

MEMORIA DE CALCULO

OBRA: Construção de três portais sede município de Mutum MG.

A.R.T.: 6292151

PLACA DE OBRA = $2,45 \times 1,225 = 3,00\text{M}^2$.

(Sendo que a face horizontal será o dobro da face vertical).

1 – TUBULÃO SAPATA 01 (X2)

ESCAVAÇÃO/CONCRETO: $3,14 \times 0,4^2 \times 2 = 1,01 \times 2 = 2,02 \text{ M3}$

Ø6.3: $14 \times 2,3 = 32,20 \times 2 = 64,40\text{m}$

Ø10: $(8 \times 1,10) + (16 \times 2,9) + (8 \times 1,10) = 64 \times 2 = 128\text{m}$

2 – TUBULÃO SAPATA 02 (X2)

ESCAVAÇÃO/CONCRETO: $3,14 \times 0,4^2 \times 2 = 1,01 \times 2 = 2,02 \text{ M3}$

Ø6.3: $14 \times 2,3 = 32,20 \times 2 = 64,40\text{m}$

Ø10: $(8 \times 1,10) + (16 \times 2,9) + (8 \times 1,10) = 64 \times 2 = 128\text{m}$

SOMATORIA TUBULÕES

ESCAVAÇÃO/CONCRETO = $(2,02 + 2,02) \times 3 = 12,12 \text{ M3}$

Ø6.3: $64,40 + 64,40 = 128,80\text{m} \times 0,245 = 31,56\text{kg} \times 3 = 94,68\text{kg}$

Ø10: $128 + 128 = 256 \text{ m} \times 0,617 = 157,95\text{kg} \times 3 = 473,85\text{kg}$

3- SAPATA 01

Concreto: $3,40 \times 1,35 \times 1,00 = 4,59\text{m}^3$

Forma: $(3,4 \times 2 + 1,35 \times 2) \times 1,0 = 9,5\text{m}^2$

Ø8.0: $7 \times 9,30 = 65,10\text{m}$

Ø12.5: $(10 \times 3,7) + (10 \times 5,1) + (22 \times 1,7) + (22 \times 3,1) = 193,60\text{m}$

4- SAPATA 02

Concreto: $4,30 \times 1,45 \times 1,00 = 6,24\text{m}^3$

Forma: $(4,30 \times 2 + 1,45 \times 2) \times 1,0 = 11,5\text{m}^2$

Ø8.0: $7 \times 11,30 = 79,10\text{m}$

Ø12.5: $(10 \times 4,6) + (10 \times 5,2) + (28 \times 1,75) + (28 \times 3,15) = 235,20\text{m}$

SOMATORIA SAPATAS

Concreto: $4,59 + 6,24 = 10,83\text{m}^3 \times 3 = 32,49 \text{ m}^3$

Forma: $9,50 + 11,50 = 21\text{m}^2 \times 3 = 63\text{m}^2$

Ø8.0: $65,10 + 79,10 = 144,20\text{m} \times 0,395 = 56,96\text{kg} \times 3 = 170,88\text{kg}$

Ø12.5: $193,60 + 235,20 = 428,80\text{m} \times 0,963 = 412,93\text{kg} \times 3 = 1.238,79\text{kg}$

5- ARRANQUE PILAR 01

Ø16.0: $18 \times 2,60 = 46,80\text{m}$

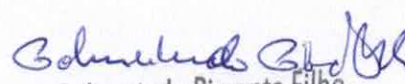
Ø5.0: $6 \times 1,96 = 11,76\text{m}$

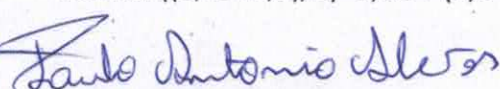
Ø8.0: $24 \times 0,34 = 8,16\text{m}$

6- PILAR P01

Concreto: $((0,75 + 3,0)/2) \times 8,60 = 16,13 \times 0,3 = 4,84\text{m}^3$

Forma: $((0,75 + 3,0)/2) \times 8,60 + (0,3 \times 0,89) + (0,3 \times 8,6) = 37,51\text{m}^2$


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Ø5.0: 6,50+ 6,40+ 6,32+ 6,24+ 6,16+ 6,08+ 6,00+ 5,92+ 5,84+ 5,76+ 5,68+ 5,62+ 5,54+ 5,46+ 5,38+ 5,30+ 5,22+ 5,14+ 5,06+ 4,98+ 4,90+ 4,82+ 4,74+ 4,66+ 4,60+ 4,52+ 4,44+ 4,36+ 4,28+ 4,20+ 4,12+ 4,04+ 3,96+ 3,88+ 3,80+ 3,72+ 3,64+ 3,56+ 3,50+ 3,42+ 3,34+ 3,26+ 3,18+ 3,10+ 3,02+ 2,94+ 2,86+ 2,78+ 2,70+ 2,62+ 2,54+ 2,48+ 2,40+ 2,32+ 2,24+ 2,16+ 2,08+ 2,00 = 245,78m

Ø16.0: (4*8,00) + (4*8,89) = 67,56 m

Ø12.5: 0,76 + 1,53+ 3,06+ 3,82+ 4,59+ 5,35+ 6,12+ 6,88+ 7,64+ 8,41+ 8,60+ 8,60+ 8,60+ 8,60 = 82,56*2 = 165,12m

Ø8.0: 252*0,34= 85,68m

7- ARRANQUE PILAR 02

Ø16.0: 22*2,60 = 57,20 m

Ø5.0: 6*2,46= 14,76m

Ø8.0: 30*0,44= 13,20m

8- PILAR P02

Concreto: ((0,90+3,70)/2)*11,05= 25,42*0,4= 10,17m³

Forma: (((0,90+3,7)/2)*11,05)*2 + (0,4*11,40) + (0,4*11,05) = 59,82m²

Ø5.0: 8,10+ 8,04+ 7,98+ 7,90+ 7,82+ 7,74+ 7,66+ 7,58+ 7,52+ 7,44+ 7,36+ 7,28+ 7,22+ 7,14+ 7,06+ 6,98+ 6,90+ 6,84+ 6,76+ 6,68+ 6,60+ 6,52+ 6,46+ 6,38+ 6,30+ 6,22+ 6,14+ 6,08+ 6,00+ 5,92+ 5,84+ 5,76+ 5,70+ 5,62+ 5,54+ 5,46+ 5,38+ 5,30+ 5,24+ 5,16+ 5,08+ 5,00+ 4,94+ 4,86+ 4,78+ 4,70+ 4,62+ 4,56+ 4,48+ 4,40+ 4,32+ 4,24+ 4,18+ 4,10+ 4,02+ 3,94+ 3,86+ 3,80+ 3,72+ 3,64+ 3,56+ 3,48+ 3,42+ 3,34+ 3,26+ 3,18+ 3,10+ 3,04+ 2,96+ 2,88+ 2,80+ 2,72+ 2,66+ 2,58+ 2,50 = 398,34m

Ø16.0: (4*11,05) + (4*11,40)= 89,80 m

Ø12.5: 1,18+ 1,97+ 2,76+ 3,55+ 4,34+ 5,13+ 5,92+ 6,71+ 7,50+ 8,29+ 9,08+ 9,87+ 10,66+ 11,05+ 11,05+ 11,05+ 11,05 = 132,21*2= 264,42m

Ø8.0: 364*0,44= 160,16m

9- ARRANQUE PILAR 03

Ø16.0: 22*2,60= 57,20m

Ø5.0: 6*3,26= 19,56m

Ø8.0: (12*0,84) + (6*0,94) = 15,72m

10- PILAR P03

Concreto: 8,0*0,9*0,8= 5,76m³

Forma: (0,9*8)*2+(6,4*2) = 27,20m²

Ø12.5: 22*8=176,0m

Ø5.0: 53*3,26= 172,78m

Ø8.0: (106*0,84) + (53*0,94) = 138,86m

11- ARRANQUE PILAR 04

Ø16.0: 18*2,60= 46,80m

Ø5.0: 6*2,46= 14,76m

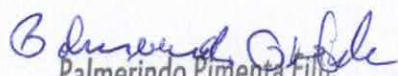
Ø8.0: 6*0,54= 3,24m

12- PILAR P04

Concreto: 8,0*0,5*0,8= 3,20m³

Forma: (0,5*8)*2+(8*0,8)*2 = 20,8m²

Ø12.5: 18*8=144,0m


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Ø5.0: $53 \times 2,46 = 130,38\text{m}$

Ø8.0: $53 \times 0,54 = 28,62\text{m}$

13- ARRANQUE PILAR P05

Ø16.0: $18 \times 2,60 = 46,80\text{m}$

Ø5.0: $6 \times 2,46 = 14,76\text{m}$

Ø8.0: $6 \times 0,54 = 3,24\text{m}$

14- PILAR P05

Concreto: $8,0 \times 0,5 \times 0,8 = 3,20\text{m}^3$

Forma: $(0,5 \times 8) \times 2 + (8 \times 0,8) \times 2 = 20,8\text{m}^2$

Ø12.5: $18 \times 8 = 144,0\text{m}$

Ø5.0: $53 \times 2,46 = 130,38\text{m}$

Ø8.0: $53 \times 0,54 = 28,62\text{m}$

SOMATORIA PILARES

Concreto: $4,84 + 10,17 + 5,76 + 3,2 + 3,2 = 27,17\text{m}^3 \times 3 = 81,51\text{m}^3$

Forma: $37,51 + 59,82 + 27,20 + 20,80 + 20,80 = 166,16\text{m}^2 \times 3 = 498,48\text{m}^2$

Ø16.0: $46,80 + 67,56 + 57,20 + 89,80 + 57,20 + 46,80 + 46,80 = 412,16\text{M} \times 1,578 = 650,39 \times 3 = 1.951,17\text{kg}$

Ø12.5: $165,12 + 264,42 + 176,00 + 144,00 + 144,00 = 893,54\text{m} \times 0,963 = 860,48\text{kg} \times 3 = 2.581,44\text{kg}$

Ø5.0: $11,76 + 245,78 + 14,76 + 398,34 + 19,56 + 172,78 + 14,76 + 130,38 + 14,76 + 130,38 = 1.153,26\text{m} \times 0,154 = 177,60\text{kg} \times 3 = 532,80\text{kg}$

Ø8.0: $8,16 + 85,68 + 13,20 + 160,16 + 15,72 + 138,86 + 3,24 + 28,62 + 3,24 + 28,62 = 485,50\text{m} \times 0,395 = 191,77\text{kg} \times 3 = 575,31\text{kg}$

Total de aço: $1.951,17 + 2.581,44 + 532,80 + 575,31 = 5.640,72\text{kg}$

15- FECHAMENTO N°6

$8,00 \times 1,3 = 10,40\text{m}^2$

16- VIGA 1

PERÍMETRO DE FORA (PERFIL 150X60X20)

PERIMETRO FORA (FRONTAL) = $11,90 \times 2 + 1,5 \times 2 = 26,80\text{M} \times 2 = 53,60\text{M}$

PERIMETRO FORA (SUPERIOR) = $0,6 \times 2 = 1,20\text{M} \times 2 = 2,40\text{M}$

PERIMETRO FORA (TOTAL) = $53,60 + 2,40 = 56,00\text{M}$

PESO PERIMETRO FORA: $56,00\text{M} \times 5,15 = 288,40\text{kg} \times 3 = 865,20\text{kg}$

PERÍMETRO DE DENTRO (PERFIL 100X50X17)

PERIMETRO DENTRO (FRONTAL) = $(7 \times 2,12 + 2,05) + 7 \times 1,5 = 27,39\text{M} \times 2 = 54,78\text{M}$

PERIMETRO DENTRO (SUPERIOR) = $(19 \times 0,85 + 0,78) + 19 \times 0,6 = 28,33\text{M} \times 2 = 56,66\text{M}$

PERIMETRO DENTRO (TOTAL) = $54,78 + 56,66 = 111,44\text{M}$

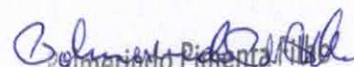
PESO PERIMETRO DENTRO: $111,44\text{M} \times 3,82 = 425,70\text{KG} \times 3 = 1.277,10\text{kg}$

FECHAMENTO EXTERNO (FRONTAL) = $11,90 \times 1,5 = 17,85 \times 2 = 35,70\text{M}^2$

FECHAMENTO EXTERNO (LATERAL) = $1,50 \times 0,60 = 0,90 \times 2 = 1,80\text{M}^2$

FECHAMENTO EXTERNO (SUPERIOR) = $11,90 \times 0,60 = 7,14\text{M}^2$

FECHAMENTO EXTERNO (INFERIOR) = $11,90 \times 0,60 = 7,14\text{M}^2$


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FECHAMENTO EXTERNO (TOTAL) = $35,70 + 1,80 + 7,14 + 7,14 = 51,78 \text{ M}^2$

PESO FECHAMENTO COM CHAPA MSG14: $51,78 \text{ M}^2 \times 16 = 828,48 \text{ kg} \times 3 = 2.485,44 \text{ kg}$

17- VIGA 2

PERIMETRO FORA (FRONTAL) = $11,27 \times 2 + 0,6 \times 2 = 23,74 \text{ M} \times 2 = 47,48 \text{ M}$

PERIMETRO FORA (SUPERIOR) = $0,6 \times 2 = 1,20 \times 2 = 2,40 \text{ M}$

PERIMETRO FORA (TOTAL) = $47,48 + 2,40 = 49,88 \text{ M}$

PESO PERIMETRO FORA: $49,88 \text{ M} \times 7,30 = 364,12 \text{ kg} \times 3 = 1.092,36 \text{ kg}$

PERIMETRO DENTRO (FRONTAL) = $13 \times 0,85 + 0,86 + 0,82 + 0,83 \times 2 + 0,84 \times 2 + 18 \times 0,6 = 26,87 \text{ M} \times 2 = 53,74 \text{ M}$

PERIMETRO DENTRO (SUPERIOR) = $18 \times 0,85 + 18 \times 0,6 = 26,10 \text{ M} \times 2 = 52,20 \text{ M}$

PERIMETRO DENTRO (TOTAL) = $53,74 + 52,00 = 105,94 \text{ M}$

PESO PERIMETRO DENTRO: $105,94 \text{ M} \times 6,10 = 646,24 \text{ kg} \times 3 = 1.938,71 \text{ kg}$

FECHAMENTO EXTERNO (FRONTAL) = $11,27 \times 0,60 = 6,76 \times 2 = 13,53 \text{ M}^2$

FECHAMENTO EXTERNO (LATERAL) = $0,60 \times 0,60 = 0,36 \times 2 = 0,72 \text{ M}^2$

FECHAMENTO EXTERNO (SUPERIOR) = $11,27 \times 0,60 = 6,76 \text{ M}^2$

FECHAMENTO EXTERNO (INFERIOR) = $11,27 \times 0,60 = 6,76 \text{ M}^2$

FECHAMENTO EXTERNO (TOTAL) = $13,53 + 0,72 + 6,76 + 6,76 = 27,77 \text{ M}^2$

PESO FECHAMENTO COM CHAPA MSG14: $27,77 \text{ M}^2 \times 16 = 444,32 \text{ kg} \times 3 = 1.332,96 \text{ kg}$

PESO TOTAL ESTRUTURA METALICA DAS VIGAS: $865,20 + 1.277,10 + 1.092,36 + 1.938,71 = 5.173,38 \text{ KG}$

PESO TOTAL FECHAMENTO COM CHAPA MSG14: $2.485,44 + 1.332,96 = 3.818,40 \text{ KG}$

AREA TOTAL FECHAMENTO COM CHAPA MSG14: $51,78 \text{ M}^2 + 27,77 \text{ M}^2 = 79,52 \text{ M}^2 \times 3 = 238,56 \text{ M}^2$

18 – CHAPA DE FECHAMENTO ENTRE PILARES 4 E 5

ÁREA DA CHAPA = $(0,05 + 1,30 + 0,05) \times 8,00 = 11,20 \text{ M}^2$

PESO DA CHAPA = $(0,05 + 1,30 + 0,05) \times 8,00 \times 74,69 = 836,53 \text{ KG} \times 3 = 2.509,59 \text{ KG}$

OBS.: Essa placa afixada para fechamento vertical e identificação com nome da cidade ira encaixar cinco centímetro em cada coluna de sua lateral.

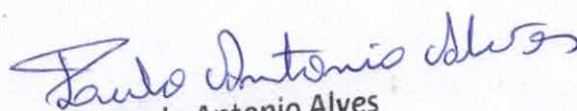
CONSIDERAÇÕES: A Prefeitura Municipal de Mutum MG, Declara que especificamente no PORTAL N° 02: SAIDA DA CIDADE DE MUTUM PARA CIDADE SENTIDO LAJINHA(19° 50' 23.34" S) E (41° 27' 24.09" W), sendo que a sua margem direita caso seja necessário movimentação de terra como corte, aterro e ou compactação, ficara a cargo e responsabilidade de execução e manutenção do Município de Mutum MG.

Mutum, 20 de Janeiro de 2021.



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