

OMAR SHEMY PORTFOLIO

SUBJECT: FLOOR WOOD DESIGN

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2024 JAN 17	202401	DEMO PORTFOLIO	O.S.	1

1) PLATFORM LOCATED BETWEEN ORTOLINES E3-F3

CALCULATIONS FOLLOW 2020 NBCC AND 2019 CSA O86 DESIGN STANDARD.

MATERIALS AND STRUCTURAL INFORMATION

$$L = 6 \text{ m} \quad (\text{BEAM LENGTH})$$

$$T_w = 1 \text{ m} \quad (\text{TRIB. WIDTH})$$

WOOD:

HEMLOCK FIR SS. $M = 4500 \text{ N/m}^3$ (WOOD MASS) T-11.25a (WC WDM)

$$b = 140 \text{ mm} \quad d = 292 \text{ mm}$$

$$A = b \cdot d = 40880 \text{ mm}^2$$

$$S_x = \frac{b \cdot d^2}{6} = 1988133 \text{ mm}^3$$

$$I_x = \frac{b d^3}{12} = 290466027 \text{ mm}^4$$

$$f_b = 14.5 \text{ MPa}$$

$$f_v = 1.2 \text{ MPa}$$

$$E = 10000 \text{ MPa}$$

T-6.3.1c CSA O86-2019

STRUCT INFO:

NON-ELASTIC CEILING

DRY SERVICE CONDITIONS

FLOOR PROVIDES LAT. SUPPORT

SIMPLY SUPPORTED

NOT TREATED

STANDARD DURATION LOAD

INTERIOR BEAM: NO SNOW LOAD

VLS $1.25D + 1.5L + 1.0S$

SLS $D + L + S$

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LOADS:

$$W_D: 1.1 \text{ kPa}$$

SERVICE DEAD EXCL. S.W.

$$W_L: 2.4 \text{ kPa}$$

SERVICE LIVE

NBCC T-4.1.5.3

$$W_{SD}: b.d. M = 0.18 \text{ kN/m} \text{ SERVICE S.W.}$$

$$W_{D,T}: (W_D) \cdot T_w + W_{SD} = 1.21 \text{ kN/m}$$

$$W_L: (W_L) \cdot T_w = 2.4 \text{ kN/m}$$

$$W_F: 1.25 \cdot (W_{D,T}) + 1.5 \cdot (W_L) = 5.1 \text{ kN/m}$$

$$M_F: \frac{W_F \cdot L^2}{8} = 22.95 \text{ kN.m} \text{ FACTORED MOM.}$$

$$V_F: \frac{W_F \cdot L}{2} = 15.3 \text{ kN} \text{ FACTORED SHEAR}$$

RESISTANCES:

$$k_D: 1.00$$

STANDARD TERM LOAD

CL 5.3.8.2 CSA 086-19

$$k_H: 1.00$$

NO SYSTEM EFFECT - SPACING > 60

CL 6.4.4 CSA 086-19

$$k_{SB}: 1.00$$

DRY SERVICE CONDITIONS (BENDING)

T-6.4.2 CSA 086-19

$$k_{SV}: 1.00$$

DRY SERVICE CONDITIONS (SHEAR)

T-6.4.2 CSA 086-19

$$k_{SE}: 1.00$$

DRY SERVICE CONDITIONS (DFL.)

T-6.4.2 CSA 086-19

$$k_T: 1.00$$

NO TREATMENT

T-6.4.3 CSA 086-19

$$k_{ZB}: 1.1$$

SIZE FACTOR (BENDING)

T-6.4.5 CSA 086-19

$$k_{ZV}: 1.1$$

SIZE FACTOR (SHEAR)

T-6.4.5 CSA 086-19

$$k_{LV}: 1.0$$

LATERAL SUPPORT FACTOR

CL 6.4.5.2 CSA 086-19

↳ ASSUME FULL SUPPORT SHEATHING

$$F_B: f_b \cdot (k_D \cdot k_H \cdot k_{SB} \cdot k_T) = 14.5 \text{ MPa}$$

CL 6.5.4.1 CSA 086-19

$$F_V: f_v \cdot (k_D \cdot k_H \cdot k_{SV} \cdot k_T) = 1.2 \text{ MPa}$$

CL 6.5.5.1 CSA 086-19

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$$\phi_b = 0.9 \quad \phi_v = 0.9$$

$$M_f = \phi_b \cdot F_b \cdot S_x \cdot k_{zb} \cdot k_l \approx 29 \text{ kN.m}$$

$$V_r = \phi_v \cdot F_v \cdot A \cdot k_{zv} \cdot 2/3 \approx 32 \text{ kN}$$

$$M_f : 29 \text{ kN.m} > M_f : 23 \text{ kN.m} \rightarrow \text{OK}$$

$$V_r : 32 \text{ kN} > V_F : 25 \text{ kN} \rightarrow \text{OK}$$

CL 6.5.4.1 CSA 086-19

CL 6.5.5.1 CSA 086-19

DEFLECTIONS:

$$\text{DEFLECTION } D+L \quad \Delta_1 = \frac{L}{180} \text{ mm}$$

$$\text{DEFLECTION } L \quad \Delta_2 = \frac{L}{360} \text{ mm}$$

$$E_s: E \cdot k_{se} \cdot k_T = 10000 \text{ MPa}$$

$$\Delta_{max} : \frac{5(W_L + W_D \cdot T) \cdot L^4}{384 \cdot E_s \cdot I_x} = 21 \text{ mm}$$

$$\Delta_{live} : \frac{5(W \cdot L) \cdot L^4}{384 \cdot E_s \cdot I_x} = 14 \text{ mm}$$

$$\Delta_{max} : 21 \text{ mm} < \frac{L}{180} : 33 \text{ mm} \rightarrow \text{OK}$$

$$\Delta_{live} : 14 \text{ mm} < \frac{L}{360} : 16 \text{ mm} \rightarrow \text{OK}$$