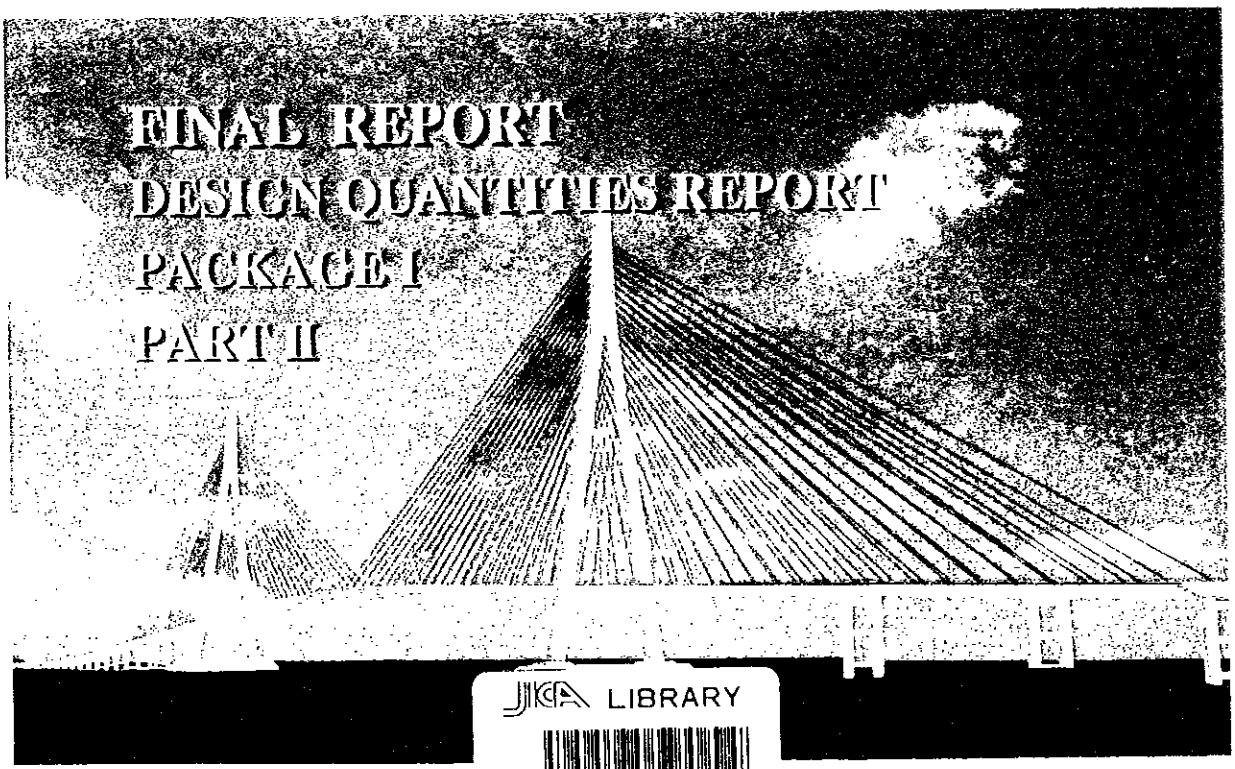
社会開発調査部報告書

No. 32

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF TRANSPORT
SOCIALIST REPUBLIC OF VIET NAM

# THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM






OCTOBER 200

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF TRANSPORT
SOCIALIST REPUBLIC OF VIET NAM

# THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM

# FINAL REPORT
## DESIGN QUANTITIES REPORT
## PACKAGE I
## PART II

OCTOBER 2000

NIPPON KOEI CO., LTD.

Table of Contents

Package I
Part - 2

Notes

1. General

Unless otherwise noted these notes are applied to all design quantities.

2. Concrete

Concrete strengths are specified as followings base on 28 days cylinder strength.

| Concrete class | Strength | Typical use |
|---|---|---|
| | | |
| Concrete class B | 40MPa | Cast in place PC box girder, Precast PC I girder |
| Concrete class C | 35MPa | Hollow slab |
| Concrete class D | 30MPa | Cast in place bored concrete pile, Deck slab, Diaphragm, Precast RC panel |
| Concrete class E | 24MPa | Abutment, Pier, Pile cap, Footing |
| Concrete class G | 15MPa | Lean concrete, Plain concrete |
| | | |

3. Reinforcement

Reinforcements are specified as SD345.

4. Prestressing

Prestressed tendons are specified as SWPR7B.

5. Anchor Bar

Anchor bars are specified as SS400.

# 3. Bridges

# 3.1. Large Tra Va Bridge

No.

# 1.Quantity of Superstructure

Superstructure

| Item | | Work Item | | Unit | Quantity | Remarks |
|---|---|---|---|---|---|---|
| Concrete | CLASS B | Girder | | cu.m | 2172.2 | σck=40Mpa |
| | CLASS D-1 | Deck Slab | | cu.m | 1389.0 | σ ck=30Mpa |
| | | Diaphragm | | cu.m | 503.3 | |
| | | Total | | cu.m | 1892.3 | |
| Form | | Deck Slab | | sq.m | 1604.8 | |
| | | Girder | | sq.m | 12167.1 | |
| | | Diaphragm | | sq.m | 1580.6 | |
| | | Total | | sq.m | 15352.5 | |
| Re-bar | | Deck Slab | - D14 | ton | 42.2 | |
| | | | D16 - D25 | ton | 134.0 | |
| | | | Total | ton | 176.1 | |
| | | Girder | - D14 | ton | 175.1 | |
| | | | D16 - D25 | ton | 31.2 | |
| | | | Total | ton | 206.3 | |
| | | Diaphragm | - D14 | ton | 8.7 | |
| | | | D16 - D25 | ton | 13.8 | |
| | | | Total | ton | 22.5 | |
| | | Total | - D14 | ton | 226.0 | |
| | | | D16 - D25 | ton | 179.0 | |
| | | | Total | ton | 405.0 | |
| PC Cable | 12S12.7B | | | ton | 129.2 | SWPR7B |
| | 3S12.7B | Transverse Tendons | | ton | 5.0 | |
| ANCHOR | 12S12.7B | | | set | 400.0 | |
| | 3S12.7B | | | set | 432.0 | |
| SHEATHING | Φ80/85 | | | m | 13902.1 | |
| | Φ50/55 | | | m | 723.6 | |
| | Sement Grout in Sheathing | | | cu.m | 69.8 | |
| Bearing | | Product layer rubber bearing | | nos | 160 | |
| | | Anchor Bar | Φ75 L=1520 | nos | 128 | |
| | | Anchor Cap | Φ100 L=800 | nos | 96 | |
| | | | Φ125 L=800 | nos | 32 | |
| Expansion Joint | | t=50mm | | m | 64.5 | |
| | | | | | | |
| Pavement | t=70mm | Aspfalt concrete surface course | | sq.m | 6017.9 | |
| | t=5mm | Water proofing | | sq.m | 6017.9 | |
| | | Concrete | | cu.m | 4.3 | |
| | | Road Marking | | sq.m | 140.5 | |
| Concrete Form | | | | sq.m | 7450.6 | |
| | | | | cu.m | 596.0 | |
| | | D14 | | ton | 71.5 | |
| Shear Key | | | | nos | 960 | |
| | | | | | | |

No.

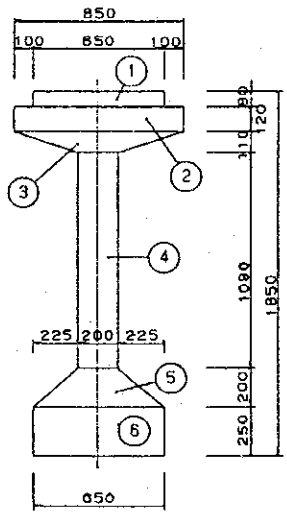
| Item | Formula | Quantity |
|---|---|---|
| 1. Girder Concrete<br>CLASS "B"<br>1) Girder | (1) Calculation of Sectional Area | |

[1] Middle Section

Summary of Sectional Area — For ONE GIRDER

| No | Formula | | | | | (m2) |
|---|---|---|---|---|---|---|
| 1 | 0.650 | × 0.080 | | | = | 0.052 |
| 2 | 0.850 | × 0.120 | | | = | 0.102 |
| 3 | 1/2 | × 0.325 × | 0.110 | × 2 = | | 0.036 |
| | 0.200 | × 0.110 | | | = | 0.022 |
| 4 | 1.090 | × 0.200 | | | = | 0.218 |
| 5 | 1/2 | × 0.225 × | 0.200 | × 2 = | | 0.045 |
| | 0.200 | × 0.200 | | | = | 0.040 |
| 6 | 0.650 | × 0.250 | | | = | 0.163 |

Total Area 0.678 m²

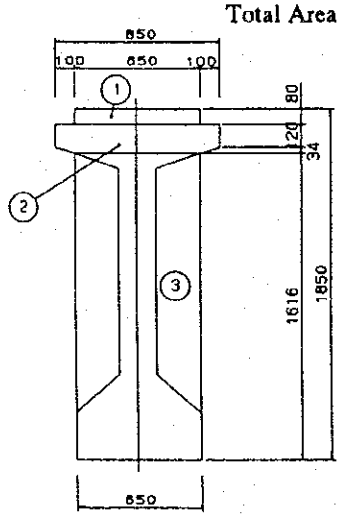



[2] End Section

Summary of Sectional Area — For ONE GIRDER

| No | Formula | | | | | (m2) |
|---|---|---|---|---|---|---|
| 1 | 0.650 | × 0.080 | | | = | 0.052 |
| 2 | 0.120 | × 0.850 | | | = | 0.102 |
| | 1/2 | × 0.100 × | 0.034 | × 2 = | | 0.003 |
| | 0.650 | × 0.034 | | | = | 0.022 |
| 3 | 0.650 | × 1.616 | | | = | 1.050 |

Total Area 1.229 m²



| Item | Formula | Quantity |
|---|---|---|

(2) Calculation of Concrete Volume

Girder Length 35.000 m

| Section No. | Section Area (m2) | Average of Section (m2) | Length of Block (m) | Concrete Volume (m3) | Remark |
|---|---|---|---|---|---|
| END | 1.229 | | | | |
| END | 1.229 | 1.229 | 0.500 | 0.615 | |
| MIDDLE | 0.678 | 0.954 | 5.200 | 4.96 | |
| MIDDLE | 0.678 | 0.678 | 23.600 | 16.00 | |
| END | 1.229 | 0.954 | 5.200 | 4.96 | |
| END | 1.229 | 1.229 | 0.500 | 0.62 | |
| Total | | | 35.000 | 27.153 | |

No. of Girder 5 × 8 × 2 = 80

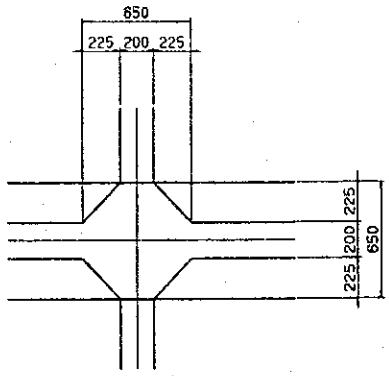
V= 27.153 × 80 = 2172.24 m³

2. Diaphragm Concrete CLASS "D-1"

1) Diaphragm

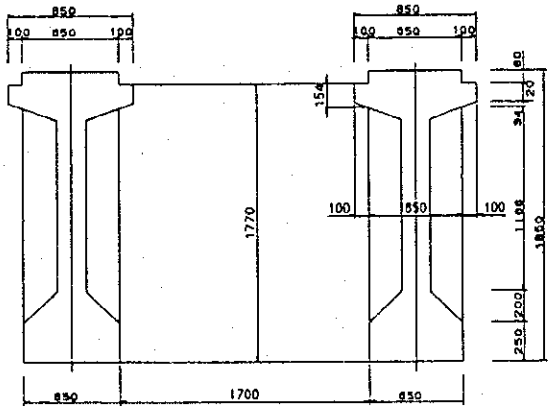
V1= ( 0.200 + 0.650 ) × 1/2 × 0.225 ×
( 1.090 + 1.366 ) × 1/2 × 2 = 0.235

V = 0.235 × 5 × 3 × 8 × 2 = 56.40 m³




2) Cross Beam

(1) End Cross Beam

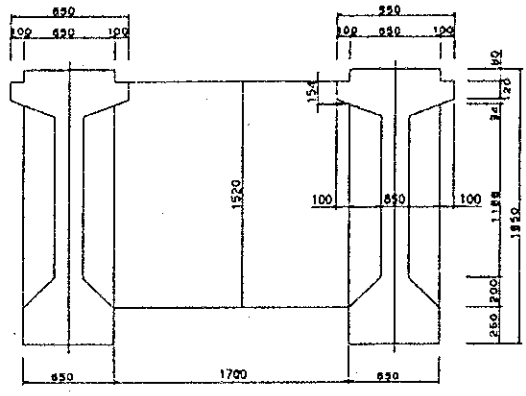



V2-1= { 1.770 × 1.700 - ( 0.120 + 0.154 ) × 1/2 × 0.100
× 2 )× 0.5 × 4 × 4 = 23.853 m³

No.

| Item | Formula | Quantity |
|---|---|---|

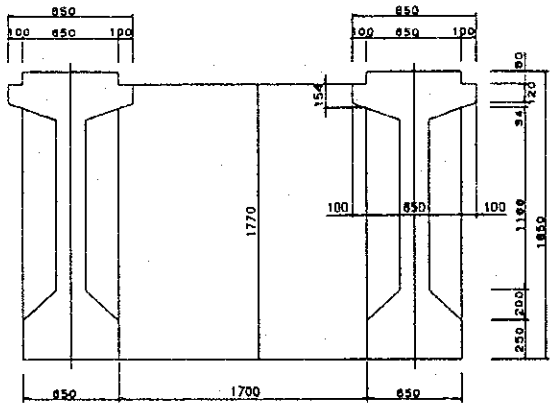
(2) Intermediate Cross Beam




V2-2= { 1.520 × 1.700 - ( 0.120 + 0.154 ) × 1/2 × 0.100
× 2 )× 0.2 × 4 × 3 × 8

= 49.087 m³

(3) Connection Cross Beam




V2-3= { { 1.770 × 1.700 - ( 0.120 + 0.154 ) × 1/2 × 0.100
× 2 )× 2.000 × 4 + 1.229 × 5 × 0.200 }
× 6 Girder section area

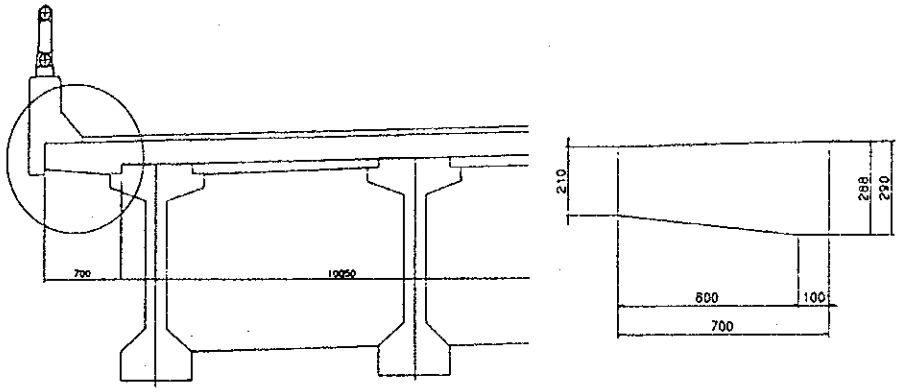
= 150.491 m³

V2 = ( 23.853 + 49.087 + 150.49 ) × 2

= 446.862 m³

Total 503.262 m³ 503.262 m³

No.

| Item | Formula | Quantity |
|---|---|---|
| 3. Deck Slab Concrete CLASS "D-1" |   | |

A 1= ( 0.21 + 0.288 ) × 1/2 × 0.600 × 2 = 0.299

A 2= ( 0.288 + 0.290 ) × 1/2 × 0.100 × 2 = 0.058

A 3= 10.050 × 0.210 = 2.111

ΣA = 2.468 m²

V = 2.468 ×( 281.600 − 0.200 )× 2 = 1388.990

1388.990 m³

No.

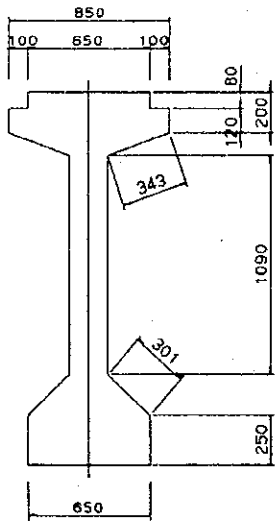
| Item | Formula | Quantity |
|---|---|---|
| 1. Girder | | |
| 1) Girder | (1) Calculation of Sectional Area | |

[1] Middle Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | (m) |
|---|---|---|---|---|
| 1 | 0.080 × | 2 | = | 0.160 |
| 2 | 0.120 × | 2 | = | 0.240 |
| 3 | 0.343 × | 2 | = | 0.686 |
| 4 | 1.090 × | 2 | = | 2.180 |
| 5 | 0.301 × | 2 | = | 0.602 |
| 6 | 0.250 × | 2 | = | 0.500 |
| | | | | |

Total Area 4.368 m

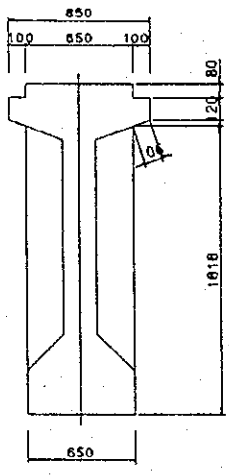



[2] End Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | (m) |
|---|---|---|---|---|
| 1 | 0.080 × | 2 | = | 0.160 |
| 2 | 0.120 × | 2 | = | 0.240 |
| 3 | 0.106 × | 2 | = | 0.212 |
| 4 | 1.616 × | 2 | = | 3.232 |
| | | | | |

Total Area 3.844 m



| Item | Formula | Quantity |
|---|---|---|

(2) Calculation of Form Area

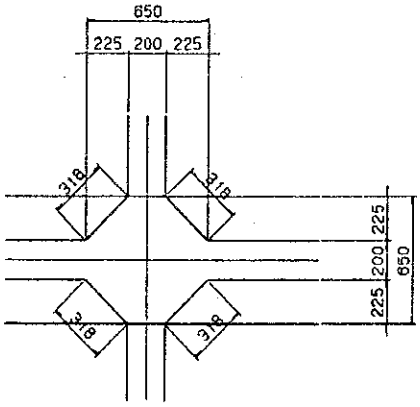
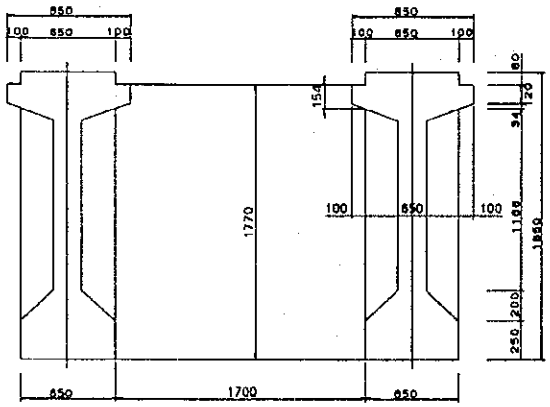
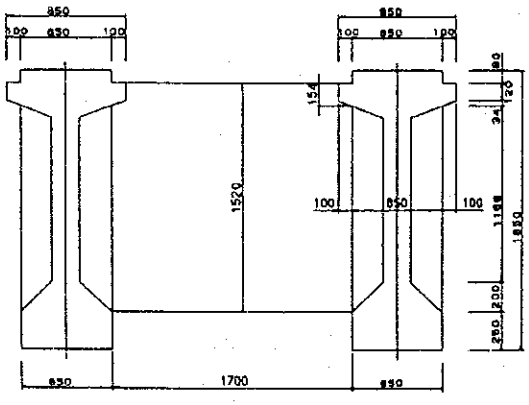
Girder Length 35.000 m

| Section No. | Section Length (m) | Average of Section (m) | Length of Block (m) | Form Area (m2) | Remark |
|---|---|---|---|---|---|
| END | 3.844 | | | 1.229 | End-sec |
| END | 3.844 | 3.844 | 0.500 | 1.922 | |
| MIDDLE | 4.368 | 4.106 | 5.200 | 21.351 | |
| MIDDLE | 4.368 | 4.368 | 23.600 | 103.085 | |
| END | 3.844 | 4.106 | 5.200 | 21.351 | |
| END | 3.844 | 3.844 | 0.500 | 1.922 | |
| | | | | 1.229 | End-sec |
| Total | | | 35.000 | 152.089 | |

No. of Girc 5 × 8 × 2 = 80

A = 152.089 × 80 = 12167.1 m² 12167.120 m²

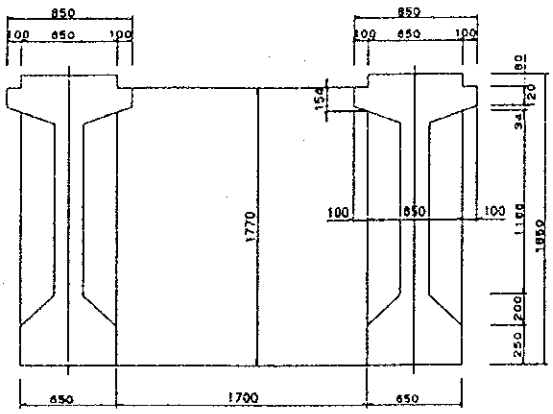
No.

| Item | Formula | Quantity |
|---|---|---|
| 2. Diaphragm | | |
| 1) Diaphragm | a1= 0.318 × 2 × ( 1.090 + 1.366 ) × 1/2 + 0.200 × 1.366 ) = 1.054 m² | |
| | a2= 0.318 × 2 × ( 1.090 + 1.366 ) × 1/2 = 0.781 m² | |
| | A1 = ( 1.054 × 6 + 0.781 × 9 ) × 8 = 106.824 m² | |
| |   | |
| 2) Cross Beam | (1) End Cross Beam | |
| |   | |
| | A2-1= [( 1.770 × 1.700 − ( 0.120 + 0.154 ) × 1/2 × 0.100 × 2 × 2 )+ 1.700 × 0.500 ] × 4 × 4 = 60.867 m² | |
| | (2) Intermediate Cross Beam | |
| |   | |
| | A2-2= [( 1.520 × 1.700 − ( 0.120 + 0.154 ) × 1/2 × 0.100 × 2 )× 2 + 1.700 × 0.200 ] × 4 × 3 × 8 = 523.507 m² | |

No.

| Item | Formula | Quantity |
|---|---|---|

(3) Connection Cross Beam

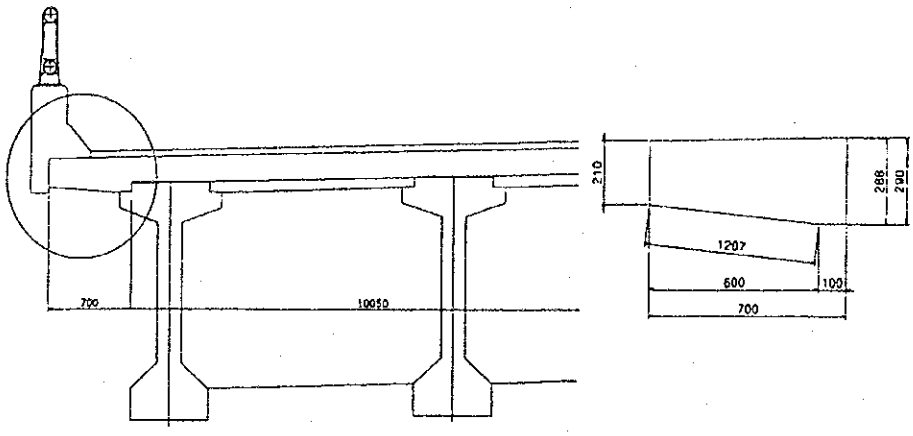



A2-3= [( 1.770 × 1.700 - ( 0.120 + 0.154 ) × 1/2 × 0.100
× 2 × 2 )+ 1.700 × 2.000 ] × 4 × 6
= 152.501 m²

V2 = ( 60.867 + 523.507 + 152.501 )× 2 = 1473.75 m²

Total 1580.57 m² 1580.574 m²

No.

| Item | Formula | Quantity |
|---|---|---|
| 3. Deck Slab |  | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 = | ( | 0.210 + | 1.207 )× | 2 | ×( | 281.600 - | 0.200 | )= | 797.488 | m² |
| A2= | ( | 0.200 + | 0.288 ) × | 1/2 | × | 0.600 × | 4 | = | 0.586 | m² |
| A3= | ( | 0.288 + | 0.290 ) × | 1/2 | × | 0.100 × | 4 | = | 0.116 | m² |
| A4= | | 10.050 × | 0.210 × | 2 | | | | = | 4.221 | m² |
| | | | | | | | Sub -total | | 802.411 | m² |
| Total | | A = | 802.411 × | 2 | | | | = | 1604.822 | m² |

1604.822 m²

LIST OF REINFORCEMENT SLAB

| SIGN | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|
| S 1 | D20 | 11,350 | 1,678 | 2.466 | 28.000 | 46,984.0 | |
| 2 | D20 | 10,850 | 1,678 | 2.466 | 26.800 | 44,970.4 | (AVE) |
| 3 | D14 | 963 | 3,836 | 1.208 | 1.160 | 4,449.8 | |
| 4 | D22 | 12,000 | 600 | 2.984 | 35.800 | 21,480.0 | |
| 5 | D14 | 25,460 | 400 | 1.208 | 30.800 | 12,320.0 | |
| 6 | D14 | 30,606 | 200 | 1.208 | 37.000 | 7,400.0 | |
| 6' | D14 | 32,606 | 200 | 1.208 | 39.400 | 7,880.0 | |
| 7 | D25 | 11,350 | 240 | 3.853 | 43.700 | 10,488.0 | (AVE) |
| 8 | D25 | 10,850 | 240 | 3.853 | 41.800 | 10,032.0 | |
| 9 | D12 | 565 | 20,160 | 0.888 | 0.502 | 10,120.3 | |
| | | | | | TOTAL | 176,124.5 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | D25 | 20520.0 | |
| | | | | | D22 | 21480.0 | |
| | | | | | D20 | 91954.4 | |
| | | | | | D14 | 32049.8 | |
| | | | | | D12 | 10120.3 | |
| | | | | | | 176,124.5 | |
| | | | | | | | |
| | | | | | - D14 | 42,170.1 | 42.2 |
| | | | | | D16-D25 | 133,954.4 | 134.0 |
| | | | | | ToTAL | 176,124.5 | 176.1 |
| | | | | | | | |
| | | | | | | | |

LIST OF REINFORCEMENT

GIRDER

| SIGN | DIACETER | LENGTH | NOS. SPAN 1,4,5,8 | NOS. SPAN 2,3,6,7 | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT SPAN 1,4,5,8 | TOTAL WEIGHT SPAN 2,3,6,7 | NOTE |
|---|---|---|---|---|---|---|---|---|---|
| G- 1 | D14 | 4,411 | 170 | 170 | 1.208 | 5.330 | 906.1 | 906.1 | |
| 2 | D14 | 4,636 | 72 | 72 | 1.208 | 5.600 | 403.2 | 403.2 | (AVE) |
| 3 | D14 | 4,861 | 6 | 6 | 1.208 | 5.870 | 35.2 | 35.2 | |
| 4 | D14 | 4,861 | 6 | 6 | 1.208 | 5.870 | 35.2 | 35.2 | |
| 5 | D14 | 1,751 | 184 | 184 | 1.208 | 2.120 | 390.1 | 390.1 | |
| 6 | D14 | 1,243 | 184 | 184 | 1.208 | 1.500 | 276.0 | 276.0 | |
| 7 | D14 | 1,935 | 112 | 112 | 1.208 | 2.340 | 262.1 | 262.1 | |
| 8 | D14 | 1,635 | 72 | 72 | 1.208 | 1.980 | 142.6 | 142.6 | (AVE) |
| 9 | D14 | 1,345 | 6 | 6 | 1.208 | 1.630 | 9.8 | 9.8 | |
| 10 | D22 | 34,740 | 6 | 6 | 2.984 | 104.000 | 624.0 | 624.0 | |
| 11 | D14 | 34,740 | 22 | 22 | 1.208 | 42.000 | 924.0 | 924.0 | |
| 12 | D14 | 34,750 | 12 | 12 | 1.208 | 42.000 | 504.0 | 504.0 | |
| 13 | D14 | 987 | 36 | 36 | 1.208 | 1.190 | 42.8 | 42.8 | |
| 14 | D14 | 1,000 | 12 | 12 | 1.208 | 1.210 | 14.5 | 14.5 | |
| 15 | D16 | 1,600 | 75 | 66 | 1.578 | 2.530 | 189.8 | 167.0 | INTERIOR GORDER |
| 16 | D16 | 1,100 | 75 | 66 | 1.578 | 1.740 | 130.5 | 114.8 | EXTERIOR GIRDER |
| 17 | D10 | 570 | 24 | 24 | 0.617 | 0.351 | 8.4 | 8.4 | |
| 18 | D10 | 150 | 104 | 104 | 0.617 | 0.092 | 9.6 | 9.6 | |
| 19 | D14 | 2,017 | 170 | 170 | 1.208 | 2.440 | 414.8 | 414.8 | |

| | SPAN1,4,5,8 | | SPAN2,3,6,7 | | |
|---|---|---|---|---|---|
| | INTERIOR | EXTERIOR | INTERIOR | EXTERIOR | (per one span) |
| D22 | 624.0 | 624.0 | 624.0 | 624.0 | |
| D16 | 189.8 | 130.5 | 167.0 | 114.8 | |
| D14 | 4360.4 | 4360.4 | 4360.4 | 4360.4 | |
| D10 | 18.0 | 18.0 | 18.0 | 18.0 | |
| TOTAL | 5,192.2 | 5,132.9 | 5,169.4 | 5,117.2 | |

| | | | |
|---|---|---|---|
| - D14 | | 175,136 | 175.1 |
| D16-D25 | | 31,204 | 31.2 |
| ToTAL | | 206,340 | 206.3 |

LIST OF REINFORCEMENT

Diaphragm

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| D | 1 | D16 | 1,700 | 288 | 1.578 | 2.680 | 771.8 | |
| | 2 | D14 | 1,700 | 112 | 1.208 | 2.050 | 229.6 | (AVE) |
| E | 1 | D16 | 4,724 | 1,536 | 1.578 | 7.460 | 11,458.6 | |
| | 2 | D14 | 3,924 | 672 | 1.208 | 4.740 | 3,185.3 | |
| C | 1 | D16 | 1,700 | 528 | 1.578 | 2.680 | 1,415.0 | |
| | 2 | D14 | 2,400 | 672 | 1.208 | 2.900 | 1,948.8 | |
| | 3 | D14 | 5,442 | 336 | 1.208 | 6.580 | 2,210.9 | |
| | 4 | D14 | 5,514 | 168 | 1.208 | 6.660 | 1,118.9 | (AVE) |
| | 5 | D16 | 9,900 | 12 | 1.578 | 15.600 | 187.2 | |
| | | | | | | TOTAL | 22,526.1 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | D16 | 13832.6 | |
| | | | | | | D14 | 8693.5 | |
| | | | | | | | 22,526.1 | |
| | | | | | - D14 | | 8,694 | 8.7 |
| | | | | | D16-D25 | | 13,833 | 13.8 |
| | | | | | ToTAL | | 22,526 | 22.5 |

No.

| Item | Formula | Quantity |
|---|---|---|

PC CABLE

1) 12S12.7

For ONE GIRDER

| CABLE VAR. | EACH LENGTH | CABLE NO. | EACH | TOTAL LENGTH | UNIT WEIGHT | WEIGHT |
|---|---|---|---|---|---|---|
| 1 | 34.702 | C1 | 1 | 34.702 | 9.290 | 322.4 |
| 2 | 34.714 | C2 | 1 | 34.714 | 9.290 | 322.5 |
| 3 | 34.754 | C3 | 1 | 34.754 | 9.290 | 322.9 |
| 4 | 34.784 | C4 | 1 | 34.784 | 9.290 | 323.1 |
| 5 | 34.822 | C5 | 1 | 34.822 | 9.290 | 323.5 |
| | | | | | | |
| | | | | | | |
| TOTAL | | | 5 | 173.776 | | 1614.4 |

SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE

Wp= 1614.4 × 5 × 8 × 2 = 129152 kgf

129.2 ton

TENSION UNIT

Ns= 5 × 2 × 5 × 8 × 2 = 400 nos

HEATHING Φ80/85

L= 173.776 × 5 × 8 × 2 = 13902.08 m

CENEBT GROUT

V= 0.873 × 5 × 8 × 2 = 69.844 m3

2) 3S12.7

PC CABLE OF DIAPHRAGMS

| LOCATION | EACH LENGTH | CABLE NO. | EACH | TOTAL LENGTH | UNIT WEIGHT | WEIGHT |
|---|---|---|---|---|---|---|
| Connection One | 10.050 | | 216 | 2170.8 | 2.322 | 5040.598 |
| | | | | | | |
| | | | | | | |
| TOTAL | | | 216 | 2170.800 | | 5040.598 |

TOTAL WEIGHT OF PC CABLES per BRIDGE(A1-P12)

Wp= 5040.598 = 5040.598 kgf

5.0 ton

TENSION UNIT

Ns= 216 × 2 = 432 nos

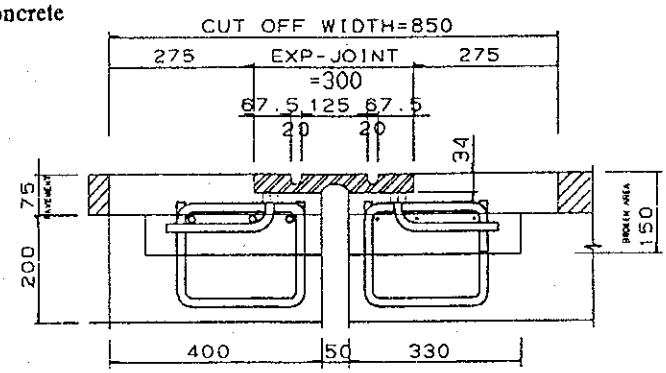
HEATHING Φ50/55

L= 723.600 = 723.600 m

CENEBT GROUT

V= 0.002 × 723.600 = 1.42 m3

No.

| Item | Formula | Quantity |
|---|---|---|
| 9 Pavement | | |
| 1) | Pavement t=70mm | |
| | A = 10.750 ×( 281.60 − 0.850 × Exp 2 ) × 2 = 6017.9 m² | 6017.9 m² |
| 2) | Water Proofing t=5mm | |
| | A = 2 = 6017.9 m² | 6017.9 m² |
| 3) | Concrete | |
| |   | |
| | per one side | |
| | A1 = 0.400 × 0.075 - 0.1 × 0.034 = 0.027 | |
| | A2 = 0.075 × 0.300 = 0.023 | |
| | Total 0.050 m² | |
| | V = 0.050 × 10.750 × 8 = 4.300 m³ | 4.300 m³ |
| 4) | Road marking | |
| | Bridge Length L= 281.600 - 0.600 = 281.000 m | |
| | Side Line | |
| | A1 = 281.000 × 0.100 × 4 = 112.400 m² | |
| | Center Line | |
| | L = 281.000 / 5.000 = 56.2 m | |
| | A2 = 2.500 × 0.100 × 56.2 × 2 = 28.100 m² | |
| | Total 112.400 + 28.100 = 140.5 m² | 140.5 m² |

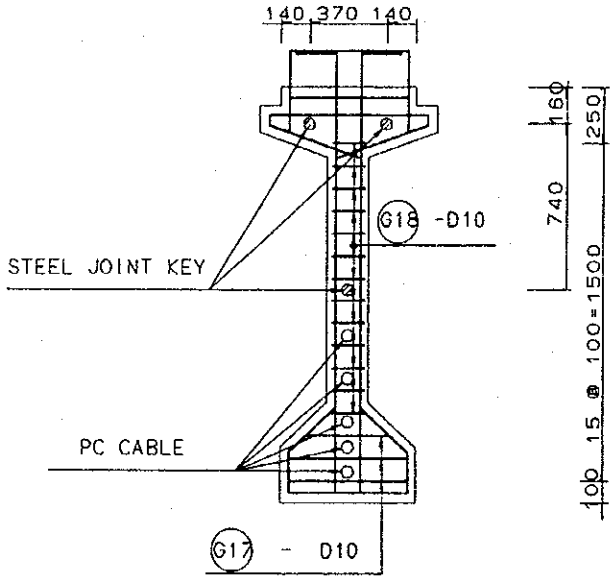
A1-P4 No.

| Item | Formula | | Quantity |
|---|---|---|---|
| 1. Expansion Joint (TYPE A) | | | |
| | EACH LENGTH | | |
| | L = 10.750 | | |
| | N = 3 × 2 = 6 | | |
| | TOTAL LENGTH | | |
| | L = 10.750 × 6 | = | 64.500 m |
| 2. BEARING PAD | ELASTOMERIC 550*300*57 | | |
| | EACH for One SPAN | | |
| | N = 5 | | |
| | TOTAL EACH | | |
| | N = 5 × 16 × 2 | = | 160 nos |
| 3. ANCHOR BAR | | | |
| | Φ75 L=1520 (FIX) | | |
| | N = 4 × 12 × 2 | = | 96 nos |
| | Φ75 L=1520 (MOVE) | | |
| | N = 4 × 4 × 2 | = | 32 nos |
| | | Total = | 128 nos |
| 4. ANCHOR CAP (SGP) | | | |
| | Φ100 L=800 (FIX) | | |
| | N = 4 × 12 × 2 | = | 96 nos |
| | Φ125 L=800 (MOVE) | | |
| | N = 4 × 4 × 2 | = | 32 nos |
| 5.Railing | | | |
| | L= 281.600 × 2 × 2 | = | 1126.4 m |

A1-P12 No.

| Item | Formula | Quantity |
|---|---|---|
| Slab Plate | A = 1.950 × 8 × 39.800 × 3 × 4 = | 7450.560 m² |
| | V = 7450.56 × 0.080 = | 596.045 m³ |
| | W = 596.045 × 120 (kg/M3) = | 71525.4 kg<br>71.525 ton |

| Item | Formula | Quantity |
|---|---|---|
| Shear Key | per one girder | each |
| | N = 3 × 4 × 5 × 16 = | 960 |



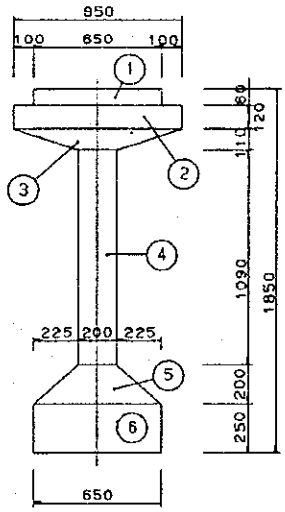
| Item | Formula | Quantity |
|---|---|---|
| Efection | | |

(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Area — For ONE GIRDER

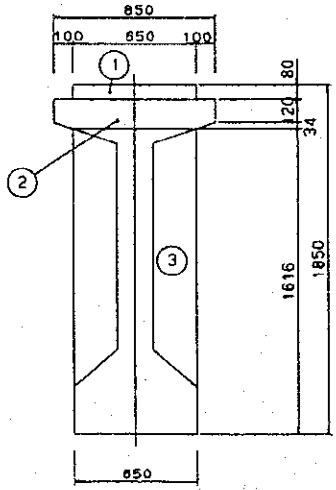
| No | Formula | | | | | (m2) |
|---|---|---|---|---|---|---|
| 1 | 0.650 × | 0.080 | | | = | 0.052 |
| 2 | 0.850 × | 0.120 | | | = | 0.102 |
| 3 | 1/2 × | 0.325 × | 0.110 × | 2 = | | 0.036 |
| | 0.200 × | 0.110 | | | = | 0.022 |
| 4 | 1.090 × | 0.200 | | | = | 0.218 |
| 5 | 0.500 × | 0.225 × | 0.200 × | 2 = | | 0.045 |
| | 0.200 × | 0.200 | | | = | 0.040 |
| 6 | 0.650 × | 0.250 | | | = | 0.163 |
| | | | | Total Area | | 0.678 m² |




[2] End Section

Summary of Sectional Area — For ONE GIRDER

| No | Formula | | | | | (m2) |
|---|---|---|---|---|---|---|
| 1 | 0.650 × | 0.080 | | | = | 0.052 |
| 2 | 0.120 × | 0.850 | | | = | 0.102 |
| | 1/2 × | 0.100 × | 0.034 × | 2 = | | 0.003 |
| | 0.650 × | 0.034 | | | = | 0.022 |
| 3 | 0.650 × | 1.616 | | | = | 1.050 |
| | | | | Total Area | | 1.229 m² |



| Item | Formula | Quantity |
|---|---|---|

Concrete Volume

Girder Length 35.000 m

| Section No. | Section Area (m2) | Average of Section (m2) | Length of Block (m) | Concrete Volume (m3) | Remark |
|---|---|---|---|---|---|
| END | 1.229 | | | | |
| END | 1.229 | 1.229 | 0.400 | 0.492 | |
| MIDDLE | 0.678 | 0.954 | 6.000 | 5.724 | |
| MIDDLE | 0.678 | 0.678 | 22.200 | 15.052 | |
| END | 1.229 | 0.954 | 6.000 | 5.724 | |
| END | 1.229 | 1.229 | 0.400 | 0.492 | |
| Total | | | 35.000 | 27.484 | |

Efection Weight

per one girder (kgf)

W = 27.484 × 2500 = 68710

(ton)

68.7

(kgf)

W = 27.484 × 2500 × 9 × 3 × 4 = 7420680

(ton)

7420.7

No.

# QUANTITY TABLE OF BRIDGE

Large Tra Va Bridge

| Item | | | UNIT | ABUTMENT A1 | ABUTMENT A2 | Total |
|---|---|---|---|---|---|---|
| A - ABUTMENT | | | | | | |
| PILES | NUMBER OF PILES | | pile | 17 | 17 | 34 |
| | TOTAL LENGTH OF BORED $\phi$ 1500 | | m | 1190.0 | 1190.0 | 2380.0 |
| | CONCRETE DLASS D | | m3 | 2102.9 | 2102.9 | 4205.8 |
| | REINFORCEMENT | 32 | kg | | | |
| | | 28 | kg | 1624.0 | 1624 | 3248.0 |
| | | 25 | kg | 3509.8 | 3509.8 | 7019.6 |
| | | 22 | kg | 387.0 | 387 | 774.0 |
| | | 16 | kg | 29.0 | 29 | 58.0 |
| | | 10 | kg | 1077.6 | 1077.6 | 2155.2 |
| | | TOTAL | kg | 6627.4 | 6627.4 | 13254.8 |
| ABUTMENT | CONCRETE DLASS E | | m3 | 671.6 | 670.9 | 1342.5 |
| | REINFORCEMENT | 25 | kg | 16020.6 | 16024.8 | 32045.4 |
| | | 22 | kg | 5052.6 | 5051.8 | 10104.4 |
| | | 20 | kg | 6814.2 | 6814.2 | 13628.4 |
| | | 18 | kg | 802.5 | 802.0 | 1604.5 |
| | | 16 | kg | 4813.0 | 4814.6 | 9627.6 |
| | | 14 | kg | 2967.5 | 2967.5 | 5935.0 |
| | | 10 | kg | 159.3 | 159.3 | 318.6 |
| | | TOTAL | kg | 36629.7 | 36634.2 | 73263.9 |
| | BLINDING STONE | | m3 | 45.7 | 45.7 | 91.4 |
| | LEAN CONCRETE CLASS G | | m3 | 22.8 | 22.8 | 45.7 |
| | EXCAVATION | | m3 | 420.6 | 567.8 | 988.4 |
| | BACK FILL | | m3 | 97.1 | 144.5 | 241.6 |
| B - APPROACH SLAB | | | | | | |
| | CONCRETE DLASS E | | m3 | 45.1 | 45.1 | 90.2 |
| | LEAN CONCRETE CLASS G | | m3 | 13.1 | 13.1 | 26.3 |
| | FORM | | m2 | 20.4 | 20.4 | 40.8 |
| | ASPHANTIC JOINT FILLTER T=20 | | m3 | 0.4 | 0.4 | 0.8 |
| | REINFORCEMENT | 20 | kg | 3421.6 | 3421.6 | 6843.2 |
| | | 16 | kg | 3402.3 | 3402.3 | 6804.6 |
| | | 10 | kg | 255.8 | 255.8 | 511.6 |
| | | TOTAL | kg | 7158.7 | 7158.7 | 14317.4 |
| C - SLOPE PROTECTION | | | | | | |
| SIDE SLOPE | STONE MANSORY T=300mm | | m3 | 829.7 | 860.5 | 1690.2 |
| | BLINDING AGGREGATE T=100mm | | m3 | 276.2 | 286.8 | 563.0 |
| | GEOTEXTILE | | m2 | 831.0 | 955.0 | 1786.0 |
| | PVC PILE $\Phi$50mm DIA. L=1000mm | | m | 75.0 | 76.0 | 151.0 |
| FOOTING | LENGTH OF FOOTING | | m | 149.9 | 156.1 | 306.0 |
| | WOODEN PILE L=3.0m | | m | 8996.0 | 9094.0 | 18090.0 |
| | BLINDING | | m3 | 26.0 | 12.1 | 38.1 |
| | STONE MANSORY | | m3 | 40.0 | 54.8 | 94.8 |
| | EXCAVATION | | m3 | 648.0 | 655.0 | 1303.0 |
| | BACK FILL | | m3 | 450.0 | 455.0 | 905.0 |

Large Tra Va Bridge

| Item | Formula | Quantity |
|---|---|---|
| Abutment A1 | | |
| 1. Concrete (Class E) | | |
| 1) Paramet | V1 = 24.100 x 0.400 x 2.335 = | 22.509 m3 |
| 2) Corbel | V2 =( 0.300 + 0.600 )x 1/2 x 0.300 | |
| | x( 22.100 + 22.700 )x 1/2 | 3.024 m3 |
| 3) Wall | V3 = 24.100 x 1.500 x 4.640 = | 167.736 m3 |
| 4) Footing | V4 = 24.100 x 9.200 x 2.000 = | 443.440 m3 |
| 5) Wing Wall | V5-1 =( 6.975 + 7.140 )x 1/2 x 5.050 | |
| | x 0.500 x 2 = | 35.640 m3 |
| | V5-2 =-( 5.000 + 5.800 )x 1/2 x 0.650 | |
| | x 0.500 x 2 = | -3.510 m3 |
| 6) Wall Haunch | V6 = 0.500 x 0.500 x 1/2 x 6.975 | |
| | x 2 = | 1.744 m3 |
| 7) Railing | V7 =( 0.300 x 0.300 - 0.02 x 0.020 | |
| | x 1/2 x 2 +( 0.35 + 0.500 ) | |
| | x 1/2 x 0.150 + 0.500 x 0.05 ) | |
| | x 5.350 x 2 | 0.976 m3 |
| | Total (One Abutment) | 671.559 m3 |
| 2. Form | | |
| 1) Paramet | A1 = 24.100 x 2.335 +( 2.335 - 0.600 ) | |
| | x 22.100 = | 94.617 m2 |
| 2) Corbel | A2 =( 0.300 + 0.300 x 1.414 )x( 22.100 | |
| | + 22.700 )x 1/2 = | 16.222 m2 |
| 3) Wall | A3 =( 24.100 + 22.100 )x 4.640 = | 214.368 m2 |
| 4) Footing | A4 =( 24.100 + 9.200 )x 2.000 x 2 = | 133.200 m2 |
| 5) Wing Wall | A5-1 =( 6.975 + 7.140 )x 1/2 x 5.050 | |
| | x 4 = | 142.562 m2 |
| | A5-2 =-( 5.000 + 5.800 )x 1/2 x 0.650 | |
| | x 4 - 0.500 x 6.975 x 2.000 = | -7.065 m2 |
| | A5-3 = 0.500 x 2.335 x 2 = | 2.335 m2 |
| | A5-4 =( 1.040 +( 0.800$^2$ + 0.650$^2$ )$^{0.5}$+ 5.000 ) | |
| | x 0.500 x 2 = | 7.071 m2 |
| 6) Wall Haunch | A6 =( 0.300$^2$ + 0.300$^2$ )$^{0.5}$x 6.975 x 2 = | 5.918 m2 |

No.

Large Tra Va Bridge

| Item | Formula | Quantity |
|---|---|---|
| 7) Railing | A7-1 =( 0.300 x 0.300 - 0.02 x 0.020 ) | |
| | x 1/2 x 2 +( 0.35 + 0.500 ) | |
| | x 1/2 x 0.150 + 0.500 x 0.05 ) | |
| | x 2 | 0.182 m2 |
| | A7-2 =( 0.050 + 0.150 x 1.414 + 0.280 | |
| | + 0.480 + 0.020 x 1.414 x 2 ) | |
| | x 5.350 x 2 = | 11.542 m2 |
| | Total (One Abutment) | 620.952 m2 |

No.

Large Tra Va Bridge

| Item | Formula | Quantity |
|---|---|---|
| 4. Lean Concrete | V = 24.300 x 9.400 x 0.1000 = | 22.842 m3 |
| 5. Blinding Stone | V = 24.300 x 9.400 x 0.2000 = | 45.684 m3 |
| 6.Excavation | ‹cavation Hight= 1.450 | |
| | V =( 25.300 x 10.400 + 26.750 x 11.850 ) x 1/2 x 1.450 = | 420.578 m3 |
| 7.Back Fill | V = 420.578 - 45.684 - 22.842 - 24.100 x 9.200 x 1.150 = | 97.074 m3 |

Large Tra Va Bridge

| Item | Formula | Quantity |
|---|---|---|
| Abutment A2 | | |
| 1. Concrete (Class E) | | |
| 1) Paramet | V1 = 24.100 x 0.400 x 2.335 = | 22.509 m3 |
| 2) Corbel | V2 =( 0.300 + 0.600 )x 1/2 x 0.300 | |
| | x( 22.100 + 22.700 )x 1/2 | 3.024 m3 |
| 3) Wall | V3 = 24.100 x 1.500 x 4.640 = | 167.736 m3 |
| 4) Footing | V4 = 24.100 x 9.200 x 2.000 = | 443.440 m3 |
| 5) Wing Wall | V5-1 =( 6.975 + 6.893 )x 1/2 x 5.050 | |
| | x 0.500 x 2 = | 35.017 m3 |
| | V5-2 =-( 5.000 + 5.800 )x 1/2 x 0.650 | |
| | x 0.500 x 2 = | -3.510 m3 |
| 6) Wall Haunch | V6 = 0.500 x 0.500 x 1/2 x 6.975 | |
| | x 2 = | 1.744 m3 |
| 7) Railing | V7 =( 0.300 x 0.300 - 0.02 x 0.020 | |
| | x 1/2 x 2 +( 0.35 + 0.500 ) | |
| | x 1/2 x 0.150 + 0.500 x 0.05 ) | |
| | x 5.350 x 2 | 0.976 m3 |
| | Total (One Abutment) | 670.936 m3 |
| 2. Form | | |
| 1) Paramet | A1 = 24.100 x 2.335 +( 2.335 - 0.600 ) | |
| | x 22.100 = | 94.617 m2 |
| 2) Corbel | A2 =( 0.300 + 0.300 x 1.414 )x( 22.100 | |
| | + 22.700 )x 1/2 = | 16.222 m2 |
| 3) Wall | A3 =( 24.100 + 22.100 )x 4.640 = | 214.368 m2 |
| 4) Footing | A4 =( 24.100 + 9.200 )x 2.000 x 2 = | 133.200 m2 |
| 5) Wing Wall | A5-1 =( 6.975 + 6.893 )x 1/2 x 5.050 | |
| | x 4 = | 140.067 m2 |
| | A5-2 =-( 5.000 + 5.800 )x 1/2 x 0.650 | |
| | x 4 - 0.500 x 6.975 x 2.000 = | -7.065 m2 |
| | A5-3 = 0.500 x 2.335 x 2 = | 2.335 m2 |
| | A5-4 =( 1.040 +( 0.800 $^2$ + 0.650 $^2$ )$^{0.5}$+ 5.053 ) | |
| | x 0.500 x 2 = | 7.124 m2 |
| 6) Wall Haunch | A6 =( 0.300 $^2$ + 0.300 $^2$ )$^{0.5}$x 6.975 x 2 = | 5.918 m2 |

No.

Large Tra Va Bridge

| Item | Formula | | | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|
| 7) Railing | A7-1 | =( | 0.300 | x | 0.300 | - | 0.02 | x | 0.020 | |
| | | x | 1/2 | x | 2 | +( | 0.35 | + | 0.500 | ) |
| | | x | 1/2 | x | 0.150 | + | 0.500 | x | 0.05 | ) |
| | | x | 2 | | | | | | | 0.182 m2 |
| | A7-2 | =( | 0.050 | + | 0.150 | x | 1.414 | + | 0.280 | |
| | | + | 0.480 | + | 0.020 | x | 1.414 | x | 2 | ) |
| | | x | 5.350 | x | 2 | | | | | = 11.542 m2 |
| | | | | | | | | Total (One Abutment) | | 618.510 m2 |

No.

Large Tra Va Bridge

| Item | Formula | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|
| 4. Lean Concrete | V = | 24.300 x | 9.400 | x | 0.1000 | | = | 22.842 m3 |
| 5. Blinding Stone | V = | 24.300 x | 9.400 | x | 0.2000 | | = | 45.684 m3 |
| 6.Excavation | ‹cavation Hight= | | 1.900 | | | | | |
| | V =( | 25.300 x | 10.400 | + | 27.200 | x | 12.300 ) | |
| | x | 1/2 x | 1.900 | | | | = | 567.796 m3 |
| 7.Back Fill | V = | 567.796 - | 45.684 | - | 22.842 | - | 24.100 | |
| | x | 9.200 x | 1.600 | | | | = | 144.518 m3 |

No.

Large Tra Va Bridge

| Item | Formula | Quantity |
|---|---|---|
| Pile | A1,A2 | |
| 1) | Number of Pile | |
| | N = 17 = 17 | 17 Pill |
| 2) | Total Length of Bored Piles $\phi$ 1500 | |
| | L = 17 × 70.000 = 1190.0 | 1190.0 m |
| 3) | Concrete Class D | |
| | V = 0.750 $^2$× $\pi$ × 1190.0 = 2102.904 | 2102.9 m$^3$ |
| 4) | Reiforcemento | |
| | D28 1624.0 | |
| | D25 3509.8 | |
| | D22 387.0 | |
| | D16 29.0 | |
| | D10 1077.6 | |
| | Total 6627.4 | |

No.

Large Tra Va Bridge

LIST OF REINFORCEMENT A1

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| A1 | 1 | D14 | 2,611 | 289 | 1.208 | 3.154 | 911.6 | |
| | 2 | D14 | 24,752 | 18 | 1.208 | 29.900 | 538.3 | |
| | 3 | D14 | 720 | 196 | 1.208 | 0.870 | 170.5 | |
| | 4 | D16 | 1,837 | 97 | 1.579 | 2.901 | 281.4 | |
| | 5 | D14 | 690 | 97 | 1.208 | 0.834 | 80.9 | |
| | 6 | D14 | 23,552 | 4 | 1.208 | 28.451 | 113.9 | |
| F | 1 | D25 | 12,500 | 97 | 3.854 | 48.175 | 4,673.0 | |
| | 2 | D25 | 9,000 | 96 | 3.854 | 34.686 | 3,329.9 | |
| | 3 | D25 | 9,874 | 97 | 3.854 | 38.054 | 3,691.3 | |
| | 4 | D25 | 6,200 | 96 | 3.854 | 23.895 | 2,294.0 | |
| | 5 | D20 | 9,655 | 16 | 2.466 | 23.809 | 381.0 | |
| | 6 | D20 | 25,200 | 16 | 2.466 | 62.143 | 994.3 | |
| | 7 | D16 | 4,830 | 176 | 1.579 | 7.627 | 1,342.3 | |
| | 8 | D20 | 28,700 | 37 | 2.466 | 70.774 | 2,618.7 | |
| | 9 | D20 | 25,900 | 37 | 2.466 | 63.869 | 2,363.2 | |
| W | 1 | D22 | 5,485 | 94 | 2.984 | 16.367 | 1,538.6 | |
| | 2 | D22 | 6,955 | 97 | 2.984 | 20.754 | 2,013.2 | |
| | 3 | D16 | 6,850 | 97 | 1.579 | 10.816 | 1,049.2 | |
| | 4 | D14 | 1,822 | 221 | 1.208 | 2.201 | 486.5 | |
| | 5 | D16 | 24,856 | 20 | 1.579 | 39.248 | 785.0 | |
| | 6 | D14 | 24,752 | 20 | 1.208 | 29.900 | 598.1 | |
| | 7 | D16 | 1.860 | 97 | 1.579 | 2.937 | 284.9 | |
| K | 1 | D22 | 5,955 | 8 | 2.984 | 17.770 | 142.2 | |
| | 2 | D22 | 3,085 | 18 | 2.984 | 9.206 | 165.8 | |
| | 3 | D22 | 4,185 | 16 | 2.984 | 12.488 | 199.9 | |
| | 4 | D25 | 9,649 | 42 | 3.854 | 37.187 | 1,561.9 | |
| | 5 | D25 | 4,587 | 24 | 3.854 | 17.678 | 424.3 | |
| | 6 | D22 | 6,045 | 38 | 2.984 | 18.038 | 685.5 | |
| | 7 | D18 | 6,770 | 8 | 1.998 | 13.526 | 108.3 | |
| | 8 | D16 | 6,745 | 10 | 1.579 | 10.650 | 106.6 | |
| | 9 | D16 | 1,731 | 48 | 1.579 | 2.733 | 131.2 | |
| | 10 | D16 | 2,370 | 2 | 1.579 | 3.742 | 7.5 | |
| | 11 | D20 | 2,250 | 18 | 2.466 | 5.549 | 99.9 | |
| | 12 | D16 | 9,492 | 42 | 1.579 | 14.988 | 629.5 | |
| | 13 | D18 | 6,335 | 38 | 1.998 | 12.657 | 481.0 | |
| | 14 | D10 | 690 | 290 | 0.617 | 0.426 | 123.5 | |
| | 15 | D22 | 5,681 | 6 | 2.984 | 16.952 | 101.8 | |
| | 16 | D18 | 6,496 | 6 | 1.998 | 12.979 | 77.9 | |
| | 17 | D16 | 2,091 | 4 | 1.579 | 3.302 | 13.3 | |
| | 18 | D16 | 2,091 | 4 | 1.579 | 3.302 | 13.3 | |
| | 19 | D22 | 5,305 | 4 | 2.984 | 15.830 | 63.4 | |
| | 20 | D18 | 5,235 | 4 | 1.998 | 10.460 | 41.9 | |
| | 21 | D25 | 2,994 | 4 | 3.854 | 11.539 | 46.2 | |
| | 22 | D14 | 875 | 64 | 1.208 | 1.057 | 67.7 | |
| | 23 | D20 | 3,810 | 38 | 2.466 | 9.395 | 357.1 | |
| | 24 | D16 | 2,227 | 48 | 1.579 | 3.516 | 168.8 | |
| | 25 | D22 | 5,956 | 8 | 2.984 | 17.773 | 142.2 | |
| | 26 | D18 | 5,841 | 8 | 1.998 | 11.670 | 93.4 | |
| R | 1 | D10 | 5,800 | 10 | 0.617 | 3.579 | 35.8 | |
| | | | | | | TOTAL | 36,629.7 | |

| | | |
|---|---|---|
| D25 | 16020.6 | |
| D22 | 5052.6 | |
| D20 | 6814.2 | |
| D18 | 802.5 | |
| D16 | 4813.0 | |
| D14 | 2967.5 | |
| D12 | 0.0 | |
| D10 | 159.3 | |
| | 36629.7 | |

No.

Large Tra Va Bridge

LIST OF REINFORCEMENT

A2

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| A1 | 1 | D14 | 2,611 | 289 | 1.208 | 3.154 | 911.6 | |
| | 2 | D14 | 24,752 | 18 | 1.208 | 29.900 | 538.3 | |
| | 3 | D14 | 720 | 196 | 1.208 | 0.870 | 170.5 | |
| | 4 | D16 | 1,837 | 97 | 1.579 | 2.901 | 281.4 | |
| | 5 | D14 | 690 | 97 | 1.208 | 0.834 | 80.9 | |
| | 6 | D14 | 23,552 | 4 | 1.208 | 28.451 | 113.9 | |
| F | 1 | D25 | 12,500 | 97 | 3.854 | 48.175 | 4,673.0 | |
| | 2 | D25 | 9,000 | 96 | 3.854 | 34.686 | 3,329.9 | |
| | 3 | D25 | 9,874 | 97 | 3.854 | 38.054 | 3,691.3 | |
| | 4 | D25 | 6,200 | 96 | 3.854 | 23.895 | 2,294.0 | |
| | 5 | D20 | 9,655 | 16 | 2.466 | 23.809 | 381.0 | |
| | 6 | D20 | 25,200 | 16 | 2.466 | 62.143 | 994.3 | |
| | 7 | D16 | 4,830 | 176 | 1.579 | 7.627 | 1,342.3 | |
| | 8 | D20 | 28,700 | 37 | 2.466 | 70.774 | 2,618.7 | |
| | 9 | D20 | 25,900 | 37 | 2.466 | 63.869 | 2,363.2 | |
| W | 1 | D22 | 5,485 | 94 | 2.984 | 16.367 | 1,538.6 | |
| | 2 | D22 | 6,955 | 97 | 2.984 | 20.754 | 2,013.2 | |
| | 3 | D16 | 6,850 | 97 | 1.579 | 10.816 | 1,049.2 | |
| | 4 | D14 | 1,822 | 221 | 1.208 | 2.201 | 486.5 | |
| | 5 | D16 | 24,856 | 20 | 1.579 | 39.248 | 785.0 | |
| | 6 | D14 | 24,752 | 20 | 1.208 | 29.900 | 598.1 | |
| | 7 | D16 | 1,860 | 97 | 1.579 | 2.937 | 284.9 | |
| K | 1 | D22 | 5,955 | 8 | 2.984 | 17.770 | 142.2 | |
| | 2 | D22 | 3,085 | 18 | 2.984 | 9.206 | 165.8 | |
| | 3 | D22 | 4,185 | 16 | 2.984 | 12.488 | 199.9 | |
| | 4 | D25 | 9,675 | 42 | 3.854 | 37.287 | 1,566.1 | |
| | 5 | D25 | 4,587 | 24 | 3.854 | 17.678 | 424.3 | |
| | 6 | D22 | 6,045 | 38 | 2.984 | 18.038 | 685.5 | |
| | 7 | D18 | 6,770 | 8 | 1.998 | 13.526 | 108.3 | |
| | 8 | D16 | 6,745 | 10 | 1.579 | 10.650 | 106.6 | |
| | 9 | D16 | 1,731 | 48 | 1.579 | 2.733 | 131.2 | |
| | 10 | D16 | 2,370 | 2 | 1.579 | 3.742 | 7.5 | |
| | 11 | D20 | 2,250 | 18 | 2.466 | 5.549 | 99.9 | |
| | 12 | D16 | 9,518 | 42 | 1.579 | 15.029 | 631.3 | |
| | 13 | D18 | 6,335 | 38 | 1.998 | 12.657 | 481.0 | |
| | 14 | D10 | 690 | 290 | 0.617 | 0.426 | 123.5 | |
| | 15 | D22 | 5,637 | 6 | 2.984 | 16.821 | 101.0 | |
| | 16 | D18 | 6,452 | 6 | 1.998 | 12.891 | 77.4 | |
| | 17 | D16 | 2,087 | 4 | 1.579 | 3.295 | 13.2 | |
| | 18 | D16 | 2,087 | 4 | 1.579 | 3.295 | 13.2 | |
| | 19 | D22 | 5,305 | 4 | 2.984 | 15.830 | 63.4 | |
| | 20 | D18 | 5,235 | 4 | 1.998 | 10.460 | 41.9 | |
| | 21 | D25 | 2,994 | 4 | 3.854 | 11.539 | 46.2 | |
| | 22 | D14 | 875 | 64 | 1.208 | 1.057 | 67.7 | |
| | 23 | D20 | 3,810 | 38 | 2.466 | 9.395 | 357.1 | |
| | 24 | D16 | 2,227 | 48 | 1.579 | 3.516 | 168.8 | |
| | 25 | D22 | 5,956 | 8 | 2.984 | 17.773 | 142.2 | |
| | 26 | D18 | 5,841 | 8 | 1.998 | 11.670 | 93.4 | |
| R | 1 | D10 | 5,800 | 10 | 0.617 | 3.579 | 35.8 | |
| | | | | | | TOTAL | 36,634.2 | |

| | |
|---|---|
| D25 | 16,024.8 |
| D22 | 5,051.8 |
| D20 | 6,814.2 |
| D18 | 802.0 |
| D16 | 4,814.6 |
| D14 | 2,967.5 |
| D10 | 159.3 |
| | 36,634.2 |

Large Tra Va Bridge No.

LIST OF REINFORCEMENT $\phi$ 1500 L=70m

| SIGN | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|
| N 1 | D28 | 12,000 | 28 | 4.834 | 58.000 | 1,624.0 | |
| 2 | D25 | 12,000 | 70 | 3.854 | 46.200 | 3,234.0 | |
| 2' | D25 | 5,100 | 14 | 3.854 | 19.700 | 275.8 | |
| 3 | D22 | 4,312 | 6 | 2.984 | 12.900 | 77.4 | |
| 4 | D22 | 4,331 | 24 | 2.984 | 12.900 | 309.6 | |
| 5 | D10 | 152,053 | 1 | 0.617 | 93.800 | 93.8 | |
| 6 | D10 | 174,861 | 1 | 0.617 | 108.000 | 108.0 | |
| 7 | D10 | 4,105 | 94 | 0.617 | 2.530 | 237.8 | |
| 8 | D10 | 1,033,961 | 1 | 0.617 | 638.000 | 638.0 | |
| 9 | D16 | 1,148 | 16 | 1.579 | 1.810 | 29.0 | |
| | | | | | TOTAL | 6,627.4 | |

| | | |
|---|---|---|
| D28 | 1624.0 | |
| D25 | 3509.8 | |
| D22 | 387.0 | |
| D16 | 29.0 | |
| D10 | 1077.6 | |
| | 6,627.4 | |

No.

Large Tra Va Bridge

| Item | Formula | | | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|
| Approach Slab | | | | | | | | | | |
| 1. Concrete (Class E) | V1 = | 23.040 | x | 6.000 | x | 0.300 | | | = | 41.472 m3 |
| | V2 =( | 0.300 | + | 0.500 | )x | 1/2 | x | 0.200 | | |
| | x | 23.040 | | | | | | | = | 3.686 m3 |
| | V3= = - | 0.500 | x | 0.500 | x | 1/2 | x | 0.300 | | |
| | x | 2 | | | | | | | = | -0.075 m3 |
| | | | | | | | | Total | | 45.083 m3 |
| 2. Lean Concrete | V = | 23.040 | x | 5.700 | x | 0.100 | | | = | 13.133 m3 |
| 3. Form | A1 =( | 0.300 | + | 0.500 | )x | 23.040 | | | = | 18.432 m2 |
| | A2 = | 0.300 | x | 6.000 | | | | | = | 1.800 m2 |
| | A3 =( | 0.300 | + | 0.500 | )x | 1/2 | x | 0.200 | | |
| | x | 2 | | | | | | | = | 0.160 m2 |
| | | | | | | | | Total | | 20.392 m2 |
| 4.Asphtic joint | V =(( | 0.060 | + | 0.020 | )x | 1/2 | x | 0.300 | | |
| | + | 0.020 | x | 0.300 | )x | 23.040 | | | = | 0.415 m3 |
| 5.Re-bar | | D10 | 255.8 | | | | | | | |
| | | D16 | 3402.3 | | | | | | | |
| | | D20 | 3421.6 | | | | | | | |
| | | Total | 7079.7 | | | | | | | 7079.700 kg |

# QUANTITIES FOR EARTHWORKS SLOPE PROTECTION

Bridge **LARGE TRA VA**
Abutment A1

| h1 | h2 | h3 | h4 | h5 | h6 | d1 | d2 |
|---|---|---|---|---|---|---|---|
| 8.22 | 0.5 | 2.9 | 0.45 | 0.95 | 0.25 | 24.1 | 12 |

| Block | a | b | Dh | R | r | L | Sxq | W | Masonry | Blinding |
|---|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | (m) | (m) | (m) | (m2) | (m) | (m3) | (m3) |
| 1 | 9.940 | 6.400 | 4.720 | 8.170 | 0.500 | 9.435 | 60.514 | | 18.15 | 6.05 |
| 2 | 12.000 | 12.000 | 0.600 | 20.170 | 8.170 | 12.015 | 267.296 | | 80.19 | 26.73 |
| 3 | 4.900 | 3.063 | 2.450 | 24.151 | 20.170 | 4.675 | 162.643 | | 48.79 | 16.26 |
| 4 | 24.100 | 12.000 | 0.600 | | | | 289.561 | | 86.87 | 28.96 |
| 5 | 24.100 | 3.063 | 2.450 | | | | 94.518 | | 28.36 | 9.45 |
| 6 | 9.940 | 6.400 | 4.720 | 8.170 | 0.000 | 9.435 | 60.514 | | 18.15 | 6.05 |
| 7 | 12.000 | 12.000 | 0.600 | 20.170 | 8.170 | 12.015 | 267.296 | | 80.19 | 26.73 |
| 8 | 4.900 | 3.063 | 2.450 | 24.151 | 20.170 | 4.675 | 162.643 | | 48.79 | 16.26 |
| 9 | | | 1.200 | | | | 4.320 | 99.935 | | |
| Extra | | | | | | | | 87.434 | **409** | **136** |

| | | | | | | |
|---|---|---|---|---|---|---|
| FOOTING | Wood pile | | (m) | 5996 | | |
| | Binding | | (m3) | 8.0 | | |
| | Stone masonry | | (m3) | 36.0 | LENGTH OF FOOTING : L = | 99.93 (m) |
| | Excavation | | (m3) | 432 | | |
| | Back fill | | (m3) | 300 | | |
| SIDE SLOPE | Masonry | | (m3) | 409 | | |
| | Blinding | | (m3) | 136 | | |
| | Geotextile | | (m2) | 507 | | |
| | PVC Pipe | | (m) | 50 | | |

Abutment A2

| h1 | h2 | h3 | h4 | h5 | h6 | d1 | d2 |
|---|---|---|---|---|---|---|---|
| 8.11 | 3.5 | 2.9 | 0.02 | 0.52 | 0.68 | 24.1 | 12 |

| Block | a | b | Dh | R | r | L | Sxq | W | Masonry | Blinding |
|---|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | (m) | (m) | (m) | (m2) | (m) | (m3) | (m3) |
| 1 | 9.720 | 6.263 | 4.610 | 7.991 | 0.000 | 9.226 | 57.874 | | 17.36 | 5.79 |
| 2 | 12.000 | 12.000 | 0.600 | 19.991 | 7.991 | 12.015 | 263.924 | | 79.18 | 26.39 |
| 3 | 5.760 | 3.600 | 2.880 | 24.671 | 19.991 | 5.495 | 192.661 | | 57.80 | 19.27 |
| 4 | 24.100 | 12.000 | 0.600 | | | | 289.561 | | 86.87 | 28.96 |
| 5 | 24.100 | 3.600 | 2.880 | | | | 111.107 | | 33.33 | 11.11 |
| 6 | 9.720 | 6.263 | 4.610 | 7.991 | 0.000 | 9.226 | 57.874 | | 17.36 | 5.79 |
| 7 | 12.000 | 12.000 | 0.600 | 19.991 | 7.991 | 12.015 | 263.924 | | 79.18 | 26.39 |
| 8 | 5.760 | 3.600 | 2.880 | 24.671 | 19.991 | 5.495 | 192.661 | | 57.80 | 19.27 |
| 9 | | | 1.200 | | | | 4.320 | 101.568 | | |
| Extra | | | | | | | | 86.873 | **429** | **143** |

| | | | | | | |
|---|---|---|---|---|---|---|
| FOOTING | Wood pile | | (m) | 6094 | | |
| | Binding | | (m3) | 8.1 | | |
| | Stone masonry | | (m3) | 36.5 | LENGTH OF FOOTING : L = | 101.57 (m) |
| | Excavation | | (m3) | 438.8 | | |
| | Back fill | | (m3) | 305 | | |
| SIDE SLOPE | Masonry | | (m3) | 428.9 | | |
| | Blinding | | (m3) | 143.0 | | |
| | Geotextile | | (m2) | 583 | | |
| | PVC Pipe | | (m) | 51 | | |

**NOTES :**

* INPUT VALUES : GRAY CELLS ; TOTAL VALUES : BOLD NUMBERS
* No. of Blocks : see drawing. Extra block used for calculation only.

$h_i$ : Elevations (see drawing)
$d_i$ : Distances (see drawing)
$a_i$ : Long edge of ellipse (or rectangle) : $a_i$=Dh$_i$*slope$_i$
$b_i$ : Short edge of ellipse (or rectangle) : $b_i$=Dh$_i$*slope$_i$
Dh$_i$ : Height of cone (or truncated cone)
$R_i$ : Average radius of lower ellipse : $R_i$=(Sa$_i$+Sb$_i$)/2
$r_i$ : Average radius of upper ellipse : $r_i$=(Sa$_{i-1}$+Sb$_{i-1}$)/2
$L_i$ : Generatrix of cone : $L_i$=sqrt(Dh$_i^2$+($R_i$-$r_i$)$^2$)
Sxq$_i$ : Area of cone's side (or plane before abutment) :
Sxq$_i$=3.14/4*($R_i$+$r_i$)*$L_i$ for block 1,2,3,6,7,8
Sxq$_i$=$a_i$*sqrt($b_i^2$+Dh$_i^2$) for block 4,5
Sxq$_9$=(1.8+1.8+Dh$_9$+2*Dh$_9$)*Dh$_9$/2 for block 9

W : Length of masonry's footing : $W_9$
$W_9$=2*3.14*$R_9$/4+$a_9$+2*3.14*$R_9$/4 , and
$W_{Ex}$=2*3.14*$R_7$/4+$a_7$+2*3.14*$R_7$/4
Masonry$_i$ = 0.3*Sxq$_i$
Blinding$_i$ = 0.1*Sxq$_i$
Geotextile = Sxq$_3$ +Sxq$_5$ +Sxq$_8$ +$W_{Ex}$*1
PVC Pipe = $W_9$/2
Wood Pile = $W_9$*0.8*25*3
Excavation = $W_9$*Sxq$_9$
Filling = Excavation-$W_9$*Dh$_9$*1.1

LARGE TRA VA BRIDGE : QUANTITIES OF EARTHWORKS SLOPE PROTECTION OF 25M BEHIND HEAD WALL

ABUTMENT A1 :

| Block | B | L | S | Thick | Masonry | Blinding (T=0.1m) | |
|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m2) | (m) | (m3) | (m3) | |
| 10 | 10.55 | 25 | 263.86 | 0.30 | 79.16 | 26.39 | |
| 11 | 12.01 | 25 | 300.37 | 0.30 | 90.11 | 30.04 | |
| 12 | 5.48 | 25 | 136.96 | 0.30 | 41.09 | 13.70 | **Geotextile (m2)** |
| 15 | 10.55 | 25 | 263.86 | 0.30 | 79.16 | 26.39 | = 2 x ( L*1 + S12) = 324 |
| 16 | 12.01 | 25 | 300.37 | 0.30 | 90.11 | 30.04 | **PVC pipe (m)** |
| 17 | 5.48 | 25 | 136.96 | 0.30 | 41.09 | 13.70 | = 2 x L/2 x 1m = 25 |
| FOOTING | Wood pile | | (m) | | 3000 | | |
| | Blinding | | (m3) | | 4 | | |
| | Stone masonry | | (m3) | | 18.00 | LENGTH OF FOOTING L = | 50 (m) |
| | Excavation | | (m3) | | 216.00 | | |
| | Back fill | | (m3) | | 150.00 | | |
| SIDE SLOPE | Stone masonry | | (m3) | | 420.71 | | |
| | Blinding | | (m3) | | 140.24 | | |
| | Geotextle | | (m2) | | 324 | | |
| | PVC pile | | (m) | | 25 | | |

| No | h | Dh | S | L | Total (m3) | | |
|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m2) | (m) | **Excavation** | **Back fill** | |
| 5 | 0.95 | | | | | | Excavation = 2 x S x L |
| 6 | -0.25 | 1.2 | 4.32 | 25 | **216** | **150** | Filling = Excavation - 2 x 25 x Dh x 1.1 |

ABUTMENT A2 :

| Block | B | L | S | Thick | Masonry | Blinding (T=0.1m) | |
|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m2) | (m) | (m3) | (m3) | |
| 10 | 10.31 | 25 | 257.71 | 0.30 | 77.31 | 25.77 | |
| 11 | 12.01 | 25 | 300.37 | 0.30 | 90.11 | 30.04 | |
| 12 | 6.44 | 25 | 161.00 | 0.30 | 48.30 | 16.10 | **Geotextile (m2)** |
| 15 | 10.31 | 25 | 257.71 | 0.30 | 77.31 | 25.77 | = 2 x ( L*1 + S12) = 372 |
| 16 | 12.01 | 25 | 300.37 | 0.30 | 90.11 | 30.04 | **PVC pipe (m)** |
| 17 | 6.44 | 25 | 161.00 | 0.30 | 48.30 | 16.10 | = 2 x L/2 x 1m = 25 |
| FOOTING | Wood pile | | (m) | | 3000 | | |
| | Blinding | | (m3) | | 4 | | |
| | Stone masonry | | (m3) | | 18.00 | LENGTH OF FOOTING L = | 50 (m) |
| | Excavation | | (m3) | | 216.00 | | |
| | Back fill | | (m3) | | 150.00 | | |
| SIDE SLOPE | Stone masonry | | (m3) | | 431.45 | | |
| | Blinding | | (m3) | | 143.82 | | |
| | Geotextle | | (m2) | | 372 | | |
| | PVC pile | | (m) | | 25 | | |

QUANTITY TABLE OF PIER

Large Tra Va Bridge

| Item | | | UNIT | Pier 1 | Pier 2 | Pier 3 | Pier 4 | Pier 5 | Pier 6 | Pier 7 | Total (1dir) | Total (2dir) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NUMBER OF PILES | | pile | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 42 | 84 |
| | TOTAL LENGTH OF BORED $\phi$ 1500m | | m | 420.0 | 420.0 | 420.0 | 420.0 | 444.0 | 444.0 | 420.0 | 2988.0 | 5976.0 |
| | CONCRETE DLASS D | | m3 | 742.2 | 742.2 | 742.2 | 742.2 | 784.6 | 784.6 | 742.2 | 5280.2 | 10560.5 |
| | REINFORCEMENT | 25 | kg | 4524.4 | 4524.4 | 4524.4 | 4524.4 | 4848.0 | 4,848.0 | 4524.4 | 32318 | 64636.0 |
| | | 22 | kg | 418.3 | 418.3 | 418.3 | 418.3 | 380.3 | 380.3 | 418.3 | 2852.1 | 5704.2 |
| | | 16 | kg | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | 233.8 | 467.6 |
| | | 10 | kg | 1154.4 | 1154.4 | 1154.4 | 1154.4 | 1084.1 | 1,084.1 | 1154.4 | 7940.2 | 15880.4 |
| | | TOTAL | kg | 6130.5 | 6130.5 | 6130.5 | 6130.5 | 7130.4 | 7,130.4 | 6130.5 | 44913.326 | 89826.7 |
| PiER | CONCRETE DLASS E | | m3 | 212.5 | 210.2 | 217.1 | 217.1 | 195.9 | 193.6 | 210.2 | 1456.6 | 2913.2 |
| | REINFORCEMENT | 32 | kg | 3576.3 | 3576.3 | 3576.3 | 3576.3 | 3715.2 | 3715.2 | 3576.3 | 25312.0 | 50624.0 |
| | | 28 | kg | 1745.1 | 1745.1 | 1745.1 | 1745.1 | 1745.1 | 1745.1 | 1745.1 | 12215.9 | 24431.7 |
| | | 25 | kg | 3077.9 | 2916.1 | 3401.6 | 3077.9 | 1912.8 | 1751.0 | 2916.1 | 19053.4 | 38106.8 |
| | | 22 | kg | 3812.4 | 3812.4 | 3812.4 | 3812.4 | 3946.6 | 3946.6 | 3812.4 | 26955.3 | 53910.7 |
| | | 20 | kg | 722.0 | 722.0 | 722.0 | 722.0 | 737.8 | 737.8 | 722.0 | 5085.9 | 10171.8 |
| | | 16 | kg | 869.1 | 869.1 | 869.1 | 869.1 | 869.1 | 869.1 | 869.1 | 6083.8 | 12167.7 |
| | | 14 | kg | 1801.7 | 1752.8 | 1915.8 | 1801.7 | 1410.5 | 1361.6 | 1752.8 | 11796.9 | 23593.7 |
| | | 10 | kg | 17.9 | 17.9 | 17.9 | 35.8 | 35.8 | 35.8 | 17.9 | 178.9 | 357.9 |
| | | TOTAL | kg | 15622.6 | 15411.8 | 16060.3 | 15640.5 | 14372.9 | 14162.1 | 15411.8 | 106682.1 | 213364.2 |
| | BLINDING STONE | | m3 | 16.1 | 16.1 | 16.1 | 16.1 | | | 16.1 | | 161.3 |
| | LEAN CONCRETE CLASS G | | m3 | 8.1 | 8.1 | 8.1 | 8.1 | | | 8.1 | | 80.6 |
| | EXCAVATION | | m3 | 470.3 | 466.6 | 464.7 | 500.3 | | | 466.6 | | 4736.8 |
| | BACK FILL | | m3 | 287.2 | 283.6 | 281.8 | 316.5 | | | 283.6 | | 2905.1 |

Large Tra Va Bridge P1

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x $\pi$ x 6.000 x 3 = | 27.709 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 212.509 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x $\pi$ x 3 = | 14.982 m2 |
| | A6 = 1.400 x $\pi$ x 6.000 x 3 = | 79.168 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3576.3<br>D28 1745.1<br>D25 3077.9<br>D22 3812.4<br>D20 722.0<br>D18 0.0<br>D16 869.1<br>D14 1801.7<br>D12 0.0<br>D10 17.9<br>Total 15622.6 | |

Large Tra Va Bridge P1

| Item | Formula | Quantity |
|---|---|---|
| 4. Lean Concrete | V = 11.200 x 7.200 x 0.1000 = | 8.064 m3 |
| 5. Blinding Stone | V = 11.200 x 7.200 x 0.2000 = | 16.128 m3 |
| 6.Excavation | Excavation Hight= 3.360 | |
| | V =( 12.200 x 8.200 + 15.560 x 11.560 ) x 1/2 x 3.360 = | 470.255 m3 |
| 7.Back Fill | V = 470.255 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 - 0.700$^2$ x $\pi$ x 3 x 1.060 = | 287.168 m3 |

LIST OF REINFORCEMENT

P1

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 5 | 0.617 | 3.579 | 17.9 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 9,510 | 84 | 3.853 | 36.642 | 3,077.9 | |
| | 2 | D14 | 4,498 | 159 | 1.208 | 5.434 | 863.9 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 47 | 2.984 | 44.969 | 2,113.5 | |
| | 3 | D32 | 10,300 | 55 | 6.313 | 65.024 | 3,576.3 | |
| | 4 | D22 | 7,570 | 37 | 2.984 | 22.589 | 835.8 | |
| | 5 | D20 | 7,500 | 16 | 2.466 | 18.495 | 295.9 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 15,622.6 | |

| | |
|---|---|
| D32 | 3576.3 |
| D28 | 1745.1 |
| D25 | 3077.9 |
| D22 | 3812.4 |
| D20 | 722.0 |
| D18 | 0.0 |
| D16 | 869.1 |
| D14 | 1801.7 |
| D12 | 0.0 |
| D10 | 17.9 |
| | 15622.6 |

No.

Large Tra Va Bridge P2

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x $\pi$ x 5.500 x 3 = | 25.400 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 210.200 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x $\pi$ x 3 = | 14.982 m2 |
| | A6 = 1.400 x $\pi$ x 5.500 x 3 = | 72.571 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3576.3<br>D28 1745.1<br>D25 2916.1<br>D22 3812.4<br>D20 722.0<br>D18 0.0<br>D16 869.1<br>D14 1752.8<br>D12 0.0<br>D10 17.9<br>Total 15411.8 | |

No.

Large Tra Va Bridge P2

| Item | Formula | Quantity |
|---|---|---|
| 4. Lean Concrete | V = 11.200 x 7.200 x 0.1000 = | 8.064 m3 |
| 5. Blinding Stone | V = 11.200 x 7.200 x 0.2000 = | 16.128 m3 |
| 6.Excavation | Excavation Hight= 3.340 | |
| | V =( 12.200 x 8.200 + 15.540 x 11.540 ) x 1/2 x 3.340 = | 466.551 m3 |
| 7.Back Fill | V = 466.551 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 - $0.700^2$ x $\pi$ x 3 x 1.040 = | 283.556 m3 |

## LIST OF REINFORCEMENT

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 5 | 0.617 | 3.579 | 17.9 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 9,010 | 84 | 3.853 | 34.716 | 2,916.1 | |
| | 2 | D14 | 4,498 | 150 | 1.208 | 5.434 | 815.0 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 47 | 2.984 | 44.969 | 2,113.5 | |
| | 3 | D32 | 10,300 | 55 | 6.313 | 65.024 | 3,576.3 | |
| | 4 | D22 | 7,570 | 37 | 2.984 | 22.589 | 835.8 | |
| | 5 | D20 | 7,500 | 16 | 2.466 | 18.495 | 295.9 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 15,411.8 | |

| | |
|---|---|
| D32 | 3576.3 |
| D28 | 1745.1 |
| D25 | 2916.1 |
| D22 | 3812.4 |
| D20 | 722.0 |
| D18 | 0.0 |
| D16 | 869.1 |
| D14 | 1752.8 |
| D12 | 0.0 |
| D10 | 17.9 |
| | 15411.8 |

No.

Large Tra Va Bridge P3

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x $\pi$ x 7.000 x 3 = | 32.327 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 217.127 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x $\pi$ x 3 = | 14.982 m2 |
| | A6 = 1.400 x $\pi$ x 7.000 x 3 = | 92.363 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3576.3<br>D28 1745.1<br>D25 3401.6<br>D22 3812.4<br>D20 722.0<br>D18 0.0<br>D16 869.1<br>D14 1915.8<br>D12 0.0<br>D10 17.9<br>Total 16060.3 | |

Large Tra Va Bridge P3

| Item | Formula | Quantity |
|---|---|---|
| 4. Lean Concrete | V = 11.200 x 7.200 x 0.1000 = | 8.064 m3 |
| 5. Blinding Stone | V = 11.200 x 7.200 x 0.2000 = | 16.128 m3 |
| 6.Excavation | Excavation Hight= 3.330 | |
| | V =( 12.200 x 8.200 + 15.530 x 11.530 ) x 1/2 x 3.330 = | 464.703 m3 |
| 7.Back Fill | V = 464.703 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 - $0.700^2$ x $\pi$ x 3 x 1.030 = | 281.754 m3 |

## LIST OF REINFORCEMENT

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 5 | 0.617 | 3.579 | 17.9 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 10,510 | 84 | 3.853 | 40.495 | 3,401.6 | |
| | 2 | D14 | 4,498 | 180 | 1.208 | 5.434 | 978.0 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 47 | 2.984 | 44.969 | 2,113.5 | |
| | 3 | D32 | 10,300 | 55 | 6.313 | 65.024 | 3,576.3 | |
| | 4 | D22 | 7,570 | 37 | 2.984 | 22.589 | 835.8 | |
| | 5 | D20 | 7,500 | 16 | 2.466 | 18.495 | 295.9 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 16,060.3 | |

| | | |
|---|---|---|
| D32 | 3576.3 | |
| D28 | 1745.1 | |
| D25 | 3401.6 | |
| D22 | 3812.4 | |
| D20 | 722.0 | |
| D18 | 0.0 | |
| D16 | 869.1 | |
| D14 | 1915.8 | |
| D12 | 0.0 | |
| D10 | 17.9 | |
| | 16060.3 | |

No.

Large Tra Va Bridge P4

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x $\pi$ x 6.000 x 3 = | 27.709 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 212.509 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x $\pi$ x 3 = | 14.982 m2 |
| | A6 = 1.400 x $\pi$ x 6.000 x 3 = | 79.168 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3576.3<br>D28 1745.1<br>D25 3077.9<br>D22 3812.4<br>D20 722.0<br>D18 0.0<br>D16 869.1<br>D14 1801.7<br>D12 0.0<br>D10 35.8<br>Total 15640.5 | |

No.

Large Tra Va Bridge P4

| Item | Formula | Quantity |
|---|---|---|
| 4. Lean Concrete | V = 11.200 x 7.200 x 0.1000 = | 8.064 m3 |
| 5. Blinding Stone | V = 11.200 x 7.200 x 0.2000 = | 16.128 m3 |
| 6.Excavation | Excavation Hight= 3.520 | |
| | V =( 12.200 x 8.200 + 15.720 x 11.720 ) x 1/2 x 3.520 = | 500.330 m3 |
| 7.Back Fill | V = 500.330 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 - 0.700$^2$ x $\pi$ x 3 x 1.220 = | 316.504 m3 |

## LIST OF REINFORCEMENT

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 10 | 0.617 | 3.579 | 35.8 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 9,510 | 84 | 3.853 | 36.642 | 3,077.9 | |
| | 2 | D14 | 4,498 | 159 | 1.208 | 5.434 | 863.9 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 47 | 2.984 | 44.969 | 2,113.5 | |
| | 3 | D32 | 10,300 | 55 | 6.313 | 65.024 | 3,576.3 | |
| | 4 | D22 | 7,570 | 37 | 2.984 | 22.589 | 835.8 | |
| | 5 | D20 | 7,500 | 16 | 2.466 | 18.495 | 295.9 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 15,640.5 | |

| | | |
|---|---|---|
| D32 | 3576.3 | |
| D28 | 1745.1 | |
| D25 | 3077.9 | |
| D22 | 3812.4 | |
| D20 | 722.0 | |
| D18 | 0.0 | |
| D16 | 869.1 | |
| D14 | 1801.7 | |
| D12 | 0.0 | |
| D10 | 35.8 | |
| | 15640.5 | |

No.

Large Tra Va Bridge P5

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x π x 2.400 x 3 = | 11.084 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 195.884 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$ x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x π x 3 = | 14.982 m2 |
| | A6 = 1.400 x π x 2.400 x 3 = | 31.667 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3715.2<br>D28 1745.1<br>D25 1912.8<br>D22 3946.6<br>D20 737.8<br>D18 0.0<br>D16 869.1<br>D14 1410.5<br>D12 0.0<br>D10 35.8<br>Total 14372.9 | |

LIST OF REINFORCEMENT



| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 10 | 0.617 | 3.579 | 35.8 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 5,910 | 84 | 3.853 | 22.771 | 1,912.8 | |
| | 2 | D14 | 4,498 | 87 | 1.208 | 5.434 | 472.7 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 49 | 2.984 | 44.969 | 2,203.5 | |
| | 3 | D32 | 10,700 | 55 | 6.313 | 67.549 | 3,715.2 | |
| | 4 | D22 | 7,970 | 37 | 2.984 | 23.782 | 880.0 | |
| | 5 | D20 | 7,900 | 16 | 2.466 | 19.481 | 311.7 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 14,372.9 | |

| | | |
|---|---|---|
| D32 | 3715.2 | |
| D28 | 1745.1 | |
| D25 | 1912.8 | |
| D22 | 3946.6 | |
| D20 | 737.8 | |
| D18 | 0.0 | |
| D16 | 869.1 | |
| D14 | 1410.5 | |
| D12 | 0.0 | |
| D10 | 35.8 | |
| | 14372.9 | |

Large Tra Va Bridge P6

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x π x 1.900 x 3 = | 8.774 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 193.574 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x π x 3 = | 14.982 m2 |
| | A6 = 1.400 x π x 1.900 x 3 = | 25.070 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3715.2<br>D28 1745.1<br>D25 1751.0<br>D22 3946.6<br>D20 737.8<br>D18 0.0<br>D16 869.1<br>D14 1361.6<br>D12 0.0<br>D10 35.8<br>Total 14162.1 | |

## LIST OF REINFORCEMENT

| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 10 | 0.617 | 3.579 | 35.8 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 5,410 | 84 | 3.853 | 20.845 | 1,751.0 | |
| | 2 | D14 | 4,498 | 78 | 1.208 | 5.434 | 423.8 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 49 | 2.984 | 44.969 | 2,203.5 | |
| | 3 | D32 | 10,700 | 55 | 6.313 | 67.549 | 3,715.2 | |
| | 4 | D22 | 7,970 | 37 | 2.984 | 23.782 | 880.0 | |
| | 5 | D20 | 7,900 | 16 | 2.466 | 19.481 | 311.7 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 14,162.1 | |

| | | |
|---|---|---|
| D32 | 3715.2 | |
| D28 | 1745.1 | |
| D25 | 1751.0 | |
| D22 | 3946.6 | |
| D20 | 737.8 | |
| D18 | 0.0 | |
| D16 | 869.1 | |
| D14 | 1361.6 | |
| D12 | 0.0 | |
| D10 | 35.8 | |
| | **14162.1** | |

Large Tra Va Bridge P7

| Item | Formula | Quantity |
|---|---|---|
| Pier | | |
| 1. Concrete (Class E) | | |
| | V1 = 11.400 x 2.000 x 0.700 = | 15.960 m3 |
| | V2 =( 11.400 + 9.800 )x 1/2 x 2.000 x 0.700 = | 14.840 m3 |
| | V3 = $0.700^2$ x $\pi$ x 5.500 x 3 = | 25.400 m3 |
| | V4 = 11.000 x 7.000 x 2.000 = | 154.000 m3 |
| | Total (One Pier) | 210.200 m3 |
| 2. Form | | |
| | A1 = 11.400 x 0.700 x 2 = | 15.960 m2 |
| | A2 =( 11.400 + 9.800 )x 1/2 x 0.700 x 2 = | 14.840 m2 |
| | A3 = 0.700 x 2.000 x 2 = | 2.800 m2 |
| | A4 =( $0.700^2$ + $0.800^2$ )$^{0.5}$x 2.000 x 2 = | 4.252 m2 |
| | A5 = 9.800 x 2.000 - $0.700^2$ x $\pi$ x 3 = | 14.982 m2 |
| | A6 = 1.400 x $\pi$ x 5.500 x 3 = | 72.571 m2 |
| | A7 =( 11.000 + 7.000 )x 2 x 2.000 = | 72.000 m2 |
| 3. Re-Bar | D32 3576.3<br>D28 1745.1<br>D25 2916.1<br>D22 3812.4<br>D20 722.0<br>D18 0.0<br>D16 869.1<br>D14 1752.8<br>D12 0.0<br>D10 17.9<br>Total 15411.8 | |

Large Tra Va Bridge P7

| Item | Formula | Quantity |
|---|---|---|
| 4. Lean Concrete | V = 11.200 x 7.200 x 0.1000 = | 8.064 m3 |
| 5. Blinding Stone | V = 11.200 x 7.200 x 0.2000 = | 16.128 m3 |
| 6.Excavation | Excavation Hight= 3.340 | |
| | V =( 12.200 x 8.200 + 15.540 x 11.540 ) x 1/2 x 3.340 = | 466.551 m3 |
| 7.Back Fill | V = 466.551 - 16.128 - 8.064 - 11.000 x 7.000 x 2.000 - $0.700^2$ x $\pi$ x 3 x 1.040 = | 283.556 m3 |

LIST OF REINFORCEMENT



| SIGN | | DIACETER | LENGTH | NOS. | UNIT WEIGHT | PIECE WEIGHT | TOTAL WEIGHT | NOTE |
|---|---|---|---|---|---|---|---|---|
| R | 1 | D10 | 5,800 | 5 | 0.617 | 3.579 | 17.9 | |
| B | 1 | D28 | 11,200 | 13 | 4.834 | 54.141 | 703.8 | |
| | 2 | D28 | 9,800 | 13 | 4.834 | 47.373 | 615.9 | |
| | 3 | D16 | 11,200 | 6 | 1.578 | 17.674 | 106.0 | |
| | 3 -a | D16 | 10,490 | 4 | 1.578 | 16.553 | 66.2 | |
| | 4 | D14 | 4,916 | 49 | 1.208 | 5.939 | 291.0 | |
| | 4 -a | D14 | 3,566 | 98 | 1.208 | 4.308 | 422.2 | |
| | 4 -b | D14 | 2,332 | 49 | 1.208 | 2.817 | 138.0 | |
| | 5 | D14 | 4,157 | 6 | 1.208 | 5.022 | 30.1 | |
| | 5 -a | D14 | 2,728 | 12 | 1.208 | 3.295 | 39.5 | |
| | 5 -b | D14 | 2,332 | 6 | 1.208 | 2.817 | 16.9 | |
| | 6 | D28 | 3,393 | 13 | 4.834 | 16.402 | 213.2 | |
| | 7 | D28 | 3,377 | 13 | 4.834 | 16.324 | 212.2 | |
| C | 1 | D25 | 9,010 | 84 | 3.853 | 34.716 | 2,916.1 | |
| | 2 | D14 | 4,498 | 150 | 1.208 | 5.434 | 815.0 | |
| F | 1 | D22 | 11,570 | 25 | 2.984 | 34.525 | 863.1 | |
| | 2 | D22 | 15,070 | 47 | 2.984 | 44.969 | 2,113.5 | |
| | 3 | D32 | 10,300 | 55 | 6.313 | 65.024 | 3,576.3 | |
| | 4 | D22 | 7,570 | 37 | 2.984 | 22.589 | 835.8 | |
| | 5 | D20 | 7,500 | 16 | 2.466 | 18.495 | 295.9 | |
| | 6 | D20 | 10,800 | 16 | 2.466 | 26.633 | 426.1 | |
| | 7 | D16 | 4,698 | 94 | 1.578 | 7.413 | 696.9 | |
| | | | | | | TOTAL | 15,411.8 | |

| | | |
|---|---|---|
| D32 | 3576.3 | |
| D28 | 1745.1 | |
| D25 | 2916.1 | |
| D22 | 3812.4 | |
| D20 | 722.0 | |
| D18 | 0.0 | |
| D16 | 869.1 | |
| D14 | 1752.8 | |
| D12 | 0.0 | |
| D10 | 17.9 | |
| | 15411.8 | |

Large Tra Va Bridge

| Item | Formula | Quantity |
|---|---|---|
| Pile | P1,P2,P3,P4,P7 | |
| 1) | Number of Pile | |
| | N = 6 = 6 | 6 Pill |
| 2) | Total Length of Bored Piles $\phi$ 1500 | |
| | L = 6 × 70.000 = 420.0 | 420.0 m |
| 3) | Concrete Class D | |
| | V = 0.750 $^2$× $\pi$ × 420.0 = 742.201 | 742.2 m$^3$ |
| 4) | Reiforcemento | |
| | D10 1154.4<br>D16 33.4<br>D22 418.3<br>D25 4524.4<br>Total 6130.5 | |
| Pile | `P5,P6 | |
| 1) | Number of Pile | |
| | N = 6 = 6 | 6 Pill |
| 2) | Total Length of Bored Piles $\phi$ 1500 | |
| | L = 6 × 74.000 = 444.0 | 444.0 m |
| 3) | Concrete Class D | |
| | V = 0.750 $^2$× $\pi$ × 444.0 = 784.613 | 784.6 m$^3$ |
| 4) | Reiforcemento | |
| | D10 1084.1<br>D16 33.4<br>D22 380.3<br>D25 4848.0<br>Total 6345.8 | |

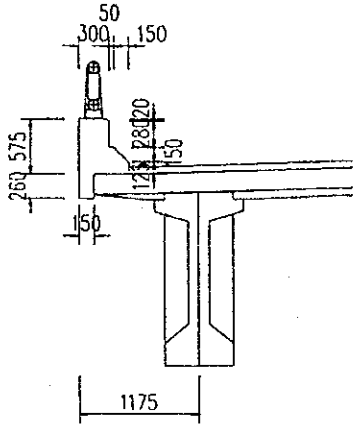
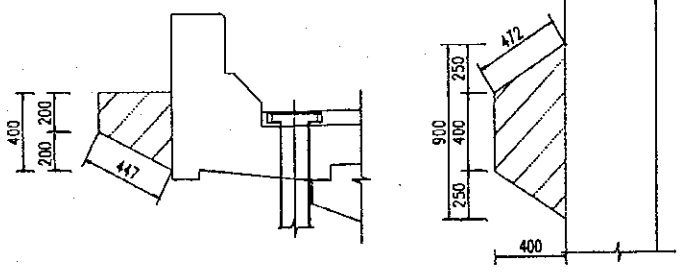
No.

# QUANTITY OF MISCELLANEOUS

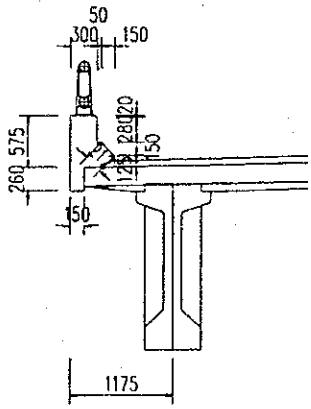
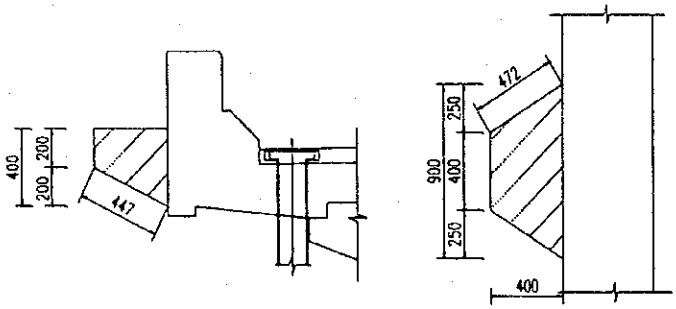
| Item | | Work Item | Unit | Quantity | Remarks |
|---|---|---|---|---|---|
| Concrete | CLASS E | Parapet | m3 | 1150.05 | |
| | | Lighting pole base | m3 | 0.70 | |
| Form | | Parapet | m2 | 7217.97 | |
| | | Lighting pole base | m2 | 4.88 | |
| | | Total | | 7222.86 | |
| Re-bar | | Parapet | ton | 44.604 | |
| | | Lighting pole base | ton | 0.252 | |
| | | Total | ton | 44.86 | |
| Steel Railing | | | m | 1149.40 | |
| Lighting | Pole | | set | 8 | |
| | Pipe Φ100 | | m | 1149.40 | |
| Drainage | Pot | | set | 38 | |
| | Pipe Φ180 | | m | 63.22 | |

Concrete

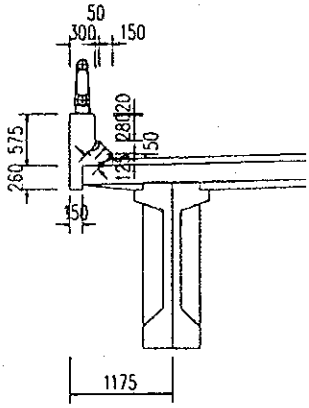
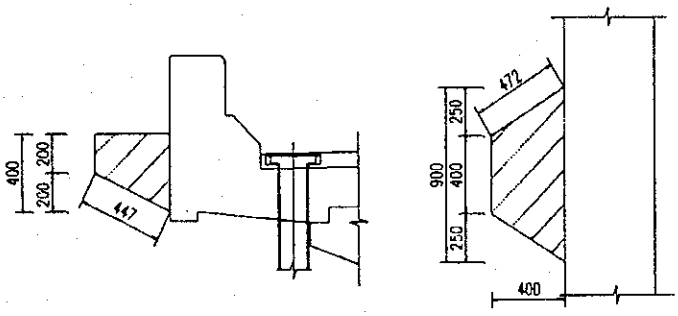
No.

| Item | Formula | Quantity |
|---|---|---|
| 1. Parapet CLASS "E" |  | |
| | A = {( 0.300 × 0.575 + 0.260 × 0.150 + ( 0.125 + 0.275 ) × 0.150 × 1/2 + 0.275 × 0.050} × 2 × 2 = 1.021 m2 | |
| | V = 1.021 × 281.600 × 4 = 1,150.05 m3 | 1,150.05 m3 |
| 2. Lighting CLASS "E" |  | |
| | V = (0.200 × 0.400 + 0.400 × 0.900) × 1/2 × 0.4 × 8 = 0.704 m3 | 0.704 m3 |

Formworks A1-A2 No.

| Item | Formula | Quantity |
|---|---|---|
| 1. Parapet |  | |
| | A = (0.575 + 0.260 + 0.15 + 0.125 + 0.212 + 0.280 ) × 2 × 2 × 281.600 × 4 | |
| | = 7217.97 m2 | 7217.97 m2 |
| 2. Lighting |  | |
| | A = [ (0.900 + 0.400) × 0.447 × 1/2 + (0.400 + 0.200) × 0.4 × 1/2 × 2 + 0.2 × 0.400 ] × 8 | |
| | = 4.884 m2 | 4.884 m2 |

Formworks A1-A2 No.

| Item | Formula | Quantity |
|---|---|---|
| 1. Parapet |  | |
| | A = (0.575 + 0.260 + 0.15 + 0.125 + 0.212 + 0.280 ) × 2 × 2 × 281.600 | |
| | = 1804.49 m2 | 1804.49 m2 |
| 2. Lighting |  | |
| | A = { (0.900 + 0.400) × 0.447 × 1/2 + (0.400 + 0.200) × 0.4 × 1/2 × 2 + 0.2 × 0.400 } × 8 | |
| | = 4.884 m2 | 4.884 m2 |

Accessories No.

| Item | Formula | Quantity |
|---|---|---|
| 1. Drainage | | |
| | TOTAL EACH | |
| | EACH = 19 x 2 = | 38 EACH |
| | PIPE | |
| | L1 = 0.98 x 34 = 33.32 | |
| | L2 = 23.70 + 6.20 = 29.90 | |
| | Total | 63.22 m |
| 2. Steel railing | L = 281.600 x 4 = 1126.400 | |
| | Length for abutment | |
| | L = 5.75 x 4 = 23.00 m | |
| | TOTAL LENGTH | |
| | L = 281.600 x 1 x 2 x 2 + 23.000 = | 1149.400 m |
| 3. Lighting | Each for one span | |
| | Each = 8 | |
| | Total lighting poles | |
| | 8 x 1 = | 8 pole |
| | PVC pipe Φ100mm = | 1149.400 m |

Re-bar Parapet

No.

Per 10m

| SCHEDULE OF REINFORCEMENT ( OF RAILING ) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BAR MARK | SIZE (mm) | DIMENSIONS (mm) | | | | | | | LENGTH (mm) | UNIT WEIGHT (kg/m) | NO. OF BARS | WEIGHT (kg) | REMARKS |
| | | a | b | c | d | e | f | g | | | | | |
| P1 | 14 | 250 | 701 | 212 | 747 | 70 | | | 1980 | 1.208 | 68 | 162.65 | |
| P2 | 14 | 230 | 297 | 176 | 275 | 245 | | | 1223 | 1.208 | 68 | 100.46 | |
| P3 | 14 | 10000 | | | | | | | 10000 | 1.208 | 11 | 132.88 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | 395.99 | |

Total Weight

Total = 395.99 / 10 × 281.6 × 4 = 44,604.31 (kg)

Re-bar Lighting

No.

Per BRIDGE

| SCHEDULE OF REINFORCEMENT (OF LIGHTING ) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BAR MARK | SIZE (mm) | DIMENSIONS (mm) | | | | | | | LENGTH (mm) | UNIT WEIGHT (kg/m) | NO. OF BARS | WEIGHT (kg) | REMARKS |
| | | a | b | c | d | e | f | g | | | | | |
| P1 | 20 | 113 | 825 | 320 | | | | | 1258 | 2.466 | 3 | 9.31 | |
| P2 | 16 | 113 | 380 | 488 | 280 | | | | 1261 | 1.578 | 3 | 5.97 | |
| P3 | 20 | 1000 | 300 | 1000 | | | | | 2300 | 2.466 | 2 | 11.34 | |
| P4 | 16 | 282 | 285 | 282 | | | | | 849 | 1.578 | 2 | 2.68 | |
| P5 | 16 | 208 | 285 | 208 | | | | | 701 | 1.578 | 2 | 2.21 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | 31.51 | |

Total Weight

Total = 31.51 × 8 = 252.10 (kg)

# 3.2 Small Tra Va Bridge

No.

# Quantity of Superstructure

| Item | | Work Item | Unit | Quantity | Remarks |
|---|---|---|---|---|---|
| Concrete | CLASS B | Girder | m3 | 609.8 | σck=400kgf/cm2 |
| | CLASS D | Panel | m3 | 96.3 | |
| | | Deck Slab | m3 | 419.6 | |
| | | Diaphragm | m3 | 129.9 | |
| | | Total | | 645.8 | |
| | CLASS E | Parapet | m3 | 89.3 | σck=300kgf/cm2 |
| | | Lighting | m3 | 0.2 | |
| | | Total | | 89.5 | |
| Form | | Parapet | m2 | 330.4 | |
| | | Lighting | m2 | 1.3 | |
| | | Girder | m2 | 3,867.6 | |
| | | Diaphragm | m2 | 495.1 | |
| | | Deck Slab | m2 | 286.9 | |
| | | Panel | m2 | 1,507.1 | |
| | | Total | | 6,488.4 | |
| Scaffolding | | Platform of construction | m2 | 2,114.1 | |
| Re-bar | | D25 | kg | 5,987.6 | |
| | | D22 | kg | 29,795.9 | |
| | | D20 | kg | 60,042.1 | |
| | | D16 | kg | 7,876.1 | |
| | | D14 | kg | 137,061.3 | |
| | | D12 | kg | 7,312.6 | |
| | | D10 | kg | 316.9 | |
| | | D6 | kg | 11,550.7 | |
| | | Total | kg | 259943.20 | |
| PC Cable | 12S12.7B | | ton | 30.87 | SWPR7B |
| | 3S12.7B | | ton | 1.68 | |
| Anchor | 12S12.7B | | set | 220.00 | |
| | 3S12.7B | | set | 144.00 | |
| Steel shear key | | | set | 240.00 | |
| Sheathing | φ80/85 | | m | 3322.92 | |
| | φ50/55 | | m | 723.82 | |
| Cement grout in sheathing | | | m3 | 18.11 | |
| Expansion Joint | | | m | 43.00 | |
| Bearing 500x250x50 | | | set | 40.00 | |
| Bearing 600x300x57 | | | set | 20.00 | |
| Anchorage Bar | | | set | 48.00 | |
| Steel Bridge Railing | | | m | 367.6 | |
| Lighting pole | pole | | set | 2.0 | |
| | pipe Þ100 | | m | 350.0 | |
| Pavement | 70mm | | m2 | 1,862 | |
| Water Proofing | 5mm | | m2 | 1,862 | |
| Drainage | pot | | set | 14.0 | |
| | Pipe Þ165 | | m | 24.4 | |

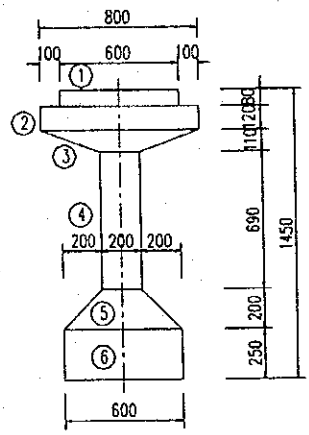
| Item | Formula | Quantity |
|---|---|---|
| 1. Girder<br>CLASS "B"<br>1) Girder | (1) Calculation of Sectional Area | |

[1] Middle Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | | (m2) |
|---|---|---|---|---|---|
| 1 | 0.600 × | 0.080 | | = | 0.048 |
| 2 | 0.800 × | 0.120 | | = | 0.096 |
| 3 | 1\2 × | 1.000 × | 0.110 | = | 0.055 |
| 4 | 0.690 × | 0.200 | | = | 0.138 |
| 5 | 1\2 × | 0.800 × | 0.200 | = | 0.080 |
| 6 | 0.250 × | 0.600 | | = | 0.150 |
| | | | | | |

Total Area 0.567 m2

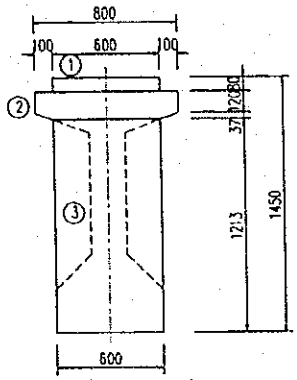



[2] End Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | | | (m2) |
|---|---|---|---|---|---|---|
| 1 | 0.600 × | 0.080 | | | = | 0.048 |
| 2 | 0.800 × | 0.120 + | 0.034\2 × | 1.400 | = | 0.122 |
| 3 | 0.600 × | 1.213 | | | = | 0.728 |
| | | | | | | |

Total Area 0.898 m2



| Item | Formula | Quantity |
|---|---|---|

(2) Calculation of Form Area

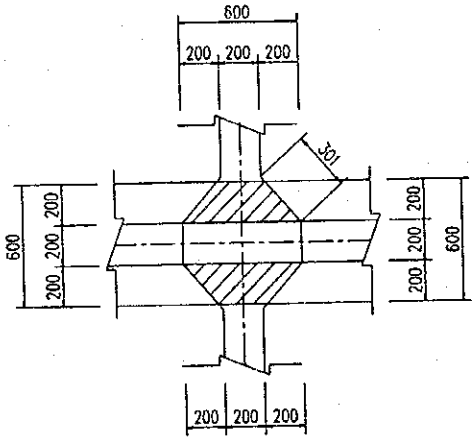
[1] A1-A2 Girder Length 25.000 m

| Section № | Section Area (m) | Average of Section (m2) | Length of Block (m) | Concrete Volume (m3) | Remark |
|---|---|---|---|---|---|
| END | 0.898 | | | | |
| END | 0.898 | 0.898 | 0.450 | 0.404 | |
| MIDDLE | 0.567 | 0.733 | 3.500 | 2.566 | |
| MIDDLE | 0.567 | 0.567 | 17.100 | 9.696 | |
| END | 0.898 | 0.733 | 3.500 | 2.566 | |
| END | 0.898 | 0.898 | 0.450 | 0.404 | |
| | | | | | |
| Total | | | 25 | 15.636 | |

No. of Girder 10 × 2 = 20

V1= 15.636 × 20 = 312.720 m3

2)Diaphragm



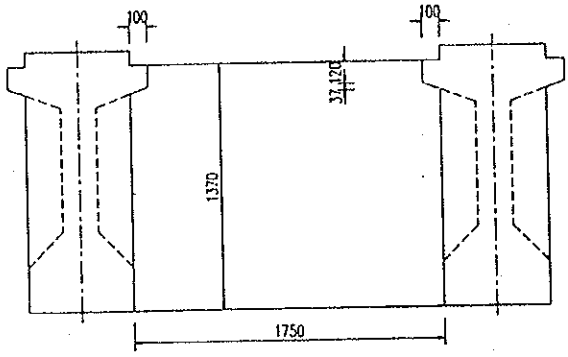

V2= ( 0.200 × 0.963 + 0.600 × 0.690 ) × 1/2 × 0.2
× 2 × 2 × 10 × 2 = 4.853 m3

Total V = 312.720 + 4.853 + = 317.573 m3 317.573 m3

A1-P1, P2-A2 No.

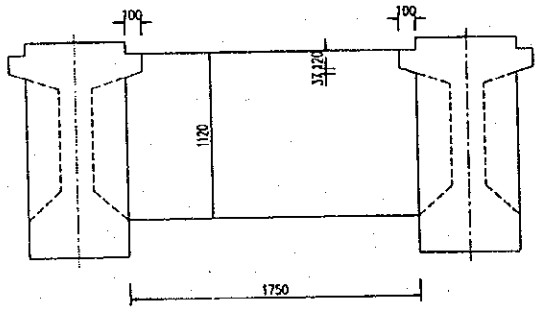
| Item | Formula | Quantity |
|---|---|---|
| 2. Diaphragm CLASS "D" | | |

(1) End Cross Beam




V1= { 1.750 × 1.370 - ( 0.120 + 0.157 ) × 2/2 × 0.100 }
× 0.450 × 2 × 8 = 17.063 m3

(2) Intermediate Cross Beam




V2= [ { 1.750 × 1.120 - ( 0.120 + 0.157 ) × 2/2 × 0.100 }
× 0.200 × 2 × 8 × 2 = 12.367 m3
V = 17.063 + 12.367 = 29.430 m3 29.430 m3

P1-P2

No.

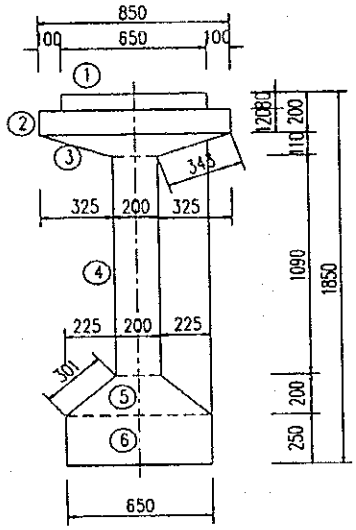
| Item | Formula | Quantity |
|---|---|---|
| 1. Girder<br>CLASS "B"<br>1) Girder | (1) Calculation of Sectional Area | |

[1] Middle Section

Summary of Sectional Area — For ONE GIRDER

| No | Formula | | | | (m2) |
|---|---|---|---|---|---|
| 1 | 0.650 × | 0.080 | | = | 0.052 |
| 2 | 0.850 × | 0.120 | | = | 0.102 |
| 3 | 1\2 × | 1.050 × | 0.110 | = | 0.058 |
| 4 | 1.090 × | 0.200 | | = | 0.218 |
| 5 | 1\2 × | 0.850 × | 0.200 | = | 0.085 |
| 6 | 0.250 × | 0.650 | | = | 0.163 |
| | | | | | |

Total Area 0.678 m2

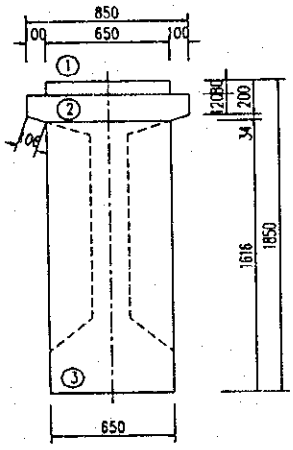



[2] End Section

Summary of Sectional Area — For ONE GIRDER

| No | Formula | | | | | (m2) |
|---|---|---|---|---|---|---|
| 1 | 0.650 × | 0.080 | | | = | 0.052 |
| 2 | 0.850 × | 0.120 | + 0.034\2 × | 1.500 | = | 0.128 |
| 3 | 0.650 × | 1.616 | | | = | 1.050 |
| | | | | | | |

Total Area 1.230 m2



| Item | Formula | Quantity |
|---|---|---|

(2) Calculation of Concrete Volume

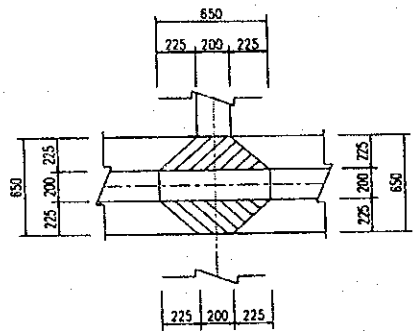
[1] A1-A2 Girder Length 37.000 m

| Section No | Section Area (m2) | Average of Section (m2) | Length of Block (m) | Concrete Volume (m3) | Remark |
|---|---|---|---|---|---|
| END | 1.23 | | | | |
| END | 1.23 | 1.23 | 0.500 | 0.615 | |
| MIDDLE | 0.678 | 0.954 | 5.300 | 5.056 | |
| MIDDLE | 0.678 | 0.678 | 25.400 | 17.221 | |
| END | 1.23 | 0.954 | 5.300 | 5.056 | |
| END | 1.23 | 1.23 | 0.500 | 0.615 | |
| | | | | | |
| Total | | | 37 | 28.563 | |

No. of Girder 10 × 1 = 10

V1= 28.563 × 10 = 285.630 m3

2) Diaphragm



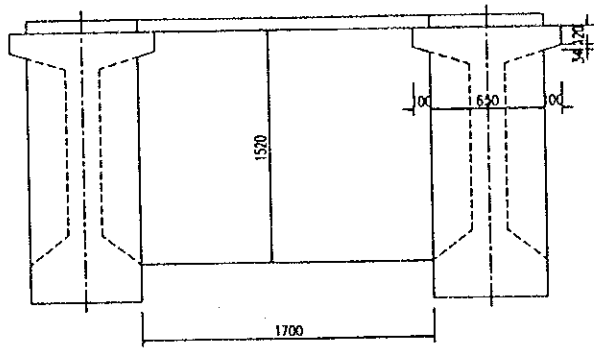

V2= ( 0.200 x 1.366 + 0.65 × 1.090 ) × 1/2 × 0.225
× 2 × 3 × 10 × 1 = 6.626 m3

Total V = 285.630 + 6.626 = 292.256 292.256 m3

P1-P2 No.

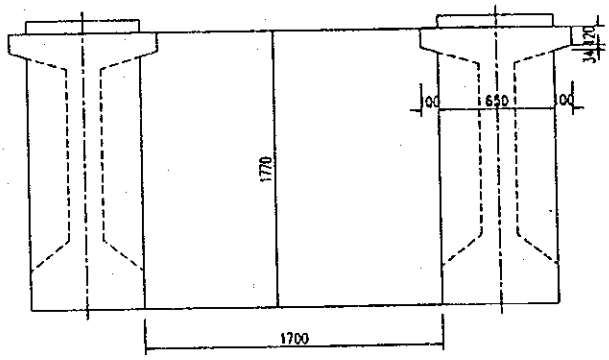
| Item | Formula | Quantity |
|---|---|---|
| 2. Diaphragm CLASS "D" | | |

(1) Intermediate Cross Beam



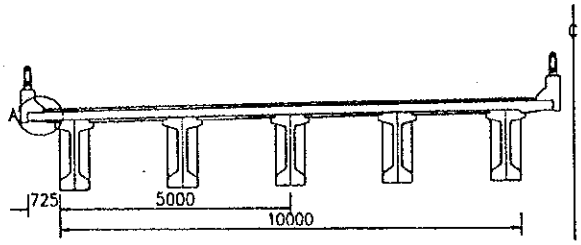
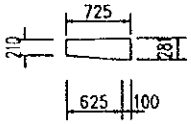
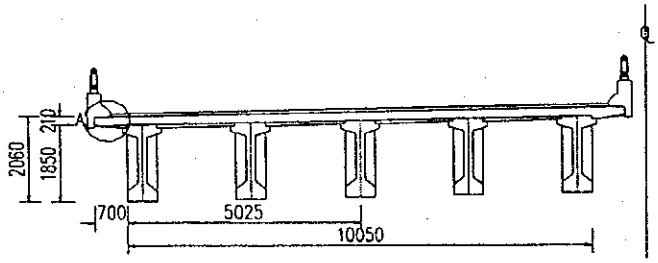
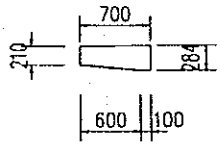
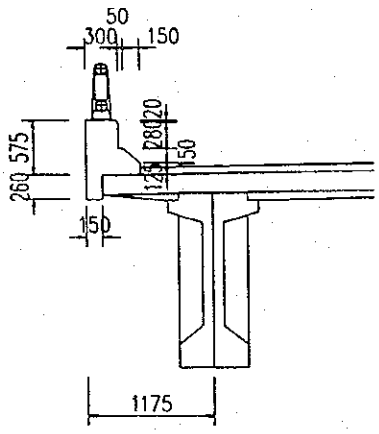

V1= [ { 1.700 × 1.520 - ( 0.120 + 0.154 ) × 2/2 × 0.100 }
× 0.200 × 1 × 3 × 8 = 12.272 m3

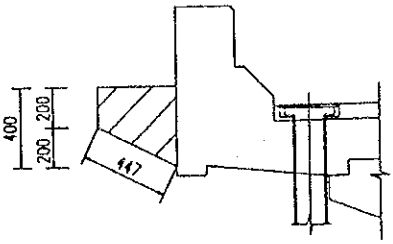
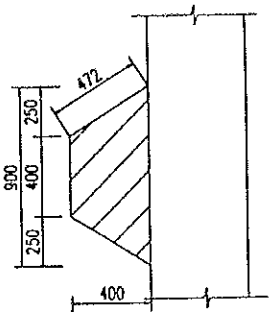
(2) Connection Cross Beam

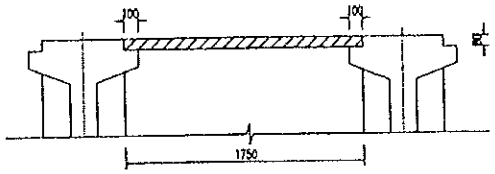
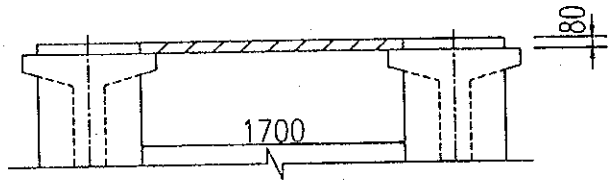



V3= [ { 1.770 × 1.700 - ( 0.120 + 0.154 ) × 2/2 × 0.100 }
× 0.900 + { 1.750 × 1.370 - ( 0.120 + 0.157 ) × 2/2
× 0.100 } x 1.100] × 2.000 × 1 × 8 + 0.898
x 10 x 0.200 x 2 = 88.236 m3

Sub-tota V = 12.272 + 88.236 = 100.508 m3 100.508 m3

| Item | Formula | Quantity |
|---|---|---|
| 2. Deck Slab CLASS "D" |  <br>  <br>DETAIL "A" | |
| | A-1 = [{( 0.210 + 0.281 ) × 0.625 × 1/2 + 0.100 × 0.281 )} × 2 + ( 5.000 x 2 ) × 0.210] × 2 = 4.926 m2 | |
| | V-1 = 4.926 × 25.100 x 2.000 = 247.300 m3 | |
| |  <br>  <br>DETAIL "A" | |
| | A-2 = [{( 0.210 + 0.284 ) × 0.600 × 1/2 + 0.100 × 0.284 )} × 2 + ( 5.025 × 0.210 × 2 )] × 2 = 4.631 m2 | |
| | V-2 = 4.631 x 37.200 = 172.300 m3 | |
| | V = 247.300 + 172.300 = 419.600 m3 | 419.600 m3 |
| 3. Railing CLASS "E" |  | |
| | A = {( 0.300 × 0.575 + 0.260 × 0.150 + ( 0.125 + 0.275 ) × 0.150 × 1/2 + 0.275 × 0.050} × 2 × 2 = 1.021 m2 | |

| | | | | |
|---|---|---|---|---|
| | V = 1.021 × 87.500 | = 89.338 m3 | 89.338 m3 |
| 4.Lighting Class "E" |     | | |
| | V = (0.200 × 0.400 + 0.400 × 0.900) × 1/2 x 0.4 x 2 = | 0.176 m3 | 0.176 m3 |

| Item | Formula | Quantity |
|---|---|---|
| Panel concrete class D | V-1 = 1.750 × 0.08 × 8 × 25.000 × 2 = 56.00 m3 | |
| |   | |
| | V-2 = 1.700 × 0.08 × 8 × 37.000 × 1 = 40.256 m3 | |
| |   | |
| | V= 56.000 + 40.256 = 96.256 m3 | 96.256 m3 |

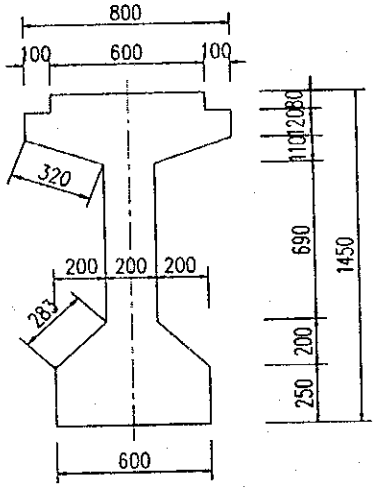
| Item | Formula | Quantity |
|---|---|---|
| 1. Girder CLASS "B" 1) Girder | (1) Calculation of Sectional Area | |

[1] Middle Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | | (m) |
|---|---|---|---|---|---|
| 1 | 0.080 × | 2 | | = | 0.160 |
| 2 | 0.120 × | 2 | | = | 0.240 |
| 3 | 0.320 × | 2 | | = | 0.640 |
| 4 | 0.690 × | 2 | | = | 1.380 |
| 5 | 0.283 × | 2 | | = | 0.566 |
| 6 | 0.250 × | 2 + | 0.600 | = | 1.100 |
| | | | | | |

Total Length 4.086 m

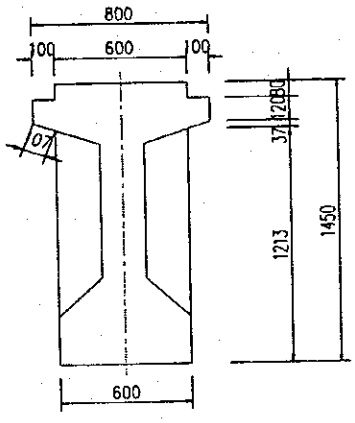



[2] End Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | | (m) |
|---|---|---|---|---|---|
| 1 | 0.080 × | 2 | | = | 0.160 |
| 2 | 0.120 × | 2 | | = | 0.240 |
| 2 | 0.107 × | 2 | | = | 0.214 |
| 3 | 1.213 × | 2 + | 0.600 | = | 3.026 |
| | | | | | |

Total Length 3.640 m



| Item | Formula | Quantity |
|---|---|---|

(2) Calculation of Form Area

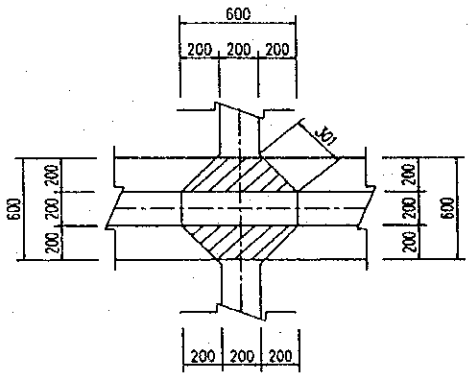
[1] A1-A2 Girder Length 25.000 m

| Section № | Section Length (m) | Average of Section (m) | Length of Block (m) | Form Area (m2) | Remark |
|---|---|---|---|---|---|
| END | 3.64 | | | | |
| END | 3.64 | 3.64 | 0.450 | 1.638 | |
| MIDDLE | 4.086 | 3.863 | 3.500 | 13.521 | |
| MIDDLE | 4.086 | 4.086 | 17.100 | 69.871 | |
| END | 3.64 | 3.863 | 3.500 | 13.521 | |
| END | 3.64 | 3.64 | 0.450 | 1.638 | |
| | | | | | |
| Total | | | 25 | 100.189 | |

No. of Girder 10 × 2 = 20

A1= 100.189 × 20 = 2,003.780 m2

2) Diaphragm

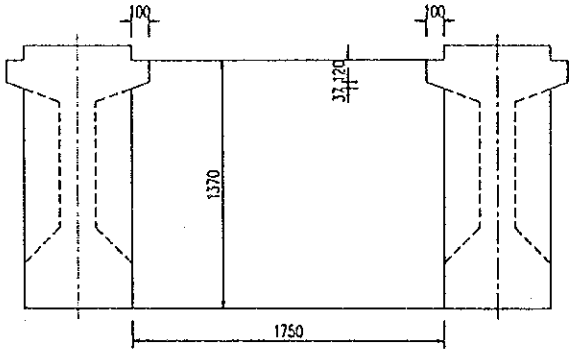



A2= { ( 0.200 x 1 + 0.301 × 2 ) × ( 0.690 + 1.000 )
× 1/2 - 0.600 x 0.690 } × 10 × 2 × 2
× 2 = 21.095 m2

Total A = 2,003.780 + 21.095 = 2,024.875 m2 2,024.875 m2

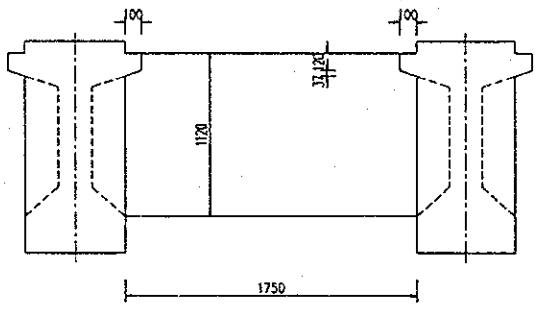
| Item | Formula | Quantity |
|---|---|---|
| 2. Diaphragm CLASS "C" | | |

(1) End Cross Beam




A1= [ { 1.750 × 1.370 - ( 0.120 + 0.157 ) × 2/2 × 0.100 }
× 2 + 1.75 × 0.450 ] × 8 × 2 = 88.434 m2

(2) Intermediate Cross Beam




A1= [ { 1.750 × 1.120 - ( 0.120 + 0.154 ) × 2/2 × 0.100 }
× 2 + 1.75 × 0.200 ] × 8 × 2 x 2
= 134.886 m2

A = 88.434 + 134.886 = 223.320 m2 223.320 m2

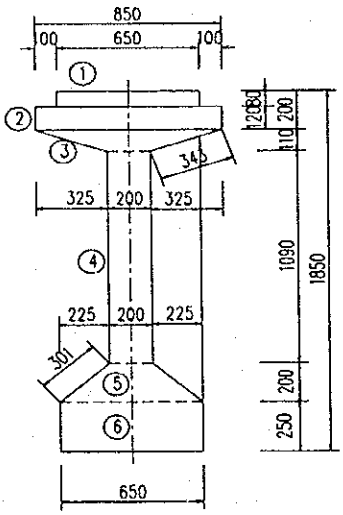
| Item | Formula | Quantity |
|---|---|---|
| 1. Girder CLASS "B" 1) Girder | (1) Calculation of Sectional Area | |

[1] Middle Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | | (m) |
|---|---|---|---|---|---|
| 1 | 0.080 | × | 2 | = | 0.160 |
| 2 | 0.120 | × | 2 | = | 0.240 |
| 3 | 0.343 | × | 2 | = | 0.686 |
| 4 | 1.090 | × | 2 | = | 2.180 |
| 5 | 0.301 | × | 2 | = | 0.602 |
| 6 | 0.250 | × | 2 + 0.650 | = | 1.150 |
| | | | | | |

Total Length 5.018 m

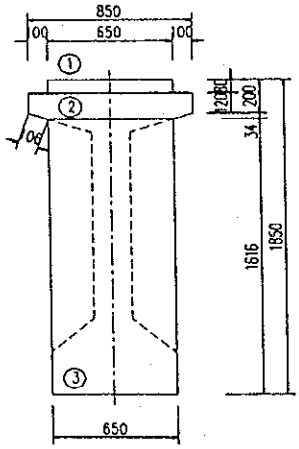



[2] End Section

Summary of Sectional Length — For ONE GIRDER

| No | Formula | | | | (m) |
|---|---|---|---|---|---|
| 1 | 0.080 | × | 2 | = | 0.160 |
| 2 | 0.120 | × | 2 | = | 0.240 |
| 2 | 0.106 | × | 2 | = | 0.212 |
| 3 | 1.616 | × | 2 + 0.650 | = | 3.882 |
| | | | | | |

Total Length 4.494 m



P1-P2 No.

| Item | Formula | Quantity |
|---|---|---|

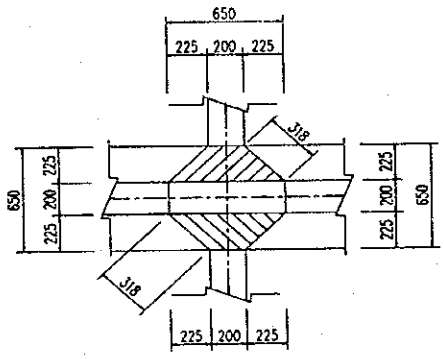
(2) Calculation of Form Area

[1] A1-A2 Girder Length 37.000 m

| Section № | Section Length (m) | Average of Section (m) | Length of Block (m) | Form Area (m2) | Remark |
|---|---|---|---|---|---|
| END | 4.494 | | | | |
| END | 4.494 | 4.494 | 0.500 | 2.247 | |
| MIDDLE | 5.018 | 4.756 | 5.300 | 25.207 | |
| MIDDLE | 5.018 | 5.018 | 25.400 | 127.457 | |
| END | 4.494 | 4.756 | 5.300 | 25.207 | |
| END | 4.494 | 4.494 | 0.500 | 2.247 | |
| | | | | | |
| Total | | | 37 | 182.365 | |

A1= 182.365 × No. of Girder 10 / 10 × 1 = 10 = 1,823.650 m2

2) Diaphragm




A3= { (0.200 × 1 + 0.318 × 2) × (1.090 + 1.366) × 1/2 - 0.650 × 1.090 } × 10 × 3 × 2 = 19.086 m2

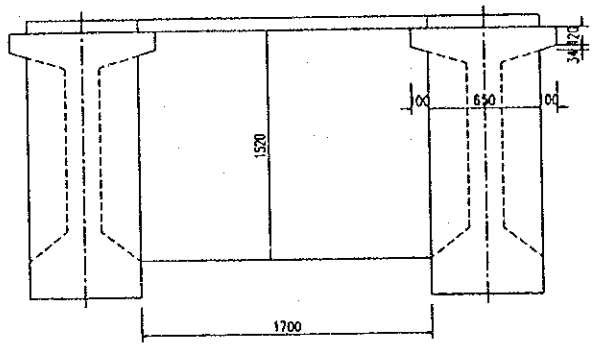
Total A = 1,823.650 + 19.086 = 1,842.736 m2 1,842.736 m2

No.

| Item | Formula | Quantity |
|---|---|---|

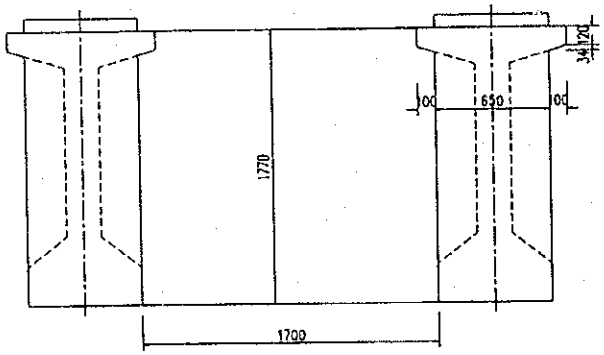
2. Diaphragm
CLASS "C"

(1) Intermediate Cross Beam




A1= [{ 1.700 × 1.520 - ( 0.120 + 0.154 ) × 2/2 × 0.100 }
× 2 + 0.200 × 1.700 ] × 8 × 3 × 1
= 130.877 m2

(2) Connection Cross Beam

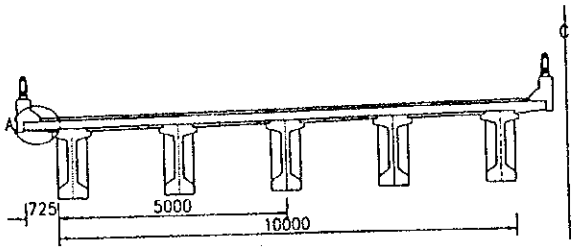


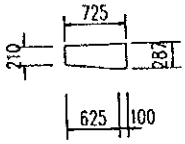

A2= [{ 1.770 × 1.700 - ( 0.120 + 0.154 ) × 2/2 × 0.100
+ 0.900 × 1.700 } + { 1.750 × 1.370 - ( 0.120 + 0.157 )
× 2/2 × 0.100 } + 1.100 × 1.750 ] × 8 × 2.000
= 140.902 m2

A= 130.877 + 140.902 = 271.779 m2 271.779 m2

A1-P1, P1-P2, P2-A2 No.

| Item | Formula | Quantity |
|---|---|---|
| 1. Deck Slab CLASS " " | a. SIDE SPAN | |



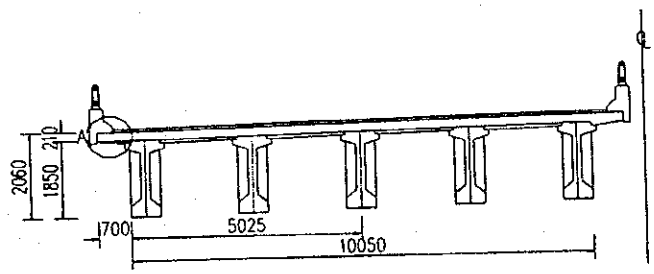



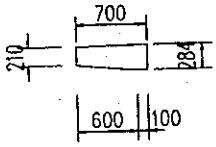

DETAIL "A"




L-1 = ( 0.210 + 0.625 ) × 2 × 2 = 3.340 m
A1 = 3.340 × 25.000 × 2.000 = 167.0 m2

b. MID SPAN



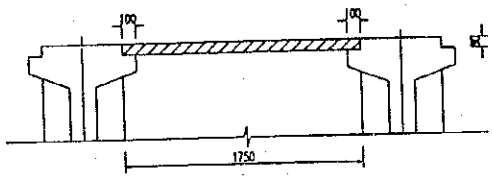




DETAIL "A"

L-2 = ( 0.210 + 0.600 ) × 2 × 2 = 3.240 m
A2 = 3.240 × 37.000 × 1.000 = 119.88 m2

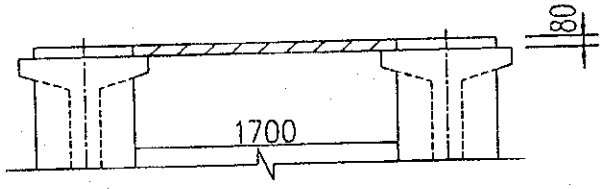
A= 167.00 + 119.88 = 286.88 m2 | 286.88 m2

| | | |
|---|---|---|
| 2. Panel CLASS "D" | a. SIDE SPAN | |



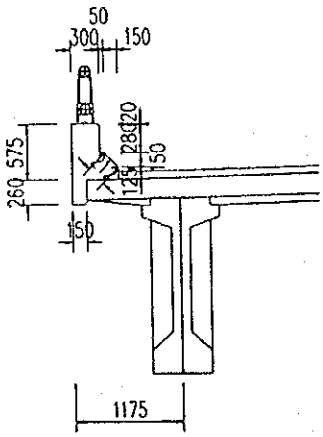
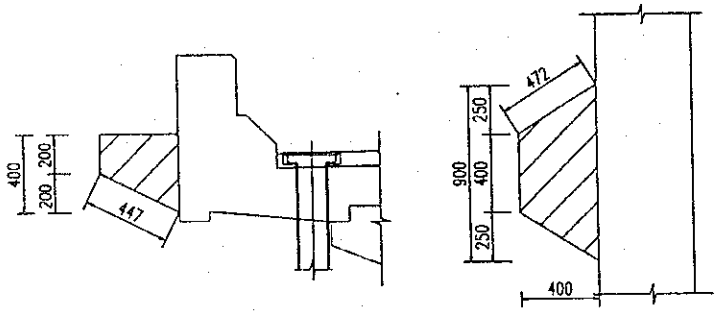

A1 = {( 1.000 + 1.750) × 0.080 × 2 + 1.750 × 1.000}
× 8 × 25 x 2 = 876.000 m2

b. MID SPAN




A2 = {( 1.000 + 1.700) × 0.080 × 2 + 1.700 × 1.000}
× 8 × 37 = 631.072 m2

A= 876.000 + 631.072 = 1,507.072 m2 | 1,507.072 m2

| Item | Formula | Quantity |
|---|---|---|
| 3. Railing CLASS "D" |  <br>A = (0.575 + 0.280) × 4 × (2.000 × 25.000 + 0.212 + 37.0) + 0.05 = 330.4 m2 | 330.400 m2 |
| 4.Lighting |  <br>A = {(0.900 + 0.400) × 0.447 × 1/2 + (0.400 + 0.200) × 0.472 × 2/2 + 0.400 × 0.200} × 2 = 1.308 m2 | 1.308 m2 |
| 5. Platform for construction | A = 26.100 × (23.000 × 2.000 + 35.000) = 2,114.100 m2 | 2114.100 m2 |

Per bridge

No.

| Item | Formula | Quantity |
|---|---|---|
| 1. PC CABLE 12S12.7(B) | | |

1. A1-P1, P2-A2 — For ONE GIRDER

| CABLE VAR. | EACH LENGTH | CABLE NO. | EACH | TOTAL LENGTH | UNIT WEIGHT | WEIGHT |
|---|---|---|---|---|---|---|
| 1 | 24.702 | C1 | 1 | 24.702 | 9.290 | 229.482 |
| 2 | 24.738 | C2 | 1 | 24.738 | 9.290 | 229.816 |
| 3 | 24.818 | C3 | 1 | 24.818 | 9.290 | 230.559 |
| TOTAL | | | 3 | 74.258 | | 689.857 |

TOTAL WEIGHT OF PC CABLES

Wp1= 689.857 × 10 × 2 = 13797.140 kg

TENSION UNIT

Ns1= 3 × 2 × 10 × 2 = 120 EACH

2.P1-P2 — For ONE GIRDER

| CABLE VAR. | EACH LENGTH | CABLE NO. | EACH | TOTAL LENGTH | UNIT WEIGHT | WEIGHT |
|---|---|---|---|---|---|---|
| 1 | 36.702 | C1 | 1 | 36.702 | 9.290 | 340.962 |
| 2 | 36.714 | C2 | 1 | 36.714 | 9.290 | 341.073 |
| 3 | 36.754 | C3 | 1 | 36.754 | 9.290 | 341.445 |
| 4 | 36.784 | C4 | 1 | 36.784 | 9.290 | 341.723 |
| 5 | 36.822 | C5 | 1 | 36.822 | 9.290 | 342.076 |
| TOTAL | | | 5 | 183.776 | | 1707.279 |

TOTAL WEIGHT OF PC CABLES

Wp2= 1707.279 × 10 × 1 = 17072.790 kg

TENSION UNIT

Ns2= 5 × 2 × 10 × 1 = 100 EACH

SUB-TOTAL WEIGHT OF PC CABLES

Wp= 13797.140 + 17072.790 = 30869.930 kg — 30870 kg

TOTAL TENSION UNIT

Ns= 120 + 100 = 220 EACH — 220 EACH

| 2. PC CABLE 3S12.7(B) | | | | | | | |
|---|---|---|---|---|---|---|---|

PC CABLE OF DIAPHRAGMS — For A1-A2

| LOCATION | EACH LENGTH | CABLE NO. | EACH | TOTAL LENGTH | UNIT WEIGHT | WEIGHT kg | |
|---|---|---|---|---|---|---|---|
| Connection One | 10.053 | | 72 | 723.8 | 2.320 | 1679.253 | |
| | | | | | | | |
| | | | | | | | |
| TOTAL | | | 72 | 723.816 | | 1679.253 | 1679 kg |

Per bridge

No.

| Item | Formula | | | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|
| 3. SHEATHING Þ 80/85MM | LENGTH | 74.258 x | 20 + | 183.776 x | 10 | | | = | | 3322.92 m |
| 3. SHEATHING Þ 50/55MM | LENGTH | | | 723.816 x | 1 | | | = | | 723.82 m |
| 4. STEEL SHEAR KEY | | 6 x | 20 + | 12 x | 10 | | | = | | 240 set |
| 5. CEMENT GROUT IN SHEATHING | 3.14 x | 0.08 x | 0.080 / | 4 x | 3322.92 + | 3.14 x | 0.05 x | 0.05 / | 4 x | 723.82 = 18.115 m3 |
| 6. ANCHOR a. 12S12.7 (B) | 6 x | 10 x | 2 + | 10 x | 10 | | | = | | 220 set |
| b. 3S12.7 (B) | 72 x | 2 | | | = | 144 | set | | | 144 set |

A1-A2

No.

For ONE GIRDER

1) A1-P1, P2-A2

SCHEDULE OF REINFORCEMENT FOR GIRDER L=25M

| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G1 | 14 | 190 | 1557 | 117 | 1557 | 190 | | | 3611 | 1.208 | 119 | 519.1 | |
| G2 | 14 | 190 | 1557 | 317 | 1557 | 190 | | | 3811 | 1.208 | 48 | 221.0 | Average |
| G3 | 14 | 190 | 1557 | 517 | 1557 | 190 | | | 4011 | 1.208 | 8 | 38.8 | |
| G4 | 14 | 190 | 1557 | 517 | 1557 | 190 | | | 4011 | 1.208 | 4 | 19.4 | |
| G5 | 14 | 200 | 209 | 159 | 509 | 159 | 209 | 200 | 1645 | 1.208 | 131 | 260.3 | |
| G6 | 14 | 200 | 43 | 709 | 43 | 200 | | | 1195 | 1.208 | 131 | 189.1 | |
| G7 | 14 | 200 | 283 | 189 | 517 | 189 | 283 | 200 | 1861 | 1.208 | 75 | 168.6 | |
| G8 | 14 | 200 | 141 | 189 | 517 | 189 | 141 | 200 | 1577 | 1.208 | 48 | 91.4 | Average |
| G9 | 14 | 389 | 517 | 389 | | | | | 1295 | 1.208 | 8 | 12.5 | |
| G10 | 22 | 7445 | 9950 | 7445 | | | | | 24840 | 2.984 | 6 | 444.7 | |
| G11 | 14 | 7445 | 9950 | 7445 | | | | | 24840 | 1.208 | 18 | 540.1 | |
| G12 | 14 | 420 | 3436 | 17148 | 3436 | 420 | | | 24860 | 1.208 | 8 | 240.2 | |
| G13 | 14 | 100 | 277 | 151 | 277 | 100 | | | 905 | 1.208 | 16 | 17.5 | |
| G14 | 14 | 200 | 800 | | | | | | 1000 | 1.208 | 12 | 14.5 | |
| G15 | 16 | 1600 | | | | | | | 1600 | 1.578 | 48 | 121.2 | Interior |
| G16 | 16 | 1100 | | | | | | | 1100 | 1.578 | 48 | 83.3 | Exterior |
| G17 | 10 | 520 | | | | | | | 520 | 0.617 | 12 | 3.9 | |
| G18 | 10 | 150 | | | | | | | 150 | 0.617 | 32 | 3.0 | |
| G19 | 14 | 361 | 364 | 567 | 364 | 361 | | | 2017 | 1.208 | 119 | 289.9 | |
| Total | SIDE SPAN | Interior grider | | | | | | | | | | 3195.2 | |
| | | Exterior girder | | | | | | | | | | 3157.3 | |

No.

For ONE GIRDER

2) P1-P2

SCHEDULE OF REINFORCEMENT (OF GIRDER )

| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G1 | 14 | 190 | 1957 | 117 | 1957 | 190 | | | 4411 | 1.208 | 184 | 980.4 | |
| G2 | 14 | 190 | 1957 | 342 | 1957 | 190 | | | 4636 | 1.208 | 74 | 414.4 | Average |
| G3 | 14 | 190 | 1957 | 567 | 1957 | 190 | | | 4861 | 1.208 | 6 | 35.2 | |
| G4 | 14 | 190 | 1957 | 567 | 1957 | 190 | | | 4861 | 1.208 | 6 | 35.2 | |
| G5 | 14 | 200 | 238 | 154 | 567 | 154 | 238 | 200 | 1751 | 1.208 | 196 | 414.6 | |
| G6 | 14 | 200 | 42 | 759 | 42 | 200 | | | 1243 | 1.208 | 196 | 294.3 | |
| G7 | 14 | 200 | 301 | 183 | 567 | 183 | 301 | 200 | 1935 | 1.208 | 122 | 285.2 | |
| G8 | 14 | 200 | 151 | 183 | 567 | 183 | 151 | 200 | 1635 | 1.208 | 74 | 146.2 | Average |
| G9 | 14 | 389 | 567 | 389 | | | | | 1345 | 1.208 | 6 | 9.8 | |
| G10 | 22 | 6945 | 7450 | 7950 | 7450 | 6945 | | | 36740 | 2.984 | 6 | 657.8 | Average |
| G11 | 14 | 6945 | 7450 | 7950 | 7450 | 6945 | | | 36740 | 1.208 | 22 | 976.4 | |
| G12 | 14 | 6950 | 7450 | 7950 | 7450 | 6950 | | | 36750 | 1.208 | 12 | 532.7 | |
| G13 | 14 | 100 | 318 | 151 | 318 | 100 | | | 987 | 1.208 | 30 | 35.8 | |
| G14 | 14 | 200 | 800 | | | | | | 1000 | 1.208 | 12 | 14.5 | |
| G15 | 16 | 1600 | | | | | | | 1600 | 1.578 | 84 | 212.1 | Interior |
| G16 | 16 | 1100 | | | | | | | 1100 | 1.578 | 84 | 145.8 | Exterior |
| G17 | 10 | 570 | | | | | | | 570 | 0.617 | 24 | 8.4 | |
| G18 | 10 | 150 | | | | | | | 150 | 0.617 | 104 | 9.6 | |
| G19 | 14 | 361 | 364 | 567 | 364 | 361 | | | 2017 | 1.208 | 184 | 448.3 | |
| Total | Mid span | Interior grider | | | | | | | | | | 5510.9 | |
| | | Exterior girder | | | | | | | | | | 5444.7 | |

| Span | Mid/Side | Int/Ext | Nos. | Weight/G | Total | Remark |
|---|---|---|---|---|---|---|
| A1-P1 | Side span | Interior Beam | 6 | 3195.15 | 19170.90 | |
| | | Exterior Beam | 4 | 3157.28 | 12629.12 | |
| P2-A2 | Side span | Interior Beam | 6 | 3195.15 | 19170.90 | |
| | | Exterior Beam | 4 | 3157.28 | 12629.12 | |
| P1-P2 | Mid Span | Interior Beam | 6 | 5510.94 | 33065.64 | |
| | | Exterior Beam | 4 | 5444.67 | 21778.68 | |
| Total | | | | | 118444.36 | |

No. 1

A1-P1, P2-A2

Per EACH

| SCHEDULE OF REINFORCEMENT FOR DIAPRAGM | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) END DIAPHRAGM | | | | | | | | | | | | | |
| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
| A1 | 16 | 1750 | | | | | | | 1750 | 1.578 | 56 | 154.60 | |
| A2 | 14 | 198 | 1559 | 360 | 1559 | 198 | | | 3874 | 1.208 | 28 | 131.00 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Sub-Total | | | | | | | | | | | | 285.60 | |
| (2) INTERMEDIATE DIAPHRAGM | | | | | | | | | | | | | |
| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
| B1 | 16 | 1750 | | | | | | | 1750 | 1.578 | 48 | 132.60 | |
| B2 | 14 | 198 | 1309 | 110 | 1309 | 198 | | | 3124 | 1.208 | 28 | 105.70 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Sub-Total | | | | | | | | | | | | 238.30 | |

Total Weight

| SECTION | Nos. | Weight/EACH | Weight |
|---|---|---|---|
| END DIAPHRAGM | 4 | 285.60 | 1142.40 |
| INTERMEDIATE DIAPHRAGM | 8 | 238.30 | 1906.40 |
| | | | |
| Total | | | 3048.80 |

No.

P1- P2

Par EACH

SCHEDULE OF REINFORCEMENT (OF DIAPHRAGM )

(1) INTERMEDIATE DIAPHRAGM

| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K1 | 16 | 1700 | | | | | | | 1700 | 1.578 | 64 | 171.70 | |
| K2 | 14 | 198 | 1709 | 110 | 1709 | 198 | | | 3924 | 1.208 | 28 | 132.70 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Sub-Total | | | | | | | | | | | | 304.40 | |

(2) CONNECTION DIAPHRAGM

| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 16 | 1700 | | | | | | | 1700 | 1.578 | 56 | 150.20 | |
| L2 | 14 | 245 | 1910 | 245 | | | | | 2400 | 1.208 | 84 | 243.50 | |
| L3 | 14 | 198 | 1559 | 1128 | 1559 | 198 | | | 4642 | 1.208 | 56 | 314.00 | |
| L4 | 14 | 198 | 1559 | 1200 | 1559 | 198 | | | 4714 | 1.208 | 28 | 159.40 | |
| L5 | 16 | 9950 | | | | | | | 9950 | 1.578 | 2 | 31.40 | |
| L6 | 14 | 1042 | 810 | 1042 | | | | | 2894 | 1.208 | 28 | 97.90 | |
| L7 | 16 | 1750 | | | | | | | 1750 | 1.578 | 40 | 110.50 | |
| Sub-Total | | | | | | | | | | | | 1106.90 | |

Total Weight

| SECTION | Nos. | Weight/EACH | Weight |
|---|---|---|---|
| INTERMEDIATE DIAPHRAGM | 6 | 304.40 | 1826.40 |
| CONNECTION DIAPHRAGM | 4 | 1106.90 | 4427.60 |
| | | | |
| Total | | | 6254.00 |

No.

A1-P1, P1-P2, P2-A2

Per BRIDGE

SCHEDULE OF REINFORCEMENT FOR RAILING

| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | 14 | 250 | 701 | 212 | 747 | 70 | | | 1980 | 1.208 | 68 | 162.6 | |
| P2 | 14 | 230 | 297 | 176 | 275 | 245 | | | 1223 | 1.208 | 68 | 100.5 | |
| P3 | 14 | 10000 | | | | | | | 10000 | 1.208 | 11 | 132.9 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | 396.0 | |

W = 396 / 10 x 87.5 x 4 = 13860 kg

No.

A1-P1, P1-P2, P2-A2

Per BRIDGE

| SCHEDULE OF REINFORCEMENT FOR DECK SLAB | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kgf/m) | NO. OF BARS | WEIGHT (kgf) | REMARKS |
| S1 | 20 | 11350 | | | | | | | 11350 | 2.466 | 1096 | 30676.1 | |
| S2 | 20 | 10850 | | | | | | | 10850 | 2.466 | 1096 | 29324.7 | |
| S3 | 14 | 133 | 623 | 207 | | | | | 963 | 1.208 | 2332 | 2712.8 | |
| S4 | 22 | 12000 | | | | | | | 12000 | 2.984 | 400 | 14323.2 | |
| S5 | 14 | 27460 | | | | | | | 27460 | 1.208 | 200 | 6634.3 | |
| S6 | 14 | 19180 | | | | | | | 19180 | 1.208 | 200 | 4633.9 | |
| S6* | 14 | 21180 | | | | | | | 21180 | 1.208 | 200 | 5117.1 | |
| S7 | 25 | 11350 | | | | | | | 11350 | 3.853 | 70 | 3061.2 | |
| S8 | 25 | 10850 | | | | | | | 10850 | 3.853 | 70 | 2926.4 | |
| S9 | 12 | 210 | 145 | 210 | | | | | 565 | 0.888 | 14575 | 7312.6 | |
| | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | 106722.3 | 106722.3 |

No.

A1-P1, P1-P2, P2-A2

Per BRIDGE

| SCHEDULE OF REINFORCEMENT (OF LIGHTING ) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BAR MARK | SIZE (mm) | DIMENSIONS (mm) a | b | c | d | e | f | g | LENGTH (mm) | UNIT WEIGHT (kg/m) | NO. OF BARS | WEIGHT (kg) | REMARKS |
| P1 | 20 | 113 | 825 | 320 | | | | | 1258 | 2.466 | 3 | 9.31 | |
| P2 | 16 | 113 | 380 | 488 | 280 | | | | 1261 | 1.578 | 3 | 5.97 | |
| P3 | 20 | 1000 | 300 | 1000 | | | | | 2300 | 2.466 | 2 | 11.34 | |
| P4 | 16 | 282 | 285 | 282 | | | | | 849 | 1.578 | 2 | 2.68 | |
| P5 | 16 | 208 | 285 | 208 | | | | | 701 | 1.578 | 2 | 2.21 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | 31.51 | |

Total Weight

Total = 31.51 × 2 = 63.02 (kg)

| Item | Formula | | Quantity |
|---|---|---|---|
| ETC. | 1. JOINT | | |
| | EACH LENGTH<br>L = 10.750 + 10.750 = 21.500 | | |
| | EACH = 2 | | |
| | TOTAL LENGTH | | |
| | L = 21.500 × 2 | = | 43.000 m |
| | 2. DRAIN | | |
| | TOTAL EACH | | |
| | EACH = 7 × 2 | = | 14 EACH |
| | PIPE = 1.74 × 14 | = | 24.36 m |
| | 3. BEARING PAD<br>a. ELASTOMERIC 500x250x50 | | |
| | EACH for One SPAN | | |
| | EACH = 10 | | |
| | TOTAL EACH | | |
| | EACH = 10 × 2 × 2 | = | 40 EACH |
| | b. ELASTOMERIC 600x300x57 | | |
| | EACH for One SPAN | | |
| | EACH = 10 | | |
| | TOTAL EACH | | |
| | EACH = 10 × 2 × 1 | = | 20 EACH |
| | 4. ANCHOR BAR | | |
| | EACH for One SPAN | | |
| | EACH = 4 | | |
| | TOTAL EACH (FIX) | | |
| | EACH = 4 × 8 | = | 32 EACH |
| | TOTAL EACH (MOVE) | | |
| | EACH = 4 × 4 | = | 16 EACH |

| Item | Formula | Quantity |
|---|---|---|
| | 4. RAILING<br>EACH LENGTH for One SIDE SPAN<br>L1 = 25.100<br>EACH = 2 SPAN<br>EACH LENGTH for One MID SPAN<br>L2 = 37.200<br>EACH = 1 SPAN<br>TOTAL LENGTH<br>L = 25.10 × 4 × 2 + 37.20 × 4 × 1<br>+ 4.50 × 4 = | 367.600 m |
| | 5. LIGHTING<br>EACH for One SIDE SPAN<br>EACH = 1<br>EACH for One MID SPAN<br>EACH = 0<br>TOTAL EACH = 1.0 x 2.0 + 0 = 2.0 EACH | EACH<br>2.0 |
| | 6. PAVEMENT<br>a. WATER PROOFING 5MM 10.75 X ( 24.700 x 2 + 37.200 ) x 2 = | 1862 m2 |
| | b. ALPHALT CONCRETE 70MM 10.75 X ( 24.700 x 2 + 37.200 ) x 2 = | 1862 m2 |

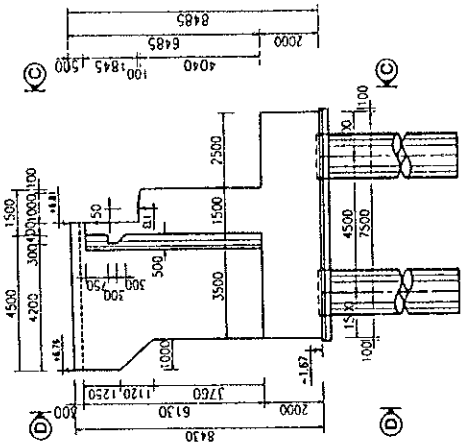
# QUANTITY TABLE OF ABUTMENTS

| ITEMS | | | UNIT | ABUTMENT A1 | ABUTMENT A2 | TOTAL |
|---|---|---|---|---|---|---|
| PILE | NUMBER OF PILES | | PILE | 10 | 10 | 20 |
| | TOTAL LENGTH BORED PILES F1500MM | | M | 660.0 | 660.0 | 1320 |
| | CONCRETE | CLASS D | M3 | 1166.3 | 1166.3 | 2333 |
| | EXCAVATION MATERIALS | | M3 | 1164.5 | 1164.5 | 2329.1 |
| | REINFORCEMENT | D32 | KG | 22727.0 | 22727.0 | 45454 |
| | | D25 | KG | 35487.0 | 35487.0 | 70974 |
| | | D22 | KG | 3542.0 | 3542.0 | 7084 |
| | | D16 | KG | 334.0 | 334.0 | 668 |
| | | D10 | KG | 10386.0 | 10386.0 | 20772 |
| | | TOTAL | KG | 72476.0 | 72476.0 | 144952 |
| | LEAN CONCRETE CLASS G | | M3 | 16.9 | 16.9 | 34 |
| | BLINDING STONE | | M3 | 33.9 | 33.9 | 67.8 |
| ABUTMENT | CONCRETE | CLASS E | M3 | 582.8 | 582.8 | 1166 |
| | | FORM | M2 | 503.15 | 503.15 | 1006.3 |
| | REINFORCEMENT | D32 | KG | 0.0 | 0.0 | 0 |
| | | D25 | KG | 12883.7 | 12883.7 | 25767 |
| | | D22 | KG | 4604.7 | 4604.7 | 9209 |
| | | D20 | KG | 5773.2 | 5773.2 | 11546 |
| | | D18 | KG | 701.4 | 701.4 | 1403 |
| | | D16 | KG | 4100.9 | 4100.9 | 8202 |
| | | D14 | KG | 2616.8 | 2616.8 | 5234 |
| | | D10 | KG | 152.7 | 152.7 | 305 |
| | | TOTAL | KG | 30833.4 | 30833.4 | 61667 |
| | EXCAVATION FOR FOUNDATION | | M3 | 1217.2 | 1201.7 | 2418.9 |
| | BACK FILL | | M3 | 576.5 | 561.0 | 1137.5 |
| | FORM | | M2 | 503.15 | 503.15 | 1006.3 |
| | SCAFFOLDING WORK | H<4M | M2 | 142.40 | 142.40 | 284.8 |
| | | 4M<H<30M | M2 | 462.04 | 462.04 | 924.1 |
| APPROACH SLAB | CONCRETE | CLASS E | M3 | 43.2 | 43.2 | 86.5 |
| | LEAN CONCRETE | CLASS G | M3 | 13.3 | 13.3 | 26.6 |
| | ASPHANTIC BIND FILLER T=20MM | | M3 | 0.41 | 0.41 | 0.81 |
| | FORM | | M2 | 24.15 | 24.15 | 48.3 |
| | REINFORCEMENT | D20 | KG | 3421.6 | 3421.6 | 6843 |
| | | D16 | KG | 3402.3 | 3402.3 | 6805 |
| | | D10 | KG | 255.8 | 255.8 | 512 |
| | | TOTAL | KG | 7079.7 | 7079.7 | 14159.4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SLOPE PROTECTION | STONE MASONRY T=300MM | | M3 | 563.9 | 660.7 | 1225 |
| | BLINDING AGGREGATE | | M3 | 187.6 | 220.23 | 408 |
| | GEOTEXTILE | | M2 | 622 | 946 | 1568 |
| | PVC PILE Φ50MM DIA., L=1000MM | | M | 66 | 69 | 135 |
| | EXCAVATION | | M3 | 568 | 595 | 1163 |
| | FILLING | | M3 | 395 | 413 | 808 |
| | FOOTING | WOODEN PILE L=3M | M | 7891 | 8264 | 16155 |
| | | BLINDING STONE | M3 | 10.5 | 11 | 22 |
| | | STONE MASORY | M3 | 47.3 | 49.6 | 97 |

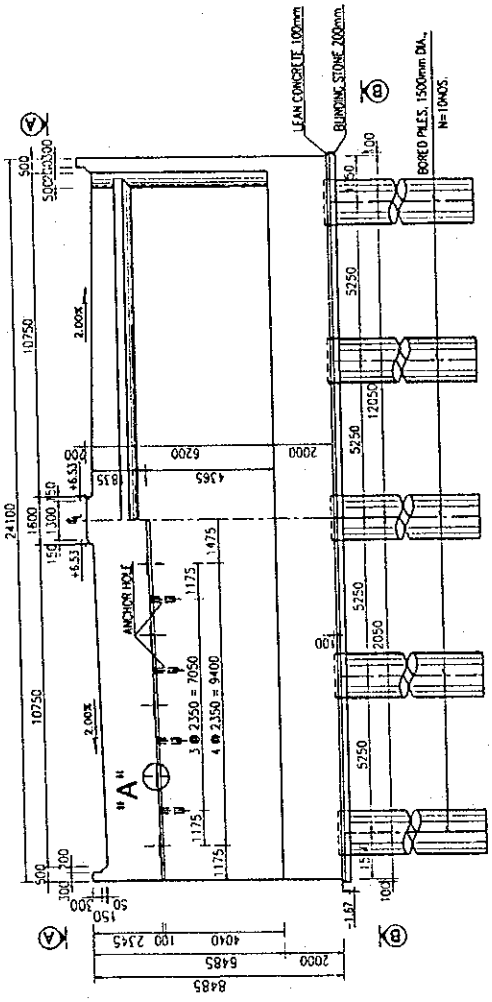
ABUTMENT OF SMALL TRA VA BRIDGE

SIDE ELEVATION



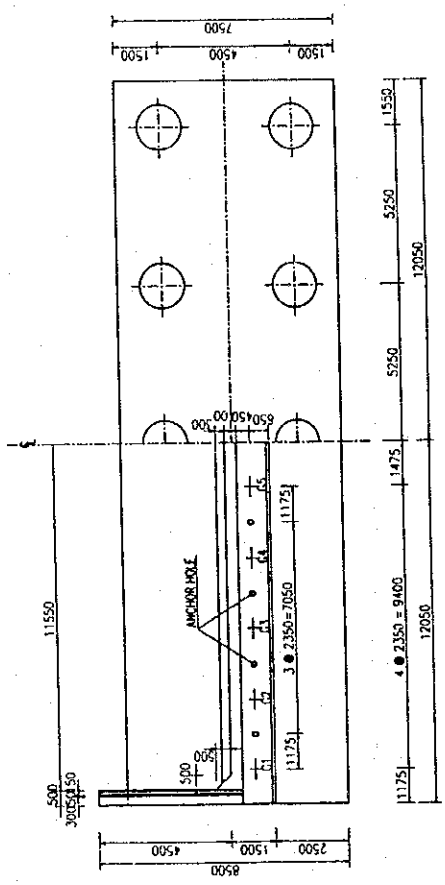
1/2 C - C

1/2 D - D




1/2 A - A

1/2 B - B



Abutment A1 No.

| Item | Formula | Quantity |
|---|---|---|
| 1) Concrete | | |
| | * BackWall | |
| | v1 = 24.10 x 1.85 x 0.40 = 17.79 m3 | |
| | * Frontwall | |
| | v2 = 24.10 x (( 4.14 + 4.38 ) / 2 | |
| | x 1.50 - 0.10 ^2 / 2 )= 153.90 m3 | |
| | * Corbel | |
| | v3 = 0.30 x( 0.30 + 0.60 ) / 2 | |
| | x 23.10 = 3.12 m3 | |
| | * Haunch | |
| | v4 = 5.99 x 0.50 x 0.50 / 2 x 2 | |
| | = 1.50 m3 | |
| | *Wingwall | |
| | v5 =( 3.50 x( 5.99 + 5.95 ) / 2 | |
| | + 1.00 x( 1.05 + 2.18 ) / 2 ) | |
| | x 2 = 45.00 m3 | |
| | * Parapet | |
| | v7 =( 0.50 x 0.30 + 0.20 ^2 | |
| | - 0.15 ^2/ 2 )x 4.90 x 2 | |
| | = 1.75 m3 | |
| | *Footing | |
| | v6 = 24.10 x 7.50 x 2.00 | |
| | - 10 x pi x 0.75 ^2 x 0.1 | |
| | = 359.73 m3 | |
| | **Total** | **582.8 m3** |
| 2) Form | | |
| | * BackWall | |
| | a1 = 2.00 x 1.85 x 24.10 - | |
| | - 1.85 x ( 0.50 + 0.50 ) x 2 | |
| | = 85.24 m2 | |
| | * Frontwall | |
| | a2 = 24.1 x( 4.14 + 4.381 ) | |
| | - ( 0.5 + 0.5 ) x 4.381 x 2 | |
| | + 4.26 x 1.5 x 2 = 209.38 m2 | |
| | * Corbel | |
| | a3 = ( 0.3 + ( 0.3 ^2+ 0.3 ^2)^ 0.5) | |
| | x 23.1 = 16.73 m2 | |
| | * Haunch | |
| | a4 = + ( 0.5 ^2+ 0.5 ^2)^ 0.5 | |
| | x 5.985 x 2 = 8.46 | |
| | *Wingwall | |
| | a5 = 2 x ( 3.5 x ( 5.985 + 5.95 )x1/2 | |
| | + 1 x ( 1.05 + 2.18 )x1/2 | |
| | + 0.5 x ( 1.05 + 1.50 + 3.76 ) | |
| | - 0.5 x 5.99 )= 45.33 m2 | |
| | * Parapet | |
| | a5 = ( 4.9 x( 0.5 + 0.3 + 0.05 | |
| | + 1.4142 x 0.15 + 0.05 ) | |
| | + 2 x 0.17875 ) x 2 | |
| | = 11.61 m2 | |
| | *Footing | |
| | a 6 = 2 x( 24.100 + 7.500 )x 2.00 | |
| | 126.40 m2 | |
| | **Total** | **503.1 m2** |

| Item | Formula | Quantity |
|---|---|---|
| 3) Scaffolding: | * H<=4m | |
| | A2 ={ 2 x( 24.10 + 7.50 ) + 8 } x 2 = | 142.4 m2 |
| | * 4m< H<=30m | |
| | A2 = {(24.1+2) + (4.5+1.5+2) + (0.5+2) + (4.5+1-1) +(24.1-2 x 1.5) + (4.5-1+1) + (0.5+2) + (4.5+1.5+2)} x (1.85+4.14) | 462.0 m2 |
| 4) Support | V = ( 8.43 - 1.55 + 5.76 ) x 1.00 /2 x 0.50 x 2 = | 6.3 m3 |
| 5) Lean Concrete | * Concrete class G | |
| | V = 0.1 x { ( 24.10 + 0.2 ) x ( 7.50 + + 0.2 ) - 10 x 1/4 x pi x 1.50 ^2} = | 16.9 m3 |
| | * Form | |
| | A = 0.1 x { ( 24.10 + 0.2 ) + ( 7.50 + 0.20 )}x 2 = | 6.40 m2 |
| 6) Blinding Stone | | |
| | v = 0.2 x { ( 24.10 + 0.2 ) x ( 7.50 + + 0.2 )- 10 x 1/4 x pi x 1.50 ^2} = | 33.9 m3 |
| 7) Bored Pile | | |
| | * Concrete | |
| | = 10 x 1/4 x pi x 1.50 x 1.50 x ( 65.90 + 0.10 ) = | 1166.3 m3 |
| | * Excavation Length | |
| | N<20: = 50.9 x 10 = | 509.0 m |
| | 20<N<40: 13.3 x 10 = | 133.0 m |
| | 40<N: 1.7 x 10 = | 17.0 m |
| | * Excavation Volume | |
| | = 10 x 1/4 x pi x 1.50 x 1.50 x 65.90 | 1164.5 m3 |
| 8)Earthworks | * Excavation for foundation | |
| | = 3.23 / 6 x{ ( 9.50 x 26.10 ) + ( 15.96 x 32.56 ) + ( 9.50 + 15.96 ) x ( 26.10 + 32.56 ) = | 1217.2 m3 |
| | * Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume | |
| | Pile Occupied Volume = 10 x pi /4 x 1.50 x 1.50 x 0.400 = | 7.07 m3 |
| | Excess Soil = | 640.68 m3 |
| | * Back Fill = | 576.5 m3 |
| 9) Approach Slab | | |
| | * Concrete | |
| | = 23.04 x { 6.00 x 0.30 + ( 0.30 + 0.50 ) / 2 x 0.20 } - 0.50 x 0.50 / 2 x 0.3 x 2 = | 43.24 m3 |
| | * Lean Concrete | |
| | = ( 0.30 + 0.28 + 5.20 ) x 23.04 x 0.1 = | 13.3 m3 |
| | * Asphaltic Joint Filler | |
| | = { 0.30 x ( 0.02 + 0.06 )/ 2 + 0.30 x 0.02 } x 23.04 = | 0.41 m3 |
| | * Form = ( 2 x ( 6.00 x 0.30 ) + 11.52 x ( 0.30 + 0.50 ) + ( 0.50 + 0.30 ) x 0.50 x 0.20 x 2 ) x 2 - 6.00 x 0.30 = | 24.15 m2 |

Abutment A2 No.

| Item | Formula | | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|---|
| 1) Concrete | | | | | | | | | |
| | * BackWall | | | | | | | | |
| | v1 = | 24.10 | x | 1.85 | x | 0.40 | = | 17.79 m3 | |
| | * Frontwall | | | | | | | | |
| | v2 = | 24.10 | x {( | 4.14 | + | 4.38 | ) / | 2 | |
| | x | 1.50 | - | 0.10 | ^2 / | 2 | }= | 153.90 m3 | |
| | * Corbel | | | | | | | | |
| | v3 = | 0.30 | x( | 0.30 | + | 0.60 | ) / | 2 | |
| | | | | | x | 23.10 | = | 3.12 m3 | |
| | * Haunch | | | | | | | | |
| | v4 = | 5.99 | x | 0.50 | x | 0.50 | / 2 x 2 | | |
| | | | | | | | = | 1.50 m3 | |
| | *Wingwall | | | | | | | | |
| | v5 =( | 3.50 | x( | 5.99 | + | 5.95 | ) / | 2 | |
| | + | 1.00 | x( | 1.05 | + | 2.18 | ) / | 2 } | |
| | | | | | x | 2 | = | 45.00 m3 | |
| | * Parapet | | | | | | | | |
| | v7 =( | 0.50 | x | 0.30 | + | 0.20 | ^2 | | |
| | - | 0.15 | ^2/ | 2 | )x | 4.90 | x | 2 | |
| | | | | | | | = | 1.75 m3 | |
| | *Footing | | | | | | | | |
| | v6 = | 24.10 | x | 7.50 | x | 2.00 | | | |
| | - | 10 | x | pi | x | 0.75 | ^2 x | 0.1 | |
| | | | | | | | = | 359.73 m3 | |
| | | | | | | | Total | | 582.8 m3 |
| 2) Form | | | | | | | | | |
| | * BackWall | | | | | | | | |
| | a1 = | 2.00 | x | 1.85 | x | 24.10 | - | | |
| | - | 1.85 | x ( | 0.50 | + | 0.50 | ) x | 2 | |
| | | | | | | | = | 85.24 m2 | |
| | * Frontwall | | | | | | | | |
| | a2 = | 24.1 | x( | 4.14 | + | 4.381 | ) | | |
| | - ( | 0.5 | + | 0.5 | ) x | 4.381 | x | 2 | |
| | + | 4.26 | x | 1.5 | x | 2 | = | 209.38 m2 | |
| | * Corbel | | | | | | | | |
| | a3 = { | 0.3 | + ( | 0.3 | ^2+ | 0.3 | ^2)^ 0.5} | | |
| | | | | | x | 23.1 | = | 16.73 m2 | |
| | * Haunch | | | | | | | | |
| | a4 = | | + ( | 0.5 | ^2+ | 0.5 | ^2)^ 0.5 | | |
| | | | x | 5.985 | x | 2 | = | 8.46 | |
| | *Wingwall | | | | | | | | |
| | a5 = | 2 | x { | 3.5 | x ( | 5.985 | + | 5.95 )x1/2 | |
| | | | + | 1 | x ( | 1.05 | + | 2.18 )x1/2 | |
| | + | 0.5 | x ( | 1.05 | + | 1.50 | + | 3.76 ) | |
| | | | - | 0.5 | x | 5.99 | }= | 45.33 m2 | |
| | * Parapet | | | | | | | | |
| | a5 = { | 4.9 | x( | 0.5 | + | 0.3 | + | 0.05 | |
| | | | + | 1.4142 | x | 0.15 | + | 0.05 ) | |
| | | | + | 2 | x | 0.17875 | } x | 2 | |
| | | | | | | | = | 11.61 m2 | |
| | *Footing | | | | | | | | |
| | a 6 = | 2 | x( | 24.100 | + | 7.500 | )x | 2.00 | |
| | | | | | | | | 126.40 m2 | |
| | | | | | | | Total | | 503.1 m2 |

| Item | Formula | Quantity |
|---|---|---|
| 3) Scaffolding: | * H<=4m | |
| | A2 ={ 2 x( 24.10 + 7.50 ) + 8 } | |
| | x 2 = | 142.4 m2 |
| | * 4m< H<=30m | |
| | A2 = {(24.1+2) + (4.5+1.5+2) + (0.5+2) + (4.5+1-1) | |
| | +(24.1-2 x 1.5) + (4.5-1+1) + (0.5+2) + (4.5+1.5+2)} x (1.85+4.14) | 462.0 m2 |
| 4) Support | V = ( 8.43 - 1.55 + 5.76 ) x 1.00 /2 | |
| | x 0.50 x 2 = | 6.3 m3 |
| 5) Lean Concrete | * Concrete class G | |
| | V = 0.1 x { ( 24.10 + 0.2 ) x ( 7.50 + | |
| | + 0.2 ) - 10 x 1/4 x pi x 1.50 ^2} | |
| | = | 16.9 m3 |
| | * Form | |
| | A = 0.1 x { ( 24.10 + 0.2 ) + ( 7.50 | |
| | + 0.20 )}x 2 = | 6.40 m2 |
| 6) Blinding Stone | | |
| | v = 0.2 x { ( 24.10 + 0.2 ) x ( 7.50 + | |
| | + 0.2 )- 10 x 1/4 x pi x 1.50 ^2} | |
| | = | 33.9 m3 |
| 7) Bored Pile | | |
| | * Concrete | |
| | = 10 x 1/4 x pi x 1.50 x 1.50 | |
| | x ( 65.90 + 0.10 ) = | 1166.3 m3 |
| | * Excavation Length | |
| | N<20: = 53.3 x 10 = | 533.0 m |
| | 20<N<40: 9.2 x 10 = | 92.0 m |
| | 40<N: 3.4 x 10 = | 34.0 m |
| | * Excavation Volume | |
| | = 10 x 1/4 x pi x 1.50 x 1.50 | |
| | x 65.90 | 1164.5 m3 |
| 8)Earthworks | * Excavation for foundation | |
| | = 3.20 / 6 x{ ( 9.50 x 26.10 ) | |
| | + ( 15.9 x 32.5 ) + ( 9.50 + 15.9 ) | |
| | x ( 26.10 + 32.5 ) = | 1201.7 m3 |
| | * Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume | |
| | Pile Occupied Volume = 10 x pi /4 x 1.50 | |
| | x 1.50 x 0.400 = | 7.07 m3 |
| | Excess Soil = | 640.68 m3 |
| | * Back Fill = | 561.0 m3 |
| 9) Approach Slab | | |
| | * Concrete | |
| | = 23.04 x { 6.00 x 0.30 | |
| | + ( 0.30 + 0.50 ) / 2 x 0.20 ) | |
| | - 0.50 x 0.50 / 2 x 0.3 | |
| | x 2 = | 43.24 m3 |
| | * Lean Concrete | |
| | = ( 0.30 + 0.28 + 5.20 ) | |
| | x 23.04 x 0.1 = | 13.3 m3 |
| | * Asphaltic Joint Filler | |
| | = { 0.30 x ( 0.02 + 0.06 )/ 2 | |
| | + 0.30 x 0.02 } x 23.04 = | 0.41 m3 |
| | * Form = ( 2 x ( 6.00 x 0.30 ) + 11.52 | |
| | x ( 0.30 + 0.50 ) + ( 0.50 + 0.30 ) x | |
| | 0.50 x 0.20 x 2 ) x 2 | |
| | - 6.00 x 0.30 = | 24.15 m2 |

# LIST OF REINFORCEMENT (FOR ONE ABUTMENT)

| REINF No | DIA (mm) | LENGTH (mm) | NUMBER | UNIT WEIGHT (kg/m) | WEIGHT (kg) | REMARKS |
|---|---|---|---|---|---|---|
| A1 | 14 | 2176 | 289 | 1.208 | 759.7 | |
| A2 | 14 | 24752 | 16 | 1.208 | 478.6 | |
| A3 | 14 | 720 | 141 | 1.208 | 122.7 | |
| A4 | 16 | 1837 | 97 | 1.578 | 281.2 | |
| A5 | 14 | 690 | 97 | 1.208 | 80.9 | |
| A6 | 14 | 23126 | 4 | 1.208 | 111.8 | |
| F1 | 25 | 10800 | 97 | 3.853 | 4036.8 | |
| F2 | 25 | 7300 | 96 | 3.853 | 2700.4 | |
| F3 | 25 | 8174 | 97 | 3.853 | 3055.0 | |
| F4 | 25 | 4900 | 96 | 3.853 | 1812.6 | |
| F5 | 20 | 8053 | 16 | 2.466 | 317.8 | |
| F6 | 20 | 25200 | 16 | 2.466 | 994.4 | |
| F7 | 16 | 4820 | 155 | 1.578 | 1179.2 | |
| F8 | 20 | 28688 | 30 | 2.466 | 2122.5 | |
| F9 | 20 | 25940 | 30 | 2.466 | 1919.2 | |
| W1 | 22 | 5185 | 94 | 2.984 | 1454.4 | |
| W2 | 22 | 6357 | 97 | 2.984 | 1840.0 | AVERAGE |
| W3 | 16 | 6252 | 97 | 1.578 | 957.2 | AVERAGE |
| W4 | 14 | 1822 | 184 | 1.208 | 405.1 | |
| W5 | 16 | 24874 | 17 | 1.578 | 667.4 | |
| W6 | 14 | 24752 | 22 | 1.208 | 658.0 | |
| W7 | 16 | 1790 | 97 | 1.578 | 274.0 | |
| K1 | 22 | 5129 | 8 | 2.984 | 122.4 | |
| K2 | 22 | 2985 | 14 | 2.984 | 153.9 | |
| K3 | 22 | 4785 | 16 | 2.984 | 228.5 | |
| K4 | 25 | 8425 | 28 | 3.853 | 909.0 | AVERAGE |
| K5 | 25 | 4437 | 16 | 3.853 | 273.6 | |
| K6 | 22 | 6217 | 32 | 2.984 | 593.7 | |
| K7 | 18 | 6232 | 12 | 1.998 | 149.4 | |
| K8 | 16 | 6170 | 10 | 1.578 | 97.4 | |
| K9 | 16 | 1754 | 40 | 1.578 | 110.7 | |
| K10 | 16 | 2360 | 2 | 1.578 | 7.4 | |
| K11 | 20 | 2250 | 18 | 2.466 | 99.9 | |
| K12 | 16 | 8268 | 28 | 1.578 | 365.4 | AVERAGE |
| K13 | 18 | 6152 | 32 | 1.998 | 393.3 | |
| K14 | 10 | 760 | 208 | 0.617 | 97.5 | |
| K15 | 10 | 750 | 50 | 0.617 | 23.1 | |
| K16 | 20 | 3809 | 34 | 2.466 | 319.4 | |
| K17 | 22 | 4776 | 4 | 2.984 | 57.0 | AVERAGE |
| K18 | 25 | 2148 | 6 | 3.853 | 49.7 | AVERAGE |
| K19 | 25 | 3025 | 4 | 3.853 | 46.6 | |
| K20 | 18 | 4706 | 6 | 1.998 | 56.4 | AVERAGE |
| K21 | 18 | 5358 | 2 | 1.998 | 21.4 | |
| K22 | 16 | 1991 | 6 | 1.578 | 18.9 | AVERAGE |
| K23 | 22 | 5428 | 2 | 2.984 | 32.4 | AVERAGE |
| K24 | 16 | 2251 | 40 | 1.578 | 142.1 | |
| K25 | 22 | 5129 | 8 | 2.984 | 122.4 | |
| K26 | 18 | 5059 | 8 | 1.998 | 80.9 | |
| R1 | 10 | 300 | 80 | 0.617 | 14.8 | |
| R2 | 10 | 700 | 40 | 0.617 | 17.3 | |

| | | | | | |
|---|---|---|---|---|---|
| TOTAL | 30833.4 | kg | | | |
| D10: | 152.7 | kg | D20: | 5773.2 | kg |
| D14: | 2616.8 | kg | D22: | 4604.7 | kg |
| D16: | 4100.9 | kg | D25: | 12883.7 | kg |
| D18: | 701.4 | kg | | | |

# LIST REINFORCEMENT OF APPROACH SLAB

| TYPE | D (mm) | LENGTH OF BAR (mm) | U.WEIGHT (kg/m) | NUMBER | WEIGHT (Kg) |
|---|---|---|---|---|---|
| AS1 | D20 | 5850 | 2.466 | 230 | 3318.0 |
| AS2 | D16 | 11670 | 1.578 | 110 | 2025.7 |
| AS3 | D16 | 6320 | 1.578 | 116 | 1156.9 |
| AS4 | D16 | 1200 | 1.578 | 116 | 219.7 |
| AS5 | D20 | 700 | 2.466 | 60 | 103.6 |
| AS6 | D10 | 1580 | 0.617 | 60 | 58.5 |
| AS7 | D10 | 519 | 0.617 | 616 | 197.3 |

| | |
|---|---|
| D10 | 255.8 kg |
| D16 | 3402.3 kg |
| D20 | 3421.6 kg |
| TOTAL : | 7079.7 kg |
| CONCRETE : | 43.4 m3 |
| LEAN CONCRETE : | 13.4 m3 |
| ASPHATIC JONT FILLER : | 0.6 m3 |

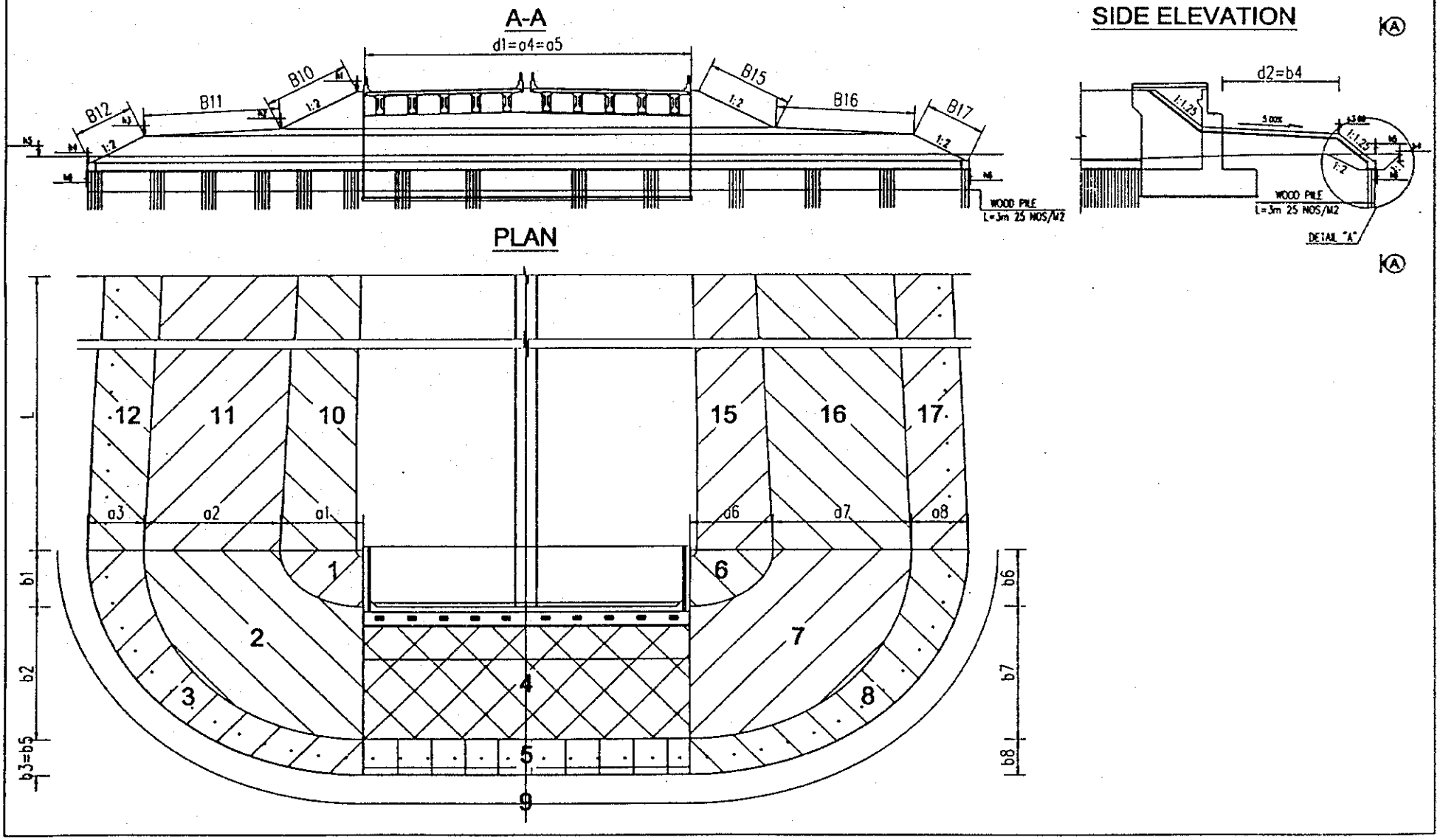
# LIST REINFORCEMENT OF BORED PILES - L=66M

## (FOR ABUTMENTS)

| TYPE | D(mm) | LENGTH OF BAR (mm) | UNIT WEIGTH (kg/m) | NUMBER | WEIGTH (kg) | CONCRETE VOLUMN (m3) |
|---|---|---|---|---|---|---|
| N1 | D32 | 12000 | 6.313 | 30 | 2272.7 | |
| N2 | D25 | 12000 | 3.853 | 60 | 2774.2 | |
| N3 | D25 | 8000 | 3.853 | 15 | 462.4 | |
| N4 | D25 | 5400 | 3.853 | 15 | 312.1 | |
| N5 | D22 | 4203 | 2.984 | 6 | 75.3 | |
| N6 | D22 | 4248 | 2.984 | 22 | 278.9 | |
| N7 | D10 | 152053 | 0.617 | 1 | 93.8 | |
| N8 | D10 | 167258 | 0.617 | 1 | 103.2 | |
| N9 | D10 | 961736 | 0.617 | 1 | 593.4 | |
| N10 | D10 | 4105 | 0.617 | 98 | 248.2 | |
| N11 | D16 | 1322 | 1.578 | 16 | 33.4 | |

| | | |
|---|---|---|
| D10 | 1038.6 kg | |
| D16 | 33.4 kg | |
| D22 | 354.2 kg | |
| D25 | 3548.7 kg | |
| D32 | 2272.7 kg | 116.63 |
| TOTAL | 7247.6 kg | |

# EARTHWORKS SLOPE PROTECTION



Bridge SMALL TRA VA
Abutment A1

| h1 | h2 | h3 | h4 | h5 | h6 | d1 | d2 |
|---|---|---|---|---|---|---|---|
| 6.29 | 3.5 | 3 | 1 | 1.5 | 0.3 | 24.1 | 8.5 |

| Block | a | b | Dh | R | r | L | Sxq | W | Masonry | Blinding |
|---|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | (m) | (m) | (m) | (m2) | (m) | (m3) | (m3) |
| 1 | 6.080 | 3.988 | 2.790 | 5.034 | 0.000 | 5.755 | 22.742 | | 6.82 | 2.27 |
| 2 | 10.000 | 10.000 | 0.500 | 15.034 | 5.034 | 10.012 | 157.727 | | 47.32 | 15.77 |
| 3 | 4.000 | 2.500 | 2.000 | 18.284 | 15.034 | 3.816 | 99.807 | | 29.94 | 9.98 |
| 4 | 24.100 | 8.500 | 0.500 | | | | 205.204 | | 61.56 | 20.52 |
| 5 | 24.100 | 2.500 | 2.000 | | | | 77.158 | | 23.15 | 7.72 |
| 6 | 6.080 | 3.988 | 2.790 | 5.034 | 0.000 | 5.755 | 22.742 | | 6.82 | 2.27 |
| 7 | 10.000 | 10.000 | 0.500 | 15.034 | 5.034 | 10.012 | 157.727 | | 47.32 | 15.77 |
| 8 | 4.000 | 2.500 | 2.000 | 18.284 | 15.034 | 3.816 | 99.807 | | 29.94 | 9.98 |
| 9 | | | 1.200 | | | | 4.320 | 81.511 | | |
| Extra | | | | | | | | 71.306 | 253 | 84 |

| | | | |
|---|---|---|---|
| Masonry | (m3) | | 253 |
| Blinding | (m3) | | 84 |
| Geotextile | (m2) | | 348 |
| PVC Pipe | (m) | | 41 |
| Excavation | (m3) | | 352 |
| Filling | (m3) | | 245 |

| | | | | |
|---|---|---|---|---|
| ΣSxq (block 2,4,7) | | (m2) | | 521 |
| | ΣSxq | (m2) | | 843 |

| | | | | |
|---|---|---|---|---|
| FOOTING | WOOD PILE | (m) | | 4891 |
| | BLINDING | (m3) | V=0.1*0.8*81.511 | 6.5 |
| | STONE MASONRY | (m3) | V1=0.6*0.6*81.511 | 29.3 |

Abutment A2

| h1 | h2 | h3 | h4 | h5 | h6 | d1 | d2 |
|---|---|---|---|---|---|---|---|
| 6.29 | 3.5 | 3 | -0.218 | 0.282 | -0.918 | 24.1 | 8.5 |

| Block | a | b | Dh | R | r | L | Sxq | W | Masonry | Blinding |
|---|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | (m) | (m) | (m) | (m2) | (m) | (m3) | (m3) |
| 1 | 6.080 | 3.988 | 2.790 | 5.034 | 0.000 | 5.755 | 22.742 | | 6.82 | 2.27 |
| 2 | 10.000 | 10.000 | 0.500 | 15.034 | 5.034 | 10.012 | 157.727 | | 47.32 | 15.77 |
| 3 | 6.436 | 4.023 | 3.218 | 20.263 | 15.034 | 6.140 | 170.129 | | 51.04 | 17.01 |
| 4 | 24.100 | 8.500 | 0.500 | | | | 205.204 | | 61.56 | 20.52 |
| 5 | 24.100 | 4.023 | 3.218 | | | | 124.147 | | 37.24 | 12.41 |
| 6 | 6.080 | 3.988 | 2.790 | 5.034 | 0.000 | 5.755 | 22.742 | | 6.82 | 2.27 |
| 7 | 10.000 | 10.000 | 0.500 | 15.034 | 5.034 | 10.012 | 157.727 | | 47.32 | 15.77 |
| 8 | 6.436 | 4.023 | 3.218 | 20.263 | 15.034 | 6.140 | 170.129 | | 51.04 | 17.01 |
| 9 | | | 1.200 | | | | 4.320 | 87.726 | | |
| Extra | | | | | | | | 71.306 | 309 | 103 |

| | | | |
|---|---|---|---|
| Masonry | (m3) | | 309 |
| Blinding | (m3) | | 103 |
| Geotextile | (m2) | | 536 |
| PVC Pipe | (m) | | 44 |
| Excavation | (m3) | | 379 |
| Filling | (m3) | | 263 |

| | | | | |
|---|---|---|---|---|
| ΣSxq (block 2,4,7) | | (m2) | | 521 |
| | ΣSxq | (m2) | | 1031 |

| | | | | |
|---|---|---|---|---|
| FOOTING | WOOD PILE | (m) | | 5264 |
| | BLINDING | (m3) | V=0.1*0.8*87.726 | 7.0 |
| | STONE MASONRY | (m3) | V1=0.6*0.6*87.726 | 31.6 |

NOTES :

* INPUT VALUES : GRAY CELLS ; TOTAL VALUES : BOLD NUMBERS
* No. of Blocks : see drawing. Extra block used for calculation only.

$h_i$ : Elevations (see drawing)

$d_i$ : Distances (see drawing)

SMALL TRA VA BRIDGE : QUANTITIES OF EARTHWORKS SLOPE PROTECTION OF 25M BEHIND HEAD WALL

ABUTMENT A1 :

| Block | B | L | S | Thick | Masonry | Blinding (T=0.1m) | |
|---|---|---|---|---|---|---|---|
| | m | m | m2 | m | m3 | m3 | |
| 10 | 6.24 | 25 | 155.97 | 0.30 | 46.79 | 15.60 | |
| 11 | 10.01 | 25 | 250.31 | 0.30 | 75.09 | 25.03 | |
| 12 | 4.47 | 25 | 111.80 | 0.30 | 33.54 | 11.18 | Geotextile (m2) |
| 15 | 6.24 | 25 | 155.97 | 0.30 | 46.79 | 15.60 | = 2 x ( L + S12) = 274 |
| 16 | 10.01 | 25 | 250.31 | 0.30 | 75.09 | 25.03 | PVC pipe (m) |
| 17 | 4.47 | 25 | 111.80 | 0.30 | 33.54 | 11.18 | = 2 x L/2 x 1m = 25 |
| TOTAL | | | 1036.16 | | 310.85 | 103.62 | |
| FOOTING | 0.8 | 25 | 20.00 | 0.1 | | 4.00 | |
| | 0.6 | 25 | 15.00 | 0.6 | 18.00 | | |
| | Wood pile (m) =3000 | | | | | | |

| No | h | Dh | S | L | Total (m3) | | |
|---|---|---|---|---|---|---|---|
| | m | m | m2 | m | Excavation | Filling | |
| 5 | 1.5 | | | | | | Excavation = 2 x S x L |
| 6 | 0.3 | 1.2 | 4.32 | 25 | 216 | 150 | Filling = Excavation - 2 x 25 x Dh x 1.1 |

ABUTMENT A2 :

| Block | B | L | S | Thick | Masonry | Blinding (T=0.1m) | |
|---|---|---|---|---|---|---|---|
| | m | m | m2 | m | m3 | m3 | |
| 10 | 6.24 | 25 | 155.97 | 0.30 | 46.79 | 15.60 | Geotextile (m2) |
| 11 | 10.01 | 25 | 250.31 | 0.30 | 75.09 | 25.03 | = 2 x ( L*1 + S12) = 410 |
| 12 | 7.20 | 25 | 179.89 | 0.30 | 53.97 | 17.99 | PVC pipe (m) |
| 15 | 6.24 | 25 | 155.97 | 0.30 | 46.79 | 15.60 | = 2 x L/2 x 1m = 25 |
| 16 | 10.01 | 25 | 250.31 | 0.30 | 75.09 | 25.03 | |
| 17 | 7.20 | 25 | 179.89 | 0.30 | 53.97 | 17.99 | |
| TOTAL | | | 1172.34 | | 351.70 | 117.23 | |
| FOOTING | 0.8 | 25 | 20.00 | 0.1 | | 4.00 | |
| | 0.6 | 25 | 15.00 | 0.6 | 18.00 | | |
| | Wood pile (m) =3000 | | | | | | |

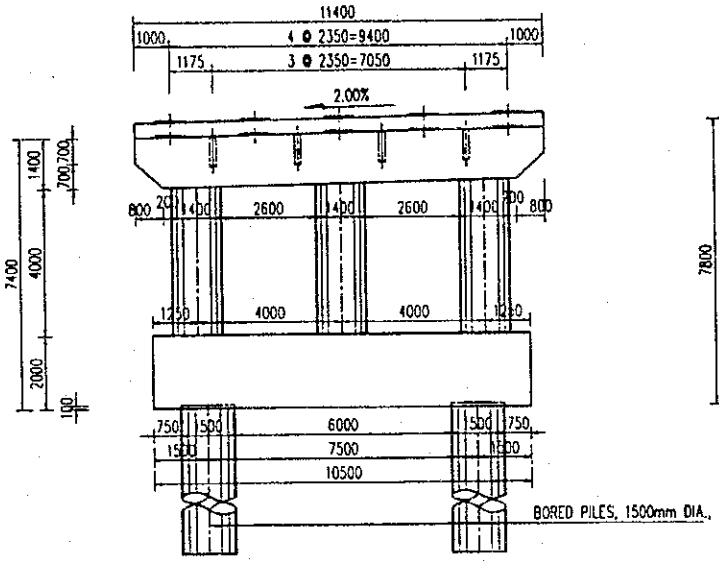
| No | h | Dh | S | L | Total (m3) | | |
|---|---|---|---|---|---|---|---|
| | m | m | m2 | m | Excavation | Filling | |
| 5 | 0.282 | | | | | | Excavation = 2 x S x L |
| 6 | -0.918 | 1.2 | 4.32 | 25 | 216 | 150 | Filling = Excavation - 2 x 25 x Dh x 1.1 |

# QUANTITY TABLE OF PIER

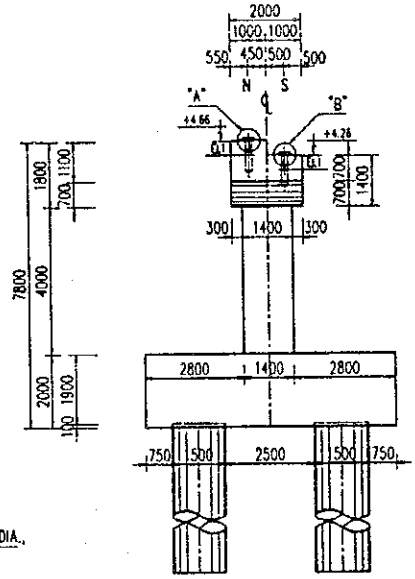
| Items | | | Unit | Pier 1 | Pier 2 | Total |
|---|---|---|---|---|---|---|
| Pile | Number of piles | | Pile | 8 | 8 | 16 |
| | Total length bored piles D=1500mm Dia. | | m | 512.0 | 512.0 | 1024.0 |
| | Concrete piles class D | | $m^3$ | 904.8 | 904.8 | 1809.6 |
| | Excavation | | $m^3$ | 961.3 | 964.2 | 1925.5 |
| | Renforcement | D10 | kg | 7845.6 | 7845.6 | 15691.2 |
| | | D16 | kg | 267.2 | 267.2 | 534.4 |
| | | D22 | kg | 2839.2 | 2839.2 | 5678.4 |
| | | D25 | kg | 30153.6 | 30153.6 | 60307.2 |
| | | Total | kg | 41105.6 | 41105.6 | 82211.2 |
| Pier | Concrete class E | | $m^3$ | 401.3 | 401.3 | 802.6 |
| | Reinforcement | D10 | kg | 34.6 | 34.6 | 69.2 |
| | | D14 | kg | 1829.9 | 1829.9 | 3659.8 |
| | | D16 | kg | 920.8 | 920.8 | 1841.6 |
| | | D20 | kg | 702.3 | 702.3 | 1404.6 |
| | | D22 | kg | 3707.4 | 3707.4 | 7414.8 |
| | | D28 | kg | 1786.0 | 1786.0 | 3572.0 |
| | | D32 | kg | 7428.8 | 7428.8 | 14857.6 |
| | | Total | kg | 16409.8 | 16409.8 | 32819.6 |
| | Form | Curve | $m^2$ | 108.6 | 108.6 | 217.1 |
| | | Flat | $m^2$ | 265.5 | 265.5 | 531.0 |
| | Scaffolingding work | H < 4m | $m^2$ | 254.4 | 254.4 | 508.8 |
| | | 4m ≤ H < 30m | $m^2$ | 237.6 | 237.6 | 475.3 |
| | Support | | $m^3$ | 118.5 | 118.5 | 237.0 |
| | Earth work | Excavation for foundation | $m^3$ | 1351.5 | 1410.6 | 2762.2 |
| | | Blinding Concrete class G | $m^3$ | 281.2 | 281.2 | 562.4 |
| | | Rip rap | $m^3$ | 777.7 | 836.8 | 1614.6 |
| | Cofferdams | Sheet pile Larsen IV | m | 2328.0 | 2328.0 | 4656.0 |
| | | Steel pile I 400 | m | 480.0 | 480.0 | 960.0 |
| | | Brace C 300 | m | 784.0 | 784.0 | 1568.0 |

# PIERS P1 & P2 OF SMALL TRA VA BRIDGE

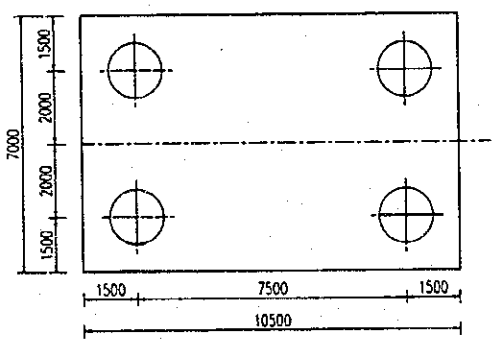
## ELEVATION



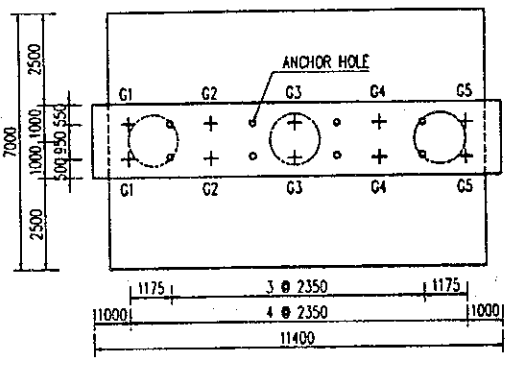

## SIDE VIEW




## HALF PLAN PILE FOOTING




## HALF PLAN




## NOTES

ALL DIMENTIONS ARE I MILIMETERS UNLESS OTHERWISE INDICATED.

# QUANTITY SURVEYING FOR PIER P1

No.

| Item | Formula | Quantity |
|---|---|---|
| 1) Concrete | | |
| | * Headstock | |
| | v1 ={( 11.40 x 1.40 - 0.80 x 0.70 ) | |
| | x 1.00 | |
| | + ( 11.40 x 1.80 - 0.80 x 0.70 ) | |
| | x 1.00 | |
| | ) x 2 = 70.72 m3 | |
| | * Column | |
| | v2 = 2 x 1/4 x pi x 1.40 ^2 x | |
| | x ( 4.03 + 4.11 + 4.19 ) = 38.00 m3 | |
| | *Footing | |
| | v4 = 2 x 10.50 x 7.00 x 2.00 | |
| | - 8 x pi x 0.75 ^2 x 0.1 | |
| | = 292.59 m3 | |
| | Total | 401.30 m3 |
| 2) Form | | |
| | * Headstock | |
| | a1 = {( 11.40 x 1.40 - 0.80 x 0.70 ) | |
| | + ( 1.06 + 0.70 ) x 1.00 x 2 | |
| | + ( 9.80 x 2.00 - 3 * pi /4 x 1.40 ^2 ) | |
| | + ( 11.40 x 1.80 - 0.80 x 0.70 ) | |
| | + ( 11.40 x 0.40 ) x 2 = 125.51 m2 | |
| | * Column (Curve form) | |
| | a2 = 2 x pi x 1.40 | |
| | x ( 4.03 + 4.11 + 4.19 ) = 108.57 m2 | |
| | *Footing | |
| | a4 = 2 x ( 10.500 + 7.000 ) x 2.00 | |
| | x 2 = 140.00 m2 | |
| | Total Curve = | 108.57 m2 |
| | Flat = | 265.51 m2 |
| 3) Scaffolding: | * H<=4m | |
| | A1 = 2 x ( 24.85 + 9.00 ) x 2.00 | |
| | + ( 2 x ( 4.00 + 25.75 ) x 2.00 = | 254.40 m2 |
| | * 4m< H<=30m | |
| | A2 = 2 x( 4.00 + 25.75 ) x 3.99 | |
| | = | 237.64 m2 |
| 4) Support | = ( 11.40 - 3 x 1.40 ) x 2.00 | |
| | x 4.11 x 2 = | 118.48 m3 |
| 5) Lean Concrete | * Concrete class G | |
| | V = 0.50 x {( 22.85 + 4 ) x ( 7.00 + | |
| | + 4 ) - 8 x 1/4 x pi x 1.50 ^2} | |
| | x 2 = | 281.21 m3 |
| 6) Bored Pile | | |
| | * Concrete | |
| | = 8 x 1/4 x pi x 1.50 x 1.50 | |
| | x ( 63.90 + 0.10 ) = | 904.78 m3 |
| | * Excavation Length | |
| | N<20: = 50.1 x 8 = | 400.80 m |
| | 20<N<40: 13.3 x 8 = | 106.40 m |
| | 40<N: 0.5 x 8 = | 4.00 m |

# QUANTITY SURVEYING FOR PIER P1

No.

| Item | Formula | Quantity |
|---|---|---|
| 7) Earthwork | * Excavation Volume<br>= 8 x 1/4 x pi x 1.50 x 1.50<br>x 68.00 = | 961.33 m3 |
| | * Excavation for footing (inside cofferdam)<br>= 4.60 x ( 26.85 x 11.00 )<br>- 8 x pi /4 x 1.50 ^2 x 0.50 = | 1351.54 m3 |
| | * Excess Soil<br>v1 = Lean Concrete = 281.21 m3<br>v2 = Blinding Stone = 0.00 m3<br>v3 = Footing Volume = 292.59 m3<br>Total = | 573.80 m3 |
| | * Riprap = Excavation for footing - Excess Soil<br>= 1351.54 - 573.80 = | 777.74 m3 |
| 8) Cofferdams | * Sheet pile larsen IV<br>L = 12 x 194 = | 2328 m |
| | * Steel pile I 400<br>L = 12 x 40 = | 480 m |
| | * Brace C 300<br>L1 = 27.9 x 10 = 279 m<br>L2 = 27.1 x 10 = 271 m<br>L3 = 12.1 x 10 = 121 m<br>L4 = 11.3 x 10 = 113 m<br>Total = | 784 m |

# QUANTITY SURVEYING FOR PIER P2

No.

| Item | Formula | | | | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1) Concrete | | | | | | | | | | | |
| | * Headstock | | | | | | | | | | |
| | v1 = { ( | 11.40 | x | 1.40 | - | 0.80 | x | 0.70 | ) | | |
| | | | | | x | 1.00 | | | | | |
| | + ( | 11.40 | x | 1.80 | - | 0.80 | x | 0.70 | ) | | |
| | | | | | x | 1.00 | | | | | |
| | | | | | ) x | 2 | = | 70.72 | m3 | | |
| | * Column | | | | | | | | | | |
| | v2 = | | 2 | x | 1/4 x pi | x | 1.40 | ^2 x | | | |
| | x ( | 4.03 | + | 4.11 | + | 4.19 | ) = | 38.00 | m3 | | |
| | *Footing | | | | | | | | | | |
| | v4 = | | 2 | x | 10.50 | x | 7.00 | x | 2.00 | | |
| | - | 8 | x | pi | x | 0.75 | ^2 x | 0.1 | | | |
| | | | | | | | = | 292.59 | m3 | | |
| | | | | | | | Total | | | | 401.30 m3 |
| 2) Form | | | | | | | | | | | |
| | * Headstock | | | | | | | | | | |
| | a1 = { ( | 11.40 | x | 1.40 | - | 0.80 | x | 0.70 | ) | | |
| | + ( | 1.06 | + | 0.70 | ) x | 1.00 | x | 2 | | | |
| | + ( | 9.80 | x | 2.00 | - | 3 * pi /4 | x | 1.40 | ^2 ) | | |
| | + ( | 11.40 | x | 1.80 | - | 0.80 | x | 0.70 | ) | | |
| | + ( | 11.40 | x | 0.40 | ) x | 2 | = | 125.51 | m2 | | |
| | * Column (Curve form) | | | | | | | | | | |
| | a2 = | 2 x pi | x | 1.40 | | | | | | | |
| | x ( | 4.03 | + | 4.11 | + | 4.19 | ) = | 108.57 | m2 | | |
| | *Footing | | | | | | | | | | |
| | a4 = | 2 | x ( | 10.500 | + | 7.000 | ) x | 2.00 | | | |
| | | | | | x | 2 | = | 140.00 | m2 | | |
| | | | | | | Total | | Curve | = | | 108.57 m2 |
| | | | | | | | | Flat | = | | 265.51 m2 |
| 3) Scaffolding: | * H<=4m | | | | | | | | | | |
| | A1 = | 2 | x ( | 24.85 | + | 9.00 | ) x | 2.00 | | | |
| | + ( | 2 | x ( | 4.00 | + | 25.75 | ) x | 2.00 | = | | 254.40 m2 |
| | * 4m< H<=30m | | | | | | | | | | |
| | A2 = | 2 | x( | 4.00 | + | 25.75 | ) x | 3.99 | | | |
| | | | | | | | | | = | | 237.64 m2 |
| 4) Support | = ( | 11.40 | - | 3 | x | 1.40 | ) x | 2.00 | | | |
| | | | | | x | 4.11 | x | 2 | = | | 118.48 m3 |
| 5) Lean Concrete | * Concrete class G | | | | | | | | | | |
| | V = | 0.50 | x { ( | 22.85 | + | 4 | ) x ( | 7.00 | + | | |
| | + | 4 | ) - | 8 | x | 1/4 x pi | x | 1.50 | ^2) | | |
| | | | | | | | x | 2 | = | | 281.21 m3 |
| 6) Bored Pile | * Concrete | | | | | | | | | | |
| | = | 8 | x | 1/4 x pi | x | 1.50 | x | 1.50 | | | |
| | | | | | x ( | 63.90 | + | 0.10 | ) = | | 904.78 m3 |
| | * Excavation Length | | | | | | | | | | |
| | N<20: | | = | | | 53.8 | x | 8 | = | | 430.40 m |
| | 20<N<40: | | | | | 9.3 | x | 8 | = | | 74.00 m |
| | 40<N: | | | | | 0.9 | x | 8 | = | | 6.80 m |

# QUANTITY SURVEYING FOR PIER P2

No.

| Item | Formula | | | | | | | | Quantity |
|---|---|---|---|---|---|---|---|---|---|
| 7) Earthwork | * Excavation Volume | | | | | | | | |
| | = | 8 | x 1/4 x pi | x | 1.50 | x | 1.50 | | |
| | | | | x | 68.20 | | | = | 964.15 m3 |
| | * Excavation for footing (inside cofferdam) | | | | | | | | |
| | = | 4.80 | x ( 26.85 | x | 11.00 ) | | | | |
| | - | 8 | x pi /4 | x | 1.50 | ^2 x | 0.50 | = | 1410.61 m3 |
| | * Excess Soil | | | | | | | | |
| | v1 = | Lean Concrete | | | | | = | 281.21 m3 | |
| | v2 = | Blinding Stone | | | | | = | 0.00 m3 | |
| | v3 = | Footing Volume | | | | | = | 292.59 m3 | |
| | | | | | | | Total | = | 573.80 m3 |
| | * Riprap = | Excavation for footing - Excess Soil | | | | | | = | 836.81 m3 |
| | = | 1410.61 | - | 573.80 | | | | | |
| 8) Cofferdams | * Sheet pile larsen IV | | | | | | | | |
| | L = | 12 | x | 194 | | | | = | 2328 m |
| | * Steel pile I 400 | | | | | | | | |
| | L = | 12 | x | 40 | | | | = | 480 m |
| | * Brace C 300 | | | | | | | | |
| | L1 = | 27.9 | x | 10 | = | 279 | m | | |
| | L2 = | 27.1 | x | 10 | = | 271 | m | | |
| | L3 = | 12.1 | x | 10 | = | 121 | m | | |
| | L4 = | 11.3 | x | 10 | = | 113 | m | | |
| | | | | | | | Total | = | 784 m |

STEEL OF PIER 1&2

| DETAIL | No | D (mm) | LENGTH (m) | QUANTITY (nos.) | UNIT WEIGH (kg/m) | TOTAL STEEL (kg) |
|---|---|---|---|---|---|---|
| PIER CAP | R1 | 10 | 5600 | 10 | 0.617 | 34.6 |
| | B1 | 28 | 11200 | 14 | 4.834 | 758.0 |
| | B2 | 28 | 9800 | 13 | 4.834 | 615.9 |
| | B3 | 16 | 11200 | 9 | 1.578 | 159.1 |
| | B3a | 16 | 10490 | 4 | 1.578 | 66.2 |
| | B4 | 14 | 4916 | 49 | 1.208 | 291.0 |
| | B4a | 14 | 4666 | 49 | 1.208 | 276.2 |
| | B4b | 14 | 2182 | 49 | 1.208 | 129.2 |
| | B4c | 14 | 3566 | 49 | 1.208 | 211.1 |
| | B4d | 14 | 2332 | 49 | 1.208 | 138.0 |
| | B5 | 14 | 4151 | 8 | 1.208 | 40.1 |
| | B5a | 14 | 3901 | 8 | 1.208 | 37.7 |
| | B5b | 14 | 1800 | 6 | 1.208 | 13.0 |
| | B5c | 14 | 2801 | 6 | 1.208 | 20.3 |
| | B5d | 14 | 2332 | 14 | 1.208 | 39.4 |
| | B6 | 28 | 3393 | 7 | 4.834 | 114.8 |
| | B6a | 28 | 3793 | 5 | 4.834 | 91.7 |
| | B7 | 28 | 3377 | 7 | 4.834 | 114.3 |
| | B7a | 28 | 3777 | 5 | 4.834 | 91.3 |
| COLUMN | C1 | 32 | 7510 | 84 | 6.313 | 3982.5 |
| | C2 | 14 | 4485 | 117 | 1.208 | 633.9 |
| FOOTING | F1 | 22 | 11070 | 25 | 2.984 | 825.8 |
| | F2 | 22 | 14587 | 47 | 2.984 | 2045.8 |
| | F3 | 32 | 10300 | 53 | 6.313 | 3446.3 |
| | F4 | 22 | 7570 | 37 | 2.984 | 835.8 |
| | F5 | 20 | 7500 | 16 | 2.466 | 295.9 |
| | F6 | 20 | 10300 | 16 | 2.466 | 406.4 |
| | F7 | 16 | 4689 | 94 | 1.578 | 695.5 |

| TOTAL | | | |
|---|---|---|---|
| | D = 10 | 34.6 | (kg) |
| | D = 14 | 1829.9 | (kg) |
| | D = 16 | 920.8 | (kg) |
| | D = 20 | 702.3 | (kg) |
| | D = 22 | 3707.4 | (kg) |
| | D = 28 | 1786.0 | (kg) |
| | D = 32 | 7428.8 | (kg) |
| | TOTAL | 8981.0 | (kg) |

# LIST REINFORCEMENT OF BORED PILE - L= 64m.
## (FOR PIER)

| TYPE | D(mm) | LENGTH OF BAR (mm) | UNIT WEIGTH (kg/m) | NUMBER | WEIGTH (kg) | CONCRETE VOLUMN (m3) |
|---|---|---|---|---|---|---|
| N1 | D25 | 12000 | 3.853 | 70 | 3236.5 | |
| N2 | D25 | 9875 | 3.853 | 14 | 532.7 | |
| N3 | D22 | 4228 | 2.984 | 28 | 534.9 | |
| N4 | D10 | 152053 | 0.617 | 1 | 93.8 | |
| N5 | D10 | 182464 | 0.617 | 1 | 112.6 | |
| N6 | D10 | 938928 | 0.617 | 1 | 579.3 | |
| N7 | D10 | 4105 | 0.617 | 77 | 195.0 | |
| N8 | D16 | 1322 | 1.578 | 16 | 33.4 | |
| | D10 | 980.7 kg | | | | |
| | D16 | 33.4 kg | | | | |
| | D22 | 354.9 kg | | | | |
| | D25 | 3769.2 kg | | | | |
| | TOTAL | 5138.2 kg | | | | 113.1 |

## QUANTITY OF SMALL TRA VA BRIDGE

| ITEMS | | UNIT | ABUTMENTS | PIERS | SUPERSTRUCTERE | TOTAL |
|---|---|---|---|---|---|---|
| CONCRETE | CLASS B | M3 | | | 609.8 | 609.8 |
| | CLASS D | M3 | 2332.6 | 1809.6 | 645.8 | 4788.0 |
| | CLASS E | M3 | 1252.0 | 802.6 | 89.3 | 2144.0 |
| | CLASS G | M3 | 60.5 | 562.4 | | 623.0 |
| PC - STEEL | 12 S 12.7 | ton | | | 30.9 | 30.9 |
| | 3 S 12.7 | ton | | | 1.7 | 1.7 |
| SHEATHING | CABLES Þ 80/85 | M | | | 3322.9 | 3322.9 |
| | CABLES Þ 50/55 | M | | | 723.8 | 723.8 |
| CEMENT GROUT IN SHEATHING | | M3 | | | 18.1 | 18.1 |
| ANCHORAGE | CABLES 12S12.7 | SET | | | 220.0 | 220.0 |
| | CABLES 3S12.7 | SET | | | 144.0 | 144.0 |
| STEEL SHEAR KEY | | SET | | | 240.0 | 240.0 |
| REINFORCEMENT | RE-BAR | TON | 220.8 | 115.0 | 259943.2 | 260279.0 |
| EXPANSION JOINT | 50MM | M | | | 43.0 | 43.0 |
| BEARING | 600x300x57 | SET | | | 20.0 | 20.0 |
| BEARING | 500x250x50 | SET | | | 40.0 | 40.0 |
| ANCHORAGE BAR | | SET | | | 48.0 | 48.0 |
| PVC PIPE | Þ 50 MM | M | 135.0 | | | 135.0 |
| | Þ 100 MM | M | | | 350.0 | 350.0 |
| RAILING | | M | | | 367.6 | 367.6 |
| LIGHTING POLE | | SET | | | 2.0 | 2.0 |
| DRAINAGE | POT | SET | | | 14.0 | 14.0 |
| | PIPE Þ 165 MM | M | | | 24.4 | 24.4 |
| PAVEMENT | WATER PROOFING 5 MM | M2 | | | 1861.9 | 1861.9 |
| | ALPHALT CONCRETE 70 MM | M2 | | | 1861.9 | 1861.9 |
| PILE Þ150CM | | M | 1320.0 | 1024.0 | | 2344.0 |
| GEOTEXTILE | | M2 | 1568.0 | | | 1568.0 |
| STONE MANSORY | | M3 | 1224.6 | | | 1224.6 |
| BLINGDING AGGREGATE | | M3 | 407.9 | | | 407.9 |
| FOOTING OF SLOPE ROTECTION | | M | 219.2 | | | 219.2 |
| RIP RAP | | M3 | | 1614.6 | | 1614.6 |
| BLINDING STONE | | M3 | 67.8 | | | 67.8 |
| WOODEN PIPE L = 3M | | M | 16155.0 | | | 16155.0 |
| EXCAVATION | | M3 | 3581.9 | 2762.2 | | 6344.0 |
| FILLING | | M3 | 1945.5 | | | 1945.5 |
| FORM WORK | CURVE | M2 | | 217.1 | | 217.1 |
| | FLAT | M2 | 1054.6 | 531.0 | 6488.4 | 8074.0 |
| SCAFFOLDING WORK | H < 4M | M2 | 284.8 | 508.8 | 2114.1 | 2907.7 |
| | 4 M < H < 30M | M2 | 924.1 | 475.3 | | 1399.4 |
| SUPPORT | | M3 | | 237.0 | | 237.0 |
| COFFERDAMS | SHEET PILE LARSEN IV | M | | 4656 | | 4656.0 |
| | STEEL PILE I 400 | M | | 960 | | 960.0 |
| | BRACE C 300 | M | | 1568 | | 1568.0 |