

BOB D. CAMPBELL & CO.

Structural Engineers

Since 1957

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Project OLP CANOPY LEE'S Summit, MoDate 4-7-21 SKC Page 1 of 3EAVE BEAM

$$\text{SPAN} = 22'-0"$$

$$\text{LOAD TO BEAM} = 14(.035) = .49 \text{ KLF}$$

$$M_{\text{max}} = \frac{.49(22)^2}{8.3} = 28.5 \text{ K'}$$

$$S_{\text{REQ'D}} = \frac{28.5(12)}{2.4} = 142.8 \text{ in}^3$$

$$\text{TRY DBL } 3\frac{1}{2} \times 13\frac{1}{2} \text{ GLU-LAMS} - S = 2(106.3) = 212.6 \text{ in}^3$$

$$I = 2(717.6) = 1435.2 \text{ in}^4$$

$$f_b = \frac{28.5(12)}{212.6} = 1.61 \text{ KSI} < 24 \text{ KSI} \therefore \text{OK}$$

CHECK DEFLECTION:

$$\Delta = \frac{.49(4.75)(22) + (1728)}{384(1800)(1435.2)} = .95" \text{ c/y } 278 \therefore \text{OK}$$

CANTILEVER: 5'-0"

$$\text{LOAD (P)} = 14(2.5)(.035) = 1.23 \text{ K}$$

$$M_{\text{max}} = 1.23(4.5) = 5.5 \text{ K'}$$

$$f_b = \frac{5.5(12)}{212.6} = .31 \text{ KSI} \therefore \text{OK}$$

CHECK DEFLECTION:

$$\Delta = \frac{1.23(4.5)^3(1728)}{3(1800)(1435.2)} = .025" \text{ c/y } 2160 \therefore \text{OK}$$

COLUMNS

$$H_T = 8'-7"$$

$$\text{LOAD TO COLUMN} = 14(.11)(.035) = 5.4 \text{ K (max)}$$

$$\text{TRY HSS } 5 \times 5 \times 5/16 \quad A = 5.61 \text{ in}^2 \quad r = 1.89 \text{ in} \quad S = 8.02 \text{ in}^3 \quad I = 20.1 \text{ in}^4$$

$$\frac{K L}{r} = \frac{1.2(8.58)(12)}{1.89} = 65.37 \Rightarrow F_a = 16.91(42/36) = 19.7 \text{ KSI}$$

$$f_a = 5.4 / 5.61 = .963 \text{ KSI} \therefore \text{OK}$$



COLUMN FOOTING

$$\text{LOAD TO FTG (P)} = 16(14)(.035) = 7.84\text{K} + .25\text{K} = 8.2\text{K}$$

$$\text{SOIL BRG CAPACITY} = 1500 \text{ PSF}$$

$$f_{brg} = 8.2 / 3(3) = .91 \text{ KSF} \therefore \text{OK}$$

LATERAL LOAD

$$\text{WIND} = 115 \text{ mph, } 3 \text{ SEC. GUST FACTOR}$$

$$P_w = 14.9 \text{ psf}$$

N-S WIND:

$$P_{N-S} = 28(2)(.0149) = .84\text{K}$$

- LOAD TAKEN INTO (8) - COLS:

$$P_{col} = .84 / 8 = .205\text{K/col}$$

$$M_w = .205(8.58) = 1.76\text{K'}$$

$$f_b = \frac{1.76(12)}{8.02} = 2.63 \text{ KSI} \therefore \text{OK}$$

CHECK LATERAL DEFLECTION:

$$\Delta = \frac{.205(8.58)^3(1728)}{3(29000)(20.1)} = .128" @ 4/804 \therefore \text{OK}$$

E-W WIND:

$$P_{E-W} = 32(4)(.0149) = 1.91\text{K}$$

- LOAD TAKEN INTO (8) - COLS:

$$P_{col} = 1.91 / 8 = .2384\text{K/col}$$

$$M_w = .2384(8.58) = 2.046\text{K'}$$

$$f_b = \frac{2.046(12)}{8.02} = 3.06 \text{ KSI} \therefore \text{OK}$$

CHECK LATERAL DEFLECTION:

$$\Delta = \frac{.2384(8.58)^3(1728)}{3(29000)(20.1)} = .149" @ 4/692 \therefore \text{OK}$$

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Project DLP CANOPY LEES Summit, MODate 4-1-21SML Page 3 of 3CHECK FOOTING OVERTURNING

$$P_{FTG} = 2(.2384) = .4768 \text{ k/ftg (MAX).}$$

$$M_o = .4768(8.58) = 4.1 \text{ k'}$$

$$\begin{aligned} M_R &= \frac{28(32)}{4} \times (.015) = 13.4 \text{ k} \times 1.5 \times .6 = 12.1 \text{ k' (CANOPY)} \\ &+ 2.25(1.17)(2)(.15) = .789 \times 1.5 = 1.18 \text{ k' (PEDESTAL)} \\ &+ 3(3)(1)(.15) = 1.35 \times 1.5 = 2.02 \text{ k' (FTG)} \\ &+ 7.8(2)(.10) = 1.56(1.5) = 2.34 \text{ k' (SOIL)} \\ &\quad \underline{\quad \quad \quad} \\ &\quad \quad \quad 17.6 \text{ k' } \therefore \text{OK} \end{aligned}$$

CHECK UPLIFT (10 PSF NET)

$$P_{UP} = 28(32)(.01) = 8.96 \text{ k}$$

- FORCE RESISTED BY 4 FTGS -

$$P_{UP} = 8.96 / 4 = 2.24 \text{ k/ftg}$$

$$\begin{aligned} \text{WT. } &= 8.04 \text{ k} \\ &+ .78 \text{ k (PEDESTAL)} \\ &+ 1.35 \text{ k (FTG)} \\ &+ 1.56 \text{ k (SOIL)} \\ &\quad \underline{\quad \quad \quad} \\ &\quad \quad \quad 11.7 \text{ k } \therefore \text{OK} \end{aligned}$$