where

c = cohesion factor, ksi [LRFD Art. 5.8.4.3]

μ = coefficient of friction [LRFD Art. 5.8.4.3]

A_{cv} = area of concrete section resisting shear transfer, in.^{2}

A_{vf} = area of shear reinforcement crossing the shear plane, in.^{2}

P_c = permanent net compressive force normal to the shear plane, kips

f_{yh} = specified yield strength of shear reinforcement, ksi

For cast-in-place concrete slabs placed on clean concrete girder surface intentionally roughened : [LRFD Art. 5.8.4.3]

c = 0.28 ksi

μ = 1.0

The actual contact width, b_v, between the slab and the beam is 106.0 in.

A_{cv} = (106.0 in.)(1.0 in.) = 106.0 in.^{2}

LRFD Eq. 5.8.4.1-3 can be solved for A_{vf} as follows:

$9.40 = (0.28 \times 106) + 0.6[A_{vf}(60.0) + 0]$

Solving for A_{vf}

A_{vf}(req'd) < 0

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

9.8.12.3.1 Required Interface Shear Reinforcement

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

From the design of vertical shear reinforcement, a No. 4 four-leg bar at 15-in. spacing is provided from the beam extending into the deck. Therefore, A_{vf} = 0.64 in.^{2}/ft.

A_{vf} = (0.64 in.^{2}/ft) $<$ $(0.05A_{cv})/f_{yh}$ = 0.05(106)/60.0 = 0.088 in.^{2}/in. = 1.06 in.^{2}/ft NG

However, LRFD Article 5.8.4.4 states that the minimum reinforcement need not exceed the amount needed to resist $1.33V_{hi}/\phi$ as determined using LRFD Eq. 5.8.4.1-3.

$(1.33 \times 8.46/0.9) = (0.28 \times 106.0) + 1.0[A_{vf}(60.0) + 0]$

Solving for A_{vf}

A_{vf}(req'd) < 0 OK

9.8.12.4 Maximum Nominal Shear Resistance

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

$$V_{ni} \text{ provided} = 0.28(106) + 1.0\left(\frac{0.64}{12}(60.0) + 0\right) = 32.88 \text{ kips/in.}$$

$K_1 f_c' A_{cv}$ = (0.3)(4.0)(106.0) = 127.20 kips/in.

$K_2 A_{cv}$ = 1.8(106.0) = 190.8 kips/in.

Since provided $V_{ni} \leq 0.3 f_c' A_{cv}$ OK [LRFD Eq. 5.8.4.1-4]

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