

SANDRA GUADALUPE RUIZ MORALES

TALLER DE CONSTRUCCION DE MATERIALES BASICOS

VOLUMEN DE OBRA

GARCÍA LÓPEZ PEDRO ALBERTO

12 DE MARZO DEL 2021



# PRELIMINARES

## ▶ Limpieza

$$5.80 (9.70) = 53.36 \text{ m}^2$$

## ▶ EXCAVACION

Zapata ZC-1

$$(10.05\text{m}) \times (1.00\text{m}) \times (1.15\text{m}) = 11.5575 (2 \text{ tramos}) = 23.115 \text{ m}^3 < \text{ eje A y B}$$

$$(1.6250\text{m}) \times (1.00\text{m}) \times (1.15\text{m}) = 1.86875 (4 \text{ tramos}) = 7.475 \text{ m}^3 < \text{ eje 1, 3, 5 y 7}$$

$$(2.0750\text{m}) \times (1.00\text{m}) \times (1.15\text{m}) = 2.37875 (2 \text{ tramos}) = 4.6575 \text{ m}^3 < \text{ eje 2 y 6}$$

$$(7.95\text{m}) \times (1.00\text{m}) \times (1.15\text{m}) = 9.125 < \text{ eje C}$$

$$Z-1 \text{ Total} = 44.39 \text{ m}^3$$

Zapata ZC-2

$$(1.625\text{m}) \times (1.10\text{m}) \times (1.15\text{m}) = 2.055675 < \text{ eje 4 (arriba)}$$

$$(2.0750\text{m}) \times (1.10\text{m}) \times (1.15\text{m}) = 2.561675 < \text{ eje 4 (abajo)}$$

$$Z-2 \text{ Total} = 4.61725 \text{ m}^3$$

$$\text{Total Z-1 y Z-2} = 49.00725 (1.30) = 63.709475 \text{ m}^3$$

# CIMENTACION

## ZAPATA CORRIDA 2-1 (C/C = A)

### no. 3 transversal

$$\text{long} = 0.80 + 0.24 = 1.04 \text{ m}$$

$$\text{Pzas} = 1.675 / 0.20 + 1 = 9.125 \rightarrow 10$$

$$\text{Total} = 1.04 \text{ m} (10 \text{ pzas}) = 10.4 \text{ m} (2 \text{ tramos}) = 20.8 \text{ m}$$

cuadrante  
1 1 9

$$\text{Pzas} = 1.25 / 0.20 + 1 = 7.25 \rightarrow 8$$

$$\text{Total} = 1.04 \text{ m} (8 \text{ pzas}) = 8.32 \text{ m} (2 \text{ tramos}) = 16.64$$

cuadrante  
2 4 3

### no. 3 longitudinal

$$\text{long} = 9.85 + 0.24 = 10.09 \text{ m} (9 \text{ pzas}) = 46.36 \text{ m}$$

### no. 3 (Contratubo)

$$\text{long} = 9.20 + 0.24 = 9.44 \text{ m} (2 \text{ pzas}) = 18.88 \text{ m}$$

### no. 3 total

$$96.68 \text{ m}$$

### no. 5 longitudinal

$$\text{long} = 9.85 + 0.40 = 10.25 \text{ m} (2 \text{ pzas}) = 20.5 \text{ m}$$

$$\text{Pzas} = 2$$

### no. 4 longitudinal

$$\text{long} = 9.20 + 0.30 = 9.50 \text{ m} (2 \text{ pzas}) = 19 \text{ m}$$

$$\text{Pzas} = 2$$

### no. 2 (estribos)

$$\text{long} = 1.30 + 0.14 = 1.44 \text{ m}$$

$$\text{Pzas} = 9.20 / 0.15 + 1 = 62.3 \rightarrow 63 \text{ pzas}$$

$$\text{Total} = 1.44 \text{ m} (63) = 90.72 \text{ m}$$

▶ ZAPATA CORRIDA 2-1 (OC B)

no. 3 transversal

$$\text{long} = 0.80 + 0.29 = 1.09\text{m}$$

$$\text{pzas} = 0.75 / 0.70 + 1 = 2.25 \rightarrow 3 - 2 = 1 \text{ pza}$$

$$\text{Total} = 1.09\text{m} (1 \text{ pza}) = 1.09\text{m} (2 \text{ tiramos}) = \underline{2.08\text{m}}$$

$$\text{pza} = 0.575 / 0.70 + 1 = 3.8 \rightarrow 4 - 2 = 2 \text{ pzas}$$

$$\text{Total} = 1.09\text{m} (2 \text{ pzas}) = 2.08\text{m} (2 \text{ tiramos}) = \underline{4.16\text{m}}$$

$$\text{pzas} = 1.25 / 0.70 + 1 = 7.25 \rightarrow 8 - 2 = 6 \text{ pzas}$$

$$\text{Total} = 1.09\text{m} (6 \text{ pzas}) = 6.24\text{m} (2 \text{ tiramos}) = \underline{12.48\text{m}}$$

no. 3 longitudinal

$$\text{long} = 9.85 + 0.24 = 10.09\text{m} (4 \text{ pzas}) = \underline{40.36\text{m}}$$

no. 3 (contratubos)

$$\text{long} = 9.20 + 0.24 = 9.44\text{m} (2 \text{ pzas}) = \underline{18.88\text{m}}$$

no. 3 total

$$77.96\text{m}$$

no. 5 longitudinal

$$\text{long} = 9.85 + 0.40 = 10.25\text{m} (2 \text{ pzas}) = 20.5\text{m}$$

$$\text{pza} = 2$$

no. 4 longitudinal

$$\text{long} = 9.20 + 0.30 = 9.50\text{m} (2 \text{ pzas}) = 19\text{m}$$

$$\text{pza} = 2$$

no. 2 (estibos)

$$\text{long} = 1.30 + 0.14 = 1.44\text{m}$$

$$\text{pzas} = 9.20 / 0.15 + 1 = 67.3 \rightarrow 63 \text{ pzas}$$

$$\text{Total} = 1.44\text{m} (63) = 90.72\text{m}$$

## ▶ ZAPATA CORRIDA 2-1 (EJE C)

### No. 3 transversal

$$\text{long} = 0.80 + 0.24 = 1.04\text{m}$$

$$Pzas = 2.625 / 0.20 + 1 = 14.125 \rightarrow 15$$

$$\text{Total} = 1.04 (15) = 15.6\text{m} (2 \text{ tramos}) = 31.2\text{m}$$

### No. 3 longitudinal

$$\text{long} = 7.75 + 0.24 = 7.99\text{m} (4 \text{ pzas}) = 31.96\text{m}$$

### No. 3 (Contratubo)

$$\text{long} = 7.10\text{m} + 0.24\text{m} = 7.34\text{m} (2 \text{ pzas}) = 14.68\text{m}$$

### No. 3 Total

$$77.84\text{m}$$

### No. 5 longitudinal

$$\text{long} = 7.75 + 0.40 = 8.15\text{m} (2 \text{ pzas}) = 16.3\text{m}$$

$$Pza = 2$$

### No. 4 longitudinal

$$\text{long} = 7.10\text{m} + 0.30\text{m} = 7.40\text{m} (2 \text{ pzas}) = 14.8\text{m}$$

$$Pza = 2$$

### No. 2 (estribos)

$$\text{long} = 1.30 + 0.14 = 1.44\text{m}$$

$$Pzas = 7.10 / 0.15 + 1 = 48.3 \rightarrow 49$$

$$\text{Total} = 1.44\text{m} (49) = 70.56\text{m}$$

▷ ZAPATA CORRIDA 2-1 (EJE 1, 3, 5, 7)

no. 3 transversal

$$\text{long} = 0.80 + 0.29 = 1.09 \text{ m}$$

$$Pzas = 1.825 / 0.20 + 1 = 10.125 \rightarrow 11 \text{ pzas}$$

$$\text{Total} = 1.09 (11) = 11.99 \text{ m}$$

no. 3 longitudinal

$$\text{long} = 3.925 + 0.74 = 3.665 \text{ m (1 pzas)} = 19.66 \text{ m}$$

no. 3 (contratebe)

$$\text{long} = 2.775 + 0.29 \text{ m} = 3.015 (2 pzas) = 6.03 \text{ m}$$

no. 3 Total

$$32.13 (4) = 128.52 \text{ m}$$

no. 5 longitudinal

$$\text{long} = 3.925 + 0.90 = 3.825 \text{ m (2 pzas)} = 7.65 \text{ m}$$

$$Pzas = 2$$

no. 4 longitudinal

$$\text{long} = 2.775 + 0.30 = 3.075 \text{ m (2 pzas)} = 6.15 \text{ m}$$

$$Pzas = 2$$

no. 2 (estribos)

$$\text{long} = 1.30 + 0.14 = 1.44 \text{ m}$$

$$Pzas = 2.775 / 0.15 + 1 = 19.5 \rightarrow 20$$

$$\text{Total} = 1.44 \text{ m} (20) = 28.8$$

Total eje 1, 3, 5, 7

no. 3 ▶ mts = 128.52 m

no. 4 ▶ Pzas = 2 (4) = 8

▶ mts = 6.15 (4) = 24.6



no. 5 ▶ Pzas = 2 (4) = 8

no. 2 ▶ Pzas = 20 (4) = 80

▶ mts = 7.65 (4) = 30.6

▶ mts = 28.8 (4) = 115.2

▶ Zapata corrida Z-1 EJE 2,6

no. 3 transversal

$$\text{long} = 0.80 + 0.24 = 1.04\text{m}$$

$$P_{\text{za}} = 2.775 / 0.20 + 1 = 12.125 \rightarrow 13$$

$$\text{total} = 1.04 (13) = 13.52\text{m}$$

no. 3 longitudinal

$$\text{long} = 3.825 + 0.24 = 4.065\text{m} (1\text{ pza}) = 16.26\text{m}$$

no. 3 (Contratubo)

$$\text{long} = 3.175\text{m} + 0.24 = 3.415\text{m} (2\text{ pzas}) = 6.83\text{m}$$

no. 3 Total

$$36.61 (?) = 73.22$$

no. 5 longitudinal

$$\text{long} = 3.825 + 0.40 = 4.225\text{m} (2\text{ pzas}) = 8.45\text{m}$$

$$P_{\text{za}} = 2$$

no. 4 longitudinal

$$\text{long} = 3.175\text{m} + 0.30 = 3.475\text{m} (2\text{ pzas}) = 6.95\text{m}$$

$$P_{\text{za}} = 2$$

no. 2 (estribos)

$$\text{long} = 1.30 + 0.14 = 1.44\text{m}$$

$$P_{\text{zas}} = 3.175\text{m} / 0.15 + 1 = 22.16 \rightarrow 23\text{ pzas}$$

$$\text{Total} = 1.44\text{m} (23) = 33.14\text{m}$$

Total eje 2,6

$$\text{no. 3 } P_{\text{mts}} = 73.22$$

$$\text{no. 4 } P_{\text{za}} = 2 (2) = 4$$

$$P_{\text{mts}} = 6.95 (2) = 13.9$$

$$\text{no. 5 } P_{\text{za}} = 2 (2) = 4$$

$$\text{no. 2 } P_{\text{zas}} = 23 (2) = 46$$

$$P_{\text{mts}} = 8.45 (2) = 16.9$$

$$P_{\text{mts}} = 33.14\text{m} (2) = 66.28$$

Norma



ZAPATA CORRIDA 2-2 EJE 4

no. 3 transversal

long = 0.90 + 0.24 = 1.14m

pzas = 2.225 / 0.20 + 1 = 12.125 -> 13

Total = 1.14 (13) = 14.82m

cuadrante 1  
(abajo)

pzas = 1.825 / 0.20 + 1 = 10.125 -> 11

Total = 1.14 (11) = 12.54m

cuadrante 2  
(arriba)

no. 3 longitudinal

long = 6.45 + 0.24 = 6.69m (9 pzas) = 26.76m

no. 3 (contratabe)

long = 5.86 + 0.24 = 6.09m (7 pzas) = 12.08m

no. 3 Total

66.7m

no. 5 longitudinal

long = 6.45 + 0.40 = 6.85m (7 pzas) = 13.7m

pzas = 2

no. 4 longitudinal

long = 5.80m + 0.30m = 6.10m (7 pzas) = 12.7m

pzas = 2

no. 2 (estribos)

long = 1.6m + 0.14 = 1.74m

pzas = 5.80 / 0.15 + 1 = 39.6 -> 40 pzas

Total = 1.74m (40) = 69.6m

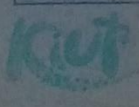
Total oc 4



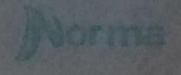
no. 3 pzas = 66.7

no. 5 pzas = 13.7

no. 4 pzas = 12.7



no. 2 pzas = 40  
pzas = 69.6m





## Resultados Finales

### ► Acero en zapata 1

	acero no.3	acero no.5	acero no.4	acero no.2
secc →	96.68m	20.5m	19m	90.72m
eje B →	77.96m	20.5m	19m	90.72m
eje C →	77.84m	16.3m	14.8m	70.56m
eje 1,3,5,7 →	128.52m	30.6m	24.6m	115.2m
eje 2,6 →	73.22m	16.9m	13.9m	66.74m
Total →	454.22m	104.8m	91.3	433.44m
	X 1.03	X 1.07	X 1.05	X 1.03
	467.8466m	112.136m	95.865m	446.4432m

### | Total en acero en zapata 1 |

$$\text{no. 3} \rightarrow \text{pza} = 467.8466\text{m} / 12 = 38.98 \rightarrow 39 \text{ pzas}$$

$$\rightarrow \text{kg} = 467.8466\text{m} (0.566) = 264.8011756 \text{ kg}$$

$$\text{no. 5} \rightarrow \text{pza} = 112.136\text{m} / 12 = 9.34 \rightarrow 10 \text{ pzas}$$

$$\rightarrow \text{kg} = 112.136\text{m} (1.566) = 175.604976 \text{ kg}$$

$$\text{no. 4} \rightarrow \text{pza} = 95.865\text{m} / 12 = 7.98 \rightarrow 8 \text{ pzas}$$

$$\rightarrow \text{kg} = 95.865\text{m} (0.997) = 95.577405 \text{ kg}$$

$$\text{no. 2} \rightarrow \text{pza} = 446.4432\text{m} / 12 = 37.20 \rightarrow 38 \text{ pzas}$$

$$\rightarrow \text{kg} = 446.4432\text{m} (0.250) = 111.6108 \text{ kg}$$

## ▷ ACERO EN ZAPATA 2

	acero no. 3	acero no. 5	acero no. 4	acero no. 2
c/c 4	66.2 m	13.7 m	12.2 m	69.6 m
kg	$\times 1.03$	$\times 1.07$	$\times 1.05$	$17.922 \times 1.03$
	68.186 m	14.659 m	12.81 m	71.688 m

Total en acero en zapata 2

no. 3  $\triangleright pza = 68.186 \text{ m} / 12 = 5.68 \rightarrow 6 \text{ pzas}$

$\triangleright \text{kg} = 68.186 \text{ m} (0.566) = 38.593776 \text{ kg}$

no. 5  $\triangleright pza = 14.659 \text{ m} / 12 = 1.22 \rightarrow 2 \text{ pzas}$

$\triangleright \text{kg} = 14.659 \text{ m} (1.566) = 22.955999 \text{ kg}$

no. 4  $\triangleright pza = 12.81 \text{ m} / 12 = 1.06 \rightarrow 2 \text{ pzas}$

$\triangleright \text{kg} = 12.81 \text{ m} (0.997) = 12.77157 \text{ kg}$

no. 2  $\triangleright pza = 71.688 \text{ m} / 12 = 5.974 \rightarrow 6 \text{ pzas}$

$\triangleright \text{kg} = 71.688 \text{ m} (0.250) = 17.922 \text{ kg}$

# CIMENTACION

▶ Plantilla de concreto  $f'c = 100 \text{ kg/cm}^2$

Zapata Z-1

$$(10.05\text{m})(1.00\text{m})(0.05\text{m}) = 0.5025\text{m}^3 (2) = 1.005\text{m}^3 < \text{cjc A y B}$$

$$(1.625\text{m})(1.00\text{m})(0.05\text{m}) = 0.08125\text{m}^3 (4) = 0.325\text{m}^3 < \text{cjc 1, 3, 5 y 7}$$

$$(2.025\text{m})(1.00\text{m})(0.05\text{m}) = 0.10125\text{m}^3 (2) = 0.2025\text{m}^3 < \text{cjc 2 y 6}$$

$$(7.95\text{m})(1.00\text{m})(0.05\text{m}) = 0.3975 < \text{cjc C}$$

$$\text{Total Zapata 1} = 1.93\text{m}^3$$

Zapata Z-2

$$(1.625\text{m})(1.10\text{m})(0.05\text{m}) = 0.089375 < \text{cjc A (arriba)}$$

$$(2.025\text{m})(1.10\text{m})(0.05\text{m}) = 0.111375 < \text{cjc A (abajo)}$$

$$\text{Total Zapata 2} = 0.20075\text{m}^3$$

$$\text{Resultado Final} = 2.13075 (1.10) = 2.343825\text{m}^3$$

▶ Data - 1 armex (15x20)

$$\text{cjc A} \rightarrow 9.70\text{m} \quad \text{cjc 1} \rightarrow 2.775\text{m} \quad \text{cjc 2} \rightarrow 3.175\text{m}$$

$$\text{cjc B} \rightarrow 9.70\text{m} \quad \text{cjc 3} \rightarrow 2.775\text{m} \quad \text{cjc 6} \rightarrow 3.175\text{m}$$

$$\text{cjc C} \rightarrow 7.10\text{m} \quad \text{cjc 5} \rightarrow 2.775\text{m}$$

$$\text{cjc 7} \rightarrow 2.775\text{m}$$

$$\text{Total} = 42.95\text{m}$$

$$\text{pzus} = 42.95\text{m} / 6\text{m} = 7.15 \rightarrow 8 \text{ pzus}$$

▶ Data - 2 cjc A

no. 3 longitudinal

$$\text{long} = 5.80 + 0.24 = 6.04\text{m}$$

$$\text{Total} = 6.04\text{m} (4 \text{ pzus}) = 24.16\text{m} (1.03) = 24.8848$$

$$\text{pzus} = 4$$

$$\text{kg} = 24.8848 (0.566) = 14.08 \text{ kg}$$

no. 2 (estribos)

$$\text{long} = 1.00\text{m} + 0.19\text{m} = 1.19\text{m}$$

$$\text{pzus} = 5.80 / 0.10 + 1 = 59 \text{ pzus}$$

$$\text{Total} = 1.19 (59) = 69.26\text{m} (1.03) = 69.2778\text{m}$$

$$\text{pzus} = 69.2778\text{m} / 12 = 5.77 \rightarrow 6 \text{ pzus}$$

$$\text{kg} = 69.2778\text{m} (0.250) = 17.319 \text{ kg}$$

CONCRETO F'c = 200 kg/cm<sup>2</sup>

Base  $\rightarrow (0.80)(0.15)(9.85) = 1.182 \text{ m}^3$   
contratiabe  $\rightarrow (0.15)(0.35)(9.70) = 0.483 \text{ m}^3$   
dala  $\rightarrow (0.15)(0.70)(9.70) = 0.776 \text{ m}^3$

ejc A, B  
 $1.991(2) = 3.882 \text{ m}^3$

Base  $\rightarrow (0.80)(0.15)(7.75) = 0.93 \text{ m}^3$   
contratiabe  $\rightarrow (0.15)(0.35)(7.10) = 0.37 \text{ m}^3$   
dala  $\rightarrow (0.15)(0.70)(7.10) = 0.213 \text{ m}^3$

ejc C  
 $1.51575 \text{ m}^3$

Base  $\rightarrow (0.80)(0.15)(1.875) = 0.219 \text{ m}^3$   
contratiabe  $\rightarrow (0.15)(0.35)(2.475) = 0.129 \text{ m}^3$   
dala  $\rightarrow (0.15)(0.70)(2.475) = 0.079 \text{ m}^3$

ejc 1, 3, 5, 7  
 $0.477(4) = 1.69275 \text{ m}^3$

Base  $\rightarrow (0.80)(0.15)(2.225) = 0.267 \text{ m}^3$   
contratiabe  $\rightarrow (0.15)(0.35)(2.875) = 0.15 \text{ m}^3$   
dala  $\rightarrow (0.15)(0.70)(2.875) = 0.086 \text{ m}^3$

ejc 2, 6  
 $0.5041875(2) = 1.008375 \text{ m}^3$

Base  $\rightarrow (0.90)(0.15)(2.775) = 0.300 \text{ m}^3$   
contratiabe  $\rightarrow (0.30)(0.35)(2.875) = 0.301 \text{ m}^3$   
dala  $\rightarrow (0.30)(0.70)(2.875) = 0.1775 \text{ m}^3$

ejc 4 seccion 1 (abuso)  
 $0.77475 \text{ m}^3$

Base  $\rightarrow (0.90)(0.15)(1.875) = 0.296 \text{ m}^3$   
contratiabe  $\rightarrow (0.30)(0.35)(2.475) = 0.259 \text{ m}^3$   
dala  $\rightarrow (0.30)(0.70)(2.475) = 0.1485 \text{ m}^3$

ejc 4 seccion 2 (arriba)  
 $0.65475 \text{ m}^3$

Resultados Finales =  $9.528375 \times 1.05 = 10.00479375 \text{ m}^3$

# CIMENTACION

## ▼ muro de enrase de cimentacion (pzas)

Zapata Z-1

$(9.70m)(0.90m) = 3.68m^2 (13 pzas/m) = 47.84 \rightarrow 48 pzas (2 tramos) = 96 pzas$  < eje A y B

$(2.475m)(0.90m) = 0.99m^2 (13) = 12.87 \rightarrow 13 pzas (1 tramos) = 52 pzas$  < eje <sup>1, 3</sup> 5, 7

$(7.10m)(0.90m) = 2.84m^2 (13) = 36.97 \rightarrow 37 pzas$  < eje C

$(2.875m)(0.90m) = 1.15m^2 (13) = 14.95 \rightarrow 15 pzas (2 tramos) = 30 pzas$  < eje 2, 6

Z-1 Total de pzas = 215 pzas,

Zapata Z-2

$(2.475m)(0.90m) = 0.99 (13) = 12.87 \rightarrow 13 pzas (2 ladrillos) = 26$  > eje 4 (arriba)

$(2.875m)(0.90m) = 1.15m^2 (13) = 14.95 \rightarrow 15 pzas (2 ladrillos) = 30$  > eje 4 (abajo)

Z-2 total de pzas = 56 pzas,

Total = 215 pzas + 56 pzas = 271 pzas,

# AIBANERIA

## ▼ CASTILLO #1

eje A y B

$(= 4m pzas = 6$  Total =  $4(6) = 24m (2 tramos) = 48m$

eje C

$(= 4m pzas = 4$  Total =  $4(4) = 16m$

eje 1 y 7

$(= 4m pzas = 1$   $4(1) = 4 (2 tramos) = 8m$   $1 armex = 6m$

total =  $72m / 6m = 12 pzas$

### ► castillo K-2

no. 3

$$\text{long} = 4\text{m} \quad \text{varillas} = 6 \quad \text{Total} = 6(4) = 24\text{m} \quad (8 \text{ castillos}) = 192\text{m} \quad (1.03) = 197.76$$

$$\text{Pzas} = 197.76 / 12 = 16.48 \rightarrow 17 \text{ pzas}$$

$$\text{kg} = 197.76 (0.566) = 111.93216 \text{ kg}$$

no. 2 (castillos)

$$\text{long} = 0.60\text{m} + 0.19\text{m} = 0.79 (2 \text{ pzas}) = 1.48\text{m}$$

$$\text{Pzas} = 4\text{m} / 0.15 + 1 = 27.6 \rightarrow 28 \text{ pzas}$$

$$\text{Total} = 1.48\text{m} (28) = 41.44\text{m} \quad (8 \text{ castillos}) = 331.52 (1.03) = 341.4656$$

$$\text{Pzas} = 341.4656 / 12 = 28.45 \rightarrow 29 \text{ pzas}$$

$$\text{kg} = 341.4656 (0.250) = 85.3664 \text{ kg}$$

### ► castillo K-3

no. 4

$$\text{long} = 4\text{m} \quad \text{varillas} = 8 \quad \text{Total} = 4(8) = 32\text{m} \quad (3 \text{ castillos}) = 96\text{m} \quad (1.05) = 100.8\text{m}$$

$$\text{Pzas} = 100.8 / 12 = 8.4 \rightarrow 9 \text{ pzas}$$

$$\text{kg} = 100.8 (0.997) = 100.4976 \text{ kg}$$

no. 2 (castillos)

$$\text{long} = 1.2\text{m} + 0.19\text{m} = 1.39\text{m} (2) = 2.68\text{m}$$

$$\text{Pzas} = 4\text{m} / 0.15 + 1 = 27.66 \rightarrow 28 \text{ pzas}$$

$$\text{Total} = 2.68\text{m} (28) = 75.04\text{m} \quad (3 \text{ castillos}) = 225.12 (1.03) = 231.8736$$

$$\text{Pzas} = 231.8736 / 12 = 19.32 \rightarrow 20 \text{ pzas}$$

$$\text{kg} = 231.8736 (0.250) = 57.9684 \text{ kg}$$