OHIO DEPARTMENT OF TRANSPORTATION

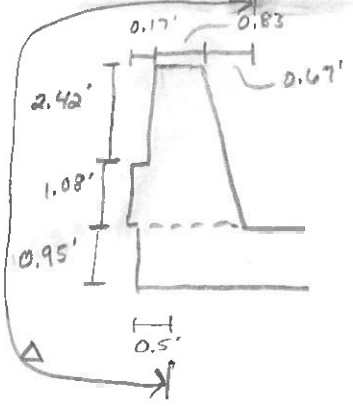
PLANNING & ENGINEERING DEPARTMENT, DISTRICT 4

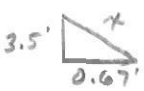
Project ATB-11-22.16 — Calc By MA Date ____

Desc Concrete Sealing — Chk By ____ Date ____

PID/PROJ 84625

ATB-11-2344 L : Parapet





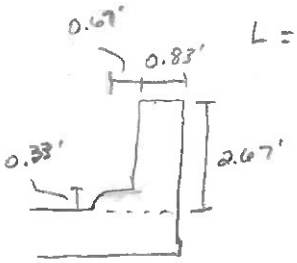
$x = \sqrt{3.5^2 + 0.67^2} = \sqrt{12.25 + 0.45} = 3.56'$

Δ = sealing limits length = 365.62'

$P = 0.5' + 0.95' + 0.17' + 1.08' + 0.17' + 2.42' + 0.83' + 3.56' = 9.68'$

$A = 9.68' \times 365.62' \times \frac{SY}{9SF} = 393.24\ SY$

approach parapets:



L = 50'

$P = 0.33' + 0.67' + 2.34' + 0.83' + 2.67' = 6.84'$

$P_{avg} = \frac{6.84' + 9.68'}{2} = 8.26'$

$A = 8.26' \times 50' \times \frac{SY}{9\ SF} = 45.89\ SY$

$\Sigma = (393.24 + 45.89) \times 2\ \text{sides} = 878.26 \approx \boxed{879\ SY}$

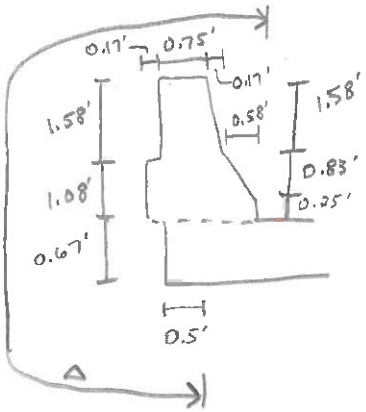
ATB-11-2344R : Parapet

See ATB-11-2344L

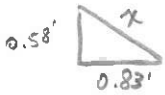
Project ATB-11-22.16 Calc By MA Date
Desc Concrete Sealing Chk By Date
PID/PROJ 84625

ATB-11-2515 : Parapet

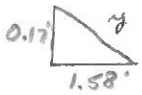
L = 234.54'



△ = sealing limits



$x = \sqrt{0.83^2 + 0.58^2} = 1.01'$

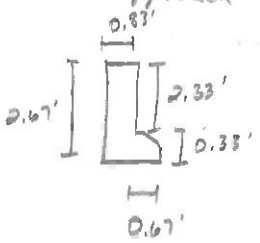


$y = \sqrt{0.17^2 + 1.58^2} = 1.59'$

$P = 0.5' + 0.67' + 0.17' + 1.08' + 0.17' + 1.58' + 0.75' + 1.01' + 1.59' + 0.25'$
$= 7.77'$

$A = 7.77' \times 234.54' \times \frac{SY}{9\ SF} = 202.49\ SY$

Approach Parapets :



L = 50'

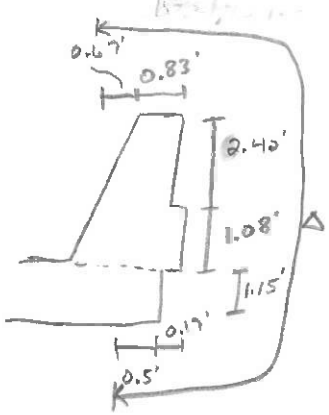
$P = 2.67' + 0.83' + 2.33' + 0.67' + 0.33' = 6.83'$

$P_{avg.} = \frac{6.83' + 7.77'}{2} = 7.30'$

$A = 7.30' \times 50' \times \frac{SY}{9\ SF} = 40.56\ SY$

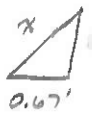
$\Sigma = (202.94 + 40.56) \times 2\ sides = \boxed{487\ SY}$

ATB-11-2515 L : Parapet



L = 1,157.5'

Δ = sealing limits



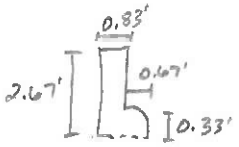
$x = \sqrt{3.5^2 + 0.67^2} = 3.56'$

$P = 3.56' + 0.83' + 2.42' + 0.17' + 1.08' + 0.17' + 1.15' + 0.5' = 9.88'$

$A = 1{,}157.5' \times 9.88' \times \frac{SY}{9\ SF} = 1{,}270.68\ SY$

Approach Parapet

L = 32.5'



$P = 2.67' + 0.83' + 2.34' + 0.67' + 0.33' = 6.84'$

$P_{avg.} = \frac{9.88' + 6.84'}{2} = 8.36'$

$A = 8.36' \times 32.5' \times \frac{SY}{9\ SF} = 30.19\ SY$

$\Sigma = (1{,}270.68 + 30.19) \times 2 \text{ sides} = 2{,}601.74 \approx \boxed{2{,}602.5\ SY}$

ATB-11-2515 R

See ATB-11-2515 L

Project ATB-11-22.16 Calc By MA Date
Desc Chk By Date
PID/PROJ 84625

ATB-11-2542

End Crossframes:

L 4" x 4" x $\frac{5}{16}$" ⇒ 8.2 lb/ft.
girder = 48" tall
girder spacing = 8'

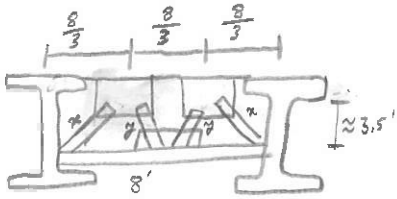
Based on SCD CSB-2-56:

$\frac{8}{3} = 2.67'$

$x = \sqrt{3.5^2 + 2.67^2} = 4.4'$

$\frac{8}{6} = 1.33'$

$y = \sqrt{3.5^2 + 1.33^2} = 3.74'$



Total bar length per bay = $8' + 2(4.4') + 2(3.74')$
$= 24.28'$

3 bays x 2 abutments x 24.28' x $\frac{8.2\ lb}{ft}$ ≈ 1,195 lb.

Beam Ends:

Assume maximum of 2' of web needs repaired

Web thickness = $\frac{5}{16}$" = 0.03 ft.
Unit weight of steel ≈ 490 lb/CF

4 girders x 2 abutments x 2' x 4' x 0.03' x $\frac{490\ lb}{CF}$

≈ 941 lb.

$\Sigma = 1,195 + 941 = \boxed{2,136\ lb}$

OHIO DEPARTMENT OF TRANSPORTATION

ENGINEERING & ENGINEERING DEPARTMENT, DISTRICT 4

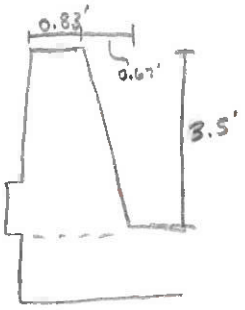
Project ATB-11-22.16 Calc By MA Date _____

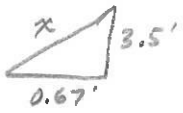
Desc _____ Chk By _____ Date _____

PID/PROJ 84625

ATB-11-2749 L and ATB-11-2750 R

Parapet sealing (top and inside only)





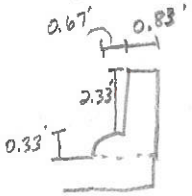
$x = \sqrt{3.5^2 + 0.67^2} = 3.56'$

Bridge length = 202.16'

$P = 0.83' + 3.56' = 4.39'$

$A = 202.16' \times 4.39' = 887.48\ SF$

Approach parapet (top and inside only):



$L = 50'$

$P = 0.33' + 0.67' + 2.33' + 0.83' = 4.16'$

$A = 4.16' \times 50' = 208\ SF$

$\Sigma = (887.48\ SF + 208\ SF) \times 2\ sides \times \frac{SY}{9\ SF} = 243.44 \approx \boxed{244\ SY}$

Project ATB-11-22.16 Calc By MA Date
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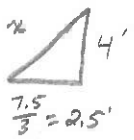
ATB-84-1475

End Crossframes:

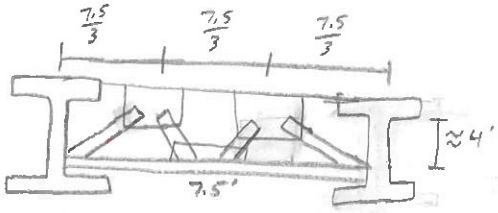
L 4" x 4" x $\frac{5}{16}$" ⇒ 8.2 lb/ft
girder = 54" tall = 4.5'
girder spacing = 7.5'

Based on SCD-2-56:



$x = \sqrt{4^2 + 2.5^2} = 4.72'$

$z = \sqrt{4^2 + 1.25^2} = 4.19'$



Total bar length per bay = 7.5' + 2(4.72') + 2(4.19')
= 25.32'

4 bays x 2 abutments x 25.32' x $\frac{8.2'}{ft}$ ≈ 1,661 lb

Beam Ends:

Assume maximum of 2' of web needs repaired
Web thickness = $\frac{3}{8}$" = 0.03 ft
Unit weight of steel: 490 lb/ft

5 girders x 2 abutments x 2' x 4.5' x 0.03' x $\frac{490\ lb}{CF}$

≈ 1,323 lb

$\Sigma_1 = 1,661 + 1,323 = \boxed{2,984\ lb}$

Project ATB-11-22.16 Calc By MA Date
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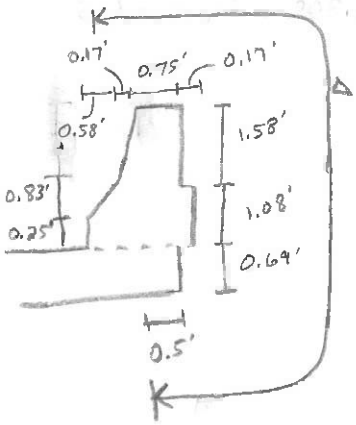
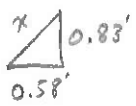
ATB-11-2782R and ATB-11-2783L

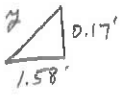
Parapet sealing:



Bridge Length = 208.23' △ = sealing limits



$x = \sqrt{0.83^2 + 0.58^2} = 1.01'$



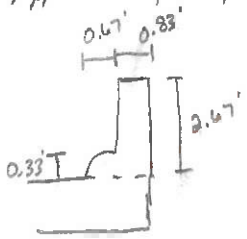
$y = \sqrt{0.17^2 + 1.58^2} = 1.59'$

$P = 0.25 + 1.01 + 1.59 + 0.75 + 1.58 + 0.17 + 1.08 + 0.17 + 0.69 + 0.5$

$= 7.79'$

$A = 7.79' \times 208.23' \times \frac{SY}{9\ SF} = 180.23\ SY$

Approach parapets:



$L = 50'$

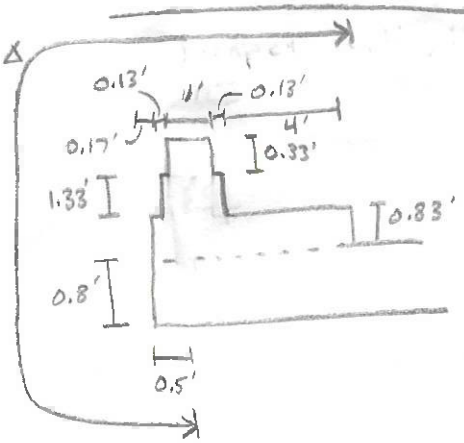
$P = 0.33' + 0.67' + 2.33' + 0.83' + 2.67' = 6.83'$

$A = 6.83' \times 50' \times \frac{SY}{9\ SF} = 37.94\ SY$

$\Sigma = (180.23 + 37.94) \times 2\ sides \approx \boxed{437\ SY}$

Project ATB-11-22.18 Calc By MA Date
Desc ATB-11-2822 Concrete Sealing Chk By Date
PID/PROJ 84625

ATB-11-2822 Parapet Sealing



Δ = sealing limit

$P = 0.5' + 0.8' + 0.83' + 0.17' + 1.33' + 0.13' + 0.33' + 1' + 0.33' + 0.13' + 1.33' + 4' + 0.83' = 11.71'$

$A_{end} = [(2' \times 2' \times 2 \text{ sides}) + (1' \times 2') + (2' \times 1' \times 2 \text{ sides})] \times 2 \text{ approaches}$
$= 28 \text{ SF}$

Bridge length = $208.52' + 2(10.5') = 229.52'$

$A_{Parapet} = [(229.52' \times 11.71') + 28 \text{ SF}] \times 2 \text{ sides} \times \frac{SY}{9 \text{ SF}} \approx 604 \text{ SY}$

Curb Sealing

$L = 258.52'$

$w = 3'$

$h = 0.5'$

$A = 2(0.5' \times 258.52') + (258.52' \times 3') \times \frac{SY}{9 \text{ SF}} \approx 115.5 \text{ SY}$

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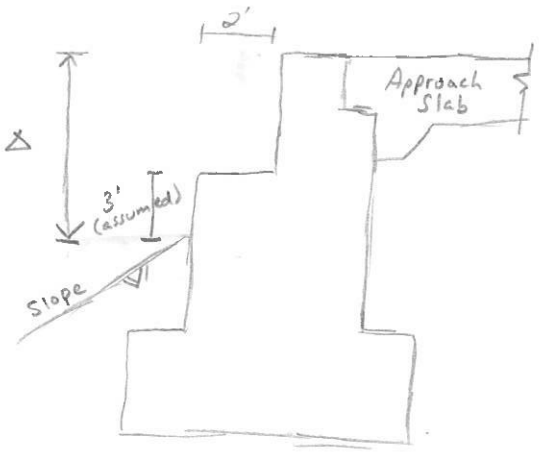
Abutment Sealing

Rear :



Δ = sealing limits
L = 68.53'

Top of backwall elevation = 647.93 − 1.33 = 646.60

Top of beam seat elev:

$$\frac{643.54 + 643.66 + 643.78 + 643.90 + 644.02 + 643.90 + 643.78 + 643.66 + 643.54}{9}$$

$$= 643.75$$

$$P = (646.60 - 643.75) + 2' + 3' = 7.85'$$

$$A = 7.85' \times 68.53' \times \frac{SY}{9\ SF} = 60\ SY$$

Forward :

Top of backwall elevation = $\left(\frac{646 + 645.87}{2}\right) - 1.33 = 644.61$

Top of beam seat elev:

$$\frac{641.65 + 641.76 + 641.86 + 641.96 + 642.06 + 641.92 + 641.79 + 641.65 + 641.51}{9} = 641.80$$

$$P = (644.61 - 641.80) + 2' + 3' = 7.81'$$

$$A = 7.81' \times 68.53' \times \frac{SY}{9\ SF} \approx 60\ SY$$

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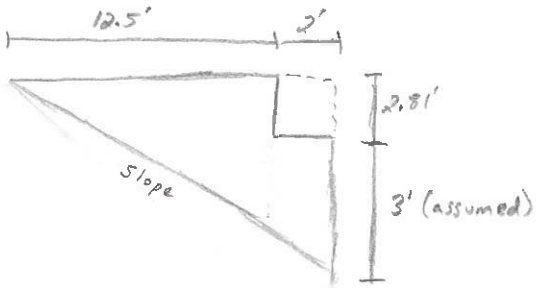
Wingwalls:



$$A = 4 \times \left[\left\{\tfrac{1}{2}(14.5' \times 5.81')\right\} - (2' \times 2.81')\right] \times \frac{SY}{9\,SF} = 4\left[42.12 - 5.62\right] \times \frac{SY}{9\,SF} \approx 17\ SY$$

$$\Sigma = 60 + 60 + 604 + 115 + 17 = \boxed{856\ SY}$$