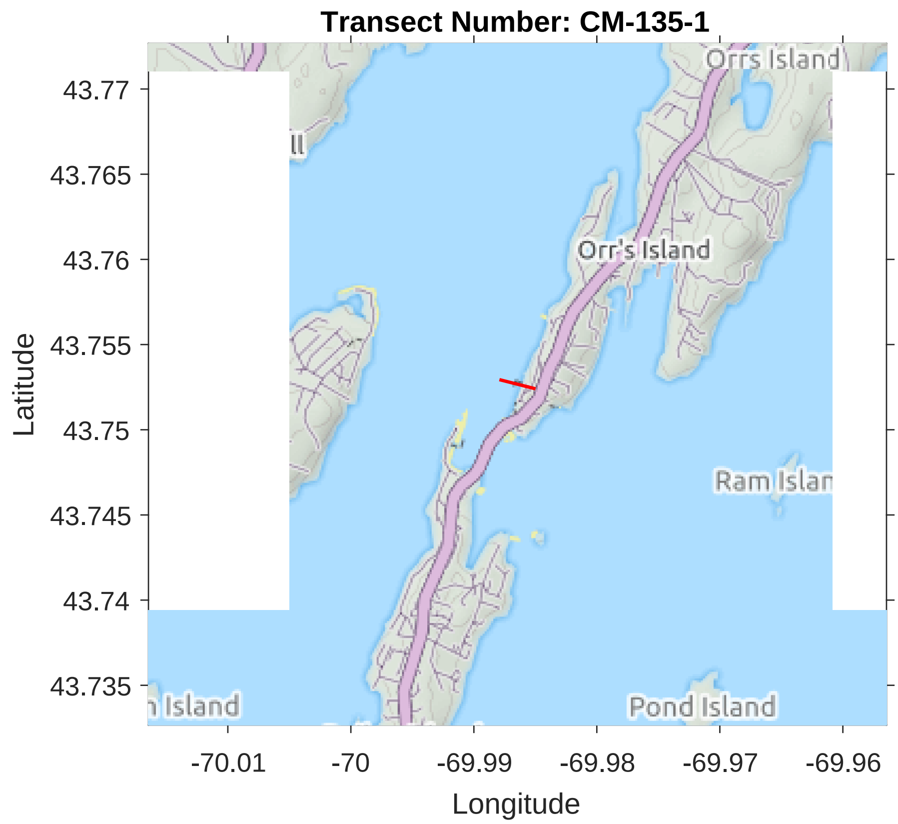
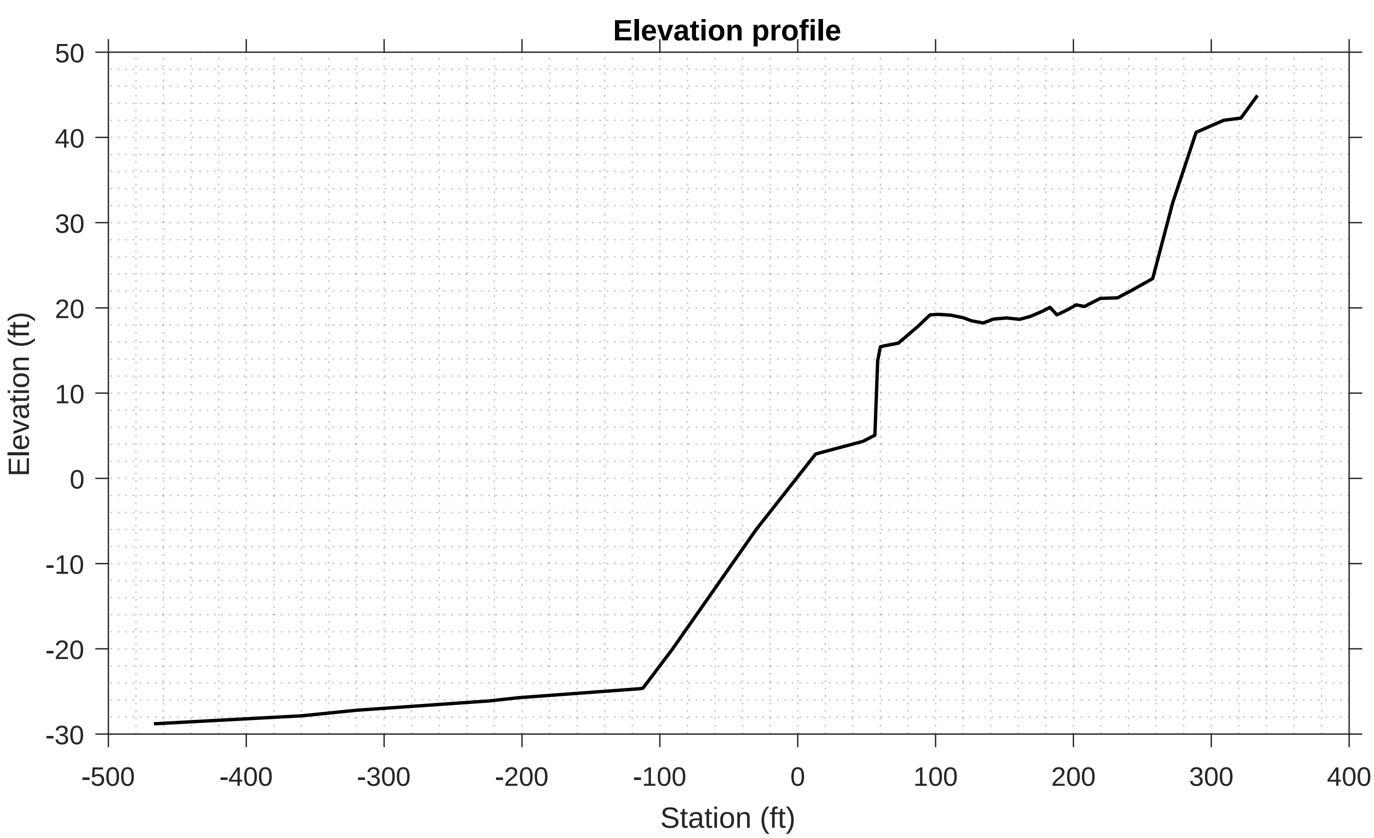

Transect Number: CM-135-1
Orrs Island
Orr's Island
Ram Islan
Pond Island
Island
Latitude
Longitude
43.77
43.765
43.76
43.755
43.75
43.745
43.74
43.735
-70.01
-70
-69.99
-69.98
-69.97
-69.96


Elevation profile
Elevation (ft)
Station (ft)
50
40
30
20
10
0
-10
-20
-30
-500
-400
-300
-200
-100
0
100
200
300
400

DATA LOG FOR TRANSECT ID: CM-135-1

PART 1: USER INPUT

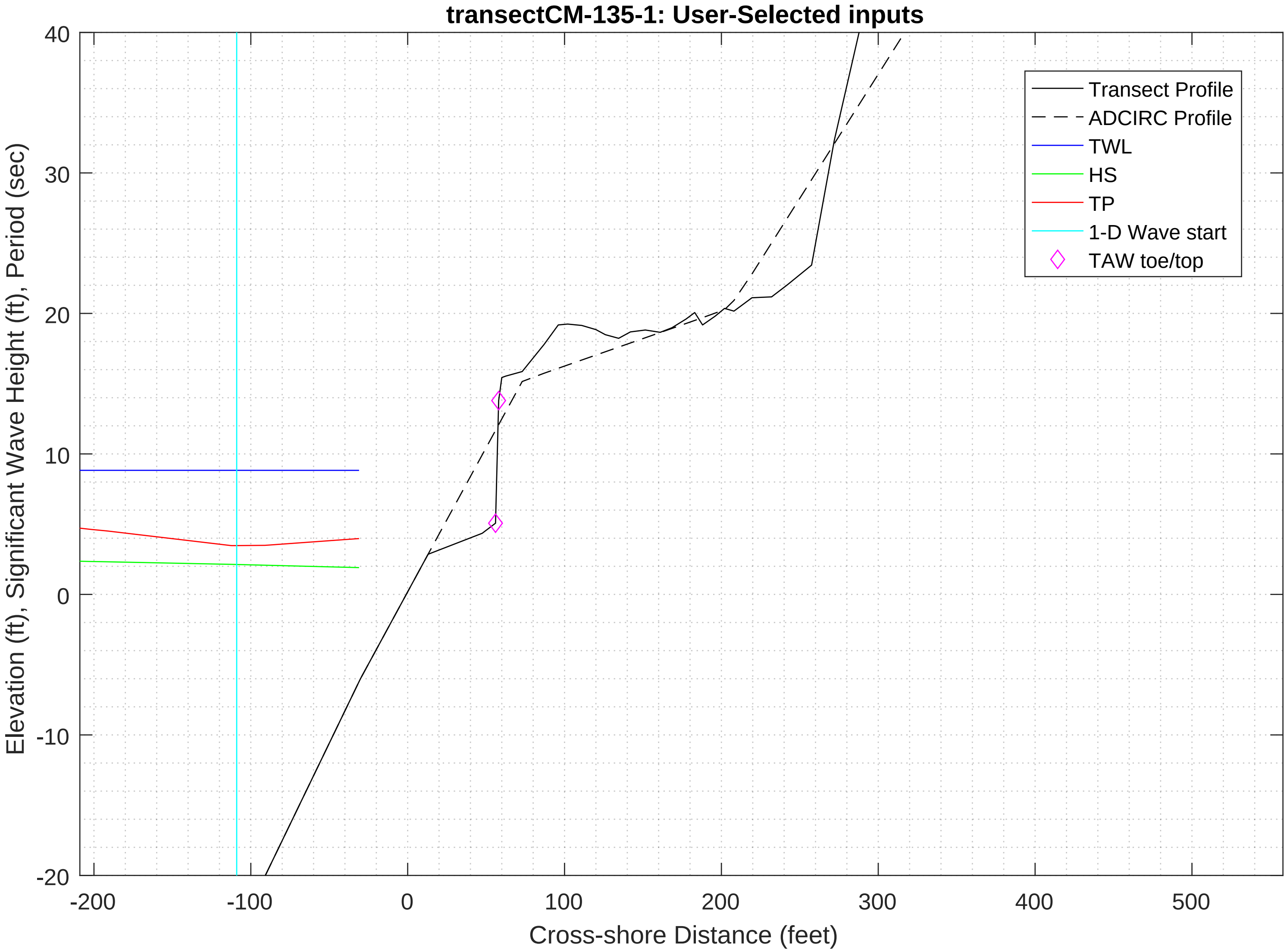
SWAN 1-D / WHAFIS input

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

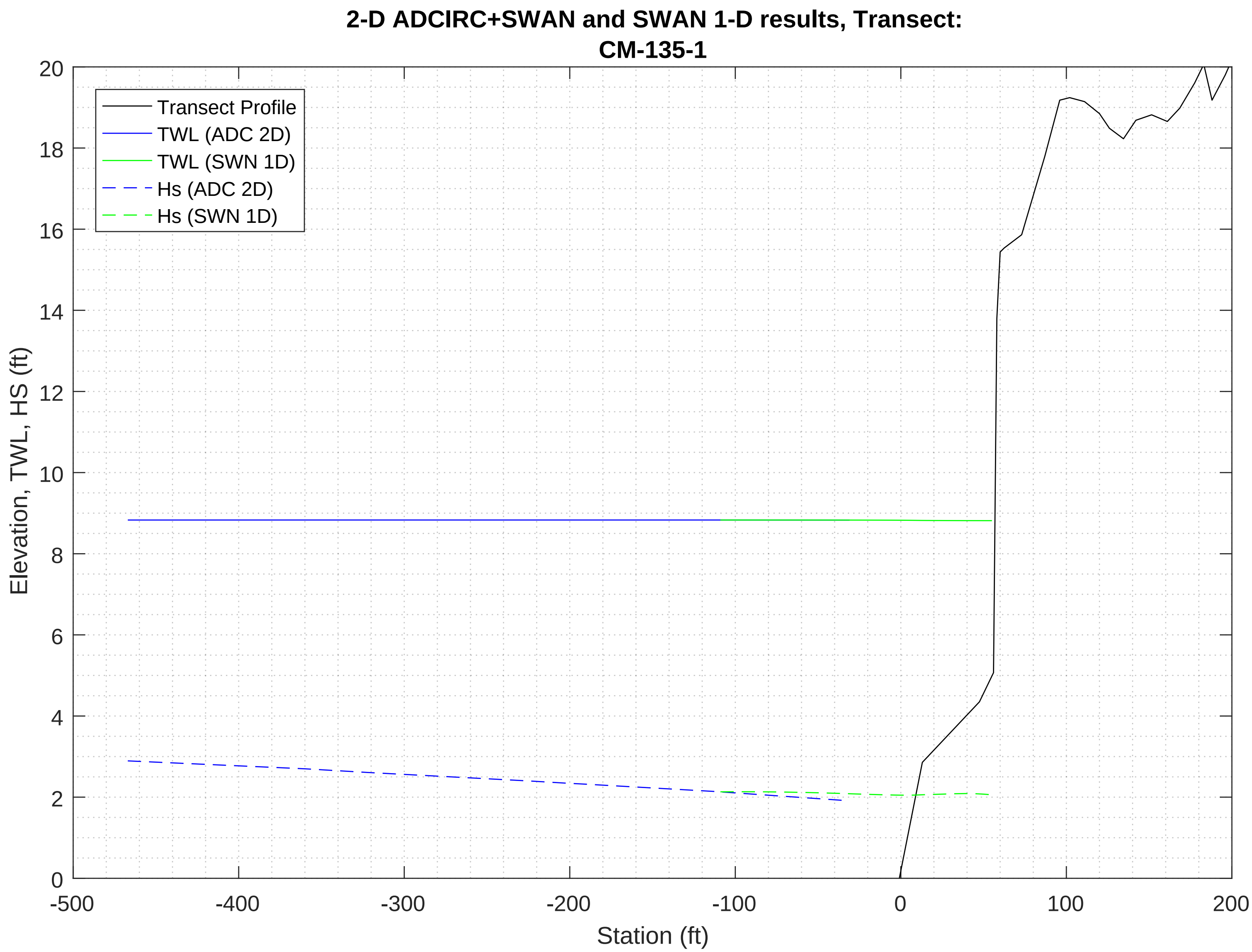
TAW/RUNUP input

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)
20
18
16
14
12
10
8
6
4
2
0
-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
```

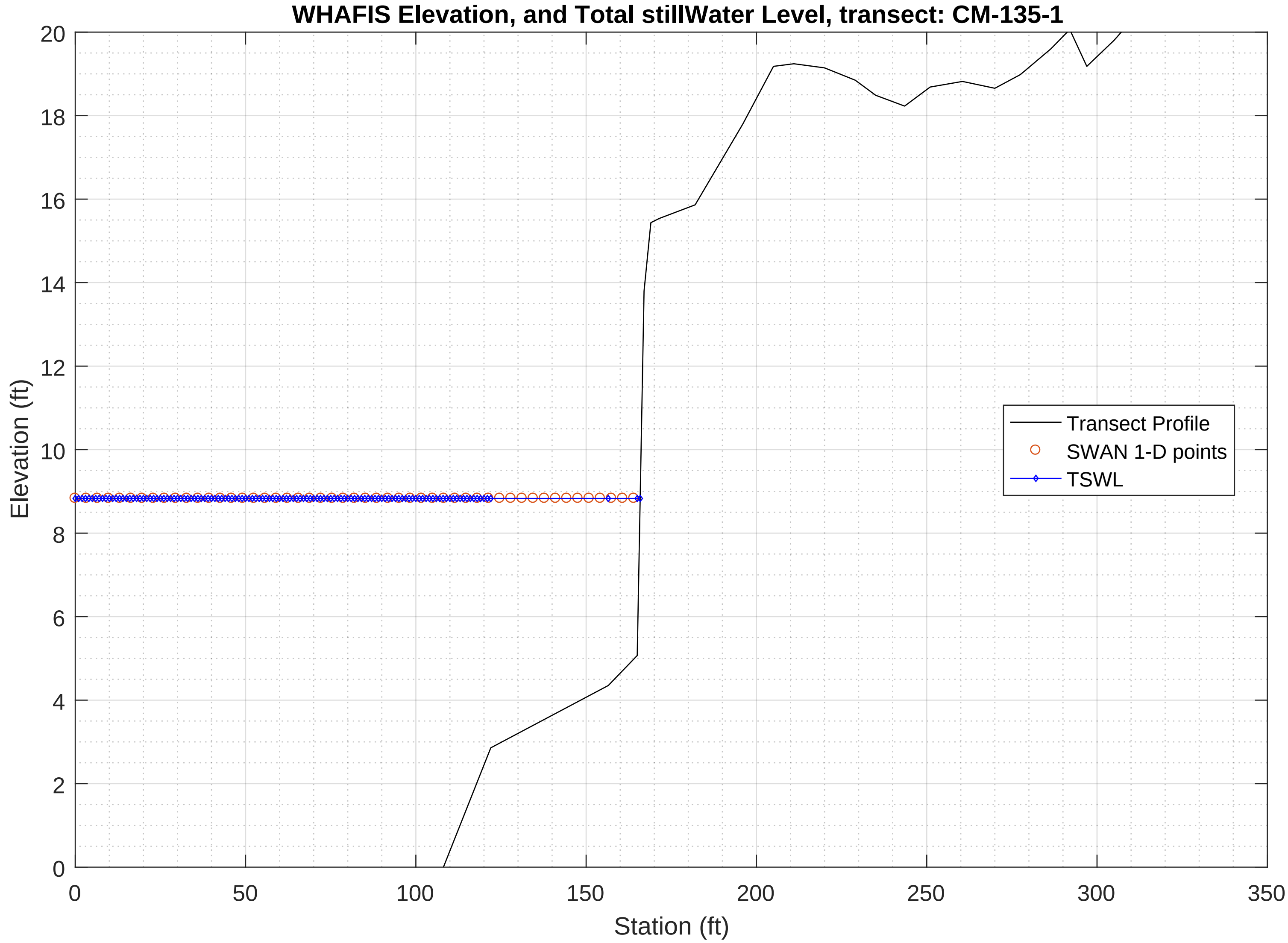
%
%
% Run:1 Table:curve SWAN version:41.20A
%

| % 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 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 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 |

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|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | | |

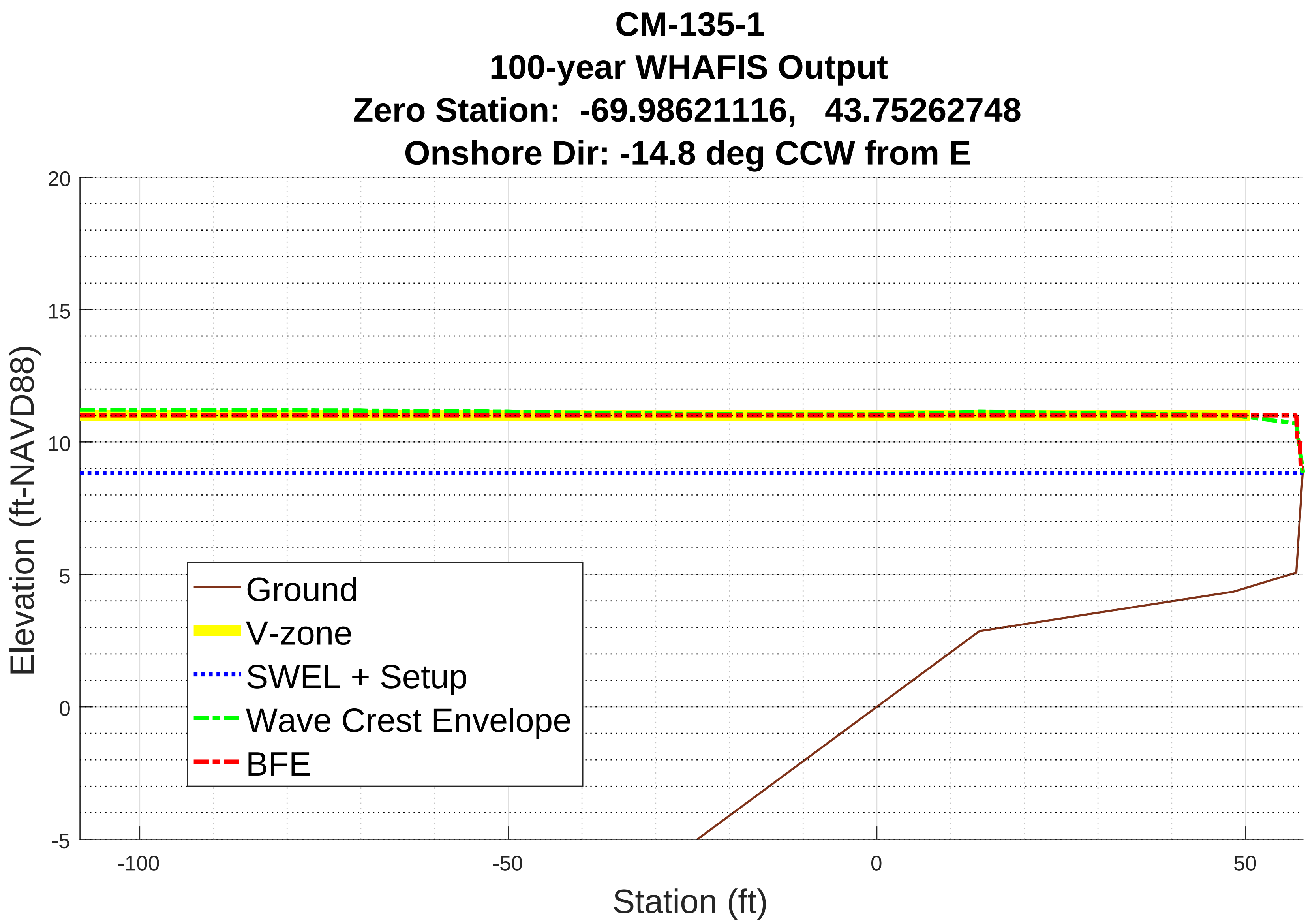
ZONE TERMINATED AT END OF TRANSECT

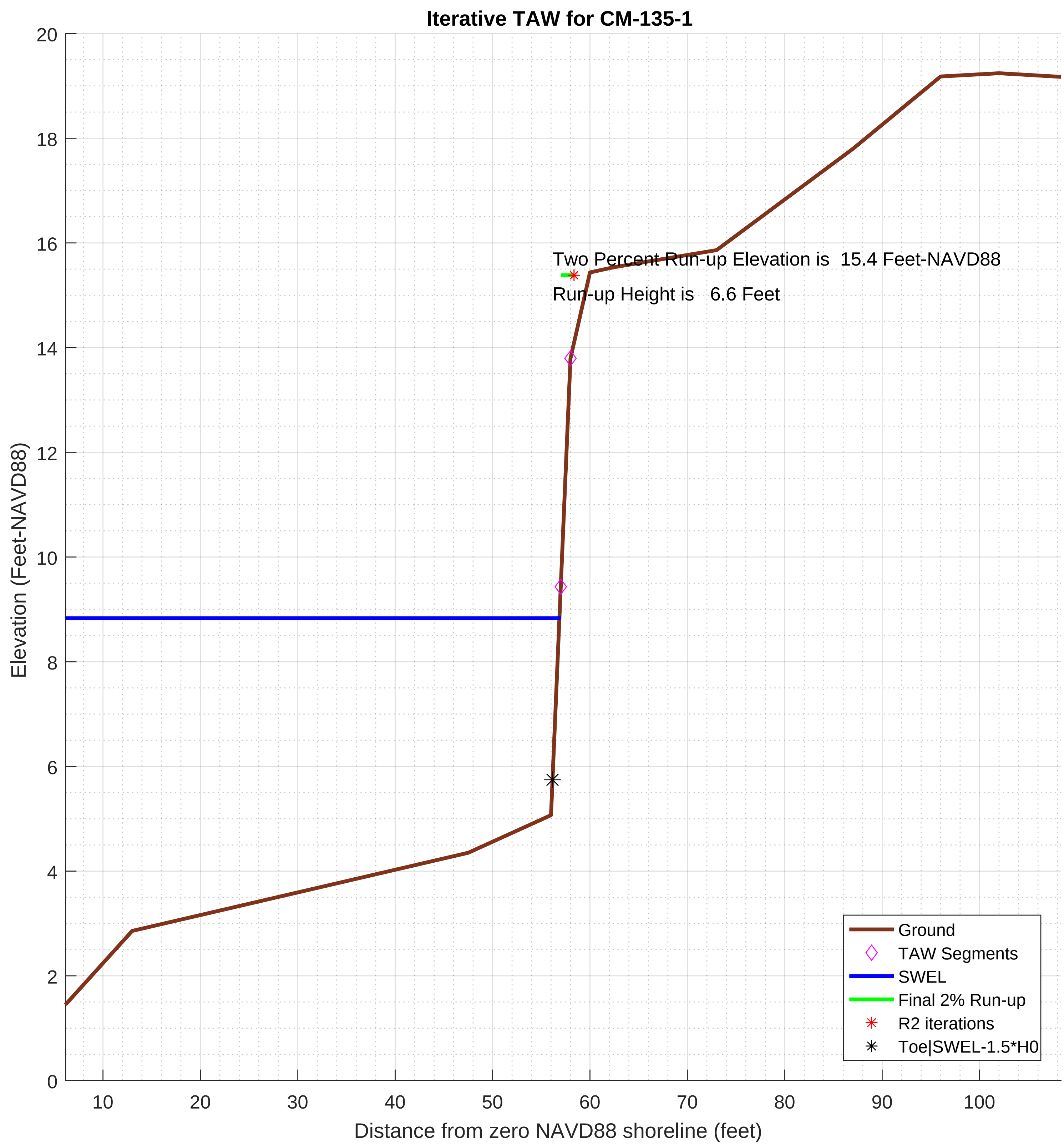
PART 7 POSTSCRIPT NOTES

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)
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80
90
100
Ground
TAW Segments
SWEL
Final 2% Run-up
R2 iterations
Toe|SWEL-1.5*H0

```
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

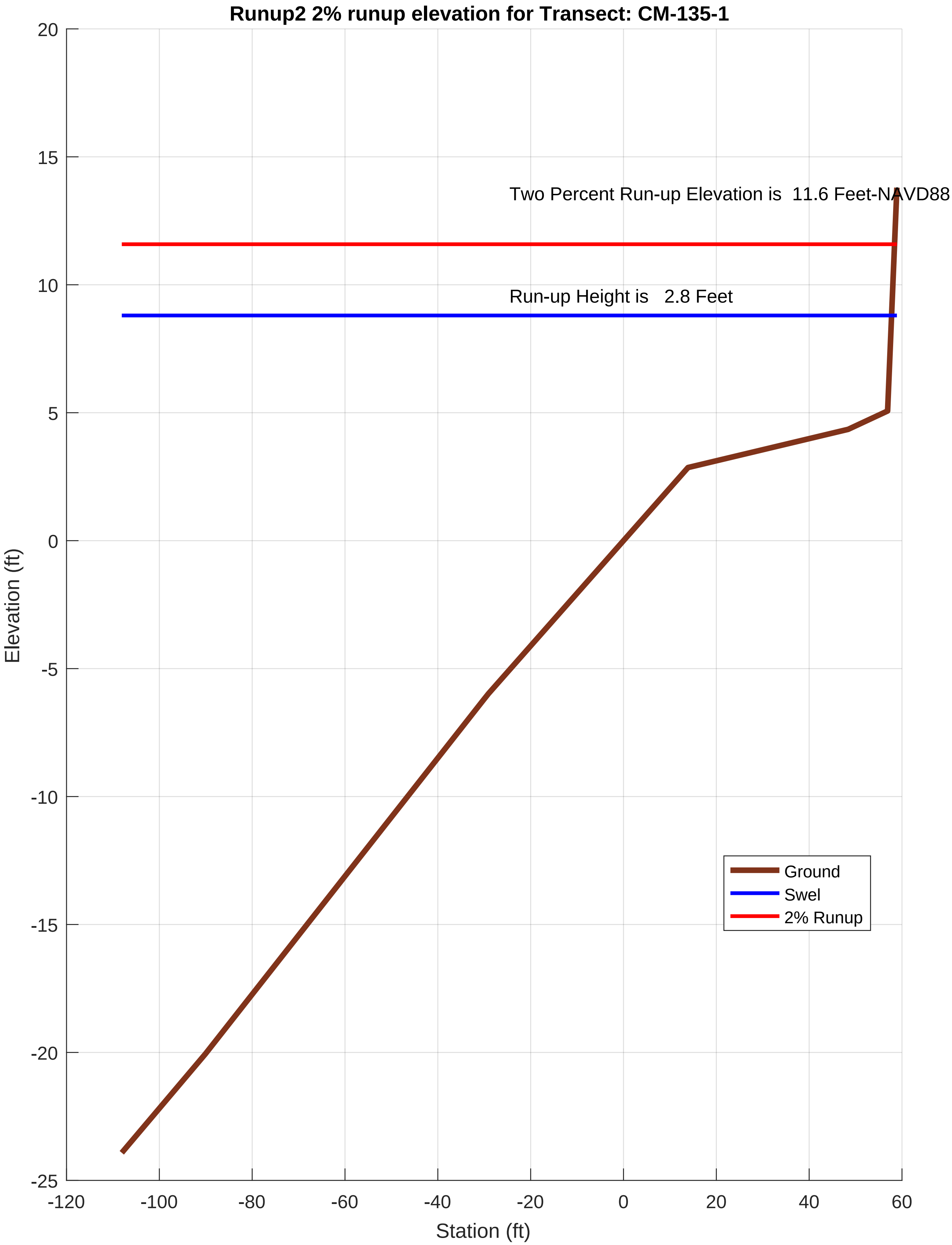
| | LENGTH | ELEV. | SLOPE | ROUGHNESS |
|---|---|---|---|---|
| 1 | -108.0 | -23.9 | | |
| | | | .00 | .80 |
| 2 | -107.0 | -23.7 | | |
| | | | 4.52 | .80 |
| 3 | -92.1 | -20.4 | | |
| | | | 5.00 | .80 |
| 4 | -90.1 | -20.0 | | |
| | | | 4.38 | .80 |
| 5 | -83.1 | -18.4 | | |
| | | | 4.38 | .80 |
| 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