

III. SAN JOSE

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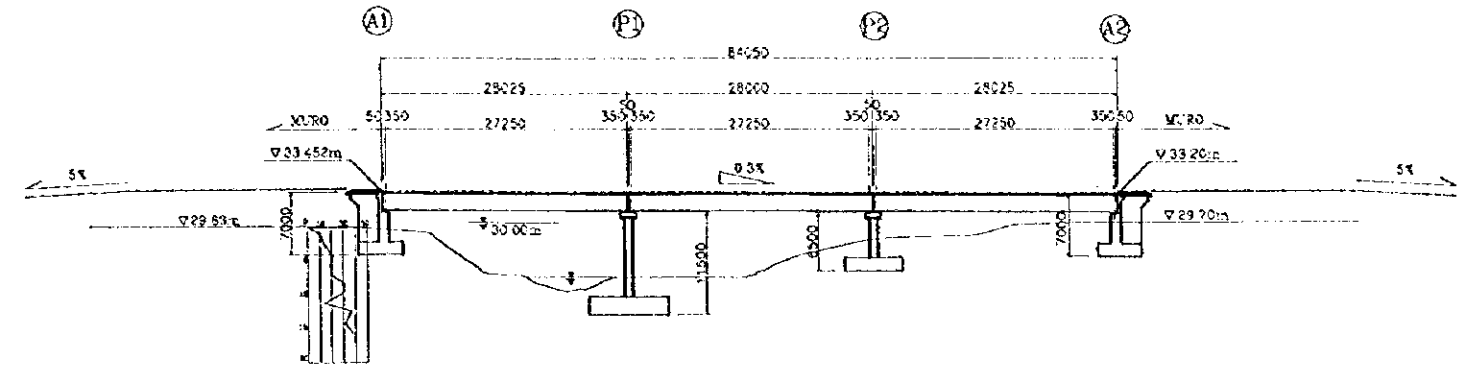
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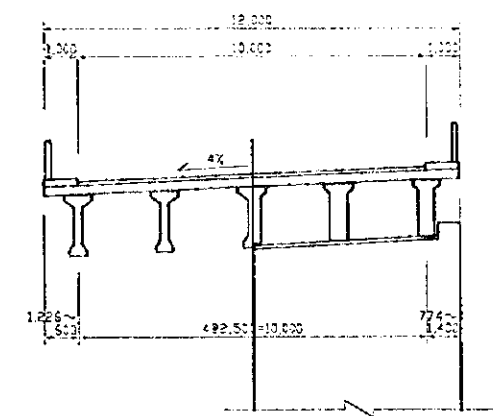
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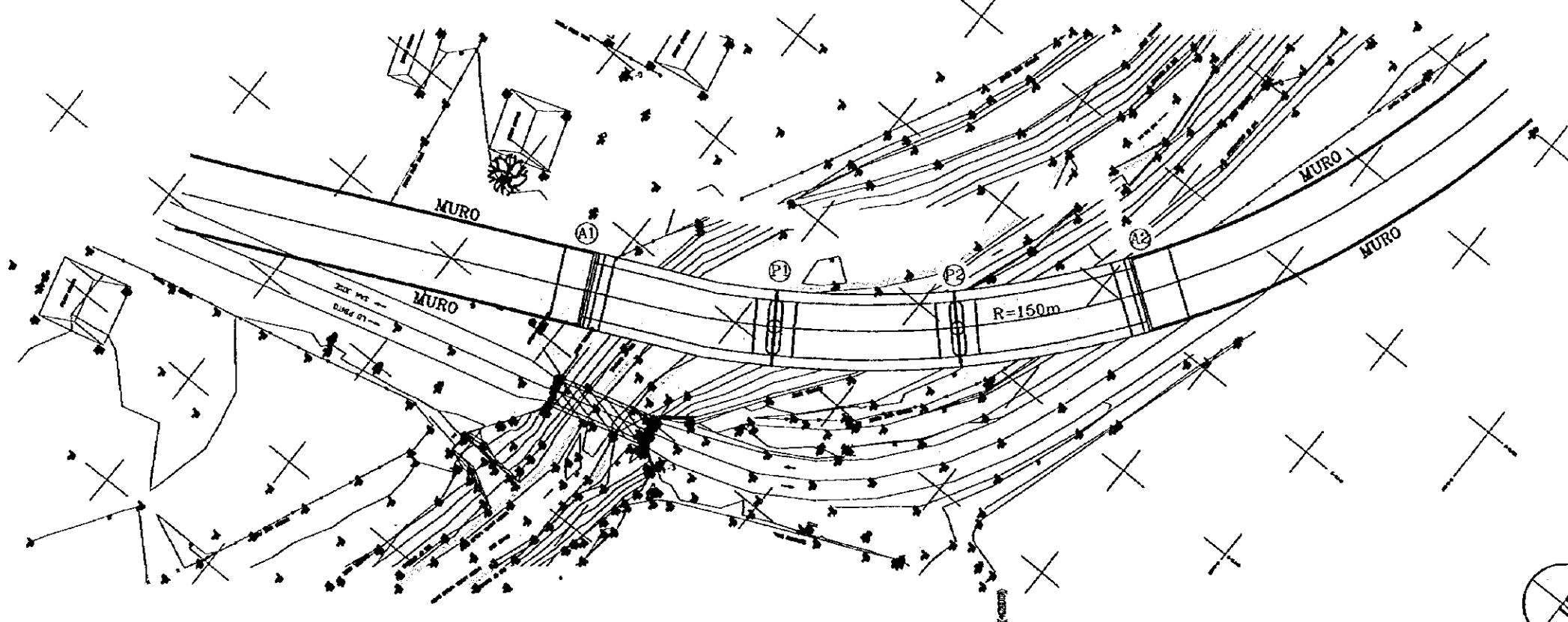
CORTE LONGITUDINAL
ESC. 1:400



SECCION DE VIGA
ESC. 1:100



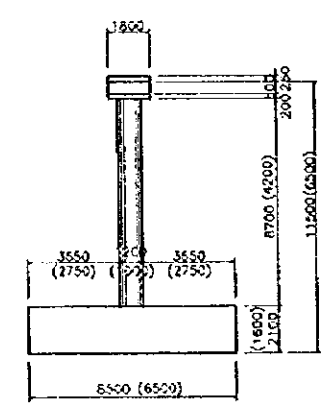
PLANTA
ESC. 1:400



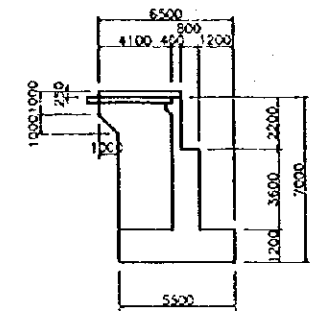
DETALLE DE BH

| | |
|--------------|-------------|
| Pavimento | 50 |
| Losa | 170 |
| Viga | 1850 |
| Apoyo | 50 |
| Pedestal | 130 |
| Total | 2250 |

PILA P1 (P2)
ESC. 1:150

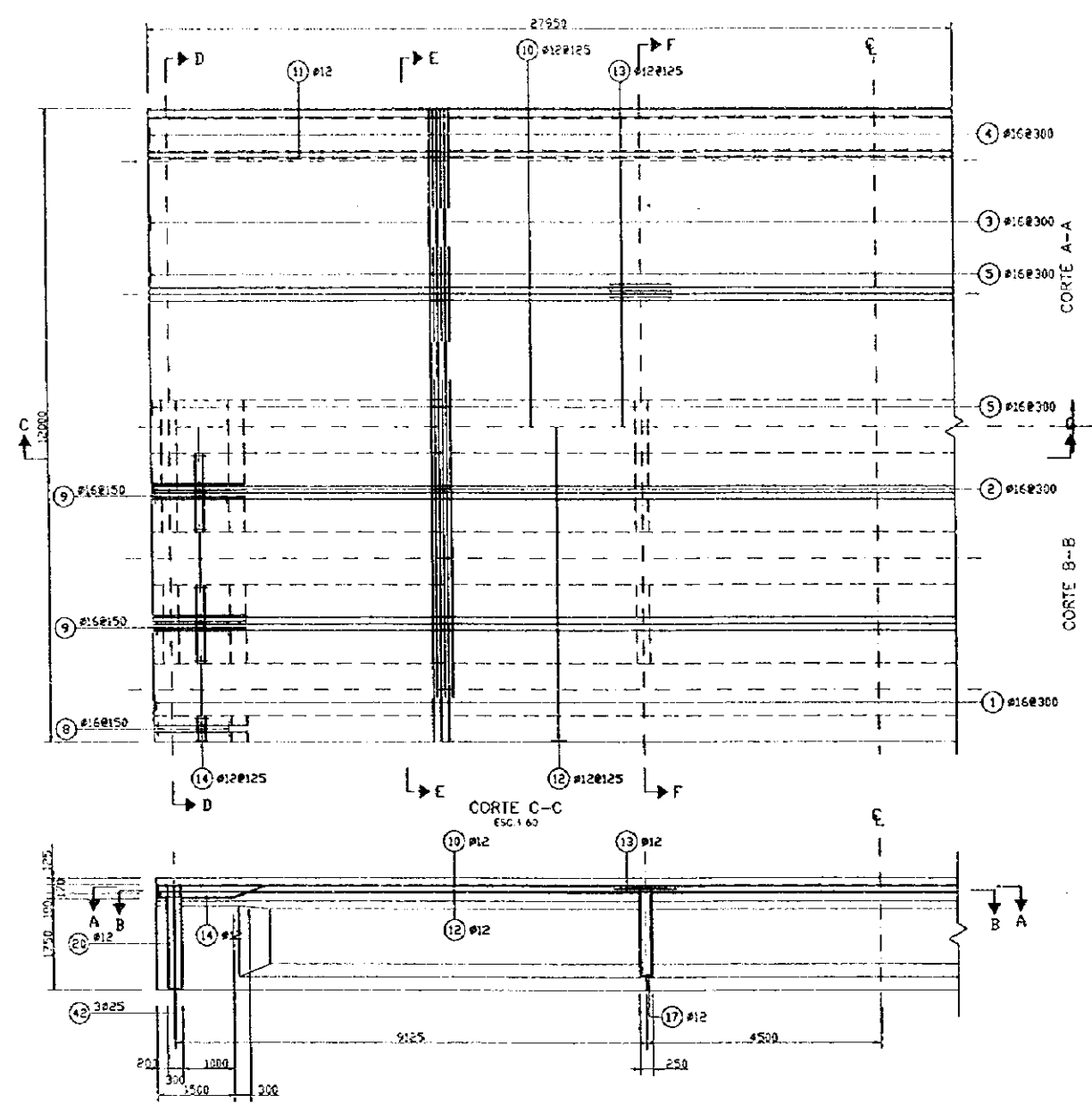


ESTRIBO A1 A2
ESC. 1:150

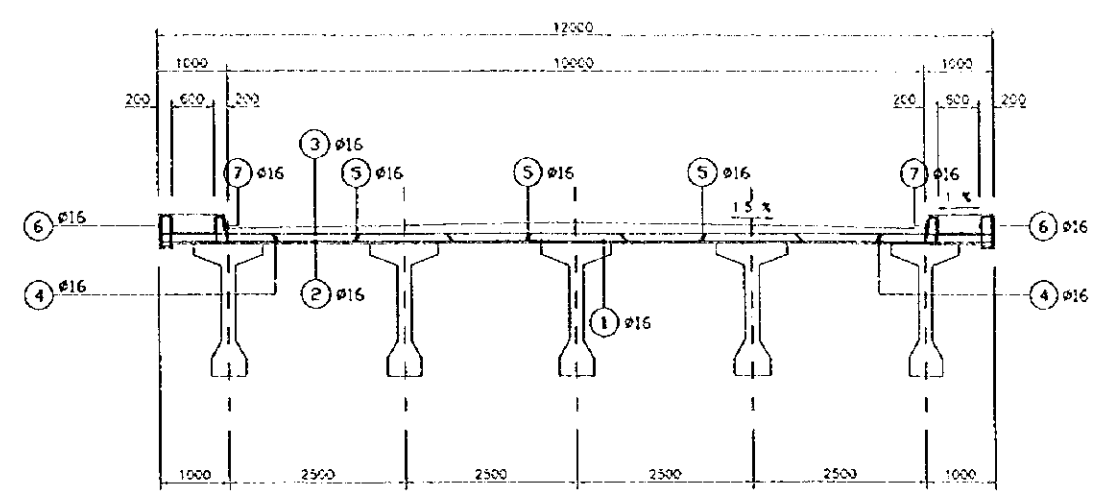


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|--|----------------------|
| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente SAN JOSE | |
| Camino: | |
| Provincia: | Region: RM |
| Proyecto: | Reviso: |
| Ve Jo Ing. Jefe Depto. Puentes | Director de Vialidad |
| Fecha: | Vista General |

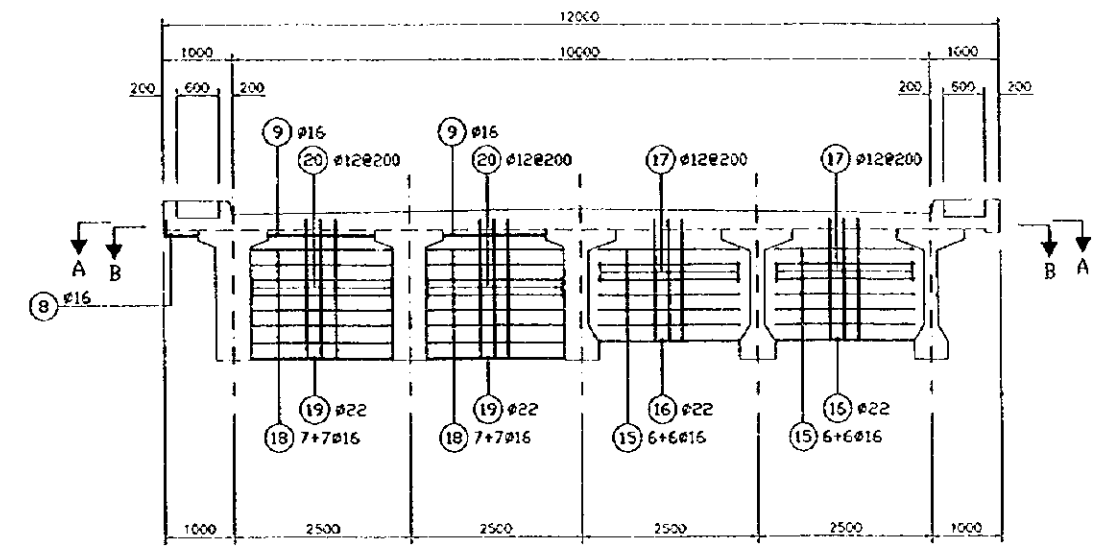
PLANTA DE LOSA
ESC. 1/50



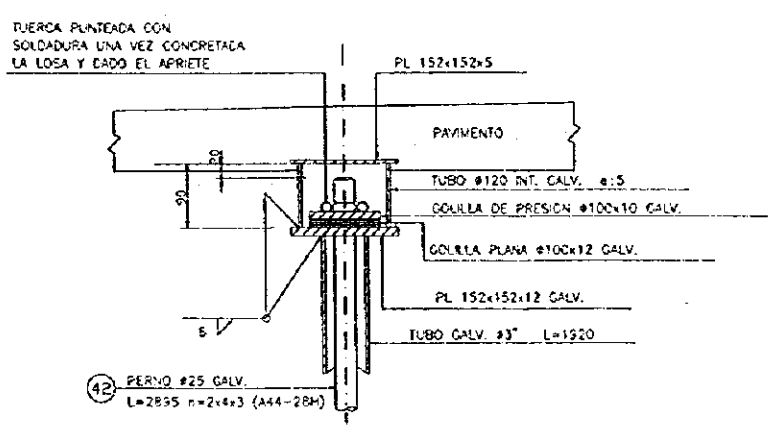
CORTE TRVERSAL
CORTE E-E
ESC. 1/50



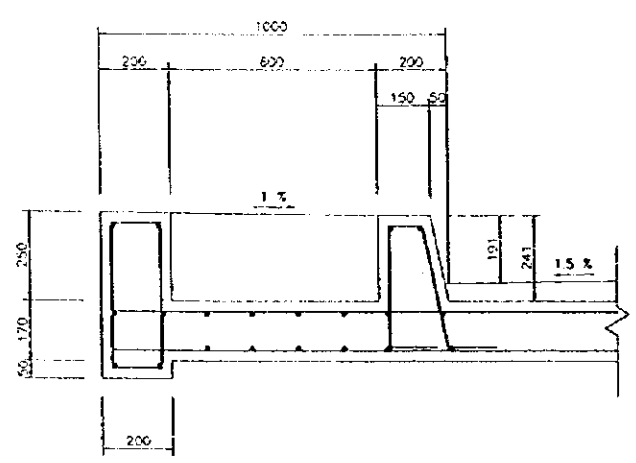
TRAVESAOS EXTREMOS
CORTE D-D
ESC. 1/50
CORTE F-F



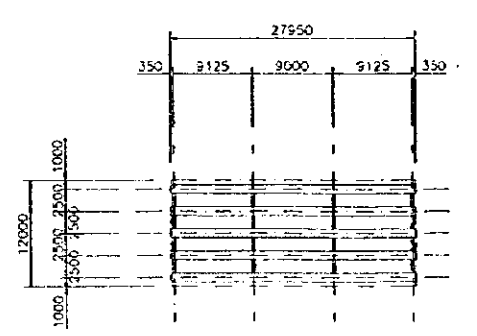
DETALLE BARRAS ANTISISMICAS
ESC. 1/5



DETALLE DE PASILLO
ESC. 1/10

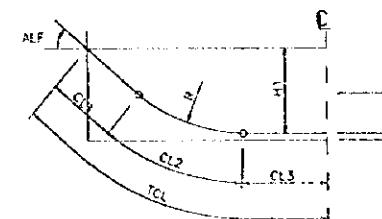
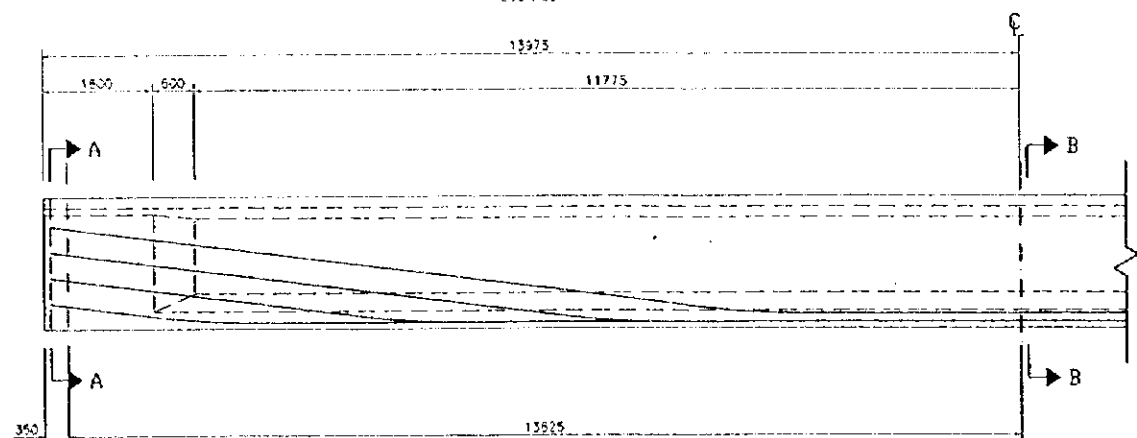


PLANTA DE DISPOSICION



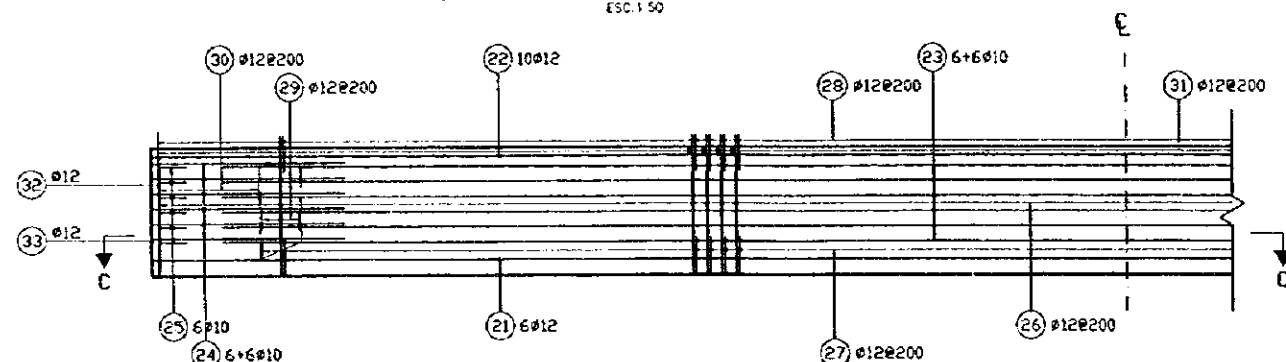
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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: SAN JOSE | |
| Comino: | |
| Provincia: | Region: RM |
| Projecto | Reviso |
| Yo Bo Ing. Jefe Depto. Puentes | Director de Vialidad |
| Drawn Fecha: | |

1/2 ELEVACION DE VIGA POSTENSADO
ESC 1:50

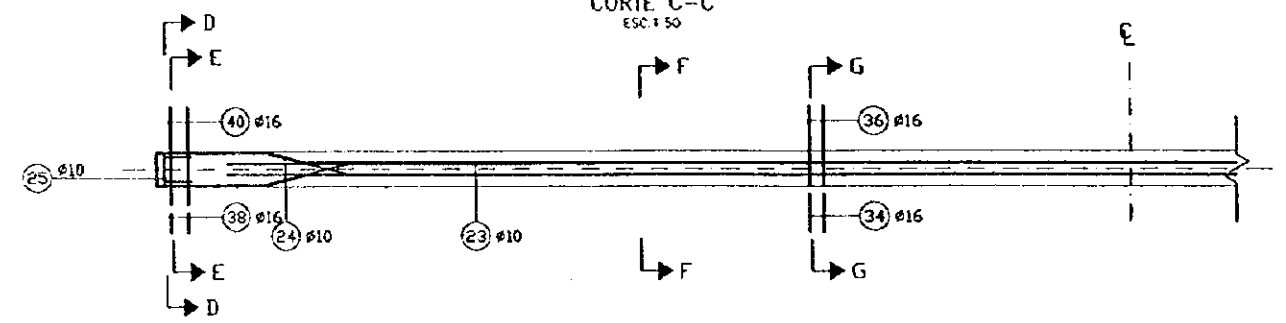


| | ALF | R | H1 | H2 | H3 | CL1 | CL2 | CL3 | TCL |
|----|-----|----|------|----|-----|------|------|-------|-------|
| D1 | 7 | 10 | 1230 | 75 | 210 | 9481 | 1222 | 3245 | 13949 |
| D2 | 7 | 10 | 930 | 75 | 90 | 7512 | 1222 | 5200 | 13934 |
| D3 | 7 | 10 | 630 | 75 | 90 | 4558 | 1222 | 8132 | 13912 |
| D4 | 7 | 10 | 270 | 75 | 90 | 1604 | 1222 | 11054 | 13890 |

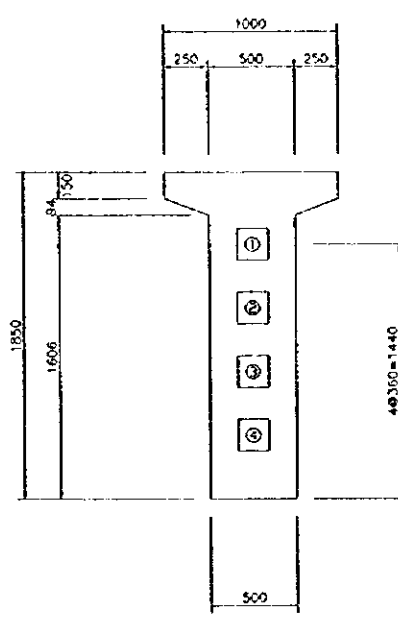
1/2 ENFIERRADURA VIGA POSTENSADO
ESC 1:50



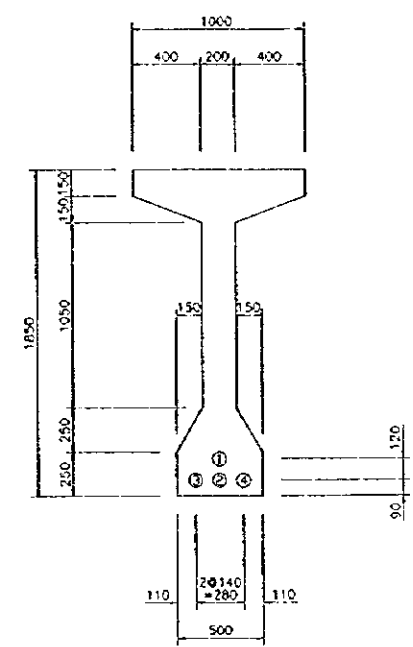
CORTE C-C
ESC 1:50



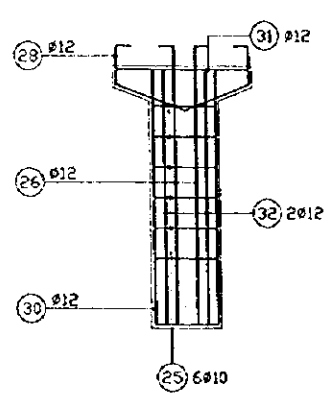
CORTE A-A
ESC 1:20



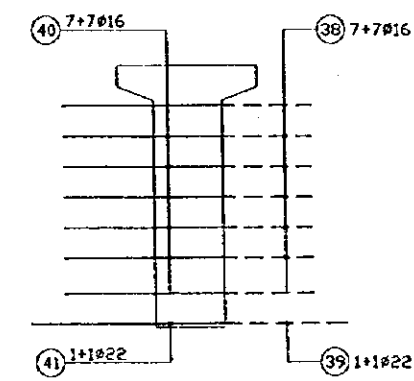
CORTE B-B
ESC 1:20



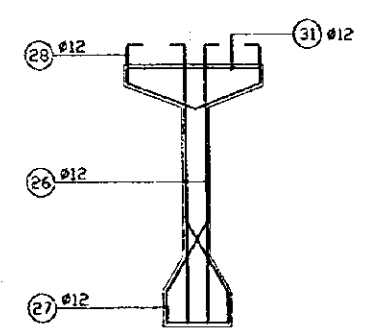
CORTE D-D
ESC 1:25



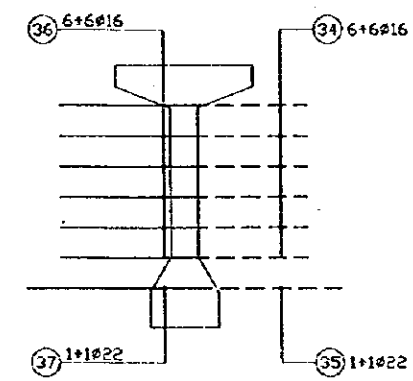
CORTE E-E
ESC 1:25



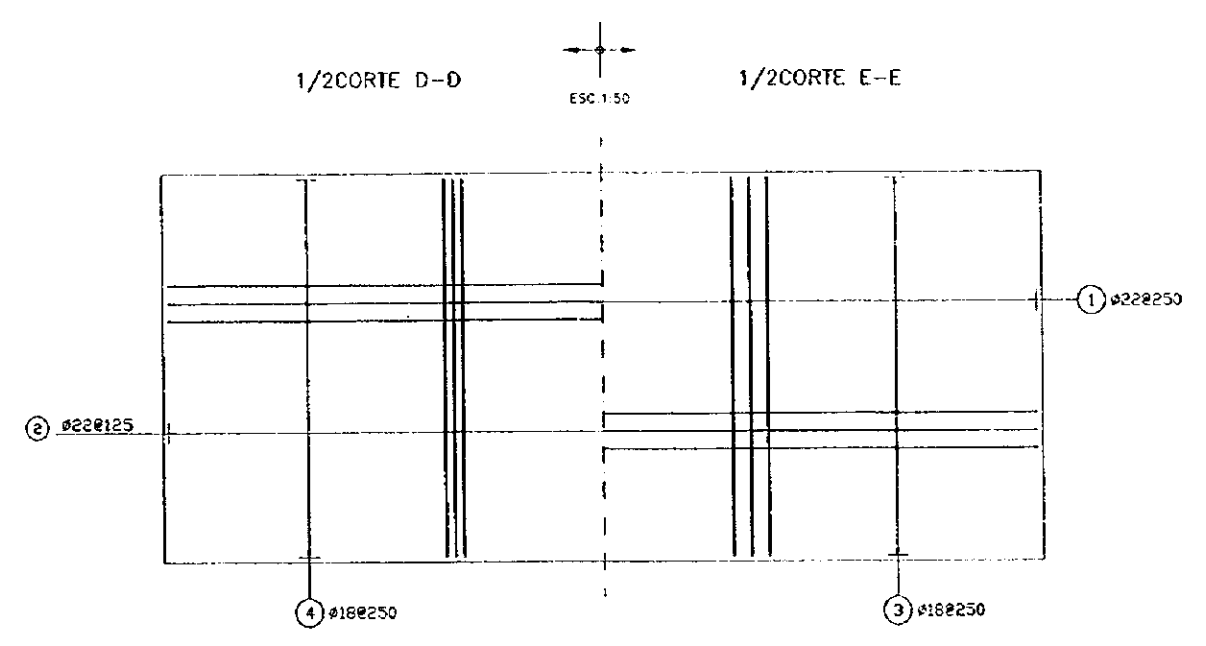
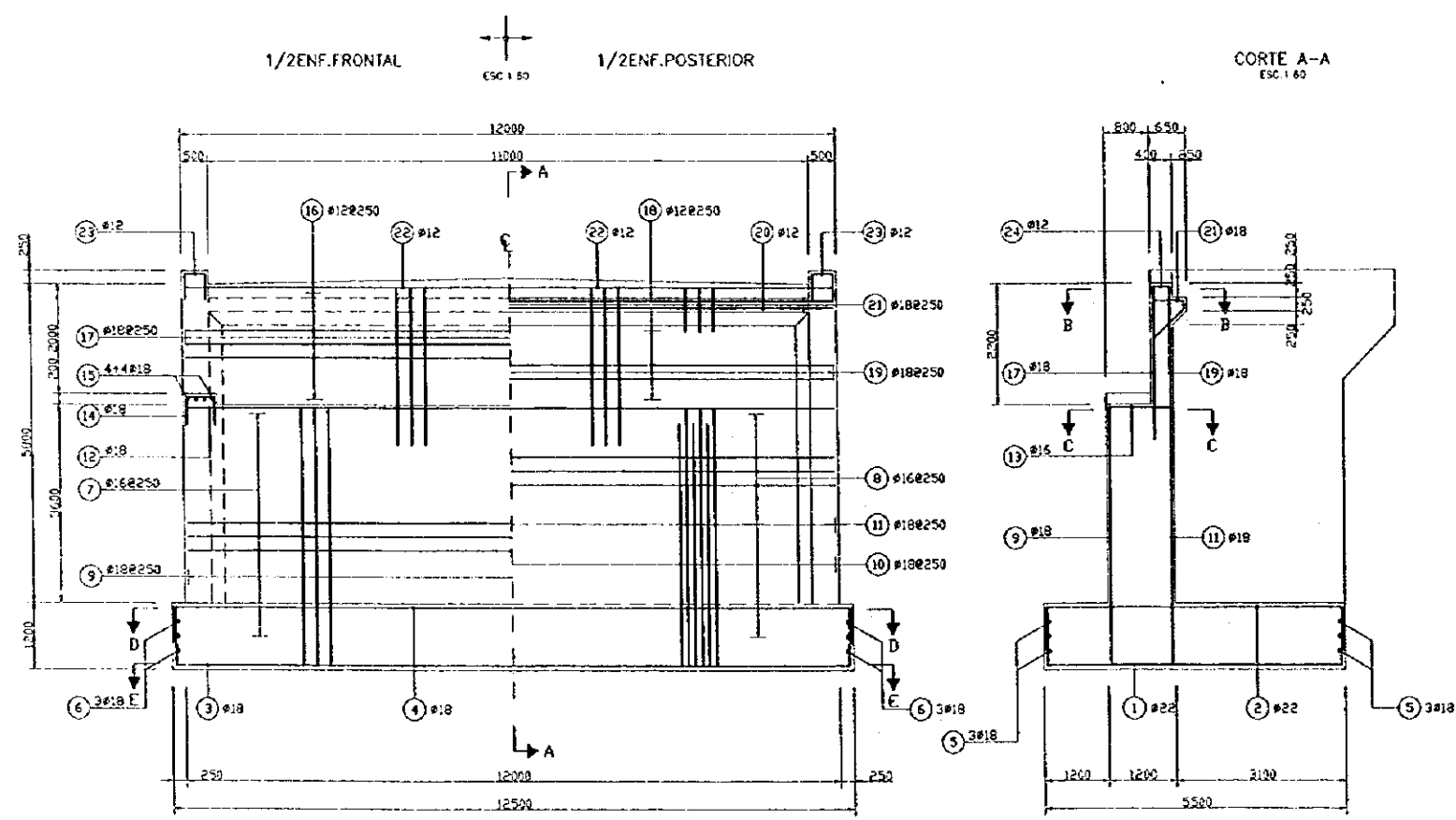
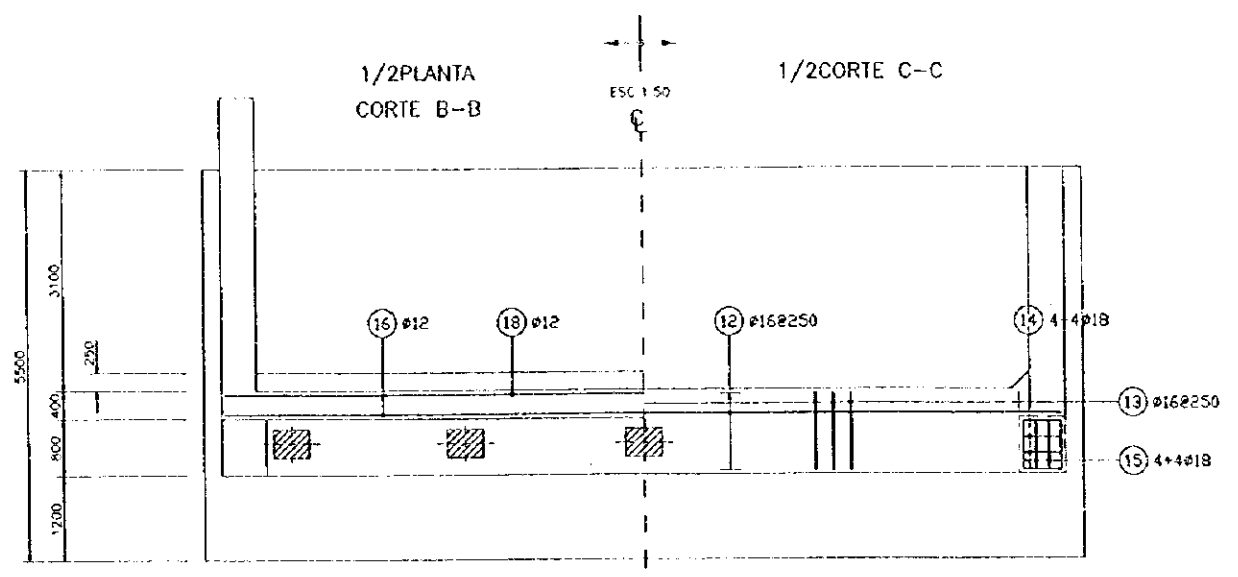
CORTE F-F
ESC 1:25



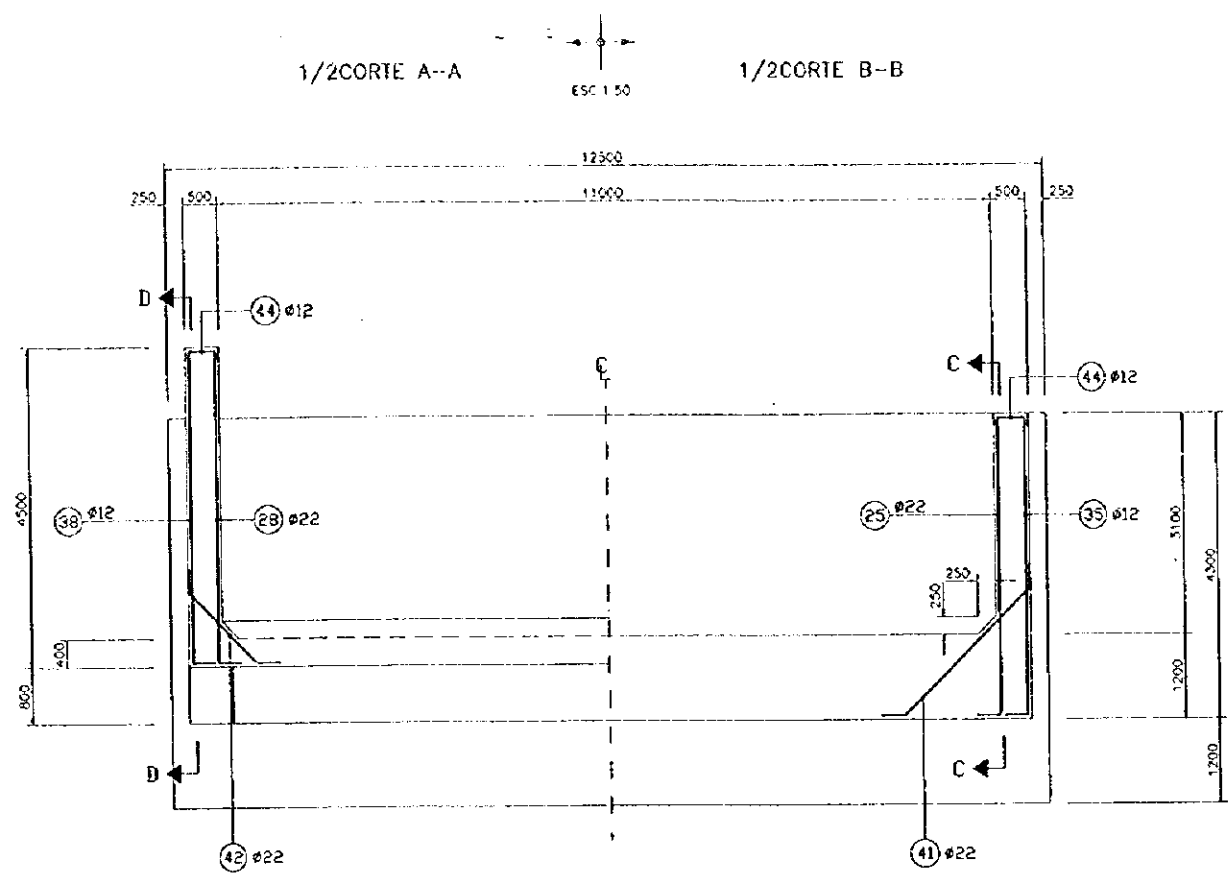
CORTE G-G
ESC 1:25



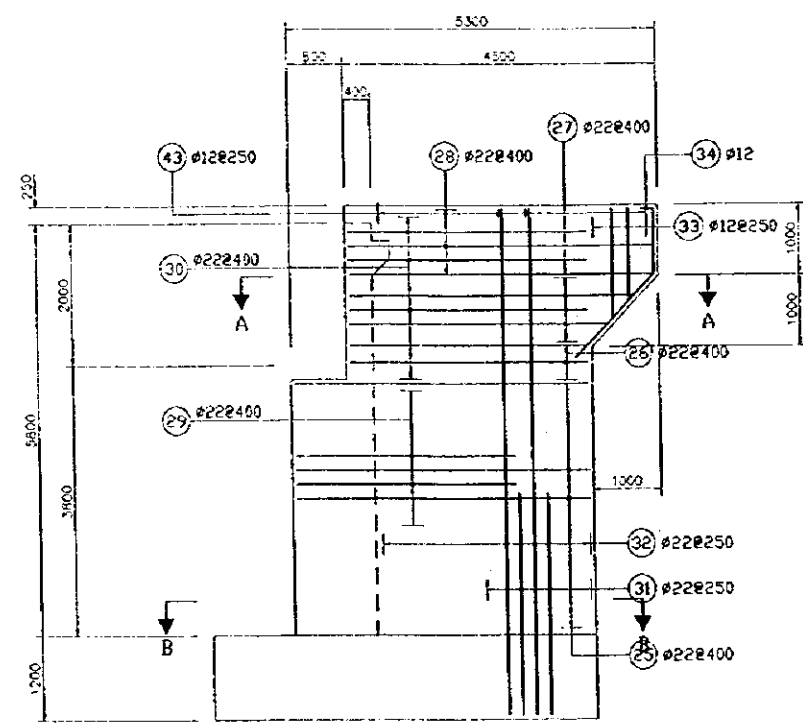
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|--|----------------------|
| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: SAN JOSE | |
| Camino: | |
| Provincia: | Region: RM |
| Proyecto: | Reviso: |
| Va. Bg. Ing. Jefe Depto. Puentes | Director de Vialidad |
| Edición: | |
| Fecha: | |



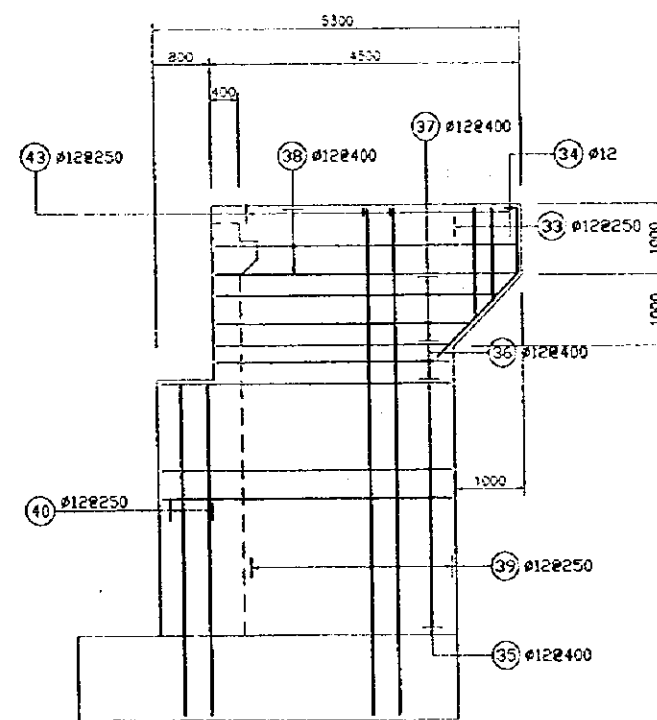
| | |
|--|------------|
| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: SAN JOSE ALA2 | |
| Carretera: | |
| Provincia: | Region: RM |
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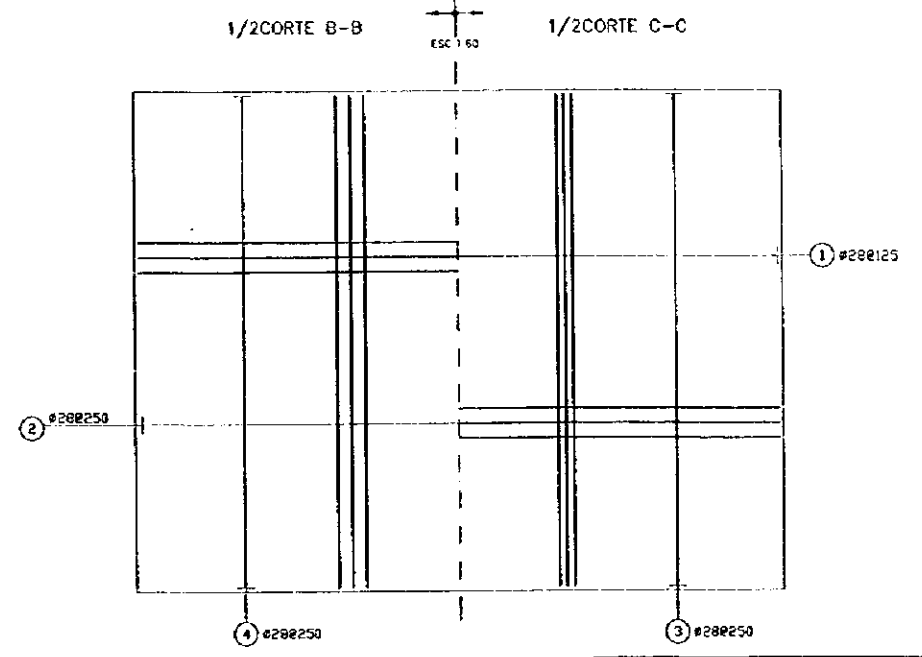
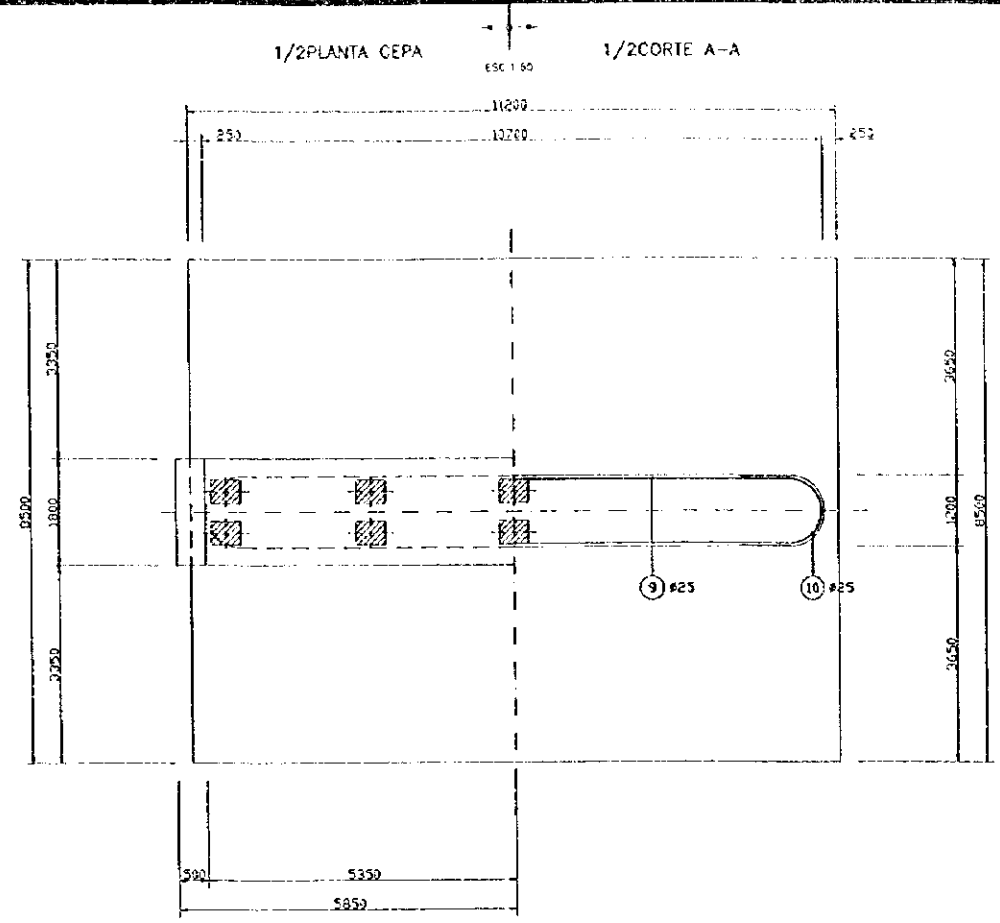
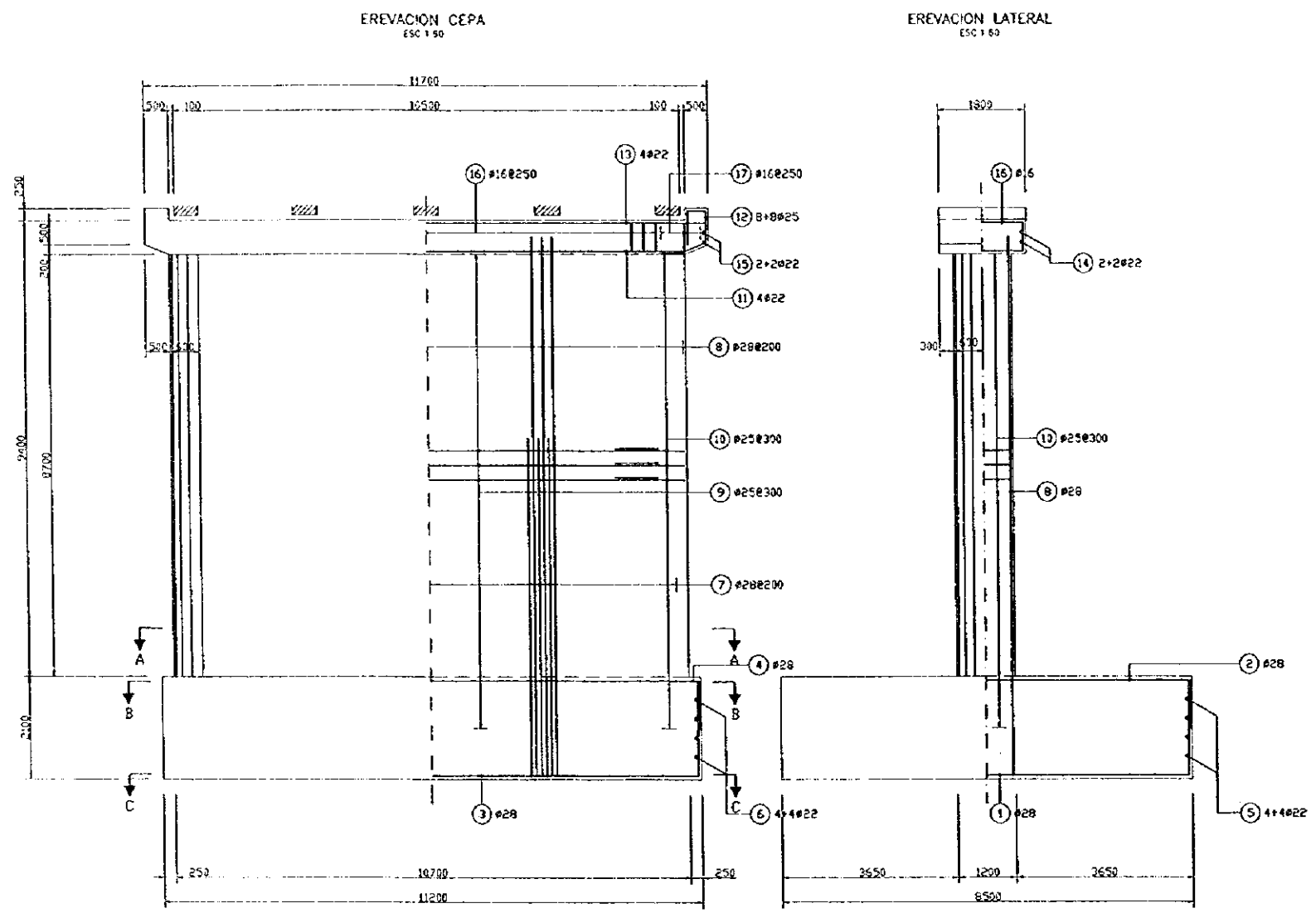
ENFIERRADURA ALA
CORTE C-C
ESC 1:50



ENFIERRADURA ALA
CORTE D-D
ESC 1:50

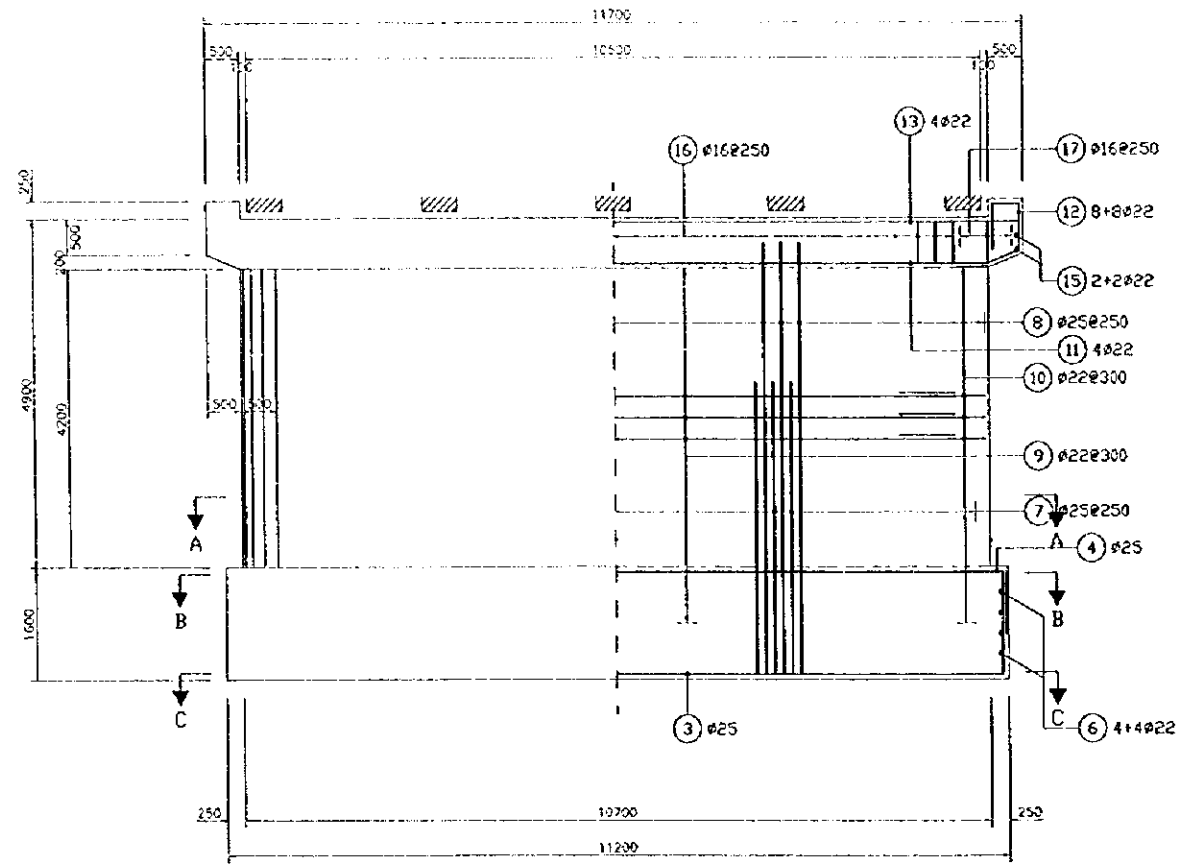


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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: SAN JOSE A1,A2 | |
| Camino: | |
| Provincia: | Region: RM |
| _____ Proyecto | _____ Reviso |
| _____ Va Bo Ing. Jefe Depto. Puentes | _____ Director de Vialidad |
| _____ Dibujó | _____ Fecha |

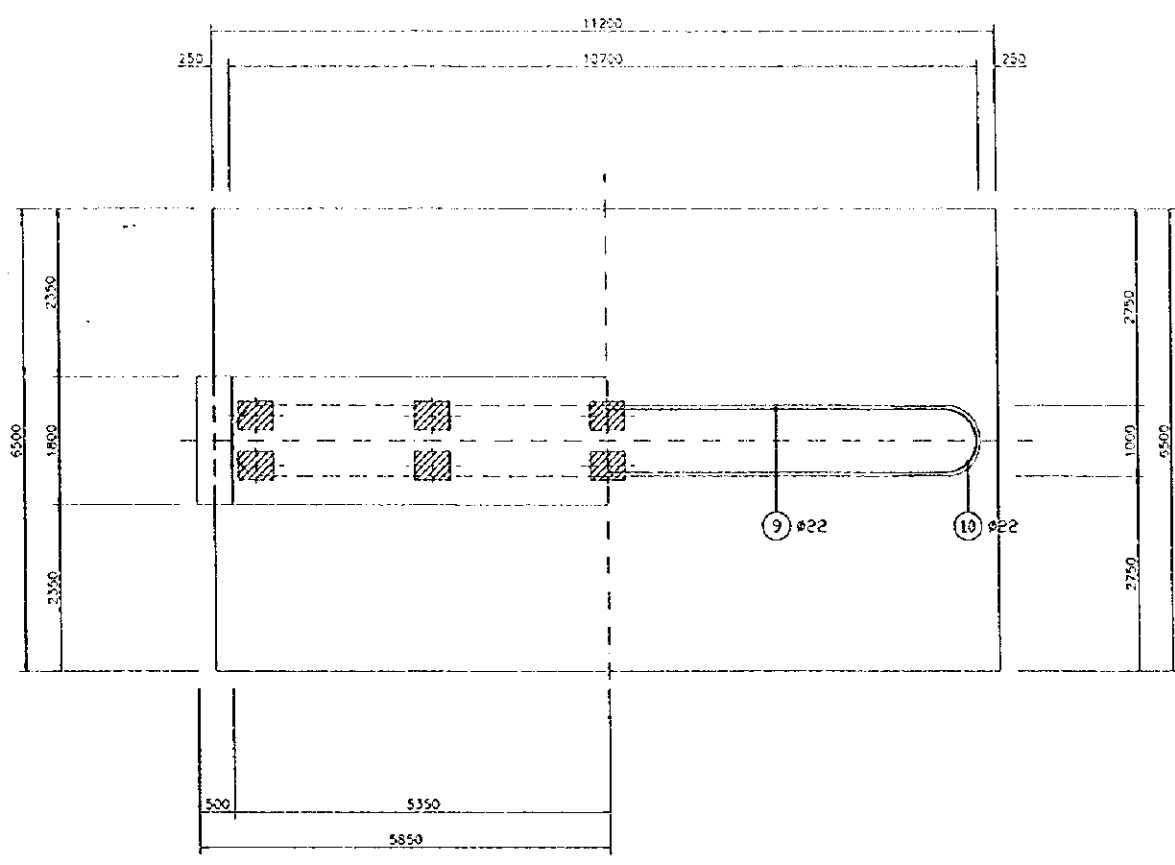


| | |
|--|------------|
| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: SAN JOSE P1 | |
| Camino: | |
| Provincial | Region: RM |
| | |
| | |
| | |
| Via 30 Ing. Jefe Depto. Puentes | |
| Director de Vialidad | |
| Echivo: _____ | |
| Fecha: _____ | |

EREVACION CEPA
ESC. 1:50

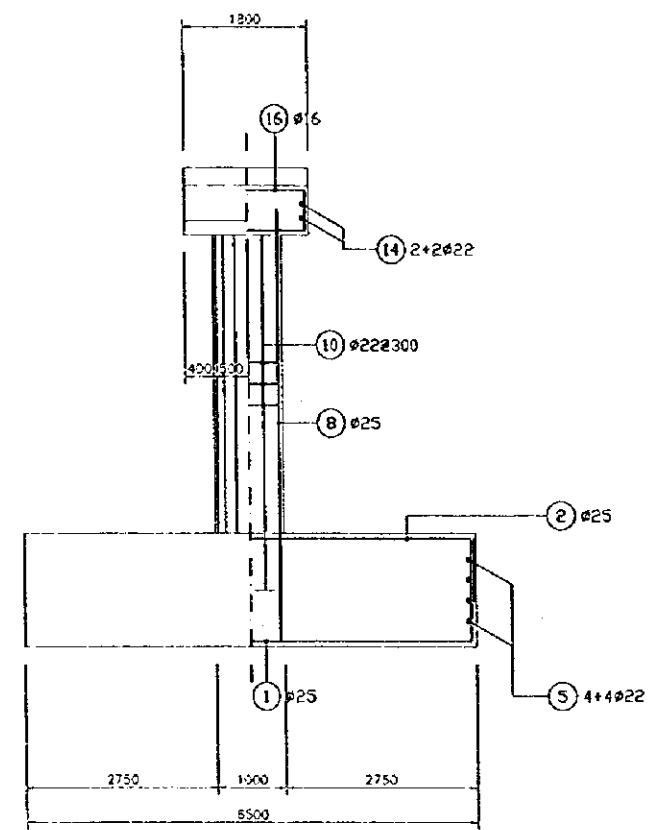


1/2 PLANTA CEPA
ESC. 1:50

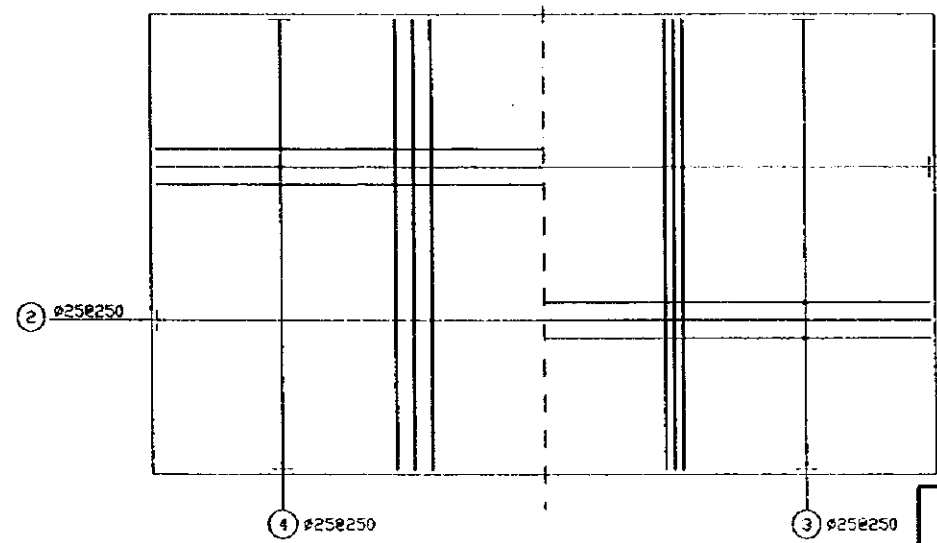


1/2 CORTE A-A

EREVACION LATERAL
ESC. 1:50



1/2 CORTE B-B



1/2 CORTE C-C

| | |
|--|----------------------|
| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: SAN JOSE P2 | |
| Camino: | |
| Provincia: | Region: RM |
| Proyecto | Reviso |
| Va. Dg. Ing. Jefe Depto. Puentes | Director de Vialidad |
| Dibujador | Fecha: |

Resultado del diseño

Tipo de Estructura : **Viga de Postensado**

Fecha :

(1) Datos Generales

Número de Punte :

Nombre del Punte : **SAN JOSE**

De la Ruta, Camino :

Rol Ruta :

En el Cauce :

Región : **RM : SANTIAGO**

Provincia :

Longitud del Punte : $L = 84.050 \text{ m}$, Luz(Longitud de cálculo) : $L_c = 27.250 \text{ m}$

Número de Pistas : **2**

Ancho : $1.000 + 10.000 + 1.000 = 12.000 \text{ m}$

(Pasillos) (Calzada) (Pasillos)

Pendiente : **1.0 1.5 1.0 %**

Espesor mínimo del Pavimento : **50 mm** , Espesor máximo del Pavimento : **125 mm**

Ancho de Baranda : $B_b = 200 \text{ mm}$, $h_b = 0.250 \text{ m}$

(2) Cargas

Baranda : $W_B = 0.050 \text{ t/m}$, $W_L = 0.020 \text{ t/m}$, $h = 1.100 \text{ m}$

Cargas de Pavimento : **2.30 t/m³**

Hormigón : **2.30 t/m³ (en masa)** , **2.50 t/m³ (armado y/o postensado)**

Acero : **7.85 t/m³**

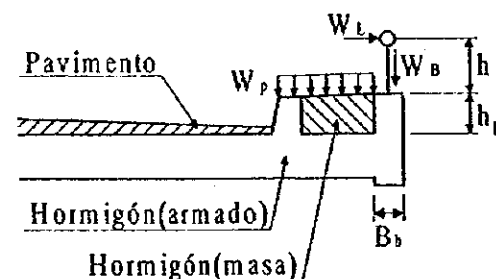
Peatones : $W_p = 0.415 \text{ t/m}^2$ (Losa)

0.293 t/m^2 (Viga)

Cargas de Tránsito : **HS20-44**

Cargas de Viento : $W_v = 0.244 \text{ t/m}^2$

Coefficientes sísmicos : $K_h = 0.15$, $K_v = 0.00$



(3) Material

Hormigón :

Losa y Travesaño grado : **H-30** $f_{cl} = 250 \text{ kg/cm}^2$, $f_{RC} = 100 \text{ kg/cm}^2$

$$E_{RC} = w_c^{1.5} \times 33 \sqrt{f_{RC}} = 57000 \sqrt{f_{RC}} \text{ psi} = 15800 \sqrt{f_{RC}} \text{ kg/cm}^2 = 2.50 \times 10^5 \text{ kg/cm}^2$$

$$w_c = 145 \text{ pcf} = 2.32 \text{ kg/m}^3 \quad (\text{AASHTO 8.7.1})$$

Viga grado : **H-40** $f_{cv} = 350 \text{ kg/cm}^2$, $E_{PC} = 3.01 \times 10^5 \text{ kg/cm}^2$

$$f_{ci}' = 280 \text{ kg/cm}^2 \quad E_{Pi} = 2.69 \times 10^5 \text{ kg/cm}^2$$

Acero para Armadura de Losa y Viga : **A63-42H** $f_y = 4200 \text{ kg/cm}^2$, $f_{sa} = 1690 \text{ kg/cm}^2$

$$E_s = 29,000,000 \text{ psi} = 2.1 \times 10^6 \text{ kg/cm}^2$$

Acero Travesaño y barras antisísmicas : **A44-28H** $f_y = 2800 \text{ kg/cm}^2$, $f_{sa} = 1400 \text{ kg/cm}^2$

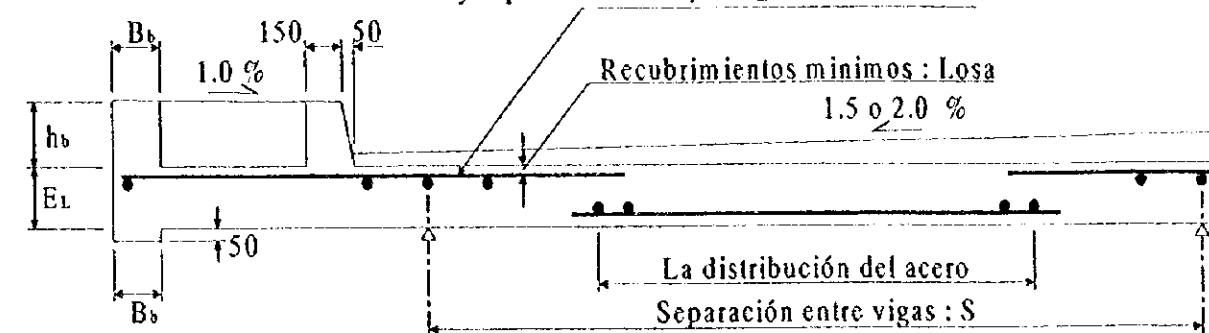
Acero (cable) : Grado **270 K** , **ASTM416-80** Cable : **7-12.7** $A_s^* = 6.910 \text{ cm}^2$

Tensión de ruptura : $f_{pu} = 18980 \text{ kg/cm}^2$, $E_s = 1.97 \times 10^6 \text{ kg/cm}^2$

Tensión de fluencia : $f_{py} = 16100 \text{ kg/cm}^2$

(4) Geometría :

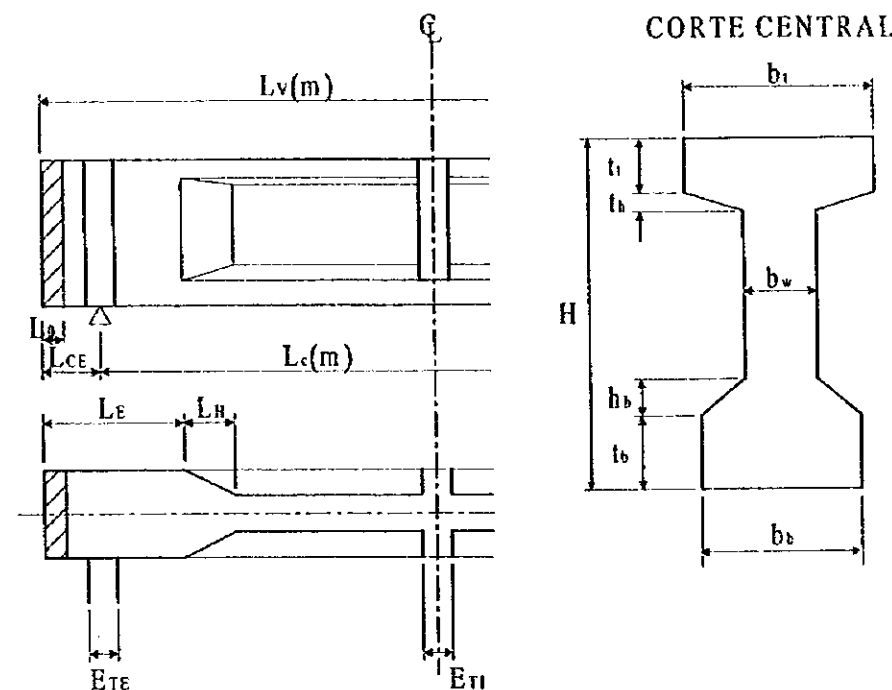
Determinación de número de barras y espaciamento : $\phi 16 @ 150 \text{ As} = 13.407 \text{ cm}^2$



Espesor de losa : $E_L = 170 \text{ mm}$, Recubrimientos mínimos : Losa **3.0 cm**

La distribución del acero en el fondo de losa : $\phi 12 @ 125 \text{ As} = 9.048 \text{ cm}^2$

Número de Vigas : $n_v = 5$, Separación entre vigas : $S = 2.500 \text{ m}$, $4 @ 2.500 = 10.000 \text{ m}$



Longitud de Viga : $L_v = 27.950 \text{ m}$, $L_{CE} = 0.350 \text{ m}$, $L_0 = 100 \text{ mm}$

$L_E = 1600 \text{ mm}$, $L_H = 600 \text{ mm}$, $E_{TE} = 300 \text{ mm}$, $E_{TI} = 250 \text{ mm}$

Altura de Viga : $H = 1.850 \text{ m}$

$b_1 = 1000 \text{ mm}$, $t_1 = 150 \text{ mm}$, $t_b = 150 \text{ mm}$, $b_w = 200 \text{ mm}$

$h_b = 250 \text{ mm}$, $t_b = 250 \text{ mm}$, $b_b = 500 \text{ mm}$

Coefficiente de rozamiento parásito : $K = 0.0045$

Coefficiente de rozamiento en curva : $\mu = 0.25$

Número de Travesaños (Intermedio) : **2**

Separación entre Travesaños : **9.000 m**

Ancho Mesa Mínimo : $W_m = 10.500 \text{ m}$

| No. | α (deg) | R(m) |
|-----|----------------|-------|
| 1 | 7.0 | 10.00 |
| 2 | 7.0 | 10.00 |
| 3 | 7.0 | 10.00 |
| 4 | 7.0 | 10.00 |
| 5 | 0.0 | 0.00 |
| 6 | 0.0 | 0.00 |
| 7 | 0.0 | 0.00 |

Número de ductos a descontar :
 $N_d = 4$, $d = 80$ mm
 $N_c = 3$, $C_s = 140$ mm
 $C_{bc} = 120$ mm, $C_{bc} = 90$ mm
 $C_r = 180$ mm
 $C_{be} = 360$ mm, $C_{be} = 360$ mm
 $C_{dc} = 12.0$ cm, $C_{de} = 90.0$ cm

Recubrimientos mínimos : Viga 2.5 cm
 1: $\phi 12 @ 200$, 2: $\phi 12 @ 200$, 3: $\phi 16 n 7$, 4: $\phi 22$
 5: $\phi 12$, 6: $\phi 10 n 6$, 7: $\phi 12$
 8: $\phi 25 n 3$, 9: $\phi 3$ "

Cuantificación del Postensado

(5) Diseño de Losa

| E_M (cm) | E_L (cm) | d_{req} (cm) | d (cm) | A_{sreq} (cm ²) | A_s (cm ²) | | | |
|-------------------|------------|----------------|----------|---|--------------------------|---------------------------|----------------------------|----|
| 16.7 | ≤ 17.0 | OK | 12.4 | ≤ 14.0 | OK | 10.786 | ≤ $\phi 16 @ 150 = 13.407$ | OK |
| ϕM_o (tm/m) | | Mu (tm/m) | | Distribución : A_s (cm ²) | | | | |
| 6.424 | ≥ | 4.709 | OK | 67 (%) | 7.227 | ≤ $\phi 12 @ 125 = 9.048$ | OK | |

(6) Diseño de Viga

$(x = l/2 = 13.625$ m)

| Fatiga (kg/cm ²) | Exterior | | Interior | | | | | |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------|----|-----------|----|
| | Transferencial | Servicio | Transferencial | Servicio | | | | |
| Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | | | | |
| Viga Superior: f_{vs} | 4 ≤ 168 | OK | 63 ≤ 140 | OK | 4 ≤ 168 | OK | 71 ≤ 140 | OK |
| Viga Inferior: f_{vi} | 114 ≤ 168 | OK | -1 ≥ -15 | OK | 114 ≤ 168 | OK | -12 ≥ -15 | OK |

$(x = 10.379$ m) Interior

| Fatiga (kg/cm ²) | Transferencial | Servicio | | |
|------------------------------|-----------------------------------|-----------------------------------|----------|----|
| | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | | |
| Viga Superior: f_{vs} | 1 ≤ 168 | OK | 65 ≤ 140 | OK |
| Viga Inferior: f_{vi} | 119 ≤ 168 | OK | -1 ≥ -15 | OK |

| A_p (cm ²) | A_s (cm ²) | ϕM_o (tm) | Mu (tm) | ϕM_o (tm) | $1.2M_o$ (tm) | | |
|--------------------------|--------------------------|-----------------|-----------|-----------------|---------------|-----------|----|
| 4x6.910 = 27.640 | 6- $\phi 12 = 6.786$ | 957.717 | ≥ 817.272 | OK | 957.717 | ≥ 701.225 | OK |

(7) Verificación de Corte

| | | | | |
|-----------------------|---|--|-----------------------------|-----------------|
| $h/2 =$ | 0.925 m | $A_v = 6-\phi 12 = 6.786$ cm ² | $s = 20.0$ cm | $d_p = 95.0$ cm |
| $V_u =$ | 112.794 t | ≤ $\phi(V_c + V_s) = 0.9 \times (100.496 + 135.381) = 212.289$ t | | OK |
| Cálculo de Conectores | $A_v = 4-\phi 12 = 4.524$ cm ² | $V_u = 112.794$ t | ≤ $\phi V_{un} = 454.371$ t | OK |

(8) Deflexión de Transferencia

| δ_o (cm) | δ_r (cm) | Lc/800 | |
|-----------------|-----------------|--------|----|
| 2.8 | 1.0 | ≤ 3.4 | OK |

(9) Cálculo de Travesaño

| A_{sreq} (cm ²) | A_s (cm ²) | |
|-------------------------------|--------------------------|----|
| 10.008 | ≤ 11.624 | OK |

(10) Cálculo de Anclajes Antisísmicos

| A_p (cm ²) | R_v (t) | | |
|--------------------------|---------------------------|----|--------|
| 51.083 | ≤ 4x3x $\phi 25 = 58.908$ | OK | 50.729 |

Resultado del diseño

Tipo de Estructura : Estribo

Fecha :

(1) Datos Generales

Número de Puente:

Nombre del Puente : SAN JOSE A1,A2

De la Ruta, Camino :

Rol Ruta:

En el Cauce :

Región RM : SANTIAGO

Provincia :

Longitud del Puente : L = 84.050 m

Número de Pistas : 2

Ancho : 1.000 + 10.000 + 1.000 = 12.000 m
(Pasillos) (Calzada) (Pasillos)

Pendiente : 1.0 , 1.5 , 1.0 %

(2) Cargas

Peso específico suelo : $\gamma_s = 1.50 \text{ t/m}^3$ Carga de Hormigón : $w_c = 2.50 \text{ t/m}^3$

Coeficiente de Aceleración de Diseño : A = 0.15

Longitud de Viga : $L_v = 27.950 \text{ m}$, Luz : $L_c = 27.250 \text{ m}$ (Longitud de cálculo)Número de Vigas : $n_v = 5$

Separación entre vigas : S = 2.500 m , 4 @ 2.500 = 10.000 m

Altura de Viga : h = 1.850 m , Ancho de Viga : $b_v = 50.0 \text{ cm}$ Carga de Superestructura : $R_v = 50.73 \text{ t}$, Carga de Tránsito : HS20 - 44
(para 1 apoyo)Carga de superficie : $Q_w = 1.00 \text{ t/m}^2$, Carga de Pavimento : $\gamma_c = 2.30 \text{ t/m}^3$

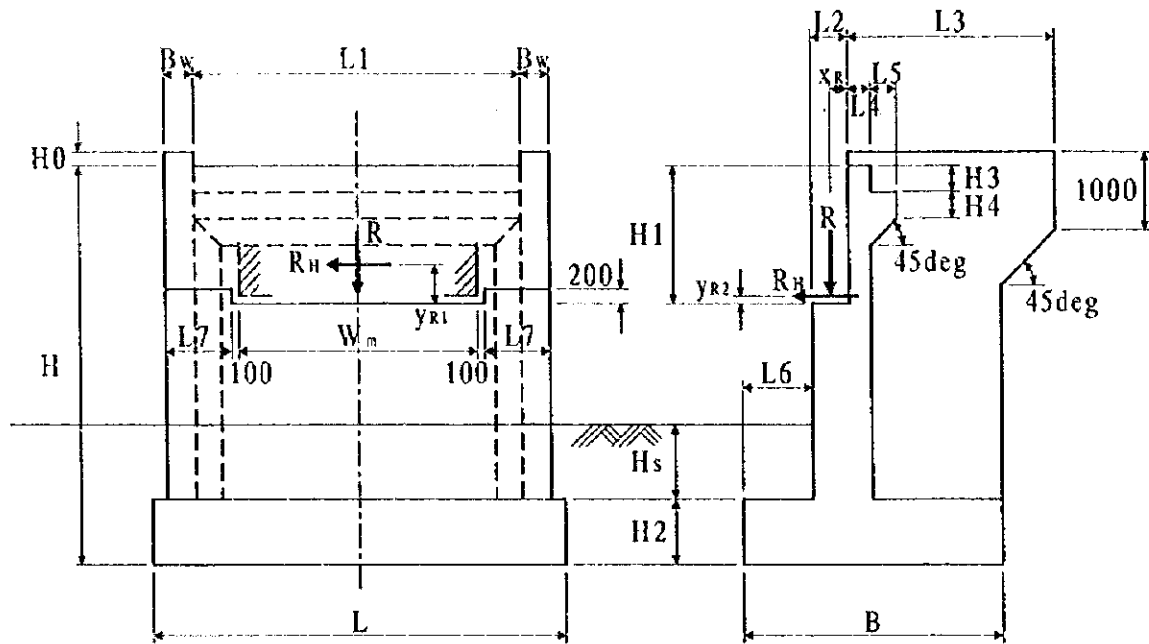
(3) Material

Hormigón : grado : H-30

 $f_c' = 250 \text{ kg/cm}^2$, $w_c = 145 \text{ pcf} = 2.32 \text{ kg/m}^3$ (AASHTO 8.7.1) $E_c = w_c^{1.5} 33 (f_c')^{1/2} = 57000 (f_c')^{1/2}$ $= w_c^{1.5} (0.0428) (f_c')^{1/2} = 4729.77 (f_c')^{1/2} = 2.5 \times 10^5 \text{ kg/cm}^2$ Acero : A63-42H $f_y = 4200 \text{ kg/cm}^2$, $f_{ca} = 1690 \text{ kg/cm}^2$, $E_s = 2.1 \times 10^6 \text{ kg/cm}^2$ Ángulo de fricción interna relleno : $\phi = 25 \text{ deg}$ Adhesión entre dado y suelo de fundación : $c_B = 0.00 \text{ t/m}^2$ Ángulo de fricción interna suelo de fundación : $\phi_B = 42 \text{ deg}$ Ángulo de fricción entre dado y suelo de fundación : $\delta_B = 30 \text{ deg}$

(4) Geometría

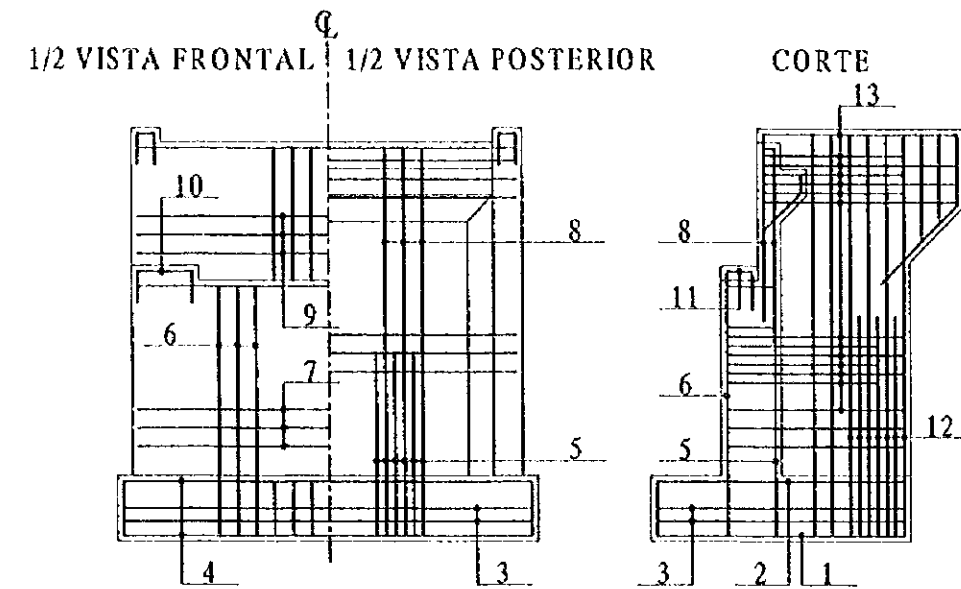
Longitud de Acceso : $I_0 = 4.000 \text{ m}$, Espesor de Acceso : $h_A = 0.250 \text{ m}$



- $B = 5500 \text{ mm}$, $L = 12500 \text{ mm}$, $H = 7000 \text{ mm}$, $H_s = 2000 \text{ mm}$, $W_m = 10500 \text{ mm}$
 $B_w = 500 \text{ mm}$, $y_{R1} = 1600 \text{ mm}$, $y_{R2} = 130 \text{ mm}$, $x_R = 400 \text{ mm}$
 $L1 = 11000 \text{ mm}$, $L2 = 800 \text{ mm}$, $L3 = 4500 \text{ mm}$, $L4 = 400 \text{ mm}$, $L5 = 250 \text{ mm}$
 $L6 = 1200 \text{ mm}$, $L7 = 650 \text{ mm}$
 $H0 = 250 \text{ mm}$, $H1 = 2200 \text{ mm}$, $H2 = 1200 \text{ mm}$, $H3 = 250 \text{ mm}$, $H4 = 250 \text{ mm}$

(5) Arriostamiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm
Elevación 4.0 cm



- 1 : $\phi 22 @ 250$ 2 : $\phi 22 @ 125$ 3 : $\phi 18 \text{ n } 3$ 4 : $\phi 18 @ 250$ 5 : $\phi 18 @ 125$
 6 : $\phi 18 @ 250$ 7 : $\phi 16 @ 250$ 8 : $\phi 18 @ 250$ 9 : $\phi 12 @ 250$ 10 : $\phi 18 \text{ n } 4$
 11 : $\phi 18 \text{ n } 4$ 12 : $\phi 22 @ 125$ 13 : $\phi 22 @ 200$

Suma del Diseño del Estribo

(7) Fuerzas

| Caso | e (m) | |
|----------|--------------------------|----|
| Estático | 0.497 \leq B/6 = 0.917 | OK |
| Sísmico | 1.802 \leq B/3 = 1.833 | OK |

(8) Análisis de Estabilidad

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{ADM}(t/m^2)$ | F.S.(O) | |
|----------|------------------|---------------------|------------------|---------|--|
| Estático | 3.628 \geq 1.5 | 24.80 \leq 246.09 | 6.618 \geq 2.0 | OK | |
| Sísmico | 1.254 \geq 1.2 | 55.97 \leq 121.55 | 1.549 \geq 1.5 | OK | |

(9) Diseño del Muro de Retención

Diseño del refuerzo anterior (Caso estático)

| $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | |
|-----------------------------------|-------------------|-------------|--|
| 9.194 \leq $\phi 18@250=10.180$ | 4.97 \leq 13.47 | OK | |

Diseño del refuerzo posterior (Caso sísmico)

| $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|-----------------------------------|-------------------|-----------------|--------------|----------------|--|
| 1.877 \leq $\phi 18@250=10.180$ | 1.35 \leq 13.47 | 0.4 \leq 20.0 | OK | | |

(10) Diseño del guarda rueda

| $A_s(cm^2)$ | M(tm) | $M_u(tm)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|---------------------------------|-------------------|-----------------|--------------|----------------|--|
| 4.992 \leq $\phi 18n4=10.180$ | 6.09 \leq 22.99 | 0.8 \leq 20.0 | OK | | |

(11) Diseño del Cuerpo del Estribo

| Caso | $A_s(cm^2/m)$ | $f_t(kg/cm^2)$ | $f_{cs}(kg/cm^2)$ | $f_t(kg/cm^2)$ | $f_{cs}(kg/cm^2)$ |
|----------|-----------------------------|----------------|-------------------|----------------|-------------------|
| Estático | 13.218 \leq $\phi 18@125$ | 1.9 \leq 100 | 57.1 \leq 1690 | | |
| Sísmico | 11.574 \leq 20.360 | 2.3 \leq 133 | 72.1 \leq 2248 | | |

| Caso | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|-----------------|----------------|--|
| Estático | 0.9 \leq 15.0 | OK | |
| Sísmico | 1.0 \leq 20.0 | OK | |

(12) Diseño de Fundaciones

Diseño del dado frontal

| Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|----------------------------|--------------------|-----------------|--------------|----------------|--|
| Estático | 8.554 \leq $\phi 22@250$ | 14.78 \leq 65.23 | 1.1 \leq 15.0 | OK | | |
| Sísmico | 14.126 \leq 15.204 | 32.47 \leq 65.23 | 2.5 \leq 20.0 | OK | | |

Diseño del dado trasero

| Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|-----------------------------|---------------------|-----------------|--------------|----------------|--|
| Estático | 13.576 \leq $\phi 22@125$ | 23.47 \leq 128.73 | 0.8 \leq 15.0 | OK | | |
| Sísmico | 27.345 \leq 30.408 | 62.86 \leq 128.73 | 2.8 \leq 20.0 | OK | | |

(13) Diseño del Muro Ala

| | Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----|----------|-----------------------------|--------------------|-----------------|--------------|----------------|--|
| a | Estático | 13.573 \leq $\phi 22@200$ | 9.38 \leq 31.70 | 1.2 \leq 15.0 | OK | | |
| | Sísmico | 7.213 \leq 19.005 | 6.63 \leq 31.70 | 0.8 \leq 20.0 | OK | | |
| b | Estático | 17.549 \leq $\phi 22@200$ | 12.13 \leq 31.70 | 1.7 \leq 15.0 | OK | | |
| | Sísmico | 11.072 \leq 19.005 | 10.18 \leq 31.70 | 1.4 \leq 20.0 | OK | | |
| b' | Estático | 6.407 \leq $\phi 22@400$ | 4.43 \leq 16.19 | 1.2 \leq 15.0 | OK | | |
| | Sísmico | 4.287 \leq 9.503 | 3.94 \leq 16.19 | 1.1 \leq 20.0 | OK | | |
| c | Estático | 22.935 \leq $\phi 22@125$ | 15.86 \leq 49.42 | 2.5 \leq 15.0 | OK | | |
| | Sísmico | 15.122 \leq 30.408 | 13.90 \leq 49.42 | 2.2 \leq 20.0 | OK | | |
| c' | Estático | 7.080 \leq $\phi 22@250$ | 4.90 \leq 25.57 | 1.4 \leq 15.0 | OK | | |
| | Sísmico | 4.793 \leq 15.204 | 4.41 \leq 25.57 | 1.3 \leq 20.0 | OK | | |
| d | Estático | 0.490 \leq $\phi 22@400$ | 0.34 \leq 16.19 | 0.2 \leq 15.0 | OK | | |
| | Sísmico | 0.221 \leq 9.503 | 0.20 \leq 16.19 | 0.1 \leq 20.0 | OK | | |

Resultado del diseño

Tipo de Estructura : Cepa

Fecha :

(1) Datos Generales

Nombre del Puente : SAN JOSE P1
 De la Ruta, Camino :
 En el Cauce :
 Región : RM : SANTIAGO
 Provincia :
 Longitud del Puente : L = 84.050 m
 Número de Pistas : 2
 Ancho : 1.000 + 10.000 + 1.000 = 12.000 m
 (Pasillos) (Calzada) (Pasillos)
 Pendiente : 1.0 , 1.5 , 1.0 %

Número de Puente :

Rol Ruta :

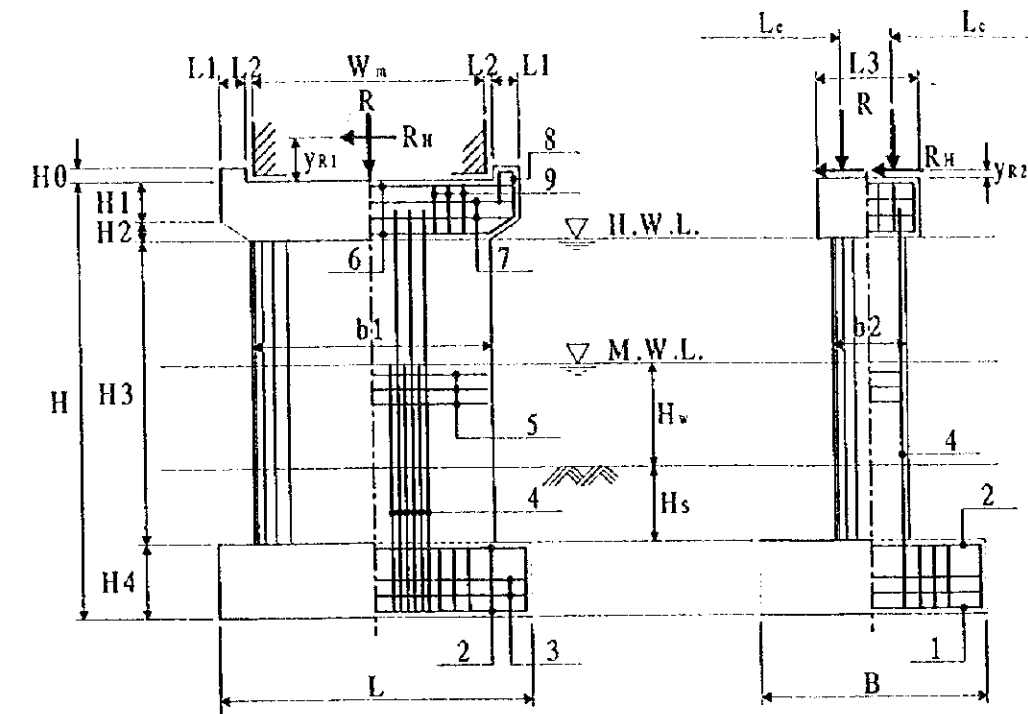
(2) Cargas

Peso específico suelo : $\gamma_s = 1.50 \text{ t/m}^3$
 Cargas de Hormigón : $w_c = 2.50 \text{ t/m}^3$
 Coeficiente de Aceleración de Diseño : $A = 0.15$
 Longitud de Viga : $L_v = 27.950 \text{ m}$, Luz : $L_c = 27.250 \text{ m}$ (Longitud de cálculo)
 Número de Vigas : $n_v = 5$
 Separación entre vigas : $S = 2.500 \text{ m}$, 4 @ 2.500 = 10.000 m
 Ancho de Viga : $b_v = 50.0 \text{ cm}$
 Carga de Superestructura : $R_v = 50.73 \text{ t}$ (para 1 apoyo)
 Cargas de Tránsito : HS20 - 44
 Altura de la Superestructura : $H_v = 1.850 \text{ m}$
 Carga de viento sobre Superestructura : $W_v = 0.244 \text{ t/m}^2$
 Carga de viento sobre infraestructura : $W_E = 0.244 \text{ t/m}^2$
 Velocidad del cauce : $V = 2.000 \text{ m/s}$

(3) Material

Hormigón : H-30 $f'_c = 250 \text{ kg/cm}^2$, $w_c = 145 \text{ pcf} = 2.32 \text{ kg/m}^3$ (AASHTO 8.7.1)
 $E_c = w_c^{1.5} 33(f'_c)^{1/2} = 57000(f'_c)^{1/2}$
 $= w_c^{1.5} (0.0428)(f'_c)^{1/2} = 4729.77(f'_c)^{1/2} = 2.5 \times 10^5 \text{ kg/cm}^2$
 Acero : A63-42H $f_y = 4200 \text{ kg/cm}^2$, $f_{sa} = 1690 \text{ kg/cm}^2$, $E_s = 2.1 \times 10^6 \text{ kg/cm}^2$
 Adhesión entre dado y suelo de fundación : $c_B = 0.00 \text{ t/m}^2$
 Ángulo de fricción interna suelo de fundación : $\phi_B = 42 \text{ deg}$
 Ángulo de fricción entre dado y suelo de fundación : $\delta_B = 30 \text{ deg}$

(4) Geometría



$B = 8500 \text{ mm}$, $L = 11200 \text{ mm}$, $H = 11500 \text{ mm}$, $H_s = 2000 \text{ mm}$, $H_w = 1000 \text{ mm}$
 $y_{R1} = 1600 \text{ mm}$, $y_{R2} = 130 \text{ mm}$, $L1 = 500 \text{ mm}$, $L2 = 100 \text{ mm}$, $L3 = 1800 \text{ mm}$
 $b1 = 10700 \text{ mm}$, $b2 = 1200 \text{ mm}$, $W_m = 10500 \text{ mm}$, $H0 = 250 \text{ mm}$
 $H1 = 500 \text{ mm}$, $H2 = 200 \text{ mm}$, $H3 = 8700 \text{ mm}$, $H4 = 2100 \text{ mm}$

Arriostramiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm
 Elevación 4.0 cm
 1 : $\phi 28 @ 125$, 2 : $\phi 28 @ 250$, 3 : $\phi 22 \text{ n } 4$, 4 : $\phi 28 @ 100$
 5 : $\phi 25 @ 300$, 6 : $\phi 22 \text{ n } 4$, 7 : $\phi 22 \text{ n } 2$, 8 : $\phi 25 \text{ n } 8$
 9 : $\phi 16 @ 250$

Suma del Diseño de la Cepa

(6) Fuerzas

Longitudinal :

| Caso | e_p (m) | |
|---------|--------------------------|----|
| Sísmico | 2.773 $\leq B/3 = 2.833$ | OK |

Transversal :

| Caso | e_L (m) | |
|----------|--------------------------|----|
| Estático | 0.153 $\leq L/6 = 1.867$ | OK |
| Sísmico | 2.942 $\leq L/3 = 3.733$ | OK |

(7) Análisis de Estabilidad

Longitudinal :

| Caso | F.S.(S) | q_{max} (t/m ²) | q_{all} (t/m ²) | F.S.(O) | |
|----------|------------------|-------------------------------|-------------------------------|------------------|----|
| Estático | | 23.39 \leq | 524.83 | | OK |
| Sísmico | 2.057 ≥ 1.2 | 46.86 \leq | 288.58 | 1.533 ≥ 1.5 | OK |

Transversal :

| Caso | F.S.(S) | q_{max} (t/m ²) | q_{all} (t/m ²) | F.S.(O) | |
|----------|-------------------|-------------------------------|-------------------------------|-------------------|----|
| Estático | 47.608 ≥ 1.5 | 13.28 \leq | 513.53 | 36.513 ≥ 2.0 | OK |
| Sísmico | 2.056 ≥ 1.2 | 34.31 \leq | 363.96 | 1.904 ≥ 1.5 | OK |

(8) Diseño del guarda rueda

| A_s (cm ²) | M (tm) | M_u (tm) | v (kg/cm ²) | v_c (kg/cm ²) | |
|---|--------------|------------|---------------------------|-----------------------------|----|
| 25.861 $\leq \phi 25 \text{ n } 8 = 39.272$ | 23.78 \leq | 65.09 | 11.5 \leq | 20.0 | OK |

(9) Diseño de la cepa

| A_s (cm ²) | f_c (kg/cm ²) | f_{cs} (kg/cm ²) | f_t (kg/cm ²) | f_{ts} (kg/cm ²) |
|--|-----------------------------|--------------------------------|-----------------------------|--------------------------------|
| 572.579 $\leq \phi 28 @ 100 = 591.168$ | 69.9 \leq | 133 | 1621.3 \leq | 2248 |

| v (kg/cm ²) | v_c (kg/cm ²) | |
|---------------------------|-----------------------------|----|
| 1.4 \leq | 20.0 | OK |

(10) Diseño de Fundaciones

| Caso | A_s (cm ² /m) | M (tm/m) | M_u (tm/m) | v (kg/cm ²) | v_c (kg/cm ²) | |
|----------|--------------------------------------|---------------|--------------|---------------------------|-----------------------------|----|
| Estático | 39.229 $\leq \phi 28 @ 125 = 49.264$ | 120.87 \leq | 372.68 | 2.3 \leq | 15.0 | OK |
| Sísmico | 46.723 $\leq \phi 28 @ 125 = 49.264$ | 191.46 \leq | 372.68 | 3.5 \leq | 20.0 | OK |

Resultado del diseño

Tipo de Estructura : Cepa

Fecha :

(1) Datos Generales

Nombre del Puente : SAN JOSE P2

De la Ruta, Camino :

En el Cauce :

Región : RM : SANTIAGO

Provincia :

Longitud del Puente : $L = 84.050$ m

Número de Pistas : 2

Ancho : $1.000 + 10.000 + 1.000 = 12.000$ m

(Pasillos) (Calzada) (Pasillos)

Pendiente : 1.0, 1.5, 1.0 %

Número de Puente :

Rol Ruta :

(2) Cargas

Peso específico suelo : $\gamma_s = 1.50$ t/m³Cargas de Hormigón : $w_c = 2.50$ t/m³Coeficiente de Aceleración de Diseño : $A = 0.15$ Longitud de Viga : $L_v = 27.950$ m, Luz : $L_c = 27.250$ m (Longitud de cálculo)Número de Vigas : $n_v = 5$ Separación entre vigas : $S = 2.500$ m, 4 @ 2.500 = 10.000 mAncho de Viga : $b_b = 50.0$ cmCarga de Superestructura : $R_v = 50.73$ t (para 1 apoyo)

Cargas de Tránsito : HS20 - 44

Altura de la Superestructura : $H_v = 1.850$ mCarga de viento sobre Superestructura : $W_v = 0.244$ t/m²Carga de viento sobre infraestructura : $W_E = 0.244$ t/m²Velocidad del cauce : $V = 2.000$ m/s

(3) Material

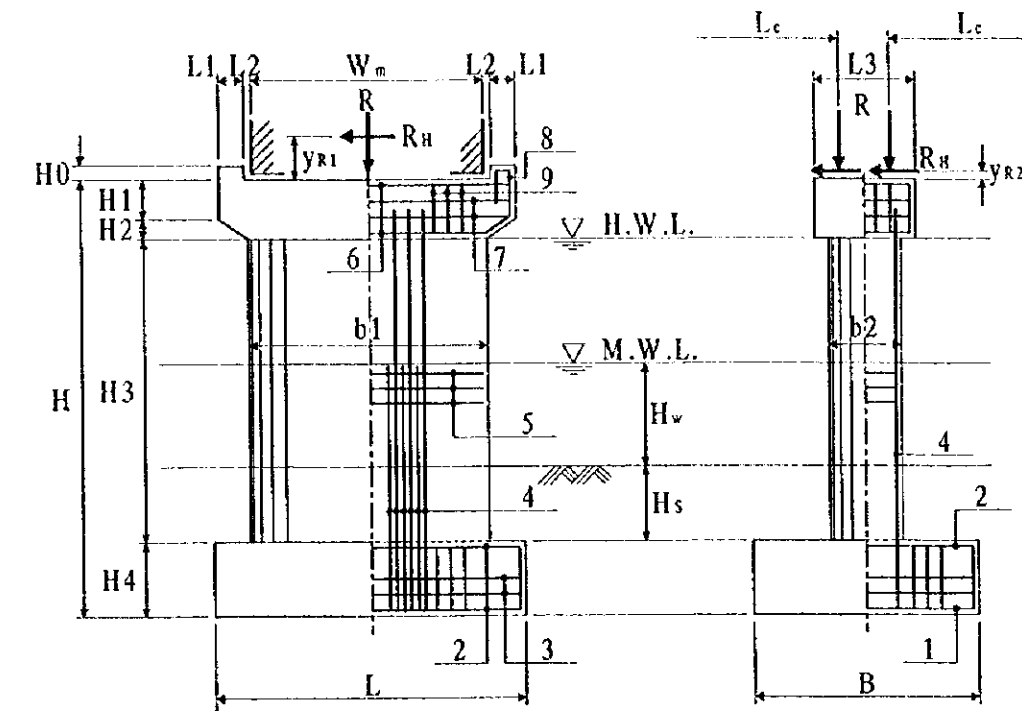
Hormigón : H-30 $f'_c = 250$ kg/cm², $w_c = 145$ pcf = 2.32 kg/m³ (AASHTO 8.7.1)

$$E_c = w_c^{1.5} 33 (f'_c)^{1/2} = 57000 (f'_c)^{1/2}$$

$$= w_c^{1.5} (0.0428) (f'_c)^{1/2} = 4729.77 (f'_c)^{1/2} = 2.5 \times 10^5 \text{ kg/cm}^2$$

Acero : A63-42H $f_y = 4200$ kg/cm², $f_{sa} = 1690$ kg/cm², $E_s = 2.1 \times 10^6$ kg/cm²Adhesión entre dado y suelo de fundación : $c_B = 0.00$ t/m²Ángulo de fricción interna suelo de fundación : $\phi_B = 42$ degÁngulo de fricción entre dado y suelo de fundación : $\delta_B = 30$ deg

(4) Geometría



$B = 6500$ mm, $L = 11200$ mm, $H = 6500$ mm, $H_s = 2000$ mm, $H_w = 1000$ mm
 $y_{R1} = 1600$ mm, $y_{R2} = 130$ mm, $L1 = 500$ mm, $L2 = 100$ mm, $L3 = 1800$ mm
 $b1 = 10700$ mm, $b2 = 1000$ mm, $W_m = 10500$ mm, $H0 = 250$ mm
 $H1 = 500$ mm, $H2 = 200$ mm, $H3 = 4200$ mm, $H4 = 1600$ mm

Arriostamiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm

Elevación 4.0 cm

1 : ϕ 25 @125, 2 : ϕ 25 @250, 3 : ϕ 22 n 4, 4 : ϕ 25 @1255 : ϕ 22 @300, 6 : ϕ 22 n 4, 7 : ϕ 22 n 2, 8 : ϕ 22 n 89 : ϕ 16 @250

Suma del Diseño de la Cepa

(6) Fuerzas

Longitudinal :

| Caso | e_p (m) | |
|---------|--------------------------|----|
| Sísmico | 2.101 $\leq B/3 = 2.167$ | OK |

Transversal :

| Caso | e_t (m) | |
|----------|--------------------------|----|
| Estático | 0.115 $\leq L/6 = 1.867$ | OK |
| Sísmico | 2.329 $\leq L/3 = 3.733$ | OK |

(7) Análisis de Estabilidad

Longitudinal :

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{all}(t/m^2)$ | F.S.(O) | |
|----------|------------------|------------------|------------------|------------------|----|
| Estático | | 24.66 | ≤ 428.08 | | OK |
| Sísmico | 1.713 ≥ 1.2 | 44.61 | ≤ 213.28 | 1.547 ≥ 1.5 | OK |

Transversal :

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{all}(t/m^2)$ | F.S.(O) | |
|----------|-------------------|------------------|------------------|-------------------|----|
| Estático | 40.042 ≥ 1.5 | 13.50 | ≤ 417.35 | 48.738 ≥ 2.0 | OK |
| Sísmico | 1.713 ≥ 1.2 | 27.00 | ≤ 317.61 | 2.405 ≥ 1.5 | OK |

(8) Diseño del guarda rueda

| A_s (cm ²) | M(tm) | M_u (tm) | v (kg/cm ²) | v_u (kg/cm ²) | |
|---|-------|--------------|---------------------------|-----------------------------|----|
| 25.861 $\leq \phi 22 \text{ n } 8 = 30.408$ | 23.78 | ≤ 50.95 | 11.5 | ≤ 20.0 | OK |

(9) Diseño de la cepa

| A_s (cm ²) | f_c (kg/cm ²) | f_{cu} (kg/cm ²) | f_t (kg/cm ²) | f_{ts} (kg/cm ²) |
|--|-----------------------------|--------------------------------|-----------------------------|--------------------------------|
| 344.703 $\leq \phi 25 @ 125 = 387.811$ | 57.8 | ≤ 133 | 1513.4 | ≤ 2248 |

| v (kg/cm ²) | v_u (kg/cm ²) | |
|---------------------------|-----------------------------|----|
| 1.5 | ≤ 20.0 | OK |

(10) Diseño de Fundaciones

| Caso | A_s (cm ² /m) | M(tm/m) | M_u (tm/m) | v (kg/cm ²) | v_u (kg/cm ²) | |
|----------|--------------------------------------|---------|---------------|---------------------------|-----------------------------|----|
| Estático | 33.530 $\leq \phi 25 @ 125 = 39.272$ | 78.11 | ≤ 224.33 | 2.6 | ≤ 15.0 | OK |
| Sísmico | 35.079 $\leq \phi 25 @ 125 = 39.272$ | 108.69 | ≤ 224.33 | 3.5 | ≤ 20.0 | OK |

RESUMEN DE CUBICACIONES
Puente N° 3

Nombre del Puente: San Jose

Superestructura

| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Comentarios |
|---------------------------------------|------------|----------------|------------|------|------|------|---------|----------------------------|
| | | | A1 | P1 | P2 | A2 | Total | |
| Superestructura | | | | | | | | |
| Hormigón | II-25 | m ³ | | | | | 112.86 | Losa, Viga Travesaño |
| | II-35 | m ³ | | | | | 99.08 | Viga |
| Acero | A63-42H | kg | | | | | 30556.2 | |
| | A44-28H | kg | | | | | 711.82 | Viga Travesaño |
| PC Cable | ASTM416-80 | m | | | | | 556.85 | |
| Accesorios | | n° | | | | | 40 | |
| Moldaje | | m ² | | | | | 1068.12 | Losa, Viga Travesaño, Viga |
| Andamios | | m ² | | | | | 972.0 | Para Losa de Hormigón |
| Zapata | | n° | 5.0 | 10.0 | 10.0 | 5.0 | 30.0 | |
| Cantoneira | | m | 12.0 | | | 12.0 | 24.0 | |
| Baranda | | m | | | | | 168.1 | |
| Drenaje | | n° | | | | | | |
| Pasillo | | m ² | | | | | 168.1 | |
| Pavimento | | m ² | | | | | 840.5 | |

Losa de Acceso

| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Comentarios |
|---------------------------------------|--------|----------------|------------|----|----|-------|-------|-------------|
| | | | A1 | P1 | P2 | A2 | Total | |
| Hormigón | II-25 | m ³ | 10.0 | | | 10.0 | 20.0 | |
| Acero | A44-28 | kg | 457.9 | | | 457.9 | 915.8 | |
| Moldaje | | m ² | 4.5 | | | 4.5 | 9.0 | |

Infraestructura y otros

| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Comentarios |
|---------------------------------------|---------|----------------|------------|----------|----------|----------|-----------|-------------|
| | | | A1 | P1 | P2 | A2 | Total | |
| Infraestructura | | | | | | | | |
| Hormigón | II-25 | m ³ | 334.1 | 647.9 | 351.1 | 334.1 | 1,667.2 | |
| Acero | A63-42H | kg | 20,216.2 | 54,953.3 | 27,864.8 | 20,216.2 | 123,250.6 | |
| Moldaje | | m ² | 552.8 | 618.1 | 363.0 | 552.8 | 2,086.7 | |
| Excavación | | m ³ | 234.5 | 462.0 | 204.0 | 328.3 | 1,228.8 | |
| Horm. Emplant. | | m ³ | 6.6 | 10.3 | 7.5 | 6.6 | 31.0 | |
| Andamios | | m ³ | 207.2 | 128.0 | 119.3 | 207.2 | 661.7 | |

Camino de Acceso

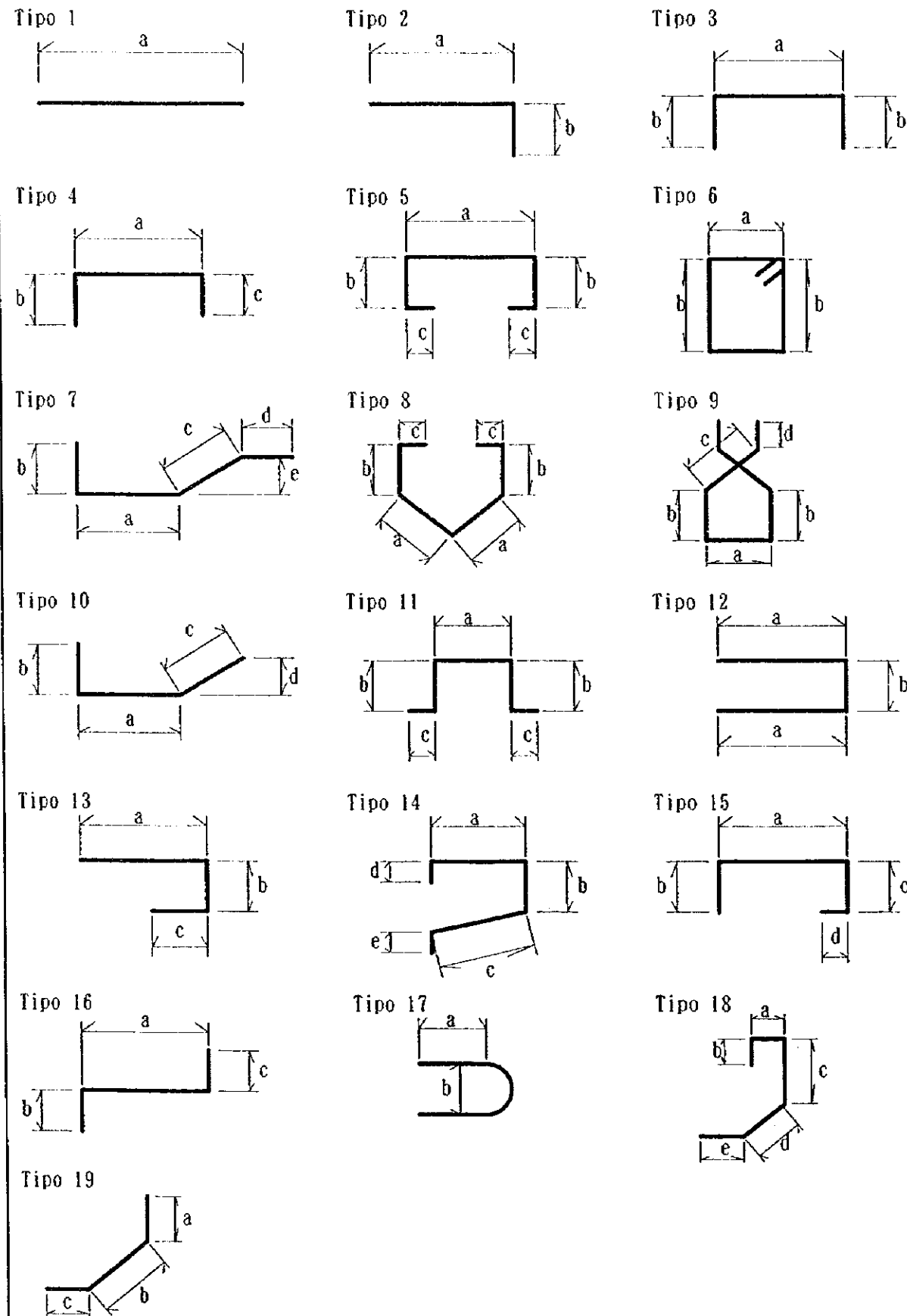
| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Comentarios |
|---------------------------------------|-------|----------------|------------|----|----|---------|---------|-------------|
| | | | A1 | P1 | P2 | A2 | Total | |
| Terraplén | | m ³ | 2,285.6 | | | 1,791.6 | 4,077.2 | |
| Base | | m ³ | 156.0 | | | 140.0 | 296.0 | |
| Pavimento | | m ² | 780.0 | | | 700.0 | 1,480.0 | |

Cubicaciones

Fecha : _____ Número de Puente : _____
 Nombre del Puente : SAN JOSE
 De la Ruta, Camino : _____ Rol Ruta : _____
 En el Cauce : _____
 Región : RM : SANTIAGO Provincia : _____
 Longitud del Puente : L = 84.05 m
 Número de Pistas : 2
 Ancho : 1.00+10.00+1.00 = 12.00 m
 Pendiente : 1.0% (Pasillos) 1.5% (Calzada)
 Tipo de Estructura : **Postensado**
 Longitud de Viga : Lv = 27.95 m
 Luz : Lc = 27.25 m
 Número de Vigas : nv = 5
 Separación entre Vigas : S = 2.50 m
 Ancho Mesa Mínima : Wm = 11.00 m

| Materia | Grado | Unidad | Cantidad | | Observación |
|----------------------|-------------|----------------|---------------|---------------|-------------|
| | | | (Para 1 Viga) | (Para Puente) | |
| Losa | | | | | |
| Hormigón | H-25 | m ³ | | 97.65 | |
| Moldaje | | m ² | | 266.92 | |
| Acero | A63-42H | kg | | 20,247.56 | |
| Travesaño Intermedio | | | | | |
| Hormigón | H-25 | m ³ | | 6.93 | |
| Moldaje | | m ² | | 59.40 | |
| Acero | A44-28H | kg | | 711.82 | |
| Travesaño Extremos | | | | | |
| Hormigón | H-25 | m ³ | | 8.28 | |
| Moldaje | | m ² | | 60.03 | |
| Acero | A63-42H | kg | | 1,076.91 | |
| Viga | | | Exterior | Interior | |
| Hormigón | H-35 | m ³ | 19.82 | 19.82 | 99.08 |
| Moldaje | | m ² | 136.35 | 136.35 | 681.77 |
| Acero | A63-42H | kg | 1,796.16 | 1,879.81 | 9,231.75 |
| PC Cable | ASTMA416-80 | m | 111.37 | 111.37 | 556.85 |
| Anclaje | | grupo | 8 | 8 | 40 |

Tipo de Barras para hormigón



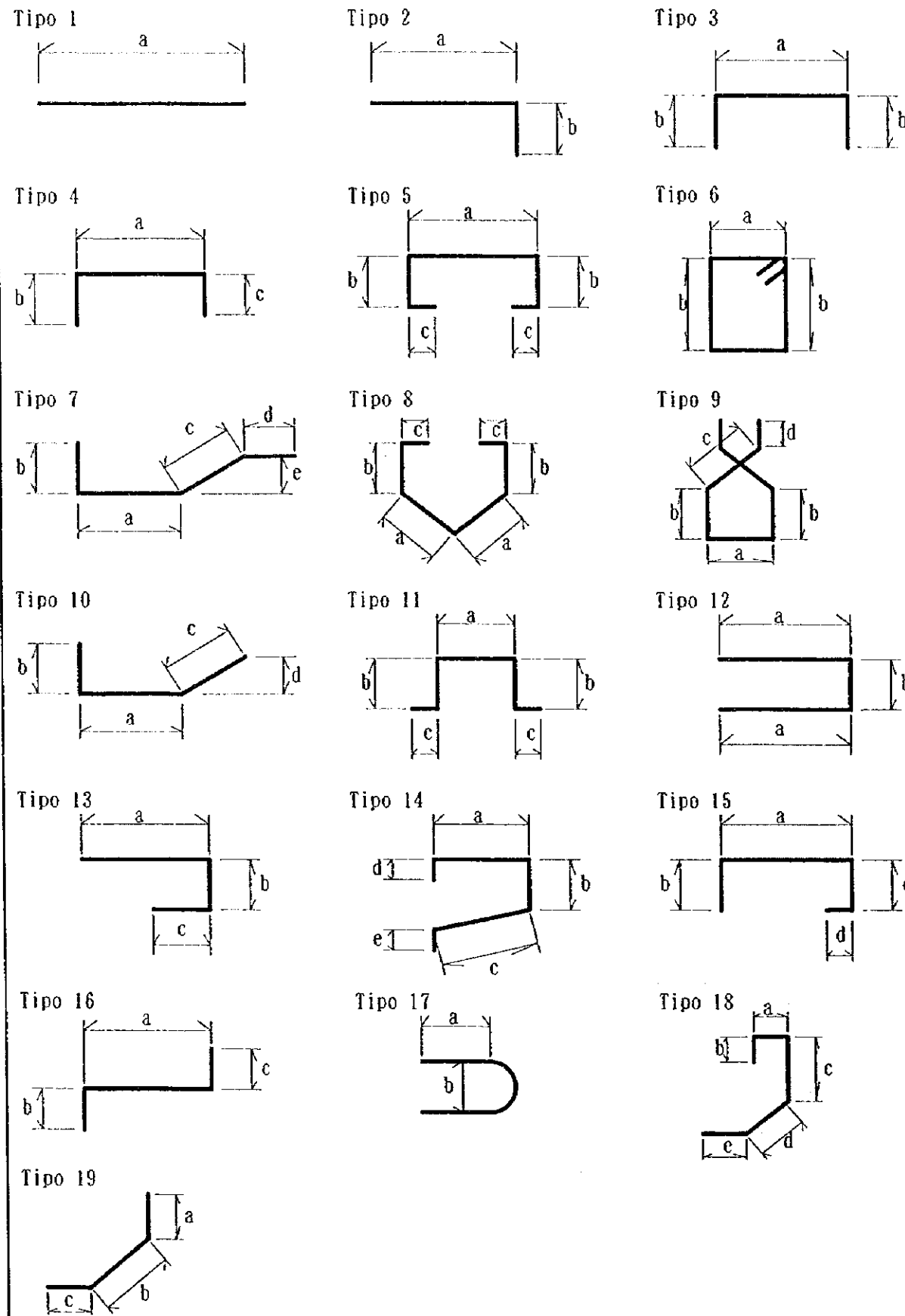
| Marca | Dia. (mm) | Unit W (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|-----------|---------------|------|------------------|------|------|-----|-----|-------------|---------------|-------------|-----------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 16 | 1.578 | 1 | 11940 | | | | | 11940 | 18.84 | 189 | 3,561.01 | |
| 2 | 16 | 1.578 | 1 | 10300 | | | | | 10300 | 16.25 | 186 | 3,023.13 | |
| 3 | 16 | 1.578 | 3 | 11940 | 110 | | | | 12160 | 19.19 | 187 | 3,588.25 | |
| 4 | 16 | 1.578 | 7 | 1595 | 110 | 156 | 150 | 110 | 2011 | 3.17 | 372 | 1,180.49 | |
| 5 | 16 | 1.578 | 20 | 1250 | 110 | 156 | 150 | | 1862 | 2.94 | 558 | 1,639.54 | |
| 6 | 16 | 1.578 | 6 | 140 | 409 | | | | 1337 | 2.11 | 374 | 789.06 | |
| 7 | 16 | 1.578 | 14 | 351 | 96 | 359 | 136 | 136 | 1077 | 1.70 | 374 | 635.62 | |
| 8 | 16 | 1.578 | 2 | 470 | 210 | | | | 680 | 1.07 | 40 | 42.92 | |
| 9 | 16 | 1.578 | 1 | 1500 | | | | | 1500 | 2.37 | 80 | 189.36 | |
| 10 | 12 | 0.888 | 3 | 27890 | 360 | | | | 28610 | 25.41 | 101 | 2,565.97 | |
| 11 | 12 | 0.888 | 1 | 27890 | | | | | 27890 | 24.77 | 8 | 198.13 | |
| 12 | 12 | 0.888 | 1 | 27890 | | | | | 27890 | 24.77 | 101 | 2,501.40 | |
| 13 | 12 | 0.888 | 1 | 1210 | | | | | 1210 | 1.07 | 198 | 212.75 | |
| 14 | 12 | 0.888 | 7 | 1466 | 102 | 665 | 180 | 210 | 2412 | 2.14 | 56 | 119.94 | |
| 15 | 16 | 1.578 | 1 | 2000 | | | | | 2000 | 3.16 | 96 | 302.98 | |
| 16 | 22 | 2.984 | 1 | 2000 | | | | | 2000 | 5.97 | 16 | 95.49 | |
| 17 | 12 | 0.888 | 6 | 200 | 1715 | | | | 4010 | 3.56 | 88 | 313.36 | |
| 18 | 16 | 1.578 | 1 | 2000 | | | | | 2000 | 3.16 | 112 | 353.47 | |
| 19 | 22 | 2.984 | 1 | 2000 | | | | | 2000 | 5.97 | 16 | 95.49 | |
| 20 | 12 | 0.888 | 6 | 250 | 1965 | | | | 4610 | 4.09 | 88 | 360.24 | |
| 21 | 12 | 0.888 | 3 | 27900 | 180 | | | | 28260 | 25.09 | 30 | 752.85 | |
| 22 | 12 | 0.888 | 3 | 27900 | 180 | | | | 28260 | 25.09 | 50 | 1,254.74 | |
| 23 | 10 | 0.617 | 1 | 25850 | | | | | 25850 | 15.95 | 60 | 956.97 | |
| 24 | 10 | 0.617 | 10 | 1572 | 450 | 1237 | 300 | | 3259 | 2.01 | 120 | 241.30 | |
| 25 | 10 | 0.617 | 3 | 950 | 400 | | | | 1750 | 1.08 | 60 | 64.79 | |
| 26 | 12 | 0.888 | 11 | 1965 | 150 | 102 | | | 2469 | 2.19 | 695 | 1,523.77 | |
| 27 | 12 | 0.888 | 9 | 450 | 219 | 584 | 180 | | 2413 | 2.14 | 615 | 1,317.79 | |
| 28 | 12 | 0.888 | 8 | 508 | 273 | 102 | | | 1764 | 1.57 | 695 | 1,088.67 | |
| 29 | 12 | 0.888 | 5 | 300 | 1965 | 102 | | | 4434 | 3.94 | 20 | 78.75 | Var |
| 30 | 12 | 0.888 | 5 | 450 | 1800 | 102 | | | 4254 | 3.78 | 80 | 302.20 | |
| 31 | 12 | 0.888 | 3 | 950 | 102 | | | | 1154 | 1.02 | 695 | 712.20 | |
| 32 | 12 | 0.888 | 3 | 1800 | 180 | | | | 2160 | 1.92 | 20 | 38.36 | |
| 33 | 12 | 0.888 | 2 | 1800 | 75 | | | | 1875 | 1.67 | 40 | 66.60 | |
| 34 | 16 | 1.578 | 1 | 1780 | | | | | 1780 | 2.81 | 72 | 202.24 | |
| 35 | 22 | 2.984 | 1 | 2260 | | | | | 2260 | 6.74 | 12 | 80.93 | |
| 36 | 16 | 1.578 | 1 | 965 | | | | | 965 | 1.52 | 48 | 73.09 | |
| 37 | 22 | 2.984 | 1 | 1205 | | | | | 1205 | 3.60 | 8 | 28.77 | |
| 38 | 16 | 1.578 | 1 | 1780 | | | | | 1780 | 2.81 | 84 | 235.94 | |
| 39 | 22 | 2.984 | 1 | 2260 | | | | | 2260 | 6.74 | 12 | 80.93 | |
| 40 | 16 | 1.578 | 1 | 1115 | | | | | 1115 | 1.76 | 56 | 98.53 | |
| 41 | 22 | 2.984 | 1 | 1355 | | | | | 1355 | 4.04 | 8 | 32.35 | |
| 42 | 25 | 3.853 | 1 | 2895 | | | | | 2895 | 11.15 | 24 | 267.71 | |

Cubicaciones

Fecha : _____ Número de Puente : _____
 Nombre del Puente : SAN JOSE A1,A2
 De la Ruta, Camino : _____ Rol Ruta : _____
 En el Cauce : _____
 Región : RM : SANTIAGO Provincia : _____
 Longitud del Puente : L = 84.05 m
 Número de Pistas : 2
 Ancho : 1.00+10.00+1.00 = 12.00 m
 Pendiente : 1.0% (Pasillos) 1.5% (Calzada)
 Tipo de Estructura : **Estribo**
 Altura de Estribo : H = 7.00 m
 Longitud de Viga : Lv = 27.95 m
 Luz : Lc = 27.25 m
 Número de Vigas : n_v = 5.00
 Separación entre Vigas : S = 2.50 m
 Ancho Mesa Mínima : Wm = 10.50 m

| Materia | Grado | Unidad | Cantidad | Observación |
|-----------------|----------------|----------------------|------------------|-------------|
| Espaldar | | | | |
| Hormigón | H-25 | m ³ | 11.73 | |
| Moldaje | | m ² | 53.64 | |
| Acero | A63-42H | kg | 966.87 | |
| Muro | | | | |
| Hormigón | H-25 | m ³ | 52.15 | |
| Moldaje | | m ² | 90.54 | |
| Acero | A63-42H | kg | 2,271.86 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 82.50 | |
| Moldaje | | m ² | 43.20 | |
| Acero | A63-42H | kg | 4,777.51 | |
| Muros | | | | |
| Hormigón | H-25 | m ³ | 20.69 | |
| Moldaje | | m ² | 89.02 | |
| Acero | A63-42H | kg | 2,091.87 | |
| Total | | | | |
| Hormigón | H-25 | m³ | 167.07 | |
| Moldaje | | m² | 276.39 | |
| Acero | A63-42H | kg | 10,108.11 | |

Tipo de Barras para hormigón



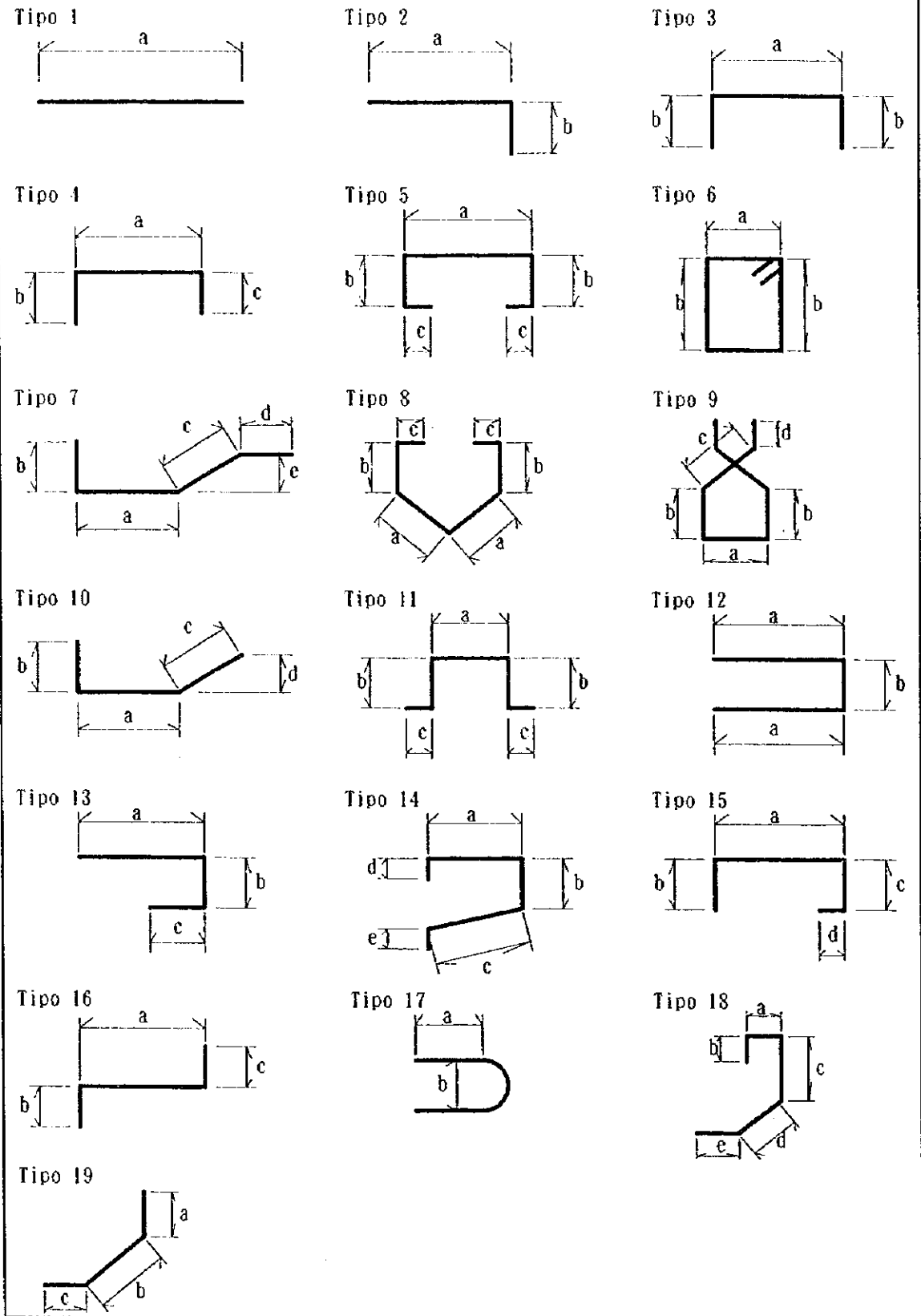
| Marca | Dia. (mm) | Unit W. (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par. (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|--------------|-------------------|------|------------------|------|------|------|-----|----------------|-------------------|----------------|--------------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 22 | 2.984 | 3 | 5400 | 1100 | | | | 7600 | 22.68 | 51 | 1,156.60 | |
| 2 | 22 | 2.984 | 3 | 5400 | 770 | | | | 6940 | 20.71 | 101 | 2,091.60 | |
| 3 | 18 | 1.998 | 3 | 12400 | 1100 | | | | 14600 | 29.17 | 23 | 670.93 | |
| 4 | 18 | 1.998 | 3 | 12400 | 630 | | | | 13660 | 27.29 | 23 | 627.73 | |
| 5 | 18 | 1.998 | 3 | 12400 | 360 | | | | 13120 | 26.21 | 6 | 157.28 | |
| 6 | 18 | 1.998 | 3 | 5400 | 360 | | | | 6120 | 12.23 | 6 | 73.37 | |
| 7 | 16 | 1.578 | 1 | 11920 | | | | | 11920 | 18.81 | 17 | 319.77 | |
| 8 | 16 | 1.578 | 1 | 11920 | | | | | 11920 | 18.81 | 17 | 319.77 | |
| 9 | 18 | 1.998 | 2 | 4710 | 270 | | | | 4980 | 9.95 | 49 | 487.55 | |
| 10 | 18 | 1.998 | 2 | 3310 | 270 | | | | 3580 | 7.15 | 48 | 343.34 | |
| 11 | 18 | 1.998 | 2 | 4710 | 270 | | | | 4980 | 9.95 | 49 | 487.55 | |
| 12 | 16 | 1.578 | 3 | 11920 | 240 | | | | 12400 | 19.57 | 6 | 117.40 | |
| 13 | 18 | 1.998 | 3 | 1120 | 270 | | | | 1660 | 3.32 | 43 | 142.62 | |
| 14 | 18 | 1.998 | 3 | 570 | 520 | | | | 1610 | 3.22 | 8 | 25.73 | |
| 15 | 18 | 1.998 | 3 | 720 | 520 | | | | 1760 | 3.52 | 8 | 28.13 | |
| 16 | 12 | 0.888 | 1 | 11920 | | | | | 11920 | 10.58 | 9 | 95.26 | |
| 17 | 18 | 1.998 | 1 | 2790 | | | | | 2790 | 5.57 | 49 | 273.15 | |
| 18 | 12 | 0.888 | 1 | 11920 | | | | | 11920 | 10.58 | 7 | 74.09 | |
| 19 | 18 | 1.998 | 1 | 2790 | | | | | 2790 | 5.57 | 49 | 273.15 | |
| 20 | 12 | 0.888 | 1 | 11920 | | | | | 11920 | 10.58 | 3 | 31.75 | |
| 21 | 18 | 1.998 | 14 | 570 | 194 | 807 | 270 | 153 | 1993 | 3.98 | 43 | 171.23 | |
| 22 | 12 | 0.888 | 1 | 11920 | | | | | 11920 | 10.58 | 2 | 21.17 | |
| 23 | 12 | 0.888 | 3 | 420 | 390 | | | | 1200 | 1.07 | 4 | 4.26 | |
| 24 | 12 | 0.888 | 3 | 320 | 102 | | | | 524 | 0.47 | 49 | 22.80 | |
| 25 | 22 | 2.984 | 2 | 4220 | 330 | | | | 4550 | 13.58 | 20 | 271.54 | |
| 26 | 22 | 2.984 | 2 | 3420 | 330 | | | | 3750 | 11.19 | 4 | 44.76 | |
| 27 | 22 | 2.984 | 2 | 4020 | 330 | | | | 4350 | 12.98 | 4 | 51.92 | Var |
| 28 | 22 | 2.984 | 2 | 4420 | 330 | | | | 4750 | 14.17 | 8 | 113.39 | |
| 29 | 22 | 2.984 | 2 | 3150 | 330 | | | | 3480 | 10.38 | 12 | 124.61 | |
| 30 | 22 | 2.984 | 2 | 3420 | 330 | | | | 3750 | 11.19 | 12 | 134.28 | |
| 31 | 22 | 2.984 | 2 | 3140 | 330 | | | | 3470 | 10.35 | 14 | 144.96 | |
| 32 | 22 | 2.984 | 2 | 7160 | 330 | | | | 7490 | 22.35 | 26 | 581.10 | |
| 33 | 12 | 0.888 | 3 | 420 | 1444 | | | | 3307 | 2.94 | 6 | 17.62 | Var |
| 34 | 12 | 0.888 | 10 | 944 | 180 | 1655 | 1170 | | 2778 | 2.47 | 4 | 9.87 | |
| 35 | 12 | 0.888 | 2 | 4220 | 180 | | | | 4400 | 3.91 | 20 | 78.14 | |
| 36 | 12 | 0.888 | 2 | 3420 | 180 | | | | 3600 | 3.20 | 4 | 12.79 | |
| 37 | 12 | 0.888 | 2 | 4020 | 180 | | | | 4200 | 3.73 | 4 | 14.92 | Var |
| 38 | 12 | 0.888 | 2 | 4420 | 180 | | | | 4600 | 4.08 | 8 | 32.68 | |
| 39 | 12 | 0.888 | 2 | 7160 | 180 | | | | 7340 | 6.52 | 26 | 169.47 | |
| 40 | 12 | 0.888 | 2 | 4710 | 180 | | | | 4890 | 4.34 | 8 | 34.74 | |
| 41 | 22 | 2.984 | 2 | 2565 | 330 | | | | 2895 | 8.64 | 20 | 172.77 | |
| 42 | 22 | 2.984 | 2 | 1434 | 330 | | | | 1764 | 5.26 | 10 | 52.64 | |
| 43 | 12 | 0.888 | 2 | 420 | 102 | | | | 522 | 0.46 | 32 | 14.83 | |
| 44 | 12 | 0.888 | 2 | 420 | 102 | | | | 522 | 0.46 | 32 | 14.83 | |

Cubicaciones

Fecha : _____ Número de Puente : _____
 Nombre del Puente : SAN JOSE P1
 De la Ruta, Camino : _____ Rol Ruta : _____
 En el Cauce : _____
 Región : RM: SANTIAGO Provincia : _____
 Longitud del Puente : L = 84.05 m
 Número de Pistas : 2
 Ancho : 1.00+10.00+1.00 = 12.00 m
 Pendiente : 1.0% (Pasillos) 1.5% (Calzada)
 Tipo de Estructura : **Cepa**
 Altura de Cepa : H = 11.50 m
 Longitud de Viga : Lv = 27.95 m
 Luz : Lc = 27.25 m
 Número de Vigas : n_v = 5.00
 Separación entre Vigas : S = 2.50 m
 Ancho Mesa Mínima : Wm = 10.50 m

| Materia | Grado | Unidad | Cantidad | Observación |
|--------------|---------|----------------|----------|-------------|
| Cabezal | | | | |
| Hormigón | H-25 | m ³ | 15.01 | |
| Moldaje | | m ² | 28.23 | |
| Acero | A63-42H | kg | 880.51 | |
| Columna | | | | |
| Hormigón | H-25 | m ³ | 109.02 | |
| Moldaje | | m ² | 198.10 | |
| Acero | A63-42H | kg | 13625.82 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 199.92 | |
| Moldaje | | m ² | 82.74 | |
| Acero | A63-42H | kg | 12970.34 | |
| Total | | | | |
| Hormigón | H-25 | m ³ | 323.95 | |
| Moldaje | | m ² | 309.07 | |
| Acero | A63-42H | kg | 27476.67 | |

Tipo de Barras para hormigón



| Marca | Dia. (mm) | Unit W. (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par. (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|-----------|----------------|------|------------------|------|-----|-----|-------|-------------|----------------|-------------|-----------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 28 | 4.834 | 3 | 8400 | 2000 | | | 12400 | 59.94 | 90 | 5,394.74 | | |
| 2 | 28 | 4.834 | 3 | 8400 | 980 | | | 10360 | 50.08 | 46 | 2,303.69 | | |
| 3 | 28 | 4.834 | 3 | 11100 | 2000 | | | 15100 | 72.99 | 35 | 2,554.77 | | |
| 4 | 28 | 4.834 | 3 | 11100 | 980 | | | 13060 | 63.13 | 35 | 2,209.62 | | |
| 5 | 22 | 2.984 | 3 | 11100 | 440 | | | 11980 | 35.75 | 8 | 285.99 | | |
| 6 | 22 | 2.984 | 3 | 8400 | 440 | | | 9280 | 27.69 | 8 | 221.53 | | |
| 7 | 28 | 4.834 | 2 | 6960 | 420 | | | 7380 | 35.67 | 114 | 4,066.94 | | |
| 8 | 28 | 4.834 | 2 | 11310 | 420 | | | 11730 | 56.70 | 112 | 6,350.72 | | |
| 9 | 25 | 3.853 | 1 | 9500 | | | | 9500 | 36.60 | 64 | 2,342.62 | | |
| 10 | 25 | 3.853 | 17 | 875 | 1120 | | | 3510 | 13.52 | 64 | 865.54 | | |
| 11 | 22 | 2.984 | 1 | 10685 | | | | 10685 | 31.88 | 4 | 127.54 | | |
| 12 | 25 | 3.853 | 18 | 420 | 710 | 683 | 504 | 2817 | 10.85 | 16 | 173.66 | | |
| 13 | 22 | 2.984 | 1 | 11620 | | | | 11620 | 34.67 | 4 | 138.70 | | |
| 14 | 22 | 2.984 | 3 | 11620 | 440 | | | 12500 | 37.30 | 4 | 149.20 | | |
| 15 | 22 | 2.984 | 3 | 1720 | 440 | | | 2600 | 7.76 | 4 | 31.03 | | |
| 16 | 16 | 1.578 | 5 | 1720 | 620 | 136 | | 3232 | 5.10 | 39 | 198.90 | | |
| 17 | 16 | 1.578 | 6 | 1720 | 620 | | | 4920 | 7.76 | 6 | 46.58 | | |
| 17 | 16 | 1.578 | 6 | 1720 | 520 | | | 4720 | 7.45 | 2 | 14.90 | | |

Cubicaciones

Fecha : _____ Número de Puente : _____

Nombre del Puente : SAN JOSE P2

De la Ruta, Camino : _____ Rol Ruta : _____

En el Cauce : _____

Región : RM : SANTIAGO Provincia : _____

Longitud del Puente : L = 84.05 m

Número de Pistas : 2

Ancho : 1.00+10.00+1.00 = 12.00 m

Pendiente : 1.0% (Pasillos) 1.5% (Calzada)

Tipo de Estructura : Cepa

Altura de Cepa : H = 6.50 m

Longitud de Viga : Lv = 27.95 m

Luz : Lc = 27.25 m

Número de Vigas : nv = 5.00

Separación entre Vigas : S = 2.50 m

Ancho Mesa Mínima : Wm = 10.50 m

| Materia | Grado | Unidad | Cantidad | Observación |
|--------------|---------|----------------|----------|-------------|
| Cabezal | | | | |
| Hormigón | H-25 | m ³ | 15.01 | |
| Moldaje | | m ² | 30.19 | |
| Acero | A63-42H | kg | 825.19 | |
| Columna | | | | |
| Hormigón | H-25 | m ³ | 44.04 | |
| Moldaje | | m ² | 94.67 | |
| Acero | A63-42H | kg | 5139.69 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 116.48 | |
| Moldaje | | m ² | 56.64 | |
| Acero | A63-42H | kg | 7967.54 | |
| Total | | | | |
| Hormigón | H-25 | m ³ | 175.53 | |
| Moldaje | | m ² | 181.51 | |
| Acero | A63-42H | kg | 13932.41 | |

IV. PUANGUE

1. Planos

| | |
|---|------|
| (1) Planos de Vista General | 4- 1 |
| (2) Superestructura de Postensado | 4- 2 |
| (3) Infraestructura A1 Estribo | 4- 4 |
| (4) Infraestructura A2 Estribo | 4- 6 |
| (5) Infraestructura P1,P2 Cepa | 4- 8 |
| (6) Infraestructura P3 Cepa | 4- 9 |

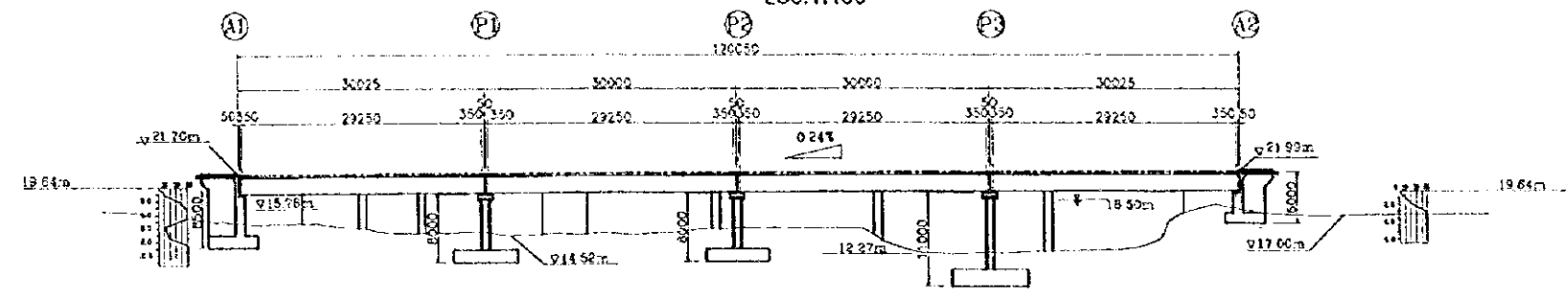
2. Informe del Cálculo (Tabla de Ingreso y Generalización)

| | |
|---|-------|
| (1) Superestructura de Postensado | 4- 10 |
| (2) Infraestructura A1 Estribo | 4- 12 |
| (3) Infraestructura A2 Estribo | 4- 15 |
| (4) Infraestructura P1,P2 Cepa | 4- 18 |
| (5) Infraestructura P3 Cepa | 4- 20 |

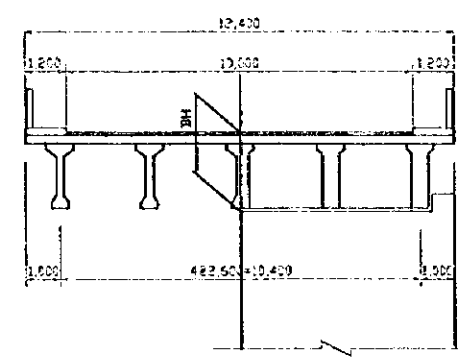
3. Lista de Materiales

| | |
|---|-------|
| (1) Resumen de Cubicaciones | 4- 22 |
| (2) Superestructura de Postensado | 4- 23 |
| (3) Infraestructura A1 Estribo | 4- 25 |
| (4) Infraestructura A2 Estribo | 4- 27 |
| (5) Infraestructura P1,P2 Cepa | 4- 29 |
| (6) Infraestructura P3 Cepa | 4- 31 |

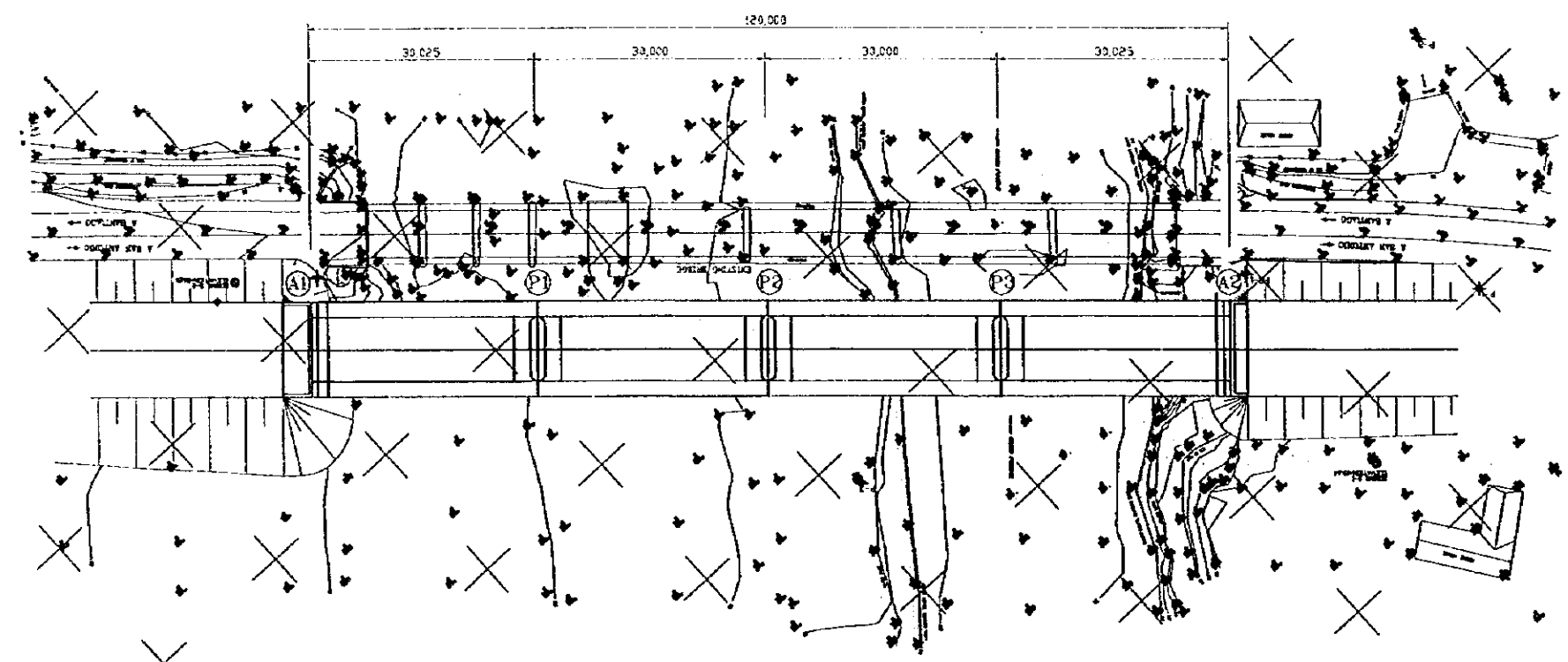
CORTE LOGITUDINAL
ESC. 1:400



SECCION DE VIGA
ESC. 1:100



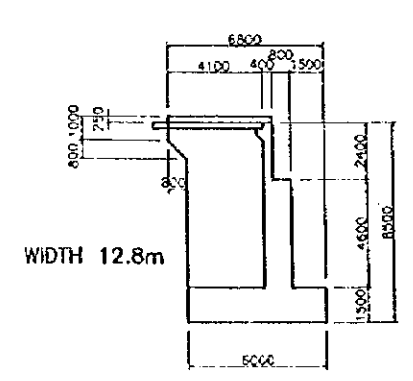
PLANTA
ESC. 1:400



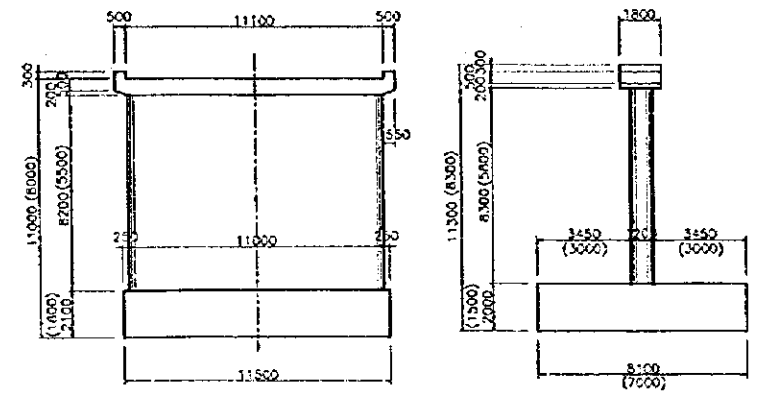
DETALE DE BH

| | |
|--------------|-------------|
| Pavimento | 125 |
| Losa | 200 |
| Viga | 1800 |
| Apoyo | 50 |
| Pedestal | 75 |
| Total | 2150 |

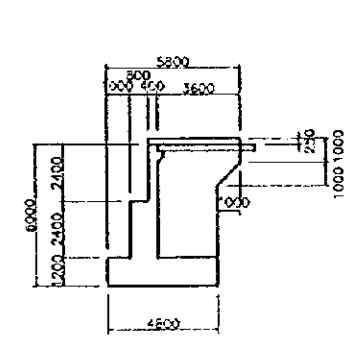
ESTRIBO A1
ESC. 1:150



PILA P3 (P1, P2)
ESC. 1:150

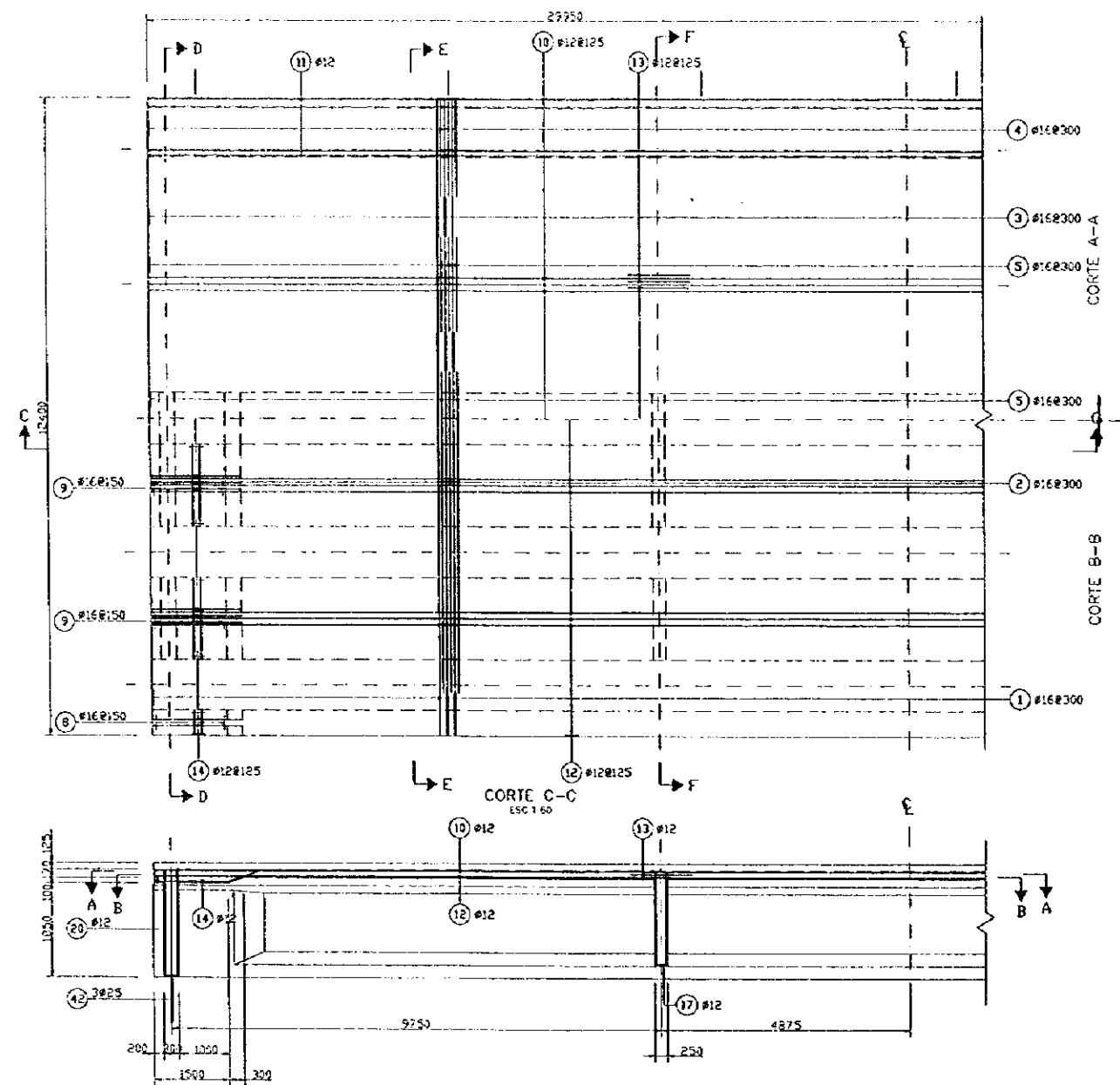


ESTRIBO A2
ESC. 1:150

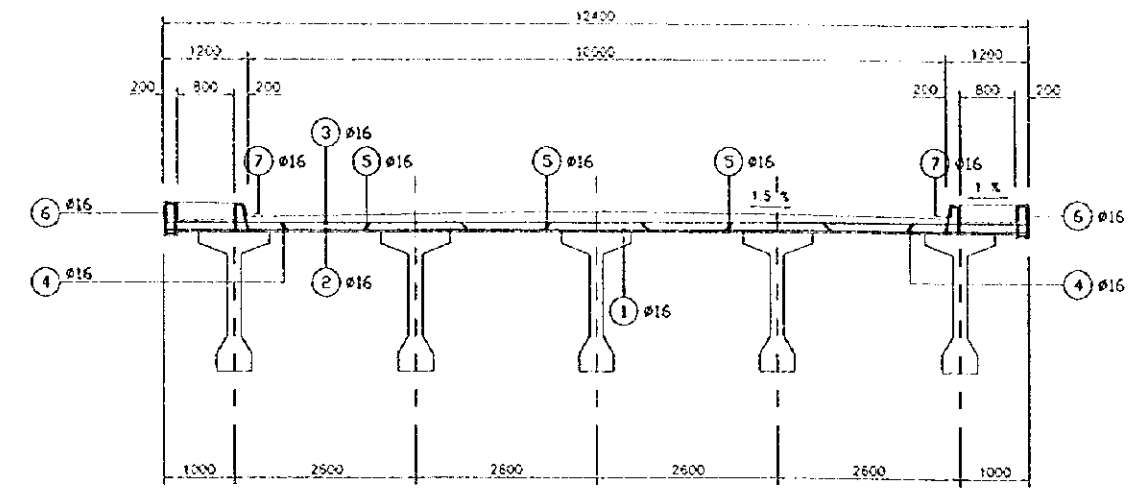


| | |
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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE | |
| Camino: | |
| Provincia: | Region: RM |
| Proyecto | Revisó |
| Vista Ing. Jefe Depto. Puentes | Director de Vialidad |
| Fecha: | Vista General |

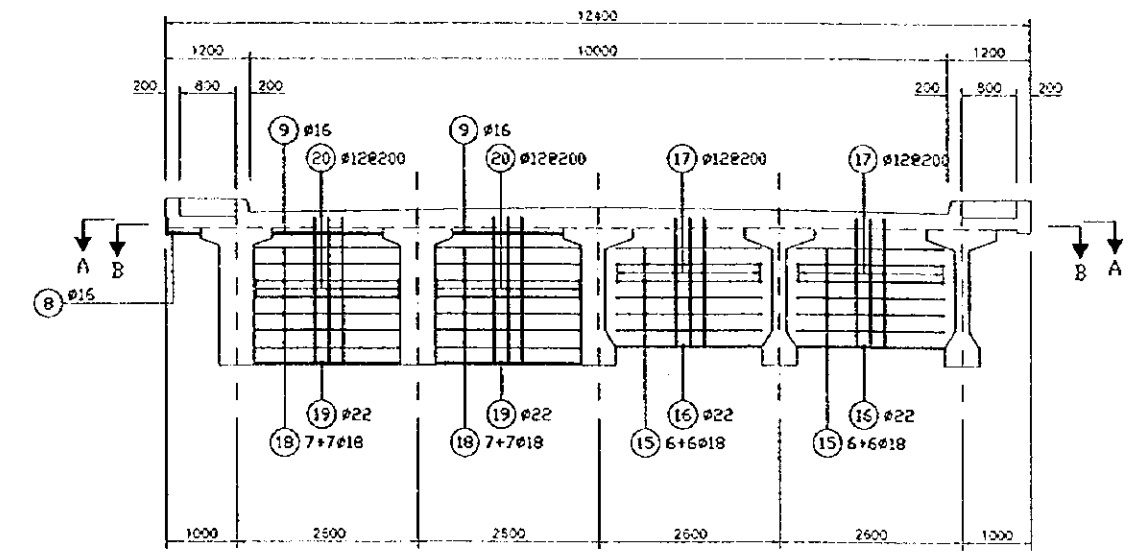
PLANTA DE LOSA
ESC 1:50



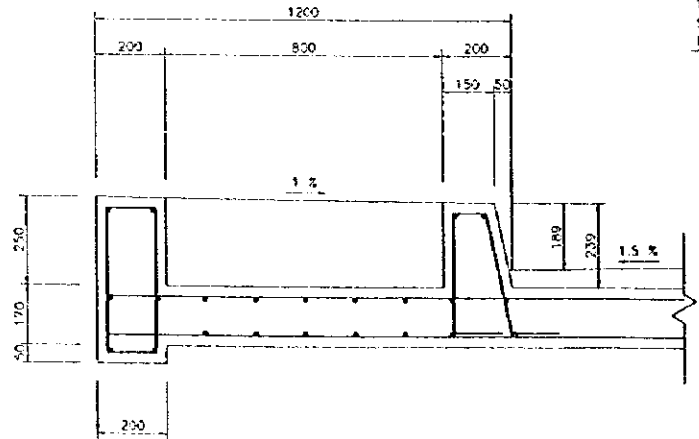
CORTE TRVERSAL
CORTE E-E
ESC 1:50



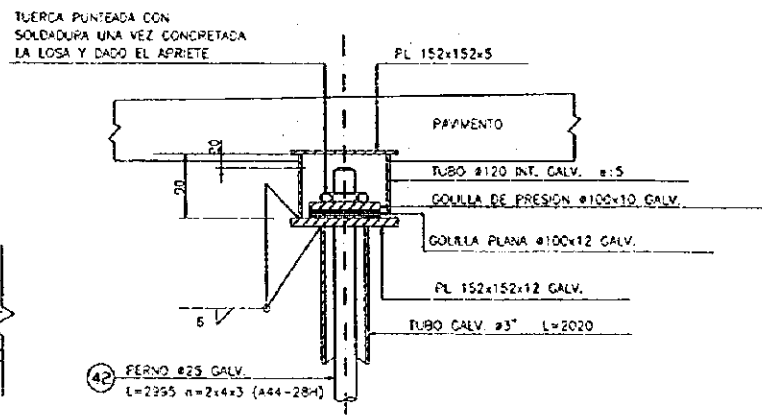
TRAVESAÑOS EXTREMOS
CORTE D-D
CORTE F-F
ESC 1:50



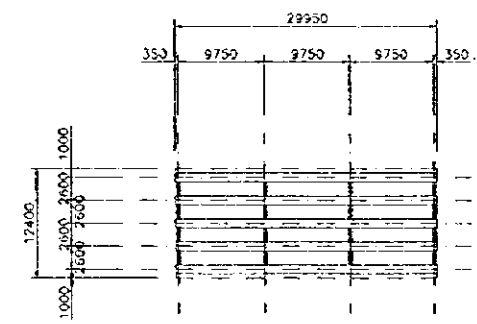
DETALLE DE PASILLO
ESC 1:10



DETALLE BARRAS ANTISISMICAS
ESC 1:5

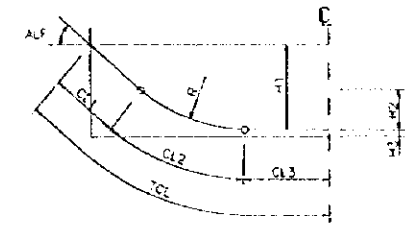
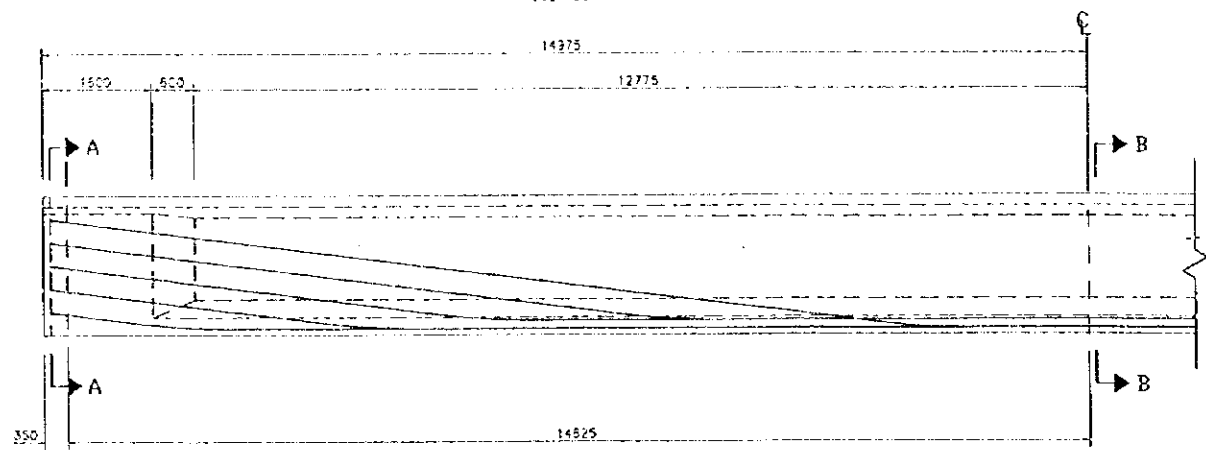


PLANTA DE DISPOSICION



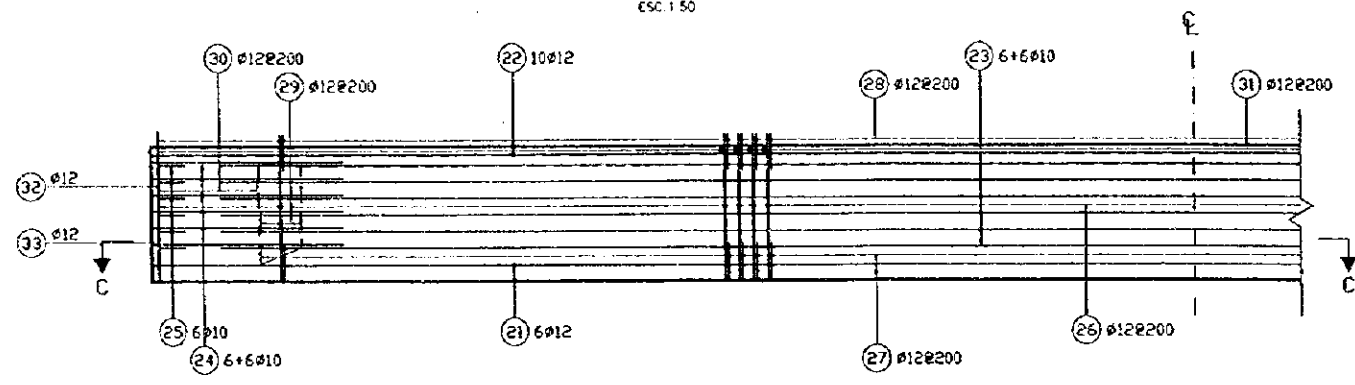
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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE | |
| Canino: | |
| Provincia: | Region: RM |
| Proyecto: | Reviso: |
| Vo Bo Ing. Jefe Depto. Puentes | Director de Vialidad |
| Dibujo: Fecha: | |

1/2 ELEVACION DE VIGA POSTENSADO
ESC. 1:50

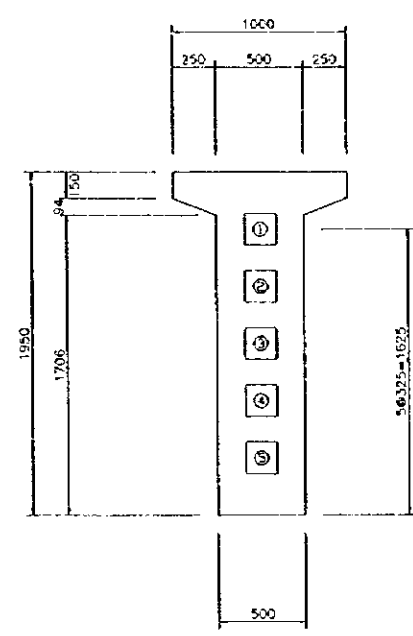


| | ALF | R | H1 | H2 | H3 | CL1 | CL2 | CL3 | TCL |
|----|-----|----|------|----|-----|-------|------|-------|-------|
| 01 | 7 | 10 | 1535 | 75 | 90 | 11984 | 1222 | 1762 | 14567 |
| 02 | 7 | 10 | 1090 | 75 | 210 | 8332 | 1222 | 5386 | 14340 |
| 03 | 7 | 10 | 765 | 75 | 210 | 5666 | 1222 | 8053 | 14920 |
| 04 | 7 | 10 | 560 | 75 | 90 | 3383 | 1222 | 9703 | 14308 |
| 05 | 7 | 10 | 235 | 75 | 90 | 1317 | 1222 | 12349 | 14883 |

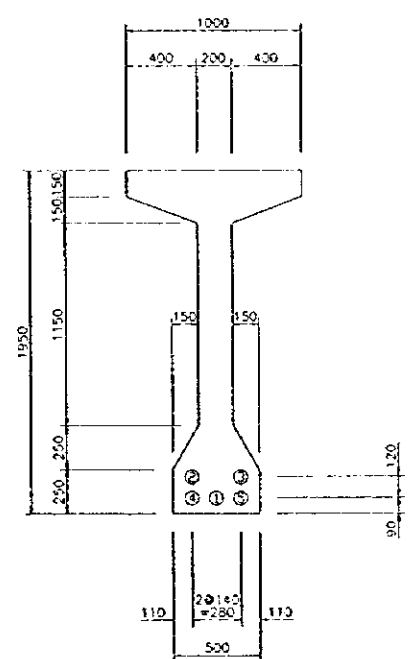
1/2 ENFIERRADURA VIGA POSTENSADO
ESC. 1:50



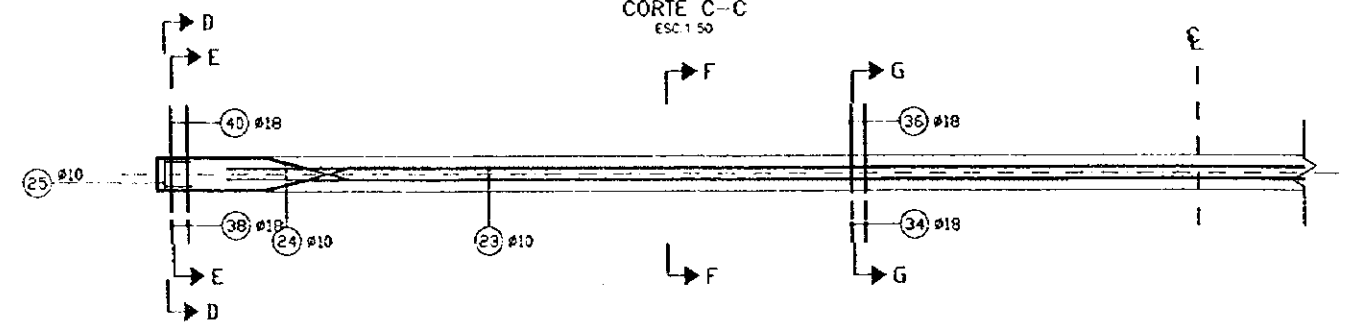
CORTE A-A
ESC. 1:20



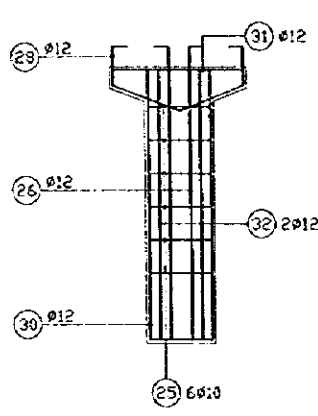
CORTE B-B
ESC. 1:20



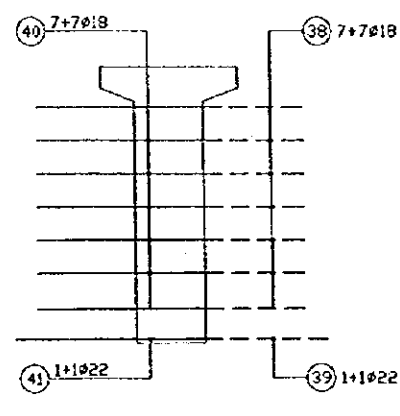
CORTE C-C
ESC. 1:50



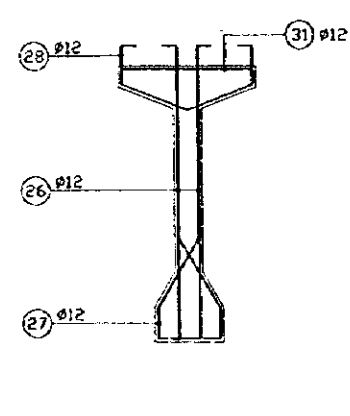
CORTE D-D
ESC. 1:25



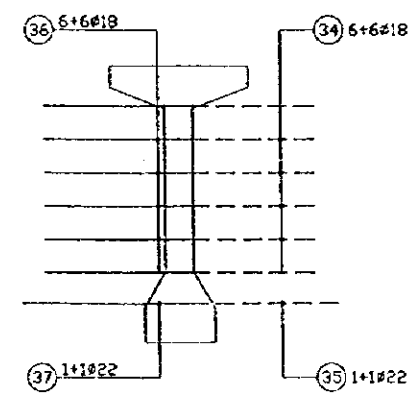
CORTE E-E
ESC. 1:25



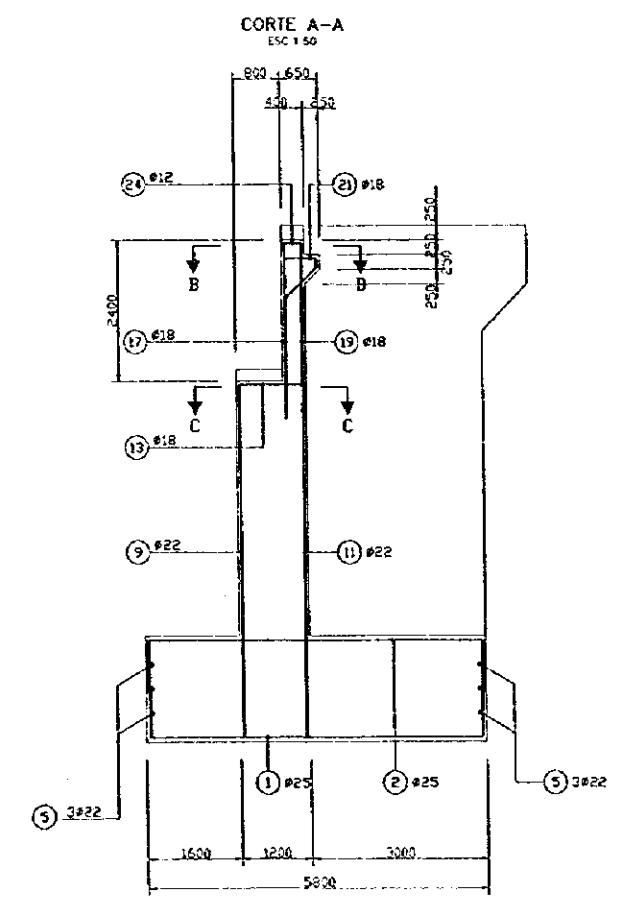
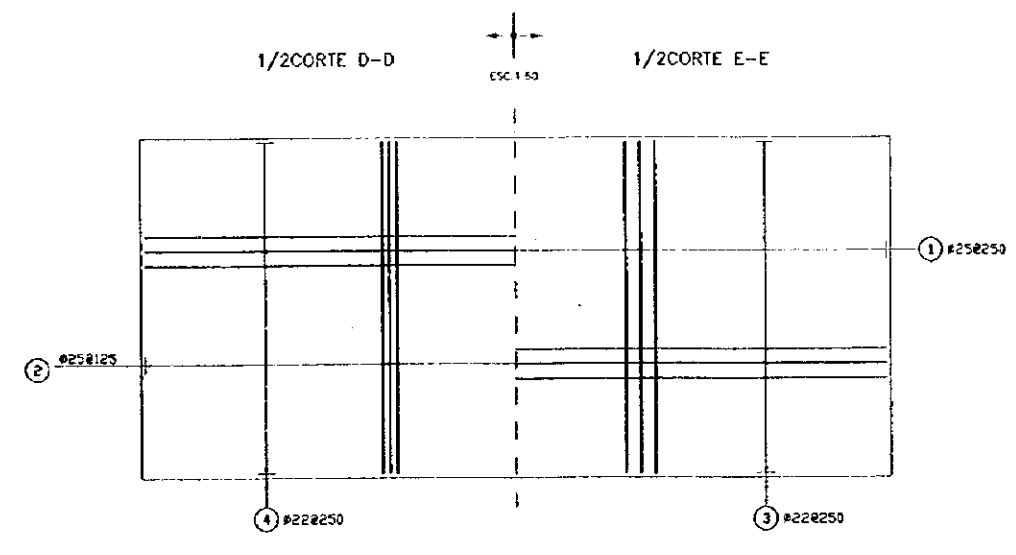
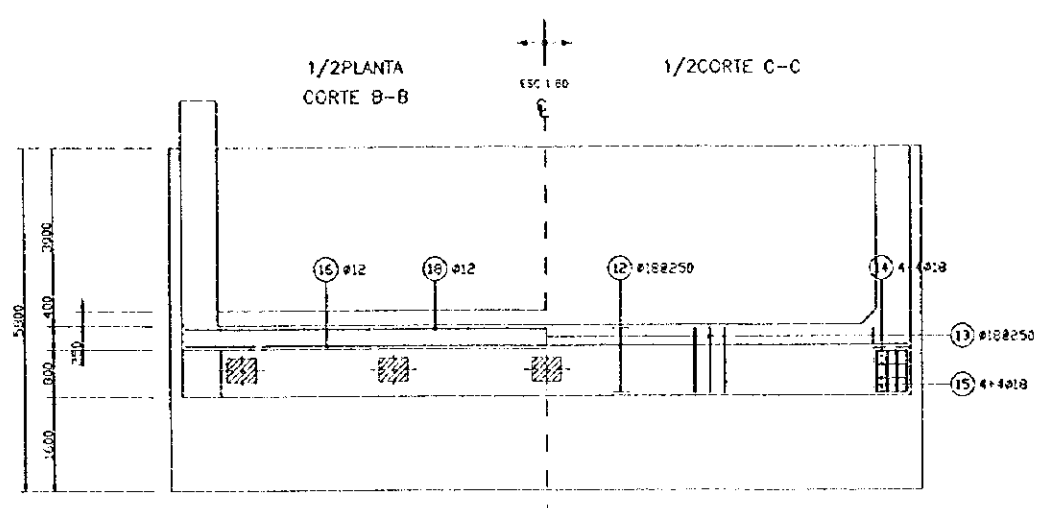
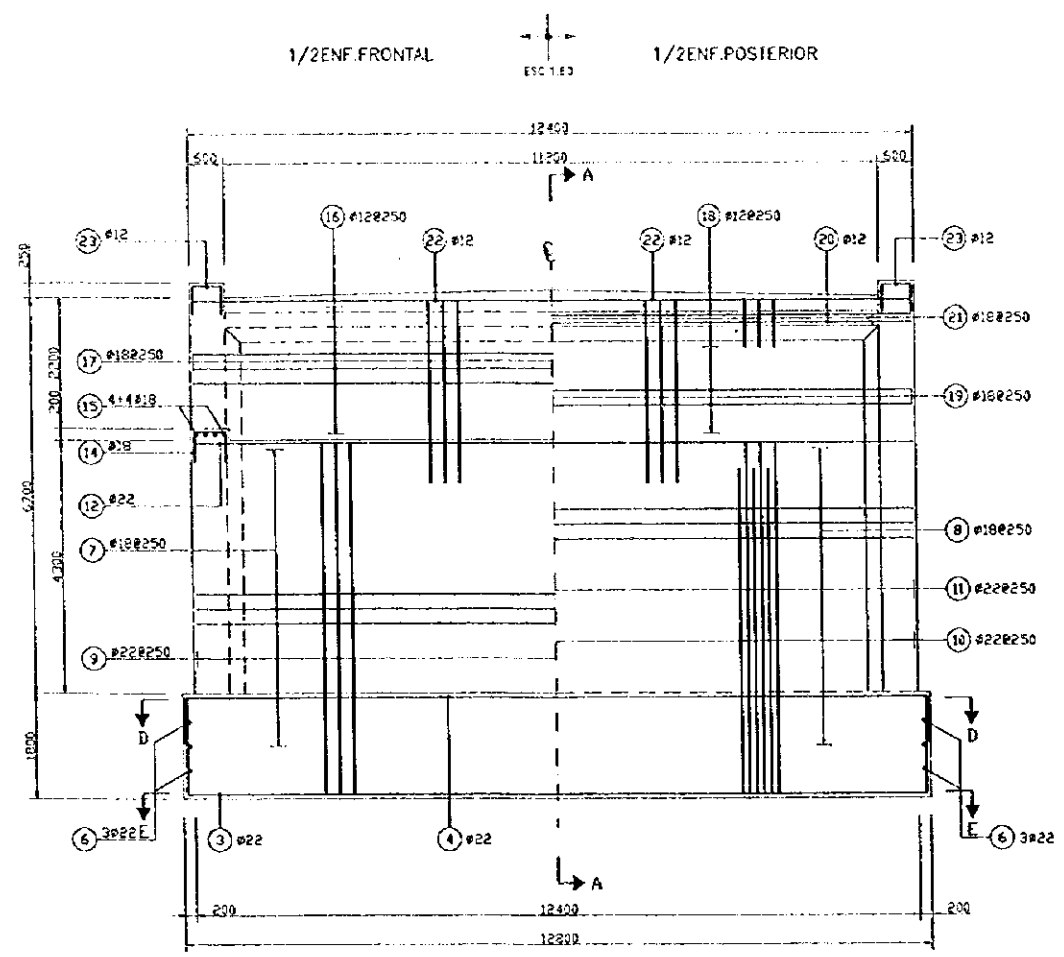
CORTE F-F
ESC. 1:25



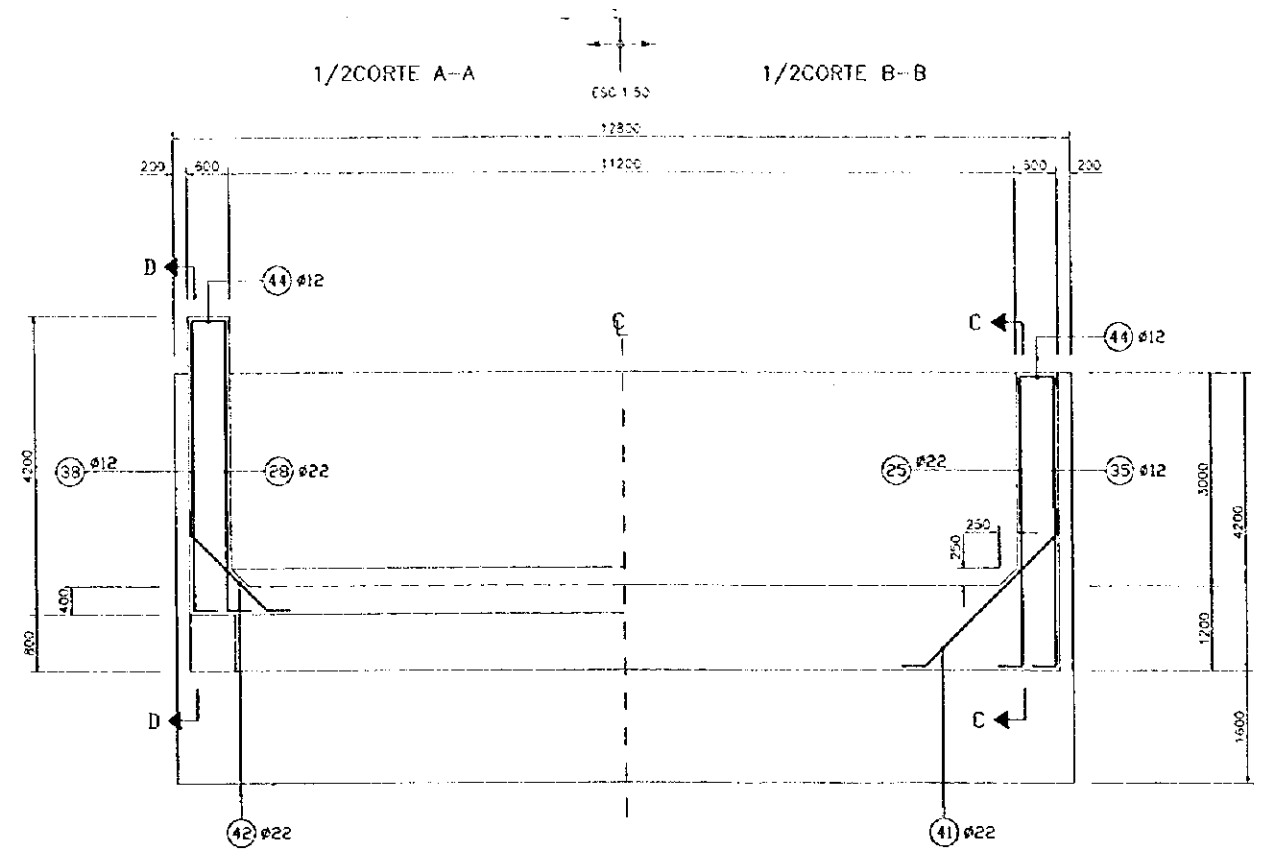
CORTE G-G
ESC. 1:25



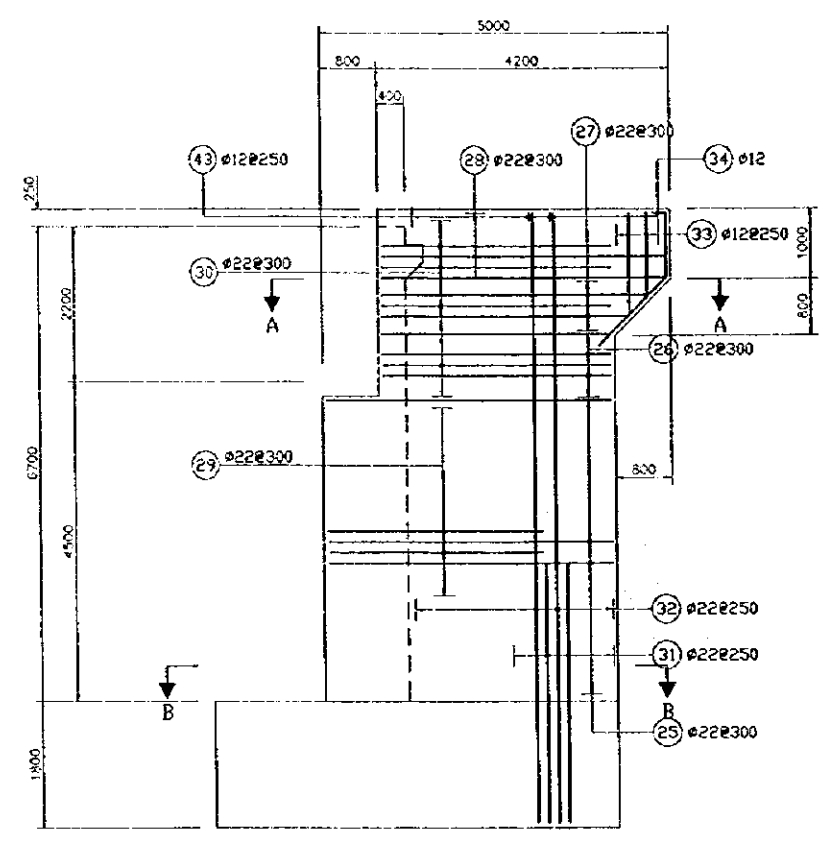
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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE | |
| Camino: | |
| Provincia: | Region: RM |
| Proyecto | Revista |
| Va Do Ing. Jefe Depto. Puentes | Director de Vialidad |
| Fecha: | |



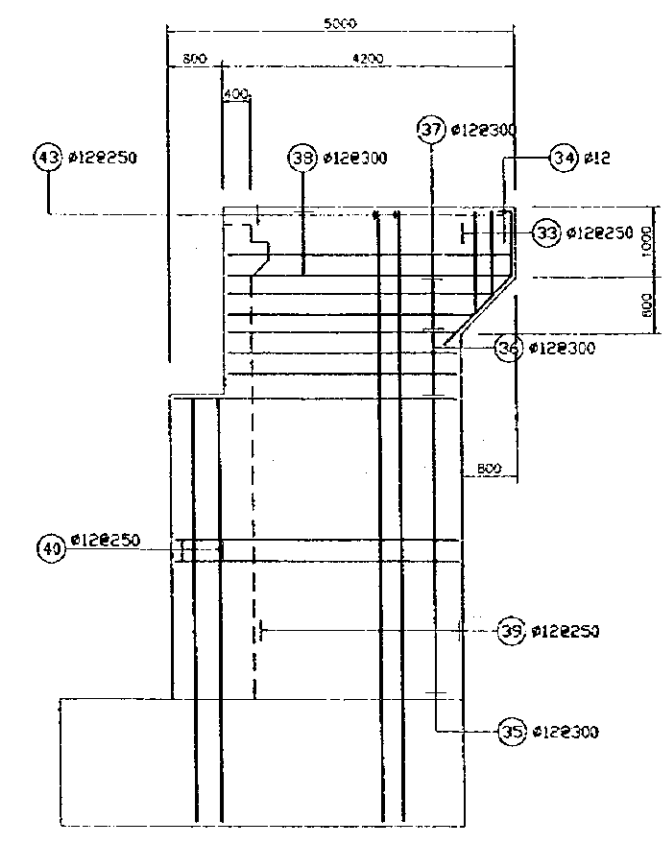
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| DIRECCION DE VIALIDAD | |
| DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE A1 | |
| Camino: | |
| Provincia: | Region: RM |
| _____ Proyecto | _____ Reviso |
| _____ Va. Dn. Ing. Jefe. Depto. Puentes | _____ Director de Validad |
| Dibujo Fecha: | |



ENFIERRADURA ALA
CORTE C-C
ESC. 1:50

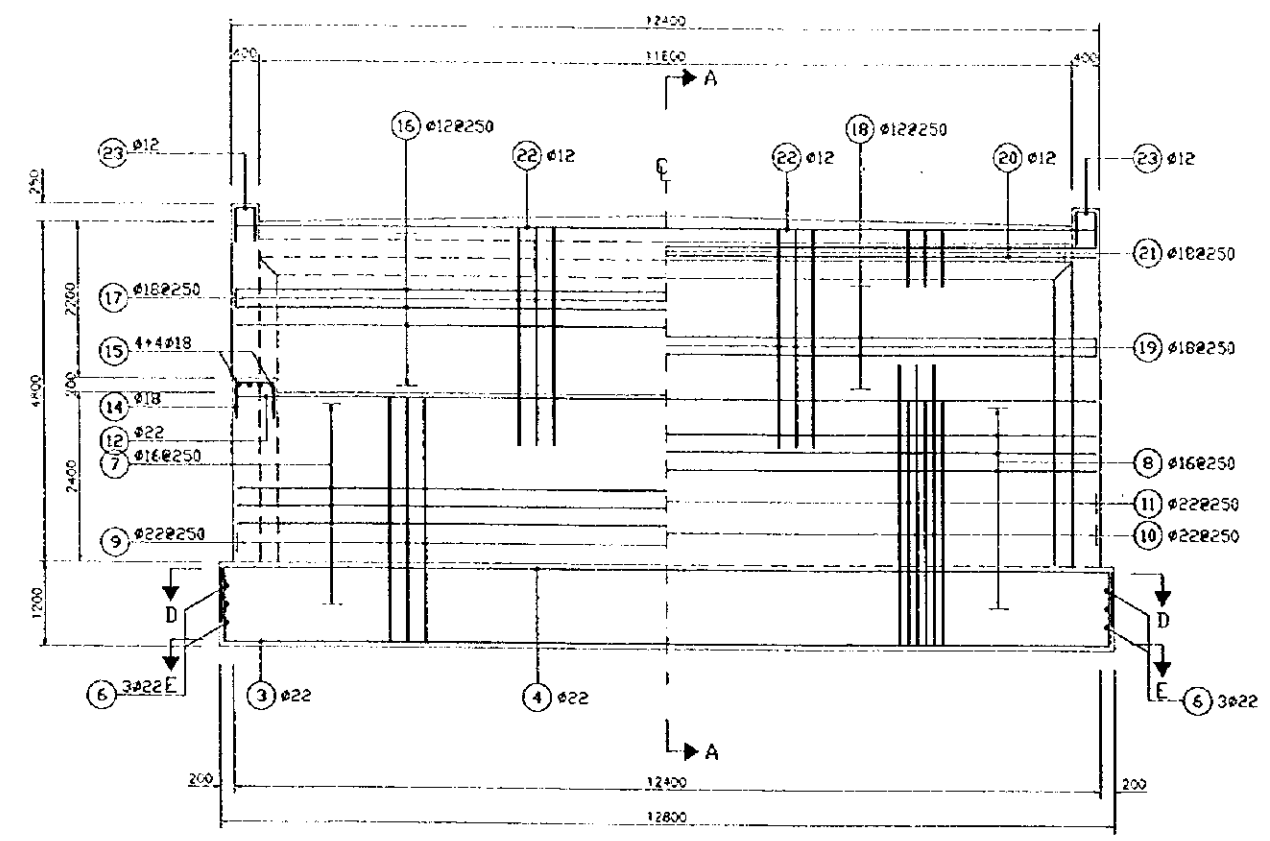


ENFIERRADURA ALA
CORTE D-D
ESC. 1:50

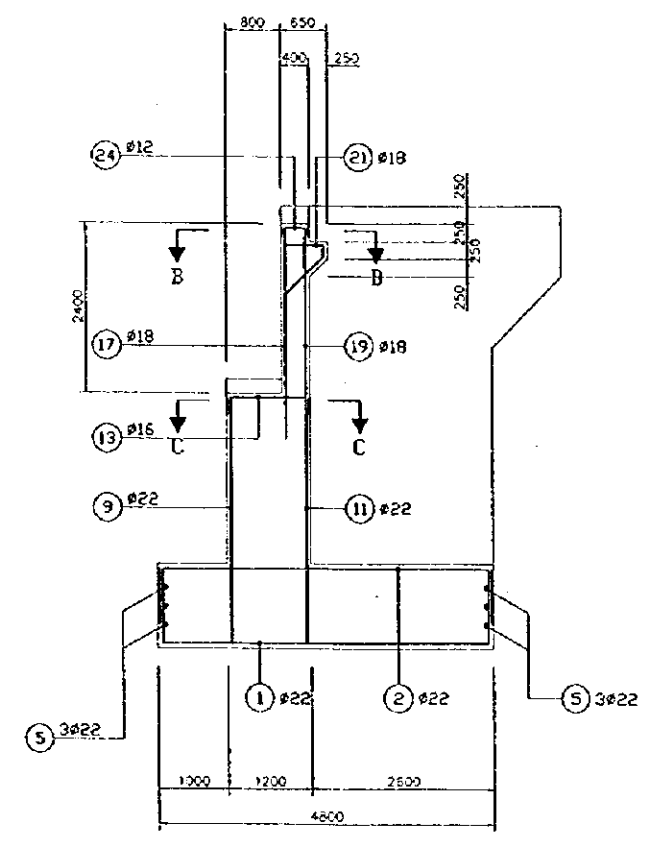


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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE A1 | |
| Camino: | |
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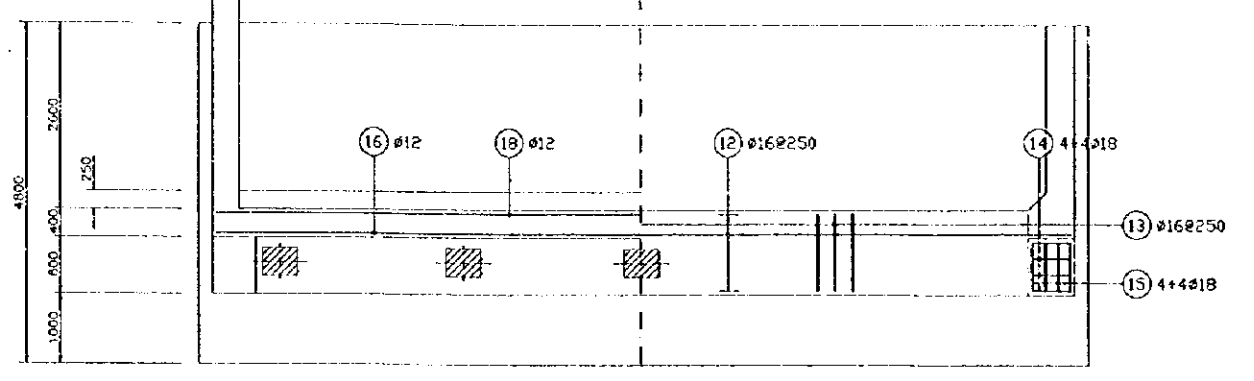
1/2 ENF. FRONTAL ESC 1/50 1/2 ENF. POSTERIOR



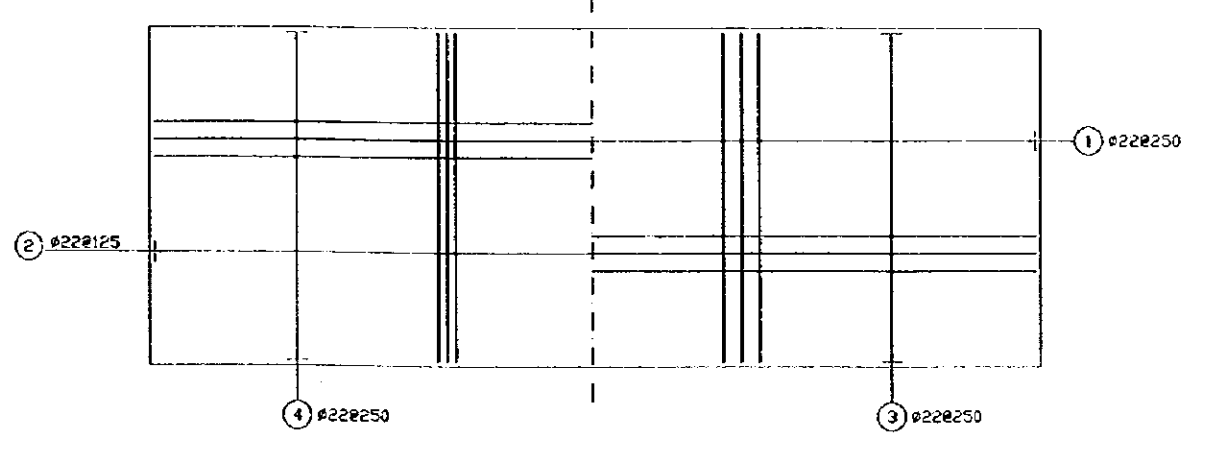
CORTE A-A ESC 1/50



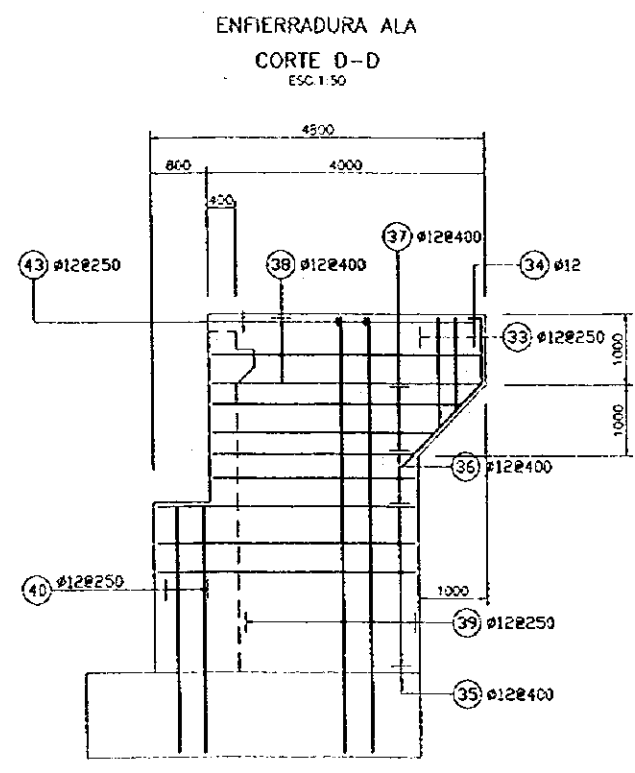
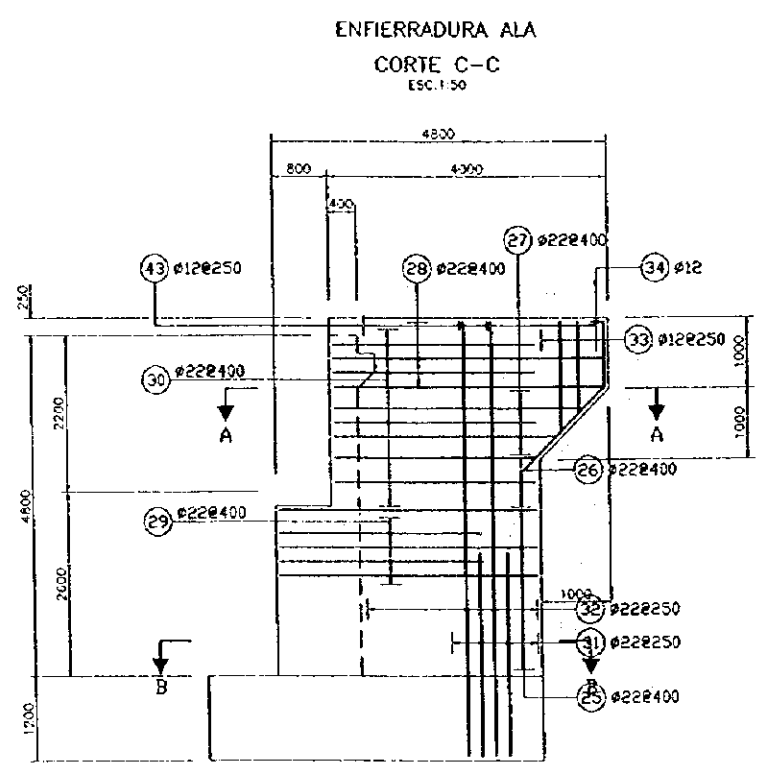
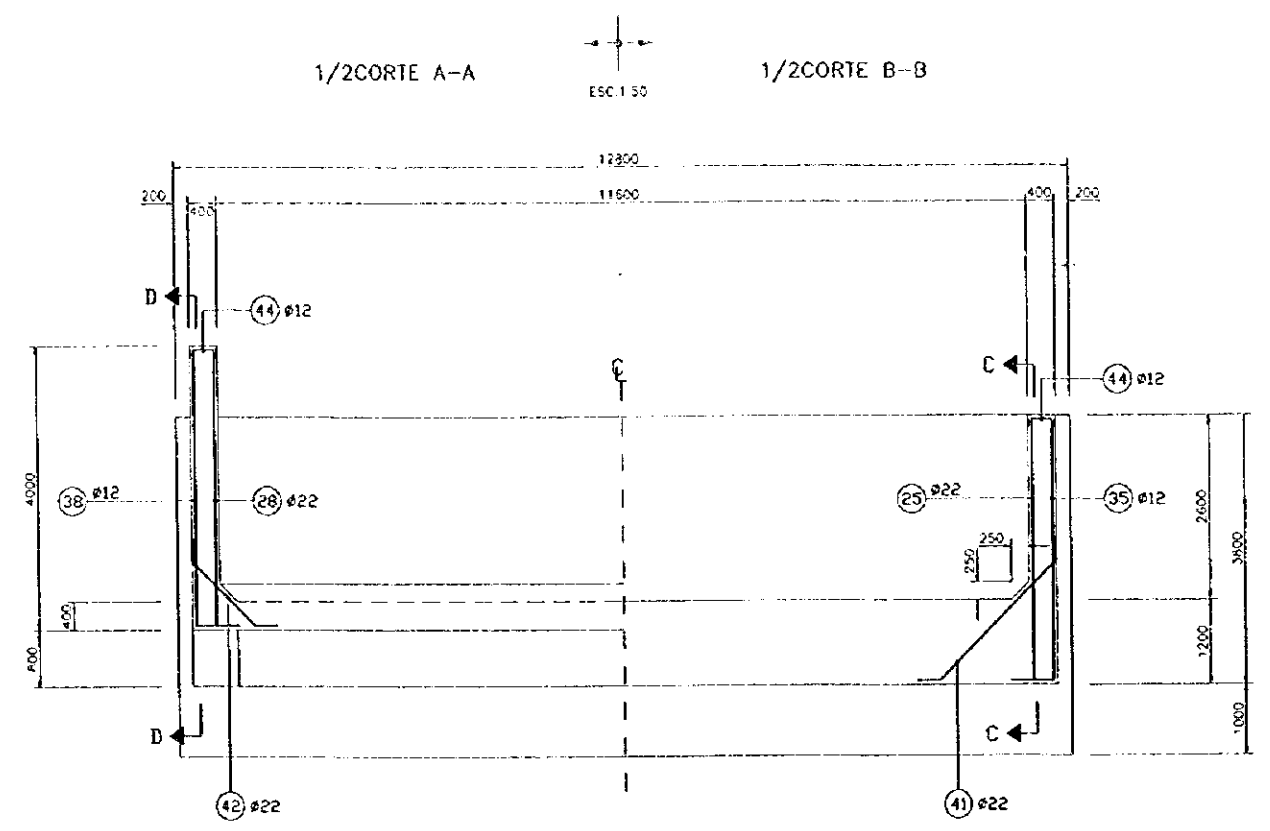
1/2 PLANTA CORTE B-B ESC 1/50 1/2 CORTE C-C



1/2 CORTE D-D ESC 1/50 1/2 CORTE E-E



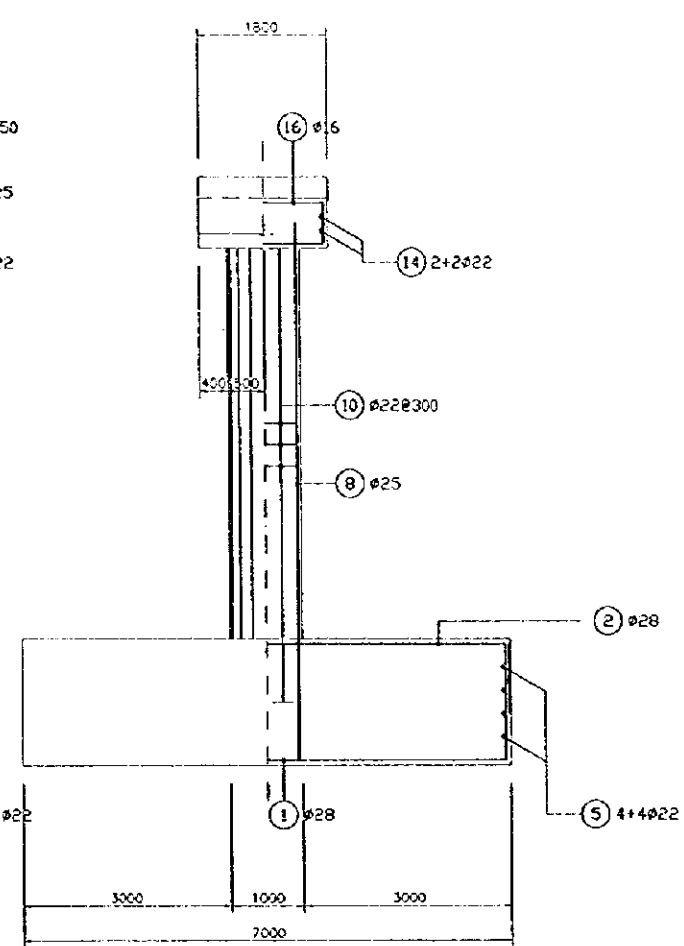
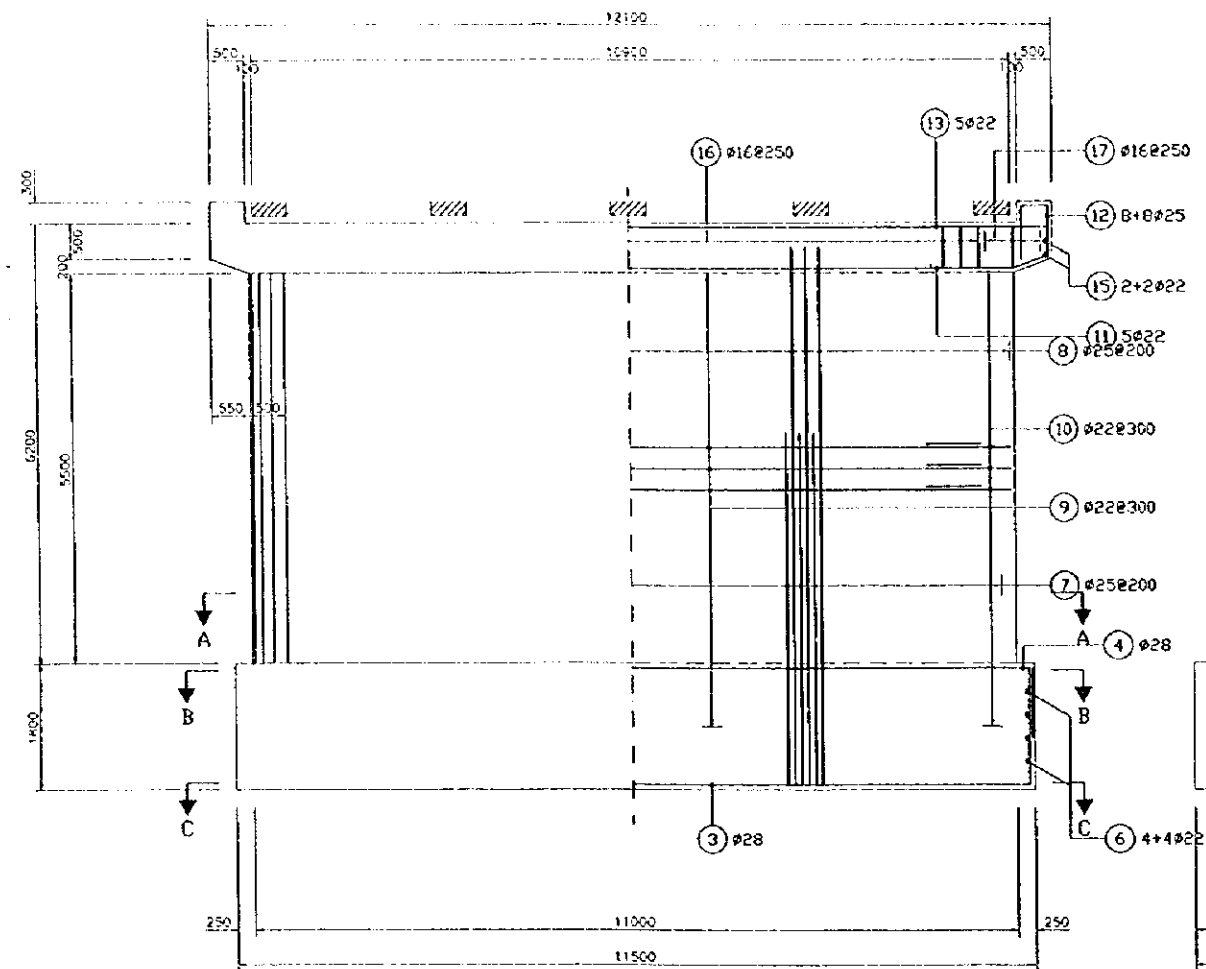
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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE A2 | |
| Camino: | |
| Provincial | Region: RM |
| Projecto | Reviso |
| Va. Sr. Ing. Jefe Depto. Puentes | Director de Obras |
| Drawn | Feche |



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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE A2 | |
| Camino: | |
| Provincia: | Region: RM |
| Proyecto: | Fecha: |
| Via Bo Ing. Jefe Depto. Puentes | Director de Vialidad |
| T:\NOVA\Bustigosa\ARC-Constructores\PLANES\puangue_a2_2.DWG Escala: 1:50 | |

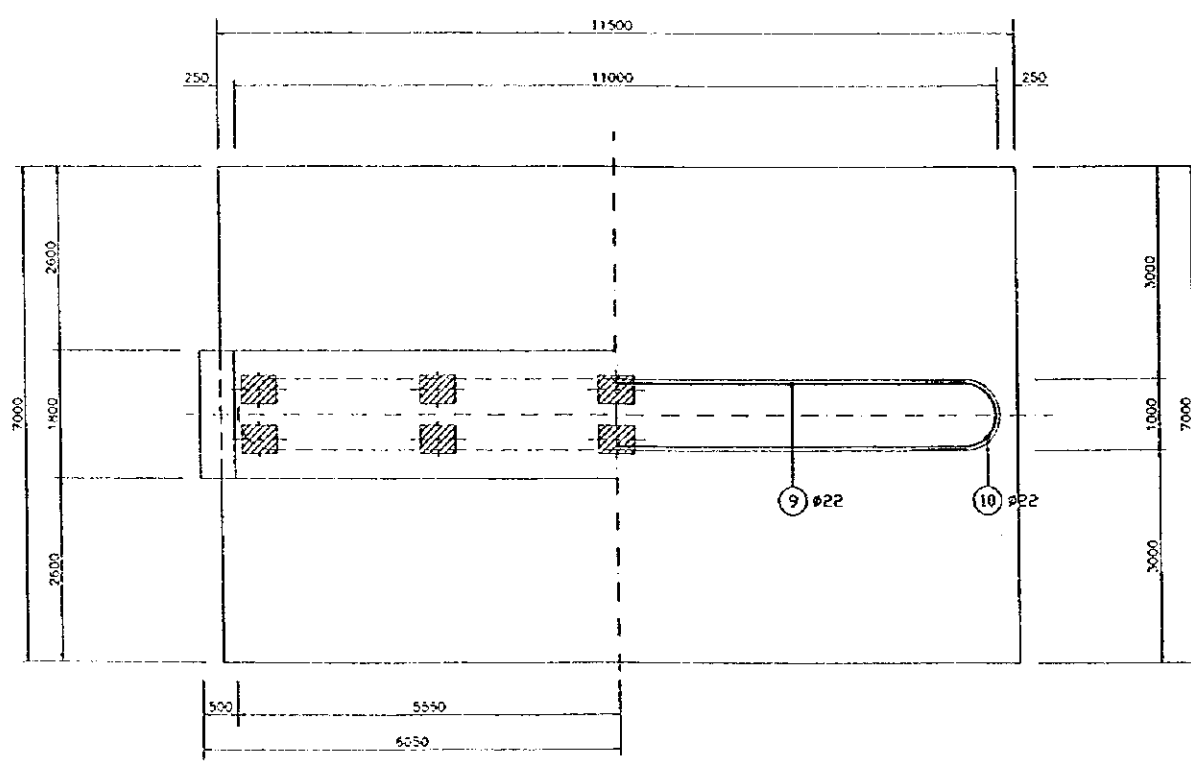
EREVACION CEPA
ESC. 1/50

EREVACION LATERAL
ESC. 1/50



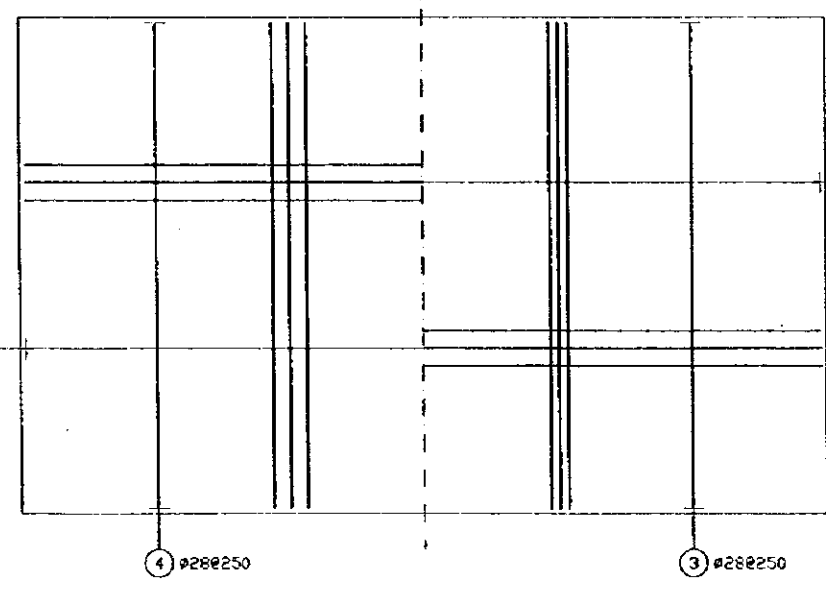
1/2 PLANTA CEPA
ESC. 1/50

1/2 CORTE A-A
ESC. 1/50



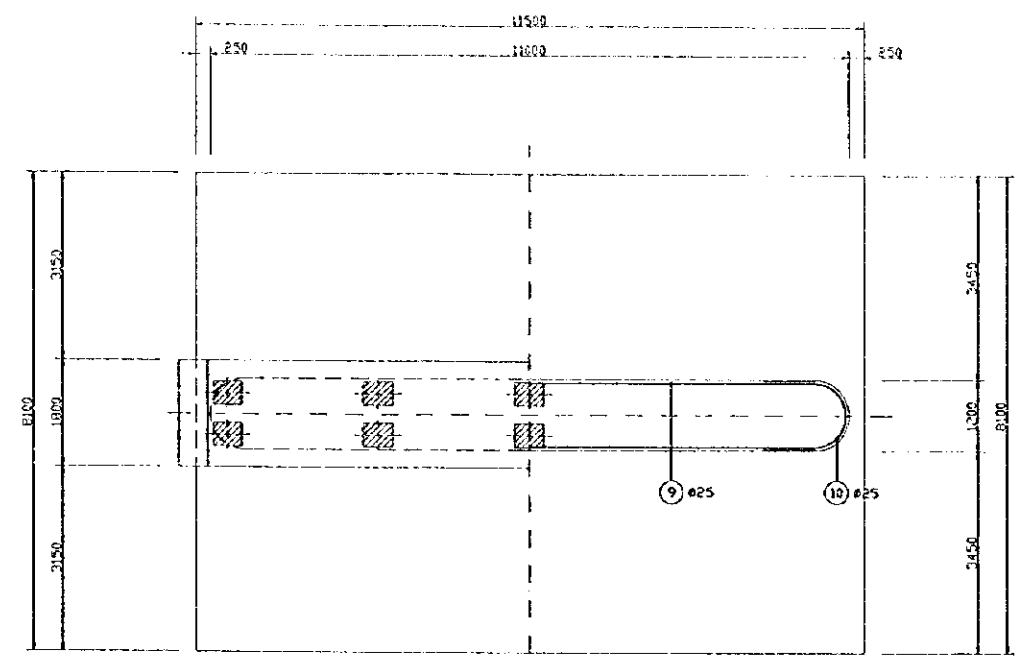
1/2 CORTE B-B
ESC. 1/50

1/2 CORTE C-C
ESC. 1/50

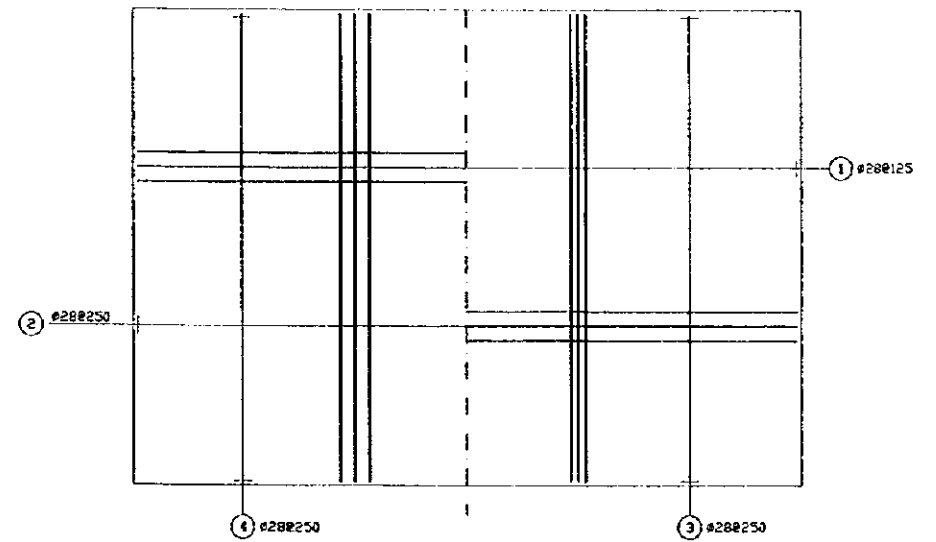


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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE P1,P2 | |
| Camino: | |
| Provincia: | Region: RM |
| _____ Proyecto | _____ Re:so |
| _____ Va. Ing. Jefe Depto. Puentes | _____ Erector de Validez |
| Escala: Fecha: | |

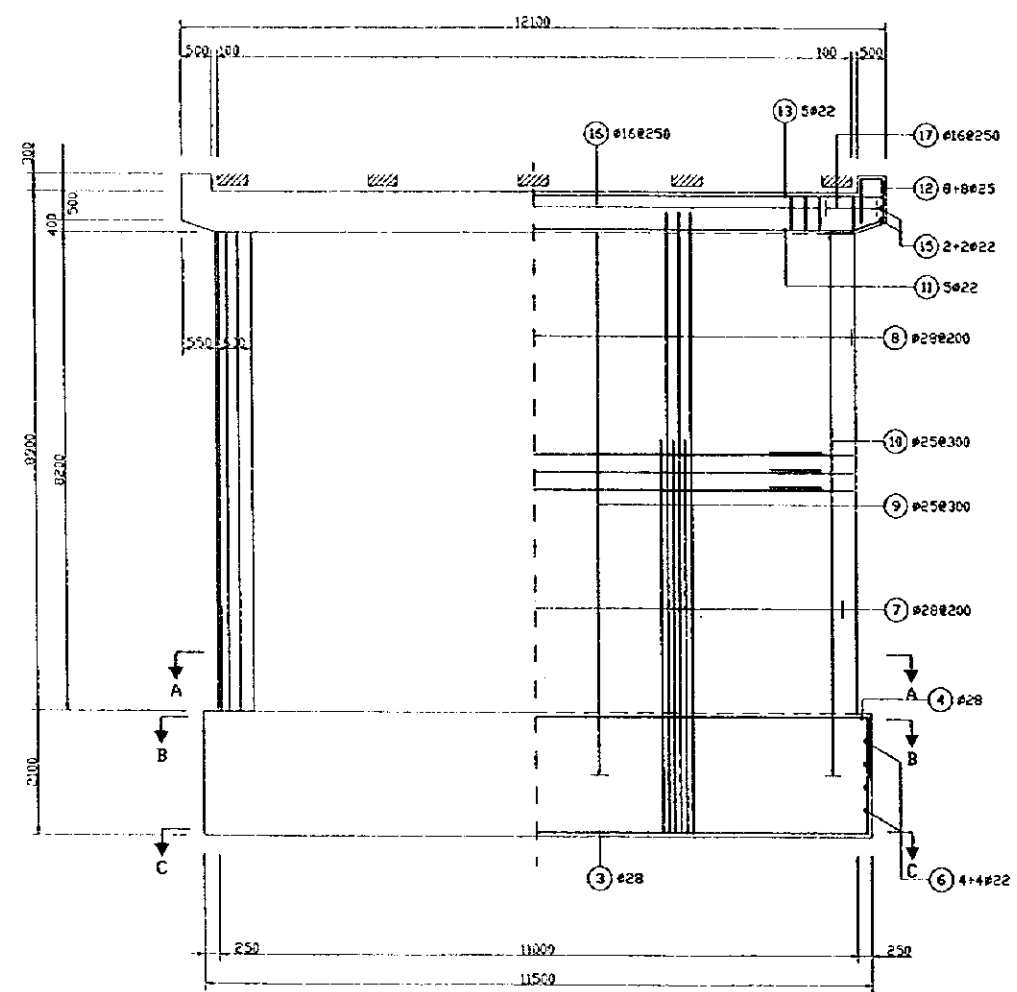
1/2 PLANTA CEPA ESC 1:50
 1/2 CORTE A-A ESC 1:50



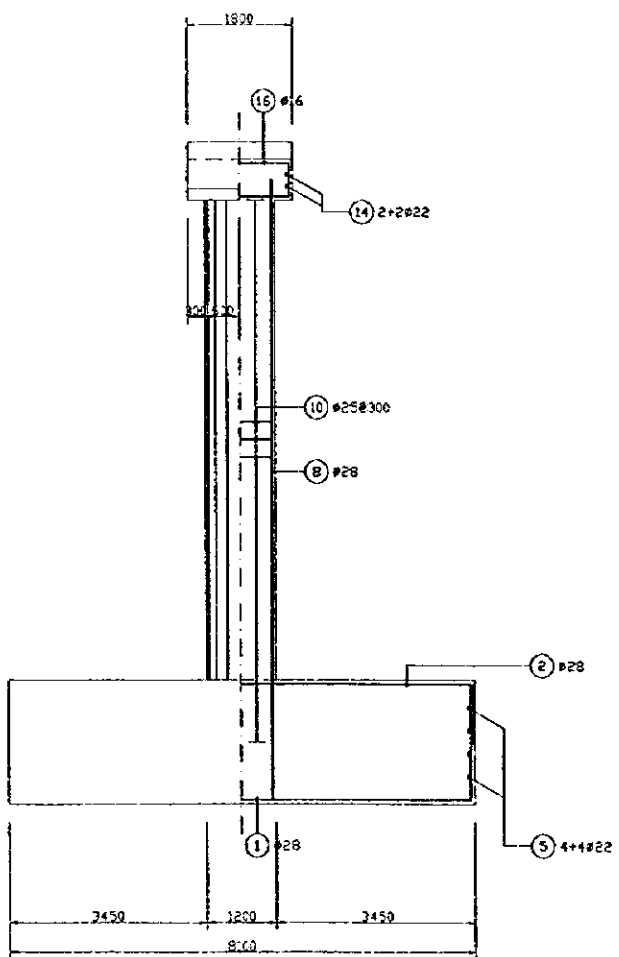
1/2 CORTE B-B ESC 1:50
 1/2 CORTE C-C ESC 1:50



EREVACION CEPA
 ESC 1:50



EREVACION LATERAL
 ESC 1:50



| | |
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| DIRECCION DE VIALIDAD DEPARTAMENTO DE PUENTES | |
| Puente: PUANGUE P3 | |
| Camino: | |
| Provincia: | Región: RM |
| Proyecto: | Revisó: |
| Vs. Sr. Ing. Jefe Depto. Puentes | Director de Vialidad |
| Dibujó: FECH: | |

Resultado del diseño

Tipo de Estructura : **Viga de Postensado**

Fecha :

(1) Datos Generales

Número de Puente :

Nombre del Puente : **PUANGUE**

De la Ruta, Camino :

Rol Ruta :

En el Cauce :

Región : **RM : SANTIAGO**

Provincia :

Longitud del Puente : $L = 120.050 \text{ m}$, Luz(Longitud de cálculo) : $L_c = 29.250 \text{ m}$

Número de Pistas : **2**

Ancho : $1.200 + 10.000 + 1.200 = 12.400 \text{ m}$

(Pasillos) (Calzada) (Pasillos)

Pendiente : **1.0 1.5 1.0 %**

Espesor mínimo del Pavimento : **50 mm**, Espesor máximo del Pavimento : **125 mm**

Ancho de Baranda : $B_b = 200 \text{ mm}$, $h_b = 0.250 \text{ m}$

(2) Cargas

Baranda : $W_B = 0.050 \text{ t/m}$, $W_L = 0.020 \text{ t/m}$, $h = 1.100 \text{ m}$

Cargas de Pavimento : **2.30 t/m³**

Hormigón : **2.30 t/m³ (en masa), 2.50 t/m³ (armado y/o postensado)**

Acero : **7.85 t/m³**

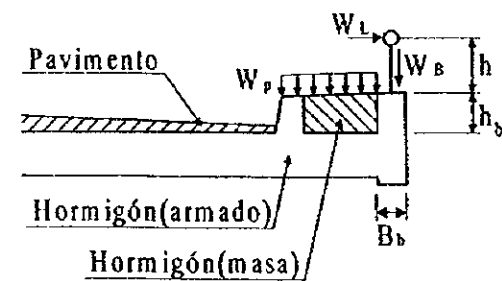
Peatones : $W_p = 0.415 \text{ t/m}^2$ (Losa)

0.293 t/m^2 (Viga)

Cargas de Tránsito : **HS20-44**

Cargas de Viento : $W_v = 0.244 \text{ t/m}^2$

Coefficientes sísmicos : $K_h = 0.15$, $K_v = 0.00$



(3) Material

Hormigón :

Losa y Travesaño grado : **H-30** $f_{cl} = 250 \text{ kg/cm}^2$, $f_{RC} = 100 \text{ kg/cm}^2$

$$E_{RC} = w_c^{1.5} \times 33 \sqrt{f_{RC}} = 57000 \sqrt{f_{RC}} \text{ psi} = 15800 \sqrt{f_{RC}} \text{ kg/cm}^2 = 2.50 \times 10^5 \text{ kg/cm}^2$$

$$w_c = 145 \text{ pcf} = 2.32 \text{ kg/m}^3 \quad (\text{AASHTO 8.7.1})$$

Viga grado : **H-40** $f_{cv} = 350 \text{ kg/cm}^2$, $E_{RC} = 3.01 \times 10^5 \text{ kg/cm}^2$

$$f_{ci}' = 280 \text{ kg/cm}^2, \quad E_{pi} = 2.69 \times 10^5 \text{ kg/cm}^2$$

Acero para Armadura de Losa y Viga : **A63-42H** $f_y = 4200 \text{ kg/cm}^2$, $f_{sa} = 1690 \text{ kg/cm}^2$

$$E_s = 29,000,000 \text{ psi} = 2.1 \times 10^5 \text{ kg/cm}^2$$

Acero Travesaño y barras antisísmicas : **A44-28H** $f_y = 2800 \text{ kg/cm}^2$, $f_{sa} = 1400 \text{ kg/cm}^2$

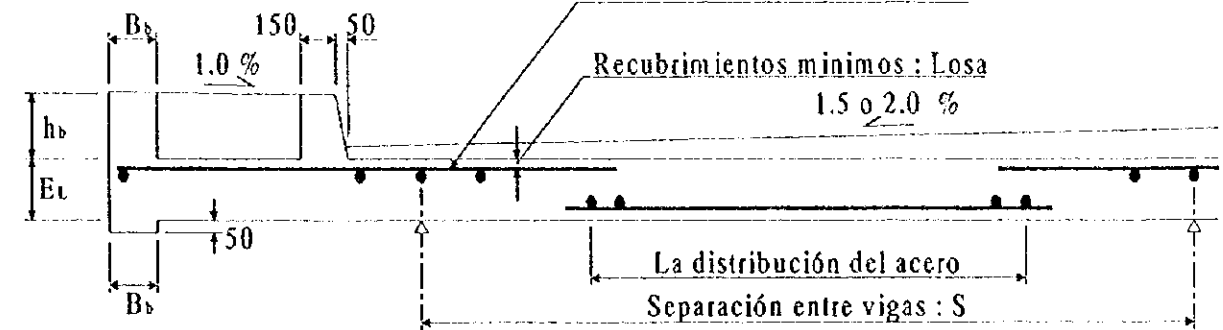
Acero (cable) : Grado **270 K**, ASTM416-80 Cable : **7-12.7** $A_s^* = 6.910 \text{ cm}^2$

Tensión de ruptura : $f_{pu} = 18980 \text{ kg/cm}^2$, $E_s = 1.97 \times 10^5 \text{ kg/cm}^2$

Tensión de fluencia : $f_{py} = 16100 \text{ kg/cm}^2$

(4) Geometría :

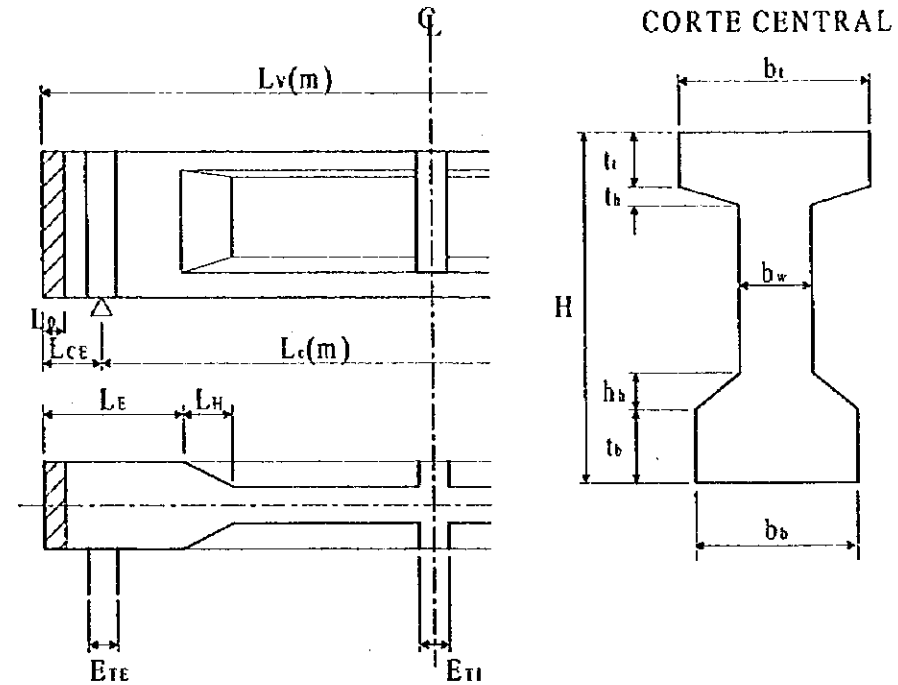
Determinación de número de barras y espaciamento : $\phi 16 @ 150$ $A_s = 13.407 \text{ cm}^2$



Espesor de losa : $E_L = 170 \text{ mm}$, Recubrimientos mínimos : Losa **3.0 cm**

La distribución del acero en el fondo de losa : $\phi 12 @ 125$ $A_s = 9.048 \text{ cm}^2$

Número de Vigas : $n_v = 5$, Separación entre vigas : $S = 2.600 \text{ m}$, $4 @ 2.600 = 10.400 \text{ m}$



Longitud de Viga : $L_v = 29.950 \text{ m}$, $L_{ce} = 0.350 \text{ m}$, $L_o = 100 \text{ mm}$

$L_E = 1600 \text{ mm}$, $L_H = 600 \text{ mm}$, $E_{TE} = 300 \text{ mm}$, $E_{TL} = 250 \text{ mm}$

Altura de Viga : $H = 1.950 \text{ m}$

$b_t = 1000 \text{ mm}$, $t_t = 150 \text{ mm}$, $t_b = 150 \text{ mm}$, $b_w = 200 \text{ mm}$

$h_b = 250 \text{ mm}$, $t_b = 250 \text{ mm}$, $b_b = 500 \text{ mm}$

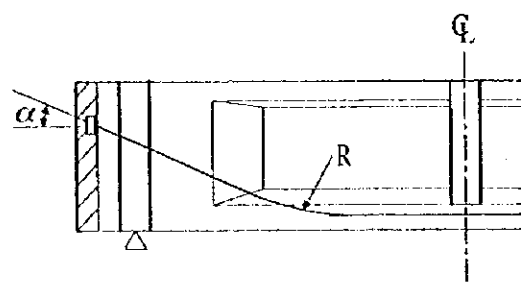
Coefficiente de rozamiento parásito : $K = 0.0045$

Coefficiente de rozamiento en curva : $\mu = 0.25$

Número de Travesaños (Intermedio) : **2**

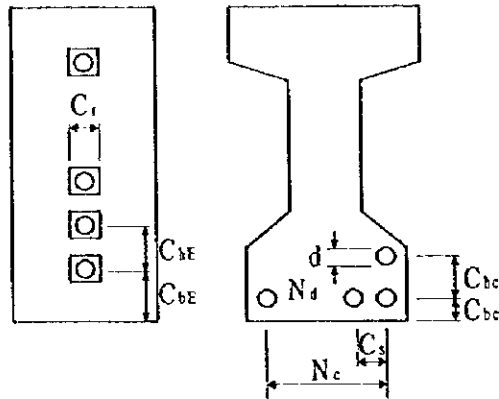
Separación entre Travesaños : **9.750 m**

Ancho Mesa Mínimo : $W_m = 10.900 \text{ m}$



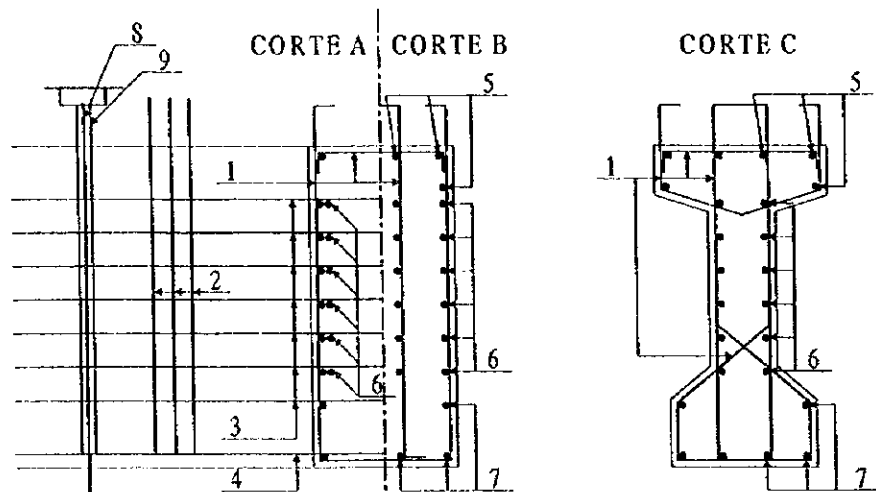
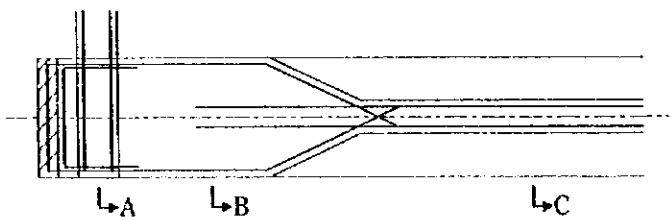
| No. | α (deg) | R(m) |
|-----|----------------|-------|
| 1 | 7.0 | 10.00 |
| 2 | 7.0 | 10.00 |
| 3 | 7.0 | 10.00 |
| 4 | 7.0 | 10.00 |
| 5 | 7.0 | 10.00 |
| 6 | 0.0 | 0.00 |
| 7 | 0.0 | 0.00 |

CORTE FINAL CORTE CENTRAL



Número de ductos a descontar :

$N_d = 5$, $d = 80$ mm
 $N_c = 3$, $C_s = 140$ mm
 $C_{bc} = 120$ mm, $C_{bc} = 90$ mm
 $C_t = 180$ mm
 $C_{hE} = 325$ mm, $C_{bE} = 325$ mm
 $c_{DC} = 13.8$ cm, $c_{DE} = 97.5$ cm



Recubrimientos mínimos : Viga 2.5 cm

1: $\phi 12 @ 200$, 2: $\phi 12 @ 200$, 3: $\phi 18 n 7$, 4: $\phi 22$
 5: $\phi 12$, 6: $\phi 10 n 6$, 7: $\phi 12$
 8: $\phi 25 n 3$, 9: $\phi 3$ "

Cuantificación del Postensado

(5) Diseño de Losa

| E_M (cm) | E_L (cm) | d_{req} (cm) | d (cm) | A_{sreq} (cm ²) | A_s (cm ²) | | | |
|-------------------|--------------|---|---|-------------------------------|--------------------------|--------|-------------------------------|----|
| 17.0 | ≤ 17.0 | OK | 12.7 | ≤ 14.0 | OK | 11.276 | $\leq \phi 16 @ 150 = 13.407$ | OK |
| ϕM_n (tm/m) | M_u (tm/m) | Distribución : A_s (cm ²) | | | | | | |
| 6.424 | ≥ 4.910 | OK | 67 (%) 7.555 $\leq \phi 12 @ 125 = 9.048$ | | | OK | | |

(6) Diseño de Viga

($x = L/2 = 14.625$ m)

| | Exterior | | Interior | |
|------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | Transferencial | Servicio | Transferencial | Servicio |
| Fatiga (kg/cm ²) | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) | Total f_s (kg/cm ²) |
| Viga Superior: f_{VS} | 2 ≤ 168 OK | 67 ≤ 140 OK | 2 ≤ 168 OK | 76 ≤ 140 OK |
| Viga Inferior: f_{VI} | 140 ≤ 168 OK | 12 ≤ 140 OK | 140 ≤ 168 OK | -1 ≥ -15 OK |

($x = 11.886$ m) Interior

| | Transferencial | Servicio |
|-------------------------|------------------------------|-----------------------------------|
| | Fatiga (kg/cm ²) | Total f_s (kg/cm ²) |
| Viga Superior: f_{VS} | 0 ≥ -13 OK | 72 ≤ 140 OK |
| Viga Inferior: f_{VI} | 145 ≤ 168 OK | 7 ≤ 140 OK |

| A_p (cm ²) | A_s (cm ²) | ϕM_n (tm) | M_u (tm) | ϕM_n (tm) | $1.2M_u$ (tm) |
|---------------------------|----------------------------|-------------------------|------------|-------------------------|---------------|
| $5 \times 6.910 = 34.550$ | $6 \times \phi 12 = 6.786$ | $1224.396 \geq 957.512$ | OK | $1224.396 \geq 868.135$ | OK |

(7) Verificación de Corte

| | | | |
|-----------------------|---|--|-----------------|
| $h/2 = 0.975$ m | $A_v = 6 \times \phi 12 = 6.786$ cm ² | $s = 20.0$ cm | $d_p = 97.5$ cm |
| $V_u = 122.838$ t | $\leq \phi(V_c + V_s) = 0.9 \times (116.110 + 138.943) = 229.548$ t | | |
| Cálculo de Conectores | $A_v = 4 \times \phi 12 = 4.524$ cm ² | $V_u = 122.838 \leq \phi V_{uh} = 466.328$ | OK |

(8) Deflexión de Transferencia

| δ_D (cm) | δ_L (cm) | $L_c/800$ |
|-----------------|-----------------|---------------|
| 3.4 | 1.1 | ≤ 3.7 OK |

(9) Cálculo de Travesaño

| A_{sreq} (cm ²) | A_s (cm ²) |
|-------------------------------|--------------------------|
| 11.713 | ≤ 12.692 OK |

(10) Cálculo de Anclajes Antisísmicos

| A_p (cm ²) | R_v (t) | |
|--|-----------|--------|
| $56.831 \leq 4 \times 3 \times \phi 25 = 58.908$ | OK | 56.437 |

Resultado del diseño

Tipo de Estructura : Estribo

Fecha :

(1) Datos Generales

Número de Puentes:

Nombre del Puente : PUANGUE A1

De la Ruta, Camino :

Rol Ruta:

En el Cauce :

Región RM : SANTIAGO

Provincia :

Longitud del Puente : $L = 120.050$ m

Número de Pistas : 2

Ancho : $1.200 + 10.000 + 1.200 = 12.400$ m
(Pasillos) (Calzada) (Pasillos)

Pendiente : 1.0, 1.5, 1.0 %

(2) Cargas

Peso específico suelo : $\gamma_s = 1.90$ t/m³Carga de Hormigón : $w_c = 2.50$ t/m³Coeficiente de Aceleración de Diseño : $A = 0.15$ Longitud de Viga : $L_v = 29.950$ m, Luz : $L_c = 29.250$ m (Longitud de cálculo)Número de Vigas : $n_v = 5$ Separación entre vigas : $S = 2.600$ m, 4 @ 2.600 = 10.400 mAltura de Viga : $h = 1.950$ m, Ancho de Viga : $b_b = 50.0$ cmCarga de Superestructura : $R_v = 56.44$ t, Carga de Tránsito : HS20 - 44
(para 1 apoyo)Carga de superficie : $Q_w = 1.00$ t/m², Carga de Pavimento : $\gamma_c = 2.30$ t/m³

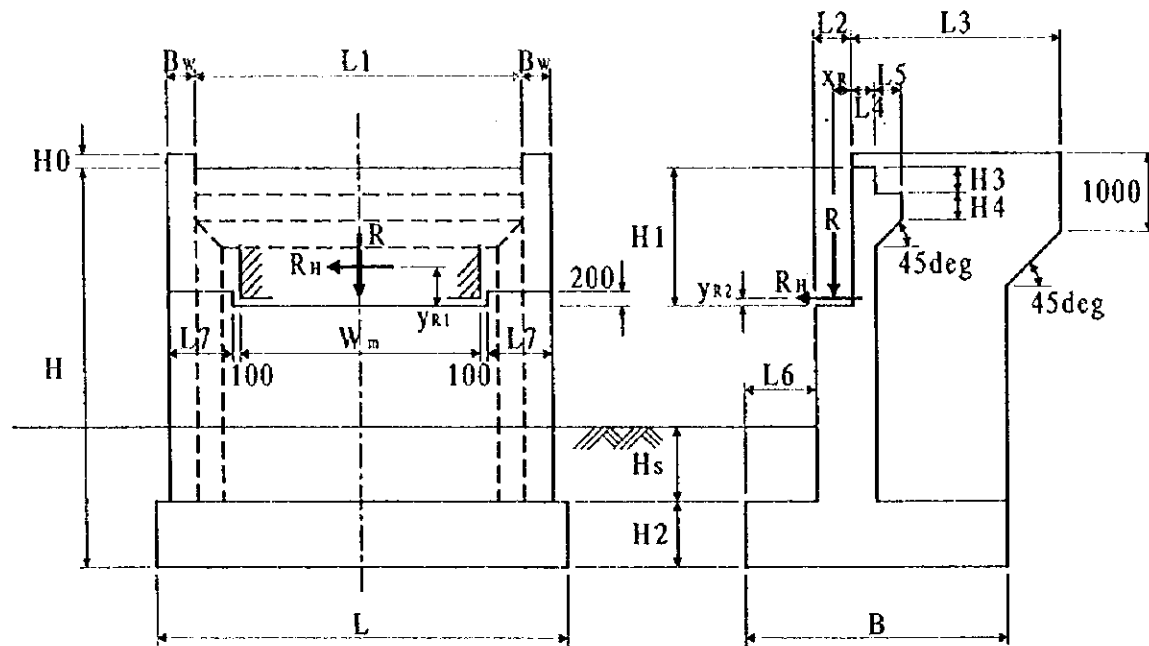
(3) Material

Hormigón : grado : H-30

 $f_c' = 250$ kg/cm², $w_c = 145$ pcf = 2.32 kg/m³ (AASHTO 8.7.1) $E_c = w_c^{1.5} 33(f_c')^{1/2} = 57000(f_c')^{1/2}$ $= w_c^{1.5} (0.0428)(f_c')^{1/2} = 4729.77(f_c')^{1/2} = 2.5 \times 10^5$ kg/cm²Acero : A63-42H $f_y = 4200$ kg/cm², $f_{sa} = 1690$ kg/cm², $E_s = 2.1 \times 10^6$ kg/cm²Ángulo de fricción interna relleno : $\phi = 30$ degAdhesión entre dado y suelo de fundación : $c_B = 0.00$ t/m²Ángulo de fricción interna suelo de fundación : $\phi_B = 42$ degÁngulo de fricción entre dado y suelo de fundación : $\delta_B = 30$ deg

(4) Geometría

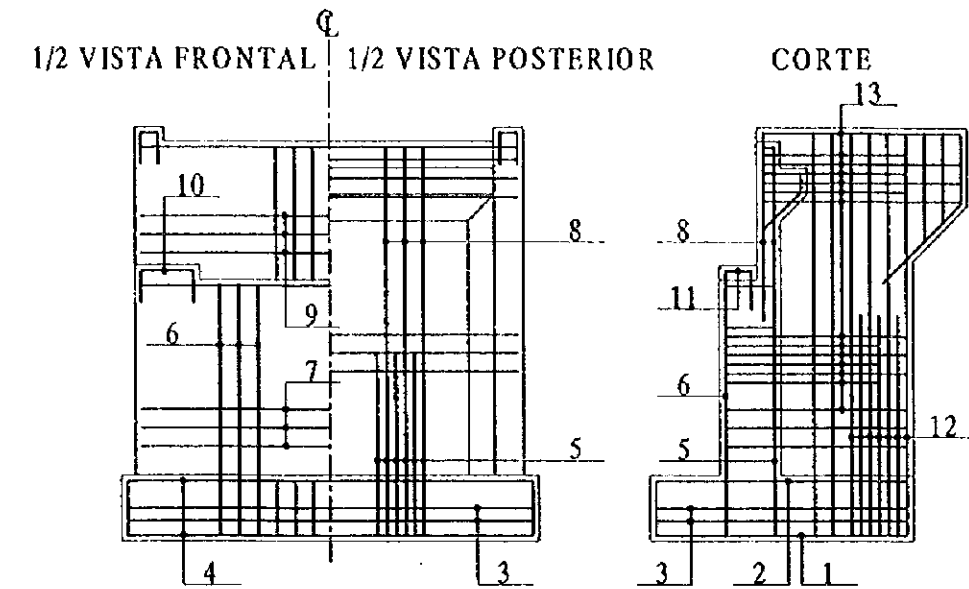
Longitud de Acceso : $L_0 = 4.000 \text{ m}$, Espesor de Acceso: $h_A = 0.250 \text{ m}$



$B = 5800 \text{ mm}$, $L = 12800 \text{ mm}$, $H = 8500 \text{ mm}$, $H_s = 2000 \text{ mm}$, $W_m = 10900 \text{ mm}$
 $B_w = 600 \text{ mm}$, $y_{R1} = 1700 \text{ mm}$, $y_{R2} = 155 \text{ mm}$, $x_R = 400 \text{ mm}$
 $L1 = 11200 \text{ mm}$, $L2 = 800 \text{ mm}$, $L3 = 4200 \text{ mm}$, $L4 = 400 \text{ mm}$, $L5 = 250 \text{ mm}$
 $L6 = 1600 \text{ mm}$, $L7 = 650 \text{ mm}$
 $H0 = 250 \text{ mm}$, $H1 = 2400 \text{ mm}$, $H2 = 1800 \text{ mm}$, $H3 = 250 \text{ mm}$, $H4 = 250 \text{ mm}$

(5) Arriostamiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm
 Elevación 4.0 cm



1 : $\phi 25 @ 250$ 2 : $\phi 25 @ 125$ 3 : $\phi 22 \text{ n } 3$ 4 : $\phi 22 @ 250$ 5 : $\phi 22 @ 125$
 6 : $\phi 22 @ 250$ 7 : $\phi 18 @ 250$ 8 : $\phi 18 @ 250$ 9 : $\phi 12 @ 250$ 10 : $\phi 18 \text{ n } 4$
 11 : $\phi 18 \text{ n } 4$ 12 : $\phi 22 @ 125$ 13 : $\phi 22 @ 150$

Suma del Diseño del Estribo

(7) Fuerzas

| Caso | e (m) | |
|----------|--------------------------|----|
| Estático | 0.346 \leq B/6 = 0.967 | OK |
| Sísmico | 1.850 \leq B/3 = 1.933 | OK |

(8) Análisis de Estabilidad

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{ADM}(t/m^2)$ | F.S.(O) | |
|----------|------------------|---------------------|------------------|------------------|----|
| Estático | 3.302 \geq 1.5 | 26.57 \leq 353.61 | | 5.886 \geq 2.0 | OK |
| Sísmico | 1.259 \geq 1.2 | 66.54 \leq 180.49 | | 1.513 \geq 1.5 | OK |

(9) Diseño del Muro de Retención

Diseño del refuerzo anterior (Caso estático)

| $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | |
|-----------------------------------|-------------------|-------------|----|
| 9.194 \leq $\phi 18@250=10.180$ | 4.97 \leq 13.47 | | OK |

Diseño del refuerzo posterior (Caso sísmico)

| $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|-----------------------------------|-------------------|-------------|-----------------|----------------|----|
| 2.482 \leq $\phi 18@250=10.180$ | 1.79 \leq 13.47 | | 0.5 \leq 20.0 | | OK |

(10) Diseño del guarda rueda

| $A_s(cm^2)$ | M(tm) | $M_u(tm)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|---------------------------------|-------------------|-----------|-----------------|----------------|----|
| 5.902 \leq $\phi 18n4=10.180$ | 7.20 \leq 22.99 | | 0.9 \leq 20.0 | | OK |

(11) Diseño del Cuerpo del Estribo

| Caso | $A_s(cm^2/m)$ | $f_c(kg/cm^2)$ | $f_{cs}(kg/cm^2)$ | $f_s(kg/cm^2)$ | $f_{ss}(kg/cm^2)$ |
|----------|-----------------------------|----------------|-------------------|------------------|-------------------|
| Estático | 19.755 \leq $\phi 22@125$ | 2.4 \leq 100 | | 65.1 \leq 1690 | |
| Sísmico | 18.458 \leq 30.408 | 3.0 \leq 133 | | 87.2 \leq 2248 | |

| Caso | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|-----------------|----------------|----|
| Estático | 1.2 \leq 15.0 | | OK |
| Sísmico | 1.4 \leq 20.0 | | OK |

(12) Diseño de Fundaciones

Diseño del dado frontal

| Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|-----------------------------|---------------------|-------------|-----------------|----------------|----|
| Estático | 10.114 \leq $\phi 25@250$ | 26.60 \leq 128.45 | | 0.8 \leq 15.0 | | OK |
| Sísmico | 18.580 \leq 19.636 | 65.00 \leq 128.45 | | 2.2 \leq 20.0 | | OK |

Diseño del dado trasero

| Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|-----------------------------|---------------------|-------------|-----------------|----------------|----|
| Estático | 14.260 \leq $\phi 25@125$ | 37.51 \leq 254.02 | | 1.0 \leq 15.0 | | OK |
| Sísmico | 25.674 \leq 39.272 | 89.81 \leq 254.02 | | 2.4 \leq 20.0 | | OK |

(13) Diseño del Muro Ala

| | Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----|----------|-----------------------------|--------------------|-------------|-----------------|----------------|----|
| a | Estático | 13.492 \leq $\phi 22@150$ | 11.36 \leq 51.24 | | 1.3 \leq 15.0 | | OK |
| | Sísmico | 8.234 \leq 25.340 | 9.22 \leq 51.24 | | 1.0 \leq 20.0 | | OK |
| b | Estático | 21.467 \leq $\phi 22@150$ | 18.07 \leq 51.24 | | 2.2 \leq 15.0 | | OK |
| | Sísmico | 14.582 \leq 25.340 | 16.32 \leq 51.24 | | 1.9 \leq 20.0 | | OK |
| b' | Estático | 7.271 \leq $\phi 22@300$ | 6.12 \leq 26.22 | | 1.5 \leq 15.0 | | OK |
| | Sísmico | 5.078 \leq 12.670 | 5.68 \leq 26.22 | | 1.4 \leq 20.0 | | OK |
| c | Estático | 26.546 \leq $\phi 22@125$ | 22.34 \leq 60.91 | | 2.9 \leq 15.0 | | OK |
| | Sísmico | 18.401 \leq 30.408 | 20.60 \leq 60.91 | | 2.7 \leq 20.0 | | OK |
| c' | Estático | 7.906 \leq $\phi 22@250$ | 6.65 \leq 31.32 | | 1.6 \leq 15.0 | | OK |
| | Sísmico | 5.555 \leq 15.204 | 6.22 \leq 31.32 | | 1.5 \leq 20.0 | | OK |
| d | Estático | 0.298 \leq $\phi 22@300$ | 0.25 \leq 26.22 | | 0.1 \leq 15.0 | | OK |
| | Sísmico | 0.146 \leq 12.670 | 0.16 \leq 26.22 | | 0.1 \leq 20.0 | | OK |

Resultado del diseño

Tipo de Estructura : Estribo

Fecha :

(1) Datos Generales

Número de Puente:

Nombre del Puente : PUANGUE A2

De la Ruta, Camino :

Rol Ruta:

En el Cauce :

Región RM : SANTIAGO

Provincia :

Longitud del Puente : L = 120.050 m

Número de Pistas : 2

Ancho : 1.200 + 10.000 + 1.200 = 12.400 m

(Pasillos) (Calzada) (Pasillos)

Pendiente : 1.0, 1.5, 1.0 %

(2) Cargas

Peso específico suelo : $\gamma_s = 1.90 \text{ t/m}^3$ Carga de Hormigón : $w_c = 2.50 \text{ t/m}^3$

Coeficiente de Aceleración de Diseño : A = 0.15

Longitud de Viga : $L_v = 29.950 \text{ m}$, Luz : $L_c = 29.250 \text{ m}$ (Longitud de cálculo)Número de Vigas : $n_v = 5$

Separación entre vigas : S = 2.600 m , 4 @ 2.600 = 10.400 m

Altura de Viga : h = 1.950 m , Ancho de Viga : $b_b = 50.0 \text{ cm}$ Carga de Superestructura : $R_v = 56.44 \text{ t}$, Carga de Tránsito : HS20 - 44

(para 1 apoyo)

Carga de superficie : $Q_w = 1.00 \text{ t/m}^2$, Carga de Pavimento : $\gamma_c = 2.30 \text{ t/m}^3$

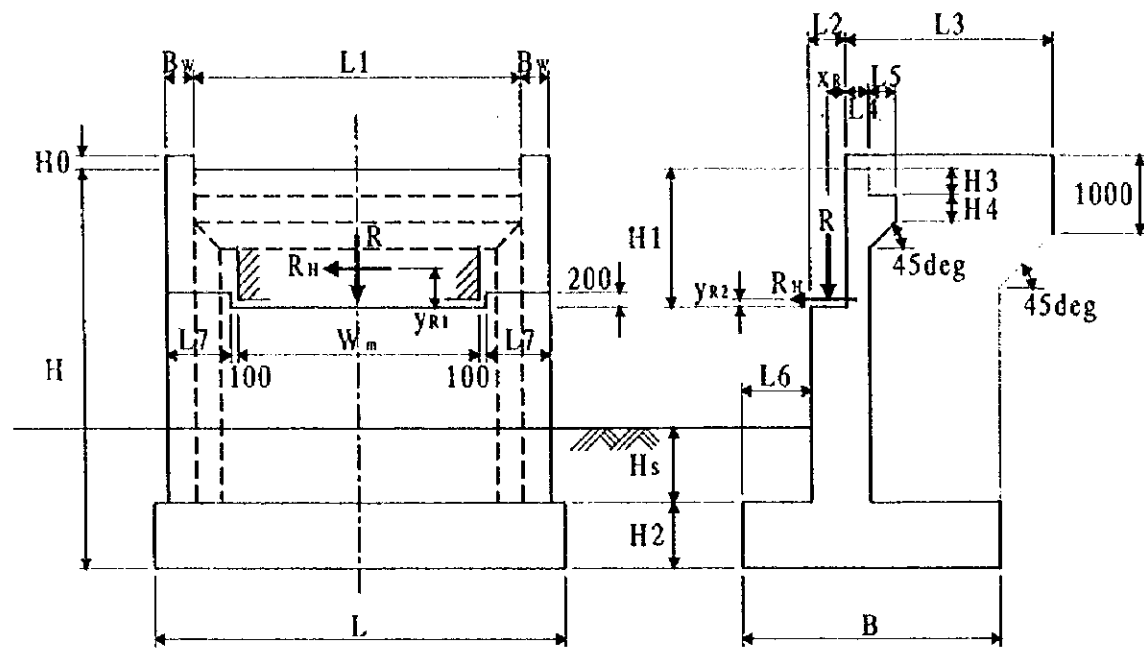
(3) Material

Hormigón : grado : H-30

 $f_c' = 250 \text{ kg/cm}^2$, $w_c = 145 \text{ pcf} = 2.32 \text{ kg/m}^3$ (AASHTO 8.7.1) $E_c = w_c^{1.5} 33(f_c')^{1/2} = 57000(f_c')^{1/2}$ $= w_c^{1.5} (0.0428)(f_c')^{1/2} = 4729.77(f_c')^{1/2} = 2.5 \times 10^5 \text{ kg/cm}^2$ Acero : A63-42H $f_y = 4200 \text{ kg/cm}^2$, $f_{sa} = 1690 \text{ kg/cm}^2$, $E_s = 2.1 \times 10^6 \text{ kg/cm}^2$ Ángulo de fricción interna relleno : $\phi = 30 \text{ deg}$ Adhesión entre dado y suelo de fundación : $c_B = 0.00 \text{ t/m}^2$ Ángulo de fricción interna suelo de fundación : $\phi_B = 42 \text{ deg}$ Ángulo de fricción entre dado y suelo de fundación : $\delta_B = 30 \text{ deg}$

(4) Geometría

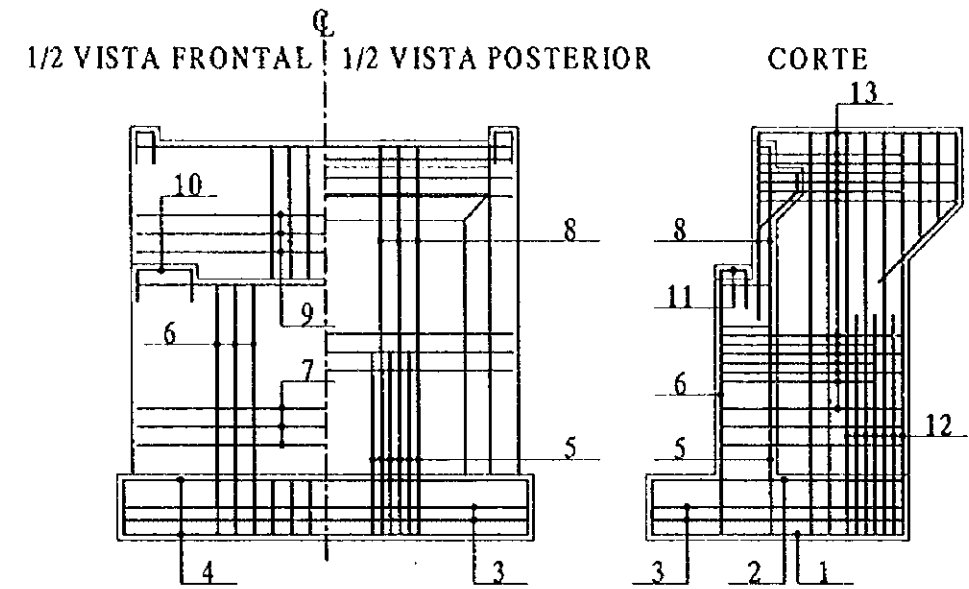
Longitud de Acceso : $L_o = 4.000 \text{ m}$, Espesor de Acceso: $h_A = 0.250 \text{ m}$



- $B = 4800 \text{ mm}$, $L = 12800 \text{ mm}$, $H = 6000 \text{ mm}$, $H_s = 2000 \text{ mm}$, $W_m = 10900 \text{ mm}$
- $B_w = 400 \text{ mm}$, $y_{R1} = 1700 \text{ mm}$, $y_{R2} = 155 \text{ mm}$, $x_R = 400 \text{ mm}$
- $L1 = 11600 \text{ mm}$, $L2 = 800 \text{ mm}$, $L3 = 4000 \text{ mm}$, $L4 = 400 \text{ mm}$, $L5 = 250 \text{ mm}$
- $L6 = 1000 \text{ mm}$, $L7 = 650 \text{ mm}$
- $H0 = 250 \text{ mm}$, $H1 = 2400 \text{ mm}$, $H2 = 1200 \text{ mm}$, $H3 = 250 \text{ mm}$, $H4 = 250 \text{ mm}$

(5) Arriostamiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm
Elevación 4.0 cm



- 1 : $\phi 22 @ 250$ 2 : $\phi 22 @ 125$ 3 : $\phi 22 \text{ n } 3$ 4 : $\phi 22 @ 250$ 5 : $\phi 22 @ 125$
- 6 : $\phi 22 @ 250$ 7 : $\phi 16 @ 250$ 8 : $\phi 18 @ 250$ 9 : $\phi 12 @ 250$ 10 : $\phi 18 \text{ n } 4$
- 11 : $\phi 18 \text{ n } 4$ 12 : $\phi 22 @ 125$ 13 : $\phi 22 @ 200$

Suma del Diseño del Estribo

(7) Fuerzas

| Caso | e (m) | |
|----------|--------------------------|----|
| Estático | 0.372 \leq B/6 = 0.800 | OK |
| Sísmico | 1.515 \leq B/3 = 1.600 | OK |

(8) Análisis de Estabilidad

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{ADM}(t/m^2)$ | F.S.(O) | |
|----------|------------------|---------------------|------------------|------------------|----|
| Estático | 4.475 \geq 1.5 | 24.47 \leq 315.05 | | 8.315 \geq 2.0 | OK |
| Sísmico | 1.247 \geq 1.2 | 54.33 \leq 151.07 | | 1.613 \geq 1.5 | OK |

(9) Diseño del Muro de Retención

Diseño del refuerzo anterior (Caso estático)

| $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | |
|-----------------------------------|-------------------|-------------|----|
| 9.194 \leq $\phi 18@250=10.180$ | 4.97 \leq 13.47 | | OK |

Diseño del refuerzo posterior (Caso sísmico)

| $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|-----------------------------------|-------------------|-------------|-----------------|----------------|----|
| 2.482 \leq $\phi 18@250=10.180$ | 1.79 \leq 13.47 | | 0.5 \leq 20.0 | | OK |

(10) Diseño del guarda rueda

| $A_s(cm^2)$ | M(tm) | $M_u(tm)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|---------------------------------|-------------------|-----------|-----------------|----------------|----|
| 5.902 \leq $\phi 18n4=10.180$ | 7.20 \leq 22.99 | | 0.9 \leq 20.0 | | OK |

(11) Diseño del Cuerpo del Estribo

| Caso | $A_s(cm^2/m)$ | $f_c(kg/cm^2)$ | $f_{cs}(kg/cm^2)$ | $f_t(kg/cm^2)$ | $f_{ts}(kg/cm^2)$ |
|----------|----------------------------|----------------|-------------------|------------------|-------------------|
| Estático | 7.812 \leq $\phi 22@125$ | 0.9 \leq 100 | | 17.3 \leq 1690 | |
| Sísmico | 7.010 \leq 30.408 | 1.1 \leq 133 | | 23.8 \leq 2248 | |

| Caso | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|-----------------|----------------|----|
| Estático | 0.7 \leq 15.0 | | OK |
| Sísmico | 0.8 \leq 20.0 | | OK |

(12) Diseño de Fundaciones

Diseño del dado frontal

| Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|----------------------------|--------------------|-------------|-----------------|----------------|----|
| Estático | 5.899 \leq $\phi 22@250$ | 10.20 \leq 65.23 | | 0.7 \leq 15.0 | | OK |
| Sísmico | 9.680 \leq 15.204 | 22.25 \leq 65.23 | | 1.6 \leq 20.0 | | OK |

Diseño del dado trasero

| Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----------|----------------------------|---------------------|-------------|-----------------|----------------|----|
| Estático | 8.676 \leq $\phi 22@125$ | 15.00 \leq 128.73 | | 0.7 \leq 15.0 | | OK |
| Sísmico | 20.017 \leq 30.408 | 46.01 \leq 128.73 | | 2.4 \leq 20.0 | | OK |

(13) Diseño del Muro Ala

| | Caso | $A_s(cm^2/m)$ | M(tm/m) | $M_u(tm/m)$ | $v(kg/cm^2)$ | $v_c(kg/cm^2)$ | |
|----|----------|-----------------------------|--------------------|-------------|-----------------|----------------|----|
| a | Estático | 14.356 \leq $\phi 22@200$ | 7.77 \leq 24.51 | | 1.4 \leq 15.0 | | OK |
| | Sísmico | 7.572 \leq 19.005 | 5.45 \leq 24.51 | | 1.0 \leq 20.0 | | OK |
| b | Estático | 16.180 \leq $\phi 22@200$ | 8.75 \leq 24.51 | | 1.9 \leq 15.0 | | OK |
| | Sísmico | 10.169 \leq 19.005 | 7.32 \leq 24.51 | | 1.6 \leq 20.0 | | OK |
| b' | Estático | 5.974 \leq $\phi 22@400$ | 3.23 \leq 12.59 | | 1.4 \leq 15.0 | | OK |
| | Sísmico | 3.992 \leq 9.503 | 2.87 \leq 12.59 | | 1.2 \leq 20.0 | | OK |
| c | Estático | 21.323 \leq $\phi 22@125$ | 11.54 \leq 37.93 | | 2.8 \leq 15.0 | | OK |
| | Sísmico | 14.036 \leq 30.408 | 10.10 \leq 37.93 | | 2.5 \leq 20.0 | | OK |
| c' | Estático | 6.617 \leq $\phi 22@250$ | 3.58 \leq 19.83 | | 1.6 \leq 15.0 | | OK |
| | Sísmico | 4.476 \leq 15.204 | 3.22 \leq 19.83 | | 1.5 \leq 20.0 | | OK |
| d | Estático | 0.710 \leq $\phi 22@400$ | 0.38 \leq 12.59 | | 0.3 \leq 15.0 | | OK |
| | Sísmico | 0.337 \leq 9.503 | 0.24 \leq 12.59 | | 0.2 \leq 20.0 | | OK |

Resultado del diseño

Tipo de Estructura : Cepa

Fecha :

(1) Datos Generales

Nombre del Puente : PUANGUE P1,P2

De la Ruta, Camino :

En el Cauce :

Región : RM : SANTIAGO

Provincia :

Longitud del Puente : $L = 120.050 \text{ m}$

Número de Pistas : 2

Ancho : $1.200 + 10.000 + 1.200 = 12.400 \text{ m}$

(Pasillos) (Calzada) (Pasillos)

Pendiente : 1.0 , 1.5 , 1.0 %

(2) Cargas

Peso específico suelo : $\gamma_s = 1.90 \text{ t/m}^3$

Cargas de Hormigón : $w_c = 2.50 \text{ t/m}^3$

Coefficiente de Aceleración de Diseño : $A = 0.15$

Longitud de Viga : $L_v = 29.950 \text{ m}$, Luz : $L_c = 29.250 \text{ m}$ (Longitud de cálculo)

Número de Vigas : $n_v = 5$

Separación entre vigas : $S = 2.600 \text{ m}$, 4 @ 2.600 = 10.400 m

Ancho de Viga : $b_b = 50.0 \text{ cm}$

Carga de Superestructura : $R_v = 56.44 \text{ t}$ (para 1 apoyo)

Cargas de Tránsito : HS20 - 44

Altura de la Superestructura : $H_v = 1.850 \text{ m}$

Carga de viento sobre Superestructura : $W_v = 0.244 \text{ t/m}^2$

Carga de viento sobre infraestructura : $W_e = 0.244 \text{ t/m}^2$

Velocidad del cauce : $V = 2.000 \text{ m/s}$

(3) Material

Hormigón : H-30 $f'_c = 250 \text{ kg/cm}^2$, $w_c = 145 \text{ pcf} = 2.32 \text{ kg/m}^3$ (AASHTO 8.7.1)

$$E_c = w_c^{1.5} 33(f'_c)^{1/2} = 57000(f'_c)^{1/2}$$

$$= w_c^{1.5} (0.0428)(f'_c)^{1/2} = 4729.77(f'_c)^{1/2} = 2.5 \times 10^5 \text{ kg/cm}^2$$

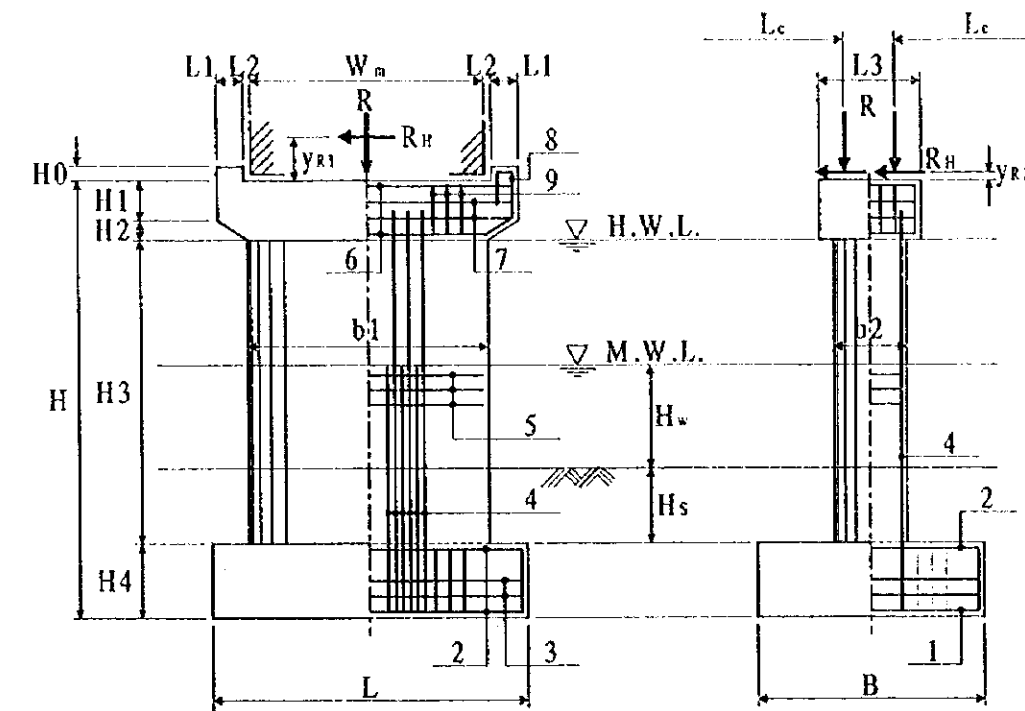
Acero : A63-42H $f_y = 4200 \text{ kg/cm}^2$, $f_{sa} = 1690 \text{ kg/cm}^2$, $E_s = 2.1 \times 10^6 \text{ kg/cm}^2$

Adhesión entre dado y suelo de fundación : $c_B = 0.00 \text{ t/m}^2$

Ángulo de fricción interna suelo de fundación : $\phi_B = 42 \text{ deg}$

Ángulo de fricción entre dado y suelo de fundación : $\delta_B = 30 \text{ deg}$

(4) Geometría



$B = 7000 \text{ mm}$, $L = 11500 \text{ mm}$, $H = 8000 \text{ mm}$, $H_s = 2000 \text{ mm}$, $H_w = 1000 \text{ mm}$
 $y_{R1} = 1700 \text{ mm}$, $y_{R2} = 155 \text{ mm}$, $L1 = 500 \text{ mm}$, $L2 = 100 \text{ mm}$, $L3 = 1800 \text{ mm}$
 $b1 = 11000 \text{ mm}$, $b2 = 1000 \text{ mm}$, $W_m = 10900 \text{ mm}$, $H0 = 300 \text{ mm}$
 $H1 = 500 \text{ mm}$, $H2 = 200 \text{ mm}$, $H3 = 5500 \text{ mm}$, $H4 = 1800 \text{ mm}$

Arriostramiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm
 Elevación 4.0 cm

1 : $\phi 28 @ 125$, 2 : $\phi 28 @ 250$, 3 : $\phi 22 \text{ n } 4$, 4 : $\phi 25 @ 100$
 5 : $\phi 22 @ 300$, 6 : $\phi 22 \text{ n } 5$, 7 : $\phi 22 \text{ n } 2$, 8 : $\phi 25 \text{ n } 8$
 9 : $\phi 16 @ 250$

Suma del Diseño de la Cepa

(6) Fuerzas

Longitudinal :

| Caso | e_p (m) | |
|---------|--------------------------|----|
| Sísmico | 2.324 $\leq B/3 = 2.333$ | OK |

Transversal :

| Caso | e_t (m) | |
|----------|--------------------------|----|
| Estático | 0.123 $\leq L/6 = 1.917$ | OK |
| Sísmico | 2.540 $\leq L/3 = 3.833$ | OK |

(7) Análisis de Estabilidad

Longitudinal :

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{all}(t/m^2)$ | F.S.(O) | |
|----------|------------------|------------------|------------------|------------------|----|
| Estático | | 26.15 \leq | 578.95 | | OK |
| Sísmico | 1.866 ≥ 1.2 | 52.37 \leq | 301.60 | 1.506 ≥ 1.5 | OK |

Transversal :

| Caso | F.S.(S) | $q_{max}(t/m^2)$ | $q_{all}(t/m^2)$ | F.S.(O) | |
|----------|-------------------|------------------|------------------|-------------------|----|
| Estático | 44.593 ≥ 1.5 | 14.76 \leq | 565.93 | 46.689 ≥ 2.0 | OK |
| Sísmico | 1.865 ≥ 1.2 | 31.52 \leq | 444.75 | 2.264 ≥ 1.5 | OK |

(8) Diseño del guarda rueda

| A_s (cm ²) | M (tm) | M_u (tm) | v (kg/cm ²) | v_c (kg/cm ²) | |
|---|--------------|------------|---------------------------|-----------------------------|----|
| 34.526 $\leq \phi 25 \text{ n } 8 = 39.272$ | 31.75 \leq | 65.09 | 12.8 \leq | 20.0 | OK |

(9) Diseño de la cepa

| A_s (cm ²) | f_c (kg/cm ²) | f_{ca} (kg/cm ²) | f_t (kg/cm ²) | f_{ta} (kg/cm ²) |
|--|-----------------------------|--------------------------------|-----------------------------|--------------------------------|
| 488.017 $\leq \phi 25 @ 100 = 495.809$ | 71.0 \leq | 133 | 1721.3 \leq | 2248 |

| v (kg/cm ²) | v_c (kg/cm ²) | |
|---------------------------|-----------------------------|----|
| 1.6 \leq | 20.0 | OK |

(10) Diseño de Fundaciones

| Caso | A_s (cm ² /m) | M (tm/m) | M_u (tm/m) | v (kg/cm ²) | v_c (kg/cm ²) | |
|----------|--------------------------------------|---------------|--------------|---------------------------|-----------------------------|----|
| Estático | 37.046 $\leq \phi 28 @ 125 = 49.264$ | 97.44 \leq | 316.82 | 2.6 \leq | 15.0 | OK |
| Sísmico | 42.485 $\leq \phi 28 @ 125 = 49.264$ | 148.62 \leq | 316.82 | 3.9 \leq | 20.0 | OK |

Resultado del diseño

Tipo de Estructura : Cepa

Fecha :

(1) Datos Generales

Nombre del Puente : PUANGUE P3

De la Ruta, Camino :

En el Cauce :

Región : RM : SANTIAGO

Provincia :

Longitud del Puente : $L = 120.050$ m

Número de Pistas : 2

Ancho : $1.200 + 10.000 + 1.200 = 12.400$ m

(Pasillos) (Calzada) (Pasillos)

Pendiente : 1.0, 1.5, 1.0 %

Número de Puente :

Rol Ruta :

(2) Cargas

Peso específico suelo : $\gamma_s = 1.90$ t/m³Cargas de Hormigón : $w_c = 2.50$ t/m³Coeficiente de Aceleración de Diseño : $A = 0.15$ Longitud de Viga : $L_v = 29.950$ m, Luz : $L_c = 29.250$ m (Longitud de cálculo)Número de Vigas : $n_v = 5$ Separación entre vigas : $S = 2.600$ m, $4 @ 2.600 = 10.400$ mAncho de Viga : $b_v = 50.0$ cmCarga de Superestructura : $R_v = 56.44$ t (para 1 apoyo)

Cargas de Tránsito : HS20 - 44

Altura de la Superestructura : $H_v = 1.850$ mCarga de viento sobre Superestructura : $W_v = 0.244$ t/m²Carga de viento sobre infraestructura : $W_E = 0.244$ t/m²Velocidad del cauce : $V = 2.000$ m/s

(3) Material

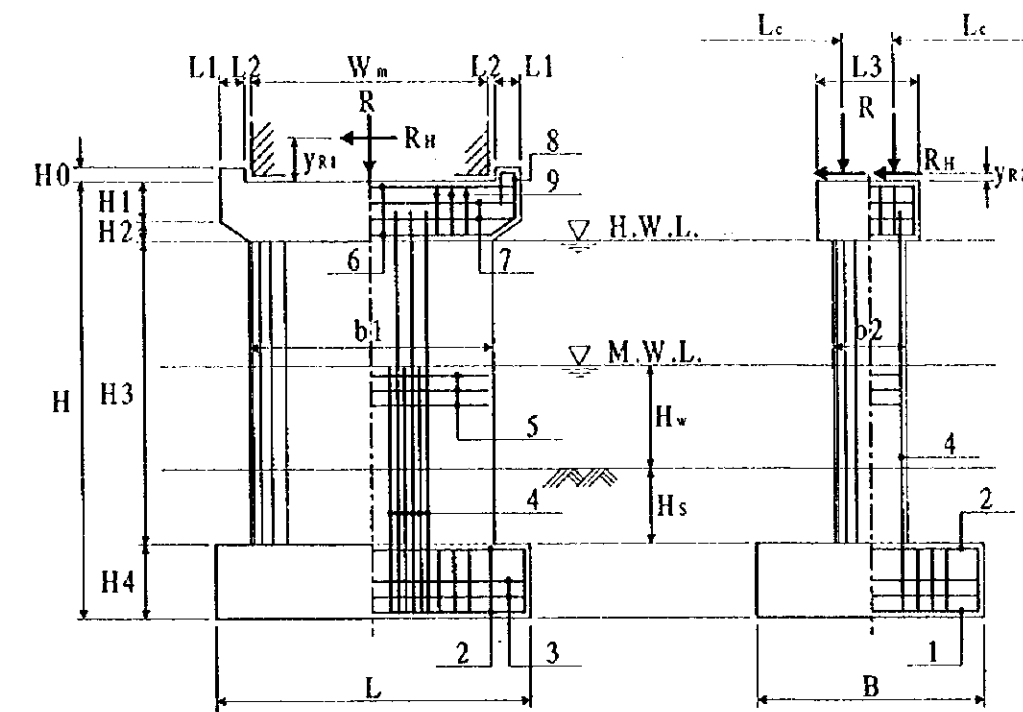
Hormigón : H-30 $f'_c = 250$ kg/cm², $w_c = 145$ pcf = 2.32 kg/m³ (AASHTO 8.7.1)

$$E_c = w_c^{1.5} 33 (f'_c)^{1/2} = 57000 (f'_c)^{1/2}$$

$$= w_c^{1.5} (0.0428) (f'_c)^{1/2} = 4729.77 (f'_c)^{1/2} = 2.5 \times 10^5 \text{ kg/cm}^2$$

Acero : A63-42H $f_y = 4200$ kg/cm², $f_{sa} = 1690$ kg/cm², $E_s = 2.1 \times 10^6$ kg/cm²Adhesión entre dado y suelo de fundación : $c_B = 0.00$ t/m²Ángulo de fricción interna suelo de fundación : $\phi_B = 42$ degÁngulo de fricción entre dado y suelo de fundación : $\delta_B = 30$ deg

(4) Geometría



$B = 8100$ mm, $L = 11500$ mm, $H = 11000$ mm, $H_s = 2000$ mm, $H_w = 1000$ mm
 $y_{R1} = 1700$ mm, $y_{R2} = 155$ mm, $L1 = 500$ mm, $L2 = 100$ mm, $L3 = 1800$ mm
 $b1 = 11000$ mm, $b2 = 1200$ mm, $W_m = 10900$ mm, $H0 = 300$ mm
 $H1 = 500$ mm, $H2 = 200$ mm, $H3 = 8200$ mm, $H4 = 2100$ mm

Arriostamiento de Refuerzo

Recubrimientos mínimos : Fundación 5.0 cm

Elevación 4.0 cm

1 : $\phi 28 @ 125$, 2 : $\phi 28 @ 250$, 3 : $\phi 22$ n 4, 4 : $\phi 28 @ 100$ 5 : $\phi 25 @ 300$, 6 : $\phi 22$ n 5, 7 : $\phi 22$ n 2, 8 : $\phi 25$ n 89 : $\phi 16 @ 250$

Suma del Diseño de la Cepa

(6) Fuerzas

Longitudinal :

| Caso | e_B (m) | |
|---------|--------------------------|----|
| Sísmico | 2.698 $\leq B/3 = 2.700$ | OK |

Transversal :

| Caso | e_L (m) | |
|----------|--------------------------|----|
| Estático | 0.144 $\leq L/6 = 1.917$ | OK |
| Sísmico | 2.879 $\leq L/3 = 3.833$ | OK |

(7) Análisis de Estabilidad

Longitudinal :

| Caso | F.S.(S) | q_{max} (t/m ²) | q_{min} (t/m ²) | F.S.(O) | |
|----------|------------------|-------------------------------|-------------------------------|------------------|----|
| Estático | | 25.64 \leq | 648.88 | | OK |
| Sísmico | 2.076 ≥ 1.2 | 54.32 \leq | 356.82 | 1.501 ≥ 1.5 | OK |

Transversal :

| Caso | F.S.(S) | q_{max} (t/m ²) | q_{min} (t/m ²) | F.S.(O) | |
|----------|-------------------|-------------------------------|-------------------------------|-------------------|----|
| Estático | 49.270 ≥ 1.5 | 14.79 \leq | 635.56 | 39.886 ≥ 2.0 | OK |
| Sísmico | 2.075 ≥ 1.2 | 36.32 \leq | 479.87 | 1.997 ≥ 1.5 | OK |

(8) Diseño del guarda rueda

| A_s (cm ²) | M (tm) | M_u (tm) | v (kg/cm ²) | v_c (kg/cm ²) | |
|---|--------------|------------|---------------------------|-----------------------------|----|
| 34.526 $\leq \phi 25 \text{ n } 8 = 39.272$ | 31.75 \leq | 65.09 | 12.8 \leq | 20.0 | OK |

(9) Diseño de la cepa

| A_s (cm ²) | f_c (kg/cm ²) | f_{ca} (kg/cm ²) | f_c (kg/cm ²) | f_{ca} (kg/cm ²) |
|--|-----------------------------|--------------------------------|-----------------------------|--------------------------------|
| 596.932 $\leq \phi 28 @ 100 = 609.642$ | 70.8 \leq | 133 | 1651.7 \leq | 2248 |

| v (kg/cm ²) | v_c (kg/cm ²) | |
|---------------------------|-----------------------------|----|
| 1.5 \leq | 20.0 | OK |

(10) Diseño de Fundaciones

| Caso | A_s (cm ² /m) | M (tm/m) | M_u (tm/m) | v (kg/cm ²) | v_c (kg/cm ²) | |
|----------|--------------------------------------|---------------|--------------|---------------------------|-----------------------------|----|
| Estático | 39.379 $\leq \phi 28 @ 125 = 49.264$ | 121.33 \leq | 372.68 | 2.4 \leq | 15.0 | OK |
| Sísmico | 48.899 $\leq \phi 28 @ 125 = 49.264$ | 200.38 \leq | 372.68 | 3.9 \leq | 20.0 | OK |

RESUMEN DE CUBICACIONES
Puente N° 4

Nombre del Puente: Puange

Superestructura

| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Total | Comentarios |
|--|------------|----------------|------------|------|------|------|------|----------|----------------------------|
| | | | A1 | P1 | P2 | P3 | A2 | | |
| Superestructura | | | | | | | | | |
| Hormigón | H-25 | m ³ | | | | | | 126.5 | Losa, Viga Travesaño |
| | H-35 | m ³ | | | | | | 109.2 | Viga |
| Acero | A63-42H | kg | | | | | | 33,755.3 | |
| | A44-28H | kg | | | | | | 862.0 | Viga Travesaño |
| PC Cable | ASTM416-80 | m | | | | | | 746.2 | |
| Accesorios | | n° | | | | | | 50.0 | |
| Moldaje | | m ² | | | | | | 1,190.3 | Losa, Viga travesaño, Viga |
| Andamios | | m ² | | | | | | 1,438.4 | Para Losa de Hormigón |
| Zapata | | n° | 5.0 | 10.0 | 10.0 | 10.0 | 5.0 | 40.0 | |
| Cantonera | | m | 12.4 | | | | 12.4 | 24.8 | |
| Baranda | | m | | | | | | 240.1 | |
| Drenaje | | n° | | | | | | | |
| Pasillo | | m ² | | | | | | 288.1 | |
| Pavimento | | m ² | | | | | | 1,200.5 | |

Losa de Acceso

| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Total | Comentarios |
|--|--------|----------------|------------|----|----|----|-------|-------|-------------|
| | | | A1 | P1 | P2 | P3 | A2 | | |
| Hormigón | H-25 | m ³ | 10.0 | | | | 10.0 | 20.0 | |
| Acero | A44-28 | kg | 457.9 | | | | 457.9 | 915.8 | |
| Moldaje | | m ² | 4.5 | | | | 4.5 | 9.0 | |

Infraestructura y otros

| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Total | Comentarios |
|--|---------|----------------|------------|----------|----------|----------|----------|-----------|-------------|
| | | | A1 | P1 | P2 | P3 | A2 | | |
| Infraestructura | | | | | | | | | |
| Hormigón | H-25 | m ³ | 475.8 | 439.6 | 439.6 | 633.8 | 269.9 | 2,258.8 | |
| Acero | A63-42H | kg | 30,297.5 | 39,304.8 | 39,304.8 | 54,442.8 | 20,349.1 | 183,699.0 | |
| Moldaje | | m ² | 671.4 | 451.0 | 451.0 | 607.1 | 460.7 | 2,641.1 | |
| Excavación | | m ³ | 331.2 | 356.3 | 356.3 | 481.3 | 187.7 | 1,712.6 | |
| Horm. Emplant. | | m ³ | 8.1 | 9.0 | 9.0 | 10.8 | 6.5 | 43.4 | |
| Andamios | | m ³ | 274.4 | 172.9 | 172.9 | 239.4 | 168.0 | 1,027.6 | |

Camino de Acceso

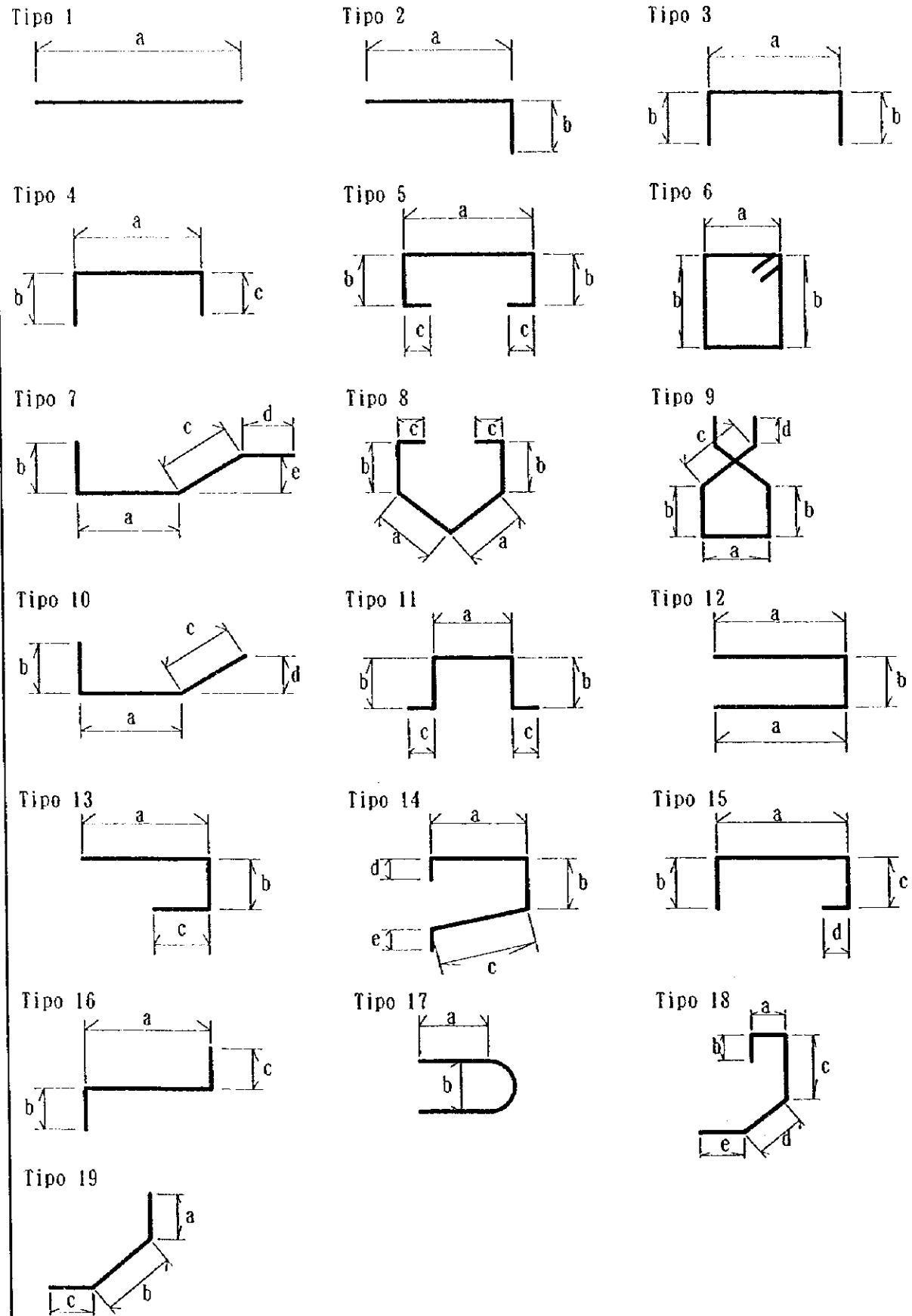
| Material (Ítem de Construcción) | Grado | Unidad | Cantidades | | | | | Total | Comentarios |
|--|-------|----------------|------------|----|----|----|---------|---------|-------------|
| | | | A1 | P1 | P2 | P3 | A2 | | |
| Terraplén | | m ³ | 510.6 | | | | 4,037.5 | 4,548.1 | |
| Base | | m ³ | 76.8 | | | | 200.0 | 276.8 | |
| Pavimento | | m ² | 387.0 | | | | 1,000.0 | 1,387.0 | |

Cubicaciones

Fecha : _____ Número de Puente : _____
 Nombre del Puente : PUANGUE
 De la Ruta, Camino : _____ Rol Ruta : _____
 En el Cauce : _____
 Región : RM : SANTIAGO Provincia : _____
 Longitud del Puente : L = 120.05 m
 Número de Pistas : 2
 Ancho : 1.20+10.00+1.20 = 12.40 m
 Pendiente : 1.0% (Pasillos) 1.5% (Calzada)
 Tipo de Estructura : **Postensado**
 Longitud de Viga : Lv = 29.95 m
 Luz : Lc = 29.25 m
 Número de Vigas : nv = 5
 Separación entre Vigas : S = 2.60 m
 Ancho Mesa Mínima : Wm = 11.40 m

| Materia | Grado | Unidad | Cantidad | | Observación |
|-----------------------------|-------------|----------------|---------------|---------------|-------------|
| | | | (Para 1 Viga) | (Para Puente) | |
| Losa | | | | | |
| Hormigón | H-25 | m ³ | | 109.51 | |
| Moldaje | | m ² | | 297.27 | |
| Acero | A63-42H | kg | | 22,385.92 | |
| Travesaño Intermedio | | | | | |
| Hormigón | H-25 | m ³ | | 7.73 | |
| Moldaje | | m ² | | 66.00 | |
| Acero | A44-28H | kg | | 861.95 | |
| Travesaño Extremos | | | | | |
| Hormigón | H-25 | m ³ | | 9.21 | |
| Moldaje | | m ² | | 66.43 | |
| Acero | A63-42H | kg | | 1,257.19 | |
| Viga | | | Exterior | Interior | |
| Hormigón | H-35 | m ³ | 21.85 | 21.85 | 109.24 |
| Moldaje | | m ² | 152.13 | 152.13 | 760.63 |
| Acero | A63-42H | kg | 1,957.65 | 2,065.64 | 10,112.23 |
| PC Cable | ASTMA416-80 | m | 149.25 | 149.25 | 746.23 |
| Anclaje | | grupo | 10 | 10 | 50 |

Tipo de Barras para hormigón



| Marca | Dia. (mm) | Unit W. (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|-----------|----------------|------|------------------|------|------|-----|-----|-------------|---------------|-------------|-----------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 16 | 1.578 | 1 | 12340 | | | | | 12340 | 19.47 | 203 | 3,952.92 | |
| 2 | 16 | 1.578 | 1 | 10700 | | | | | 10700 | 16.88 | 200 | 3,376.92 | |
| 3 | 16 | 1.578 | 3 | 12340 | 110 | | | | 12560 | 19.82 | 201 | 3,983.76 | |
| 4 | 16 | 1.578 | 7 | 1620 | 110 | 156 | 150 | 110 | 2036 | 3.21 | 400 | 1,285.12 | |
| 5 | 16 | 1.578 | 20 | 1300 | 110 | 156 | 150 | | 1912 | 3.02 | 600 | 1,810.28 | |
| 6 | 16 | 1.578 | 6 | 140 | 409 | | | | 1337 | 2.11 | 402 | 848.13 | |
| 7 | 16 | 1.578 | 14 | 349 | 96 | 357 | 136 | 136 | 1073 | 1.69 | 402 | 680.66 | |
| 8 | 16 | 1.578 | 2 | 470 | 210 | | | | 680 | 1.07 | 40 | 42.92 | |
| 9 | 16 | 1.578 | 1 | 1600 | | | | | 1600 | 2.52 | 80 | 201.98 | |
| 10 | 12 | 0.888 | 3 | 29890 | 360 | | | | 30610 | 27.18 | 105 | 2,854.08 | |
| 11 | 12 | 0.888 | 1 | 29890 | | | | | 29890 | 26.54 | 8 | 212.34 | |
| 12 | 12 | 0.888 | 1 | 29890 | | | | | 29890 | 26.54 | 105 | 2,786.94 | |
| 13 | 12 | 0.888 | 1 | 1210 | | | | | 1210 | 1.07 | 206 | 221.34 | |
| 14 | 12 | 0.888 | 7 | 1466 | 102 | 665 | 180 | 210 | 2412 | 2.14 | 60 | 128.51 | |
| 15 | 18 | 1.998 | 1 | 2100 | | | | | 2100 | 4.20 | 96 | 402.80 | |
| 16 | 22 | 2.984 | 1 | 2100 | | | | | 2100 | 6.27 | 16 | 100.26 | |
| 17 | 12 | 0.888 | 6 | 200 | 1815 | | | | 4210 | 3.74 | 96 | 358.89 | |
| 18 | 18 | 1.998 | 1 | 2100 | | | | | 2100 | 4.20 | 112 | 469.93 | |
| 19 | 22 | 2.984 | 1 | 2100 | | | | | 2100 | 6.27 | 16 | 100.26 | |
| 20 | 12 | 0.888 | 6 | 250 | 2065 | | | | 4810 | 4.27 | 96 | 410.04 | |
| 21 | 12 | 0.888 | 3 | 29900 | 180 | | | | 30260 | 26.87 | 30 | 806.13 | |
| 22 | 12 | 0.888 | 3 | 29900 | 180 | | | | 30260 | 26.87 | 50 | 1,343.54 | |
| 23 | 10 | 0.617 | 1 | 27850 | | | | | 27850 | 17.18 | 60 | 1,031.01 | |
| 24 | 10 | 0.617 | 10 | 1572 | 450 | 1237 | 300 | | 3259 | 2.01 | 120 | 241.30 | |
| 25 | 10 | 0.617 | 3 | 950 | 400 | | | | 1750 | 1.08 | 60 | 64.79 | |
| 26 | 12 | 0.888 | 11 | 2065 | 150 | 102 | | | 2569 | 2.28 | 745 | 1,699.55 | |
| 27 | 12 | 0.888 | 9 | 450 | 219 | 584 | 180 | | 2413 | 2.14 | 665 | 1,424.92 | |
| 28 | 12 | 0.888 | 8 | 508 | 273 | 102 | | | 1764 | 1.57 | 745 | 1,166.99 | |
| 29 | 12 | 0.888 | 5 | 300 | 2065 | 102 | | | 4634 | 4.11 | 20 | 82.30 | Var |
| 30 | 12 | 0.888 | 5 | 450 | 1900 | 102 | | | 4454 | 3.96 | 80 | 316.41 | |
| 31 | 12 | 0.888 | 3 | 950 | 102 | | | | 1154 | 1.02 | 745 | 763.44 | |
| 32 | 12 | 0.888 | 3 | 1900 | 180 | | | | 2260 | 2.01 | 20 | 40.14 | |
| 33 | 12 | 0.888 | 2 | 1900 | 75 | | | | 1975 | 1.75 | 40 | 70.15 | |
| 34 | 18 | 1.998 | 1 | 1940 | | | | | 1940 | 3.88 | 72 | 279.08 | |
| 35 | 22 | 2.984 | 1 | 2260 | | | | | 2260 | 6.74 | 12 | 80.93 | |
| 36 | 18 | 1.998 | 1 | 1045 | | | | | 1045 | 2.09 | 48 | 100.22 | |
| 37 | 22 | 2.984 | 1 | 1205 | | | | | 1205 | 3.60 | 8 | 28.77 | |
| 38 | 18 | 1.998 | 1 | 1940 | | | | | 1940 | 3.88 | 84 | 325.59 | |
| 39 | 22 | 2.984 | 1 | 2260 | | | | | 2260 | 6.74 | 12 | 80.93 | |
| 40 | 18 | 1.998 | 1 | 1195 | | | | | 1195 | 2.39 | 56 | 133.71 | |
| 41 | 22 | 2.984 | 1 | 1355 | | | | | 1355 | 4.04 | 8 | 32.35 | |
| 42 | 25 | 3.853 | 1 | 2995 | | | | | 2995 | 11.54 | 24 | 276.95 | |

Cubicaciones

Fecha : _____ Número de Puente : _____

Nombre del Puente : PUANGUE A1

De la Ruta, Camino : _____ Rol Ruta : _____

En el Cauce : _____

Región : RM : SANTIAGO Provincia : _____

Longitud del Puente : L = 120.05 m

Número de Pistas : 2

Ancho : 1.20+10.00+1.20 = 12.40 m

Pendiente : 1.0% (Pasillos) 1.5% (Calzada)

Tipo de Estructura : **Estribo**

Altura de Estribo : H = 8.50 m

Longitud de Viga : Lv = 29.95 m

Luz : Lc = 29.25 m

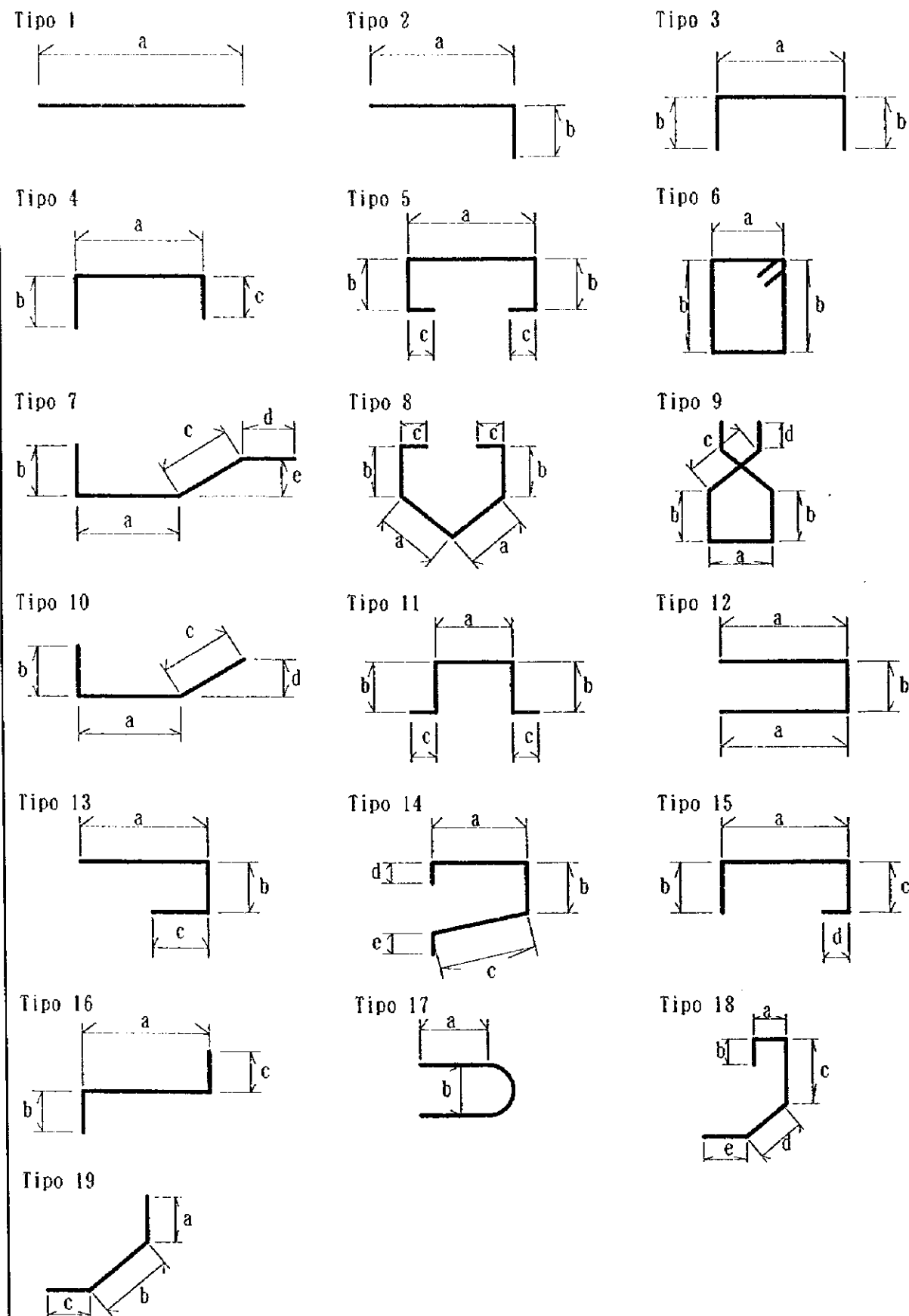
Número de Vigas : n_v = 5.00

Separación entre Vigas : S = 2.60 m

Ancho Mesa Mínima : Wm = 10.90 m

| Materia | Grado | Unidad | Cantidad | Observación |
|-----------------|----------------|----------------------|------------------|-------------|
| Espaldar | | | | |
| Hormigón | H-25 | m ³ | 13.10 | |
| Moldaje | | m ² | 59.80 | |
| Acero | A63-42H | kg | 1,053.59 | |
| Muro | | | | |
| Hormigón | H-25 | m ³ | 64.30 | |
| Moldaje | | m ² | 110.55 | |
| Acero | A63-42H | kg | 4,102.04 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 133.63 | |
| Moldaje | | m ² | 66.96 | |
| Acero | A63-42H | kg | 7,313.61 | |
| Muros | | | | |
| Hormigón | H-25 | m ³ | 26.87 | |
| Moldaje | | m ² | 98.39 | |
| Acero | A63-42H | kg | 2,679.52 | |
| Total | | | | |
| Hormigón | H-25 | m³ | 237.90 | |
| Moldaje | | m² | 335.70 | |
| Acero | A63-42H | kg | 15,148.77 | |

Tipo de Barras para hormigón



| Marca | Dia. (mm) | Unit W. (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|-----------|----------------|------|------------------|------|------|-----|-----|-------------|---------------|-------------|-----------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 25 | 3.853 | 3 | 5700 | 1700 | | | | 9100 | 35.06 | 52 | 1,823.24 | |
| 2 | 25 | 3.853 | 3 | 5700 | 875 | | | | 7450 | 28.70 | 103 | 2,956.60 | |
| 3 | 22 | 2.984 | 3 | 12700 | 1700 | | | | 16100 | 48.04 | 24 | 1,153.02 | |
| 4 | 22 | 2.984 | 3 | 12700 | 770 | | | | 14240 | 42.49 | 24 | 1,019.81 | |
| 5 | 22 | 2.984 | 3 | 12700 | 440 | | | | 13580 | 40.52 | 6 | 243.14 | |
| 6 | 22 | 2.984 | 3 | 5700 | 440 | | | | 6580 | 19.63 | 6 | 117.81 | |
| 7 | 18 | 1.998 | 1 | 12320 | | | | | 12320 | 24.62 | 21 | 516.92 | |
| 8 | 18 | 1.998 | 1 | 12320 | | | | | 12320 | 24.62 | 21 | 516.92 | |
| 9 | 22 | 2.984 | 2 | 6010 | 330 | | | | 6340 | 18.92 | 51 | 964.85 | |
| 10 | 22 | 2.984 | 2 | 4340 | 330 | | | | 4670 | 13.94 | 50 | 696.76 | |
| 11 | 22 | 2.984 | 2 | 6010 | 330 | | | | 6340 | 18.92 | 51 | 964.85 | |
| 12 | 18 | 1.998 | 3 | 12320 | 270 | | | | 12860 | 25.69 | 6 | 154.17 | |
| 13 | 22 | 2.984 | 3 | 1120 | 330 | | | | 1780 | 5.31 | 44 | 233.71 | |
| 14 | 18 | 1.998 | 3 | 570 | 520 | | | | 1610 | 3.22 | 8 | 25.73 | |
| 15 | 18 | 1.998 | 3 | 720 | 520 | | | | 1760 | 3.52 | 8 | 28.13 | |
| 16 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 10 | 109.40 | |
| 17 | 18 | 1.998 | 1 | 2990 | | | | | 2990 | 5.97 | 51 | 304.68 | |
| 18 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 7 | 76.58 | |
| 19 | 18 | 1.998 | 1 | 2990 | | | | | 2990 | 5.97 | 51 | 304.68 | |
| 20 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 3 | 32.82 | |
| 21 | 18 | 1.998 | 14 | 570 | 194 | 807 | 270 | 153 | 1993 | 3.98 | 44 | 175.21 | |
| 22 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 2 | 21.88 | |
| 23 | 12 | 0.888 | 3 | 520 | 390 | | | | 1300 | 1.15 | 4 | 4.62 | |
| 24 | 12 | 0.888 | 3 | 320 | 102 | | | | 524 | 0.47 | 51 | 23.73 | |
| 25 | 22 | 2.984 | 2 | 4120 | 330 | | | | 4450 | 13.28 | 30 | 398.36 | |
| 26 | 22 | 2.984 | 2 | 3320 | 330 | | | | 3650 | 10.89 | 8 | 87.13 | |
| 27 | 22 | 2.984 | 2 | 3770 | 330 | | | | 4100 | 12.23 | 4 | 48.94 | Var |
| 28 | 22 | 2.984 | 2 | 4120 | 330 | | | | 4450 | 13.28 | 10 | 132.79 | |
| 29 | 22 | 2.984 | 2 | 3100 | 330 | | | | 3430 | 10.24 | 20 | 204.70 | |
| 30 | 22 | 2.984 | 2 | 3320 | 330 | | | | 3650 | 10.89 | 16 | 174.27 | |
| 31 | 22 | 2.984 | 2 | 3690 | 330 | | | | 4020 | 12.00 | 12 | 143.95 | |
| 32 | 22 | 2.984 | 2 | 8660 | 330 | | | | 8990 | 26.83 | 24 | 643.83 | |
| 33 | 12 | 0.888 | 3 | 520 | 1444 | | | | 3407 | 3.03 | 6 | 18.15 | Var |
| 34 | 12 | 0.888 | 10 | 944 | 180 | 1372 | 970 | | 2495 | 2.22 | 4 | 8.86 | |
| 35 | 12 | 0.888 | 2 | 4120 | 180 | | | | 4300 | 3.82 | 30 | 114.55 | |
| 36 | 12 | 0.888 | 2 | 3320 | 180 | | | | 3500 | 3.11 | 8 | 24.86 | |
| 37 | 12 | 0.888 | 2 | 3770 | 180 | | | | 3950 | 3.51 | 4 | 14.03 | Var |
| 38 | 12 | 0.888 | 2 | 4120 | 180 | | | | 4300 | 3.82 | 10 | 38.18 | |
| 39 | 12 | 0.888 | 2 | 8660 | 180 | | | | 8840 | 7.85 | 24 | 188.40 | |
| 40 | 12 | 0.888 | 2 | 6010 | 180 | | | | 6190 | 5.50 | 8 | 43.97 | |
| 41 | 22 | 2.984 | 2 | 2707 | 330 | | | | 3037 | 9.06 | 30 | 271.87 | |
| 42 | 22 | 2.984 | 2 | 1575 | 330 | | | | 1905 | 5.68 | 14 | 79.58 | |
| 43 | 12 | 0.888 | 2 | 520 | 102 | | | | 622 | 0.55 | 30 | 16.57 | |
| 44 | 12 | 0.888 | 2 | 520 | 102 | | | | 622 | 0.55 | 48 | 26.51 | |

Cubicaciones

Fecha : _____ Número de Puente : _____

Nombre del Puente : PUANGUE A2

De la Ruta, Camino : _____ Rol Ruta : _____

En el Cauce : _____

Región : RM : SANTIAGO Provincia : _____

Longitud del Puente : $L = \underline{120.05}$ m

Número de Pistas : 2

Ancho : $1.20 + 10.00 + 1.20 = \underline{12.40}$ m

Pendiente : 1.0% (Pasillos) 1.5% (Calzada)

Tipo de Estructura : Estribo

Altura de Estribo : $H = \underline{6.00}$ m

Longitud de Viga : $L_v = \underline{29.95}$ m

Luz : $L_c = \underline{29.25}$ m

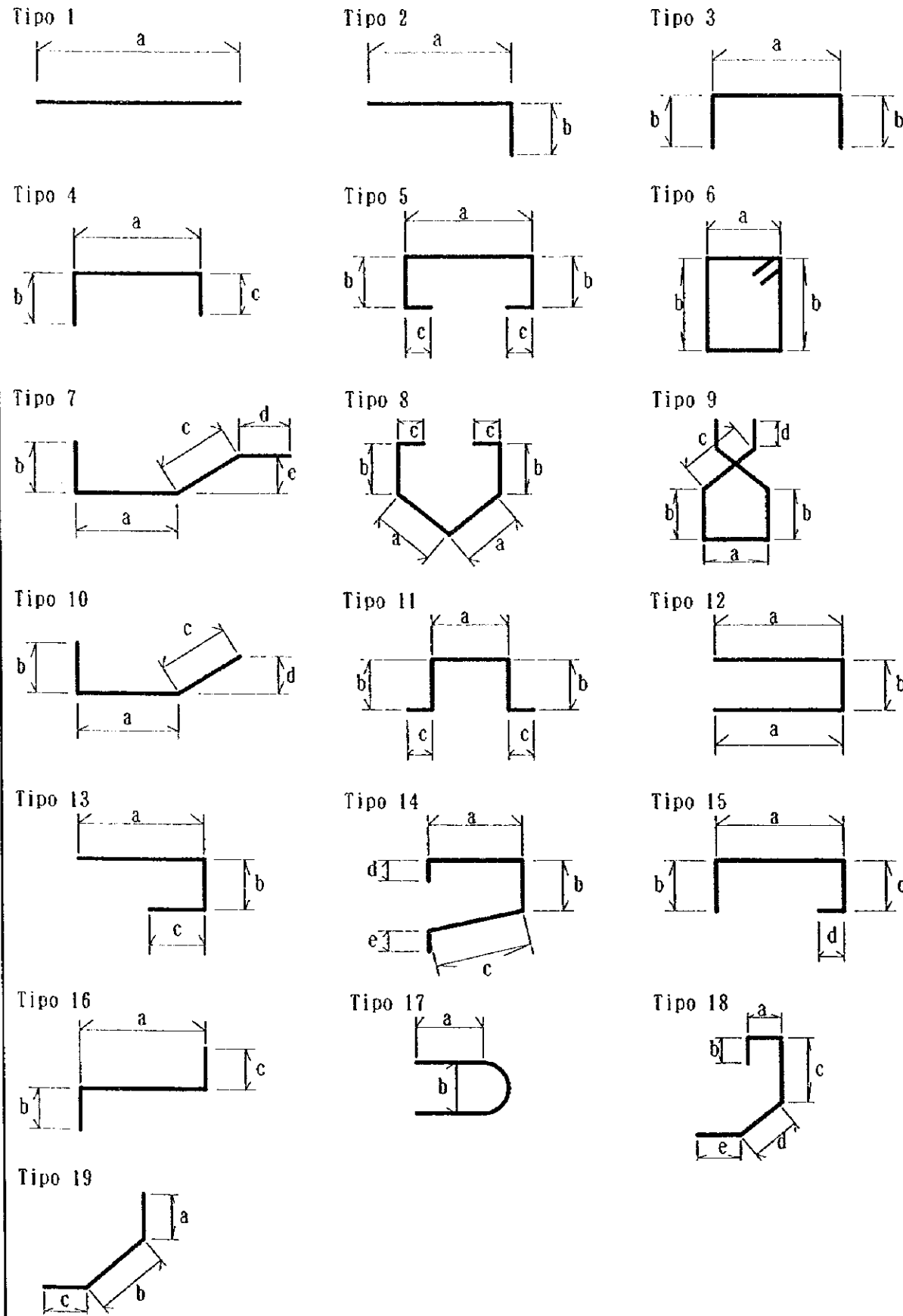
Número de Vigas : $n_v = \underline{5.00}$

Separación entre Vigas : $S = \underline{2.60}$ m

Ancho Mesa Mínima : $W_m = \underline{10.90}$ m

| Materia | Grado | Unidad | Cantidad | Observación |
|-----------------|----------------|----------------------|------------------|-------------|
| Espaldar | | | | |
| Hormigón | H-25 | m ³ | 13.16 | |
| Moldaje | | m ² | 60.89 | |
| Acero | A63-42H | kg | 1,060.84 | |
| Muro | | | | |
| Hormigón | H-25 | m ³ | 36.02 | |
| Moldaje | | m ² | 63.06 | |
| Acero | A63-42H | kg | 2,509.62 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 73.73 | |
| Moldaje | | m ² | 42.24 | |
| Acero | A63-42H | kg | 5,070.65 | |
| Muros | | | | |
| Hormigón | H-25 | m ³ | 12.05 | |
| Moldaje | | m ² | 64.17 | |
| Acero | A63-42H | kg | 1,533.44 | |
| Total | | | | |
| Hormigón | H-25 | m³ | 134.96 | |
| Moldaje | | m² | 230.36 | |
| Acero | A63-42H | kg | 10,174.56 | |

Tipo de Barras para hormigón



| Marca | Dia. (mm) | Unit W. (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|-----------|----------------|------|------------------|------|------|------|-----|-------------|---------------|-------------|-----------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 22 | 2.984 | 3 | 4700 | 1100 | | | | 6900 | 20.59 | 52 | 1,070.66 | |
| 2 | 22 | 2.984 | 3 | 4700 | 770 | | | | 6240 | 18.62 | 103 | 1,917.88 | |
| 3 | 22 | 2.984 | 3 | 12700 | 1100 | | | | 14900 | 44.46 | 20 | 889.23 | |
| 4 | 22 | 2.984 | 3 | 12700 | 770 | | | | 14240 | 42.49 | 20 | 849.84 | |
| 5 | 22 | 2.984 | 3 | 12700 | 440 | | | | 13580 | 40.52 | 6 | 243.14 | |
| 6 | 22 | 2.984 | 3 | 4700 | 440 | | | | 5580 | 16.65 | 6 | 99.90 | |
| 7 | 16 | 1.578 | 1 | 12320 | | | | | 12320 | 19.44 | 12 | 233.29 | |
| 8 | 16 | 1.578 | 1 | 12320 | | | | | 12320 | 19.44 | 12 | 233.29 | |
| 9 | 22 | 2.984 | 2 | 3510 | 330 | | | | 3840 | 11.46 | 51 | 584.39 | |
| 10 | 22 | 2.984 | 2 | 2790 | 330 | | | | 3120 | 9.31 | 50 | 465.50 | |
| 11 | 22 | 2.984 | 2 | 3510 | 330 | | | | 3840 | 11.46 | 51 | 584.39 | |
| 12 | 16 | 1.578 | 3 | 12320 | 240 | | | | 12800 | 20.20 | 6 | 121.19 | |
| 13 | 22 | 2.984 | 3 | 1120 | 330 | | | | 1780 | 5.31 | 44 | 233.71 | |
| 14 | 18 | 1.998 | 3 | 570 | 520 | | | | 1610 | 3.22 | 8 | 25.73 | |
| 15 | 18 | 1.998 | 3 | 720 | 520 | | | | 1760 | 3.52 | 8 | 28.13 | |
| 16 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 10 | 109.40 | |
| 17 | 18 | 1.998 | 1 | 2990 | | | | | 2990 | 5.97 | 51 | 304.68 | |
| 18 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 7 | 76.58 | |
| 19 | 18 | 1.998 | 1 | 2990 | | | | | 2990 | 5.97 | 51 | 304.68 | |
| 20 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 3 | 32.82 | |
| 21 | 18 | 1.998 | 14 | 570 | 194 | 807 | 270 | 153 | 1993 | 3.98 | 46 | 183.17 | |
| 22 | 12 | 0.888 | 1 | 12320 | | | | | 12320 | 10.94 | 2 | 21.88 | |
| 23 | 12 | 0.888 | 3 | 320 | 390 | | | | 1100 | 0.98 | 4 | 3.91 | |
| 24 | 12 | 0.888 | 3 | 320 | 102 | | | | 524 | 0.47 | 51 | 23.73 | |
| 25 | 22 | 2.984 | 2 | 3720 | 330 | | | | 4050 | 12.09 | 14 | 169.19 | |
| 26 | 22 | 2.984 | 2 | 2920 | 330 | | | | 3250 | 9.70 | 4 | 38.79 | |
| 27 | 22 | 2.984 | 2 | 3520 | 330 | | | | 3850 | 11.49 | 4 | 45.95 | Var |
| 28 | 22 | 2.984 | 2 | 3920 | 330 | | | | 4250 | 12.68 | 8 | 101.46 | |
| 29 | 22 | 2.984 | 2 | 2900 | 330 | | | | 3230 | 9.64 | 6 | 57.83 | |
| 30 | 22 | 2.984 | 2 | 2920 | 330 | | | | 3250 | 9.70 | 12 | 116.38 | |
| 31 | 22 | 2.984 | 2 | 2890 | 330 | | | | 3220 | 9.61 | 12 | 115.30 | |
| 32 | 22 | 2.984 | 2 | 6160 | 330 | | | | 6490 | 19.37 | 22 | 426.06 | |
| 33 | 12 | 0.888 | 3 | 320 | 1444 | | | | 3207 | 2.85 | 6 | 17.09 | Var |
| 34 | 12 | 0.888 | 10 | 944 | 180 | 1655 | 1170 | | 2778 | 2.47 | 4 | 9.87 | |
| 35 | 12 | 0.888 | 2 | 3720 | 180 | | | | 3900 | 3.46 | 14 | 48.48 | |
| 36 | 12 | 0.888 | 2 | 2920 | 180 | | | | 3100 | 2.75 | 4 | 11.01 | |
| 37 | 12 | 0.888 | 2 | 3520 | 180 | | | | 3700 | 3.29 | 4 | 13.14 | Var |
| 38 | 12 | 0.888 | 2 | 3920 | 180 | | | | 4100 | 3.64 | 8 | 29.13 | |
| 39 | 12 | 0.888 | 2 | 6160 | 180 | | | | 6340 | 5.63 | 22 | 123.86 | |
| 40 | 12 | 0.888 | 2 | 3510 | 180 | | | | 3690 | 3.28 | 8 | 26.21 | |
| 41 | 22 | 2.984 | 2 | 2424 | 330 | | | | 2754 | 8.22 | 14 | 115.05 | |
| 42 | 22 | 2.984 | 2 | 1292 | 330 | | | | 1622 | 4.84 | 10 | 48.40 | |
| 43 | 12 | 0.888 | 2 | 320 | 102 | | | | 422 | 0.37 | 28 | 10.49 | |
| 44 | 12 | 0.888 | 2 | 320 | 102 | | | | 422 | 0.37 | 26 | 9.74 | |

Cubicaciones

Fecha : _____ Número de Puente : _____

Nombre del Puente : PUANGUE P1,P2

De la Ruta, Camino : _____ Rol Ruta : _____

En el Cauce : _____

Región : RM : SANTIAGO Provincia : _____

Longitud del Puente : L = 120.05 m

Número de Pistas : 2

Ancho : 1.20+10.00+1.20 = 12.40 m

Pendiente : 1.0% (Pasillos) 1.5% (Calzada)

Tipo de Estructura : Cepa

Altura de Cepa : H = 8.00 m

Longitud de Viga : Lv = 29.95 m

Luz : Lc = 29.25 m

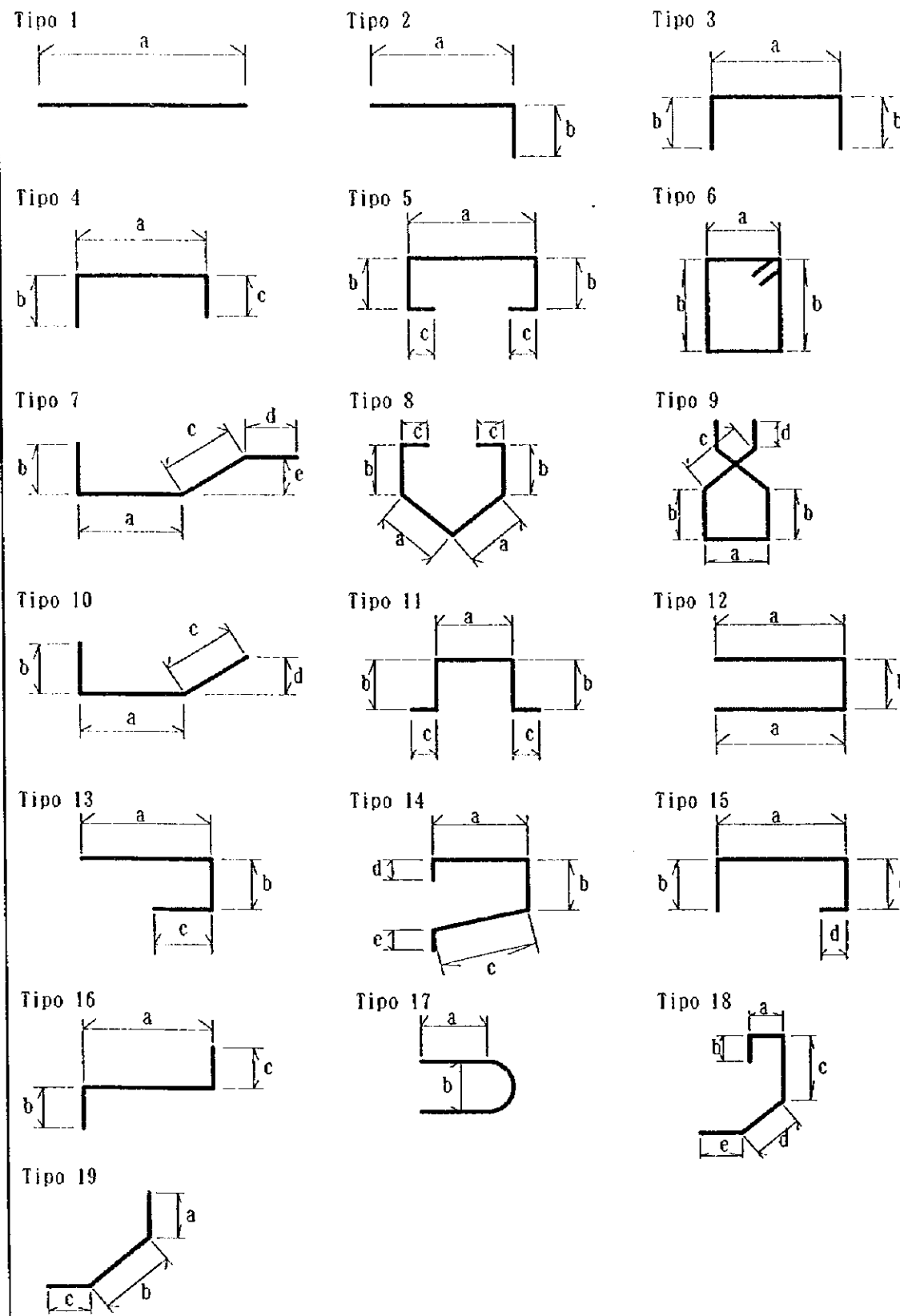
Número de Vigas : n_v = 5.00

Separación entre Vigas : S = 2.60 m

Ancho Mesa Mínima : Wm = 10.90 m

| Materia | Grado | Unidad | Cantidad | Observación |
|--------------|---------|----------------|----------|-------------|
| Cabezal | | | | |
| Hormigón | H-25 | m ³ | 15.59 | |
| Moldaje | | m ² | 31.60 | |
| Acero | A63-42H | kg | 980.42 | |
| Columna | | | | |
| Hormigón | H-25 | m ³ | 59.32 | |
| Moldaje | | m ² | 127.28 | |
| Acero | A63-42H | kg | 7602.01 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 144.90 | |
| Moldaje | | m ² | 66.60 | |
| Acero | A63-42H | kg | 11069.97 | |
| Total | | | | |
| Hormigón | H-25 | m ³ | 219.81 | |
| Moldaje | | m ² | 225.48 | |
| Acero | A63-42H | kg | 19652.40 | |

Tipo de Barras para hormigón



| Marca | Dia. (mm) | Unit W. (kg/m) | Tipo | Dimensiones (mm) | | | | | Largos (mm) | Peso/Par (kg) | Cant. Requ. | Peso Total (kg) | Obs. |
|-------|--------------|-------------------|------|------------------|------|-----|-----|-----|----------------|------------------|----------------|--------------------|------|
| | | | | a | b | c | d | e | | | | | |
| 1 | 28 | 4.834 | 3 | 6900 | 1700 | | | | 10300 | 49.79 | 93 | 4,630.49 | |
| 2 | 28 | 4.834 | 3 | 6900 | 980 | | | | 8860 | 42.83 | 47 | 2,012.97 | |
| 3 | 28 | 4.834 | 3 | 11400 | 1700 | | | | 14800 | 71.54 | 29 | 2,074.75 | |
| 4 | 28 | 4.834 | 3 | 11400 | 980 | | | | 13360 | 64.58 | 29 | 1,872.88 | |
| 5 | 22 | 2.984 | 3 | 11400 | 440 | | | | 12280 | 36.64 | 8 | 293.15 | |
| 6 | 22 | 2.984 | 3 | 6900 | 440 | | | | 7780 | 23.22 | 8 | 185.72 | |
| 7 | 25 | 3.853 | 2 | 5000 | 375 | | | | 5375 | 20.71 | 114 | 2,360.93 | |
| 8 | 25 | 3.853 | 2 | 7710 | 375 | | | | 8085 | 31.15 | 116 | 3,613.57 | |
| 9 | 22 | 2.984 | 1 | 10000 | | | | | 10000 | 29.84 | 42 | 1,253.28 | |
| 10 | 22 | 2.984 | 17 | 770 | 920 | | | | 2986 | 8.91 | 42 | 374.23 | |
| 11 | 22 | 2.984 | 1 | 10986 | | | | | 10986 | 32.78 | 5 | 163.91 | |
| 12 | 25 | 3.853 | 18 | 420 | 760 | 732 | 551 | 500 | 2963 | 11.42 | 16 | 182.66 | |
| 13 | 22 | 2.984 | 1 | 12020 | | | | | 12020 | 35.87 | 5 | 179.34 | |
| 14 | 22 | 2.984 | 3 | 12020 | 440 | | | | 12900 | 38.49 | 4 | 153.97 | |
| 15 | 22 | 2.984 | 3 | 1720 | 440 | | | | 2600 | 7.76 | 4 | 31.03 | |
| 16 | 16 | 1.578 | 5 | 1720 | 620 | 136 | | | 3232 | 5.10 | 41 | 209.10 | |
| 17 | 16 | 1.578 | 6 | 1720 | 620 | | | | 4920 | 7.76 | 4 | 31.06 | |
| 17 | 16 | 1.578 | 6 | 1720 | 484 | | | | 4648 | 7.33 | 4 | 29.34 | Var |

Cubicaciones

Fecha : _____ Número de Puente : _____

Nombre del Puente : PUANGUE P3

De la Ruta, Camino : _____ Rol Ruta : _____

En el Cauce : _____

Región : RM : SANTIAGO Provincia : _____

Longitud del Puente : L = 120.05 m

Número de Pistas : 2

Ancho : 1.20+10.00+1.20 = 12.40 m

Pendiente : 1.0% (Pasillos) 1.5% (Calzada)

Tipo de Estructura : Cepa

Altura de Cepa : H = 11.00 m

Longitud de Viga : Lv = 29.95 m

Luz : Lc = 29.25 m

Número de Vigas : n_v = 5.00

Separación entre Vigas : S = 2.60 m

Ancho Mesa Mínima : Wm = 10.90 m

| Materia | Grado | Unidad | Cantidad | Observación |
|--------------|---------|----------------|----------|-------------|
| Cabezal | | | | |
| Hormigón | H-25 | m ³ | 15.59 | |
| Moldaje | | m ² | 29.58 | |
| Acero | A63-42H | kg | 995.95 | |
| Columna | | | | |
| Hormigón | H-25 | m ³ | 105.71 | |
| Moldaje | | m ² | 191.63 | |
| Acero | A63-42H | kg | 13474.83 | |
| Fundación | | | | |
| Hormigón | H-25 | m ³ | 195.62 | |
| Moldaje | | m ² | 82.32 | |
| Acero | A63-42H | kg | 12750.62 | |
| Total | | | | |
| Hormigón | H-25 | m ³ | 316.91 | |
| Moldaje | | m ² | 303.53 | |
| Acero | A63-42H | kg | 27221.40 | |

