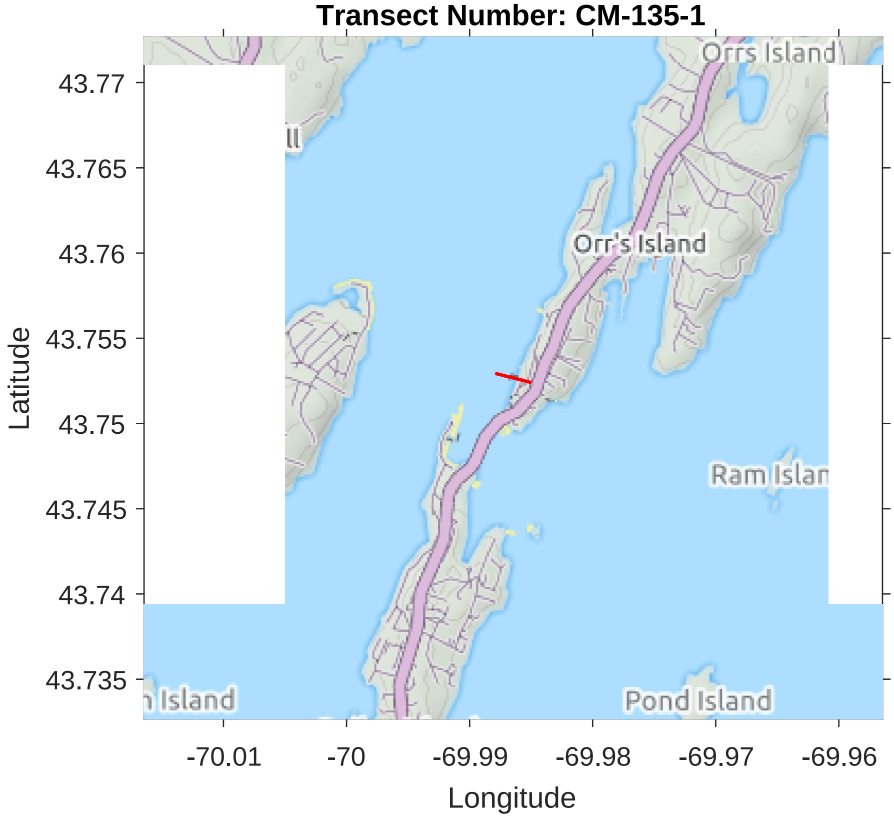
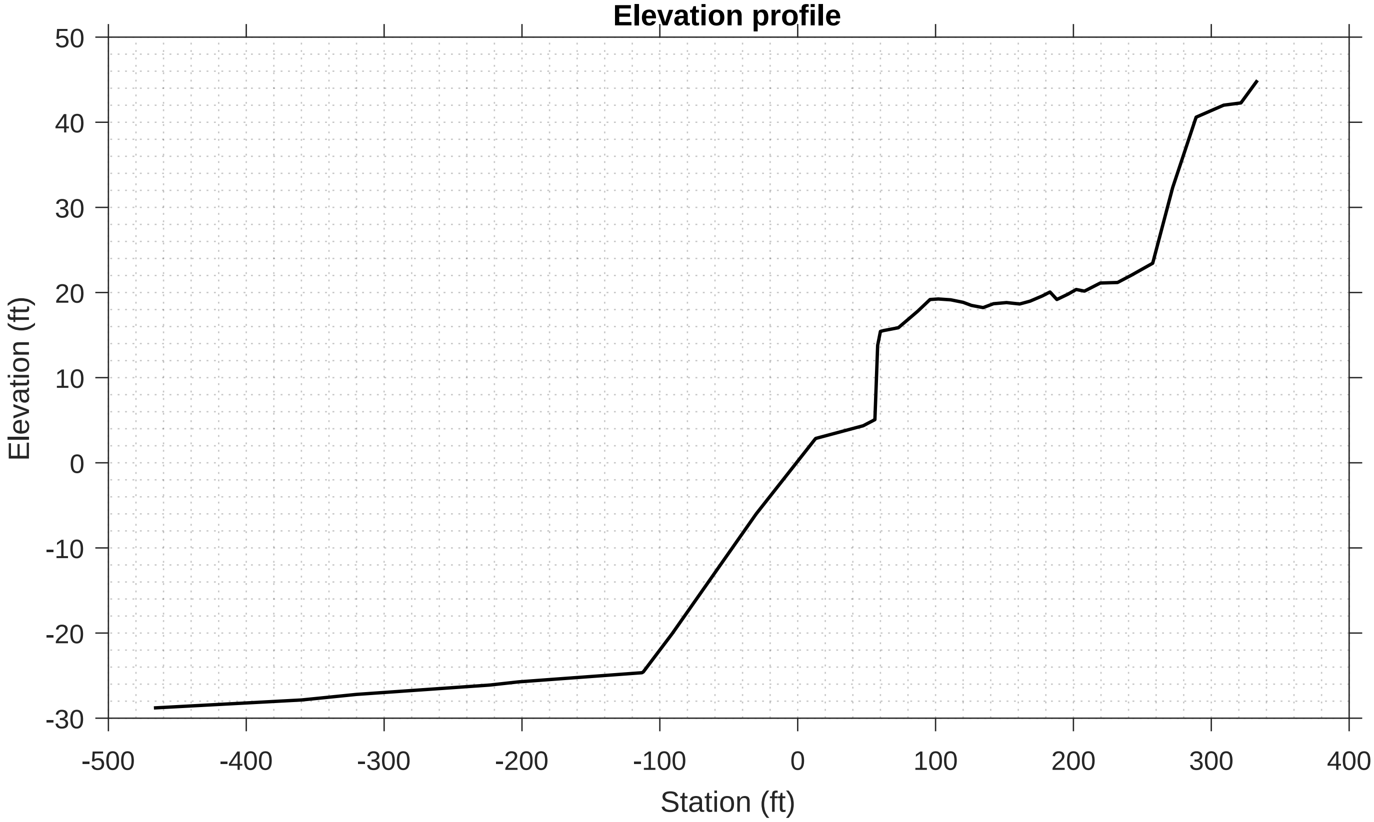
Transect Number: CM-135-1



Elevation profile



DATA LOG FOR TRANSECT ID: CM-135-1

PART 1: USER INPUT

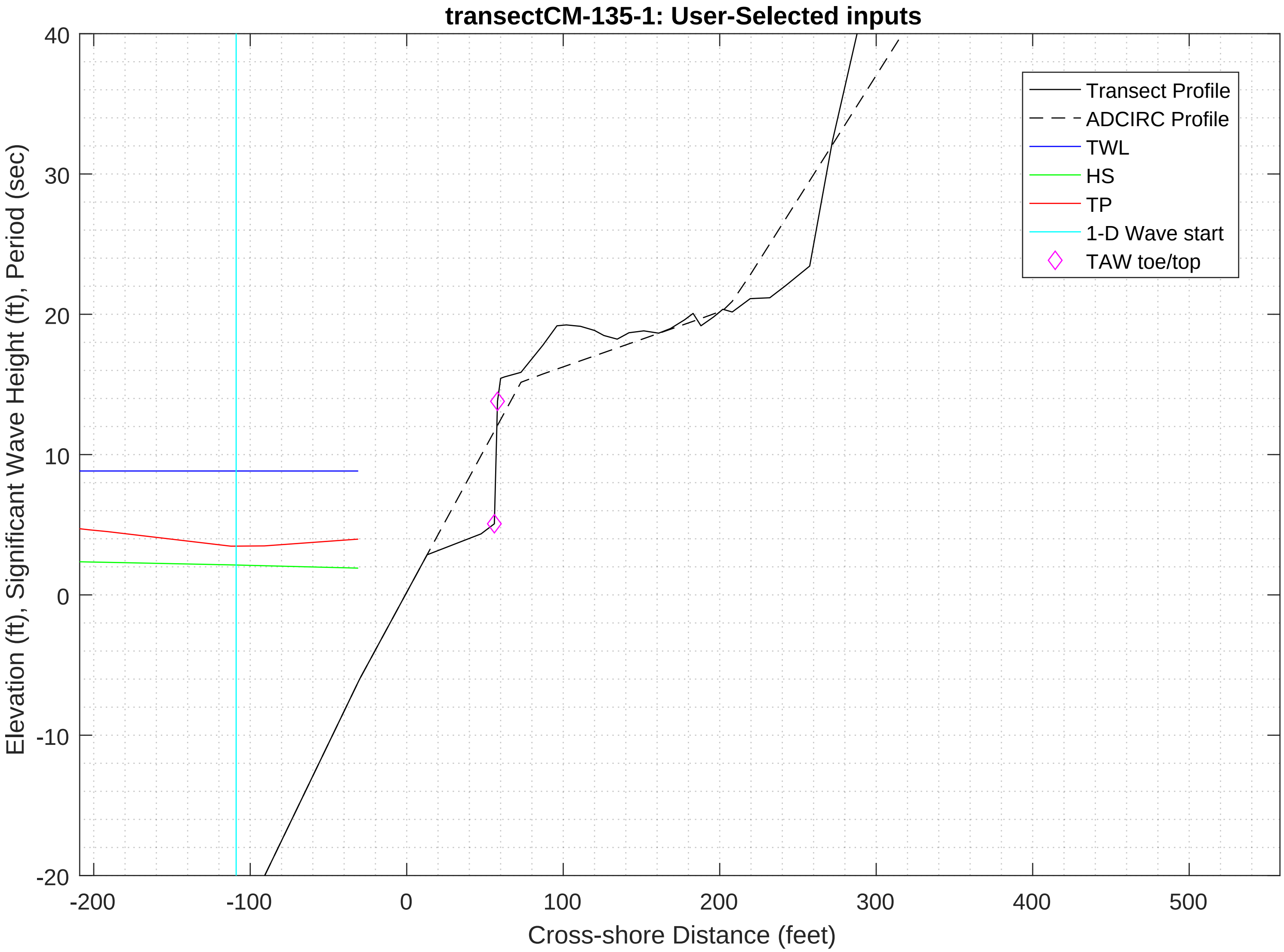
SWAN 1-D / WHAFIS input

station: -109 ft
LON: -69.9866 deg E
LAT: 43.7527 deg N
Bottom ELEV: -23.9202 ft-NAVD88
TWL: 8.8313 ft-NAVD88
HS: 2.1302 ft
TP: 3.4768 sec
Wave Direction bin: 0 deg CCW from East (90 deg sector)
Transect Direction: 349.6616 deg CCW from East

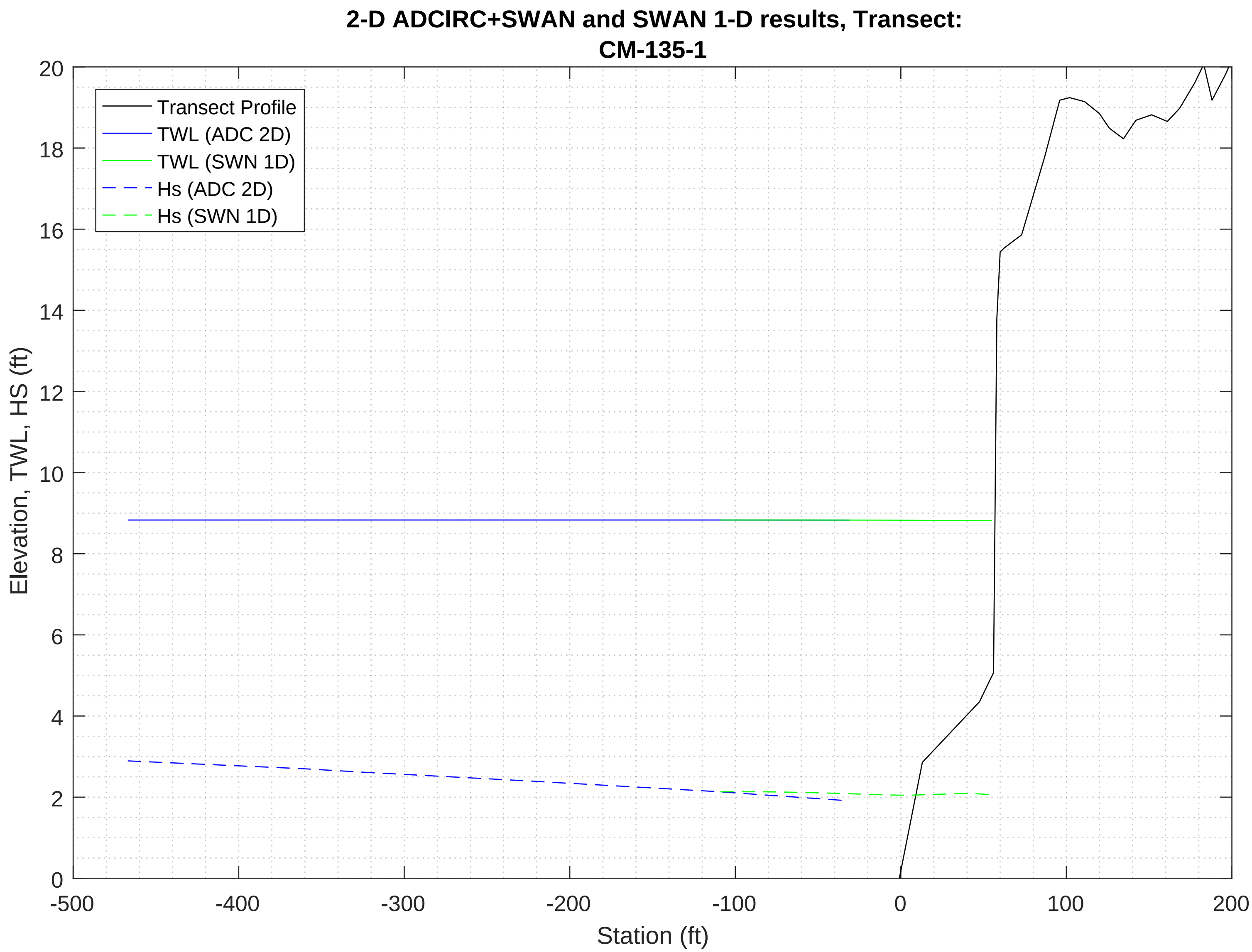
TAW/RUNUP input

toe sta: 56 ft
toe elev: 5.0689 ft-NAVD88
top sta: 58 ft
top elev: 13.7959 ft-NAVD88
Wave and water level conditions at toe to be calculated in SWAN 1-D

PART 1 COMPLETE


transectCM-135-1: User-Selected inputs
Elevation (ft), Significant Wave Height (ft), Period (sec)
Cross-shore Distance (feet)
40
30
20
10
0
-10
-20
-200
-100
0
100
200
300
400
500
Transect Profile
ADCIRC Profile
TWL
HS
TP
1-D Wave start
TAW toe/top

```
____________________________________________________________
PART 2: SWAN 1-D

swan input grid name: 2_swan/gridfiles/CM-135-1zmeters_xmeters.grd
swan file name:       2_swan/swanfiles/CM-135-1.swn
swan output name:     2_swan/swanfiles/CM-135-1.dat

Boundary Conditions:
    TWL- 2.6918 meters
    HS-  0.64929 meters
    PER- 3.4768 seconds

Batch File: 2_swan/swanfiles/runswan.dat

SWAN maximum additional wave setup: 0 feet
SWAN output at toe:
    SETUP- NaN feet
    HS-    NaN feet
    PER-   NaN seconds

PART 2 COMPLETE____________________________________________
```


2-D ADCIRC+SWAN and SWAN 1-D results, Transect:
CM-135-1
Transect Profile
TWL (ADC 2D)
TWL (SWN 1D)
Hs (ADC 2D)
Hs (SWN 1D)
Elevation, TWL, HS (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
20
-500
-400
-300
-200
-100
0
100
200

```
1
                    Execution started at 20200220.141935


                    ---------------------------------------
                                     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      50       0.   50     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      50   0      1       1

 !READinp BOTtom [fac]  'fname1'  [idla]  [nhedf]  [FREe|FORmat[form]|UNFormatted]

  READ    BOTTOM   -1. '../gridfiles/CM-135-1zmeters_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   0.64929     3.4768     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] [edm1pm] [cdrag] [umin] [cfpm]
!-- GEN2 [cf10] [cf20] [cf30] [cf40] [cf50] [cf60] [edm1pm] [cdrag] [umin] [cfpm]
    GEN3 KOMEN
!   whitecapping ( on by default)
!-- WCAPping KOMen [cds2] [stpm] [powst] [delta] [powk]
    WCAP KOM
!   quadruplet wave interactions
!-- QUADrupl [iquad] [lambda] [Cn14] [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’ [xp1] [yp1] <[int]   [xp]   [yp] >
 CURVE ’curve’ 0     0      50  50    0
!TABLe ’sname’ < HEADer|NOHEADer|INDexed > ’fname’ <output parameters> (output time)
 Table ’curve’   HEADER ’CM-135-1.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              51 MYC              1
                     : MCGRD            52
                     : 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 EDMLPM  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  13.73 % 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   1.97 % 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  17.65 % 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  96.08 % 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 100.00 % of wet grid points ( 99.50 % required)


STOP
```

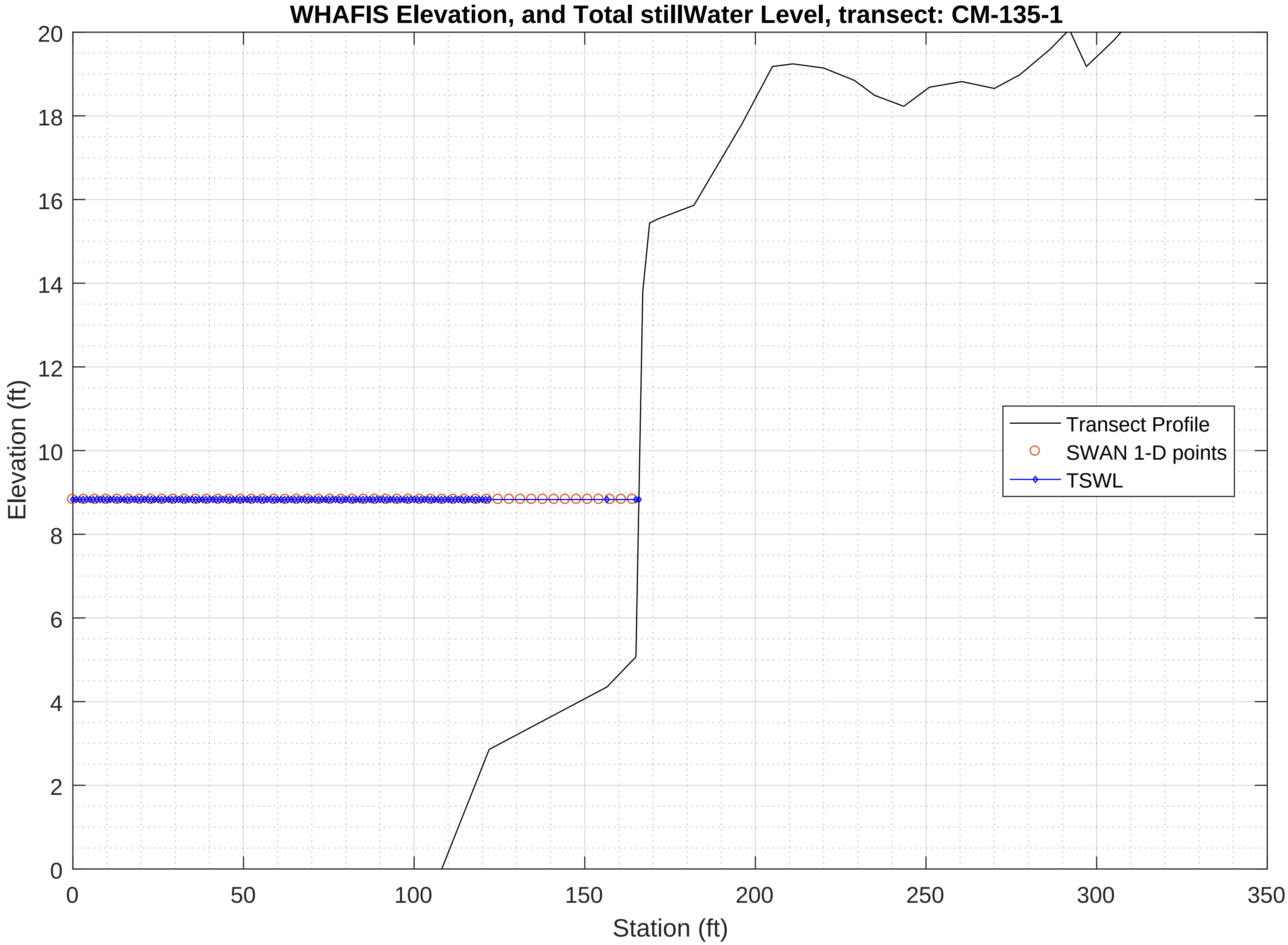
%
%
% Run:1   Table:curve   SWAN version:41.20A
%

% Xp [m]	Yp [m]	Hsig [m]	TPsmoo [sec]	RTpeak [sec]	Tm_10 [sec]	Dir [degr]	Dspr [degr]	Depth [m]	Setup [m]
0.	0.	0.64972	3.3870	3.3473	3.1263	0.000	31.5098	9.9800	0.000000
1.	0.	0.64992	3.3865	3.3473	3.1231	0.000	31.4797	9.7700	-0.000005
2.	0.	0.65006	3.3860	3.3473	3.1197	0.000	31.4482	9.5500	-0.000010
3.	0.	0.65018	3.3855	3.3473	3.1164	0.000	31.4153	9.3400	-0.000016
4.	0.	0.65021	3.3850	3.3473	3.1129	0.000	31.3801	9.1200	-0.000022
5.	0.	0.65023	3.3844	3.3473	3.1094	0.000	31.3431	8.9100	-0.000029
6.	0.	0.65014	3.3838	3.3473	3.1057	0.000	31.3014	8.6900	-0.000036
7.	0.	0.64995	3.3832	3.3473	3.1019	0.000	31.2561	8.4600	-0.000045
8.	0.	0.64968	3.3825	3.3473	3.0979	0.000	31.2076	8.2299	-0.000054
9.	0.	0.64928	3.3818	3.3473	3.0937	0.000	31.1533	7.9899	-0.000065
10.	0.	0.64882	3.3811	3.3473	3.0895	0.000	31.0936	7.7599	-0.000076
11.	0.	0.64827	3.3804	3.3473	3.0851	0.000	31.0285	7.5299	-0.000089
12.	0.	0.64761	3.3798	3.3473	3.0807	0.000	30.9612	7.2999	-0.000103
13.	0.	0.64685	3.3791	3.3473	3.0761	0.000	30.8861	7.0699	-0.000119
14.	0.	0.64603	3.3785	3.3473	3.0710	0.000	30.8000	6.8399	-0.000137
15.	0.	0.64522	3.3779	3.3473	3.0650	0.000	30.6997	6.6098	-0.000157
16.	0.	0.64434	3.3774	3.3473	3.0585	0.000	30.5866	6.3798	-0.000180
17.	0.	0.64343	3.3769	3.3473	3.0513	0.000	30.4620	6.1498	-0.000206
18.	0.	0.64244	3.3766	3.3473	3.0438	0.000	30.3250	5.9198	-0.000235
19.	0.	0.64135	3.3763	3.3473	3.0360	0.000	30.1703	5.6897	-0.000268
20.	0.	0.64013	3.3762	3.3473	3.0276	0.000	29.9972	5.4497	-0.000307
21.	0.	0.63895	3.3762	3.3473	3.0190	0.001	29.8078	5.2196	-0.000350
22.	0.	0.63768	3.3764	3.3473	3.0104	0.004	29.6091	4.9896	-0.000399
23.	0.	0.63630	3.3767	3.3473	3.0019	0.009	29.3918	4.7595	-0.000455
24.	0.	0.63489	3.3772	3.3473	2.9937	0.017	29.1576	4.5295	-0.000520
25.	0.	0.63361	3.3778	3.3473	2.9860	0.027	28.9176	4.3194	-0.000588
26.	0.	0.63239	3.3785	3.3473	2.9788	0.035	28.6766	4.1193	-0.000661
27.	0.	0.63113	3.3793	3.3473	2.9720	0.042	28.4195	3.9093	-0.000750
28.	0.	0.62984	3.3802	3.3473	2.9661	0.050	28.1373	3.7092	-0.000847
29.	0.	0.62849	3.3813	3.3473	2.9609	0.058	27.8231	3.4990	-0.000964
30.	0.	0.62735	3.3824	3.3473	2.9560	0.066	27.4807	3.2989	-0.001095
31.	0.	0.62631	3.3840	3.3473	2.9523	0.071	27.1137	3.0887	-0.001257
32.	0.	0.62542	3.3855	3.3473	2.9493	0.074	26.7024	2.8886	-0.001439
33.	0.	0.62474	3.3871	3.3473	2.9478	0.079	26.2442	2.6783	-0.001668
34.	0.	0.62444	3.3888	3.3473	2.9471	0.088	25.7647	2.4781	-0.001932
35.	0.	0.62455	3.3906	3.3473	2.9484	0.101	25.2127	2.2677	-0.002273
36.	0.	0.62531	3.3926	3.3473	2.9519	0.110	24.6012	2.0573	-0.002703
37.	0.	0.62729	3.3945	3.3473	2.9569	0.113	24.0902	1.8568	-0.003225
38.	0.	0.62861	3.3951	3.3473	2.9552	0.115	23.8095	1.7865	-0.003454
39.	0.	0.62994	3.3956	3.3473	2.9521	0.118	23.6336	1.7364	-0.003632
40.	0.	0.63122	3.3959	3.3473	2.9480	0.126	23.5008	1.6962	-0.003782
41.	0.	0.63246	3.3962	3.3473	2.9434	0.140	23.3584	1.6561	-0.003936
42.	0.	0.63387	3.3967	3.3473	2.9385	0.156	23.2037	1.6059	-0.004130
43.	0.	0.63500	3.3970	3.3473	2.9317	0.173	23.0531	1.5657	-0.004283
44.	0.	0.63594	3.3973	3.3473	2.9236	0.186	22.8719	1.5256	-0.004431
45.	0.	0.63667	3.3978	3.3473	2.9149	0.200	22.6667	1.4754	-0.004605
46.	0.	0.63632	3.3982	3.3473	2.9048	0.214	22.4751	1.4353	-0.004693
47.	0.	0.63520	3.3986	3.3473	2.8932	0.230	22.2528	1.3953	-0.004742
48.	0.	0.63332	3.3994	3.3473	2.8812	0.251	21.9347	1.3352	-0.004837
49.	0.	0.63065	3.3998	3.3473	2.8658	0.284	21.5010	1.2550	-0.004974
50.	0.	0.62720	3.3990	3.3473	2.8347	0.322	21.3527	1.1650	-0.004982

PART 3: WHAFIS

WHAFIS input: CM-135-1.dat
WHAFIS output: CM-135-1.out

PART 3 COMPLETE


WHAFIS Elevation, and Total stillWater Level, transect: CM-135-1
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
20
0
50
100
150
200
250
300
350
Transect Profile
SWAN 1-D points
TSWL

WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)
Executed on: Thu Feb 20 14:57:36 2020
Input file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Harpswell\3_whafis\whafis4\CM-135-1.dat
Output file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Harpswell\3_whafis\whafis4\CM-135-1.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	-23.920	1.000	1.000	8.831	3.408	3.477	56.140	0.215	0.000
OF	1.000	-23.705	0.000	8.831	0.000	0.000	0.000	0.000	0.215	0.000
OF	2.000	-23.490	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	3.000	-23.276	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	4.000	-23.062	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	5.000	-22.847	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	6.000	-22.633	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	7.000	-22.418	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	8.000	-22.204	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	9.000	-21.989	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	10.000	-21.775	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	11.000	-21.560	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	12.000	-21.346	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	13.000	-21.132	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	14.000	-20.917	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	15.000	-20.703	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	16.000	-20.488	0.000	8.831	0.000	0.000	0.000	0.000	0.215	0.000
OF	17.000	-20.273	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
OF	18.000	-20.059	0.000	8.831	0.000	0.000	0.000	0.000	0.222	0.000
OF	19.000	-19.828	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	20.000	-19.597	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	21.000	-19.366	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	22.000	-19.136	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	23.000	-18.905	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	24.000	-18.674	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	25.000	-18.443	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	26.000	-18.212	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	27.000	-17.981	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	28.000	-17.750	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	29.000	-17.520	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	30.000	-17.289	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	31.000	-17.058	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	32.000	-16.827	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	33.000	-16.596	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	34.000	-16.365	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	35.000	-16.134	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	36.000	-15.903	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	37.000	-15.672	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	38.000	-15.442	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	39.000	-15.211	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	40.000	-14.979	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
OF	41.000	-14.749	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
OF	42.000	-14.518	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	43.000	-14.287	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	44.000	-14.056	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	45.000	-13.825	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	46.000	-13.594	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
OF	47.000	-13.364	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	48.000	-13.132	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	49.000	-12.901	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
OF	50.000	-12.671	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
OF	51.000	-12.440	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	52.000	-12.209	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	53.000	-11.978	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	54.000	-11.747	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	55.000	-11.516	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	56.000	-11.285	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	57.000	-11.054	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	58.000	-10.823	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
OF	59.000	-10.593	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
OF	60.000	-10.362	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	61.000	-10.131	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	62.000	-9.901	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	63.000	-9.670	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	64.000	-9.439	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	65.000	-9.208	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	66.000	-8.977	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	67.000	-8.746	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	68.000	-8.515	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	69.000	-8.285	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	70.000	-8.054	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	71.000	-7.823	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	72.000	-7.591	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	73.000	-7.361	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	74.000	-7.130	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	75.000	-6.899	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	76.000	-6.668	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	77.000	-6.437	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
OF	78.000	-6.207	0.000	8.830	0.000	0.000	0.000	0.000	0.229	0.000
OF	79.000	-5.979	0.000	8.830	0.000	0.000	0.000	0.000	0.217	0.000
OF	80.000	-5.773	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	81.000	-5.568	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	82.000	-5.363	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	83.000	-5.157	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	84.000	-4.952	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	85.000	-4.746	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	86.000	-4.541	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	87.000	-4.335	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	88.000	-4.129	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	89.000	-3.924	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	90.000	-3.718	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	91.000	-3.513	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	92.000	-3.307	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000

OF	93.000	-3.102	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	94.000	-2.897	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	95.000	-2.691	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	96.000	-2.485	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	97.000	-2.280	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	98.000	-2.074	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	99.000	-1.869	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	100.000	-1.664	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	101.000	-1.458	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	102.000	-1.253	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	103.000	-1.047	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	104.000	-0.841	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	105.000	-0.636	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	106.000	-0.430	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
OF	107.000	-0.225	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
OF	108.000	-0.020	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
IF	109.000	0.186	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
IF	110.000	0.391	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	111.000	0.597	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	112.000	0.803	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	113.000	1.008	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
IF	114.000	1.214	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
IF	115.000	1.419	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
IF	116.000	1.625	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	117.000	1.830	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	118.000	2.036	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	119.000	2.241	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
IF	120.000	2.447	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	121.000	2.652	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
IF	122.000	2.858	0.000	8.830	0.000	0.000	0.000	0.000	0.048	0.000
IF	156.500	4.350	0.000	8.830	0.000	0.000	0.000	0.000	0.051	0.000
IF	165.000	5.069	0.000	8.830	0.000	0.000	0.000	0.000	0.477	0.000
IF	165.900	8.830	0.000	8.830	0.000	0.000	0.000	0.000	4.179	0.000
ET	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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	END	END	FETCH	SURGE ELEV	SURGE ELEV	INITIAL	INITIAL		BOTTOM	AVERAGE
	STATION	ELEVATION	LENGTH	10-YEAR	100-YEAR	WAVE HEIGHT	W. PERIOD		SLOPE	A-ZONES
IE	0.000	-23.920	1.000	1.000	8.831	3.408	3.477	56.140	0.215	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	1.000	-23.705	0.000	8.831	0.000	0.000	0.000	0.000	0.215	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	2.000	-23.490	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	3.000	-23.276	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	4.000	-23.062	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	5.000	-22.847	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	6.000	-22.633	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	7.000	-22.418	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	8.000	-22.204	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	9.000	-21.989	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	10.000	-21.775	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	11.000	-21.560	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	12.000	-21.346	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	13.000	-21.132	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	14.000	-20.917	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	15.000	-20.703	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	16.000	-20.488	0.000	8.831	0.000	0.000	0.000	0.000	0.215	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	17.000	-20.273	0.000	8.831	0.000	0.000	0.000	0.000	0.214	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	18.000	-20.059	0.000	8.831	0.000	0.000	0.000	0.000	0.222	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	19.000	-19.828	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	20.000	-19.597	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	21.000	-19.366	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	22.000	-19.136	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	23.000	-18.905	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	24.000	-18.674	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	25.000	-18.443	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	26.000	-18.212	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	27.000	-17.981	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	28.000	-17.750	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	29.000	-17.520	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	30.000	-17.289	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	31.000	-17.058	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	32.000	-16.827	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	33.000	-16.596	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	34.000	-16.365	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	35.000	-16.134	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	36.000	-15.903	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	37.000	-15.672	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	38.000	-15.442	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	39.000	-15.211	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	40.000	-14.979	0.000	8.831	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	41.000	-14.749	0.000	8.831	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	42.000	-14.518	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	43.000	-14.287	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	44.000	-14.056	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	45.000	-13.825	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	46.000	-13.594	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	47.000	-13.364	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	48.000	-13.132	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	49.000	-12.901	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	50.000	-12.671	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	51.000	-12.440	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	52.000	-12.209	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	53.000	-11.978	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	54.000	-11.747	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	55.000	-11.516	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	56.000	-11.285	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	57.000	-11.054	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	58.000	-10.823	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	59.000	-10.593	0.000	8.830	0.000	0.000	0.000	0.000	0.230	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	60.000	-10.362	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	61.000	-10.131	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	62.000	-9.901	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	63.000	-9.670	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	64.000	-9.439	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	65.000	-9.208	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	66.000	-8.977	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	67.000	-8.746	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	68.000	-8.515	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	69.000	-8.285	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	70.000	-8.054	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	71.000	-7.823	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	72.000	-7.591	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	73.000	-7.361	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	74.000	-7.130	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	75.000	-6.899	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	76.000	-6.668	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	77.000	-6.437	0.000	8.830	0.000	0.000	0.000	0.000	0.231	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	78.000	-6.207	0.000	8.830	0.000	0.000	0.000	0.000	0.229	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	79.000	-5.979	0.000	8.830	0.000	0.000	0.000	0.000	0.217	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	80.000	-5.773	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	81.000	-5.568	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	82.000	-5.363	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	83.000	-5.157	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	84.000	-4.952	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	85.000	-4.746	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	86.000	-4.541	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	87.000	-4.335	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	88.000	-4.129	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	89.000	-3.924	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	90.000	-3.718	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	91.000	-3.513	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	92.000	-3.307	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	93.000	-3.102	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	94.000	-2.897	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	95.000	-2.691	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	96.000	-2.485	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	97.000	-2.280	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	98.000	-2.074	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	99.000	-1.869	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	100.000	-1.664	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	101.000	-1.458	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	102.000	-1.253	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	103.000	-1.047	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	104.000	-0.841	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	105.000	-0.636	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	106.000	-0.430	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	107.000	-0.225	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	108.000	-0.020	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	109.000	0.186	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	110.000	0.391	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	111.000	0.597	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	112.000	0.803	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	113.000	1.008	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	114.000	1.214	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	115.000	1.419	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	116.000	1.625	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	117.000	1.830	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	118.000	2.036	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	119.000	2.241	0.000	8.830	0.000	0.000	0.000	0.000	0.205	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	120.000	2.447	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	121.000	2.652	0.000	8.830	0.000	0.000	0.000	0.000	0.206	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	122.000	2.858	0.000	8.830	0.000	0.000	0.000	0.000	0.048	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	156.500	4.350	0.000	8.830	0.000	0.000	0.000	0.000	0.051	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	165.000	5.069	0.000	8.830	0.000	0.000	0.000	0.000	0.477	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	165.900	8.830	0.000	8.830	0.000	0.000	0.000	0.000	4.179	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	3.41	3.48	11.22
OF	1.00	3.41	3.48	11.22
OF	2.00	3.41	3.48	11.22
OF	3.00	3.41	3.48	11.22
OF	4.00	3.41	3.48	11.22
OF	5.00	3.41	3.48	11.22
OF	6.00	3.41	3.48	11.22
OF	7.00	3.41	3.48	11.21
OF	8.00	3.40	3.48	11.21
OF	9.00	3.40	3.48	11.21
OF	10.00	3.40	3.48	11.21
OF	11.00	3.40	3.48	11.21
OF	12.00	3.40	3.48	11.21
OF	13.00	3.40	3.48	11.21
OF	14.00	3.40	3.48	11.21
OF	15.00	3.40	3.48	11.21
OF	16.00	3.40	3.48	11.21
OF	17.00	3.40	3.48	11.21
OF	18.00	3.40	3.48	11.21
OF	19.00	3.40	3.48	11.21
OF	20.00	3.40	3.48	11.21
OF	21.00	3.39	3.48	11.21
OF	22.00	3.39	3.48	11.21
OF	23.00	3.39	3.48	11.21
OF	24.00	3.39	3.48	11.20
OF	25.00	3.39	3.48	11.20
OF	26.00	3.39	3.48	11.20
OF	27.00	3.39	3.48	11.20
OF	28.00	3.38	3.48	11.20
OF	29.00	3.38	3.48	11.20
OF	30.00	3.38	3.48	11.20
OF	31.00	3.38	3.48	11.20
OF	32.00	3.38	3.48	11.19
OF	33.00	3.37	3.48	11.19
OF	34.00	3.37	3.48	11.19
OF	35.00	3.37	3.48	11.19
OF	36.00	3.37	3.48	11.19
OF	37.00	3.37	3.48	11.19
OF	38.00	3.36	3.48	11.19
OF	39.00	3.36	3.48	11.18
OF	40.00	3.36	3.48	11.18
OF	41.00	3.36	3.48	11.18
OF	42.00	3.35	3.48	11.18
OF	43.00	3.35	3.48	11.17
OF	44.00	3.35	3.48	11.17
OF	45.00	3.34	3.48	11.17
OF	46.00	3.34	3.48	11.17
OF	47.00	3.34	3.48	11.17
OF	48.00	3.33	3.48	11.16
OF	49.00	3.33	3.48	11.16
OF	50.00	3.33	3.48	11.16
OF	51.00	3.32	3.48	11.16
OF	52.00	3.32	3.48	11.15
OF	53.00	3.32	3.48	11.15
OF	54.00	3.31	3.48	11.15
OF	55.00	3.31	3.48	11.15
OF	56.00	3.30	3.48	11.14
OF	57.00	3.30	3.48	11.14
OF	58.00	3.30	3.48	11.14
OF	59.00	3.29	3.48	11.13
OF	60.00	3.29	3.48	11.13
OF	61.00	3.28	3.48	11.13
OF	62.00	3.28	3.48	11.13
OF	63.00	3.27	3.48	11.12
OF	64.00	3.27	3.48	11.12
OF	65.00	3.27	3.48	11.12
OF	66.00	3.26	3.48	11.11
OF	67.00	3.26	3.48	11.11
OF	68.00	3.25	3.48	11.11
OF	69.00	3.25	3.48	11.10
OF	70.00	3.24	3.48	11.10
OF	71.00	3.24	3.48	11.10
OF	72.00	3.23	3.48	11.09
OF	73.00	3.23	3.48	11.09
OF	74.00	3.22	3.48	11.09
OF	75.00	3.22	3.48	11.08
OF	76.00	3.21	3.48	11.08
OF	77.00	3.21	3.48	11.08
OF	78.00	3.20	3.48	11.07
OF	79.00	3.20	3.48	11.07
OF	80.00	3.20	3.48	11.07
OF	81.00	3.19	3.48	11.06
OF	82.00	3.19	3.48	11.06
OF	83.00	3.19	3.48	11.06
OF	84.00	3.18	3.48	11.06
OF	85.00	3.18	3.48	11.05
OF	86.00	3.18	3.48	11.05
OF	87.00	3.17	3.48	11.05
OF	88.00	3.17	3.48	11.05

OF	89.00	3.17	3.48	11.05
OF	90.00	3.16	3.48	11.04
OF	91.00	3.16	3.48	11.04
OF	92.00	3.16	3.48	11.04
OF	93.00	3.16	3.48	11.04
OF	94.00	3.16	3.48	11.04
OF	95.00	3.15	3.48	11.04
OF	96.00	3.15	3.48	11.04
OF	97.00	3.15	3.48	11.04
OF	98.00	3.15	3.48	11.04
OF	99.00	3.15	3.48	11.04
OF	100.00	3.15	3.48	11.04
OF	101.00	3.15	3.48	11.04
OF	102.00	3.15	3.48	11.04
OF	103.00	3.15	3.48	11.04
OF	104.00	3.15	3.48	11.04
OF	105.00	3.16	3.48	11.04
OF	106.00	3.16	3.48	11.04
OF	107.00	3.16	3.48	11.04
OF	108.00	3.17	3.49	11.05
IF	109.00	3.17	3.49	11.05
IF	110.00	3.18	3.49	11.05
IF	111.00	3.18	3.49	11.06
IF	112.00	3.19	3.49	11.06
IF	113.00	3.20	3.49	11.07
IF	114.00	3.20	3.49	11.07
IF	115.00	3.21	3.49	11.08
IF	116.00	3.22	3.49	11.09
IF	117.00	3.23	3.49	11.09
IF	118.00	3.24	3.49	11.10
IF	119.00	3.26	3.49	11.11
IF	120.00	3.27	3.49	11.12
IF	121.00	3.29	3.49	11.13
IF	122.00	3.30	3.49	11.14
IF	156.50	3.12	3.49	11.02
IF	165.00	2.67	3.49	10.70
IF	165.90	0.01	3.49	8.84

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
42.00	1.00	8.83

PART5 LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
158.84	WINDWARD

PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	FHF
0.00	11.22		
		V22 EL=11	120
41.00	11.18		
		V22 EL=11	120
42.00	11.18		
		V22 EL=11	120
158.84	10.93		
		A19 EL=11	95
165.10	10.50		
		A19 EL=10	95
165.58	9.50		
		A19 EL= 9	95
165.90	8.84		

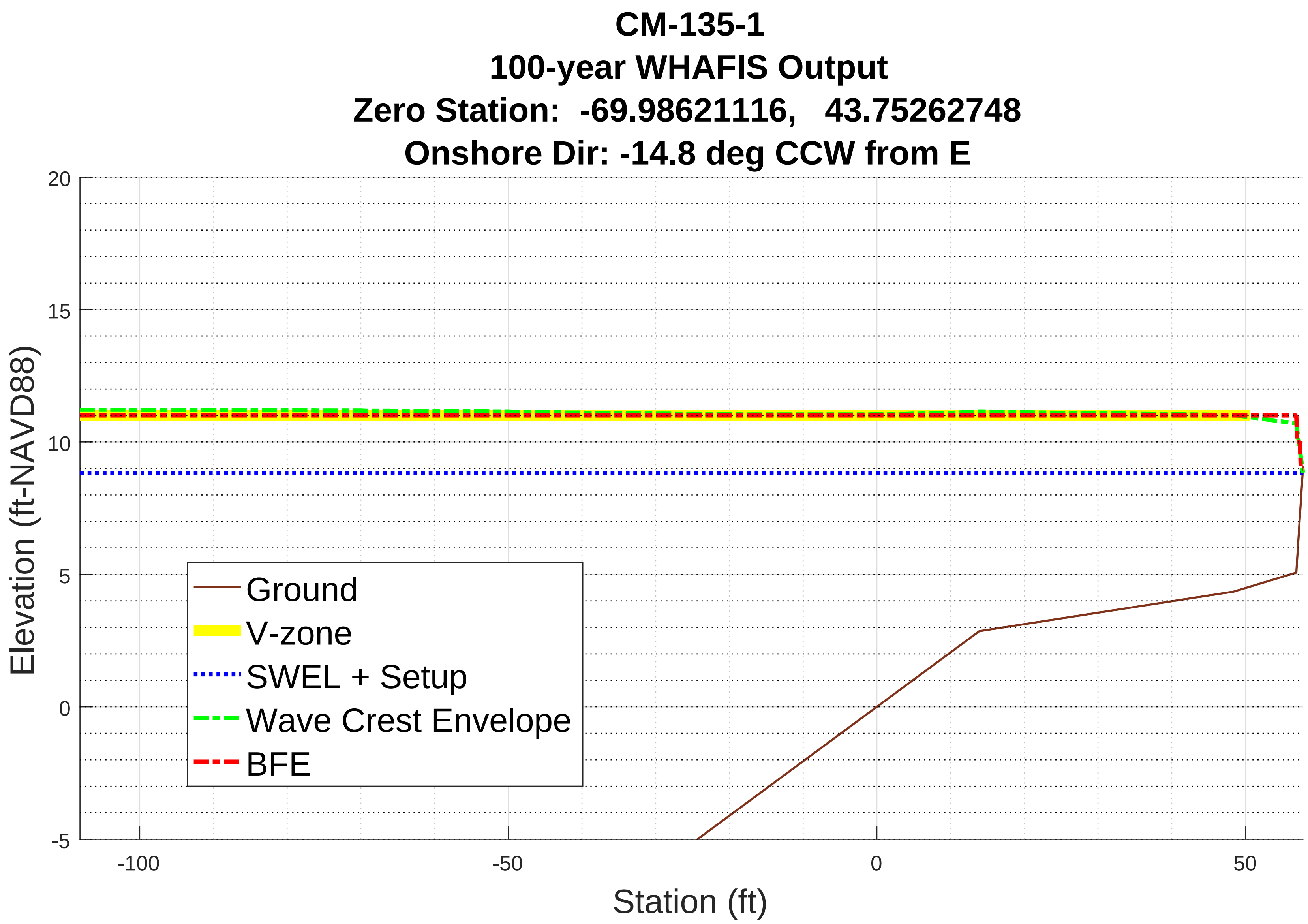
ZONE TERMINATED AT END OF TRANSECT

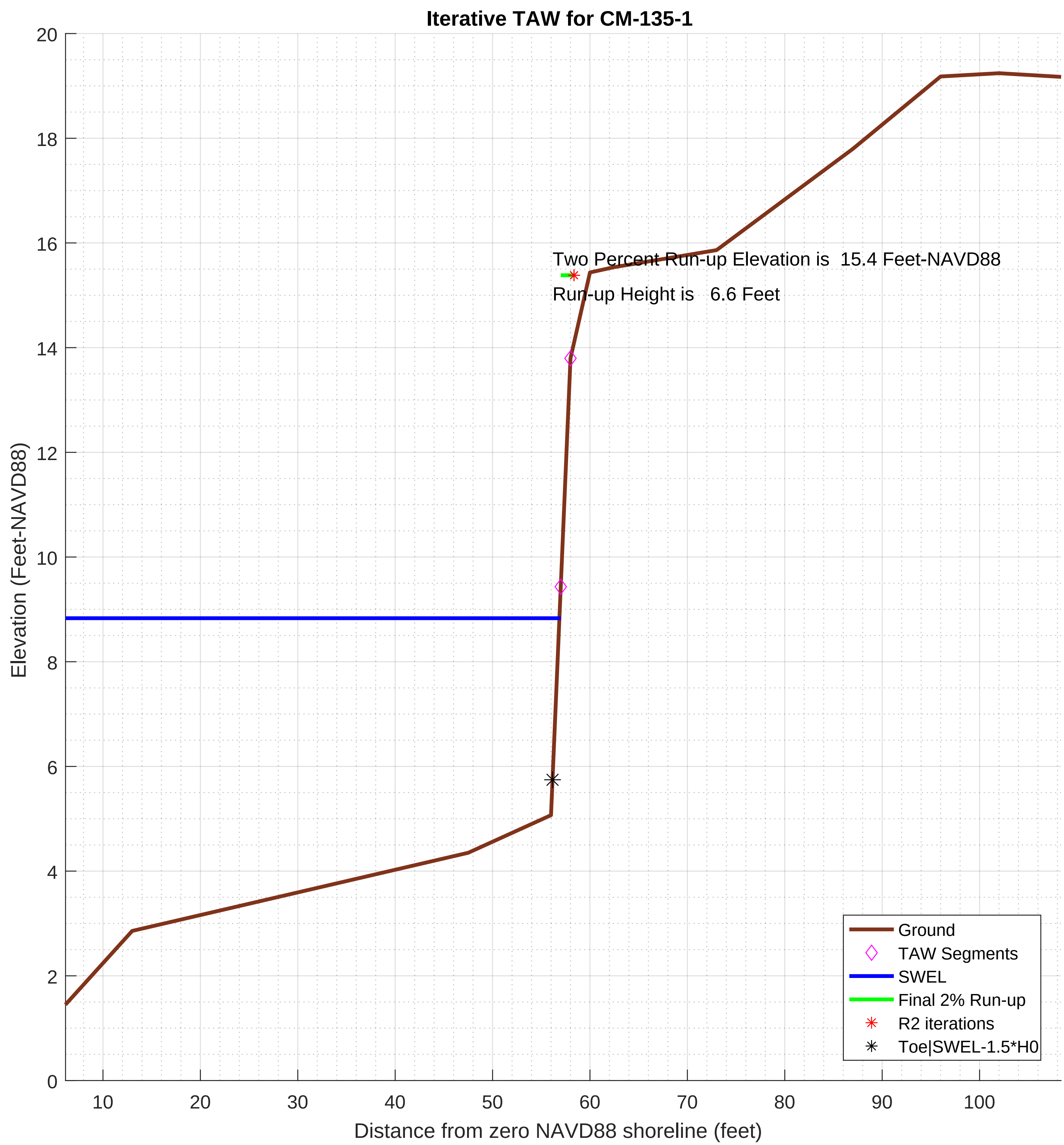
PART 7 POSTSCRIPT NOTES

PS# 1 START(420571.5907,4844879.2893)

PS# 2 END(420679.5905,4844850.7386)

-1.000000e+00


CM-135-1
100-year WHAFIS Output
Zero Station: -69.98621116, 43.75262748
Onshore Dir: -14.8 deg CCW from E
Elevation (ft-NAVD88)
Station (ft)
20
15
10
5
0
-5
-100
-50
0
50
Ground
V-zone
SWEL + Setup
Wave Crest Envelope
BFE


Iterative TAW for CM-135-1
Two Percent Run-up Elevation is 15.4 Feet-NAVD88
Run-up Height is 6.6 Feet
Elevation (Feet-NAVD88)
Distance from zero NAVD88 shoreline (feet)
Ground
TAW Segments
SWEL
Final 2% Run-up
R2 iterations
Toe|SWEL-1.5*H0
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80
90
100

```
diary on         % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-135-1
% calculation by SJH, Ransom Consulting, Inc. 21-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-135-1sta_ele_include.csv';   % file with station, elevation, include
                                      % third colunm is 0 for excluded points
imgname='logfiles/CM-135-1-runup';
SWEL=8.8313;  % 100-yr still water level including wave setup.
H0=NaN;    % significant wave height at toe of structure
Tp=NaN;    % 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;
maxSetup=0;   % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-135-1'

plotTitle =

Iterative TAW for CM-135-1



% END CONFIG
%--------------------------------

SWEL=SWEL+setupAtToe

SWEL =

                    8.8313

SWEL_fore=SWEL+maxSetup

SWEL_fore =

                    8.8313



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

L0 =

   NaN


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

Ztoe =

   NaN


% 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 =

   NaN


% 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
% 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

toe_sta =

   NaN

if top_sta==-999
   dy=Z2-dep(end);
   top_sta=sta(end)+dy/S(end)
end

top_sta =

   NaN


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

top_sta =

   NaN

toe_sta

toe_sta =

   NaN




% 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 =

-!!- The User has selected a starting point that is  NaN feet above the elevation of SWEL-1.5H0



ans =

-!!- This may be reasonable for some cases.  However the user may want to consider:



ans =

-!!-   1) Selecting a starting point that is at or below  NaN feet elevation, or



ans =

-!!-   2) Reducing the incident wave height to a depth limited condition.




% 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('!!! - - Iribaren number: %6.2f is outside the valid range (0.5-10), TAW NOT VALID - - !!!\n', Irb*gam
   TAW_VALID=0;
else
   sprintf('!!! - - Iribaren number: %6.2f is in the valid range (0.5-10), TAW RECOMMENDED - - !!!\n', Irb*gamma_
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

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 ber
   % 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 =
   NaN
toe_sta =
   NaN
top_sta =
   NaN
Z2 =
   NaN
H0 =
   NaN
Tp =
   NaN
T0 =
   NaN
R2 =
   NaN
Z2 =
   NaN
top_sta =
   NaN
Lslope =
   NaN
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     0
rB =
   NaN
rdh_mean =
     1
gamma_berm =
   NaN
slope =
   NaN
Irb =
   NaN
gamma_berm =
   NaN
gamma_perm =
     1
gamma_beta =
     1
```

```
gamma_rough =
                       0.8
gamma =
   NaN
ans =
!!! - - Iribaren number:    NaN is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:NaN V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
   NaN
R2del =
   NaN
Z2 =
   NaN
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
   NaN
diary off
plotTitle =
Iterative TAW for CM-135-1
SWEL =
                    8.8313
SWEL_fore =
                    8.8313
L0 =
   NaN
Ztoe =
   NaN
Z2 =
   NaN
toe_sta =
   NaN
top_sta =
   NaN
top_sta =
   NaN
toe_sta =
   NaN
ans =
-!!- The User has selected a starting point that is  NaN feet above the elevation of SWEL-1.5H0
ans =
-!!- This may be reasonable for some cases.  However the user may want to consider:
ans =
-!!-   1) Selecting a starting point that is at or below  NaN feet elevation, or
ans =
-!!-   2) Reducing the incident wave height to a depth limited condition.
ans =
!----------------- STARTING ITERATION 1 -----------------!
Ztoe =
   NaN
toe_sta =
   NaN
top_sta =
   NaN
Z2 =
   NaN
H0 =
   NaN
Tp =
   NaN
T0 =
   NaN
R2 =
   NaN
Z2 =
   NaN
top_sta =
   NaN
Lslope =
   NaN
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     0
rB =
   NaN
rdh_mean =
     1
gamma_berm =
   NaN
slope =
   NaN
Irb =
   NaN
gamma_berm =
   NaN
gamma_perm =
     1
gamma_beta =
```

```
     1
gamma_rough =
                       0.8
gamma =
   NaN
ans =
!!! - - Iribaren number:    NaN is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:NaN V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
   NaN
R2del =
   NaN
Z2 =
   NaN
Z2 =
   NaN
diary on         % begin recording
% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-135-1
% calculation by SJH, Ransom Consulting, Inc. 21-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-135-1sta_ele_include.csv';   % file with station, elevation, include
                                      % third colunm is 0 for excluded points
imgname='logfiles/CM-135-1-runup';
SWEL=8.8313;  % 100-yr still water level including wave setup.
H0=2.0577;    % significant wave height at toe of structure
Tp=3.99;    % 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;
maxSetup=0;   % only used in case of berm/shallow foreshore weighted average
plotTitle='Iterative TAW for CM-135-1'
plotTitle =
Iterative TAW for CM-135-1
% END CONFIG
%-------------------------------
SWEL=SWEL+setupAtToe
SWEL =
                    8.8313
SWEL_fore=SWEL+maxSetup
SWEL_fore =
                    8.8313
% FIND WAVELENGTH USING DEEPWATER DISPERSION RELATION
% using English units
L0=32.15/(2*pi)*T0^2
L0 =
          67.3227007404799
% 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 consitent with TAW guidance should be performed
% prior to the input of the significant wave height given above.
Ztoe=SWEL-1.5*H0
Ztoe =
                   5.74475
% 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 =
                  11.91785
% 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 =
          56.1548869868045
top_sta =
          57.5695944349478
% 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 =
          57.5695944349478
toe_sta
toe_sta =
          56.1548869868045
% 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  0.9 ft landward of toe of slope
ans =
-!!- Setup is interpolated between setup at toe of slope and max setup
ans =
-!!-       setup is adjusted to 0.00 feet
ans =
-!!-       SWEL is adjusted to 8.83 feet
k =
     1
% 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('!!! - - Iribaren number: %6.2f is outside the valid range (0.5-10), TAW NOT VALID - - !!!\n', Irb*gam
       TAW_VALID=0;
    else
       sprintf('!!! - - Iribaren number: %6.2f is in the valid range (0.5-10), TAW RECOMMENDED - - !!!\n', Irb*gamma_
    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

    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 ber
       % 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 =
                  5.74475
toe_sta =
         56.1548869868045
top_sta =
         57.5695944349478
Z2 =
                 11.91785
H0 =
                   2.0577
```

```
Tp =
                    3.99
T0 =
          3.62727272727273
R2 =
                  6.1731
Z2 =
                 15.0044
top_sta =
          58.2769481590194
Lslope =
          2.12206117221498
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          4.36351700000001
Irb =
          24.9589556007642
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                     0.8
gamma =
                     0.8
ans =
!!! - - Iribaren number:  24.96 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:0.2 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          6.55128384666895
R2del =
         0.378183846668948
Z2 =
          15.3825838466689
ans =
!----------------- STARTING ITERATION 2 -----------------!
Ztoe =
                 5.74475
toe_sta =
          56.1548869868045
top_sta =
          58.3636176613197
Z2 =
          15.3825838466689
H0 =
                  2.0577
Tp =
                    3.99
T0 =
          3.62727272727273
R2 =
          6.55128384666895
Z2 =
          15.3825838466689
top_sta =
          58.3636176613197
Lslope =
          2.20873067451529
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          4.36351700000001
Irb =
          24.9589556007643
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
```

```
gamma_rough =
                       0.8
gamma =
                       0.8
ans =
!!! - - Iribaren number:  24.96 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:0.2 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          6.55128384666895
R2del =
     0
Z2 =
          15.3825838466689
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
          15.3825838466689
diary off
diary on         % begin recording
% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-135-1
% calculation by SJH, Ransom Consulting, Inc. 21-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-135-1sta_ele_include.csv';   % file with station, elevation, include
                                      % third colunm is 0 for excluded points
imgname='logfiles/CM-135-1-runup';
SWEL=8.8313;  % 100-yr still water level including wave setup.
H0=2.0577;    % significant wave height at toe of structure
Tp=3.99;    % 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;
maxSetup=0;   % only used in case of berm/shallow foreshore weighted average
plotTitle='Iterative TAW for CM-135-1'
plotTitle =
Iterative TAW for CM-135-1
% END CONFIG
%-------------------------------
SWEL=SWEL+setupAtToe
SWEL =
                    8.8313
SWEL_fore=SWEL+maxSetup
SWEL_fore =
                    8.8313
% FIND WAVELENGTH USING DEEPWATER DISPERSION RELATION
% using English units
L0=32.15/(2*pi)*T0^2
L0 =
          67.3227007404799
% 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 consitent with TAW guidance should be performed
% prior to the input of the significant wave height given above.
Ztoe=SWEL-1.5*H0
Ztoe =
                   5.74475
```

```
% 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 =
                  11.91785
% 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 =
          56.1548869868045
top_sta =
          57.5695944349478
% 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 =
          57.5695944349478
toe_sta
toe_sta =
          56.1548869868045
% 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  0.9 ft landward of toe of slope
ans =
-!!- Setup is interpolated between setup at toe of slope and max setup
ans =
-!!-       setup is adjusted to 0.00 feet
ans =
-!!-       SWEL is adjusted to 8.83 feet
k =
     1
% 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('!!! - - Iribaren number: %6.2f is outside the valid range (0.5-10), TAW NOT VALID - - !!!\n', Irb*gam
       TAW_VALID=0;
    else
       sprintf('!!! - - Iribaren number: %6.2f is in the valid range (0.5-10), TAW RECOMMENDED - - !!!\n', Irb*gamma_
    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

    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 ber
       % 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 =
                   5.74475
toe_sta =
          56.1548869868045
top_sta =
          57.5695944349478
Z2 =
                  11.91785
```

```
H0 =
                    2.0577
Tp =
                      3.99
T0 =
          3.62727272727273
R2 =
                    6.1731
Z2 =
                   15.0044
top_sta =
          58.2769481590194
Lslope =
          2.12206117221498
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          4.36351700000001
Irb =
          24.9589556007642
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                       0.8
gamma =
                       0.8
ans =
!!! - - Iribaren number:  24.96 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:0.2 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          6.55128384666895
R2del =
         0.378183846668948
Z2 =
          15.3825838466689
ans =
!----------------- STARTING ITERATION 2 -----------------!
Ztoe =
                   5.74475
toe_sta =
          56.1548869868045
top_sta =
          58.3636176613197
Z2 =
          15.3825838466689
H0 =
                    2.0577
Tp =
                      3.99
T0 =
          3.62727272727273
R2 =
          6.55128384666895
Z2 =
          15.3825838466689
top_sta =
          58.3636176613197
Lslope =
          2.20873067451529
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          4.36351700000001
Irb =
          24.9589556007643
gamma_berm =
     1
gamma_perm =
     1
```

```
gamma_beta =
     1
gamma_rough =
                       0.8
gamma =
                       0.8
ans =
!!! - - Iribaren number:  24.96 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:0.2 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          6.55128384666895
R2del =
     0
Z2 =
          15.3825838466689
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
          15.3825838466689
diary off
-1.000000e+00
```

PART 5: RUNUP2

for transect: CM-135-1

Station locations shifted by: -0.91 feet from their original location to set the shoreline to elevation 0 for RUNUP2 input

RUNUP2 INPUT CONVERSIONS

for transect: CM-135-1

Incident significant wave height: 2.13 feet

Peak wave period: 3.48 seconds

Mean wave height: 1.33 feet

Local Depth below SWEL: 32.75 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 Jersy

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

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

```
    Depth, D = 32.75
    Period, T = 2.96
    Waveheight, H = 1.33
Deep water wavelength, L0 (ft)
    L0 = g*T*T/twopi
    L0 = 32.17*2.96*2.96/6.28 = 44.72
Deep water wave celerity, C0 (ft/s)
    C0 = L0/T
    C0 = 44.72/2.96 = 15.13
Angular frequency, sigma (rad/s)
    sigma = twopi/T
    sigma = 6.28/2.96 = 2.13
Hunts (1979) approximation for Celerity C1H (ft/s) at Depth D (ft)
    y = sigma.*sigma.*D./g
    y = 2.13*2.13*32.75/32.17 = 4.60
    C1H = sqrt( g.*D./(y+1./(1 + 0.6522.*y + 0.4622.*y.^2 + 0.0864.*y.^4 +0.0675.*y.^5)) )
    C1H = 15.12
Shoaling Coefficient KsH
    KsH = sqrt(C0/C1H)
    KsH = sqrt(15.13/15.12) = 1.00
Deepwater Wave Height H0_H (ft)
    H0_H = H/KsH
    H0_H = 1.33/1.00 = 1.33
```

Deepwater mean wave height: 1.33 feet

END RUNUP2 CONVERSIONS

RUNUP2 RESULTS

for transect: CM-135-1

RUNUP2 SWEL:
8.80
8.80
8.80
8.80

8.80
8.80
8.80
8.80
8.80

RUNUP2 deepwater mean wave heights:
1.27
1.27
1.27
1.33
1.33
1.33
1.40
1.40
1.40

RUNUP2 mean wave periods:
2.81
2.96
3.10
2.81
2.96
3.10
2.81
2.96
3.10

RUNUP2 runup above SWEL:
1.25
1.29
1.34
1.23
1.26
1.31
1.21
1.23
1.27

RUNUP2 Mean runup height above SWEL: 1.27 feet

RUNUP2 2-percent runup height above SWEL: 2.78 feet

RUNUP2 2-percent runup elevation: 11.58 feet-NAVD88

RUNUP2 Messages:
No Messages

______________END RUNUP2 RESULTS_______________________

________________ACES BEACH RUNUP_______________________

Incident significant wave height: 2.13 feet

Significant wave height deshoaled using Hunt equation

Deepwater significant wave height: 1.87 feet

Peak wave period: 3.48 seconds

Average beach Slope: 1:4.43 (H:V)

ACES RUNUP CALCULATED USING 'Aces_Beach_Runup.m'

ACES Beach 2-percent runup height above SWEL: 4.18 feet

ACES Beach 2-percent runup elevation: 12.98 feet-NAVD88

!!!ACES BEACH RUNUP is NOT valid

_______________END ACES BEACH RESULTS_______________________

PART 5 COMPLETE____

```
  FEMA                                                          sjh            job 2
  RUNUP2 transect: CM-135-1                                                         1
0.00
  -23.92 -108.1 0.8
  -23.71 -107.1 0.8
  -20.49 -92.1  0.8
  -20.06 -90.1  0.8
  -18.44 -83.1  0.8
  -16.83 -76.1  0.8
  -14.98 -68.1  0.8
  -13.36 -61.1  0.8
  -13.13 -60.1  0.8
  -11.52 -53.1  0.8
  -11.29 -52.1  0.8
  -7.82 -37.1  0.8
  -6.21 -30.1  0.8
  -5.98 -29.1  0.8
  -2.90 -14.1  0.8
  -1.25 -6.1   0.8
  2.86  13.9   0.8
  4.35  48.4   0.8
  5.07  56.9   0.8
1 13.80 58.9   0.8
 8.8   1.27  2.81
 8.8   1.27  2.96
 8.8   1.27  3.10
 8.8   1.33  2.81
 8.8   1.33  2.96
 8.8   1.33  3.10
 8.8   1.40  2.81
 8.8   1.40  2.96
 8.8   1.40  3.10
```

****

CROSS SECTION PROFILE

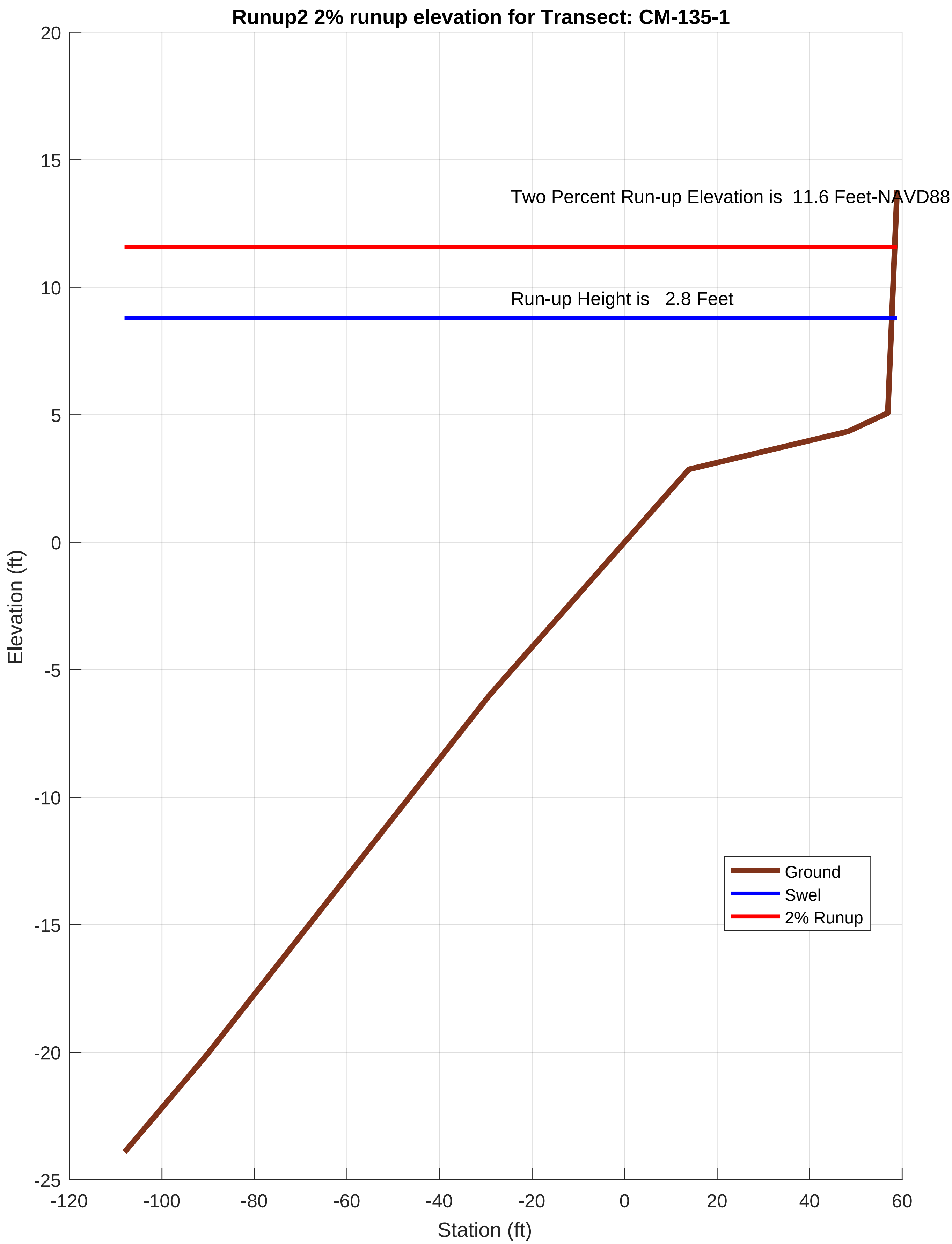
	LENGTH	ELEV.	SLOPE	ROUGHNESS
1	-108.0	-23.9		
			.00	.80
2	-107.0	-23.7		
			4.52	.80
3	-92.1	-20.4		
			5.00	.80
4	-90.1	-20.0		
			4.38	.80
5	-83.1	-18.4		
			4.38	.80
6	-76.1	-16.8		
			4.21	.80
7	-68.1	-14.9		
			4.38	.80
8	-61.1	-13.3		
			5.00	.80
9	-60.1	-13.1		
			4.38	.80
10	-53.1	-11.5		
			3.33	.80
11	-52.1	-11.2		
			4.44	.80
12	-37.1	-7.8		
			4.35	.80
13	-30.1	-6.2		
			4.35	.80
14	-29.1	-6.0		
			4.87	.80
15	-14.1	-2.9		
			4.85	.80
16	-6.1	-1.2		
			4.87	.80
17	13.9	2.9		
			23.15	.80
18	48.4	4.4		
			11.81	.80
19	56.9	5.1		
			.23	.80
20	58.9	13.8		

LAST SLOPE .00 LAST ROUGHNESS .80

****

OUTPUT TABLE

INPUT PARAMETERS			RUNUP RESULTS			
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.)
8.80	1.27	2.81	11	19	1.25	1.61
8.80	1.27	2.96	11	19	1.29	1.61
8.80	1.27	3.10	11	19	1.34	1.61
8.80	1.33	2.81	11	19	1.23	1.69
8.80	1.33	2.96	11	19	1.26	1.69
8.80	1.33	3.10	11	19	1.31	1.69
8.80	1.40	2.81	11	19	1.21	1.78
8.80	1.40	2.96	11	19	1.23	1.78
8.80	1.40	3.10	11	19	1.27	1.78


Runup2 2% runup elevation for Transect: CM-135-1
Two Percent Run-up Elevation is 11.6 Feet-NAVD88
Run-up Height is 2.8 Feet
Ground
Swel
2% Runup
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
-15
-20
-25
-120
-100
-80
-60
-40
-20
0
20
40
60