

Design Objective

Determine the dead loads due to self weight of concrete wash to remain and tees and the exposed roof snow loads applied to the Girders on Level 4. Obtain the girder reactions for further evaluation of jacking forces. The concrete wash shall be removed prior to HSE work.

Concrete Wash to Remain

Note that the concrete wash shall be removed by others prior to HSE work. The contractor performing the work may remove more than the indicated areas without adversely affecting HSE jacking operations. Only the areas required to expose the connections are demarcated for removal for the purposes of calculating worst-case loading.

Assumed unit weight of wash, $\gamma := 160 \text{ pcf}$

Assumed thickness of wash, $t := 3 \text{ in}$

Girder G-129

Self-weight

Length of girder ($\phi - \phi$ Bearings), $L := 41 \text{ ft} + 10 \text{ in} - 10 \text{ in} = 41 \text{ ft}$

Ship weight, $W_{girder} := (1 + 10\%) \cdot 43561 \text{ lbf} = 47917.1 \text{ lbf}$

Equivalent UDL, $w_{D,girder} := \frac{W_{girder}}{L} = 1.169 \frac{\text{kip}}{\text{ft}}$

Wash

Total area of wash, $A_{wash} := (54 + 257 + 54 + 636 + 75 + 35 + 46 + 72) \cdot \text{ft}^2 = 1229 \text{ ft}^2$

Equivalent UDL, $w_{D,wash} := \frac{A_{wash} \cdot \gamma \cdot t}{2 L} = 0.6 \frac{\text{kip}}{\text{ft}}$

Weights of Tees from Piece Tickets

Piece Mark	Ship Weight (lbs)	Design Weight (lbs)	Reaction Value (lbs)
7T26-225	60,817	66,899	33,449
7T26-220	65,772	72,349	36,175
7T26-224	56,531	62,184	31,092
7V26-252	42,002	46,202	23,101
7T26-231	64,288	70,717	35,358
7T26-236	64,574	71,031	35,516

Sum = 194,691

Table 1: Tabulation of Tee weights resisted by G-129

Equivalent UDL, $w_{D,tees} := \frac{W_{tees}}{L} = 4.749 \frac{\text{kip}}{\text{ft}}$

Snow

Tributary width of girder, $W_T := 60 \text{ ft}$ conservatively

Ground snow load, $p_g := 41 \text{ psf}$

Load duration factor, $C_d := 0.8$

Ref: ASCE 7 Online Hazard Tool

Ref: ASCE 37-14 § 6.4.1

Equivalent UDL, $w_s := C_d \cdot W_T \cdot p_g = 1.968 \frac{\text{kip}}{\text{ft}}$

Analysis Output

Service load governing reaction at South support, $R_o := 215 \text{ kip}$ (D+I+S)

Strength governing reaction at South support, $R_u := 265 \text{ kip}$ (1.2D+1.6I+S)

Girder G-124

Self-weight

Length of girder (¢ - ¢ Bearings), $L := 27 \text{ ft}$

Ship weight, $W_{girder} := (1 + 10\%) \cdot 28979 \text{ lbf} = 31876.9 \text{ lbf}$

Equivalent UDL, $w_{D_{girder}} := \frac{W_{girder}}{L} = 1.181 \frac{\text{kip}}{\text{ft}}$

Wash

Total area of wash, $A_{wash} := (639 + 38 + 32 + 54 + 77) \cdot \text{ft}^2 = 840 \text{ ft}^2$

Equivalent UDL, $w_{D_{wash}} := \frac{A_{wash} \cdot \gamma \cdot t}{2 L} = 0.622 \frac{\text{kip}}{\text{ft}}$

Weights of Tees from Piece Tickets

Piece Mark	Ship Weight (lbs)	Design Weight (lbs)	Reaction Value (lbs)
7T26-218	57,001	62,701	31,351
7T26-214	66,136	72,750	36,375
7T26-228	66,951	73,646	36,823
7T26-227	67,976	74,774	37,387
		Sum =	141,935

Table 2: Tabulation of Tee weights resisted by G-124

Equivalent UDL, $w_{D_{tees}} := \frac{W_{tees}}{L} = 5.257 \frac{\text{kip}}{\text{ft}}$

Snow

Tributary width of girder, $W_T := 60 \text{ ft}$ conservatively

Ground snow load, $p_g := 41 \text{ psf}$

Load duration factor, $C_d := 0.8$

Ref: ASCE 7 Online Hazard Tool

Ref: ASCE 37-14 § 6.4.1

Equivalent UDL, $w_s := C_d \cdot W_T \cdot p_g = 1.968 \frac{\text{kip}}{\text{ft}}$

Analysis Output

Service load governing reaction at South support, $R_o := 151 \text{ kip}$ (D+I+S)

Strength governing reaction at South support, $R_u := 186 \text{ kip}$ (1.2D+1.6I+S)