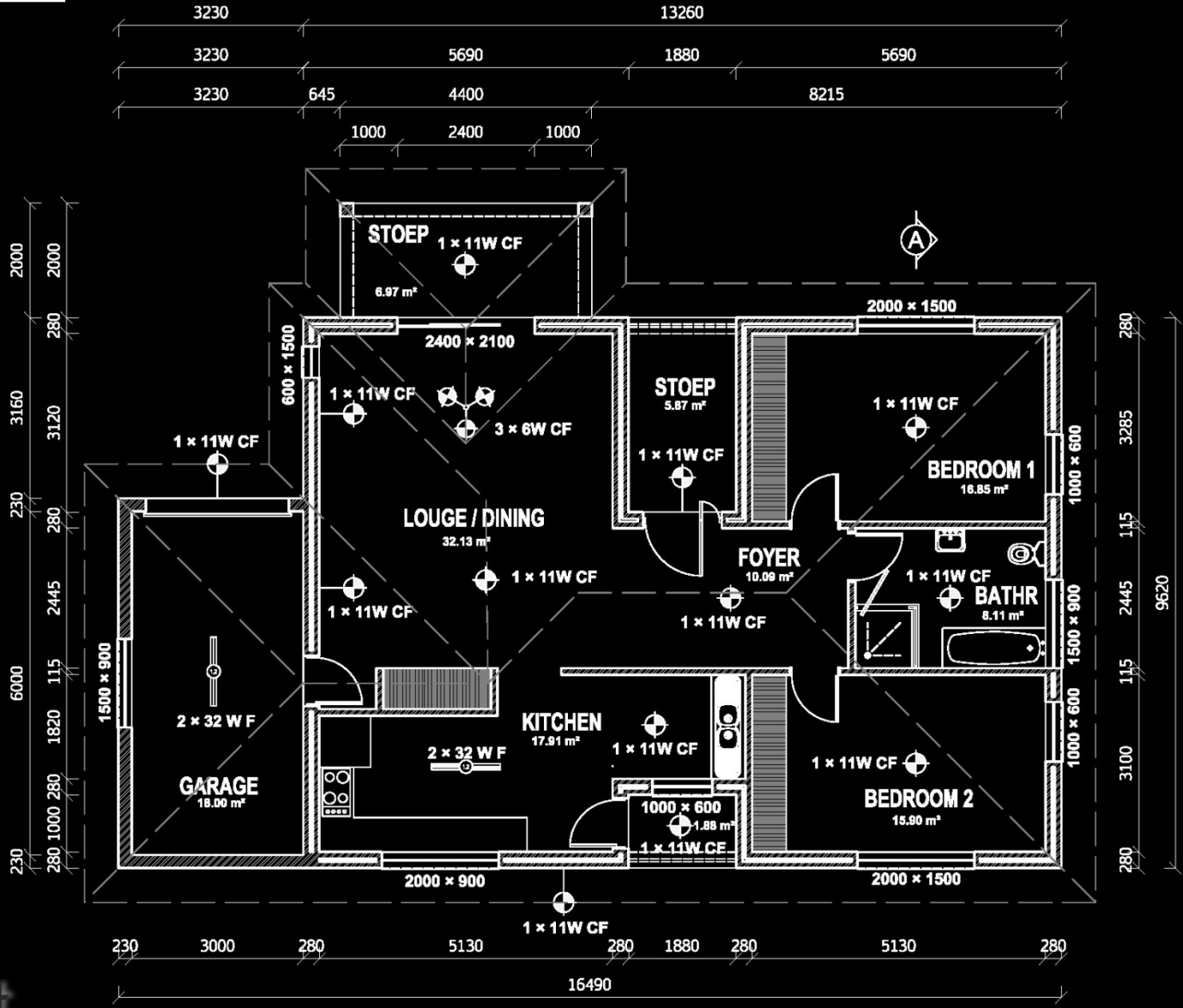


ZONE 2



Conductance: A x U

 SHG: A x S x E



NATURAL VENTILATION

CHECK FOR COMPLIANCE WITH 10400XA

NET FLOOR AREA: 100.99m²

GLAZING AREA:

$$2.4 \times 2.1 = 5.04$$

$$2 \times 1.5 \times 2 = 6.00$$

$$0.6 \times 1.0 \times 3 = 1.80$$

$$1.5 \times 0.9 = 1.35$$

$$2.0 \times 0.9 = 1.80$$

$$0.6 \times 1.5 = \underline{0.90}$$

16.89

$$16.89/100.99 \times 100 = 16.72\%$$

Do not comply with max of 15% as per SANS10400XA



NATURAL VENTILATION

CONSTANTS:

$$\text{CONDUCTANCE:} \quad 100.99 \times 1.4 = 141.39$$

$$\text{SHG:} \quad 100.99 \times 0.12 = 12.12$$

CONDUCTANCE:

Use clear glass in wooden frame

$$\begin{aligned} A \times U &= 16.89 \times 5.6 \\ &= 94.58 \quad (< 141.39 \checkmark) \end{aligned}$$

SOLAR HEAT GAIN:

$$P_1 = 600 + 115 = 715, \quad P_2 = 600 + 115 + 1280 = 1995;$$

$$P_3 = 1000 + 600 = 1600$$

$$G = 2270 - 2100 = 170 (< 500)$$



2100 Door:	$P/H = 1600/2270 = 0.70$
1500 Window:	$P/H = 715/1670 = 0.43$
900 Window:	$P/H = 715/1070 = 0.67$
600 Window ₁ :	$P/H = 715/770 = 0.93$
600 Window ₂ :	$P/H = 1995/770 = 2.59$

NORTH:

$$5.04 \times 0.77 \times 0.32 = 1.24$$

$$3.00 \times 0.77 \times 0.39 = 0.90$$

EAST:

$$(0.60 \times 0.77 \times 0.46) \times 2 = 0.43$$

$$1.35 \times 0.77 \times 0.58 = 0.60$$

SOUTH:

$$3.00 \times 0.77 \times 0.38 = 0.88$$

$$1.80 \times 0.77 \times 0.33 = 0.46$$

$$0.60 \times 0.77 \times 0.16 = 0.07$$

WEST:

$$0.90 \times 0.77 \times 0.81 = \underline{0.56}$$

$$\text{TOTAL} = 5.14 (<12.12)$$

$$A_1 [S_1 (C_A \times S_{H1} + C_B \times S_{C1}) + C_C \times U_1]$$

$A_{1,2,3}$ is the area of each glazing element

$C_{A,B,C}$ are the energy constants in table D1

$S_{1,2,3}$ is the SHGC of each glazing element in Table 6

$S_{H1,H2,H3}$ is the heating shading multiplier for each value element given in table D2

$S_{C1,C2,C3}$ is the cooling shading multiplier for each value element given in table D3

$U_{1,2,3}$ is the total U-value of each glazing element given in table 6

2100 Door: $P/H = 1600/2270 = 0.70$

1500 Window: $P/H = 715/1670 = 0.43$

900 Window: $P/H = 715/1070 = 0.67$

600 Window₁: $P/H = 715/770 = 0.93$

600 Window₂: $P/H = 1995/770 = 2.59$

$$G = 2270 - 2100 = 170 (<500)$$



ARTIFICIAL VENTILATION:

ENERGY INDEX:

NORTHERN FAÇADE: $13.26 \times 2.550 = 33.81$
 $33.81 \times 0.257 = 8.69$

EASTERN FAÇADE: $9.62 \times 2.550 = 24.53$
 $24.53 \times 0.257 = 6.30$

SOUTHERN FAÇADE: $13.26 \times 2.550 = 33.81$
 $33.81 \times 0.220 = 8.69$

WESTERN FAÇADE: $9.62 \times 2.550 = 24.53$
 $24.53 \times 0.220 = 6.30$

NORTHERN FAÇADE:

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 5.04[0.77(-0.06 \times 0.91 + 1.46 \times 0.62) + -0.02 \times 5.6] \\ &= 5.04[0.77(-0.05 + 0.91) - 0.11] \\ &= 5.04[0.77(0.86) - 0.11] \\ &= 5.04[0.66 - 0.11] \\ &= 5.04 \times 0.55 \\ &= 2.77 \end{aligned}$$

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 3[0.77(-0.06 \times 0.97 + 1.46 \times 0.77) + -0.02 \times 5.6] \\ &= 3[0.77(-0.06 + 1.12) - 0.11] \\ &= 3[0.77(1.06) - 0.11] \\ &= 3[0.82 - 0.11] \\ &= 3 \times 0.71 \\ &= 2.13 \end{aligned}$$

$$2.77 + 2.13 = 4.90 (<8.69 \checkmark)$$



EASTERN FAÇADE:

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 1.35[0.77(-0.18 \times 0.84 + 1.32 \times 0.74) + 0.00 \times 5.6] \\ &= 1.35[0.77(-0.15 + 0.98) + 0.00] \\ &= 1.35[0.77(0.83) + 0.00] \\ &= 1.35(0.64 + 0.00) \\ &= 1.35 \times 0.64 \\ &= 0.86 \end{aligned}$$

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 0.6[0.77(-0.18 \times 0.73 + 1.32 \times 0.64) + 0.00 \times 5.6] \\ &= 0.6[0.77(-0.13 + 0.84) + 0.00] \\ &= 0.6[0.77(0.71) + 0.00] \\ &= 0.6(0.55 + 0.00) \\ &= 0.6 \times 0.55 \\ &= 0.33 \end{aligned}$$

$$2 \text{ Windows} = 0.33 \times 2 = 0.66$$

$$0.86 + 0.66 = 1.52 (<6.30 \checkmark)$$

SOUTHERN FAÇADE:

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 3[0.77(-0.47 \times 0.93 + 0.41 \times 0.89) + 0.07 \times 5.6] \\ &= 3[0.77(-0.44 + 0.36) + 0.39] \\ &= 3[0.77(-0.08) + 0.39] \\ &= 3(-0.06 + 0.39) \\ &= 3 \times 0.33 \\ &= 0.99 \end{aligned}$$

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 1.8[0.77(-0.47 \times 0.88 + 0.38 \times 0.82) + 0.07 \times 5.6] \\ &= 1.8[0.77(-0.41 + 0.31) + 0.39] \\ &= 1.8[0.77(-0.10) + 0.39] \\ &= 1.8(-0.08 + 0.39) \\ &= 1.8 \times 0.31 \\ &= 0.56 \end{aligned}$$

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 0.6[0.77(-0.47 \times 0.70 + 0.41 \times 0.60) + 0.07 \times 5.6] \\ &= 0.6[0.77(-0.33 + 0.25) + 0.39] \\ &= 0.6[0.77(-0.08) + 0.39] \\ &= 0.6(-0.06 + 0.39) \\ &= 0.6 \times 0.33 \\ &= 0.20 \end{aligned}$$

$$0.99 + 0.56 + 0.20 = 3.12 (<8.69 \checkmark)$$

WESTERN FAÇADE:

$$\begin{aligned} A[S(C_A \times S_H + C_B \times S_C) + C_C \times U] &= 0.9[0.77(-0.28 \times 0.92 + 1.13 \times 0.85) + 0.02 \times 5.6] \\ &= 0.9[0.77(-0.26 + 0.96) + 0.11] \\ &= 0.9[0.77(0.70) + 0.11] \\ &= 0.9(0.54 + 0.11) \\ &= 0.9 \times 0.65 \\ &= 0.59 (<6.30 \checkmark) \end{aligned}$$

BUILDING SUITABLE FOR AIRCONDITIONING / MECHANICAL VENTILATION