Appendix D Example 5 – Horizontal Design Load on Heavy Duty Falsework

Refer to *Falsework Manual*, Section 3-3.03A *Wind Load on Heavy Duty Metal Shoring.* This example demonstrates how to calculate horizontal design loads on heavy duty falsework.

Given Information

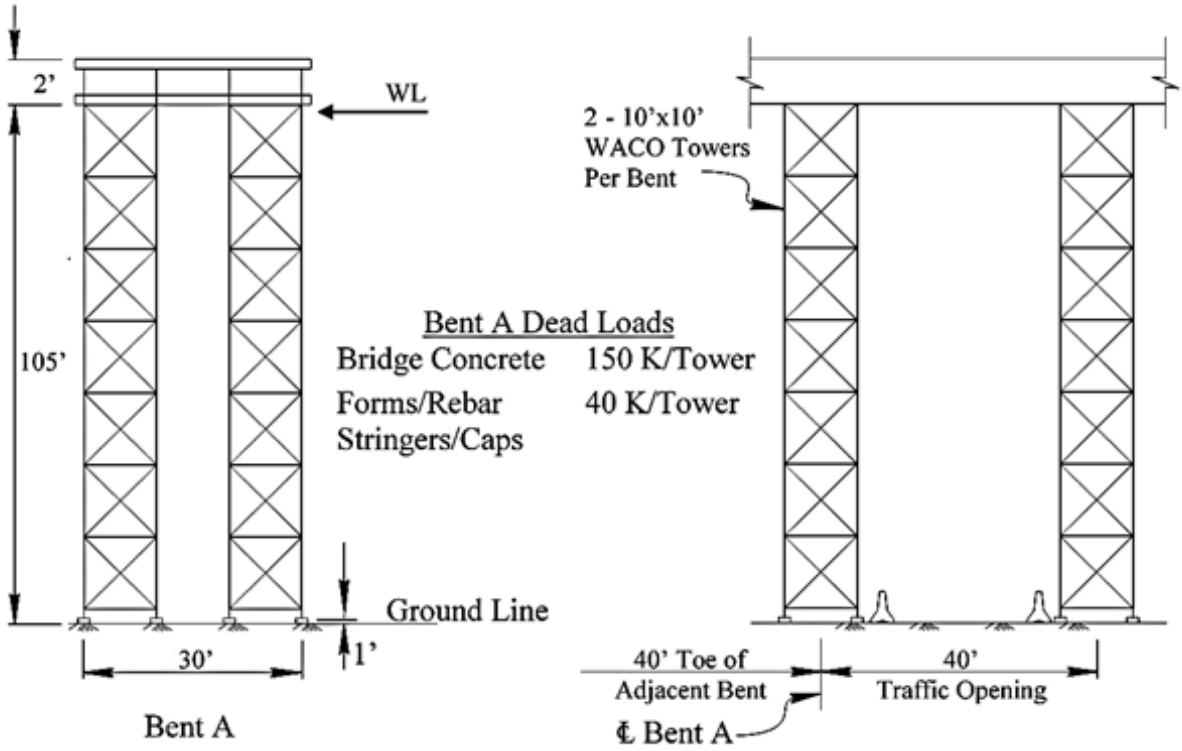

Figure D-5-1. Wind Load on Towers from Supported Falsework

Determine the Horizontal Design Load

Reference *Standard Specifications,* Section 48-2.02B(2), *Falsework – Design Criteria – Loads ,* and *Falsework Manual,* Section 3-3, *Horizontal Load.*

Determine the Horizontal Wind Load (WL) for Bent A

1. Select the wind pressure values for each height zone above the ground from *Standard Specifications*, Section 48-2.02B(2), *Falsework – Design Criteria – Loads.*

2. Calculate the horizontal wind load for each height zone:

   - Shape factor for heavy-duty steel shoring = 2.2
   - Drag coefficient for conventional falsework Q = 1+0.2W = 1+0.2(30) = 7 ≤ 10

     ∴ Q = 7

Height Zone (ft)	FW Type	Wind pressure (psf)	Horizontal wind load (psf)
0 - 30	Heavy Duty	20	20 x 2.2 = 44
30-50	″	25	25 x 2.2 = 55
50-100	″	30	30 x 2.2 = 66
100-105	″	35	35 x 2.2 = 77
105-107	Conventional	3.5Q	3.5(7) = 24.5

3. Calculate the total wind load <u>per tower</u> for each height zone:

   For tower section, full WL is applied to each tower
   *For supported FW section, 0.5 WL is applied to each tower
   For Waco shoring, 2 $^{\text{legs}}/_{\text{face,}}$ use projected area = 2.0 $^{\text{sqft}}/_{\text{ft}}$

   } See figures 3-4 thru 3-8 in sect. 3-3.03

4. Calculate the overturning moment about the base of the tower:

Height Zone (ft)	Horizontal wind load (psf)	Wind load (lbs)	Overturning moment (ft-lb)
0 - 30	44	44 x 2.00 x 30 = 2640	2640 x 14.5 = 38280
30-50	55	55 x 2.00 x 20 = 2200	2200 x 39 = 85800
50-100	66	66 x 2.00 x 50 = 6600	6600 x 74 = 488400
100-105	77	77 x 2.00 x 5 = 770	770 x 101.5= 78155
105-107	24.5	24.5 x 2 x 40' x 0.5* = 980	980 x 105 <u>= 102900</u>

Total overturning moment = 792215 ft-lb

5. Calculate the horizontal design wind load at the top of the tower:

$$\frac{793535 \text{ ft} - \text{lb}}{104 \text{ ft}} = 7630 \text{ lb}$$

Determine the Horizontal Load from 2% Total Dead Load for Bent A

Dead load – bridge concrete $150\ {}^{\text{Kip}}/_{\text{Tower}}$

Dead load – forms/rebar/stringers/caps $\frac{40\ {}^{\text{Kip}}/_{\text{Tower}}}{190\ {}^{\text{Kip}}/_{\text{Tower}}}$

2% dead = 0.02 x 190k = 3.8k = 3800 lb

Determine the Controlling Horizontal Design Load for Bent A

Wind load = 7630 lb

2% dead load = 3800 lb } **Horizontal Design Load = 7630 lb**