

## Allegato 1: Codice Matlab

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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% GENERAZIONE CASUALE DI BLOCCHI ALL'INTERNO DEL DOMINIO %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

clear all;
close all;
clc;
tic;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% CARATTERISTICHE PENDIO %

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% dimensioni del dominio, unità in m
B = 150; % base del dominio
H = 100; % altezza totale del dominio
L1 = 50; % dall'estremo del dominio all'inizio del pendio (sx--->dx)
L2 = 100; % dall'estremo del dominio alla fine del pendio (sx--->dx)
L3 = 50; % dalla base del pendio alla fine del dominio (a dx)
Lp = 50; % larghezza sull'orizzontale del pendio
H1 = 50; % dimensione caratteristica altezza del pendio
H2 = 50; % altezza dall'estremo del dominio alla base del pendio
A = (L1*H)+(1/2*Lp*H1)+(Lp*H2)+(L3*H2); % Area
PV = 0,7; % percentuale volumetrica
toll = 1/40*PV;
e=0.5; % eccentricità ellisse
% La dimensione dei blocchi, deve essere compresa tra il 5% e il 75% % della dimensione
caratteristica, in questo caso l'altezza del pendio (H1)
a = 0.05*H1;
b = 0.75*H1;
F = 0:0.0001:1;
q = -2.0;
dp = ((-F*((a^(1+q))-(b^(1+q))))+(a^(1+q))).^(1/(1+q));
%distanza minima tra 2 blocchi e tra blocchi e dominio
toll_pos = 0.05;
F2 = F.*100;
figure(1)
plot(dp,F2)
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title('Distribuzione dei diametri dei blocchi in termini probabilistici');
xlabel('Diametro blocchi (m)');
ylabel('Probabilità (%)');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%                               Distribuzione dimensionale blocchi                               %

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

d_medio = zeros([],2); % vettore con asse maggiore e asse minore di ogni ellisse
vv = 0;
i = 0;
while vv <= (PV*A + toll*A)
    i = i + 1;
    temp = round(rand(1)*length(F));
    if (temp == 0), temp = 1; end
    d_medio(i,1) = dp(temp); % asse maggiore dell'ellisse, pari al diametro dei cerchi
    % nella versione con blocchi circolari
    d_medio(i,2) = (dp(temp)^2 - e^2 * dp(temp)^2)^0.5; % asse minore dell'ellisse, pari
    % all'asse maggiore per 3/4 per e=0.5
    vvi = pi*(d_medio(i,1)/2)*(d_medio(i,2)/2); % area dell'ellisse i-esima =
    % pigreco*semiasse maggiore*semiasse minore
    vv = vv + vvi;
end
do = sort(d_medio,'descend');
figure(2)
plot(do,'x');
title('Distribuzione dimensionale blocchi');
xlabel('Blocchi');
ylabel('Diametro blocchi (m)');
Nd = numel(d_medio)/2; % numero di ellissi generate (diviso 2 perchè numel=n. elem.
% matrice, 2=n. di colonne)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%                               Verifica della dimensione frattale                               %

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% generazione delle classi
node = 0.04*sqrt(A); % valore di riferimento per rappres. grafica--> ATT.|| valutare se
% inserire 0.05 al posto di 0.04
node_classe_1 = node/2;
node_classe_2 = node;
node_classe_3 = node*2;
node_classe_4 = node_classe_3*2;
node_classe_5 = node_classe_4*2;
% definizione delle frequenze per le classi --- considerando l'asse maggiore

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ii=0;
cont_1=0;
cont_2=0;
cont_3=0;
cont_4=0;
for i=1:Nd
    if (node_classe_1<do(i,1)) && (node_classe_2>do(i,1))
        classe_1= cont_1 + 1;
        cont_1 = classe_1;
    end
    if (node_classe_2<do(i,1)) && (node_classe_3>do(i,1))
        classe_2= cont_2 + 1;
        cont_2 = classe_2;
    end
    if (node_classe_3<do(i,1)) && (node_classe_4>do(i,1))
        classe_3= cont_3 + 1;
        cont_3 = classe_3;
    end
    if (node_classe_4<do(i,1)) && (node_classe_5>do(i,1))
        classe_4= cont_4 + 1;
        cont_4 = classe_4;
    end
end
somma = cont_1 + cont_2 + cont_3 + cont_4;
verifica = somma/Nd;
freq(1) = (cont_1/Nd)*100;
freq(2) = (cont_2/Nd)*100;
freq(3) = (cont_3/Nd)*100;
freq(4) = (cont_4/Nd)*100;
med(1) = (node_classe_1+node_classe_2)/2;
med(2) = (node_classe_2+node_classe_3)/2;
med(3) = (node_classe_3+node_classe_4)/2;
med(4) = (node_classe_4+node_classe_5)/2;
figure(3)
loglog(med,freq,'+')
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
%                               Posizionamento blocchi                               %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% set number of ellipses to plot (= Nd),
n = Nd;
radiix = (do(:,1)/2); % "do" è la matrice contenente, su ogni riga, l'asse > e l'asse < di ogni
ellisse, dalla più grande alla più piccola
radiiy = (do(:,2)/2);

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pos = zeros(n, 2); % coordinate dei centri delle ellissi
posF1 = zeros(n,2);
posF2 = zeros(n,2);
allColours = lines(n);
% main loop
er=0;
t=linspace(0,2*pi);
r=length(t);
Pxx=zeros(r,1); %coordinate x dei punti sul contorno dell' ellisse idx
Pyy=zeros(r,1); %coordinate y dei punti sul contorno dell' ellisse idx
matrix=zeros(r,n-1); %matrice per calcoli di verifica non inters ellissi
for idx = 1:n
    is_good = false;
    % generate random positions and radii until we have a hit
    while ~is_good
        pos(idx,1) = rand(1)*B;
        if (pos(idx,1) > (radiix(idx)+toll_pos)) && (pos(idx,1) < (B-radiix(idx)-toll_pos))
            if pos(idx,1)<=L1
                er=1;
                while er==1
                    pos(idx,2) = rand(1)*H;
                    if (pos(idx,2) > (radiiy(idx)+toll_pos)) && (pos(idx,2) < (H-radiiy(idx)-
toll_pos))
                        er=0;
                    else
                        er=1;
                    end
                end
            end
        end
        if (pos(idx,1)>= L2) && (pos(idx,1)<= B)
            er=1;
            while er==1
                pos(idx,2) = rand(1)*H2;
                if (pos(idx,2)> (radiiy(idx)+toll_pos)) && (pos(idx,2) < (H2-radiiy(idx)-
toll_pos))
                    er=0;
                else
                    er=1;
                end
            end
        end
    end
    if (pos(idx,1) > L1) && (pos(idx,1) < L2)
        ymax =(sin(pi*45/180)/(cos(pi/180*45))*(L2-pos(idx,1)))+50;
        er=1;
    end
end

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        while er==1
            pos(idx,2) = rand(1)*ymax;
            % termine "-0.5*do(idx)*(1-cos(pi/180*45))": evita intersezioni con il pendio
            if (pos(idx,2) > (radiix(idx)+toll_pos)) && (pos(idx,2) < (ymax-radiix(idx)-
radiix(idx)*(1-cos(pi/180*45))-toll_pos))
                er=0;
            else
                er=1;
            end
        end
    end
    Coordxpunti=zeros(r,n-1);
    Coordypunti=zeros(r,n-1);
    posF1=[pos(:,1)-e*radiix,pos(:,2)]; %coordinate del fuoco F1 essendo e*raddix =
e*a= c
    posF2=[pos(:,1)+e*radiix,pos(:,2)]; %coordinate del fuoco F2
    VerPos=1;
    if idx>1
        Pkx= pos(idx,1)+radiix(idx)*cos(t);
        Pky= pos(idx,2)+radiix(idx)*sin(t);
        Coordxpunti(:,idx-1)=Pkx;
        Coordypunti(:,idx-1)=Pky;
        for j=1:idx-1
            matrix(:,j)=((Pkx-posF1(j,1)).^2+(Pky-posF1(j,2)).^2).^0.5+((Pkx-
posF2(j,1)).^2+(Pky-posF2(j,2)).^2).^0.5-2*radiix(j)-3*toll_pos;
        end
    end
    VerPos = all(matrix(:) > -0.000001);
    %%% end
    %verifica che tutti i termini siano ">0"
    if VerPos == 1
        is_good = true;
    end
end
end
end
matrix;
posF1;
posF2;
Coordxpunti;
Coordypunti;
%% plot
figure(5);
clf;

```

```

hold on
set(gca, 'visible', 'off')
daspect([1, 1, 1])
rectangle(...
    'Position',[-1 -1 2 2],...
    'Curvature', [1 1],...
    'FaceColor', 'none',...
    'EdgeColor', [ 0, 0, 0]);
for idx = 1:n
    rectangle(...
        'Position',[pos(idx, 1) - radiix(idx), pos(idx, 2) - radiiy(idx), 2*radiix(idx),
2*radiiy(idx)],...
        'Curvature', [1 1],...
        'EdgeColor','none',...
        'FaceColor', allColours(idx,:));
end
coordx=[0 0 L1 (L1+Lp) B B 0];
coordy=[0 H H H2 H2 0 0 ];
figure(5)
plot(coordx,coordy)
r=[do(:,1),do(:,2)/2]
posmod=(pos(:,1)-do(:,1)/2) %coordinate inizio asse maggiore ellisse
m=[posmod(:,1),pos(:,2),(posmod(:,1)+do(:,1)),pos(:,2),do(:,2)/2];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%                               Generazione file di coordinate                               %

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

if exist('coordinate.txt', 'file'), delete('coordinate.txt'); end
fid = fopen('coordinate.txt','a');
fprintf(fid,'%3.3f,%3.3f %2.2f,%2.2f %2.2f \r\n',m.);
fclose(fid);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%                               Controllo percentuale volumetrica                               %

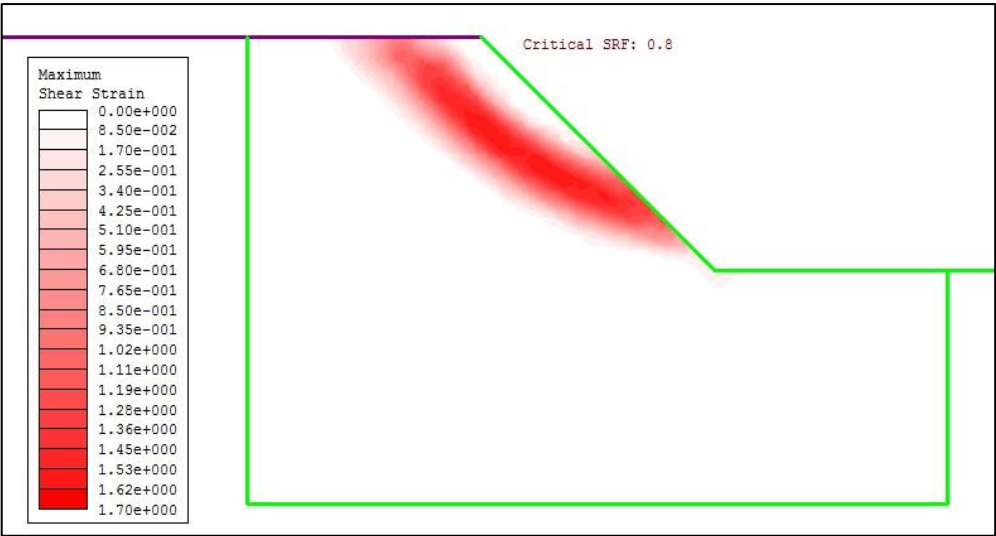
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

format long
PV
test=vv/A

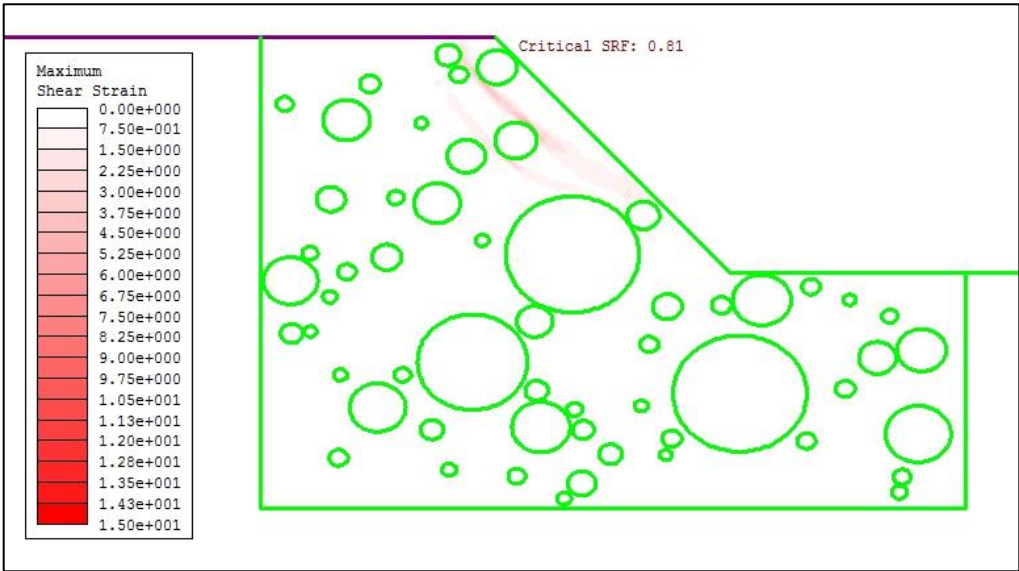
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**Allegato 2: Massima deformazione di taglio (approccio FEM)**

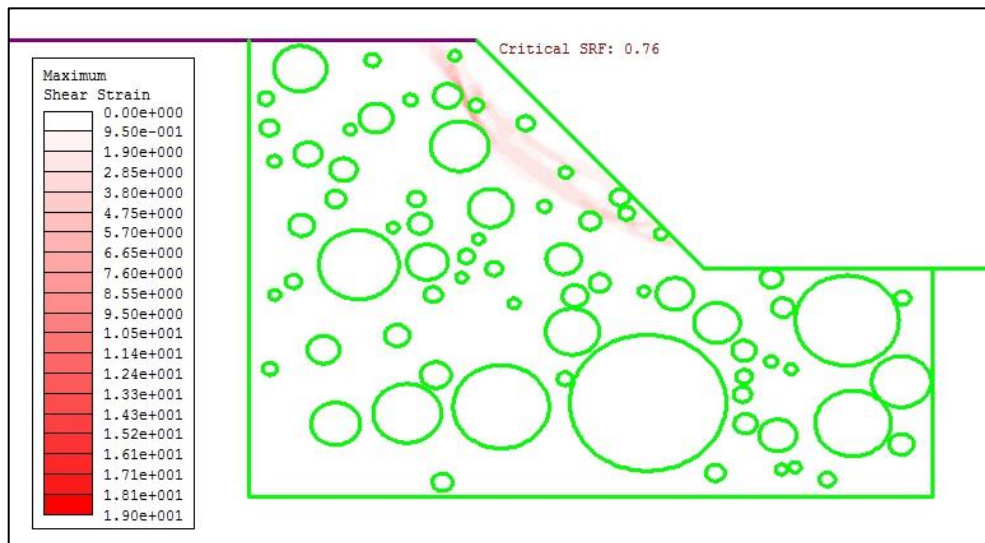
**MATRICE**



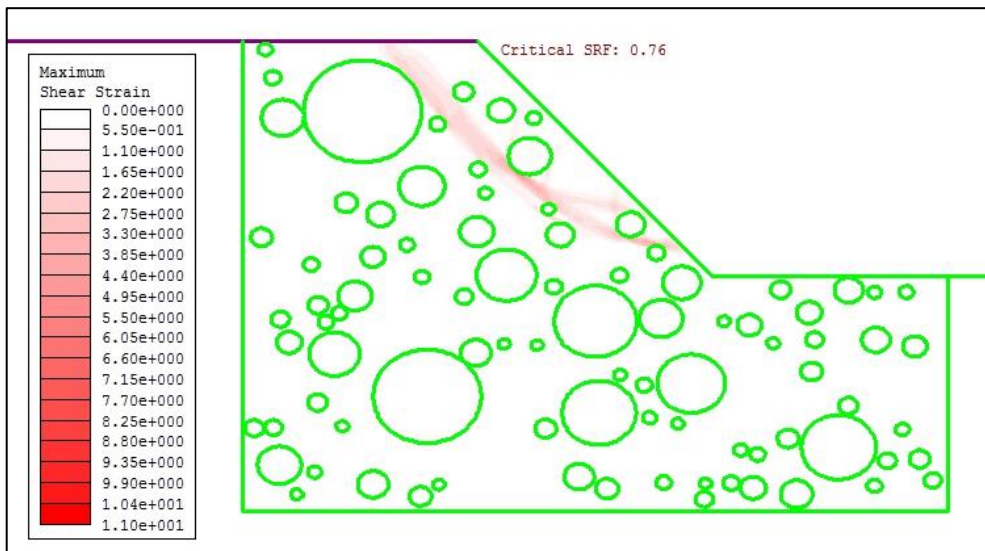
**25%\_1**



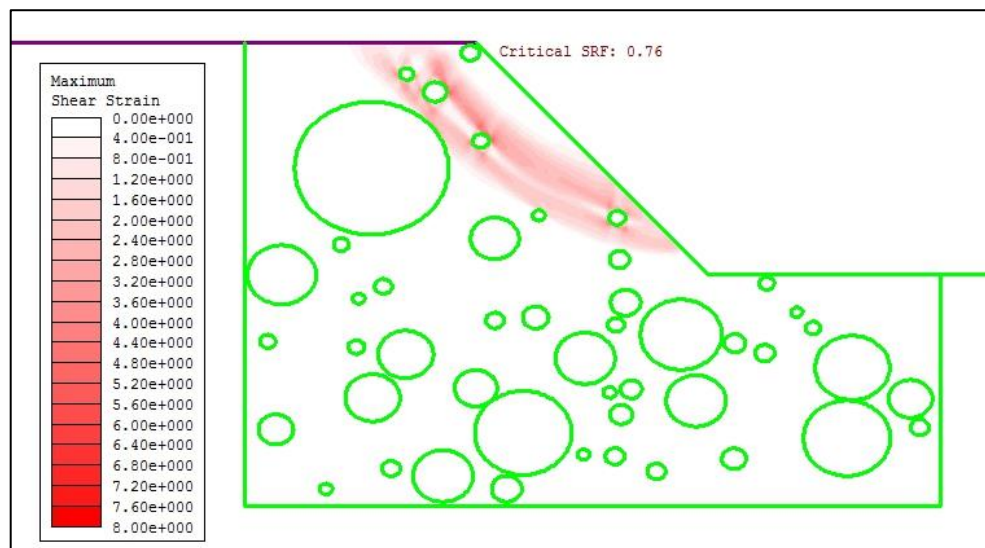
25%\_2



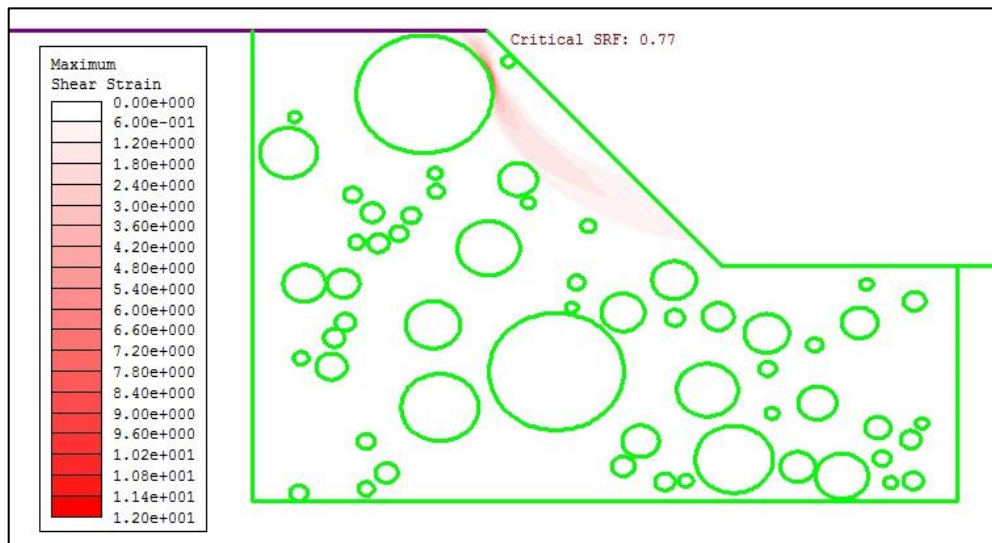
25%\_3



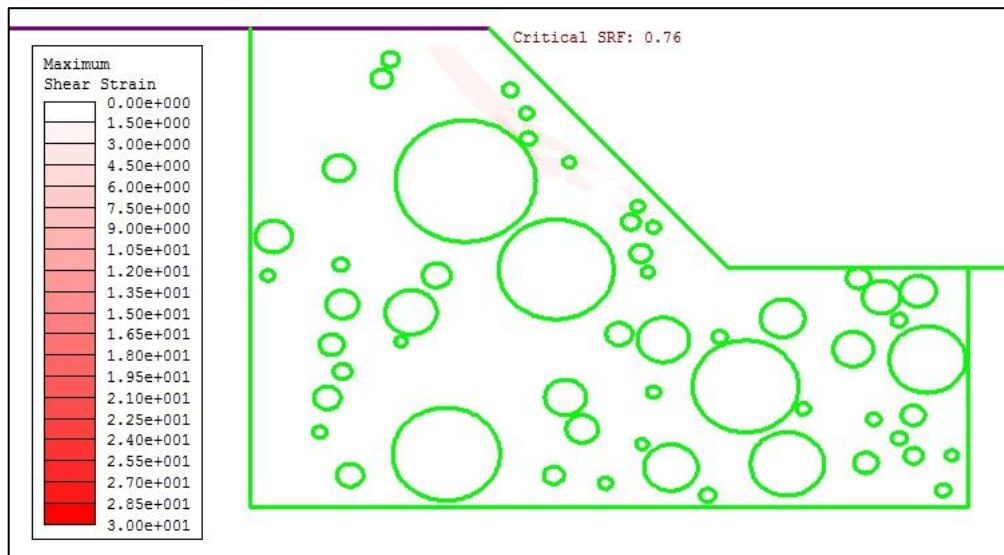
25%\_4



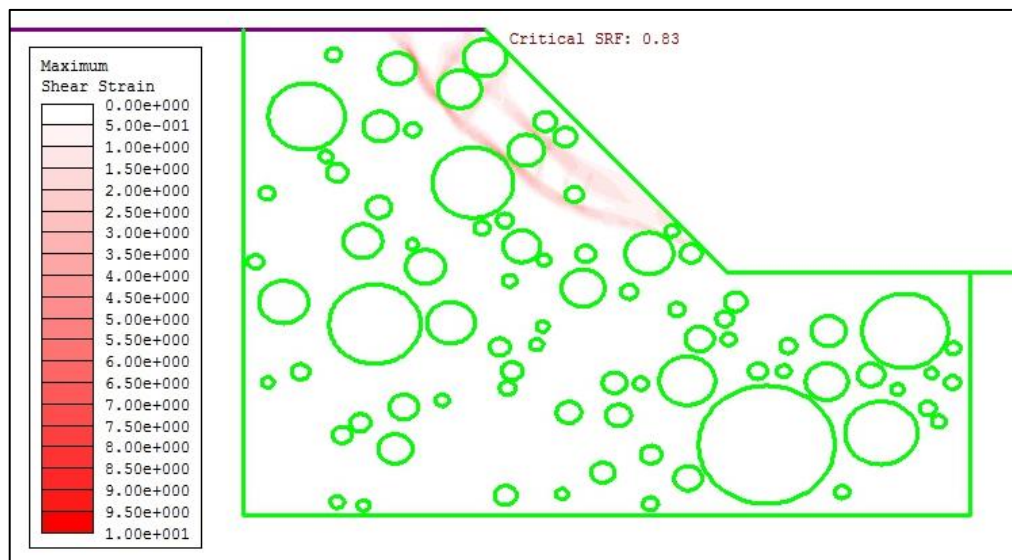
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25%\_6

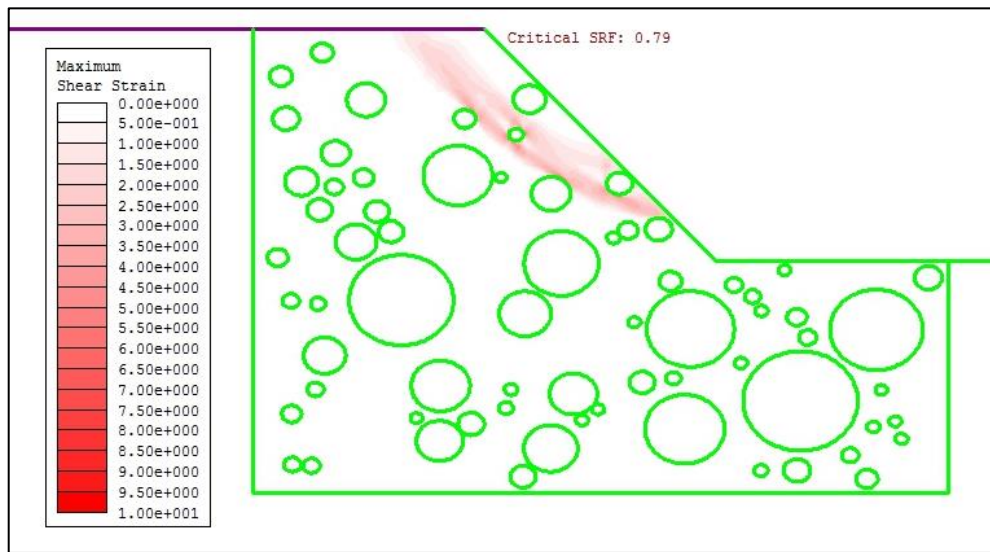


25%\_7

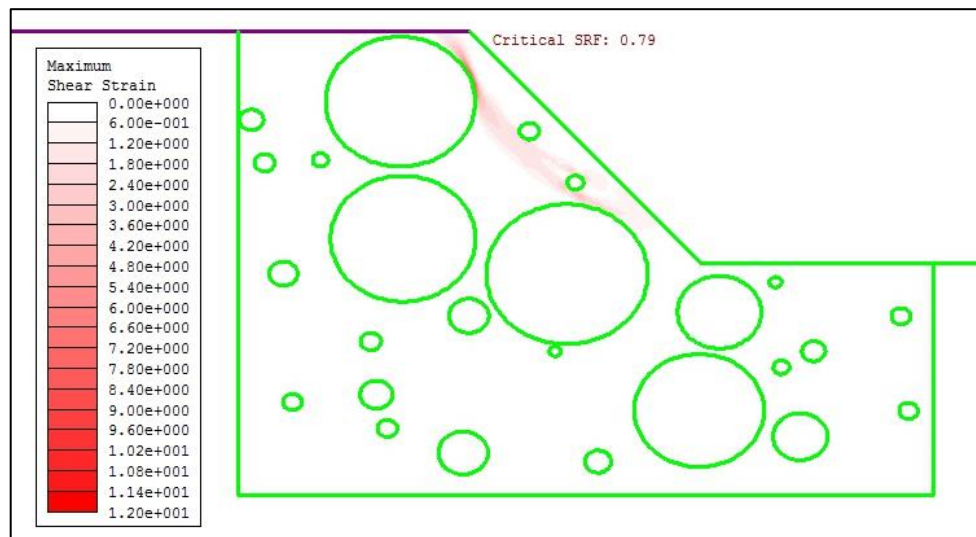




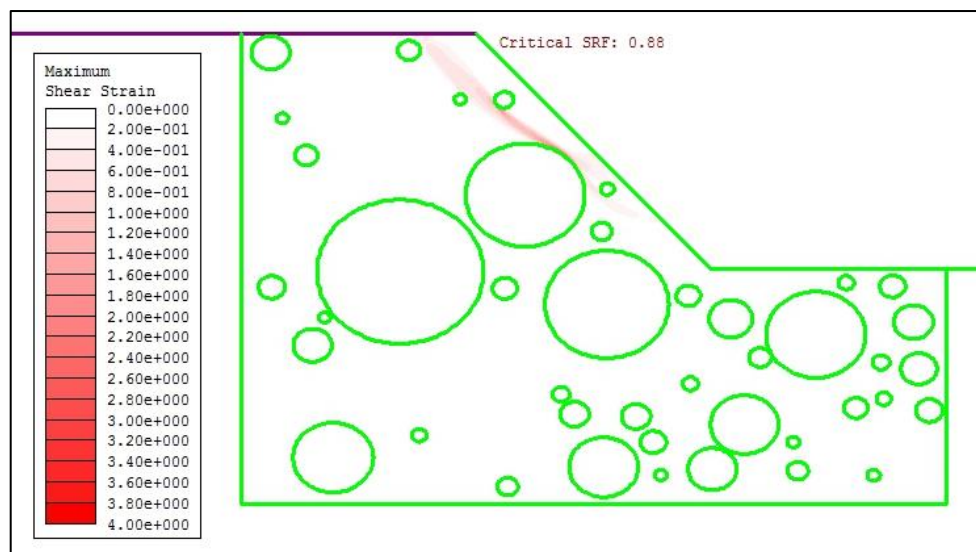
25%\_8



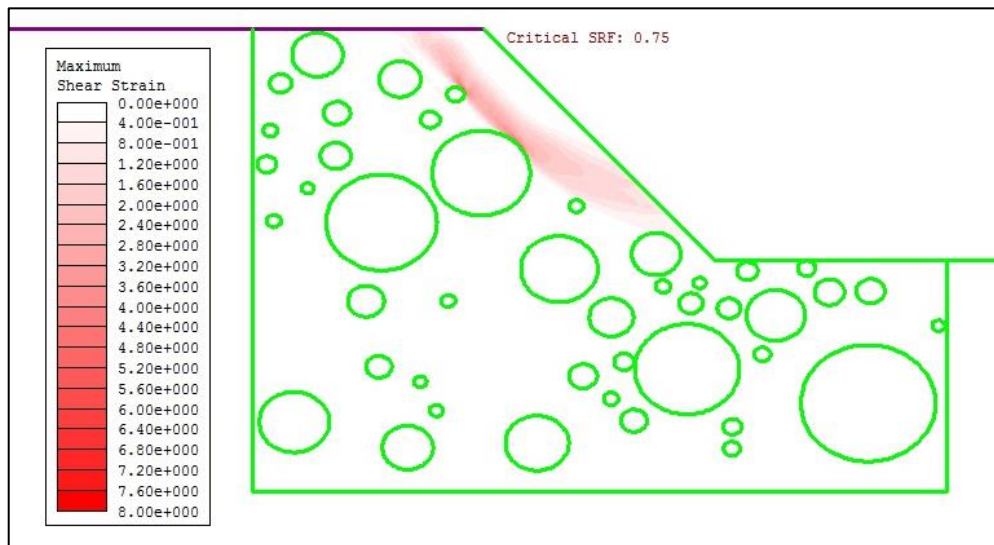
25%\_9



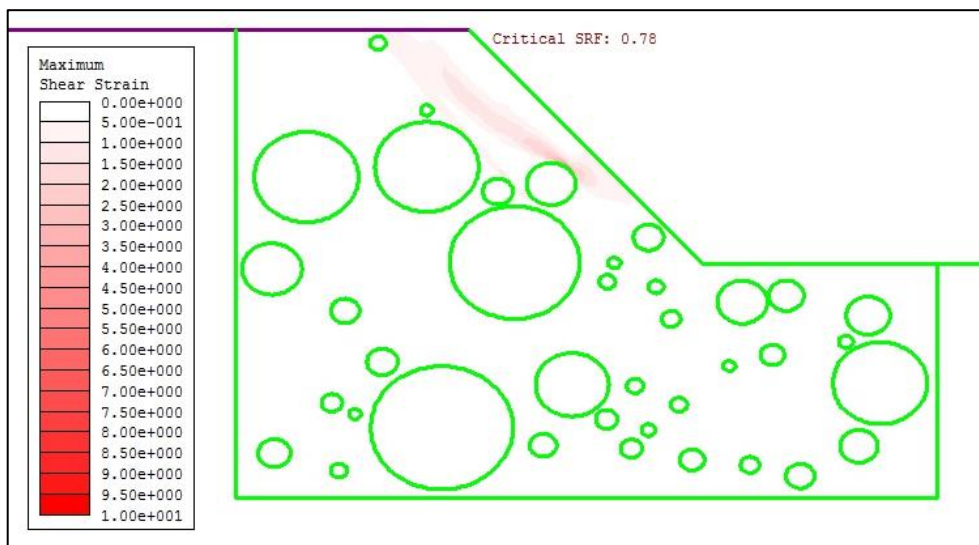
25%\_10



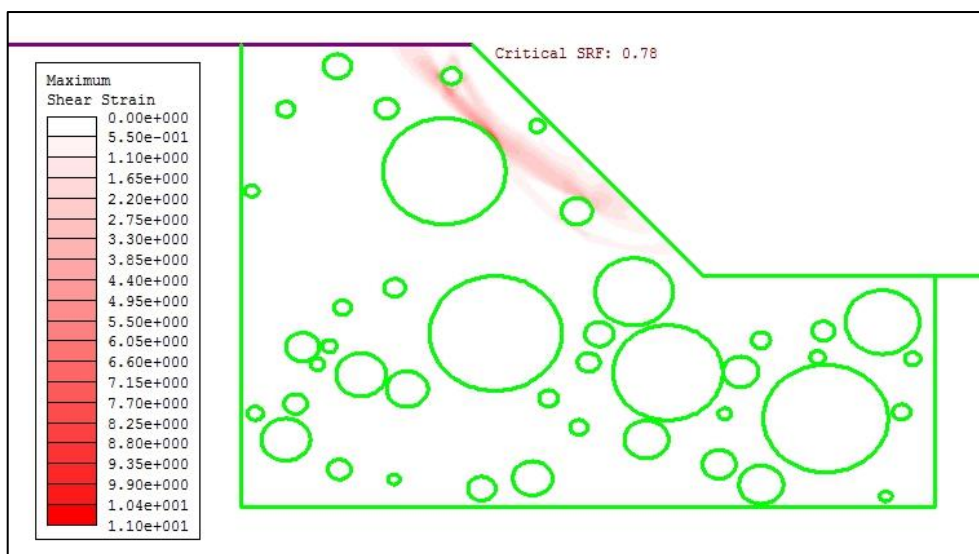
25%\_11



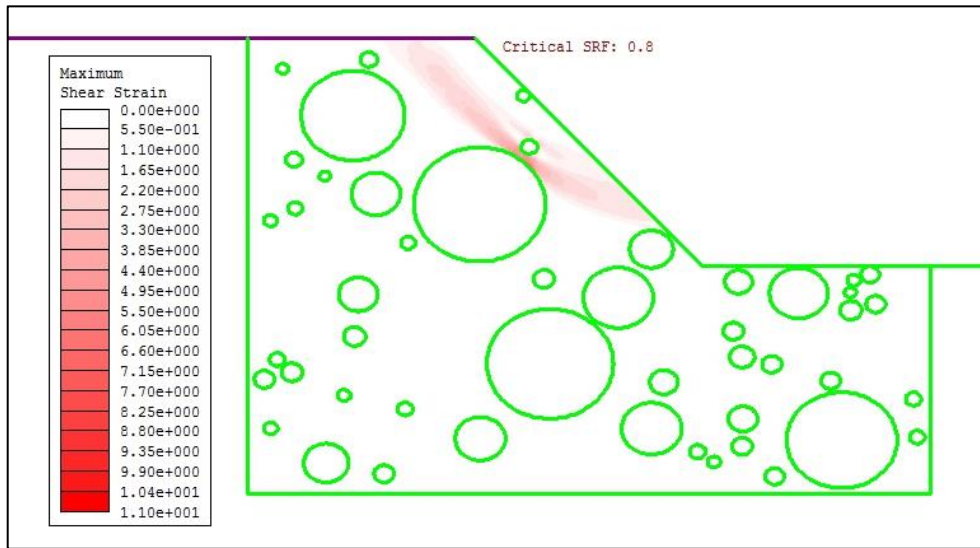
25%\_12



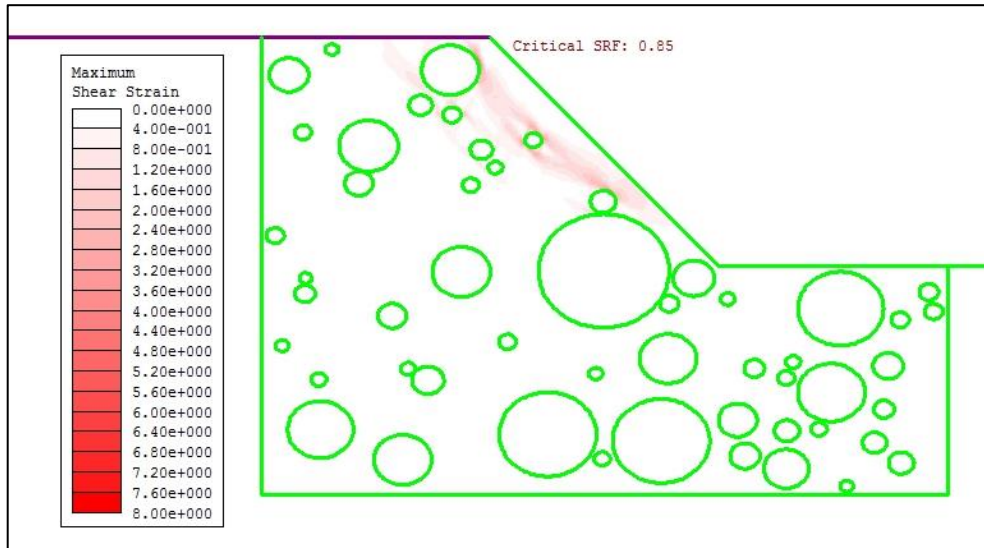
25%\_13



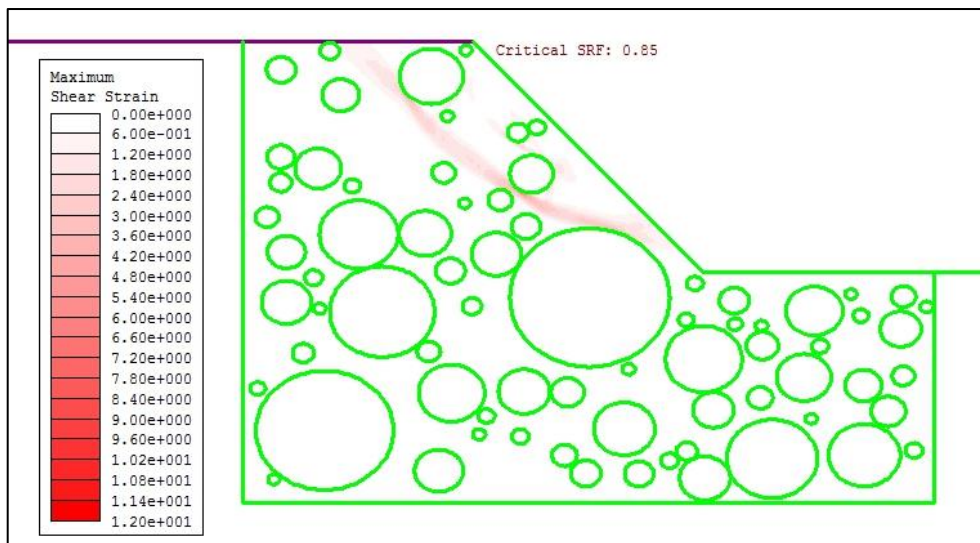
25%\_14



25%\_15

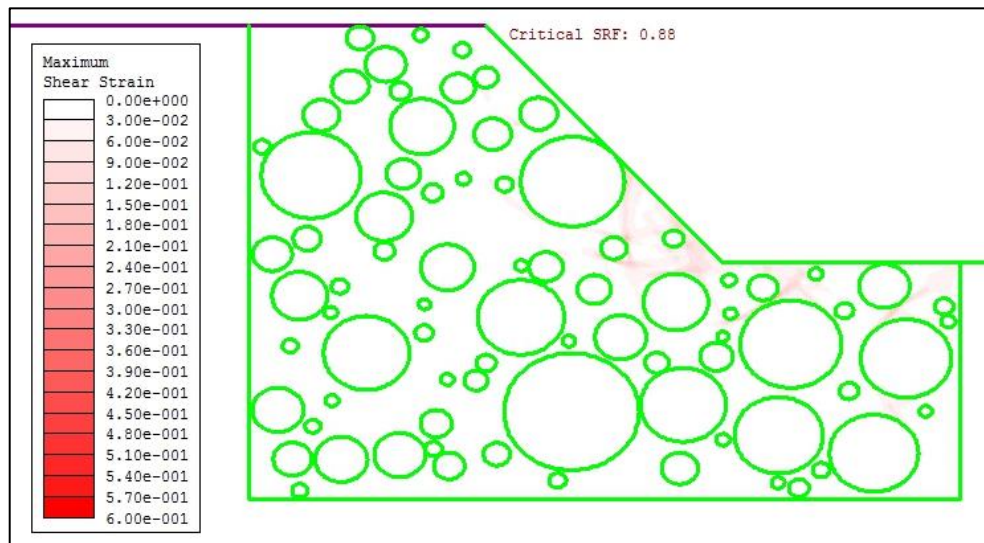


40%\_1

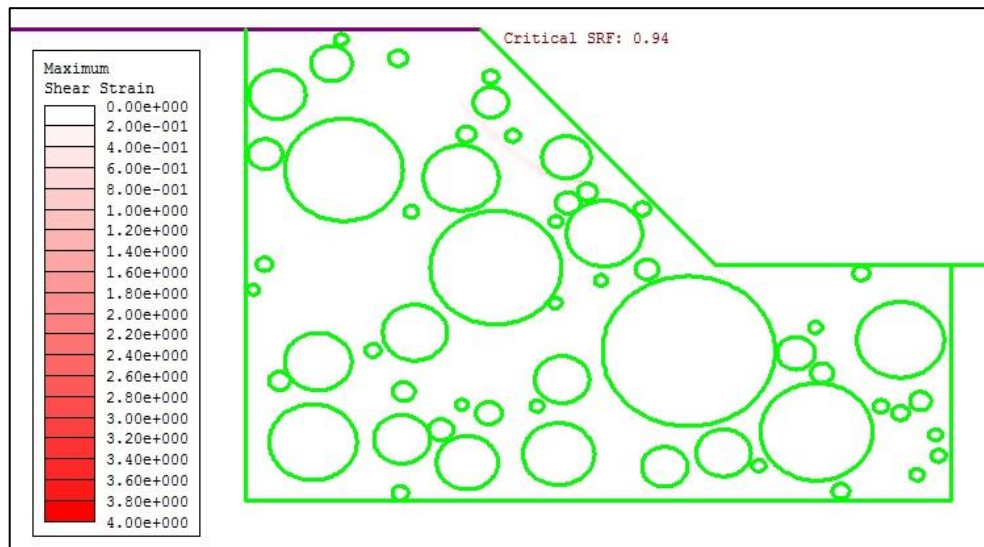




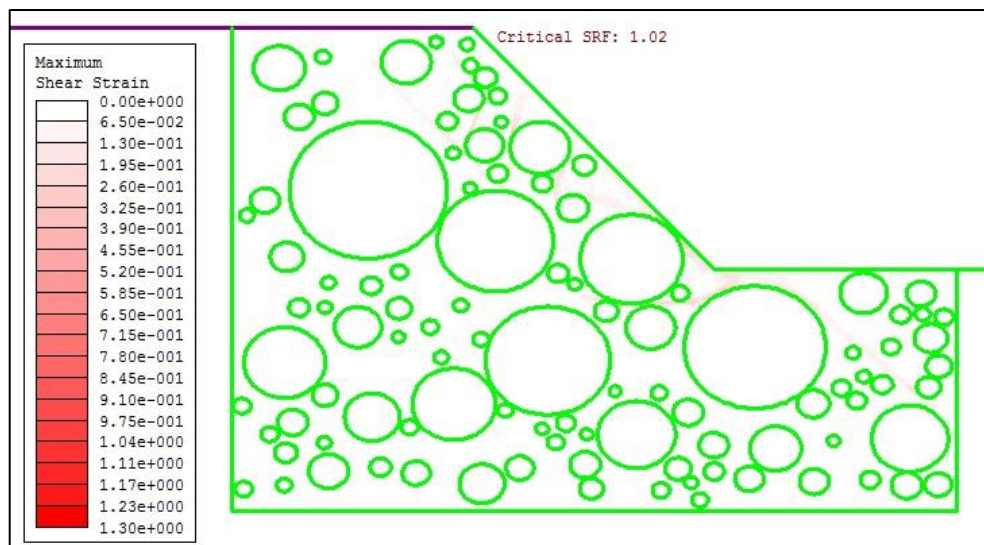
40%\_2



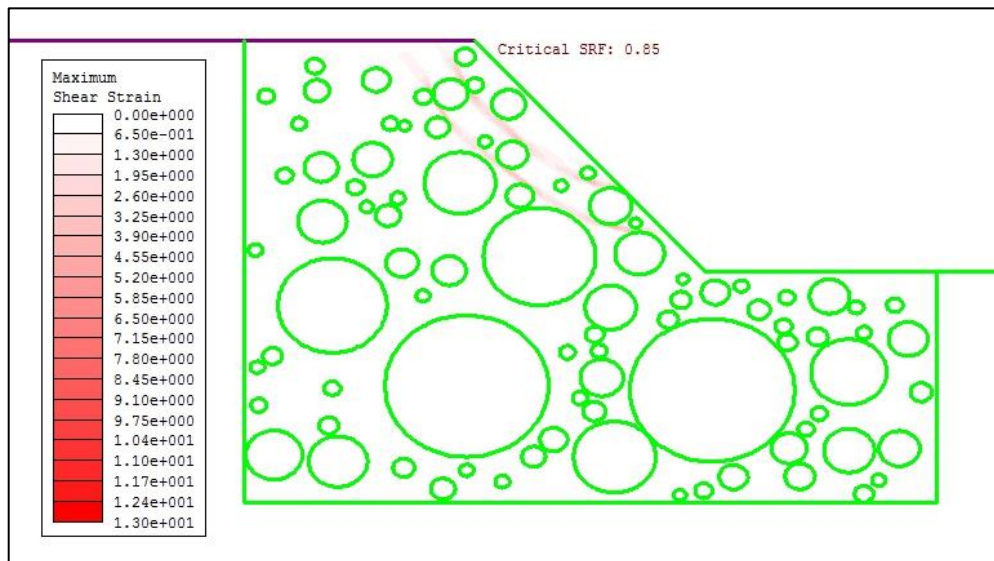
40%\_3



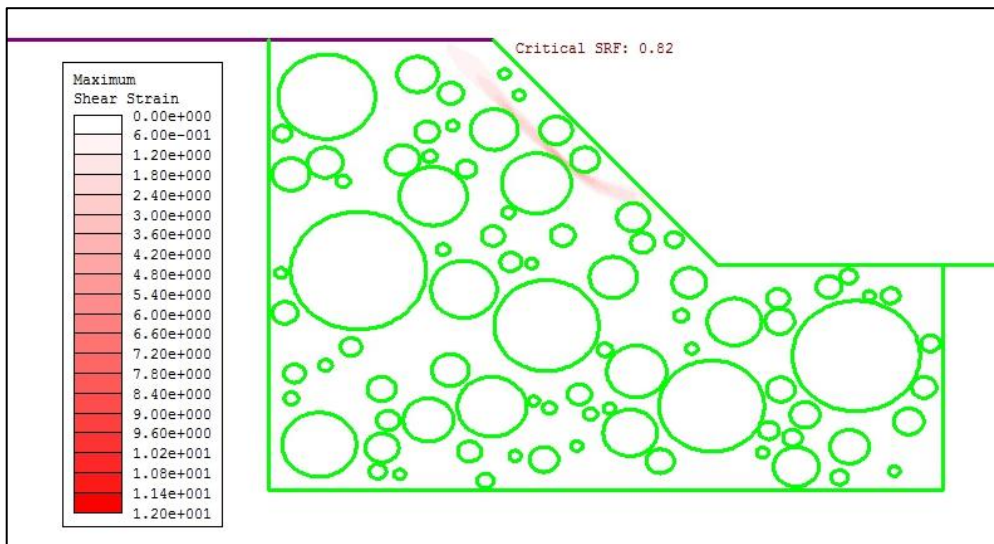
40%\_4



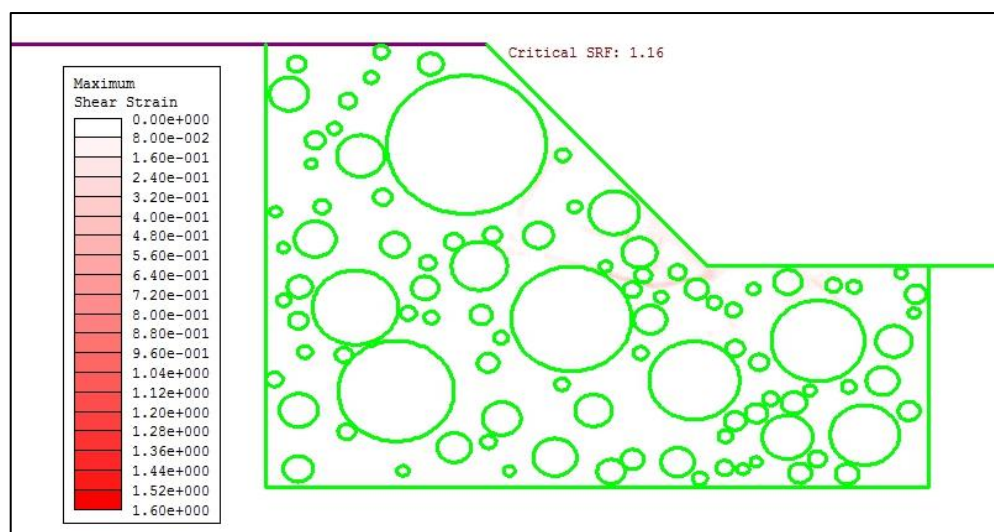
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40%\_6

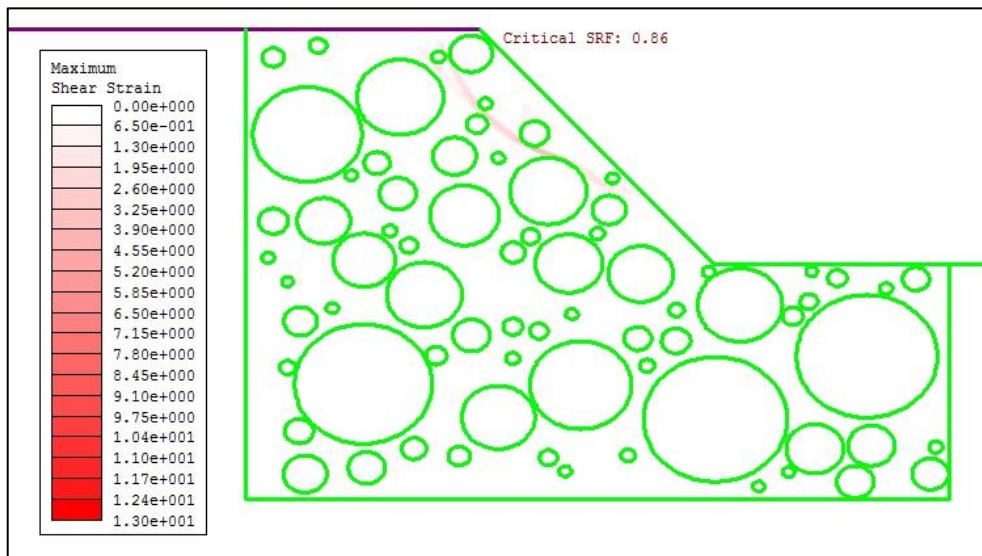


40%\_7

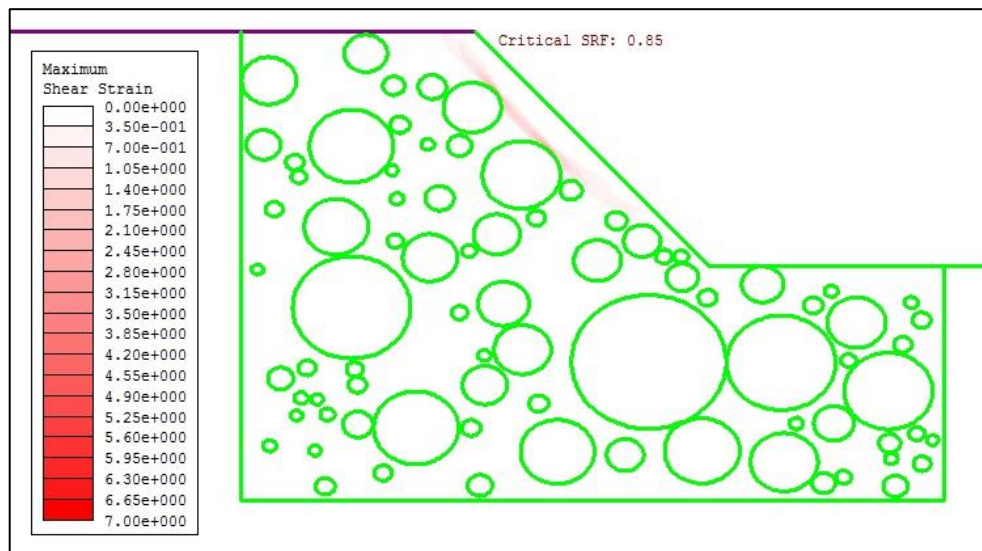




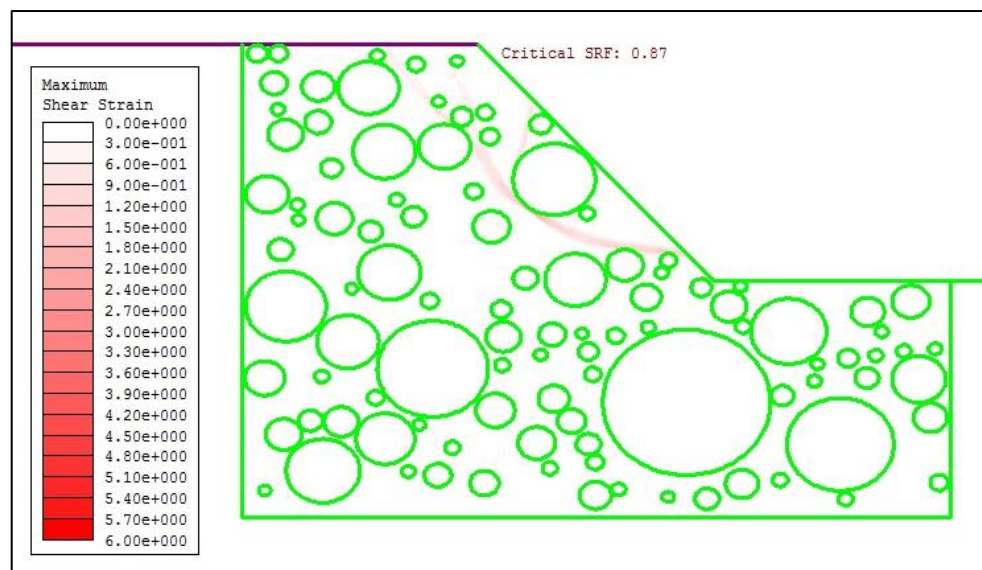
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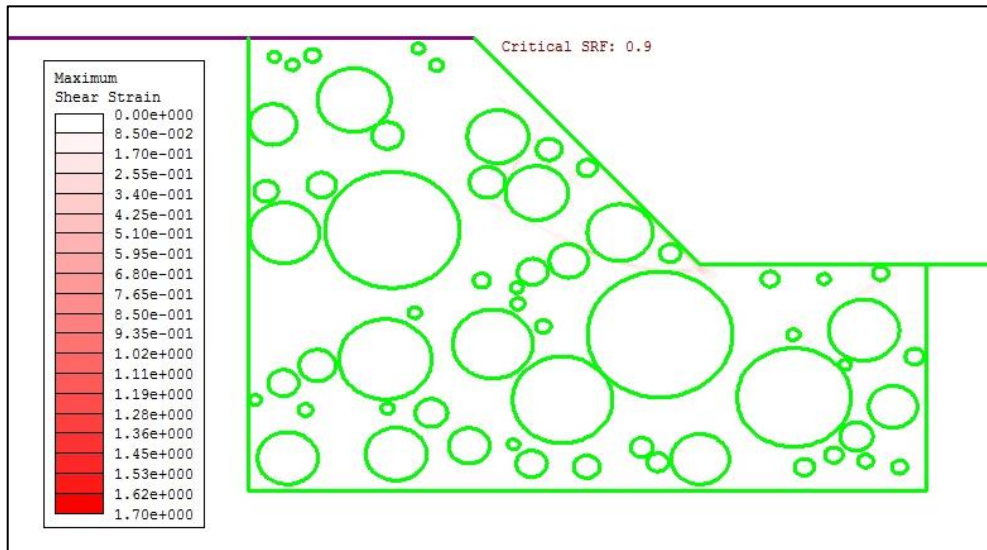
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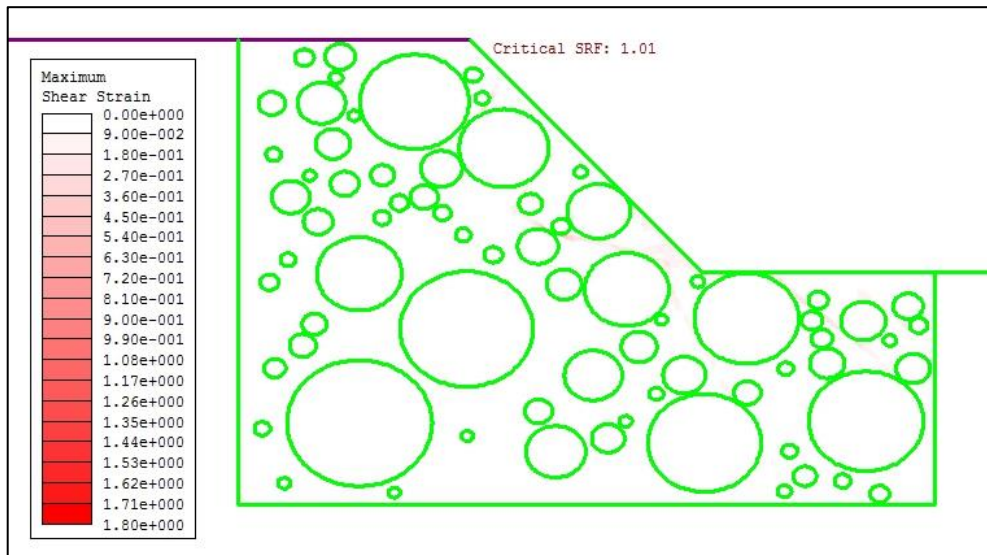
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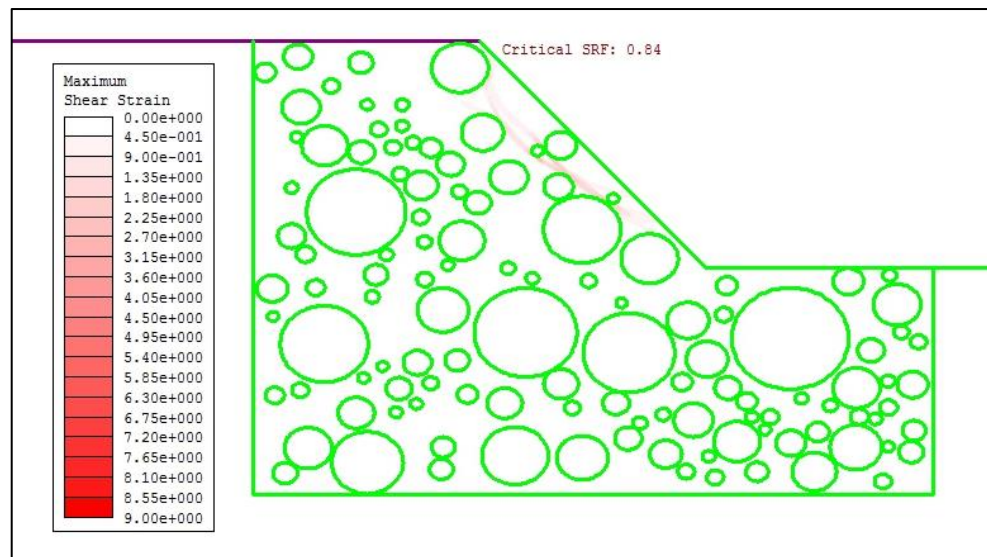
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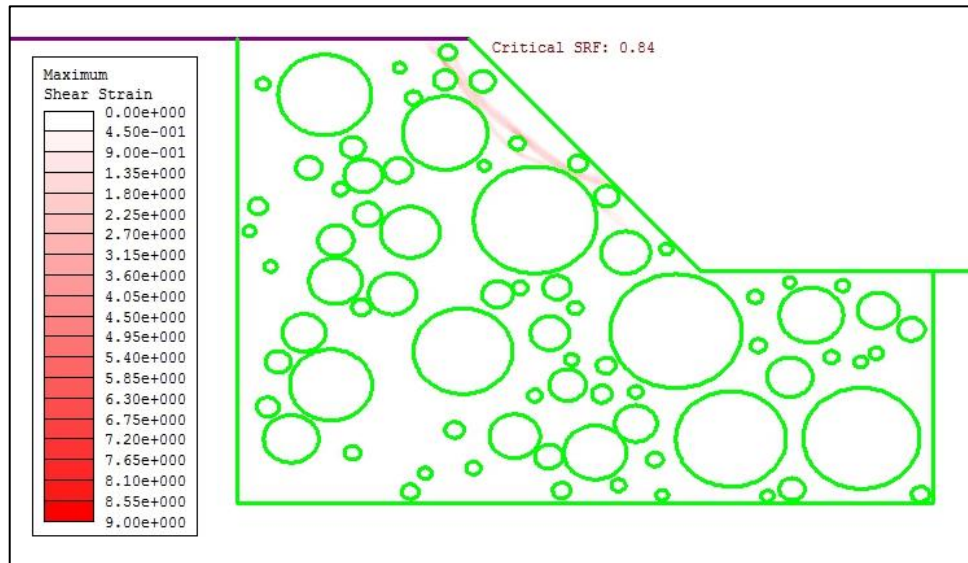
40%\_12



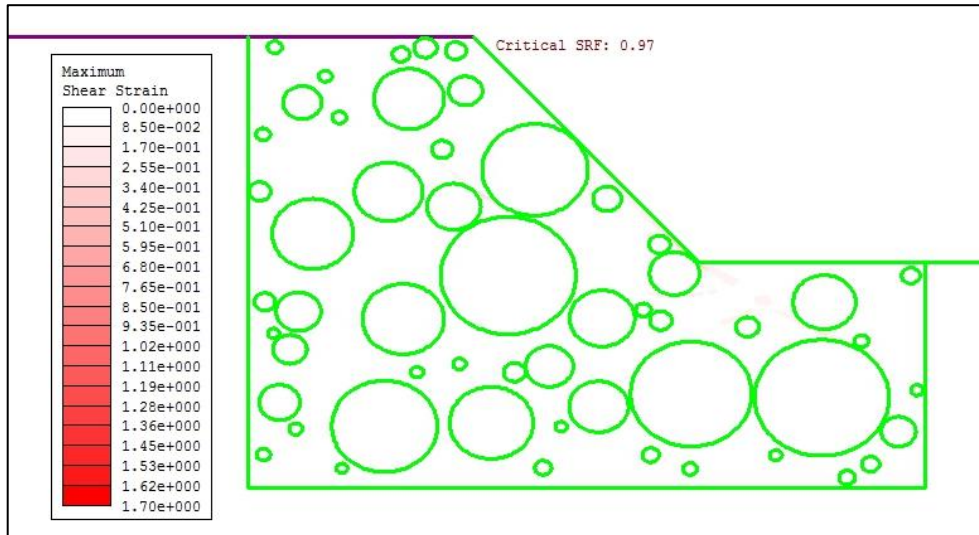
40%\_13



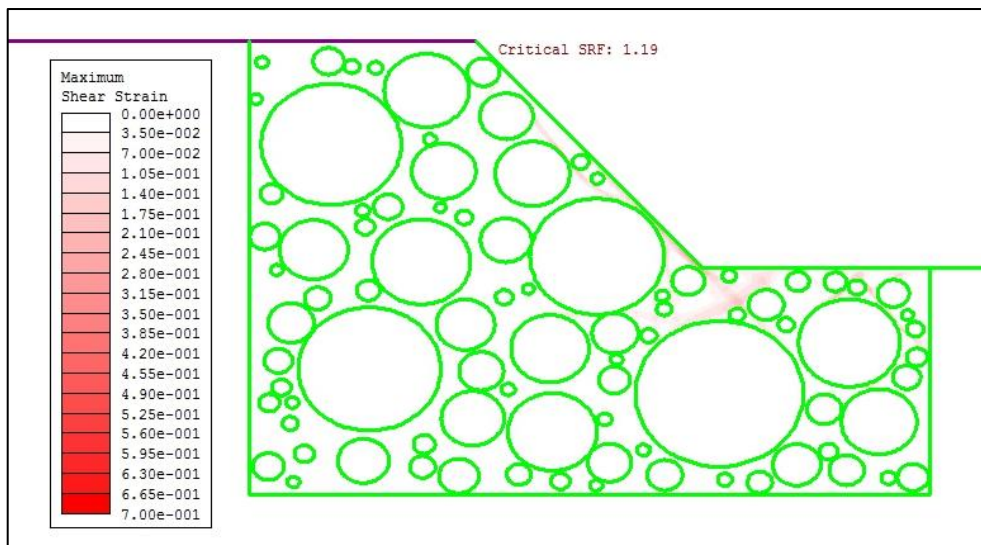
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40%\_15

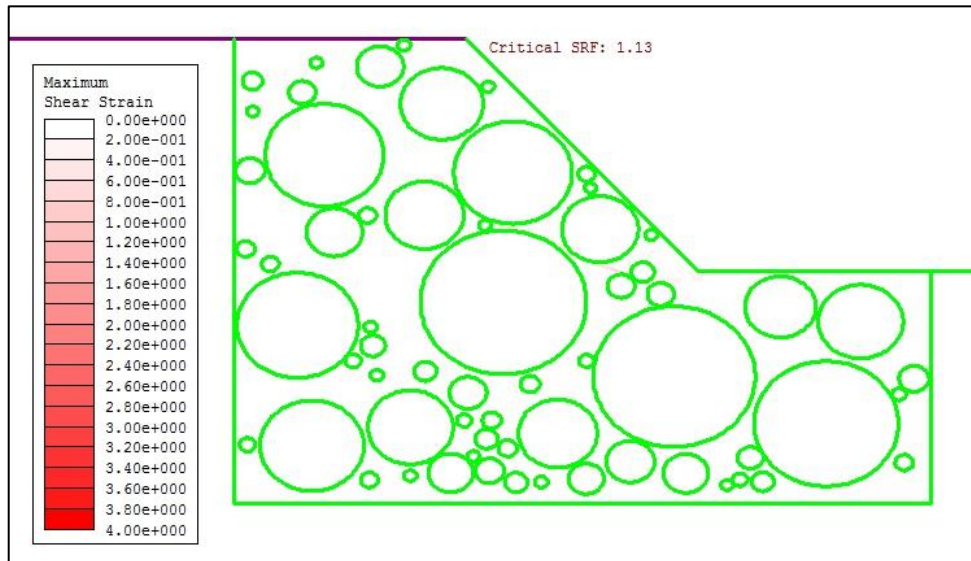


55%\_1

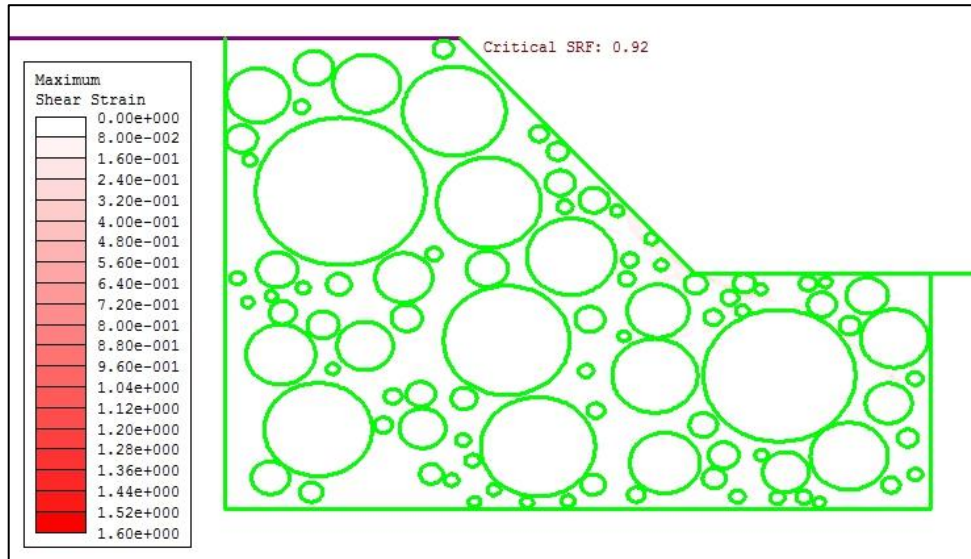




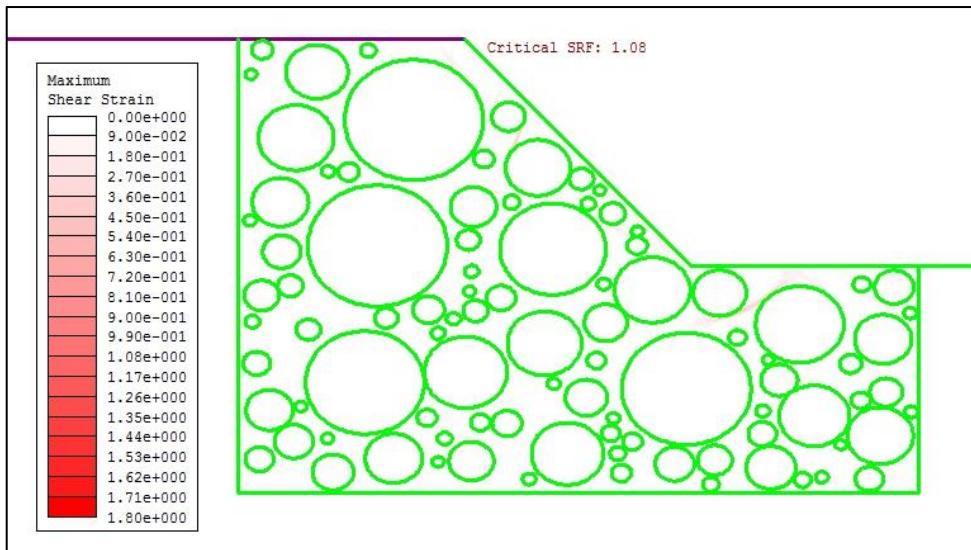
55%\_2



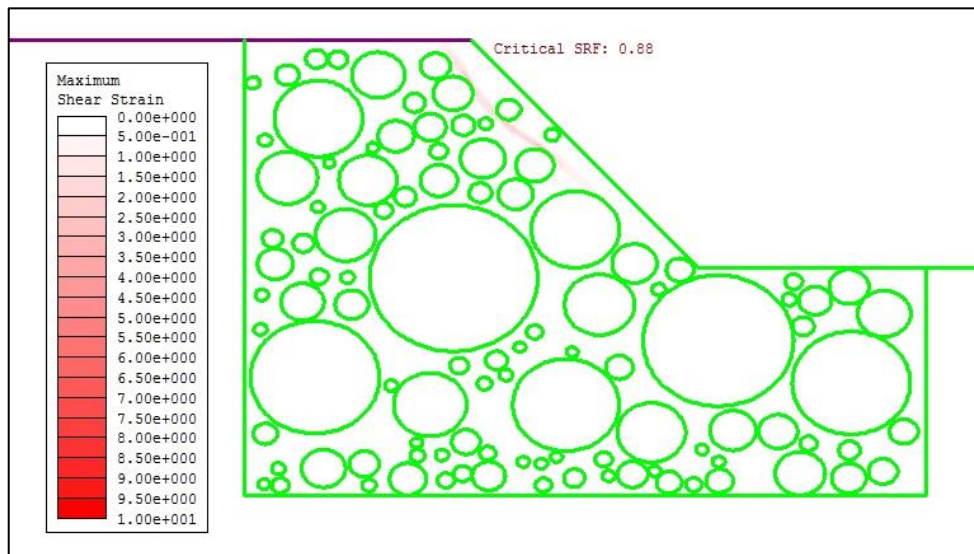
55%\_3



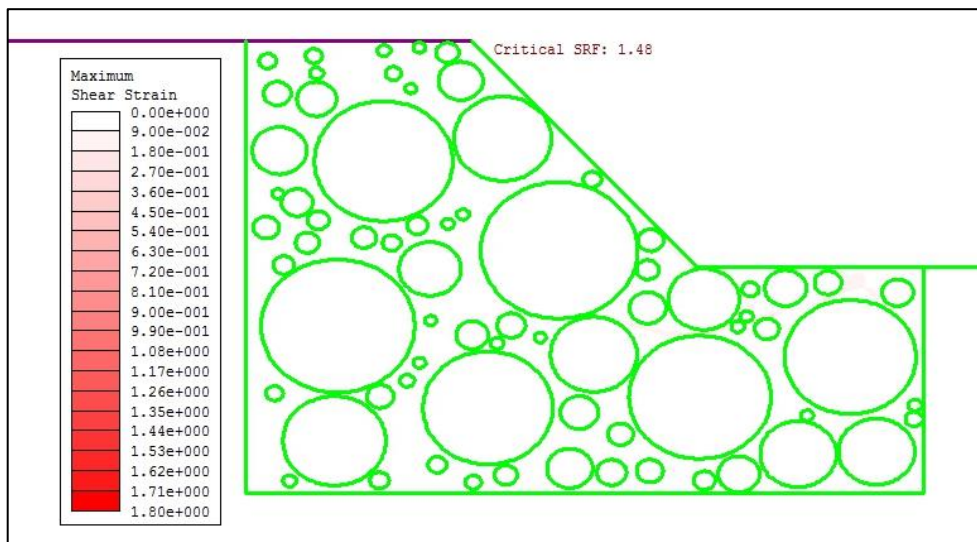
55%\_4



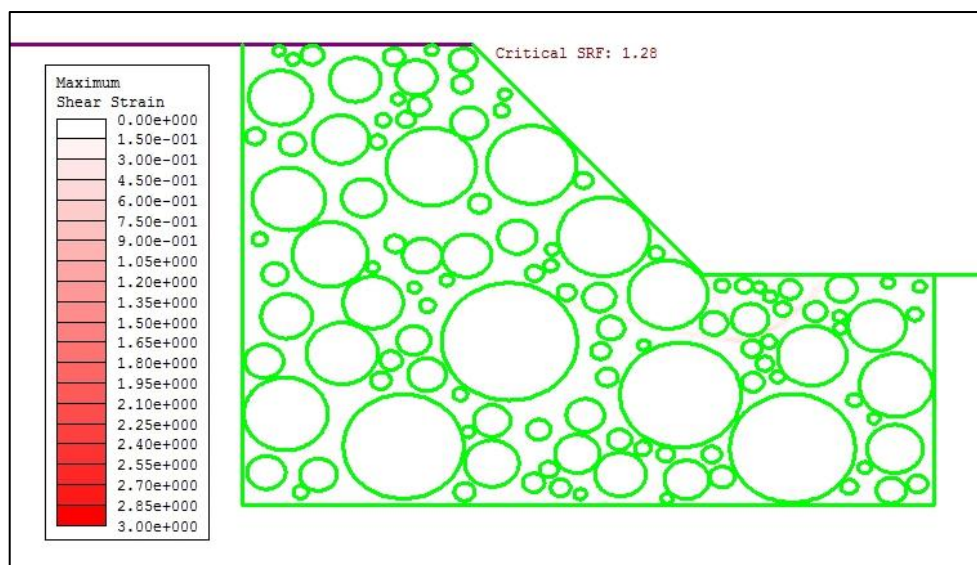
55%\_5



55%\_6

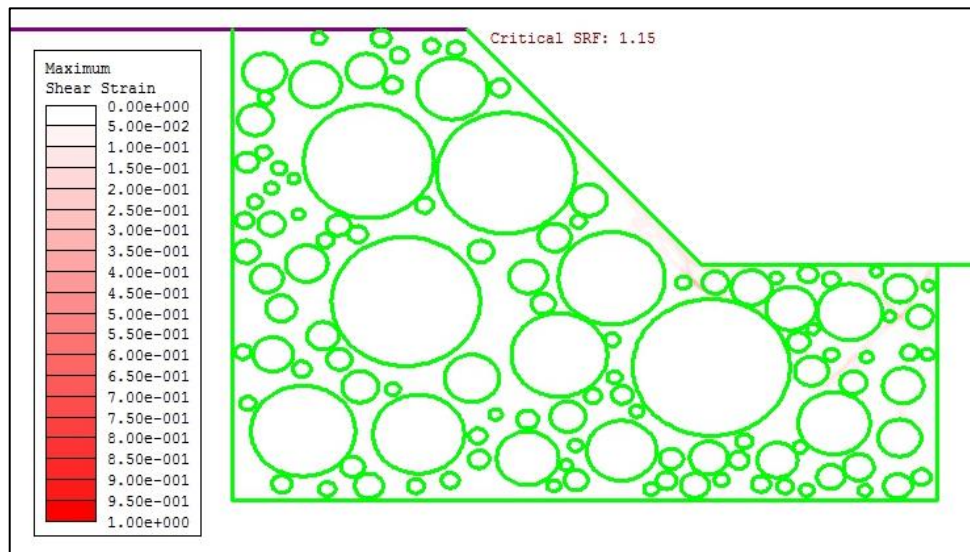


55%\_7

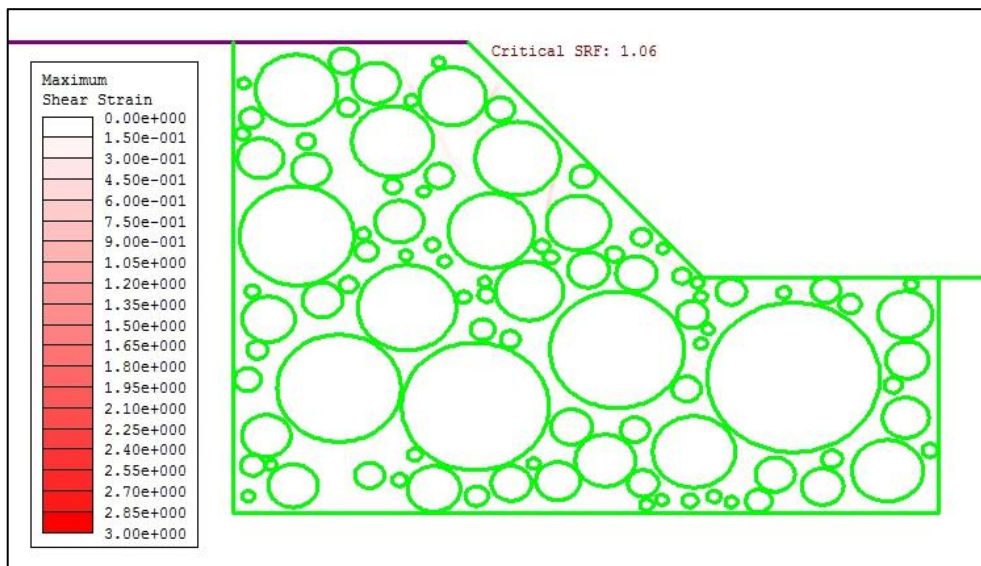




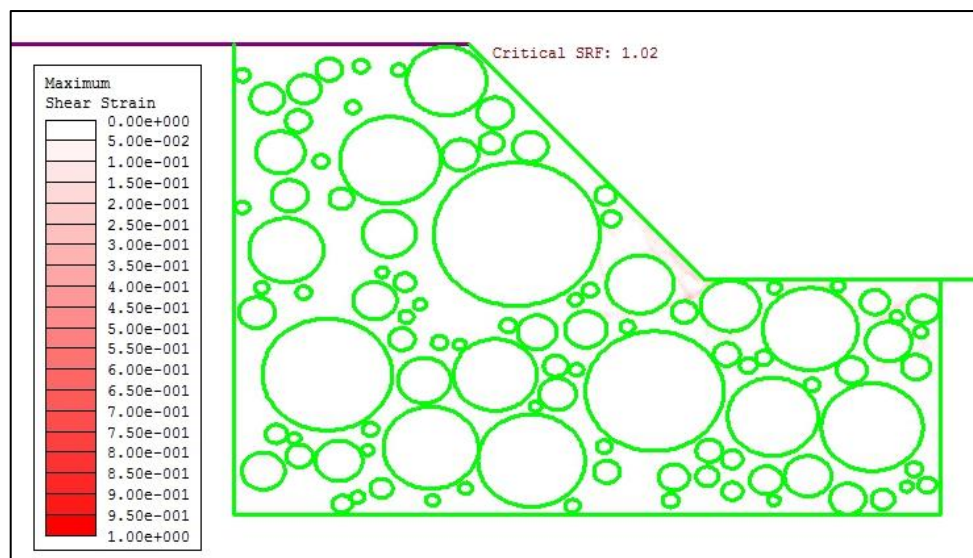
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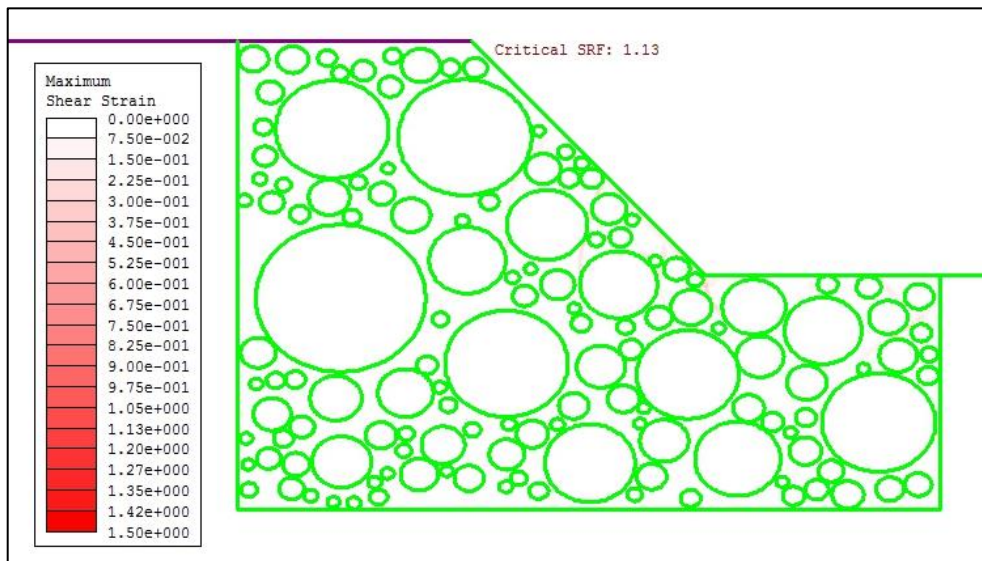


55%\_10

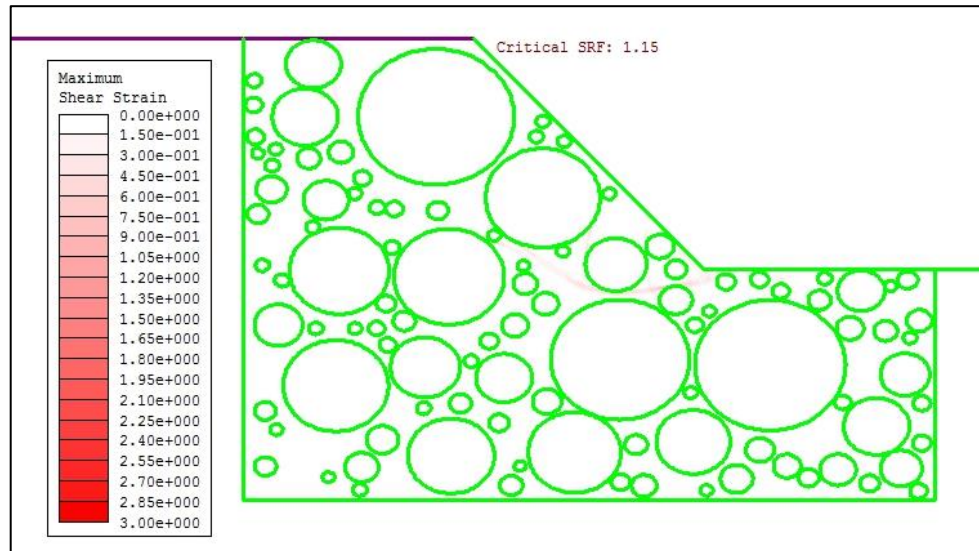




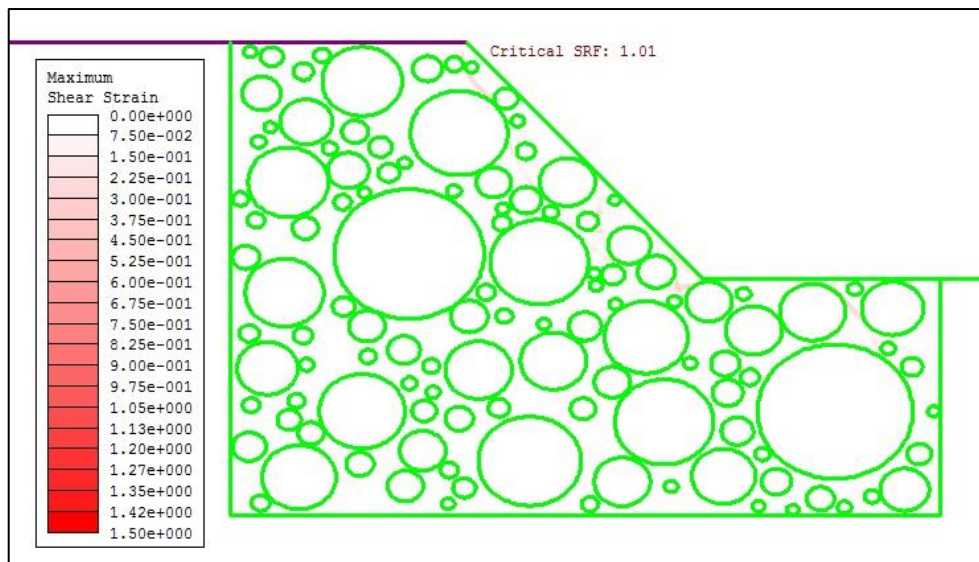
55%\_11



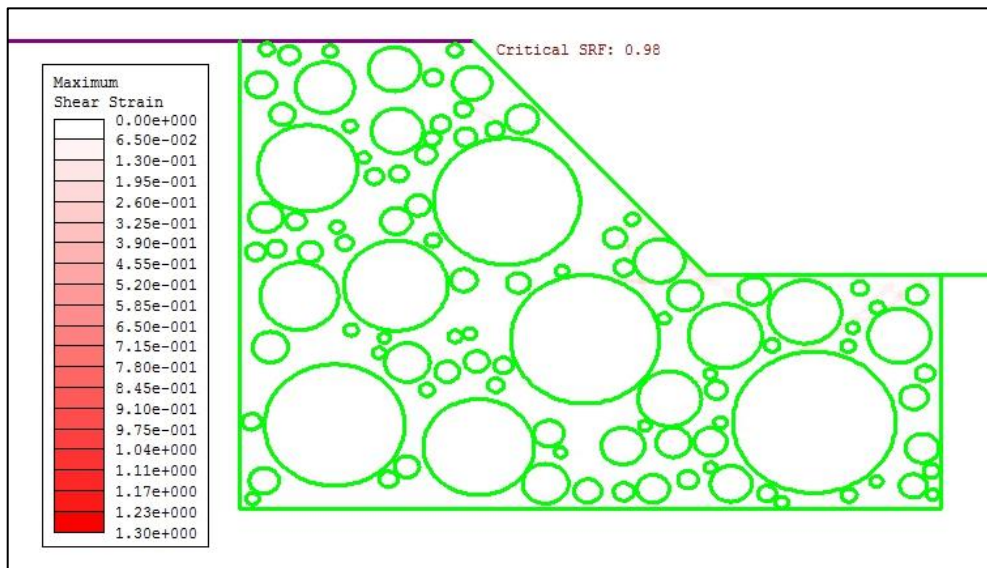
55%\_12



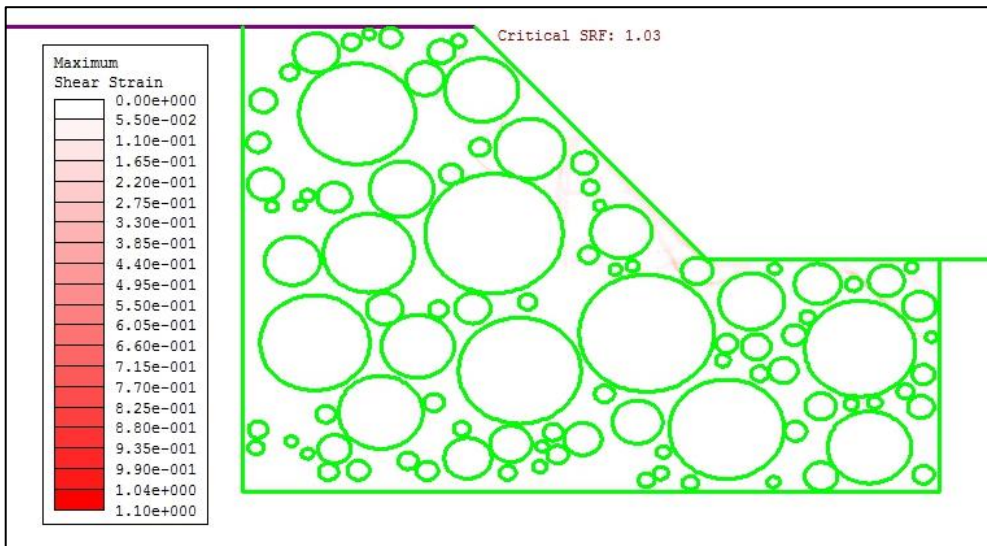
55%\_13



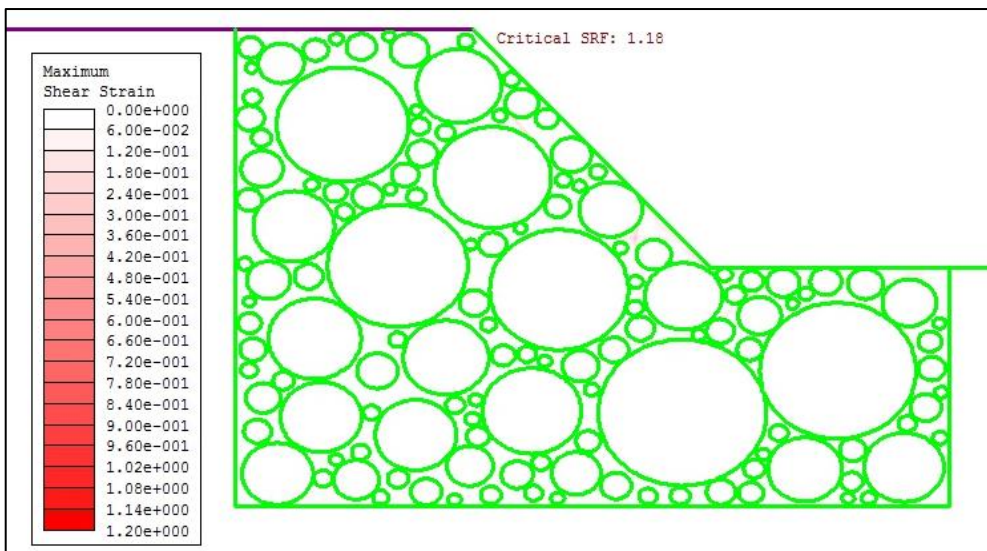
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55%\_15

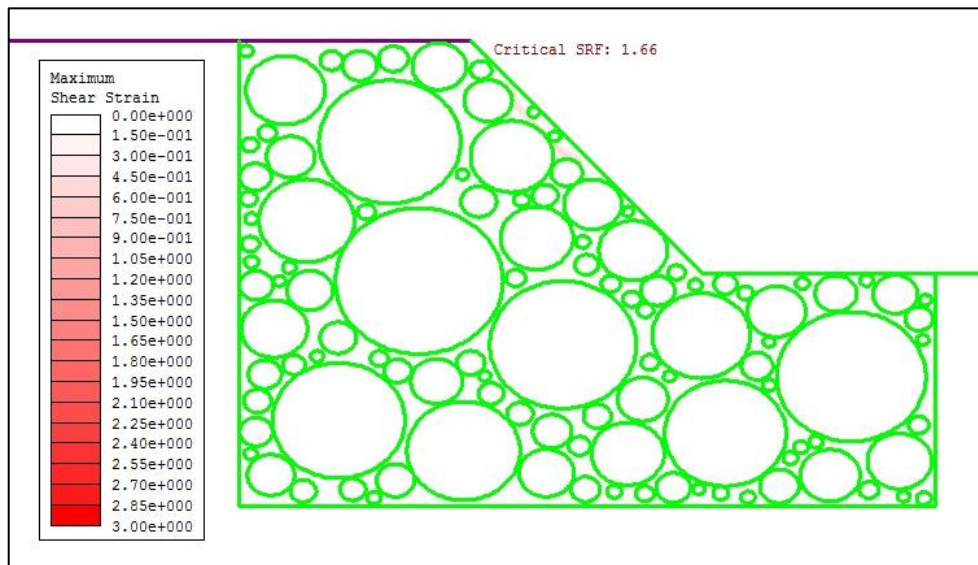


70%\_1

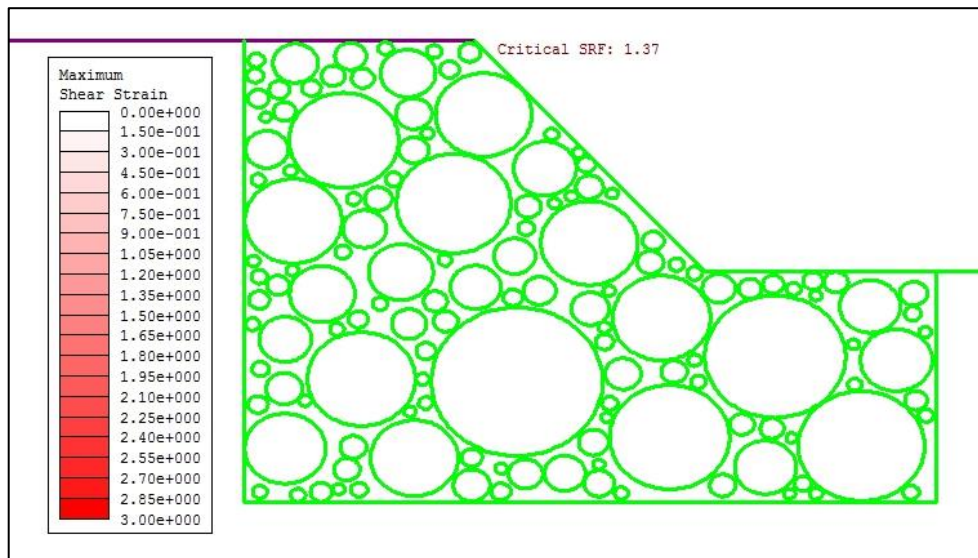




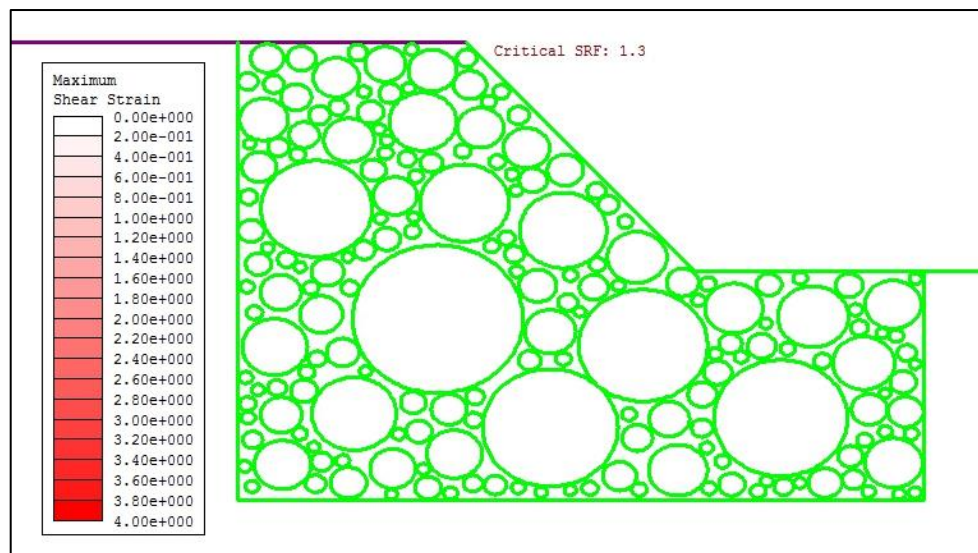
70%\_2



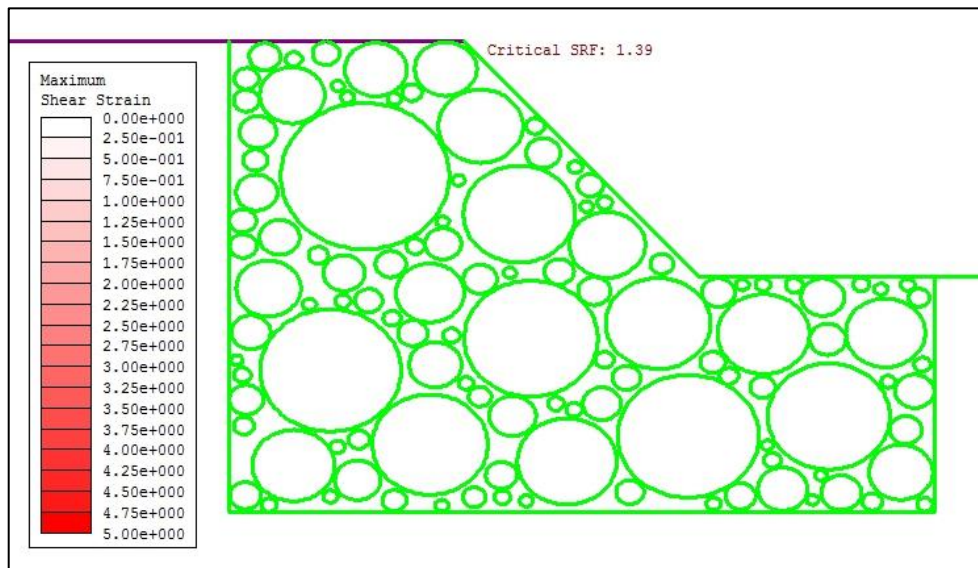
70%\_3



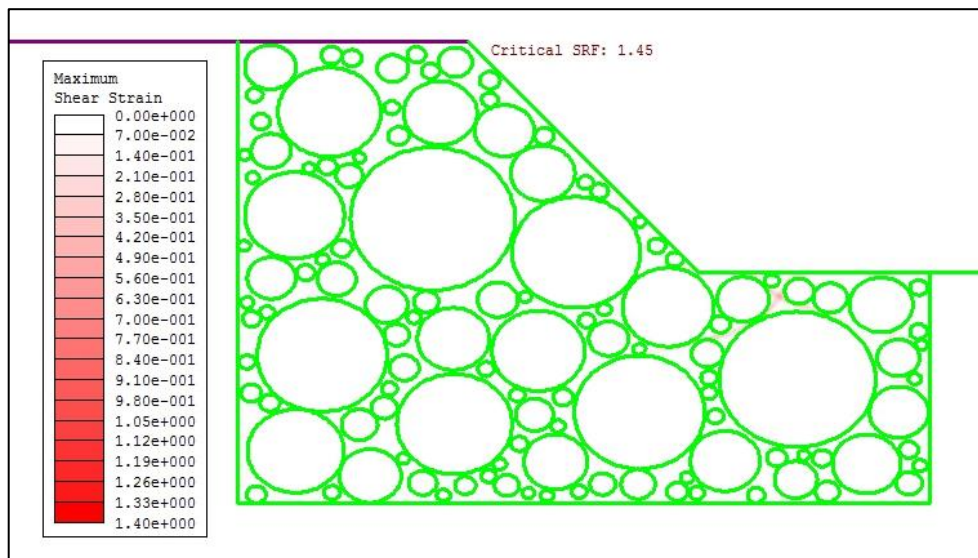
70%\_4



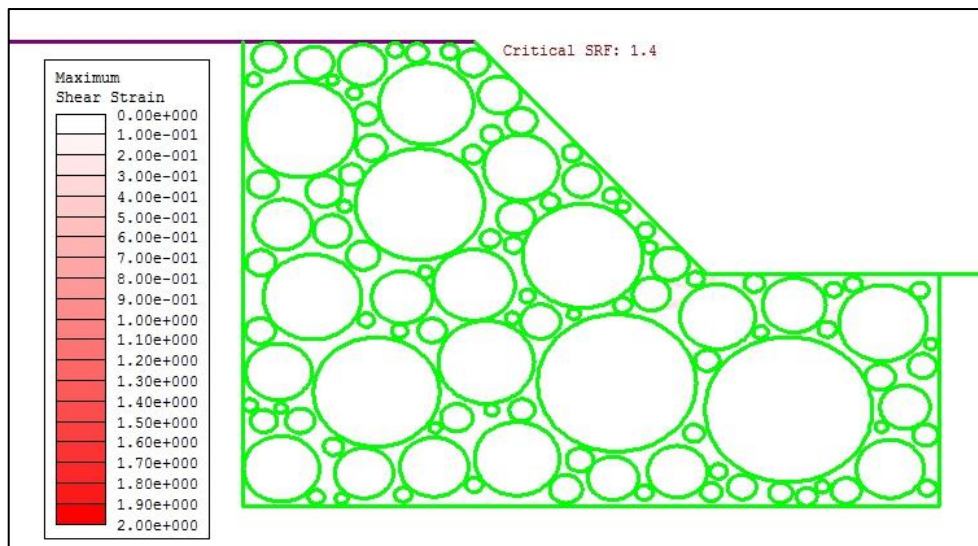
70%\_5



70%\_6

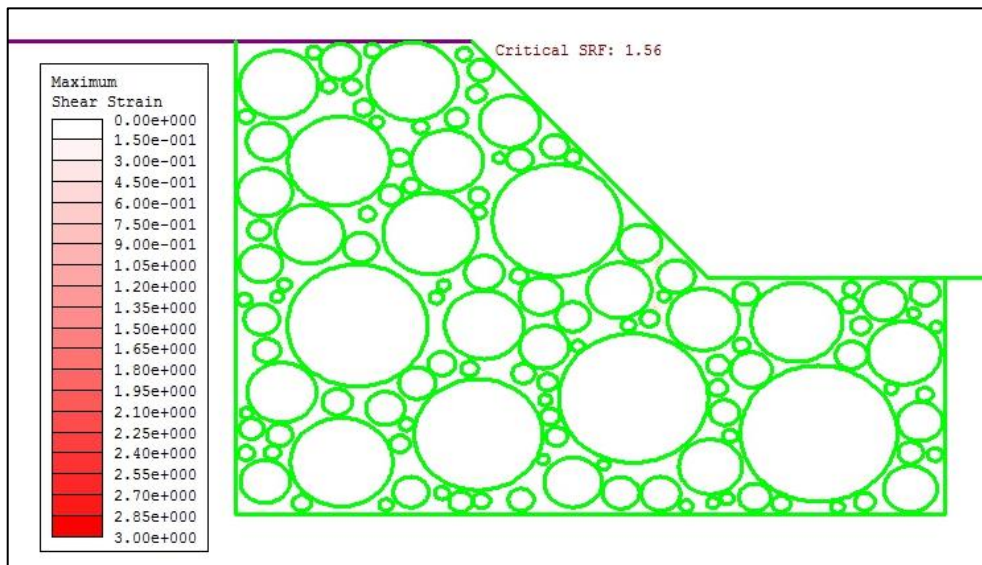


70%\_7

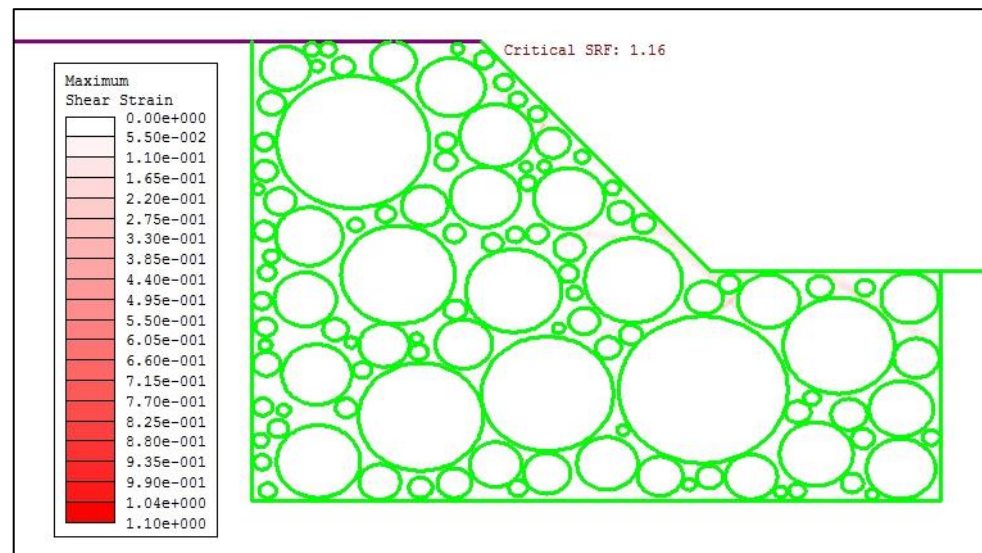




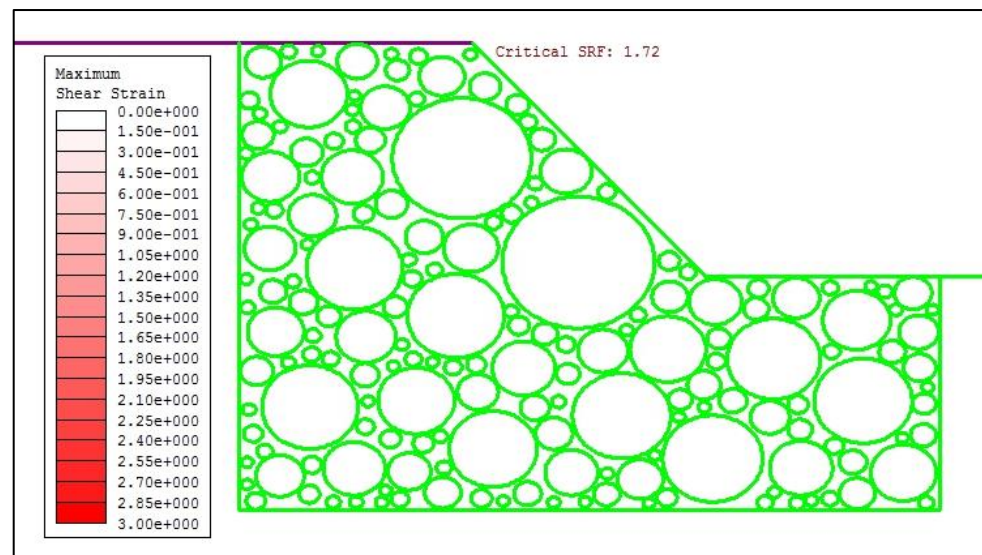
70%\_8



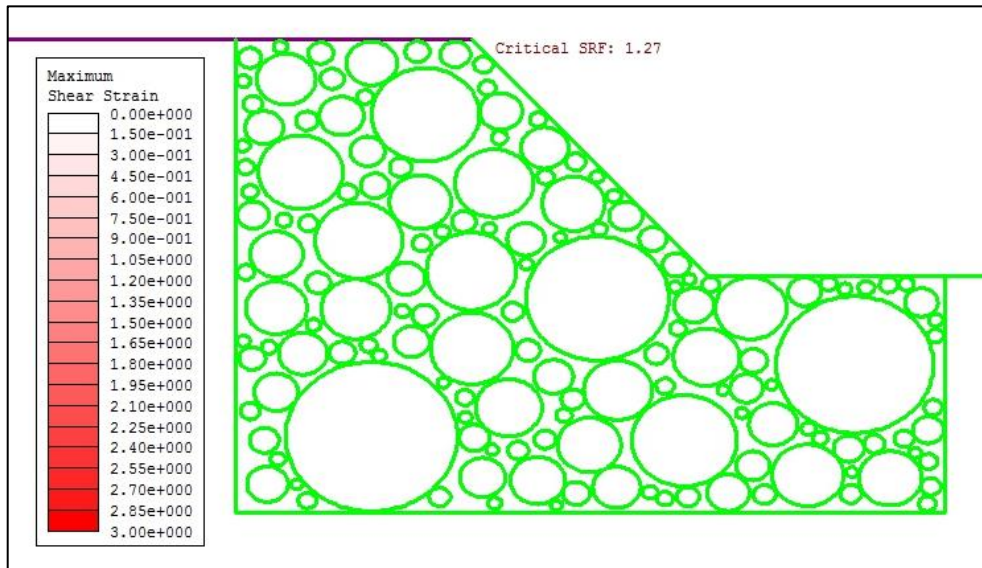
70%\_9



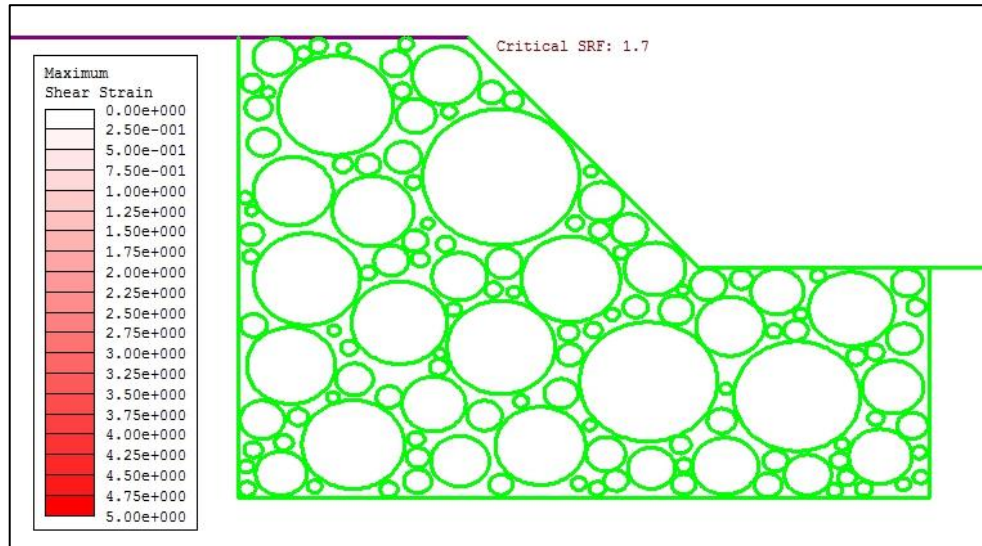
70%\_10



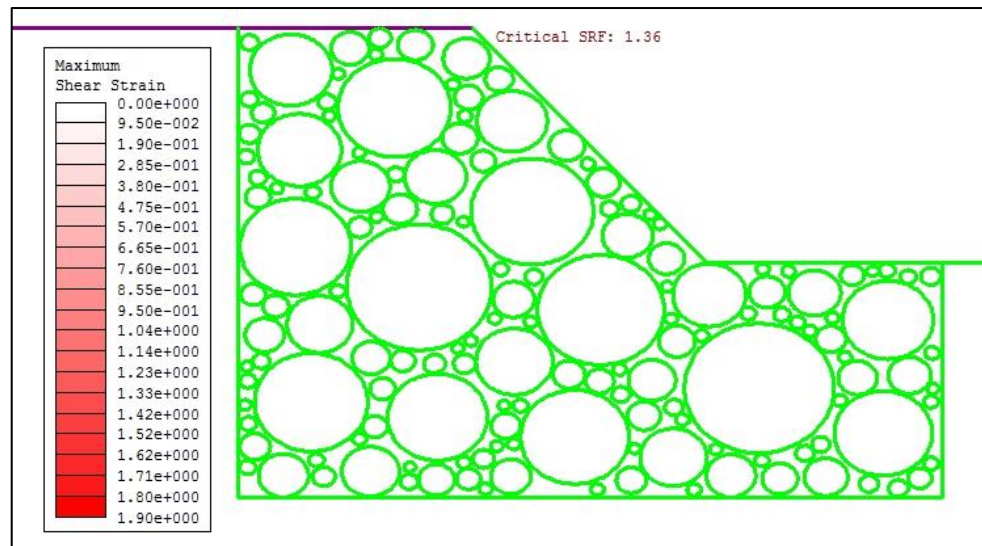
70%\_11



70%\_12

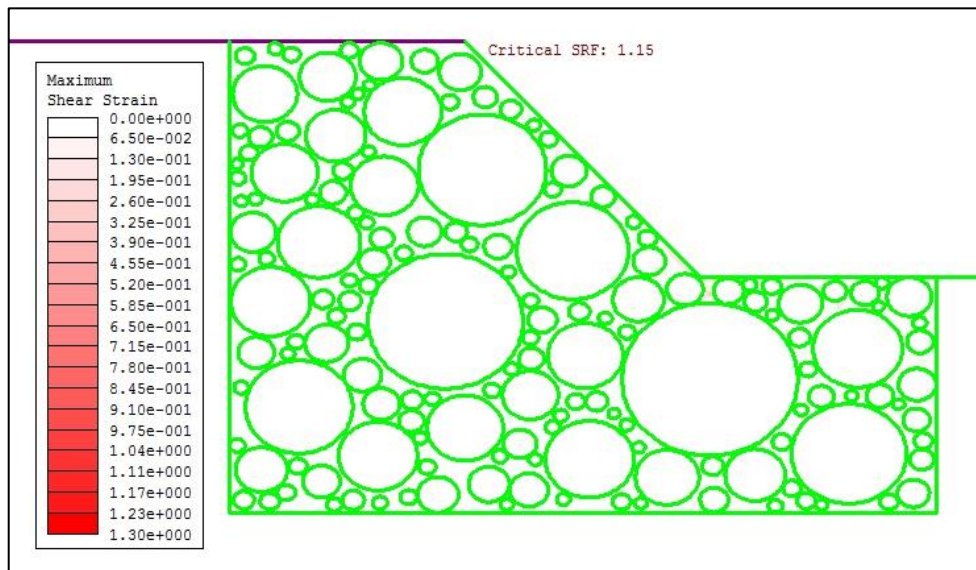


70%\_13

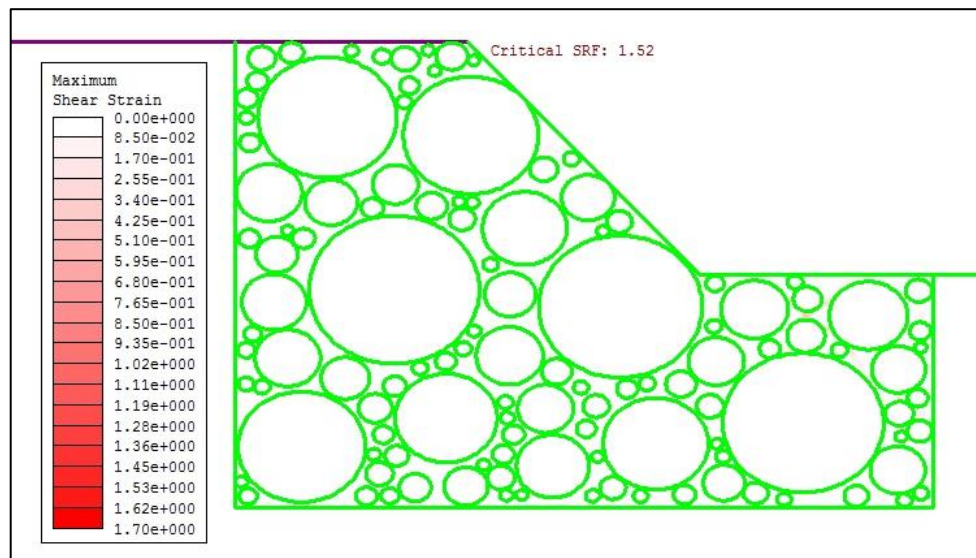




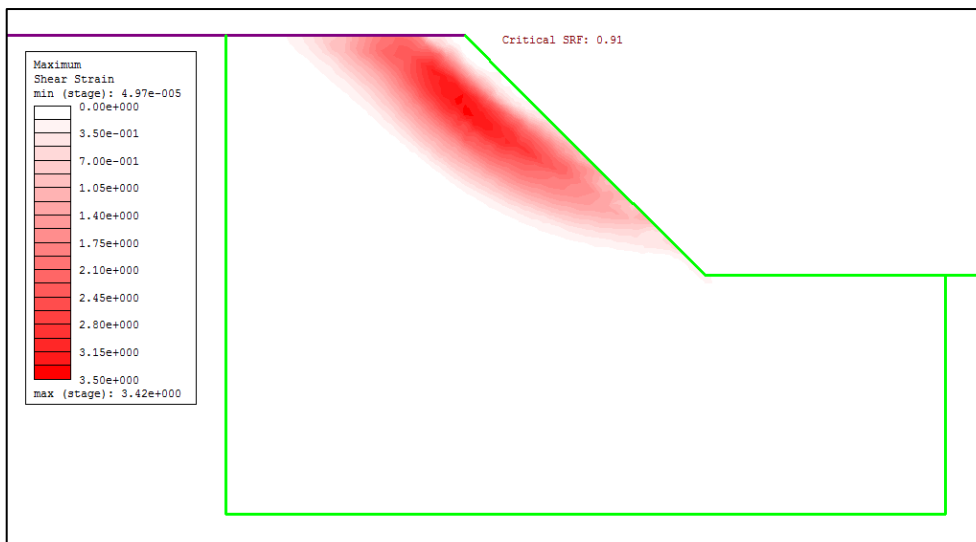
70%\_14



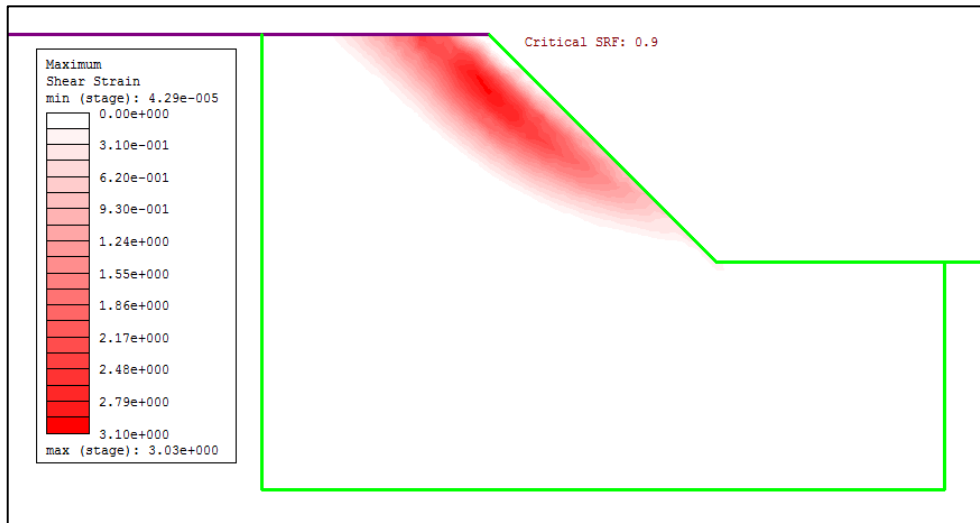
70%\_15



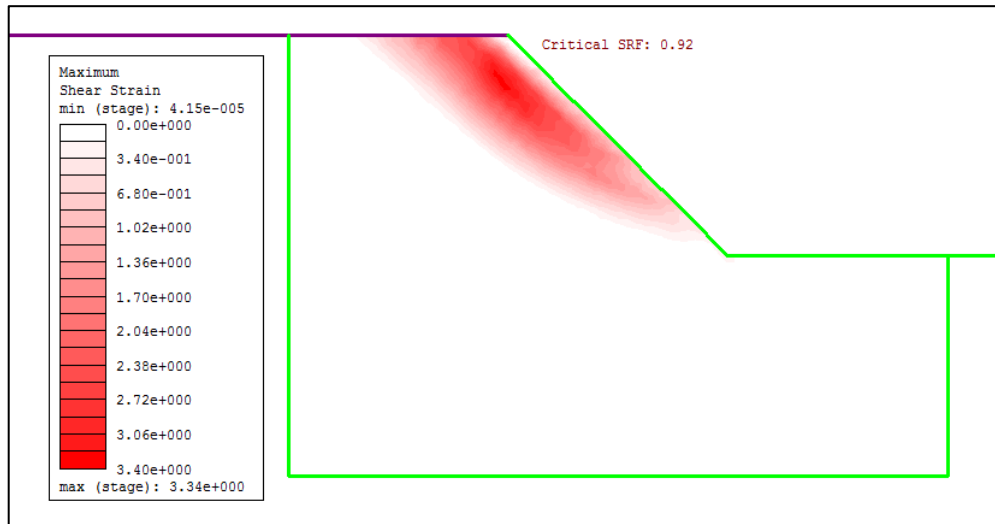
Kalender\_25



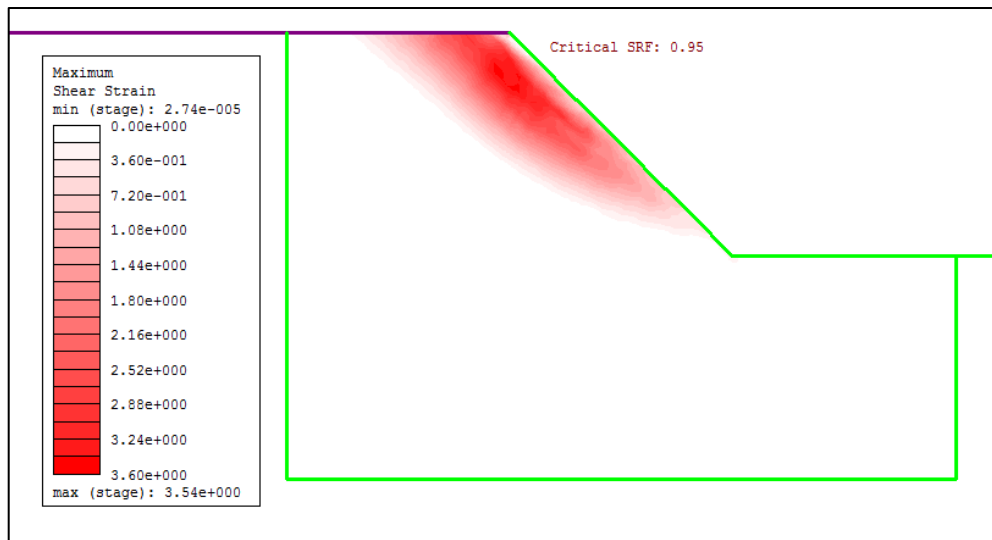
### Kalender\_40



### Kalender\_55

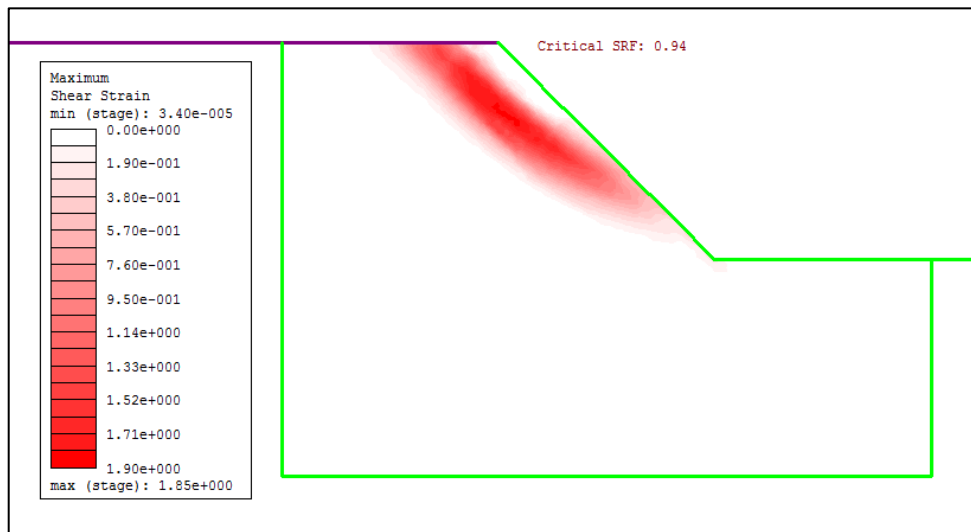


### Kalender\_70

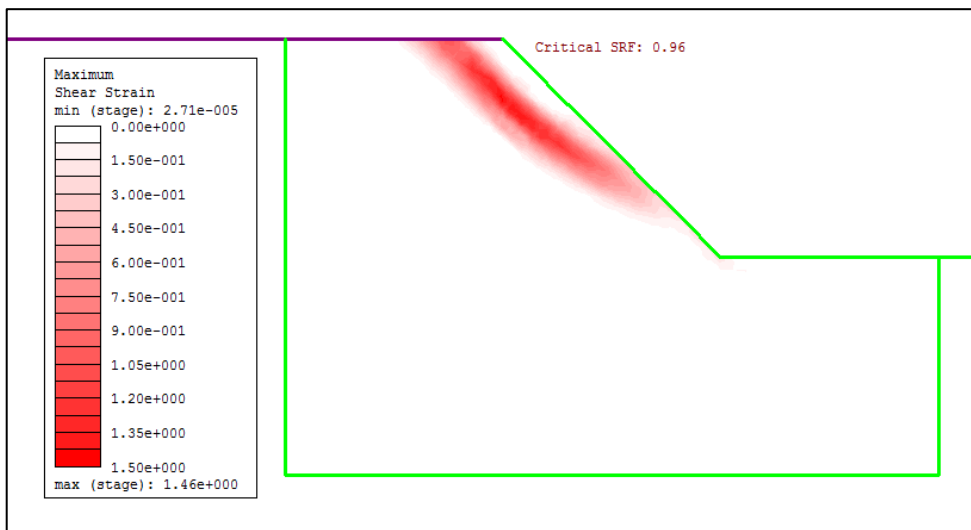




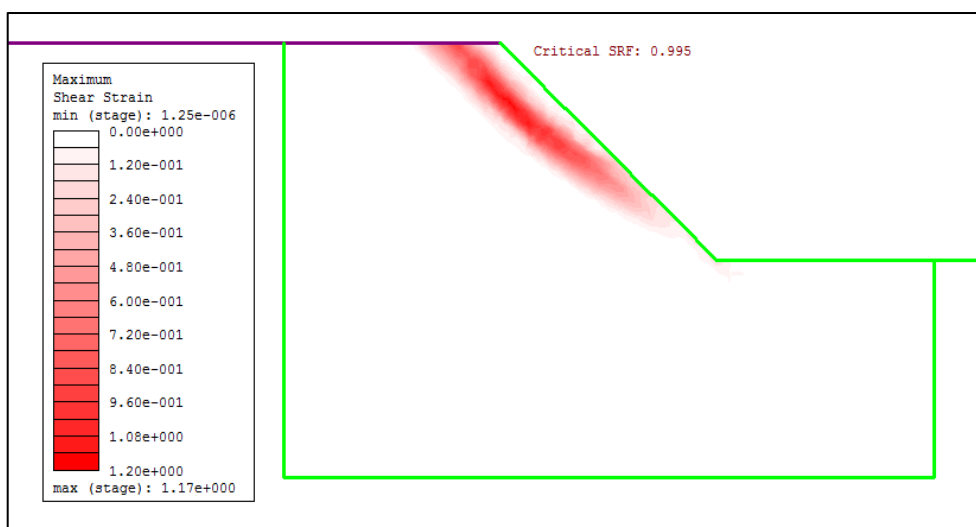
## Lindquist\_40



## Lindquist\_55

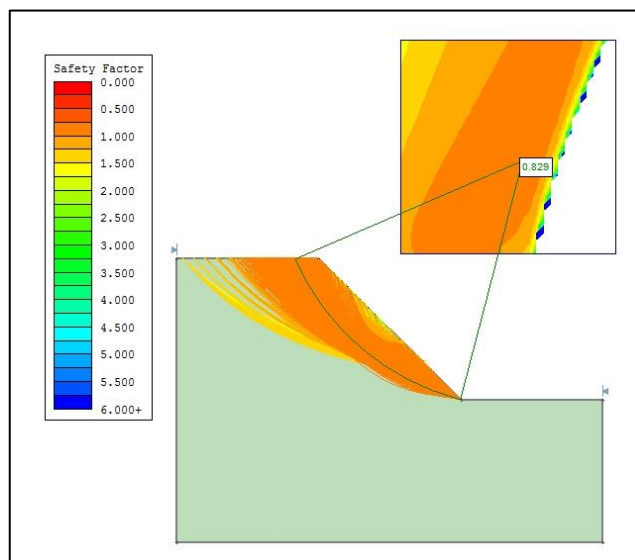


## Lindquist\_70

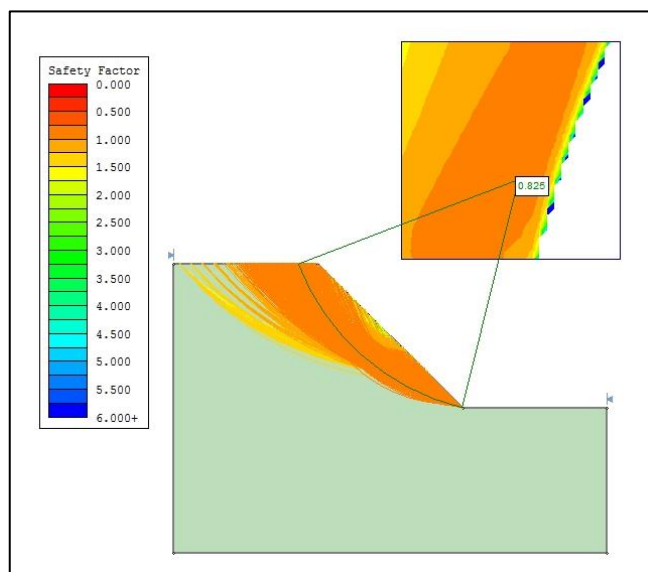


## Allegato 3: Superfici critiche minime (approccio LEM)

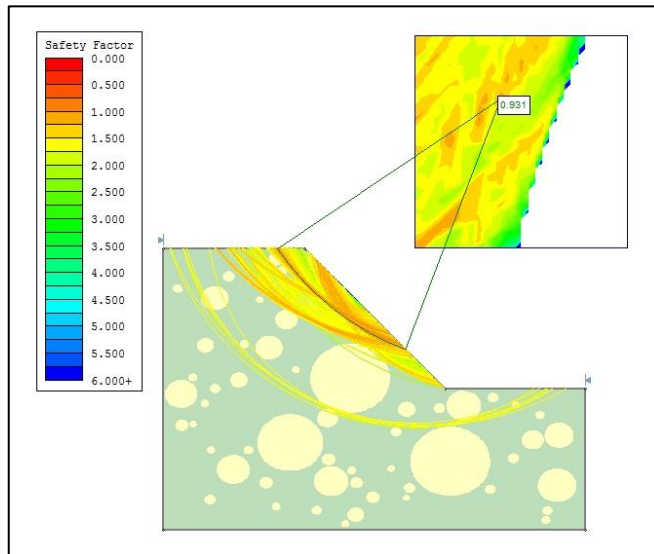
Matrice\_Bishop



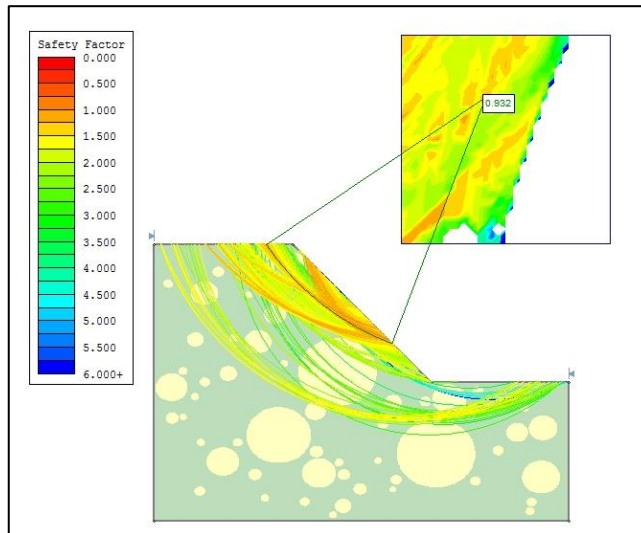
Matrice\_Spencer



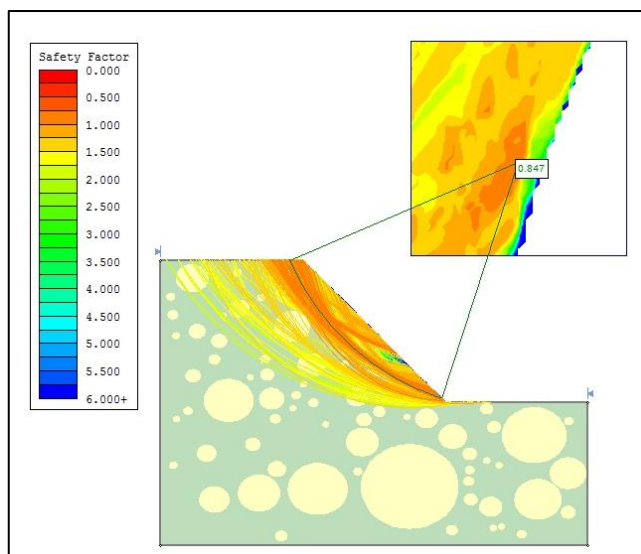
### 25\_1\_Bishop



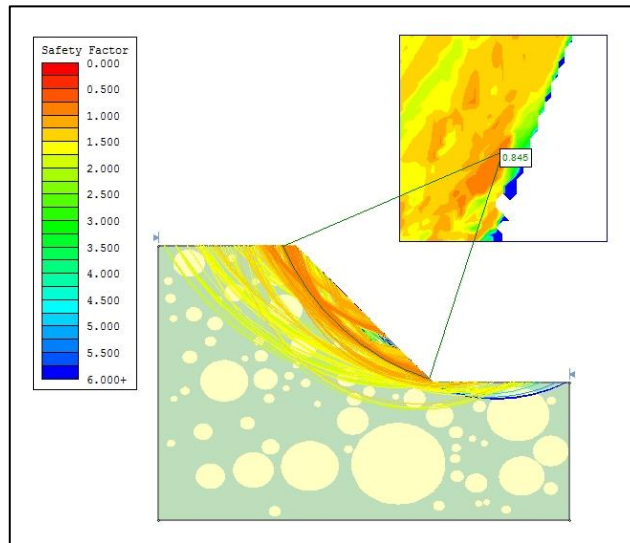
### 25\_1\_Spencer



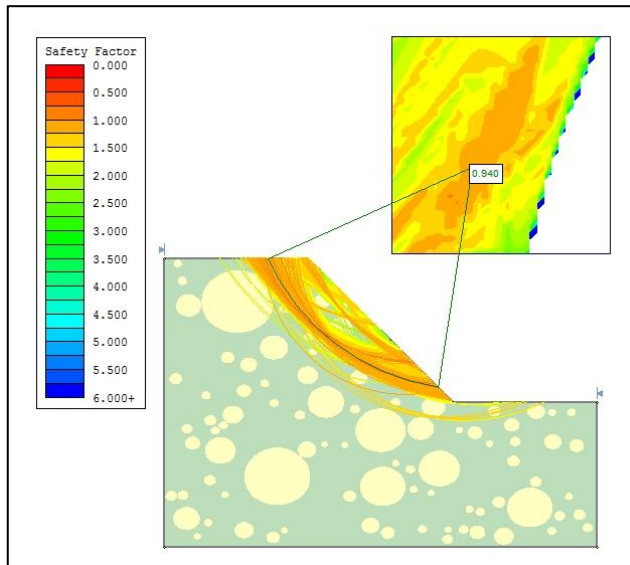
### 25\_2\_Bishop



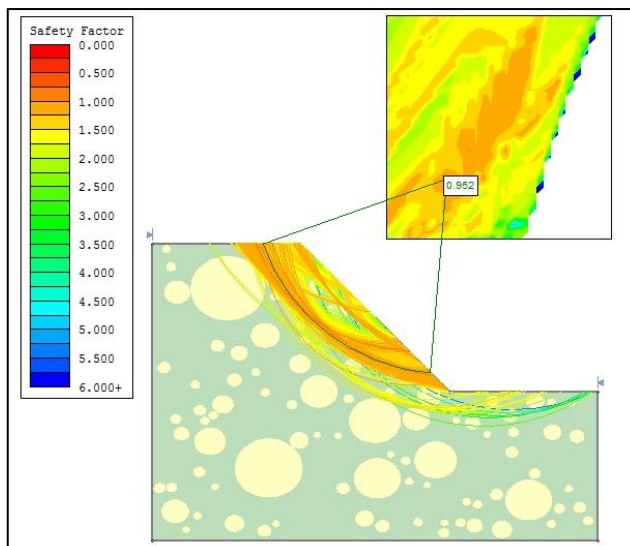
### 25\_2\_Spencer



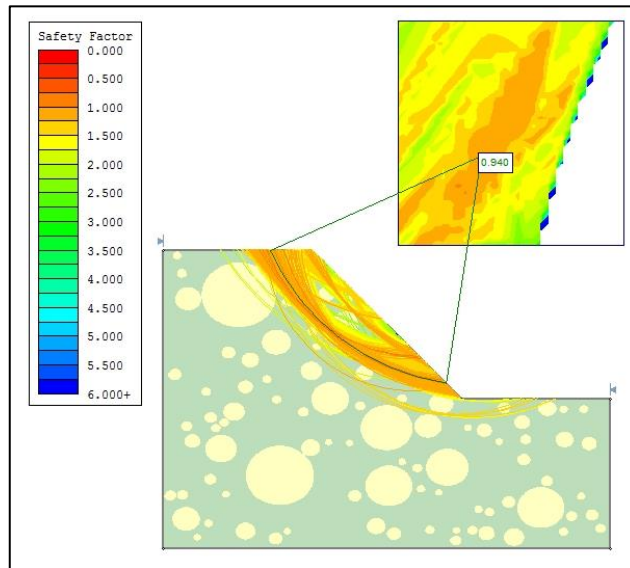
### 25\_3\_Bishop



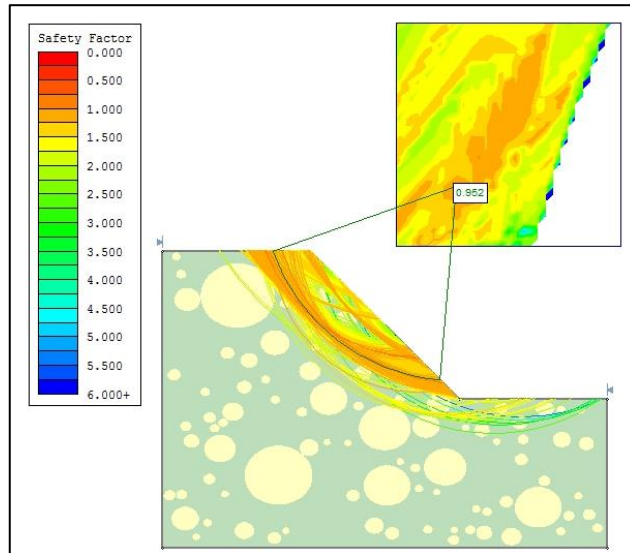
### 25\_3\_Spencer



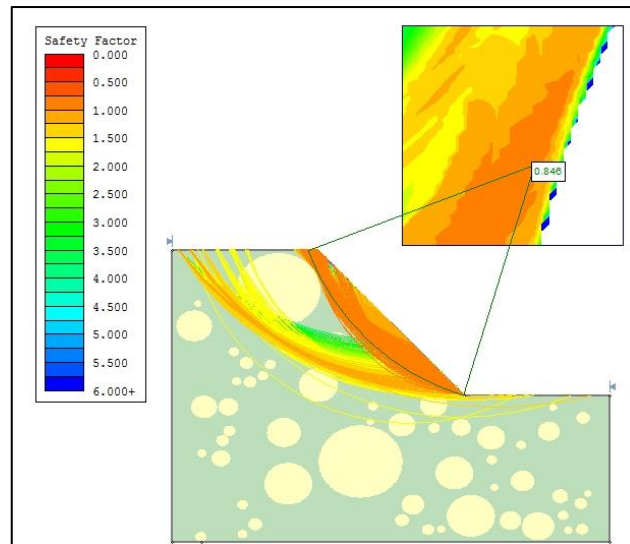
### 25\_4\_Bishop



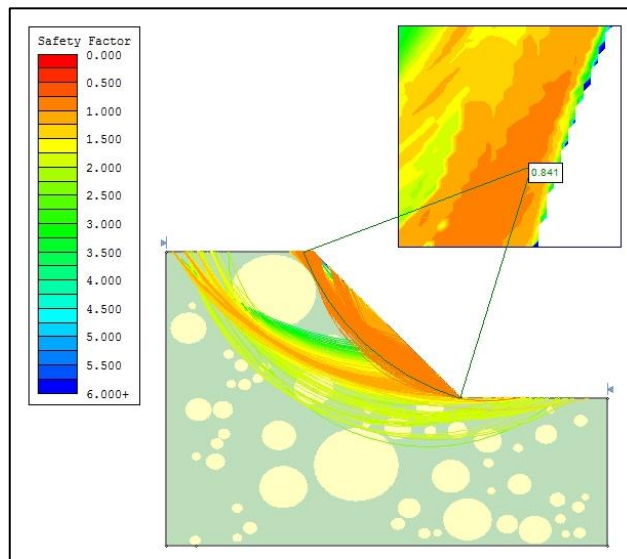
### 25\_4\_Spencer



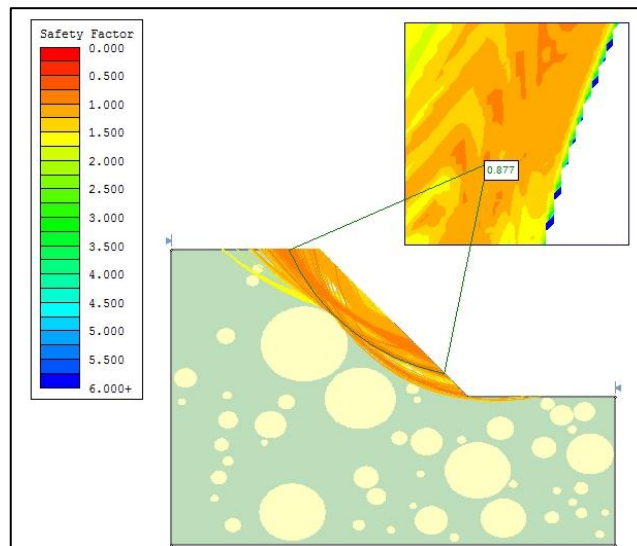
### 25\_5\_Bishop



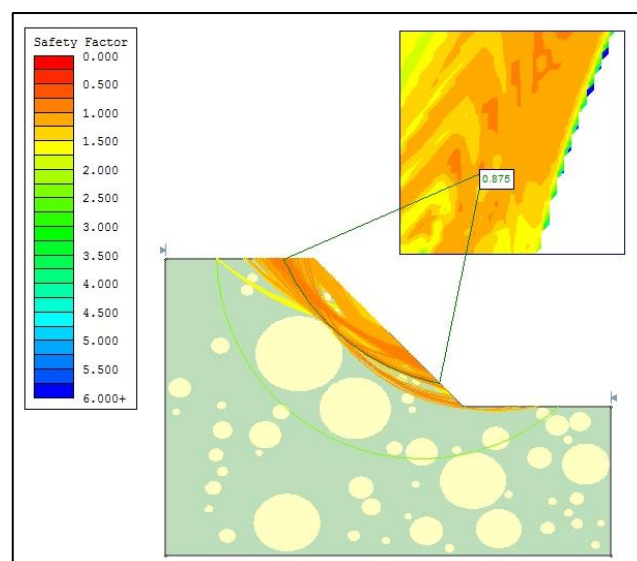
### 25\_5\_Spencer



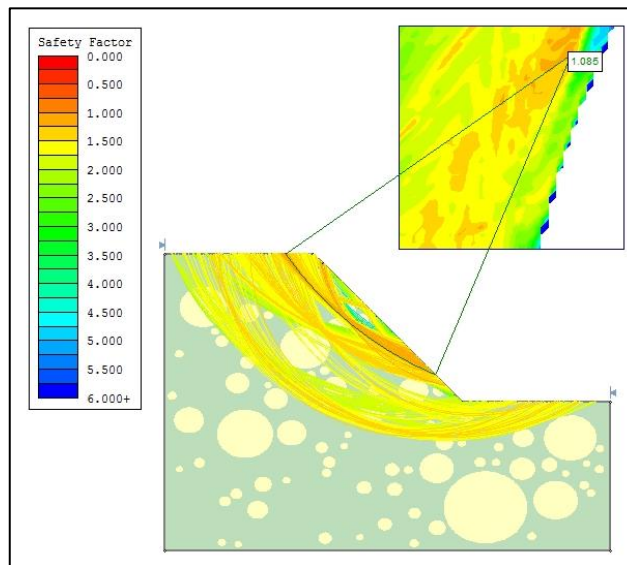
### 25\_6\_Bishop



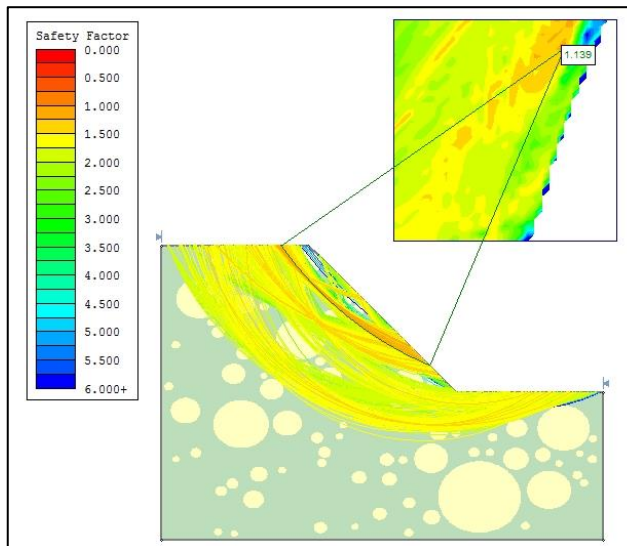
### 25\_6\_Spencer



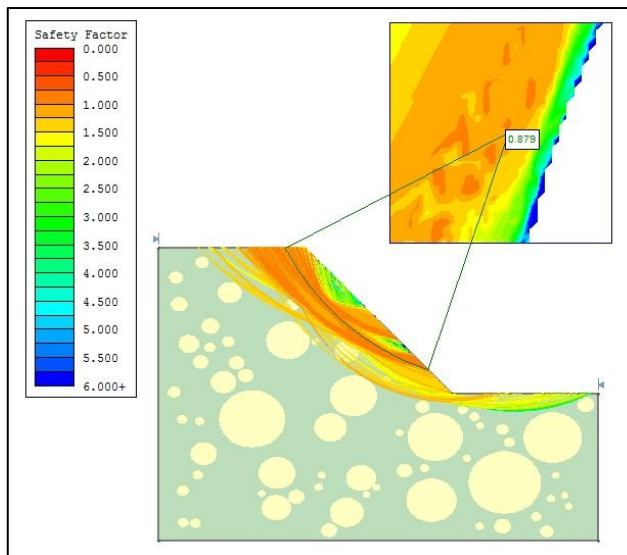
### 25\_7\_Bishop



### 25\_7\_Spencer

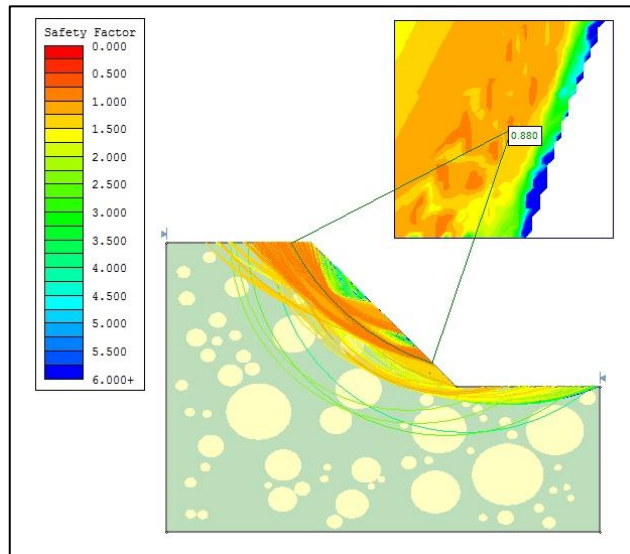


### 25\_8\_Bishop

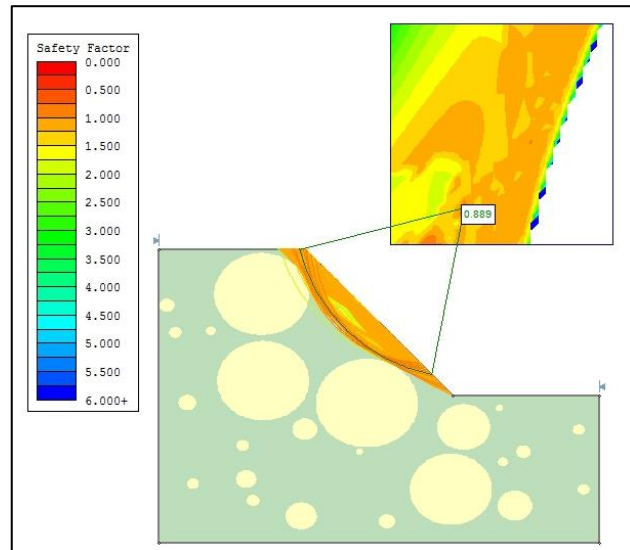




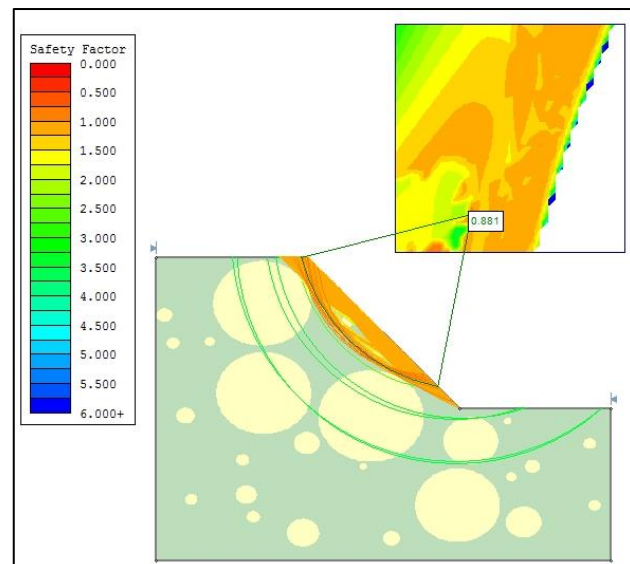
### 25\_8\_Spencer



### 25\_9\_Bishop

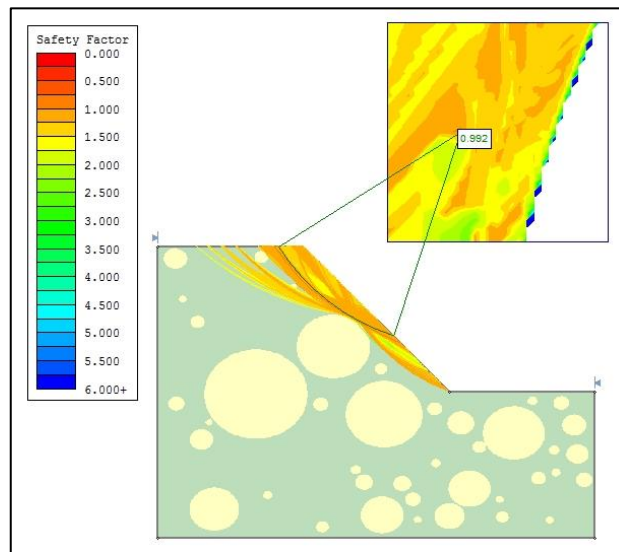


### 25\_9\_Spencer

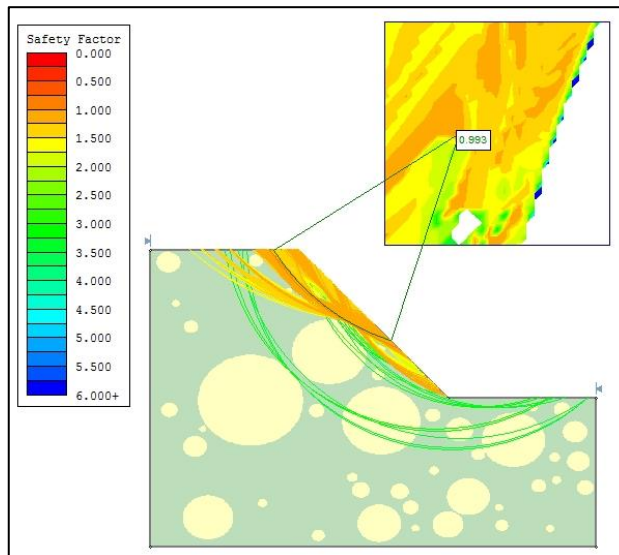




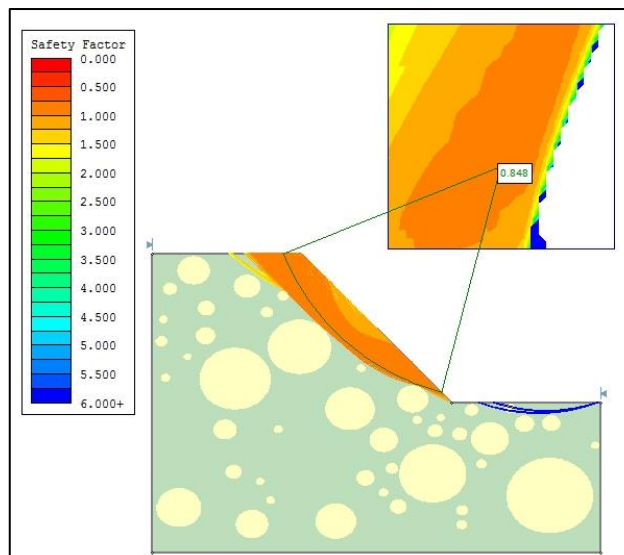
### 25\_10\_Bishop



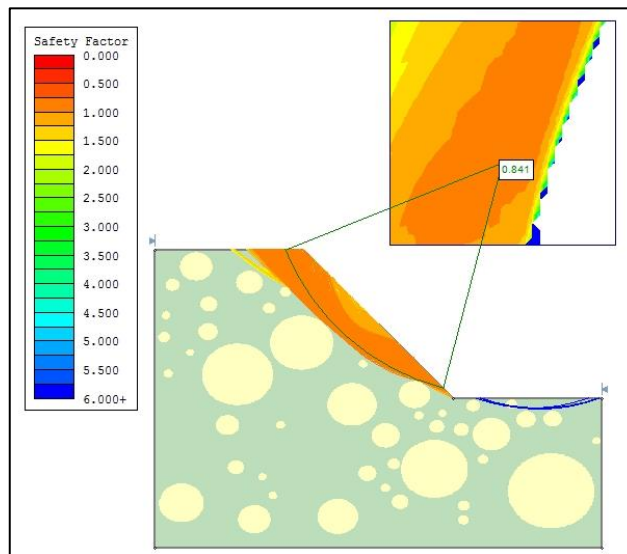
### 25\_10\_Spencer



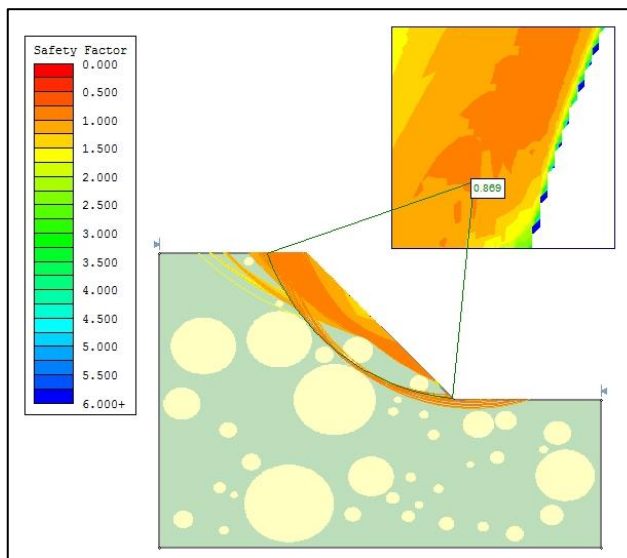
### 25\_11\_Bishop



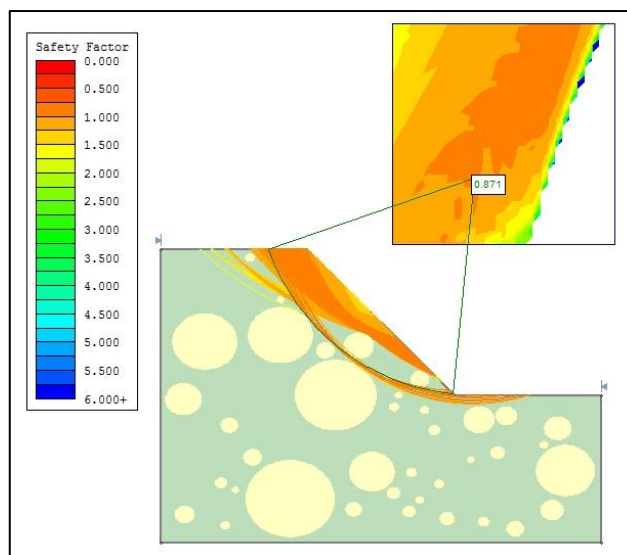
**25\_11\_Spencer**



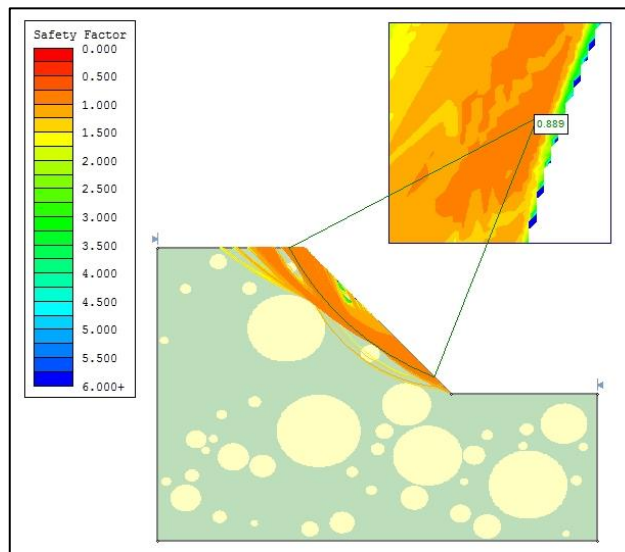
**25\_12\_Bishop**



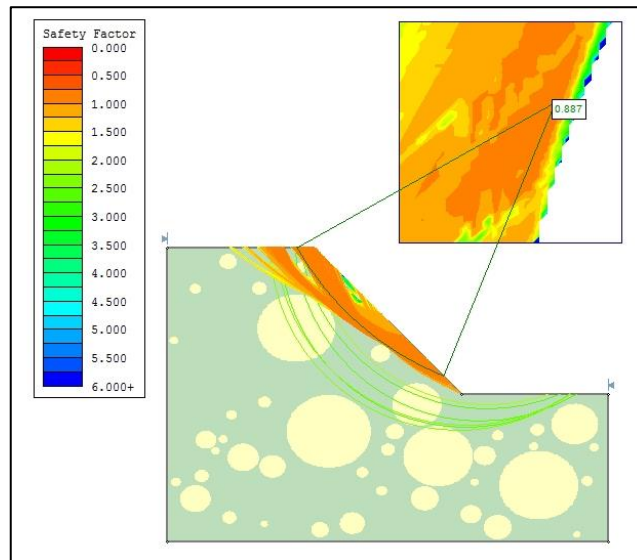
**25\_12\_Spencer**



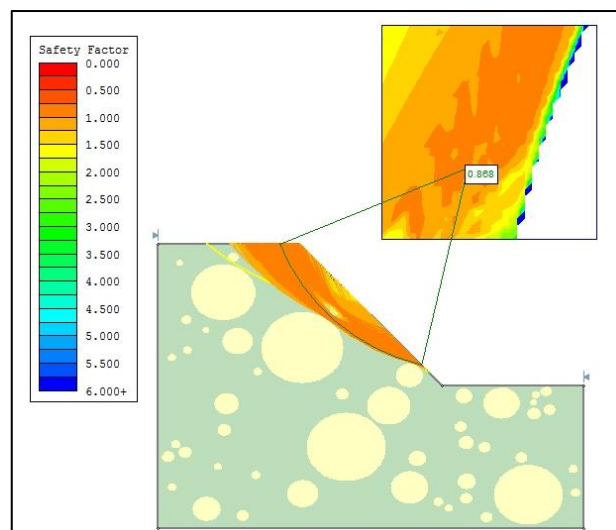
### 25\_13\_Bishop



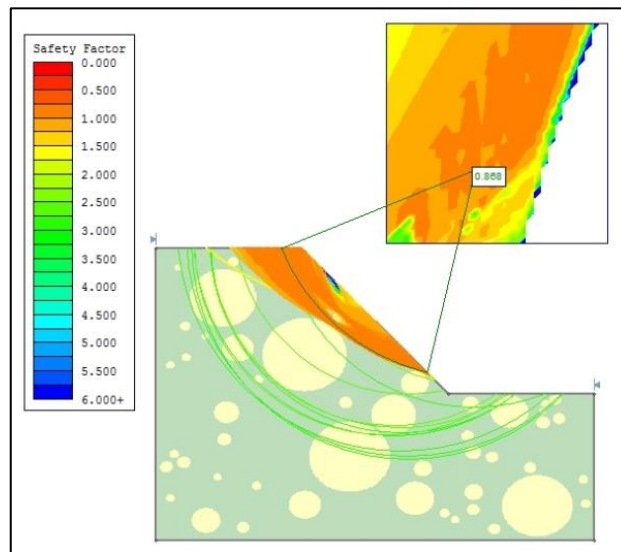
### 25\_13\_Spencer



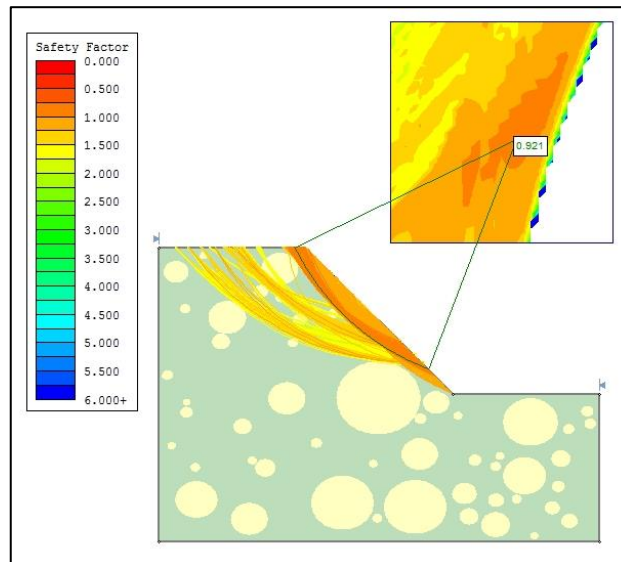
### 25\_14\_Bishop



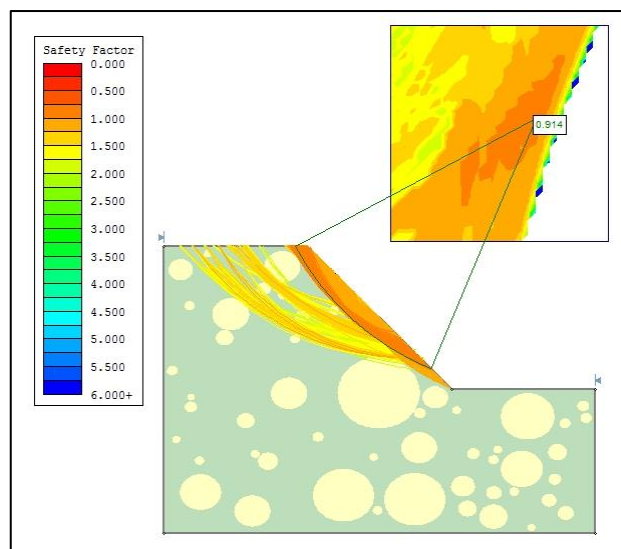
**25\_14\_Spencer**



**25\_15\_Bishop**

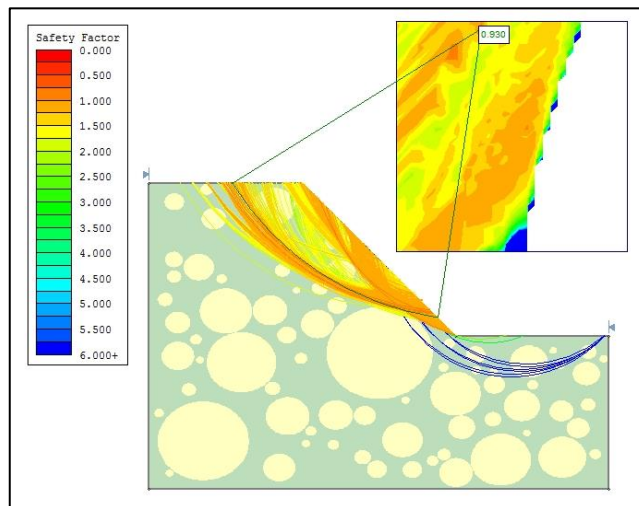


**25\_15\_Spencer**

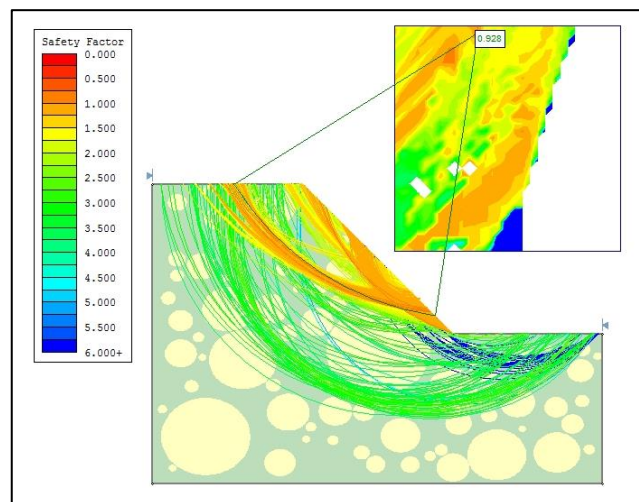




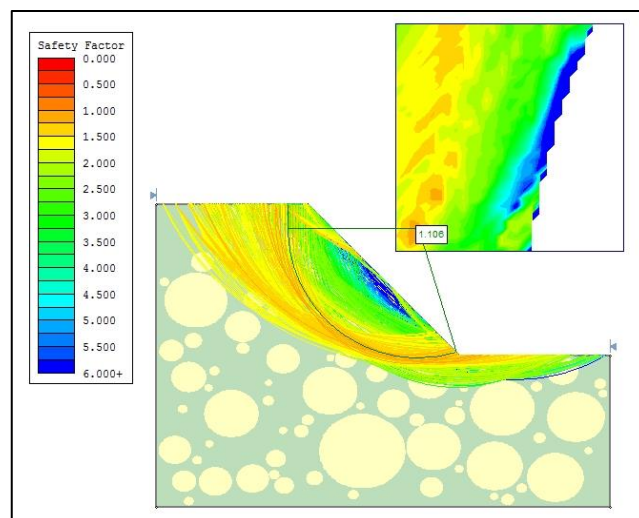
### 40\_1\_Bishop



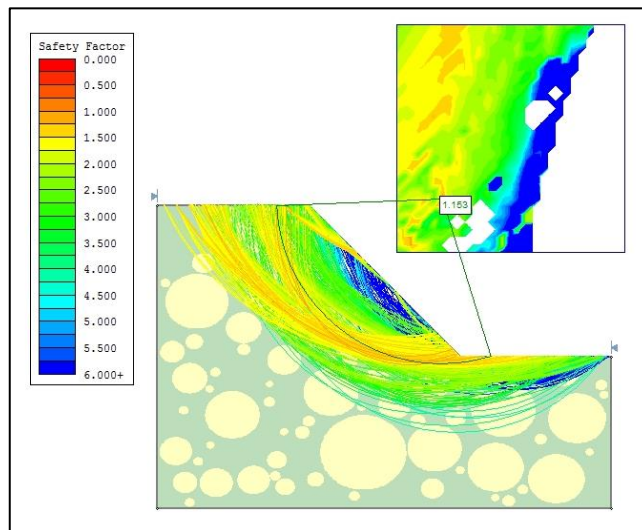
### 40\_1\_Spencer



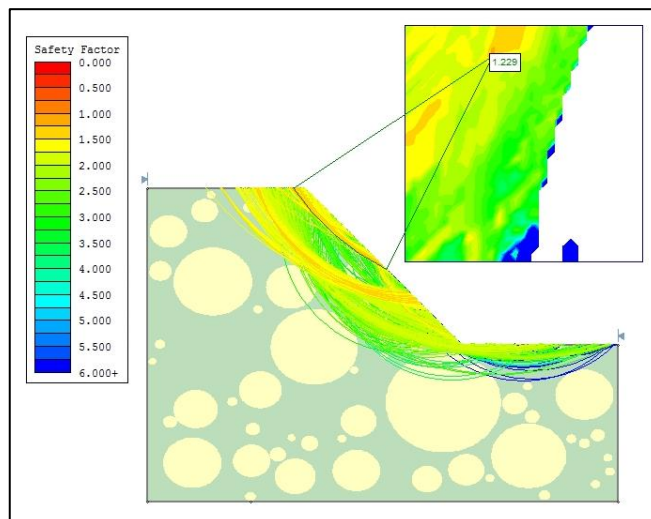
### 40\_2\_Bishop



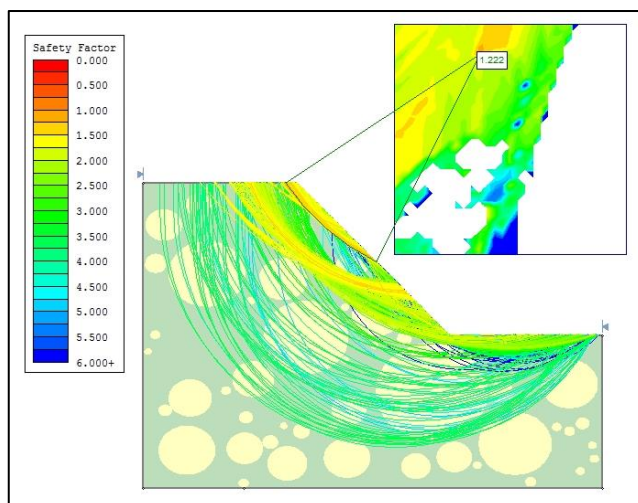
### 40\_2\_Spencer



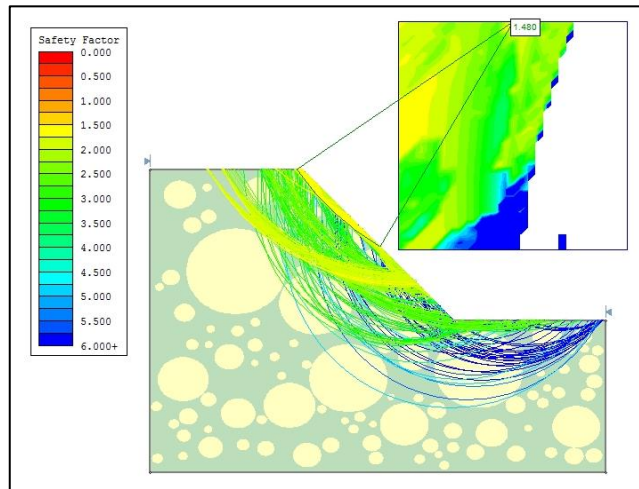
### 40\_3\_Bishop



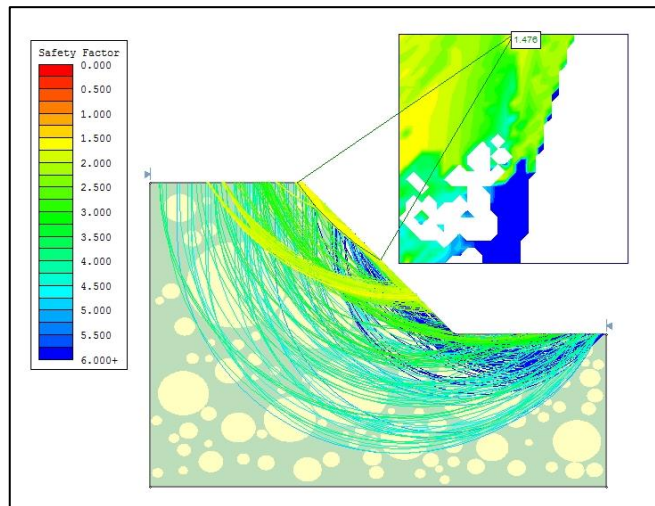
### 40\_3\_Spencer



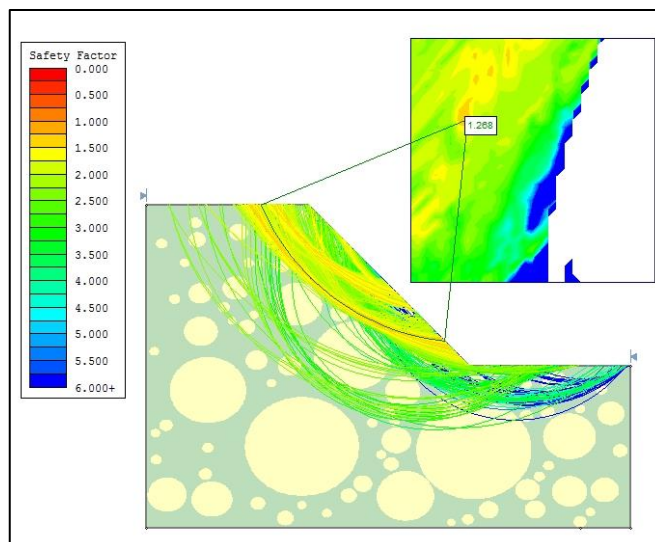
#### 40\_4\_Bishop



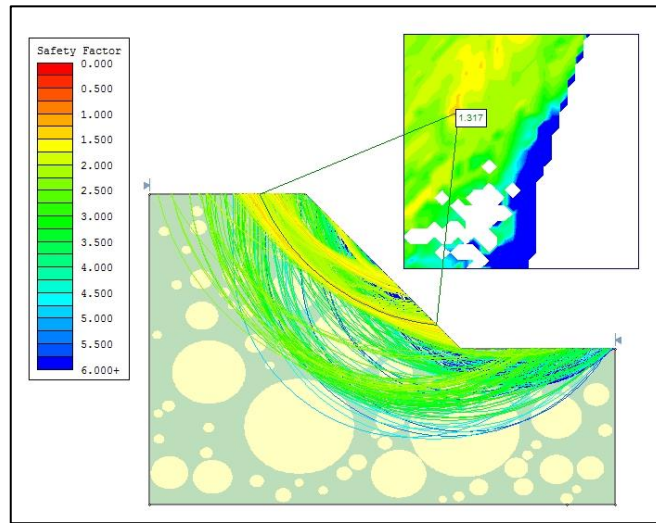
#### 40\_4\_Spencer



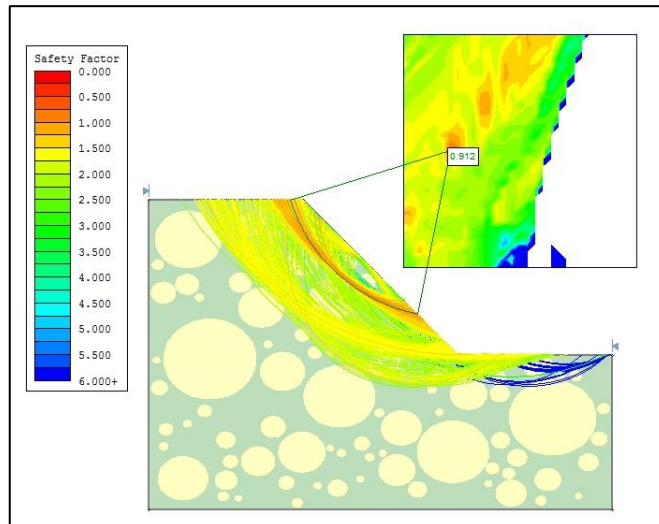
#### 40\_5\_Bishop



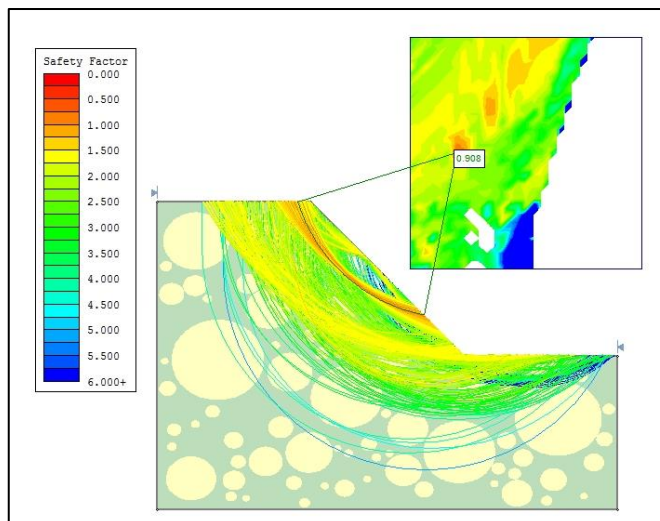
### 40\_5\_Spencer



### 40\_6\_Bishop

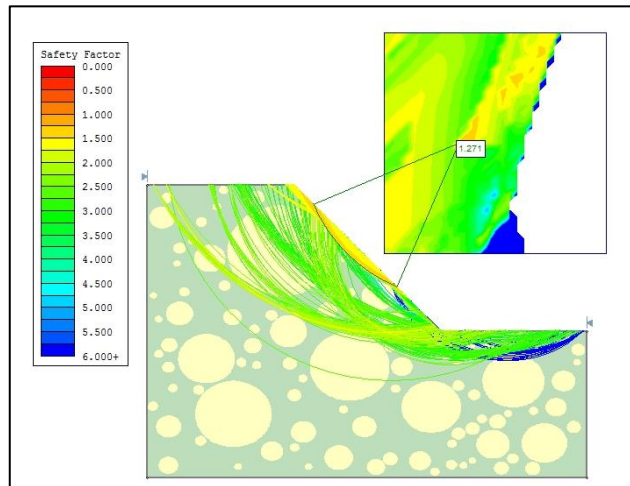


### 40\_6\_Spencer

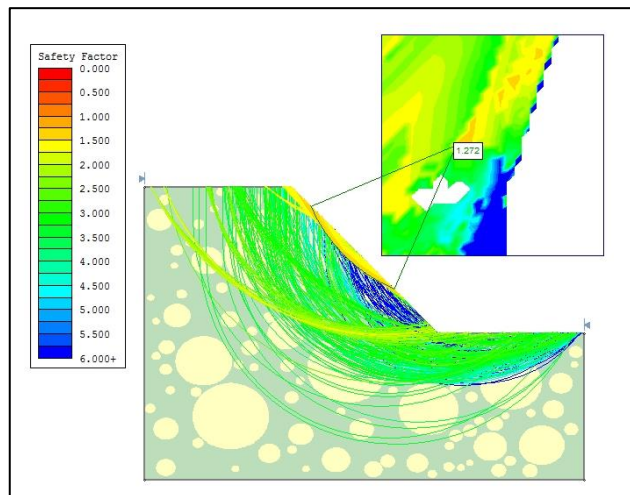




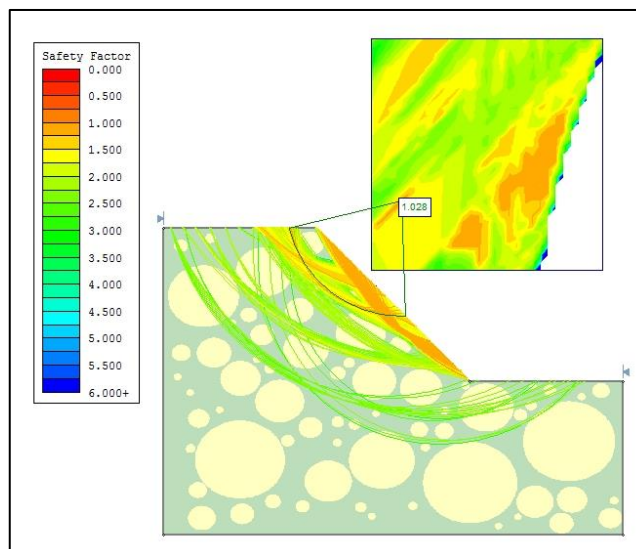
### 40\_7\_Bishop



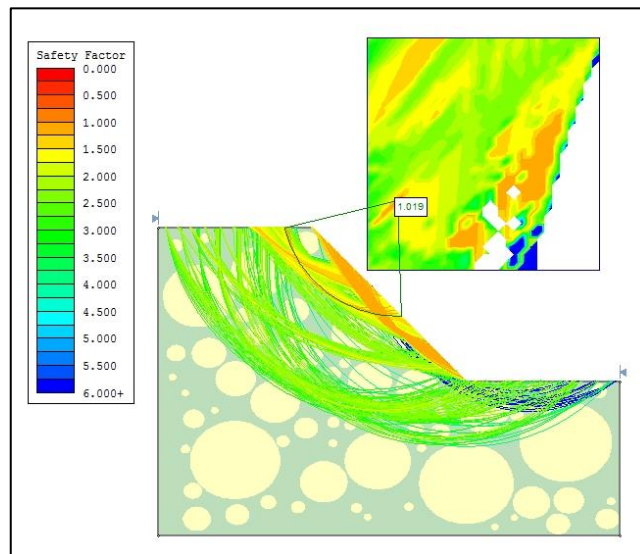
### 40\_7\_Spencer



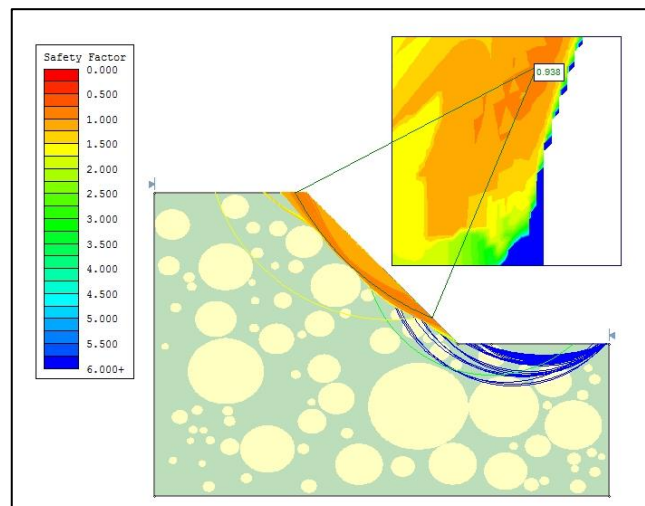
### 40\_8\_Bishop



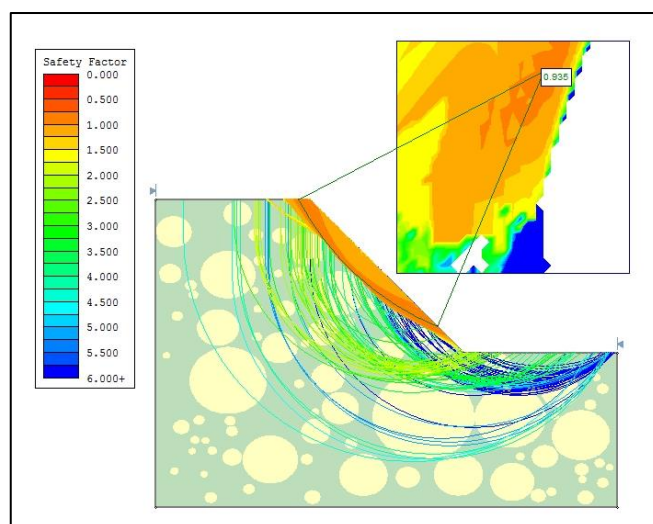
### 40\_8\_Spencer



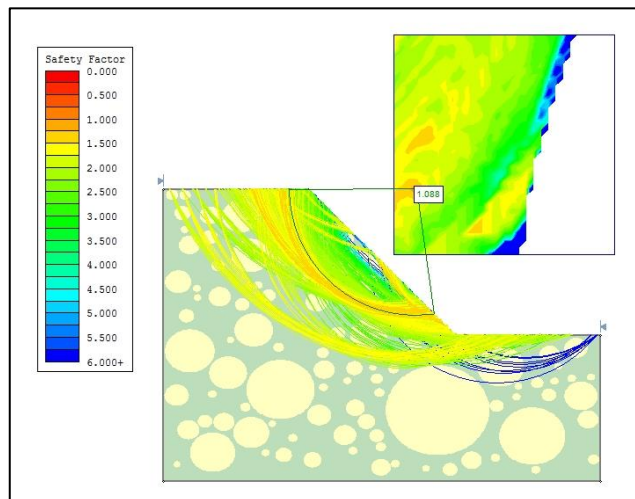
### 40\_9\_Bishop



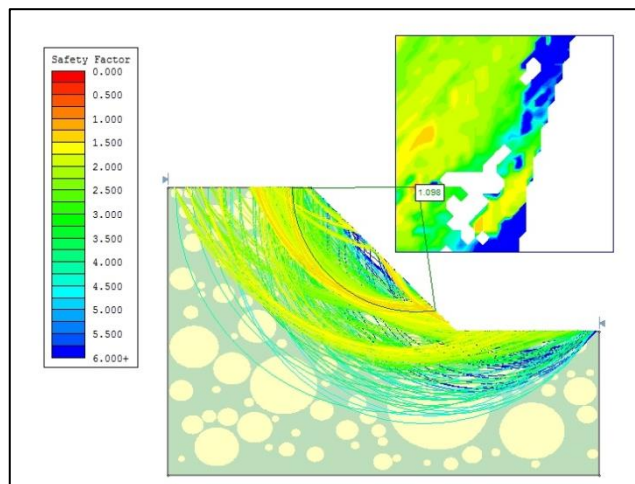
### 40\_9\_Spencer



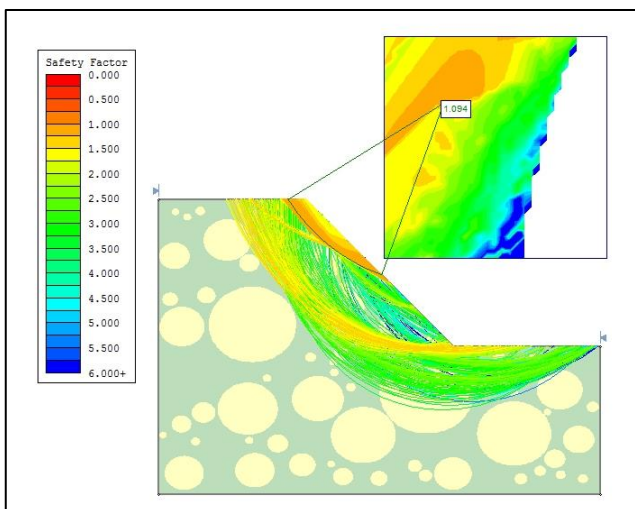
### 40\_10\_Bishop



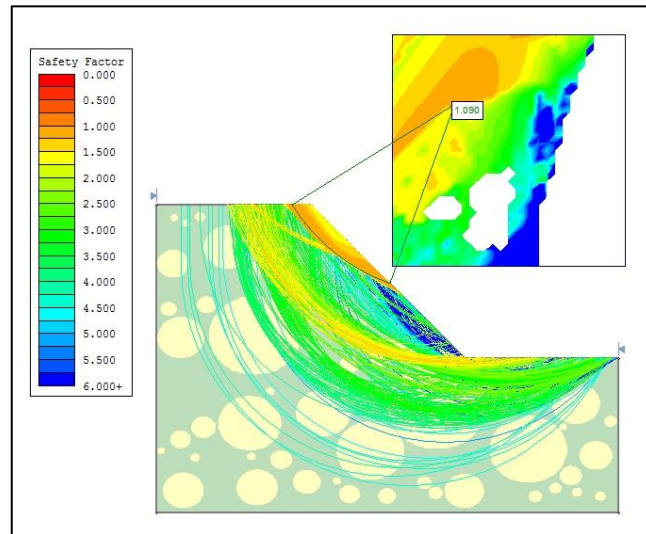
### 40\_10\_Spencer



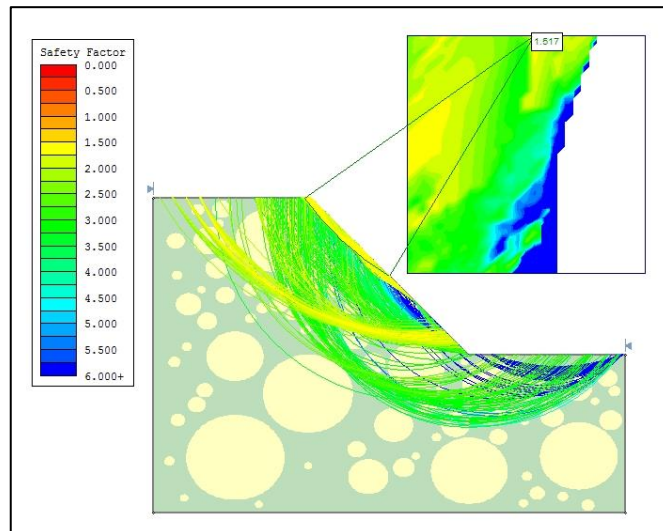
### 40\_11\_Bishop



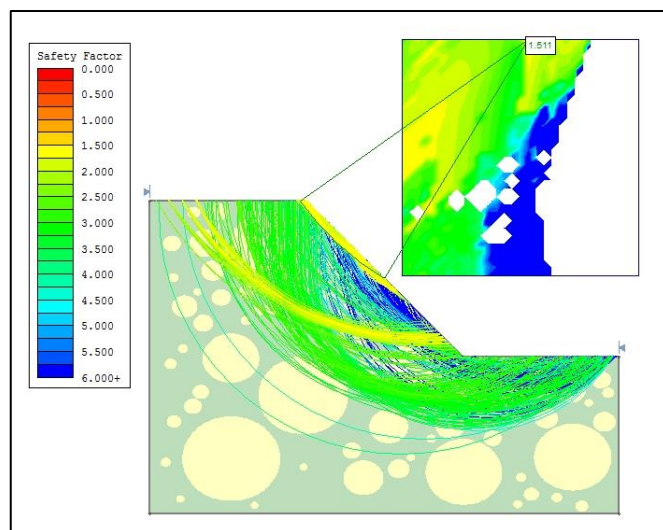
### 40\_11\_Spencer



### 40\_12\_Bishop

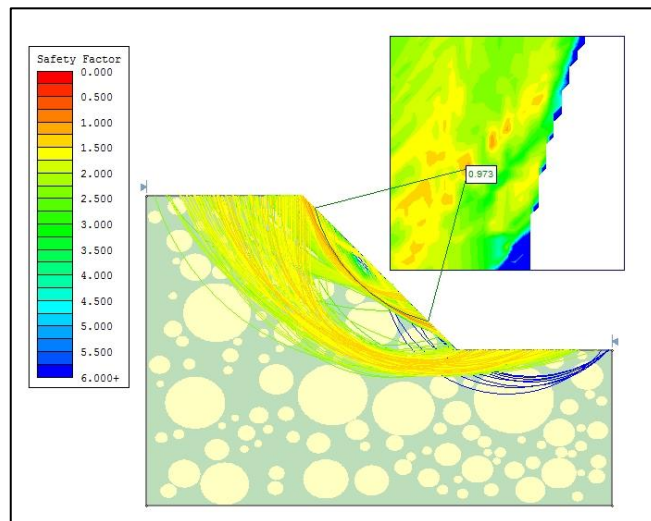


### 40\_12\_Spencer

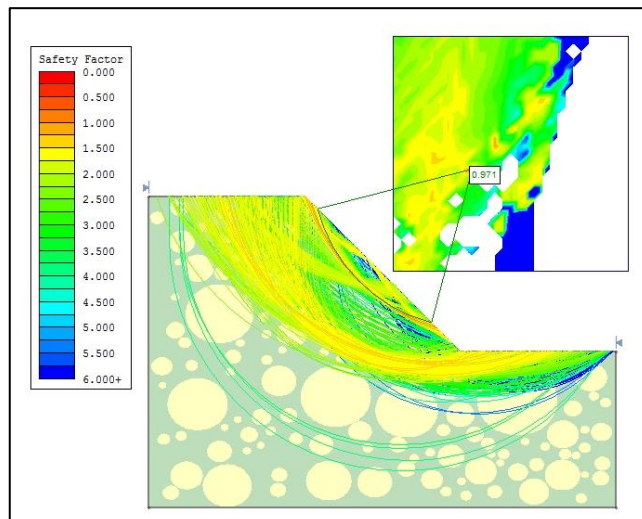




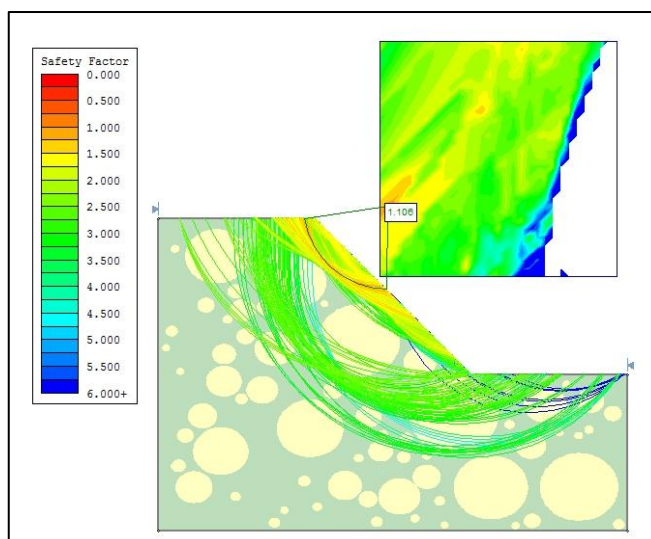
### 40\_13\_Bishop



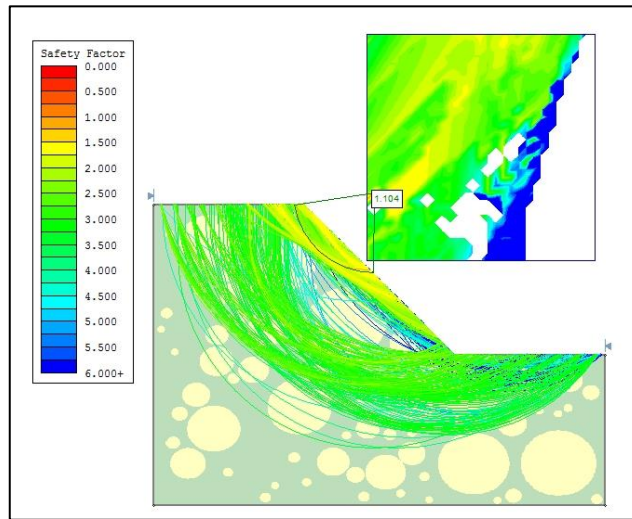
### 40\_13\_Spencer



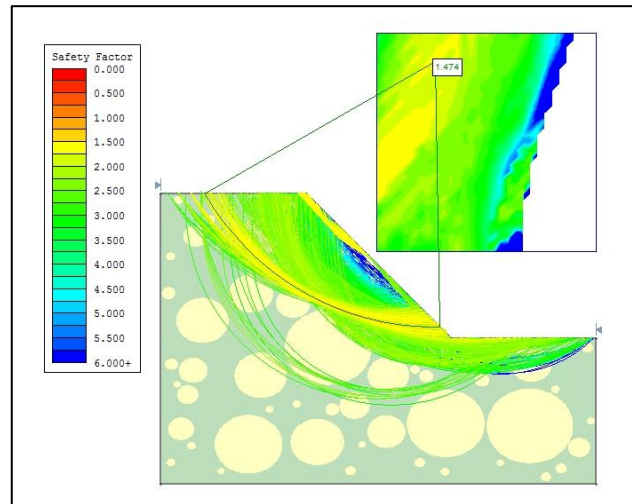
### 40\_14\_Bishop



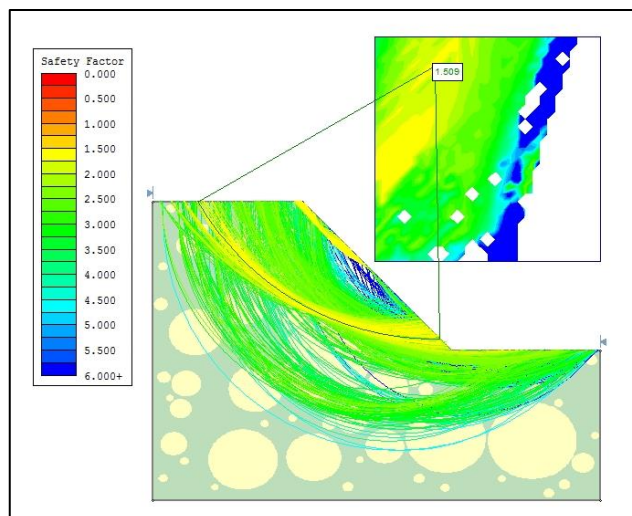
### 40\_14\_Spencer



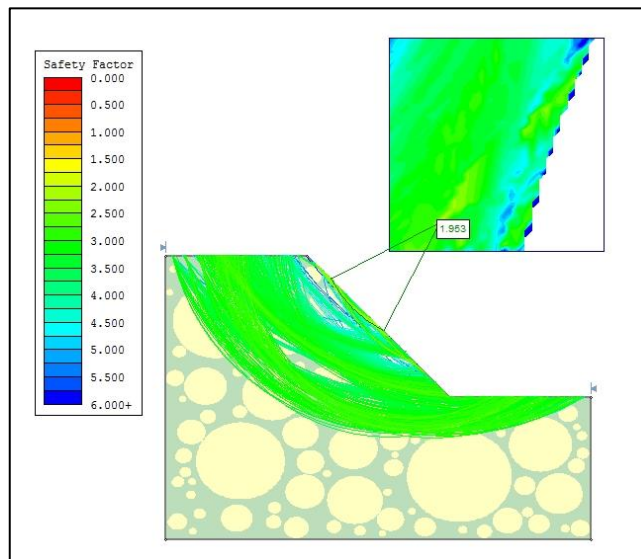
### 40\_15\_Bishop



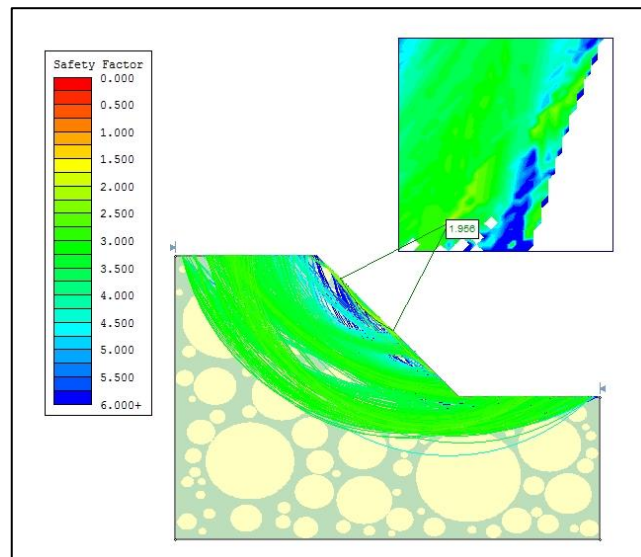
### 40\_15\_Spencer



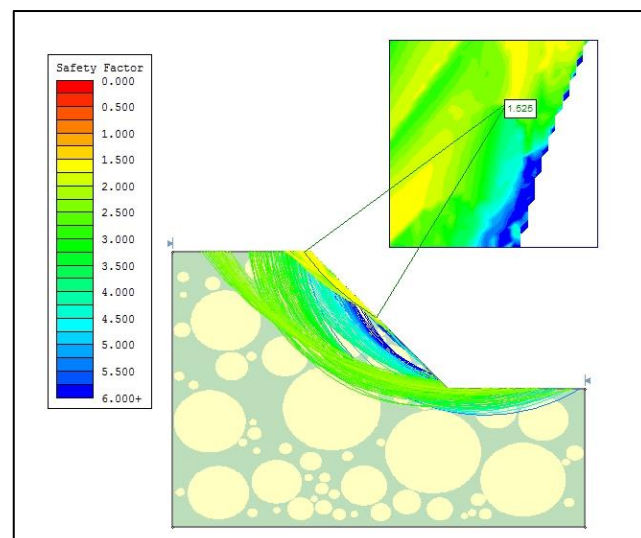
### 55\_1\_Bishop



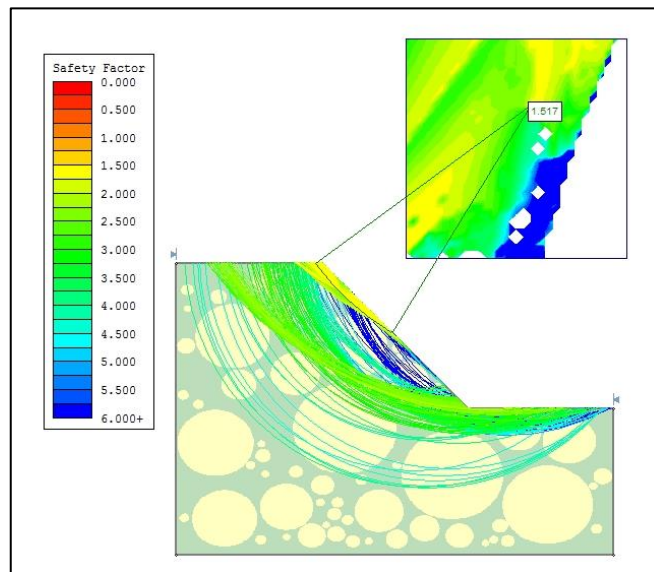
### 55\_1\_Spencer



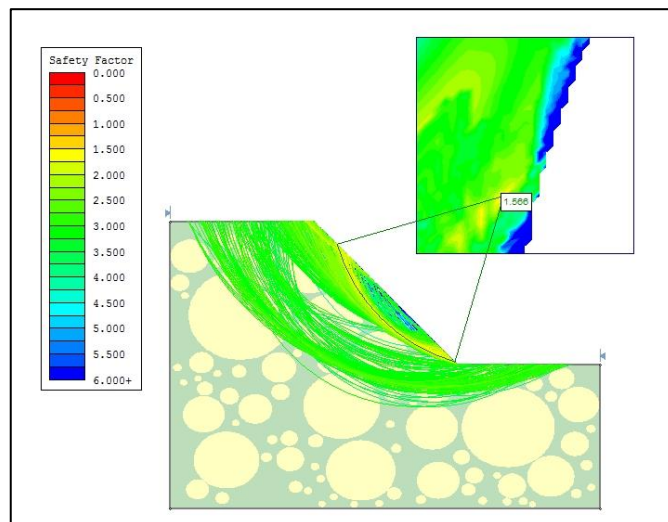
### 55\_2\_Bishop



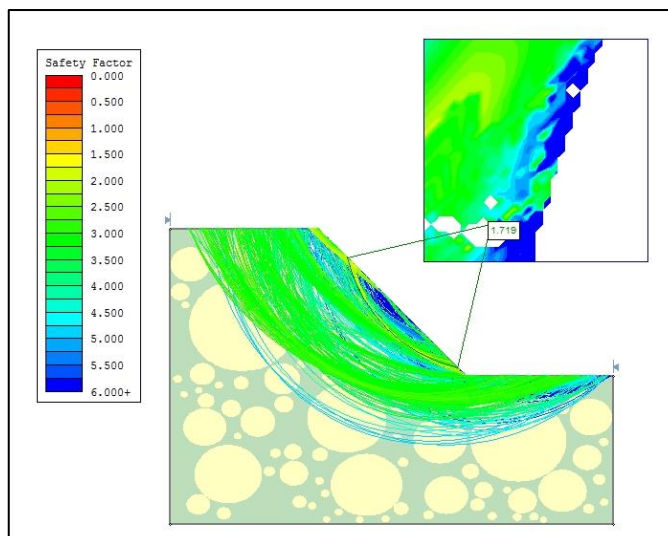
### 55\_2\_Spencer



### 55\_3\_Bishop

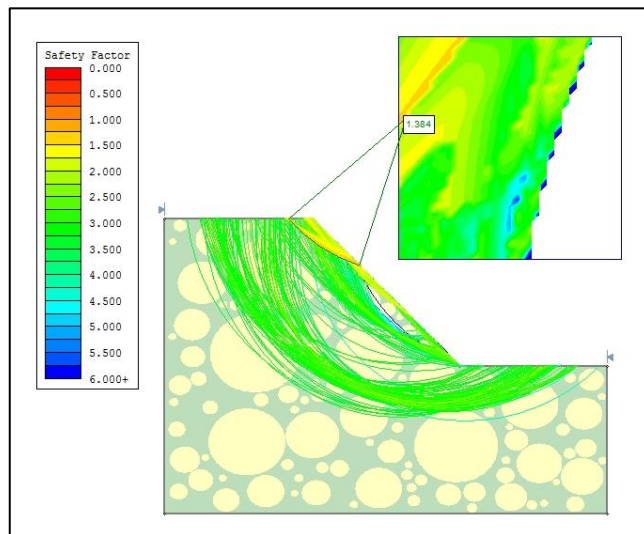


### 55\_3\_Spencer

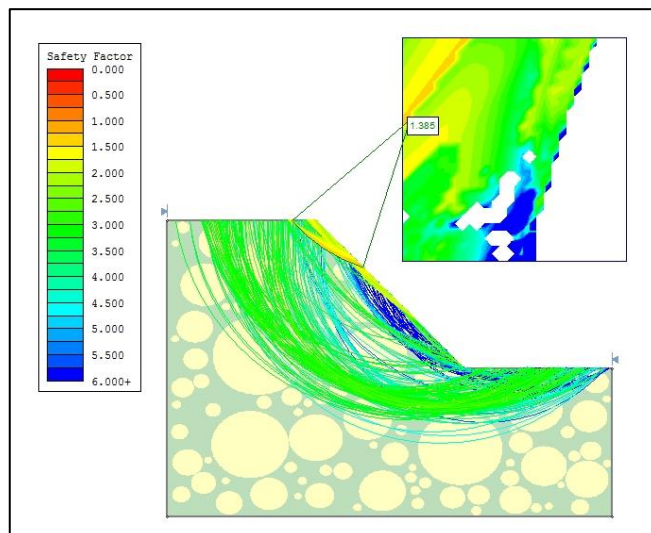




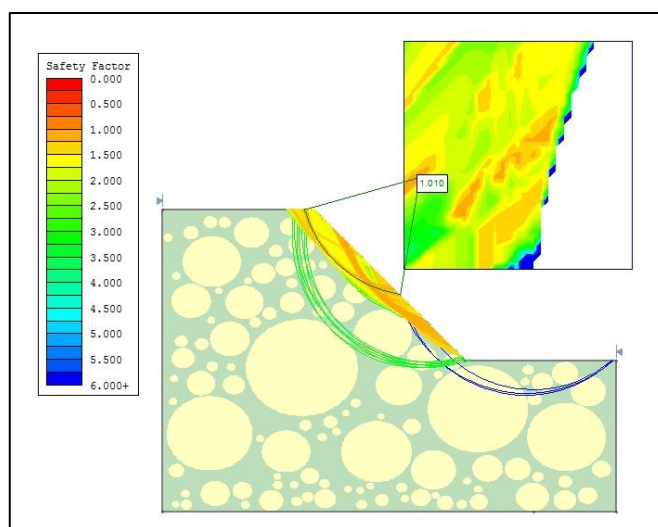
### 55\_4\_Bishop



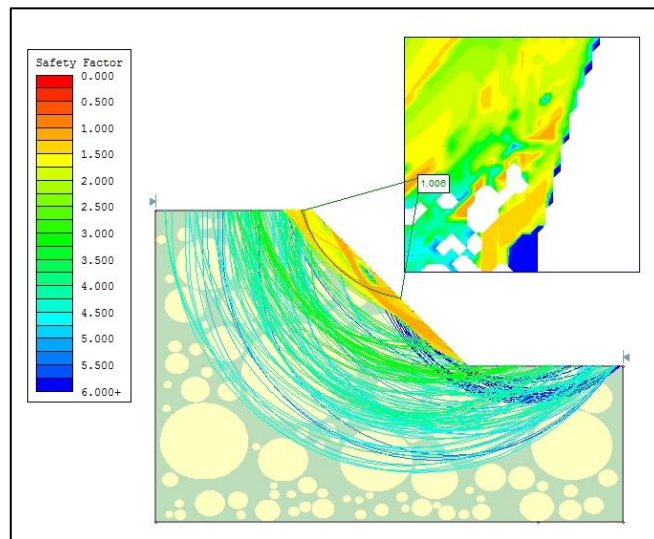
### 55\_4\_Spencer



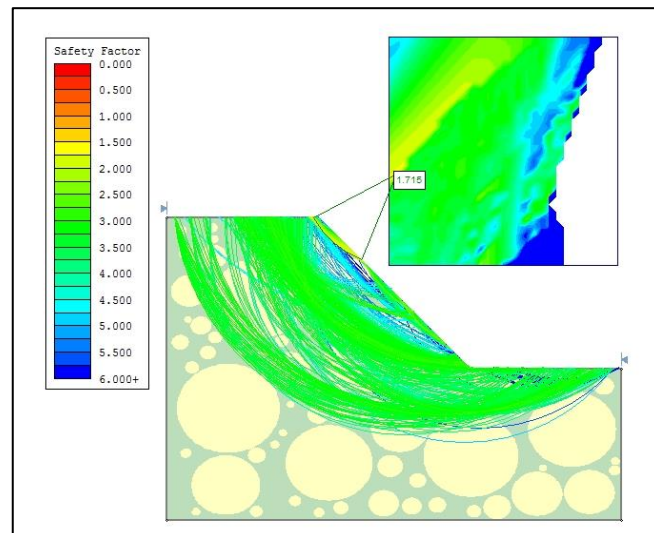
### 55\_5\_Bishop



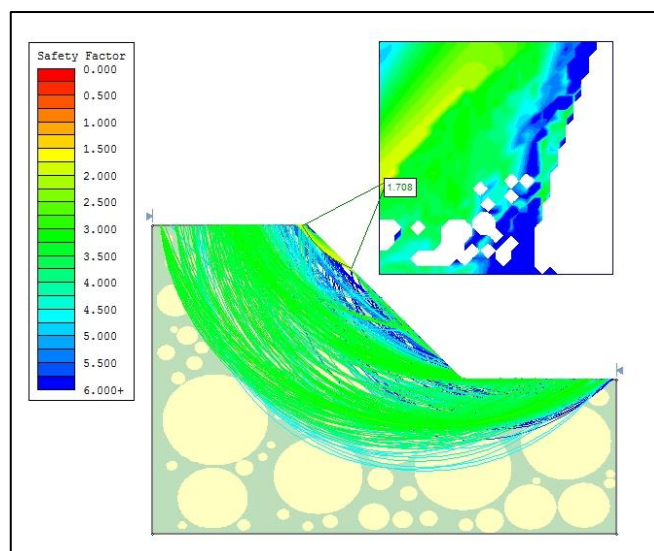
### 55\_5\_Spencer



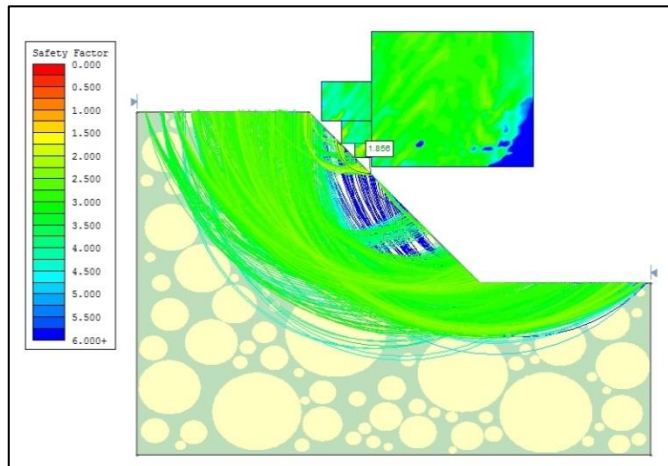
### 55\_6\_Bishop



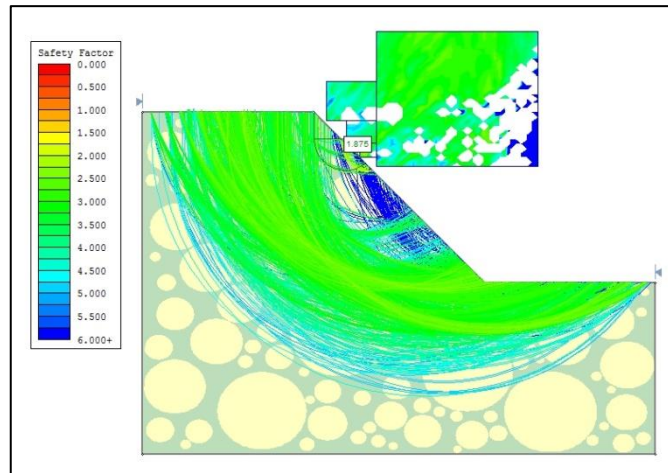
### 55\_6\_Spencer



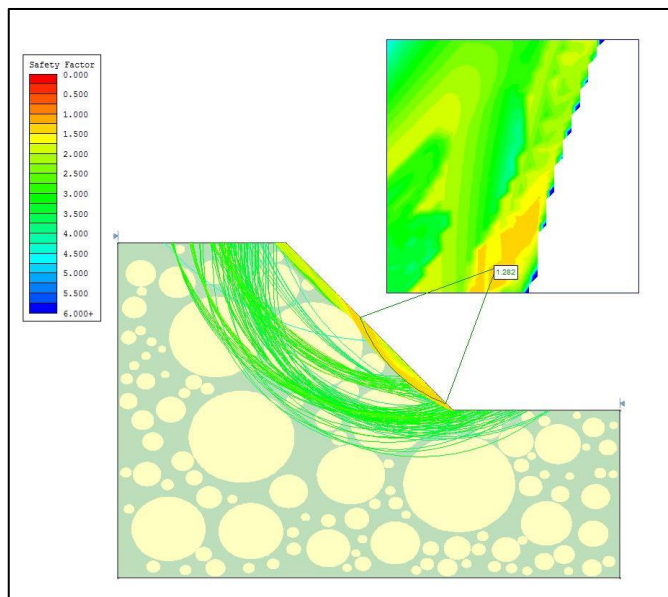
**55\_7\_Bishop**



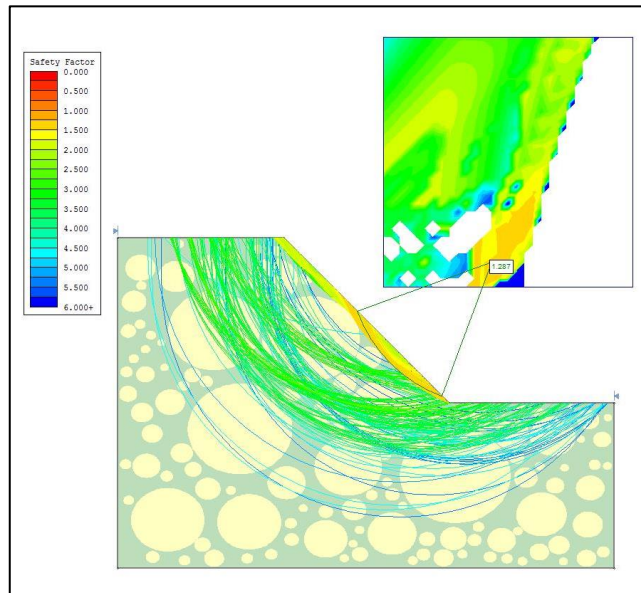
**55\_7\_Spencer**



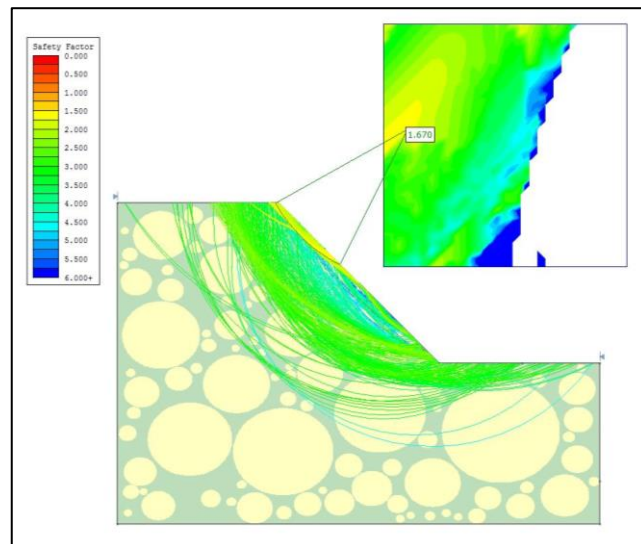
**55\_8\_Bishop**



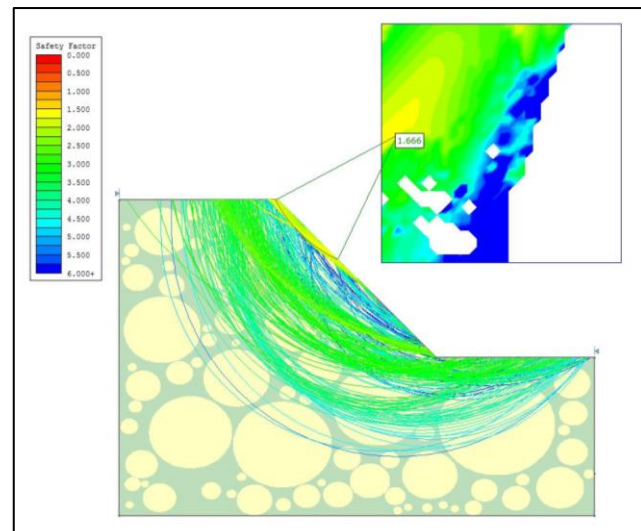
### 55\_8\_Spencer



### 55\_9\_Bishop

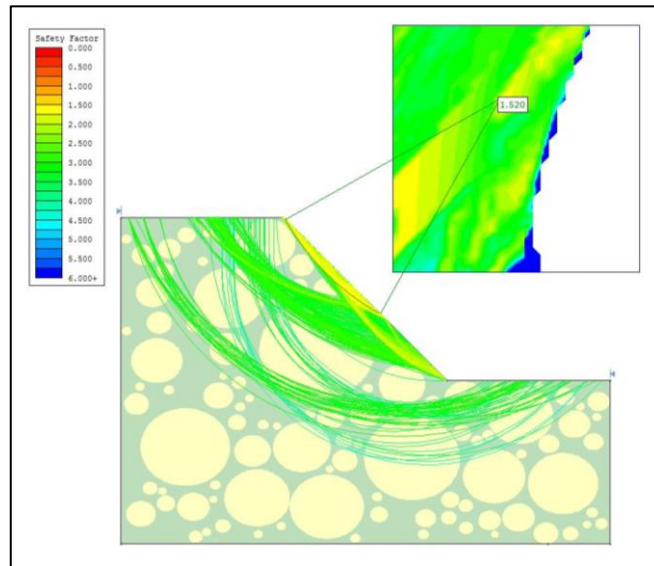


### 55\_9\_Spencer

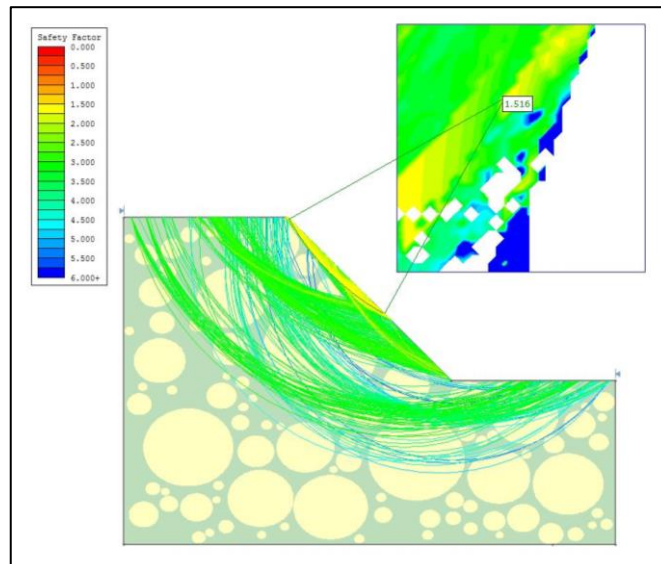




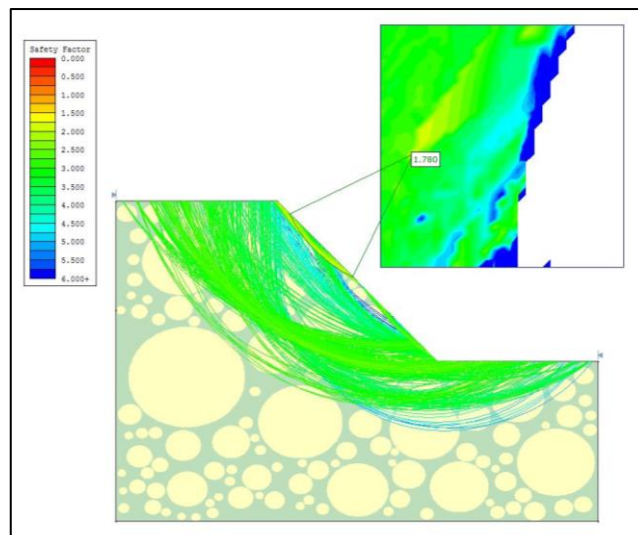
### 55\_10\_Bishop



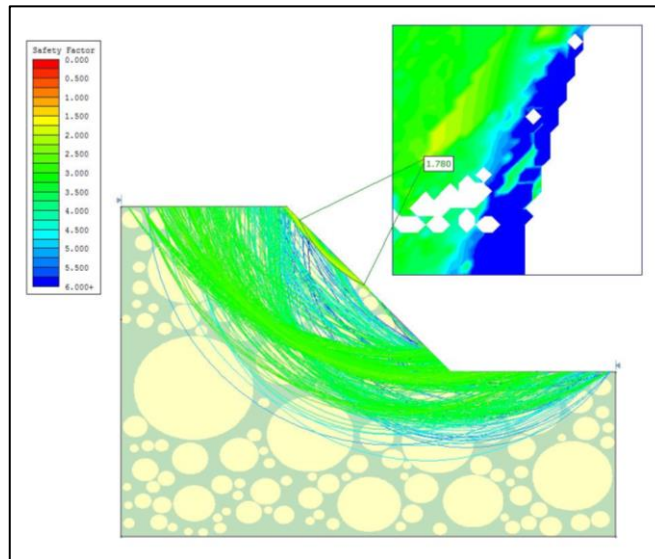
### 55\_10\_Spencer



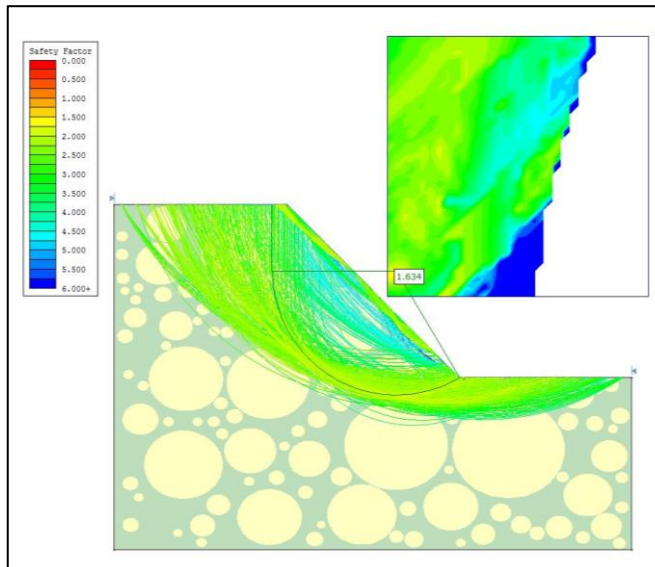
### 55\_11\_Bishop



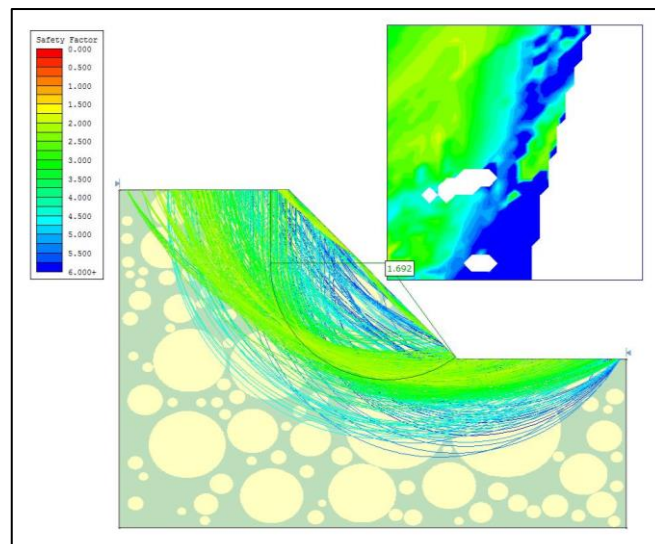
**55\_11\_Spencer**



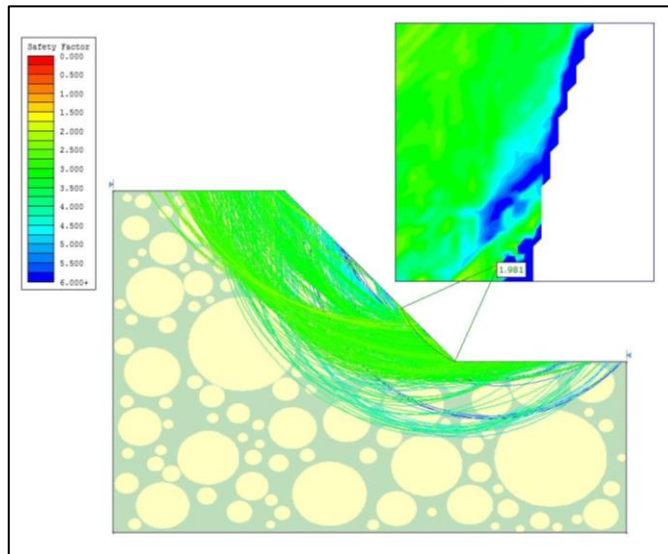
**55\_12\_Bishop**



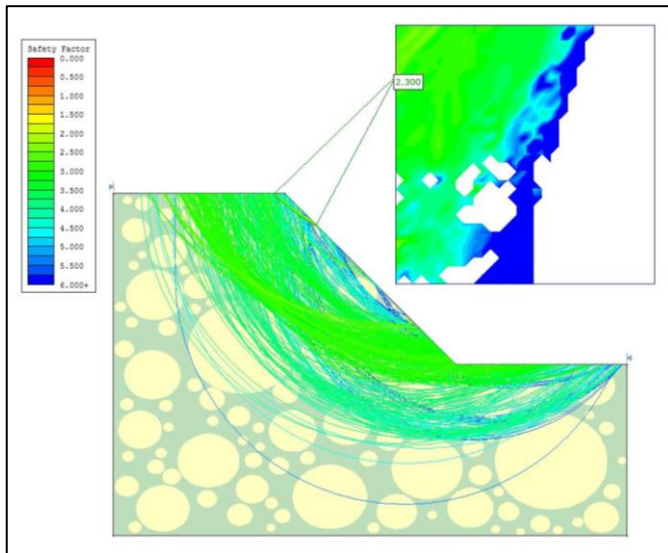
**55\_12\_Spencer**



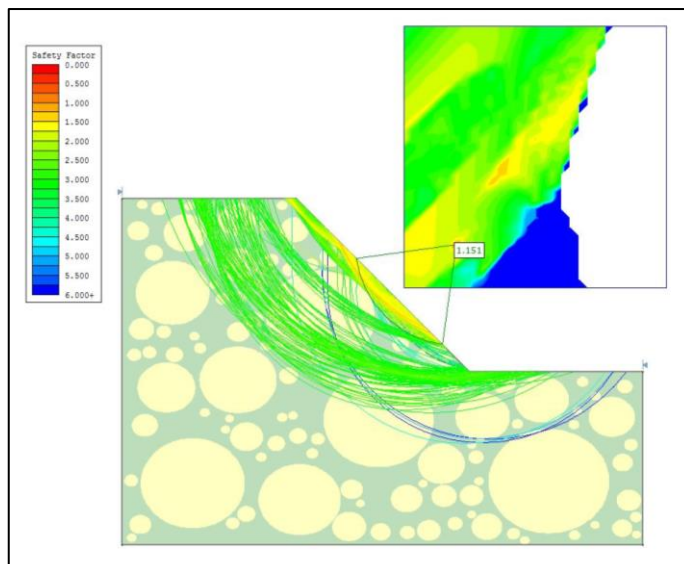
**55\_13\_Bishop**



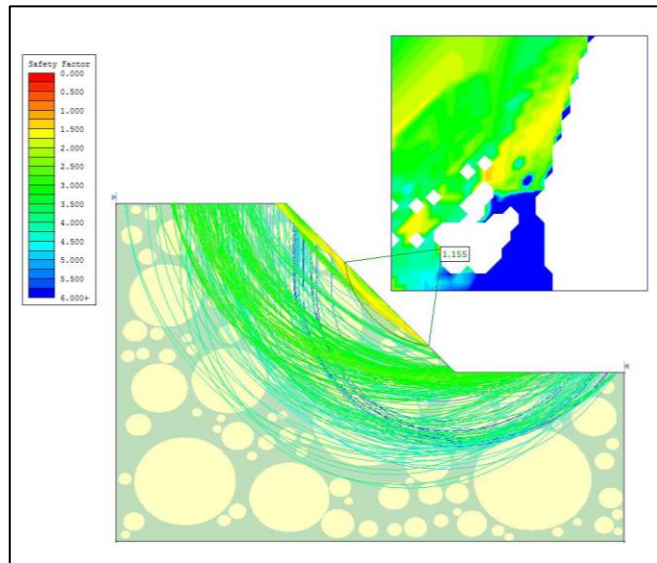
**55\_13\_Spencer**



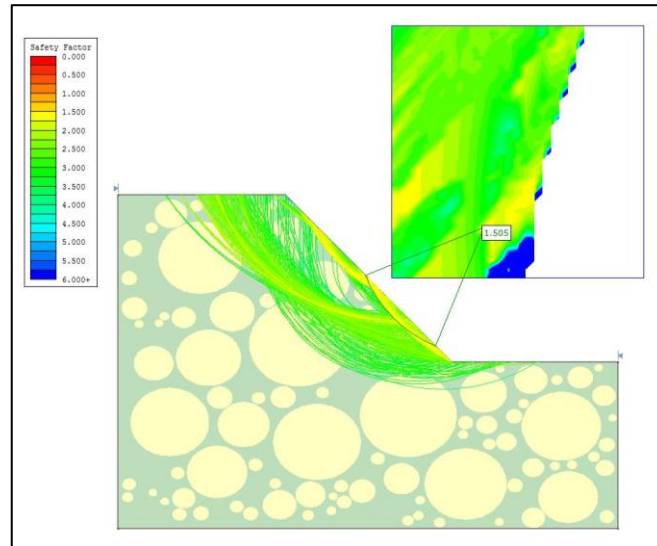
**55\_14\_Bishop**



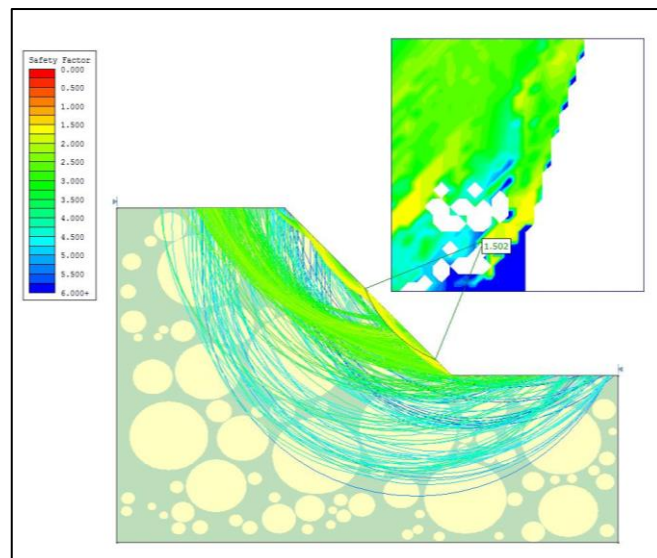
**55\_14\_Spencer**



**55\_15\_Bishop**

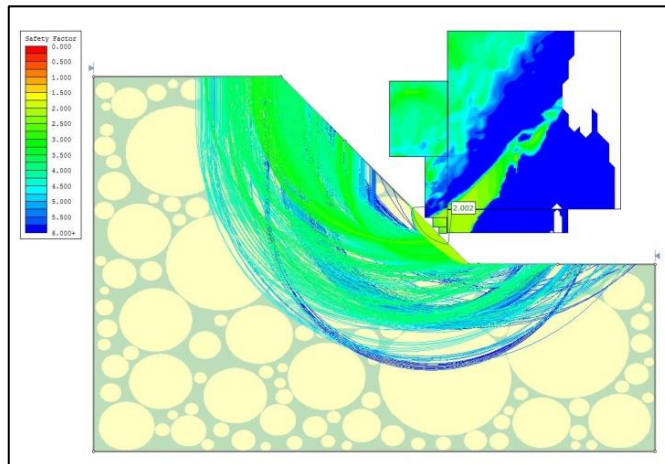


**55\_15\_Spencer**

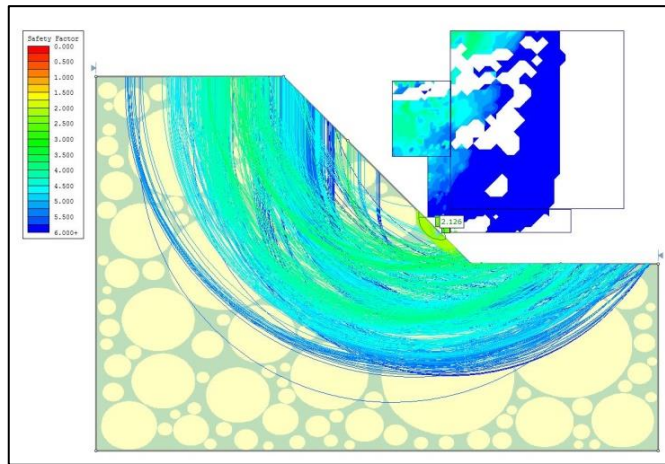




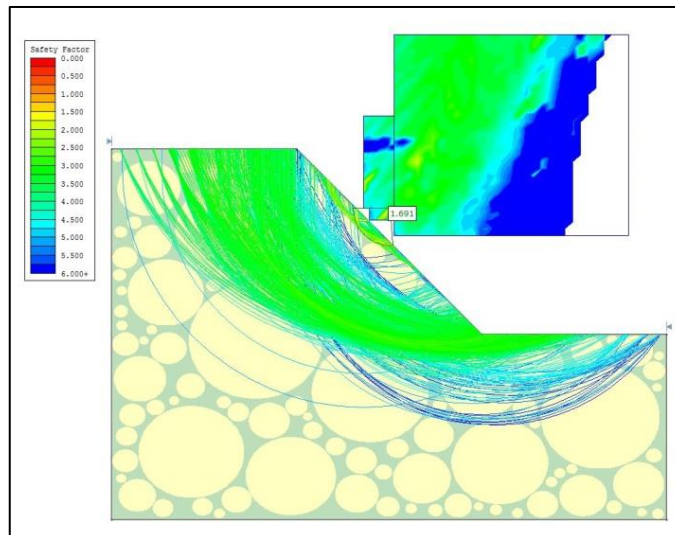
**70\_1\_Bishop**



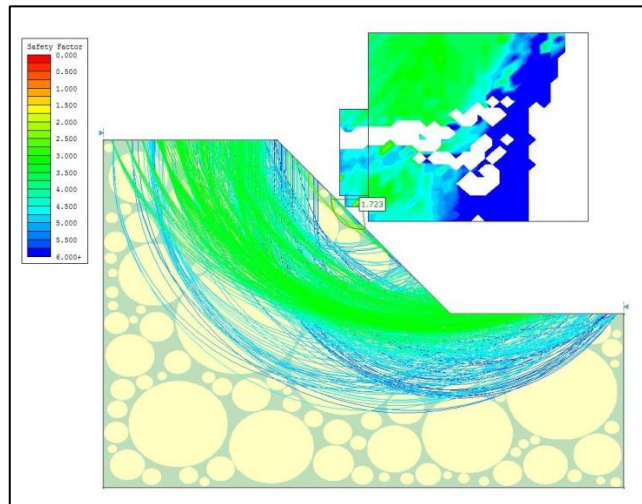
**70\_1\_Spencer**



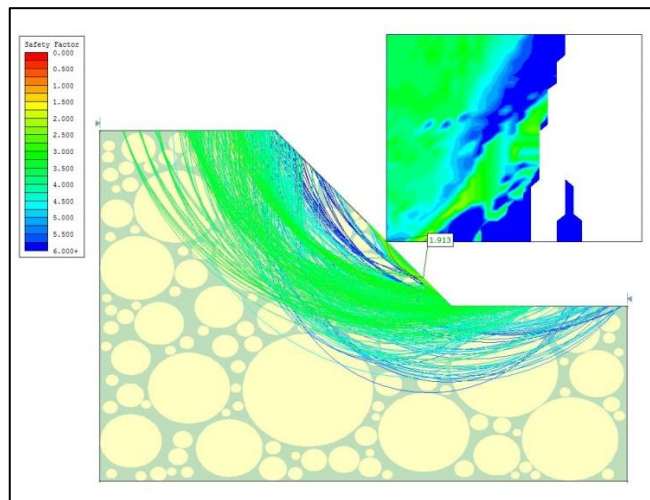
**70\_2\_Bishop**



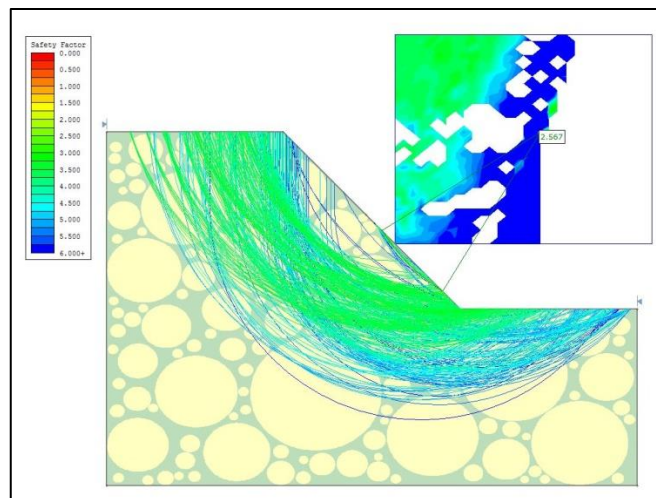
### 70\_2\_Spencer



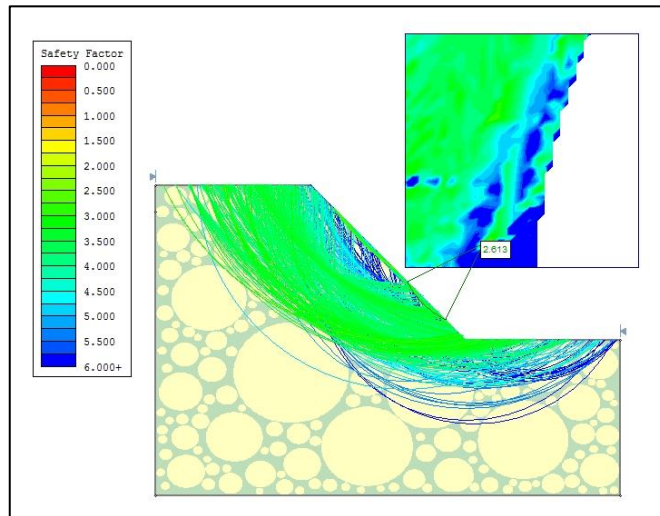
### 70\_3\_Bishop



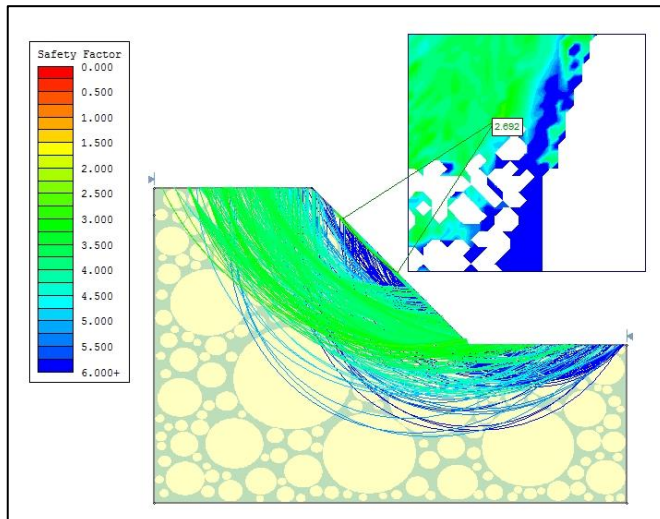
### 70\_3\_Spencer



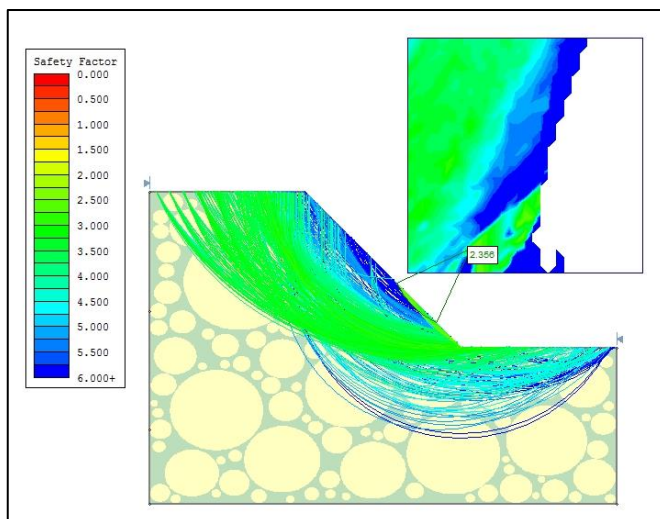
### 70\_4\_Bishop



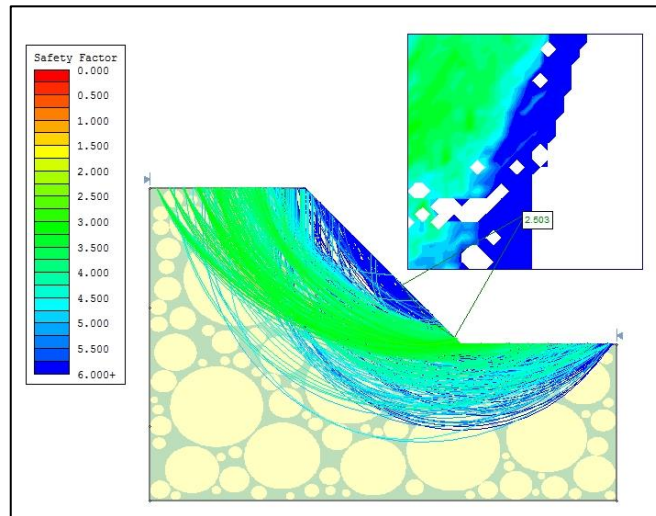
### 70\_4\_Spencer



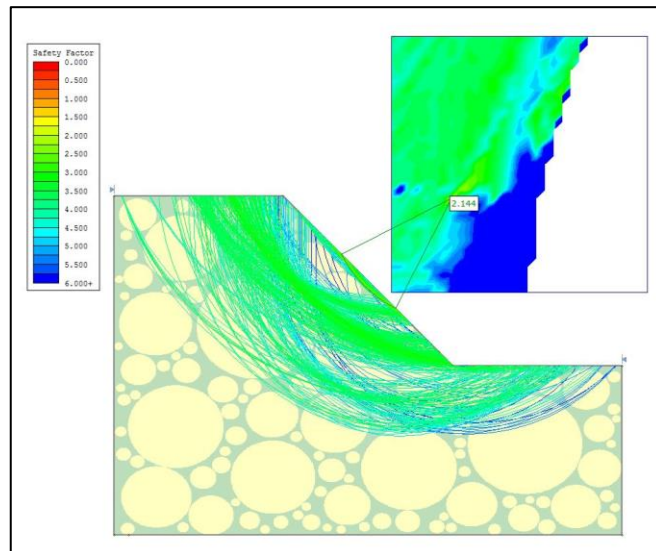
### 70\_5\_Bishop



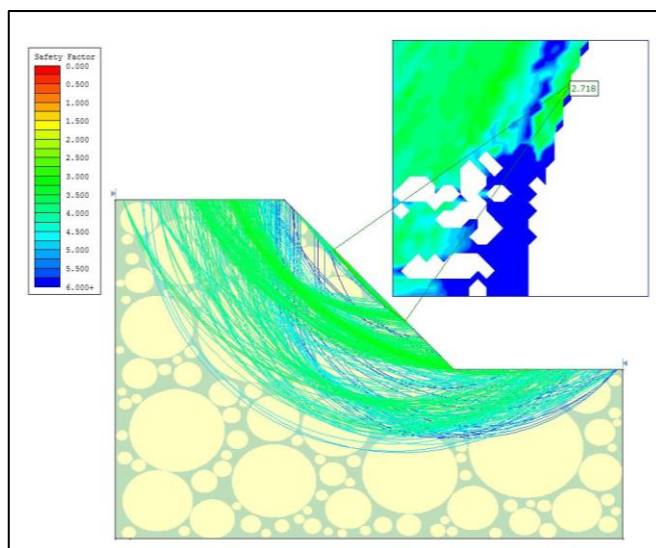
### 70\_5\_Spencer



### 70\_6\_Bishop

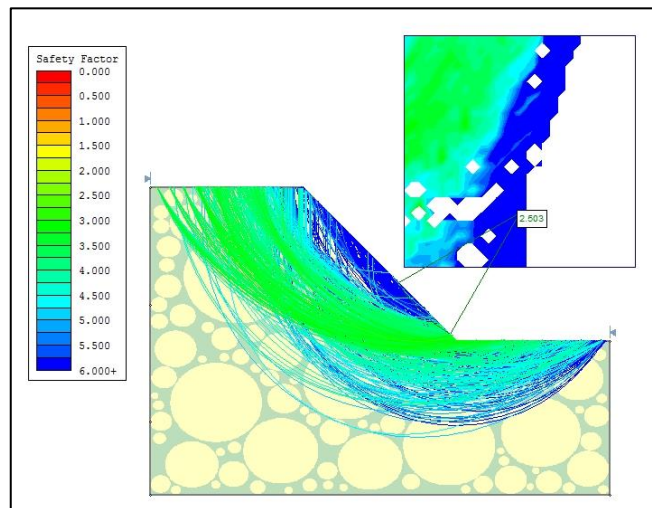


### 70\_6\_Spencer

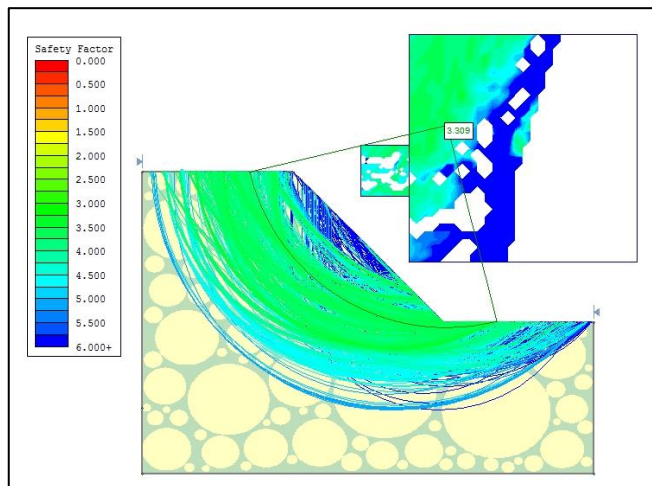




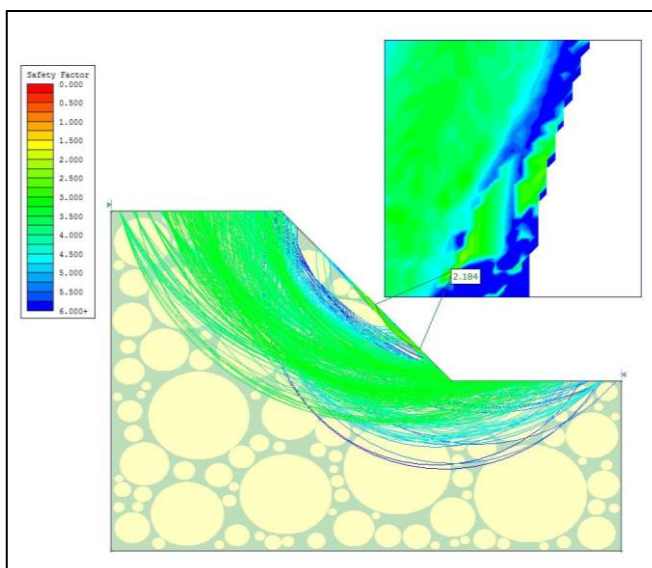
**70\_7\_Bishop**



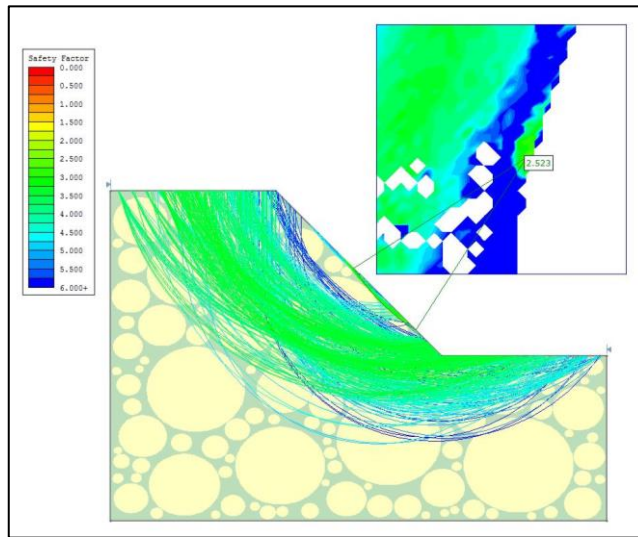
**70\_7\_Spencer**



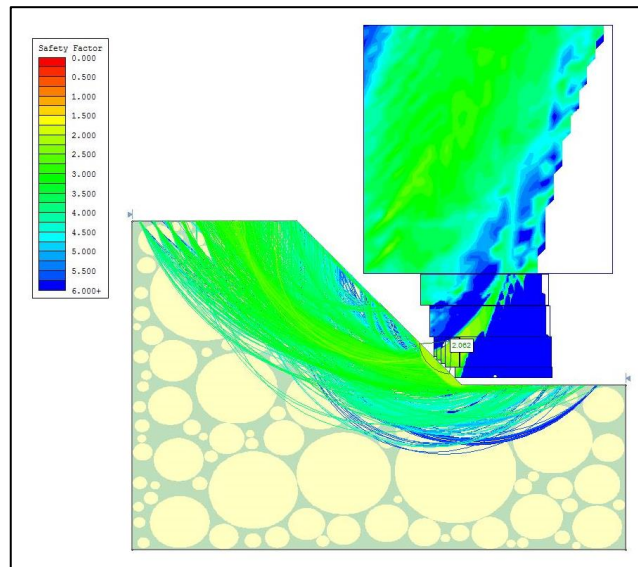
**70\_8\_Bishop**



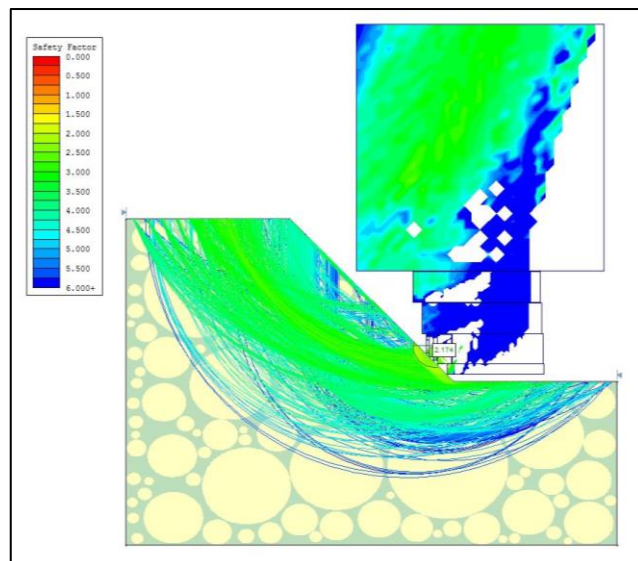
### 70\_8\_Spencer



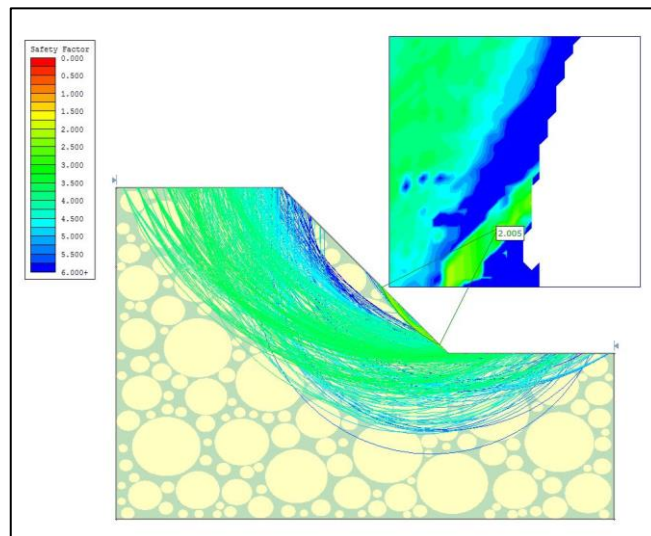
### 70\_9\_Bishop



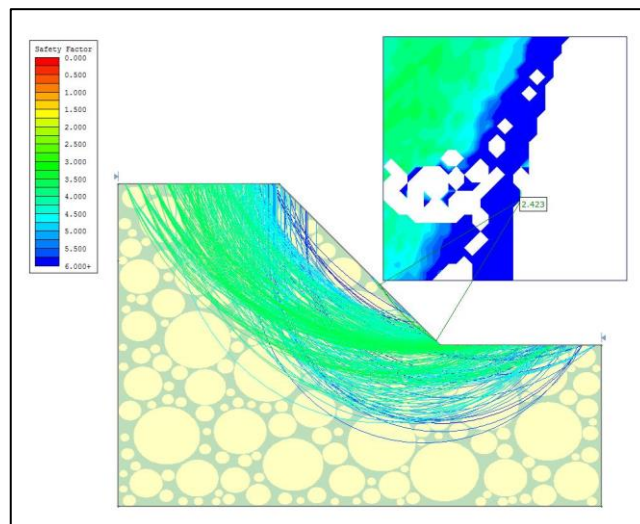
### 70\_9\_Spencer



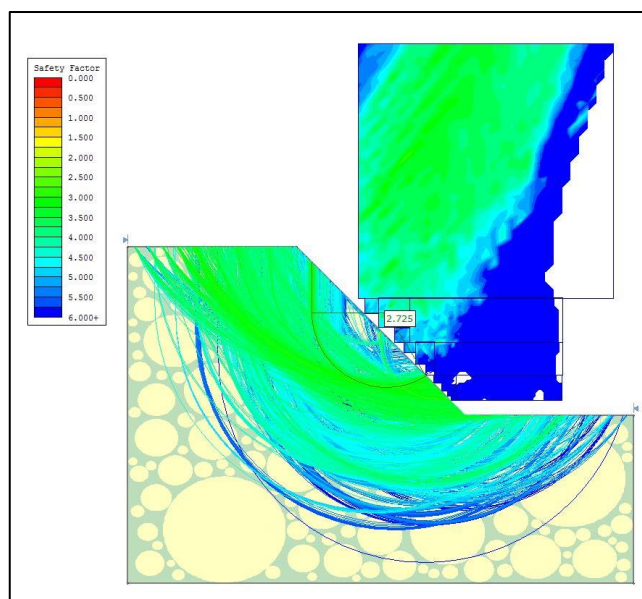
### 70\_10\_Bishop



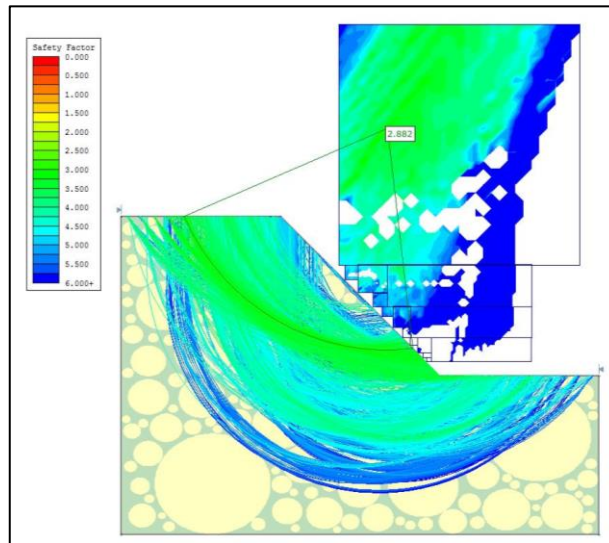
### 70\_10\_Spencer



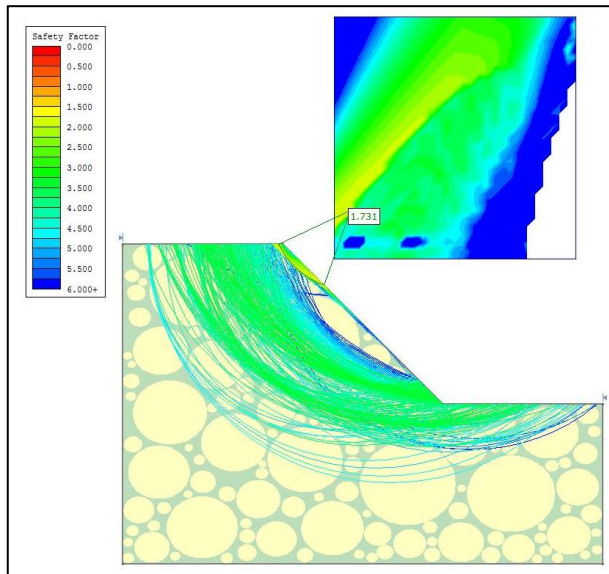
### 70\_11\_Bishop



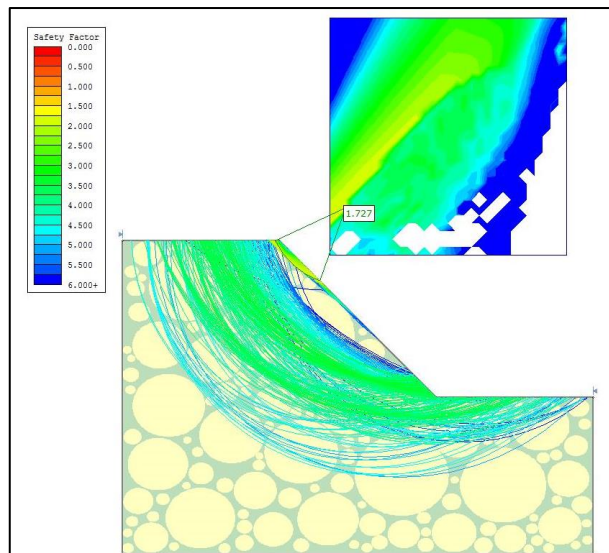
**70\_11\_Spencer**



**70\_12\_Bishop**

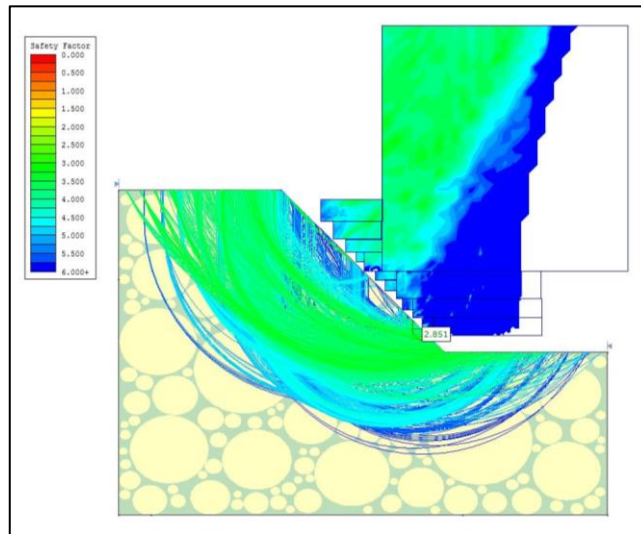


**70\_12\_Spencer**

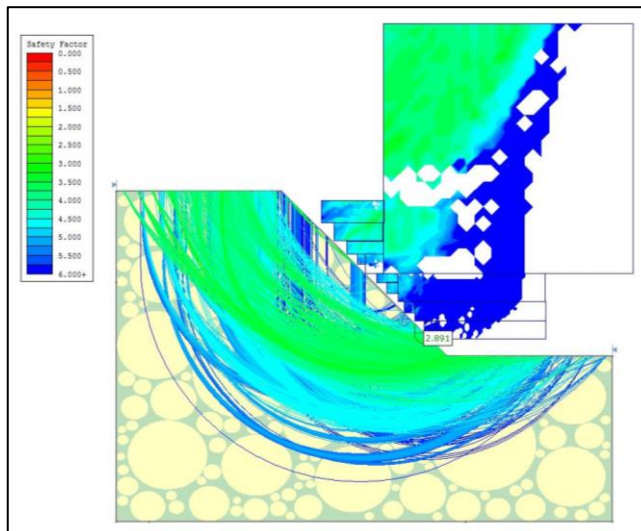




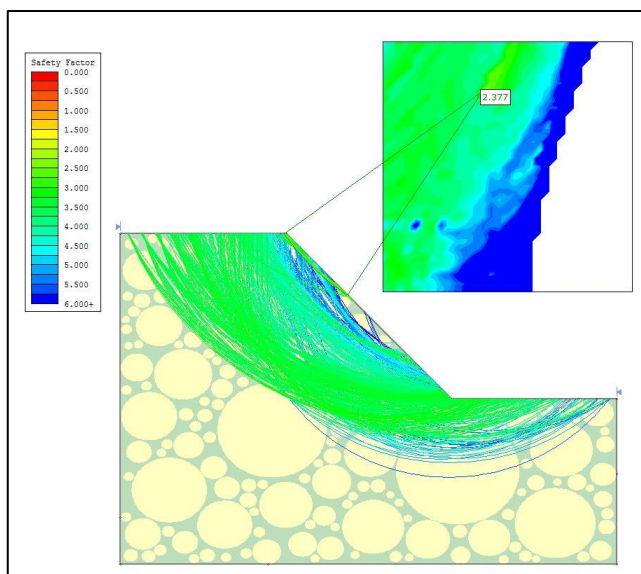
**70\_13\_Bishop**



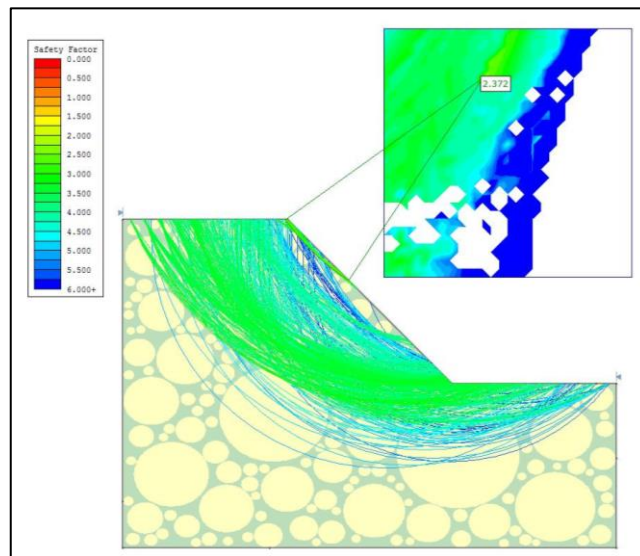
**70\_13\_Spencer**



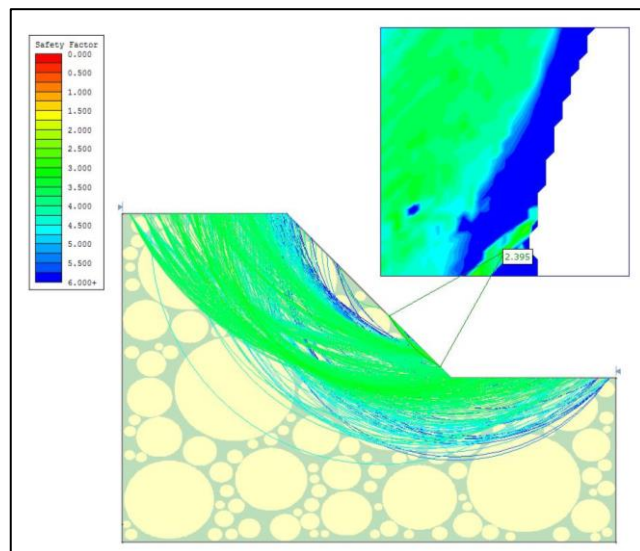
**70\_14\_Bishop**



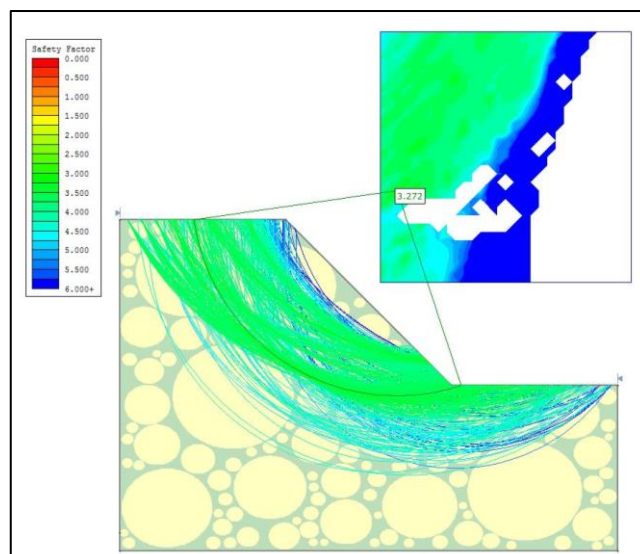
**70\_14\_Spencer**



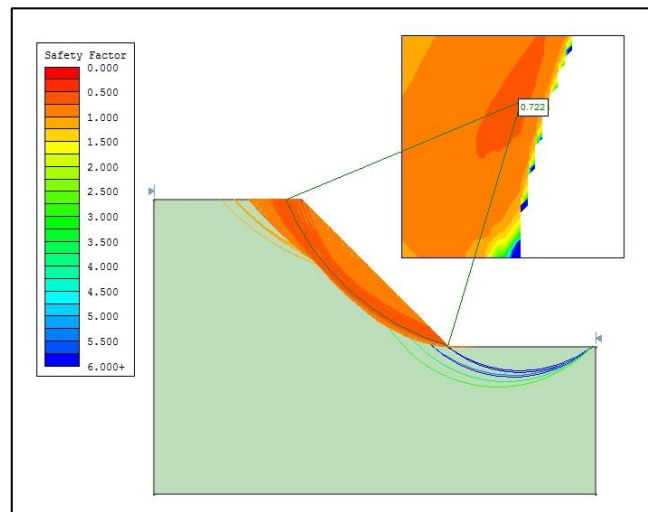
**70\_15\_Bishop**



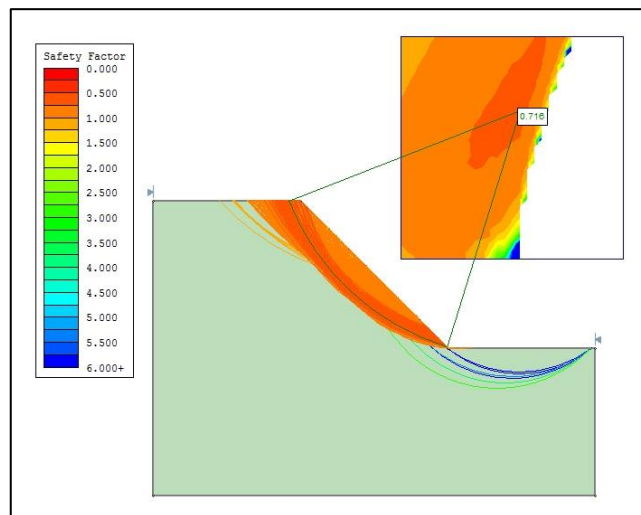
**70\_15\_Spencer**



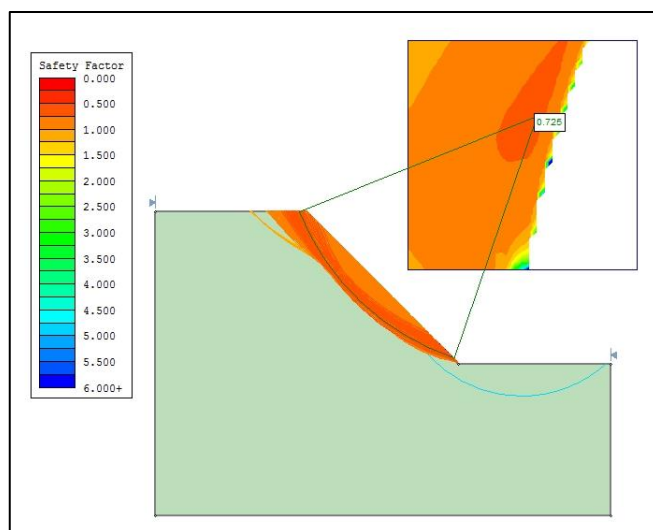
**Kalender\_25\_Bishop**



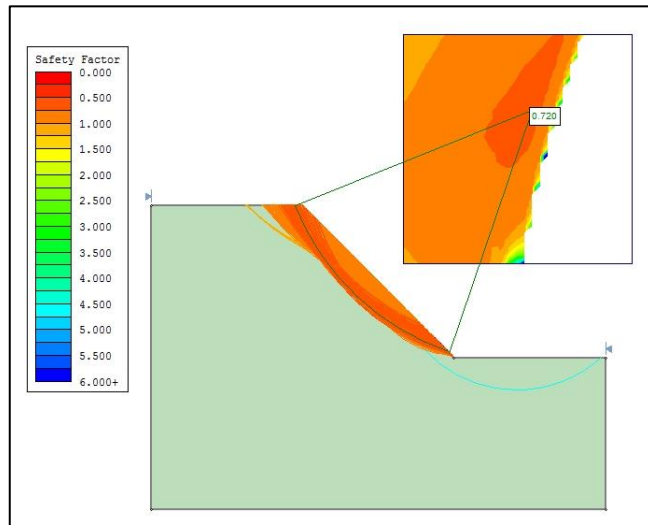
**Kalender\_25\_Spencer**



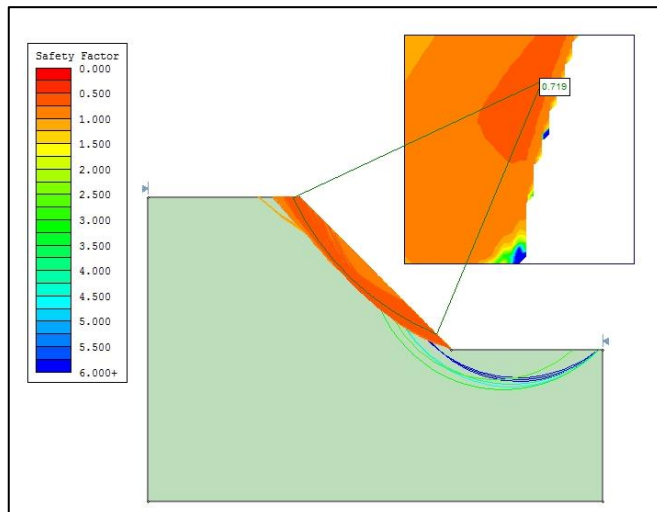
**Kalender\_40\_Bishop**



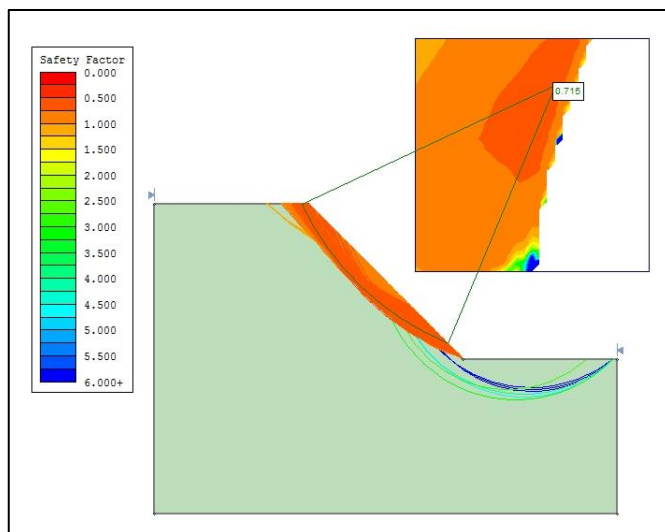
**Kalender\_40\_Spencer**



**Kalender\_55\_Bishop**

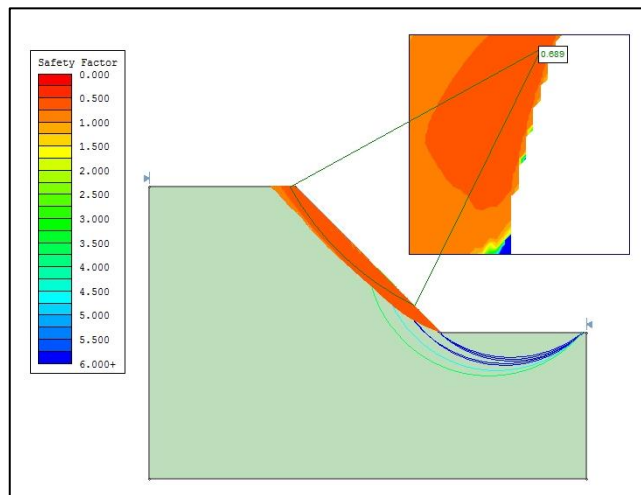


**Kalender\_55\_Spencer**

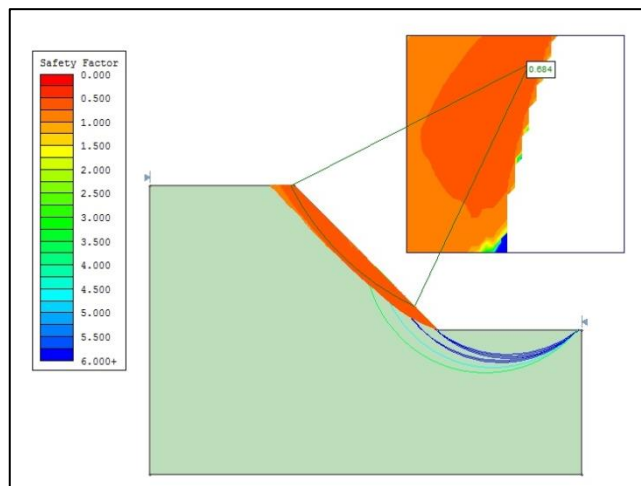




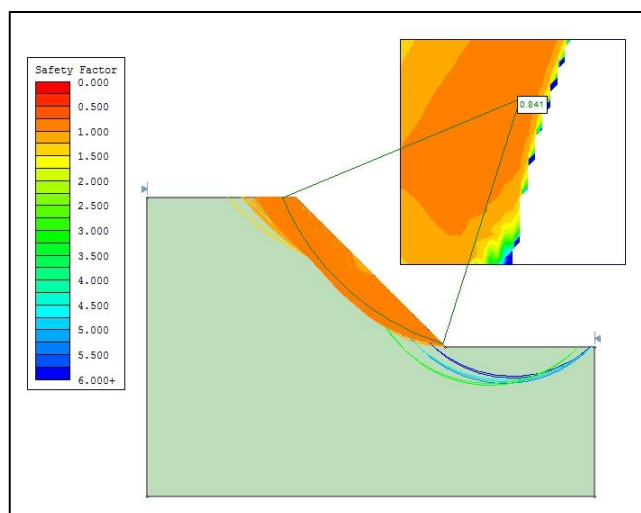
**Kalender\_70\_Bishop**



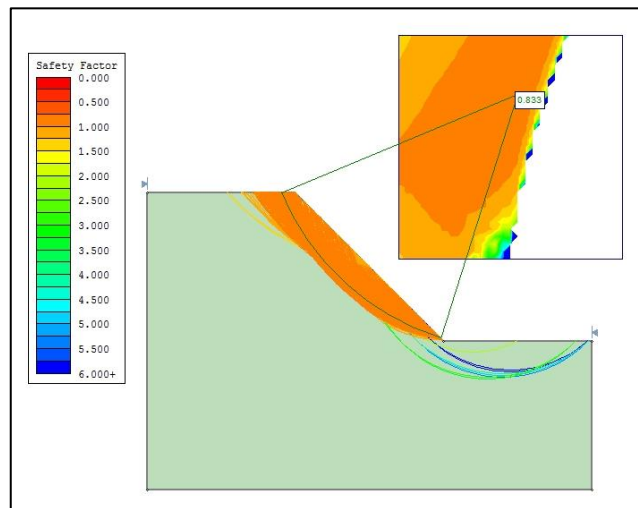
**Kalender\_70\_Spencer**



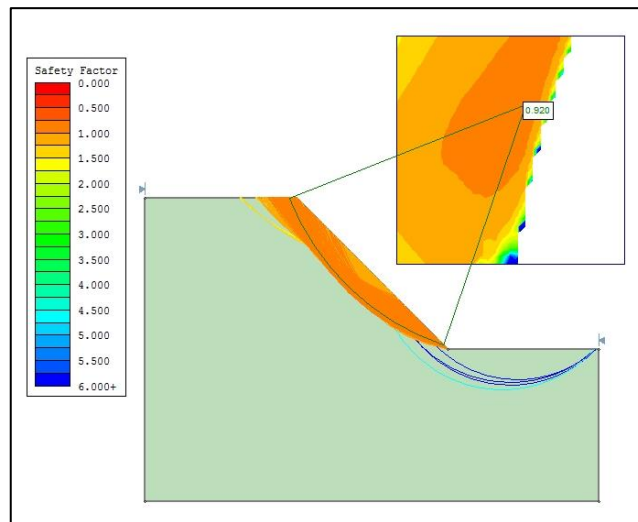
**Lindquist\_40\_Bishop**



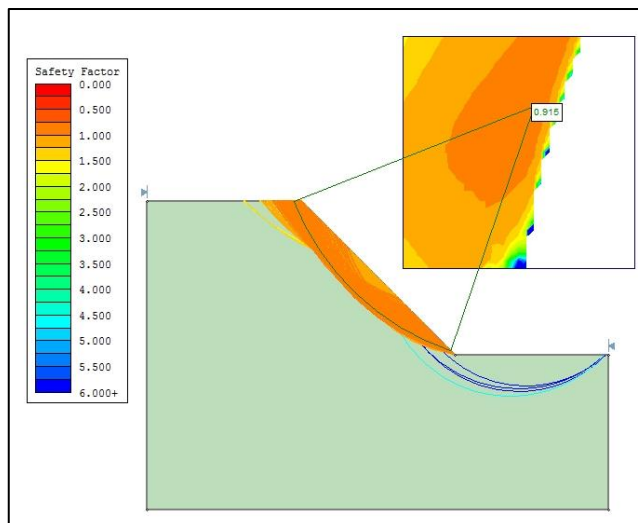
### Lindquist\_40\_Spencer



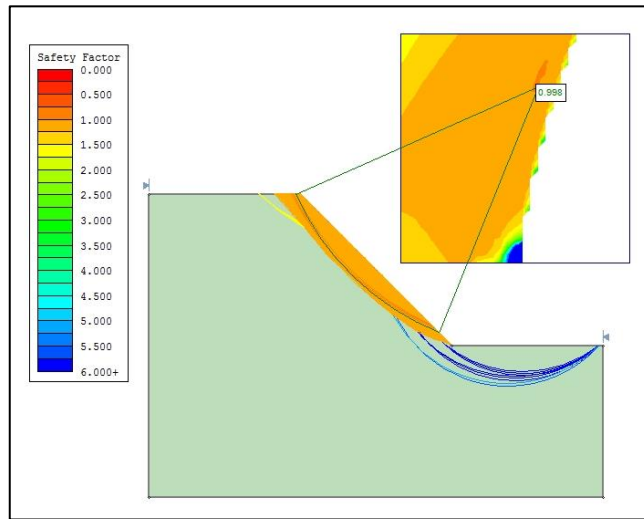
### Lindquist\_55\_Bishop



### Lindquist\_55\_Spencer



### Lindquist\_70\_Bishop



### Lindquist\_70\_Spencer

