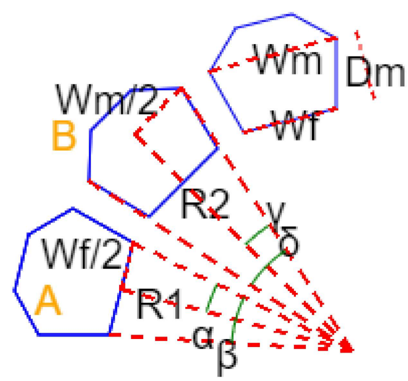
Landscape Block Circle Algorithm : Equations 1 to 4

Derivaton of the following equations is given below

*$R_1$is set to R_s
Eqn 1: $\beta = 2*\arctan(W_f/(2*R_1))$
Eqn 2: $\delta = 2*\arctan(W_m/(2*(R_1 + D_m)))$
Eqn 3: $\varepsilon = \text{maximum}(\beta,\delta)$
Eqn 4: B_r =floor(360/ ε) ... blocks per circle ring if ε is in degrees and floor is the maximun integer less than 360/ ε

Blocks per Diameter

his is about determining how many blocks can be placed in a circle of a given diameter. And that is determine by which angle is greater that for the Dimension Wm or WF.

<table>
<tr><td colspan="2">Note: R_1 is the distance from the center face of the block to the center of a circle of a given diameter D with R_1=D/2 or D=2*R_1.

</td></tr>
<tr><td>For Block A the dimesion R_1 is perpendicular (has a 90 degree angle) to dimension $W_f/2$

so $\tan(\alpha)$ = opposite/adjacent = $(W_f/2)/R_1 = W_f/(2*R_1)$

rearranging to solve for α gives $\alpha = \arctan(W_m/(2*R_1))$

angle β is twice that of α so: $\boldsymbol{\beta = 2*\arctan(W_m/(2*R_1))}$

substituting R_1=D/2 gives $\beta = 2*\arctan(W_m/(2*D/2)$
which simplifies to
$\beta = 2*\arctan(W_m/(D)$ $\beta = 2*\arctan(W_f/(2*R_1))$
Eqn 1:
Eqn 2: $\delta = 2*\arctan(W_m/(2*(R_1 + D_m)))$</td><td>For Block B the dimesion R_2 is perpendicular (has a 90 degree angle) to dimension $W_m/2$

$R_2 = R_1 + D_m$

so $\tan(\gamma)$ = opposite/adjacent = $(W_m/2)/R_2 = W_m/(2*R_2)$
$= W_m/(2*(R_1 + D_m))$

rearranging to solve for γ gives $\gamma = \arctan(W_m/(2*(R_1 + D_m)))$

angle δ is twice that of γ so: $\boldsymbol{\delta = 2*\arctan(W_m/(2*(R_1 + D_m)))}$

substituting R_1=D/2 gives
$\delta = 2*\arctan(W_m/(2*(D/2 + D_m))$
which simplifies to
$\delta = 2*\arctan(W_m/(D+ 2*D_m))$</td></tr>
</table>