

OMAR SHEMY PORTFOLIO

SUBJECT: FLOOR WOOD DESIGN

DATE	PROJECT NO.	PROJECT NAME	ENGINEER	PAGE
2024 JAN 17	202401	DEMO PORTFOLIO	O.S.	1
1) PLATFORM LOCATED BETWEEN GRIDLINES E3-F3 CALCULATIONS FOLLOW 2020 NBCC AND 2019 CSA O86 DESIGN STANDARD. MATERIALS AND STRUCTURAL INFORMATION $L = 6 \text{ m}$ (BEAM LENGTH) $T_w = 1 \text{ m}$ (TRIB. WIDTH) <u>WOOD:</u> HEMLOCK FIR SS. $M = 4500 \text{ N/m}^3$ (WOOD MASS) T-11.25a CWC WDM $b = 140 \text{ mm}$ $d = 292 \text{ mm}$ $A = b \cdot d = 40880 \text{ mm}^2$ $S_x = b \cdot d^2 / 6 = 1988133 \text{ mm}^3$ $I_x = b d^3 / 12 = 290466027 \text{ mm}^4$ $f_b = 14.5 \text{ MPa}$ $f_v = 1.2 \text{ MPa}$ $E = 10000 \text{ MPa}$ T-6.3.1c CSA O86-2019 <u>STRUCT INFO:</u> NON ELASTIC CEILING DRY SERVICE CONDITIONS FLOOR PROVIDES LAT. SUPPORT SIMPLY SUPPORTED NOT TREATED STANDARD DURATION LOAD INTERIOR BEAM: NO SNOW LOAD ULS $1.25 D + 1.5 L + 1.0 S$ SLS $D + L + S$				

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LOADS:

W_D : 1.1 kPa SERVICE DEAD EXCL. S.W.

W_L : 2.4 kPa SERVICE LIVE NBCC T-4.1.5.3

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

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

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

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

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

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

RESISTANCES:

K_D : 1.00	STANDARD TERM LOAD	CL 5.3.2.2 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 (DEFL.)	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_L : 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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$$\phi_b = 0.9 \quad \phi_v = 0.9$$

$$M_r = \phi_b \cdot F_b \cdot S_x \cdot k_{zB} \cdot k_1 \approx 29 \text{ KN}\cdot\text{m}$$

CL6.5.4.1 CSA 086-19

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

CL6.5.5.1 CSA 086-19

$$M_r : 29 \text{ KN}\cdot\text{m} > M_f : 23 \text{ KN}\cdot\text{m} \quad \text{OK}$$

$$V_r : 32 \text{ KN} > V_f : 25 \text{ KN} \quad \text{OK}$$

DEFLECTIONS:

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

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

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

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

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

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

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