

MEMÓRIA DE CÁLCULO

OBRA: CONSTRUÇÃO DE PISTA DE SKATE

LOCAL: RUA PRESIDENTE CASTELO BRANCO, PARQUE DE EXPOSIÇÕES, CENTRO, BOA ESPERANÇA – ES

1 – SERVIÇOS PRELIMINARES

1.1 PLACA DE OBRA

$$A = 1,5\text{m} \times 2,4\text{m} = 3,60\text{m}^2$$

TOTAL: 3,60m²

1.2 TAPUME

$$A = (33,40 + 17,20)\text{m} \times 02 \times 2,20\text{m} = 222,64\text{m}^2$$

TOTAL: 222,64m²

1.3 BARRACÃO

$$A = 5,00\text{m}^2$$

TOTAL: 5,00m²

1.4 REGULARIZAÇÃO DE SUBLEITO

$$A = 30,40\text{m} \times 14,20\text{m} = 431,68\text{m}^2$$

TOTAL: 431,68m²

1.5 LOCAÇÃO

$$C = (30,4\text{m} \times 02) + (14,20\text{m} \times 02) = 89,20\text{m}$$

TOTAL: 89,20 m

2 – INSTALAÇÕES PROVISÓRIAS

2.1 ENTRADA PROVISÓRIA DE ENERGIA ELÉTRICA

TOTAL: 1,00 und

2.2 KIT CAVALETE

TOTAL: 1,00 und

2.3 RAMAL PREDIAL EM TUBO

$$C = 15,00\text{m}$$

TOTAL: 15,00m

3 – ESTRUTURA

3.1 ESCAVAÇÃO

$$\text{Sapatas} = 0,7\text{m} \times 0,4\text{m} \times 1,35\text{m} \times 20\text{und} = 7,56\text{m}^3$$

$$\text{Baldrame} = [(11,07\text{m} \times 02) + (3,76\text{m} \times 06) + (5,00\text{m} \times 06) + (3,26\text{m} \times 4)] \times 0,20\text{m} \times 0,30\text{m} = (22,14+22,56+30,00+13,04)\text{m} \times 0,20\text{m} \times 0,30\text{m} = 5,26\text{m}^3$$

$$\text{Alvenaria bloco cheio (baldrame)} = [(8,72\text{m} \times 02) + (0,70\text{m} \times 02) + (5,00\text{m} \times 04) + (2,50\text{m} \times 06) + (2,00\text{m} \times 04) + (2,50\text{m} \times 01)] \times 0,20\text{m} \times 0,40\text{m} = (17,44+1,40+20,00+15,00+8,00+2,50)\text{m} \times 0,20\text{m} \times 0,40\text{m} = 5,15\text{m}^3$$

TOTAL: 16,01 m³

3.2 REATERRO

V = escavação - concreto

$$\text{Sapatas} = 7,56\text{m}^3 - [(0,70 \times 0,40 \times 0,30)\text{m} \times 20\text{und} + (0,12 \times 0,30 \times 1,00)\text{m} \times 20\text{und}] = 5,16\text{m}^3$$

$$\text{Baldrame} = 5,26\text{m}^3 - (87,74 \times 0,12 \times 0,30)\text{m} = 2,10\text{m}^3$$

$$\text{Alvenaria bloco cheio (baldrame)} = 5,15\text{m}^3 - (64,34 \times 0,14 \times 0,40)\text{m} = 1,55\text{m}^3$$

TOTAL: 8,81 m³

3.3 ATERRO MANUAL

$$\text{Obstáculo 01 e 02} = [(0,76 \times 1,30 \times 5,00)\text{m} + (2,00 \times 1,30)\text{m} / 2 \times 5,00\text{m}] \times 02 = 22,88\text{m}^3$$

$$\text{Obstáculo 03} = [(0,80 + 0,40)\text{m} \times 2,38\text{m} / 2] \times 5,00\text{m} \times 02 + (1,76 \times 5,00 \times 0,80)\text{m} = 21,32\text{m}^3$$

$$\text{Obstáculo 04} = [(1,76 \times 1,30 \times 4,00)\text{m} \times 02 + (7,07 \times 0,50 \times 4,00)\text{m}] = 32,44\text{m}^3$$

TOTAL: 76,64 m²

3.4 AÇO CA-60 B FINA, DIÂMETRO DE 4.0 A 7.0mm

$$\text{Vigas baldrames } \varnothing 5.0 = 447\text{m} \times 0,154\text{kg/m} = 68,84\text{kg}$$

$$\text{Vigas } \varnothing 5.0 = 267\text{m} \times 0,154\text{kg/m} = 41,12\text{kg}$$

$$\text{Pilares } \varnothing 5.0 = 293,90\text{m} \times 0,154\text{kg/m} = 45,26\text{kg}$$

TOTAL: 155,22kg

3.5 AÇO CA-50 A MÉDIA, DIÂMETRO DE 8.0 mm

$$\text{Sapatas } \varnothing 8.0 = (0,58\text{m} \times 7) + (0,87\text{m} \times 05) = 8,41\text{m} \times 0,395\text{kg/m} = 3,32\text{kg} \times 20\text{und} = 66,44\text{kg}$$

$$\text{Vigas baldrames } \varnothing 8.0 = 340,1\text{m} \times 0,395\text{kg/m} = 134,34\text{kg}$$

$$\text{Vigas } \varnothing 8.0 = 258,20\text{m} \times 0,395\text{kg/m} = 101,99\text{kg}$$

TOTAL: 302,77 kg

3.6 AÇO CA-50 A MÉDIA, DIÂMETRO DE 10.0 mm

$$\text{Pilaretes/pilares} = 207,20\text{m} \times 0,617\text{kg/m} = 127,84\text{kg}$$

TOTAL: 127,84 kg

3.7 CONCRETO MAGRO

$$\text{Sapatas} = 0,7\text{m} \times 0,4\text{m} \times 0,05\text{m} \times 20\text{und} = 0,28\text{m}^3$$

$$\text{Baldrame} = 87,74\text{m} \times 0,12 \times 0,05\text{m} = 0,53\text{m}^3$$

$$\text{Acabamento muretas obstáculo 03} = (7,00 + 2,00)\text{m} \times 0,50\text{m} \times 0,05\text{m} = 0,23\text{m}^3$$

TOTAL: 1,04 m³

3.8 CONCRETO FCK=25 MPa

$$\text{Sapata} = 0,7\text{m} \times 0,4\text{m} \times 0,3\text{m} = 0,084\text{m} \times 20\text{unds} = 1,68\text{m}^3$$

$$\text{Vigas baldrames} = 0,30\text{m} \times 0,12\text{m} \times 87,74\text{m} = 3,16\text{m}^3$$

$$\text{Vigas} = [(4,00 + 4,00 + 2,00 + 2,00)\text{m} \times 02 + (5,00 + 5,00 + 0,76 + 0,76 + 2,44 + 2,44)\text{m} \times 02] \times 0,3\text{m} \times 0,12\text{m} = 56,80\text{m} \times 0,30\text{m} \times 0,12\text{m} = 2,04\text{m}^3$$

$$\text{Pilares} = 0,12\text{m} \times 0,30\text{m} \times 1,40\text{m} \times 16\text{und} = 0,81\text{m}^3$$

$$\text{Pilaretes} = 0,12\text{m} \times 0,30\text{m} \times 1,00\text{m} \times 20\text{und} = 0,72\text{m}^3$$

TOTAL: 8,41 m³

3.9 LAJE PRÉ-FABRICADA

$$A1 = 7,00\text{m} \times 0,50\text{m} = 3,50\text{m}^2$$

$$A2 = 2,00\text{m} \times 0,50\text{m} = 1,00\text{m}^2$$

$$\text{TOTAL: } 4,50 \text{ m}^2$$

3.10 FÔRMA DE TÁBUA DE MADEIRA DE 2.5 X 30.0 cm

$$\text{Vigas baldrame} = 87,74\text{m} \times 0,30\text{m} \times 02 \text{ lados} = 52,64\text{m}^2$$

$$\text{Vigas} = 56,80\text{m} \times (0,3\text{m} \times 2\text{lados} + 0,12\text{m}) = 40,90\text{m}^2$$

$$\text{Pilaretes} = (0,12+0,30)\text{m} \times 02 \times 1,00\text{m} \times 20\text{und} = 16,80\text{m}^2$$

$$\text{Pilares} = (0,12+0,30)\text{m} \times 02 \times 1,40\text{m} \times 16\text{und} = 18,82\text{m}^2$$

$$\text{TOTAL: } 129,16 \text{ m}^2$$

3.11 BLOCO DE CONCRETO-CHEIO

BALDRAME

$$\text{Baldrame entorno} = (8,72 \times 0,80)\text{m} \times 02 + (0,70 \times 0,80)\text{m} \times 02 + (7,00 \times 0,80)\text{m} \times 02 = 25,71\text{m}^2$$

$$\text{Obstáculo 01 e 02} = (2,50 \times 1,10)\text{m} \times 02 = 5,50\text{m}^2$$

$$\text{Obstáculo 03} = (5,00 \times 0,80)\text{m} \times 02 + (5,00 \times 1,20)\text{m} \times 02 + (2,50 \times 1,00)\text{m} \times 06 + (2,00 \times 1,20)\text{m} \times 04 = (8,00+12,00+15,00+9,60)\text{m}^2 = 44,60\text{m}^2$$

FECHAMENTO

$$\text{Obstáculo 01 e 02} = (5,00 \times 1,40)\text{m} \times 02 + (0,76 \times 1,40)\text{m} \times 04 + [(2,38 \times 1,40)/2] \times 04 = (14,00+4,26+6,66)\text{m}^2 = 24,92\text{m}^2$$

$$\text{Muretas obstáculo 03} = (7,00+7,00+0,50+0,50+0,50+0,50)\text{m} \times 0,50\text{m} + (2,00+2,00+0,50+0,50)\text{m} \times 0,50\text{m} = (8,00+2,50)\text{m}^2 = 10,50\text{m}^2$$

$$\text{Obstáculo 04} = (4,00 \times 1,40)\text{m} \times 02 + (2,00 \times 1,40)\text{m} \times 04 + (3,49 \times 0,30)\text{m} \times 02 + (1,79 \times 0,85)\text{m} \times 04 = (11,20+11,20+2,09+6,09)\text{m}^2 = 30,58\text{m}^2$$

$$\text{TOTAL: } 141,81 \text{ m}^2$$

3.12 IMPERMEABILIZAÇÃO

$$A = \text{bloco cheio (baldrame)} \times 02 \text{ faces} = 75,81\text{m}^2 \times 02 = 151,62\text{m}^2$$

$$\text{TOTAL: } 151,62 \text{ m}^2$$

3.13 TUBO DE AÇO GALVANIZADO

$$\text{Obstáculo 01 e 02} = 5,00\text{m} \times 02 = 10,00\text{m}$$

$$\text{Obstáculo 03} = 4,50\text{m} \times 02 = 9,00\text{m}$$

$$\text{Obstáculo 04} = 4,00\text{m} \times 02 = 8,00\text{m}$$

$$\text{TOTAL: } 27,00 \text{ m}$$

4 – ALVENARIA

4.1 CHAPISCO

$$\text{Obstáculo 01 e 02} = (5,00 \times 1,40)\text{m} \times 02 + (0,76 \times 1,40)\text{m} \times 04 + [(2,38 \times 1,40)/2] \times 04 = (14,00+4,26+6,66)\text{m}^2 = 24,92\text{m}^2$$

$$\text{Obstáculo 03} = [(2,50 \times 0,55)\text{m} / 2 \times 02 + (2,00 \times 0,55)\text{m}] \times 02 \text{ lados} = 4,95\text{m}^2$$

$$\text{Muretas obstáculo 03} = (7,00+0,50)\text{m} \times 02 \times 0,50\text{m} + (2,00+0,50)\text{m} \times 02 \times 0,50\text{m} + (7,00+2,00)\text{m} \times 0,50\text{m} = (7,50+2,50+4,50)\text{m}^2 = 14,50\text{m}^2$$

Obstáculo 04 = $(4,00 \times 1,40)m \times 02 + (2,00 \times 1,40)m \times 04 + (3,49 \times 0,30)m \times 02 + (1,79 \times 0,85)m \times 04 = (11,20 + 11,20 + 2,09 + 6,09)m^2 = 30,58m^2$

TOTAL: 74,95 m²

4.2 REBOCO TIPO PAULISTA

IDEM CHAPISCO = 74,95 m²

TOTAL: 74,95 m²

4.3 PINTURA COM TINTA ACRÍLICA

IDEM REBOCO = 74,95m²

TOTAL: 74,95 m²

4.4 FUNDO SELADOR ACRÍLICO

IDEM REBOCO = 74,95m²

TOTAL: 74,95 m²

4.5 GUARDA-CORPO

Obstáculo 01 e 02 = $(5,00 + 5,00)m = 10,00m \times 0,90m = 9,00m^2$

Obstáculo 03 = $(2,70 + 2,00)m = 4,70m \times 0,90m = 4,23m^2$

Obstáculo 04 = $(4,00 + 4,00)m = 8,00m \times 0,90m = 7,20m^2$

Fechamento = $(8,75 + 8,75)m = 17,50m \times 0,90m = 15,75m^2$

TOTAL: 36,18 m²

4.6 PINTURA ESMALTE

GUARDA-CORPO = 36,18m²

TOTAL: 36,18 m²

4.7 CANTONEIRA

Obstáculo 01 = $(3,00m \times 02) + 5,00m + (1,00m \times 02) = 13,00m$

Obstáculo 02 = $(3,00m \times 02) + 5,00m + (1,00m \times 02) = 13,00m$

Obstáculo 03 = $(7,00 + 0,50)m \times 02 + (2,00 \times 0,50)m \times 02 + (2,50m \times 02) = 22,00m$

Obstáculo 04 = $(2,00m \times 04) + (4,00m \times 02) = 16,00m$

TOTAL: 64,00 m

5 – PISOS

5.1 PISO QUADRA POLIESP. FCK=25Mpa

Obstáculo 01 e 02 = $(2,87m \times 2,5m \times 2rampas) + (1,00 \times 5,00)m \times 2 rampas = 24,35m^2$

Obstáculo 01 e 02 = $(2,50 \times 3,00)m \times 02 rampas = 15,00m^2$

Obstáculo 03 = $(2,00 \times 4,00)m + (2,50 \times 4,00)m \times 02 = 28,00m^2$

Obstáculo 04 = $(2,00 \times 4,00)m \times 2 rampas + (7,07 \times 4,00)m = 44,28m^2$

Piso = $(5,00 \times 7,00)m \times 02 + [(0,70 + 2,80)m \times 8,47m / 2] \times 02 + (11,07 \times 2,80m) = (70,00 + 29,65 + 31,00)m^2 = 130,65m^2$

TOTAL: 242,28m²

5.2 RESINA ACRÍLICA

A = piso = 242,28m²

TOTAL: 242,28m²



5.3 PAVI-S

Pavimentação= área entorno – área útil = $431,68\text{m}^2 - 244,90\text{m}^2 = 186,78\text{m}^2$

TOTAL: 186,78 m²

5.4 MEIO-FIO

Pavimentação= $(30,40+14,20)\text{m} \times 02 = 89,20\text{m}$

TOTAL: 89,20 m

OBRA: CONSTRUÇÃO DE COBERTURA DE ARQUIBANCADA
LOCAL: ESTÁDIO JAIME BARROS, CENTRO, BOA ESPERANÇA - ES

6 – SERVIÇOS PRELIMINARES

6.1 PLACA DE OBRA

$$A = 1,5\text{m} \times 2,4\text{m} = 3,60\text{m}^2$$

TOTAL: 3,60m²

6.2 BARRACÃO

$$A = 5,00\text{m}^2$$

TOTAL: 5,00m²

7 – INFRA E SUPRA-ESTRUTURA

7.1 ESCARIFICAÇÃO

$$A: 0,50\text{m} \times (0,40 + 0,25)\text{m} \times 02\text{lad} \times 21\text{und} = 13,65\text{m}^2$$

TOTAL: 13,65 m²

7.2 AÇO CA-50 5.0mm

$$P1=...=P21: 06 \times 3,55\text{m} = 21,30\text{m} \times 0,617\text{kg/m} = 13,1421\text{kg} \times 21\text{und} = 275,98\text{kg}$$

TOTAL: 275,98 kg

7.3 AÇO CA-60 10.0mm

$$P1=...=P21: 27 \times (1,22 + 0,34)\text{m} = 42,12\text{m} \times 0,154\text{kg/m} = 6,48648\text{kg} \times 21\text{und} = 136,21\text{kg}$$

TOTAL: 136,21 kg

7.4 FORMA

$$A: (0,25 + 0,40)\text{m} \times 02 \times 21 \times 3,10\text{m} = 84,63\text{m}^2$$

TOTAL: 84,63m²

7.5 CONCRETAGEM

$$V: (0,25 \times 0,40 \times 3,10) \times 21\text{und} = 6,51\text{m}^3$$

TOTAL: 6,51 m³

8 - REVESTIMENTO

8.1 LIXAMENTO DE PAREDE

Área Arquibancada:

$$\text{Laterais: } 5,36\text{m}^2 \times 02 + (3,61 + 1,70)\text{m} \times 0,15\text{m} \times 02 + 50,0\text{m} \times 0,15 + 50,0\text{m} \times 1,70\text{m} \times 02 + 4,22\text{m}^2 \times 02 = 198,25\text{m}^2$$

$$\text{Degraus: } 49,70\text{m} \times 0,60\text{m} \times 05 + 50,0\text{m} \times 0,80\text{m} + 49,70\text{m} \times 0,40\text{m} \times 05 + 50,0\text{m} \times 0,60\text{m} + 0,20\text{m} \times 0,35\text{m} \times 05 \times 02 + 0,45\text{m} \times 0,30\text{m} \times 02 = 319,47\text{m}^2$$

TOTAL: 517,72 m²

8.2 CHAPISCO

$$A: (0,25 + 0,40)\text{m} \times 02 \times 21 \times 3,10\text{m} = 84,63\text{m}^2$$

TOTAL: 84,63m²

8.3 REBOCO

A: 84,63m²

TOTAL: 84,63m²

8.4 PINTURA EM ESTRUTURAS DE CONCRETO

A: 517,72m² + 84,63m² = 602,35m²

TOTAL: 602,35m²

8.5 PINTURA EM ESTRUTURAS METÁLICAS

A: 52,00m x 6,55m = 340,60m²

TOTAL: 340,60m²

9 – COBERTURA E DRENAGEM

9.1 ESTRUTURA METÁLICA

TOTAL: 01 UND

9.2 COBERTURA EM TELHA DE AÇO GALVANIZADO

A: 52,00m x 6,55m = 340,60m²

TOTAL: 340,60m²

9.3 CALHA EM AÇO GALVANIZADO

C: 52,00m

TOTAL: 52,00m

9.4 TUBO PVC 100MM

C: (5,80+0,78+4,02+1,78)m = 12,38m x 03und = 37,14m = 38,00m

TOTAL: 38,00 m

9.5 CAIXA DE INSPEÇÃO

TOTAL: 03 und

10 – ADMINISTRAÇÃO LOCAL

10.1 ADMINISTRAÇÃO LOCAL

TOTAL: 01 UND

AGOSTO DE 2019.

ALQMÁ FLEGLER GALVÃO
ENGº CIVIL: CREA-ES 041278/D