```
diary on         % begin recording

% FEMA appeal for The Town of Harpswell, Cumberland county, Maine
% TRANSECT ID: CM-139
% calculation by SJH, Ransom Consulting, Inc. 20-Feb-2020
% 100-year wave runup using TAW methodology
% including berm and weighted average with foreshore if necessary
%
% chk nld 20200220
%
% This script assumes that the incident wave conditions provided
% as input in the configuration section below are the
% appropriate values located at the end of the foreshore
% or toe of the slope on which the run-up is being calculated
% the script does not attempt to apply a depth limit or any other
% transformation to the incident wave conditions other than
% conversion of the peak wave period to the spectral mean wave
% as recommended in the references below
%
% references:
%
% Van der Meer, J.W., 2002. Technical Report Wave Run-up and
% Wave Overtopping at Dikes. TAW Technical Advisory Committee on
% Flood Defence, The Netherlands.
%
% FEMA. 2007,  Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update
%
%
%


%-------------------------------------------------------------------------
% CONFIG
%-------------------------------------------------------------------------
fname='inpfiles/CM-139sta_ele_include.csv';   % file with station, elevation, include
                                  % third colunm is 0 for excluded points
imgname='logfiles/CM-139-runup';
SWEL=8.804;  % 100-yr still water level including wave setup.
H0=6.2267;    % significant wave height at toe of structure
Tp=10.2103;    % peak period, 1/fma,
T0=Tp/1.1;

gamma_berm=0.7549;   % this may get changed automatically below
gamma_rough=1;
gamma_beta=1;
gamma_perm=1;

setupAtToe=-0.023839;
maxSetup=0.87295;   % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for CM-139'

plotTitle =

Iterative TAW for CM-139



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

SWEL=SWEL+setupAtToe

SWEL =

                8.780161

SWEL_fore=SWEL+maxSetup

SWEL_fore =

                9.653111



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

L0 =

         440.851927637668


% 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
```

```matlab
% 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 =

                -0.559889


% 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 =

                18.120211


% 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 =

        -4.37839811542992


top_sta =

          196.59710472875

% 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 =

          196.59710472875

toe_sta

toe_sta =

        -4.37839811542992



% 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 117.9 ft landward of toe of slope


ans =

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


ans =

-!!-        setup is adjusted to 0.31 feet


ans =

-!!-        SWEL is adjusted to 9.11 feet


k =

       1
       2
       3
       4
       5
       6
       7
       8
       9
      10
      11
      12
      13
      14
      15
      16
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      45
      46
      47



% 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 =
                -0.559889
toe_sta =
        -4.37839811542992
top_sta =
         196.59710472875
Z2 =
                18.120211
H0 =
                   6.2267
Tp =
                  10.2103
T0 =
          9.28209090909091
R2 =
                  18.6801
Z2 =
         27.7920895455134
top_sta =
          313.97001027602
Lslope =
          318.34840839145
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 20
dh =
         7.01733954551342
rdh_sum =
        0.599065845823981
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 21
dh =
         6.95683954551342
rdh_sum =
         1.19064063116286
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 28
dh =
         5.84106454551342
rdh_sum =
          1.6420749834842
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 29
dh =
         5.82241454551342
rdh_sum =
         2.09116860919536
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 30
dh =
         5.79601454551342
rdh_sum =
         2.53695075903407
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 31
dh =
         5.76186454551342
rdh_sum =
         2.97845290273617
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 32
dh =
         5.71803954551342
rdh_sum =
         3.41446888099168
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 33
dh =
         5.66453954551342
rdh_sum =
         3.84379821136296
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 44
dh =
         4.10266454551342
rdh_sum =
         4.08852215773557
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 45
dh =
         4.03861454551342
rdh_sum =
         4.32633313641215
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 60
dh =
        0.716464545513425
rdh_sum =
```

```
          4.33447774023632
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 61
dh =
          0.718214545513424
rdh_sum =
          4.34266207081192
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 62
dh =
          0.719939545513425
rdh_sum =
          4.35088565442187
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 63
dh =
          0.721639545513424
rdh_sum =
          4.35914801329253
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 72
dh =
          -0.569610454486575
rdh_sum =
          4.36144048709367
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 73
dh =
          -0.597610454486576
rdh_sum =
          4.36396368543612
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 74
dh =
          -0.605235454486575
rdh_sum =
          4.36655162630951
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 75
dh =
          -0.592485454486576
rdh_sum =
          4.36903176888756
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 76
dh =
          -0.584710454486576
rdh_sum =
           4.3714472984164
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 77
dh =
          -0.581910454486575
rdh_sum =
          4.37383976729215
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 82
dh =
          -1.05048545448658
rdh_sum =
          4.38162247682359
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 83
dh =
          -1.10383545448657
rdh_sum =
          4.39021343688658
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 88
dh =
          -1.89333545448658
rdh_sum =
          4.41534753029256
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 89
dh =
          -1.93178545448658
rdh_sum =
          4.44150375509001
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 94
dh =
          -2.39768545448658
rdh_sum =
           4.4816063336612
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 95
dh =
          -2.45383545448658
rdh_sum =
```

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                4.52358214779857
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 96
dh =
          -2.48993545448658
rdh_sum =
                4.56678388555495
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 97
dh =
          -2.50598545448658
rdh_sum =
                4.61053607670744
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 98
dh =
          -2.54166045448657
rdh_sum =
                4.65552368380569
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 99
dh =
          -2.59696045448658
rdh_sum =
                4.70245867193533
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 100
dh =
          -2.65703545448658
rdh_sum =
                4.75155359566805
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 101
dh =
          -2.72188545448658
rdh_sum =
                4.80303178825642
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 102
dh =
          -2.78673545448658
rdh_sum =
                 4.8569466003655
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 103
dh =
          -2.85158545448658
rdh_sum =
                4.9133510928299
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 104
dh =
          -2.91396045448658
rdh_sum =
                4.97220003309272
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 105
dh =
          -2.97386045448658
rdh_sum =
                5.03344212435562
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 106
dh =
          -3.03341045448658
rdh_sum =
                5.09710752043771
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 107
dh =
          -3.09261045448658
rdh_sum =
                5.16322535829537
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 108
dh =
          -3.14551045448658
rdh_sum =
                 5.2315710456004
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 109
dh =
          -3.19211045448658
rdh_sum =
                5.30190757209896
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 110
dh =
          -3.23113545448658
rdh_sum =
```

```
                   5.37393162870342
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 111
dh =
           -3.26258545448658
rdh_sum =
            5.44732907336501
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 112
dh =
           -3.29383545448658
rdh_sum =
            5.52210299327982
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 113
dh =
           -3.32488545448658
rdh_sum =
            5.59825621175062
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 114
dh =
           -3.36333545448658
rdh_sum =
            5.67613346400767
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 115
dh =
           -3.40918545448658
rdh_sum =
            5.75608962116676
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 118
dh =
           -3.60403545448658
rdh_sum =
            5.84515763480688
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 119
dh =
           -3.62728545448658
rdh_sum =
            5.93534256115743
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 120
dh =
           -3.64426045448658
rdh_sum =
            6.02634691220303
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 121
dh =
           -3.65496045448658
rdh_sum =
            6.11786949157243
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 126
dh =
           -4.12838545448658
rdh_sum =
            6.23362033016775
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 127
dh =
           -4.18293545448658
rdh_sum =
            6.35232234057193
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 128
dh =
           -4.21903545448658
rdh_sum =
            6.47299503364288
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 129
dh =
           -4.23668545448658
rdh_sum =
            6.59463632591779
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 130
dh =
           -4.25831045448658
rdh_sum =
             6.7174689016373
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 131
dh =
           -4.28391045448658
rdh_sum =
```

```
          6.84171818381369
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 132
dh =
         -4.31266045448658
rdh_sum =
          6.9675667956922
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 133
dh =
         -4.34456045448658
rdh_sum =
          7.09520020371398
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 138
dh =
         -4.79738545448658
rdh_sum =
          7.24929995385892
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 139
dh =
         -4.84253545448658
rdh_sum =
          7.40615115174649
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 140
dh =
         -4.86608545448658
rdh_sum =
          7.56444535148319
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 141
dh =
         -4.86803545448658
rdh_sum =
          7.72285927605111
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 142
dh =
         -4.89063545448658
rdh_sum =
          7.8826634576163
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 143
dh =
         -4.93388545448658
rdh_sum =
          8.04514188216504
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 146
dh =
         -5.13698545448658
rdh_sum =
          8.22041489208975
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 147
dh =
         -5.19413545448658
rdh_sum =
          8.39935710230119
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 148
dh =
         -5.23781045448658
rdh_sum =
          8.58112338933707
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 149
dh =
         -5.26801045448657
rdh_sum =
          8.76485249365481
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 154
dh =
         -5.69873545448658
rdh_sum =
          8.97743932112012
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 155
dh =
         -5.67618545448657
rdh_sum =
          9.18847659558763
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 172
dh =
         -6.91756045448658
rdh_sum =
```

```
              9.49035943034023
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 173
dh =
          -6.93326045448658
rdh_sum =
          9.79345509581798
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 178
dh =
          -7.37643545448658
rdh_sum =
          10.1313205579696
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 179
dh =
          -7.40228545448657
rdh_sum =
          10.4712437956307
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 180
dh =
          -7.44433545448658
rdh_sum =
           10.814520847403
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 181
dh =
          -7.50258545448658
rdh_sum =
            11.16245670252
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 184
dh =
          -7.70038545448658
rdh_sum =
           11.526318732635
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 185
dh =
          -7.72573545448657
rdh_sum =
           11.8922331195691
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 186
dh =
          -7.76693545448658
rdh_sum =
           12.2614882749465
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 187
dh =
          -7.82398545448658
rdh_sum =
           12.6353797514282
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 194
dh =
          -8.59431045448657
rdh_sum =
           13.0728347048123
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 195
dh =
          -8.64211045448658
rdh_sum =
           13.5142795294783
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 204
dh =
          -9.83591045448658
rdh_sum =
           14.0559270739797
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 205
dh =
          -9.86051045448658
rdh_sum =
           14.5996356624158
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 206
dh =
          -9.86938545448658
rdh_sum =
           15.1440876367368
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 207
dh =
          -9.86253545448658
rdh_sum =
```

```
          15.6879658514312
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 208
dh =
         -9.86646045448658
rdh_sum =
          16.2321728333765
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 209
dh =
         -9.88116045448658
rdh_sum =
          16.7776109496387
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 214
dh =
         -10.3572104544866
rdh_sum =
          17.3627259773918
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 215
dh =
         -10.4098104544866
rdh_sum =
          17.9521961529196
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 216
dh =
         -10.4557854544866
rdh_sum =
          18.5454672203581
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 217
dh =
         -10.4951354544866
rdh_sum =
          19.1419870509342
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 218
dh =
         -10.5365604544866
rdh_sum =
          19.7419223880212
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 219
dh =
         -10.5800604544866
rdh_sum =
          20.3454390921685
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 220
dh =
         -10.6233604544866
rdh_sum =
           20.952515195534
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 221
dh =
         -10.6664604544866
rdh_sum =
          21.5631286188907
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 228
dh =
         -11.2982604544866
rdh_sum =
          22.2248319635042
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 229
dh =
         -11.3397604544866
rdh_sum =
          22.8898335090317
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 230
dh =
         -11.3860854544866
rdh_sum =
          23.5585072200711
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 231
dh =
         -11.4372354544866
rdh_sum =
          24.2312236705167
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 232
dh =
         -11.4944104544866
rdh_sum =
```

```
              24.9084439162284
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 233
dh =
          -11.5576104544866
rdh_sum =
          25.5906234755512
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 234
dh =
          -11.6099604544866
rdh_sum =
          26.2768953870441
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 235
dh =
          -11.6514604544866
rdh_sum =
          26.9664012303305
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 238
dh =
          -11.8127354544866
rdh_sum =
          27.6683855252169
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 239
dh =
          -11.8211854544866
rdh_sum =
           28.371019611339
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 244
dh =
          -12.2150604544866
rdh_sum =
          29.1034659701403
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 245
dh =
          -12.2813604544866
rdh_sum =
          29.8408338001472
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 246
dh =
          -12.3164354544866
rdh_sum =
          30.5807933619185
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 247
dh =
          -12.3202854544866
rdh_sum =
          31.3210368976555
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 248
dh =
          -12.3250104544866
rdh_sum =
          32.0616288092266
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 249
dh =
          -12.3306104544866
rdh_sum =
          32.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 254
dh =
          -12.8425354544866
rdh_sum =
          33.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 255
dh =
          -12.8881854544866
rdh_sum =
          34.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 256
dh =
          -12.9345104544866
rdh_sum =
          35.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 257
dh =
          -12.9815104544866
rdh_sum =
```

```
                36.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 258
dh =
         -13.0322354544866
rdh_sum =
                37.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 259
dh =
         -13.0866854544866
rdh_sum =
                38.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 260
dh =
         -13.1325604544866
rdh_sum =
                39.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 261
dh =
         -13.1698604544866
rdh_sum =
                40.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 278
dh =
         -15.1985854544866
rdh_sum =
                41.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 279
dh =
         -15.2425354544866
rdh_sum =
                42.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 284
dh =
         -15.8273854544866
rdh_sum =
                43.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 285
dh =
         -15.8577354544866
rdh_sum =
                44.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 290
dh =
         -16.3686354544866
rdh_sum =
                45.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 291
dh =
         -16.3826854544866
rdh_sum =
                46.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 292
dh =
         -16.3988104544866
rdh_sum =
                47.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 293
dh =
         -16.4170104544866
rdh_sum =
                48.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 294
dh =
         -16.4539854544866
rdh_sum =
                49.8026334139279
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 295
dh =
         -16.5097354544866
rdh_sum =
                50.8026334139279
ans =
!------- End Berm Factor Calculation, Iter: 1 ---------!
berm_width =
    130
rB =
```

```
                0.408357625083988
rdh_mean =
                0.390789487799445
gamma_berm =
                0.751224242061582
slope =
                0.150529429941286
Irb =
                1.26659805841667
gamma_berm =
                0.751224242061582
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
     1
gamma =
                0.751224242061582
ans =
!!! - - Iribaren number:   0.95 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:6.6 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
                10.4867187515172
!   Berm_width is greater than 1/4 wave length
!   Runup will be weighted average with foreshore calculation assuming depth limited wave height on berm
fore_H0 =
                   5.89559958
upper_slope =
                0.0760215167036978
upper_slope =
                0.0759137707687769
upper_slope =
                0.075804847475598
upper_slope =
                0.0756947274203544
upper_slope =
                0.0755833907704967
upper_slope =
                0.0754708172528257
upper_slope =
                0.0754223383205499
upper_slope =
                0.0753733147729274
upper_slope =
                0.0753539582490276
upper_slope =
                0.075334381802103
w2 =
                0.0598447894485056
w1 =
                0.940155210551494
R2_new =
                 10.265964123278
R2del =
                8.41413587672201
Z2 =
                19.3779536687914
top_sta =
                211.236374706542
ans =
!---------------- STARTING ITERATION 2 ----------------!
Ztoe =
                    -0.559889
toe_sta =
                -4.37839811542992
top_sta =
                211.236374706542
Z2 =
                19.3779536687914
H0 =
                       6.2267
Tp =
                      10.2103
T0 =
                9.28209090909091
R2 =
                 10.265964123278
Z2 =
                19.3779536687914
top_sta =
                211.236374706542
Lslope =
                215.614772821972
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 20
dh =
                7.01733954551342
rdh_sum =
```

```
            0.599065845823981
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 21
dh =
          6.95683954551342
rdh_sum =
          1.19064063116286
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 28
dh =
          5.84106454551342
rdh_sum =
           1.6420749834842
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 29
dh =
          5.82241454551342
rdh_sum =
          2.09116860919536
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 30
dh =
          5.79601454551342
rdh_sum =
          2.53695075903407
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 31
dh =
          5.76186454551342
rdh_sum =
          2.97845290273617
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 32
dh =
          5.71803954551342
rdh_sum =
          3.41446888099168
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 33
dh =
          5.66453954551342
rdh_sum =
          3.84379821136296
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 44
dh =
          4.10266454551342
rdh_sum =
          4.08852215773557
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 45
dh =
          4.03861454551342
rdh_sum =
          4.32633313641215
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 60
dh =
         0.716464545513425
rdh_sum =
          4.33447774023632
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 61
dh =
         0.718214545513424
rdh_sum =
          4.34266207081192
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 62
dh =
         0.719939545513425
rdh_sum =
          4.35088565442187
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 63
dh =
         0.721639545513424
rdh_sum =
          4.35914801329253
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 72
dh =
         -0.569610454486575
rdh_sum =
          4.36672498212041
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 73
dh =
         -0.597610454486576
rdh_sum =
```

```
             4.37506304456257
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 74
dh =
        -0.605235454486575
rdh_sum =
         4.38361462508888
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 75
dh =
        -0.592485454486576
rdh_sum =
         4.39181067962445
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 76
dh =
        -0.584710454486576
rdh_sum =
         4.39979360756762
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 77
dh =
        -0.581910454486575
rdh_sum =
         4.40770046462582
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 82
dh =
        -1.05048545448658
rdh_sum =
         4.43331439950748
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 83
dh =
        -1.10383545448657
rdh_sum =
         4.46157065763506
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 88
dh =
        -1.89333545448658
rdh_sum =
         4.54317457725032
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 89
dh =
        -1.93178545448658
rdh_sum =
         4.62802857774397
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 94
dh =
        -2.39768545448658
rdh_sum =
         4.75669089949592
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 95
dh =
        -2.45383545448658
rdh_sum =
         4.89116107578002
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 96
dh =
        -2.48993545448658
rdh_sum =
         5.02942234879217
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 97
dh =
        -2.50598545448658
rdh_sum =
         5.16938334197964
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 98
dh =
        -2.54166045448657
rdh_sum =
         5.31315342220386
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 99
dh =
        -2.59696045448658
rdh_sum =
         5.46291173718541
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 100
dh =
        -2.65703545448658
rdh_sum =
```

```
                 5.61928896405186
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 101
dh =
          -2.72188545448658
rdh_sum =
           5.7829414790897
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 102
dh =
          -2.78673545448658
rdh_sum =
          5.95400174494285
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 103
dh =
          -2.85158545448658
rdh_sum =
          6.13259930688464
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 104
dh =
          -2.91396045448658
rdh_sum =
           6.3185659629714
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 105
dh =
          -2.97386045448658
rdh_sum =
          6.51171704134807
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 106
dh =
          -3.03341045448658
rdh_sum =
          6.71211276739417
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 107
dh =
          -3.09261045448658
rdh_sum =
          6.91980918509293
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 108
dh =
          -3.14551045448658
rdh_sum =
          7.13411059738993
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 109
dh =
          -3.19211045448658
rdh_sum =
          7.35429248199598
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 110
dh =
          -3.23113545448658
rdh_sum =
          7.57944277746044
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 111
dh =
          -3.26258545448658
rdh_sum =
          7.80862564159852
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 112
dh =
          -3.29383545448658
rdh_sum =
          8.04184027707684
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 113
dh =
          -3.32488545448658
rdh_sum =
          8.27908504584482
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 114
dh =
          -3.36333545448658
rdh_sum =
          8.52135326780243
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 115
dh =
          -3.40918545448658
rdh_sum =
```

```
                8.769658331117
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 118
dh =
        -3.60403545448658
rdh_sum =
        9.04415651201236
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 119
dh =
        -3.62728545448658
rdh_sum =
        9.32183550529751
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 120
dh =
        -3.64426045448658
rdh_sum =
        9.60184395092967
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 121
dh =
        -3.65496045448658
rdh_sum =
        9.88332379491445
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 126
dh =
        -4.12838545448658
rdh_sum =
        10.2320197060058
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 127
dh =
        -4.18293545448658
rdh_sum =
        10.5886916892261
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 128
dh =
        -4.21903545448658
rdh_sum =
        10.9506641629155
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 129
dh =
        -4.23668545448658
rdh_sum =
        11.3152343221553
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 130
dh =
        -4.25831045448658
rdh_sum =
        11.6829925762071
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 131
dh =
        -4.28391045448658
rdh_sum =
        12.0545324197132
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 132
dh =
        -4.31266045448658
rdh_sum =
        12.4303285528878
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 133
dh =
        -4.34456045448658
rdh_sum =
        12.8108585547613
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 138
dh =
        -4.79738545448658
rdh_sum =
        13.2595984812618
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 139
dh =
        -4.84253545448658
rdh_sum =
        13.7152150818047
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 140
dh =
        -4.86608545448658
rdh_sum =
```

```
          14.1744219643721
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 141
dh =
         -4.86803545448658
rdh_sum =
          14.6339262289742
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 142
dh =
         -4.89063545448658
rdh_sum =
          15.0968780998871
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 143
dh =
         -4.93388545448658
rdh_sum =
          15.5664325134237
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 146
dh =
         -5.13698545448658
rdh_sum =
          16.0670444089466
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 147
dh =
         -5.19413545448658
rdh_sum =
          16.5764002791265
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 148
dh =
         -5.23781045448658
rdh_sum =
          17.0924366557703
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 149
dh =
         -5.26801045448657
rdh_sum =
          17.6130908060481
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 154
dh =
         -5.69873545448658
rdh_sum =
          18.1992242539089
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 155
dh =
         -5.67618545448657
rdh_sum =
          18.7819568848075
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 172
dh =
         -6.91756045448658
rdh_sum =
           19.541642627791
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 173
dh =
         -6.93326045448658
rdh_sum =
          20.3033782107369
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 178
dh =
         -7.37643545448658
rdh_sum =
          21.1203107234644
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 179
dh =
         -7.40228545448657
rdh_sum =
          21.9402924958984
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 180
dh =
         -7.44433545448658
rdh_sum =
          22.7651916126735
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 181
dh =
         -7.50258545448658
rdh_sum =
```

```
        23.5968134563169
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 184
dh =
        -7.70038545448658
rdh_sum =
        24.4504648421444
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 185
dh =
        -7.72573545448657
rdh_sum =
        25.3068475266138
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 186
dh =
        -7.76693545448658
rdh_sum =
        26.1676234181942
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 187
dh =
        -7.82398545448658
rdh_sum =
        27.0343877890093
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 194
dh =
        -8.59431045448657
rdh_sum =
        27.9703782310523
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 195
dh =
        -8.64211045448658
rdh_sum =
        28.9099023364405
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 204
dh =
        -9.83591045448658
rdh_sum =
        29.905578438641
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 205
dh =
        -9.86051045448658
rdh_sum =
        30.9017344391704
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 206
dh =
        -9.86938545448658
rdh_sum =
        31.8980566731293
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 207
dh =
        -9.86253545448658
rdh_sum =
        32.8942509252786
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 208
dh =
        -9.86646045448658
rdh_sum =
        33.890518776846
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 209
dh =
        -9.88116045448658
rdh_sum =
        34.8870559117084
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 214
dh =
        -10.3572104544866
rdh_sum =
        35.8868610351513
ans =
!------- End Berm Factor Calculation, Iter: 2 ---------!
berm_width =
    89
rB =
        0.412773201182672
rdh_mean =
        0.403223157698329
gamma_berm =
        0.753666512411453
slope =
```

```
           0.157468534077182
Irb =
           1.32498568287725
gamma_berm =
          0.753666512411453
gamma_perm =
       1
gamma_beta =
       1
gamma_rough =
       1
gamma =
          0.753666512411453
ans =
!!! - - Iribaren number:   1.00 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:6.4 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          11.0057999055228
R2del =
          0.739835782244787
Z2 =
          20.1177894510362
top_sta =
          222.698821613257
ans =
!---------------- STARTING ITERATION 3 ----------------!
Ztoe =
                  -0.559889
toe_sta =
          -4.37839811542992
top_sta =
          222.698821613257
Z2 =
          20.1177894510362
H0 =
                    6.2267
Tp =
                   10.2103
T0 =
          9.28209090909091
R2 =
          11.0057999055228
Z2 =
          20.1177894510362
top_sta =
          222.698821613257
Lslope =
          227.077219728687
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 20
dh =
          7.01733954551342
rdh_sum =
          0.599065845823981
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 21
dh =
          6.95683954551342
rdh_sum =
          1.19064063116286
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 28
dh =
          5.84106454551342
rdh_sum =
           1.6420749834842
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 29
dh =
          5.82241454551342
rdh_sum =
          2.09116860919536
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 30
dh =
          5.79601454551342
rdh_sum =
          2.53695075903407
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 31
dh =
          5.76186454551342
rdh_sum =
          2.97845290273617
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 32
dh =
          5.71803954551342
rdh_sum =
```

```
               3.41446888099168
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 33
dh =
               5.66453954551342
rdh_sum =
               3.84379821136296
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 44
dh =
               4.10266454551342
rdh_sum =
               4.08852215773557
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 45
dh =
               4.03861454551342
rdh_sum =
               4.32633313641215
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 60
dh =
               0.716464545513425
rdh_sum =
               4.33447774023632
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 61
dh =
               0.718214545513424
rdh_sum =
               4.34266207081192
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 62
dh =
               0.719939545513425
rdh_sum =
               4.35088565442187
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 63
dh =
               0.721639545513424
rdh_sum =
               4.35914801329253
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 72
dh =
              -0.569610454486575
rdh_sum =
               4.36574270809429
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 73
dh =
              -0.597610454486576
rdh_sum =
               4.37300006948653
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 74
dh =
              -0.605235454486575
rdh_sum =
               4.38044334405394
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 75
dh =
              -0.592485454486576
rdh_sum =
               4.38757705910298
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 76
dh =
              -0.584710454486576
rdh_sum =
               4.39452520762113
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 77
dh =
              -0.581910454486575
rdh_sum =
               4.40140712305405
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 82
dh =
              -1.05048545448658
rdh_sum =
               4.42371813555522
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 83
dh =
              -1.10383545448657
rdh_sum =
```

```
                 4.44833362132377
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 88
dh =
         -1.89333545448658
rdh_sum =
          4.51959498529184
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 89
dh =
         -1.93178545448658
rdh_sum =
          4.59370568232418
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 94
dh =
         -2.39768545448658
rdh_sum =
          4.70631145841565
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 95
dh =
         -2.45383545448658
rdh_sum =
          4.82403337241888
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 96
dh =
         -2.48993545448658
rdh_sum =
          4.94509650571875
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 97
dh =
         -2.50598545448658
rdh_sum =
          5.06765808246897
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 98
dh =
         -2.54166045448657
rdh_sum =
          5.19357864037501
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 99
dh =
         -2.59696045448658
rdh_sum =
          5.32478251596152
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 100
dh =
         -2.65703545448658
rdh_sum =
          5.46183000323624
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 101
dh =
         -2.72188545448658
rdh_sum =
          5.60530531491284
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 102
dh =
         -2.78673545448658
rdh_sum =
          5.75533061772272
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 103
dh =
         -2.85158545448658
rdh_sum =
          5.91202583397765
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 104
dh =
         -2.91396045448658
rdh_sum =
           6.0752474223091
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 105
dh =
         -2.97386045448658
rdh_sum =
          6.24483693657685
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 106
dh =
         -3.03341045448658
rdh_sum =
```

```
              6.42085292176391
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 107
dh =
          -3.09261045448658
rdh_sum =
          6.60335039900445
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 108
dh =
          -3.14551045448658
rdh_sum =
           6.7917163760749
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 109
dh =
          -3.19211045448658
rdh_sum =
          6.98531086923436
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 110
dh =
          -3.23113545448658
rdh_sum =
          7.18332571482023
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 111
dh =
          -3.26258545448658
rdh_sum =
          7.38493018895868
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 112
dh =
          -3.29383545448658
rdh_sum =
          7.59012528423923
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 113
dh =
          -3.32488545448658
rdh_sum =
          7.79891125439882
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 114
dh =
          -3.36333545448658
rdh_sum =
          8.01217556865805
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 115
dh =
          -3.40918545448658
rdh_sum =
          8.23082522475304
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 118
dh =
          -3.60403545448658
rdh_sum =
          8.47288739509683
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 119
dh =
          -3.62728545448658
rdh_sum =
           8.7177979255399
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 120
dh =
          -3.64426045448658
rdh_sum =
          8.96479516842474
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 121
dh =
          -3.65496045448658
rdh_sum =
          9.21311080235554
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 126
dh =
          -4.12838545448658
rdh_sum =
          9.52192825311554
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 127
dh =
          -4.18293545448658
rdh_sum =
```

```
        9.83796258198087
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 128
dh =
        -4.21903545448658
rdh_sum =
        10.1587975183832
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 129
dh =
        -4.23668545448658
rdh_sum =
        10.4819865225741
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 130
dh =
        -4.25831045448658
rdh_sum =
        10.8080658717953
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 131
dh =
        -4.28391045448658
rdh_sum =
        11.1375754123495
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 132
dh =
        -4.31266045448658
rdh_sum =
        11.4709480628741
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 133
dh =
        -4.34456045448658
rdh_sum =
        11.8086202085289
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 138
dh =
        -4.79738545448658
rdh_sum =
        12.2086047666992
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 139
dh =
        -4.84253545448658
rdh_sum =
        12.6149112221677
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 140
dh =
        -4.86608545448658
rdh_sum =
        13.0245213877872
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 141
dh =
        -4.86803545448658
rdh_sum =
        13.4344052941846
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 142
dh =
        -4.89063545448658
rdh_sum =
        13.8474638011439
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 143
dh =
        -4.93388545448658
rdh_sum =
        14.2666075699897
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 146
dh =
        -5.13698545448658
rdh_sum =
         14.71447693083
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 147
dh =
        -5.19413545448658
rdh_sum =
        15.1704651072159
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 148
dh =
        -5.23781045448658
rdh_sum =
```

```
           15.6326658304612
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 149
dh =
          -5.26801045448657
rdh_sum =
           16.0991658440298
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 154
dh =
          -5.69873545448658
rdh_sum =
           16.6271011101238
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 155
dh =
          -5.67618545448657
rdh_sum =
           17.1518224140215
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 172
dh =
          -6.91756045448658
rdh_sum =
           17.8482854833836
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 173
dh =
          -6.93326045448658
rdh_sum =
           18.5468071191688
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 178
dh =
          -7.37643545448658
rdh_sum =
           19.3016401999774
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 179
dh =
          -7.40228545448657
rdh_sum =
           20.0596405916311
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 180
dh =
          -7.44433545448658
rdh_sum =
           20.8227631363251
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 181
dh =
          -7.50258545448658
rdh_sum =
           21.5929183878569
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 184
dh =
          -7.70038545448658
rdh_sum =
           22.3863858216431
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 185
dh =
          -7.72573545448657
rdh_sum =
           23.1827748523011
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 186
dh =
          -7.76693545448658
rdh_sum =
           23.9838790226263
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 187
dh =
          -7.82398545448658
rdh_sum =
            24.791443392604
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 194
dh =
          -8.59431045448657
rdh_sum =
           25.6775881902255
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 195
dh =
          -8.64211045448658
rdh_sum =
```

```
          26.5680308662617
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 204
dh =
          -9.83591045448658
rdh_sum =
          27.5404090297858
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 205
dh =
          -9.86051045448658
rdh_sum =
          28.5139263562617
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 206
dh =
          -9.86938545448658
rdh_sum =
          29.4878489329007
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 207
dh =
          -9.86253545448658
rdh_sum =
          30.4614589925952
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 208
dh =
          -9.86646045448658
rdh_sum =
          31.4352483438142
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 209
dh =
          -9.88116045448658
rdh_sum =
          32.4097038951878
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 214
dh =
          -10.3572104544866
rdh_sum =
          33.4011589927084
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 215
dh =
          -10.4098104544866
rdh_sum =
          34.3939406292343
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 216
dh =
          -10.4557854544866
rdh_sum =
          35.3877907529978
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 217
dh =
          -10.4951354544866
rdh_sum =
           36.382487849933
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 218
dh =
          -10.5365604544866
rdh_sum =
          37.3780091433394
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 219
dh =
          -10.5800604544866
rdh_sum =
          38.3743213382053
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 220
dh =
          -10.6233604544866
rdh_sum =
          39.3713448037664
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 221
dh =
          -10.6664604544866
rdh_sum =
          40.3690008519398
ans =
!------- End Berm Factor Calculation, Iter: 3 ---------!
berm_width =
    96
rB =
```

```
               0.42276367534 6656
rdh_mean =
               0.42051042554104
gamma_berm =
               0.75501285767666
slope =
               0.157751884681689
Irb =
               1.32736987662368
gamma_berm =
               0.75501285767666
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
     1
gamma =
               0.75501285767666
ans =
!!! - - Iribaren number:   1.00 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:6.3 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
               11.0452999339406
R2del =
               0.0395000284178515
Z2 =
               20.1572894794541
top_sta =
               223.084941148133
ans =
!---------------- STARTING ITERATION 4 ----------------!
Ztoe =
                       -0.559889
toe_sta =
               -4.37839811542992
top_sta =
               223.084941148133
Z2 =
               20.1572894794541
H0 =
                         6.2267
Tp =
                        10.2103
T0 =
               9.28209090909091
R2 =
               11.0452999339406
Z2 =
               20.1572894794541
top_sta =
               223.084941148133
Lslope =
               227.463339263563
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 20
dh =
               7.01733954551342
rdh_sum =
               0.599065845823981
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 21
dh =
               6.95683954551342
rdh_sum =
               1.19064063116286
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 28
dh =
               5.84106454551342
rdh_sum =
                1.6420749834842
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 29
dh =
               5.82241454551342
rdh_sum =
               2.09116860919536
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 30
dh =
               5.79601454551342
rdh_sum =
               2.53695075903407
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 31
dh =
               5.76186454551342
rdh_sum =
```

```
              2.97845290273617
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 32
dh =
              5.71803954551342
rdh_sum =
              3.41446888099168
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 33
dh =
              5.66453954551342
rdh_sum =
              3.84379821136296
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 44
dh =
              4.10266454551342
rdh_sum =
              4.08852215773557
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 45
dh =
              4.03861454551342
rdh_sum =
              4.32633313641215
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 60
dh =
              0.716464545513425
rdh_sum =
              4.33447774023632
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 61
dh =
              0.718214545513424
rdh_sum =
              4.34266207081192
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 62
dh =
              0.719939545513425
rdh_sum =
              4.35088565442187
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 63
dh =
              0.721639545513424
rdh_sum =
              4.35914801329253
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 72
dh =
             -0.569610454486575
rdh_sum =
              4.36569572778009
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 73
dh =
             -0.597610454486576
rdh_sum =
              4.37290139947767
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 74
dh =
             -0.605235454486575
rdh_sum =
              4.38029166349505
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 75
dh =
             -0.592485454486576
rdh_sum =
              4.38737456740953
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 76
dh =
             -0.584710454486576
rdh_sum =
              4.39427322345938
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 77
dh =
             -0.581910454486575
rdh_sum =
              4.40110611712692
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 82
dh =
             -1.05048545448658
rdh_sum =
```

```
        4.42325902522953
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 83
dh =
        -1.10383545448657
rdh_sum =
        4.44770021282661
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 88
dh =
        -1.89333545448658
rdh_sum =
         4.5184651572114
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 89
dh =
        -1.93178545448658
rdh_sum =
        4.59206011566953
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 94
dh =
        -2.39768545448658
rdh_sum =
        4.70389334217407
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 95
dh =
        -2.45383545448658
rdh_sum =
         4.8208091755344
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 96
dh =
        -2.48993545448658
rdh_sum =
        4.94104440753902
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 97
dh =
        -2.50598545448658
rdh_sum =
        5.06276831705426
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 98
dh =
        -2.54166045448657
rdh_sum =
        5.18782936113373
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 99
dh =
        -2.59696045448658
rdh_sum =
        5.31813948762408
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 100
dh =
        -2.65703545448658
rdh_sum =
        5.45425554208633
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 101
dh =
        -2.72188545448658
rdh_sum =
        5.59675819266703
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 102
dh =
        -2.78673545448658
rdh_sum =
        5.74576906481571
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 103
dh =
        -2.85158545448658
rdh_sum =
        5.90140756979662
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 104
dh =
        -2.91396045448658
rdh_sum =
        6.06353132631094
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 105
dh =
        -2.97386045448658
rdh_sum =
```

```
                6.23198312730808
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 106
dh =
          -3.03341045448658
rdh_sum =
                6.40682139450134
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 107
dh =
          -3.09261045448658
rdh_sum =
                6.58810105653411
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 108
dh =
          -3.14551045448658
rdh_sum =
                6.77521313202248
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 109
dh =
          -3.19211045448658
rdh_sum =
                6.96752174915066
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 110
dh =
          -3.23113545448658
rdh_sum =
                7.16422381730647
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 111
dh =
          -3.26258545448658
rdh_sum =
                7.36449375701655
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 112
dh =
          -3.29383545448658
rdh_sum =
                7.56833263493058
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 113
dh =
          -3.32488545448658
rdh_sum =
                7.77574078379305
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 114
dh =
          -3.36333545448658
rdh_sum =
                7.98760044704861
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 115
dh =
          -3.40918545448658
rdh_sum =
                8.20481335669187
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 118
dh =
          -3.60403545448658
rdh_sum =
                8.44530141819106
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 119
dh =
          -3.62728545448658
rdh_sum =
                8.68862137326608
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 120
dh =
          -3.64426045448658
rdh_sum =
                8.93401601162604
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 121
dh =
          -3.65496045448658
rdh_sum =
                9.18072145595269
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 126
dh =
          -4.12838545448658
rdh_sum =
```

```
              9.48759356819826
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 127
dh =
          -4.18293545448658
rdh_sum =
          9.80164433922863
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 128
dh =
          -4.21903545448658
rdh_sum =
          10.1204705111922
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 129
dh =
          -4.23668545448658
rdh_sum =
          10.4416384541943
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 130
dh =
          -4.25831045448658
rdh_sum =
          10.7656817019238
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 131
dh =
          -4.28391045448658
rdh_sum =
          11.0931373745673
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 132
dh =
          -4.31266045448658
rdh_sum =
          11.4244362570965
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 133
dh =
          -4.34456045448658
rdh_sum =
          11.7600126229715
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 138
dh =
          -4.79738545448658
rdh_sum =
          12.1575992520768
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 139
dh =
          -4.84253545448658
rdh_sum =
          12.5614789743605
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 140
dh =
          -4.86608545448658
rdh_sum =
          12.9686474966653
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 141
dh =
          -4.86803545448658
rdh_sum =
           13.376088528731
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 142
dh =
          -4.89063545448658
rdh_sum =
          13.7866899347235
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 143
dh =
          -4.93388545448658
rdh_sum =
          14.2033495891876
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 146
dh =
          -5.13698545448658
rdh_sum =
          14.6486120081791
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 147
dh =
          -5.19413545448658
rdh_sum =
```

```
              15.1019559760397
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 148
dh =
         -5.23781045448658
rdh_sum =
          15.5614954804189
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 149
dh =
         -5.26801045448657
rdh_sum =
          16.0253131965372
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 154
dh =
         -5.69873545448658
rdh_sum =
          16.5503438673183
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 155
dh =
         -5.67618545448657
rdh_sum =
          17.0721711431519
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 172
dh =
         -6.91756045448658
rdh_sum =
          17.7653825409224
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 173
dh =
         -6.93326045448658
rdh_sum =
          18.4606513267108
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 178
dh =
         -7.37643545448658
rdh_sum =
          19.2122379168318
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 179
dh =
         -7.40228545448657
rdh_sum =
          19.9669946222166
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 180
dh =
         -7.44433545448658
rdh_sum =
          20.7268786319228
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 181
dh =
         -7.50258545448658
rdh_sum =
          21.4938036977231
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 184
dh =
         -7.70038545448658
rdh_sum =
          22.2840799591124
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 185
dh =
         -7.72573545448657
rdh_sum =
          23.0772840222052
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 186
dh =
         -7.76693545448658
rdh_sum =
          23.8752138992894
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 187
dh =
         -7.82398545448658
rdh_sum =
          24.6796199680946
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 194
dh =
         -8.59431045448657
rdh_sum =
```

```
              25.5629632576319
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 195
dh =
         -8.64211045448658
rdh_sum =
              26.4506353337351
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 204
dh =
         -9.83591045448658
rdh_sum =
               27.421344182127
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 205
dh =
         -9.86051045448658
rdh_sum =
              28.3932213297462
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 206
dh =
         -9.86938545448658
rdh_sum =
              29.3655142997744
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 207
dh =
         -9.86253545448658
rdh_sum =
              30.3374865900422
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 208
dh =
         -9.86646045448658
rdh_sum =
              31.3096428467276
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 209
dh =
         -9.88116045448658
rdh_sum =
              32.2824828678676
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 214
dh =
         -10.3572104544866
rdh_sum =
              33.2729373632931
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 215
dh =
         -10.4098104544866
rdh_sum =
              34.2647916199884
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 216
dh =
         -10.4557854544866
rdh_sum =
              35.2577791838701
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 217
dh =
         -10.4951354544866
rdh_sum =
              36.2516698001199
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 218
dh =
         -10.5365604544866
rdh_sum =
              37.2464442397028
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 219
dh =
         -10.5800604544866
rdh_sum =
              38.2420728382586
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 220
dh =
         -10.6233604544866
rdh_sum =
              39.2384763206842
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 221
dh =
         -10.6664604544866
rdh_sum =
```

```
                40.2255763368092
ans =
!------- End Berm Factor Calculation, Iter: 4 ---------!
berm_width =
     96
rB =
         0.422046033047832
rdh_mean =
         0.419120586841762
gamma_berm =
         0.754842147997413
slope =
         0.157589017558115
Irb =
          1.32599946565103
gamma_berm =
         0.754842147997413
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
     1
gamma =
         0.754842147997413
ans =
!!! - - Iribaren number:   1.00 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:6.3 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
          11.0314016981865
R2del =
        0.0138982357541675
Z2 =
          20.1433912436999
top_sta =
          222.949083516128
ans =
!---------------- STARTING ITERATION 5 -----------------!
Ztoe =
               -0.559889
toe_sta =
         -4.37839811542992
top_sta =
          222.949083516128
Z2 =
          20.1433912436999
H0 =
                   6.2267
Tp =
                  10.2103
T0 =
          9.28209090909091
R2 =
          11.0314016981865
Z2 =
          20.1433912436999
top_sta =
          222.949083516128
Lslope =
          227.327481631558
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 20
dh =
          7.01733954551342
rdh_sum =
         0.599065845823981
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 21
dh =
          6.95683954551342
rdh_sum =
          1.19064063116286
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 28
dh =
          5.84106454551342
rdh_sum =
           1.6420749834842
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 29
dh =
          5.82241454551342
rdh_sum =
          2.09116860919536
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 30
dh =
          5.79601454551342
rdh_sum =
```

```
             2.53695075903407
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 31
dh =
             5.76186454551342
rdh_sum =
             2.97845290273617
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 32
dh =
             5.71803954551342
rdh_sum =
             3.41446888099168
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 33
dh =
             5.66453954551342
rdh_sum =
             3.84379821136296
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 44
dh =
             4.10266454551342
rdh_sum =
             4.08852215773557
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 45
dh =
             4.03861454551342
rdh_sum =
             4.32633313641215
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 60
dh =
             0.716464545513425
rdh_sum =
             4.33447774023632
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 61
dh =
             0.718214545513424
rdh_sum =
             4.34266207081192
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 62
dh =
             0.719939545513425
rdh_sum =
             4.35088565442187
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 63
dh =
             0.721639545513424
rdh_sum =
             4.35914801329253
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 72
dh =
            -0.569610454486575
rdh_sum =
             4.36571220061653
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 73
dh =
            -0.597610454486576
rdh_sum =
             4.37293599643225
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 74
dh =
            -0.605235454486575
rdh_sum =
             4.38034484770878
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 75
dh =
            -0.592485454486576
rdh_sum =
             4.38744556768572
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 76
dh =
            -0.584710454486576
rdh_sum =
             4.39436157742504
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 77
dh =
            -0.581910454486575
rdh_sum =
```

```
          4.40121165973634
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 82
dh =
         -1.05048545448658
rdh_sum =
           4.4234200057881
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 83
dh =
         -1.10383545448657
rdh_sum =
          4.44792230976563
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 88
dh =
         -1.89333545448658
rdh_sum =
          4.51886133336414
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 89
dh =
         -1.93178545448658
rdh_sum =
          4.59263714648905
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 94
dh =
         -2.39768545448658
rdh_sum =
          4.70474130202309
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 95
dh =
         -2.45383545448658
rdh_sum =
          4.82193982616538
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 96
dh =
         -2.48993545448658
rdh_sum =
          4.94246540315579
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 97
dh =
         -2.50598545448658
rdh_sum =
          5.06448308336729
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 98
dh =
         -2.54166045448657
rdh_sum =
          5.18984556159912
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 99
dh =
         -2.59696045448658
rdh_sum =
          5.32046913167688
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 100
dh =
         -2.65703545448658
rdh_sum =
          5.45691184915817
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 101
dh =
         -2.72188545448658
rdh_sum =
          5.59975562600399
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 102
dh =
         -2.78673545448658
rdh_sum =
          5.74912227796662
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 103
dh =
         -2.85158545448658
rdh_sum =
          5.90513139603257
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 104
dh =
         -2.91396045448658
rdh_sum =
```

```
              6.06764019234921
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 105
dh =
          -2.97386045448658
rdh_sum =
          6.23649102556178
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 106
dh =
          -3.03341045448658
rdh_sum =
           6.4117423610563
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 107
dh =
          -3.09261045448658
rdh_sum =
          6.59344916036403
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 108
dh =
          -3.14551045448658
rdh_sum =
          6.78100103519435
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 109
dh =
          -3.19211045448658
rdh_sum =
          6.97376067124052
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 110
dh =
          -3.23113545448658
rdh_sum =
          7.17092319802868
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 111
dh =
          -3.26258545448658
rdh_sum =
           7.37166123106984
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 112
dh =
          -3.29383545448658
rdh_sum =
          7.57597581116739
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 113
dh =
          -3.32488545448658
rdh_sum =
          7.78386724348411
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 114
dh =
          -3.36333545448658
rdh_sum =
          7.99621960550084
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 115
dh =
          -3.40918545448658
rdh_sum =
          8.21393647741063
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 118
dh =
          -3.60403545448658
rdh_sum =
          8.45497671070661
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 119
dh =
          -3.62728545448658
rdh_sum =
          8.69885461721066
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 120
dh =
          -3.64426045448658
rdh_sum =
          8.94481142921035
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 121
dh =
          -3.65496045448658
rdh_sum =
```

```
          9.19208170955222
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 126
dh =
         -4.12838545448658
rdh_sum =
          9.49963631911347
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 127
dh =
         -4.18293545448658
rdh_sum =
          9.81438300846251
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 128
dh =
         -4.21903545448658
rdh_sum =
          10.1339139506523
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 129
dh =
         -4.23668545448658
rdh_sum =
          10.4557909823054
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 130
dh =
         -4.25831045448658
rdh_sum =
          10.7805486007158
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 131
dh =
         -4.28391045448658
rdh_sum =
           11.108724883622
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 132
dh =
         -4.31266045448658
rdh_sum =
          11.4407513655541
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 133
dh =
         -4.34456045448658
rdh_sum =
          11.7770630618941
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 138
dh =
         -4.79738545448658
rdh_sum =
          12.1754911765547
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 139
dh =
         -4.84253545448658
rdh_sum =
          12.5802225080298
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 140
dh =
         -4.86608545448658
rdh_sum =
          12.9882478802201
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 141
dh =
         -4.86803545448658
rdh_sum =
          13.3965461948655
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 142
dh =
         -4.89063545448658
rdh_sum =
          13.8080098841127
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 143
dh =
         -4.93388545448658
rdh_sum =
           14.225541317633
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 146
dh =
         -5.13698545448658
rdh_sum =
```

```
              14.6717187024969
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 147
dh =
          -5.19413545448658
rdh_sum =
              15.1259933362586
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 148
dh =
          -5.23781045448658
rdh_sum =
              15.5864643038269
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 149
dh =
          -5.26801045448657
rdh_sum =
              16.0512234910058
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 154
dh =
          -5.69873545448658
rdh_sum =
              16.5772738844109
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 155
dh =
          -5.67618545448657
rdh_sum =
              17.1001171602999
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 172
dh =
          -6.91756045448658
rdh_sum =
              17.7944711216148
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 173
dh =
          -6.93326045448658
rdh_sum =
              18.4908829013787
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 178
dh =
          -7.37643545448658
rdh_sum =
              19.2436107649237
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 179
dh =
          -7.40228545448657
rdh_sum =
              19.9995077913618
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 180
dh =
          -7.44433545448658
rdh_sum =
              20.7605303665284
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 181
dh =
          -7.50258545448658
rdh_sum =
              21.5285911409164
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 184
dh =
          -7.70038545448658
rdh_sum =
              22.3199896757852
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 185
dh =
          -7.72573545448657
rdh_sum =
              23.1143138684938
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 186
dh =
          -7.76693545448658
rdh_sum =
              23.9133601842364
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 187
dh =
          -7.82398545448658
rdh_sum =
```

```
             24.7188771564981
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 194
dh =
         -8.59431045448657
rdh_sum =
          25.6032072516073
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 195
dh =
         -8.64211045448658
rdh_sum =
           26.491855359235
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 204
dh =
         -9.83591045448658
rdh_sum =
          27.4631556133794
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 205
dh =
         -9.86051045448658
rdh_sum =
          28.4356139792809
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 206
dh =
         -9.86938545448658
rdh_sum =
          29.4084844709152
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 207
dh =
         -9.86253545448658
rdh_sum =
          30.3810371369921
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 208
dh =
         -9.86646045448658
rdh_sum =
          31.3537721348715
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 209
dh =
         -9.88116045448658
rdh_sum =
          32.3271847556094
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 214
dh =
         -10.3572104544866
rdh_sum =
          33.3179967502946
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 215
dh =
         -10.4098104544866
rdh_sum =
          34.3101828837403
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 216
dh =
         -10.4557854544866
rdh_sum =
          35.3034796405385
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 217
dh =
         -10.4951354544866
rdh_sum =
          36.2976598235765
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 218
dh =
         -10.5365604544866
rdh_sum =
          37.2927029611055
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 219
dh =
         -10.5800604544866
rdh_sum =
          38.2885781168196
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 220
dh =
         -10.6233604544866
rdh_sum =
```

```
        39.2852058898539
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 221
dh =
       -10.6664604544866
rdh_sum =
        40.2825078104902
ans =
!------- End Berm Factor Calculation, Iter: 5 ---------!
berm_width =
    96
rB =
        0.422298260249909
rdh_mean =
        0.419609456359273
gamma_berm =
        0.754902083155022
slope =
        0.157646213774078
Irb =
         1.32648073111597
gamma_berm =
        0.754902083155022
gamma_perm =
     1
gamma_beta =
     1
gamma_rough =
     1
gamma =
        0.754902083155022
ans =
!!! - - Iribaren number:   1.00 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:6.3 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
        11.0362817164741
R2del =
       0.00488001828766471
Z2 =
        20.1482712619876
top_sta =
        222.996786529693
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
        20.1482712619876
diary off
-1.000000e+00
-1.000000e+00
```