Shoring Design Parameters

Taken from Geotech Consultants report dated May 28, 2021

Cantilevered Temporary or Permanent with level back slope	40 pcf w/ 1.5 FOS
Cantilevered Temporary or Permanent with sloped back slope	60 pcf w/ 1.5 FOS
Cantilevered Permanent	9xH psf w/ 1.2 FOS
Traffic surcharge on temporary or permanent wall	Add 2' to des ht
Catchment Walls north of garage	

Lagging Design

For Pile Spacing < 6' use .3 x ECP
For Permanent Walls Use ECP

Lagging Design

Piles P4 - P8

Wood Lagging

$Fb := 1.15 \cdot 1.1 \cdot .9$

$Hmax := 13.67$ $ECP := .04$ $Spac := 4.66$ $wh := Hmax \cdot ECP$ $wh = 0.547$

$Mh := wh \cdot \dfrac{Spac^2}{8}$ $Mh = 1.484$ $Treq := \left(\dfrac{Mh \cdot .3 \cdot 12}{2 \cdot Fb} \right)^{.5}$ $Treq = 1.532$

Use: 4x lagging

Permanent Wall

$whu := wh \cdot 1.6$ $Mhu := \dfrac{Spac^2 \cdot whu}{8}$ $Mhu = 2.375$

$d := 4$ $As := .2$ $a := \dfrac{60 \cdot As}{.85 \cdot 12 \cdot 2.5}$ $a = 0.471$

$PhiMc := As \cdot 60 \cdot .9 \cdot \left(d - \dfrac{a}{2} \right) \cdot \dfrac{1}{12}$ $PhiMc = 3.388$ Use: 8" Conc wall with #4v&h @ 12" ea way

Welded Studs

$Rmax := wh \cdot Spac$ $Rmax = 2.548$ $Tall := \dfrac{11}{1.6}$ $Tall = 6.875$

Use: 3/4"dia x 6" welded headed studs @ 18" oc

Piles P19 - P2

Wood Lagging

$Fb := 1.15 \cdot 1.1 \cdot .9$

$Hmax := 40 - 27.33 \quad Hmax = 12.67 \quad ECP := .06 \quad Spac := 6 \quad wh := Hmax \cdot ECP \quad wh = 0.76$

$Mh := wh \cdot \dfrac{Spac^2}{8} \qquad Mh = 3.421 \qquad Treq := \left(\dfrac{Mh \cdot .3 \cdot 12}{2 \cdot Fb}\right)^{.5} \qquad Treq = 2.326$

Use: 4x lagging

Permanent Wall

$whu := wh \cdot 1.6 \qquad Mhu := \dfrac{Spac^2 \cdot whu}{8} \qquad Mhu = 5.473$

$d := 4 \quad A := .31 \quad Sp := 10 \qquad As := A \cdot \dfrac{12}{Sp} \qquad a := \dfrac{60 \cdot As}{.85 \cdot 12 \cdot 2.5} \qquad a = 0.875$

$PhiMc := As \cdot 60 \cdot .9 \cdot \left(d - \dfrac{a}{2}\right) \cdot \dfrac{1}{12} \qquad PhiMc = 5.963 \qquad$ Use: 8" Conc wall with #5h @ 10"
                                                                   & #4v @ 12" ea way

Welded Studs

$Rmax := wh \cdot Spac \qquad Rmax = 4.561 \qquad Tall := \dfrac{11}{1.6} \qquad Tall = 6.875$

$\dfrac{Tall \cdot 12}{Rmax} = 18.087 \qquad\qquad$ Use: 3/4"dia x 6" welded headed
                                                                    studs @ 18" oc

Piles P19 - P23

Wood Lagging

$Fb := 1.15 \cdot 1.1 \cdot .9$

$Hmax := 47.17 - 27.33 \quad Hmax = 19.84 \quad ECP := .06 \quad Spac := 6 \quad wh := Hmax \cdot ECP \quad wh = 1.19$

$Mh := wh \cdot \dfrac{Spac^2}{8} \qquad Mh = 5.357 \qquad Treq := \left(\dfrac{Mh \cdot .3 \cdot 12}{2 \cdot Fb}\right)^{.5} \qquad Treq = 2.91$

Use: 4x lagging

Permanent Wall

$whu := wh \cdot 1.6 \qquad Mhu := \dfrac{Spac^2 \cdot whu}{8} \qquad Mhu = 8.571$

$d := 4 \quad A := .31 \quad Sp := 10 \qquad As := A \cdot \dfrac{12}{Sp} \qquad a := \dfrac{60 \cdot As}{.85 \cdot 12 \cdot 2.5} \qquad a = 0.875$

$PhiMc := As \cdot 60 \cdot .9 \cdot \left(d - \dfrac{a}{2}\right) \cdot \dfrac{1}{12} \qquad PhiMc = 5.963 \qquad$ Use: 8" Conc wall with #5h @ 10"
                                                                    & #4v @ 12" ea way

Welded Studs

$Rmax := wh \cdot Spac \qquad Rmax = 7.142 \qquad Tall := \dfrac{11}{1.6} \qquad Tall = 6.875$

$\dfrac{Tall \cdot 12}{Rmax} = 11.551 \qquad\qquad$ Use: 3/4"dia x 6" welded headed
                                                                    studs @ 18" oc