Transect Number: CM-53-1

Elevation profile
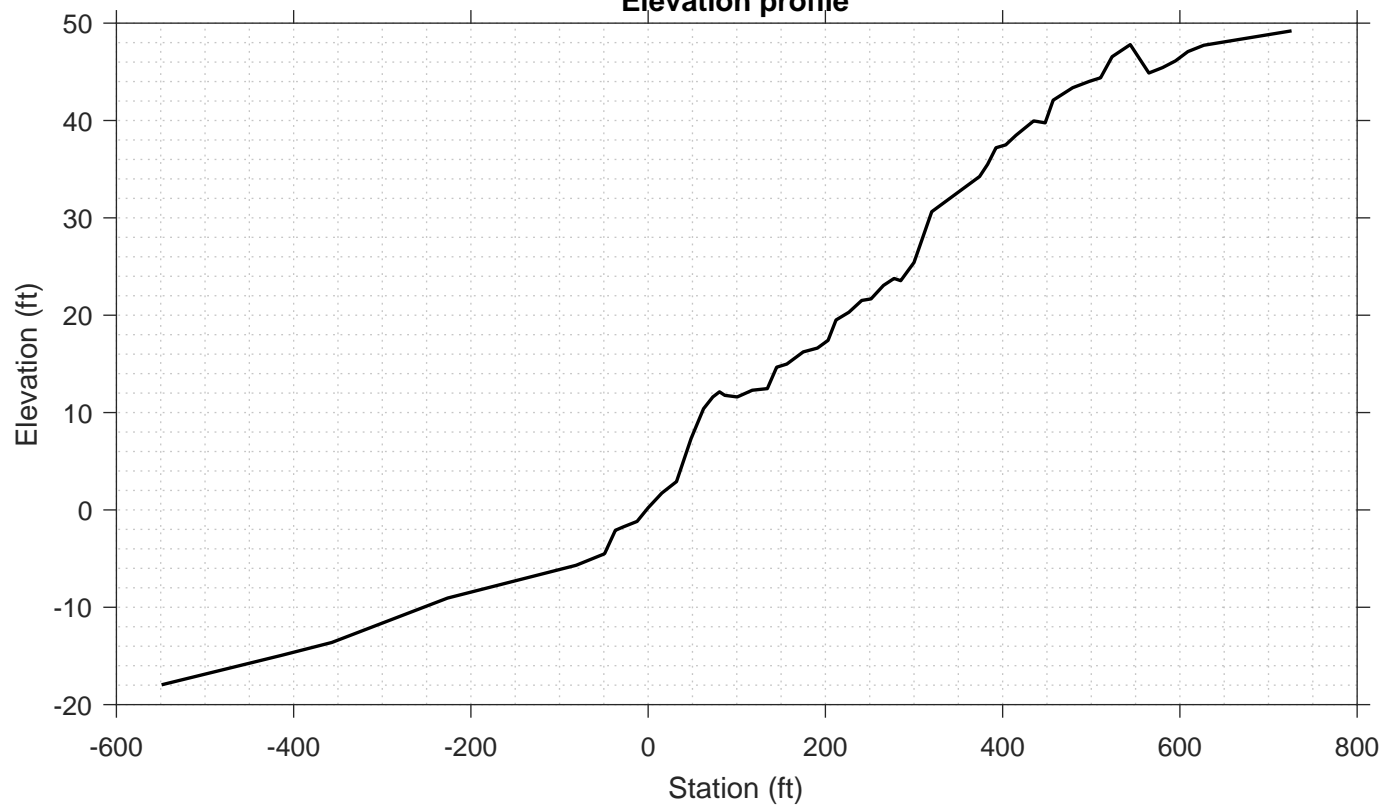
```
_____
DATA LOG FOR TRANSECT ID: CM-53-1
_____



_____
PART 1: USER INPUT


SWAN 1-D / WHAFIS input
_____
station:     -157 ft
LON:         -70.1963 deg E
LAT:         43.6512 deg N
Bottom ELEV:        -7.4456 ft-NAVD88
TWL:         9.0727 ft-NAVD88
HS:          1.6811 ft
TP:          NaN sec
Wave Direction bin: 45 deg CCW from East (90 deg sector)
Transect Direction:   66.4488 deg CCW from East


TAW/RUNUP input
_____
toe sta:     -47 ft
toe elev:    -4.0717 ft-NAVD88
top sta:     80.5 ft
top elev:    12.1293 ft-NAVD88
*Wave and water level conditions at toe to be calculated in SWAN 1-D*

PART 1 COMPLETE_____
```
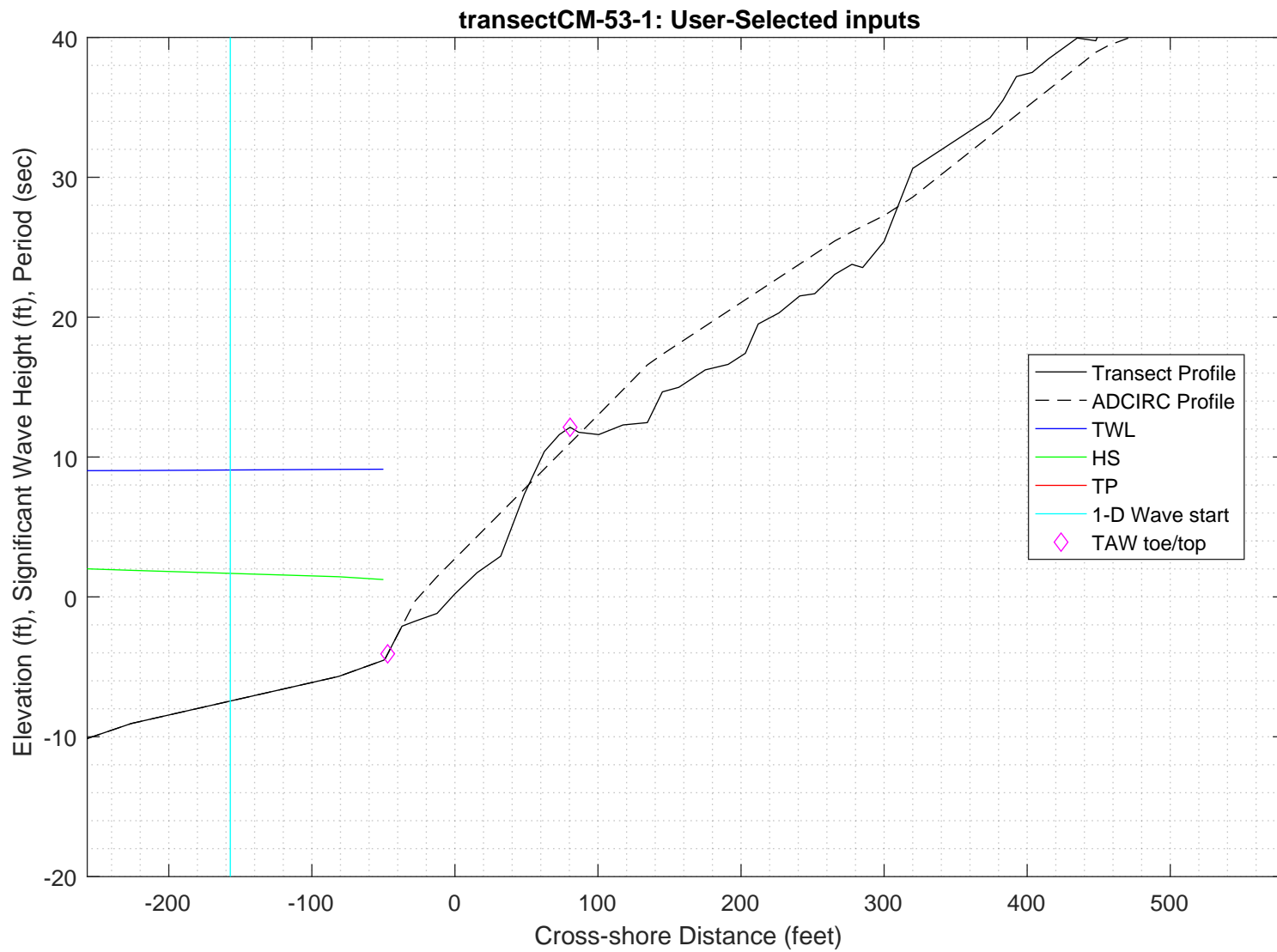
transectCM-53-1: User-Selected inputs

Legend:
- Transect Profile
- ADCIRC Profile
- TWL
- HS
- TP
- 1-D Wave start
- ◇ TAW toe/top

Y-axis: Elevation (ft), Significant Wave Height (ft), Period (sec)

X-axis: Cross-shore Distance (feet)

```
_____
PART 2: SWAN 1-D

swan input grid name: 2_swan/gridfiles/CM-53-1zmeters_xmeters.grd
swan file name:       2_swan/swanfiles/CM-53-1.swn
swan output name:     2_swan/swanfiles/CM-53-1.dat

Boundary Conditions:
    TWL- 2.7654 meters
    HS-  0.51239 meters
    PER- 8.3 seconds

Batch File: 2_swan/swanfiles/runswan.dat

SWAN maximum additional wave setup: 0.3469 feet
SWAN output at toe:
    SETUP- -0.0015879 feet
    HS-    1.7049 feet
    PER-   8.0957 seconds

PART 2 COMPLETE_____
```

2-D ADCIRC+SWAN and SWAN 1-D results, Transect: CM-53-1

Legend:
- Transect Profile
- TWL (ADC 2D)
- TWL (SWN 1D)
- Hs (ADC 2D)
- Hs (SWN 1D)

X-axis: Station (ft)
Y-axis: Elevation, TWL, HS (ft)

1
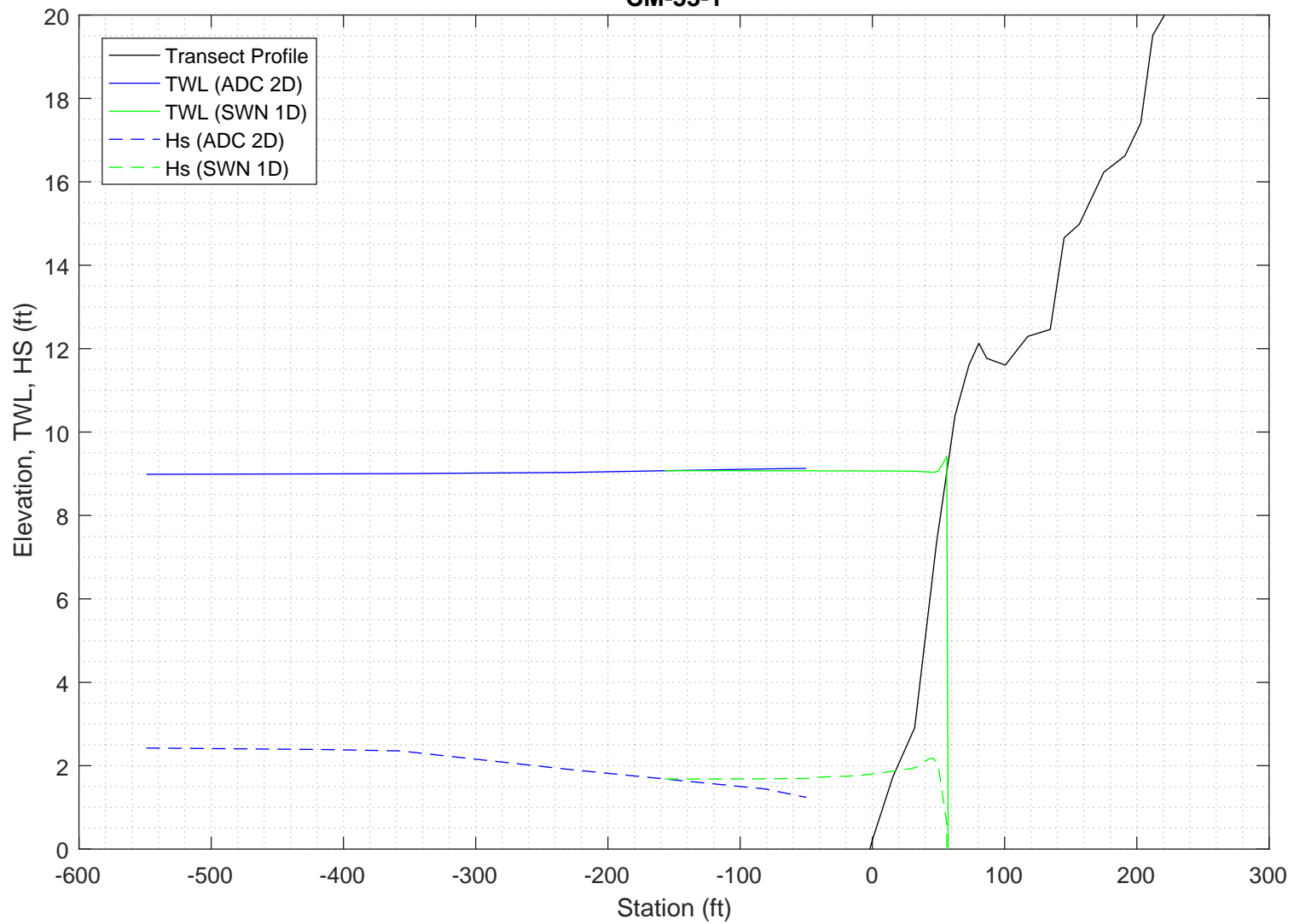
Execution started at 20200416.132458


```
                          ---------------------------------------
                                          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   66   0.   66   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   66   0   1   1

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

 READ   BOTTOM   -1. '../gridfiles/CM-53-1zmeters_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   0.51239   8.3   0 2

!-- BOUndnest1 - optional for boundary from parent run

!-- BOUndnest2

!-- BOUndnest3

!-- INITial -- usest to specify initial values

!

```
!--------------- P H Y S I C S ------------------------
!-- GEN1 [cf10] [cf20] [cf30] [cf40] [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      66  66     0
!TABLe 'sname' < HEADer|NOHEADer|INDexed > 'fname' <output parameters> (output time)
 Table 'curve'   HEADER 'CM-53-1.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              67 MYC               1
                       : MCGRD            68
                       : 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  90.91 % 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    1.52 % 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   92.43 % 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   93.94 % 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   98.49 % of wet grid points ( 99.50 % required)

iteration      7; sweep 1
iteration      7; sweep 2
iteration      7; sweep 3
iteration      7; sweep 4
accuracy OK in   98.49 % of wet grid points ( 99.50 % required)

iteration      8; sweep 1
iteration      8; sweep 2
iteration      8; sweep 3
iteration      8; sweep 4
accuracy OK in  100.00 % of wet grid points ( 99.50 % required)


STOP
```

Xp [m]	Yp [m]	Hsig [m]	TPsmoo [sec]	RTpeak [sec]	Tm_10 [sec]	Dir [degr]	Dspr [degr]	Depth [m]	Setup [m]
0.	0.	0.51206	8.0926	8.0345	7.4879	0.000	31.5057	5.0300	0.000000
1.	0.	0.51205	8.0926	8.0345	7.4876	0.000	31.3886	5.0100	-0.000006
2.	0.	0.51205	8.0926	8.0345	7.4873	0.000	31.2724	4.9900	-0.000013
3.	0.	0.51200	8.0927	8.0345	7.4869	0.000	31.1392	4.9700	-0.000019
4.	0.	0.51209	8.0927	8.0345	7.4870	0.000	31.0117	4.9400	-0.000028
5.	0.	0.51209	8.0928	8.0345	7.4866	0.000	30.9182	4.9200	-0.000034
6.	0.	0.51207	8.0928	8.0345	7.4863	0.000	30.8162	4.9000	-0.000040
7.	0.	0.51219	8.0929	8.0345	7.4863	0.000	30.7111	4.8700	-0.000050
8.	0.	0.51221	8.0929	8.0345	7.4859	0.000	30.6192	4.8499	-0.000056
9.	0.	0.51221	8.0930	8.0345	7.4855	0.000	30.5176	4.8299	-0.000062
10.	0.	0.51236	8.0931	8.0345	7.4856	0.000	30.4126	4.7999	-0.000072
11.	0.	0.51240	8.0931	8.0345	7.4851	0.000	30.3208	4.7799	-0.000079
12.	0.	0.51242	8.0932	8.0345	7.4847	0.000	30.2192	4.7599	-0.000086
13.	0.	0.51260	8.0932	8.0345	7.4847	0.000	30.1144	4.7299	-0.000096
14.	0.	0.51267	8.0933	8.0345	7.4842	360.000	30.0226	4.7099	-0.000104
15.	0.	0.51271	8.0933	8.0345	7.4837	0.000	29.9210	4.6899	-0.000111
16.	0.	0.51292	8.0934	8.0345	7.4837	360.000	29.8162	4.6599	-0.000122
17.	0.	0.51301	8.0935	8.0345	7.4831	0.000	29.7245	4.6399	-0.000129
18.	0.	0.51308	8.0935	8.0345	7.4826	0.000	29.6231	4.6199	-0.000137
19.	0.	0.51331	8.0936	8.0345	7.4825	0.000	29.5185	4.5899	-0.000149
20.	0.	0.51342	8.0936	8.0345	7.4819	360.000	29.4269	4.5698	-0.000157
21.	0.	0.51351	8.0937	8.0345	7.4812	360.000	29.3257	4.5498	-0.000165
22.	0.	0.51377	8.0938	8.0345	7.4810	0.000	29.2212	4.5198	-0.000177
23.	0.	0.51383	8.0938	8.0345	7.4803	0.000	29.1018	4.4998	-0.000186
24.	0.	0.51419	8.0940	8.0345	7.4804	360.000	28.9633	4.4598	-0.000203
25.	0.	0.51438	8.0940	8.0345	7.4800	360.000	28.8185	4.4298	-0.000216
26.	0.	0.51471	8.0942	8.0345	7.4799	0.000	28.6578	4.3898	-0.000234
27.	0.	0.51509	8.0943	8.0345	7.4799	0.000	28.5058	4.3497	-0.000252
28.	0.	0.51531	8.0944	8.0345	7.4792	360.000	28.3572	4.3197	-0.000267
29.	0.	0.51571	8.0945	8.0345	7.4790	360.000	28.2045	4.2797	-0.000286
30.	0.	0.51614	8.0946	8.0345	7.4787	0.000	28.0705	4.2397	-0.000305
31.	0.	0.51641	8.0947	8.0345	7.4778	0.000	27.9415	4.2097	-0.000320
32.	0.	0.51679	8.0949	8.0345	7.4772	0.000	27.7780	4.1697	-0.000340
33.	0.	0.51703	8.0950	8.0345	7.4772	0.000	27.4110	4.1096	-0.000371
34.	0.	0.51966	8.0957	8.0345	7.4830	0.000	26.8088	3.9095	-0.000484
35.	0.	0.52227	8.0963	8.0345	7.4875	360.000	26.1084	3.7194	-0.000607
36.	0.	0.52568	8.0970	8.0345	7.4909	360.000	25.4352	3.5192	-0.000755
37.	0.	0.52820	8.0975	8.0345	7.4894	359.999	24.9756	3.3891	-0.000864
38.	0.	0.52890	8.0978	8.0345	7.4824	359.999	24.7131	3.3491	-0.000900
39.	0.	0.52986	8.0980	8.0345	7.4728	360.000	24.5184	3.3091	-0.000938
40.	0.	0.53097	8.0983	8.0345	7.4619	360.000	24.3684	3.2690	-0.000976
41.	0.	0.53193	8.0985	8.0345	7.4483	360.000	24.2287	3.2390	-0.001006
42.	0.	0.53318	8.0988	8.0345	7.4346	360.000	24.0804	3.1990	-0.001046
43.	0.	0.53450	8.0991	8.0345	7.4203	359.999	23.9407	3.1589	-0.001088
44.	0.	0.53541	8.0994	8.0345	7.4036	359.999	23.7194	3.1289	-0.001121
45.	0.	0.53859	8.0999	8.0345	7.3893	359.999	23.3679	3.0188	-0.001245
46.	0.	0.54189	8.1005	8.0345	7.3728	359.999	22.9557	2.9086	-0.001380
47.	0.	0.54576	8.1012	8.0345	7.3541	359.999	22.5159	2.7885	-0.001544
48.	0.	0.54965	8.1020	8.0345	7.3315	359.999	22.0986	2.6783	-0.001711
49.	0.	0.55311	8.1027	8.0345	7.3044	359.999	21.6970	2.5881	-0.001862
50.	0.	0.55726	8.1036	8.0345	7.2735	359.998	21.2832	2.4880	-0.002046
51.	0.	0.56176	8.1045	8.0345	7.2376	359.998	20.8610	2.3877	-0.002250
52.	0.	0.56665	8.1056	8.0345	7.1974	359.998	20.4587	2.2875	-0.002478
53.	0.	0.57100	8.1067	8.0345	7.1515	359.998	20.1244	2.2073	-0.002678
54.	0.	0.57514	8.1078	8.0345	7.1014	359.998	19.8195	2.1371	-0.002869
55.	0.	0.58005	8.1091	8.0345	7.0485	359.998	19.5173	2.0569	-0.003106
56.	0.	0.58472	8.1104	8.0345	6.9911	359.998	19.2279	1.9867	-0.003335
57.	0.	0.58952	8.1118	8.0345	6.9284	359.997	18.8335	1.9164	-0.003587
58.	0.	0.59926	8.1136	8.0345	6.8623	359.997	18.1050	1.7658	-0.004202
59.	0.	0.61918	8.1165	8.0345	6.7808	359.997	17.0144	1.4943	-0.005687

60.	0.	0.64115	8.1201	8.0345	6.6563	359.989	15.7305	1.2323	-0.007720
61.	0.	0.66159	8.1252	8.0345	6.4630	359.917	14.3943	0.9598	-0.010224
62.	0.	0.66086	8.1311	8.0345	6.2437	359.828	12.8778	0.6889	-0.011086
63.	0.	0.61460	8.1379	8.0345	6.0960	359.717	11.5759	0.4462	-0.003800
64.	0.	0.41031	8.2635	8.0345	6.3772	358.033	12.1651	0.2756	0.045622
65.	0.	0.18321	10.6757	11.1572	7.5154	359.078	15.1803	0.1157	0.105736
66.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000

_____
PART 3: WHAFIS

WHAFIS input: CM-53-1.dat
WHAFIS output: CM-53-1.out

PART 3 COMPLETE_____
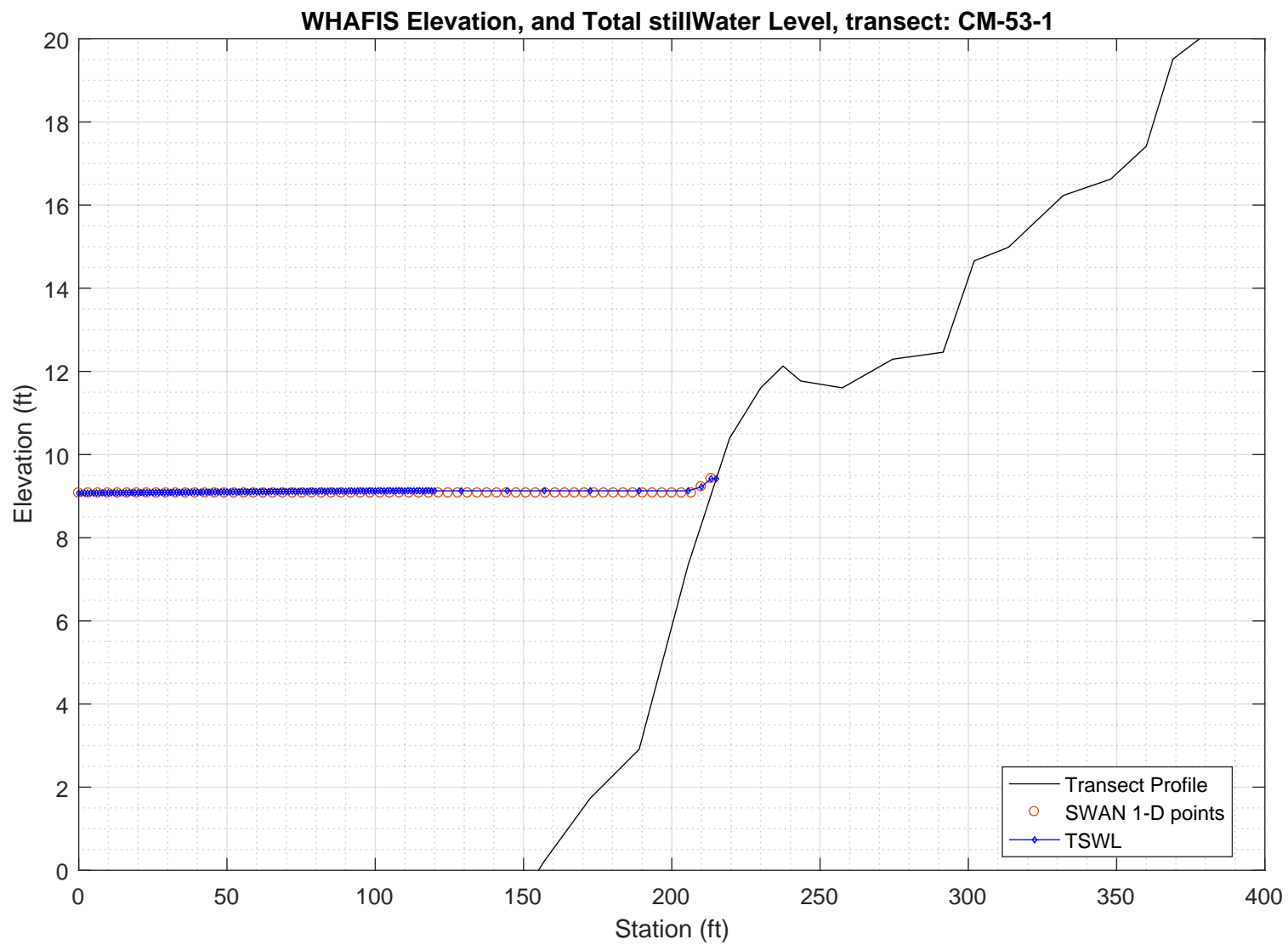
WHAFIS Elevation, and Total stillWater Level, transect: CM-53-1

```
WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)
Executed on: Thu Apr 16 13:27:11 2020
Input file:  C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Portland\3_whafis\whafis4\CM-53-1.dat
Output file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Portland\3_whafis\whafis4\CM-53-1.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    -7.446    1.000    1.000    9.073    2.690    8.300   56.140    0.023    0.000
     OF     1.000    -7.422    0.000    9.073    0.000    0.000    0.000    0.000    0.023    0.000
     OF     2.000    -7.399    0.000    9.074    0.000    0.000    0.000    0.000    0.023    0.000
     OF     3.000    -7.376    0.000    9.074    0.000    0.000    0.000    0.000    0.023    0.000
     OF     4.000    -7.353    0.000    9.075    0.000    0.000    0.000    0.000    0.023    0.000
     OF     5.000    -7.330    0.000    9.076    0.000    0.000    0.000    0.000    0.023    0.000
     OF     6.000    -7.306    0.000    9.076    0.000    0.000    0.000    0.000    0.023    0.000
     OF     7.000    -7.283    0.000    9.077    0.000    0.000    0.000    0.000    0.023    0.000
     OF     8.000    -7.260    0.000    9.077    0.000    0.000    0.000    0.000    0.023    0.000
     OF     9.000    -7.237    0.000    9.078    0.000    0.000    0.000    0.000    0.023    0.000
     OF    10.000    -7.213    0.000    9.078    0.000    0.000    0.000    0.000    0.023    0.000
     OF    11.000    -7.190    0.000    9.079    0.000    0.000    0.000    0.000    0.023    0.000
     OF    12.000    -7.167    0.000    9.080    0.000    0.000    0.000    0.000    0.023    0.000
     OF    13.000    -7.144    0.000    9.080    0.000    0.000    0.000    0.000    0.023    0.000
     OF    14.000    -7.121    0.000    9.081    0.000    0.000    0.000    0.000    0.023    0.000
     OF    15.000    -7.097    0.000    9.081    0.000    0.000    0.000    0.000    0.023    0.000
     OF    16.000    -7.074    0.000    9.082    0.000    0.000    0.000    0.000    0.023    0.000
     OF    17.000    -7.051    0.000    9.082    0.000    0.000    0.000    0.000    0.023    0.000
     OF    18.000    -7.028    0.000    9.083    0.000    0.000    0.000    0.000    0.023    0.000
     OF    19.000    -7.004    0.000    9.084    0.000    0.000    0.000    0.000    0.023    0.000
     OF    20.000    -6.981    0.000    9.084    0.000    0.000    0.000    0.000    0.023    0.000
     OF    21.000    -6.958    0.000    9.085    0.000    0.000    0.000    0.000    0.023    0.000
     OF    22.000    -6.935    0.000    9.085    0.000    0.000    0.000    0.000    0.023    0.000
     OF    23.000    -6.911    0.000    9.086    0.000    0.000    0.000    0.000    0.023    0.000
     OF    24.000    -6.888    0.000    9.086    0.000    0.000    0.000    0.000    0.023    0.000
     OF    25.000    -6.865    0.000    9.087    0.000    0.000    0.000    0.000    0.023    0.000
     OF    26.000    -6.842    0.000    9.088    0.000    0.000    0.000    0.000    0.023    0.000
     OF    27.000    -6.819    0.000    9.088    0.000    0.000    0.000    0.000    0.023    0.000
     OF    28.000    -6.795    0.000    9.089    0.000    0.000    0.000    0.000    0.023    0.000
     OF    29.000    -6.772    0.000    9.089    0.000    0.000    0.000    0.000    0.023    0.000
     OF    30.000    -6.749    0.000    9.090    0.000    0.000    0.000    0.000    0.023    0.000
     OF    31.000    -6.726    0.000    9.090    0.000    0.000    0.000    0.000    0.023    0.000
     OF    32.000    -6.703    0.000    9.091    0.000    0.000    0.000    0.000    0.023    0.000
     OF    33.000    -6.679    0.000    9.092    0.000    0.000    0.000    0.000    0.023    0.000
     OF    34.000    -6.656    0.000    9.092    0.000    0.000    0.000    0.000    0.023    0.000
     OF    35.000    -6.633    0.000    9.093    0.000    0.000    0.000    0.000    0.023    0.000
     OF    36.000    -6.610    0.000    9.093    0.000    0.000    0.000    0.000    0.023    0.000
     OF    37.000    -6.586    0.000    9.094    0.000    0.000    0.000    0.000    0.023    0.000
     OF    38.000    -6.563    0.000    9.094    0.000    0.000    0.000    0.000    0.023    0.000
     OF    39.000    -6.540    0.000    9.095    0.000    0.000    0.000    0.000    0.023    0.000
     OF    40.000    -6.517    0.000    9.096    0.000    0.000    0.000    0.000    0.023    0.000
     OF    41.000    -6.494    0.000    9.096    0.000    0.000    0.000    0.000    0.023    0.000
     OF    42.000    -6.470    0.000    9.097    0.000    0.000    0.000    0.000    0.023    0.000
     OF    43.000    -6.447    0.000    9.097    0.000    0.000    0.000    0.000    0.023    0.000
     OF    44.000    -6.424    0.000    9.098    0.000    0.000    0.000    0.000    0.023    0.000
     OF    45.000    -6.401    0.000    9.099    0.000    0.000    0.000    0.000    0.023    0.000
     OF    46.000    -6.377    0.000    9.099    0.000    0.000    0.000    0.000    0.023    0.000
     OF    47.000    -6.354    0.000    9.100    0.000    0.000    0.000    0.000    0.023    0.000
     OF    48.000    -6.331    0.000    9.100    0.000    0.000    0.000    0.000    0.023    0.000
     OF    49.000    -6.308    0.000    9.101    0.000    0.000    0.000    0.000    0.023    0.000
     OF    50.000    -6.285    0.000    9.101    0.000    0.000    0.000    0.000    0.023    0.000
     OF    51.000    -6.261    0.000    9.102    0.000    0.000    0.000    0.000    0.023    0.000
     OF    52.000    -6.238    0.000    9.102    0.000    0.000    0.000    0.000    0.023    0.000
     OF    53.000    -6.215    0.000    9.103    0.000    0.000    0.000    0.000    0.023    0.000
     OF    54.000    -6.192    0.000    9.104    0.000    0.000    0.000    0.000    0.023    0.000
     OF    55.000    -6.168    0.000    9.104    0.000    0.000    0.000    0.000    0.023    0.000
     OF    56.000    -6.145    0.000    9.105    0.000    0.000    0.000    0.000    0.023    0.000
     OF    57.000    -6.122    0.000    9.105    0.000    0.000    0.000    0.000    0.023    0.000
     OF    58.000    -6.099    0.000    9.106    0.000    0.000    0.000    0.000    0.023    0.000
     OF    59.000    -6.076    0.000    9.106    0.000    0.000    0.000    0.000    0.023    0.000
     OF    60.000    -6.052    0.000    9.107    0.000    0.000    0.000    0.000    0.023    0.000
     OF    61.000    -6.029    0.000    9.108    0.000    0.000    0.000    0.000    0.023    0.000
     OF    62.000    -6.006    0.000    9.108    0.000    0.000    0.000    0.000    0.023    0.000
     OF    63.000    -5.983    0.000    9.109    0.000    0.000    0.000    0.000    0.023    0.000
     OF    64.000    -5.959    0.000    9.109    0.000    0.000    0.000    0.000    0.023    0.000
     OF    65.000    -5.936    0.000    9.110    0.000    0.000    0.000    0.000    0.023    0.000
     OF    66.000    -5.913    0.000    9.111    0.000    0.000    0.000    0.000    0.023    0.000
     OF    67.000    -5.890    0.000    9.111    0.000    0.000    0.000    0.000    0.023    0.000
     OF    68.000    -5.867    0.000    9.112    0.000    0.000    0.000    0.000    0.023    0.000
     OF    69.000    -5.843    0.000    9.112    0.000    0.000    0.000    0.000    0.023    0.000
     OF    70.000    -5.820    0.000    9.113    0.000    0.000    0.000    0.000    0.023    0.000
     OF    71.000    -5.797    0.000    9.113    0.000    0.000    0.000    0.000    0.023    0.000
     OF    72.000    -5.774    0.000    9.114    0.000    0.000    0.000    0.000    0.023    0.000
     OF    73.000    -5.751    0.000    9.115    0.000    0.000    0.000    0.000    0.023    0.000
     OF    74.000    -5.727    0.000    9.115    0.000    0.000    0.000    0.000    0.023    0.000
     OF    75.000    -5.704    0.000    9.116    0.000    0.000    0.000    0.000    0.025    0.000
     OF    76.000    -5.677    0.000    9.116    0.000    0.000    0.000    0.000    0.032    0.000
     OF    77.000    -5.640    0.000    9.117    0.000    0.000    0.000    0.000    0.037    0.000
     OF    78.000    -5.603    0.000    9.117    0.000    0.000    0.000    0.000    0.037    0.000
     OF    79.000    -5.566    0.000    9.117    0.000    0.000    0.000    0.000    0.037    0.000
     OF    80.000    -5.529    0.000    9.118    0.000    0.000    0.000    0.000    0.037    0.000
     OF    81.000    -5.492    0.000    9.118    0.000    0.000    0.000    0.000    0.037    0.000
     OF    82.000    -5.456    0.000    9.118    0.000    0.000    0.000    0.000    0.037    0.000
     OF    83.000    -5.419    0.000    9.119    0.000    0.000    0.000    0.000    0.037    0.000
     OF    84.000    -5.382    0.000    9.119    0.000    0.000    0.000    0.000    0.037    0.000
     OF    85.000    -5.345    0.000    9.120    0.000    0.000    0.000    0.000    0.037    0.000
     OF    86.000    -5.308    0.000    9.120    0.000    0.000    0.000    0.000    0.037    0.000
     OF    87.000    -5.272    0.000    9.120    0.000    0.000    0.000    0.000    0.037    0.000
     OF    88.000    -5.235    0.000    9.121    0.000    0.000    0.000    0.000    0.037    0.000
     OF    89.000    -5.198    0.000    9.121    0.000    0.000    0.000    0.000    0.037    0.000
     OF    90.000    -5.161    0.000    9.122    0.000    0.000    0.000    0.000    0.037    0.000
     OF    91.000    -5.124    0.000    9.122    0.000    0.000    0.000    0.000    0.037    0.000
     OF    92.000    -5.087    0.000    9.122    0.000    0.000    0.000    0.000    0.037    0.000
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OF	93.000	-5.050	0.000	9.123	0.000	0.000	0.000	0.000	0.037	0.000
OF	94.000	-5.014	0.000	9.123	0.000	0.000	0.000	0.000	0.037	0.000
OF	95.000	-4.977	0.000	9.123	0.000	0.000	0.000	0.000	0.037	0.000
OF	96.000	-4.940	0.000	9.124	0.000	0.000	0.000	0.000	0.037	0.000
OF	97.000	-4.903	0.000	9.124	0.000	0.000	0.000	0.000	0.037	0.000
OF	98.000	-4.866	0.000	9.125	0.000	0.000	0.000	0.000	0.037	0.000
OF	99.000	-4.829	0.000	9.125	0.000	0.000	0.000	0.000	0.037	0.000
OF	100.000	-4.792	0.000	9.125	0.000	0.000	0.000	0.000	0.037	0.000
OF	101.000	-4.756	0.000	9.126	0.000	0.000	0.000	0.000	0.037	0.000
OF	102.000	-4.719	0.000	9.126	0.000	0.000	0.000	0.000	0.037	0.000
OF	103.000	-4.682	0.000	9.126	0.000	0.000	0.000	0.000	0.037	0.000
OF	104.000	-4.645	0.000	9.127	0.000	0.000	0.000	0.000	0.037	0.000
OF	105.000	-4.608	0.000	9.127	0.000	0.000	0.000	0.000	0.037	0.000
OF	106.000	-4.571	0.000	9.128	0.000	0.000	0.000	0.000	0.037	0.000
OF	107.000	-4.535	0.000	9.128	0.000	0.000	0.000	0.000	0.052	0.000
OF	108.000	-4.467	0.000	9.128	0.000	0.000	0.000	0.000	0.132	0.000
OF	109.000	-4.270	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	110.000	-4.072	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	111.000	-3.874	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	112.000	-3.677	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	113.000	-3.478	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	114.000	-3.281	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	115.000	-3.083	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	116.000	-2.885	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	117.000	-2.688	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	118.000	-2.490	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	119.000	-2.293	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	120.000	-2.095	0.000	9.128	0.000	0.000	0.000	0.000	0.055	0.000
OF	129.000	-1.742	0.000	9.128	0.000	0.000	0.000	0.000	0.037	0.000
OF	144.500	-1.181	0.000	9.128	0.000	0.000	0.000	0.000	0.070	0.000
IF	157.000	0.220	0.000	9.128	0.000	0.000	0.000	0.000	0.104	0.000
IF	172.500	1.732	0.000	9.128	0.000	0.000	0.000	0.000	0.084	0.000
IF	189.000	2.910	0.000	9.128	0.000	0.000	0.000	0.000	0.170	0.000
IF	205.500	7.343	0.000	9.128	0.000	0.000	0.000	0.000	0.257	0.000
IF	210.000	8.317	0.000	9.222	0.000	0.000	0.000	0.000	0.217	0.000
IF	213.300	9.033	0.000	9.420	0.000	0.000	0.000	0.000	0.220	0.000
IF	215.000	9.420	0.000	9.420	0.000	0.000	0.000	0.000	0.228	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	-7.446	1.000	1.000	9.073	2.690	8.300	56.140	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	1.000	-7.422	0.000	9.073	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	2.000	-7.399	0.000	9.074	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	3.000	-7.376	0.000	9.074	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	4.000	-7.353	0.000	9.075	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	5.000	-7.330	0.000	9.076	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	6.000	-7.306	0.000	9.076	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	7.000	-7.283	0.000	9.077	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	8.000	-7.260	0.000	9.077	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	9.000	-7.237	0.000	9.078	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	10.000	-7.213	0.000	9.078	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	11.000	-7.190	0.000	9.079	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	12.000	-7.167	0.000	9.080	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	13.000	-7.144	0.000	9.080	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	14.000	-7.121	0.000	9.081	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	15.000	-7.097	0.000	9.081	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	16.000	-7.074	0.000	9.082	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	17.000	-7.051	0.000	9.082	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	18.000	-7.028	0.000	9.083	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	19.000	-7.004	0.000	9.084	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	20.000	-6.981	0.000	9.084	0.000	0.000	0.000	0.000	0.023	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	21.000	-6.958	0.000	9.085	0.000	0.000	0.000	0.000	0.023	0.000
OF	22.000	-6.935	0.000	9.085	0.000	0.000	0.000	0.000	0.023	0.000
OF	23.000	-6.911	0.000	9.086	0.000	0.000	0.000	0.000	0.023	0.000
OF	24.000	-6.888	0.000	9.086	0.000	0.000	0.000	0.000	0.023	0.000
OF	25.000	-6.865	0.000	9.087	0.000	0.000	0.000	0.000	0.023	0.000
OF	26.000	-6.842	0.000	9.088	0.000	0.000	0.000	0.000	0.023	0.000
OF	27.000	-6.819	0.000	9.088	0.000	0.000	0.000	0.000	0.023	0.000
OF	28.000	-6.795	0.000	9.089	0.000	0.000	0.000	0.000	0.023	0.000
OF	29.000	-6.772	0.000	9.089	0.000	0.000	0.000	0.000	0.023	0.000
OF	30.000	-6.749	0.000	9.090	0.000	0.000	0.000	0.000	0.023	0.000
OF	31.000	-6.726	0.000	9.090	0.000	0.000	0.000	0.000	0.023	0.000
OF	32.000	-6.703	0.000	9.091	0.000	0.000	0.000	0.000	0.023	0.000
OF	33.000	-6.679	0.000	9.092	0.000	0.000	0.000	0.000	0.023	0.000
OF	34.000	-6.656	0.000	9.092	0.000	0.000	0.000	0.000	0.023	0.000
OF	35.000	-6.633	0.000	9.093	0.000	0.000	0.000	0.000	0.023	0.000
OF	36.000	-6.610	0.000	9.093	0.000	0.000	0.000	0.000	0.023	0.000
OF	37.000	-6.586	0.000	9.094	0.000	0.000	0.000	0.000	0.023	0.000
OF	38.000	-6.563	0.000	9.094	0.000	0.000	0.000	0.000	0.023	0.000
OF	39.000	-6.540	0.000	9.095	0.000	0.000	0.000	0.000	0.023	0.000
OF	40.000	-6.517	0.000	9.096	0.000	0.000	0.000	0.000	0.023	0.000
OF	41.000	-6.494	0.000	9.096	0.000	0.000	0.000	0.000	0.023	0.000
OF	42.000	-6.470	0.000	9.097	0.000	0.000	0.000	0.000	0.023	0.000
OF	43.000	-6.447	0.000	9.097	0.000	0.000	0.000	0.000	0.023	0.000
OF	44.000	-6.424	0.000	9.098	0.000	0.000	0.000	0.000	0.023	0.000
OF	45.000	-6.401	0.000	9.099	0.000	0.000	0.000	0.000	0.023	0.000
OF	46.000	-6.377	0.000	9.099	0.000	0.000	0.000	0.000	0.023	0.000
OF	47.000	-6.354	0.000	9.100	0.000	0.000	0.000	0.000	0.023	0.000
OF	48.000	-6.331	0.000	9.100	0.000	0.000	0.000	0.000	0.023	0.000
OF	49.000	-6.308	0.000	9.101	0.000	0.000	0.000	0.000	0.023	0.000
OF	50.000	-6.285	0.000	9.101	0.000	0.000	0.000	0.000	0.023	0.000
OF	51.000	-6.261	0.000	9.102	0.000	0.000	0.000	0.000	0.023	0.000
OF	52.000	-6.238	0.000	9.102	0.000	0.000	0.000	0.000	0.023	0.000
OF	53.000	-6.215	0.000	9.103	0.000	0.000	0.000	0.000	0.023	0.000
OF	54.000	-6.192	0.000	9.104	0.000	0.000	0.000	0.000	0.023	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	55.000	-6.168	0.000	9.104	0.000	0.000	0.000	0.000	0.023	0.000
OF	56.000	-6.145	0.000	9.105	0.000	0.000	0.000	0.000	0.023	0.000
OF	57.000	-6.122	0.000	9.105	0.000	0.000	0.000	0.000	0.023	0.000
OF	58.000	-6.099	0.000	9.106	0.000	0.000	0.000	0.000	0.023	0.000
OF	59.000	-6.076	0.000	9.106	0.000	0.000	0.000	0.000	0.023	0.000
OF	60.000	-6.052	0.000	9.107	0.000	0.000	0.000	0.000	0.023	0.000
OF	61.000	-6.029	0.000	9.108	0.000	0.000	0.000	0.000	0.023	0.000
OF	62.000	-6.006	0.000	9.108	0.000	0.000	0.000	0.000	0.023	0.000
OF	63.000	-5.983	0.000	9.109	0.000	0.000	0.000	0.000	0.023	0.000
OF	64.000	-5.959	0.000	9.109	0.000	0.000	0.000	0.000	0.023	0.000
OF	65.000	-5.936	0.000	9.110	0.000	0.000	0.000	0.000	0.023	0.000
OF	66.000	-5.913	0.000	9.111	0.000	0.000	0.000	0.000	0.023	0.000
OF	67.000	-5.890	0.000	9.111	0.000	0.000	0.000	0.000	0.023	0.000
OF	68.000	-5.867	0.000	9.112	0.000	0.000	0.000	0.000	0.023	0.000
OF	69.000	-5.843	0.000	9.112	0.000	0.000	0.000	0.000	0.023	0.000
OF	70.000	-5.820	0.000	9.113	0.000	0.000	0.000	0.000	0.023	0.000
OF	71.000	-5.797	0.000	9.113	0.000	0.000	0.000	0.000	0.023	0.000
OF	72.000	-5.774	0.000	9.114	0.000	0.000	0.000	0.000	0.023	0.000
OF	73.000	-5.751	0.000	9.115	0.000	0.000	0.000	0.000	0.023	0.000
OF	74.000	-5.727	0.000	9.115	0.000	0.000	0.000	0.000	0.023	0.000
OF	75.000	-5.704	0.000	9.116	0.000	0.000	0.000	0.000	0.025	0.000
OF	76.000	-5.677	0.000	9.116	0.000	0.000	0.000	0.000	0.032	0.000
OF	77.000	-5.640	0.000	9.117	0.000	0.000	0.000	0.000	0.037	0.000
OF	78.000	-5.603	0.000	9.117	0.000	0.000	0.000	0.000	0.037	0.000
OF	79.000	-5.566	0.000	9.117	0.000	0.000	0.000	0.000	0.037	0.000
OF	80.000	-5.529	0.000	9.118	0.000	0.000	0.000	0.000	0.037	0.000
OF	81.000	-5.492	0.000	9.118	0.000	0.000	0.000	0.000	0.037	0.000
OF	82.000	-5.456	0.000	9.118	0.000	0.000	0.000	0.000	0.037	0.000
OF	83.000	-5.419	0.000	9.119	0.000	0.000	0.000	0.000	0.037	0.000
OF	84.000	-5.382	0.000	9.119	0.000	0.000	0.000	0.000	0.037	0.000
OF	85.000	-5.345	0.000	9.120	0.000	0.000	0.000	0.000	0.037	0.000
OF	86.000	-5.308	0.000	9.120	0.000	0.000	0.000	0.000	0.037	0.000
OF	87.000	-5.272	0.000	9.120	0.000	0.000	0.000	0.000	0.037	0.000
OF	88.000	-5.235	0.000	9.121	0.000	0.000	0.000	0.000	0.037	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	89.000	-5.198	0.000	9.121	0.000	0.000	0.000	0.000	0.037	0.000
OF	90.000	-5.161	0.000	9.122	0.000	0.000	0.000	0.000	0.037	0.000
OF	91.000	-5.124	0.000	9.122	0.000	0.000	0.000	0.000	0.037	0.000
OF	92.000	-5.087	0.000	9.122	0.000	0.000	0.000	0.000	0.037	0.000
OF	93.000	-5.050	0.000	9.123	0.000	0.000	0.000	0.000	0.037	0.000
OF	94.000	-5.014	0.000	9.123	0.000	0.000	0.000	0.000	0.037	0.000
OF	95.000	-4.977	0.000	9.123	0.000	0.000	0.000	0.000	0.037	0.000
OF	96.000	-4.940	0.000	9.124	0.000	0.000	0.000	0.000	0.037	0.000
OF	97.000	-4.903	0.000	9.124	0.000	0.000	0.000	0.000	0.037	0.000
OF	98.000	-4.866	0.000	9.125	0.000	0.000	0.000	0.000	0.037	0.000
OF	99.000	-4.829	0.000	9.125	0.000	0.000	0.000	0.000	0.037	0.000
OF	100.000	-4.792	0.000	9.125	0.000	0.000	0.000	0.000	0.037	0.000
OF	101.000	-4.756	0.000	9.126	0.000	0.000	0.000	0.000	0.037	0.000
OF	102.000	-4.719	0.000	9.126	0.000	0.000	0.000	0.000	0.037	0.000
OF	103.000	-4.682	0.000	9.126	0.000	0.000	0.000	0.000	0.037	0.000
OF	104.000	-4.645	0.000	9.127	0.000	0.000	0.000	0.000	0.037	0.000
OF	105.000	-4.608	0.000	9.127	0.000	0.000	0.000	0.000	0.037	0.000
OF	106.000	-4.571	0.000	9.128	0.000	0.000	0.000	0.000	0.037	0.000
OF	107.000	-4.535	0.000	9.128	0.000	0.000	0.000	0.000	0.052	0.000
OF	108.000	-4.467	0.000	9.128	0.000	0.000	0.000	0.000	0.132	0.000
OF	109.000	-4.270	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	110.000	-4.072	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	111.000	-3.874	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	112.000	-3.677	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	113.000	-3.478	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	114.000	-3.281	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	115.000	-3.083	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	116.000	-2.885	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	117.000	-2.688	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	118.000	-2.490	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	119.000	-2.293	0.000	9.128	0.000	0.000	0.000	0.000	0.198	0.000
OF	120.000	-2.095	0.000	9.128	0.000	0.000	0.000	0.000	0.055	0.000
OF	129.000	-1.742	0.000	9.128	0.000	0.000	0.000	0.000	0.037	0.000
OF	144.500	-1.181	0.000	9.128	0.000	0.000	0.000	0.000	0.070	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
IF	157.000	0.220	0.000	9.128	0.000	0.000	0.000	0.000	0.104	0.000
IF	172.500	1.732	0.000	9.128	0.000	0.000	0.000	0.000	0.084	0.000
IF	189.000	2.910	0.000	9.128	0.000	0.000	0.000	0.000	0.170	0.000
IF	205.500	7.343	0.000	9.128	0.000	0.000	0.000	0.000	0.257	0.000
IF	210.000	8.317	0.000	9.222	0.000	0.000	0.000	0.000	0.217	0.000
IF	213.300	9.033	0.000	9.420	0.000	0.000	0.000	0.000	0.220	0.000
IF	215.000	9.420	0.000	9.420	0.000	0.000	0.000	0.000	0.228	0.000

--END OF TRANSECT--

NOTE:
SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.

PART2: CONTROLLING WAVE HEIGHTS, SPECTRAL
PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS

LOCATION		CONTROLLING WAVE HEIGHT	SPECTRAL PEAK WAVE PERIOD	WAVE CREST ELEVATION
IE	0.00	2.69	8.30	10.96
OF	1.00	2.69	8.30	10.96
OF	2.00	2.69	8.30	10.96
OF	3.00	2.70	8.30	10.96
OF	4.00	2.70	8.30	10.96
OF	5.00	2.70	8.30	10.96
OF	6.00	2.70	8.30	10.97
OF	7.00	2.70	8.30	10.97
OF	8.00	2.70	8.30	10.97
OF	9.00	2.71	8.30	10.97
OF	10.00	2.71	8.30	10.97
OF	11.00	2.71	8.30	10.98
OF	12.00	2.71	8.30	10.98
OF	13.00	2.71	8.30	10.98
OF	14.00	2.71	8.30	10.98
OF	15.00	2.72	8.30	10.98
OF	16.00	2.72	8.30	10.98
OF	17.00	2.72	8.30	10.99
OF	18.00	2.72	8.30	10.99
OF	19.00	2.72	8.30	10.99
OF	20.00	2.72	8.30	10.99
OF	21.00	2.73	8.30	10.99
OF	22.00	2.73	8.30	10.99
OF	23.00	2.73	8.30	11.00
OF	24.00	2.73	8.30	11.00
OF	25.00	2.73	8.30	11.00
OF	26.00	2.73	8.30	11.00
OF	27.00	2.74	8.30	11.00
OF	28.00	2.74	8.30	11.01
OF	29.00	2.74	8.30	11.01
OF	30.00	2.74	8.30	11.01
OF	31.00	2.74	8.30	11.01
OF	32.00	2.74	8.30	11.01
OF	33.00	2.75	8.30	11.01
OF	34.00	2.75	8.30	11.02
OF	35.00	2.75	8.30	11.02
OF	36.00	2.75	8.30	11.02
OF	37.00	2.75	8.30	11.02
OF	38.00	2.76	8.30	11.02
OF	39.00	2.76	8.30	11.02
OF	40.00	2.76	8.30	11.03
OF	41.00	2.76	8.30	11.03
OF	42.00	2.76	8.30	11.03
OF	43.00	2.76	8.30	11.03
OF	44.00	2.77	8.30	11.03
OF	45.00	2.77	8.30	11.04
OF	46.00	2.77	8.30	11.04
OF	47.00	2.77	8.30	11.04
OF	48.00	2.77	8.30	11.04
OF	49.00	2.77	8.30	11.04
OF	50.00	2.78	8.30	11.04
OF	51.00	2.78	8.30	11.05
OF	52.00	2.78	8.30	11.05
OF	53.00	2.78	8.30	11.05
OF	54.00	2.78	8.30	11.05
OF	55.00	2.79	8.30	11.05
OF	56.00	2.79	8.30	11.06
OF	57.00	2.79	8.30	11.06
OF	58.00	2.79	8.30	11.06
OF	59.00	2.79	8.30	11.06
OF	60.00	2.79	8.30	11.06
OF	61.00	2.80	8.30	11.07
OF	62.00	2.80	8.30	11.07
OF	63.00	2.80	8.30	11.07
OF	64.00	2.80	8.30	11.07
OF	65.00	2.80	8.30	11.07
OF	66.00	2.81	8.30	11.08
OF	67.00	2.81	8.30	11.08
OF	68.00	2.81	8.30	11.08
OF	69.00	2.81	8.30	11.08
OF	70.00	2.81	8.30	11.08
OF	71.00	2.82	8.30	11.08
OF	72.00	2.82	8.30	11.09

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OF      73.00       2.82        8.30        11.09
OF      74.00       2.82        8.30        11.09
OF      75.00       2.82        8.30        11.09
OF      76.00       2.82        8.30        11.09
OF      77.00       2.83        8.30        11.10
OF      78.00       2.83        8.30        11.10
OF      79.00       2.83        8.30        11.10
OF      80.00       2.84        8.30        11.10
OF      81.00       2.84        8.30        11.10
OF      82.00       2.84        8.30        11.11
OF      83.00       2.84        8.30        11.11
OF      84.00       2.85        8.30        11.11
OF      85.00       2.85        8.30        11.11
OF      86.00       2.85        8.30        11.12
OF      87.00       2.85        8.30        11.12
OF      88.00       2.86        8.30        11.12
OF      89.00       2.86        8.30        11.12
OF      90.00       2.86        8.30        11.13
OF      91.00       2.87        8.30        11.13
OF      92.00       2.87        8.30        11.13
OF      93.00       2.87        8.30        11.13
OF      94.00       2.87        8.30        11.13
OF      95.00       2.88        8.30        11.14
OF      96.00       2.88        8.30        11.14
OF      97.00       2.88        8.30        11.14
OF      98.00       2.89        8.30        11.14
OF      99.00       2.89        8.30        11.15
OF     100.00       2.89        8.30        11.15
OF     101.00       2.89        8.30        11.15
OF     102.00       2.90        8.30        11.15
OF     103.00       2.90        8.30        11.16
OF     104.00       2.90        8.30        11.16
OF     105.00       2.91        8.30        11.16
OF     106.00       2.91        8.30        11.16
OF     107.00       2.91        8.30        11.17
OF     108.00       2.92        8.30        11.17
OF     109.00       2.93        8.30        11.18
OF     110.00       2.94        8.30        11.19
OF     111.00       2.96        8.30        11.20
OF     112.00       2.97        8.30        11.21
OF     113.00       2.99        8.30        11.22
OF     114.00       3.00        8.30        11.23
OF     115.00       3.02        8.30        11.24
OF     116.00       3.04        8.30        11.25
OF     117.00       3.05        8.30        11.26
OF     118.00       3.07        8.30        11.28
OF     119.00       3.09        8.30        11.29
OF     120.00       3.11        8.30        11.30
OF     129.00       3.14        8.30        11.33
OF     144.50       3.21        8.30        11.37
IF     157.00       3.38        8.30        11.49
IF     172.50       3.63        8.30        11.67
IF     189.00       3.68        8.30        11.70
IF     205.50       1.38        8.30        10.09
IF     210.00       0.70        8.30         9.71
IF     213.30       0.30        8.30         9.63
IF     215.00       0.01        8.30         9.43
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
  2.00                1.00                    9.07
  4.00                1.00                    9.07
  5.00                1.00                    9.08
  7.00                1.00                    9.08
  9.00                1.00                    9.08
 11.00                1.00                    9.08
 12.00                1.00                    9.08
 14.00                1.00                    9.08
 16.00                1.00                    9.08
 18.00                1.00                    9.08
 19.00                1.00                    9.08
 21.00                1.00                    9.09
 23.00                1.00                    9.09
 25.00                1.00                    9.09
 26.00                1.00                    9.09
 28.00                1.00                    9.09
 30.00                1.00                    9.09
 32.00                1.00                    9.09
 33.00                1.00                    9.09
 35.00                1.00                    9.09
 37.00                1.00                    9.09
 39.00                1.00                    9.10
 40.00                1.00                    9.10
 42.00                1.00                    9.10
 44.00                1.00                    9.10
 45.00                1.00                    9.10
 47.00                1.00                    9.10
 49.00                1.00                    9.10
 51.00                1.00                    9.10
 53.00                1.00                    9.10
 54.00                1.00                    9.10
 56.00                1.00                    9.10
 58.00                1.00                    9.11
 60.00                1.00                    9.11
 61.00                1.00                    9.11
 63.00                1.00                    9.11
 65.00                1.00                    9.11
 66.00                1.00                    9.11
 68.00                1.00                    9.11
 70.00                1.00                    9.11
 72.00                1.00                    9.11
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73.00                   1.00                     9.11
75.00                   1.00                     9.12
77.00                   1.00                     9.12
80.00                   1.00                     9.12
83.00                   1.00                     9.12
85.00                   1.00                     9.12
88.00                   1.00                     9.12
90.00                   1.00                     9.12
93.00                   1.00                     9.12
96.00                   1.00                     9.12
98.00                   1.00                     9.12
101.00                  1.00                     9.13
104.00                  1.00                     9.13
106.00                  1.00                     9.13
210.00                  1.00                     9.22
213.30                  1.00                     9.42
              PART5  LOCATION OF V ZONES
           STATION OF GUTTER          LOCATION OF ZONE
                113.78                      LEEWARD
                193.88                      WINDWARD
              PART6 NUMBERED A ZONES AND V ZONES
      STATION OF GUTTER  ELEVATION  ZONE DESIGNATION   FHF
             0.00         10.96
                                    A20   EL=11      100
             1.00         10.96
                                    A20   EL=11      100
             2.00         10.96
                                    A20   EL=11      100
             3.00         10.96
                                    A20   EL=11      100
             4.00         10.96
                                    A20   EL=11      100
             5.00         10.96
                                    A20   EL=11      100
             6.00         10.97
                                    A20   EL=11      100
             7.00         10.97
                                    A20   EL=11      100
             8.00         10.97
                                    A20   EL=11      100
             9.00         10.97
                                    A20   EL=11      100
            10.00         10.97
                                    A20   EL=11      100
            11.00         10.98
                                    A20   EL=11      100
            12.00         10.98
                                    A20   EL=11      100
            13.00         10.98
                                    A20   EL=11      100
            14.00         10.98
                                    A20   EL=11      100
            15.00         10.98
                                    A20   EL=11      100
            16.00         10.98
                                    A20   EL=11      100
            17.00         10.99
                                    A20   EL=11      100
            18.00         10.99
                                    A20   EL=11      100
            19.00         10.99
                                    A20   EL=11      100
            20.00         10.99
                                    A20   EL=11      100
            21.00         10.99
                                    A20   EL=11      100
            22.00         10.99
                                    A20   EL=11      100
            23.00         11.00
                                    A20   EL=11      100
            24.00         11.00
                                    A20   EL=11      100
            25.00         11.00
                                    A20   EL=11      100
            26.00         11.00
                                    A20   EL=11      100
            27.00         11.00
                                    A20   EL=11      100
            28.00         11.01
                                    A20   EL=11      100
            29.00         11.01
                                    A20   EL=11      100
            30.00         11.01
                                    A20   EL=11      100
            31.00         11.01
                                    A20   EL=11      100
            32.00         11.01
                                    A20   EL=11      100
            33.00         11.01
                                    A20   EL=11      100
            34.00         11.02
                                    A20   EL=11      100
            35.00         11.02
                                    A20   EL=11      100
            36.00         11.02
                                    A20   EL=11      100
            37.00         11.02
                                    A20   EL=11      100
            38.00         11.02
                                    A20   EL=11      100
            39.00         11.02
                                    A20   EL=11      100
```

40.00	11.03			
		A20	EL=11	100
41.00	11.03			
		A20	EL=11	100
42.00	11.03			
		A20	EL=11	100
43.00	11.03			
		A20	EL=11	100
44.00	11.03			
		A20	EL=11	100
45.00	11.04			
		A20	EL=11	100
46.00	11.04			
		A20	EL=11	100
47.00	11.04			
		A20	EL=11	100
48.00	11.04			
		A20	EL=11	100
49.00	11.04			
		A20	EL=11	100
50.00	11.04			
		A20	EL=11	100
51.00	11.05			
		A20	EL=11	100
52.00	11.05			
		A20	EL=11	100
53.00	11.05			
		A20	EL=11	100
54.00	11.05			
		A20	EL=11	100
55.00	11.05			
		A20	EL=11	100
56.00	11.06			
		A20	EL=11	100
57.00	11.06			
		A20	EL=11	100
58.00	11.06			
		A20	EL=11	100
59.00	11.06			
		A20	EL=11	100
60.00	11.06			
		A20	EL=11	100
61.00	11.07			
		A20	EL=11	100
62.00	11.07			
		A20	EL=11	100
63.00	11.07			
		A20	EL=11	100
64.00	11.07			
		A20	EL=11	100
65.00	11.07			
		A20	EL=11	100
66.00	11.08			
		A20	EL=11	100
67.00	11.08			
		A20	EL=11	100
68.00	11.08			
		A20	EL=11	100
69.00	11.08			
		A20	EL=11	100
70.00	11.08			
		A20	EL=11	100
71.00	11.08			
		A20	EL=11	100
72.00	11.09			
		A20	EL=11	100
73.00	11.09			
		A20	EL=11	100
74.00	11.09			
		A20	EL=11	100
75.00	11.09			
		A20	EL=11	100
76.00	11.09			
		A20	EL=11	100
77.00	11.10			
		A20	EL=11	100
79.00	11.10			
		A20	EL=11	100
80.00	11.10			
		A20	EL=11	100
82.00	11.11			
		A20	EL=11	100
83.00	11.11			
		A20	EL=11	100
84.00	11.11			
		A20	EL=11	100
85.00	11.11			
		A20	EL=11	100
87.00	11.12			
		A20	EL=11	100
88.00	11.12			
		A20	EL=11	100
89.00	11.12			
		A20	EL=11	100
90.00	11.13			
		A20	EL=11	100
92.00	11.13			
		A20	EL=11	100
93.00	11.13			
		A20	EL=11	100
95.00	11.14			
		A20	EL=11	100

96.00	11.14			
		A20	EL=11	100
97.00	11.14			
		A20	EL=11	100
98.00	11.14			
		A20	EL=11	100
100.00	11.15			
		A20	EL=11	100
101.00	11.15			
		A20	EL=11	100
103.00	11.16			
		A20	EL=11	100
104.00	11.16			
		A20	EL=11	100
105.00	11.16			
		A20	EL=11	100
106.00	11.16			
		A20	EL=11	100
113.78	11.23			
		V23	EL=11	130
157.46	11.50			
		V23	EL=12	130
191.08	11.50			
		V23	EL=11	130
193.88	11.23			
		A19	EL=11	95
201.34	10.50			
		A19	EL=10	95
205.50	10.09			
		A19	EL=10	95
210.00	9.71			
		A19	EL=10	95
213.30	9.63			
		A19	EL=10	95
214.38	9.50			
		A19	EL= 9	95
215.00	9.43			

ZONE TERMINATED AT END OF TRANSECT
PART 7   POSTSCRIPT NOTES
PS# 1   START(403525.1288,4833824.8875)
PS# 2   END(403567.6267,4833952.7313)

-1.000000e+00

CM-53-1
100-year WHAFIS Output
Zero Station: -70.19614901, 43.65156997
Onshore Dir: 71.6 deg CCW from E
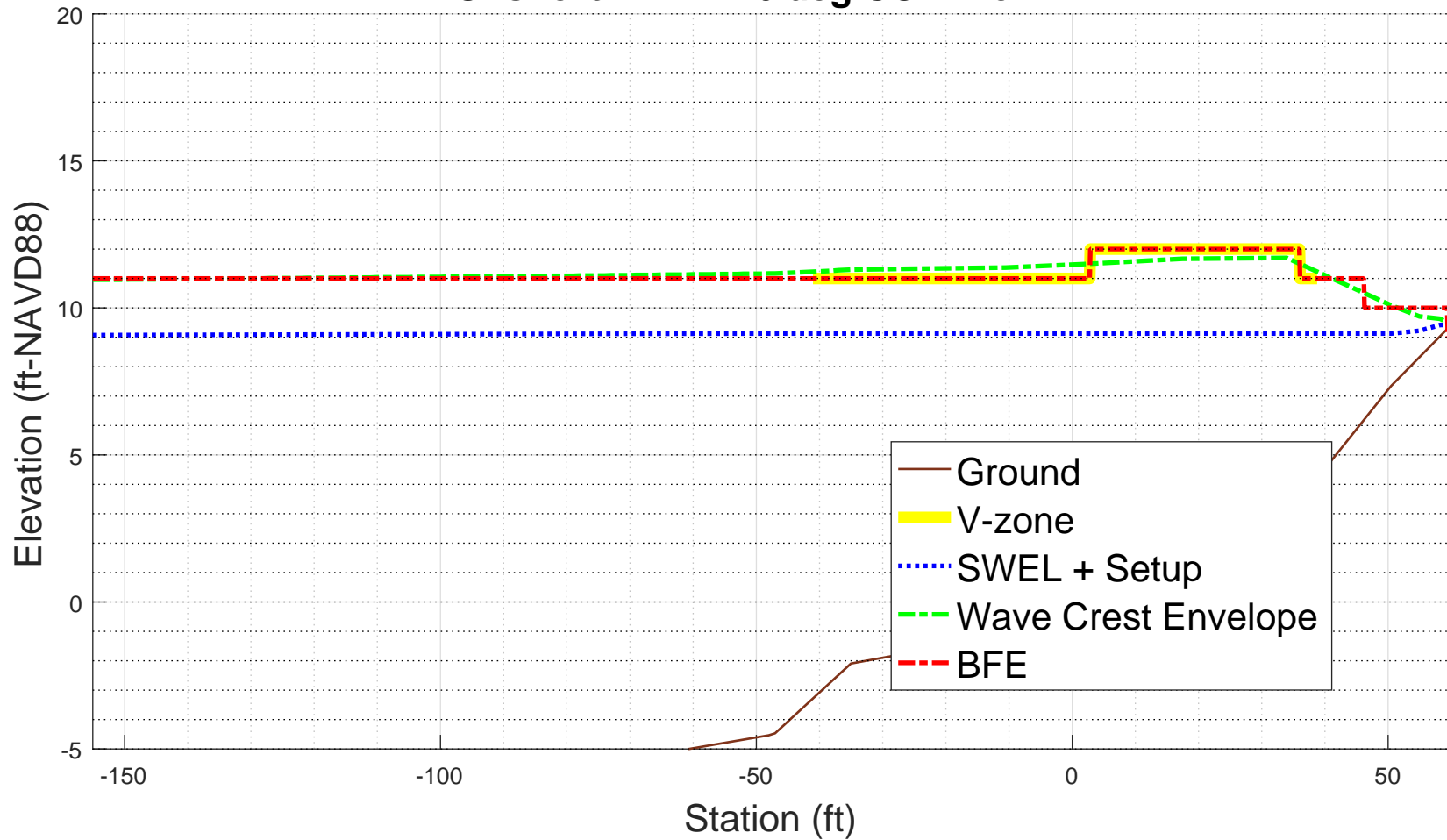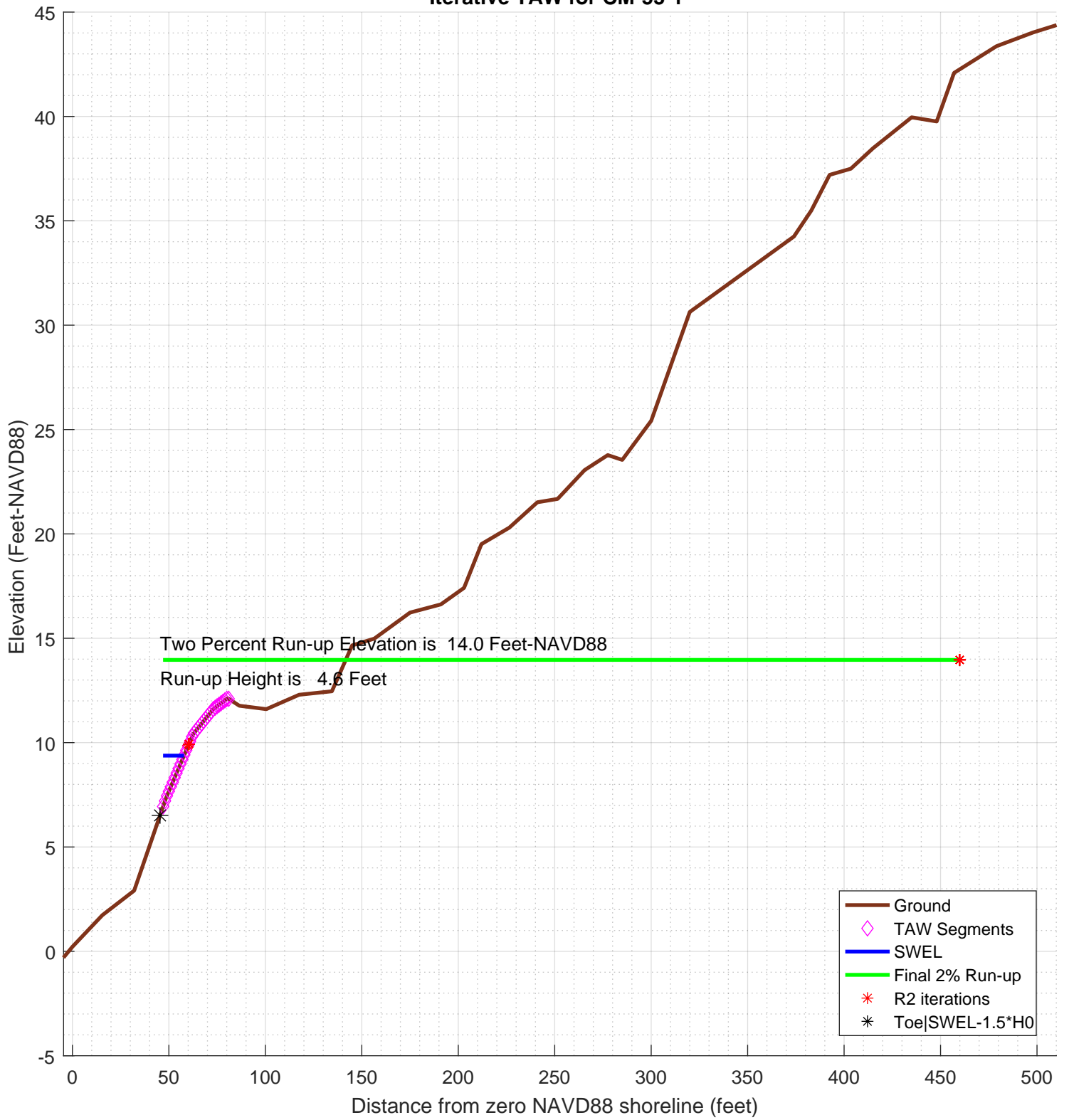
Legend:
- Ground
- V-zone
- SWEL + Setup
- Wave Crest Envelope
- BFE

Y-axis: Elevation (ft-NAVD88)
X-axis: Station (ft)

Iterative TAW for CM-53-1

Two Percent Run-up Elevation is 14.0 Feet-NAVD88

Run-up Height is 4.6 Feet

Legend:
- Ground
- ◇ TAW Segments
- SWEL
- Final 2% Run-up
- ∗ R2 iterations
- ∗ Toe|SWEL-1.5*H0

Y-axis: Elevation (Feet-NAVD88)

X-axis: Distance from zero NAVD88 shoreline (feet)

```
diary on          % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-53-1
% calculation by SJH, Ransom Consulting, Inc. 16-Apr-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-53-1sta_ele_include.csv';   % file with station, elevation, include
                                    % third colunm is 0 for excluded points
imgname='logfiles/CM-53-1-runup';
SWEL=9.0727;  % 100-yr still water level including wave setup.
H0=1.7049;    % significant wave height at toe of structure
Tp=8.0957;    % 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=-0.0015879;
maxSetup=0.3469;   % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-53-1'

plotTitle =

Iterative TAW for CM-53-1



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

SWEL=SWEL+setupAtToe

SWEL =

                9.0711121

SWEL_fore=SWEL+maxSetup

SWEL_fore =

                9.4180121



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

L0 =

          277.15616993901


% 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 =

                  6.5137621


% 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 =

                  11.6284621


% 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 =

          45.4148854748707


top_sta =

          73.3447743281279

% 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 =

          73.3447743281279

toe_sta

toe_sta =

          45.4148854748707



% 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 105.0 ft landward of toe of slope


ans =

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


ans =

-!!-        setup is adjusted to 0.31 feet


ans =

-!!-        SWEL is adjusted to 9.38 feet


k =

      1
      2
      3
      4
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```

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```

```
% 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 =
               6.5137621
toe_sta =
        45.4148854748707
top_sta =
        73.3447743281279
Z2 =
               11.6284621
H0 =
                  1.7049
Tp =
                  8.0957
T0 =
        7.35972727272727
R2 =
                  5.1147
Z2 =
        14.4924632098631
top_sta =
        567.338591721866
Lslope =
        521.923706246995
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 34
dh =
        -2.71896729013694
rdh_sum =
        0.549552760497199
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     1
rB =
        0.00191598884670466
rdh_mean =
        0.549552760497199
gamma_berm =
        0.999136948113084
slope =
        0.0153164484821506
Irb =
        0.195285903188763
gamma_berm =
```

```
                 0.999136948113084
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                      0.8
gamma =
         0.799309558490467
ans =
!!! - - Iribaren number:   0.20 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:65.3 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
         0.471040314472975
R2del =
         4.64365968552702
Z2 =
         9.84880352433604
top_sta =
         59.9998005163601
ans =
!---------------- STARTING ITERATION 2 ----------------!
Ztoe =
                 6.5137621
toe_sta =
         45.4148854748707
top_sta =
         59.9998005163601
Z2 =
         9.84880352433604
H0 =
                   1.7049
Tp =
                   8.0957
T0 =
         7.35972727272727
R2 =
         0.471040314472975
Z2 =
         9.84880352433604
top_sta =
         59.9998005163601
Lslope =
         14.5849150414894
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
         0.228663753943641
Irb =
         2.91548055461138
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                      0.8
gamma =
                      0.8
ans =
!!! - - Iribaren number:   2.92 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.5867884572374
R2del =
         4.11574814276443
Z2 =
         13.9645516671005
ans =
!---------------- STARTING ITERATION 3 ----------------!
Ztoe =
                 6.5137621
toe_sta =
         45.4148854748707
top_sta =
         460.061301991597
Z2 =
         13.9645516671005
H0 =
```

```
                            1.7049
Tp =
                            8.0957
T0 =
            7.35972727272727
R2 =
             4.5867884572374
Z2 =
            13.9645516671005
top_sta =
            460.061301991597
Lslope =
            414.646416516726
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 34
dh =
            -2.71896729013694
rdh_sum =
            0.643686401932612
ans =
!------- End Berm Factor Calculation, Iter: 3 ---------!
berm_width =
      1
rB =
        0.00241169333718253
rdh_mean =
            0.643686401932612
gamma_berm =
            0.999140680869593
slope =
            0.0180124600857002
Irb =
            0.229660259725798
gamma_berm =
            0.999140680869593
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                            0.8
gamma =
            0.799312544695675
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
            0.553955218232992
R2del =
            4.03283323900441
Z2 =
            9.93171842809605
top_sta =
            60.3802453317674
ans =
!---------------- STARTING ITERATION 4 -----------------!
Ztoe =
                        6.5137621
toe_sta =
            45.4148854748707
top_sta =
            60.3802453317674
Z2 =
            9.93171842809605
H0 =
                            1.7049
Tp =
                            8.0957
T0 =
            7.35972727272727
R2 =
            0.553955218232992
Z2 =
            9.93171842809605
top_sta =
            60.3802453317674
Lslope =
            14.9653598568967
ans =
!------- End Berm Factor Calculation, Iter: 4 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
```

```
          0.228391188770574
Irb =
          2.91200532756626
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
                    0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.58602605297957
R2del =
          4.03207083474657
Z2 =
          13.9637892628426
ans =
!---------------- STARTING ITERATION 5 -----------------!
Ztoe =
                 6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906373266168
Z2 =
          13.9637892628426
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          4.58602605297957
Z2 =
          13.9637892628426
top_sta =
          459.906373266168
Lslope =
          414.491487791297
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 34
dh =
         -2.71896729013694
rdh_sum =
          0.643834662876749
ans =
!------- End Berm Factor Calculation, Iter: 5 ---------!
berm_width =
     1
rB =
         0.0024125947804832
rdh_mean =
          0.643834662876749
gamma_berm =
          0.999140717366667
slope =
          0.0180173652488897
Irb =
          0.229722800935979
gamma_berm =
          0.999140717366667
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
          0.799312573893334
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          0.554106091868018
R2del =
          4.03191996111155
Z2 =
          9.93186930173108
top_sta =
          60.3809375968426
ans =
```

```
!---------------- STARTING ITERATION 6 ----------------!
Ztoe =
                6.5137621
toe_sta =
        45.4148854748707
top_sta =
        60.3809375968426
Z2 =
        9.93186930173108
H0 =
                  1.7049
Tp =
                  8.0957
T0 =
        7.35972727272727
R2 =
        0.554106091868018
Z2 =
        9.93186930173108
top_sta =
        60.3809375968426
Lslope =
        14.9660521219719
ans =
!------- End Berm Factor Calculation, Iter: 6 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
        0.228390705436132
Irb =
        2.91199916501473
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                     0.8
gamma =
                     0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
        4.58602469981103
R2del =
        4.03191860794301
Z2 =
        13.9637879096741
ans =
!---------------- STARTING ITERATION 7 ----------------!
Ztoe =
                6.5137621
toe_sta =
        45.4148854748707
top_sta =
        459.906098287803
Z2 =
        13.9637879096741
H0 =
                  1.7049
Tp =
                  8.0957
T0 =
        7.35972727272727
R2 =
        4.58602469981103
Z2 =
        13.9637879096741
top_sta =
        459.906098287803
Lslope =
        414.491212812932
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 34
dh =
        -2.71896729013694
rdh_sum =
        0.643834926052238
ans =
!------- End Berm Factor Calculation, Iter: 7 ---------!
berm_width =
```

```
            1
rB =
         0.00241259638102707
rdh_mean =
           0.643834926052238
gamma_berm =
           0.999140717431545
slope =
           0.0180173739581851
Irb =
           0.229722911980169
gamma_berm =
           0.999140717431545
gamma_perm =
       1
gamma_beta =
       1
gamma_rough =
                          0.8
gamma =
           0.799312573945236
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
           0.554106359749687
R2del =
             4.03191834006134
Z2 =
             9.93186956961275
top_sta =
             60.3809388259846
ans =
!---------------- STARTING ITERATION 8 -----------------!
Ztoe =
                   6.5137621
toe_sta =
             45.4148854748707
top_sta =
             60.3809388259846
Z2 =
             9.93186956961275
H0 =
                      1.7049
Tp =
                      8.0957
T0 =
             7.35972727272727
R2 =
           0.554106359749687
Z2 =
             9.93186956961275
top_sta =
             60.3809388259846
Lslope =
             14.9660533511139
ans =
!------- End Berm Factor Calculation, Iter: 8 ---------!
berm_width =
       0
rB =
       0
rdh_mean =
       1
gamma_berm =
       1
slope =
           0.228390704577994
Irb =
             2.9119991540734
gamma_berm =
       1
gamma_perm =
       1
gamma_beta =
       1
gamma_rough =
                          0.8
gamma =
                          0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
             4.58602469740854
R2del =
             4.03191833765885
Z2 =
```

```
                13.9637879072716
ans =
!---------------- STARTING ITERATION 9 -----------------!
Ztoe =
                 6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906097799591
Z2 =
          13.9637879072716
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          4.58602469740854
Z2 =
          13.9637879072716
top_sta =
          459.906097799591
Lslope =
           414.49121232472
ans =
Berm Factor Calculation: Iteration 9, Profile Segment: 34
dh =
         -2.71896729013694
rdh_sum =
         0.643834926519495
ans =
!------- End Berm Factor Calculation, Iter: 9 ---------!
berm_width =
      1
rB =
       0.00241259638386877
rdh_mean =
         0.643834926519495
gamma_berm =
         0.999140717431661
slope =
        0.0180173739736481
Irb =
         0.229722912177323
gamma_berm =
         0.999140717431661
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                       0.8
gamma =
         0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          0.5541063602253
R2del =
          4.03191833718324
Z2 =
          9.93186957008836
top_sta =
          60.3809388281669
ans =
!---------------- STARTING ITERATION 10 -----------------!
Ztoe =
                 6.5137621
toe_sta =
          45.4148854748707
top_sta =
          60.3809388281669
Z2 =
          9.93186957008836
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          0.5541063602253
Z2 =
          9.93186957008836
top_sta =
          60.3809388281669
Lslope =
```

```
                 14.9660553532962
ans =
!------- End Berm Factor Calculation, Iter: 10 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
          0.22839070457647
Irb =
          2.91199915405397
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                       0.8
gamma =
                       0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.58602469740427
R2del =
          4.03191833717897
Z2 =
          13.9637879072673
ans =
!---------------- STARTING ITERATION 11 -----------------!
Ztoe =
                 6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906097798724
Z2 =
          13.9637879072673
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          4.58602469740427
Z2 =
          13.9637879072673
top_sta =
          459.906097798724
Lslope =
          414.491212323853
ans =
Berm Factor Calculation: Iteration 11, Profile Segment: 34
dh =
          -2.71896729013694
rdh_sum =
          0.643834926520324
ans =
!------- End Berm Factor Calculation, Iter: 11 ---------!
berm_width =
      1
rB =
      0.00241259638387381
rdh_mean =
          0.643834926520324
gamma_berm =
          0.999140717431661
slope =
          0.0180173739736755
Irb =
          0.229722912177673
gamma_berm =
          0.999140717431661
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                       0.8
gamma =
          0.799312573945329
ans =
```

```
!!! - - Iribaren number:    0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          0.554106360226144
R2del =
          4.03191833717813
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
ans =
!---------------- STARTING ITERATION 12 ----------------!
Ztoe =
                    6.5137621
toe_sta =
          45.4148854748707
top_sta =
          60.3809388281708
Z2 =
          9.93186957008921
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          0.554106360226144
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
Lslope =
          14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 12 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          0.228390704576467
Irb =
          2.91199915405394
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
                    0.8
ans =
!!! - - Iribaren number:    2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.58602469740427
R2del =
          4.03191833717812
Z2 =
          13.9637879072673
ans =
!---------------- STARTING ITERATION 13 ----------------!
Ztoe =
                    6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906097798722
Z2 =
          13.9637879072673
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          4.58602469740427
Z2 =
          13.9637879072673
top_sta =
```

```
                459.906097798722
Lslope =
          414.491212323851
ans =
Berm Factor Calculation: Iteration 13, Profile Segment: 34
dh =
          -2.71896729013694
rdh_sum =
          0.643834926520326
ans =
!------- End Berm Factor Calculation, Iter: 13 ---------!
berm_width =
     1
rB =
       0.00241259638387382
rdh_mean =
          0.643834926520326
gamma_berm =
          0.999140717431661
slope =
          0.0180173739736756
Irb =
          0.229722912177674
gamma_berm =
          0.999140717431661
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
          0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          0.554106360226146
R2del =
          4.03191833717812
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
ans =
!---------------- STARTING ITERATION 14 -----------------!
Ztoe =
                6.5137621
toe_sta =
          45.4148854748707
top_sta =
          60.3809388281708
Z2 =
          9.93186957008921
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          0.554106360226146
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
Lslope =
          14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 14 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          0.228390704576467
Irb =
          2.91199915405394
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
```

```
                         0.8
gamma =
                         0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.58602469740427
R2del =
          4.03191833717812
Z2 =
          13.9637879072673
ans =
!---------------- STARTING ITERATION 15 -----------------!
Ztoe =
                 6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906097798722
Z2 =
          13.9637879072673
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
          7.35972727272727
R2 =
          4.58602469740427
Z2 =
          13.9637879072673
top_sta =
          459.906097798722
Lslope =
          414.491212323852
ans =
Berm Factor Calculation: Iteration 15, Profile Segment: 34
dh =
          -2.71896729013694
rdh_sum =
          0.643834926520326
ans =
!------- End Berm Factor Calculation, Iter: 15 ---------!
berm_width =
     1
rB =
       0.00241259638387382
rdh_mean =
          0.643834926520326
gamma_berm =
          0.999140717431661
slope =
       0.0180173739736756
Irb =
          0.229722912177674
gamma_berm =
          0.999140717431661
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                         0.8
gamma =
          0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          0.554106360226146
R2del =
          4.03191833717812
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
ans =
!---------------- STARTING ITERATION 16 -----------------!
Ztoe =
                 6.5137621
toe_sta =
          45.4148854748707
top_sta =
          60.3809388281708
Z2 =
          9.93186957008921
H0 =
```

```
                          1.7049
Tp =
                          8.0957
T0 =
            7.35972727272727
R2 =
          0.554106360226146
Z2 =
            9.93186957008921
top_sta =
            60.3809388281708
Lslope =
            14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 16 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
          0.228390704576467
Irb =
            2.91199915405394
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                          0.8
gamma =
                          0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
            4.58602469740427
R2del =
            4.03191833717812
Z2 =
            13.9637879072673
ans =
!---------------- STARTING ITERATION 17 -----------------!
Ztoe =
                    6.5137621
toe_sta =
            45.4148854748707
top_sta =
            459.906097798722
Z2 =
            13.9637879072673
H0 =
                          1.7049
Tp =
                          8.0957
T0 =
            7.35972727272727
R2 =
            4.58602469740427
Z2 =
            13.9637879072673
top_sta =
            459.906097798722
Lslope =
            414.491212323851
ans =
Berm Factor Calculation: Iteration 17, Profile Segment: 34
dh =
            -2.71896729013694
rdh_sum =
          0.643834926520326
ans =
!------- End Berm Factor Calculation, Iter: 17 ---------!
berm_width =
      1
rB =
        0.00241259638387382
rdh_mean =
          0.643834926520326
gamma_berm =
          0.999140717431661
slope =
        0.0180173739736756
Irb =
```

```
         0.229722912177674
gamma_berm =
         0.999140717431661
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
         0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
         0.554106360226146
R2del =
         4.03191833717812
Z2 =
         9.93186957008921
top_sta =
         60.3809388281708
ans =
!---------------- STARTING ITERATION 18 ----------------!
Ztoe =
                6.5137621
toe_sta =
         45.4148854748707
top_sta =
         60.3809388281708
Z2 =
         9.93186957008921
H0 =
                   1.7049
Tp =
                   8.0957
T0 =
         7.35972727272727
R2 =
         0.554106360226146
Z2 =
         9.93186957008921
top_sta =
         60.3809388281708
Lslope =
         14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 18 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
         0.228390704576467
Irb =
         2.91199915405394
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
                    0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
         4.58602469740427
R2del =
         4.03191833717812
Z2 =
         13.9637879072673
ans =
!---------------- STARTING ITERATION 19 ----------------!
Ztoe =
                6.5137621
toe_sta =
         45.4148854748707
top_sta =
         459.906097798722
Z2 =
```

```
              13.9637879072673
H0 =
                        1.7049
Tp =
                        8.0957
T0 =
             7.35972727272727
R2 =
             4.58602469740427
Z2 =
              13.9637879072673
top_sta =
             459.906097798722
Lslope =
             414.491212323852
ans =
Berm Factor Calculation: Iteration 19, Profile Segment: 34
dh =
             -2.71896729013694
rdh_sum =
            0.643834926520326
ans =
!------- End Berm Factor Calculation, Iter: 19 ---------!
berm_width =
     1
rB =
          0.00241259638387382
rdh_mean =
            0.643834926520326
gamma_berm =
            0.999140717431661
slope =
           0.0180173739736756
Irb =
            0.229722912177674
gamma_berm =
            0.999140717431661
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                           0.8
gamma =
            0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
            0.554106360226146
R2del =
             4.03191833717812
Z2 =
             9.93186957008921
top_sta =
             60.3809388281708
ans =
!---------------- STARTING ITERATION 20 -----------------!
Ztoe =
                     6.5137621
toe_sta =
             45.4148854748707
top_sta =
             60.3809388281708
Z2 =
             9.93186957008921
H0 =
                        1.7049
Tp =
                        8.0957
T0 =
             7.35972727272727
R2 =
            0.554106360226146
Z2 =
             9.93186957008921
top_sta =
             60.3809388281708
Lslope =
             14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 20 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
```

```
         1
slope =
        0.228390704576467
Irb =
        2.91199915405394
gamma_berm =
        1
gamma_perm =
        1
gamma_beta =
        1
gamma_rough =
                     0.8
gamma =
                     0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
        4.58602469740427
R2del =
        4.03191833717812
Z2 =
        13.9637879072673
ans =
!---------------- STARTING ITERATION 21 ----------------!
Ztoe =
                6.5137621
toe_sta =
        45.4148854748707
top_sta =
        459.906097798722
Z2 =
        13.9637879072673
H0 =
                   1.7049
Tp =
                   8.0957
T0 =
        7.35972727272727
R2 =
        4.58602469740427
Z2 =
        13.9637879072673
top_sta =
        459.906097798722
Lslope =
        414.491212323851
ans =
Berm Factor Calculation: Iteration 21, Profile Segment: 34
dh =
        -2.71896729013694
rdh_sum =
        0.643834926520326
ans =
!------- End Berm Factor Calculation, Iter: 21 ---------!
berm_width =
        1
rB =
      0.00241259638387382
rdh_mean =
        0.643834926520326
gamma_berm =
        0.999140717431661
slope =
      0.0180173739736756
Irb =
        0.229722912177674
gamma_berm =
        0.999140717431661
gamma_perm =
        1
gamma_beta =
        1
gamma_rough =
                     0.8
gamma =
        0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
        0.554106360226146
R2del =
        4.03191833717812
Z2 =
        9.93186957008921
top_sta =
```

```
                 60.3809388281708
ans =
!---------------- STARTING ITERATION 22 ----------------!
Ztoe =
                  6.5137621
toe_sta =
          45.4148854748707
top_sta =
          60.3809388281708
Z2 =
          9.93186957008921
H0 =
                     1.7049
Tp =
                     8.0957
T0 =
          7.35972727272727
R2 =
          0.554106360226146
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
Lslope =
          14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 22 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
          0.228390704576467
Irb =
          2.91199915405394
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                        0.8
gamma =
                        0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.58602469740427
R2del =
          4.03191833717812
Z2 =
          13.9637879072673
ans =
!---------------- STARTING ITERATION 23 ----------------!
Ztoe =
                  6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906097798722
Z2 =
          13.9637879072673
H0 =
                     1.7049
Tp =
                     8.0957
T0 =
          7.35972727272727
R2 =
          4.58602469740427
Z2 =
          13.9637879072673
top_sta =
          459.906097798722
Lslope =
          414.491212323852
ans =
Berm Factor Calculation: Iteration 23, Profile Segment: 34
dh =
          -2.71896729013694
rdh_sum =
          0.643834926520326
ans =
```

```
!------- End Berm Factor Calculation, Iter: 23 ---------!
berm_width =
     1
rB =
       0.00241259638387382
rdh_mean =
       0.643834926520326
gamma_berm =
       0.999140717431661
slope =
       0.0180173739736756
Irb =
       0.229722912177674
gamma_berm =
       0.999140717431661
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
       0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
       0.554106360226146
R2del =
       4.03191833717812
Z2 =
       9.93186957008921
top_sta =
       60.3809388281708
ans =
!---------------- STARTING ITERATION 24 -----------------!
Ztoe =
                 6.5137621
toe_sta =
       45.4148854748707
top_sta =
       60.3809388281708
Z2 =
       9.93186957008921
H0 =
                    1.7049
Tp =
                    8.0957
T0 =
       7.35972727272727
R2 =
       0.554106360226146
Z2 =
       9.93186957008921
top_sta =
       60.3809388281708
Lslope =
       14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 24 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
       0.228390704576467
Irb =
       2.91199915405394
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
                    0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
       4.58602469740427
R2del =
```

```
                 4.03191833717812
Z2 =
          13.9637879072673
ans =
!--------------- STARTING ITERATION 25 ----------------!
Ztoe =
                   6.5137621
toe_sta =
          45.4148854748707
top_sta =
          459.906097798722
Z2 =
          13.9637879072673
H0 =
                      1.7049
Tp =
                      8.0957
T0 =
          7.35972727272727
R2 =
          4.58602469740427
Z2 =
          13.9637879072673
top_sta =
          459.906097798722
Lslope =
          414.491212323851
ans =
Berm Factor Calculation: Iteration 25, Profile Segment: 34
dh =
          -2.71896729013694
rdh_sum =
          0.643834926520326
ans =
!------- End Berm Factor Calculation, Iter: 25 ---------!
berm_width =
       1
rB =
          0.00241259638387382
rdh_mean =
          0.643834926520326
gamma_berm =
          0.999140717431661
slope =
          0.0180173739736756
Irb =
          0.229722912177674
gamma_berm =
          0.999140717431661
gamma_perm =
       1
gamma_beta =
       1
gamma_rough =
                          0.8
gamma =
          0.799312573945329
ans =
!!! - - Iribaren number:   0.23 is outside the valid range (0.5-10), TAW NOT VALID - - !!!
ans =
!!! - - slope: 1:55.5 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
          0.554106360226146
R2del =
          4.03191833717812
Z2 =
          9.93186957008921
top_sta =
          60.3809388281708
ans =
!--------------- STARTING ITERATION 26 ----------------!
Ztoe =
                   6.5137621
toe_sta =
          45.4148854748707
top_sta =
          60.3809388281708
Z2 =
          9.93186957008921
H0 =
                      1.7049
Tp =
                      8.0957
T0 =
          7.35972727272727
R2 =
          0.554106360226146
Z2 =
          9.93186957008921
top_sta =
```

```
         60.3809388281708
Lslope =
         14.9660533533001
ans =
!------- End Berm Factor Calculation, Iter: 26 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
         0.228390704576467
Irb =
          2.91199915405394
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
                    0.8
ans =
!!! - - Iribaren number:   2.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:4.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          4.58602469740427
R2del =
          4.03191833717812
Z2 =
         13.9637879072673
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
         13.9637879072673
diary off
-1.000000e+00
```

```
_____
PART 5: RUNUP2

        for transect: CM-53-1

Station locations shifted by: -1.96 feet from their
original location to set the shoreline to
elevation 0 for RUNUP2 input


_____RUNUP2 INPUT CONVERSIONS_____
        for transect: CM-53-1

Incident significant wave height: 1.68 feet

Peak wave period: 8.30 seconds

Mean wave height: 1.05 feet

Local Depth below SWEL: 16.52 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 = 16.52
    Period, T = 7.06
    Waveheight, H = 1.05
Deep water wavelength, L0 (ft)
    L0 = g*T*T/twopi
    L0 = 32.17*7.06*7.06/6.28 = 254.87
Deep water wave celerity, C0 (ft/s)
    C0 = L0/T
    C0 = 254.87/7.06 = 36.13
Angular frequency, sigma (rad/s)
    sigma = twopi/T
    sigma = 6.28/7.06 = 0.89
Hunts (1979) approximation for Celerity C1H (ft/s) at Depth D (ft)
    y = sigma.*sigma.*D./g
    y = 0.89*0.89*16.52/32.17 = 0.41
    C1H = sqrt( g.*D./(y+1./(1 + 0.6522.*y + 0.4622.*y.^2 + 0.0864.*y.^4 +0.0675.*y.^5)) )
    C1H = 21.49
Shoaling Coefficient KsH
    KsH = sqrt(C0/C1H)
    KsH = sqrt(36.13/21.49) = 1.30
Deepwater Wave Height H0_H (ft)
    H0_H = H/KsH
    H0_H = 1.05/1.30 = 0.81

Deepwater mean wave height: 0.81 feet

_____END RUNUP2 CONVERSIONS_____

_____RUNUP2 RESULTS_____
        for transect: CM-53-1

RUNUP2 SWEL:
9.10
9.10
9.10
9.10
```

```
9.10
9.10
9.10
9.10
9.10

RUNUP2 deepwater mean wave heights:
0.77
0.77
0.77
0.81
0.81
0.81
0.85
0.85
0.85

RUNUP2 mean wave periods:
6.70
7.06
7.41
6.70
7.06
7.41
6.70
7.06
7.41

RUNUP2 runup above SWEL:
1.86
1.91
1.95
1.93
1.98
2.02
2.00
2.05
2.09

RUNUP2 Mean runup height above SWEL: 1.98 feet

RUNUP2 2-percent runup height above SWEL: 4.35 feet

RUNUP2 2-percent runup elevation: 13.45 feet-NAVD88

RUNUP2 Messages:
No Messages

_____END RUNUP2 RESULTS_____



_____ACES BEACH RUNUP_____

Incident significant wave height: 1.68 feet

Significant wave height is mean wave height divided by 0.626
Reference: D.2.8.1.2.1 Atlanic and Gulf of Mexico G&S Feb. 2007

Deepwater significant wave height: 1.30 feet

Peak wave period: 8.30 seconds

Average beach Slope: 1:12.13 (H:V)


ACES IRREGULAR WAVE RUNUP ON BEACHES

# Reference:
# Leenknecht, David A., Andre Szuwaiski, and Ann Sherlock. 1992.
# "Automated Coastal Engineering System Technical Reference",
# Coastal Engineering Research Center, Department of the Army
```

Waterways Experiments Station, Corps of Eniggneers, 3909 Halls
Ferry Road, Vicksburg, Mississippi 39180-6199.

INPUTS:

```
Acceleration Due to Gravity,         g  =    32.174
Deepwater Significant Wave height,   Hs =     1.30
Wave Period,                         T  =     8.30
Beach Slope,                         S  =     0.082
```

EQUATIONS:

```
Runup,           R   = Hs * a * Irb^b
Iribarren,       Irb = S/sqrt(Hs/L0)
Wavelength,      L0  = g * T^2 / 2 / pi
```

COEFFICIENTS:
(Mase, H. 1989, "Random Wave Runup Height on Gentle Slopes,"
j. Waterway, Port, Coastal and Ocean Engineering Division,
ASCE, Vol 115, No. 5, pp 649-661.)

```
              [Rmax,  R2%, R-1/3, R-1/10, R-mean]
        a = [2.32, 1.86,  1.70,   1.38,   0.88]
        b = [0.77, 0.71,  0.71,   0.70,   0.69]
```

RESULTS:

```
      RUNUP = [ 3.8,   3.0,   2.7,    2.2,    1.4]
```

ACES RUNUP CALCULATED USING 'Aces_Beach_Runup.m'

ACES Beach 2-percent runup height above SWEL: 3.00 feet

ACES Beach 2-percent runup elevation: 12.10 feet-NAVD88

ACES BEACH RUNUP is valid

_____END ACES BEACH RESULTS_____

PART 5 COMPLETE_____

```
     FEMA                                          sjh              job 2
     RUNUP2 transect: CM-53-1                                        1
15.0
     -7.45 -155.0 0.8
     -6.84 -129.0 0.8
     -6.61 -119.0 0.8
     -6.17 -100.0 0.8
     -5.70 -80.0  0.8
     -5.68 -79.0  0.8
     -4.53 -48.0  0.8
     -4.47 -47.0  0.8
     -3.87 -44.0  0.8
     -2.89 -39.0  0.8
     -2.09 -35.0  0.8
     -1.74 -26.0  0.8
     -1.18 -10.5  0.8
      0.22  2.0   0.8
      1.73  17.5  0.8
      2.91  34.0  0.8
      7.34  50.5  0.8
     10.39 64.5   0.8
     11.60 75.0   0.8
1 12.13 82.5     0.8
     9.1   0.77  6.70
     9.1   0.77  7.06
     9.1   0.77  7.41
     9.1   0.81  6.70
     9.1   0.81  7.06
     9.1   0.81  7.41
     9.1   0.85  6.70
     9.1   0.85  7.06
     9.1   0.85  7.41
```

****

          CROSS SECTION PROFILE

          LENGTH   ELEV.   SLOPE   ROUGHNESS

    1   -155.0   -7.4
                                  .00   .80
    2   -129.0   -6.8
                                43.48   .80
    3   -119.0   -6.6
                                43.18   .80
    4   -100.0   -6.2
                                42.55   .80
    5   -80.0   -5.7
                                50.00   .80
    6   -79.0   -5.7
                                26.96   .80
    7   -48.0   -4.5
                                16.67   .80
    8   -47.0   -4.5
                                 5.00   .80
    9   -44.0   -3.9
                                 5.10   .80
   10   -39.0   -2.9
                                 5.00   .80
   11   -35.0   -2.1
                                25.71   .80
   12   -26.0   -1.7
                                27.68   .80
   13   -10.5   -1.2
                                 8.93   .80
   14   2.0   .2
                                10.26   .80
   15   17.5   1.7
                                13.98   .80
   16   34.0   2.9
                                 3.72   .80
   17   50.5   7.3
                                 4.59   .80
   18   64.5   10.4
                                 8.68   .80
   19   75.0   11.6
                                14.15   .80
   20   82.5   12.1

             LAST SLOPE 15.00   LAST ROUGHNESS   .80

****

                              OUTPUT TABLE

                  INPUT PARAMETERS   RUNUP RESULTS
                  ----------------   -------------

    WATER LEVEL   DEEP WATER   BREAKING SLOPE   RUNUP SLOPE   RUNUP ABOVE   BREAKER
    ABOVE DATUM   WAVE HEIGHT   WAVE PERIOD   NUMBER   NUMBER   WATER LEVEL   DEPTH
      (FT.)   (FT.)   (SEC.)   (FT.)   (FT.)

      9.10   .77   6.70   11   18   1.86   1.41

      9.10   .77   7.06   11   18   1.91   1.45

      9.10   .77   7.41   11   18   1.95   1.49

      9.10   .81   6.70   11   18   1.93   1.46

      9.10   .81   7.06   11   18   1.98   1.50

      9.10   .81   7.41   11   18   2.02   1.55

      9.10   .85   6.70   11   18   2.00   1.51

      9.10   .85   7.06   11   18   2.05   1.56

      9.10   .85   7.41   11   18   2.09   1.60

Runup2 2% runup elevation for Transect: CM-53-1

Two Percent Run-up Elevation is 13.4 Feet-NAVD88

Run-up Height is   4.3 Feet

Legend:
- Ground
- Swel
- 2% Runup

Y-axis: Elevation (ft)

X-axis: Station (ft)
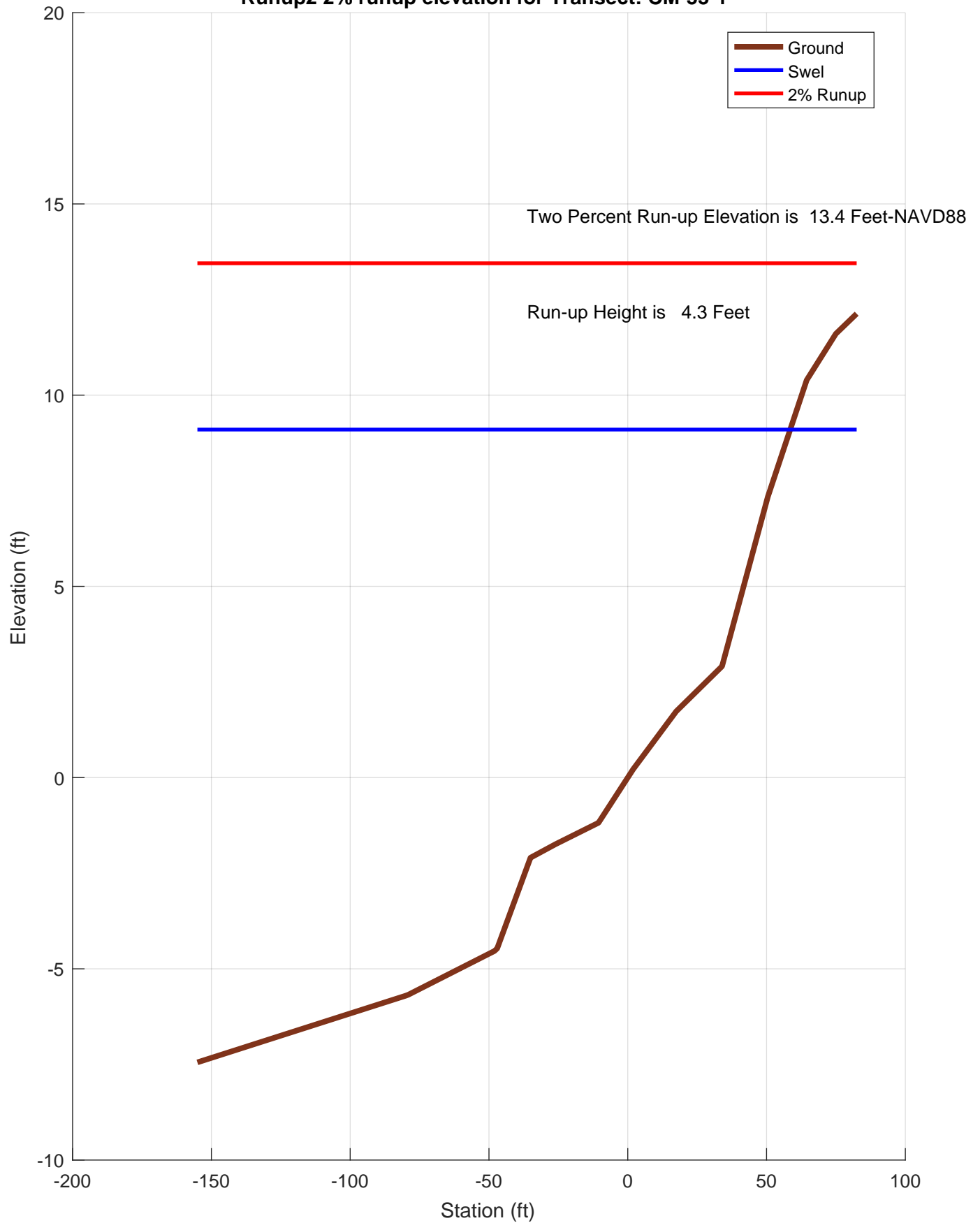
Transect Number: CM-54
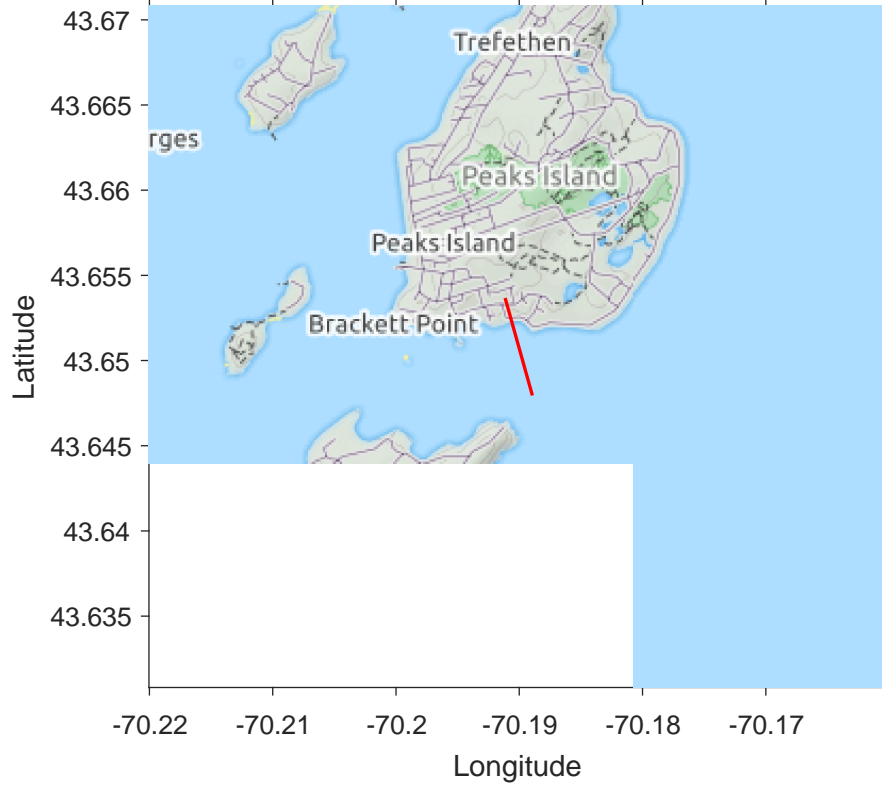
Elevation profile
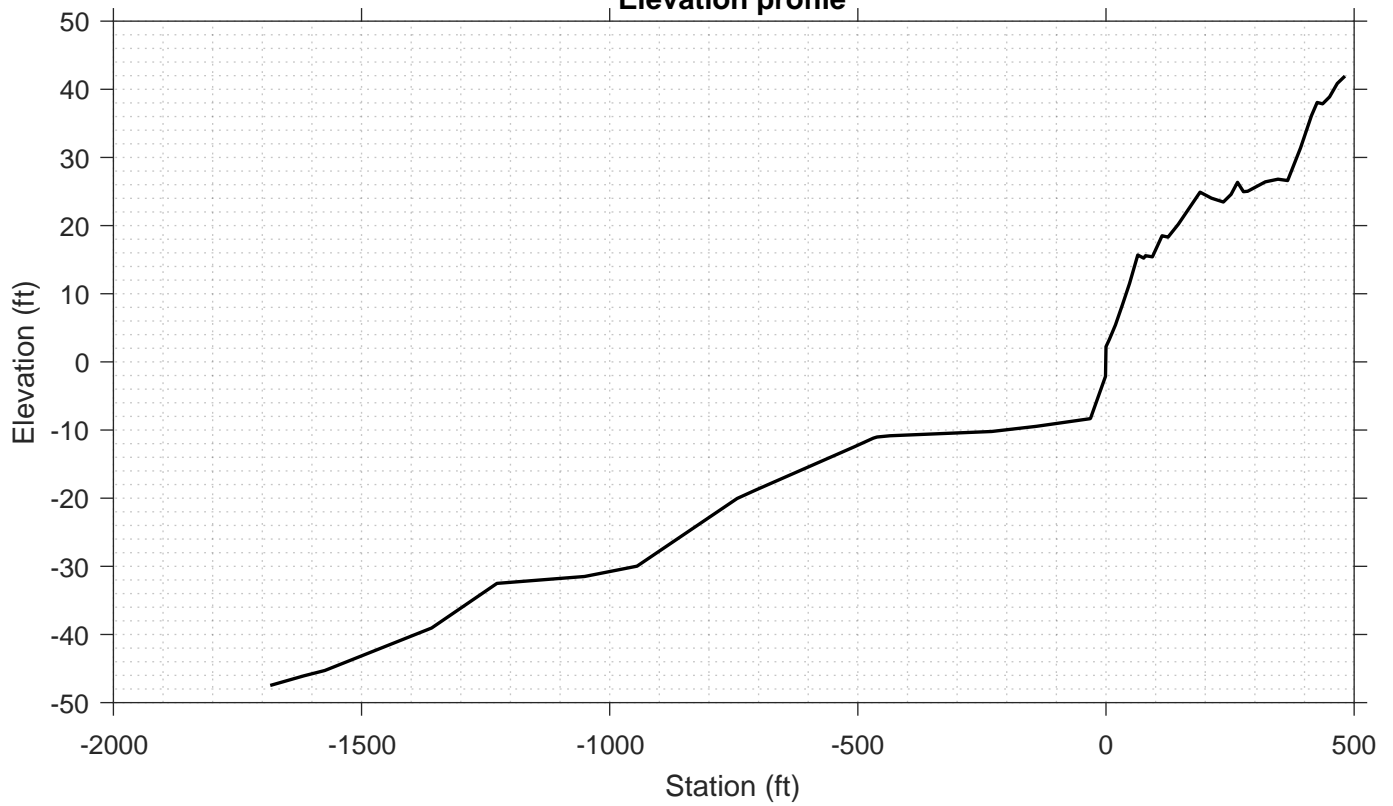
```
_____
DATA LOG FOR TRANSECT ID: CM-54
_____


_____
PART 1: USER INPUT


SWAN 1-D / WHAFIS input
_____
station:     -451 ft
LON:         -70.1902 deg E
LAT:         43.6512 deg N
Bottom ELEV:      -10.9509 ft-NAVD88
TWL:         8.9874 ft-NAVD88
HS:          11.6676 ft
TP:          14.124 sec
Wave Direction bin: 90 deg CCW from East (90 deg sector)
Transect Direction:   111.1043 deg CCW from East


TAW/RUNUP input
_____
toe sta:     -35 ft
toe elev:    -8.366 ft-NAVD88
top sta:     113 ft
top elev:    18.5072 ft-NAVD88
*Wave and water level conditions at toe to be calculated in SWAN 1-D*

PART 1 COMPLETE_____
```

transectCM-54: User-Selected inputs

Legend:
- Transect Profile
- ADCIRC Profile
- TWL
- HS
- TP
- 1-D Wave start
- ◇ TAW toe/top

X-axis: Cross-shore Distance (feet)

Y-axis: Elevation (ft), Significant Wave Height (ft), Period (sec)
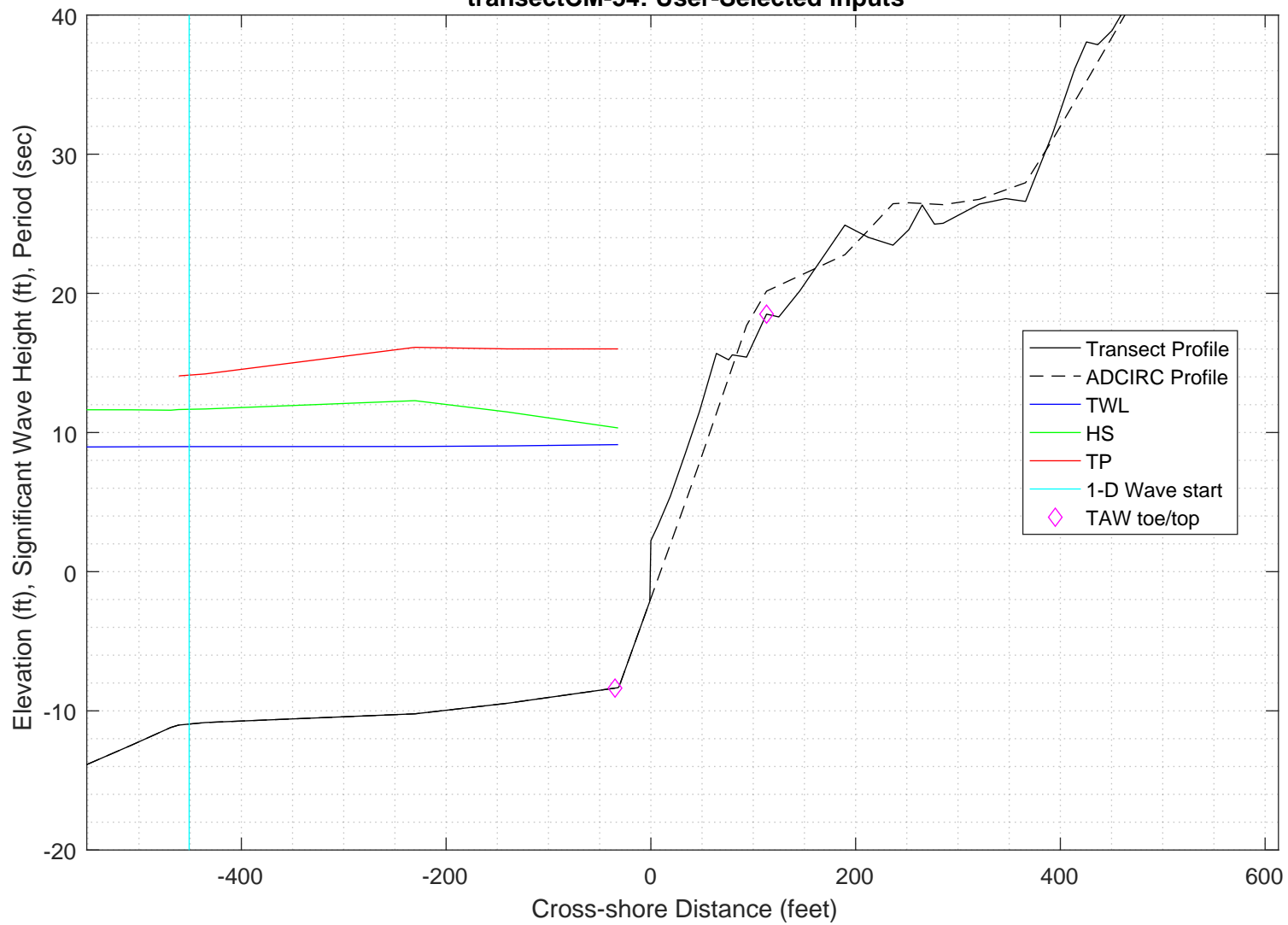
```
_____
PART 2: SWAN 1-D

swan input grid name: 2_swan/gridfiles/CM-54zmeters_xmeters.grd
swan file name:       2_swan/swanfiles/CM-54.swn
swan output name:     2_swan/swanfiles/CM-54.dat

Boundary Conditions:
    TWL- 2.7394 meters
    HS-  3.5563 meters
    PER- 14.124 seconds

Batch File: 2_swan/swanfiles/runswan.dat

SWAN maximum additional wave setup: 2.2367 feet
SWAN output at toe:
    SETUP- 0.22642 feet
    HS-    9.2313 feet
    PER-   13.882 seconds

PART 2 COMPLETE_____
```

2-D ADCIRC+SWAN and SWAN 1-D results, Transect: CM-54

                        Execution started at 20200416.132457

                                      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   151   0.   151   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   151   0   1   1

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

  READ   BOTTOM   -1. '../gridfiles/CM-54zmeters_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   3.5563   14.124   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       151  151     0

!TABLe 'sname' < HEADer|NOHEADer|INDexed > 'fname' <output parameters> (output time)

 Table 'curve'   HEADER 'CM-54.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             152 MYC               1
                      : MCGRD           153
                      : 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   5.93 % 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   0.66 % of wet grid points ( 99.50 % required)

iteration     4; sweep 1
iteration     4; sweep 2
iteration     4; sweep 3
iteration     4; sweep 4
accuracy OK in   4.61 % 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  22.37 % 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  96.72 % of wet grid points ( 99.50 % required)

iteration     7; sweep 1
iteration     7; sweep 2
iteration     7; sweep 3
iteration     7; sweep 4
accuracy OK in  97.37 % of wet grid points ( 99.50 % required)

iteration     8; sweep 1
iteration     8; sweep 2
iteration     8; sweep 3
iteration     8; sweep 4
accuracy OK in  98.03 % of wet grid points ( 99.50 % required)

iteration     9; sweep 1
iteration     9; sweep 2
iteration     9; sweep 3
iteration     9; sweep 4
accuracy OK in  97.37 % of wet grid points ( 99.50 % required)

iteration    10; sweep 1
iteration    10; sweep 2
iteration    10; sweep 3
iteration    10; sweep 4
accuracy OK in  99.35 % of wet grid points ( 99.50 % required)

iteration    11; sweep 1
iteration    11; sweep 2
iteration    11; sweep 3
iteration    11; sweep 4
accuracy OK in  99.35 % of wet grid points ( 99.50 % required)

iteration    12; sweep 1
iteration    12; sweep 2
iteration    12; sweep 3
iteration    12; sweep 4
accuracy OK in 100.00 % of wet grid points ( 99.50 % required)


STOP
```

```
%
%
% Run:1      Table:curve           SWAN version:41.20A
%
%      Xp              Yp              Hsig            TPsmoo          RTpeak          Tm_10           Dir             Dspr            Depth           Setup
%      [m]             [m]             [m]             [sec]           [sec]           [sec]           [degr]          [degr]          [m]             [m]
%
         0.              0.          3.56238         13.8602         13.8874         12.7503          0.000          31.5056          6.0800         0.000000
         1.              0.          3.56630         13.8647         13.8874         12.4971          0.000          31.4602          6.0706         0.000624
         2.              0.          3.56888         13.8689         13.8874         12.2723          0.000          31.4235          6.0613         0.001264
         3.              0.          3.56857         13.8726         13.8874         12.0790          0.000          31.3839          6.0620         0.002042
         4.              0.          3.56741         13.8758         13.8874         11.9141          0.000          31.3220          6.0527         0.002720
         5.              0.          3.56506         13.8786         13.8874         11.7720          0.000          31.2675          6.0434         0.003414
         6.              0.          3.56126         13.8810         13.8874         11.6456          0.000          31.2336          6.0442         0.004235
         7.              0.          3.55645         13.8830         13.8874         11.5343          0.000          31.1867          6.0451         0.005062
         8.              0.          3.55187         13.8848         13.8874         11.4362          0.000          31.1344          6.0358         0.005779
         9.              0.          3.54591         13.8864         13.8874         11.3484          0.000          31.0978          6.0366         0.006614
        10.              0.          3.53921         13.8877         13.8874         11.2700          0.000          31.0482          6.0374         0.007449
        11.              0.          3.53301         13.8889         13.8874         11.2001          0.000          30.9938          6.0282         0.008169
        12.              0.          3.52571         13.8899         13.8874         11.1364          0.000          30.9555          6.0290         0.009000
        13.              0.          3.51824         13.8907         13.8874         11.0786          0.000          30.9221          6.0298         0.009824
        14.              0.          3.51024         13.8915         13.8874         11.0260          0.000          30.8734          6.0306         0.010643
        15.              0.          3.50293         13.8921         13.8874         10.9787          0.000          30.8194          6.0213         0.011345
        16.              0.          3.49475         13.8926         13.8874         10.9345          0.000          30.7812          6.0222         0.012152
        17.              0.          3.48624         13.8931         13.8874         10.8940          0.000          30.7316          6.0230         0.012952
        18.              0.          3.48067         13.8935         13.8874         10.8426          0.000          30.6874          6.0136         0.013643
        19.              0.          3.47484         13.8937         13.8874         10.7891          0.000          30.6606          6.0144         0.014445
        20.              0.          3.46874         13.8938         13.8874         10.7375          0.000          30.6223          6.0152         0.015245
        21.              0.          3.46326         13.8939         13.8874         10.6894          0.000          30.5803          6.0059         0.015936
        22.              0.          3.45685         13.8938         13.8874         10.6433          0.000          30.5514          6.0067         0.016733
        23.              0.          3.45001         13.8937         13.8874         10.5999          0.000          30.5113          6.0075         0.017526
        24.              0.          3.44378         13.8935         13.8874         10.5599          0.000          30.4677          5.9982         0.018209
        25.              0.          3.43643         13.8932         13.8874         10.5223        359.999          30.4395          5.9990         0.019008
        26.              0.          3.42826         13.8929         13.8874         10.4900        359.989          30.4201          5.9998         0.019834
        27.              0.          3.41946         13.8926         13.8874         10.4607        359.973          30.3863          6.0007         0.020661
        28.              0.          3.41132         13.8922         13.8874         10.4342        359.956          30.3478          5.9914         0.021377
        29.              0.          3.40241         13.8918         13.8874         10.4086        359.935          30.3212          5.9922         0.022192
        30.              0.          3.39325         13.8913         13.8874         10.3845        359.913          30.2840          5.9930         0.022998
        31.              0.          3.38489         13.8908         13.8874         10.3626        359.891          30.2444          5.9837         0.023691
        32.              0.          3.37688         13.8903         13.8874         10.3370        359.884          30.2146          5.9844         0.024437
        33.              0.          3.36901         13.8898         13.8874         10.3113        359.882          30.1741          5.9852         0.025160
        34.              0.          3.36201         13.8892         13.8874         10.2873        359.881          30.1310          5.9758         0.025769
        35.              0.          3.35439         13.8886         13.8874         10.2632        359.881          30.1001          5.9765         0.026472
        36.              0.          3.34685         13.8881         13.8874         10.2402        359.882          30.0732          5.9772         0.027164
        37.              0.          3.33910         13.8875         13.8874         10.2182        359.882          30.0337          5.9778         0.027847
        38.              0.          3.33209         13.8869         13.8874         10.1981        359.882          29.9913          5.9684         0.028424
        39.              0.          3.32502         13.8862         13.8874         10.1734        359.868          29.9666          5.9691         0.029116
        40.              0.          3.31913         13.8857         13.8874         10.1411        359.872          29.9355          5.9698         0.029803
        41.              0.          3.31461         13.8851         13.8874         10.1071        359.874          29.9021          5.9604         0.030379
        42.              0.          3.30946         13.8846         13.8874         10.0724        359.875          29.8800          5.9610         0.031049
        43.              0.          3.30405         13.8841         13.8874         10.0388        359.877          29.8476          5.9617         0.031713
        44.              0.          3.29917         13.8837         13.8874         10.0078        359.878          29.8123          5.9523         0.032279
        45.              0.          3.29235         13.8832         13.8874          9.9817        359.880          29.7969          5.9530         0.032986
        46.              0.          3.28386         13.8829         13.8874          9.9625        359.880          29.7781          5.9537         0.033737
        47.              0.          3.27565         13.8825         13.8874          9.9469        359.881          29.7551          5.9444         0.034396
        48.              0.          3.26779         13.8822         13.8874          9.9272        359.895          29.7377          5.9451         0.035107
        49.              0.          3.26019         13.8819         13.8874          9.9076        359.887          29.7230          5.9458         0.035798
        50.              0.          3.25246         13.8817         13.8874          9.8884        359.867          29.6940          5.9465         0.036476
        51.              0.          3.24552         13.8814         13.8874          9.8707        359.846          29.6615          5.9370         0.037048
        52.              0.          3.23807         13.8812         13.8874          9.8521        359.825          29.6400          5.9377         0.037705
        53.              0.          3.23053         13.8810         13.8874          9.8341        359.805          29.6102          5.9384         0.038352
        54.              0.          3.22367         13.8808         13.8874          9.8179        359.785          29.5777          5.9289         0.038899
        55.              0.          3.21629         13.8806         13.8874          9.8009        359.766          29.5562          5.9295         0.039531
        56.              0.          3.20882         13.8805         13.8874          9.7844        359.747          29.5265          5.9302         0.040154
        57.              0.          3.20200         13.8803         13.8874          9.7699        359.728          29.4937          5.9207         0.040679
        58.              0.          3.19466         13.8802         13.8874          9.7545        359.708          29.4713          5.9213         0.041289
        59.              0.          3.18806         13.8801         13.8874          9.7363        359.702          29.4397          5.9219         0.041861
```

60.	0.	3.18239	13.8799	13.8874	9.7187	359.701	29.4053	5.9123	0.042329
61.	0.	3.17625	13.8798	13.8874	9.7001	359.701	29.3817	5.9129	0.042880
62.	0.	3.17020	13.8797	13.8874	9.6820	359.702	29.3617	5.9134	0.043423
63.	0.	3.16400	13.8796	13.8874	9.6644	359.702	29.3315	5.9140	0.043958
64.	0.	3.15841	13.8796	13.8874	9.6486	359.703	29.2987	5.9044	0.044402
65.	0.	3.15229	13.8795	13.8874	9.6320	359.703	29.2764	5.9049	0.044930
66.	0.	3.14637	13.8794	13.8874	9.6139	359.704	29.2474	5.9055	0.045452
67.	0.	3.14116	13.8794	13.8874	9.5972	359.705	29.2163	5.8959	0.045882
68.	0.	3.13527	13.8793	13.8874	9.5793	359.706	29.1853	5.8964	0.046398
69.	0.	3.12985	13.8793	13.8874	9.5632	359.707	29.1442	5.8868	0.046825
70.	0.	3.12432	13.8792	13.8874	9.5474	359.708	29.1000	5.8773	0.047251
71.	0.	3.11871	13.8792	13.8874	9.5320	359.708	29.0551	5.8677	0.047678
72.	0.	3.11305	13.8792	13.8874	9.5170	359.709	29.0101	5.8581	0.048105
73.	0.	3.10749	13.8792	13.8874	9.5024	359.710	28.9749	5.8485	0.048532
74.	0.	3.10132	13.8791	13.8874	9.4867	359.711	28.9440	5.8490	0.049043
75.	0.	3.09565	13.8791	13.8874	9.4729	359.711	28.9044	5.8395	0.049464
76.	0.	3.08989	13.8791	13.8874	9.4593	359.712	28.8624	5.8299	0.049885
77.	0.	3.08401	13.8792	13.8874	9.4464	359.715	28.8202	5.8203	0.050309
78.	0.	3.07813	13.8792	13.8874	9.4335	359.716	28.7778	5.8107	0.050731
79.	0.	3.07238	13.8792	13.8874	9.4210	359.718	28.7450	5.8012	0.051151
80.	0.	3.06600	13.8792	13.8874	9.4075	359.718	28.7168	5.8017	0.051656
81.	0.	3.06014	13.8792	13.8874	9.3957	359.720	28.6800	5.7921	0.052072
82.	0.	3.05422	13.8792	13.8874	9.3841	359.721	28.6408	5.7825	0.052487
83.	0.	3.04823	13.8793	13.8874	9.3729	359.722	28.6012	5.7729	0.052902
84.	0.	3.04220	13.8793	13.8874	9.3620	359.722	28.5617	5.7633	0.053317
85.	0.	3.03614	13.8793	13.8874	9.3513	359.723	28.5224	5.7537	0.053732
86.	0.	3.03019	13.8794	13.8874	9.3411	359.723	28.4926	5.7441	0.054146
87.	0.	3.02367	13.8794	13.8874	9.3296	359.723	28.4670	5.7446	0.054643
88.	0.	3.01767	13.8794	13.8874	9.3198	359.723	28.4328	5.7350	0.055050
89.	0.	3.01172	13.8795	13.8874	9.3098	359.724	28.3956	5.7255	0.055453
90.	0.	3.00577	13.8795	13.8874	9.2998	359.726	28.3576	5.7159	0.055854
91.	0.	2.99981	13.8796	13.8874	9.2900	359.728	28.3193	5.7063	0.056254
92.	0.	2.99399	13.8796	13.8874	9.2804	359.730	28.2903	5.6967	0.056653
93.	0.	2.98764	13.8796	13.8874	9.2694	359.733	28.2652	5.6971	0.057132
94.	0.	2.98212	13.8797	13.8874	9.2588	359.740	28.2294	5.6875	0.057511
95.	0.	2.97684	13.8797	13.8874	9.2472	359.752	28.1900	5.6779	0.057878
96.	0.	2.97183	13.8798	13.8874	9.2347	359.769	28.1491	5.6682	0.058234
97.	0.	2.96693	13.8799	13.8874	9.2218	359.790	28.1081	5.6586	0.058584
98.	0.	2.96216	13.8799	13.8874	9.2085	359.816	28.0688	5.6489	0.058930
99.	0.	2.95738	13.8800	13.8874	9.1953	359.842	28.0300	5.6393	0.059276
100.	0.	2.95259	13.8800	13.8874	9.1823	359.870	27.9914	5.6296	0.059622
101.	0.	2.94778	13.8801	13.8874	9.1693	359.898	27.9532	5.6200	0.059967
102.	0.	2.94297	13.8802	13.8874	9.1565	359.928	27.9153	5.6103	0.060313
103.	0.	2.93815	13.8802	13.8874	9.1438	359.957	27.8778	5.6007	0.060658
104.	0.	2.93335	13.8803	13.8874	9.1311	359.989	27.8410	5.5910	0.061001
105.	0.	2.92841	13.8804	13.8874	9.1184	0.021	27.7959	5.5813	0.061345
106.	0.	2.92402	13.8804	13.8874	9.1075	0.054	27.7470	5.5616	0.061606
107.	0.	2.91907	13.8805	13.8874	9.0949	0.086	27.7066	5.5520	0.061955
108.	0.	2.91415	13.8806	13.8874	9.0825	0.118	27.6688	5.5423	0.062305
109.	0.	2.90921	13.8806	13.8874	9.0703	0.150	27.6316	5.5327	0.062655
110.	0.	2.90418	13.8807	13.8874	9.0586	0.180	27.5951	5.5230	0.063007
111.	0.	2.89910	13.8808	13.8874	9.0473	0.210	27.5596	5.5134	0.063360
112.	0.	2.89394	13.8809	13.8874	9.0364	0.240	27.5250	5.5037	0.063715
113.	0.	2.88875	13.8809	13.8874	9.0257	0.269	27.4910	5.4941	0.064070
114.	0.	2.88355	13.8810	13.8874	9.0152	0.299	27.4571	5.4844	0.064425
115.	0.	2.87833	13.8811	13.8874	9.0049	0.329	27.4233	5.4748	0.064780
116.	0.	2.87308	13.8812	13.8874	8.9947	0.359	27.3897	5.4651	0.065135
117.	0.	2.86782	13.8812	13.8874	8.9848	0.388	27.3561	5.4555	0.065489
118.	0.	2.86252	13.8813	13.8874	8.9751	0.417	27.3223	5.4458	0.065843
119.	0.	2.85720	13.8814	13.8874	8.9656	0.446	27.2884	5.4362	0.066197
120.	0.	2.85187	13.8815	13.8874	8.9563	0.474	27.2543	5.4266	0.066551
121.	0.	2.84651	13.8815	13.8874	8.9472	0.503	27.2201	5.4169	0.066904
122.	0.	2.84113	13.8816	13.8874	8.9384	0.531	27.1858	5.4073	0.067257
123.	0.	2.83573	13.8817	13.8874	8.9297	0.559	27.1511	5.3976	0.067610
124.	0.	2.83031	13.8818	13.8874	8.9212	0.586	27.1162	5.3880	0.067962
125.	0.	2.82489	13.8818	13.8874	8.9128	0.613	27.0811	5.3783	0.068313
126.	0.	2.81946	13.8819	13.8874	8.9046	0.640	27.0457	5.3687	0.068664

127.	0.	2.81370	13.8820	13.8874	8.8963	0.667	26.9870	5.3590	0.069013
128.	0.	2.80760	13.8821	13.8874	8.8918	0.691	26.7722	5.3191	0.069107
129.	0.	2.80863	13.8824	13.8874	8.9129	0.716	26.3629	5.1178	0.067806
130.	0.	2.80779	13.8827	13.8874	8.9337	0.742	25.8669	4.9165	0.066484
131.	0.	2.80599	13.8831	13.8874	8.9559	0.769	25.3255	4.7051	0.065067
132.	0.	2.80169	13.8835	13.8874	8.9760	0.797	24.7627	4.5038	0.063811
133.	0.	2.79520	13.8840	13.8874	8.9952	0.827	24.1952	4.3027	0.062678
134.	0.	2.78768	13.8845	13.8874	9.0139	0.866	23.6134	4.0915	0.061504
135.	0.	2.77781	13.8851	13.8874	9.0263	0.915	22.9917	3.8905	0.060521
136.	0.	2.76663	13.8858	13.8874	9.0358	0.982	22.3353	3.6795	0.059525
137.	0.	2.74162	13.8866	13.8874	9.0385	1.021	20.4275	3.4785	0.058517
138.	0.	2.89411	13.8905	13.8874	9.3023	0.928	17.9964	1.9838	0.013764
139.	0.	2.74176	13.8959	13.8874	9.3334	1.067	16.9482	1.8655	0.045485
140.	0.	2.55725	13.9051	13.8874	9.4198	1.018	16.4717	1.7364	0.086353
141.	0.	2.37144	13.9180	13.8874	9.5140	0.709	16.1120	1.6083	0.128318
142.	0.	2.18579	13.9319	13.8874	9.6359	0.205	15.7192	1.4808	0.170806
143.	0.	1.99014	13.9514	13.8874	9.8117	359.498	15.2707	1.3463	0.216260
144.	0.	1.77431	13.9830	13.8874	10.0826	358.701	14.7962	1.1974	0.267438
145.	0.	1.55004	14.0238	13.8874	10.4278	358.110	14.2780	1.0418	0.321816
146.	0.	1.32683	14.0607	13.8874	10.8905	358.098	13.7520	0.8871	0.377087
147.	0.	1.10578	14.1104	13.8874	11.4041	358.425	13.4163	0.7335	0.433452
148.	0.	0.88640	17.7107	17.2856	12.0683	359.129	14.0370	0.5813	0.491348
149.	0.	0.65742	18.4203	19.2849	12.8574	359.717	15.1697	0.4235	0.553458
150.	0.	0.43028	18.6398	19.2849	13.5151	359.707	16.3755	0.2667	0.616684
151.	0.	0.21210	19.7048	19.2849	14.3588	356.644	17.6485	0.1118	0.681761

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PART 3: WHAFIS

WHAFIS input: CM-54.dat
WHAFIS output: CM-54.out

PART 3 COMPLETE_____
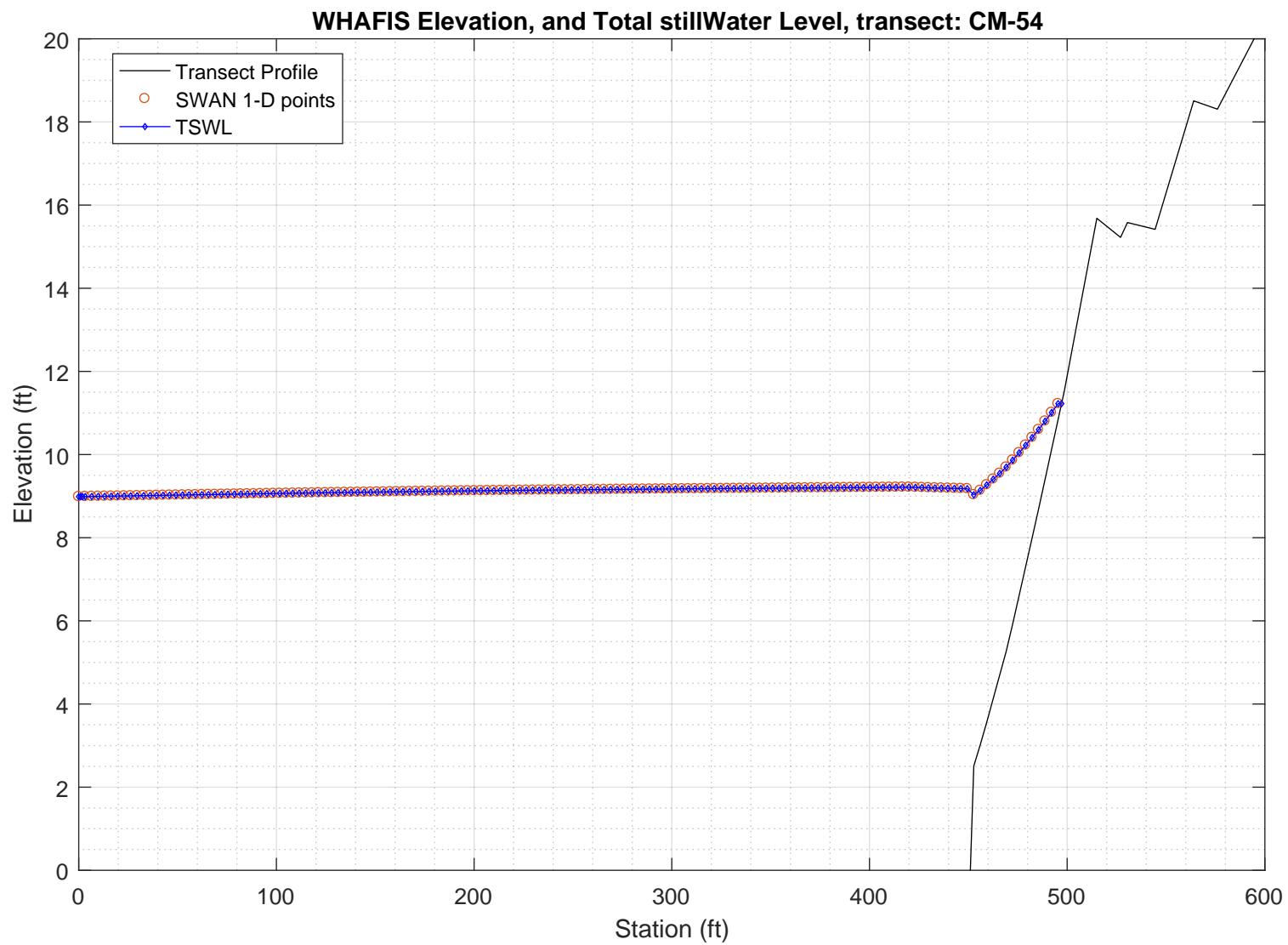
WHAFIS Elevation, and Total stillWater Level, transect: CM-54

Legend:
- Transect Profile
- SWAN 1-D points
- TSWL

X-axis: Station (ft)
Y-axis: Elevation (ft)

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WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)
Executed on: Thu Apr 16 13:27:11 2020
Input file:  C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Portland\3_whafis\whafis4\CM-54.dat
Output file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Portland\3_whafis\whafis4\CM-54.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    -10.950     1.000     1.000     8.987    18.668    14.124    56.140     0.007     0.000
     OF     1.000    -10.943     0.000     8.988     0.000     0.000     0.000     0.000     0.007     0.000
     OF     2.000    -10.936     0.000     8.988     0.000     0.000     0.000     0.000     0.007     0.000
     OF     3.300    -10.927     0.000     8.990     0.000     0.000     0.000     0.000     0.007     0.000
     OF     6.600    -10.904     0.000     8.992     0.000     0.000     0.000     0.000     0.007     0.000
     OF     9.800    -10.881     0.000     8.994     0.000     0.000     0.000     0.000     0.007     0.000
     OF    13.100    -10.858     0.000     8.996     0.000     0.000     0.000     0.000     0.007     0.000
     OF    16.400    -10.838     0.000     8.999     0.000     0.000     0.000     0.000     0.004     0.000
     OF    19.700    -10.828     0.000     9.001     0.000     0.000     0.000     0.000     0.003     0.000
     OF    23.000    -10.818     0.000     9.004     0.000     0.000     0.000     0.000     0.003     0.000
     OF    26.200    -10.808     0.000     9.006     0.000     0.000     0.000     0.000     0.003     0.000
     OF    29.500    -10.798     0.000     9.009     0.000     0.000     0.000     0.000     0.003     0.000
     OF    32.800    -10.788     0.000     9.012     0.000     0.000     0.000     0.000     0.003     0.000
     OF    36.100    -10.777     0.000     9.014     0.000     0.000     0.000     0.000     0.003     0.000
     OF    39.400    -10.767     0.000     9.017     0.000     0.000     0.000     0.000     0.003     0.000
     OF    42.700    -10.757     0.000     9.020     0.000     0.000     0.000     0.000     0.003     0.000
     OF    45.900    -10.747     0.000     9.022     0.000     0.000     0.000     0.000     0.003     0.000
     OF    49.200    -10.737     0.000     9.025     0.000     0.000     0.000     0.000     0.003     0.000
     OF    52.500    -10.727     0.000     9.027     0.000     0.000     0.000     0.000     0.003     0.000
     OF    55.800    -10.717     0.000     9.030     0.000     0.000     0.000     0.000     0.003     0.000
     OF    59.100    -10.707     0.000     9.032     0.000     0.000     0.000     0.000     0.003     0.000
     OF    62.300    -10.697     0.000     9.035     0.000     0.000     0.000     0.000     0.003     0.000
     OF    65.600    -10.687     0.000     9.037     0.000     0.000     0.000     0.000     0.003     0.000
     OF    68.900    -10.677     0.000     9.040     0.000     0.000     0.000     0.000     0.003     0.000
     OF    72.200    -10.667     0.000     9.042     0.000     0.000     0.000     0.000     0.003     0.000
     OF    75.500    -10.657     0.000     9.045     0.000     0.000     0.000     0.000     0.003     0.000
     OF    78.700    -10.647     0.000     9.047     0.000     0.000     0.000     0.000     0.003     0.000
     OF    82.000    -10.637     0.000     9.050     0.000     0.000     0.000     0.000     0.003     0.000
     OF    85.300    -10.627     0.000     9.052     0.000     0.000     0.000     0.000     0.003     0.000
     OF    88.600    -10.617     0.000     9.055     0.000     0.000     0.000     0.000     0.003     0.000
     OF    91.900    -10.607     0.000     9.058     0.000     0.000     0.000     0.000     0.003     0.000
     OF    95.100    -10.597     0.000     9.060     0.000     0.000     0.000     0.000     0.003     0.000
     OF    98.400    -10.587     0.000     9.063     0.000     0.000     0.000     0.000     0.003     0.000
     OF   101.700    -10.577     0.000     9.065     0.000     0.000     0.000     0.000     0.003     0.000
     OF   105.000    -10.567     0.000     9.068     0.000     0.000     0.000     0.000     0.003     0.000
     OF   108.300    -10.557     0.000     9.070     0.000     0.000     0.000     0.000     0.003     0.000
     OF   111.500    -10.547     0.000     9.072     0.000     0.000     0.000     0.000     0.003     0.000
     OF   114.800    -10.537     0.000     9.074     0.000     0.000     0.000     0.000     0.003     0.000
     OF   118.100    -10.527     0.000     9.076     0.000     0.000     0.000     0.000     0.003     0.000
     OF   121.400    -10.517     0.000     9.079     0.000     0.000     0.000     0.000     0.003     0.000
     OF   124.700    -10.507     0.000     9.081     0.000     0.000     0.000     0.000     0.003     0.000
     OF   128.000    -10.497     0.000     9.083     0.000     0.000     0.000     0.000     0.003     0.000
     OF   131.200    -10.487     0.000     9.085     0.000     0.000     0.000     0.000     0.003     0.000
     OF   134.500    -10.477     0.000     9.087     0.000     0.000     0.000     0.000     0.003     0.000
     OF   137.800    -10.467     0.000     9.089     0.000     0.000     0.000     0.000     0.003     0.000
     OF   141.100    -10.457     0.000     9.092     0.000     0.000     0.000     0.000     0.003     0.000
     OF   144.400    -10.447     0.000     9.093     0.000     0.000     0.000     0.000     0.003     0.000
     OF   147.600    -10.437     0.000     9.096     0.000     0.000     0.000     0.000     0.003     0.000
     OF   150.900    -10.426     0.000     9.098     0.000     0.000     0.000     0.000     0.003     0.000
     OF   154.200    -10.416     0.000     9.100     0.000     0.000     0.000     0.000     0.003     0.000
     OF   157.500    -10.406     0.000     9.103     0.000     0.000     0.000     0.000     0.003     0.000
     OF   160.800    -10.396     0.000     9.105     0.000     0.000     0.000     0.000     0.003     0.000
     OF   164.000    -10.386     0.000     9.107     0.000     0.000     0.000     0.000     0.003     0.000
     OF   167.300    -10.376     0.000     9.109     0.000     0.000     0.000     0.000     0.003     0.000
     OF   170.600    -10.366     0.000     9.111     0.000     0.000     0.000     0.000     0.003     0.000
     OF   173.900    -10.356     0.000     9.113     0.000     0.000     0.000     0.000     0.003     0.000
     OF   177.200    -10.346     0.000     9.115     0.000     0.000     0.000     0.000     0.003     0.000
     OF   180.400    -10.336     0.000     9.117     0.000     0.000     0.000     0.000     0.003     0.000
     OF   183.700    -10.326     0.000     9.119     0.000     0.000     0.000     0.000     0.003     0.000
     OF   187.000    -10.316     0.000     9.121     0.000     0.000     0.000     0.000     0.003     0.000
     OF   190.300    -10.306     0.000     9.123     0.000     0.000     0.000     0.000     0.003     0.000
     OF   193.600    -10.296     0.000     9.125     0.000     0.000     0.000     0.000     0.003     0.000
     OF   196.800    -10.286     0.000     9.126     0.000     0.000     0.000     0.000     0.003     0.000
     OF   200.100    -10.276     0.000     9.128     0.000     0.000     0.000     0.000     0.003     0.000
     OF   203.400    -10.266     0.000     9.130     0.000     0.000     0.000     0.000     0.003     0.000
     OF   206.700    -10.256     0.000     9.132     0.000     0.000     0.000     0.000     0.003     0.000
     OF   210.000    -10.246     0.000     9.133     0.000     0.000     0.000     0.000     0.003     0.000
     OF   213.300    -10.236     0.000     9.135     0.000     0.000     0.000     0.000     0.003     0.000
     OF   216.500    -10.226     0.000     9.137     0.000     0.000     0.000     0.000     0.003     0.000
     OF   219.800    -10.216     0.000     9.138     0.000     0.000     0.000     0.000     0.005     0.000
     OF   223.100    -10.192     0.000     9.140     0.000     0.000     0.000     0.000     0.008     0.000
     OF   226.400    -10.165     0.000     9.141     0.000     0.000     0.000     0.000     0.008     0.000
     OF   229.700    -10.137     0.000     9.142     0.000     0.000     0.000     0.000     0.009     0.000
     OF   232.900    -10.110     0.000     9.144     0.000     0.000     0.000     0.000     0.009     0.000
     OF   236.200    -10.082     0.000     9.145     0.000     0.000     0.000     0.000     0.009     0.000
     OF   239.500    -10.054     0.000     9.147     0.000     0.000     0.000     0.000     0.008     0.000
     OF   242.800    -10.027     0.000     9.148     0.000     0.000     0.000     0.000     0.008     0.000
     OF   246.100    -10.000     0.000     9.150     0.000     0.000     0.000     0.000     0.008     0.000
     OF   249.300     -9.972     0.000     9.151     0.000     0.000     0.000     0.000     0.009     0.000
     OF   252.600     -9.945     0.000     9.153     0.000     0.000     0.000     0.000     0.008     0.000
     OF   255.900     -9.917     0.000     9.154     0.000     0.000     0.000     0.000     0.008     0.000
     OF   259.200     -9.889     0.000     9.155     0.000     0.000     0.000     0.000     0.008     0.000
     OF   262.500     -9.862     0.000     9.157     0.000     0.000     0.000     0.000     0.009     0.000
     OF   265.700     -9.834     0.000     9.158     0.000     0.000     0.000     0.000     0.009     0.000
     OF   269.000     -9.807     0.000     9.160     0.000     0.000     0.000     0.000     0.008     0.000
     OF   272.300     -9.779     0.000     9.161     0.000     0.000     0.000     0.000     0.008     0.000
     OF   275.600     -9.752     0.000     9.162     0.000     0.000     0.000     0.000     0.008     0.000
     OF   278.900     -9.724     0.000     9.164     0.000     0.000     0.000     0.000     0.008     0.000
     OF   282.200     -9.697     0.000     9.165     0.000     0.000     0.000     0.000     0.009     0.000
     OF   285.400     -9.669     0.000     9.167     0.000     0.000     0.000     0.000     0.009     0.000
     OF   288.700     -9.641     0.000     9.168     0.000     0.000     0.000     0.000     0.008     0.000
     OF   292.000     -9.614     0.000     9.169     0.000     0.000     0.000     0.000     0.008     0.000
     OF   295.300     -9.586     0.000     9.171     0.000     0.000     0.000     0.000     0.008     0.000
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OF	298.600	-9.559	0.000	9.172	0.000	0.000	0.000	0.000	0.009	0.000
OF	301.800	-9.531	0.000	9.173	0.000	0.000	0.000	0.000	0.009	0.000
OF	305.100	-9.504	0.000	9.175	0.000	0.000	0.000	0.000	0.008	0.000
OF	308.400	-9.476	0.000	9.176	0.000	0.000	0.000	0.000	0.009	0.000
OF	311.700	-9.447	0.000	9.177	0.000	0.000	0.000	0.000	0.010	0.000
OF	315.000	-9.413	0.000	9.179	0.000	0.000	0.000	0.000	0.010	0.000
OF	318.200	-9.379	0.000	9.180	0.000	0.000	0.000	0.000	0.010	0.000
OF	321.500	-9.345	0.000	9.181	0.000	0.000	0.000	0.000	0.010	0.000
OF	324.800	-9.311	0.000	9.182	0.000	0.000	0.000	0.000	0.010	0.000
OF	328.100	-9.277	0.000	9.183	0.000	0.000	0.000	0.000	0.010	0.000
OF	331.400	-9.243	0.000	9.184	0.000	0.000	0.000	0.000	0.010	0.000
OF	334.600	-9.209	0.000	9.185	0.000	0.000	0.000	0.000	0.010	0.000
OF	337.900	-9.175	0.000	9.186	0.000	0.000	0.000	0.000	0.010	0.000
OF	341.200	-9.141	0.000	9.188	0.000	0.000	0.000	0.000	0.010	0.000
OF	344.500	-9.107	0.000	9.189	0.000	0.000	0.000	0.000	0.010	0.000
OF	347.800	-9.073	0.000	9.189	0.000	0.000	0.000	0.000	0.010	0.000
OF	351.000	-9.039	0.000	9.191	0.000	0.000	0.000	0.000	0.010	0.000
OF	354.300	-9.005	0.000	9.192	0.000	0.000	0.000	0.000	0.010	0.000
OF	357.600	-8.971	0.000	9.193	0.000	0.000	0.000	0.000	0.010	0.000
OF	360.900	-8.937	0.000	9.194	0.000	0.000	0.000	0.000	0.010	0.000
OF	364.200	-8.903	0.000	9.195	0.000	0.000	0.000	0.000	0.010	0.000
OF	367.500	-8.869	0.000	9.196	0.000	0.000	0.000	0.000	0.010	0.000
OF	370.700	-8.835	0.000	9.198	0.000	0.000	0.000	0.000	0.010	0.000
OF	374.000	-8.801	0.000	9.199	0.000	0.000	0.000	0.000	0.010	0.000
OF	377.300	-8.767	0.000	9.200	0.000	0.000	0.000	0.000	0.010	0.000
OF	380.600	-8.733	0.000	9.201	0.000	0.000	0.000	0.000	0.010	0.000
OF	383.900	-8.699	0.000	9.202	0.000	0.000	0.000	0.000	0.010	0.000
OF	387.100	-8.665	0.000	9.203	0.000	0.000	0.000	0.000	0.010	0.000
OF	390.400	-8.631	0.000	9.205	0.000	0.000	0.000	0.000	0.010	0.000
OF	393.700	-8.597	0.000	9.206	0.000	0.000	0.000	0.000	0.010	0.000
OF	397.000	-8.563	0.000	9.207	0.000	0.000	0.000	0.000	0.010	0.000
OF	400.300	-8.529	0.000	9.208	0.000	0.000	0.000	0.000	0.010	0.000
OF	403.500	-8.495	0.000	9.209	0.000	0.000	0.000	0.000	0.010	0.000
OF	406.800	-8.461	0.000	9.210	0.000	0.000	0.000	0.000	0.010	0.000
OF	410.100	-8.427	0.000	9.212	0.000	0.000	0.000	0.000	0.010	0.000
OF	413.400	-8.393	0.000	9.213	0.000	0.000	0.000	0.000	0.010	0.000
OF	416.700	-8.359	0.000	9.214	0.000	0.000	0.000	0.000	0.022	0.000
OF	419.900	-8.252	0.000	9.214	0.000	0.000	0.000	0.000	0.119	0.000
OF	423.200	-7.588	0.000	9.210	0.000	0.000	0.000	0.000	0.202	0.000
OF	426.500	-6.918	0.000	9.205	0.000	0.000	0.000	0.000	0.203	0.000
OF	429.800	-6.248	0.000	9.201	0.000	0.000	0.000	0.000	0.203	0.000
OF	433.100	-5.578	0.000	9.197	0.000	0.000	0.000	0.000	0.203	0.000
OF	436.400	-4.908	0.000	9.193	0.000	0.000	0.000	0.000	0.206	0.000
OF	439.600	-4.238	0.000	9.189	0.000	0.000	0.000	0.000	0.206	0.000
OF	442.900	-3.568	0.000	9.186	0.000	0.000	0.000	0.000	0.203	0.000
OF	446.200	-2.898	0.000	9.183	0.000	0.000	0.000	0.000	0.203	0.000
OF	449.500	-2.228	0.000	9.179	0.000	0.000	0.000	0.000	0.819	0.000
IF	452.800	2.508	0.000	9.033	0.000	0.000	0.000	0.000	0.807	0.000
IF	456.000	3.020	0.000	9.137	0.000	0.000	0.000	0.000	0.162	0.000
IF	459.300	3.563	0.000	9.271	0.000	0.000	0.000	0.000	0.168	0.000
IF	462.600	4.131	0.000	9.408	0.000	0.000	0.000	0.000	0.172	0.000
IF	465.900	4.699	0.000	9.548	0.000	0.000	0.000	0.000	0.172	0.000
IF	469.200	5.268	0.000	9.697	0.000	0.000	0.000	0.000	0.189	0.000
IF	472.400	5.927	0.000	9.865	0.000	0.000	0.000	0.000	0.208	0.000
IF	475.700	6.617	0.000	10.043	0.000	0.000	0.000	0.000	0.209	0.000
IF	479.000	7.308	0.000	10.225	0.000	0.000	0.000	0.000	0.209	0.000
IF	482.300	7.998	0.000	10.410	0.000	0.000	0.000	0.000	0.210	0.000
IF	485.600	8.696	0.000	10.599	0.000	0.000	0.000	0.000	0.217	0.000
IF	488.800	9.411	0.000	10.803	0.000	0.000	0.000	0.000	0.220	0.000
IF	492.100	10.126	0.000	11.011	0.000	0.000	0.000	0.000	0.217	0.000
IF	495.400	10.841	0.000	11.224	0.000	0.000	0.000	0.000	0.215	0.000
IF	497.200	11.224	0.000	11.224	0.000	0.000	0.000	0.000	0.213	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 STATION	END ELEVATION	FETCH LENGTH	SURGE ELEV 10-YEAR	SURGE ELEV 100-YEAR	INITIAL WAVE HEIGHT	INITIAL W. PERIOD		BOTTOM SLOPE	AVERAGE A-ZONES
IE	0.000	-10.950	1.000	1.000	8.987	18.668	14.124	56.140	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	1.000	-10.943	0.000	8.988	0.000	0.000	0.000	0.000	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	2.000	-10.936	0.000	8.988	0.000	0.000	0.000	0.000	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	3.300	-10.927	0.000	8.990	0.000	0.000	0.000	0.000	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	6.600	-10.904	0.000	8.992	0.000	0.000	0.000	0.000	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	9.800	-10.881	0.000	8.994	0.000	0.000	0.000	0.000	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	13.100	-10.858	0.000	8.996	0.000	0.000	0.000	0.000	0.007	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	16.400	-10.838	0.000	8.999	0.000	0.000	0.000	0.000	0.004	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	19.700	-10.828	0.000	9.001	0.000	0.000	0.000	0.000	0.003	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	23.000	-10.818	0.000	9.004	0.000	0.000	0.000	0.000	0.003	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	26.200	-10.808	0.000	9.006	0.000	0.000	0.000	0.000	0.003	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	29.500	-10.798	0.000	9.009	0.000	0.000	0.000	0.000	0.003	0.000
	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES

	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	32.800	-10.788	0.000	9.012	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	36.100	-10.777	0.000	9.014	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	39.400	-10.767	0.000	9.017	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	42.700	-10.757	0.000	9.020	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	45.900	-10.747	0.000	9.022	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	49.200	-10.737	0.000	9.025	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	52.500	-10.727	0.000	9.027	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	55.800	-10.717	0.000	9.030	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	59.100	-10.707	0.000	9.032	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	62.300	-10.697	0.000	9.035	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	65.600	-10.687	0.000	9.037	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	68.900	-10.677	0.000	9.040	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	72.200	-10.667	0.000	9.042	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	75.500	-10.657	0.000	9.045	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	78.700	-10.647	0.000	9.047	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	82.000	-10.637	0.000	9.050	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	85.300	-10.627	0.000	9.052	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	88.600	-10.617	0.000	9.055	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	91.900	-10.607	0.000	9.058	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	95.100	-10.597	0.000	9.060	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	98.400	-10.587	0.000	9.063	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	101.700	-10.577	0.000	9.065	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	105.000	-10.567	0.000	9.068	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	108.300	-10.557	0.000	9.070	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	111.500	-10.547	0.000	9.072	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	114.800	-10.537	0.000	9.074	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	118.100	-10.527	0.000	9.076	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	121.400	-10.517	0.000	9.079	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	124.700	-10.507	0.000	9.081	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	128.000	-10.497	0.000	9.083	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	131.200	-10.487	0.000	9.085	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	134.500	-10.477	0.000	9.087	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	137.800	-10.467	0.000	9.089	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES
OF	141.100	-10.457	0.000	9.092	0.000	0.000	0.000	0.000		0.003	0.000
	END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR						SLOPE	A-ZONES

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OF   144.400   -10.447    0.000    9.093    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   147.600   -10.437    0.000    9.096    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   150.900   -10.426    0.000    9.098    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   154.200   -10.416    0.000    9.100    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   157.500   -10.406    0.000    9.103    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   160.800   -10.396    0.000    9.105    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   164.000   -10.386    0.000    9.107    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   167.300   -10.376    0.000    9.109    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   170.600   -10.366    0.000    9.111    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   173.900   -10.356    0.000    9.113    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   177.200   -10.346    0.000    9.115    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   180.400   -10.336    0.000    9.117    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   183.700   -10.326    0.000    9.119    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   187.000   -10.316    0.000    9.121    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   190.300   -10.306    0.000    9.123    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   193.600   -10.296    0.000    9.125    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   196.800   -10.286    0.000    9.126    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   200.100   -10.276    0.000    9.128    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   203.400   -10.266    0.000    9.130    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   206.700   -10.256    0.000    9.132    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   210.000   -10.246    0.000    9.133    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   213.300   -10.236    0.000    9.135    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   216.500   -10.226    0.000    9.137    0.000    0.000    0.000    0.000       0.003      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   219.800   -10.216    0.000    9.138    0.000    0.000    0.000    0.000       0.005      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   223.100   -10.192    0.000    9.140    0.000    0.000    0.000    0.000       0.008      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   226.400   -10.165    0.000    9.141    0.000    0.000    0.000    0.000       0.008      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   229.700   -10.137    0.000    9.142    0.000    0.000    0.000    0.000       0.009      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   232.900   -10.110    0.000    9.144    0.000    0.000    0.000    0.000       0.009      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   236.200   -10.082    0.000    9.145    0.000    0.000    0.000    0.000       0.009      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   239.500   -10.054    0.000    9.147    0.000    0.000    0.000    0.000       0.008      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   242.800   -10.027    0.000    9.148    0.000    0.000    0.000    0.000       0.008      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   246.100   -10.000    0.000    9.150    0.000    0.000    0.000    0.000       0.008      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   249.300    -9.972    0.000    9.151    0.000    0.000    0.000    0.000       0.009      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
OF   252.600    -9.945    0.000    9.153    0.000    0.000    0.000    0.000       0.008      0.000
         END        END  NEW SURGE  NEW SURGE                                       BOTTOM    AVERAGE
     STATION  ELEVATION    10-YEAR   100-YEAR                                        SLOPE    A-ZONES
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	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	255.900	-9.917	0.000	9.154	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	259.200	-9.889	0.000	9.155	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	262.500	-9.862	0.000	9.157	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	265.700	-9.834	0.000	9.158	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	269.000	-9.807	0.000	9.160	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	272.300	-9.779	0.000	9.161	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	275.600	-9.752	0.000	9.162	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	278.900	-9.724	0.000	9.164	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	282.200	-9.697	0.000	9.165	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	285.400	-9.669	0.000	9.167	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	288.700	-9.641	0.000	9.168	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	292.000	-9.614	0.000	9.169	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	295.300	-9.586	0.000	9.171	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	298.600	-9.559	0.000	9.172	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	301.800	-9.531	0.000	9.173	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	305.100	-9.504	0.000	9.175	0.000	0.000	0.000	0.000	0.008	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	308.400	-9.476	0.000	9.176	0.000	0.000	0.000	0.000	0.009	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	311.700	-9.447	0.000	9.177	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	315.000	-9.413	0.000	9.179	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	318.200	-9.379	0.000	9.180	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	321.500	-9.345	0.000	9.181	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	324.800	-9.311	0.000	9.182	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	328.100	-9.277	0.000	9.183	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	331.400	-9.243	0.000	9.184	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	334.600	-9.209	0.000	9.185	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	337.900	-9.175	0.000	9.186	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	341.200	-9.141	0.000	9.188	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	344.500	-9.107	0.000	9.189	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	347.800	-9.073	0.000	9.189	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	351.000	-9.039	0.000	9.191	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	354.300	-9.005	0.000	9.192	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	357.600	-8.971	0.000	9.193	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	360.900	-8.937	0.000	9.194	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	364.200	-8.903	0.000	9.195	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES

	STATION	ELEVATION	10-YEAR	100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	367.500	-8.869	0.000	9.196	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	370.700	-8.835	0.000	9.198	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	374.000	-8.801	0.000	9.199	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	377.300	-8.767	0.000	9.200	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	380.600	-8.733	0.000	9.201	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	383.900	-8.699	0.000	9.202	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	387.100	-8.665	0.000	9.203	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	390.400	-8.631	0.000	9.205	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	393.700	-8.597	0.000	9.206	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	397.000	-8.563	0.000	9.207	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	400.300	-8.529	0.000	9.208	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	403.500	-8.495	0.000	9.209	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	406.800	-8.461	0.000	9.210	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	410.100	-8.427	0.000	9.212	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	413.400	-8.393	0.000	9.213	0.000	0.000	0.000	0.000	0.010	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	416.700	-8.359	0.000	9.214	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	419.900	-8.252	0.000	9.214	0.000	0.000	0.000	0.000	0.119	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	423.200	-7.588	0.000	9.210	0.000	0.000	0.000	0.000	0.202	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	426.500	-6.918	0.000	9.205	0.000	0.000	0.000	0.000	0.203	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	429.800	-6.248	0.000	9.201	0.000	0.000	0.000	0.000	0.203	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	433.100	-5.578	0.000	9.197	0.000	0.000	0.000	0.000	0.203	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	436.400	-4.908	0.000	9.193	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	439.600	-4.238	0.000	9.189	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	442.900	-3.568	0.000	9.186	0.000	0.000	0.000	0.000	0.203	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	446.200	-2.898	0.000	9.183	0.000	0.000	0.000	0.000	0.203	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	449.500	-2.228	0.000	9.179	0.000	0.000	0.000	0.000	0.819	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	452.800	2.508	0.000	9.033	0.000	0.000	0.000	0.000	0.807	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	456.000	3.020	0.000	9.137	0.000	0.000	0.000	0.000	0.162	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	459.300	3.563	0.000	9.271	0.000	0.000	0.000	0.000	0.168	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	462.600	4.131	0.000	9.408	0.000	0.000	0.000	0.000	0.172	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	465.900	4.699	0.000	9.548	0.000	0.000	0.000	0.000	0.172	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	469.200	5.268	0.000	9.697	0.000	0.000	0.000	0.000	0.189	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	472.400	5.927	0.000	9.865	0.000	0.000	0.000	0.000	0.208	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	475.700	6.617	0.000	10.043	0.000	0.000	0.000	0.000	0.209	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES

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 IF    479.000      7.308      0.000     10.225     0.000     0.000     0.000     0.000      0.209     0.000
           END        END  NEW SURGE  NEW SURGE                                             BOTTOM   AVERAGE
       STATION  ELEVATION    10-YEAR   100-YEAR                                              SLOPE   A-ZONES
 IF    482.300      7.998      0.000     10.410     0.000     0.000     0.000     0.000      0.210     0.000
           END        END  NEW SURGE  NEW SURGE                                             BOTTOM   AVERAGE
       STATION  ELEVATION    10-YEAR   100-YEAR                                              SLOPE   A-ZONES
 IF    485.600      8.696      0.000     10.599     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
 IF    488.800      9.411      0.000     10.803     0.000     0.000     0.000     0.000      0.220     0.000
           END        END  NEW SURGE  NEW SURGE                                             BOTTOM   AVERAGE
       STATION  ELEVATION    10-YEAR   100-YEAR                                              SLOPE   A-ZONES
 IF    492.100     10.126      0.000     11.011     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
 IF    495.400     10.841      0.000     11.224     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
 IF    497.200     11.224      0.000     11.224     0.000     0.000     0.000     0.000      0.213     0.000
-------------------------------------------------END OF TRANSECT----------------------------------------------------
NOTE:
SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.
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                          PART2: CONTROLLING WAVE HEIGHTS, SPECTRAL
                           PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS
                     LOCATION        CONTROLLING  SPECTRAL PEAK   WAVE CREST
                                     WAVE HEIGHT  WAVE PERIOD     ELEVATION
                 IE      0.00          15.09         14.12         19.55
                 OF      1.00          15.08         14.12         19.55
                 OF      2.00          15.08         14.12         19.54
                 OF      3.30          15.07         14.12         19.54
                 OF      6.60          15.06         14.12         19.53
                 OF      9.80          15.04         14.12         19.52
                 OF     13.10          15.03         14.12         19.51
                 OF     16.40          15.01         14.12         19.51
                 OF     19.70          15.01         14.12         19.51
                 OF     23.00          15.00         14.12         19.51
                 OF     26.20          15.00         14.12         19.50
                 OF     29.50          14.99         14.12         19.50
                 OF     32.80          14.99         14.12         19.50
                 OF     36.10          14.98         14.12         19.50
                 OF     39.40          14.97         14.12         19.50
                 OF     42.70          14.97         14.12         19.50
                 OF     45.90          14.96         14.12         19.50
                 OF     49.20          14.96         14.12         19.50
                 OF     52.50          14.95         14.12         19.49
                 OF     55.80          14.95         14.12         19.49
                 OF     59.10          14.94         14.12         19.49
                 OF     62.30          14.94         14.12         19.49
                 OF     65.60          14.93         14.12         19.49
                 OF     68.90          14.92         14.12         19.49
                 OF     72.20          14.92         14.12         19.49
                 OF     75.50          14.91         14.12         19.48
                 OF     78.70          14.91         14.12         19.48
                 OF     82.00          14.90         14.12         19.48
                 OF     85.30          14.90         14.12         19.48
                 OF     88.60          14.89         14.12         19.48
                 OF     91.90          14.89         14.12         19.48
                 OF     95.10          14.88         14.12         19.48
                 OF     98.40          14.88         14.12         19.48
                 OF    101.70          14.87         14.12         19.47
                 OF    105.00          14.86         14.12         19.47
                 OF    108.30          14.86         14.12         19.47
                 OF    111.50          14.85         14.12         19.47
                 OF    114.80          14.85         14.12         19.47
                 OF    118.10          14.84         14.12         19.46
                 OF    121.40          14.84         14.12         19.46
                 OF    124.70          14.83         14.12         19.46
                 OF    128.00          14.82         14.12         19.46
                 OF    131.20          14.82         14.12         19.46
                 OF    134.50          14.81         14.12         19.46
                 OF    137.80          14.81         14.12         19.45
                 OF    141.10          14.80         14.12         19.45
                 OF    144.40          14.79         14.12         19.45
                 OF    147.60          14.79         14.12         19.45
                 OF    150.90          14.78         14.12         19.45
                 OF    154.20          14.78         14.12         19.44
                 OF    157.50          14.77         14.12         19.44
                 OF    160.80          14.77         14.12         19.44
                 OF    164.00          14.76         14.12         19.44
                 OF    167.30          14.75         14.12         19.44
                 OF    170.60          14.75         14.12         19.43
                 OF    173.90          14.74         14.12         19.43
                 OF    177.20          14.74         14.12         19.43
                 OF    180.40          14.73         14.12         19.43
                 OF    183.70          14.72         14.12         19.43
                 OF    187.00          14.72         14.12         19.42
                 OF    190.30          14.71         14.12         19.42
                 OF    193.60          14.71         14.12         19.42
                 OF    196.80          14.70         14.12         19.42
                 OF    200.10          14.69         14.12         19.41
                 OF    203.40          14.69         14.12         19.41
                 OF    206.70          14.68         14.12         19.41
                 OF    210.00          14.68         14.12         19.41
                 OF    213.30          14.67         14.12         19.40
                 OF    216.50          14.66         14.12         19.40
                 OF    219.80          14.66         14.12         19.40
                 OF    223.10          14.64         14.12         19.39
                 OF    226.40          14.62         14.12         19.38
                 OF    229.70          14.60         14.12         19.36
                 OF    232.90          14.58         14.12         19.35
                 OF    236.20          14.56         14.12         19.34
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OF    239.50      14.55       14.12       19.33
OF    242.80      14.53       14.12       19.32
OF    246.10      14.51       14.12       19.31
OF    249.30      14.49       14.12       19.29
OF    252.60      14.47       14.12       19.28
OF    255.90      14.45       14.12       19.27
OF    259.20      14.43       14.12       19.26
OF    262.50      14.41       14.12       19.24
OF    265.70      14.39       14.12       19.23
OF    269.00      14.37       14.12       19.22
OF    272.30      14.35       14.12       19.21
OF    275.60      14.33       14.12       19.20
OF    278.90      14.31       14.12       19.18
OF    282.20      14.30       14.12       19.17
OF    285.40      14.28       14.12       19.16
OF    288.70      14.26       14.12       19.15
OF    292.00      14.24       14.12       19.14
OF    295.30      14.22       14.12       19.12
OF    298.60      14.20       14.12       19.11
OF    301.80      14.18       14.12       19.10
OF    305.10      14.16       14.12       19.09
OF    308.40      14.14       14.12       19.07
OF    311.70      14.12       14.12       19.06
OF    315.00      14.10       14.12       19.05
OF    318.20      14.07       14.12       19.03
OF    321.50      14.05       14.12       19.01
OF    324.80      14.02       14.12       19.00
OF    328.10      14.00       14.12       18.98
OF    331.40      13.98       14.12       18.97
OF    334.60      13.95       14.12       18.95
OF    337.90      13.93       14.12       18.93
OF    341.20      13.90       14.12       18.92
OF    344.50      13.88       14.12       18.90
OF    347.80      13.85       14.12       18.89
OF    351.00      13.83       14.12       18.87
OF    354.30      13.81       14.12       18.86
OF    357.60      13.78       14.12       18.84
OF    360.90      13.76       14.12       18.82
OF    364.20      13.73       14.12       18.81
OF    367.50      13.71       14.12       18.79
OF    370.70      13.68       14.12       18.78
OF    374.00      13.66       14.12       18.76
OF    377.30      13.64       14.12       18.75
OF    380.60      13.61       14.12       18.73
OF    383.90      13.59       14.12       18.71
OF    387.10      13.56       14.12       18.70
OF    390.40      13.54       14.12       18.68
OF    393.70      13.51       14.12       18.67
OF    397.00      13.49       14.12       18.65
OF    400.30      13.47       14.12       18.63
OF    403.50      13.44       14.12       18.62
OF    406.80      13.42       14.12       18.60
OF    410.10      13.39       14.12       18.59
OF    413.40      13.37       14.12       18.57
OF    416.70      13.34       14.12       18.56
OF    419.90      13.27       14.12       18.50
OF    423.20      12.77       14.12       18.15
OF    426.50      12.27       14.12       17.79
OF    429.80      11.77       14.12       17.44
OF    433.10      11.27       14.12       17.08
OF    436.40      10.76       14.12       16.73
OF    439.60      10.26       14.12       16.37
OF    442.90       9.76       14.12       16.02
OF    446.20       9.25       14.12       15.66
OF    449.50       8.74       14.12       15.30
IF    452.80       5.04       14.12       12.56
IF    456.00       4.73       14.12       12.45
IF    459.30       4.41       14.12       12.36
IF    462.60       4.08       14.12       12.27
IF    465.90       3.75       14.12       12.18
IF    469.20       3.43       14.12       12.10
IF    472.40       3.05       14.12       12.00
IF    475.70       2.66       14.12       11.90
IF    479.00       2.27       14.12       11.81
IF    482.30       1.87       14.12       11.72
IF    485.60       1.48       14.12       11.63
IF    488.80       1.08       14.12       11.56
IF    492.10       0.69       14.12       11.49
IF    495.40       0.30       14.12       11.43
IF    497.20       0.01       14.12       11.23
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
     1.00              1.00                   8.99
     3.30              1.00                   8.99
     6.60              1.00                   8.99
     9.80              1.00                   8.99
    13.10              1.00                   9.00
    16.40              1.00                   9.00
    19.70              1.00                   9.00
    23.00              1.00                   9.00
    26.20              1.00                   9.01
    29.50              1.00                   9.01
    32.80              1.00                   9.01
    36.10              1.00                   9.01
    39.40              1.00                   9.02
    42.70              1.00                   9.02
    45.90              1.00                   9.02
    49.20              1.00                   9.02
    52.50              1.00                   9.03
    55.80              1.00                   9.03
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59.10	1.00	9.03
62.30	1.00	9.03
65.60	1.00	9.04
68.90	1.00	9.04
72.20	1.00	9.04
75.50	1.00	9.05
78.70	1.00	9.05
82.00	1.00	9.05
85.30	1.00	9.05
88.60	1.00	9.06
91.90	1.00	9.06
95.10	1.00	9.06
98.40	1.00	9.06
101.70	1.00	9.06
105.00	1.00	9.07
108.30	1.00	9.07
111.50	1.00	9.07
114.80	1.00	9.07
118.10	1.00	9.08
121.40	1.00	9.08
124.70	1.00	9.08
128.00	1.00	9.08
131.20	1.00	9.09
134.50	1.00	9.09
137.80	1.00	9.09
141.10	1.00	9.09
144.40	1.00	9.09
147.60	1.00	9.10
150.90	1.00	9.10
154.20	1.00	9.10
157.50	1.00	9.10
160.80	1.00	9.10
164.00	1.00	9.11
167.30	1.00	9.11
170.60	1.00	9.11
173.90	1.00	9.11
177.20	1.00	9.11
180.40	1.00	9.12
183.70	1.00	9.12
187.00	1.00	9.12
190.30	1.00	9.12
193.60	1.00	9.12
196.80	1.00	9.13
200.10	1.00	9.13
203.40	1.00	9.13
206.70	1.00	9.13
210.00	1.00	9.13
213.30	1.00	9.14
216.50	1.00	9.14
219.80	1.00	9.14
223.10	1.00	9.14
226.40	1.00	9.14
229.70	1.00	9.14
232.90	1.00	9.14
236.20	1.00	9.15
239.50	1.00	9.15
242.80	1.00	9.15
246.10	1.00	9.15
249.30	1.00	9.15
252.60	1.00	9.15
255.90	1.00	9.15
259.20	1.00	9.15
262.50	1.00	9.16
265.70	1.00	9.16
269.00	1.00	9.16
272.30	1.00	9.16
275.60	1.00	9.16
278.90	1.00	9.16
282.20	1.00	9.16
285.40	1.00	9.17
288.70	1.00	9.17
292.00	1.00	9.17
295.30	1.00	9.17
298.60	1.00	9.17
301.80	1.00	9.17
305.10	1.00	9.18
308.40	1.00	9.18
311.70	1.00	9.18
315.00	1.00	9.18
318.20	1.00	9.18
321.50	1.00	9.18
324.80	1.00	9.18
328.10	1.00	9.18
331.40	1.00	9.18
334.60	1.00	9.19
337.90	1.00	9.19
341.20	1.00	9.19
344.50	1.00	9.19
351.00	1.00	9.19
354.30	1.00	9.19
357.60	1.00	9.19
360.90	1.00	9.19
364.20	1.00	9.19
367.50	1.00	9.20
370.70	1.00	9.20
374.00	1.00	9.20
377.30	1.00	9.20
380.60	1.00	9.20
383.90	1.00	9.20
387.10	1.00	9.20
390.40	1.00	9.20
393.70	1.00	9.21

397.00	1.00	9.21
400.30	1.00	9.21
403.50	1.00	9.21
406.80	1.00	9.21
410.10	1.00	9.21
413.40	1.00	9.21
416.70	1.00	9.21
423.20	1.00	9.21
426.50	1.00	9.20
429.80	1.00	9.20
433.10	1.00	9.20
436.40	1.00	9.19
439.60	1.00	9.19
442.90	1.00	9.19
446.20	1.00	9.18
449.50	1.00	9.18
452.80	1.00	9.03
456.00	1.00	9.14
459.30	1.00	9.27
462.60	1.00	9.41
465.90	1.00	9.55
469.20	1.00	9.70
472.40	1.00	9.86
475.70	1.00	10.04
479.00	1.00	10.23
482.30	1.00	10.41
485.60	1.00	10.60
488.80	1.00	10.80
492.10	1.00	11.01
495.40	1.00	11.22

PART5   LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
472.84	WINDWARD

PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	FHF
0.00	19.55		
		V22 EL=20	120
1.00	19.55		
		V22 EL=20	120
2.00	19.54		
		V22 EL=20	120
3.30	19.54		
		V22 EL=20	120
6.60	19.53		
		V22 EL=20	120
9.80	19.52		
		V22 EL=20	120
13.10	19.51		
		V22 EL=20	120
16.40	19.51		
		V22 EL=20	120
19.70	19.51		
		V22 EL=20	120
23.00	19.51		
		V22 EL=20	120
26.20	19.50		
		V22 EL=20	120
29.50	19.50		
		V22 EL=20	120
32.80	19.50		
		V22 EL=20	120
35.16	19.50		
		V22 EL=19	120
36.10	19.50		
		V22 EL=19	120
39.40	19.50		
		V22 EL=19	120
42.70	19.50		
		V22 EL=19	120
45.90	19.50		
		V22 EL=19	120
49.20	19.50		
		V22 EL=19	120
52.50	19.49		
		V22 EL=19	120
55.80	19.49		
		V22 EL=19	120
59.10	19.49		
		V22 EL=19	120
62.30	19.49		
		V22 EL=19	120
65.60	19.49		
		V22 EL=19	120
68.90	19.49		
		V22 EL=19	120
72.20	19.49		
		V22 EL=19	120
75.50	19.48		
		V22 EL=19	120
78.70	19.48		
		V22 EL=19	120
82.00	19.48		
		V22 EL=19	120
85.30	19.48		
		V22 EL=19	120
88.60	19.48		
		V22 EL=19	120
91.90	19.48		
		V22 EL=19	120
95.10	19.48		
		V22 EL=19	120
98.40	19.48		

		V23	EL=19	130
101.70	19.47	V23	EL=19	130
105.00	19.47	V23	EL=19	130
108.30	19.47	V23	EL=19	130
111.50	19.47	V23	EL=19	130
114.80	19.47	V23	EL=19	130
118.10	19.46	V23	EL=19	130
121.40	19.46	V23	EL=19	130
124.70	19.46	V23	EL=19	130
128.00	19.46	V23	EL=19	130
131.20	19.46	V23	EL=19	130
134.50	19.46	V23	EL=19	130
137.80	19.45	V23	EL=19	130
141.10	19.45	V23	EL=19	130
144.40	19.45	V23	EL=19	130
147.60	19.45	V23	EL=19	130
150.90	19.45	V23	EL=19	130
154.20	19.44	V23	EL=19	130
157.50	19.44	V23	EL=19	130
160.80	19.44	V23	EL=19	130
164.00	19.44	V23	EL=19	130
167.30	19.44	V23	EL=19	130
170.60	19.43	V23	EL=19	130
173.90	19.43	V23	EL=19	130
177.20	19.43	V23	EL=19	130
180.40	19.43	V23	EL=19	130
183.70	19.43	V23	EL=19	130
187.00	19.42	V23	EL=19	130
190.30	19.42	V23	EL=19	130
193.60	19.42	V23	EL=19	130
196.80	19.42	V23	EL=19	130
200.10	19.41	V23	EL=19	130
203.40	19.41	V23	EL=19	130
206.70	19.41	V23	EL=19	130
210.00	19.41	V23	EL=19	130
213.30	19.40	V23	EL=19	130
216.50	19.40	V23	EL=19	130
219.80	19.40	V23	EL=19	130
223.10	19.39	V23	EL=19	130
226.40	19.38	V23	EL=19	130
229.70	19.36	V23	EL=19	130
232.90	19.35	V23	EL=19	130
236.20	19.34	V23	EL=19	130
239.50	19.33	V23	EL=19	130
242.80	19.32	V23	EL=19	130
246.10	19.31	V23	EL=19	130
249.30	19.29	V23	EL=19	130
252.60	19.28	V23	EL=19	130
255.90	19.27	V23	EL=19	130
259.20	19.26	V23	EL=19	130
262.50	19.24	V23	EL=19	130
265.70	19.23			

		V23	EL=19	130
269.00	19.22			
		V23	EL=19	130
272.30	19.21			
		V23	EL=19	130
275.60	19.20			
		V23	EL=19	130
278.90	19.18			
		V23	EL=19	130
282.20	19.17			
		V23	EL=19	130
285.40	19.16			
		V23	EL=19	130
288.70	19.15			
		V23	EL=19	130
292.00	19.14			
		V23	EL=19	130
295.30	19.12			
		V23	EL=19	130
298.60	19.11			
		V23	EL=19	130
301.80	19.10			
		V23	EL=19	130
305.10	19.09			
		V23	EL=19	130
308.40	19.07			
		V23	EL=19	130
311.70	19.06			
		V23	EL=19	130
315.00	19.05			
		V23	EL=19	130
318.20	19.03			
		V23	EL=19	130
321.50	19.01			
		V23	EL=19	130
324.80	19.00			
		V23	EL=19	130
328.10	18.98			
		V23	EL=19	130
331.40	18.97			
		V23	EL=19	130
334.60	18.95			
		V23	EL=19	130
337.90	18.93			
		V23	EL=19	130
341.20	18.92			
		V23	EL=19	130
344.50	18.90			
		V23	EL=19	130
347.80	18.89			
		V23	EL=19	130
351.00	18.87			
		V23	EL=19	130
354.30	18.86			
		V23	EL=19	130
357.60	18.84			
		V23	EL=19	130
360.90	18.82			
		V23	EL=19	130
364.20	18.81			
		V23	EL=19	130
367.50	18.79			
		V23	EL=19	130
370.70	18.78			
		V23	EL=19	130
374.00	18.76			
		V23	EL=19	130
377.30	18.75			
		V23	EL=19	130
380.60	18.73			
		V23	EL=19	130
383.90	18.71			
		V23	EL=19	130
387.10	18.70			
		V23	EL=19	130
390.40	18.68			
		V23	EL=19	130
393.70	18.67			
		V23	EL=19	130
397.00	18.65			
		V23	EL=19	130
400.30	18.63			
		V23	EL=19	130
403.50	18.62			
		V23	EL=19	130
406.80	18.60			
		V23	EL=19	130
410.10	18.59			
		V23	EL=19	130
413.40	18.57			
		V23	EL=19	130
416.70	18.56			
		V23	EL=19	130
419.90	18.50			
		V23	EL=18	130
419.90	18.50			
		V23	EL=18	130
423.20	18.15			
		V23	EL=18	130
426.50	17.79			
		V23	EL=18	130
429.24	17.50			

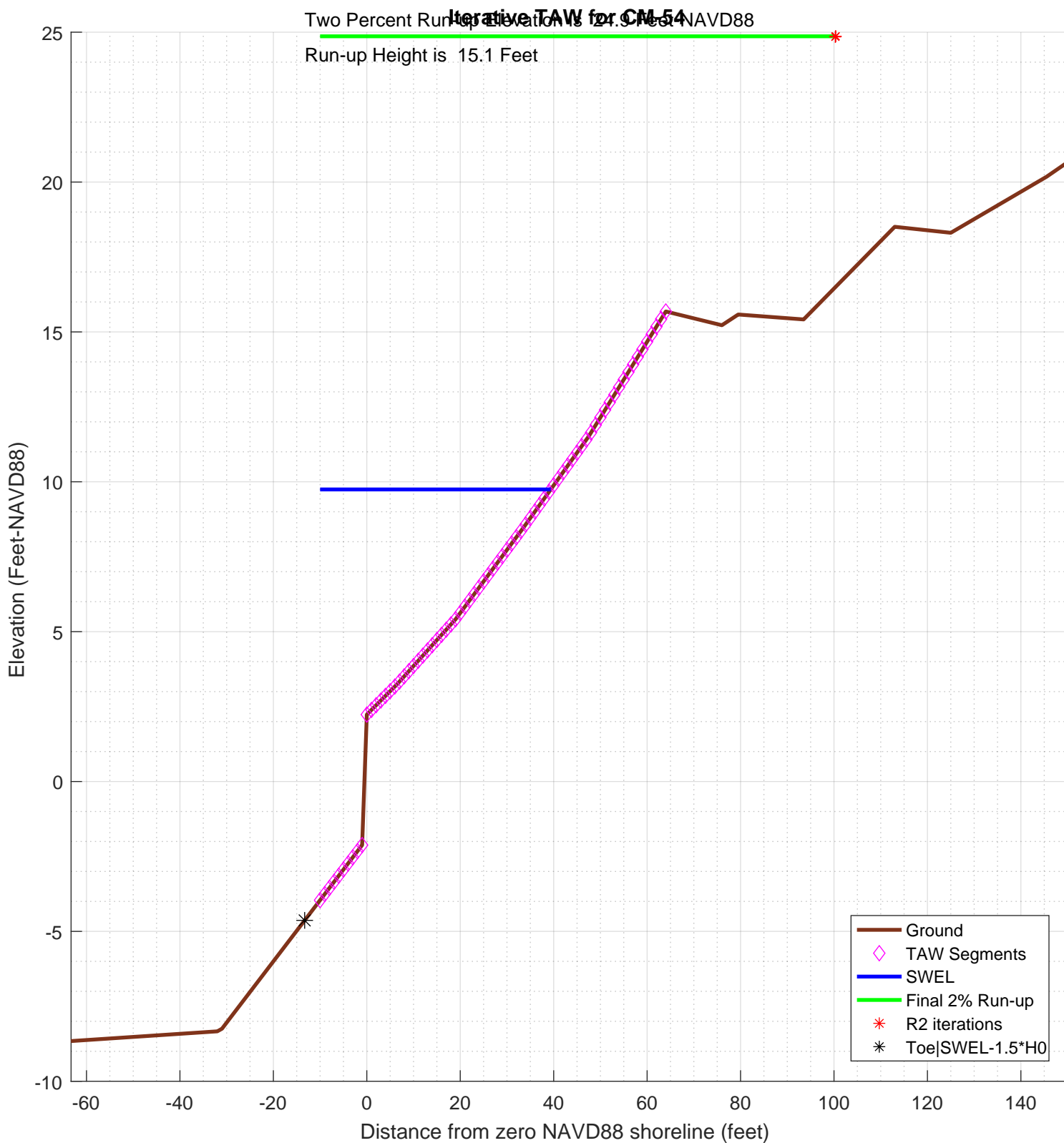|			
		V23	EL=17	130
429.80	17.44			
		V23	EL=17	130
433.10	17.08			
		V23	EL=17	130
436.40	16.73			
		V23	EL=17	130
438.45	16.50			
		V23	EL=16	130
439.60	16.37			
		V23	EL=16	130
442.90	16.02			
		V23	EL=16	130
446.20	15.66			
		V23	EL=16	130
447.66	15.50			
		V23	EL=15	130
449.50	15.30			
		V23	EL=15	130
450.46	14.50			
		V23	EL=14	130
451.67	13.50			
		V23	EL=13	130
452.80	12.56			
		V23	EL=13	130
454.48	12.50			
		V23	EL=12	130
456.00	12.45			
		V23	EL=12	130
459.30	12.36			
		V23	EL=12	130
462.60	12.27			
		V23	EL=12	130
465.90	12.18			
		V23	EL=12	130
469.20	12.10			
		V24	EL=12	140
472.40	12.00			
		V24	EL=12	140
472.84	12.05			
		A21	EL=12	110
475.70	11.90			
		A21	EL=12	110
479.00	11.81			
		A21	EL=12	110
482.30	11.72			
		A21	EL=12	110
485.60	11.63			
		A21	EL=12	110
488.80	11.56			
		A21	EL=12	110
491.79	11.50			
		A21	EL=11	110
492.10	11.49			
		A21	EL=11	110
495.40	11.43			
		A21	EL=11	110
497.20	11.23			

                    ZONE TERMINATED AT END OF TRANSECT
                    PART 7   POSTSCRIPT NOTES
         PS# 1   START(404019.8044,4833822.5918)
         PS# 2   END(403962.9959,4834037.0921)

-1.000000e+00

CM-54
100-year WHAFIS Output
Zero Station: -70.19065254, 43.65239954
Onshore Dir: 104.8 deg CCW from E
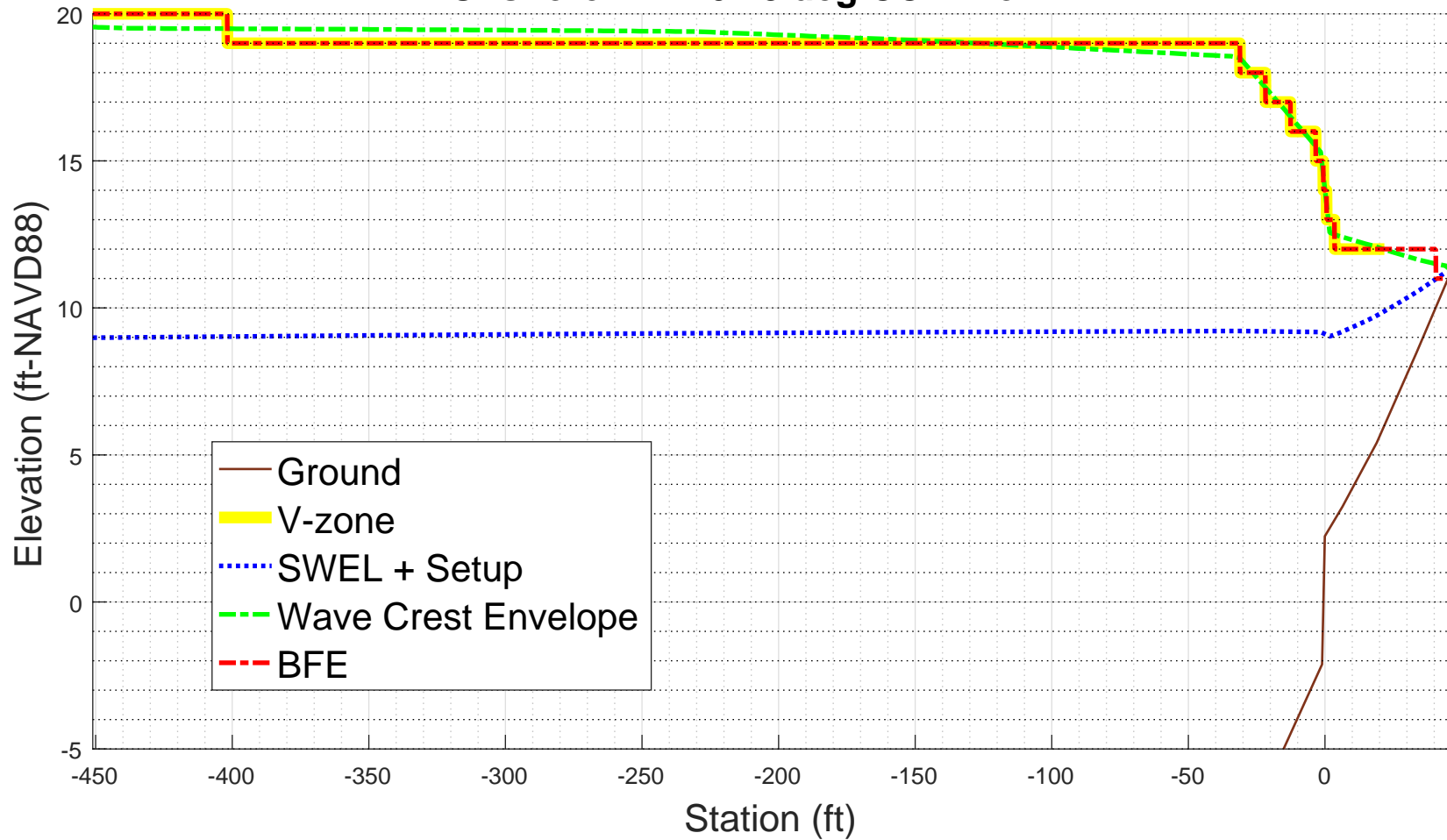
Elevation (ft-NAVD88)

Station (ft)

Ground
V-zone
SWEL + Setup
Wave Crest Envelope
BFE

Iterative TAW for CM-54
Two Percent Run-up Elevation is 24.9 Feet-NAVD88
Run-up Height is 15.1 Feet

```
diary on          % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-54
% calculation by SJH, Ransom Consulting, Inc. 16-Apr-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-54sta_ele_include.csv';   % file with station, elevation, include
                                  % third colunm is 0 for excluded points
imgname='logfiles/CM-54-runup';
SWEL=8.9874;  % 100-yr still water level including wave setup.
H0=9.2313;    % significant wave height at toe of structure
Tp=13.882;    % peak period, 1/fma,
T0=Tp/1.1;

gamma_berm=1;   % this may get changed automatically below
gamma_rough=0.5;
gamma_beta=1;
gamma_perm=1;

setupAtToe=0.22642;
maxSetup=2.2367;   % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-54'

plotTitle =

Iterative TAW for CM-54


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

SWEL=SWEL+setupAtToe

SWEL =

                 9.21382

SWEL_fore=SWEL+maxSetup

SWEL_fore =

                 11.45052


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

L0 =

          814.92908607186


% 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 =

                  -4.63313


% 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 =

                  23.06077


% 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 =

         -13.3009958538761

% 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

top_sta =

          93.218315018315


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

top_sta =

          93.218315018315

toe_sta

toe_sta =

         -13.3009958538761



% 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 82.2 ft landward of toe of slope


ans =

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


ans =

-!!-        setup is adjusted to 0.76 feet


ans =

-!!-        SWEL is adjusted to 9.74 feet


k =

     1
     2
     3
     4
     5
     6
     7
     8
     9
    10
    11
    12
    13
    14
    15
    16
    17
    18
    19
    20
    21
    22
    23
    24
    25



% 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 =
                  -4.63313
toe_sta =
        -13.3009958538761
top_sta =
        93.218315018315
Z2 =
                  23.06077
H0 =
                    9.2313
Tp =
                    13.882
T0 =
                    12.62
R2 =
                    27.6939
Z2 =
        37.4384807090869
top_sta =
```

```
              150.15410636209
Lslope =
          163.455102215966
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
          0.257389400139369
Irb =
           2.41834988586755
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                       0.5
gamma =
                       0.5
ans =
!!! - - Iribaren number:   2.42 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.9 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          15.0983921556538
R2del =
          12.5955078443462
Z2 =
          24.8429728647407
ans =
!---------------- STARTING ITERATION 2 -----------------!
Ztoe =
                   -4.63313
toe_sta =
         -13.3009958538761
top_sta =
          100.275845420219
Z2 =
          24.8429728647407
H0 =
                    9.2313
Tp =
                    13.882
T0 =
                     12.62
R2 =
          15.0983921556538
Z2 =
          24.8429728647407
top_sta =
          100.275845420219
Lslope =
          113.576841274095
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
          0.259525643908393
Irb =
           2.43842136073095
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                       0.5
gamma =
                       0.5
ans =
!!! - - Iribaren number:   2.44 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.9 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
```

```
          15.1179774588164
R2del =
       0.0195853031625539
Z2 =
          24.8625581679033
ans =
!---------------- STARTING ITERATION 3 -----------------!
Ztoe =
                   -4.63313
toe_sta =
         -13.3009958538761
top_sta =
          100.3534032983
Z2 =
          24.8625581679033
H0 =
                     9.2313
Tp =
                     13.882
T0 =
                      12.62
R2 =
          15.1179774588164
Z2 =
          24.8625581679033
top_sta =
          100.3534032983
Lslope =
          113.654399152176
ans =
!------- End Berm Factor Calculation, Iter: 3 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
       0.259520866661838
Irb =
       2.43837647522419
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                     0.5
gamma =
                     0.5
ans =
!!! - - Iribaren number:   2.44 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.9 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          15.1179339305016
R2del =
       4.35283147872667e-05
Z2 =
          24.8625146395885
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
          24.8625146395885
diary off
-1.000000e+00
```

```
_____
PART 5: RUNUP2

        for transect: CM-54

Station locations shifted by: -0.51 feet from their
original location to set the shoreline to
elevation 0 for RUNUP2 input


_____RUNUP2 INPUT CONVERSIONS_____
        for transect: CM-54

Incident significant wave height: 11.67 feet

Peak wave period: 14.12 seconds

Mean wave height: 7.30 feet

Local Depth below SWEL: 19.94 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 = 19.94
    Period, T = 12.01
    Waveheight, H = 7.30
Deep water wavelength, L0 (ft)
    L0 = g*T*T/twopi
    L0 = 32.17*12.01*12.01/6.28 = 738.04
Deep water wave celerity, C0 (ft/s)
    C0 = L0/T
    C0 = 738.04/12.01 = 61.48
Angular frequency, sigma (rad/s)
    sigma = twopi/T
    sigma = 6.28/12.01 = 0.52
Hunts (1979) approximation for Celerity C1H (ft/s) at Depth D (ft)
    y = sigma.*sigma.*D./g
    y = 0.52*0.52*19.94/32.17 = 0.17
    C1H = sqrt( g.*D./(y+1./(1 + 0.6522.*y + 0.4622.*y.^2 + 0.0864.*y.^4 +0.0675.*y.^5)) )
    C1H = 24.61
Shoaling Coefficient KsH
    KsH = sqrt(C0/C1H)
    KsH = sqrt(61.48/24.61) = 1.58
Deepwater Wave Height H0_H (ft)
    H0_H = H/KsH
    H0_H = 7.30/1.58 = 4.62

Deepwater mean wave height: 4.62 feet

_____END RUNUP2 CONVERSIONS_____

_____RUNUP2 RESULTS_____
        for transect: CM-54

RUNUP2 SWEL:
9.00
9.00
9.00
9.00
```

```
9.00
9.00
9.00
9.00
9.00

RUNUP2 deepwater mean wave heights:
4.39
4.39
4.39
4.62
4.62
4.62
4.85
4.85
4.85

RUNUP2 mean wave periods:
11.41
12.01
12.61
11.41
12.01
12.61
11.41
12.01
12.61

RUNUP2 runup above SWEL:
6.78
7.05
7.31
7.09
7.37
7.65
7.42
7.69
6.84

RUNUP2 Mean runup height above SWEL: 7.24 feet

RUNUP2 2-percent runup height above SWEL: 15.94 feet

RUNUP2 2-percent runup elevation: 24.94 feet-NAVD88

RUNUP2 Messages:
Nonfatal Error, Check Output

_____END RUNUP2 RESULTS_____



_____ACES BEACH RUNUP_____

Incident significant wave height: 11.67 feet

Significant wave height is mean wave height divided by 0.626
Reference: D.2.8.1.2.1 Atlanic and Gulf of Mexico G&S Feb. 2007

Deepwater significant wave height: 7.38 feet

Peak wave period: 14.12 seconds

Average beach Slope: 1:19.15 (H:V)


ACES IRREGULAR WAVE RUNUP ON BEACHES

# Reference:
# Leenknecht, David A., Andre Szuwaiski, and Ann Sherlock. 1992.
# "Automated Coastal Engineering System Technical Reference",
# Coastal Engineering Research Center, Department of the Army
```

```
# Waterways Experiments Station, Corps of Eniggneers, 3909 Halls
# Ferry Road, Vicksburg, Mississippi 39180-6199.

INPUTS:

Acceleration Due to Gravity,         g  =    32.174
Deepwater Significant Wave height,  Hs =     7.38
Wave Period,                         T  =    14.12
Beach Slope,                         S  =     0.052

EQUATIONS:

Runup,            R   = Hs * a * Irb^b
Iribarren,        Irb = S/sqrt(Hs/L0)
Wavelength,       L0  = g * T^2 / 2 / pi

COEFFICIENTS:
(Mase, H. 1989, "Random Wave Runup Height on Gentle Slopes,"
j. Waterway, Port, Coastal and Ocean Engineering Division,
ASCE, Vol 115, No. 5, pp 649-661.)

                [Rmax,  R2%, R-1/3, R-1/10, R-mean]
          a = [2.32, 1.86,  1.70,   1.38,   0.88]
          b = [0.77, 0.71,  0.71,   0.70,   0.69]

RESULTS:

       RUNUP = [11.8,  9.7,   8.9,    7.2,    4.6]

ACES RUNUP CALCULATED USING 'Aces_Beach_Runup.m'

ACES Beach 2-percent runup height above SWEL: 9.72 feet

ACES Beach 2-percent runup elevation: 18.72 feet-NAVD88

ACES BEACH RUNUP is valid

_____END ACES BEACH RESULTS_____

PART 5 COMPLETE_____
```

```
   FEMA                                          sjh              job 2
   RUNUP2 transect: CM-54                                          1
7.00
   -10.95 -450.5 0.5
   -10.85 -435.5 0.5
   -10.84 -434.5 0.5
   -10.22 -230.5 0.5
   -10.21 -229.5 0.5
   -9.46 -140.5 0.5
   -9.45 -139.5 0.5
   -8.33 -31.5  0.5
   -8.25 -30.5  0.5
   -5.39 -16.5  0.5
   -2.73 -3.5   0.5
   -2.12 -0.5   0.5
   2.23  0.5    0.5
   3.25  7.0    0.5
   5.41  19.5   0.5
   8.46  34.0   0.5
   11.52 48.0   0.5
   15.68 64.5   0.5
   15.68 94.0   0.5
1 18.51 113.5  0.5
   9.0    4.39  11.41
   9.0    4.39  12.01
   9.0    4.39  12.61
   9.0    4.62  11.41
   9.0    4.62  12.01
   9.0    4.62  12.61
   9.0    4.85  11.41
   9.0    4.85  12.01
   9.0    4.85  12.61
```

****

CROSS SECTION PROFILE

	LENGTH	ELEV.	SLOPE	ROUGHNESS
1	-450.0	-10.9		
			.00	.50
2	-435.0	-10.8		
			FLAT	.50
3	-434.0	-10.8		
			340.00	.50
4	-230.0	-10.2		
			FLAT	.50
5	-229.0	-10.2		
			119.59	.50
6	-140.5	-9.4		
			100.00	.50
7	-139.5	-9.4		
			96.43	.50
8	-31.5	-8.3		
			12.50	.50
9	-30.5	-8.2		
			4.90	.50
10	-16.5	-5.4		
			4.89	.50
11	-3.5	-2.7		
			4.92	.50
12	-.5	-2.1		
			.23	.50
13	.5	2.2		
			6.37	.50
14	7.0	3.3		
			5.79	.50
15	19.5	5.4		
			4.75	.50
16	34.0	8.5		
			4.58	.50
17	48.0	11.5		
			3.97	.50
18	64.5	15.7		
			FLAT	.50
19	94.0	15.7		
			6.89	.50
20	113.5	18.5		

LAST SLOPE   7.00   LAST ROUGHNESS   .50

****

OUTPUT TABLE

```
        INPUT PARAMETERS                              RUNUP RESULTS
        ----------------                              -------------

WATER LEVEL    DEEP WATER                  BREAKING SLOPE   RUNUP SLOPE   RUNUP ABOVE        BREAKER
ABOVE DATUM    WAVE HEIGHT    WAVE PERIOD     NUMBER          NUMBER      WATER LEVEL         DEPTH
  (FT.)          (FT.)         (SEC.)                                       (FT.)            (FT.)


   9.00           4.39          11.41           11              19        6.78   5.82         6.83
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.39          12.01           11              19        7.05   6.08         6.98
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.39          12.61           11              19        7.31   6.34         7.13
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.62          11.41           11              19        7.09   6.03         7.12
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.62          12.01           11              19        7.37   6.31         7.27
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.62          12.61           11              19        7.65   6.56         7.42
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.85          11.41           11              19        7.42   6.21         7.40
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.85          12.01           11              19        7.69   6.50         7.55
                                                                      SOLUTION DOES NOT CONVERGE


   9.00           4.85          12.61           11              19           6.84             7.71
```

Runup2 2% runup elevation for Transect: CM-54

Two Percent Run-up Elevation is 24.9 Feet-NAVD88

Run-up Height is 15.9 Feet

Legend:
- Ground
- Swel
- 2% Runup

X-axis: Station (ft)
Y-axis: Elevation (ft)
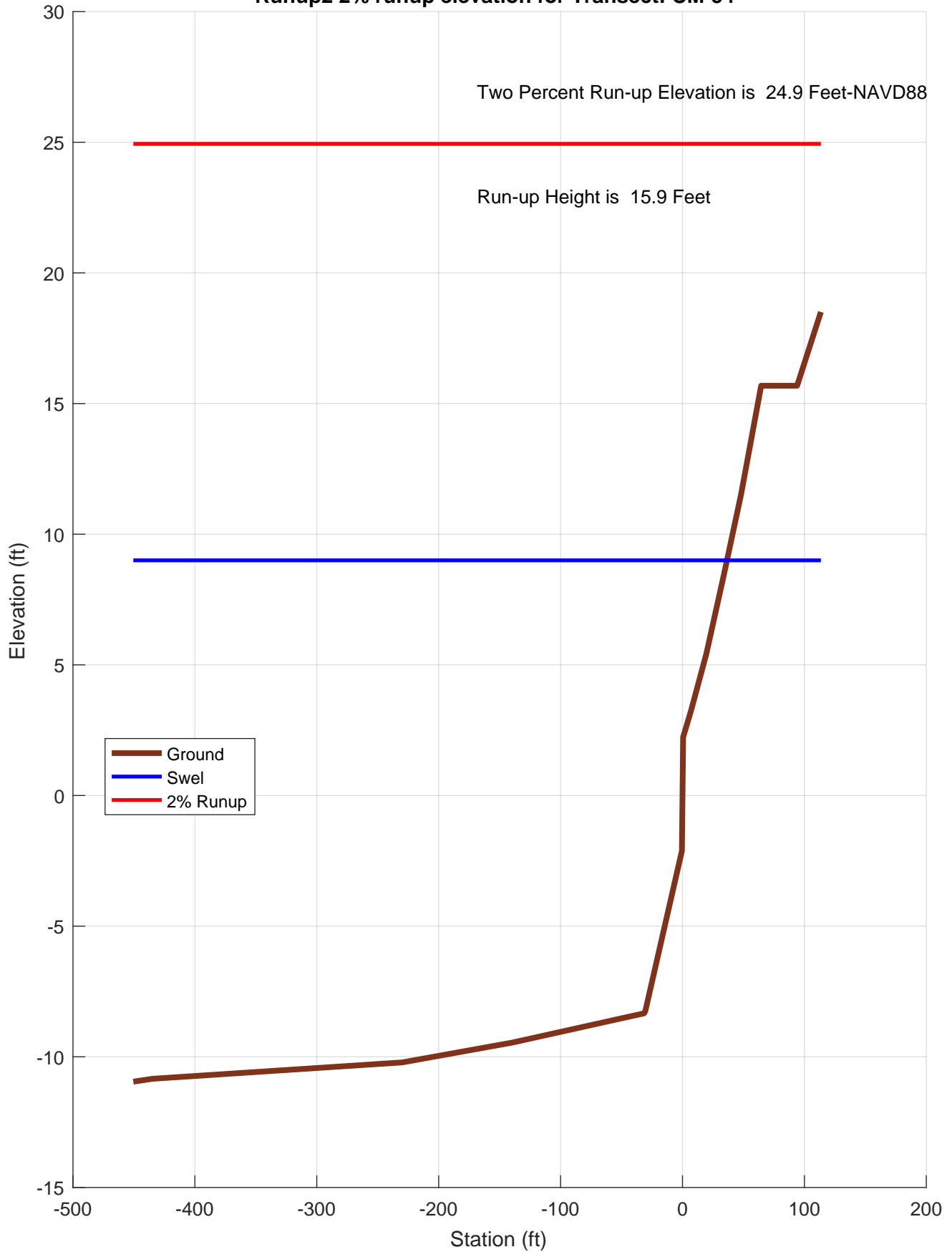
Transect Number: CM-57-1
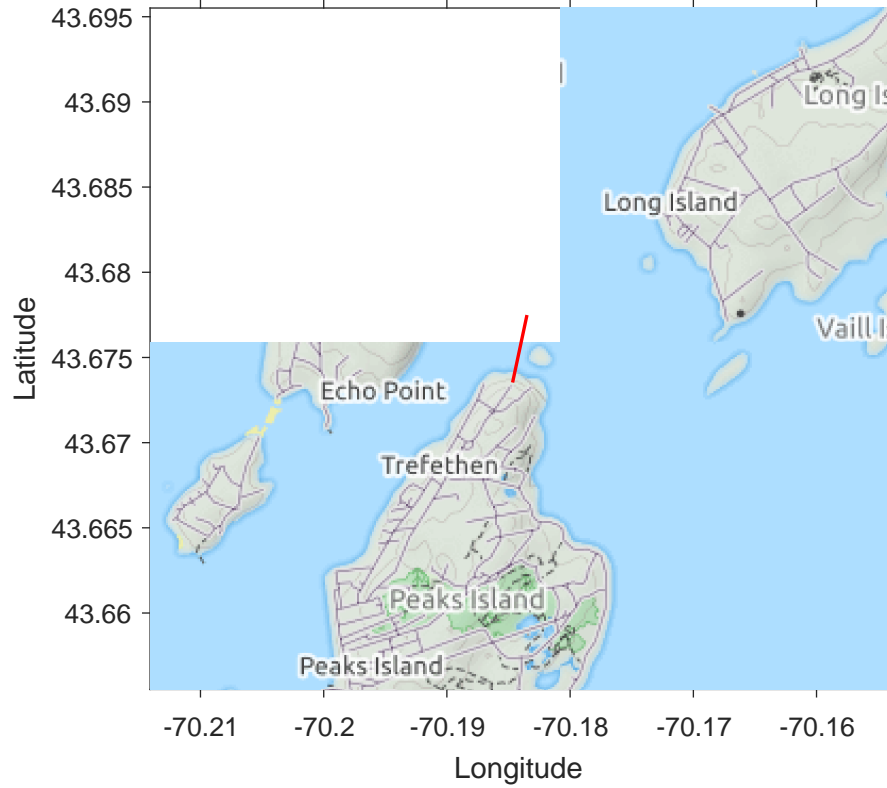
Elevation profile
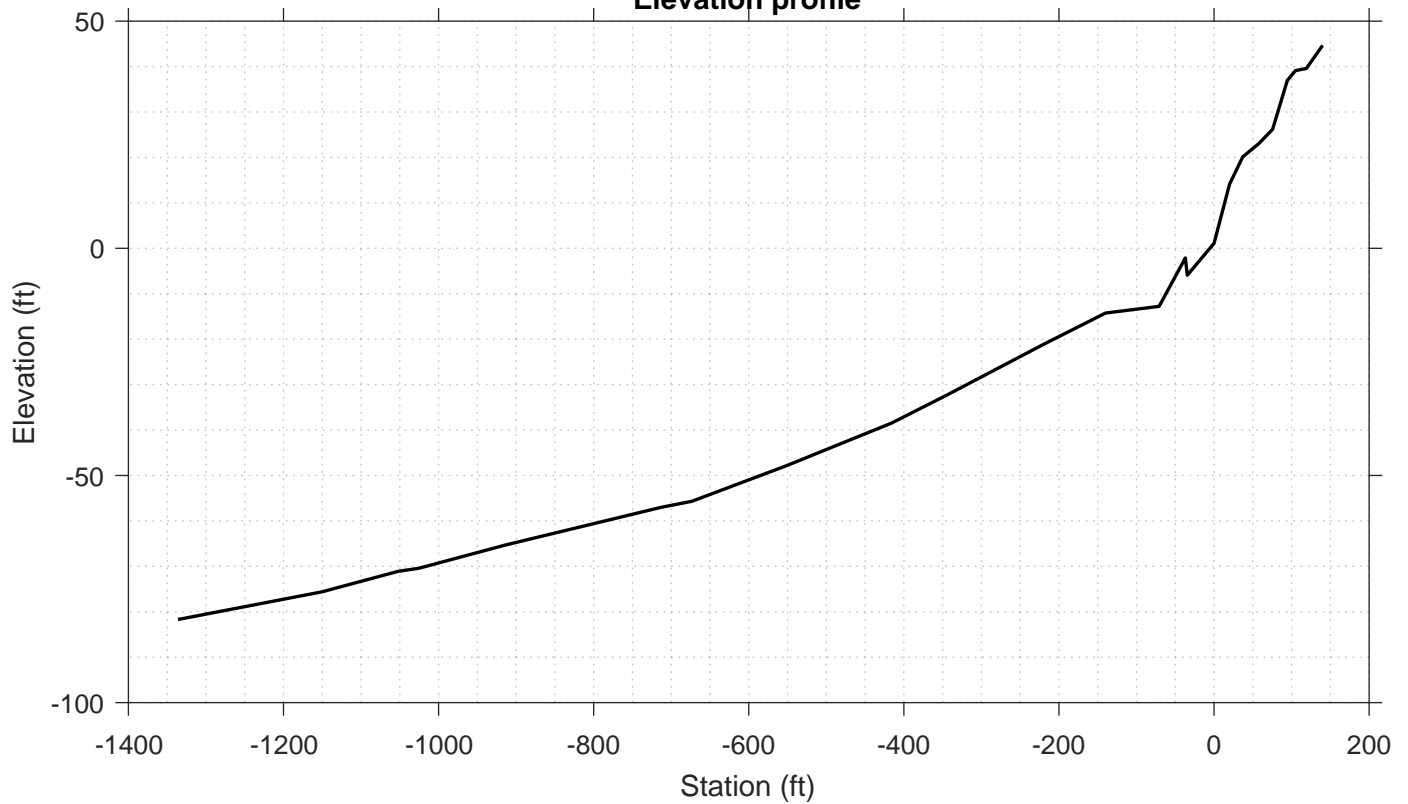
```
_____
DATA LOG FOR TRANSECT ID: CM-57-1
_____


_____
PART 1: USER INPUT


SWAN 1-D / WHAFIS input
_____
station:     -211 ft
LON:          -70.1844 deg E
LAT:          43.6745 deg N
Bottom ELEV:        -20.3769 ft-NAVD88
TWL:          8.9341 ft-NAVD88
HS:           3.5195 ft
TP:           NaN sec
Wave Direction bin: 270 deg CCW from East (90 deg sector)
Transect Direction:   253.5074 deg CCW from East


TAW/RUNUP input
_____
toe sta:      -73 ft
toe elev:    -12.8231 ft-NAVD88
top sta:      37 ft
top elev:     20.1214 ft-NAVD88
*Wave and water level conditions at toe to be calculated in SWAN 1-D*

PART 1 COMPLETE_____
```

transectCM-57-1: User-Selected inputs

Legend:
- Transect Profile
- ADCIRC Profile
- TWL
- HS
- TP
- 1-D Wave start
- ◇ TAW toe/top

X-axis: Cross-shore Distance (feet)

Y-axis: Elevation (ft), Significant Wave Height (ft), Period (sec)
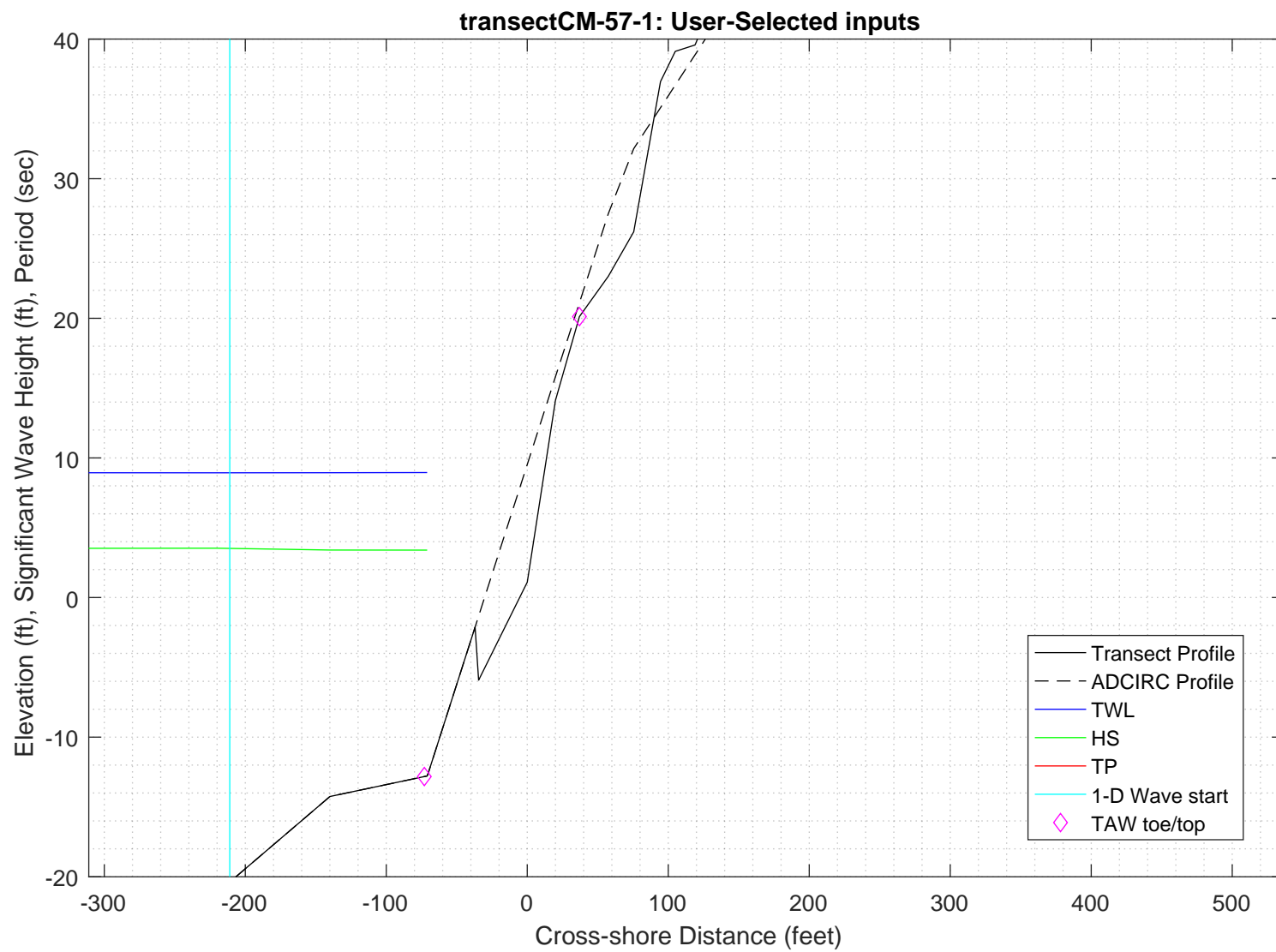
```
_____
PART 2: SWAN 1-D

swan input grid name: 2_swan/gridfiles/CM-57-1zmeters_xmeters.grd
swan file name:        2_swan/swanfiles/CM-57-1.swn
swan output name:      2_swan/swanfiles/CM-57-1.dat

Boundary Conditions:
    TWL- 2.7231 meters
    HS-  1.0728 meters
    PER- 4.7 seconds

Batch File: 2_swan/swanfiles/runswan.dat

SWAN maximum additional wave setup: 0.51165 feet
SWAN output at toe:
    SETUP- -0.002769 feet
    HS-    3.4921 feet
    PER-   4.6289 seconds

PART 2 COMPLETE_____
```

2-D ADCIRC+SWAN and SWAN 1-D results, Transect:
CM-57-1

Legend:
- Transect Profile
- TWL (ADC 2D)
- TWL (SWN 1D)
- Hs (ADC 2D)
- Hs (SWN 1D)

Y-axis: Elevation, TWL, HS (ft)

X-axis: Station (ft)

Execution started at 20200416.132457


```
                    ---------------------------------------
                                    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   70   0.   70   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   70   0   1   1

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

 READ   BOTTOM   -1. '../gridfiles/CM-57-1zmeters_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   1.0728   4.7   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       70  70     0
!TABLe 'sname' < HEADer|NOHEADer|INDexed > 'fname' <output parameters> (output time)
 Table 'curve'   HEADER 'CM-57-1.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              71 MYC                1
                      : MCGRD            72
                      : 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  27.54 % 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   1.45 % 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  31.89 % 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  97.11 % 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  97.11 % of wet grid points ( 99.50 % required)

iteration    7; sweep 1
iteration    7; sweep 2
iteration    7; sweep 3
iteration    7; sweep 4
accuracy OK in  97.11 % of wet grid points ( 99.50 % required)

iteration    8; sweep 1
iteration    8; sweep 2
iteration    8; sweep 3
iteration    8; sweep 4
accuracy OK in  98.56 % of wet grid points ( 99.50 % required)

iteration    9; sweep 1
iteration    9; sweep 2
iteration    9; sweep 3
iteration    9; sweep 4
accuracy OK in  98.56 % of wet grid points ( 99.50 % required)

iteration   10; sweep 1
iteration   10; sweep 2
iteration   10; sweep 3
iteration   10; sweep 4
accuracy OK in  98.56 % of wet grid points ( 99.50 % required)

iteration   11; sweep 1
iteration   11; sweep 2
iteration   11; sweep 3
iteration   11; sweep 4
accuracy OK in  98.56 % of wet grid points ( 99.50 % required)

iteration   12; sweep 1
iteration   12; sweep 2
iteration   12; sweep 3
iteration   12; sweep 4
accuracy OK in 100.00 % of wet grid points ( 99.50 % required)


STOP
```

```
%
%
%
% Run:1      Table:curve          SWAN version:41.20A
%
%     Xp           Yp           Hsig        TPsmoo       RTpeak       Tm_10        Dir         Dspr         Depth        Setup
%     [m]          [m]          [m]         [sec]        [sec]        [sec]        [degr]      [degr]       [m]          [m]
%
       0.           0.          1.07651      4.6270       4.6483       4.2395       0.000      31.5381      8.9300      0.000000
       1.           0.          1.07578      4.6270       4.6483       4.2375       0.000      31.4486      8.8500     -0.000019
       2.           0.          1.07497      4.6270       4.6483       4.2354       0.000      31.3613      8.7600     -0.000040
       3.           0.          1.07425      4.6270       4.6483       4.2333       0.000      31.2750      8.6799     -0.000060
       4.           0.          1.07342      4.6270       4.6483       4.2313       0.000      31.1905      8.5899     -0.000082
       5.           0.          1.07261      4.6270       4.6483       4.2292       0.000      31.1155      8.4999     -0.000105
       6.           0.          1.07189      4.6270       4.6483       4.2272       0.000      31.0409      8.4199     -0.000125
       7.           0.          1.07106      4.6270       4.6483       4.2251       0.000      30.9636      8.3299     -0.000149
       8.           0.          1.07025      4.6271       4.6483       4.2231       0.000      30.8886      8.2398     -0.000173
       9.           0.          1.06952      4.6271       4.6483       4.2211       0.000      30.8128      8.1598     -0.000196
      10.           0.          1.06872      4.6271       4.6483       4.2191       0.000      30.7359      8.0698     -0.000222
      11.           0.          1.06800      4.6272       4.6483       4.2172       0.000      30.6577      7.9898     -0.000246
      12.           0.          1.06719      4.6273       4.6483       4.2152       0.000      30.5750      7.8997     -0.000273
      13.           0.          1.06639      4.6273       4.6483       4.2133       0.000      30.4940      7.8097     -0.000302
      14.           0.          1.06569      4.6274       4.6483       4.2113       0.000      30.4122      7.7297     -0.000328
      15.           0.          1.06489      4.6275       4.6483       4.2094       0.000      30.3258      7.6396     -0.000359
      16.           0.          1.06412      4.6276       4.6483       4.2075       0.000      30.2403      7.5496     -0.000390
      17.           0.          1.06343      4.6277       4.6483       4.2057       0.000      30.1541      7.4696     -0.000419
      18.           0.          1.06267      4.6278       4.6483       4.2039       0.000      30.0667      7.3795     -0.000452
      19.           0.          1.06200      4.6279       4.6483       4.2020       0.000      29.9778      7.2995     -0.000483
      20.           0.          1.06123      4.6281       4.6483       4.2002       0.000      29.8841      7.2095     -0.000519
      21.           0.          1.06053      4.6282       4.6483       4.1985       0.000      29.7989      7.1194     -0.000556
      22.           0.          1.06024      4.6283       4.6483       4.1969       0.000      29.7426      7.0594     -0.000582
      23.           0.          1.06038      4.6283       4.6483       4.1954       0.000      29.7103      7.0394     -0.000594
      24.           0.          1.06058      4.6283       4.6483       4.1938       0.000      29.6859      7.0194     -0.000605
      25.           0.          1.06077      4.6284       4.6483       4.1923       0.000      29.6604      6.9994     -0.000617
      26.           0.          1.06089      4.6284       4.6483       4.1908       0.000      29.6344      6.9694     -0.000633
      27.           0.          1.06111      4.6284       4.6483       4.1892       0.000      29.6121      6.9494     -0.000645
      28.           0.          1.06134      4.6284       4.6483       4.1877       0.000      29.5910      6.9293     -0.000657
      29.           0.          1.06157      4.6285       4.6483       4.1861       0.000      29.5702      6.9093     -0.000669
      30.           0.          1.06180      4.6285       4.6483       4.1846       0.000      29.5495      6.8893     -0.000681
      31.           0.          1.06204      4.6285       4.6483       4.1830       0.000      29.5290      6.8693     -0.000693
      32.           0.          1.06226      4.6285       4.6483       4.1815       0.001      29.5054      6.8493     -0.000705
      33.           0.          1.06241      4.6286       4.6483       4.1799       0.001      29.4806      6.8193     -0.000722
      34.           0.          1.06265      4.6286       4.6483       4.1784       0.001      29.4590      6.7993     -0.000735
      35.           0.          1.06289      4.6286       4.6483       4.1768       0.001      29.4385      6.7793     -0.000747
      36.           0.          1.06315      4.6287       4.6483       4.1752       0.001      29.4183      6.7592     -0.000760
      37.           0.          1.06340      4.6287       4.6483       4.1737       0.001      29.3982      6.7392     -0.000773
      38.           0.          1.06365      4.6287       4.6483       4.1721       0.001      29.3781      6.7192     -0.000786
      39.           0.          1.06391      4.6288       4.6483       4.1705       0.001      29.3581      6.6992     -0.000799
      40.           0.          1.06415      4.6288       4.6483       4.1689       0.002      29.3343      6.6792     -0.000812
      41.           0.          1.06431      4.6289       4.6483       4.1673       0.002      29.3093      6.6492     -0.000830
      42.           0.          1.06438      4.6289       4.6483       4.1655       0.002      29.2570      6.6292     -0.000844
      43.           0.          1.06320      4.6291       4.6483       4.1635       0.002      29.0756      6.5291     -0.000896
      44.           0.          1.06015      4.6299       4.6483       4.1624       0.002      28.7770      6.2089     -0.001065
      45.           0.          1.05701      4.6307       4.6483       4.1617       0.003      28.4169      5.8987     -0.001252
      46.           0.          1.05402      4.6315       4.6483       4.1617       0.003      28.0249      5.5785     -0.001473
      47.           0.          1.05132      4.6324       4.6483       4.1625       0.003      27.6025      5.2683     -0.001722
      48.           0.          1.04901      4.6334       4.6483       4.1645       0.003      27.1549      4.9480     -0.002022
      49.           0.          1.04732      4.6345       4.6483       4.1676       0.004      26.6983      4.6376     -0.002365
      50.           0.          1.04636      4.6357       4.6483       4.1722       0.004      26.2354      4.3172     -0.002785
      51.           0.          1.04634      4.6368       4.6483       4.1781       0.004      25.7923      4.0067     -0.003276
      52.           0.          1.04764      4.6380       4.6483       4.1857       0.005      25.3383      3.6861     -0.003897
      53.           0.          1.05493      4.6392       4.6483       4.1954       0.005      25.8992      3.3754     -0.004603
      54.           0.          1.05116      4.6349       4.6483       4.1601       0.005      26.9724      4.4874     -0.002631
      55.           0.          1.05093      4.6356       4.6483       4.1627       0.005      26.6419      4.2771     -0.002901
      56.           0.          1.05063      4.6364       4.6483       4.1655       0.006      26.2560      4.0768     -0.003209
      57.           0.          1.05024      4.6372       4.6483       4.1688       0.006      25.7491      3.8764     -0.003560
      58.           0.          1.05038      4.6380       4.6483       4.1729       0.006      25.2321      3.6660     -0.003980
      59.           0.          1.05110      4.6388       4.6483       4.1769       0.006      24.6987      3.4656     -0.004443
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60.	0.	1.05262	4.6396	4.6483	4.1805	0.006	24.1354	3.2650	-0.004981
61.	0.	1.05544	4.6405	4.6483	4.1828	0.006	23.5571	3.0544	-0.005640
62.	0.	1.05948	4.6413	4.6483	4.1806	0.007	22.9607	2.8536	-0.006379
63.	0.	1.06517	4.6420	4.6483	4.1709	0.007	22.3210	2.6528	-0.007247
64.	0.	1.07174	4.6429	4.6483	4.1494	0.007	21.2941	2.4417	-0.008324
65.	0.	1.08828	4.6457	4.6483	4.1037	359.965	19.4181	1.9285	-0.011550
66.	0.	1.09912	4.6516	4.6483	3.9387	359.900	16.5937	1.2735	-0.016534
67.	0.	0.90228	4.6629	4.6483	3.7801	358.723	16.8584	0.6486	0.008621
68.	0.	0.22075	6.2983	6.4550	4.4359	359.420	24.0858	0.1460	0.155952
69.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000
70.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000

PART 3: WHAFIS

WHAFIS input: CM-57-1.dat
WHAFIS output: CM-57-1.out

PART 3 COMPLETE_____
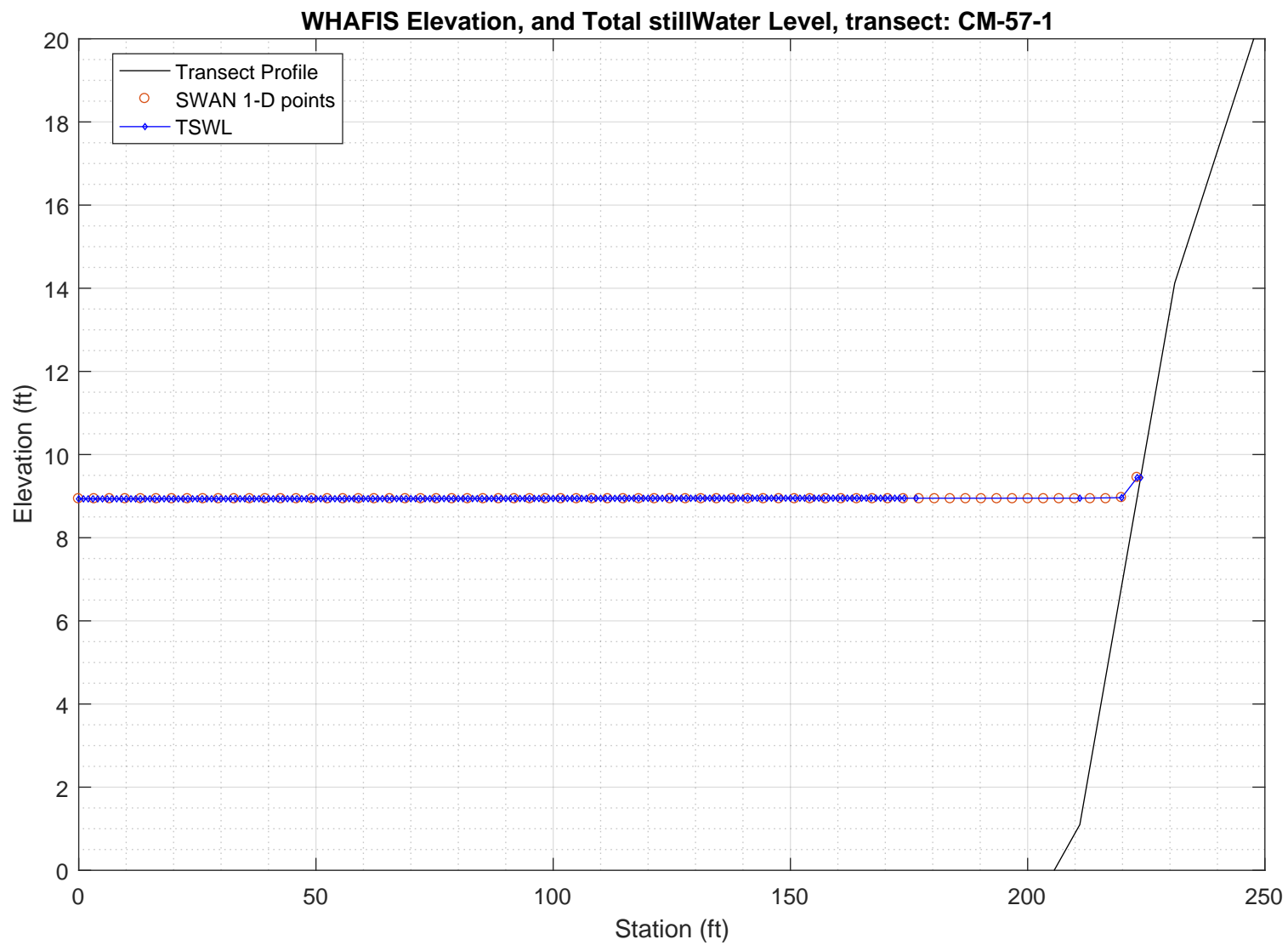
WHAFIS Elevation, and Total stillWater Level, transect: CM-57-1

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WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)
Executed on: Thu Apr 16 13:27:11 2020
Input file:  C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Portland\3_whafis\whafis4\CM-57-1.dat
Output file: C:\FEMA-TransectAnalysis\LOMR-TransectAnalysis-Portland\3_whafis\whafis4\CM-57-1.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   -20.376    1.000    1.000    8.934    5.631    4.700   56.140    0.086    0.000
   OF     1.000   -20.290    0.000    8.934    0.000    0.000    0.000    0.000    0.086    0.000
   OF     2.000   -20.204    0.000    8.934    0.000    0.000    0.000    0.000    0.086    0.000
   OF     3.000   -20.118    0.000    8.934    0.000    0.000    0.000    0.000    0.086    0.000
   OF     4.000   -20.032    0.000    8.934    0.000    0.000    0.000    0.000    0.086    0.000
   OF     5.000   -19.946    0.000    8.934    0.000    0.000    0.000    0.000    0.086    0.000
   OF     6.000   -19.859    0.000    8.934    0.000    0.000    0.000    0.000    0.086    0.000
   OF     7.000   -19.773    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF     8.000   -19.687    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF     9.000   -19.601    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    10.000   -19.514    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    11.000   -19.428    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    12.000   -19.342    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    13.000   -19.255    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    14.000   -19.169    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    15.000   -19.083    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    16.000   -18.997    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    17.000   -18.911    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    18.000   -18.824    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    19.000   -18.738    0.000    8.935    0.000    0.000    0.000    0.000    0.086    0.000
   OF    20.000   -18.652    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    21.000   -18.566    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    22.000   -18.480    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    23.000   -18.393    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    24.000   -18.307    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    25.000   -18.221    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    26.000   -18.135    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    27.000   -18.048    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    28.000   -17.962    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    29.000   -17.876    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    30.000   -17.790    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    31.000   -17.703    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    32.000   -17.617    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    33.000   -17.531    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    34.000   -17.445    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    35.000   -17.359    0.000    8.936    0.000    0.000    0.000    0.000    0.086    0.000
   OF    36.000   -17.272    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    37.000   -17.186    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    38.000   -17.100    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    39.000   -17.014    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    40.000   -16.928    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    41.000   -16.841    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    42.000   -16.755    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    43.000   -16.669    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    44.000   -16.583    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    45.000   -16.496    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    46.000   -16.410    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    47.000   -16.324    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    48.000   -16.238    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    49.000   -16.151    0.000    8.937    0.000    0.000    0.000    0.000    0.086    0.000
   OF    50.000   -16.065    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    51.000   -15.979    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    52.000   -15.893    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    53.000   -15.807    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    54.000   -15.720    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    55.000   -15.634    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    56.000   -15.548    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    57.000   -15.462    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    58.000   -15.376    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    59.000   -15.289    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    60.000   -15.203    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    61.000   -15.117    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    62.000   -15.030    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    63.000   -14.944    0.000    8.938    0.000    0.000    0.000    0.000    0.086    0.000
   OF    64.000   -14.858    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    65.000   -14.772    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    66.000   -14.686    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    67.000   -14.599    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    68.000   -14.513    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    69.000   -14.427    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    70.000   -14.341    0.000    8.939    0.000    0.000    0.000    0.000    0.086    0.000
   OF    71.000   -14.255    0.000    8.939    0.000    0.000    0.000    0.000    0.056    0.000
   OF    72.000   -14.230    0.000    8.939    0.000    0.000    0.000    0.000    0.023    0.000
   OF    73.000   -14.209    0.000    8.939    0.000    0.000    0.000    0.000    0.022    0.000
   OF    74.000   -14.187    0.000    8.939    0.000    0.000    0.000    0.000    0.022    0.000
   OF    75.000   -14.166    0.000    8.940    0.000    0.000    0.000    0.000    0.021    0.000
   OF    76.000   -14.145    0.000    8.940    0.000    0.000    0.000    0.000    0.022    0.000
   OF    77.000   -14.123    0.000    8.940    0.000    0.000    0.000    0.000    0.022    0.000
   OF    78.000   -14.102    0.000    8.940    0.000    0.000    0.000    0.000    0.021    0.000
   OF    79.000   -14.081    0.000    8.940    0.000    0.000    0.000    0.000    0.022    0.000
   OF    80.000   -14.059    0.000    8.940    0.000    0.000    0.000    0.000    0.022    0.000
   OF    81.000   -14.038    0.000    8.941    0.000    0.000    0.000    0.000    0.021    0.000
   OF    82.000   -14.017    0.000    8.941    0.000    0.000    0.000    0.000    0.021    0.000
   OF    83.000   -13.996    0.000    8.941    0.000    0.000    0.000    0.000    0.022    0.000
   OF    84.000   -13.974    0.000    8.941    0.000    0.000    0.000    0.000    0.022    0.000
   OF    85.000   -13.953    0.000    8.941    0.000    0.000    0.000    0.000    0.021    0.000
   OF    86.000   -13.932    0.000    8.941    0.000    0.000    0.000    0.000    0.022    0.000
   OF    87.000   -13.910    0.000    8.942    0.000    0.000    0.000    0.000    0.022    0.000
   OF    88.000   -13.889    0.000    8.942    0.000    0.000    0.000    0.000    0.021    0.000
   OF    89.000   -13.868    0.000    8.942    0.000    0.000    0.000    0.000    0.022    0.000
   OF    90.000   -13.846    0.000    8.942    0.000    0.000    0.000    0.000    0.022    0.000
   OF    91.000   -13.825    0.000    8.942    0.000    0.000    0.000    0.000    0.021    0.000
   OF    92.000   -13.804    0.000    8.943    0.000    0.000    0.000    0.000    0.022    0.000
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OF    93.000  -13.782   0.000   8.943   0.000   0.000   0.000   0.000   0.022   0.000
OF    94.000  -13.761   0.000   8.943   0.000   0.000   0.000   0.000   0.021   0.000
OF    95.000  -13.740   0.000   8.943   0.000   0.000   0.000   0.000   0.022   0.000
OF    96.000  -13.718   0.000   8.943   0.000   0.000   0.000   0.000   0.022   0.000
OF    97.000  -13.697   0.000   8.943   0.000   0.000   0.000   0.000   0.021   0.000
OF    98.000  -13.676   0.000   8.943   0.000   0.000   0.000   0.000   0.022   0.000
OF    99.000  -13.654   0.000   8.944   0.000   0.000   0.000   0.000   0.022   0.000
OF   100.000  -13.633   0.000   8.944   0.000   0.000   0.000   0.000   0.021   0.000
OF   101.000  -13.612   0.000   8.944   0.000   0.000   0.000   0.000   0.022   0.000
OF   102.000  -13.590   0.000   8.944   0.000   0.000   0.000   0.000   0.022   0.000
OF   103.000  -13.569   0.000   8.944   0.000   0.000   0.000   0.000   0.021   0.000
OF   104.000  -13.548   0.000   8.944   0.000   0.000   0.000   0.000   0.022   0.000
OF   105.000  -13.526   0.000   8.945   0.000   0.000   0.000   0.000   0.022   0.000
OF   106.000  -13.505   0.000   8.945   0.000   0.000   0.000   0.000   0.021   0.000
OF   107.000  -13.484   0.000   8.945   0.000   0.000   0.000   0.000   0.022   0.000
OF   108.000  -13.462   0.000   8.945   0.000   0.000   0.000   0.000   0.022   0.000
OF   109.000  -13.441   0.000   8.945   0.000   0.000   0.000   0.000   0.021   0.000
OF   110.000  -13.420   0.000   8.946   0.000   0.000   0.000   0.000   0.022   0.000
OF   111.000  -13.398   0.000   8.946   0.000   0.000   0.000   0.000   0.022   0.000
OF   112.000  -13.377   0.000   8.946   0.000   0.000   0.000   0.000   0.021   0.000
OF   113.000  -13.356   0.000   8.946   0.000   0.000   0.000   0.000   0.021   0.000
OF   114.000  -13.335   0.000   8.946   0.000   0.000   0.000   0.000   0.022   0.000
OF   115.000  -13.313   0.000   8.946   0.000   0.000   0.000   0.000   0.022   0.000
OF   116.000  -13.292   0.000   8.946   0.000   0.000   0.000   0.000   0.022   0.000
OF   117.000  -13.270   0.000   8.947   0.000   0.000   0.000   0.000   0.022   0.000
OF   118.000  -13.249   0.000   8.947   0.000   0.000   0.000   0.000   0.021   0.000
OF   119.000  -13.228   0.000   8.947   0.000   0.000   0.000   0.000   0.021   0.000
OF   120.000  -13.207   0.000   8.947   0.000   0.000   0.000   0.000   0.022   0.000
OF   121.000  -13.185   0.000   8.947   0.000   0.000   0.000   0.000   0.022   0.000
OF   122.000  -13.164   0.000   8.948   0.000   0.000   0.000   0.000   0.021   0.000
OF   123.000  -13.143   0.000   8.948   0.000   0.000   0.000   0.000   0.022   0.000
OF   124.000  -13.121   0.000   8.948   0.000   0.000   0.000   0.000   0.022   0.000
OF   125.000  -13.100   0.000   8.948   0.000   0.000   0.000   0.000   0.021   0.000
OF   126.000  -13.079   0.000   8.948   0.000   0.000   0.000   0.000   0.022   0.000
OF   127.000  -13.057   0.000   8.948   0.000   0.000   0.000   0.000   0.022   0.000
OF   128.000  -13.036   0.000   8.949   0.000   0.000   0.000   0.000   0.021   0.000
OF   129.000  -13.015   0.000   8.949   0.000   0.000   0.000   0.000   0.022   0.000
OF   130.000  -12.993   0.000   8.949   0.000   0.000   0.000   0.000   0.022   0.000
OF   131.000  -12.972   0.000   8.949   0.000   0.000   0.000   0.000   0.021   0.000
OF   132.000  -12.951   0.000   8.949   0.000   0.000   0.000   0.000   0.022   0.000
OF   133.000  -12.929   0.000   8.949   0.000   0.000   0.000   0.000   0.022   0.000
OF   134.000  -12.908   0.000   8.950   0.000   0.000   0.000   0.000   0.021   0.000
OF   135.000  -12.887   0.000   8.950   0.000   0.000   0.000   0.000   0.022   0.000
OF   136.000  -12.865   0.000   8.950   0.000   0.000   0.000   0.000   0.022   0.000
OF   137.000  -12.844   0.000   8.950   0.000   0.000   0.000   0.000   0.021   0.000
OF   138.000  -12.823   0.000   8.950   0.000   0.000   0.000   0.000   0.022   0.000
OF   139.000  -12.801   0.000   8.950   0.000   0.000   0.000   0.000   0.022   0.000
OF   140.000  -12.780   0.000   8.951   0.000   0.000   0.000   0.000   0.148   0.000
OF   141.000  -12.504   0.000   8.951   0.000   0.000   0.000   0.000   0.296   0.000
OF   142.000  -12.188   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   143.000  -11.874   0.000   8.951   0.000   0.000   0.000   0.000   0.314   0.000
OF   144.000  -11.560   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   145.000  -11.244   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   146.000  -10.930   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   147.000  -10.615   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   148.000  -10.301   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   149.000   -9.986   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   150.000   -9.671   0.000   8.951   0.000   0.000   0.000   0.000   0.314   0.000
OF   151.000   -9.357   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   152.000   -9.041   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   153.000   -8.727   0.000   8.951   0.000   0.000   0.000   0.000   0.314   0.000
OF   154.000   -8.412   0.000   8.951   0.000   0.000   0.000   0.000   0.314   0.000
OF   155.000   -8.098   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   156.000   -7.782   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   157.000   -7.468   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   158.000   -7.154   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   159.000   -6.838   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   160.000   -6.523   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   161.000   -6.209   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   162.000   -5.895   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   163.000   -5.579   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   164.000   -5.265   0.000   8.951   0.000   0.000   0.000   0.000   0.314   0.000
OF   165.000   -4.950   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   166.000   -4.635   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   167.000   -4.320   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   168.000   -4.006   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   169.000   -3.691   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   170.000   -3.376   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   171.000   -3.061   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   172.000   -2.747   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   173.000   -2.431   0.000   8.951   0.000   0.000   0.000   0.000   0.315   0.000
OF   174.000   -2.117   0.000   8.951   0.000   0.000   0.000   0.000  -0.996   0.000
OF   176.500   -5.919   0.000   8.951   0.000   0.000   0.000   0.000   0.087   0.000
IF   211.000    1.099   0.000   8.951   0.000   0.000   0.000   0.000   0.295   0.000
IF   219.800    6.840   0.000   8.962   0.000   0.000   0.000   0.000   0.651   0.000
IF   223.100    8.977   0.000   9.446   0.000   0.000   0.000   0.000   0.651   0.000
IF   223.800    9.446   0.000   9.446   0.000   0.000   0.000   0.000   0.670   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    -20.376      1.000      1.000      8.934      5.631      4.700     56.140        0.086      0.000
          END        END NEW SURGE  NEW SURGE                                                    BOTTOM    AVERAGE
      STATION  ELEVATION    10-YEAR   100-YEAR                                                    SLOPE    A-ZONES
OF      1.000    -20.290      0.000      8.934      0.000      0.000      0.000      0.000        0.086      0.000
          END        END NEW SURGE  NEW SURGE                                                    BOTTOM    AVERAGE
      STATION  ELEVATION    10-YEAR   100-YEAR                                                    SLOPE    A-ZONES
OF      2.000    -20.204      0.000      8.934      0.000      0.000      0.000      0.000        0.086      0.000
          END        END NEW SURGE  NEW SURGE                                                    BOTTOM    AVERAGE
      STATION  ELEVATION    10-YEAR   100-YEAR                                                    SLOPE    A-ZONES
OF      3.000    -20.118      0.000      8.934      0.000      0.000      0.000      0.000        0.086      0.000
          END        END NEW SURGE  NEW SURGE                                                    BOTTOM    AVERAGE
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	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	4.000	-20.032	0.000	8.934	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	5.000	-19.946	0.000	8.934	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	6.000	-19.859	0.000	8.934	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	7.000	-19.773	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	8.000	-19.687	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	9.000	-19.601	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	10.000	-19.514	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	11.000	-19.428	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	12.000	-19.342	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	13.000	-19.255	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	14.000	-19.169	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	15.000	-19.083	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	16.000	-18.997	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	17.000	-18.911	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	18.000	-18.824	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	19.000	-18.738	0.000	8.935	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	20.000	-18.652	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	21.000	-18.566	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	22.000	-18.480	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	23.000	-18.393	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	24.000	-18.307	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	25.000	-18.221	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	26.000	-18.135	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	27.000	-18.048	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	28.000	-17.962	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	29.000	-17.876	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	30.000	-17.790	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	31.000	-17.703	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	32.000	-17.617	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	33.000	-17.531	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	34.000	-17.445	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	35.000	-17.359	0.000	8.936	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	36.000	-17.272	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	37.000	-17.186	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	38.000	-17.100	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	39.000	-17.014	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	40.000	-16.928	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	41.000	-16.841	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	42.000	-16.755	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	43.000	-16.669	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	44.000	-16.583	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	45.000	-16.496	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	46.000	-16.410	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	47.000	-16.324	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	48.000	-16.238	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	49.000	-16.151	0.000	8.937	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	50.000	-16.065	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	51.000	-15.979	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	52.000	-15.893	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	53.000	-15.807	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	54.000	-15.720	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	55.000	-15.634	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	56.000	-15.548	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	57.000	-15.462	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	58.000	-15.376	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	59.000	-15.289	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	60.000	-15.203	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	61.000	-15.117	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	62.000	-15.030	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	63.000	-14.944	0.000	8.938	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	64.000	-14.858	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	65.000	-14.772	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	66.000	-14.686	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	67.000	-14.599	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	68.000	-14.513	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	69.000	-14.427	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	70.000	-14.341	0.000	8.939	0.000	0.000	0.000	0.000	0.086	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	71.000	-14.255	0.000	8.939	0.000	0.000	0.000	0.000	0.056	0.000
END	END	NEW SURGE	NEW SURGE						BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	72.000	-14.230	0.000	8.939	0.000	0.000	0.000	0.000	0.023	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	73.000	-14.209	0.000	8.939	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	74.000	-14.187	0.000	8.939	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	75.000	-14.166	0.000	8.940	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	76.000	-14.145	0.000	8.940	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	77.000	-14.123	0.000	8.940	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	78.000	-14.102	0.000	8.940	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	79.000	-14.081	0.000	8.940	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	80.000	-14.059	0.000	8.940	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	81.000	-14.038	0.000	8.941	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	82.000	-14.017	0.000	8.941	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	83.000	-13.996	0.000	8.941	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	84.000	-13.974	0.000	8.941	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	85.000	-13.953	0.000	8.941	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	86.000	-13.932	0.000	8.941	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	87.000	-13.910	0.000	8.942	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	88.000	-13.889	0.000	8.942	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	89.000	-13.868	0.000	8.942	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	90.000	-13.846	0.000	8.942	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	91.000	-13.825	0.000	8.942	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	92.000	-13.804	0.000	8.943	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	93.000	-13.782	0.000	8.943	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	94.000	-13.761	0.000	8.943	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	95.000	-13.740	0.000	8.943	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	96.000	-13.718	0.000	8.943	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	97.000	-13.697	0.000	8.943	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	98.000	-13.676	0.000	8.943	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	99.000	-13.654	0.000	8.944	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	100.000	-13.633	0.000	8.944	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	101.000	-13.612	0.000	8.944	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	102.000	-13.590	0.000	8.944	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	103.000	-13.569	0.000	8.944	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	104.000	-13.548	0.000	8.944	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	105.000	-13.526	0.000	8.945	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	106.000	-13.505	0.000	8.945	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	107.000	-13.484	0.000	8.945	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	108.000	-13.462	0.000	8.945	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	109.000	-13.441	0.000	8.945	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	110.000	-13.420	0.000	8.946	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	111.000	-13.398	0.000	8.946	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	112.000	-13.377	0.000	8.946	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	113.000	-13.356	0.000	8.946	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	114.000	-13.335	0.000	8.946	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	115.000	-13.313	0.000	8.946	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	116.000	-13.292	0.000	8.946	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	117.000	-13.270	0.000	8.947	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	118.000	-13.249	0.000	8.947	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	119.000	-13.228	0.000	8.947	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	120.000	-13.207	0.000	8.947	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	121.000	-13.185	0.000	8.947	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	122.000	-13.164	0.000	8.948	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	123.000	-13.143	0.000	8.948	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	124.000	-13.121	0.000	8.948	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	125.000	-13.100	0.000	8.948	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	126.000	-13.079	0.000	8.948	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	127.000	-13.057	0.000	8.948	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	128.000	-13.036	0.000	8.949	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	129.000	-13.015	0.000	8.949	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	130.000	-12.993	0.000	8.949	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	131.000	-12.972	0.000	8.949	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	132.000	-12.951	0.000	8.949	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	133.000	-12.929	0.000	8.949	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	134.000	-12.908	0.000	8.950	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	135.000	-12.887	0.000	8.950	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	136.000	-12.865	0.000	8.950	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	137.000	-12.844	0.000	8.950	0.000	0.000	0.000	0.000	0.021	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	138.000	-12.823	0.000	8.950	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	139.000	-12.801	0.000	8.950	0.000	0.000	0.000	0.000	0.022	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	140.000	-12.780	0.000	8.951	0.000	0.000	0.000	0.000	0.148	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	141.000	-12.504	0.000	8.951	0.000	0.000	0.000	0.000	0.296	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	142.000	-12.188	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	143.000	-11.874	0.000	8.951	0.000	0.000	0.000	0.000	0.314	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	144.000	-11.560	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	145.000	-11.244	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	146.000	-10.930	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	147.000	-10.615	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	148.000	-10.301	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	149.000	-9.986	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	150.000	-9.671	0.000	8.951	0.000	0.000	0.000	0.000	0.314	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	151.000	-9.357	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	152.000	-9.041	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	153.000	-8.727	0.000	8.951	0.000	0.000	0.000	0.000	0.314	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	154.000	-8.412	0.000	8.951	0.000	0.000	0.000	0.000	0.314	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	155.000	-8.098	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	156.000	-7.782	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	157.000	-7.468	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	158.000	-7.154	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	159.000	-6.838	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	160.000	-6.523	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	161.000	-6.209	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	162.000	-5.895	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	163.000	-5.579	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	164.000	-5.265	0.000	8.951	0.000	0.000	0.000	0.000	0.314	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	165.000	-4.950	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	166.000	-4.635	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	167.000	-4.320	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	168.000	-4.006	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	169.000	-3.691	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	170.000	-3.376	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	171.000	-3.061	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	172.000	-2.747	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	173.000	-2.431	0.000	8.951	0.000	0.000	0.000	0.000	0.315	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	174.000	-2.117	0.000	8.951	0.000	0.000	0.000	0.000	-0.996	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	176.500	-5.919	0.000	8.951	0.000	0.000	0.000	0.000	0.087	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	211.000	1.099	0.000	8.951	0.000	0.000	0.000	0.000	0.295	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	219.800	6.840	0.000	8.962	0.000	0.000	0.000	0.000	0.651	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	223.100	8.977	0.000	9.446	0.000	0.000	0.000	0.000	0.651	0.000
	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
IF	223.800	9.446	0.000	9.446	0.000	0.000	0.000	0.000	0.670	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	5.63	4.70	12.88
OF	1.00	5.63	4.70	12.87
OF	2.00	5.63	4.70	12.87
OF	3.00	5.63	4.70	12.87
OF	4.00	5.62	4.70	12.87
OF	5.00	5.62	4.70	12.87
OF	6.00	5.62	4.70	12.87
OF	7.00	5.62	4.70	12.87
OF	8.00	5.62	4.70	12.87
OF	9.00	5.62	4.70	12.87
OF	10.00	5.62	4.70	12.87
OF	11.00	5.61	4.70	12.86
OF	12.00	5.61	4.70	12.86
OF	13.00	5.61	4.70	12.86
OF	14.00	5.61	4.70	12.86
OF	15.00	5.61	4.70	12.86
OF	16.00	5.61	4.70	12.86
OF	17.00	5.60	4.70	12.86
OF	18.00	5.60	4.70	12.86
OF	19.00	5.60	4.70	12.86
OF	20.00	5.60	4.70	12.86
OF	21.00	5.60	4.70	12.85
OF	22.00	5.60	4.70	12.85
OF	23.00	5.60	4.70	12.85
OF	24.00	5.59	4.70	12.85
OF	25.00	5.59	4.70	12.85
OF	26.00	5.59	4.70	12.85
OF	27.00	5.59	4.70	12.85
OF	28.00	5.59	4.70	12.85
OF	29.00	5.59	4.70	12.85
OF	30.00	5.58	4.70	12.85
OF	31.00	5.58	4.70	12.84
OF	32.00	5.58	4.70	12.84
OF	33.00	5.58	4.70	12.84
OF	34.00	5.58	4.70	12.84
OF	35.00	5.58	4.70	12.84
OF	36.00	5.58	4.70	12.84
OF	37.00	5.57	4.70	12.84
OF	38.00	5.57	4.70	12.84
OF	39.00	5.57	4.70	12.84
OF	40.00	5.57	4.70	12.84
OF	41.00	5.57	4.70	12.84
OF	42.00	5.57	4.70	12.83
OF	43.00	5.57	4.70	12.83
OF	44.00	5.56	4.70	12.83
OF	45.00	5.56	4.70	12.83
OF	46.00	5.56	4.70	12.83
OF	47.00	5.56	4.70	12.83
OF	48.00	5.56	4.70	12.83
OF	49.00	5.56	4.70	12.83
OF	50.00	5.56	4.70	12.83
OF	51.00	5.56	4.70	12.83
OF	52.00	5.55	4.70	12.83
OF	53.00	5.55	4.70	12.82
OF	54.00	5.55	4.70	12.82
OF	55.00	5.55	4.70	12.82
OF	56.00	5.55	4.70	12.82
OF	57.00	5.55	4.70	12.82
OF	58.00	5.55	4.70	12.82
OF	59.00	5.55	4.70	12.82
OF	60.00	5.54	4.70	12.82
OF	61.00	5.54	4.70	12.82
OF	62.00	5.54	4.70	12.82
OF	63.00	5.54	4.70	12.82
OF	64.00	5.54	4.70	12.82
OF	65.00	5.54	4.70	12.82
OF	66.00	5.54	4.70	12.82
OF	67.00	5.54	4.70	12.81
OF	68.00	5.54	4.70	12.81
OF	69.00	5.53	4.70	12.81
OF	70.00	5.53	4.70	12.81
OF	71.00	5.53	4.70	12.81
OF	72.00	5.53	4.70	12.81
OF	73.00	5.53	4.70	12.81
OF	74.00	5.53	4.70	12.81
OF	75.00	5.53	4.70	12.81
OF	76.00	5.53	4.70	12.81

OF	77.00	5.53	4.70	12.81
OF	78.00	5.53	4.70	12.81
OF	79.00	5.53	4.70	12.81
OF	80.00	5.53	4.70	12.81
OF	81.00	5.53	4.70	12.81
OF	82.00	5.53	4.70	12.81
OF	83.00	5.53	4.70	12.81
OF	84.00	5.53	4.70	12.81
OF	85.00	5.53	4.70	12.81
OF	86.00	5.53	4.70	12.81
OF	87.00	5.53	4.70	12.81
OF	88.00	5.53	4.70	12.81
OF	89.00	5.53	4.70	12.81
OF	90.00	5.53	4.70	12.81
OF	91.00	5.53	4.70	12.81
OF	92.00	5.53	4.70	12.81
OF	93.00	5.53	4.70	12.81
OF	94.00	5.53	4.70	12.81
OF	95.00	5.53	4.70	12.81
OF	96.00	5.53	4.70	12.81
OF	97.00	5.53	4.70	12.81
OF	98.00	5.53	4.70	12.81
OF	99.00	5.53	4.70	12.82
OF	100.00	5.53	4.70	12.82
OF	101.00	5.53	4.70	12.82
OF	102.00	5.53	4.70	12.82
OF	103.00	5.53	4.70	12.82
OF	104.00	5.53	4.70	12.82
OF	105.00	5.53	4.70	12.82
OF	106.00	5.53	4.70	12.82
OF	107.00	5.53	4.70	12.82
OF	108.00	5.53	4.70	12.82
OF	109.00	5.53	4.70	12.82
OF	110.00	5.53	4.70	12.82
OF	111.00	5.53	4.70	12.82
OF	112.00	5.53	4.70	12.82
OF	113.00	5.53	4.70	12.82
OF	114.00	5.53	4.70	12.82
OF	115.00	5.53	4.70	12.82
OF	116.00	5.53	4.70	12.82
OF	117.00	5.53	4.70	12.82
OF	118.00	5.53	4.70	12.82
OF	119.00	5.53	4.70	12.82
OF	120.00	5.53	4.70	12.82
OF	121.00	5.53	4.70	12.82
OF	122.00	5.53	4.70	12.82
OF	123.00	5.53	4.70	12.82
OF	124.00	5.53	4.70	12.82
OF	125.00	5.53	4.71	12.82
OF	126.00	5.53	4.71	12.82
OF	127.00	5.53	4.71	12.82
OF	128.00	5.53	4.71	12.82
OF	129.00	5.53	4.71	12.82
OF	130.00	5.53	4.71	12.82
OF	131.00	5.53	4.71	12.82
OF	132.00	5.53	4.71	12.82
OF	133.00	5.53	4.71	12.82
OF	134.00	5.53	4.71	12.82
OF	135.00	5.53	4.71	12.82
OF	136.00	5.53	4.71	12.82
OF	137.00	5.53	4.71	12.82
OF	138.00	5.53	4.71	12.82
OF	139.00	5.53	4.71	12.82
OF	140.00	5.53	4.71	12.82
OF	141.00	5.53	4.71	12.82
OF	142.00	5.52	4.71	12.82
OF	143.00	5.52	4.71	12.82
OF	144.00	5.52	4.71	12.81
OF	145.00	5.52	4.71	12.81
OF	146.00	5.52	4.71	12.81
OF	147.00	5.52	4.71	12.81
OF	148.00	5.52	4.71	12.81
OF	149.00	5.52	4.71	12.81
OF	150.00	5.52	4.71	12.81
OF	151.00	5.52	4.71	12.81
OF	152.00	5.52	4.71	12.81
OF	153.00	5.52	4.71	12.82
OF	154.00	5.52	4.71	12.82
OF	155.00	5.53	4.71	12.82
OF	156.00	5.53	4.71	12.82
OF	157.00	5.54	4.71	12.83
OF	158.00	5.54	4.71	12.83
OF	159.00	5.55	4.71	12.83
OF	160.00	5.55	4.71	12.84
OF	161.00	5.56	4.71	12.84
OF	162.00	5.57	4.71	12.85
OF	163.00	5.58	4.71	12.86
OF	164.00	5.59	4.71	12.86
OF	165.00	5.60	4.71	12.87
OF	166.00	5.61	4.71	12.88
OF	167.00	5.63	4.71	12.89
OF	168.00	5.64	4.71	12.90
OF	169.00	5.66	4.71	12.91
OF	170.00	5.68	4.71	12.92
OF	171.00	5.70	4.71	12.94
OF	172.00	5.72	4.71	12.95
OF	173.00	5.74	4.71	12.97
OF	174.00	5.76	4.71	12.98
OF	176.50	5.57	4.71	12.85
IF	211.00	5.50	4.71	12.80
IF	219.80	1.61	4.71	10.09
IF	223.10	0.36	4.71	9.70

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IF    223.80         0.01         4.71         9.45
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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
7.00	1.00	8.94
20.00	1.00	8.94
36.00	1.00	8.94
50.00	1.00	8.94
64.00	1.00	8.94
75.00	1.00	8.94
81.00	1.00	8.94
87.00	1.00	8.94
92.00	1.00	8.94
99.00	1.00	8.94
105.00	1.00	8.94
110.00	1.00	8.95
117.00	1.00	8.95
122.00	1.00	8.95
128.00	1.00	8.95
134.00	1.00	8.95
140.00	1.00	8.95
219.80	1.00	8.96
223.10	1.00	9.45

              PART5 LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
216.65	WINDWARD

         PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION		FHF
0.00	12.88			
		V22	EL=13	120
6.00	12.87			
		V22	EL=13	120
7.00	12.87			
		V22	EL=13	120
19.00	12.86			
		V22	EL=13	120
20.00	12.86			
		V22	EL=13	120
35.00	12.84			
		V22	EL=13	120
36.00	12.84			
		V22	EL=13	120
49.00	12.83			
		V22	EL=13	120
50.00	12.83			
		V22	EL=13	120
63.00	12.82			
		V22	EL=13	120
64.00	12.82			
		V22	EL=13	120
74.00	12.81			
		V22	EL=13	120
75.00	12.81			
		V22	EL=13	120
80.00	12.81			
		V22	EL=13	120
81.00	12.81			
		V22	EL=13	120
86.00	12.81			
		V22	EL=13	120
87.00	12.81			
		V22	EL=13	120
91.00	12.81			
		V22	EL=13	120
92.00	12.81			
		V22	EL=13	120
98.00	12.81			
		V22	EL=13	120
99.00	12.82			
		V22	EL=13	120
104.00	12.82			
		V22	EL=13	120
105.00	12.82			
		V22	EL=13	120
109.00	12.82			
		V22	EL=13	120
110.00	12.82			
		V22	EL=13	120
116.00	12.82			
		V22	EL=13	120
117.00	12.82			
		V22	EL=13	120
121.00	12.82			
		V22	EL=13	120
122.00	12.82			
		V22	EL=13	120
127.00	12.82			
		V22	EL=13	120
128.00	12.82			
		V22	EL=13	120
133.00	12.82			
		V22	EL=13	120
134.00	12.82			
		V22	EL=13	120
139.00	12.82			
		V22	EL=13	120
140.00	12.82			
		V22	EL=13	120
211.00	12.80			
		V22	EL=13	120
211.98	12.50			

		V22	EL=12	120
215.22	11.50			
		V22	EL=11	120
216.65	11.06			
		A18	EL=11	90
218.46	10.50			
		A18	EL=10	90
219.80	10.09			
		A18	EL=10	90
223.10	9.70			
		A18	EL=10	90
223.66	9.50			
		A18	EL= 9	90
223.80	9.45			

ZONE TERMINATED AT END OF TRANSECT
PART 7   POSTSCRIPT NOTES
PS# 1   START(404524.3377,4836399.8865)
PS# 2   END(404506.0031,4836320.1278)

-1.000000e+00

CM-57-1
100-year WHAFIS Output
Zero Station: -70.18455684, 43.67392219
Onshore Dir: -102.9 deg CCW from E
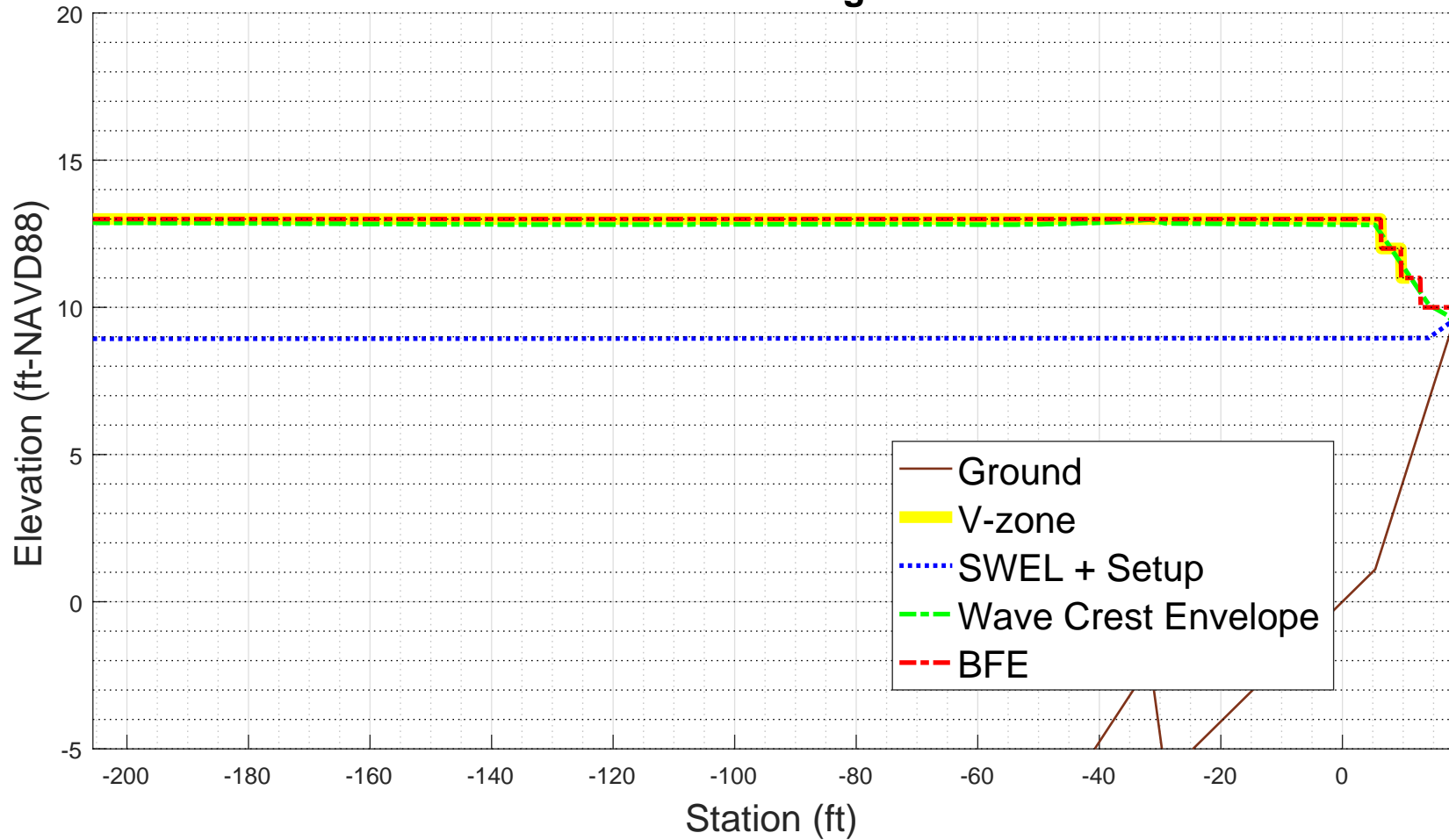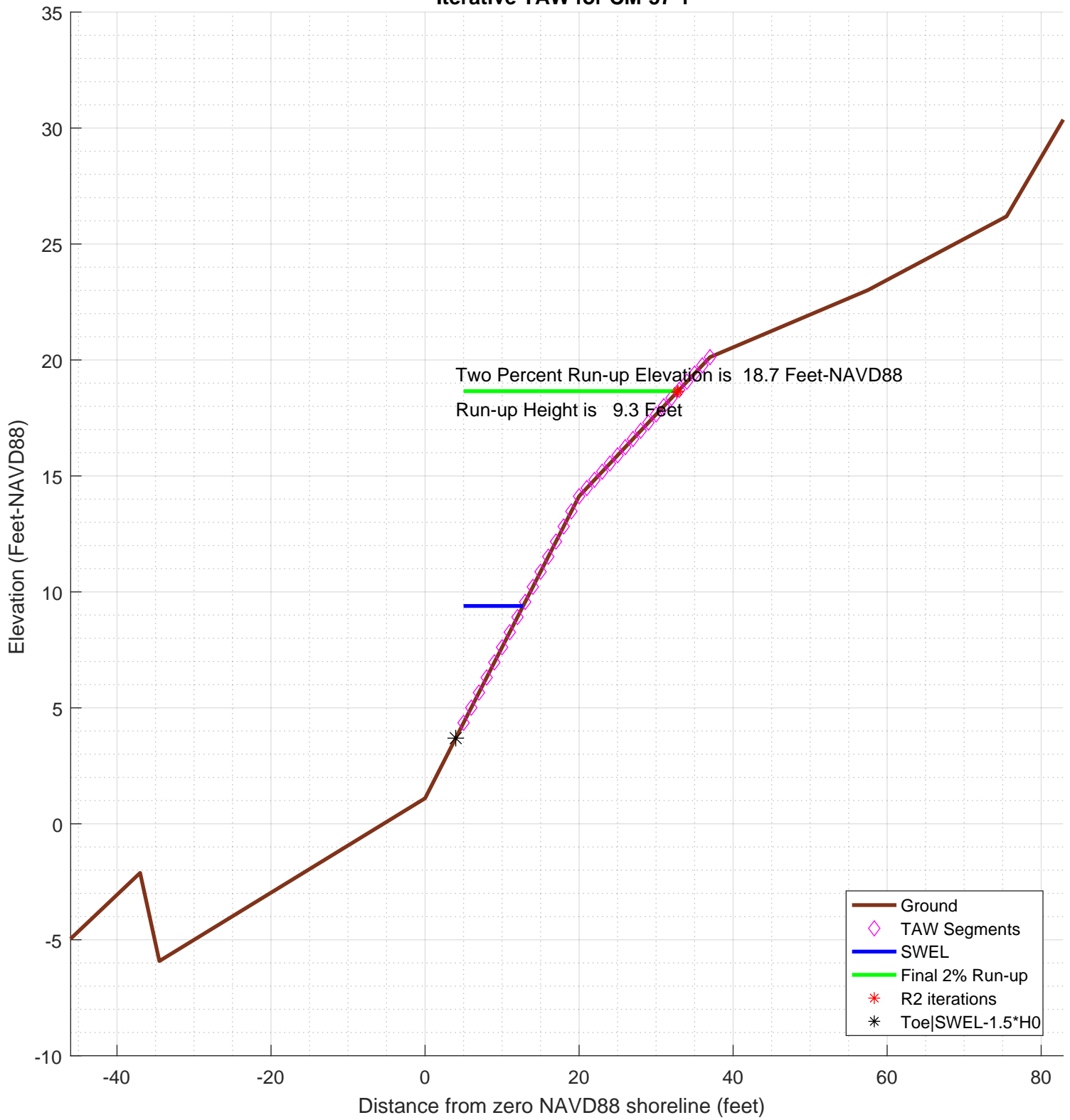
Legend:
- Ground
- V-zone
- SWEL + Setup
- Wave Crest Envelope
- BFE

Elevation (ft-NAVD88)

Station (ft)

Iterative TAW for CM-57-1

Two Percent Run-up Elevation is 18.7 Feet-NAVD88

Run-up Height is 9.3 Feet

Legend:
- Ground
- ◇ TAW Segments
- SWEL
- Final 2% Run-up
- ∗ R2 iterations
- ∗ Toe|SWEL-1.5*H0

X-axis: Distance from zero NAVD88 shoreline (feet)
Y-axis: Elevation (Feet-NAVD88)

```
diary on          % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-57-1
% calculation by SJH, Ransom Consulting, Inc. 16-Apr-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-57-1sta_ele_include.csv';   % file with station, elevation, include
                                  % third colunm is 0 for excluded points
imgname='logfiles/CM-57-1-runup';
SWEL=8.9341;  % 100-yr still water level including wave setup.
H0=3.4921;    % significant wave height at toe of structure
Tp=4.6289;    % 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=-0.002769;
maxSetup=0.51165;   % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-57-1'

plotTitle =

Iterative TAW for CM-57-1



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

SWEL=SWEL+setupAtToe

SWEL =

                8.931331

SWEL_fore=SWEL+maxSetup

SWEL_fore =

                9.442981



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

L0 =

          90.6089996880873


% 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 =

                  3.693181


% 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 =

                  14.169481


% 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 =

          3.98328281478888


top_sta =

          20.1288737963701

% 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 =

          20.1288737963701

toe_sta

toe_sta =

          3.98328281478888



% 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 85.8 ft landward of toe of slope


ans =

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


ans =

-!!-        setup is adjusted to 0.46 feet


ans =

-!!-        SWEL is adjusted to 9.39 feet


k =

     1
     2
     3
     4
     5
     6
     7
     8
     9
    10
    11
    12
    13
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78
```

```
% 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 =
                 3.693181
toe_sta =
          3.98328281478888
top_sta =
          20.1288737963701
Z2 =
                14.169481
H0 =
                   3.4921
Tp =
                   4.6289
T0 =
          4.20809090909091
R2 =
                  10.4763
Z2 =
          19.8691232594291
top_sta =
          36.2849262003111
Lslope =
          32.3016433855222
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          0.500777686954445
Irb =
          2.55086398387982
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                      0.8
gamma =
                      0.8
ans =
!!! - - Iribaren number:   2.55 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:2.0 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          9.21414563601113
R2del =
          1.26215436398887
Z2 =
          18.6069688954403
top_sta =
           32.707256490291
ans =
```

```
!---------------- STARTING ITERATION 2 ----------------!
Ztoe =
                 3.693181
toe_sta =
        3.98328281478888
top_sta =
         32.707256490291
Z2 =
        18.6069688954403
H0 =
                   3.4921
Tp =
                   4.6289
T0 =
        4.20809090909091
R2 =
        9.21414563601113
Z2 =
        18.6069688954403
top_sta =
         32.707256490291
Lslope =
        28.7239736755021
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
        0.519210470804736
Irb =
         2.6447569940343
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                   0.8
gamma =
                   0.8
ans =
!!! - - Iribaren number:   2.64 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:1.9 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
        9.26427328867568
R2del =
       0.0501276526645462
Z2 =
        18.6570965481048
top_sta =
        32.8493469093386
ans =
!---------------- STARTING ITERATION 3 ----------------!
Ztoe =
                 3.693181
toe_sta =
        3.98328281478888
top_sta =
        32.8493469093386
Z2 =
        18.6570965481048
H0 =
                   3.4921
Tp =
                   4.6289
T0 =
        4.20809090909091
R2 =
        9.26427328867568
Z2 =
        18.6570965481048
top_sta =
        32.8493469093386
Lslope =
        28.8660640945497
ans =
!------- End Berm Factor Calculation, Iter: 3 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
```

```
        1
gamma_berm =
        1
slope =
          0.518391267305827
Irb =
          2.64058413099492
gamma_berm =
        1
gamma_perm =
        1
gamma_beta =
        1
gamma_rough =
                          0.8
gamma =
                          0.8
ans =
!!! - - Iribaren number:    2.64 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:1.9 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          9.26210240573921
R2del =
        0.00217088293646839
Z2 =
          18.6549256651684
top_sta =
          32.8431933862879
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
          18.6549256651684
diary off
-1.000000e+00
```

───
PART 5: RUNUP2

        for transect: CM-57-1

Station locations shifted by: -5.40 feet from their
original location to set the shoreline to
elevation 0 for RUNUP2 input

_____RUNUP2 INPUT CONVERSIONS_____
        for transect: CM-57-1

Incident significant wave height: 3.52 feet

Peak wave period: 4.70 seconds

Mean wave height: 2.20 feet

Local Depth below SWEL: 29.31 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 = 29.31
    Period, T = 4.00
    Waveheight, H = 2.20
Deep water wavelength, L0 (ft)
    L0 = g*T*T/twopi
    L0 = 32.17*4.00*4.00/6.28 = 81.73
Deep water wave celerity, C0 (ft/s)
    C0 = L0/T
    C0 = 81.73/4.00 = 20.46
Angular frequency, sigma (rad/s)
    sigma = twopi/T
    sigma = 6.28/4.00 = 1.57
Hunts (1979) approximation for Celerity C1H (ft/s) at Depth D (ft)
    y = sigma.*sigma.*D./g
    y = 1.57*1.57*29.31/32.17 = 2.25
    C1H = sqrt(g.*D./(y+1./(1 + 0.6522.*y + 0.4622.*y.^2 + 0.0864.*y.^4 +0.0675.*y.^5)))
    C1H = 20.06
Shoaling Coefficient KsH
    KsH = sqrt(C0/C1H)
    KsH = sqrt(20.46/20.06) = 1.01
Deepwater Wave Height H0_H (ft)
    H0_H = H/KsH
    H0_H = 2.20/1.01 = 2.18

Deepwater mean wave height: 2.18 feet

_____END RUNUP2 CONVERSIONS_____

_____RUNUP2 RESULTS_____
        for transect: CM-57-1

RUNUP2 SWEL:
8.90
8.90
8.90
8.90

```
8.90
8.90
8.90
8.90
8.90

RUNUP2 deepwater mean wave heights:
2.07
2.07
2.07
2.18
2.18
2.18
2.29
2.29
2.29

RUNUP2 mean wave periods:
3.80
4.00
4.19
3.80
4.00
4.19
3.80
4.00
4.19

RUNUP2 runup above SWEL:
3.34
3.40
3.45
3.50
3.55
3.60
3.64
3.69
3.76

RUNUP2 Mean runup height above SWEL: 3.55 feet

RUNUP2 2-percent runup height above SWEL: 7.81 feet

RUNUP2 2-percent runup elevation: 16.71 feet-NAVD88

RUNUP2 Messages:
No Messages

_____END RUNUP2 RESULTS_____



_____ACES BEACH RUNUP_____

Incident significant wave height: 3.52 feet

Significant wave height is mean wave height divided by 0.626
Reference: D.2.8.1.2.1 Atlanic and Gulf of Mexico G&S Feb. 2007

Deepwater significant wave height: 3.48 feet

Peak wave period: 4.70 seconds

Average beach Slope: 1:6.12 (H:V)


ACES IRREGULAR WAVE RUNUP ON BEACHES

# Reference:
# Leenknecht, David A., Andre Szuwaiski, and Ann Sherlock. 1992.
# "Automated Coastal Engineering System Technical Reference",
# Coastal Engineering Research Center, Department of the Army
```

Waterways Experiments Station, Corps of Eniggneers, 3909 Halls
Ferry Road, Vicksburg, Mississippi 39180-6199.

INPUTS:

```
Acceleration Due to Gravity,          g  =    32.174
Deepwater Significant Wave height,  Hs =     3.48
Wave Period,                          T  =     4.70
Beach Slope,                          S  =     0.163
```

EQUATIONS:

```
Runup,            R   = Hs * a * Irb^b
Iribarren,        Irb = S/sqrt(Hs/L0)
Wavelength,       L0  = g * T^2 / 2 / pi
```

COEFFICIENTS:
(Mase, H. 1989, "Random Wave Runup Height on Gentle Slopes,"
j. Waterway, Port, Coastal and Ocean Engineering Division,
ASCE, Vol 115, No. 5, pp 649-661.)

```
                [Rmax,  R2%, R-1/3, R-1/10, R-mean]
          a = [2.32, 1.86,  1.70,   1.38,   0.88]
          b = [0.77, 0.71,  0.71,   0.70,   0.69]
```

RESULTS:

```
        RUNUP = [ 7.6,  6.2,   5.6,    4.6,    2.9]
```

ACES RUNUP CALCULATED USING 'Aces_Beach_Runup.m'

ACES Beach 2-percent runup height above SWEL: 6.16 feet

ACES Beach 2-percent runup elevation: 15.06 feet-NAVD88

ACES BEACH RUNUP is valid

_____END ACES BEACH RESULTS_____

PART 5 COMPLETE_____

3.00
  -20.38 -205.6 0.8
  -16.58 -161.6 0.8
  -14.77 -140.6 0.8
  -14.25 -134.6 0.8
  -14.23 -133.6 0.8
  -12.78 -65.6 0.8
  -12.50 -64.6 0.8
  -11.24 -60.6 0.8
  -10.30 -57.6 0.8
  -9.04 -53.6   0.8
  -8.10 -50.6   0.8
  -6.84 -46.6   0.8
  -5.89 -43.6   0.8
  -4.63 -39.6   0.8
  -3.69 -36.6   0.8
  -2.12 -31.6   0.8
  -2.12 -29.1   0.8
   1.10 5.4   0.8
  14.12 25.4   0.8
1 20.12 42.4   0.8
  8.9   2.07   3.80
  8.9   2.07   4.00
  8.9   2.07   4.19
  8.9   2.18   3.80
  8.9   2.18   4.00
  8.9   2.18   4.19
  8.9   2.29   3.80
  8.9   2.29   4.00
  8.9   2.29   4.19

****

CROSS SECTION PROFILE

	LENGTH	ELEV.	SLOPE	ROUGHNESS
1	-205.0	-20.3		
			.00	.80
2	-161.0	-16.5		
			11.67	.80
3	-140.0	-14.7		
			12.00	.80
4	-134.0	-14.2		
			FLAT	.80
5	-133.0	-14.2		
			44.93	.80
6	-65.6	-12.7		
			5.00	.80
7	-64.6	-12.5		
			3.08	.80
8	-60.6	-11.2		
			3.33	.80
9	-57.6	-10.3		
			3.17	.80
10	-53.6	-9.0		
			3.19	.80
11	-50.6	-8.1		
			3.17	.80
12	-46.6	-6.8		
			3.16	.80
13	-43.6	-5.9		
			3.17	.80
14	-39.6	-4.6		
			3.19	.80
15	-36.6	-3.7		
			3.18	.80
16	-31.6	-2.1		
			FLAT	.80
17	-29.1	-2.1		
			10.71	.80
18	5.4	1.1		
			1.54	.80
19	25.4	14.1		
			2.83	.80
20	42.4	20.1		

LAST SLOPE 3.00   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.)
8.90	2.07	3.80	11	18	3.34	2.63
8.90	2.07	4.00	11	18	3.40	2.63
8.90	2.07	4.19	11	18	3.45	2.65
8.90	2.18	3.80	11	18	3.50	2.77
8.90	2.18	4.00	11	18	3.55	2.77
8.90	2.18	4.19	11	18	3.60	2.78
8.90	2.29	3.80	11	18	3.64	2.91
8.90	2.29	4.00	11	18	3.69	2.91
8.90	2.29	4.19	11	18	3.76	2.91

Runup2 2% runup elevation for Transect: CM-57-1

Two Percent Run-up Elevation is 16.7 Feet-NAVD88

Run-up Height is   7.8 Feet

Elevation (ft)

Station (ft)

Ground
Swel
2% Runup
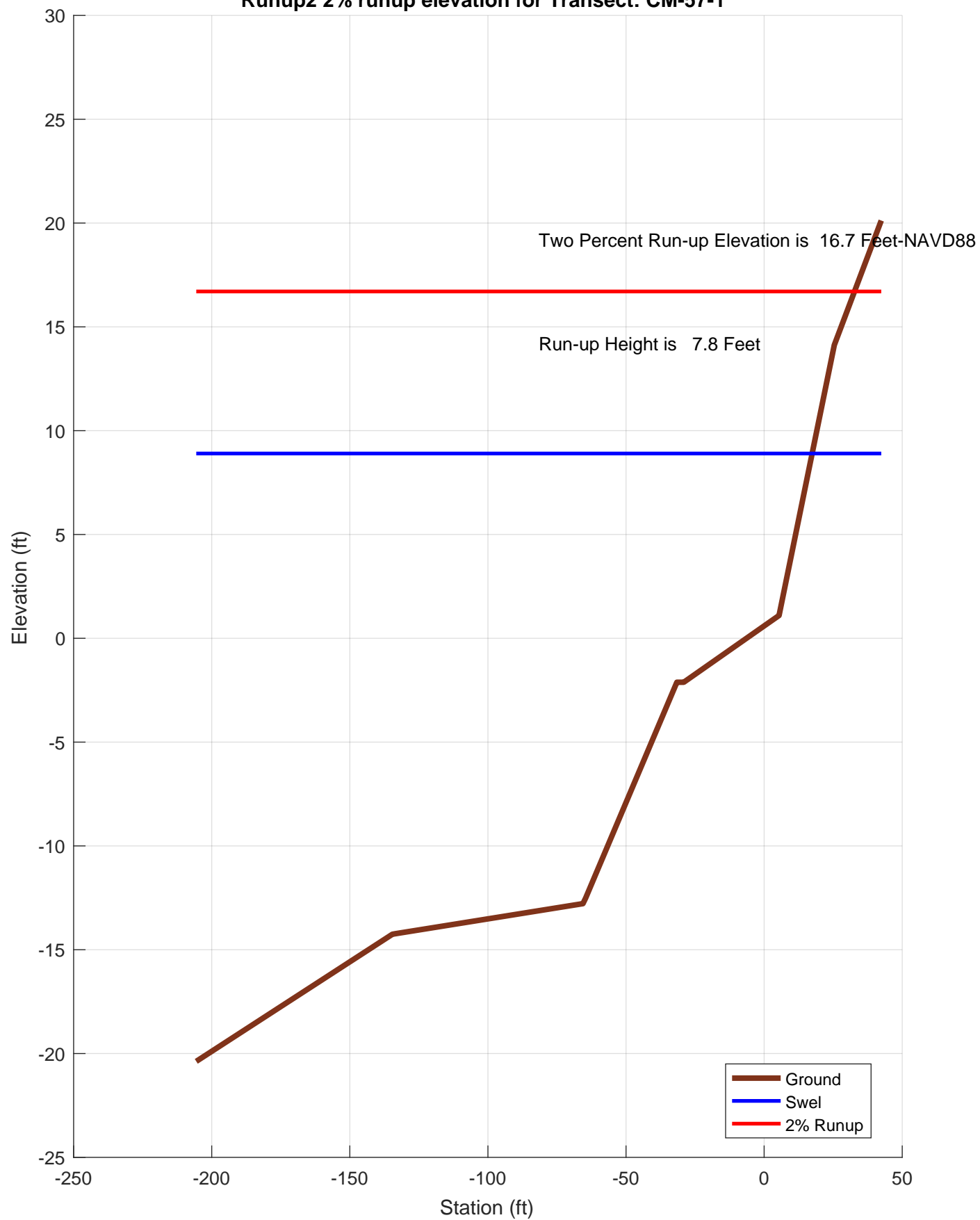
Transect Number: CM-96-1
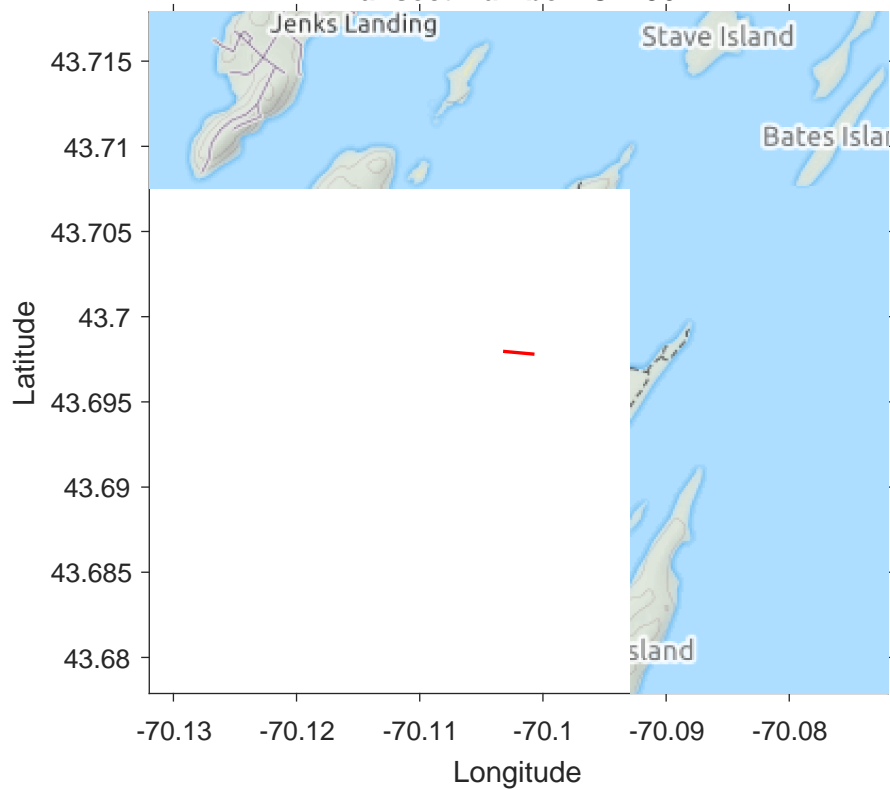
Elevation profile
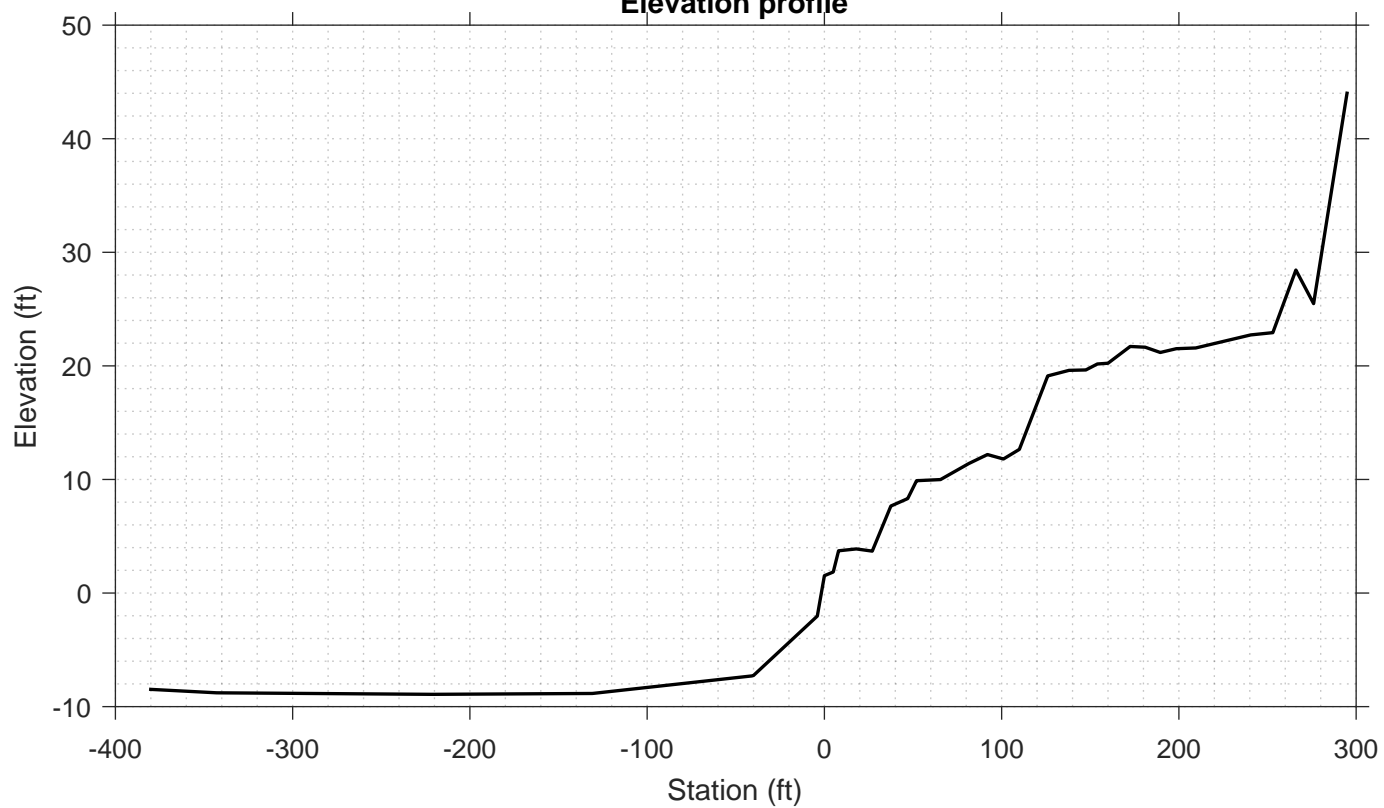
```
_____
DATA LOG FOR TRANSECT ID: CM-96-1
_____


_____
PART 1: USER INPUT


SWAN 1-D / WHAFIS input
_____
station:     -129 ft
LON:         -70.1016 deg E
LAT:         43.6979 deg N
Bottom ELEV:       -8.8091 ft-NAVD88
TWL:         8.8814 ft-NAVD88
HS:          2.5775 ft
TP:          4.7208 sec
Wave Direction bin: 180 deg CCW from East (90 deg sector)
Transect Direction:   176.1953 deg CCW from East


TAW/RUNUP input
_____
toe sta:      -6 ft
toe elev:    -2.3185 ft-NAVD88
top sta:     52 ft
top elev:    9.8917 ft-NAVD88
*Wave and water level conditions at toe to be calculated in SWAN 1-D*

PART 1 COMPLETE_____
```

transectCM-96-1: User-Selected inputs

Legend:
- Transect Profile
- ADCIRC Profile
- TWL
- HS
- TP
- 1-D Wave start
- TAW toe/top

X-axis: Cross-shore Distance (feet)

Y-axis: Elevation (ft), Significant Wave Height (ft), Period (sec)
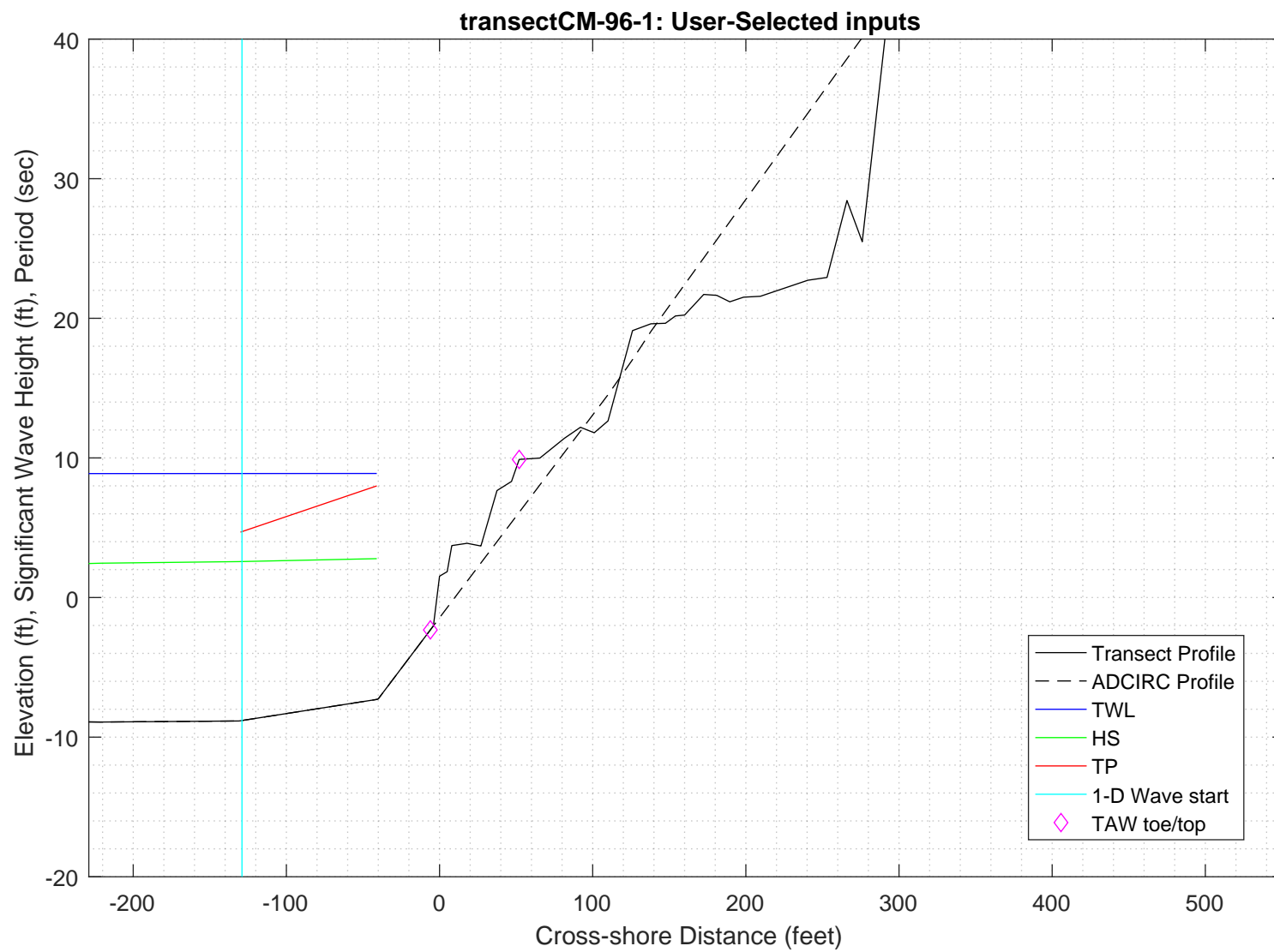
```
_____
PART 2: SWAN 1-D

swan input grid name: 2_swan/gridfiles/CM-96-1zmeters_xmeters.grd
swan file name:        2_swan/swanfiles/CM-96-1.swn
swan output name:      2_swan/swanfiles/CM-96-1.dat

Boundary Conditions:
    TWL- 2.7071 meters
    HS-  0.78561 meters
    PER- 4.7208 seconds

Batch File: 2_swan/swanfiles/runswan.dat

SWAN maximum additional wave setup: 0.31165 feet
SWAN output at toe:
    SETUP- -0.0052132 feet
    HS-     2.5766 feet
    PER-    4.6414 seconds

PART 2 COMPLETE_____
```

2-D ADCIRC+SWAN and SWAN 1-D results, Transect:
CM-96-1
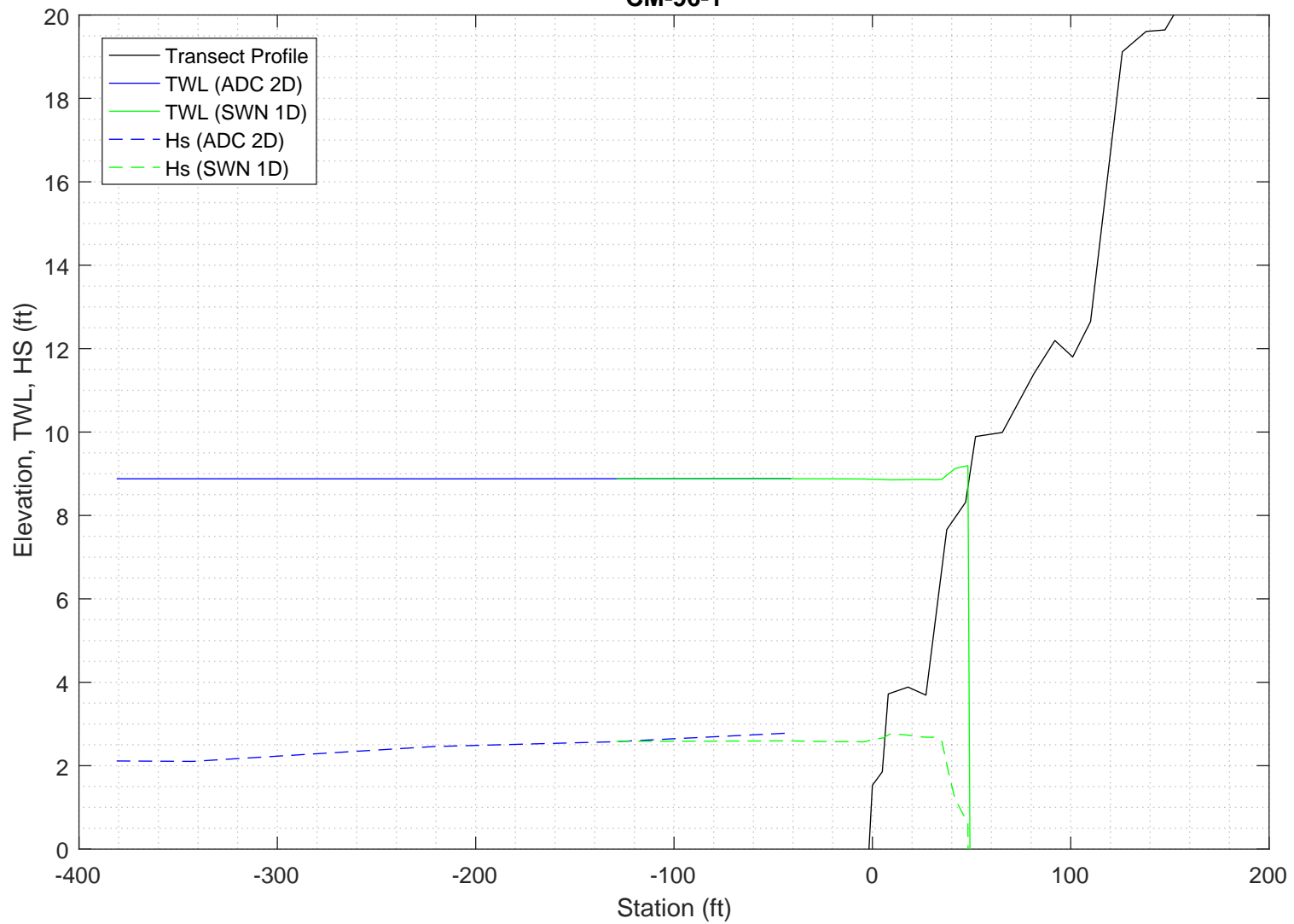
                    Execution started at 20200416.132456

                                   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   55   0.   55   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   55   0   1   1

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

  READ   BOTTOM   -1. '../gridfiles/CM-96-1zmeters_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   0.78561   4.7208   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      55  55     0

!TABLe 'sname' < HEADer|NOHEADer|INDexed > 'fname' <output parameters> (output time)

 Table 'curve'   HEADER 'CM-96-1.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              56 MYC               1
                       : MCGRD            57
                       : 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  36.37 % 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   1.82 % 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  36.37 % 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  92.73 % 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  92.73 % of wet grid points ( 99.50 % required)

iteration     7; sweep 1
iteration     7; sweep 2
iteration     7; sweep 3
iteration     7; sweep 4
accuracy OK in  96.37 % of wet grid points ( 99.50 % required)

iteration     8; sweep 1
iteration     8; sweep 2
iteration     8; sweep 3
iteration     8; sweep 4
accuracy OK in  96.37 % of wet grid points ( 99.50 % required)

iteration     9; sweep 1
iteration     9; sweep 2
iteration     9; sweep 3
iteration     9; sweep 4
accuracy OK in  96.37 % of wet grid points ( 99.50 % required)

iteration    10; sweep 1
iteration    10; sweep 2
iteration    10; sweep 3
iteration    10; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    11; sweep 1
iteration    11; sweep 2
iteration    11; sweep 3
iteration    11; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    12; sweep 1
iteration    12; sweep 2
iteration    12; sweep 3
iteration    12; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    13; sweep 1
iteration    13; sweep 2
iteration    13; sweep 3
iteration    13; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    14; sweep 1
iteration    14; sweep 2
iteration    14; sweep 3
iteration    14; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    15; sweep 1
iteration    15; sweep 2
iteration    15; sweep 3
iteration    15; sweep 4
accuracy OK in  96.37 % of wet grid points ( 99.50 % required)

iteration    16; sweep 1
iteration    16; sweep 2
iteration    16; sweep 3
iteration    16; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    17; sweep 1
iteration    17; sweep 2
iteration    17; sweep 3
iteration    17; sweep 4
accuracy OK in  98.19 % of wet grid points ( 99.50 % required)

iteration    18; sweep 1
iteration    18; sweep 2
iteration    18; sweep 3
```

```
iteration    18; sweep 4
accuracy OK in 100.00 % of wet grid points ( 99.50 % required)



STOP
```

Xp [m]	Yp [m]	Hsig [m]	TPsmoo [sec]	RTpeak [sec]	Tm_10 [sec]	Dir [degr]	Dspr [degr]	Depth [m]	Setup [m]
0.	0.	0.78761	4.6361	4.6483	4.2574	0.000	31.5060	5.3900	0.000000
1.	0.	0.78771	4.6362	4.6483	4.2560	0.000	31.4556	5.3700	-0.000012
2.	0.	0.78782	4.6362	4.6483	4.2545	0.000	31.4055	5.3600	-0.000019
3.	0.	0.78788	4.6362	4.6483	4.2531	0.000	31.3449	5.3400	-0.000031
4.	0.	0.78797	4.6362	4.6483	4.2516	0.000	31.2918	5.3200	-0.000043
5.	0.	0.78809	4.6362	4.6483	4.2501	0.000	31.2414	5.3099	-0.000050
6.	0.	0.78816	4.6362	4.6483	4.2486	0.000	31.1819	5.2899	-0.000062
7.	0.	0.78822	4.6362	4.6483	4.2472	0.000	31.1227	5.2699	-0.000074
8.	0.	0.78833	4.6363	4.6483	4.2457	0.000	31.0783	5.2499	-0.000086
9.	0.	0.78847	4.6363	4.6483	4.2441	0.000	31.0380	5.2399	-0.000094
10.	0.	0.78856	4.6363	4.6483	4.2426	0.000	30.9910	5.2199	-0.000106
11.	0.	0.78869	4.6363	4.6483	4.2411	0.000	30.9498	5.1999	-0.000118
12.	0.	0.78884	4.6363	4.6483	4.2395	0.000	30.9113	5.1899	-0.000125
13.	0.	0.78895	4.6363	4.6483	4.2380	0.000	30.8652	5.1699	-0.000138
14.	0.	0.78905	4.6364	4.6483	4.2364	0.000	30.8165	5.1498	-0.000150
15.	0.	0.78918	4.6364	4.6483	4.2349	0.000	30.7752	5.1298	-0.000163
16.	0.	0.78935	4.6364	4.6483	4.2332	0.000	30.7362	5.1198	-0.000171
17.	0.	0.78947	4.6364	4.6483	4.2317	0.000	30.6900	5.0998	-0.000183
18.	0.	0.78963	4.6364	4.6483	4.2301	0.000	30.6497	5.0798	-0.000196
19.	0.	0.78981	4.6364	4.6483	4.2284	0.000	30.6113	5.0698	-0.000205
20.	0.	0.78995	4.6365	4.6483	4.2268	0.000	30.5653	5.0498	-0.000218
21.	0.	0.79007	4.6365	4.6483	4.2252	0.000	30.5167	5.0298	-0.000231
22.	0.	0.79025	4.6365	4.6483	4.2236	0.000	30.4754	5.0098	-0.000245
23.	0.	0.79044	4.6365	4.6483	4.2218	0.000	30.4366	4.9997	-0.000253
24.	0.	0.79060	4.6366	4.6483	4.2201	0.000	30.3903	4.9797	-0.000267
25.	0.	0.79079	4.6366	4.6483	4.2185	0.000	30.3496	4.9597	-0.000281
26.	0.	0.79095	4.6366	4.6483	4.2167	0.000	30.3026	4.9497	-0.000289
27.	0.	0.79061	4.6367	4.6483	4.2146	0.000	30.1519	4.9197	-0.000309
28.	0.	0.78968	4.6370	4.6483	4.2140	0.000	29.8711	4.7896	-0.000386
29.	0.	0.78860	4.6374	4.6483	4.2135	0.000	29.5239	4.6495	-0.000475
30.	0.	0.78761	4.6379	4.6483	4.2134	0.000	29.1494	4.4994	-0.000579
31.	0.	0.78674	4.6383	4.6483	4.2135	0.000	28.7709	4.3593	-0.000685
32.	0.	0.78606	4.6388	4.6483	4.2141	0.000	28.4096	4.2092	-0.000807
33.	0.	0.78551	4.6393	4.6483	4.2148	0.000	28.0477	4.0691	-0.000931
34.	0.	0.78519	4.6398	4.6483	4.2160	0.000	27.6720	3.9189	-0.001077
35.	0.	0.78499	4.6403	4.6483	4.2173	0.000	27.2826	3.7788	-0.001228
36.	0.	0.78508	4.6409	4.6483	4.2192	0.000	26.8760	3.6286	-0.001405
37.	0.	0.78534	4.6414	4.6483	4.2210	0.000	26.4554	3.4884	-0.001589
38.	0.	0.78342	4.6420	4.6483	4.2225	0.000	25.2861	3.3382	-0.001820
39.	0.	0.79555	4.6454	4.6483	4.2473	0.000	23.6042	2.5165	-0.003540
40.	0.	0.80563	4.6468	4.6483	4.2320	0.000	22.3904	2.1953	-0.004698
41.	0.	0.81262	4.6476	4.6483	4.1900	0.000	21.0891	2.0345	-0.005464
42.	0.	0.84059	4.6507	4.6483	4.0971	359.998	19.8543	1.5615	-0.008459
43.	0.	0.83971	4.6518	4.6483	3.9795	359.970	19.4525	1.5420	-0.007953
44.	0.	0.83581	4.6528	4.6483	3.8876	359.931	19.3008	1.5327	-0.007257
45.	0.	0.83157	4.6536	4.6483	3.8140	359.915	19.2647	1.5234	-0.006606
46.	0.	0.82557	4.6541	4.6483	3.7549	359.910	19.3507	1.5443	-0.005749
47.	0.	0.81905	4.6545	4.6483	3.7099	359.910	19.1751	1.5650	-0.005005
48.	0.	0.81771	4.6557	4.6483	3.6801	359.916	18.2038	1.4043	-0.005675
49.	0.	0.81784	4.6585	4.6483	3.5851	359.926	16.4201	1.0225	-0.007506
50.	0.	0.78676	4.6595	4.6483	3.3450	0.336	14.9529	0.6559	-0.004087
51.	0.	0.56489	4.6819	4.6483	3.3229	358.629	14.6772	0.3853	0.035309
52.	0.	0.36913	4.7481	4.6483	3.0457	356.984	14.4745	0.3630	0.072984
53.	0.	0.27723	4.6696	4.6483	2.5205	358.293	12.8713	0.3065	0.086528
54.	0.	0.18957	6.2150	6.4550	3.0964	356.278	13.0518	0.1550	0.094991
55.	0.	-9.00000	-9.0000	-9.0000	-9.0000	-999.000	-9.0000	-99.0000	-9.000000

PART 3: WHAFIS

WHAFIS input: CM-96-1.dat
WHAFIS output: CM-96-1.out

PART 3 COMPLETE_____
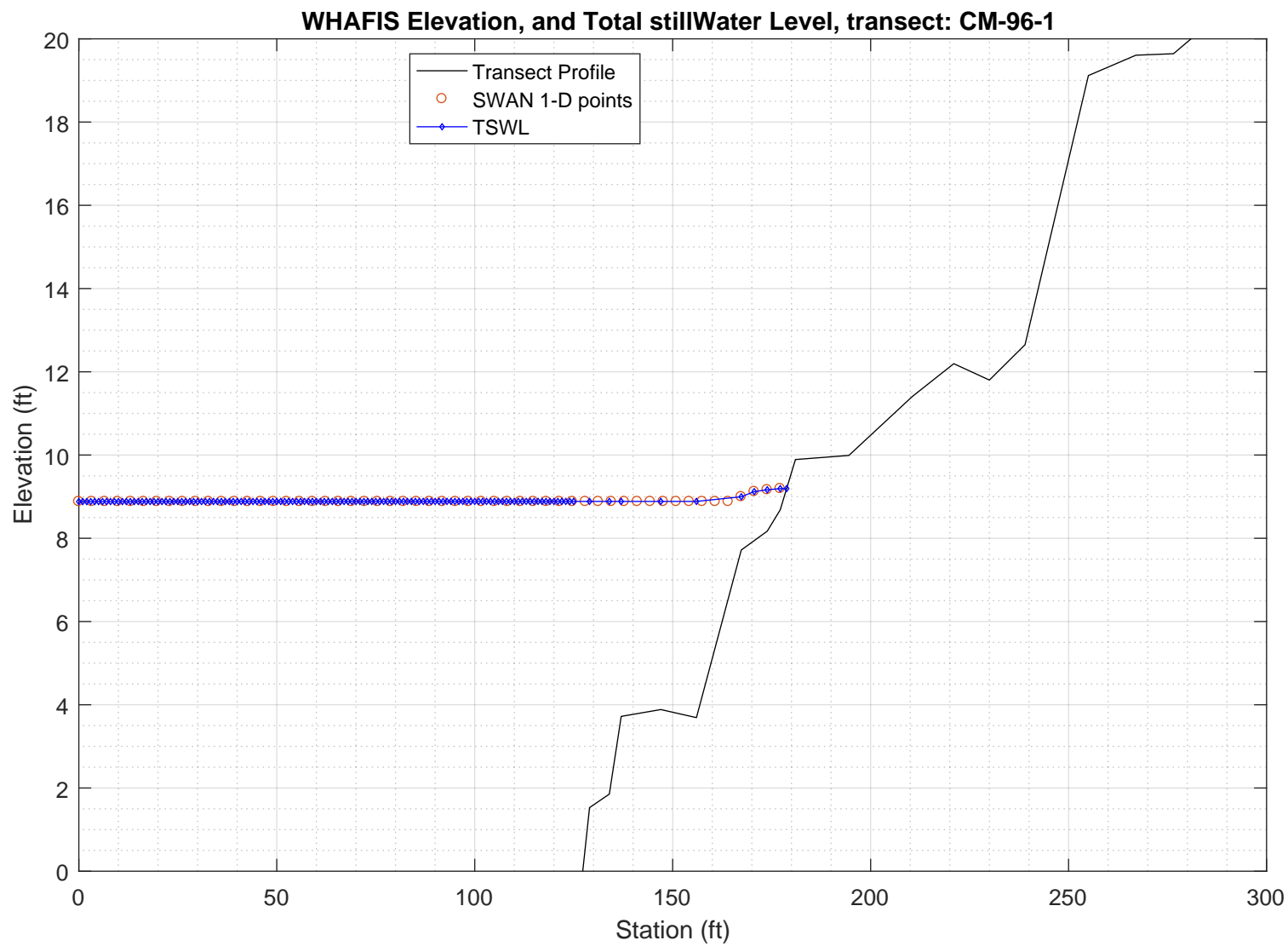
WHAFIS Elevation, and Total stillWater Level, transect: CM-96-1

Legend:
- Transect Profile
- SWAN 1-D points
- TSWL

X-axis: Station (ft)
Y-axis: Elevation (ft)

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                                          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    -8.809    1.000    1.000    8.881    4.124    4.721   56.140    0.017    0.000
     OF     1.000    -8.792    0.000    8.881    0.000    0.000    0.000    0.000    0.017    0.000
     OF     2.000    -8.775    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     3.000    -8.758    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     4.000    -8.740    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     5.000    -8.723    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     6.000    -8.706    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     7.000    -8.689    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     8.000    -8.672    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF     9.000    -8.655    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    10.000    -8.637    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    11.000    -8.620    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    12.000    -8.603    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    13.000    -8.586    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    14.000    -8.569    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    15.000    -8.552    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    16.000    -8.534    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    17.000    -8.517    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    18.000    -8.500    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    19.000    -8.483    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    20.000    -8.466    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    21.000    -8.449    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    22.000    -8.431    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    23.000    -8.414    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    24.000    -8.397    0.000    8.882    0.000    0.000    0.000    0.000    0.017    0.000
     OF    25.000    -8.380    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    26.000    -8.363    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    27.000    -8.346    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    28.000    -8.328    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    29.000    -8.311    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    30.000    -8.294    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    31.000    -8.277    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    32.000    -8.260    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    33.000    -8.243    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    34.000    -8.225    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    35.000    -8.208    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    36.000    -8.191    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    37.000    -8.174    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    38.000    -8.157    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    39.000    -8.139    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    40.000    -8.122    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    41.000    -8.105    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    42.000    -8.088    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    43.000    -8.071    0.000    8.883    0.000    0.000    0.000    0.000    0.017    0.000
     OF    44.000    -8.054    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    45.000    -8.037    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    46.000    -8.019    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    47.000    -8.002    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    48.000    -7.985    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    49.000    -7.968    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    50.000    -7.951    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    51.000    -7.934    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    52.000    -7.916    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    53.000    -7.899    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    54.000    -7.882    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    55.000    -7.865    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    56.000    -7.848    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    57.000    -7.831    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    58.000    -7.813    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    59.000    -7.796    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    60.000    -7.779    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    61.000    -7.762    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    62.000    -7.745    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    63.000    -7.728    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    64.000    -7.710    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    65.000    -7.693    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    66.000    -7.676    0.000    8.884    0.000    0.000    0.000    0.000    0.017    0.000
     OF    67.000    -7.659    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    68.000    -7.642    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    69.000    -7.625    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    70.000    -7.608    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    71.000    -7.590    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    72.000    -7.573    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    73.000    -7.556    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    74.000    -7.539    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    75.000    -7.522    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    76.000    -7.504    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    77.000    -7.487    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    78.000    -7.470    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    79.000    -7.453    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    80.000    -7.436    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    81.000    -7.419    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    82.000    -7.402    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    83.000    -7.384    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    84.000    -7.367    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    85.000    -7.350    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    86.000    -7.333    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    87.000    -7.316    0.000    8.885    0.000    0.000    0.000    0.000    0.017    0.000
     OF    88.000    -7.299    0.000    8.885    0.000    0.000    0.000    0.000    0.030    0.000
     OF    89.000    -7.256    0.000    8.885    0.000    0.000    0.000    0.000    0.094    0.000
     OF    90.000    -7.111    0.000    8.885    0.000    0.000    0.000    0.000    0.145    0.000
     OF    91.000    -6.966    0.000    8.885    0.000    0.000    0.000    0.000    0.145    0.000
     OF    92.000    -6.821    0.000    8.885    0.000    0.000    0.000    0.000    0.145    0.000
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OF	93.000	-6.676	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	94.000	-6.530	0.000	8.885	0.000	0.000	0.000	0.000	0.146	0.000
OF	95.000	-6.385	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	96.000	-6.240	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	97.000	-6.094	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	98.000	-5.949	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	99.000	-5.804	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	100.000	-5.659	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	101.000	-5.514	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	102.000	-5.368	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	103.000	-5.223	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	104.000	-5.078	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	105.000	-4.933	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	106.000	-4.787	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	107.000	-4.642	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	108.000	-4.497	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	109.000	-4.352	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	110.000	-4.207	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	111.000	-4.061	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	112.000	-3.916	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	113.000	-3.771	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	114.000	-3.626	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	115.000	-3.480	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	116.000	-3.335	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	117.000	-3.190	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	118.000	-3.045	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	119.000	-2.899	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	120.000	-2.754	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	121.000	-2.609	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	122.000	-2.464	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	123.000	-2.319	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	124.000	-2.174	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	125.000	-2.028	0.000	8.885	0.000	0.000	0.000	0.000	0.740	0.000
IF	129.000	1.529	0.000	8.885	0.000	0.000	0.000	0.000	0.431	0.000
IF	134.000	1.854	0.000	8.885	0.000	0.000	0.000	0.000	0.274	0.000
IF	137.000	3.720	0.000	8.885	0.000	0.000	0.000	0.000	0.156	0.000
IF	147.000	3.885	0.000	8.885	0.000	0.000	0.000	0.000	-0.002	0.000
IF	156.000	3.691	0.000	8.885	0.000	0.000	0.000	0.000	0.189	0.000
IF	167.300	7.718	0.000	8.997	0.000	0.000	0.000	0.000	0.291	0.000
IF	170.600	7.944	0.000	9.121	0.000	0.000	0.000	0.000	0.069	0.000
IF	173.900	8.171	0.000	9.165	0.000	0.000	0.000	0.000	0.112	0.000
IF	177.200	8.684	0.000	9.193	0.000	0.000	0.000	0.000	0.209	0.000
IF	178.800	9.193	0.000	9.193	0.000	0.000	0.000	0.000	0.318	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	-8.809	1.000	1.000	8.881	4.124	4.721	56.140	0.017	0.000

	END	END	NEW SURGE	NEW SURGE					BOTTOM	AVERAGE
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	1.000	-8.792	0.000	8.881	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	2.000	-8.775	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	3.000	-8.758	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	4.000	-8.740	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	5.000	-8.723	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	6.000	-8.706	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	7.000	-8.689	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	8.000	-8.672	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	9.000	-8.655	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	10.000	-8.637	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	11.000	-8.620	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	12.000	-8.603	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	13.000	-8.586	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	14.000	-8.569	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	15.000	-8.552	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	16.000	-8.534	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	17.000	-8.517	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE	A-ZONES
OF	18.000	-8.500	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000

Note: Between each OF data row above, the repeated header rows read:
END STATION | END ELEVATION | NEW SURGE 10-YEAR | NEW SURGE 100-YEAR | BOTTOM SLOPE | AVERAGE A-ZONES

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	19.000	-8.483	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
OF	20.000	-8.466	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
OF	21.000	-8.449	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
OF	22.000	-8.431	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
OF	23.000	-8.414	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
OF	24.000	-8.397	0.000	8.882	0.000	0.000	0.000	0.000	0.017	0.000
OF	25.000	-8.380	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	26.000	-8.363	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	27.000	-8.346	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	28.000	-8.328	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	29.000	-8.311	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	30.000	-8.294	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	31.000	-8.277	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	32.000	-8.260	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	33.000	-8.243	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	34.000	-8.225	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	35.000	-8.208	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	36.000	-8.191	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	37.000	-8.174	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	38.000	-8.157	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	39.000	-8.139	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	40.000	-8.122	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	41.000	-8.105	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	42.000	-8.088	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	43.000	-8.071	0.000	8.883	0.000	0.000	0.000	0.000	0.017	0.000
OF	44.000	-8.054	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	45.000	-8.037	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	46.000	-8.019	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	47.000	-8.002	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	48.000	-7.985	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	49.000	-7.968	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	50.000	-7.951	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	51.000	-7.934	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	52.000	-7.916	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	53.000	-7.899	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	54.000	-7.882	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	55.000	-7.865	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	56.000	-7.848	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	57.000	-7.831	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	58.000	-7.813	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	59.000	-7.796	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	60.000	-7.779	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	61.000	-7.762	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	62.000	-7.745	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	63.000	-7.728	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	64.000	-7.710	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	65.000	-7.693	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	66.000	-7.676	0.000	8.884	0.000	0.000	0.000	0.000	0.017	0.000
OF	67.000	-7.659	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	68.000	-7.642	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	69.000	-7.625	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	70.000	-7.608	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	71.000	-7.590	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	72.000	-7.573	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	73.000	-7.556	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	74.000	-7.539	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	75.000	-7.522	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	76.000	-7.504	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	77.000	-7.487	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	78.000	-7.470	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	79.000	-7.453	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	80.000	-7.436	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	81.000	-7.419	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	82.000	-7.402	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	83.000	-7.384	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	84.000	-7.367	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	85.000	-7.350	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	86.000	-7.333	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	87.000	-7.316	0.000	8.885	0.000	0.000	0.000	0.000	0.017	0.000
OF	88.000	-7.299	0.000	8.885	0.000	0.000	0.000	0.000	0.030	0.000
OF	89.000	-7.256	0.000	8.885	0.000	0.000	0.000	0.000	0.094	0.000
OF	90.000	-7.111	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	91.000	-6.966	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	92.000	-6.821	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	93.000	-6.676	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	94.000	-6.530	0.000	8.885	0.000	0.000	0.000	0.000	0.146	0.000
OF	95.000	-6.385	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	96.000	-6.240	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	97.000	-6.094	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	98.000	-5.949	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	99.000	-5.804	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	100.000	-5.659	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	101.000	-5.514	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	102.000	-5.368	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	103.000	-5.223	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	104.000	-5.078	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	105.000	-4.933	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	106.000	-4.787	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	107.000	-4.642	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	108.000	-4.497	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	109.000	-4.352	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	110.000	-4.207	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	111.000	-4.061	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	112.000	-3.916	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	113.000	-3.771	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	114.000	-3.626	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	115.000	-3.480	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	116.000	-3.335	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	117.000	-3.190	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	118.000	-3.045	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	119.000	-2.899	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	120.000	-2.754	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000

	END STATION	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE	AVERAGE A-ZONES
OF	121.000	-2.609	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	122.000	-2.464	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	123.000	-2.319	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	124.000	-2.174	0.000	8.885	0.000	0.000	0.000	0.000	0.145	0.000
OF	125.000	-2.028	0.000	8.885	0.000	0.000	0.000	0.000	0.740	0.000
IF	129.000	1.529	0.000	8.885	0.000	0.000	0.000	0.000	0.431	0.000
IF	134.000	1.854	0.000	8.885	0.000	0.000	0.000	0.000	0.274	0.000
IF	137.000	3.720	0.000	8.885	0.000	0.000	0.000	0.000	0.156	0.000
IF	147.000	3.885	0.000	8.885	0.000	0.000	0.000	0.000	-0.002	0.000
IF	156.000	3.691	0.000	8.885	0.000	0.000	0.000	0.000	0.189	0.000
IF	167.300	7.718	0.000	8.997	0.000	0.000	0.000	0.000	0.291	0.000
IF	170.600	7.944	0.000	9.121	0.000	0.000	0.000	0.000	0.069	0.000
IF	173.900	8.171	0.000	9.165	0.000	0.000	0.000	0.000	0.112	0.000
IF	177.200	8.684	0.000	9.193	0.000	0.000	0.000	0.000	0.209	0.000
IF	178.800	9.193	0.000	9.193	0.000	0.000	0.000	0.000	0.318	0.000

--END OF TRANSECT--

NOTE:
SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.
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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	4.12	4.72	11.77
OF	1.00	4.12	4.72	11.77
OF	2.00	4.12	4.72	11.77
OF	3.00	4.13	4.72	11.77
OF	4.00	4.13	4.72	11.77
OF	5.00	4.13	4.72	11.77
OF	6.00	4.13	4.72	11.77
OF	7.00	4.13	4.72	11.77
OF	8.00	4.13	4.72	11.77
OF	9.00	4.13	4.72	11.77
OF	10.00	4.13	4.72	11.77
OF	11.00	4.13	4.72	11.77
OF	12.00	4.13	4.72	11.77
OF	13.00	4.13	4.72	11.77
OF	14.00	4.13	4.72	11.77
OF	15.00	4.13	4.72	11.77
OF	16.00	4.13	4.72	11.77
OF	17.00	4.13	4.72	11.77
OF	18.00	4.13	4.72	11.77
OF	19.00	4.13	4.72	11.77
OF	20.00	4.13	4.72	11.77
OF	21.00	4.13	4.72	11.78
OF	22.00	4.13	4.72	11.78
OF	23.00	4.13	4.72	11.78
OF	24.00	4.13	4.72	11.78
OF	25.00	4.14	4.72	11.78
OF	26.00	4.14	4.72	11.78
OF	27.00	4.14	4.72	11.78
OF	28.00	4.14	4.72	11.78
OF	29.00	4.14	4.72	11.78
OF	30.00	4.14	4.72	11.78
OF	31.00	4.14	4.72	11.78
OF	32.00	4.14	4.72	11.78
OF	33.00	4.14	4.72	11.78
OF	34.00	4.14	4.72	11.78
OF	35.00	4.14	4.72	11.78
OF	36.00	4.14	4.72	11.78
OF	37.00	4.14	4.72	11.78
OF	38.00	4.14	4.72	11.78
OF	39.00	4.14	4.72	11.78
OF	40.00	4.14	4.72	11.78
OF	41.00	4.14	4.72	11.78
OF	42.00	4.14	4.72	11.78
OF	43.00	4.14	4.72	11.78
OF	44.00	4.14	4.72	11.78
OF	45.00	4.14	4.72	11.79
OF	46.00	4.15	4.72	11.79
OF	47.00	4.15	4.72	11.79
OF	48.00	4.15	4.72	11.79

```
OF      49.00          4.15            4.72            11.79
OF      50.00          4.15            4.72            11.79
OF      51.00          4.15            4.72            11.79
OF      52.00          4.15            4.72            11.79
OF      53.00          4.15            4.72            11.79
OF      54.00          4.15            4.72            11.79
OF      55.00          4.15            4.72            11.79
OF      56.00          4.15            4.72            11.79
OF      57.00          4.15            4.72            11.79
OF      58.00          4.15            4.72            11.79
OF      59.00          4.15            4.72            11.79
OF      60.00          4.15            4.72            11.79
OF      61.00          4.15            4.72            11.79
OF      62.00          4.15            4.72            11.79
OF      63.00          4.15            4.72            11.79
OF      64.00          4.15            4.72            11.79
OF      65.00          4.15            4.72            11.79
OF      66.00          4.16            4.72            11.79
OF      67.00          4.16            4.72            11.79
OF      68.00          4.16            4.72            11.79
OF      69.00          4.16            4.72            11.79
OF      70.00          4.16            4.72            11.80
OF      71.00          4.16            4.72            11.80
OF      72.00          4.16            4.72            11.80
OF      73.00          4.16            4.72            11.80
OF      74.00          4.16            4.72            11.80
OF      75.00          4.16            4.72            11.80
OF      76.00          4.16            4.72            11.80
OF      77.00          4.16            4.72            11.80
OF      78.00          4.16            4.72            11.80
OF      79.00          4.16            4.72            11.80
OF      80.00          4.16            4.72            11.80
OF      81.00          4.16            4.72            11.80
OF      82.00          4.16            4.72            11.80
OF      83.00          4.16            4.72            11.80
OF      84.00          4.16            4.72            11.80
OF      85.00          4.17            4.72            11.80
OF      86.00          4.17            4.72            11.80
OF      87.00          4.17            4.72            11.80
OF      88.00          4.17            4.72            11.80
OF      89.00          4.17            4.72            11.80
OF      90.00          4.17            4.72            11.80
OF      91.00          4.17            4.72            11.81
OF      92.00          4.18            4.72            11.81
OF      93.00          4.18            4.72            11.81
OF      94.00          4.18            4.72            11.81
OF      95.00          4.18            4.72            11.81
OF      96.00          4.19            4.72            11.82
OF      97.00          4.19            4.72            11.82
OF      98.00          4.19            4.72            11.82
OF      99.00          4.20            4.72            11.82
OF     100.00          4.20            4.73            11.83
OF     101.00          4.20            4.73            11.83
OF     102.00          4.21            4.73            11.83
OF     103.00          4.21            4.73            11.83
OF     104.00          4.22            4.73            11.84
OF     105.00          4.22            4.73            11.84
OF     106.00          4.23            4.73            11.84
OF     107.00          4.23            4.73            11.85
OF     108.00          4.24            4.73            11.85
OF     109.00          4.24            4.73            11.85
OF     110.00          4.25            4.73            11.86
OF     111.00          4.25            4.73            11.86
OF     112.00          4.26            4.73            11.87
OF     113.00          4.26            4.73            11.87
OF     114.00          4.27            4.73            11.87
OF     115.00          4.28            4.73            11.88
OF     116.00          4.28            4.73            11.88
OF     117.00          4.29            4.73            11.89
OF     118.00          4.30            4.73            11.89
OF     119.00          4.31            4.73            11.90
OF     120.00          4.31            4.73            11.90
OF     121.00          4.32            4.73            11.91
OF     122.00          4.33            4.73            11.92
OF     123.00          4.34            4.73            11.92
OF     124.00          4.35            4.73            11.93
OF     125.00          4.36            4.73            11.93
IF     129.00          4.59            4.73            12.09
IF     134.00          4.53            4.73            12.06
IF     137.00          3.76            4.73            11.52
IF     147.00          3.65            4.73            11.44
IF     156.00          3.62            4.73            11.42
IF     167.30          0.98            4.73             9.68
IF     170.60          0.90            4.73             9.75
IF     173.90          0.76            4.73             9.70
IF     177.20          0.39            4.73             9.47
IF     178.80          0.01            4.73             9.20
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
  2.00                 1.00                      8.88
 25.00                 1.00                      8.88
 44.00                 1.00                      8.88
 67.00                 1.00                      8.89
167.30                 1.00                      9.00
170.60                 1.00                      9.12
173.90                 1.00                      9.16
177.20                 1.00                      9.19
               PART5  LOCATION OF V ZONES
        STATION OF GUTTER         LOCATION OF ZONE
             158.67                  WINDWARD
```
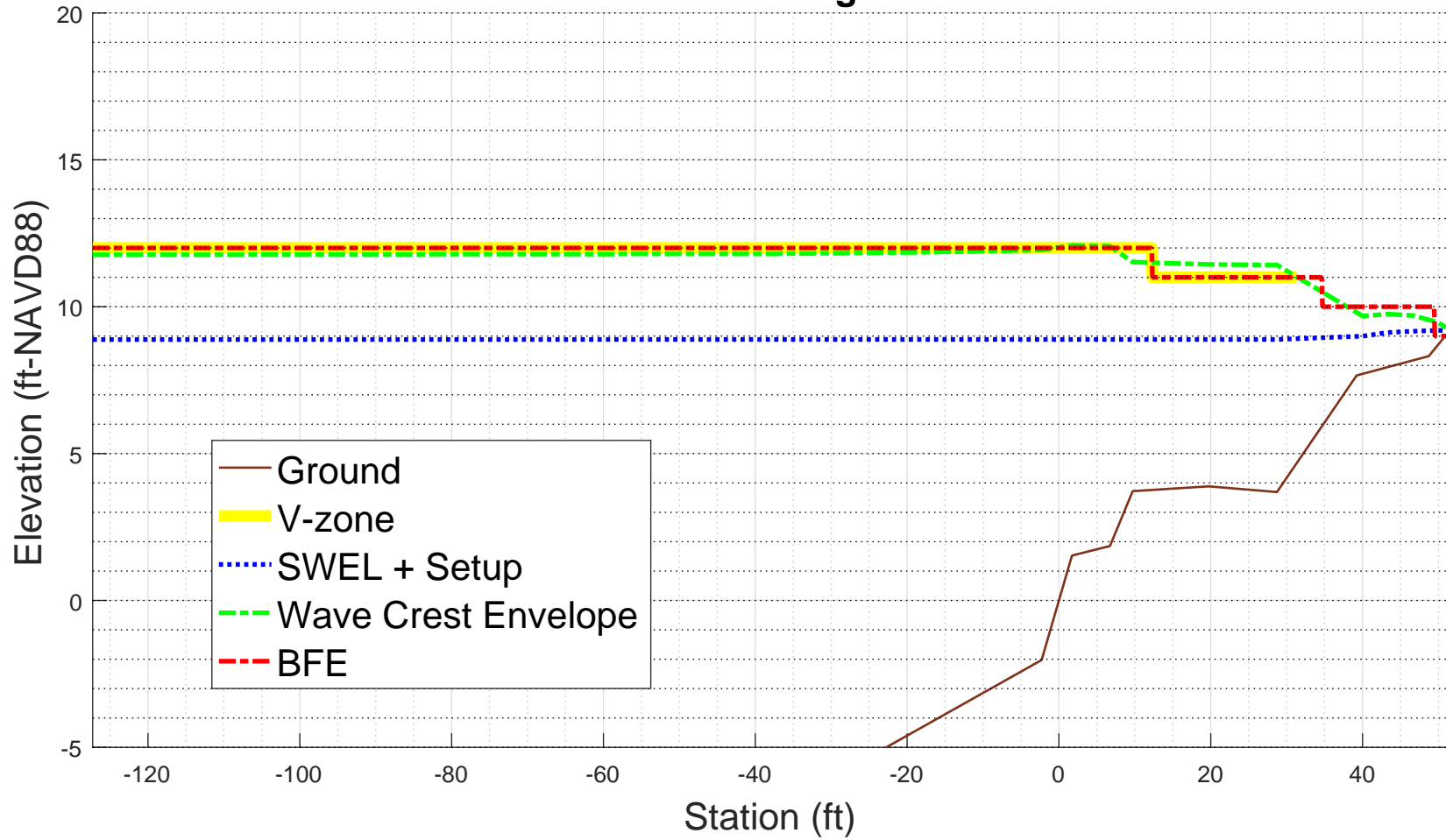
```
                    PART6 NUMBERED A ZONES AND V ZONES
            STATION OF GUTTER   ELEVATION   ZONE DESIGNATION      FHF
                 0.00             11.77
                                              V22   EL=12        120
                 1.00             11.77
                                              V22   EL=12        120
                 2.00             11.77
                                              V22   EL=12        120
                24.00             11.78
                                              V22   EL=12        120
                25.00             11.78
                                              V22   EL=12        120
                43.00             11.78
                                              V22   EL=12        120
                44.00             11.78
                                              V22   EL=12        120
                66.00             11.79
                                              V22   EL=12        120
                67.00             11.79
                                              V22   EL=12        120
               138.94             11.50
                                              V22   EL=11        120
               156.00             11.42
                                              V22   EL=11        120
               158.67             11.04
                                              A18   EL=11         90
               161.99             10.50
                                              A18   EL=10         90
               167.30              9.68
                                              A18   EL=10         90
               170.60              9.75
                                              A18   EL=10         90
               173.90              9.70
                                              A18   EL=10         90
               176.76              9.50
                                              A18   EL= 9         90
               177.20              9.47
                                              A18   EL= 9         90
               178.80              9.20
                       ZONE TERMINATED AT END OF TRANSECT
                       PART 7   POSTSCRIPT NOTES
        PS#  1   START(411230.068,4838905.6463)
        PS#  2   END(411114.2713,4838917.814)
-1.000000e+00
```
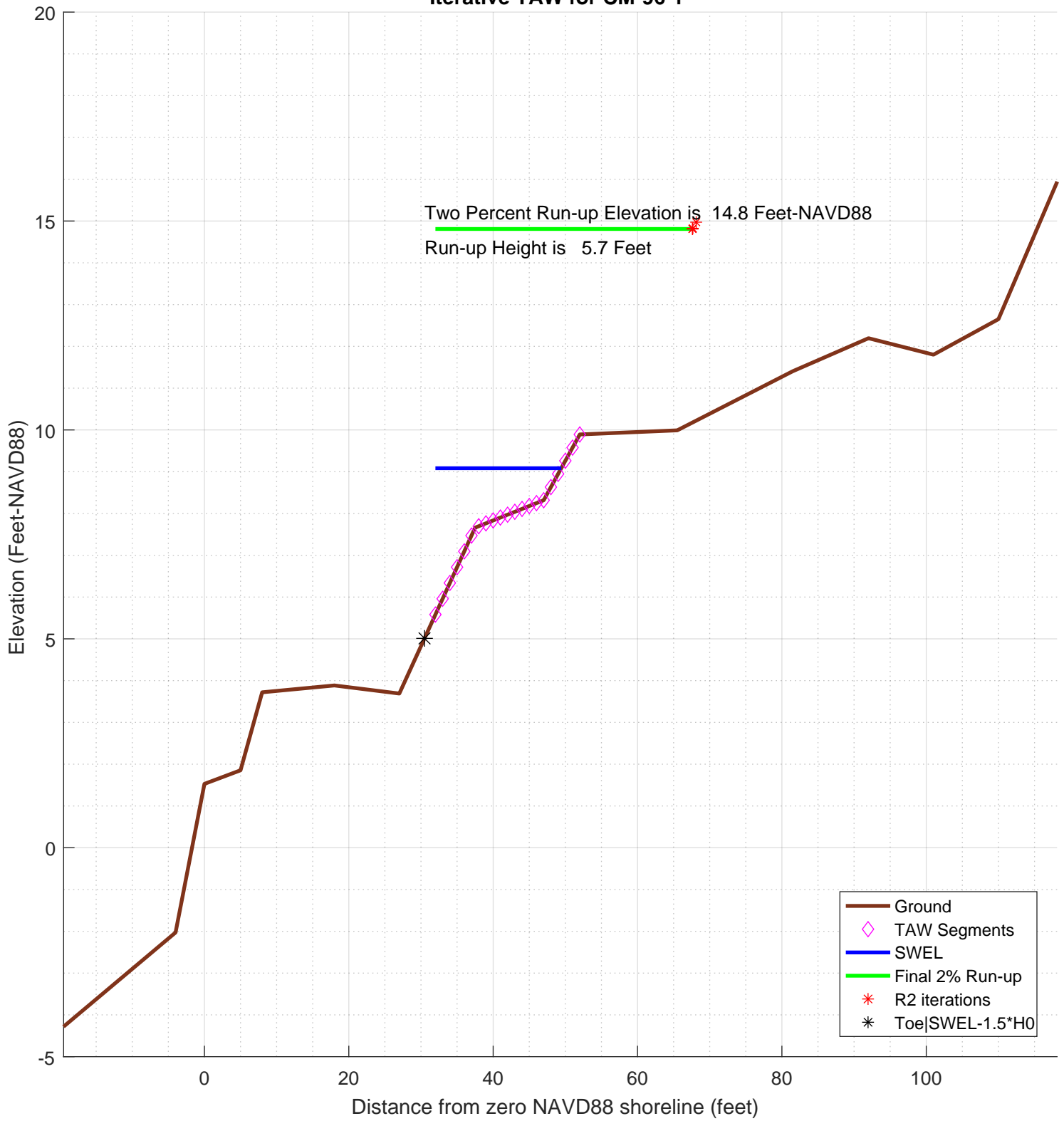
CM-96-1
100-year WHAFIS Output
Zero Station: -70.10211560, 43.69789496
Onshore Dir: 174.0 deg CCW from E

Legend:
- Ground
- V-zone
- SWEL + Setup
- Wave Crest Envelope
- BFE

Y-axis: Elevation (ft-NAVD88)
X-axis: Station (ft)

Iterative TAW for CM-96-1

Two Percent Run-up Elevation is 14.8 Feet-NAVD88

Run-up Height is   5.7 Feet

Ground
TAW Segments
SWEL
Final 2% Run-up
R2 iterations
Toe|SWEL-1.5*H0

Elevation (Feet-NAVD88)

Distance from zero NAVD88 shoreline (feet)

```
diary on        % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-96-1
% calculation by SJH, Ransom Consulting, Inc. 16-Apr-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-96-1sta_ele_include.csv';   % file with station, elevation, include
                                 % third colunm is 0 for excluded points
imgname='logfiles/CM-96-1-runup';
SWEL=8.8814;  % 100-yr still water level including wave setup.
H0=2.5766;    % significant wave height at toe of structure
Tp=4.6414;    % 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=-0.0052132;
maxSetup=0.31165;   % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-96-1'

plotTitle =

Iterative TAW for CM-96-1


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

SWEL=SWEL+setupAtToe

SWEL =

               8.8761868

SWEL_fore=SWEL+maxSetup

SWEL_fore =

               9.1878368


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

L0 =

          91.0990261582998


% 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 =

                  5.0112868


% 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 =

                  12.7410868


% 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 =

          30.4922497474066

% 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

top_sta =

          61.046687685142


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

top_sta =

          61.046687685142

toe_sta

toe_sta =

          30.4922497474066




% 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 55.8 ft landward of toe of slope


ans =

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


ans =

-!!-        setup is adjusted to 0.20 feet


ans =

-!!-        SWEL is adjusted to 9.08 feet


k =

     1
     2
     3
     4
     5
     6
     7
     8
     9
    10
    11
    12
    13
    14
    15
    16
    17
    18
    19
    20
    21
    22
    23
    24
    25
    26
    27
    28
    29
    30
    31
    32
    33
    34
    35
    36
    37
    38




% 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 =
                5.0112868
toe_sta =
        30.4922497474066
top_sta =
        61.046687685142
```

```
Z2 =
                12.7410868
H0 =
                    2.5766
Tp =
                    4.6414
T0 =
          4.21945454545455
R2 =
                    7.7298
Z2 =
          16.8133395082333
top_sta =
          73.9760748417528
Lslope =
          43.4838250943462
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          0.271412477688579
Irb =
          1.61385003375967
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                    0.8
gamma =
                    0.8
ans =
!!! - - Iribaren number:   1.61 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.7 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          5.88807633173098
R2del =
          1.84172366826902
Z2 =
          14.9716158399643
ans =
!---------------- STARTING ITERATION 2 -----------------!
Ztoe =
                    5.0112868
toe_sta =
          30.4922497474066
top_sta =
           68.128609065771
Z2 =
          14.9716158399643
H0 =
                    2.5766
Tp =
                    4.6414
T0 =
          4.21945454545455
R2 =
          5.88807633173098
Z2 =
          14.9716158399643
top_sta =
           68.128609065771
Lslope =
          37.6363593183644
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
          0.264646454129909
Irb =
          1.57361847387867
gamma_berm =
     1
```

```
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                         0.8
gamma =
                         0.8
ans =
!!! - - Iribaren number:   1.57 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.8 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
         5.74129286947083
R2del =
        0.146783462260157
Z2 =
          14.8248323777041
ans =
!---------------- STARTING ITERATION 3 -----------------!
Ztoe =
                    5.0112868
toe_sta =
         30.4922497474066
top_sta =
         67.6625721206884
Z2 =
          14.8248323777041
H0 =
                       2.5766
Tp =
                       4.6414
T0 =
          4.21945454545455
R2 =
         5.74129286947083
Z2 =
          14.8248323777041
top_sta =
         67.6625721206884
Lslope =
          37.1703223732818
ans =
!------- End Berm Factor Calculation, Iter: 3 ---------!
berm_width =
     0
rB =
     0
rdh_mean =
     1
gamma_berm =
     1
slope =
        0.264015616522018
Irb =
          1.56986744038359
gamma_berm =
     1
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
                         0.8
gamma =
                         0.8
ans =
!!! - - Iribaren number:   1.57 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.8 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
         5.72760735279958
R2del =
       0.0136855166712468
Z2 =
          14.8111468610329
ans =
!---------------- STARTING ITERATION 4 -----------------!
Ztoe =
                    5.0112868
toe_sta =
         30.4922497474066
top_sta =
         67.6191206563127
Z2 =
          14.8111468610329
H0 =
                       2.5766
Tp =
                       4.6414
```

```
T0 =
          4.21945454545455
R2 =
          5.72760735279958
Z2 =
          14.8111468610329
top_sta =
          67.6191206563127
Lslope =
          37.1268709089061
ans =
!------- End Berm Factor Calculation, Iter: 4 ---------!
berm_width =
      0
rB =
      0
rdh_mean =
      1
gamma_berm =
      1
slope =
          0.263955992549916
Irb =
          1.56951290933841
gamma_berm =
      1
gamma_perm =
      1
gamma_beta =
      1
gamma_rough =
                        0.8
gamma =
                        0.8
ans =
!!! - - Iribaren number:   1.57 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:3.8 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          5.72631385847711
R2del =
        0.00129349432246606
Z2 =
          14.8098533667104
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
          14.8098533667104
diary off
-1.000000e+00
```

```
_____
PART 5: RUNUP2

        for transect: CM-96-1

Station locations shifted by: -1.72 feet from their
original location to set the shoreline to
elevation 0 for RUNUP2 input


_____RUNUP2 INPUT CONVERSIONS_____
        for transect: CM-96-1

Incident significant wave height: 2.58 feet

Peak wave period: 4.72 seconds

Mean wave height: 1.61 feet

Local Depth below SWEL: 17.69 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 = 17.69
    Period, T = 4.01
    Waveheight, H = 1.61
Deep water wavelength, L0 (ft)
    L0 = g*T*T/twopi
    L0 = 32.17*4.01*4.01/6.28 = 82.45
Deep water wave celerity, C0 (ft/s)
    C0 = L0/T
    C0 = 82.45/4.01 = 20.55
Angular frequency, sigma (rad/s)
    sigma = twopi/T
    sigma = 6.28/4.01 = 1.57
Hunts (1979) approximation for Celerity C1H (ft/s) at Depth D (ft)
    y = sigma.*sigma.*D./g
    y = 1.57*1.57*17.69/32.17 = 1.35
    C1H = sqrt( g.*D./(y+1./(1 + 0.6522.*y + 0.4622.*y.^2 + 0.0864.*y.^4 +0.0675.*y.^5)) )
    C1H = 18.57
Shoaling Coefficient KsH
    KsH = sqrt(C0/C1H)
    KsH = sqrt(20.55/18.57) = 1.05
Deepwater Wave Height H0_H (ft)
    H0_H = H/KsH
    H0_H = 1.61/1.05 = 1.53

Deepwater mean wave height: 1.53 feet

_____END RUNUP2 CONVERSIONS_____

_____RUNUP2 RESULTS_____
        for transect: CM-96-1

RUNUP2 SWEL:
8.90
8.90
8.90
8.90
```

```
8.90
8.90
8.90
8.90
8.90

RUNUP2 deepwater mean wave heights:
1.46
1.46
1.46
1.53
1.53
1.53
1.61
1.61
1.61

RUNUP2 mean wave periods:
3.81
4.01
4.21
3.81
4.01
4.21
3.81
4.01
4.21

RUNUP2 runup above SWEL:
2.06
2.21
2.37
2.06
2.22
2.37
2.07
2.21
2.38

RUNUP2 Mean runup height above SWEL: 2.22 feet

RUNUP2 2-percent runup height above SWEL: 4.88 feet

RUNUP2 2-percent runup elevation: 13.78 feet-NAVD88

RUNUP2 Messages:
No Messages

_____END RUNUP2 RESULTS_____



_____ACES BEACH RUNUP_____

Incident significant wave height: 2.58 feet

Significant wave height is mean wave height divided by 0.626
Reference: D.2.8.1.2.1 Atlanic and Gulf of Mexico G&S Feb. 2007

Deepwater significant wave height: 2.45 feet

Peak wave period: 4.72 seconds

Average beach Slope: 1:9.68 (H:V)


ACES IRREGULAR WAVE RUNUP ON BEACHES

# Reference:
# Leenknecht, David A., Andre Szuwaiski, and Ann Sherlock. 1992.
# "Automated Coastal Engineering System Technical Reference",
# Coastal Engineering Research Center, Department of the Army
```

```
# Waterways Experiments Station, Corps of Eniggneers, 3909 Halls
# Ferry Road, Vicksburg, Mississippi 39180-6199.

INPUTS:

Acceleration Due to Gravity,        g  =   32.174
Deepwater Significant Wave height,  Hs =    2.45
Wave Period,                        T  =    4.72
Beach Slope,                        S  =    0.103

EQUATIONS:

Runup,            R   = Hs * a * Irb^b
Iribarren,        Irb = S/sqrt(Hs/L0)
Wavelength,       L0  = g * T^2 / 2 / pi

COEFFICIENTS:
(Mase, H. 1989, "Random Wave Runup Height on Gentle Slopes,"
j. Waterway, Port, Coastal and Ocean Engineering Division,
ASCE, Vol 115, No. 5, pp 649-661.)

                [Rmax,  R2%, R-1/3, R-1/10, R-mean]
         a = [2.32, 1.86,  1.70,   1.38,   0.88]
         b = [0.77, 0.71,  0.71,   0.70,   0.69]

RESULTS:

       RUNUP = [ 4.3,  3.6,   3.3,    2.6,    1.7]

ACES RUNUP CALCULATED USING 'Aces_Beach_Runup.m'

ACES Beach 2-percent runup height above SWEL: 3.56 feet

ACES Beach 2-percent runup elevation: 12.46 feet-NAVD88

ACES BEACH RUNUP is valid

_____END ACES BEACH RESULTS_____

PART 5 COMPLETE_____
```

3.00
  -8.81 -127.3 0.8
  -8.38 -102.3 0.8
  -8.09 -85.3 0.8
  -7.30 -39.3 0.8
  -7.26 -38.3 0.8
  -6.68 -34.3 0.8
  -6.38 -32.3 0.8
  -5.51 -26.3 0.8
  -5.22 -24.3 0.8
  -4.35 -18.3 0.8
  -3.77 -14.3 0.8
  -2.03 -2.3   0.8
  1.53 1.7   0.8
  1.85 6.7   0.8
  3.72 9.7   0.8
  3.88 19.7   0.8
  3.88 28.7   0.8
  7.66 39.2   0.8
  8.32 48.7   0.8
1 9.89 53.7   0.8
  8.9   1.46   3.81
  8.9   1.46   4.01
  8.9   1.46   4.21
  8.9   1.53   3.81
  8.9   1.53   4.01
  8.9   1.53   4.21
  8.9   1.61   3.81
  8.9   1.61   4.01
  8.9   1.61   4.21

****

CROSS SECTION PROFILE

	LENGTH	ELEV.	SLOPE	ROUGHNESS
1	-127.3	-8.8		
			.00	.80
2	-102.3	-8.4		
			58.62	.80
3	-85.3	-8.1		
			58.23	.80
4	-39.3	-7.3		
			25.00	.80
5	-38.3	-7.3		
			6.90	.80
6	-34.3	-6.7		
			6.67	.80
7	-32.3	-6.4		
			6.90	.80
8	-26.3	-5.5		
			6.90	.80
9	-24.3	-5.2		
			6.90	.80
10	-18.3	-4.3		
			6.90	.80
11	-14.3	-3.8		
			6.90	.80
12	-2.3	-2.0		
			1.12	.80
13	1.7	1.5		
			15.63	.80
14	6.7	1.9		
			1.60	.80
15	9.7	3.7		
			62.50	.80
16	19.7	3.9		
			FLAT	.80
17	28.7	3.9		
			2.78	.80
18	39.2	7.7		
			14.39	.80
19	48.7	8.3		
			3.18	.80
20	53.7	9.9		

LAST SLOPE   3.00   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.)
8.90	1.46	3.81	11	20	2.06	1.91
8.90	1.46	4.01	11	20	2.21	1.93
8.90	1.46	4.21	11	20	2.37	1.96
8.90	1.53	3.81	11	20	2.06	1.99
8.90	1.53	4.01	11	20	2.22	2.01
8.90	1.53	4.21	11	20	2.37	2.04
8.90	1.61	3.81	11	20	2.07	2.08
8.90	1.61	4.01	11	20	2.21	2.10
8.90	1.61	4.21	11	20	2.38	2.13

Runup2 2% runup elevation for Transect: CM-96-1

Two Percent Run-up Elevation is 13.8 Feet-NAVD88

Run-up Height is 4.9 Feet