LRFD Eq. 5.6.4.1-3 can be solved for A_{vf} as follows:

$7.98 = 0.28\,(31.5) + 1.0[A_{vf}(60)+0]$

Solving for A_{vf}

A_{vf}(req'd) < 0.0 in.^{2}/ft

Since the resistance provided by cohesion is greater than the applied force, provide the minimum required interface reinforcement.

9.6.12.3.1 Minimum Interface Shear Reinforcement

Minimum shear reinforcement, $A_{vf} \geq (0.05A_{cv})/f_{yh}$ [LRFD Eq. 5.8.4.4-1]

From the design of vertical shear reinforcement, a No. 4 two leg bar at 10 in. spacing is provided from the beam extending into the deck. Therefore, A_{vf} =0.48 in.^{2}/ft.

$A_{vf} = (0.48$ in.^{2}/ft$) > (0.05\,A_{cv})/f_{yh} = 0.05(31.5)/60 = 0.026$ in.^{2}/in. $= 0.31$ in^2/ft OK

Consider further that LRFD Article 5.8.4.4 states that the minimum reinforcement requirement may be waived if $v_{hi}/A_{cv} < 0.210$ ksi with surface roughened to an amplitude of 0.25 in.

7.18 kips/in./31.5 in. = 0.228 ksi > 0.210 ksi

Therefore, the minimum reinforcement requirement cannot be waived.

9.6.12.4 Maximum Nominal Shear Reinforcement

$V_{ni} \leq K_1 f'_c A_{cv}$ or $K_2 A_{cv}$

V_n provided $= 0.28(31.5) + 1.0\left(\dfrac{0.96}{12}(60) + 0\right) = 13.62$ kips/in.

$K_1 f'_c A_{cv} = (0.3)(4.0)(31.5) = 37.8$ kips/in.

$K_2 A_{cv} = 1.8(31.5) = 56.7$ kips/in.

Since provided $V_n \leq 0.3 f'_c A_{cv}$ OK [LRFD Eq. 5.8.4.1-4]

$\leq 1.8 A_{cv}$ OK [LRFD Eq. 5.8.4.1-5]

9.6.13 MINIMUM LONGITUDINAL REINFORCEMENT REQUIREMENT [LRFD Art. 5.8.3.5]

Longitudinal reinforcement should be proportioned so that at each section, the following equation is satisfied:

$$A_{ps}f_{ps} + A_s f_y \geq \frac{M_u}{d_v \phi_f} + 0.5\frac{N_u}{\phi_c}\left(\left|\frac{V_u}{\phi_v} - V_p\right| - 0.5V_s\right)\cot\theta \qquad \text{[LRFD Eq.5.8.3.5-1]}$$

where

A_{ps} = area of prestressing strand at the tension side of the section, in.^{2}

f_{ps} = average stress in prestressing strand at the time for which the nominal resistance is required, ksi

A_s = area of nonprestressed tension reinforcement, in.^{2}

f_y = specified yield strength of reinforcing bars, ksi

M_u = factored moment at the section corresponding to the factored shear force, ft-kips

d_v = effective shear depth, in.

ϕ = resistance factor as appropriate for moment, shear and axial resistance. [LRFD Art.5.5.4.2] Therefore, different ϕ factors will be used for the terms in LRFD Equation 5.8.3.5-1, depending on the type of action being considered

N_u = applied factored axial force, kips