

*STRAP LENGTH CALCULATIONS FOR 34° SOIL, 250 PSF LIVE LOAD SURCHARGE (WITH A 3.0' MIN. SETBACK FROM THE TOP OF THE WALL), NO BACK SLOPE, NO FRONT SLOPE.*

**ROSETTA BLOCKS**

STRAP DESIGNED FOR 12"x6' BLOCK

(LARGEST BLOCK AREA PER SINGLE LIFT HOOK)

$H_{BLOCK} = 12"$

$L_{BLOCK} = 6'$

$W_{BLOCK} = 18"$  (CALCULATED BLOCK WIDTH / THEORETICAL TOE LOCATION)

$G_U = 8.6"$  (FROM THEORETICAL TOE)

WALL BATTER = 3" HORIZONTAL/12" VERTICAL,  $\omega = 14.0^\circ$

**REINFORCED SOIL PROPERTIES**

$\phi_i = 34^\circ$

$\gamma_i = 120$  PCF

$\delta_i = \frac{2}{3} \phi_i = 22.7^\circ$

$K_A = 0.167$

$K_{AH} = K_A \cos(\delta_i - \omega) = 0.165$

$\alpha_i = 52.9^\circ$

**PARAWEB 30 STRAP (VALUES PUBLISHED BY LINEAR COMPOSITES)**

$W_s = 3.25"$

$RF_D = 1.05$

$FS_{UNC} = 1.5$

$T_{ULT} = 6744$  LB

$RF_{ID} = 1.04$  (SAND)

$T_{ALLOW} = T_{ULT} / RF_D RF_{ID} RF_{CR} FS_{UNC} = 2656$  LB

$C_i = 0.8$  (34° SOIL)

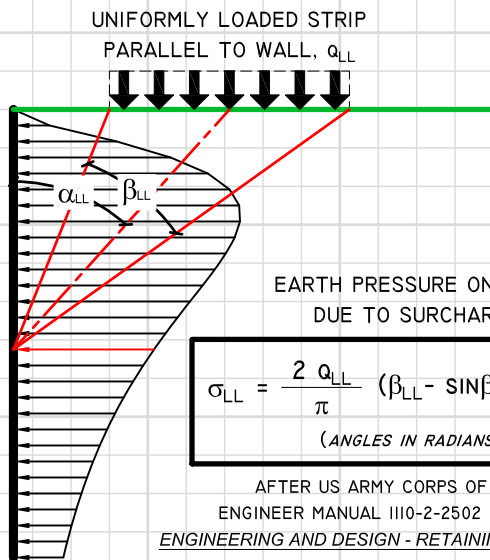
$RF_{CR} = 1.55$

**HORIZONTAL EARTH PRESSURE LOAD ON THE FACING BLOCK**

THE FORCE ACTING ON THE FACING BLOCK:

$F_{PO} = K_{AH} \times \sigma_N \times A_{BLOCK} = K_{AH} \times (\text{DEPTH}_{MIDDLE OF BLOCK} \times \gamma_i + Q_{DL} + Q_{LL}) \times A_{BLOCK}$

THE INCREASED PRESSURE ACTING ON THE WALL FROM THE LIVE LOAD SURCHARGE ( $Q_{LL}$ ) IS CALCULATED USING THE METHOD OUTLINED IN THE US ARMY CORPS OF ENGINEERS EM 1110-2-2502.



FOR THE TOP BLOCK WITH A 3' SETBACK

AND A 50' WIDE SURCHARGE AREA,

$\alpha_{LL} = 1.5529$  AND  $\beta_{LL} = 0.1557$

$\sigma_{LL} = \frac{2 \times 250}{\pi} (0.1557 - \sin 0.1557 \times \cos 3.1058)$

$\sigma_{LL} = 49.4$  PSF

$$\sigma_{LL} = \frac{2 q_{LL}}{\pi} (\beta_{LL} - \sin \beta_{LL} \times \cos 2\alpha_{LL})$$
 (ANGLES IN RADIANS)

AFTER US ARMY CORPS OF ENGINEERS  
 ENGINEER MANUAL 1110-2-2502 (29 SEPT 1989)  
 ENGINEERING AND DESIGN - RETAINING AND FLOOD WALLS

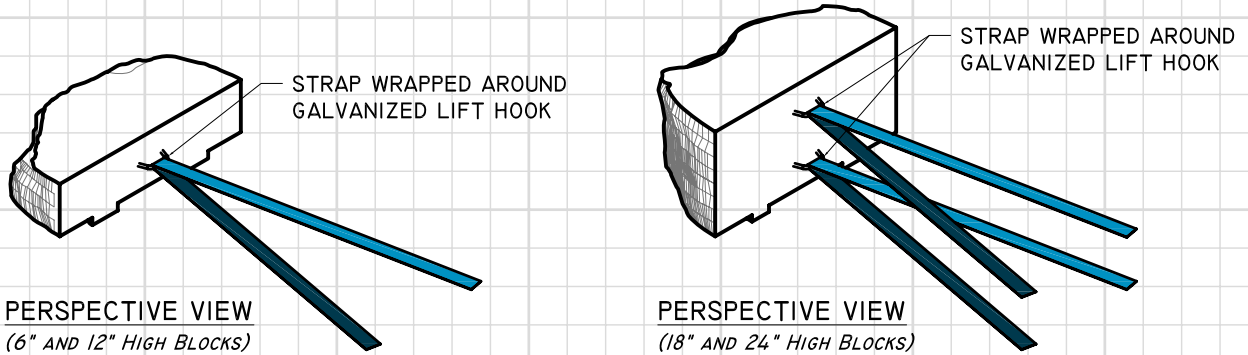
AND THE FORCE ACTING ON THE TOP BLOCK IS:

$F_{PO} = K_{AH} \times \sigma_N \times A_{BLOCK} = K_{AH} \times (\text{DEPTH}_{MIDDLE OF BLOCK} \times \gamma_i + Q_{DL} + Q_{LL}) \times A_{BLOCK}$   
 $= 0.165 \times (0.5 \times 120 + 0 + 49.4) \times 6$   
 $= 108.3$  LB

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**PARAWEB STRAP CONNECTION**

FOR REINFORCED SOIL WALLS, INDIVIDUAL ROSETTA FACING BLOCKS ARE HELD IN PLACE WITH PARAWEB GEOSYNTHETIC STRAP. THE STRAP IS LOOPED AROUND A GALVANIZED LIFT HOOK CAST INTO THE BACK OF THE ROSETTA BLOCKS. THERE IS ONE LIFT HOOK (AND STRAP CONNECTION) IN 6" AND 12" HIGH ROSETTA BLOCKS AND TWO LIFT HOOKS (AND STRAP CONNECTIONS) IN 18" AND 24" HIGH ROSETTA BLOCKS.



**LENGTH OF PARAWEB STRAP TO RESIST PULLOUT FROM THE SOIL**

CAPACITY OF THE INDIVIDUAL PARAWEB STRAP TO RESIST PULLOUT:

$$R_{P0} = C_1 \times L_E \times W_s \times 2 \text{ LEGS/HOOK} \times 2 \text{ SIDES/LEG} \times \sigma_N \text{ (DEAD LOAD COMPONENT ONLY)} \times \tan \phi_1$$

FOR THE STRAP RESISTING PULLOUT ON THE TOP BLOCK:

$$R_{P0} = 0.8 \times L_E \times 0.271' \times 2 \text{ LEGS/HOOK} \times 2 \text{ SIDES/LEG} \times (0.5 \times 120) \times \tan 34^\circ$$

$$= 35.1 \times L_E \text{ LB}$$

SETTING  $R_{P0} = F_{P0} \times 1.5$  (FACTOR OF SAFETY), RESULTS IN  $L_E = 4.6$  FT.

ADDITIONAL CALCULATIONS FOR LOWER BLOCKS IN THE WALL SHOW THIS  $L_E$  TO BE THE LONGEST REQUIRED STRAP EMBEDMENT LENGTH. FOR TYPICAL CONSTRUCTION, THIS LENGTH OF STRAP IS USED ON ALL BLOCKS IN THE WALL.

**LENGTH OF PARAWEB STRAP IN THE ACTIVE ZONE**

ADDITIONAL STRAP IS REQUIRED TO INSURE  $L_E$  IS LOCATED BEYOND THE LOCAL FAILURE SURFACE BETWEEN GEOGRID LAYERS. THE LENGTH OF STRAP IN THE ACTIVE ZONE,  $L_A$  IS CALCULATED BY:

$$L_A = \text{GEOGRID LAYER VERTICAL SPACING} / \tan \alpha_1$$

WITH A 30" MAXIMUM SPACING BETWEEN GEOGRID LAYERS:

$$L_A = 30" / \tan 52.9^\circ = 1.9 \text{ FT}$$

**TOTAL STRAP LENGTH**

THE STRAP REQUIRED FOR EACH BLOCK IS THE SUM OF THE EMBEDMENT AND ACTIVE LENGTHS:

$$L_{MIN} = L_E + L_A$$

$$= 4.6 \text{ FT} + 1.9 \text{ FT}$$

$$= \mathbf{6.5 \text{ FT / LEG OR 13 FT / HOOK}}$$

*(NOTE: THIS IS THE STRAP LENGTH SHOWN IN THE ROSETTA HARDSCAPES PRELIMINARY WALL HEIGHT GUIDE)*