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diary on          % begin recording

% FEMA appeal for The Town of Kennebunkport, York county, Maine
% TRANSECT ID: YK-107
% calculation by SJH, Ransom Consulting, Inc. 02-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/YK-107sta_ele_include.csv'; % file with station, elevation, include
                                     % third column is 0 for excluded points
imgname='logfiles/YK-107-runup';
SWEL=9.3596; % 100-yr still water level including wave setup.
H0=5.7654; % significant wave height at toe of structure
Tp=13.2478; % peak period, 1/fma,
T0=Tp/1.1;

gamma_berm=0.70525; % this may get changed automatically below
gamma_rough=0.6;
gamma_beta=1;
gamma_perm=1;

setupAtToe=-0.0031758;
maxSetup=0.61291; % only used in case of berm/shallow foreshore weighted average

plotTitle='Iterative TAW for YK-107'

plotTitle =

Iterative TAW for YK-107

% END CONFIG
%-----

SWEL=SWEL+setupAtToe

SWEL =

          9.3564242

SWEL_fore=SWEL+maxSetup

SWEL_fore =

          9.9693342

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

L0 =

          742.169776643312

% 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

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

Ztoe =

    0.7083242000000002

% 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 =

    18.0045242

% determine station at the max runup and -1.5*H0 (i.e. the toe)
top_sta=-999;
toe_sta=-999;
for kk=1:length(sta)-1
    if ((Z2 > dep(kk)) & (Z2 <= dep(kk+1))) % here is the intersection of z2 with profile
        top_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Z2)
    end
    if ((Ztoe > dep(kk)) & (Ztoe <= dep(kk+1))) % here is the intersection of Ztoe with profile
        toe_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Ztoe)
    end
end
% check to make sure we got them, if not extend the end slopes outward
S=diff(dep)./diff(sta);
if toe_sta== -999
    dy=dep(1)-Ztoe;
    toe_sta=sta(1)-dy/S(1)
end

toe_sta =

    -9.28910224942969

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

top_sta =

    244.624605765617

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

top_sta =

    244.624605765617

toe_sta

toe_sta =

    -9.28910224942969

% 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')

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

ans =

!!- The User has selected a starting point that is 0.64 feet above the elevation of SWEL-1.5H0

ans =

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

ans =

!!-      1) Selecting a starting point that is at or below 0.71 feet elevation, or

ans =

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

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

    R2=R2_new
    Z2=R2+SWEL
    % determine slope for this iteration
    top_sta=-999;
    for kk=1:length(sta)-1
        if ((Z2 > dep(kk)) & (Z2 <= dep(kk+1))) % here is the intersection of z2 with profile
            top_sta=interp1(dep(kk:kk+1),sta(kk:kk+1),Z2)
            break;
        end
    end
    if top_sta== -999
        dy=Z2-dep(end);
        top_sta=sta(end)+dy/S(end)
    end

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

    % loop over profile segments to determine berm factor
    % re-calculate influence of depth of berm based on this run-up elevation
    % check for berm, berm width, berm height
    berm_width=0;
    rdh_sum=0;

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

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

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

% check to see if we need to evaluate a shallow foreshore
if berm_width > 0.25 * L0;
    disp('! Berm_width is greater than 1/4 wave length')
    disp('! Runup will be weighted average with foreshore calculation assuming depth limited wave height on berm')
    % do the foreshore calculation
    fore_H0=0.78*(SWEL_fore-min(Berm_Heights))
    % get upper slope
    fore_toe_sta=-999;
    fore_toe_dep=-999;
    for kk=length(dep)-1:-1:1

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        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
    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 =
    0.708324200000002
toe_sta =
   -9.28910224942969
top_sta =
   244.624605765617
Z2 =
    18.0045242
H0 =
    5.7654
Tp =
    13.2478
T0 =
   12.0434545454545
R2 =
    17.2962
Z2 =
    26.6526242
top_sta =
   415.735189252295
Lslope =
   425.024291501724
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 40
dh =
    4.4473502
rdh_sum =
    0.324280978646442
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 41
dh =
    4.4192287
rdh_sum =
    0.644980637357216
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 42
dh =
    4.3911072
rdh_sum =
    0.962109501471238
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 43

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dh =
    4.3629857
rdh_sum =
    1.27567830594121
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 44
dh =
    4.3348642
rdh_sum =
    1.58569799470345
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 45
dh =
    4.3067427
rdh_sum =
    1.89217972003547
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 46
dh =
    4.2786212
rdh_sum =
    2.1951348419013
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 47
dh =
    4.2504997
rdh_sum =
    2.49457492728462
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    2.79051174950979
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    3.0829572875507
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    3.26854164898686
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 59
dh =
    3.2475002
rdh_sum =
    3.45181489328406
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 60
dh =
    3.2256282
rdh_sum =
    3.63278826754331
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 61
dh =
    3.2037557
rdh_sum =
    3.81147304834834
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 62
dh =
    3.1818832
rdh_sum =
    3.98788064626011
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 63
dh =
    3.1600112
rdh_sum =
    4.16202260436817
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 64
dh =
    3.1364562
rdh_sum =
    4.33373753040655
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 65
dh =
    3.1112187
rdh_sum =
    4.50286707129962
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 66
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```
dh =
    3.0859817
rdh_sum =
    4.66942692112822
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 67
dh =
    3.0607447
rdh_sum =
    4.83343284408631
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 68
dh =
    3.0355077
rdh_sum =
    4.99490072511098
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 69
dh =
    3.0102702
rdh_sum =
    5.15384651932369
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 70
dh =
    2.9973072
rdh_sum =
    5.31150312858367
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 71
dh =
    3.0088937
rdh_sum =
    5.47031182615509
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 72
dh =
    3.0327542
rdh_sum =
    5.63150375862059
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 73
dh =
    3.0566147
rdh_sum =
    5.79509324427916
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 74
dh =
    3.0804757
rdh_sum =
    5.96109455079449
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 75
dh =
    3.1043362
rdh_sum =
    6.1295217428272
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 80
dh =
    2.5429832
rdh_sum =
    6.24480448001698
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 81
dh =
    2.5119012
rdh_sum =
    6.35739656631689
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 82
dh =
    2.4808197
rdh_sum =
    6.46732582636616
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 83
dh =
    2.4497382
rdh_sum =
    6.57462023225059
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 84
dh =
    2.4186562
rdh_sum =
    6.67930790329641
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 85
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```
dh =
    2.3875747
rdh_sum =
    6.78141722962548
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 86
dh =
    2.3564932
rdh_sum =
    6.88097674409328
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 87
dh =
    2.3254112
rdh_sum =
    6.97801512207878
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 88
dh =
    2.2943297
rdh_sum =
    7.0725613008643
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 89
dh =
    2.2681657
rdh_sum =
    7.16503211071685
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 90
dh =
    2.2518362
rdh_sum =
    7.2562181282114
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 91
dh =
    2.2404247
rdh_sum =
    7.34651109955671
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 92
dh =
    2.2290132
rdh_sum =
    7.43591498514927
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 93
dh =
    2.2176017
rdh_sum =
    7.52443375397985
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 94
dh =
    2.2061902
rdh_sum =
    7.61207138359508
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 95
dh =
    2.1947782
rdh_sum =
    7.6988318217137
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 96
dh =
    2.1833667
rdh_sum =
    7.78471910139933
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 97
dh =
    2.1719552
rdh_sum =
    7.8697372256357
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 98
dh =
    2.1605437
rdh_sum =
    7.95389020580813
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 99
dh =
    2.1491322
rdh_sum =
    8.03718206166478
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 100
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dh =
    2.1377202
rdh_sum =
    8.11961678381213
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 101
dh =
    2.1279132
rdh_sum =
    8.2013181454926
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 102
dh =
    2.1197112
rdh_sum =
    8.28240846046287
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 103
dh =
    2.1115092
rdh_sum =
    8.36288982061794
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 104
dh =
    2.1033072
rdh_sum =
    8.44276432089374
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 105
dh =
    2.0951052
rdh_sum =
    8.52203405925664
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 106
dh =
    2.0869032
rdh_sum =
    8.600701136693
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 107
dh =
    2.0787012
rdh_sum =
    8.67876765719867
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 108
dh =
    2.0704992
rdh_sum =
    8.75623572776848
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 109
dh =
    2.0683277
rdh_sum =
    8.83354571035977
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 110
dh =
    2.0721872
rdh_sum =
    8.91113677165987
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 111
dh =
    2.0760472
rdh_sum =
    8.98900941523621
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 112
dh =
    2.0799072
rdh_sum =
    9.06716410796121
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 113
dh =
    2.0837672
rdh_sum =
    9.1456013163953
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 114
dh =
    2.0876267
rdh_sum =
    9.22432147010061
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 115
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dh =
    2.0914862
rdh_sum =
    9.3033250348915
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 116
dh =
    2.0953462
rdh_sum =
    9.38261251307542
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 117
dh =
    2.1138252
rdh_sum =
    9.46326561177069
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 118
dh =
    2.1615422
rdh_sum =
    9.54749413122066
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 119
dh =
    2.2238782
rdh_sum =
    9.63649923617176
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 120
dh =
    2.2862142
rdh_sum =
    9.73039947182654
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 121
dh =
    2.3485502
rdh_sum =
    9.82931197146185
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 122
dh =
    2.4108862
rdh_sum =
    9.9333524226435
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 123
dh =
    2.4732222
rdh_sum =
    10.042635033858
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 124
dh =
    2.5355582
rdh_sum =
    10.1572725015708
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 125
dh =
    2.5978942
rdh_sum =
    10.2773759777207
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 126
dh =
    2.6602302
rdh_sum =
    10.40305503766
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 127
dh =
    2.6922182
rdh_sum =
    10.5316372534521
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 128
dh =
    2.6635107
rdh_sum =
    10.6576127392301
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 129
dh =
    2.6044557
rdh_sum =
    10.7782979701724
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 130
```

```

dh =
    2.5454007
rdh_sum =
    10.893791140033
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 131
dh =
    2.4863452
rdh_sum =
    11.0041917439506
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 132
dh =
    2.4305707
rdh_sum =
    11.1098753004792
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 133
dh =
    2.3813582
rdh_sum =
    11.2114723594644
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 134
dh =
    2.3354267
rdh_sum =
    11.3093199720722
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 135
dh =
    2.2894952
rdh_sum =
    11.4034811159413
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 136
dh =
    2.2435632
rdh_sum =
    11.4940193069266
ans =
Berm Factor Calculation: Iteration 1, Profile Segment: 169
dh =
    -4.8006863
rdh_sum =
    11.6723599774653
ans =
!----- End Berm Factor Calculation, Iter: 1 -----!
berm_width =
    86
rB =
    0.20234137605674
rdh_mean =
    0.135725116017038
gamma_berm =
    0.825121430683608
slope =
    0.0765263748065912
Irb =
    0.868256515356538
gamma_berm =
    0.825121430683608
gamma_perm =
    1
gamma_beta =
    1
gamma_rough =
    0.6
gamma =
    0.495072858410165
ans =
!!! - - Iribaren number: 0.72 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:13.1 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
    4.38651762330388
R2del =
    12.9096823766961
Z2 =
    13.7429418233039
top_sta =
    163.944816826593
ans =
!----- STARTING ITERATION 2 -----!
Ztoe =
    0.708324200000002
toe_sta =
    -9.28910224942969
top_sta =
    163.944816826593

```

```

Z2 =
    13.7429418233039
H0 =
    5.7654
Tp =
    13.2478
T0 =
    12.0434545454545
R2 =
    4.38651762330388
Z2 =
    13.7429418233039
top_sta =
    163.944816826593
Lslope =
    173.233919076022
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 40
dh =
    4.4473502
rdh_sum =
    1
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 41
dh =
    4.4192287
rdh_sum =
    2
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 42
dh =
    4.3911072
rdh_sum =
    3
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 43
dh =
    4.3629857
rdh_sum =
    3.31356880446997
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 44
dh =
    4.3348642
rdh_sum =
    3.62358849323221
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 45
dh =
    4.3067427
rdh_sum =
    3.93007021856423
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 46
dh =
    4.2786212
rdh_sum =
    4.23302534043006
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 47
dh =
    4.2504997
rdh_sum =
    4.53246542581338
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    4.82840224803855
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    5.12084778607947
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    5.30643214751562
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 59
dh =
    3.2475002
rdh_sum =
    5.48970539181282
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 60

```

```
dh =
    3.2256282
rdh_sum =
    5.67067876607207
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 61
dh =
    3.2037557
rdh_sum =
    5.84936354687711
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 62
dh =
    3.1818832
rdh_sum =
    6.02577114478887
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 63
dh =
    3.1600112
rdh_sum =
    6.19991310289693
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 64
dh =
    3.1364562
rdh_sum =
    6.37162802893531
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 65
dh =
    3.1112187
rdh_sum =
    6.54075756982839
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 66
dh =
    3.0859817
rdh_sum =
    6.70731741965698
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 67
dh =
    3.0607447
rdh_sum =
    6.87132334261507
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 68
dh =
    3.0355077
rdh_sum =
    7.03279122363974
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 69
dh =
    3.0102702
rdh_sum =
    7.19173701785245
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 70
dh =
    2.9973072
rdh_sum =
    7.34939362711243
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 71
dh =
    3.0088937
rdh_sum =
    7.50820232468385
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 72
dh =
    3.0327542
rdh_sum =
    7.66939425714935
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 73
dh =
    3.0566147
rdh_sum =
    7.83298374280792
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 74
dh =
    3.0804757
rdh_sum =
    7.99898504932325
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 75
```

```
dh =
    3.1043362
rdh_sum =
    8.16741224135596
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 80
dh =
    2.5429832
rdh_sum =
    8.28269497854575
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 81
dh =
    2.5119012
rdh_sum =
    8.39528706484565
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 82
dh =
    2.4808197
rdh_sum =
    8.50521632489492
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 83
dh =
    2.4497382
rdh_sum =
    8.61251073077935
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 84
dh =
    2.4186562
rdh_sum =
    8.71719840182517
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 85
dh =
    2.3875747
rdh_sum =
    8.81930772815424
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 86
dh =
    2.3564932
rdh_sum =
    8.91886724262204
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 87
dh =
    2.3254112
rdh_sum =
    9.01590562060754
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 88
dh =
    2.2943297
rdh_sum =
    9.11045179939306
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 89
dh =
    2.2681657
rdh_sum =
    9.20292260924562
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 90
dh =
    2.2518362
rdh_sum =
    9.29410862674016
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 91
dh =
    2.2404247
rdh_sum =
    9.38440159808547
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 92
dh =
    2.2290132
rdh_sum =
    9.47380548367804
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 93
dh =
    2.2176017
rdh_sum =
    9.56232425250861
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 94
```

```
dh =
    2.2061902
rdh_sum =
    9.64996188212385
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 95
dh =
    2.1947782
rdh_sum =
    9.73672232024246
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 96
dh =
    2.1833667
rdh_sum =
    9.82260959992809
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 97
dh =
    2.1719552
rdh_sum =
    9.90762772416446
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 98
dh =
    2.1605437
rdh_sum =
    9.99178070433689
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 99
dh =
    2.1491322
rdh_sum =
    10.0750725601935
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 100
dh =
    2.1377202
rdh_sum =
    10.1575072823409
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 101
dh =
    2.1279132
rdh_sum =
    10.2392086440214
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 102
dh =
    2.1197112
rdh_sum =
    10.3202989589916
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 103
dh =
    2.1115092
rdh_sum =
    10.4007803191467
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 104
dh =
    2.1033072
rdh_sum =
    10.4806548194225
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 105
dh =
    2.0951052
rdh_sum =
    10.5599245577854
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 106
dh =
    2.0869032
rdh_sum =
    10.6385916352218
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 107
dh =
    2.0787012
rdh_sum =
    10.7166581557274
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 108
dh =
    2.0704992
rdh_sum =
    10.7941262262972
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 109
```

```
dh =
    2.0683277
rdh_sum =
    10.8714362088885
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 110
dh =
    2.0721872
rdh_sum =
    10.9490272701886
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 111
dh =
    2.0760472
rdh_sum =
    11.026899913765
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 112
dh =
    2.0799072
rdh_sum =
    11.10505460649
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 113
dh =
    2.0837672
rdh_sum =
    11.1834918149241
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 114
dh =
    2.0876267
rdh_sum =
    11.2622119686294
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 115
dh =
    2.0914862
rdh_sum =
    11.3412155334203
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 116
dh =
    2.0953462
rdh_sum =
    11.4205030116042
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 117
dh =
    2.1138252
rdh_sum =
    11.5011561102995
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 118
dh =
    2.1615422
rdh_sum =
    11.5853846297494
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 119
dh =
    2.2238782
rdh_sum =
    11.6743897347005
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 120
dh =
    2.2862142
rdh_sum =
    11.7682899703553
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 121
dh =
    2.3485502
rdh_sum =
    11.8672024699906
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 122
dh =
    2.4108862
rdh_sum =
    11.9712429211723
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 123
dh =
    2.4732222
rdh_sum =
    12.0805255323868
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 124
```



```

dh =
    2.5355582
rdh_sum =
    12.1951630000995
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 125
dh =
    2.5978942
rdh_sum =
    12.3152664762495
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 126
dh =
    2.6602302
rdh_sum =
    12.4409455361888
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 127
dh =
    2.6922182
rdh_sum =
    12.5695277519809
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 128
dh =
    2.6635107
rdh_sum =
    12.6955032377589
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 129
dh =
    2.6044557
rdh_sum =
    12.8161884687011
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 130
dh =
    2.5454007
rdh_sum =
    12.9316816385617
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 131
dh =
    2.4863452
rdh_sum =
    13.0420822424794
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 132
dh =
    2.4305707
rdh_sum =
    13.147765799008
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 133
dh =
    2.3813582
rdh_sum =
    13.2493628579932
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 134
dh =
    2.3354267
rdh_sum =
    13.347210470601
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 135
dh =
    2.2894952
rdh_sum =
    13.4413716144701
ans =
Berm Factor Calculation: Iteration 2, Profile Segment: 136
dh =
    2.2435632
rdh_sum =
    13.5319098054553
ans =
!----- End Berm Factor Calculation, Iter: 2 -----!
berm_width =
    85
rB =
    0.490666033842359
rdh_mean =
    0.15919893888771
gamma_berm =
    0.587447478093586
gamma_berm =
    0.6
slope =
    0.147727968561311

```

```

Irb =
1.67609888130617
gamma_berm =
0.6
gamma_perm =
1
gamma_beta =
1
gamma_rough =
0.6
gamma =
0.36
ans =
!!! - - Iribaren number: 1.01 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:6.8 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
6.15750604840807
R2del =
1.77098842510419
Z2 =
15.5139302484081
ans =
!----- STARTING ITERATION 3 -----!
Ztoe =
0.708324200000002
toe_sta =
-9.28910224942969
top_sta =
195.345922091136
Z2 =
15.5139302484081
H0 =
5.7654
Tp =
13.2478
T0 =
12.0434545454545
R2 =
6.15750604840807
Z2 =
15.5139302484081
top_sta =
195.345922091136
Lslope =
204.635024340565
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 40
dh =
4.4473502
rdh_sum =
0.324280978646442
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 41
dh =
4.4192287
rdh_sum =
0.644980637357216
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 42
dh =
4.3911072
rdh_sum =
0.962109501471238
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 43
dh =
4.3629857
rdh_sum =
1.27567830594121
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 44
dh =
4.3348642
rdh_sum =
1.58569799470345
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 45
dh =
4.3067427
rdh_sum =
1.89217972003547
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 46
dh =
4.2786212
rdh_sum =
2.1951348419013
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 47

```

```
dh =
    4.2504997
rdh_sum =
    2.49457492728462
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    2.79051174950979
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    3.0829572875507
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    3.26854164898686
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 59
dh =
    3.2475002
rdh_sum =
    3.45181489328406
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 60
dh =
    3.2256282
rdh_sum =
    3.63278826754331
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 61
dh =
    3.2037557
rdh_sum =
    3.81147304834834
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 62
dh =
    3.1818832
rdh_sum =
    3.98788064626011
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 63
dh =
    3.1600112
rdh_sum =
    4.16202260436817
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 64
dh =
    3.1364562
rdh_sum =
    4.33373753040655
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 65
dh =
    3.1112187
rdh_sum =
    4.50286707129962
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 66
dh =
    3.0859817
rdh_sum =
    4.66942692112822
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 67
dh =
    3.0607447
rdh_sum =
    4.83343284408631
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 68
dh =
    3.0355077
rdh_sum =
    4.99490072511098
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 69
dh =
    3.0102702
rdh_sum =
    5.15384651932369
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 70
```

```
dh =
    2.9973072
rdh_sum =
    5.31150312858367
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 71
dh =
    3.0088937
rdh_sum =
    5.47031182615509
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 72
dh =
    3.0327542
rdh_sum =
    5.63150375862059
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 73
dh =
    3.0566147
rdh_sum =
    5.79509324427916
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 74
dh =
    3.0804757
rdh_sum =
    5.96109455079449
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 75
dh =
    3.1043362
rdh_sum =
    6.1295217428272
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 80
dh =
    2.5429832
rdh_sum =
    6.24480448001698
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 81
dh =
    2.5119012
rdh_sum =
    6.35739656631689
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 82
dh =
    2.4808197
rdh_sum =
    6.46732582636616
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 83
dh =
    2.4497382
rdh_sum =
    6.57462023225059
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 84
dh =
    2.4186562
rdh_sum =
    6.67930790329641
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 85
dh =
    2.3875747
rdh_sum =
    6.78141722962548
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 86
dh =
    2.3564932
rdh_sum =
    6.88097674409328
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 87
dh =
    2.3254112
rdh_sum =
    6.97801512207878
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 88
dh =
    2.2943297
rdh_sum =
    7.0725613008643
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 89
```

```
dh =
    2.2681657
rdh_sum =
    7.16503211071685
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 90
dh =
    2.2518362
rdh_sum =
    7.2562181282114
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 91
dh =
    2.2404247
rdh_sum =
    7.34651109955671
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 92
dh =
    2.2290132
rdh_sum =
    7.43591498514927
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 93
dh =
    2.2176017
rdh_sum =
    7.52443375397985
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 94
dh =
    2.2061902
rdh_sum =
    7.61207138359508
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 95
dh =
    2.1947782
rdh_sum =
    7.6988318217137
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 96
dh =
    2.1833667
rdh_sum =
    7.78471910139933
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 97
dh =
    2.1719552
rdh_sum =
    7.8697372256357
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 98
dh =
    2.1605437
rdh_sum =
    7.95389020580813
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 99
dh =
    2.1491322
rdh_sum =
    8.03718206166478
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 100
dh =
    2.1377202
rdh_sum =
    8.11961678381213
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 101
dh =
    2.1279132
rdh_sum =
    8.2013181454926
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 102
dh =
    2.1197112
rdh_sum =
    8.28240846046287
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 103
dh =
    2.1115092
rdh_sum =
    8.36288982061794
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 104
```

```
dh =
    2.1033072
rdh_sum =
    8.44276432089374
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 105
dh =
    2.0951052
rdh_sum =
    8.52203405925664
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 106
dh =
    2.0869032
rdh_sum =
    8.600701136693
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 107
dh =
    2.0787012
rdh_sum =
    8.67876765719867
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 108
dh =
    2.0704992
rdh_sum =
    8.75623572776848
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 109
dh =
    2.0683277
rdh_sum =
    8.83354571035977
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 110
dh =
    2.0721872
rdh_sum =
    8.91113677165987
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 111
dh =
    2.0760472
rdh_sum =
    8.98900941523621
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 112
dh =
    2.0799072
rdh_sum =
    9.06716410796121
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 113
dh =
    2.0837672
rdh_sum =
    9.1456013163953
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 114
dh =
    2.0876267
rdh_sum =
    9.22432147010061
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 115
dh =
    2.0914862
rdh_sum =
    9.3033250348915
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 116
dh =
    2.0953462
rdh_sum =
    9.38261251307542
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 117
dh =
    2.1138252
rdh_sum =
    9.46326561177069
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 118
dh =
    2.1615422
rdh_sum =
    9.54749413122066
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 119
```

```
dh =
    2.2238782
rdh_sum =
    9.63649923617176
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 120
dh =
    2.2862142
rdh_sum =
    9.73039947182654
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 121
dh =
    2.3485502
rdh_sum =
    9.82931197146185
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 122
dh =
    2.4108862
rdh_sum =
    9.9333524226435
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 123
dh =
    2.4732222
rdh_sum =
    10.042635033858
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 124
dh =
    2.5355582
rdh_sum =
    10.1572725015708
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 125
dh =
    2.5978942
rdh_sum =
    10.2773759777207
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 126
dh =
    2.6602302
rdh_sum =
    10.40305503766
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 127
dh =
    2.6922182
rdh_sum =
    10.5316372534521
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 128
dh =
    2.6635107
rdh_sum =
    10.6576127392301
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 129
dh =
    2.6044557
rdh_sum =
    10.7782979701724
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 130
dh =
    2.5454007
rdh_sum =
    10.893791140033
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 131
dh =
    2.4863452
rdh_sum =
    11.0041917439506
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 132
dh =
    2.4305707
rdh_sum =
    11.1098753004792
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 133
dh =
    2.3813582
rdh_sum =
    11.2114723594644
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 134
```

```

dh =
    2.3354267
rdh_sum =
    11.3093199720722
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 135
dh =
    2.2894952
rdh_sum =
    11.4034811159413
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 136
dh =
    2.2435632
rdh_sum =
    11.4940193069266
ans =
Berm Factor Calculation: Iteration 3, Profile Segment: 169
dh =
    -4.8006863
rdh_sum =
    12.378922429044
ans =
!----- End Berm Factor Calculation, Iter: 3 -----!
berm_width =
    86
rB =
    0.420260413764136
rdh_mean =
    0.143940958477256
gamma_berm =
    0.640232273003122
slope =
    0.124799620775612
Irb =
    1.41595736275642
gamma_berm =
    0.640232273003122
gamma_perm =
    1
gamma_beta =
    1
gamma_rough =
    0.6
gamma =
    0.384139363801873
ans =
!!! - - Iribaren number: 0.91 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:8.0 V:H is outside the valid range (1:8 - 1:1), TAW NOT VALID - - !!!
R2_new =
    5.55062259206032
R2del =
    0.606883456347744
Z2 =
    14.9070467920603
ans =
!----- STARTING ITERATION 4 -----!
Ztoe =
    0.708324200000002
toe_sta =
    -9.28910224942969
top_sta =
    183.338176768571
Z2 =
    14.9070467920603
H0 =
    5.7654
Tp =
    13.2478
T0 =
    12.0434545454545
R2 =
    5.55062259206032
Z2 =
    14.9070467920603
top_sta =
    183.338176768571
Lslope =
    192.627279018001
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 40
dh =
    4.4473502
rdh_sum =
    0.324280978646442
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 41
dh =
    4.4192287

```



```
rdh_sum =
    0.644980637357216
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 42
dh =
    4.3911072
rdh_sum =
    0.962109501471238
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 43
dh =
    4.3629857
rdh_sum =
    1.27567830594121
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 44
dh =
    4.3348642
rdh_sum =
    1.58569799470345
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 45
dh =
    4.3067427
rdh_sum =
    1.89217972003547
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 46
dh =
    4.2786212
rdh_sum =
    2.1951348419013
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 47
dh =
    4.2504997
rdh_sum =
    2.49457492728462
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    2.79051174950979
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    3.0829572875507
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    3.26854164898686
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 59
dh =
    3.2475002
rdh_sum =
    3.45181489328406
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 60
dh =
    3.2256282
rdh_sum =
    3.63278826754331
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 61
dh =
    3.2037557
rdh_sum =
    3.81147304834834
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 62
dh =
    3.1818832
rdh_sum =
    3.98788064626011
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 63
dh =
    3.1600112
rdh_sum =
    4.16202260436817
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 64
dh =
    3.1364562
```

```
rdh_sum =
    4.33373753040655
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 65
dh =
    3.1112187
rdh_sum =
    4.50286707129962
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 66
dh =
    3.0859817
rdh_sum =
    4.66942692112822
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 67
dh =
    3.0607447
rdh_sum =
    4.83343284408631
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 68
dh =
    3.0355077
rdh_sum =
    4.99490072511098
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 69
dh =
    3.0102702
rdh_sum =
    5.15384651932369
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 70
dh =
    2.9973072
rdh_sum =
    5.31150312858367
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 71
dh =
    3.0088937
rdh_sum =
    5.47031182615509
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 72
dh =
    3.0327542
rdh_sum =
    5.63150375862059
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 73
dh =
    3.0566147
rdh_sum =
    5.79509324427916
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 74
dh =
    3.0804757
rdh_sum =
    5.96109455079449
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 75
dh =
    3.1043362
rdh_sum =
    6.1295217428272
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 80
dh =
    2.5429832
rdh_sum =
    6.24480448001698
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 81
dh =
    2.5119012
rdh_sum =
    6.35739656631689
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 82
dh =
    2.4808197
rdh_sum =
    6.46732582636616
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 83
dh =
    2.4497382
```

```
rdh_sum =
    6.57462023225059
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 84
dh =
    2.4186562
rdh_sum =
    6.67930790329641
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 85
dh =
    2.3875747
rdh_sum =
    6.78141722962548
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 86
dh =
    2.3564932
rdh_sum =
    6.88097674409328
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 87
dh =
    2.3254112
rdh_sum =
    6.97801512207878
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 88
dh =
    2.2943297
rdh_sum =
    7.0725613008643
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 89
dh =
    2.2681657
rdh_sum =
    7.16503211071685
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 90
dh =
    2.2518362
rdh_sum =
    7.2562181282114
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 91
dh =
    2.2404247
rdh_sum =
    7.34651109955671
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 92
dh =
    2.2290132
rdh_sum =
    7.43591498514927
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 93
dh =
    2.2176017
rdh_sum =
    7.52443375397985
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 94
dh =
    2.2061902
rdh_sum =
    7.61207138359508
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 95
dh =
    2.1947782
rdh_sum =
    7.6988318217137
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 96
dh =
    2.1833667
rdh_sum =
    7.78471910139933
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 97
dh =
    2.1719552
rdh_sum =
    7.8697372256357
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 98
dh =
    2.1605437
```

```
rdh_sum =
    7.95389020580813
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 99
dh =
    2.1491322
rdh_sum =
    8.03718206166478
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 100
dh =
    2.1377202
rdh_sum =
    8.11961678381213
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 101
dh =
    2.1279132
rdh_sum =
    8.2013181454926
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 102
dh =
    2.1197112
rdh_sum =
    8.28240846046287
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 103
dh =
    2.1115092
rdh_sum =
    8.36288982061794
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 104
dh =
    2.1033072
rdh_sum =
    8.44276432089374
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 105
dh =
    2.0951052
rdh_sum =
    8.52203405925664
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 106
dh =
    2.0869032
rdh_sum =
    8.600701136693
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 107
dh =
    2.0787012
rdh_sum =
    8.67876765719867
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 108
dh =
    2.0704992
rdh_sum =
    8.75623572776848
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 109
dh =
    2.0683277
rdh_sum =
    8.83354571035977
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 110
dh =
    2.0721872
rdh_sum =
    8.91113677165987
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 111
dh =
    2.0760472
rdh_sum =
    8.98900941523621
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 112
dh =
    2.0799072
rdh_sum =
    9.06716410796121
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 113
dh =
    2.0837672
```

```
rdh_sum =
    9.1456013163953
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 114
dh =
    2.0876267
rdh_sum =
    9.22432147010061
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 115
dh =
    2.0914862
rdh_sum =
    9.3033250348915
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 116
dh =
    2.0953462
rdh_sum =
    9.38261251307542
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 117
dh =
    2.1138252
rdh_sum =
    9.46326561177069
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 118
dh =
    2.1615422
rdh_sum =
    9.54749413122066
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 119
dh =
    2.2238782
rdh_sum =
    9.63649923617176
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 120
dh =
    2.2862142
rdh_sum =
    9.73039947182654
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 121
dh =
    2.3485502
rdh_sum =
    9.82931197146185
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 122
dh =
    2.4108862
rdh_sum =
    9.9333524226435
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 123
dh =
    2.4732222
rdh_sum =
    10.042635033858
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 124
dh =
    2.5355582
rdh_sum =
    10.1572725015708
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 125
dh =
    2.5978942
rdh_sum =
    10.2773759777207
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 126
dh =
    2.6602302
rdh_sum =
    10.40305503766
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 127
dh =
    2.6922182
rdh_sum =
    10.5316372534521
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 128
dh =
    2.6635107
```

```

rdh_sum =
    10.6576127392301
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 129
dh =
    2.6044557
rdh_sum =
    10.7782979701724
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 130
dh =
    2.5454007
rdh_sum =
    10.893791140033
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 131
dh =
    2.4863452
rdh_sum =
    11.0041917439506
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 132
dh =
    2.4305707
rdh_sum =
    11.1098753004792
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 133
dh =
    2.3813582
rdh_sum =
    11.2114723594644
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 134
dh =
    2.3354267
rdh_sum =
    11.3093199720722
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 135
dh =
    2.2894952
rdh_sum =
    11.4034811159413
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 136
dh =
    2.2435632
rdh_sum =
    11.4940193069266
ans =
Berm Factor Calculation: Iteration 4, Profile Segment: 169
dh =
    -4.8006863
rdh_sum =
    12.449650311268
ans =
!----- End Berm Factor Calculation, Iter: 4 -----!
berm_width =
    86
rB =
    0.446458053285192
rdh_mean =
    0.144763375712419
gamma_berm =
    0.618172721622367
slope =
    0.13316219566724
Irb =
    1.51083785530769
gamma_berm =
    0.618172721622367
gamma_perm =
    1
gamma_beta =
    1
gamma_rough =
    0.6
gamma =
    0.37090363297342
ans =
!!! - - Iribaren number: 0.93 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:7.5 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
    5.71849380898391
R2del =
    0.167871216923583
Z2 =
    15.0749180089839

```

```

ans =
!----- STARTING ITERATION 5 -----!
Ztoe =
    0.708324200000002
toe_sta =
    -9.28910224942969
top_sta =
    186.659662630022
Z2 =
    15.0749180089839
H0 =
    5.7654
Tp =
    13.2478
T0 =
    12.0434545454545
R2 =
    5.71849380898391
Z2 =
    15.0749180089839
top_sta =
    186.659662630022
Lslope =
    195.948764879451
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 40
dh =
    4.4473502
rdh_sum =
    0.324280978646442
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 41
dh =
    4.4192287
rdh_sum =
    0.644980637357216
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 42
dh =
    4.3911072
rdh_sum =
    0.962109501471238
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 43
dh =
    4.3629857
rdh_sum =
    1.27567830594121
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 44
dh =
    4.3348642
rdh_sum =
    1.58569799470345
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 45
dh =
    4.3067427
rdh_sum =
    1.89217972003547
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 46
dh =
    4.2786212
rdh_sum =
    2.1951348419013
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 47
dh =
    4.2504997
rdh_sum =
    2.49457492728462
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    2.79051174950979
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    3.0829572875507
ans =
Berm Factor Calculation: Iteration 5, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    3.26854164898686

```

```
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 59  
dh =  
3.2475002  
rdh_sum =  
3.45181489328406  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 60  
dh =  
3.2256282  
rdh_sum =  
3.63278826754331  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 61  
dh =  
3.2037557  
rdh_sum =  
3.81147304834834  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 62  
dh =  
3.1818832  
rdh_sum =  
3.98788064626011  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 63  
dh =  
3.1600112  
rdh_sum =  
4.16202260436817  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 64  
dh =  
3.1364562  
rdh_sum =  
4.33373753040655  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 65  
dh =  
3.1112187  
rdh_sum =  
4.50286707129962  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 66  
dh =  
3.0859817  
rdh_sum =  
4.66942692112822  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 67  
dh =  
3.0607447  
rdh_sum =  
4.83343284408631  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 68  
dh =  
3.0355077  
rdh_sum =  
4.99490072511098  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 69  
dh =  
3.0102702  
rdh_sum =  
5.15384651932369  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 70  
dh =  
2.9973072  
rdh_sum =  
5.31150312858367  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 71  
dh =  
3.0088937  
rdh_sum =  
5.47031182615509  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 72  
dh =  
3.0327542  
rdh_sum =  
5.63150375862059  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 73  
dh =  
3.0566147  
rdh_sum =  
5.79509324427916
```



```
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 74  
dh =  
3.0804757  
rdh_sum =  
5.96109455079449  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 75  
dh =  
3.1043362  
rdh_sum =  
6.1295217428272  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 80  
dh =  
2.5429832  
rdh_sum =  
6.24480448001698  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 81  
dh =  
2.5119012  
rdh_sum =  
6.35739656631689  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 82  
dh =  
2.4808197  
rdh_sum =  
6.46732582636616  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 83  
dh =  
2.4497382  
rdh_sum =  
6.57462023225059  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 84  
dh =  
2.4186562  
rdh_sum =  
6.67930790329641  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 85  
dh =  
2.3875747  
rdh_sum =  
6.78141722962548  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 86  
dh =  
2.3564932  
rdh_sum =  
6.88097674409328  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 87  
dh =  
2.3254112  
rdh_sum =  
6.97801512207878  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 88  
dh =  
2.2943297  
rdh_sum =  
7.0725613008643  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 89  
dh =  
2.2681657  
rdh_sum =  
7.16503211071685  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 90  
dh =  
2.2518362  
rdh_sum =  
7.2562181282114  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 91  
dh =  
2.2404247  
rdh_sum =  
7.34651109955671  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 92  
dh =  
2.2290132  
rdh_sum =  
7.43591498514927
```

```
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 93  
dh =  
2.2176017  
rdh_sum =  
7.52443375397985  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 94  
dh =  
2.2061902  
rdh_sum =  
7.61207138359508  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 95  
dh =  
2.1947782  
rdh_sum =  
7.6988318217137  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 96  
dh =  
2.1833667  
rdh_sum =  
7.78471910139933  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 97  
dh =  
2.1719552  
rdh_sum =  
7.8697372256357  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 98  
dh =  
2.1605437  
rdh_sum =  
7.95389020580813  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 99  
dh =  
2.1491322  
rdh_sum =  
8.03718206166478  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 100  
dh =  
2.1377202  
rdh_sum =  
8.11961678381213  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 101  
dh =  
2.1279132  
rdh_sum =  
8.2013181454926  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 102  
dh =  
2.1197112  
rdh_sum =  
8.28240846046287  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 103  
dh =  
2.1115092  
rdh_sum =  
8.36288982061794  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 104  
dh =  
2.1033072  
rdh_sum =  
8.44276432089374  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 105  
dh =  
2.0951052  
rdh_sum =  
8.52203405925664  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 106  
dh =  
2.0869032  
rdh_sum =  
8.600701136693  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 107  
dh =  
2.0787012  
rdh_sum =  
8.67876765719867
```

```
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 108  
dh =  
2.0704992  
rdh_sum =  
8.75623572776848  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 109  
dh =  
2.0683277  
rdh_sum =  
8.83354571035977  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 110  
dh =  
2.0721872  
rdh_sum =  
8.91113677165987  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 111  
dh =  
2.0760472  
rdh_sum =  
8.98900941523621  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 112  
dh =  
2.0799072  
rdh_sum =  
9.06716410796121  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 113  
dh =  
2.0837672  
rdh_sum =  
9.1456013163953  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 114  
dh =  
2.0876267  
rdh_sum =  
9.22432147010061  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 115  
dh =  
2.0914862  
rdh_sum =  
9.3033250348915  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 116  
dh =  
2.0953462  
rdh_sum =  
9.38261251307542  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 117  
dh =  
2.1138252  
rdh_sum =  
9.46326561177069  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 118  
dh =  
2.1615422  
rdh_sum =  
9.54749413122066  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 119  
dh =  
2.2238782  
rdh_sum =  
9.63649923617176  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 120  
dh =  
2.2862142  
rdh_sum =  
9.73039947182654  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 121  
dh =  
2.3485502  
rdh_sum =  
9.82931197146185  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 122  
dh =  
2.4108862  
rdh_sum =  
9.9333524226435
```

```
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 123  
dh =  
    2.4732222  
rdh_sum =  
    10.042635033858  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 124  
dh =  
    2.5355582  
rdh_sum =  
    10.1572725015708  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 125  
dh =  
    2.5978942  
rdh_sum =  
    10.2773759777207  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 126  
dh =  
    2.6602302  
rdh_sum =  
    10.40305503766  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 127  
dh =  
    2.6922182  
rdh_sum =  
    10.5316372534521  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 128  
dh =  
    2.6635107  
rdh_sum =  
    10.6576127392301  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 129  
dh =  
    2.6044557  
rdh_sum =  
    10.7782979701724  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 130  
dh =  
    2.5454007  
rdh_sum =  
    10.893791140033  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 131  
dh =  
    2.4863452  
rdh_sum =  
    11.0041917439506  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 132  
dh =  
    2.4305707  
rdh_sum =  
    11.1098753004792  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 133  
dh =  
    2.3813582  
rdh_sum =  
    11.2114723594644  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 134  
dh =  
    2.3354267  
rdh_sum =  
    11.3093199720722  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 135  
dh =  
    2.2894952  
rdh_sum =  
    11.4034811159413  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 136  
dh =  
    2.2435632  
rdh_sum =  
    11.4940193069266  
ans =  
Berm Factor Calculation: Iteration 5, Profile Segment: 169  
dh =  
    -4.8006863  
rdh_sum =  
    12.431794626244
```

```

ans =
!----- End Berm Factor Calculation, Iter: 5 -----!
berm_width =
    86
rB =
    0.438890237725702
rdh_mean =
    0.144555751467954
gamma_berm =
    0.624553870400686
slope =
    0.130666259186591
Irb =
    1.48251934268095
gamma_berm =
    0.624553870400686
gamma_perm =
    1
gamma_beta =
    1
gamma_rough =
    0.6
gamma =
    0.374732322240412
ans =
!!! - - Iribaren number: 0.93 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:7.7 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
    5.669232040686
R2del =
    0.0492617682979093
Z2 =
    15.025656240686
ans =
!----- STARTING ITERATION 6 -----!
Ztoe =
    0.708324200000002
toe_sta =
    -9.28910224942969
top_sta =
    185.684973401516
Z2 =
    15.025656240686
H0 =
    5.7654
Tp =
    13.2478
T0 =
    12.0434545454545
R2 =
    5.669232040686
Z2 =
    15.025656240686
top_sta =
    185.684973401516
Lslope =
    194.974075650946
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 40
dh =
    4.4473502
rdh_sum =
    0.324280978646442
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 41
dh =
    4.4192287
rdh_sum =
    0.644980637357216
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 42
dh =
    4.3911072
rdh_sum =
    0.962109501471238
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 43
dh =
    4.3629857
rdh_sum =
    1.27567830594121
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 44
dh =
    4.3348642
rdh_sum =
    1.58569799470345
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 45

```

```
dh =
    4.3067427
rdh_sum =
    1.89217972003547
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 46
dh =
    4.2786212
rdh_sum =
    2.1951348419013
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 47
dh =
    4.2504997
rdh_sum =
    2.49457492728462
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    2.79051174950979
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    3.0829572875507
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    3.26854164898686
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 59
dh =
    3.2475002
rdh_sum =
    3.45181489328406
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 60
dh =
    3.2256282
rdh_sum =
    3.63278826754331
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 61
dh =
    3.2037557
rdh_sum =
    3.81147304834834
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 62
dh =
    3.1818832
rdh_sum =
    3.98788064626011
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 63
dh =
    3.1600112
rdh_sum =
    4.16202260436817
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 64
dh =
    3.1364562
rdh_sum =
    4.33373753040655
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 65
dh =
    3.1112187
rdh_sum =
    4.50286707129962
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 66
dh =
    3.0859817
rdh_sum =
    4.66942692112822
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 67
dh =
    3.0607447
rdh_sum =
    4.83343284408631
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 68
```

```
dh =
    3.0355077
rdh_sum =
    4.99490072511098
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 69
dh =
    3.0102702
rdh_sum =
    5.15384651932369
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 70
dh =
    2.9973072
rdh_sum =
    5.31150312858367
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 71
dh =
    3.0088937
rdh_sum =
    5.47031182615509
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 72
dh =
    3.0327542
rdh_sum =
    5.63150375862059
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 73
dh =
    3.0566147
rdh_sum =
    5.79509324427916
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 74
dh =
    3.0804757
rdh_sum =
    5.96109455079449
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 75
dh =
    3.1043362
rdh_sum =
    6.1295217428272
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 80
dh =
    2.5429832
rdh_sum =
    6.24480448001698
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 81
dh =
    2.5119012
rdh_sum =
    6.35739656631689
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 82
dh =
    2.4808197
rdh_sum =
    6.46732582636616
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 83
dh =
    2.4497382
rdh_sum =
    6.57462023225059
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 84
dh =
    2.4186562
rdh_sum =
    6.67930790329641
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 85
dh =
    2.3875747
rdh_sum =
    6.78141722962548
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 86
dh =
    2.3564932
rdh_sum =
    6.88097674409328
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 87
```

```
dh =
    2.3254112
rdh_sum =
    6.97801512207878
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 88
dh =
    2.2943297
rdh_sum =
    7.0725613008643
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 89
dh =
    2.2681657
rdh_sum =
    7.16503211071685
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 90
dh =
    2.2518362
rdh_sum =
    7.2562181282114
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 91
dh =
    2.2404247
rdh_sum =
    7.34651109955671
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 92
dh =
    2.2290132
rdh_sum =
    7.43591498514927
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 93
dh =
    2.2176017
rdh_sum =
    7.52443375397985
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 94
dh =
    2.2061902
rdh_sum =
    7.61207138359508
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 95
dh =
    2.1947782
rdh_sum =
    7.6988318217137
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 96
dh =
    2.1833667
rdh_sum =
    7.78471910139933
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 97
dh =
    2.1719552
rdh_sum =
    7.8697372256357
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 98
dh =
    2.1605437
rdh_sum =
    7.95389020580813
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 99
dh =
    2.1491322
rdh_sum =
    8.03718206166478
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 100
dh =
    2.1377202
rdh_sum =
    8.11961678381213
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 101
dh =
    2.1279132
rdh_sum =
    8.2013181454926
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 102
```



```
dh =
    2.1197112
rdh_sum =
    8.28240846046287
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 103
dh =
    2.1115092
rdh_sum =
    8.36288982061794
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 104
dh =
    2.1033072
rdh_sum =
    8.44276432089374
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 105
dh =
    2.0951052
rdh_sum =
    8.52203405925664
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 106
dh =
    2.0869032
rdh_sum =
    8.600701136693
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 107
dh =
    2.0787012
rdh_sum =
    8.67876765719867
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 108
dh =
    2.0704992
rdh_sum =
    8.75623572776848
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 109
dh =
    2.0683277
rdh_sum =
    8.83354571035977
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 110
dh =
    2.0721872
rdh_sum =
    8.91113677165987
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 111
dh =
    2.0760472
rdh_sum =
    8.98900941523621
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 112
dh =
    2.0799072
rdh_sum =
    9.06716410796121
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 113
dh =
    2.0837672
rdh_sum =
    9.1456013163953
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 114
dh =
    2.0876267
rdh_sum =
    9.22432147010061
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 115
dh =
    2.0914862
rdh_sum =
    9.3033250348915
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 116
dh =
    2.0953462
rdh_sum =
    9.38261251307542
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 117
```

```
dh =
    2.1138252
rdh_sum =
    9.46326561177069
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 118
dh =
    2.1615422
rdh_sum =
    9.54749413122066
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 119
dh =
    2.2238782
rdh_sum =
    9.63649923617176
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 120
dh =
    2.2862142
rdh_sum =
    9.73039947182654
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 121
dh =
    2.3485502
rdh_sum =
    9.82931197146185
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 122
dh =
    2.4108862
rdh_sum =
    9.9333524226435
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 123
dh =
    2.4732222
rdh_sum =
    10.042635033858
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 124
dh =
    2.5355582
rdh_sum =
    10.1572725015708
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 125
dh =
    2.5978942
rdh_sum =
    10.2773759777207
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 126
dh =
    2.6602302
rdh_sum =
    10.40305503766
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 127
dh =
    2.6922182
rdh_sum =
    10.5316372534521
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 128
dh =
    2.6635107
rdh_sum =
    10.6576127392301
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 129
dh =
    2.6044557
rdh_sum =
    10.7782979701724
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 130
dh =
    2.5454007
rdh_sum =
    10.893791140033
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 131
dh =
    2.4863452
rdh_sum =
    11.0041917439506
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 132
```

```

dh =
    2.4305707
rdh_sum =
    11.1098753004792
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 133
dh =
    2.3813582
rdh_sum =
    11.2114723594644
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 134
dh =
    2.3354267
rdh_sum =
    11.3093199720722
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 135
dh =
    2.2894952
rdh_sum =
    11.4034811159413
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 136
dh =
    2.2435632
rdh_sum =
    11.4940193069266
ans =
Berm Factor Calculation: Iteration 6, Profile Segment: 169
dh =
    -4.8006863
rdh_sum =
    12.4372150827059
ans =
!----- End Berm Factor Calculation, Iter: 6 -----!
berm_width =
    86
rB =
    0.441084281142907
rdh_mean =
    0.144618780031464
gamma_berm =
    0.622704789487036
slope =
    0.131382917956981
Irb =
    1.49065044321003
gamma_berm =
    0.622704789487036
gamma_perm =
    1
gamma_beta =
    1
gamma_rough =
    0.6
gamma =
    0.373622873692222
ans =
!!! - - Iribaren number: 0.93 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:7.6 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
    5.68344916884426
R2del =
    0.014217128158263
Z2 =
    15.0398733688443
ans =
!----- STARTING ITERATION 7 -----!
Ztoe =
    0.708324200000002
toe_sta =
    -9.28910224942969
top_sta =
    185.966272310486
Z2 =
    15.0398733688443
H0 =
    5.7654
Tp =
    13.2478
T0 =
    12.0434545454545
R2 =
    5.68344916884426
Z2 =
    15.0398733688443
top_sta =
    185.966272310486

```

```
Lslope =
    195.255374559916
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 40
dh =
    4.4473502
rdh_sum =
    0.324280978646442
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 41
dh =
    4.4192287
rdh_sum =
    0.644980637357216
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 42
dh =
    4.3911072
rdh_sum =
    0.962109501471238
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 43
dh =
    4.3629857
rdh_sum =
    1.27567830594121
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 44
dh =
    4.3348642
rdh_sum =
    1.58569799470345
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 45
dh =
    4.3067427
rdh_sum =
    1.89217972003547
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 46
dh =
    4.2786212
rdh_sum =
    2.1951348419013
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 47
dh =
    4.2504997
rdh_sum =
    2.49457492728462
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 48
dh =
    4.2223782
rdh_sum =
    2.79051174950979
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 49
dh =
    4.1942567
rdh_sum =
    3.0829572875507
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 58
dh =
    3.2693722
rdh_sum =
    3.26854164898686
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 59
dh =
    3.2475002
rdh_sum =
    3.45181489328406
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 60
dh =
    3.2256282
rdh_sum =
    3.63278826754331
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 61
dh =
    3.2037557
rdh_sum =
    3.81147304834834
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 62
dh =
    3.1818832
```

```
rdh_sum =
    3.98788064626011
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 63
dh =
    3.1600112
rdh_sum =
    4.16202260436817
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 64
dh =
    3.1364562
rdh_sum =
    4.33373753040655
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 65
dh =
    3.1112187
rdh_sum =
    4.50286707129962
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 66
dh =
    3.0859817
rdh_sum =
    4.66942692112822
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 67
dh =
    3.0607447
rdh_sum =
    4.83343284408631
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 68
dh =
    3.0355077
rdh_sum =
    4.99490072511098
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 69
dh =
    3.0102702
rdh_sum =
    5.15384651932369
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 70
dh =
    2.9973072
rdh_sum =
    5.31150312858367
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 71
dh =
    3.0088937
rdh_sum =
    5.47031182615509
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 72
dh =
    3.0327542
rdh_sum =
    5.63150375862059
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 73
dh =
    3.0566147
rdh_sum =
    5.79509324427916
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 74
dh =
    3.0804757
rdh_sum =
    5.96109455079449
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 75
dh =
    3.1043362
rdh_sum =
    6.1295217428272
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 80
dh =
    2.5429832
rdh_sum =
    6.24480448001698
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 81
dh =
    2.5119012
```

```
rdh_sum =
    6.35739656631689
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 82
dh =
    2.4808197
rdh_sum =
    6.46732582636616
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 83
dh =
    2.4497382
rdh_sum =
    6.57462023225059
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 84
dh =
    2.4186562
rdh_sum =
    6.67930790329641
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 85
dh =
    2.3875747
rdh_sum =
    6.78141722962548
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 86
dh =
    2.3564932
rdh_sum =
    6.88097674409328
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 87
dh =
    2.3254112
rdh_sum =
    6.97801512207878
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 88
dh =
    2.2943297
rdh_sum =
    7.0725613008643
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 89
dh =
    2.2681657
rdh_sum =
    7.16503211071685
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 90
dh =
    2.2518362
rdh_sum =
    7.2562181282114
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 91
dh =
    2.2404247
rdh_sum =
    7.34651109955671
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 92
dh =
    2.2290132
rdh_sum =
    7.43591498514927
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 93
dh =
    2.2176017
rdh_sum =
    7.52443375397985
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 94
dh =
    2.2061902
rdh_sum =
    7.61207138359508
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 95
dh =
    2.1947782
rdh_sum =
    7.6988318217137
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 96
dh =
    2.1833667
```

```
rdh_sum =
    7.78471910139933
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 97
dh =
    2.1719552
rdh_sum =
    7.8697372256357
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 98
dh =
    2.1605437
rdh_sum =
    7.95389020580813
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 99
dh =
    2.1491322
rdh_sum =
    8.03718206166478
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 100
dh =
    2.1377202
rdh_sum =
    8.11961678381213
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 101
dh =
    2.1279132
rdh_sum =
    8.2013181454926
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 102
dh =
    2.1197112
rdh_sum =
    8.28240846046287
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 103
dh =
    2.1115092
rdh_sum =
    8.36288982061794
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 104
dh =
    2.1033072
rdh_sum =
    8.44276432089374
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 105
dh =
    2.0951052
rdh_sum =
    8.52203405925664
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 106
dh =
    2.0869032
rdh_sum =
    8.600701136693
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 107
dh =
    2.0787012
rdh_sum =
    8.67876765719867
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 108
dh =
    2.0704992
rdh_sum =
    8.75623572776848
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 109
dh =
    2.0683277
rdh_sum =
    8.83354571035977
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 110
dh =
    2.0721872
rdh_sum =
    8.91113677165987
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 111
dh =
    2.0760472
```

```
rdh_sum =
    8.98900941523621
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 112
dh =
    2.0799072
rdh_sum =
    9.06716410796121
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 113
dh =
    2.0837672
rdh_sum =
    9.1456013163953
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 114
dh =
    2.0876267
rdh_sum =
    9.22432147010061
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 115
dh =
    2.0914862
rdh_sum =
    9.3033250348915
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 116
dh =
    2.0953462
rdh_sum =
    9.38261251307542
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 117
dh =
    2.1138252
rdh_sum =
    9.46326561177069
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 118
dh =
    2.1615422
rdh_sum =
    9.54749413122066
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 119
dh =
    2.2238782
rdh_sum =
    9.63649923617176
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 120
dh =
    2.2862142
rdh_sum =
    9.73039947182654
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 121
dh =
    2.3485502
rdh_sum =
    9.82931197146185
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 122
dh =
    2.4108862
rdh_sum =
    9.9333524226435
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 123
dh =
    2.4732222
rdh_sum =
    10.042635033858
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 124
dh =
    2.5355582
rdh_sum =
    10.1572725015708
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 125
dh =
    2.5978942
rdh_sum =
    10.2773759777207
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 126
dh =
    2.6602302
```



```

rdh_sum =
    10.40305503766
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 127
dh =
    2.6922182
rdh_sum =
    10.5316372534521
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 128
dh =
    2.6635107
rdh_sum =
    10.6576127392301
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 129
dh =
    2.6044557
rdh_sum =
    10.7782979701724
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 130
dh =
    2.5454007
rdh_sum =
    10.893791140033
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 131
dh =
    2.4863452
rdh_sum =
    11.0041917439506
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 132
dh =
    2.4305707
rdh_sum =
    11.1098753004792
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 133
dh =
    2.3813582
rdh_sum =
    11.2114723594644
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 134
dh =
    2.3354267
rdh_sum =
    11.3093199720722
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 135
dh =
    2.2894952
rdh_sum =
    11.4034811159413
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 136
dh =
    2.2435632
rdh_sum =
    11.4940193069266
ans =
Berm Factor Calculation: Iteration 7, Profile Segment: 169
dh =
    -4.8006863
rdh_sum =
    12.4356649294839
ans =
!----- End Berm Factor Calculation, Iter: 7 -----!
berm_width =
    86
rB =
    0.44044882346432
rdh_mean =
    0.144600754993998
gamma_berm =
    0.623240408944839
slope =
    0.131174774939651
Irb =
    1.48828888444837
gamma_berm =
    0.623240408944839
gamma_perm =
    1
gamma_beta =
    1
gamma_rough =
    0.6

```

```
gamma =
    0.373944245366903
ans =
!!! - - Iribaren number:    0.93 is in the valid range (0.5-10), TAW RECOMMENDED - - !!!
ans =
!!! - - slope: 1:7.6 V:H is in the valid range (1:8 - 1:1), TAW RECOMMENDED - - !!!
R2_new =
    5.67932605393606
R2del =
    0.00412311490820283
Z2 =
    15.0357502539361
% final 2% runup elevation
Z2=R2_new+SWEL
Z2 =
    15.0357502539361
diary off
-1.000000e+00
```