER	RUNUP ABOVE WATER LEVEL (FT.)	BREAKER DEPTH (FT.)
8.90	.89	1.86	11	19	.82	1.13
8.90	.89	1.95	11	19	.85	1.13
8.90	.89	2.05	11	19	.90	1.13
8.90	.94	1.86	11	19	.84	1.19
8.90	.94	1.95	11	19	.88	1.19
8.90	.94	2.05	11	19	.92	1.19
8.90	.99	1.86	11	19	.86	1.26
8.90	.99	1.95	11	19	.90	1.26
8.90	.99	2.05	11	19	.95	1.26



Runup2 2% runup elevation for Transect: CM-150-1

