

Factura

SERIE:

FOLIO: 305

FECHA: 7/10/2016 14:23:41

Documento Válido

Constructora Santa Rosalia SA de CV

CNR860912525 PERIFERICO VICENTE LOMBARDO  
TOLEDANO No. 1411 Int. No. D PLOMEROS,  
CHIHUAHUA 31370  
CHIHUAHUA CHIHUAHUA MEXICO

Cliente: MUNICIPIO DE CHIHUAHUA

R.F.C.: MCI651010V22

Domicilio: MINA No. 408

Teléfono:

Ciudad: CHIHUAHUA

Colonia: CENTRO

Estado: CHIHUAHUA

C.P.: 31000

País: MÉXICO

Lugar de Expedición: PERIFERICO VICENTE LOMBARDO TOLEDANO 1411 D, PLOMEROS, 31370, CHIHUAHUA, CHIHUAHUA, MEXICO

| Cantidad | Unidad    | Concepto / Descripción                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Valor Unitario | Importe      |
|----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| 1.00     | NO APLICA | ESTIMACION<br>ESTIMACIÓN No. 10 (DIEZ) (CIERRE CONTRATO) CORRESPONDIENTE A LOS TRABAJOS EN: "CONSTRUCCION DEL EJE SESENTA (60) DEL DISTRIBUIDOR VIAL ZOOTECHNIA, UBICADO EN ENTRONQUE DE PERIF. FRANCISCO R. ALMADA Y CARR. A CD. CUAUHTEMOC, COLONIA ESPERANZA Y ZOOTECHNIA, EN ESTA CIUDAD DE CHIHUAHUA", DE ACUERDO AL CONTRATO DE OBRA PUBLICA No. 040/2016 DEL 20 DE ABRIL DEL 2016.<br><br>RETENCIONES PACTADAS EN EL CONTRATO<br>0.2% I.C.I.C. \$ 3,390.00<br>0.2% C.N.I.C. \$ 3,390.00<br>2% D.I.F. \$ 6,390.00<br>SUMA DE DESCUENTOS \$ 19,170.00<br><br>SALDO NETO A RECIBIR \$ 3,687,030.38 | 3,195,000.33   | 3,195,000.33 |

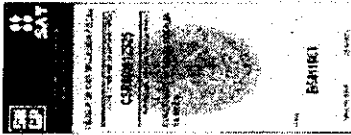
Importe con letra

TRES MILLONES SETECIENTOS SEIS MIL DOSCIENTOS PESOS 38/100

Método de Pago

NA

|           |              |
|-----------|--------------|
| SUBTOTAL: | 3,195,000.33 |
| I.V.A.:   | 511,200.05   |
| TOTAL:    | 3,706,200.38 |



FIRMA DE AUTENTICIDAD



Este documento es una representación impresa de un CFDI.

\*Efectos fiscales al pago

PAGO EN UNA SOLA EXHIBICION

Emitido por:

CONTRPAQ

|                                      |                                      |
|--------------------------------------|--------------------------------------|
| Serie del Certificado del emisor:    | 00001000000202780873                 |
| Folio fiscal:                        | 15B29E6C-7FB3-4A38-8ABF-BC9A1CA8B6BA |
| No de Serie del Certificado del SAT: | 00001000000202854883                 |
| Fecha y hora de certificación:       | Octubre 7 2016 - 15:23:44            |

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gob.mx

Verificación de Comprobantes Fiscales Digitales por Internet

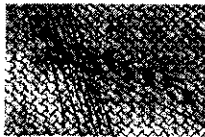
A través de esta opción, Usted podrá verificar si el comprobante fue Certificado por el SAT

Folio Fiscal

RFC Emisor

RFC Receptor

Proporcione los dígitos de la imagen      Verificar CFDI



| RFC del Emisor                       | Nombre o Razón Social del Emisor    | RFC del Receptor        | Nombre o Razón Social del Receptor |
|--------------------------------------|-------------------------------------|-------------------------|------------------------------------|
| CSR860912S25                         | Constructora Santa Rosalia SA de CV | MCI651010V22            | MUNICIPIO DE CHIHUAHUA             |
| Folio Fiscal                         | Fecha de Expedición                 | Fecha Certificación SAT | PAC que Certificó                  |
| 16B29E6C-7FB3-4A38-8ABF-BC9A1CA8B6BA | 2016-10-07T14:23:41                 | 2016-10-07T15:23:44     | MAS0810247C0                       |
| Total del CFDI                       | Efecto del Comprobante              | Estado CFDI             |                                    |
| \$3,706,200.38                       | ingreso                             | Vigente                 |                                    |

Imprimir



# DIRECCIÓN DE OBRAS PÚBLICAS

## RESUMEN DE ESTIMACION

|                                                                                                                                                                                                                             |                                           |                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------|
| PROGRAMA: ESTATAL-MUNICIPAL                                                                                                                                                                                                 | CONTRATO No. 040/2016                     | CONTRATADOS              |
| OBRA: Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua. | ESTIMACIÓN No. No. 10 CIERRE CONTRAT      | \$ 62,635,080.96 CON IVA |
| UBICACIÓN: Perif. Fco. R. Almada y Carretera Cd. Cuauhtemoc                                                                                                                                                                 | PERÍODO EJEC. 12 AL 15 DE SEPTIEMBRE 2016 |                          |
| CONTRATISTA: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.                                                                                                                                                                        | IMPORTE ESTIMADO (CON IVA)                | \$ 3,706,200.38 CON IVA  |
| RFC CSR860912S25                                                                                                                                                                                                            | ACUMULADO ANTERIOR (CON IVA)              | \$ 58,928,876.20 CON IVA |
|                                                                                                                                                                                                                             | IMPORTE ACUMULADO (CON IVA)               | \$ 62,635,076.58 CON IVA |

| TIPO DE OBRA                        | IMPORTE         | OBSERVACIONES |
|-------------------------------------|-----------------|---------------|
| <u>NORMAL</u>                       | \$ 2,233,876.05 |               |
| <u>EXEDENTES</u>                    | \$ 961,124.28   |               |
| <u>EXTRAORDINARIOS</u>              | \$ -            |               |
| IMPORTE TOTAL ESTIMACION ( SIN IVA) | \$ 3,195,000.33 |               |

### DESCUENTOS

|                 |              |
|-----------------|--------------|
| 0.2% I.C.I.C.   | \$ 6,390.00  |
| 0.2% C.M.I.C.   | \$ 6,390.00  |
| 0.2% D.I.F.     | \$ 6,390.00  |
| SUMA DESCUENTOS | \$ 19,170.00 |

### RESUMEN

|                      |                 |
|----------------------|-----------------|
| SUMA ESTA ESTIMACION | \$ 3,195,000.33 |
| AMORT ANTICIPO       | \$ 0.00         |
| SUB-TOTAL            | \$ 3,195,000.33 |
| I.V.A.               | \$ 511,200.05   |
| TOTAL                | \$ 3,706,200.38 |

(CON LETRA)

(TRES MILLONES SETECIENTOS SEIS MIL DOSCIENTOS PESOS 38/100 M.N.)

|                      |                 |
|----------------------|-----------------|
| DESCUENTOS           | \$ 19,170.00    |
| SALDO NETO A RECIBIR | \$ 3,687,030.38 |

AUTORIZO

ELABORO

ING. ROQUE FARMENDARIZ RONQUILLO CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.  
RESIDENTE D.O.P.M

CONTRATISTA

Vo. Bo.

REVISO

ING. XOCHITL PEREZ BLANCO  
SUBDIRECTOR DE  
OBRA PUBLICA E INFRAESTRUCTURA

ING. ENRIQUE VILLARREAL ALEMÁN  
JEFE DEL DEPTO DE CONSTRUCCION.

Vo. Bo.

ING. RAMON DAVID RAMOS ARMENTA  
DIRECTOR DE OBRAS PUBLICAS Y MANTENIMIENTO

CHIHUAHUA, CHIH.,

15 DE SEPTIEMBRE 2016

RECIBIMOS DE LA DIRECCIÓN DE OBRAS PÚBLICAS Y MANTENIMIENTO DEL MPIO., LA CANTIDAD DE: \$ 3,687,030.38  
**(TRES MILLONES SEISCIENTOS OCHENTA Y SIETE MIL TREINTA PESOS 38/100 M.N.)** COMO PAGO A LA  
 ESTIMACIÓN NUM. 10 CIERRE CONTR CONTRATO No. 040/2016 POR LA CANTIDAD DE : \$ 62,635,080.96  
 SESENTA Y DOS MILLONES SEISCIENTOS TREINTA Y CINCO MIL OCHENTA PESOS 96/100 M.N. POR TRABAJOS EN LA OBRA:  
 Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y  
 Carretera a Cd. Cuauhtémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua.

ALCANCE DE LA ESTIMACION \$ 3,195,000.33

AMORTIZACION DEL ANTICIPO \$ -

SUBTOTAL \$ 3,195,000.33  
 IVA \$ 511,200.05  
 TOTAL \$ 3,706,200.38

RETENCIONES PACTADA EN CONTRATO

I.C.I.C. DEL 0.2% \$6,390.00  
 C.M.I.C. DEL 0.2% \$6,390.00  
 D.I.F. DEL 0.2% \$6,390.00  
 SUMA \$19,170.00

RESUMEN FINANCIERO DE LA OBRA

1.- CONTRATO

IMPORTE CONTRATADO  
 CONVENIO MODIFICATORIO  
 ESTIMACION ACUMULADA ANTERIOR  
 ESTA ESTIMACION  
 ACUMULADO HASTA EST ESTIMACION  
 POR EJERCER CONVENIO  
 POR EJERCER

CONTRATO  
 \$ 62,635,080.96  
 \$ -  
 \$ 58,928,876.20  
 \$ 3,706,200.38  
 \$ 62,635,076.58  
 \$ -  
 \$ 4.38

2.- AMORTIZACION DEL ANTICIPO

IMPORTE DE ANTICIPO  
 ACUMULADO ANTERIOR  
 ESTA ESTIMACION  
 ACUMULADO ACTUAL  
 POR AMORTIZAR

CONTRATO  
 \$ -  
 \$ -  
 \$ -  
 \$ -  
 \$ -

3.- RETENCIONES PACTADAS EN CONTRATO

|                    | 0.2% I.C.I.C. | 0.2% C.M.I.C. | 0.2% D.I.F.   |
|--------------------|---------------|---------------|---------------|
| ACUMULADO ANTERIOR | \$101,601.50  | \$101,601.50  | \$ 101,601.50 |
| ESTA ESTIMACION    | \$6,390.00    | \$6,390.00    | \$ 6,390.00   |
| ACUMULADO ACTUAL   | \$107,991.50  | \$107,991.50  | \$ 107,991.50 |

R E C I B I M O S

CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.  
 CSR860912S25

OBRA: Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia,  
Ubicado en Entronque del Periférico Francisco R. Almada y Carretera  
a Cd. Cuautémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad

CONTRATISTA: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

UBICACIÓN Perif. Fco. R. Almada y Carretera Cd. Cuautémoc

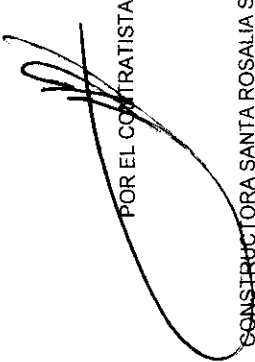
ESTIMACIÓN No.

PERÍODO: 12 AL 15 DE SEPTIEMBRE 2016

No. CONTRATO: 040/2016

No. 10 CIERRE CONTRATO

| RESUMEN DE LA ESTIMACIÓN POR PARTIDAS |                             |              |
|---------------------------------------|-----------------------------|--------------|
| No.                                   | DESCRIPCIÓN DE LAS PARTIDAS | IMPORTE      |
| <b>OBRA NORMAL</b>                    |                             |              |
|                                       | ESTRUCTURAS                 | 2,233,876.05 |
|                                       | <b>OBRA EXEDEDENTE</b>      |              |
|                                       | ESTRUCTURAS                 | 961,124.28   |
|                                       | <b>EXTRAORDINARIOS</b>      |              |
|                                       |                             | 0.00         |
|                                       | SUBTOTAL                    | 3,195,000.33 |
|                                       | I.V.A.                      | 511,200.05   |
|                                       | TOTAL                       | 3,706,200.38 |



POR EL CONTRATISTA

POR EL DEPARTAMENTO DE CONSTRUCCIÓN

CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

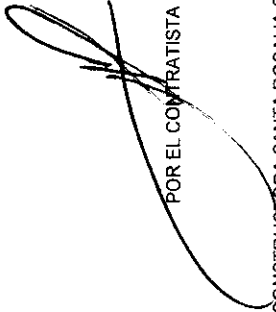
ING.RODOLFO ARMENDARIZ RONQUILLO

OBRA: Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua.

UBICACIÓN: Perif. Fco. R. Almada y Carretera No. CONTRATO: 040/2016  
ESTIMACIÓN No. No. 10 CIERRE CONTRATO  
PERIODO: 12 AL 15 DE SEPTIEMBRE 2016

CONTRATISTA: CONSTRUCTORA SANTA ROSALIA, S.A. DE C.V.

| No.           | CONCEPTOS<br>DESCRIPCIÓN                                                                                                                                                                                                                                                                         | UNIDAD | PROYECTO<br>VOLUMEN | ACUM. TOTAL | VOLUMENES     |               | PRECIO<br>UNITARIO | IMPORTE         |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------|-------------|---------------|---------------|--------------------|-----------------|
|               |                                                                                                                                                                                                                                                                                                  |        |                     |             | CUM. ANTERIOR | VOL. ESTIMADO |                    |                 |
| OBRA NORMAL   |                                                                                                                                                                                                                                                                                                  |        |                     |             |               |               |                    |                 |
| ESTRUCTURAS   |                                                                                                                                                                                                                                                                                                  |        |                     |             |               |               |                    |                 |
| 24            | Concreto hidráulico, por unidad de obra terminada (Inciso: 3.01.02.026-H.10): Simple, colado en seco en puentes y pasos a desnivel: De f'c = 280 Kg/cm2, utilizado en losas.                                                                                                                     | m3     | 613.00              | 382.76      | 187.35        | 195.41        | \$3,185.29         | \$ 622,437.52   |
| 37            | Montaje de vigas catón de acero A709 grado 50.                                                                                                                                                                                                                                                   | Kg     | 698,800.00          | 663,052.66  | 514,532.98    | 148,519.68    | \$10.85            | \$ 1,611,438.53 |
|               |                                                                                                                                                                                                                                                                                                  |        |                     |             |               |               |                    | \$ 2,233,876.05 |
| OBRA EXEDENTE |                                                                                                                                                                                                                                                                                                  |        |                     |             |               |               |                    |                 |
| ESTRUCTURAS   |                                                                                                                                                                                                                                                                                                  |        |                     |             |               |               |                    |                 |
| 21            | Rellenos (Inciso: 3.01.02.023-H.01): De excavaciones para estructuras, con material producto de las excavaciones, compactado al 90% de su PVS <sub>M</sub> , por unidad de obra terminada.                                                                                                       | m3     | 1,275.00            | 3,508.38    | 3,408.38      | 100.00        | \$266.19           | \$ 26,619.00    |
| 33            | Acero de Refuerzo, por unidad de obra terminada (Inciso: 3.01.02.027-H.03): Vanillas con límite elástico igual o mayor a 4,200 Kg/cm2: En puentes: Suministro, habilitación y colocación y de acero para todos los elementos de la estructura.                                                   | Kg     | 64,967.00           | 103,092.00  | 89,873.00     | 13,219.00     | \$22.34            | \$ 295,312.46   |
| 44            | SUBESTRUCTURA: Suministro y colocación de Muro de contención mecánicamente estabilizado, por unidad de obra terminada. Incluye materiales, herrajes, acarrees, patente, proyector, mano de obra, equipo, herramienta y todo lo necesario para su correcta ejecución por unidad de obra terminada | m2     | 1,800.00            | 2,504.94    | 2,168.42      | 336.52        | \$1,899.42         | \$ 639,192.82   |
|               |                                                                                                                                                                                                                                                                                                  |        |                     |             |               |               |                    | \$ 961,124.28   |

  
POR EL CONTRATISTA

POR EL DEPARTAMENTO DE CONSTRUCCIÓN

CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

ING. RODOLFO ARMENDARIZ RONQUILLO

|            |                                                                                                                                                                                                                                                                                      |        |                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------|
| CONTRATO : | 040/2016                                                                                                                                                                                                                                                                             | TRAMO: | Perif. Fco. R. Almada y Carretera Cd. Cuauhtemoc |
| OBRA :     | <p>Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua.</p> <p>CONTRATISTA: CONSTRUCTORA SANTA ROSALIA SA DE CV</p> |        |                                                  |

[illegible]

CONTRATISTA  
CONSTRUCTORA SANTA ROSALIA SA DE CV

~~RESIDENTE~~  
~~ING. RODOLFO ARMENDARIZ RONQUILLO~~

PERIF. R. ALMADA

RAMPA 1

VIALIDAD C.M.P.

FF.C.C.

SALIDA CUAUHTEMOC

TRANSPORTE CHIHUAHUENSES

OXXO

GASOLINERA

ENTRADA CHIHUAHUA

RAMPA 2

RAMPA 1 = 61.7

RAMPA 2 = 1.16

$\Sigma = 1.2$

EN ESTIMACIONES ANTERIORES SE CONSIDERÓ UN PAGO DE 1,040 M<sup>3</sup> COMO VOL. PARCIAL. AHORA SE CONSIDERA UN PAGO DE 100 M<sup>3</sup> DE VOL. PARCIAL.

VOL. = 100 M<sup>3</sup> VOL. PARCIAL

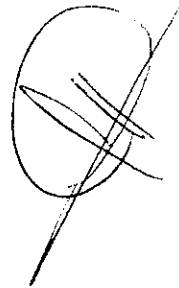
$$\begin{aligned} \text{RAMPA 1} &= 61.70 \text{ m}^3 \\ \text{RAMPA 2} &= 1,164.82 \text{ m}^3 \\ \hline \Sigma &= 1,226.52 \text{ m}^3 \end{aligned}$$

EN ESTIMACIONES ANTERIORES SE  
PAGO  $1,040 \text{ m}^3$  COMO VOLUMEN  
PARCIAL. AHORA SE PAGAN OTROS  
 $100 \text{ m}^3$  DE VOL. PARCIAL

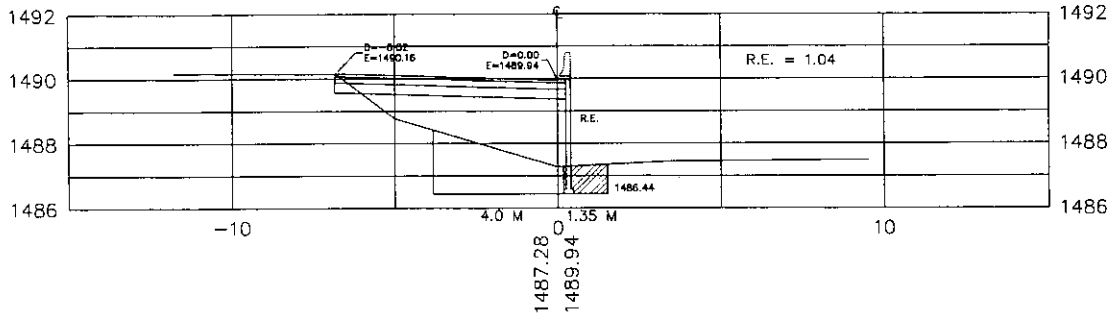
$$VOL. = 100 M^3 \text{ VOL. PARCIAL}$$

## CURVA MASA RAMPA 1 RELLENO PARA ESTRUCTURAS

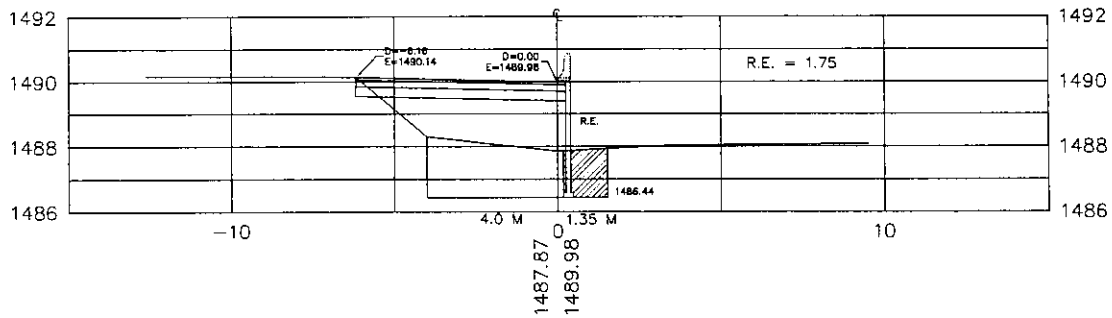
|              |        | AREA  |           | AREA 1 + AREA 2 |           | SEMIDIST. | VOLUMEN     |                |
|--------------|--------|-------|-----------|-----------------|-----------|-----------|-------------|----------------|
| CADENAMIENTO |        | CORTE | TERRAPLEN | CORTE           | TERRAPLEN |           | VOL. CORTE  | VOL. TERRAPLEN |
| 59+          | 999.36 |       | 1.54      |                 |           |           |             |                |
| 60+          | 000    |       | 1.51      | 0.00            | 3.05      | 0.32      | 0.00        | 0.98           |
| 60+          | 003.36 |       | 0.79      | 0.00            | 2.30      | 1.68      | 0.00        | 3.86           |
| 60+          | 003.36 |       | 1.75      | 0.00            | 2.54      | 0.00      | 0.00        | 0.00           |
| 60+          | 009.36 |       | 1.04      | 0.00            | 2.79      | 3.00      | 0.00        | 8.37           |
| 60+          | 009.36 |       | 2.01      | 0.00            | 3.05      | 0.00      | 0.00        | 0.00           |
| 60+          | 015.36 |       | 1.48      | 0.00            | 3.49      | 3.00      | 0.00        | 10.47          |
| 60+          | 015.36 |       | 2.46      | 0.00            | 3.94      | 0.00      | 0.00        | 0.00           |
| 60+          | 020    |       | 1.47      | 0.00            | 3.93      | 2.32      | 0.00        | 9.12           |
| 60+          | 023.36 |       | 1.46      | 0.00            | 2.93      | 1.68      | 0.00        | 4.92           |
| 60+          | 023.36 |       | 2.43      | 0.00            | 3.89      | 0.00      | 0.00        | 0.00           |
| 60+          | 025    |       | 2.05      | 0.00            | 4.48      | 0.82      | 0.00        | 3.67           |
| 60+          | 025    |       | 2.05      | 0.00            | 4.10      | 0.00      | 0.00        | 0.00           |
| 60+          | 029.36 |       | 0.82      | 0.00            | 2.87      | 2.18      | 0.00        | 6.26           |
| 60+          | 029.36 |       | 1.78      | 0.00            | 2.60      | 0.00      | 0.00        | 0.00           |
| 60+          | 035.36 |       | 1.11      | 0.00            | 2.89      | 3.00      | 0.00        | 8.67           |
| 60+          | 035.36 |       | 2.07      | 0.00            | 3.18      | 0.00      | 0.00        | 0.00           |
| 60+          | 038.63 |       | 1.22      | 0.00            | 3.29      | 1.64      | 0.00        | 5.38           |
| 60+          |        |       |           | 0.00            | 0.00      | 0.00      | 0.00        | 0.00           |
|              |        |       |           | 0.00            | 0.00      | 0.00      | 0.00        | 0.00           |
|              |        |       |           |                 |           |           | <b>0.00</b> | <b>61.70</b>   |



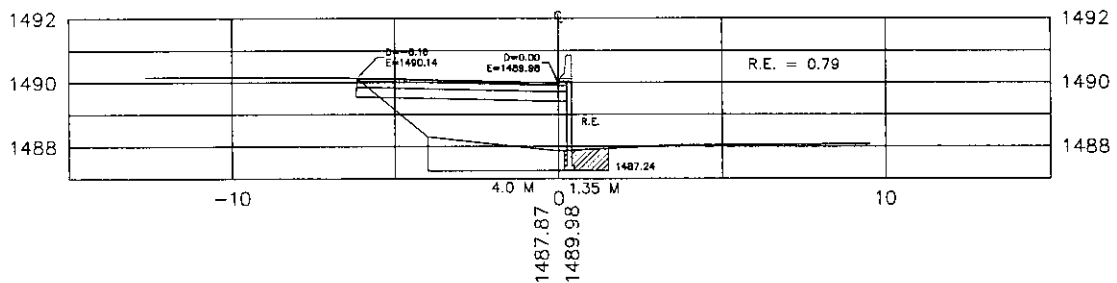
60+009.36



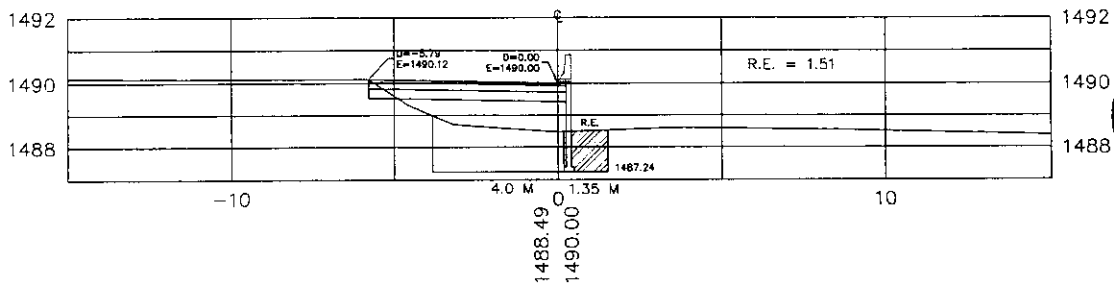
60+003.36



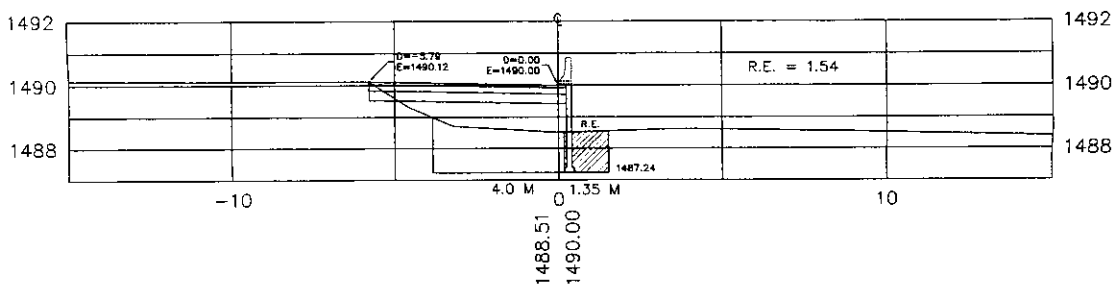
60+003.36



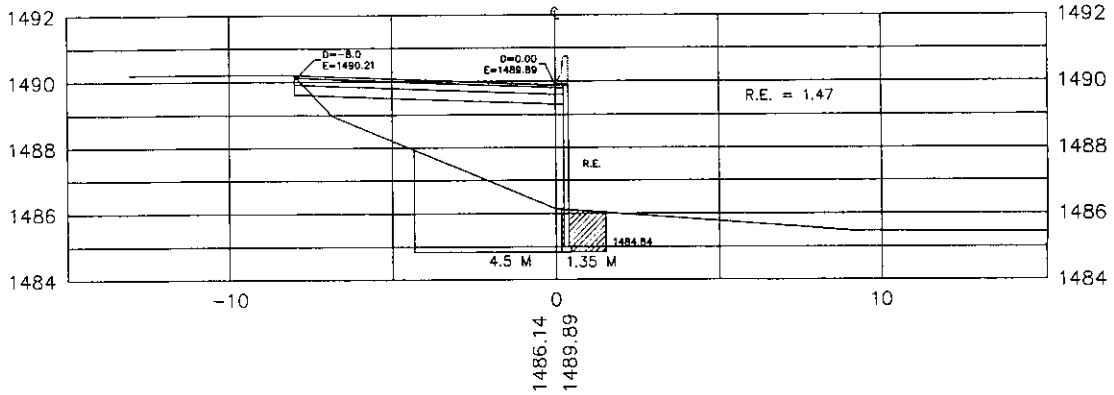
60+000



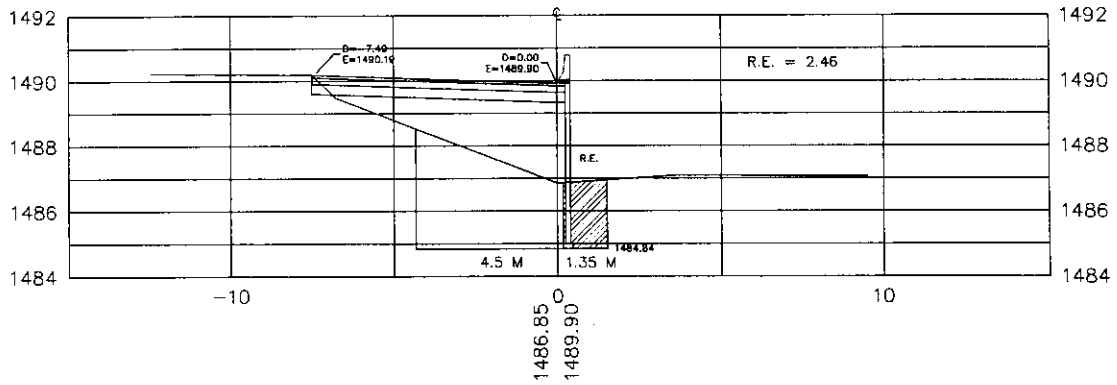
59+999.36



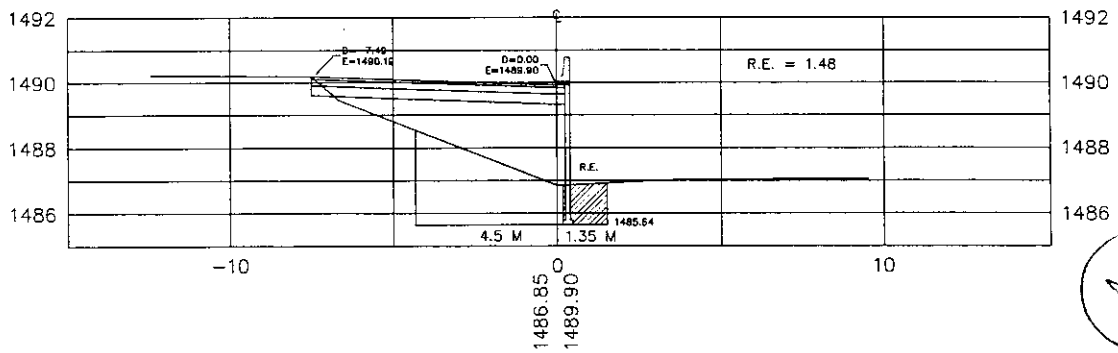
60+020



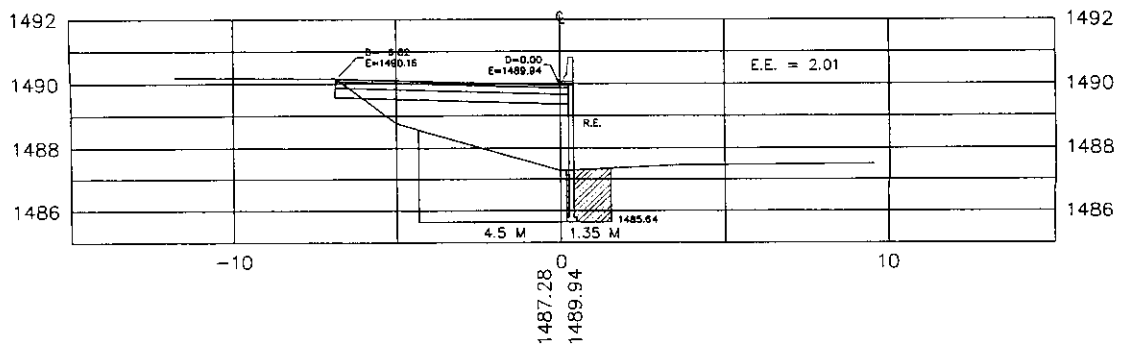
60+015.36



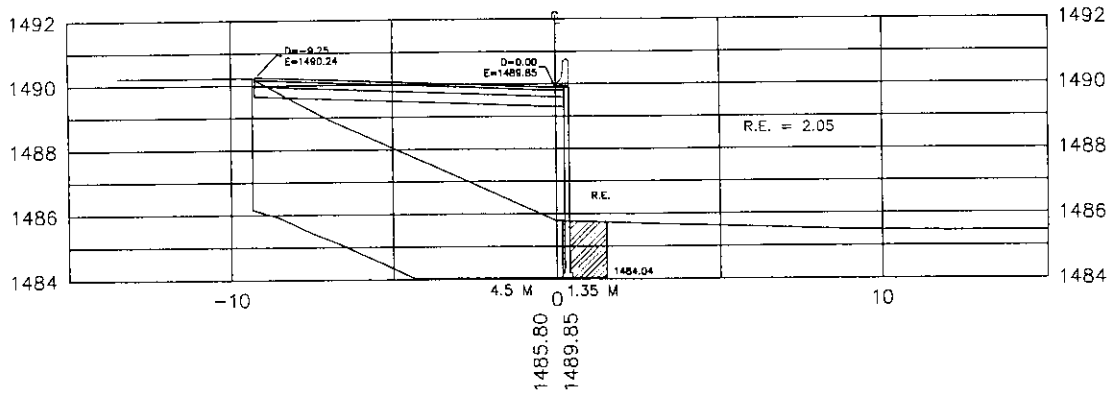
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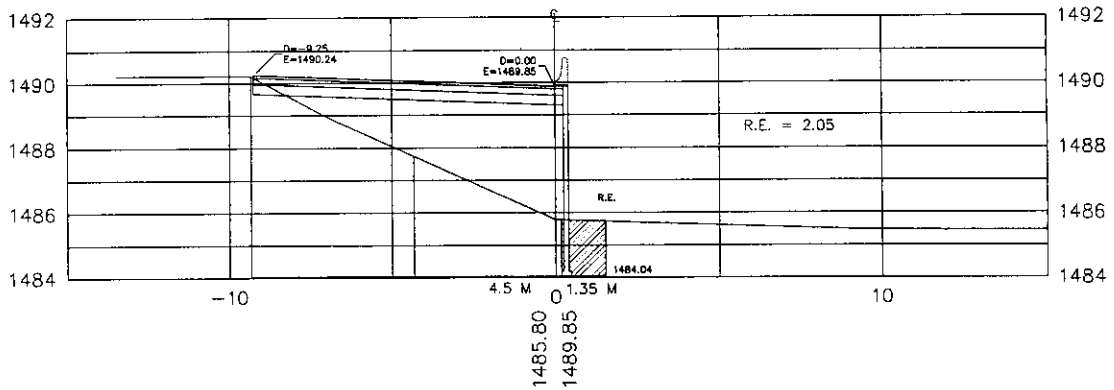
60+009.36



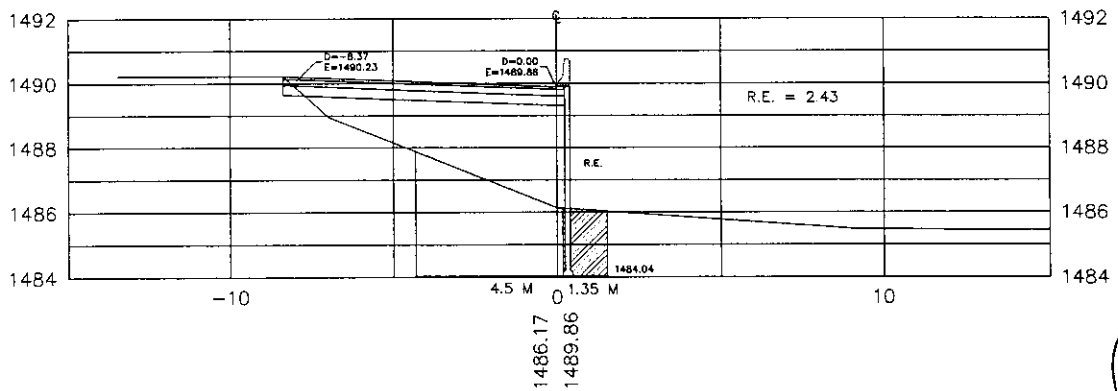
60+025



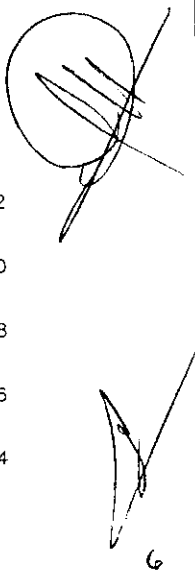
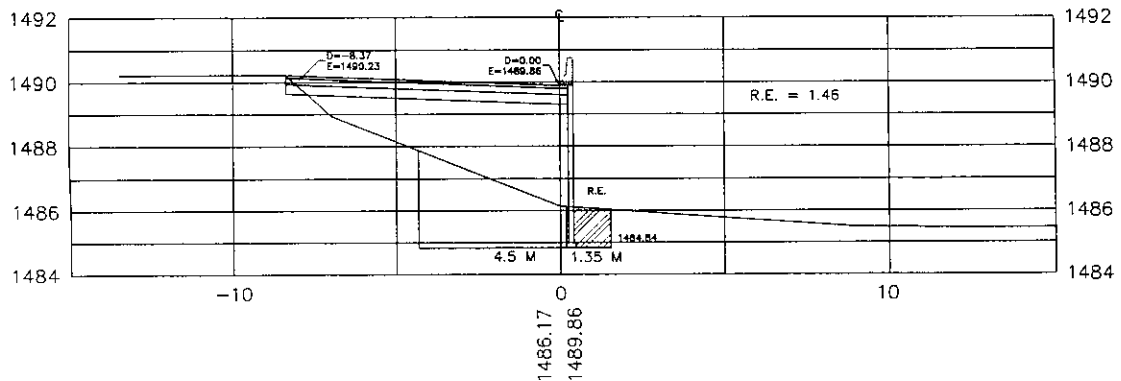
60+025



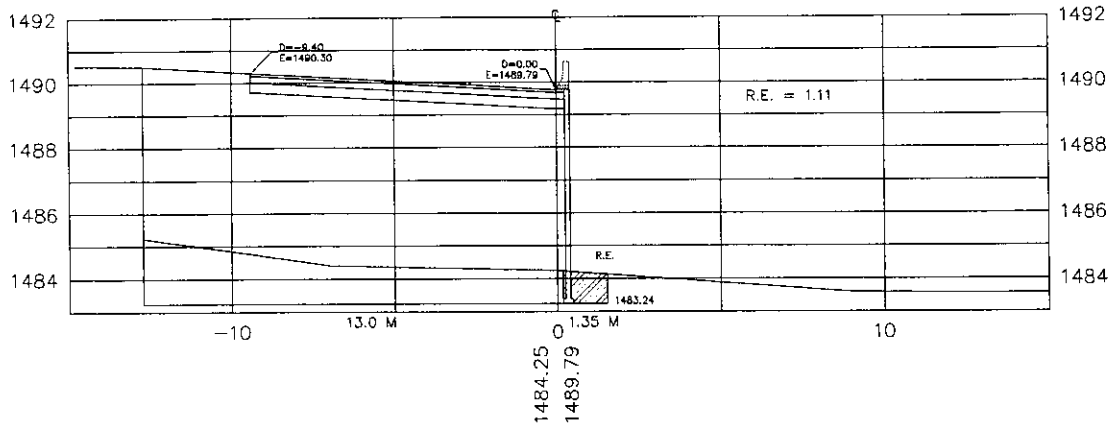
60+023.36



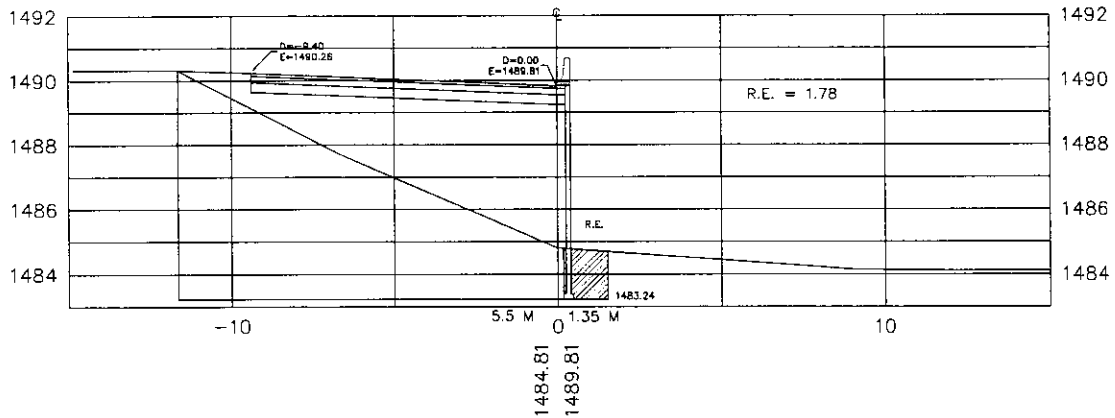
60+023.36



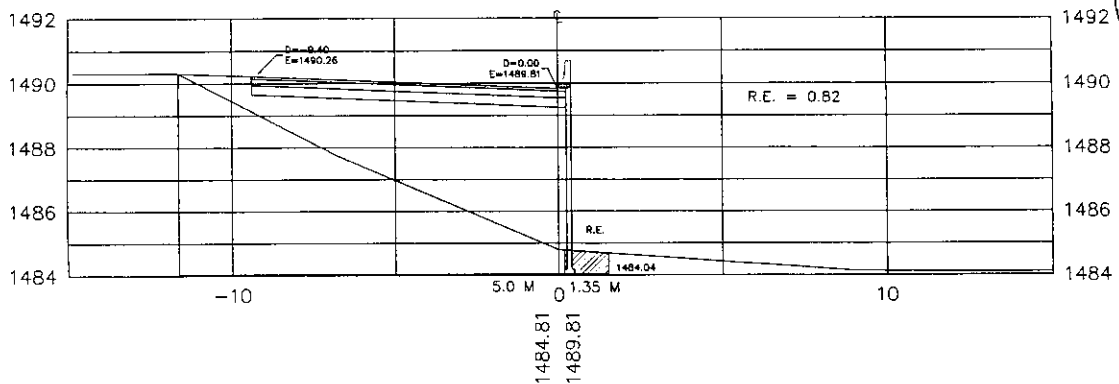
60+035.36



60+029.36



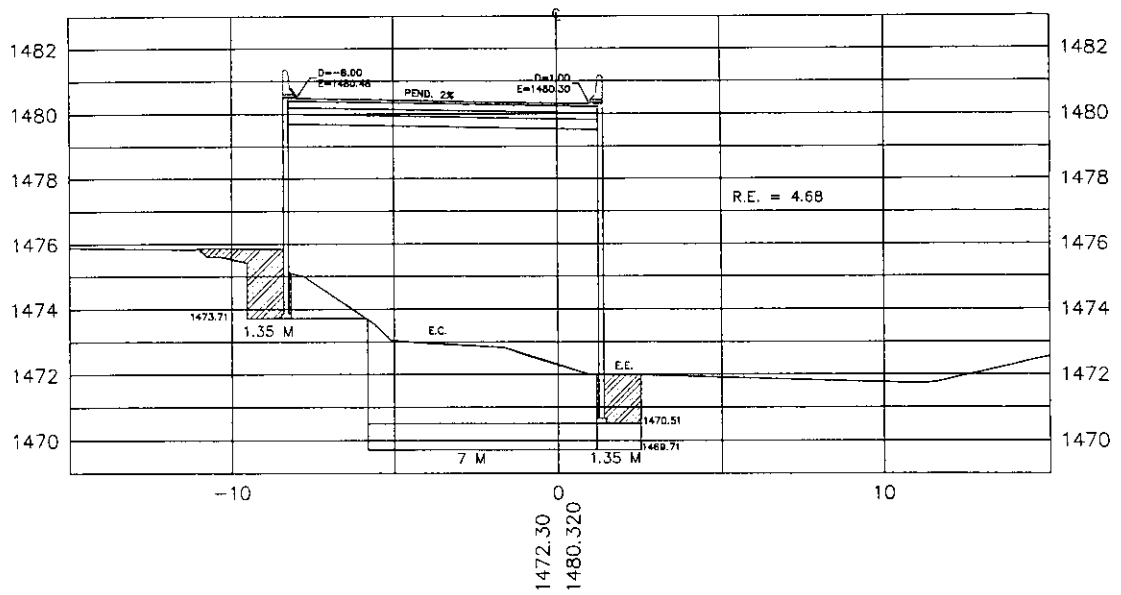
60+029.36



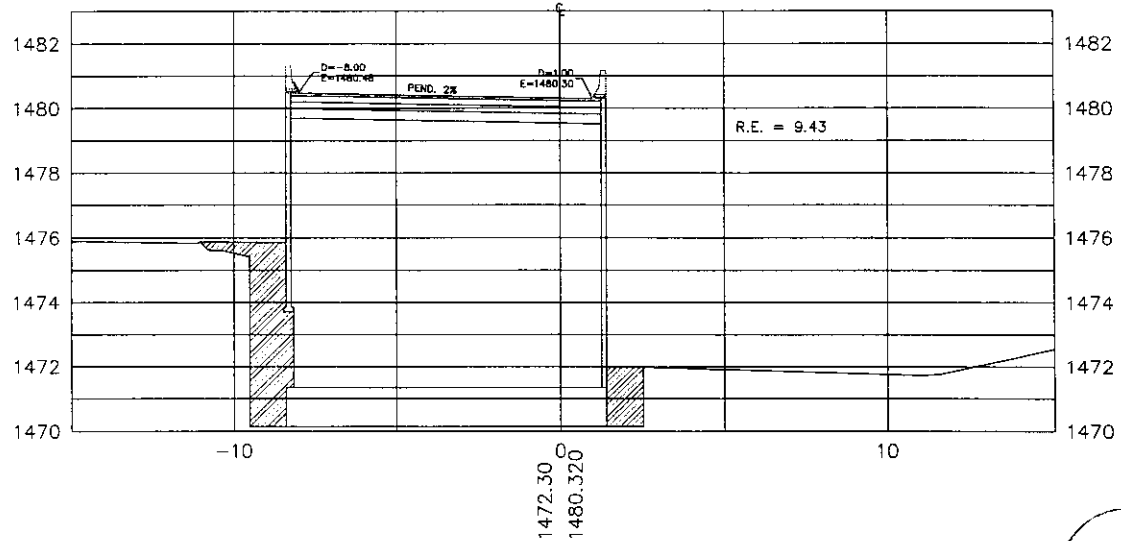
## CURVA MASA RAMPA 2 RELLENO PARA ESTRUCTURAS

| CADENAMIENTO |        | AREA  |           | AREA 1 + AREA 2 |           | SEMIDIST. | VOLUMEN     |                 |
|--------------|--------|-------|-----------|-----------------|-----------|-----------|-------------|-----------------|
|              |        | CORTE | TERRAPLEN | CORTE           | TERRAPLEN |           | VOL. CORTE  | VOL. TERRAPLEN  |
| 60+          | 308.44 |       | 9.44      |                 |           |           |             |                 |
| 60+          | 311.45 |       | 9.43      | 0               | 18.87     | 1.51      | 0.00        | 28.40           |
| 60+          | 311.45 |       | 4.68      | 0               | 14.11     | 0.00      | 0.00        | 0.00            |
| 60+          | 320    |       | 4.18      | 0               | 8.86      | 4.28      | 0.00        | 37.88           |
| 60+          | 320.69 |       | 4.19      | 0               | 8.37      | 0.34      | 0.00        | 2.89            |
| 60+          | 320.69 |       | 5.14      | 0               | 9.33      | 0.00      | 0.00        | 0.00            |
| 60+          | 340    |       | 4.29      | 0               | 9.43      | 9.66      | 0.00        | 91.05           |
| 60+          | 352.69 |       | 4.40      | 0               | 8.69      | 6.35      | 0.00        | 55.14           |
| 60+          | 352.69 |       | 5.17      | 0               | 9.57      | 0.00      | 0.00        | 0.00            |
| 60+          | 360    |       | 4.60      | 0               | 9.77      | 3.66      | 0.00        | 35.71           |
| 60+          | 362.95 |       | 4.62      | 0               | 9.22      | 1.47      | 0.00        | 13.60           |
| 60+          | 362.95 |       | 5.59      | 0               | 10.21     | 0.00      | 0.00        | 0.00            |
| 60+          | 378.69 |       | 4.52      | 0               | 10.11     | 7.87      | 0.00        | 79.57           |
| 60+          | 378.69 |       | 5.47      | 0               | 9.99      | 0.00      | 0.00        | 0.00            |
| 60+          | 380    |       | 5.48      | 0               | 10.95     | 0.66      | 0.00        | 7.17            |
| 60+          | 384.95 |       | 5.30      | 0               | 10.78     | 2.47      | 0.00        | 26.68           |
| 60+          | 384.95 |       | 6.27      | 0               | 11.57     | 0.00      | 0.00        | 0.00            |
| 60+          | 400    |       | 4.77      | 0               | 11.04     | 7.53      | 0.00        | 83.08           |
| 60+          | 412.69 |       | 4.78      | 0               | 9.55      | 6.35      | 0.00        | 60.59           |
| 60+          | 412.69 |       | 5.68      | 0               | 10.46     | 0.00      | 0.00        | 0.00            |
| 60+          | 416.95 |       | 5.47      | 0               | 11.15     | 2.13      | 0.00        | 23.75           |
| 60+          | 416.95 |       | 6.46      | 0               | 11.93     | 0.00      | 0.00        | 0.00            |
| 60+          | 420    |       | 5.39      | 0               | 11.85     | 1.53      | 0.00        | 18.07           |
| 60+          | 436.69 |       | 4.48      | 0               | 9.87      | 8.35      | 0.00        | 82.37           |
| 60+          | 436.69 |       | 5.43      | 0               | 9.91      | 0.00      | 0.00        | 0.00            |
| 60+          | 440    |       | 5.61      | 0               | 11.04     | 1.66      | 0.00        | 18.27           |
| 60+          | 452.95 |       | 5.06      | 0               | 10.67     | 6.47      | 0.00        | 69.09           |
| 60+          | 452.95 |       | 6.03      | 0               | 11.09     | 0.00      | 0.00        | 0.00            |
| 60+          | 460    |       | 5.19      | 0               | 11.22     | 3.53      | 0.00        | 39.55           |
| 60+          | 466.69 |       | 4.91      | 0               | 10.10     | 3.35      | 0.00        | 33.78           |
| 60+          | 466.69 |       | 5.87      | 0               | 10.78     | 0.00      | 0.00        | 0.00            |
| 60+          | 474.95 |       | 5.07      | 0               | 10.94     | 4.13      | 0.00        | 45.18           |
| 60+          | 474.95 |       | 5.97      | 0               | 11.04     | 0.00      | 0.00        | 0.00            |
| 60+          | 480    |       | 5.72      | 0               | 11.69     | 2.53      | 0.00        | 29.52           |
| 60+          | 498.95 |       | 2.87      | 0               | 8.59      | 9.47      | 0.00        | 81.39           |
| 60+          | 498.95 |       | 4.76      | 0               | 7.63      | 0.00      | 0.00        | 0.00            |
| 60+          | 500    |       | 4.75      | 0               | 9.51      | 0.53      | 0.00        | 4.99            |
| 60+          | 518.69 |       | 3.87      | 0               | 8.62      | 9.35      | 0.00        | 80.55           |
| 60+          | 518.69 |       | 4.88      | 0               | 8.75      | 0.00      | 0.00        | 0.00            |
| 60+          | 520    |       | 1.57      | 0               | 6.45      | 0.65      | 0.00        | 4.22            |
| 60+          | 522.95 |       | 1.49      | 0               | 3.06      | 1.48      | 0.00        | 4.51            |
| 60+          | 522.95 |       | 1.49      | 0               | 2.98      | 0.00      | 0.00        | 0.00            |
| 60+          | 540    |       | 1.31      | 0               | 2.80      | 8.52      | 0.00        | 23.87           |
| 60+          | 546.95 |       | 0.98      | 0               | 2.29      | 3.48      | 0.00        | 7.96            |
| 60+          | 546.95 |       | 1.94      | 0               | 2.92      | 0.00      | 0.00        | 0.00            |
| 60+          | 560    |       | 1.36      | 0               | 3.30      | 6.52      | 0.00        | 21.53           |
| 60+          | 560.89 |       | 1.28      | 0               | 2.64      | 0.00      | 0.00        | 0.00            |
| 60+          | 566.95 |       | 0.68      | 0               | 1.96      | 3.03      | 0.00        | 5.94            |
| 60+          | 566.95 |       | 1.68      | 0               | 2.36      | 0.00      | 0.00        | 0.00            |
| 60+          | 580    |       | 1.37      | 0               | 3.05      | 6.52      | 0.00        | 19.90           |
| 60+          | 586.95 |       | 2.14      | 0               | 3.51      | 3.48      | 0.00        | 12.20           |
| 60+          | 586.95 |       | 1.24      | 0               | 3.38      | 0.00      | 0.00        | 0.00            |
| 60+          | 598.72 |       | 1.55      | 0               | 2.79      | 5.88      | 0.00        | 16.42           |
| 60+          |        |       |           | 0               | 0.00      | 0.00      | 0.00        | 0.00            |
| 60+          |        |       |           | 0               | 0.00      | 0.00      | 0.00        | 0.00            |
|              |        |       |           |                 |           |           | <b>0.00</b> | <b>1,164.82</b> |

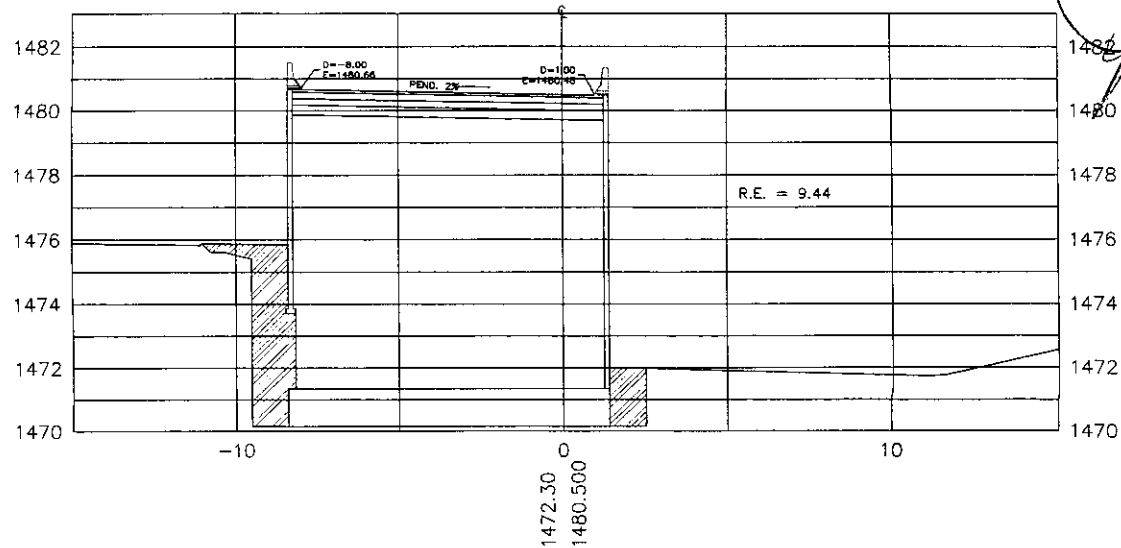
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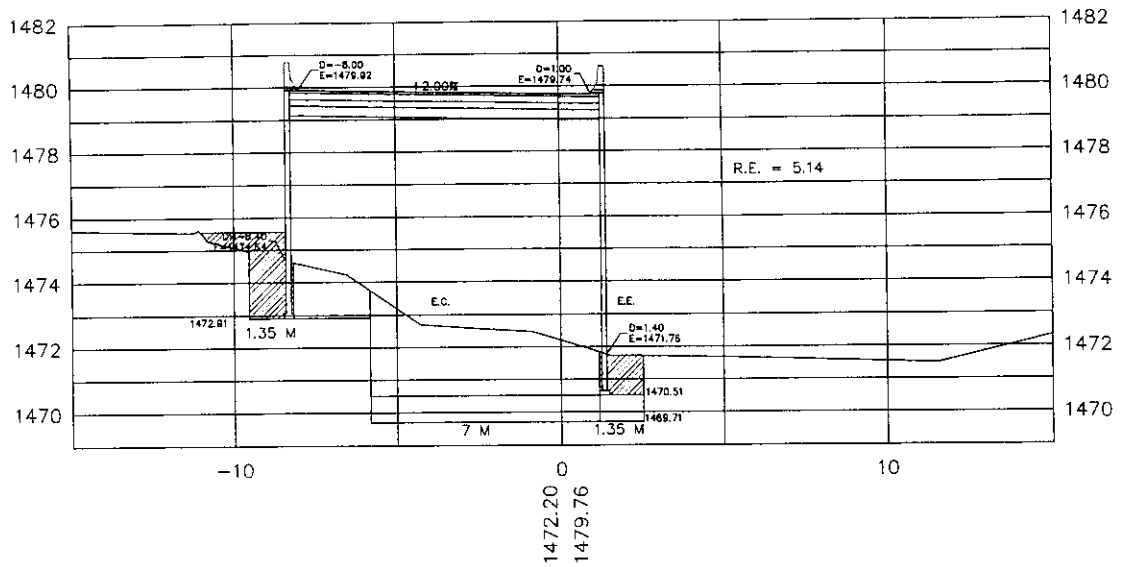
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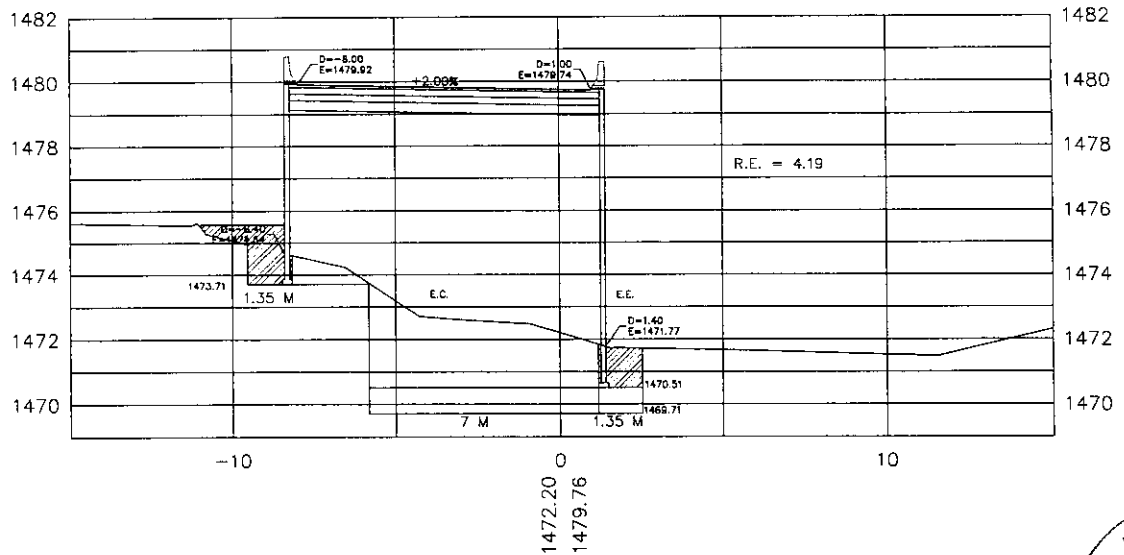
60+308.44  
ESTRIBO 7



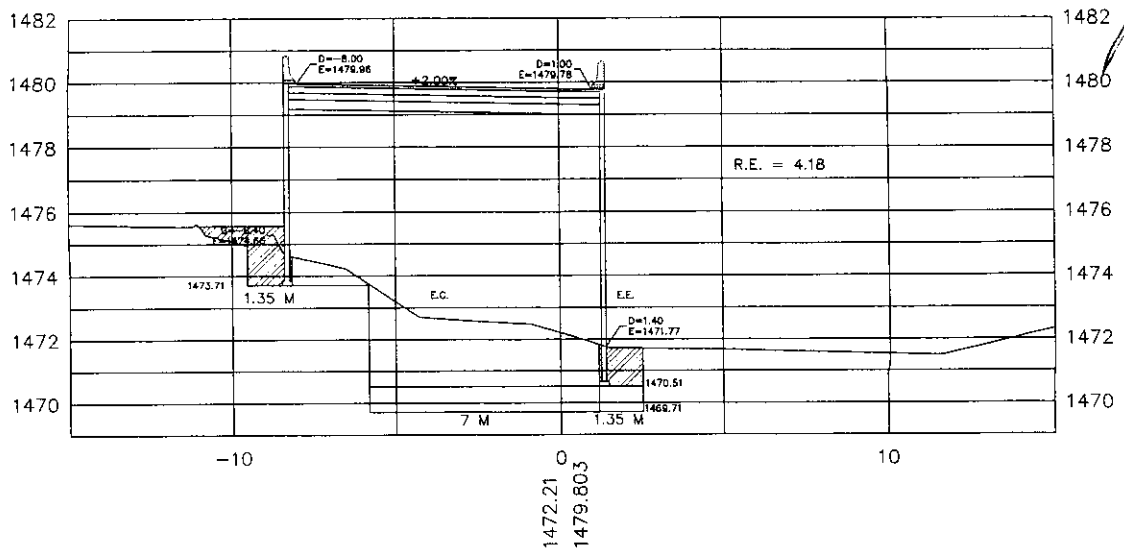
60+320.69



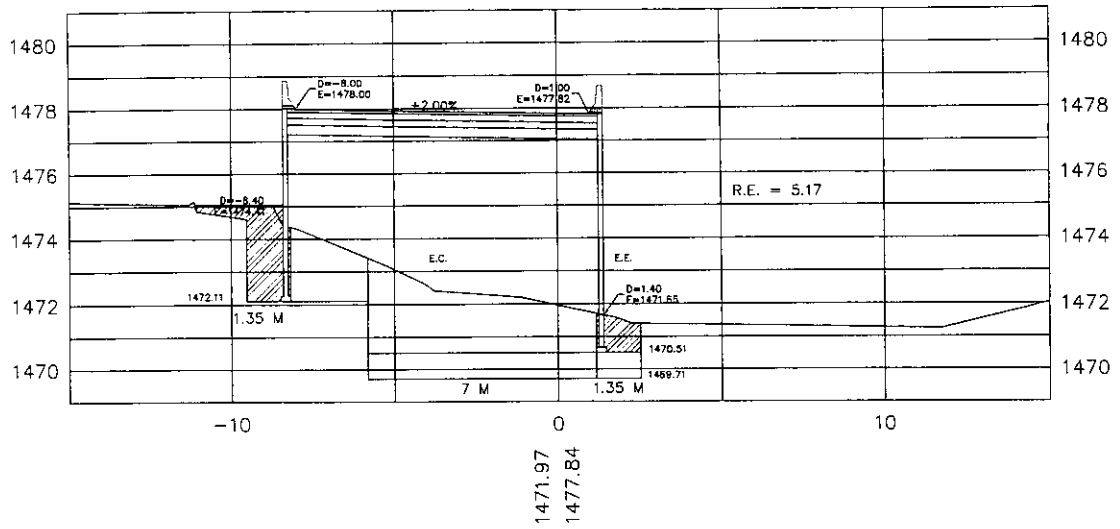
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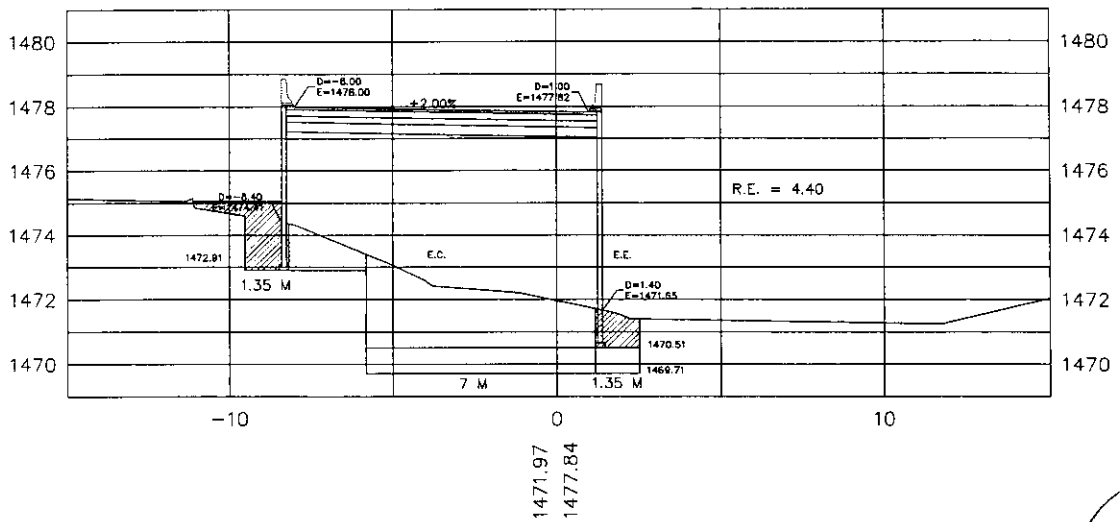
60+320



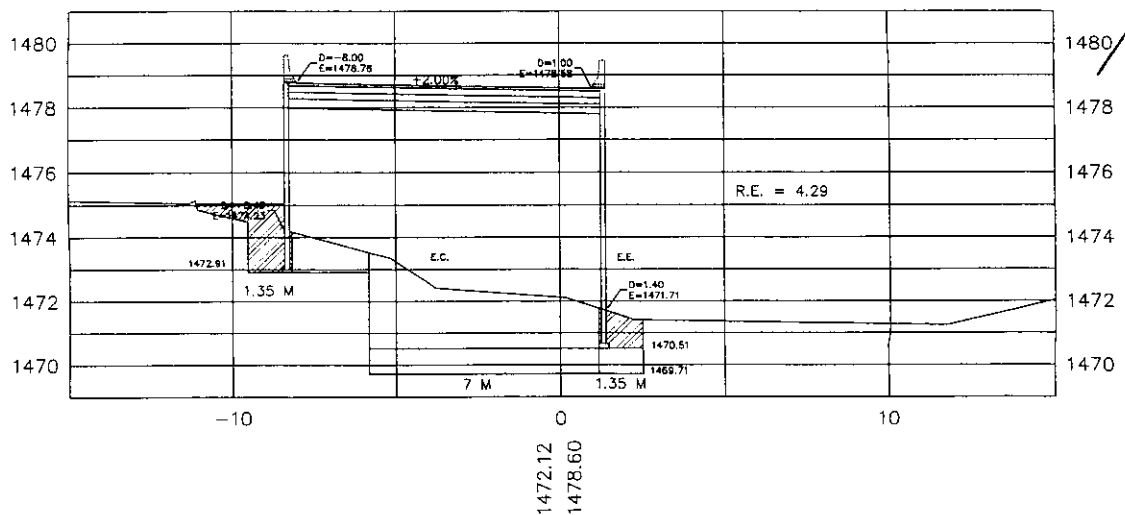
60+352.69



60+352.69



60+340



[illegible]

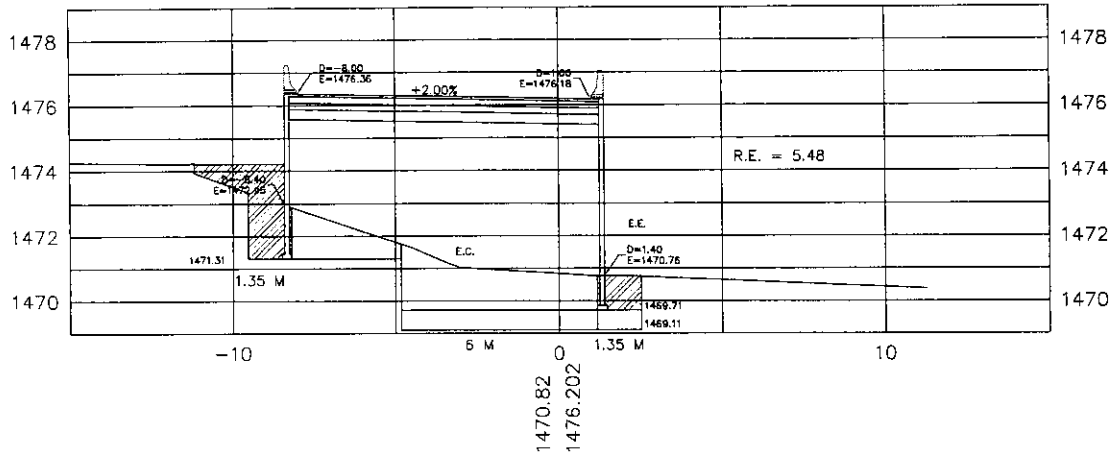
The diagram illustrates a cross-section of a road structure. Key features include:

- Top Surface:** A horizontal line representing the road surface with a  $+2.00\%$  slope.
- Left Shoulder:** A sloped area with a width of  $1.35\text{ M}$  and a base elevation of  $1472.11$ . The top edge of the shoulder is labeled  $D=8.40$  and  $E=1477.38$ .
- Main Roadway:** A central section with a width of  $7\text{ M}$ . The top edge is labeled  $D=1.00$  and  $E=1477.20$ .
- Right Shoulder:** A sloped area with a width of  $1.35\text{ M}$  and a base elevation of  $1470.51$ . The top edge is labeled  $D=1.40$  and  $E=1471.60$ .
- Ground Profile:** A line labeled  $E.C.$  (Existing Ground) showing the natural terrain.
- Proposed Profile:** A line labeled  $E.S.$  (Existing Surface) showing the proposed road surface.
- Dimensions:** The total width of the structure is  $10\text{ M}$ , with  $1.35\text{ M}$  shoulders on both sides and a  $7\text{ M}$  main roadway.
- Elevations:** The diagram shows elevations ranging from  $1470$  to  $1480$  on the vertical axis.
- Labels:** The diagram includes labels for  $D$  (Distance),  $E$  (Elevation),  $E.C.$  (Existing Ground), and  $E.S.$  (Existing Surface).

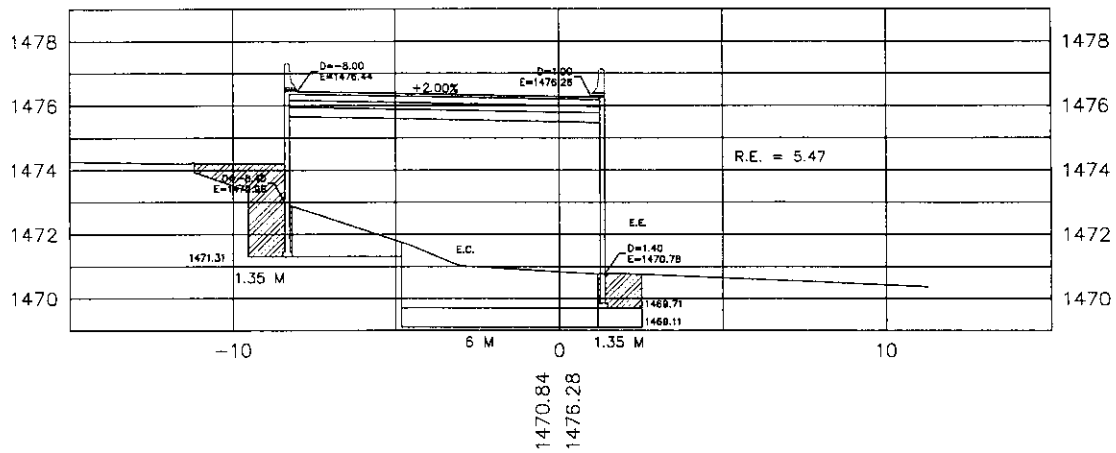
[illegible]

3

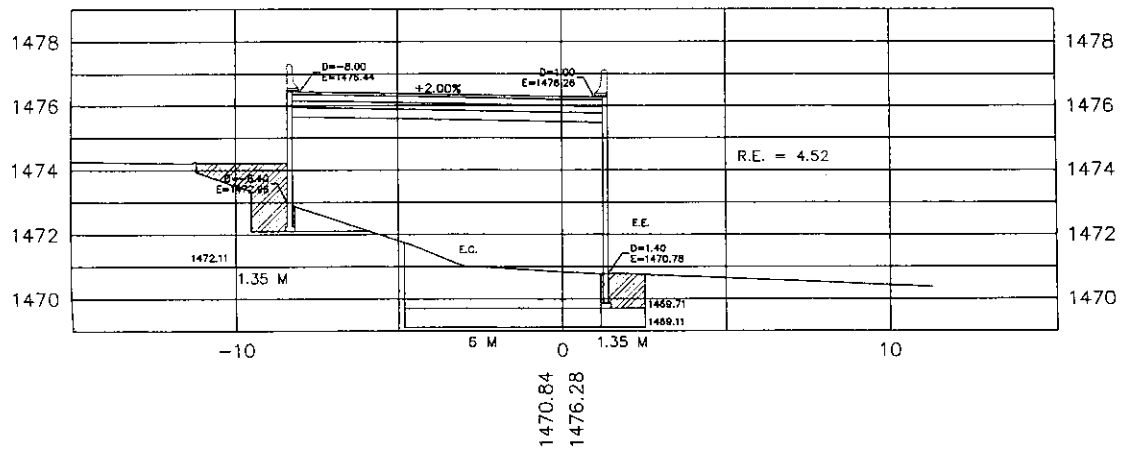
60+380



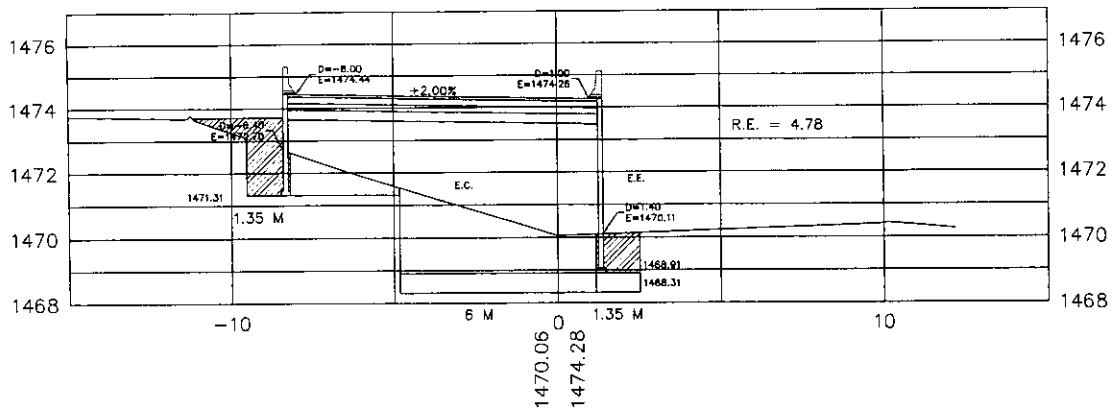
60+378.69



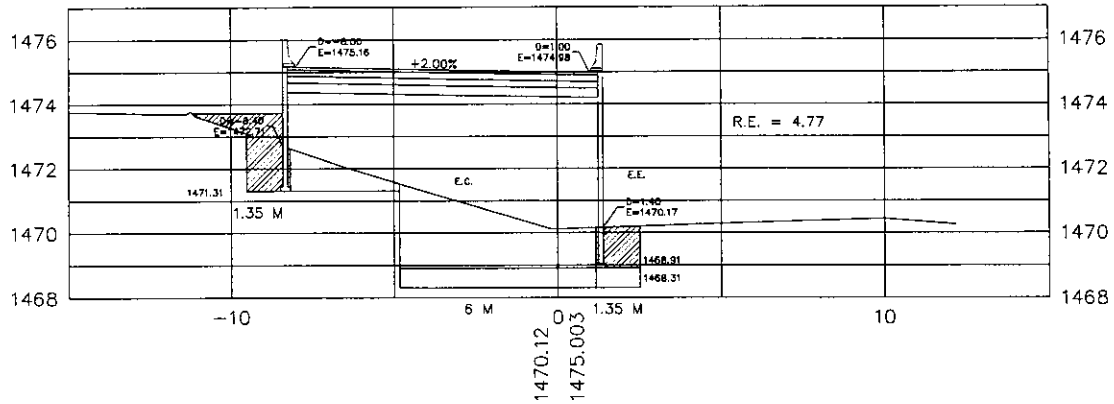
60+378.69



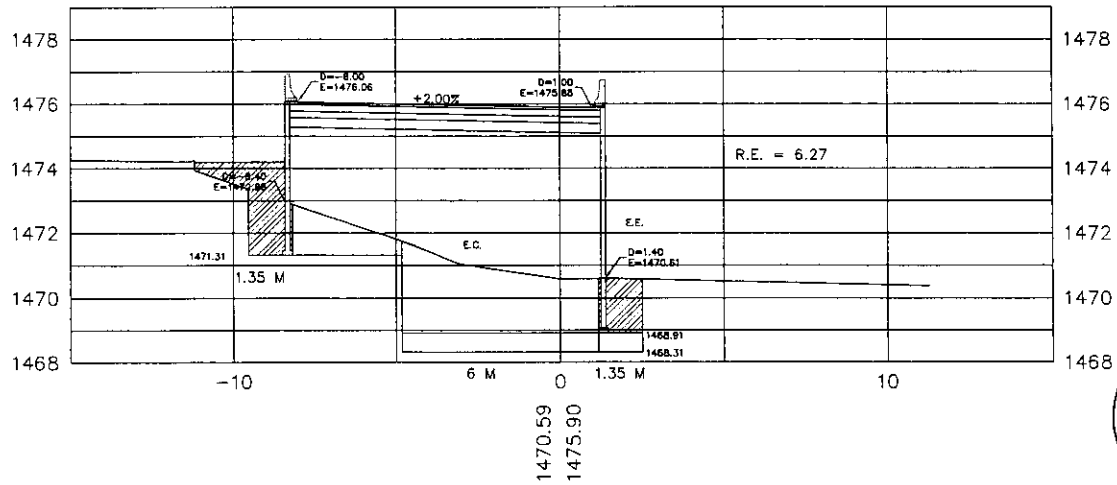
60+412.69



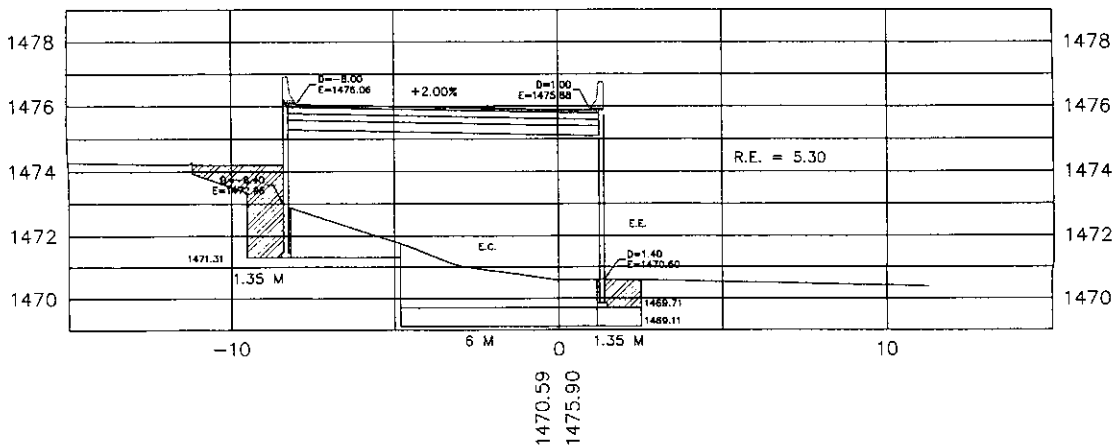
60+400



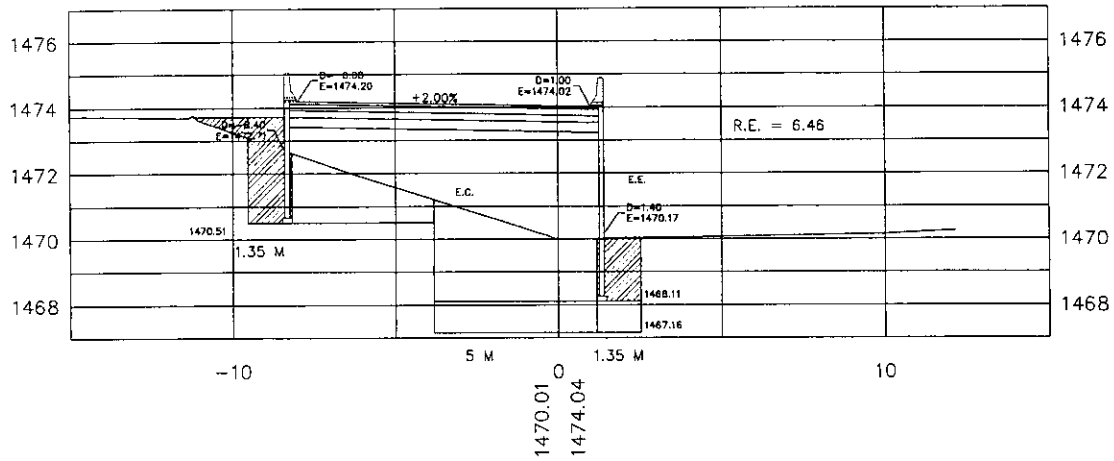
60+384.95



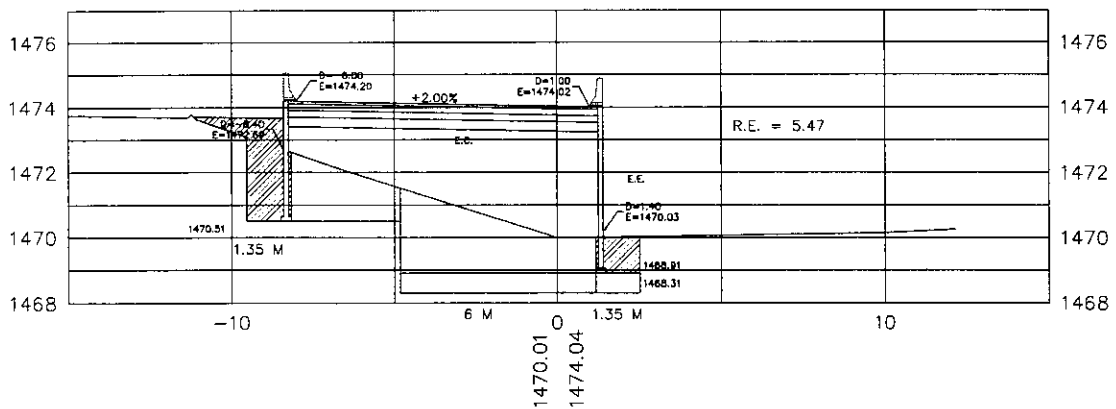
60+384.95



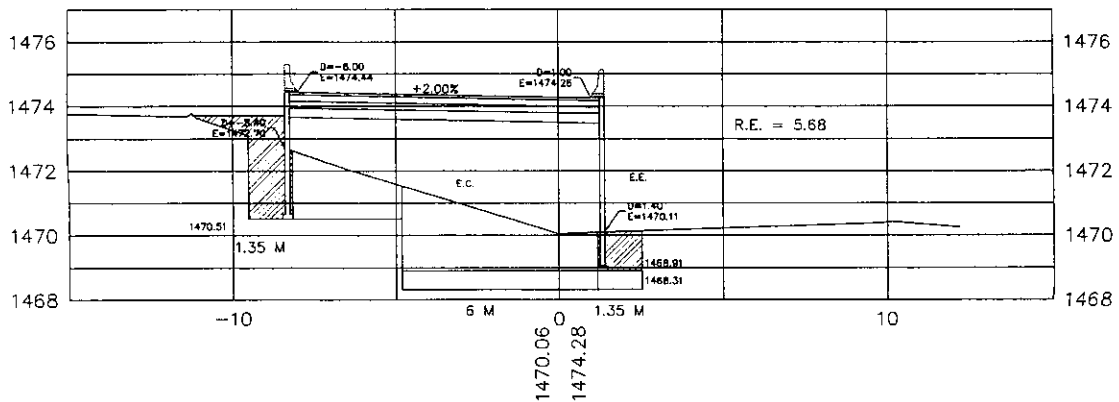
60+416.95



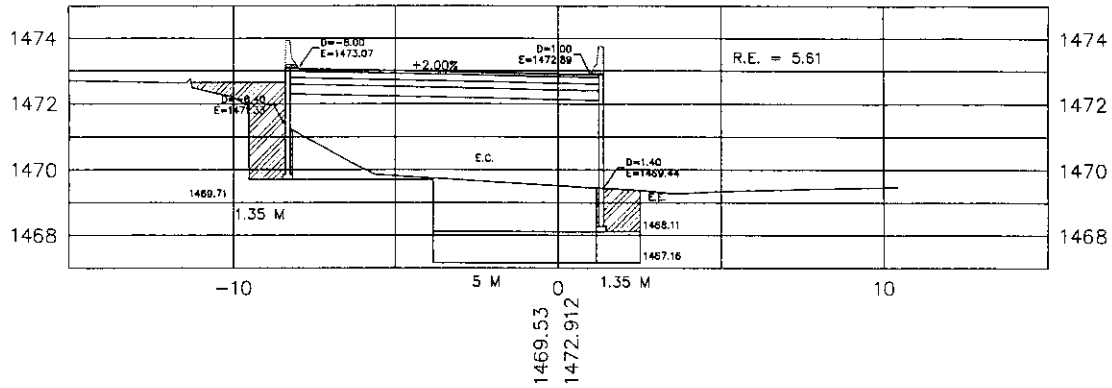
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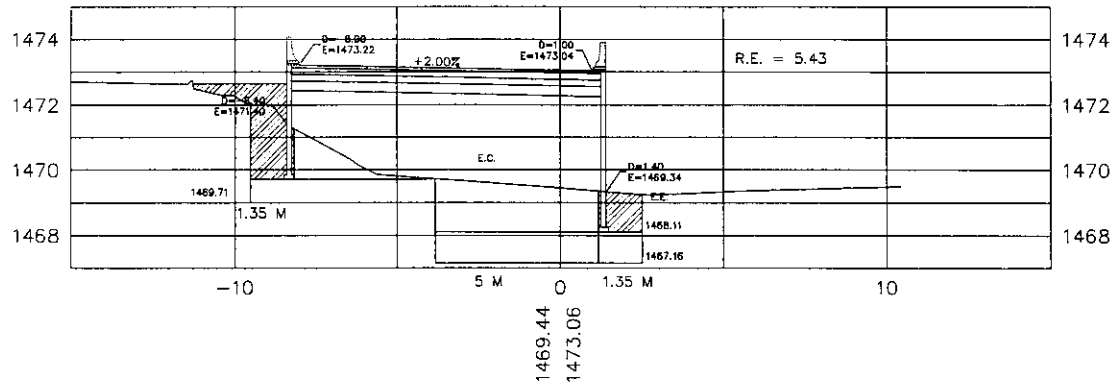
60+412.69



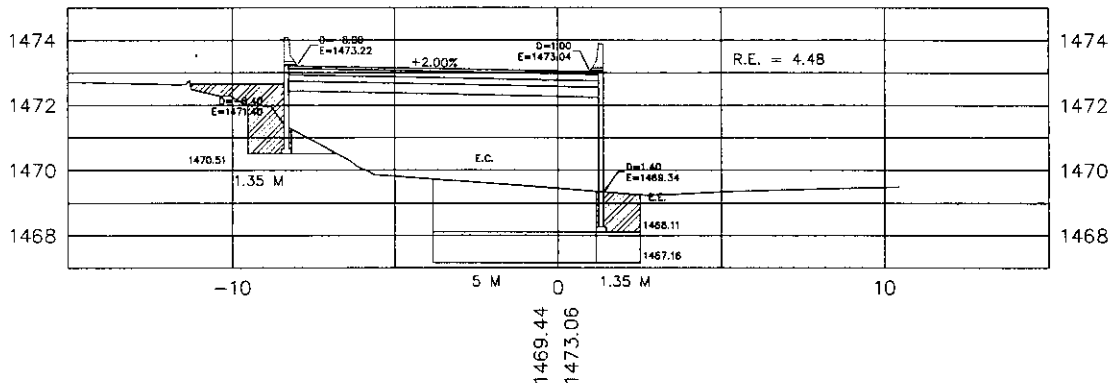
60+440



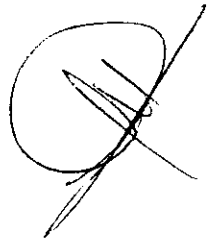
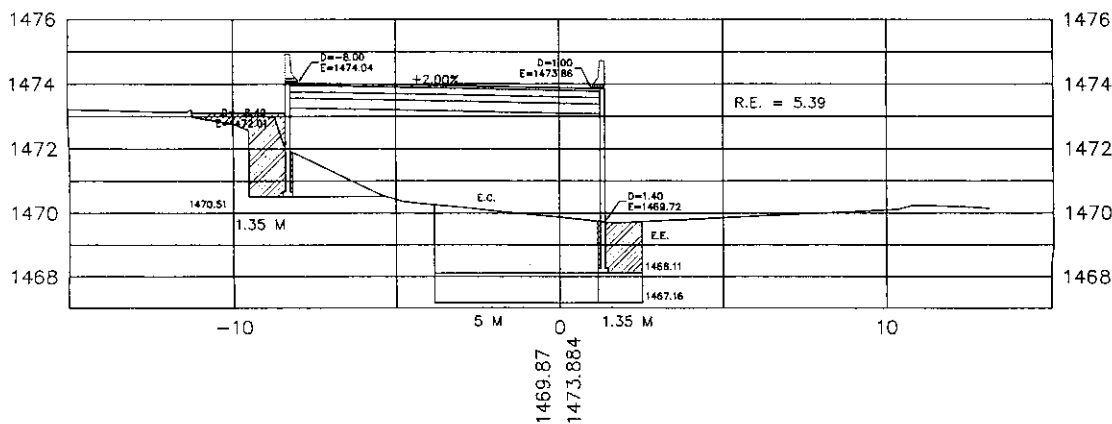
60+436.69



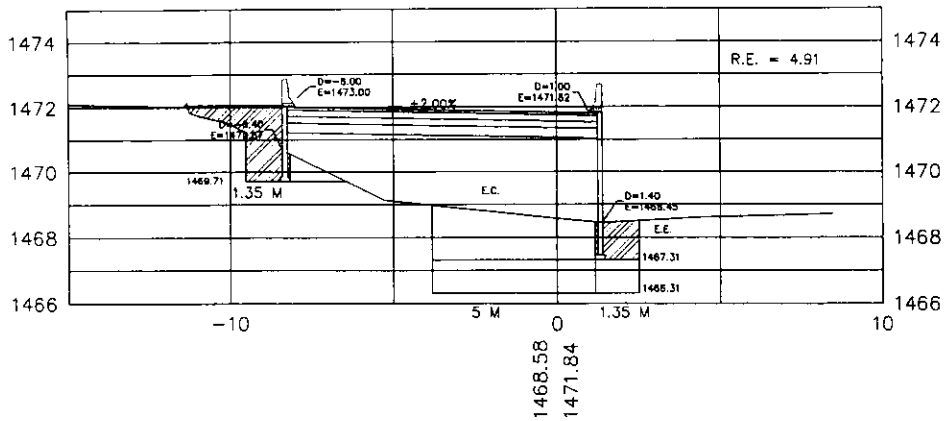
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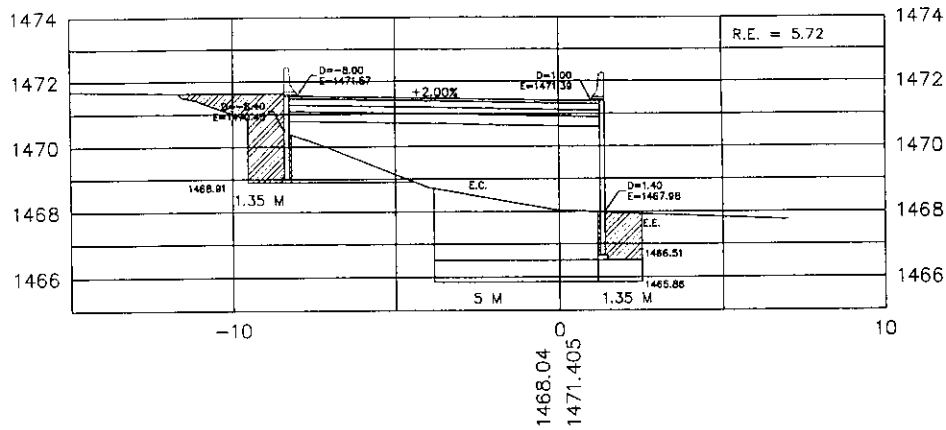
60+420



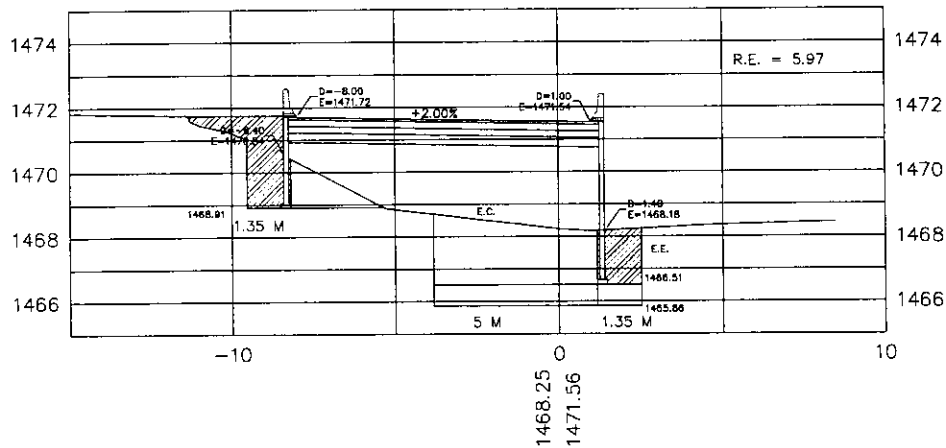
60+466.69



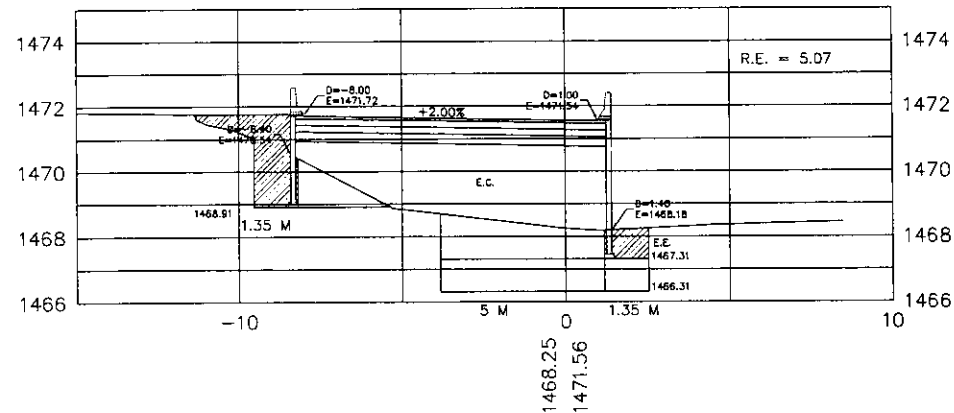
60+480



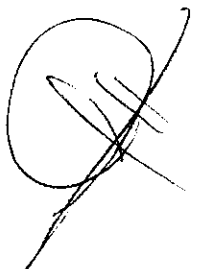
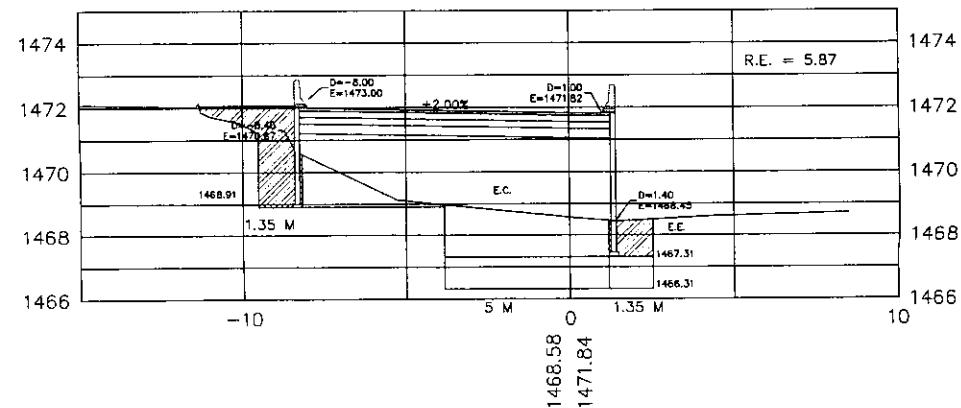
60+474.95



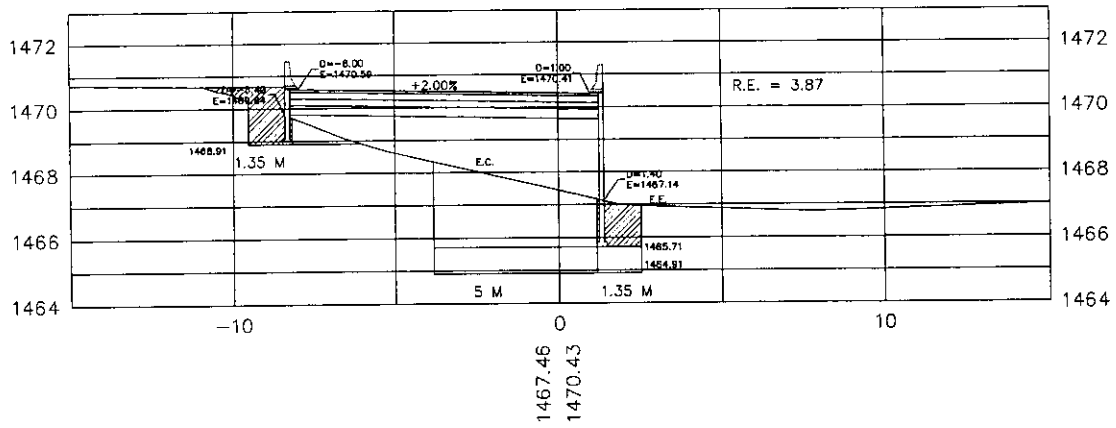
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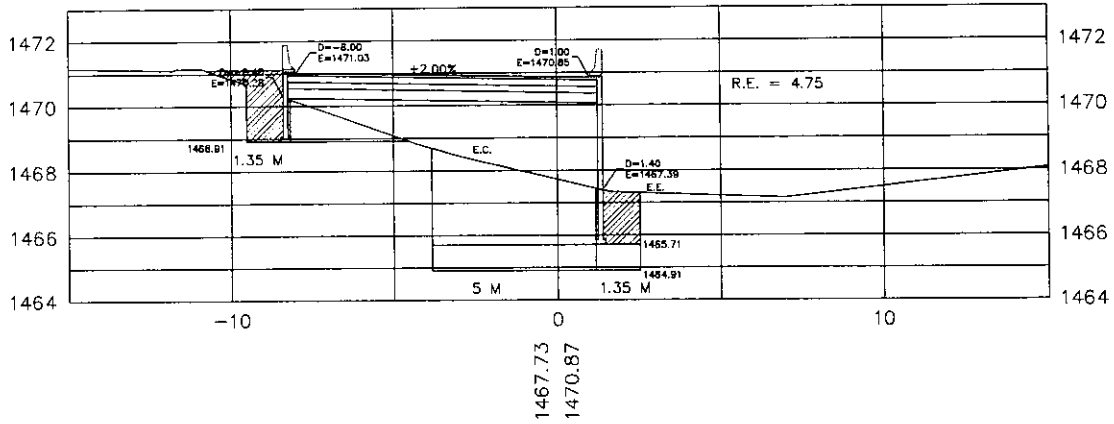
60+466.69



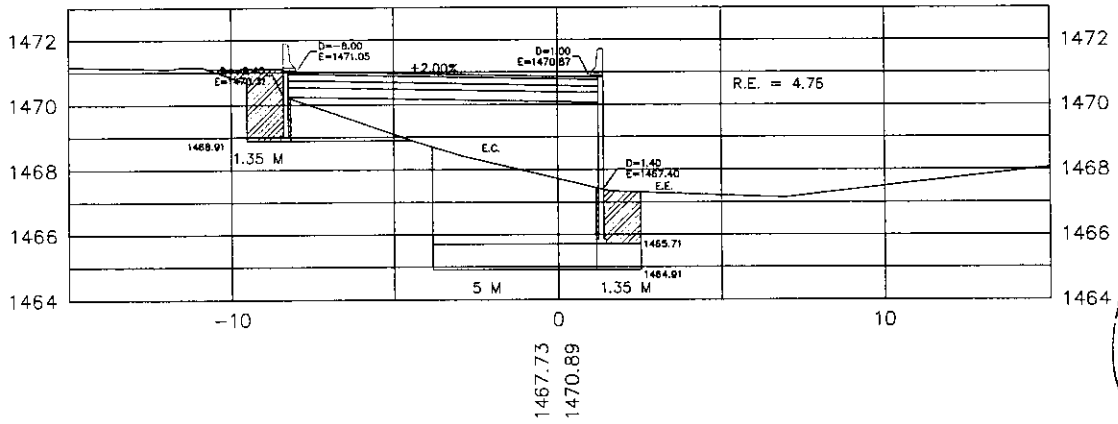
60+518.69



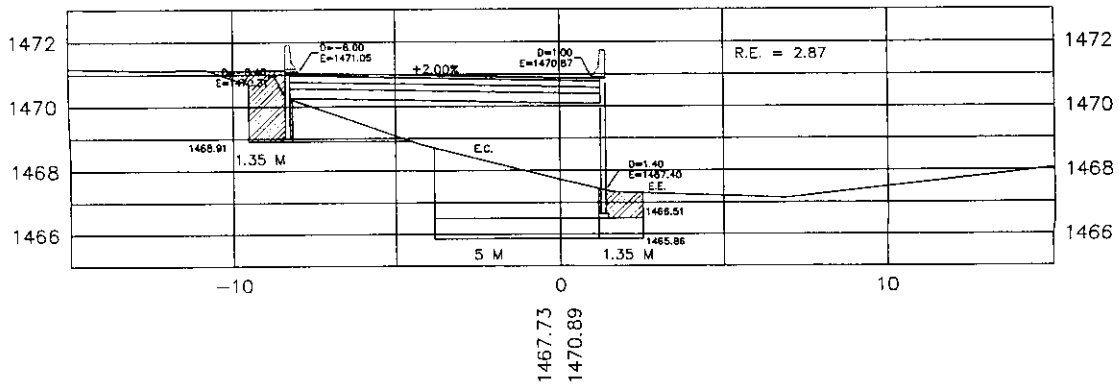
60+500



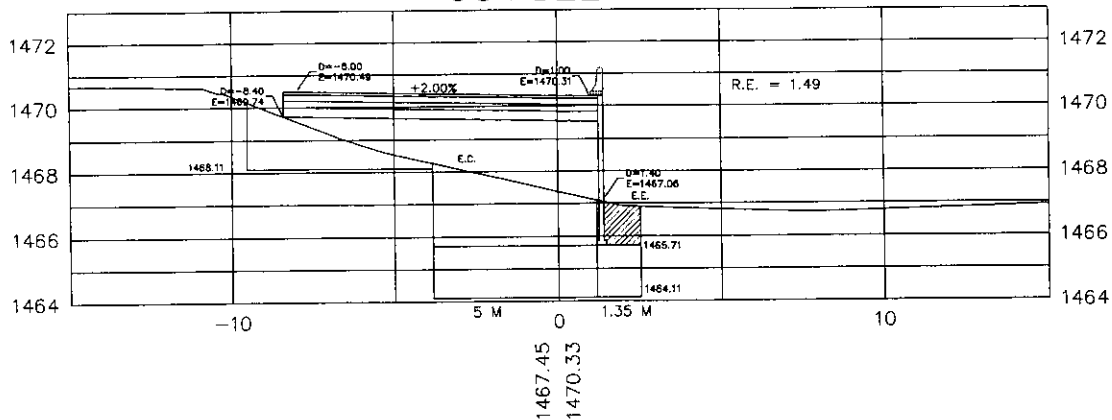
60+498.95



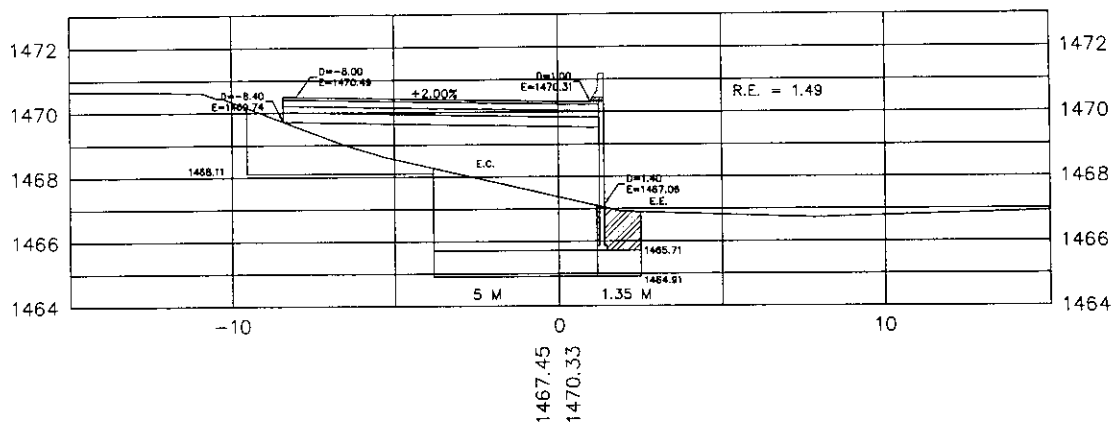
60+498.95



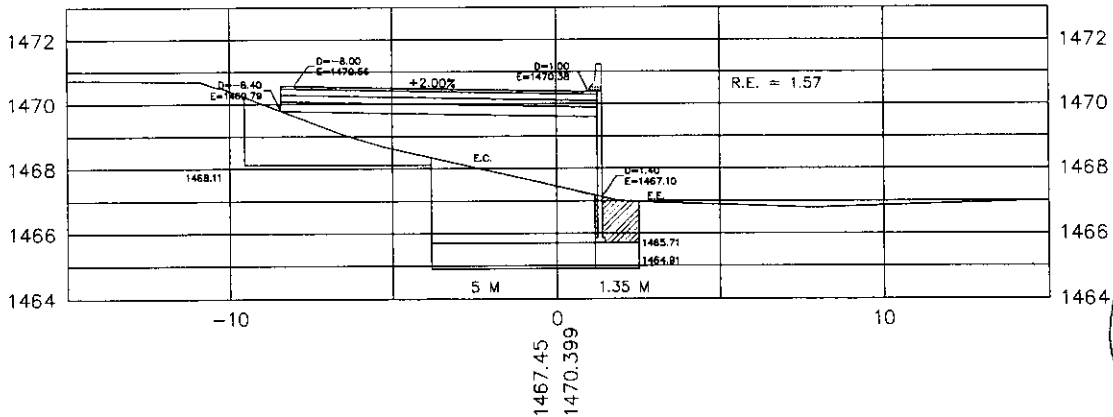
60+522.95



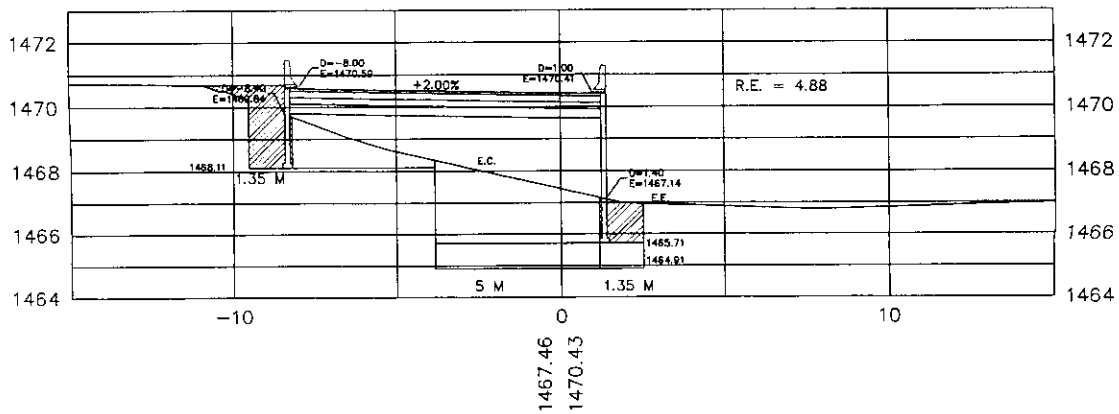
60+522.95



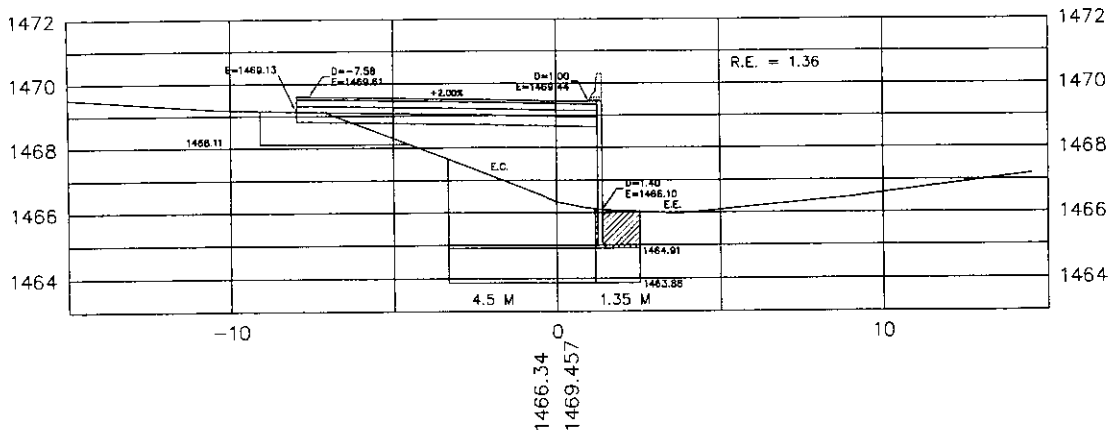
60+520



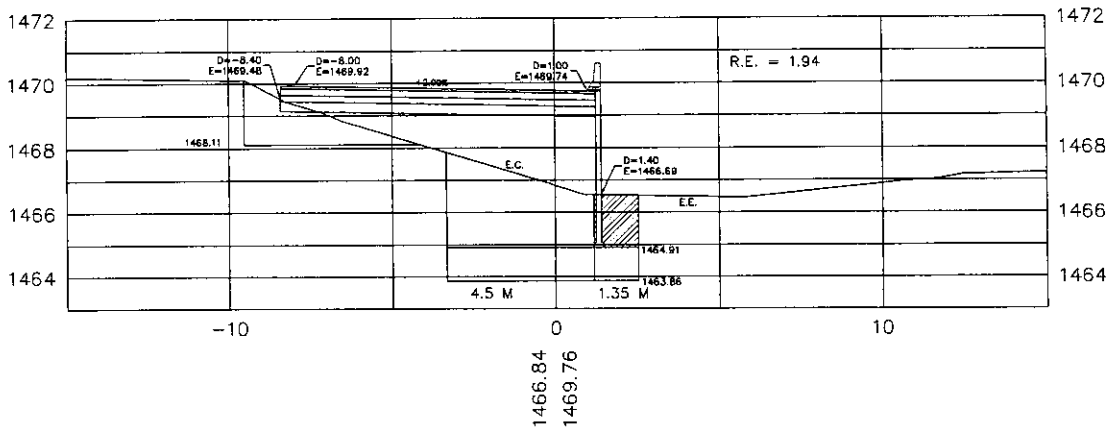
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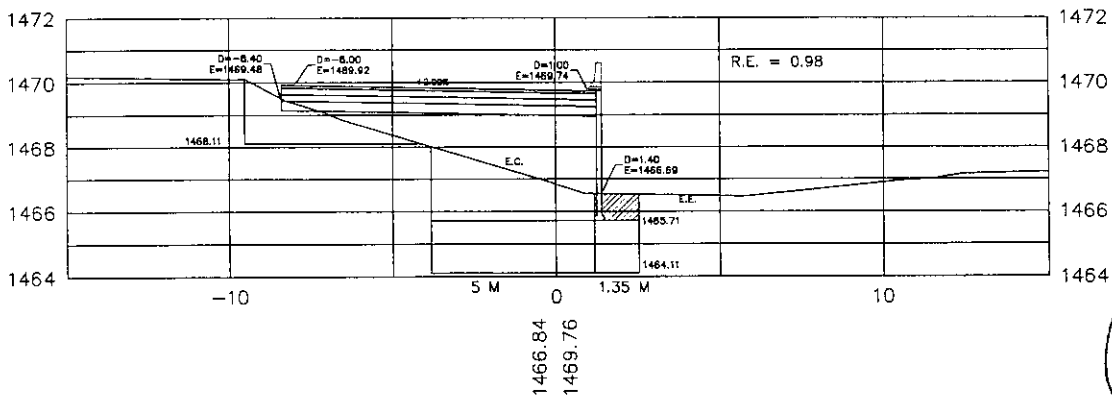
60+560



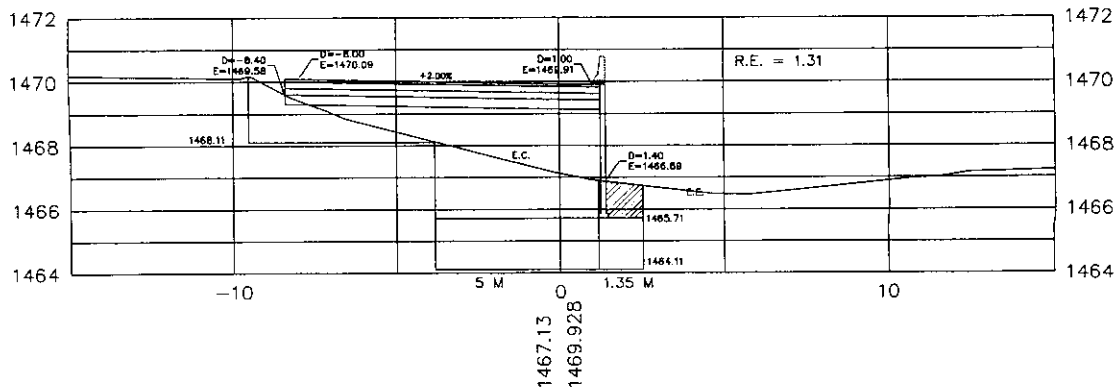
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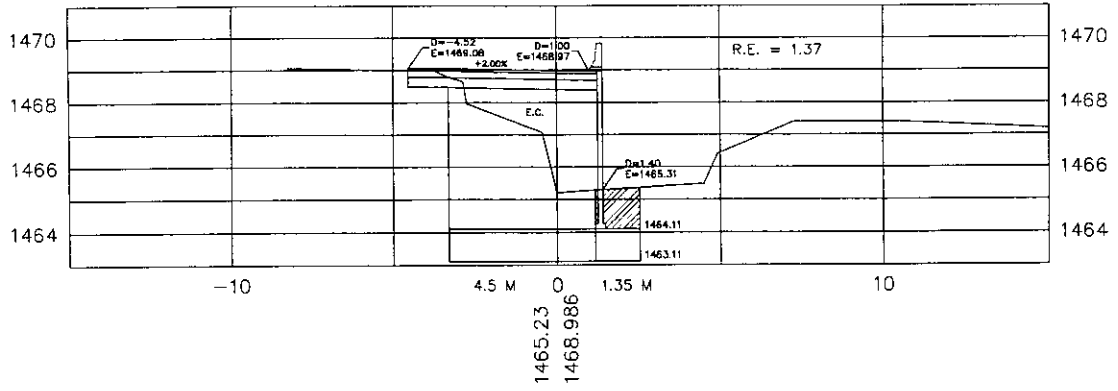
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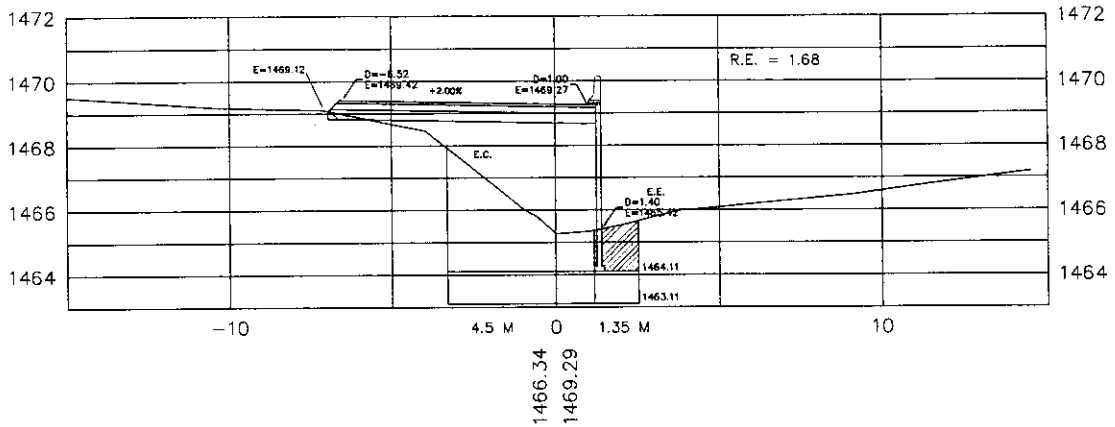
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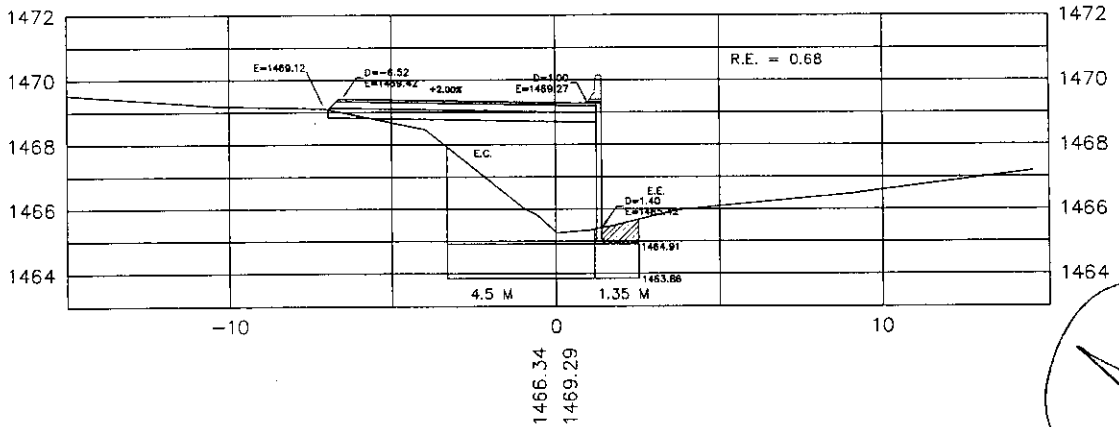
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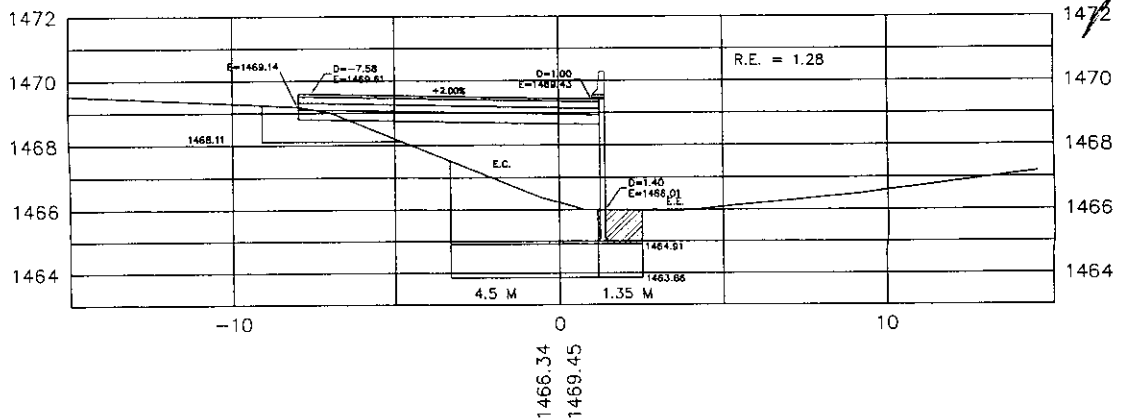
60+566.95



60+566.95



60+560.89



[illegible][illegible]

24

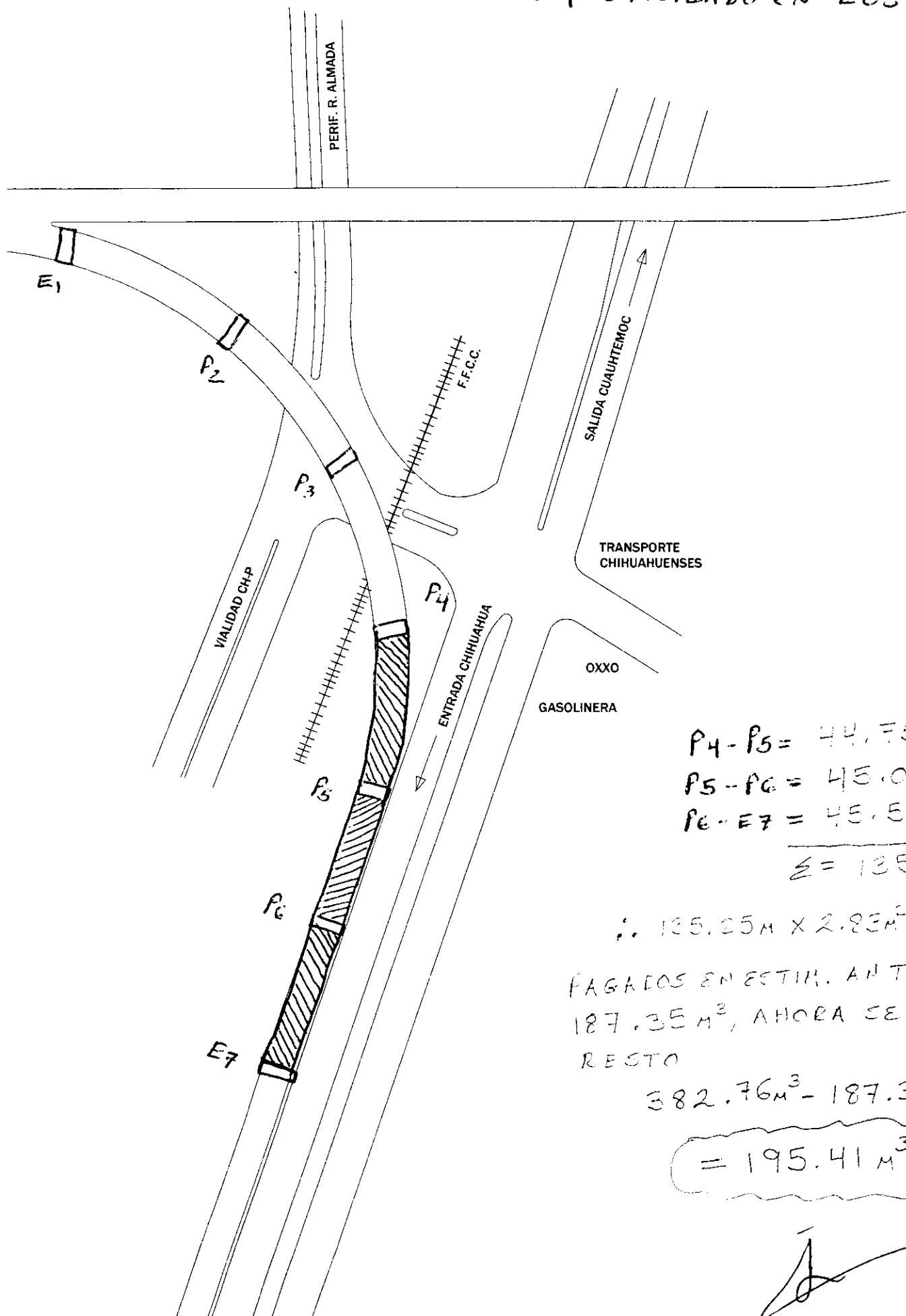
|            |                                                                                                                                                                                                                       |              |                                                  |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------|
| CONTRATO : | 040/2016                                                                                                                                                                                                              | TRAMO:       | Perif. Fco. R. Almada y Carretera Cd. Cuauhtemoc |
| OBRA :     | Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua. |              |                                                  |
|            |                                                                                                                                                                                                                       | CONTRATISTA: | CONSTRUCTORA SANTA ROSALIA SA DE CV              |

| CONCEPTO                                                                                                                                                                                        | 24                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Concreto hidráulico, por unidad de obra terminada (Inciso:<br>3.01.02.026-H.10): Simple, colado en seco en puentes y<br>pasos a desnivel; De f'c = 280 Kg/cm <sup>2</sup> , utilizado en losas. |                         |
|                                                                                                                                                                                                 | OPERACIONES ARITMETICAS |
| PILA 4 A PILA 5 = 44.75 M                                                                                                                                                                       |                         |
| PILA 5 A PILA 6 = 45 M                                                                                                                                                                          |                         |
| PILA 6 A ESTRIBO 7 = 45.5 M                                                                                                                                                                     |                         |
| TOTAL DE LONGITUD = 135.25 M                                                                                                                                                                    |                         |
| 135.25 M X 2.83 M2 = 382.76 M3                                                                                                                                                                  |                         |
| PAGADOS EN ESTIMACION ANTERIOR                                                                                                                                                                  |                         |
| 187.35 M3, AHORA SE PAGA EL RESTO                                                                                                                                                               |                         |
| 382.76 M3 - 187.35 M3 = 195.41 M3                                                                                                                                                               |                         |

~~RESIDENTE~~  
ING. RODOLFO ARMENDARIZ RONQUILLO

CONTRATISTA  
CONSTRUCTORA SANTA ROSALIA SA DE CV

24 - CONCRETO  $F'c = 250 \text{ KG}$  UTILIZADO EN LOSAS



$$P_4 - P_5 = 44.75 \text{ M}$$

$$P_5 - P_6 = 45.0 \text{ M}$$

$$P_6 - E_7 = 45.5 \text{ M}$$

$$\Sigma = 135.25 \text{ M}$$

$$\therefore 135.25 \text{ M} \times 2.83 \text{ M}^2 = 382.76 \text{ M}^3$$

FAGADOS EN ESTIM. ANTERIOR  
 $187.35 \text{ M}^3$ , AHORA SE FAGA EL  
 RESTO

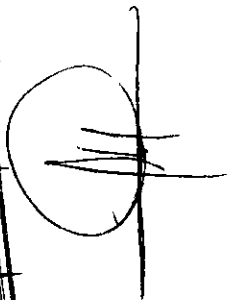
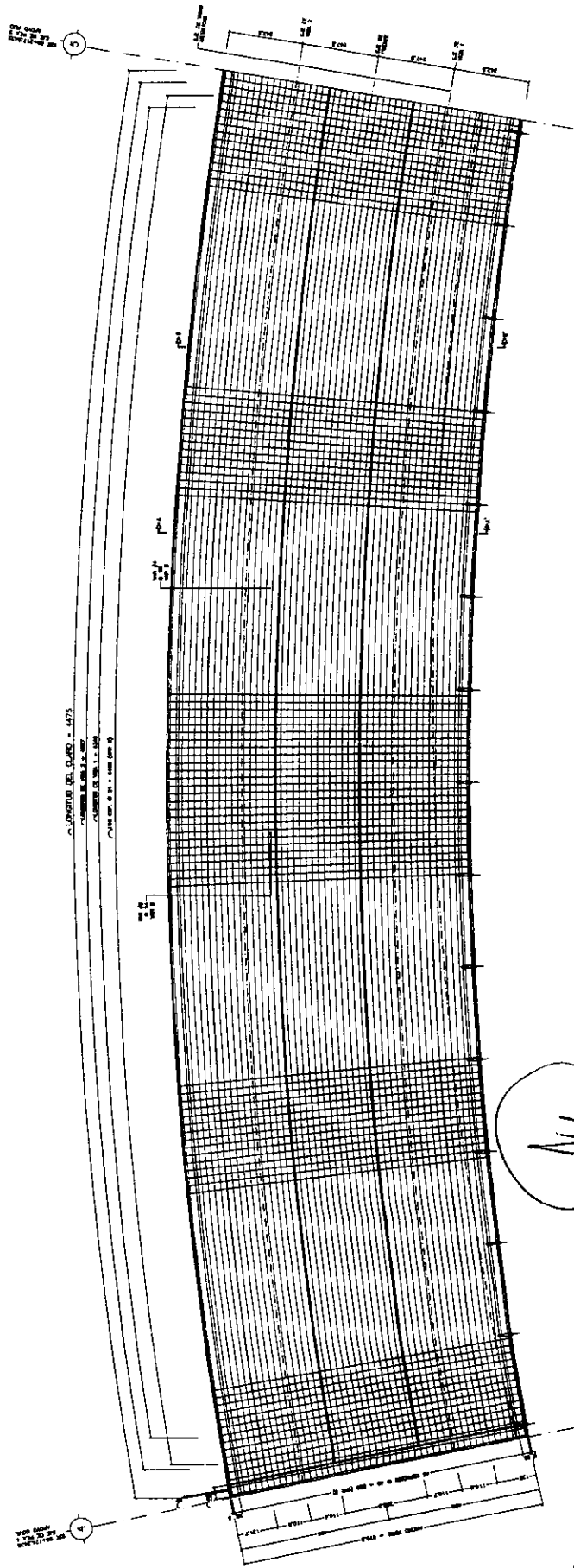
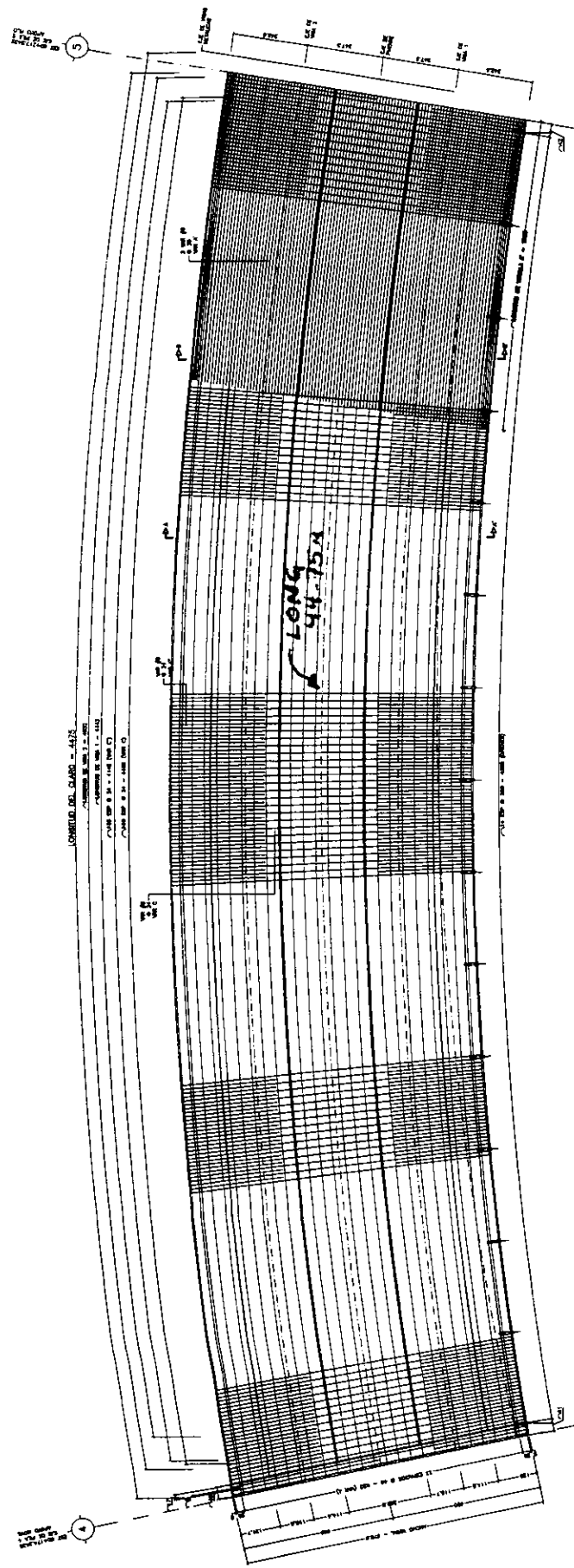
$$382.76 \text{ M}^3 - 187.35 \text{ M}^3$$

$$= 195.41 \text{ M}^3$$

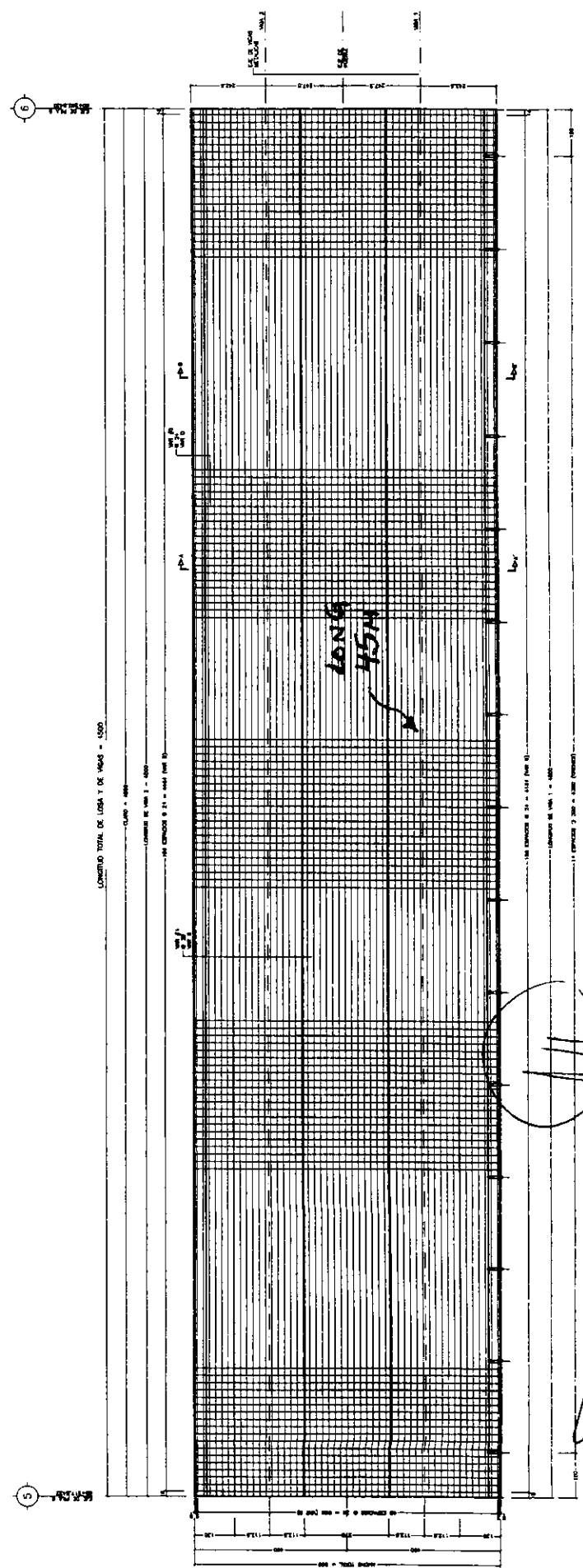
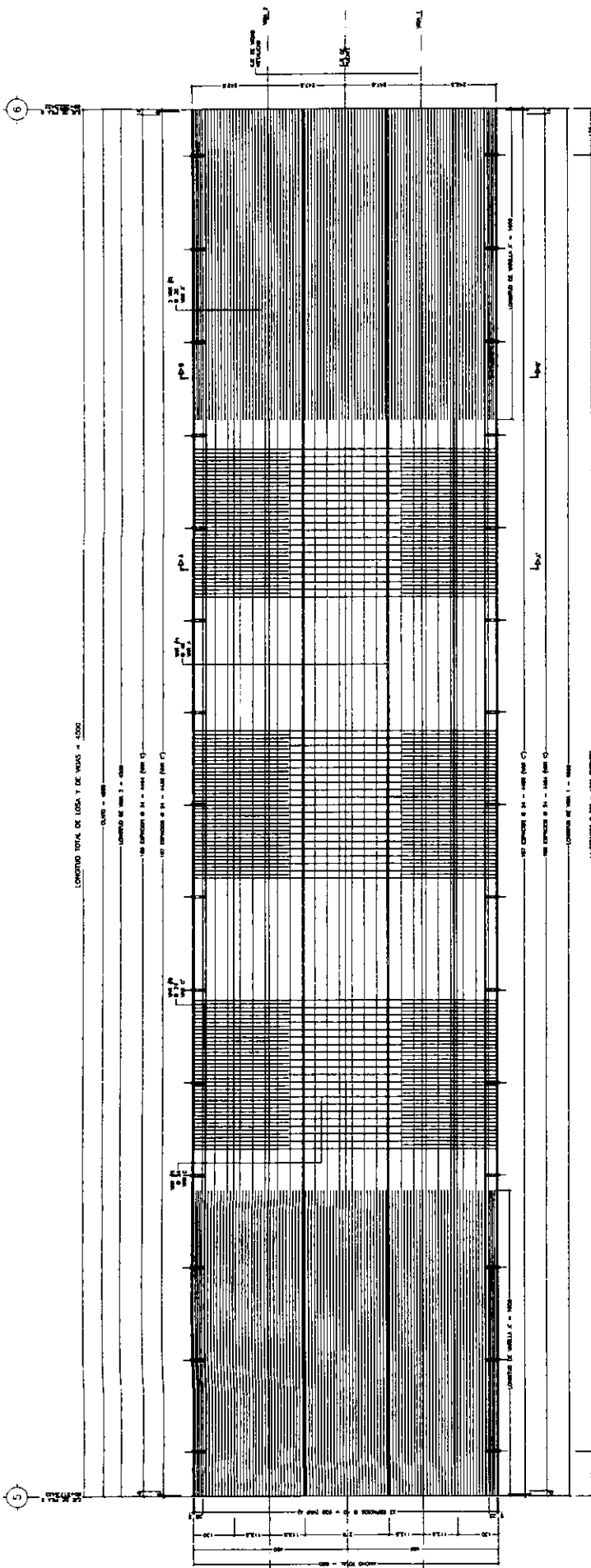
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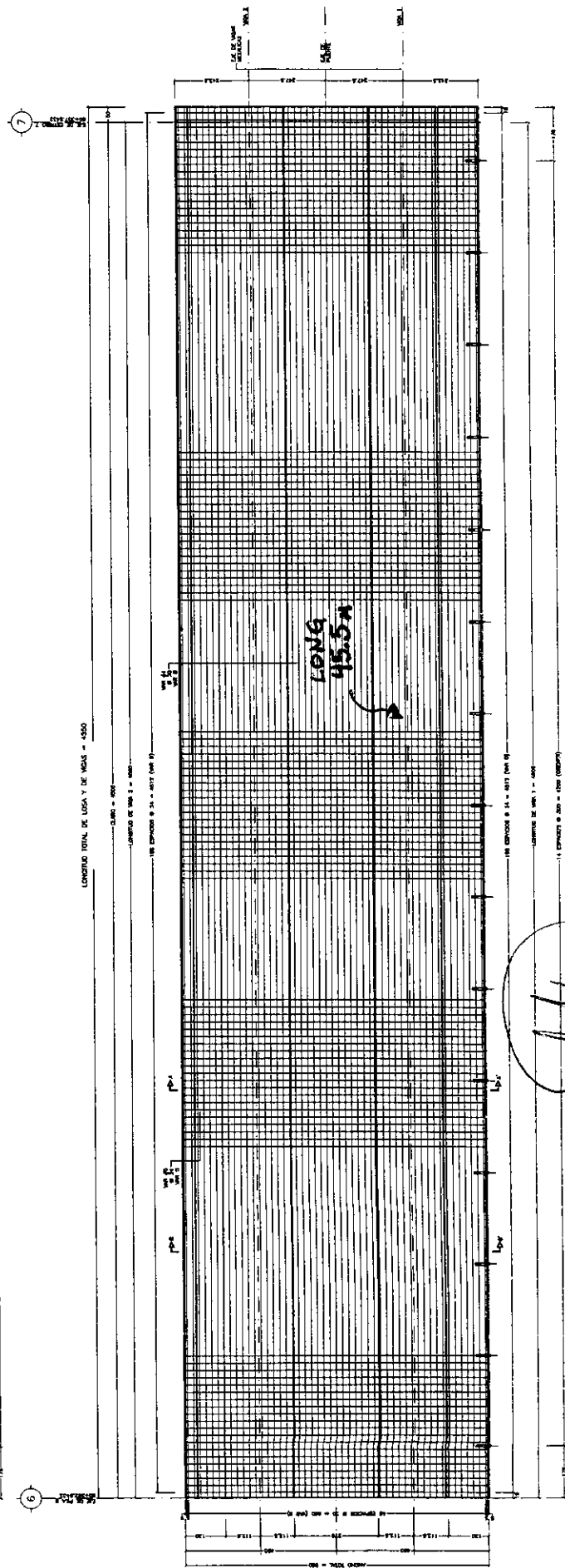
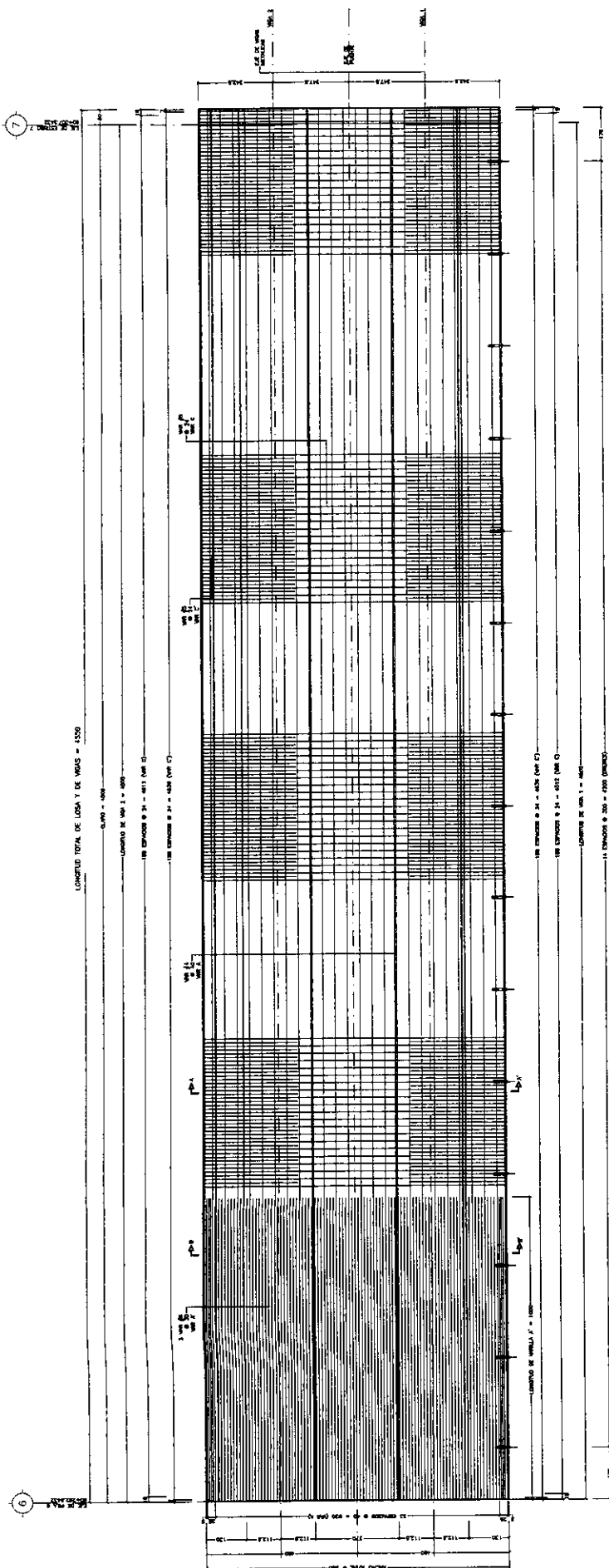
# PILA 4-5



# PILA 5-6



# PILA 6-7



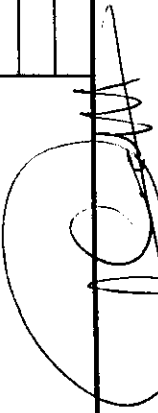
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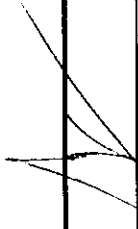
GENERADOR DE ESTIMACION

|            |                                                                                                                                                                                                                       |              |                                                  |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------|
| CONTRATO : | 040/2016                                                                                                                                                                                                              | TRAMO:       | Perif. Fco. R. Almada y Carretera Cd. Cuauhtemoc |
| OBRA :     | Construcción del Eje Sesenia (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtemoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua. |              |                                                  |
|            |                                                                                                                                                                                                                       | CONTRATISTA: | CONSTRUCTORA SANTA ROSALIA SA DE CV              |

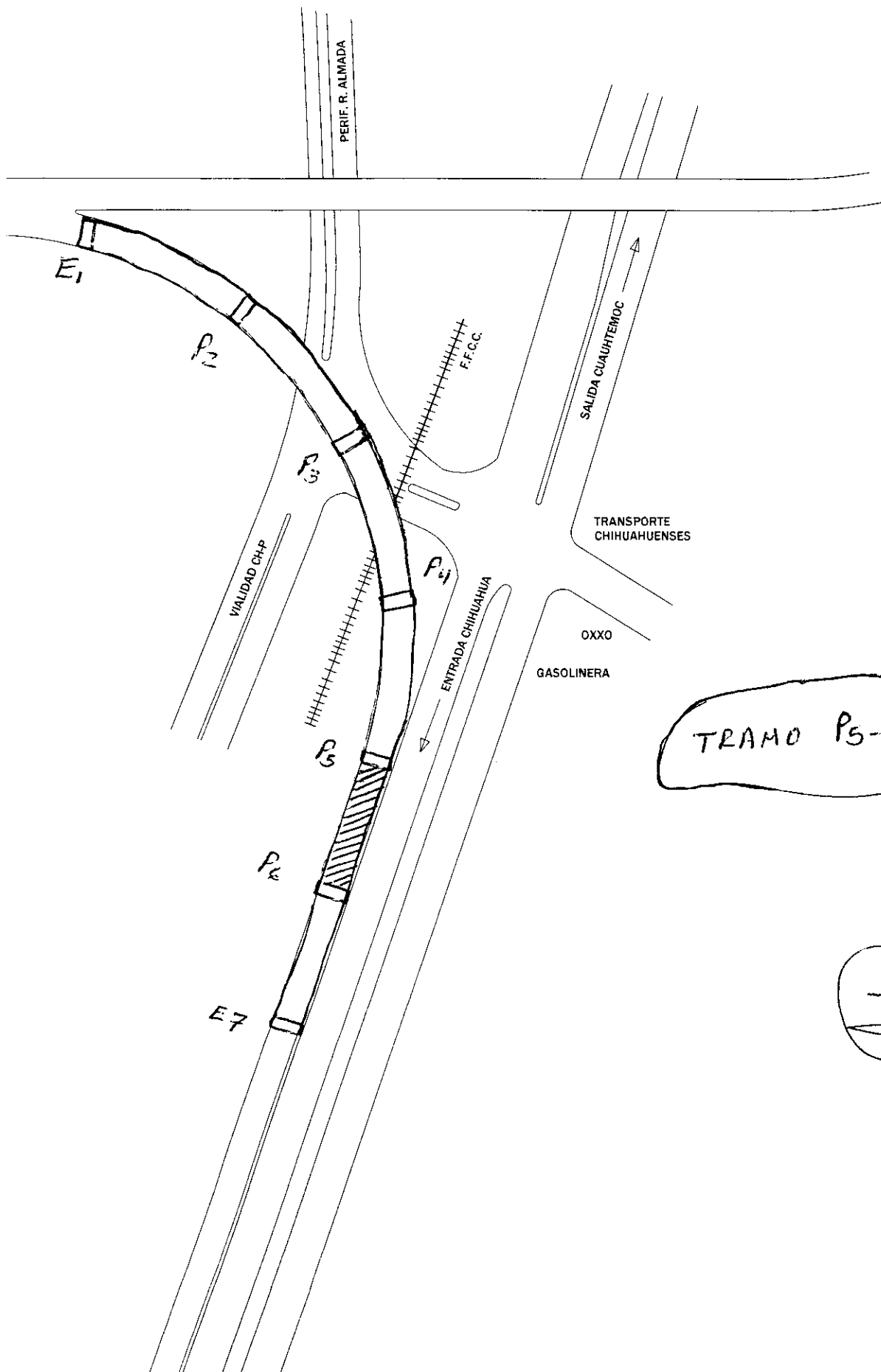
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| No DE ESTIMACION: No. 10                                                                                                                                                                                                                       |  | PERIODO: 12 AL 15 DE SEPTIEMBRE 2016 | CROQUIS          | VOLUMEN<br>A PAGAR<br>13,219 KG |
| CONCEPTO 33                                                                                                                                                                                                                                    |  | OPERACIONES ARITMETICAS              | SE ANEXA CROQUIS |                                 |
| Acero de Refuerzo, por unidad de obra terminada (Inciso: 3.01.02.027-H.03): Varillas con límite elástico igual o mayor a 4,200 Kg/cm2: En puentes: Suministro, habilitación y colocación y de acero para todos los elementos de la estructura. |  | DE PILA 5 A PILA 6                   |                  |                                 |
|                                                                                                                                                                                                                                                |  | VOL. = 13,219 KG                     |                  |                                 |
|                                                                                                                                                                                                                                                |  |                                      |                  |                                 |
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SE ANEXA CROQUIS

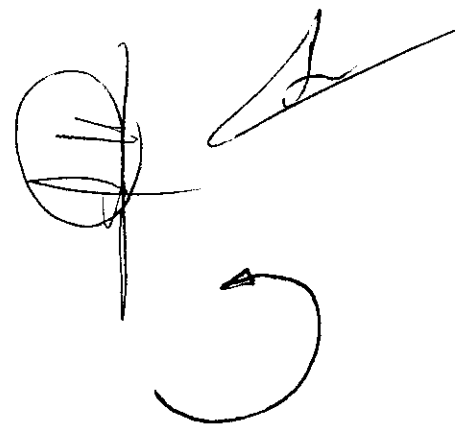
  
PRESIDENTE  
ING. RODOLFO ARMENDARIZ RONQUILLO

  
CONTRATISTA  
CONSTRUCTORA SANTA ROSALIA SA DE CV

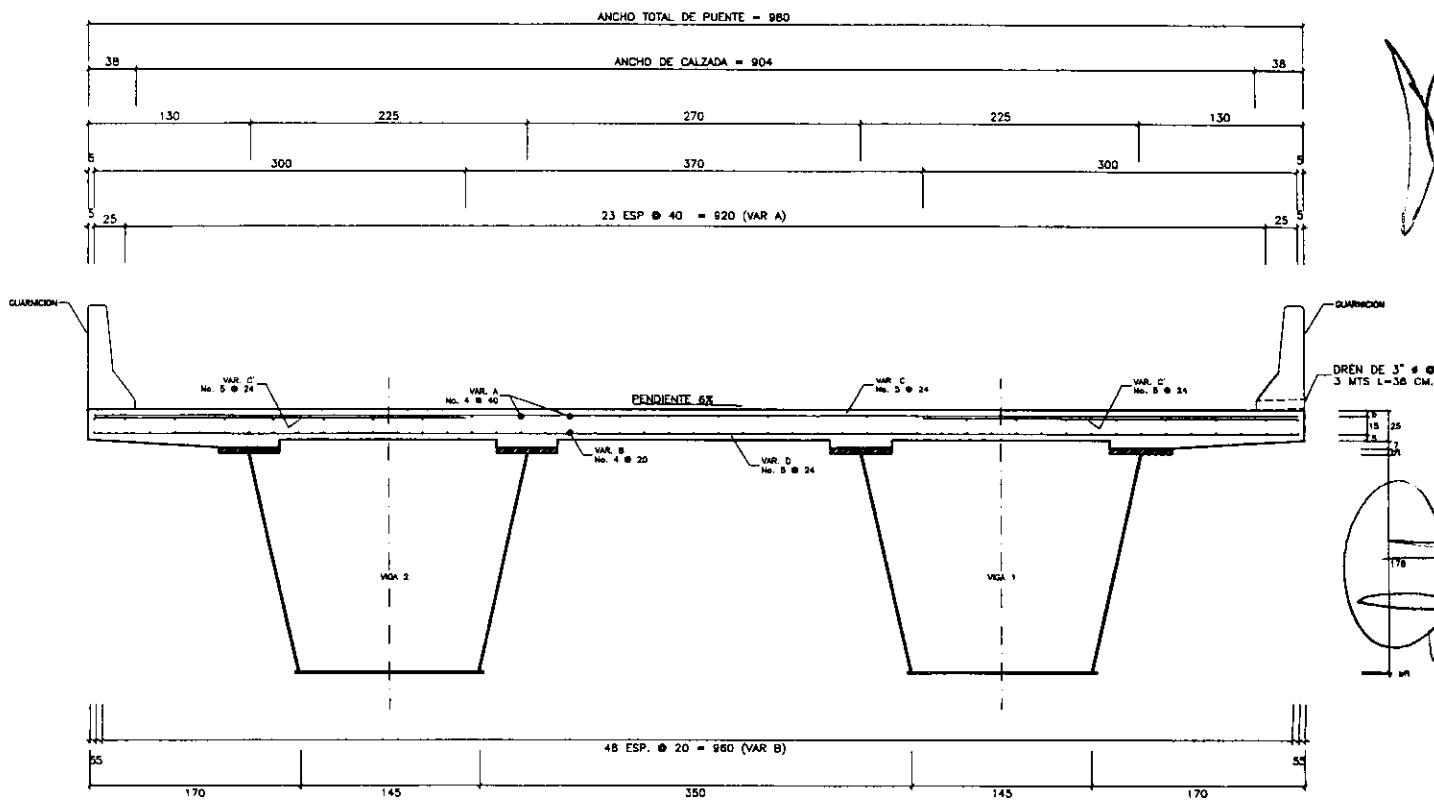
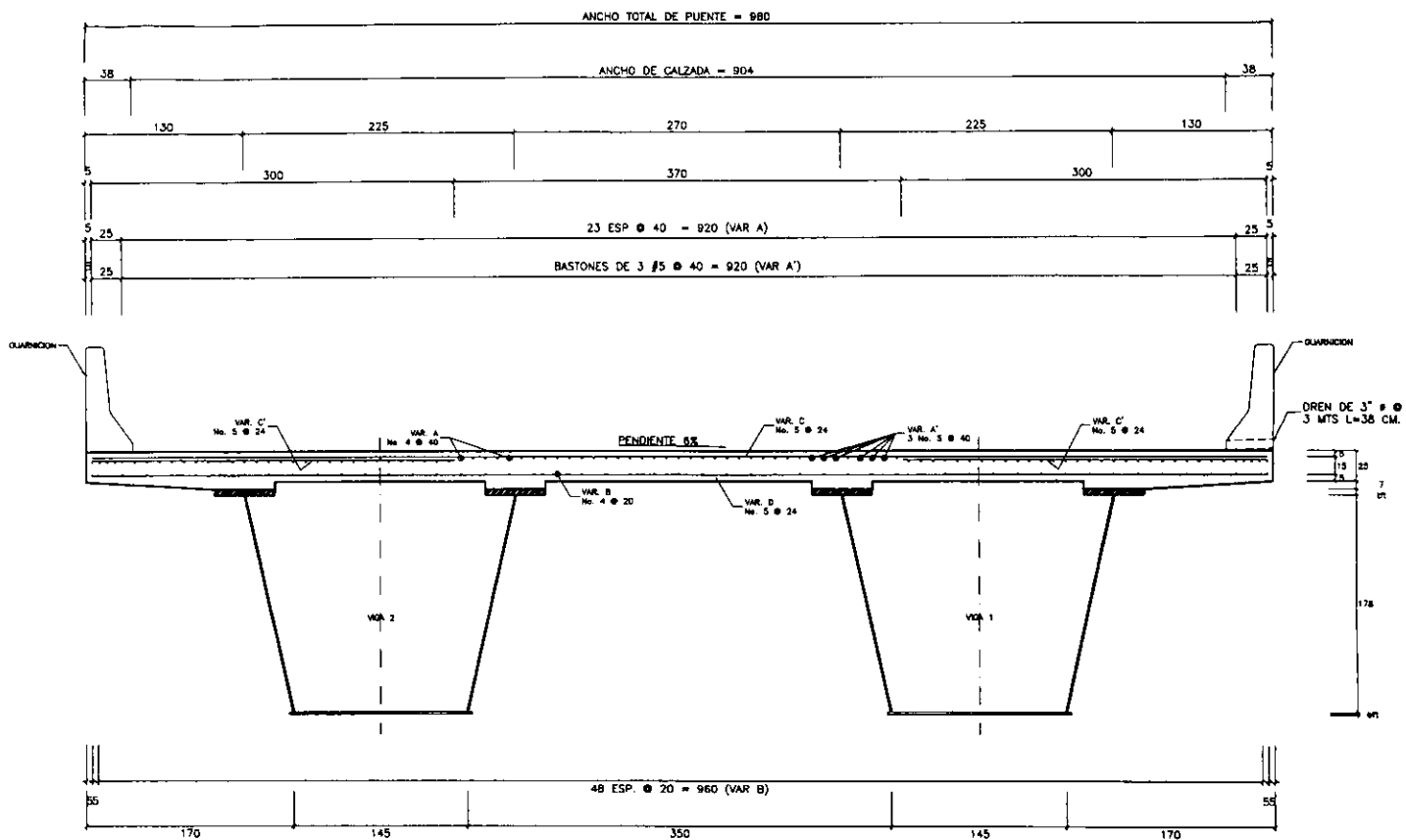
### 33- ACERO DE REFUERZO EN ELEMENTOS ESTRUCTURALES

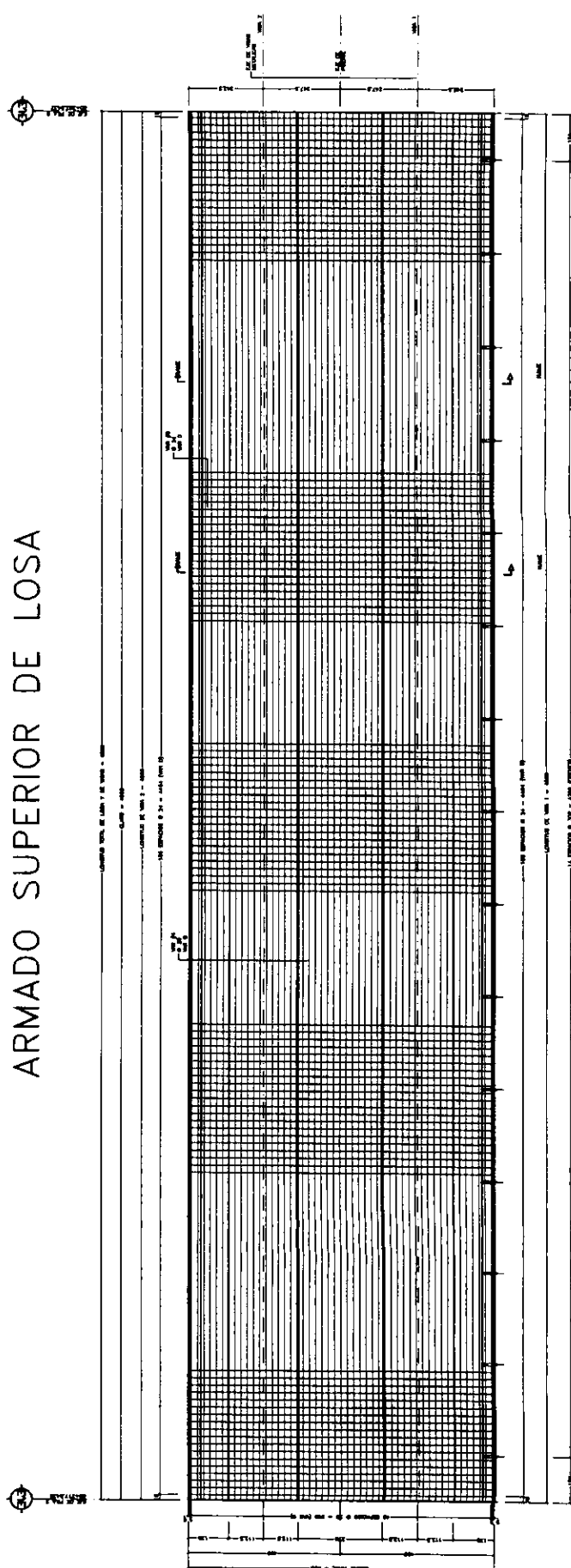
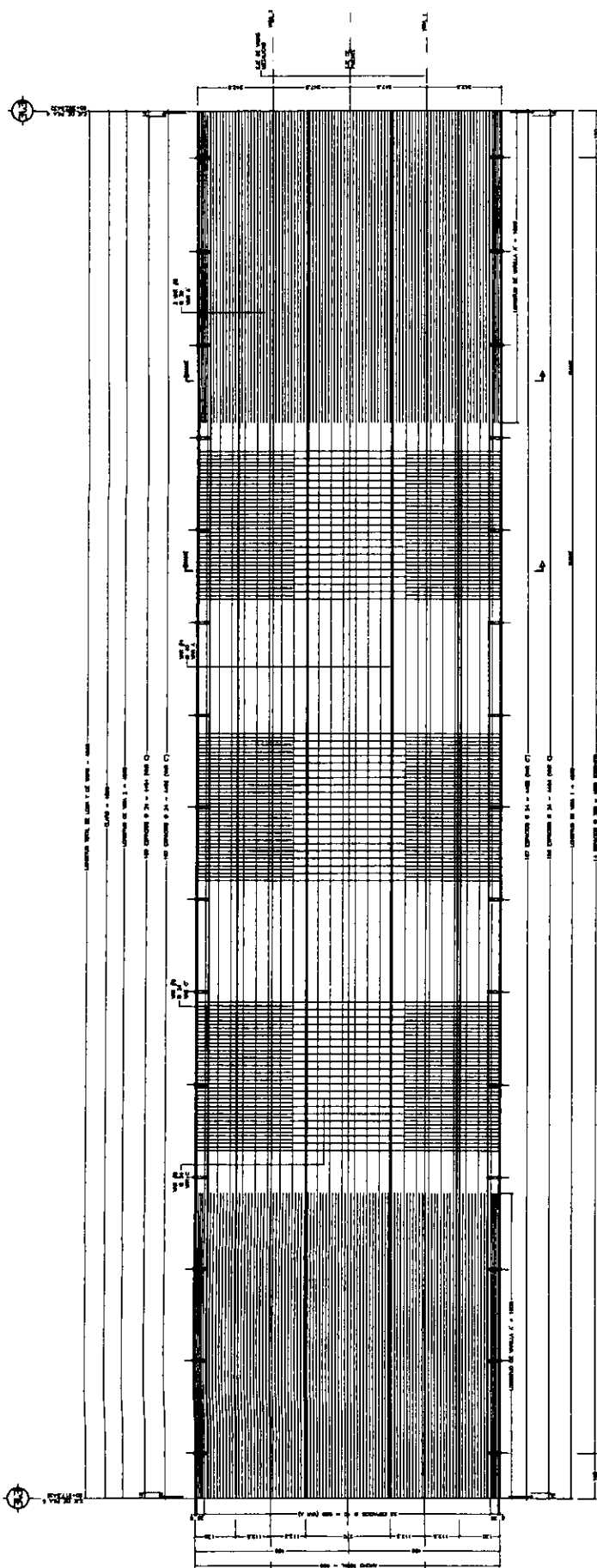


TRAMO  $P_5 - P_6 = 13,219 \text{ KG}$



| LOSA TRAMO 5-6                                       |      |       |                |              |                |                                                                                    |             |             |            |
|------------------------------------------------------|------|-------|----------------|--------------|----------------|------------------------------------------------------------------------------------|-------------|-------------|------------|
| LISTA DE VARILLAS                                    |      |       |                |              |                |                                                                                    |             |             |            |
| LOC.                                                 | VAR. | DIAM. | PESO<br>(kg/m) | NUM.<br>PZA. | LONG.<br>TOTAL | CROQUIS                                                                            | MAX<br>(cm) | MIN<br>(cm) | PESO<br>KG |
| LOSA                                                 | A    | 4C    | 0.993          | 26           | 4500           |  | 4500        | —           | 1162       |
|                                                      | A'   | 5C    | 1.552          | 150          | 1000           |                                                                                    | 1000        | —           | 2328       |
|                                                      | B    | 4C    | 0.993          | 51           | 4500           |                                                                                    | 4500        | —           | 2279       |
|                                                      | C    | 5C    | 1.552          | 189          | 970            |                                                                                    | 970         | —           | 2845       |
|                                                      | C'   | 5C    | 1.552          | 378          | 300            |                                                                                    | 300         | —           | 1760       |
|                                                      | D    | 5C    | 1.552          | 189          | 970            |                                                                                    | 970         | —           | 2845       |
|                                                      |      |       |                |              |                |                                                                                    |             |             |            |
| SUBESTRUCTURA:                                       |      |       |                |              |                |                                                                                    |             |             |            |
| ACERO DE REFUERZO $f_y = 4200 \text{ kg/cm}^2$ ----- |      |       |                |              |                |                                                                                    |             |             |            |
| CONCRETO $f'_c = 250 \text{ kg/cm}^2$ :              |      |       |                |              |                |                                                                                    |             |             |            |
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ARMADO INFERIOR DE LOSA



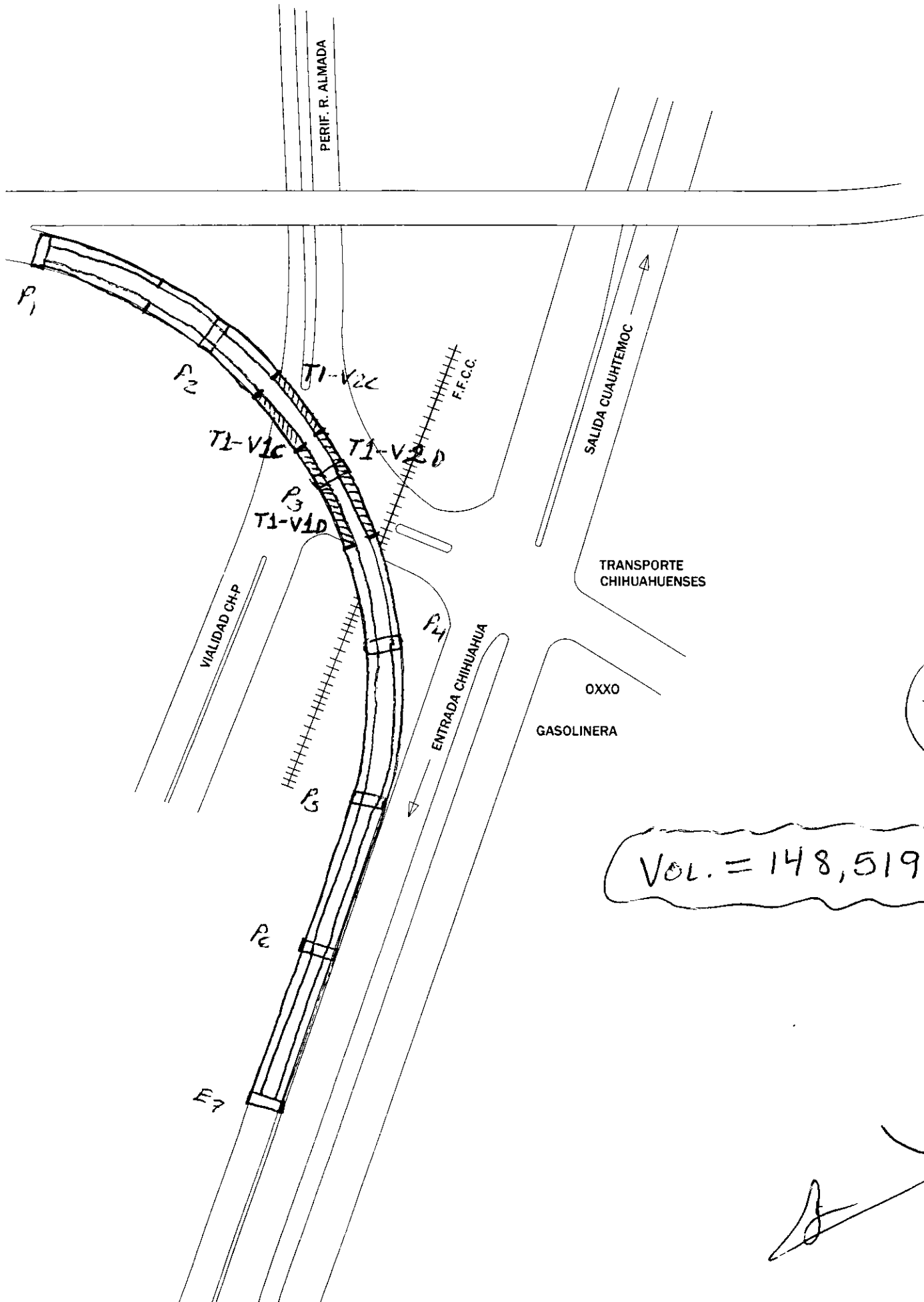
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| CONTRATO: | 040/2016                                                                                                                                                                                                                                                                | TRAMO: | Perif. Fco. R. Almada y Carretera Cd. Cuauhtemoc |
| OBRA:     | <p>Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtemoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua.</p> <p>CONSTRUCTORA SANTA ROSALIA SA DE CV</p> |        |                                                  |

[illegible]

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|----------------------------------------|-------------------------------------------------|
| <p>CROQUIS</p> <p>SE ANEXA CROQUIS</p> | <p>VOLUMEN<br/>A PAGAR</p> <p>148,519.68 KG</p> |
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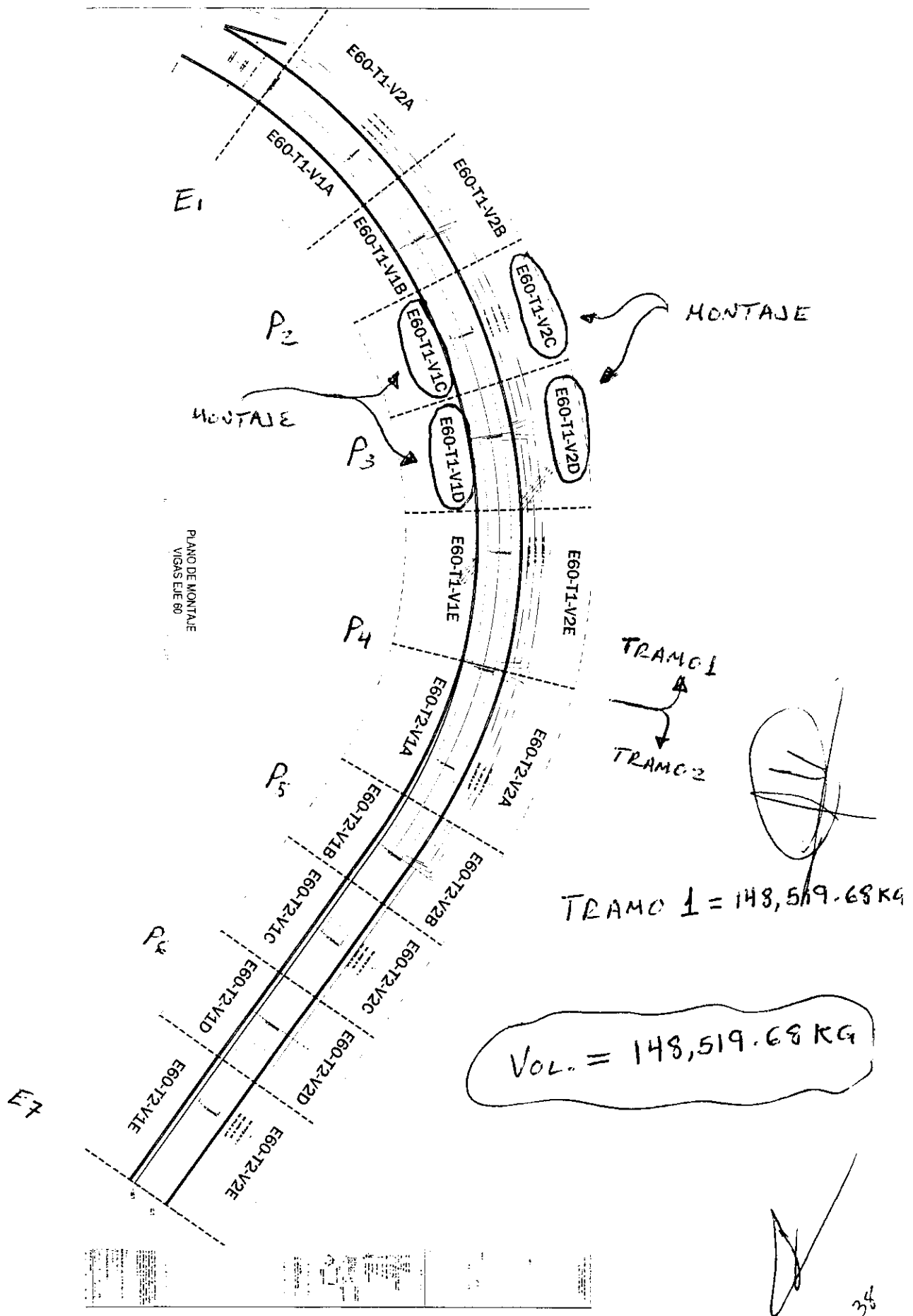
# 37- MONTAJE DE ACERO EN VIGAS



VOL. = 148,519.68 KG

37

# 37- MONTAJE DE ACERO EN VIGAS



## RESUMEN DE GENERADORES

Obra: Construcción de Distribuidor Vial Zootecnia Chihuahua, Chih. Eje 60  
 Tramo:  
 Contratista: CONSTRUCTORA SANTA ROSALIA SA DE CV  
 Fecha:

TRAMO 1

| DESCRIPCIÓN                  | PESO      |             |              |
|------------------------------|-----------|-------------|--------------|
| E60-T1-V1A                   | 38126.075 |             |              |
| CT-01                        | 1688.352  |             |              |
| CH-01                        | 750.809   | 41458.96 Kg |              |
| TORNILLERIA CONEX. CAMPO 1-2 | 301.840   |             |              |
| TORNILLERIA DIAFRAGMA        | 78.380    |             |              |
| PERNOS NELSON                | 513.500   |             |              |
| VIGA E60-T1-V2A              | 42750.184 |             |              |
| CT-01                        | 1688.352  |             |              |
| CH-01                        | 750.809   | 46107.08 Kg |              |
| TORNILLERIA CONEX. CAMPO 1-2 | 301.840   |             |              |
| TORNILLERIA DIAFRAGMA        | 80.280    |             |              |
| PERNOS NELSON                | 535.620   |             |              |
| VIGA E60-T1-V1B              | 28296.922 |             |              |
| CT-01                        | 964.773   |             |              |
| CH-01                        | 536.292   | 30526.61 Kg |              |
| TORNILLERIA CONEX. CAMPO 2-3 | 301.840   |             |              |
| TORNILLERIA DIAFRAGMA        | 79.180    |             |              |
| PERNOS NELSON                | 347.600   |             |              |
| VIGA E60-T1-V2B              | 31358.295 |             |              |
| CT-01                        | 964.773   |             |              |
| CH-01                        | 495.793   | 33565.18 Kg |              |
| TORNILLERIA CONEX. CAMPO 2-3 | 301.840   |             |              |
| TORNILLERIA DIAFRAGMA        | 81.080    |             |              |
| PERNOS NELSON                | 363.400   |             |              |
| → VIGA E60-T1-V1C            | 28930.740 |             |              |
| CT-01                        | 1205.966  |             |              |
| CH-01                        | 643.551   | 31466.04 Kg | 31,466.04 Kg |
| TORNILLERIA CONEX. CAMPO 3-4 | 301.840   |             |              |
| PERNOS NELSON                | 383.940   |             |              |
| → VIGA E60-T1-V2C            | 29760.842 |             |              |
| CT-01                        | 1205.984  |             |              |
| CH-01                        | 643.551   | 32328.10 Kg | 32,328.10 Kg |
| TORNILLERIA CONEX. CAMPO 3-4 | 316.400   |             |              |
| PERNOS NELSON                | 401.320   |             |              |
| → VIGA E60-T1-V2D            | 41944.585 |             |              |
| CT-01                        | 1205.984  |             |              |
| CH-01                        | 536.292   | 44505.84 Kg | 44,505.84 Kg |
| TORNILLERIA CONEX. CAMPO 4-5 | 311.600   |             |              |
| TORNILLERIA DIAFRAGMA        | 80.780    |             |              |
| PERNOS NELSON                | 426.600   |             |              |
| → VIGA E60-T1-V1D            | 35867.271 |             |              |
| CT-01                        | 1205.984  |             |              |
| CH-01                        | 536.292   | 38401.69 Kg | 38,401.69 Kg |
| TORNILLERIA CONEX. CAMPO 4-5 | 301.840   |             |              |
| TORNILLERIA DIAFRAGMA        | 81.080    |             |              |
| PERNOS NELSON                | 409.220   |             |              |
| VIGA E60-T1-V1E              | 45372.949 |             |              |
| CT-01                        | 1447.159  |             |              |
| CH-01                        | 750.809   | 48173.08 Kg |              |
| TORNILLERIA DIAFRAGMA        | 79.180    |             |              |
| PERNOS NELSON                | 522.980   |             |              |
| VIGA E60-T1-V2E              | 47029.579 |             |              |
| CT-01                        | 1447.159  |             |              |
| CH-01                        | 750.809   | 49848.67 Kg |              |
| TORNILLERIA DIAFRAGMA        | 79.180    |             |              |
| PERNOS NELSON                | 541.940   |             |              |
| DIAFRAGMA 1                  | 1420.163  |             |              |
| DIAFRAGMA 2                  | 1432.430  |             |              |
| → DIAFRAGMA 3                | 1438.207  | 5723.38 Kg  | 1,438.207 Kg |
| DIAFRAGMA 4B                 | 1432.583  |             |              |
| CUÑA 1                       | 373.935   |             |              |
| CUÑA 2                       | 374.355   |             |              |
| → CUÑA 3                     | 379.808   | 1525.22 Kg  | 379.808 Kg   |
| CUÑA PILA 4B                 | 397.126   |             |              |

Peso Total = 403629.84 kg

$\Sigma = 148,519.68 \text{ Kg}$

# GENERADOR DE ESTIMACION

Obra: Construcción de Distribuidor Vial Zootecnia Chihuahua, Chih. Eje 60

Tramo:

Contratista: CONSTRUCTORA SANTA ROSALIA SA DE CV

Fecha:

| Cantidad               | Descripción  | Mca.          | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unit) (Kg) | Calculo (acum.) (Kg) |
|------------------------|--------------|---------------|-----------|-----------|-------------|--------------|---------------------|----------------------|
| <b>VIGA E60-T1-V1C</b> |              | <b>1 Pzas</b> |           |           |             |              |                     |                      |
| 1                      | PL 25.4x1520 | 75            | 24.314    | 1.520     |             | 199.40       | 7,369.282           | 7,369.282            |
| 1                      | PL 19.1x1819 | 42            | 24.437    | 1.819     |             | 149.90       | 6,663.190           | 6,663.190            |
| 1                      | PL 19.1x1819 | 41            | 24.048    | 1.819     |             | 149.90       | 6,557.122           | 6,557.122            |
| 1                      | PL 25.4x500  | 62            | 24.447    | 0.500     |             | 199.40       | 2,437.366           | 2,437.366            |
| 1                      | PL 25.4x500  | 63            | 23.976    | 0.500     |             | 199.40       | 2,390.407           | 2,390.407            |
| 11                     | PL 16x350    | 13            | 1.700     | 0.350     |             | 124.80       | 74.256              | 816.816              |
| 4                      | PL 16x175    | 14            | 0.800     | 0.175     |             | 124.80       | 17.472              | 69.888               |
| 4                      | PL 16x650    | 15            | 1.525     | 0.650     |             | 124.80       | 123.708             | 494.832              |
| 2                      | PL 16x400    | 17            | 0.800     | 0.400     |             | 124.80       | 39.936              | 79.872               |
| 2                      | PL 16x175    | 18            | 0.800     | 0.175     |             | 124.80       | 17.472              | 34.944               |
| 2                      | PL 16x650    | 20            | 1.300     | 0.650     |             | 124.80       | 105.456             | 210.912              |
| 1                      | PL 6x312.5   | 25            | 1.300     | 0.013     |             | 50.24        | 0.816               | 0.816                |
| 1                      | PL 16x400    | 30            | 0.800     | 0.400     |             | 124.80       | 39.936              | 39.936               |
| 2                      | WT8X38.5     | b13           | 2.802     |           | 57.300      |              | 160.555             | 321.109              |
| 1                      | WT8X38.5     | b84           | 2.815     |           | 57.300      |              | 161.300             | 161.300              |
| 1                      | WT8X38.5     | b28           | 2.807     |           | 57.300      |              | 160.841             | 160.841              |
| 1                      | WT8X38.5     | b88           | 2.804     |           | 57.300      |              | 160.669             | 160.669              |
| 1                      | WT8X38.5     | b93           | 2.801     |           | 57.300      |              | 160.497             | 160.497              |
| 1                      | WT8X38.5     | b14           | 2.799     |           | 57.300      |              | 160.383             | 160.383              |
| 1                      | WT8X38.5     | b91           | 2.797     |           | 57.300      |              | 160.268             | 160.268              |
| 1                      | WT8X38.5     | b30           | 2.795     |           | 57.300      |              | 160.154             | 160.154              |
| 1                      | WT8X38.5     | b15           | 2.794     |           | 57.300      |              | 160.096             | 160.096              |
| 1                      | WT8X38.5     | b32           | 2.793     |           | 57.300      |              | 160.039             | 160.039              |

Peso VIGA E60-T1-V1C = 28,930.740

|              |              |               |       |       |       |       |                     |                  |
|--------------|--------------|---------------|-------|-------|-------|-------|---------------------|------------------|
| <b>CT-01</b> |              | <b>5 Pzas</b> |       |       |       |       |                     |                  |
| 10           | PL 12.7x180  | 11            | 1.860 | 0.180 |       | 99.70 | 33.380              | 333.796          |
| 10           | L5X5X5/8     | b18           | 1.386 |       | 29.76 |       | 41.247              | 412.474          |
| 5            | L5X5X3/4     | b12           | 2.026 |       | 35.12 |       | 71.153              | 355.766          |
| 5            | PL 12.7x387  | 12            | 0.450 | 0.387 |       | 99.70 | 17.363              | 86.814           |
| 10           | PL 12.7x97.1 | 10            | 0.177 | 0.097 |       | 99.70 | 1.712               | 17.117           |
|              |              |               |       |       |       |       | <b>Peso CT-01 =</b> | <b>1,205.966</b> |

|              |              |               |       |       |       |       |                     |                |
|--------------|--------------|---------------|-------|-------|-------|-------|---------------------|----------------|
| <b>CH-01</b> |              | <b>6 Pzas</b> |       |       |       |       |                     |                |
| 12           | PL 12.7x180  | 11            | 1.860 | 0.180 |       | 99.70 | 33.380              | 400.555        |
| 6            | L5X5X3/8     | b11           | 2.026 |       | 18.30 |       | 37.076              | 222.455        |
| 12           | PL 12.7x97.1 | 10            | 0.177 | 0.097 |       | 99.70 | 1.712               | 20.541         |
|              |              |               |       |       |       |       | <b>Peso CH-01 =</b> | <b>643.551</b> |

|                                    |                        |            |  |  |  |             |                    |                |
|------------------------------------|------------------------|------------|--|--|--|-------------|--------------------|----------------|
| <b>TORNILLERIA CONEX. CAMPO3-4</b> |                        |            |  |  |  |             |                    |                |
| 80                                 | TORNILLO 7/8" x 3-3/4" | PATIN SUP. |  |  |  | 0.57 Kg/pza |                    | 45.600         |
| 320                                | TORNILLO 7/8" x 3-1/2" | ALMA       |  |  |  | 0.55 Kg/pza |                    | 176.000        |
| 136                                | TORNILLO 7/8" x 4"     | PATIN INF. |  |  |  | 0.59 Kg/pza |                    | 80.240         |
|                                    |                        |            |  |  |  |             | <b>Peso TORN =</b> | <b>301.840</b> |

|     |                         |    |        |  |  |             |                      |                |
|-----|-------------------------|----|--------|--|--|-------------|----------------------|----------------|
| 246 | PERNO NELSON 7/8" x 10" | 76 | 24.447 |  |  | 0.79 Kg/pza |                      | 194.340        |
| 240 | PERNO NELSON 7/8" x 10" | 75 | 23.976 |  |  | 0.79 Kg/pza |                      | 189.600        |
|     |                         |    |        |  |  |             | <b>Peso PERNOS =</b> | <b>383.940</b> |

Cantidad de Vigas y Peso Total = 1 Pzas 31466.04 kg

# GENERADOR DE ESTIMACION

Obra: Construcción de Distribuidor Vial Zootecnia Chihuahua, Chih. Eje 60  
 Tramo:  
 Contratista: CONSTRUCTORA SANTA ROSALIA SA DE CV  
 Fecha:

| Cantidad                 | Descripción  | Mca.          | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unit) (Kg) | Calculo (acum.) (Kg) |
|--------------------------|--------------|---------------|-----------|-----------|-------------|--------------|---------------------|----------------------|
| <b>VIGA E60-T1-V2C</b>   |              | <b>1 Pzas</b> |           |           |             |              |                     |                      |
| 1                        | PL 25.4x1520 | 76            | 25.365    | 1.520     |             | 199.40       | 7,687.827           | 7,687.827            |
| 1                        | PL 19.1x1819 | 43            | 25.490    | 1.819     |             | 149.90       | 6,950.310           | 6,950.310            |
| 1                        | PL 19.1x1819 | 40            | 23.905    | 1.819     |             | 149.90       | 6,518.131           | 6,518.131            |
| 1                        | PL 25.4x500  | 65            | 25.498    | 0.500     |             | 199.40       | 2,542.151           | 2,542.151            |
| 1                        | PL 25.4x500  | 64            | 25.027    | 0.500     |             | 199.40       | 2,495.192           | 2,495.192            |
| 11                       | PL 16x350    | 13            | 1.700     | 0.350     |             | 124.80       | 74.256              | 816.816              |
| 4                        | PL 16x650    | 15            | 1.525     | 0.650     |             | 124.80       | 123.708             | 494.832              |
| 4                        | PL 16x175    | 14            | 0.800     | 0.175     |             | 124.80       | 17.472              | 69.888               |
| 2                        | PL 16x175    | 18            | 0.800     | 0.175     |             | 124.80       | 17.472              | 34.944               |
| 2                        | PL 16x400    | 17            | 0.800     | 0.400     |             | 124.80       | 39.936              | 79.872               |
| 1                        | PL 16x400    | 30            | 0.800     | 0.400     |             | 124.80       | 39.936              | 39.936               |
| 2                        | PL 16x650    | 20            | 1.300     | 0.650     |             | 124.80       | 105.456             | 210.912              |
| 1                        | PL 6x312.5   | 25            | 1.300     | 0.313     |             | 50.24        | 20.410              | 20.410               |
| 2                        | WT8X38.5     | b10           | 2.854     |           | 57.300      |              | 163.534             | 327.068              |
| 1                        | WT8X38.5     | b62           | 2.886     |           | 57.300      |              | 165.368             | 165.368              |
| 1                        | WT8X38.5     | b63           | 2.880     |           | 57.300      |              | 165.024             | 165.024              |
| 1                        | WT8X38.5     | b22           | 2.863     |           | 57.300      |              | 164.050             | 164.050              |
| 1                        | WT8X38.5     | b67           | 2.862     |           | 57.300      |              | 163.993             | 163.993              |
| 1                        | WT8X38.5     | b17           | 2.849     |           | 57.300      |              | 163.248             | 163.248              |
| 1                        | WT8X38.5     | b73           | 2.845     |           | 57.300      |              | 163.019             | 163.019              |
| 1                        | WT8X38.5     | b76           | 2.843     |           | 57.300      |              | 162.904             | 162.904              |
| 1                        | WT8X38.5     | b78           | 2.839     |           | 57.300      |              | 162.675             | 162.675              |
| 1                        | WT8X38.5     | b25           | 2.832     |           | 57.300      |              | 162.274             | 162.274              |
| <b>Peso E60-T1-V2C =</b> |              |               |           |           |             |              | <b>29,760.842</b>   |                      |

|                     |              |               |       |       |       |       |                  |         |
|---------------------|--------------|---------------|-------|-------|-------|-------|------------------|---------|
| <b>CT-01</b>        |              | <b>5 Pzas</b> |       |       |       |       |                  |         |
| 10                  | PL 12.7x180  | 11            | 1.860 | 0.180 |       | 99.70 | 33.380           | 333.796 |
| 10                  | L5X5X5/8     | b18           | 1.386 |       | 29.76 |       | 41.247           | 412.474 |
| 5                   | L5X5X3/4     | b12           | 2.026 |       | 35.12 |       | 71.153           | 355.766 |
| 5                   | PL 12.7x387  | 12            | 0.450 | 0.387 |       | 99.70 | 17.363           | 86.814  |
| 10                  | PL 12.7x97.1 | 10            | 0.177 | 0.097 |       | 99.70 | 1.714            | 17.135  |
| <b>Peso CT-01 =</b> |              |               |       |       |       |       | <b>1,205.984</b> |         |

|                     |              |               |       |       |       |       |                |         |
|---------------------|--------------|---------------|-------|-------|-------|-------|----------------|---------|
| <b>CH-01</b>        |              | <b>6 Pzas</b> |       |       |       |       |                |         |
| 12                  | PL 12.7x180  | 11            | 1.860 | 0.180 |       | 99.70 | 33.380         | 400.555 |
| 6                   | L5X5X3/8     | b11           | 2.026 |       | 18.30 |       | 37.076         | 222.455 |
| 12                  | PL 12.7x97.1 | 10            | 0.177 | 0.097 |       | 99.70 | 1.712          | 20.541  |
| <b>Peso CH-01 =</b> |              |               |       |       |       |       | <b>643.551</b> |         |

|                                     |                         |            |  |  |  |             |                |         |
|-------------------------------------|-------------------------|------------|--|--|--|-------------|----------------|---------|
| <b>TORNILLERIA CONEX. CAMPO 3-4</b> |                         |            |  |  |  |             |                |         |
| 80                                  | TORNILLO 7/8" x 4- 1/2" | PATIN SUP. |  |  |  | 0.65 Kg/pza |                | 52.000  |
| 320                                 | TORNILLO 7/8" x 3 1/2"  | ALMA       |  |  |  | 0.55 Kg/pza |                | 176.000 |
| 136                                 | TORNILLO 7/8" x 4 1/2"  | PATIN INF. |  |  |  | 0.65 Kg/pza |                | 88.400  |
| <b>Peso TORN =</b>                  |                         |            |  |  |  |             | <b>316.400</b> |         |

|                      |                         |    |        |  |  |             |                |         |
|----------------------|-------------------------|----|--------|--|--|-------------|----------------|---------|
| 256                  | PERNO NELSON 7/8" x 10" | 74 | 25.498 |  |  | 0.79 Kg/pza |                | 202.240 |
| 252                  | PERNO NELSON 7/8" x 10" | 73 | 25.027 |  |  | 0.79 Kg/pza |                | 199.080 |
| <b>Peso PERNOS =</b> |                         |    |        |  |  |             | <b>401.320</b> |         |

Cantidad de Vigas y Peso Total = **1 Pzas 32328.10 kg**

# GENERADOR DE ESTIMACION

Obra: Construcción de Distribuidor Vial Zooteconia Chihuahua, Chih. Eje 60

Tramo:

Contratista: CONSTRUCTORA SANTA ROSALIA SA DE CV

Fecha:

| Cantidad                      | Descripción    | Mca. | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unif) (Kg) | Calculo (acum.) (Kg) |
|-------------------------------|----------------|------|-----------|-----------|-------------|--------------|---------------------|----------------------|
| <b>VIGA E60-T1-V2D</b>        |                |      |           |           |             |              |                     |                      |
| 1                             | PL 38x1520     | 88   | 27.023    | 1.520     |             | 299.10       | 12,285.521          | 12,285.521           |
| 1                             | PL 22x1819     | 51   | 26.748    | 1.819     |             | 174.30       | 8,480.499           | 8,480.499            |
| 1                             | PL 22x1819     | 49   | 27.096    | 1.819     |             | 174.30       | 8,590.833           | 8,590.833            |
| 1                             | PL 38x500      | 87   | 27.138    | 0.500     |             | 299.10       | 4,058.488           | 4,058.488            |
| 1                             | PL 38x500      | 85   | 26.638    | 0.500     |             | 299.10       | 3,983.713           | 3,983.713            |
| 10                            | PL 16x350      | 13   | 1.700     | 0.350     |             | 124.80       | 74.256              | 742.560              |
| 4                             | PL 16x175      | 14   | 0.800     | 0.175     |             | 124.80       | 17.472              | 69.888               |
| 4                             | PL 16x650      | 15   | 1.525     | 0.650     |             | 124.80       | 123.708             | 494.832              |
| 2                             | PL 16x400      | 17   | 0.800     | 0.400     |             | 124.80       | 39.936              | 79.872               |
| 2                             | PL 16x175      | 18   | 0.800     | 0.175     |             | 124.80       | 17.472              | 34.944               |
| 2                             | PL 16x650      | 20   | 1.300     | 0.650     |             | 124.80       | 105.456             | 210.912              |
| 4                             | PL 25.4x160    | 21   | 1.792     | 0.160     |             | 199.40       | 57.172              | 228.688              |
| 1                             | PL 6x312.5     | 25   | 1.300     | 0.313     |             | 50.24        | 20.410              | 20.410               |
| 1                             | PL 12.7x340    | 26   | 0.460     | 0.340     |             | 99.70        | 15.593              | 15.593               |
| 1                             | PL 19.1x340    | 27   | 1.730     | 0.340     |             | 149.90       | 88.171              | 88.171               |
| 2                             | PL 16x350      | 29   | 0.850     | 0.350     |             | 124.80       | 37.128              | 74.256               |
| 1                             | PL 16x400      | 30   | 0.800     | 0.400     |             | 124.80       | 39.936              | 39.936               |
| 1                             | PL 19.1x1799.2 | 38   | 2.222     | 1.799     |             | 149.90       | 599.207             | 599.207              |
| 1                             | WT8X38.5       | b35  | 3.045     |           | 57.300      |              | 174.479             | 174.479              |
| 1                             | WT8X38.5       | b37  | 3.033     |           | 57.300      |              | 173.791             | 173.791              |
| 1                             | WT8X38.5       | b46  | 2.994     |           | 57.300      |              | 171.556             | 171.556              |
| 1                             | WT8X38.5       | b48  | 2.987     |           | 57.300      |              | 171.155             | 171.155              |
| 1                             | WT8X38.5       | b19  | 2.981     |           | 57.300      |              | 170.811             | 170.811              |
| 1                             | WT8X38.5       | b20  | 2.980     |           | 57.300      |              | 170.754             | 170.754              |
| 1                             | WT8X38.5       | b64  | 2.869     |           | 57.300      |              | 164.394             | 164.394              |
| 1                             | WT8X38.5       | b22  | 2.864     |           | 57.300      |              | 164.107             | 164.107              |
| 1                             | WT8X38.5       | b95  | 2.832     |           | 57.300      |              | 162.274             | 162.274              |
| 1                             | WT8X38.5       | b83  | 2.822     |           | 57.300      |              | 161.701             | 161.701              |
| 1                             | WT8X38.5       | b85  | 2.814     |           | 57.300      |              | 161.242             | 161.242              |
| <b>Peso VIGA E60-T1-V2D =</b> |                |      |           |           |             |              |                     | <b>41.944.585</b>    |

|                     |              |     |       |       |       |       |        |                  |
|---------------------|--------------|-----|-------|-------|-------|-------|--------|------------------|
| <b>CT-01</b>        |              |     |       |       |       |       |        |                  |
| 10                  | PL 12.7x180  | 11  | 1.860 | 0.180 |       | 99.70 | 33.380 | 333.796          |
| 10                  | LSX5X5/8     | b18 | 1.386 |       | 29.76 |       | 41.247 | 412.474          |
| 5                   | LSX5X3/4     | b12 | 2.026 |       | 35.12 |       | 71.153 | 355.766          |
| 5                   | PL 12.7x387  | 12  | 0.450 | 0.397 |       | 99.70 | 17.363 | 86.814           |
| 10                  | PL 12.7x97.1 | 10  | 0.177 | 0.097 |       | 99.70 | 1.714  | 17.135           |
| <b>Peso CT-01 =</b> |              |     |       |       |       |       |        | <b>1,205.984</b> |

|                     |              |     |       |       |       |       |        |                |
|---------------------|--------------|-----|-------|-------|-------|-------|--------|----------------|
| <b>CH-01</b>        |              |     |       |       |       |       |        |                |
| 10                  | PL 12.7x180  | 11  | 1.860 | 0.180 |       | 99.70 | 33.380 | 333.796        |
| 5                   | LSX5X3/8     | b11 | 2.026 |       | 18.30 |       | 37.076 | 185.379        |
| 10                  | PL 12.7x97.1 | 10  | 0.177 | 0.097 |       | 99.70 | 1.712  | 17.117         |
| <b>Peso CH-01 =</b> |              |     |       |       |       |       |        | <b>536.292</b> |

|                                     |                        |            |  |  |  |             |  |                |
|-------------------------------------|------------------------|------------|--|--|--|-------------|--|----------------|
| <b>TORNILLERIA CONEX. CAMPO 4-5</b> |                        |            |  |  |  |             |  |                |
| 80                                  | TORNILLO 7/8" x 4"     | PATIN SUP. |  |  |  | 0.59 Kg/pza |  | 47.200         |
| 320                                 | TORNILLO 7/8" x 3-1/2" | ALMA       |  |  |  | 0.55 Kg/pza |  | 176.000        |
| 136                                 | TORNILLO 7/8" x 4 1/4" | PATIN INF. |  |  |  | 0.65 Kg/pza |  | 88.400         |
| <b>Peso TORN =</b>                  |                        |            |  |  |  |             |  | <b>311.600</b> |

|                              |                      |                |  |  |  |             |  |               |
|------------------------------|----------------------|----------------|--|--|--|-------------|--|---------------|
| <b>TORNILLERIA DIAFRAGMA</b> |                      |                |  |  |  |             |  |               |
| 40                           | TORNILLO 1" x 2-3/4" | PATIN SUPERIOR |  |  |  | 0.57 Kg/pza |  | 22.800        |
| 24                           | TORNILLO 1" x 3 1/2" | PATIN SUPERIOR |  |  |  | 0.72 Kg/pza |  | 17.280        |
| 16                           | TORNILLO 1" x 2 3/4" | PATIN INFERIOR |  |  |  | 0.62 Kg/pza |  | 9.920         |
| 16                           | TORNILLO 1" x 2 3/4" | PATIN INFERIOR |  |  |  | 0.57 Kg/pza |  | 9.120         |
| 38                           | TORNILLO 1" x 2 3/4" | PATIN INFERIOR |  |  |  | 0.57 Kg/pza |  | 21.660        |
| <b>Peso TORN =</b>           |                      |                |  |  |  |             |  | <b>80.780</b> |

|                      |                         |    |        |  |  |             |  |                |
|----------------------|-------------------------|----|--------|--|--|-------------|--|----------------|
| 272                  | PERNO NELSON 7/8" x 10" | 70 | 27.138 |  |  | 0.79 Kg/pza |  | 214.880        |
| 268                  | PERNO NELSON 7/8" x 10" | 69 | 26.638 |  |  | 0.79 Kg/pza |  | 211.720        |
| <b>Peso PERNOS =</b> |                         |    |        |  |  |             |  | <b>426.600</b> |

Cantidad de Vigas y Peso Total = 1 Pzas **44505.84 kg**

# GENERADOR DE ESTIMACION

Obra: Construcción de Distribuidor Vial Zootecnia Chihuahua, Chih. Eje 60

Tramo:

Contratista: CONSTRUCTORA SANTA ROSALIA SA DE CV

Fecha:

| Cantidad                 | Descripción  | Mca. | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unif) (Kg) | Calculo (acum) (Kg) |
|--------------------------|--------------|------|-----------|-----------|-------------|--------------|---------------------|---------------------|
| <b>VIGA E60-T1-VID</b>   |              |      |           |           |             |              |                     |                     |
| 1                        | PL 32x1520   | 83   | 25.922    | 1.520     |             | 249.60       | 9,834.599           | 9,834.599           |
| 1                        | PL 22x1819   | 53   | 25.628    | 1.819     |             | 174.40       | 8,130.063           | 8,130.063           |
| 1                        | PL 22x1819   | 50   | 25.994    | 1.819     |             | 174.30       | 8,241.442           | 8,241.442           |
| 1                        | PL 25.4x500  | 66   | 25.537    | 0.500     |             | 199.40       | 2,546.039           | 2,546.039           |
| 1                        | PL 25.4x500  | 47   | 26.037    | 0.500     |             | 199.40       | 2,595.889           | 2,595.889           |
| 10                       | PL 16x350    | 13   | 1.700     | 0.350     |             | 124.80       | 74.256              | 742.560             |
| 4                        | PL 16x175    | 14   | 0.800     | 0.175     |             | 124.80       | 17.472              | 69.888              |
| 4                        | PL 16x650    | 15   | 1.525     | 0.650     |             | 124.80       | 123.708             | 494.832             |
| 2                        | PL 16x400    | 17   | 0.800     | 0.400     |             | 124.80       | 39.936              | 79.872              |
| 2                        | PL 16x175    | 18   | 0.800     | 0.175     |             | 124.80       | 17.472              | 34.944              |
| 2                        | PL 16x650    | 20   | 1.300     | 0.650     |             | 124.80       | 105.456             | 210.912             |
| 4                        | PL 25.4x160  | 21   | 1.792     | 0.160     |             | 199.40       | 57.172              | 228.688             |
| 1                        | PL 6x312.5   | 25   | 1.300     | 0.313     |             | 50.24        | 20.410              | 20.410              |
| 1                        | PL 12.7x340  | 26   | 0.460     | 0.340     |             | 99.70        | 15.593              | 15.593              |
| 1                        | PL 19.1x340  | 27   | 1.730     | 0.340     |             | 149.90       | 88.171              | 88.171              |
| 2                        | PL 16x350    | 29   | 0.850     | 0.350     |             | 124.80       | 37.128              | 74.256              |
| 1                        | PL 16x400    | 30   | 0.800     | 0.400     |             | 124.80       | 39.936              | 39.936              |
| 1                        | PL 19.1x1793 | 37   | 2.222     | 1.793     |             | 149.90       | 597.208             | 597.208             |
| 1                        | WT8X38.5     | b44  | 3.001     |           | 57.300      |              | 171.957             | 171.957             |
| 1                        | WT8X38.5     | b50  | 2.975     |           | 57.300      |              | 170.468             | 170.468             |
| 1                        | WT8X38.5     | b51  | 2.972     |           | 57.300      |              | 170.296             | 170.296             |
| 1                        | WT8X38.5     | b58  | 2.952     |           | 57.300      |              | 169.150             | 169.150             |
| 1                        | WT8X38.5     | b60  | 2.938     |           | 57.300      |              | 168.347             | 168.347             |
| 1                        | WT8X38.5     | b61  | 2.936     |           | 57.300      |              | 168.233             | 168.233             |
| 1                        | WT8X38.5     | b96  | 2.821     |           | 57.300      |              | 161.643             | 161.643             |
| 1                        | WT8X38.5     | b87  | 2.811     |           | 57.300      |              | 161.070             | 161.070             |
| 1                        | WT8X38.5     | b29  | 2.806     |           | 57.300      |              | 160.784             | 160.784             |
| 1                        | WT8X38.5     | b93  | 2.800     |           | 57.300      |              | 160.440             | 160.440             |
| 1                        | WT8X38.5     | b33  | 2.785     |           | 57.300      |              | 159.581             | 159.581             |
| <b>Peso E60-T1-VID =</b> |              |      |           |           |             |              | <b>35,867.271</b>   |                     |

|                     |              |     |       |       |       |       |                  |         |
|---------------------|--------------|-----|-------|-------|-------|-------|------------------|---------|
| <b>CT-01</b>        |              |     |       |       |       |       |                  |         |
| 10                  | PL 12.7x180  | 11  | 1.860 | 0.180 |       | 99.70 | 33.380           | 333.796 |
| 10                  | L5X5X5/8     | b18 | 1.386 |       | 29.76 |       | 41.247           | 412.474 |
| 5                   | L5X5X3/4     | b12 | 2.026 |       | 35.12 |       | 71.153           | 355.766 |
| 5                   | PL 12.7x387  | 12  | 0.450 | 0.387 |       | 99.70 | 17.363           | 86.814  |
| 10                  | PL 12.7x97.1 | 10  | 0.177 | 0.097 |       | 99.70 | 1.714            | 17.135  |
| <b>Peso CT-01 =</b> |              |     |       |       |       |       | <b>1,205.984</b> |         |

|                     |              |     |       |       |       |       |                |         |
|---------------------|--------------|-----|-------|-------|-------|-------|----------------|---------|
| <b>CH-01</b>        |              |     |       |       |       |       |                |         |
| 10                  | PL 12.7x180  | 11  | 1.860 | 0.180 |       | 99.70 | 33.380         | 333.796 |
| 5                   | L5X5X3/8     | b11 | 2.026 |       | 18.30 |       | 37.076         | 185.379 |
| 10                  | PL 12.7x97.1 | 10  | 0.177 | 0.097 |       | 99.70 | 1.712          | 17.117  |
| <b>Peso CH-01 =</b> |              |     |       |       |       |       | <b>536.292</b> |         |

|                                     |                        |            |  |  |  |             |                |         |
|-------------------------------------|------------------------|------------|--|--|--|-------------|----------------|---------|
| <b>TORNILLERIA CONEX. CAMPO 4-5</b> |                        |            |  |  |  |             |                |         |
| 80                                  | TORNILLO 7/8" x 3-3/4" | PATIN SUP. |  |  |  | 0.57 Kg/pza |                | 45.600  |
| 320                                 | TORNILLO 7/8" x 3-1/2" | ALMA       |  |  |  | 0.55 Kg/pza |                | 176.000 |
| 136                                 | TORNILLO 7/8" x 4"     | PATIN INF. |  |  |  | 0.59 Kg/pza |                | 80.240  |
| <b>Peso TORN =</b>                  |                        |            |  |  |  |             | <b>301.840</b> |         |

|                              |                      |                |  |  |  |             |               |        |
|------------------------------|----------------------|----------------|--|--|--|-------------|---------------|--------|
| <b>TORNILLERIA DIAFRAGMA</b> |                      |                |  |  |  |             |               |        |
| 40                           | TORNILLO 1" x 2-3/4" | PATIN SUPERIOR |  |  |  | 0.57 Kg/pza |               | 22.800 |
| 24                           | TORNILLO 1" x 3"     | PATIN SUPERIOR |  |  |  | 0.62 Kg/pza |               | 14.880 |
| 16                           | TORNILLO 1" x 3 1/2" | PATIN INFERIOR |  |  |  | 0.67 Kg/pza |               | 10.720 |
| 16                           | TORNILLO 1" x 2 3/4" | PATIN INFERIOR |  |  |  | 0.57 Kg/pza |               | 9.120  |
| 38                           | TORNILLO 1" x 3"     | PATIN INFERIOR |  |  |  | 0.62 Kg/pza |               | 23.560 |
| <b>Peso TORN =</b>           |                      |                |  |  |  |             | <b>81.080</b> |        |

|                      |                         |    |        |  |  |             |                |         |
|----------------------|-------------------------|----|--------|--|--|-------------|----------------|---------|
| 256                  | PERNO NELSON 7/8" x 10" | 72 | 25.537 |  |  | 0.79 Kg/pza |                | 202.240 |
| 262                  | PERNO NELSON 7/8" x 10" | 71 | 26.037 |  |  | 0.79 Kg/pza |                | 206.980 |
| <b>Peso PERNOS =</b> |                         |    |        |  |  |             | <b>409.220</b> |         |

Cantidad de Vigas y Peso Total = **1 Pzas 38401.69 kg**

# GENERADOR DE ESTIMACION

Obra: Construcción de Distribuidor Vial Zootechnia Chihuahua, Chih. Eje 60

Tramo:

Contratista: CONSTRUCTORA SANTA ROSALIA SA DE CV

Fecha:

| Cantidad            | Descripción    | Mca.          | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unif)<br>(Kg) | Calculo<br>(acum.) (Kg) |
|---------------------|----------------|---------------|-----------|-----------|-------------|--------------|------------------------|-------------------------|
| <b>DIAFRAGMA 1</b>  |                | <b>1 Pzas</b> |           |           |             |              |                        |                         |
| 1                   | PL 19.1x1793.4 | 99            | 3.411     | 1.793     |             | 149.90       | 916.981                | 916.981                 |
| 1                   | PL 19.1x340    | 35            | 3.411     | 0.340     |             | 149.90       | 173.845                | 173.845                 |
| 4                   | L4X4X1/2       | b74           | 1.710     |           | 19.050      |              | 32.576                 | 130.302                 |
| 1                   | PL 19.1x340    | 34            | 2.181     | 0.340     |             | 149.90       | 111.157                | 111.157                 |
| 2                   | PL 12.7x340    | 22            | 1.060     | 0.340     |             | 124.80       | 44.978                 | 89.956                  |
| 2                   | PL 12.7x340    | 28            | 0.500     | 0.340     |             | 99.70        | 16.949                 | 33.898                  |
| -1                  | HUECO          |               | 0.600     | 0.400     |             | 149.90       | 35.976                 | 35.976                  |
| <b>Peso DIAF1 =</b> |                |               |           |           |             |              | <b>1,420.163</b>       |                         |

|                     |                |               |       |       |       |        |                  |         |
|---------------------|----------------|---------------|-------|-------|-------|--------|------------------|---------|
| <b>DIAFRAGMA 2</b>  |                | <b>1 Pzas</b> |       |       |       |        |                  |         |
| 1                   | PL 19.1x1800.7 | 172           | 3.411 | 1.801 |       | 149.90 | 920.714          | 920.714 |
| 1                   | PL 19.1x340    | 35            | 3.411 | 0.340 |       | 149.90 | 173.845          | 173.845 |
| 4                   | L4X4X1/2       | b74           | 1.710 |       | 19.05 |        | 32.576           | 130.302 |
| 1                   | PL 19.1x340    | 34            | 2.181 | 0.340 |       | 149.90 | 111.157          | 111.157 |
| 2                   | PL 12.7x340    | 22            | 1.060 | 0.340 |       | 124.80 | 44.978           | 89.956  |
| 2                   | PL 12.7x340    | 28            | 0.500 | 0.340 |       | 124.80 | 21.216           | 42.432  |
| -1                  | HUECO          |               | 0.600 | 0.400 |       | 149.90 | 35.976           | 35.976  |
| <b>Peso DIAF2 =</b> |                |               |       |       |       |        | <b>1,432.430</b> |         |

|                    |              |               |       |       |       |        |                  |         |
|--------------------|--------------|---------------|-------|-------|-------|--------|------------------|---------|
| <b>DIAFRAGMA 3</b> |              | <b>1 Pzas</b> |       |       |       |        |                  |         |
| 1                  | PL 19.1x1812 | 100           | 3.411 | 1.812 |       | 149.90 | 926.492          | 926.492 |
| 1                  | PL 19.1x340  | 35            | 3.411 | 0.340 |       | 149.90 | 173.845          | 173.845 |
| 4                  | L4X4X1/2     | b74           | 1.710 |       | 19.05 |        | 32.576           | 130.302 |
| 1                  | PL 19.1x340  | 34            | 2.181 | 0.340 |       | 149.90 | 111.157          | 111.157 |
| 2                  | PL 12.7x340  | 22            | 1.060 | 0.340 |       | 124.80 | 44.978           | 89.956  |
| 2                  | PL 12.7x340  | 28            | 0.500 | 0.340 |       | 124.80 | 21.216           | 42.432  |
| -1                 | HUECO        |               | 0.600 | 0.400 |       | 149.90 | 35.976           | 35.976  |
| <b>Peso DIAF3=</b> |              |               |       |       |       |        | <b>1,438.207</b> |         |

|                      |              |               |       |       |       |        |                  |         |
|----------------------|--------------|---------------|-------|-------|-------|--------|------------------|---------|
| <b>DIAFRAGMA 4B</b>  |              | <b>1 Pzas</b> |       |       |       |        |                  |         |
| 1                    | PL 19.1x1801 | 172           | 3.411 | 1.801 |       | 149.90 | 920.867          | 920.867 |
| 1                    | PL 19.1x340  | 102           | 3.411 | 0.340 |       | 149.90 | 173.845          | 173.845 |
| 4                    | L4X4X1/2     | b74           | 1.710 |       | 19.05 |        | 32.576           | 130.302 |
| 1                    | PL 19.1x340  | 101           | 2.181 | 0.340 |       | 149.90 | 111.157          | 111.157 |
| 2                    | PL 12.7x340  | 22            | 1.060 | 0.340 |       | 124.80 | 44.978           | 89.956  |
| 2                    | PL 12.7x340  | 98            | 0.500 | 0.340 |       | 124.80 | 21.216           | 42.432  |
| -1                   | HUECO        |               | 0.600 | 0.400 |       | 149.90 | 35.976           | 35.976  |
| <b>Peso DIAF4B =</b> |              |               |       |       |       |        | <b>1,432.583</b> |         |

Cantidad de Diafragmas y Peso Total = **4 Pzas**

44

| Cantidad | Descripción   | Mca.          | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unit) (Kg) | Calculo (acum) (Kg) |
|----------|---------------|---------------|-----------|-----------|-------------|--------------|---------------------|---------------------|
|          | <b>CUÑA 3</b> | <b>2 Pzas</b> |           |           |             |              |                     |                     |
| 2        | PL 19x700     | 103           | 0.700     | 0.700     |             | 149.90       | 73.451              | 146.902             |
| 2        | PL 19x700     | 147           | 0.700     | 0.700     |             | 149.90       | 73.451              | 146.902             |
| 2        | PL 19.1x61.6  | 138           | 0.642     | 0.062     |             | 149.90       | 5.928               | 11.856              |
| 2        | PL 19.1x52    | 129           | 0.642     | 0.052     |             | 149.90       | 5.004               | 10.009              |
| 2        | PL 19.1x61.9  | 140           | 0.680     | 0.062     |             | 149.90       | 6.310               | 12.619              |
| 2        | PL 19.1x42.4  | 121           | 0.642     | 0.042     |             | 149.90       | 4.080               | 8.161               |
| 2        | PL 19.1x52.6  | 125           | 0.680     | 0.053     |             | 149.90       | 5.362               | 10.723              |
| 2        | PL 19.1x32.8  | 114           | 0.642     | 0.033     |             | 149.90       | 3.157               | 6.313               |
| 2        | PL 19.1x23.1  | 109           | 0.642     | 0.023     |             | 149.90       | 2.223               | 4.446               |
| 2        | PL 19.1x58.5  | 136           | 0.146     | 0.059     |             | 149.90       | 1.280               | 2.561               |
| 2        | PL 19.1x56.1  | 166           | 0.146     | 0.056     |             | 149.90       | 1.228               | 2.456               |
| 2        | PL 19.1x53.8  | 107           | 0.146     | 0.054     |             | 149.90       | 1.177               | 2.355               |
| 2        | PL 19.1x48.8  | 152           | 0.146     | 0.049     |             | 149.90       | 1.068               | 2.136               |
| 2        | PL 19.1x46.5  | 131           | 0.146     | 0.047     |             | 149.90       | 1.018               | 2.035               |
| 2        | PL 19.1x44.1  | 139           | 0.146     | 0.044     |             | 149.90       | 0.965               | 1.930               |
| 2        | PL 19.1x39.2  | 119           | 0.146     | 0.039     |             | 149.90       | 0.858               | 1.716               |
| 2        | PL 19.1x36.8  | 105           | 0.146     | 0.037     |             | 149.90       | 0.805               | 1.611               |
| 2        | PL 19.1x34.5  | 104           | 0.146     | 0.035     |             | 149.90       | 0.755               | 1.510               |
| 2        | PL 19.1x29.5  | 113           | 0.146     | 0.030     |             | 149.90       | 0.646               | 1.291               |
| 2        | PL 19.1x27.2  | 148           | 0.146     | 0.027     |             | 149.90       | 0.595               | 1.191               |
| 2        | PL 19.1x24.8  | 110           | 0.146     | 0.025     |             | 149.90       | 0.543               | 1.086               |
|          |               |               |           |           |             |              | <b>PESO CUÑA 3</b>  | <b>379.808</b>      |

| Cantidad | Descripción         | Mca.          | Largo (m) | Ancho (m) | Peso (kg/m) | Peso (kg/m2) | Calculo (unit) (Kg) | Calculo (acum) (Kg) |
|----------|---------------------|---------------|-----------|-----------|-------------|--------------|---------------------|---------------------|
|          | <b>CUÑA PILA 4B</b> | <b>2 Pzas</b> |           |           |             |              |                     |                     |
| 2        | PL 19x700           | 103           | 0.700     | 0.700     |             | 149.94       | 73.471              | 146.941             |
| 2        | PL 19x700           | 146           | 0.700     | 0.700     |             | 149.94       | 73.471              | 146.941             |
| 2        | PL 19.1x73          | 143           | 0.642     | 0.073     |             | 149.94       | 7.027               | 14.054              |
| 2        | PL 19.1x73.7        | 144           | 0.680     | 0.074     |             | 149.94       | 7.514               | 15.029              |
| 2        | PL 19.1x64          | 141           | 0.642     | 0.064     |             | 149.94       | 6.161               | 12.321              |
| 2        | PL 19.1x55.1        | 132           | 0.642     | 0.055     |             | 149.94       | 5.304               | 10.608              |
| 2        | PL 19.1x46.1        | 122           | 0.642     | 0.046     |             | 149.94       | 4.438               | 8.875               |
| 2        | PL 19.1x50.3        | 124           | 0.680     | 0.050     |             | 149.94       | 5.129               | 10.257              |
| 2        | PL 19.1x37.1        | 117           | 0.642     | 0.037     |             | 149.94       | 3.571               | 7.143               |
| 2        | PL 19.1x66.8        | 142           | 0.146     | 0.067     |             | 149.94       | 1.462               | 2.925               |
| 2        | PL 19.1x61          | 145           | 0.146     | 0.061     |             | 149.94       | 1.335               | 2.671               |
| 2        | PL 19.1x57.8        | 133           | 0.146     | 0.058     |             | 149.94       | 1.265               | 2.531               |
| 2        | PL 19.1x55.2        | 151           | 0.146     | 0.055     |             | 149.94       | 1.208               | 2.417               |
| 2        | PL 19.1x52          | 127           | 0.146     | 0.052     |             | 149.94       | 1.138               | 2.277               |
| 2        | PL 19.1x48.8        | 123           | 0.146     | 0.049     |             | 149.94       | 1.068               | 2.137               |
| 2        | PL 19.1x46.2        | 131           | 0.146     | 0.046     |             | 149.94       | 1.011               | 2.023               |
| 2        | PL 19.1x43          | 106           | 0.146     | 0.043     |             | 149.94       | 0.941               | 1.883               |
| 2        | PL 19.1x39.8        | 120           | 0.146     | 0.040     |             | 149.94       | 0.871               | 1.743               |
| 2        | PL 19.1x37.2        | 118           | 0.146     | 0.037     |             | 149.94       | 0.814               | 1.629               |
| 2        | PL 19.1x34          | 116           | 0.146     | 0.034     |             | 149.94       | 0.744               | 1.489               |
| 2        | PL 19.1x28.2        | 111           | 0.146     | 0.028     |             | 149.94       | 0.617               | 1.235               |
|          |                     |               |           |           |             |              | <b>PESO CUÑA 4B</b> | <b>397.126</b>      |

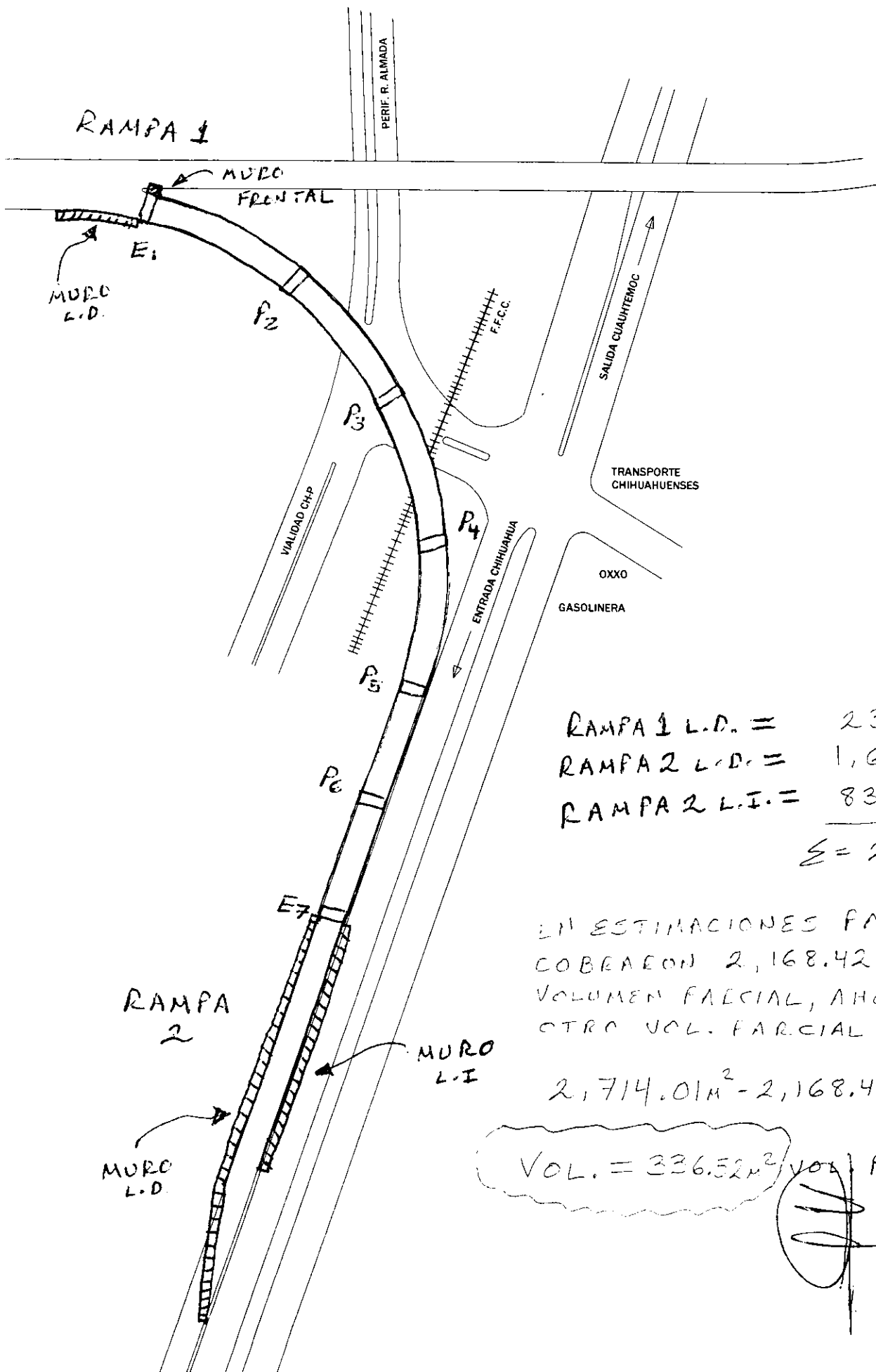
Peso Total Cuñas =

|            |                                                                                                                                                                                                                                                                                      |        |                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------|
| CONTRATO : | 040/2016                                                                                                                                                                                                                                                                             | TRAMO: | Perif. Fco. R. Almada y Carretera Cd. Cuauhtemoc |
| OBRA :     | <p>Construcción del Eje Sesenta (60) del Distribuidor Vial Zootecnia, Ubicado en Entronque del Periférico Francisco R. Almada y Carretera a Cd. Cuauhtémoc, Colonia Esperanza, y Zootecnia, en esta Ciudad de Chihuahua.</p> <p>CONTRATISTA: CONSTRUCTORA SANTA ROSALIA SA DE CV</p> |        |                                                  |

|                                                                                                                                                                                                                                                                                                |        |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------|
| No DE ESTIMACION:                                                                                                                                                                                                                                                                              | No. 10 | PERIODO: 12 AL 15 DE SEPTIEMBRE 2016 |
| CONCEPTO                                                                                                                                                                                                                                                                                       | 44     | OPERACIONES ARITMETICAS              |
| SUBESTRUCTURA: Suministro y colocación de Muro de contención mecánicamente estabilizado, por unidad de obra terminada. Incluye materiales, herrajes, acarreo, patente, proyecto, mano de obra, equipo, herramienta y todo lo necesario para su correcta ejecución por unidad de obra terminada |        |                                      |
| RAMPA 1 L.D. = 230.11 M2                                                                                                                                                                                                                                                                       |        |                                      |
| RAMPA 2 L.D. = 1,646.04 M2                                                                                                                                                                                                                                                                     |        |                                      |
| RAMPA 2 L.I. = 837.86 M2                                                                                                                                                                                                                                                                       |        |                                      |
| TOTAL = 2,714.01 M2                                                                                                                                                                                                                                                                            |        |                                      |
| EN ESTIMACIONES ANTERIORES SE                                                                                                                                                                                                                                                                  |        |                                      |
| COBRARON 2,168.42 M2 COMO UN VOLUMEN                                                                                                                                                                                                                                                           |        |                                      |
| PARCIAL, AHORA SE COBRA OTRO VOLUMEN                                                                                                                                                                                                                                                           |        |                                      |
| PARCIAL                                                                                                                                                                                                                                                                                        |        |                                      |
| 2,714.01 M2 - 2,168.42 M2 = 545.59 M2                                                                                                                                                                                                                                                          |        |                                      |
| VOL. = 336.52 M2 VOL. PARCIAL                                                                                                                                                                                                                                                                  |        |                                      |

ING. RODOLFO ARMENDARIZ RONQUILLO

# 44 - MURO DE CONTENSION MECANICAMENTE ESTABILIZADO



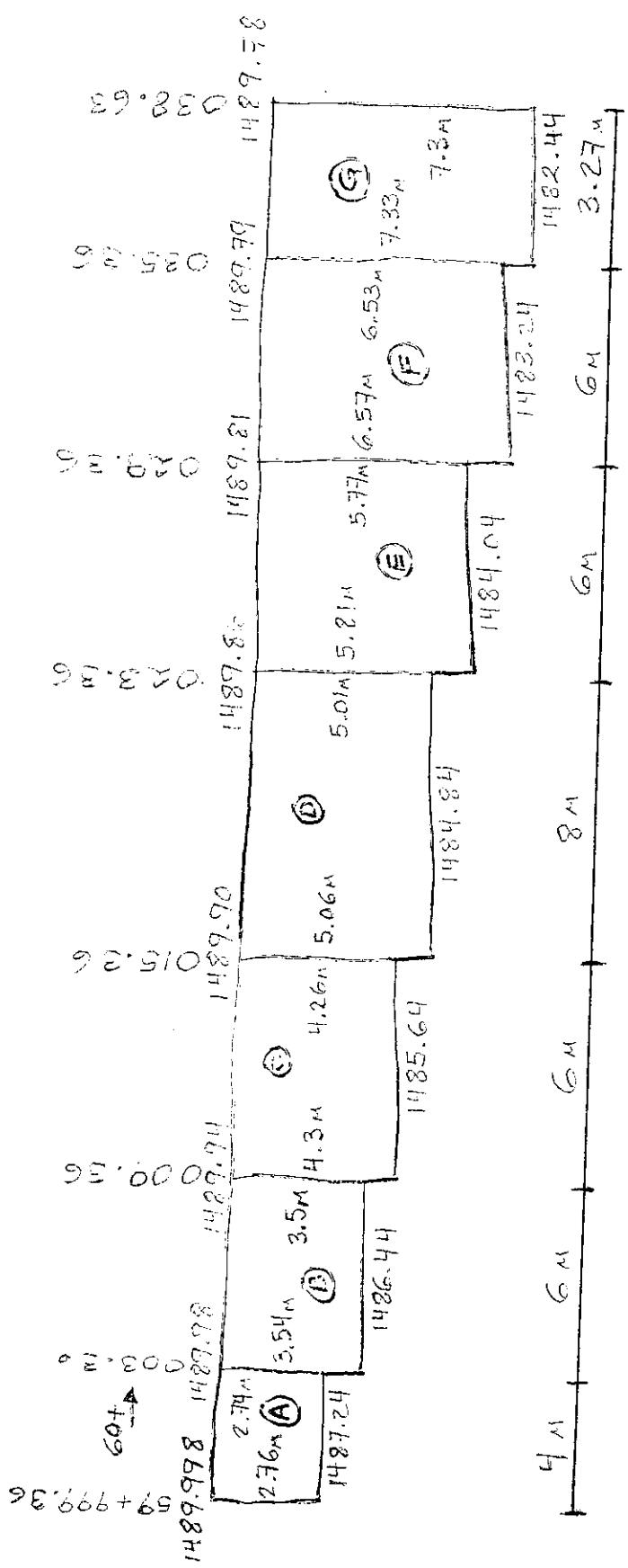
$$\begin{aligned}
 \text{RAMPA 1 L.D.} &= 230.11 \text{ m}^2 \\
 \text{RAMPA 2 L.D.} &= 1,646.04 \text{ m}^2 \\
 \text{RAMPA 2 L.I.} &= 837.86 \text{ m}^2 \\
 \hline
 \Sigma &= 2,714.01 \text{ m}^2
 \end{aligned}$$

EN ESTIMACIONES PASADAS SE COBRARON  $2,168.42 \text{ m}^2$  COMO UN VOLUMEN PARCIAL, AHORA SE COBRA OTRO VOL. PARCIAL

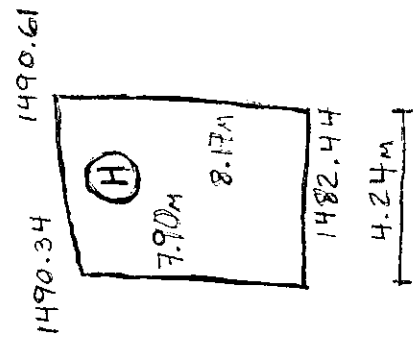
$$2,714.01 \text{ m}^2 - 2,168.42 \text{ m}^2 = 545.59 \text{ m}^2$$

$$\text{VOL.} = 336.52 \text{ m}^2 \text{ VOL. PARCIAL}$$

**MURO  
DERECHO  
RAMPA 1**

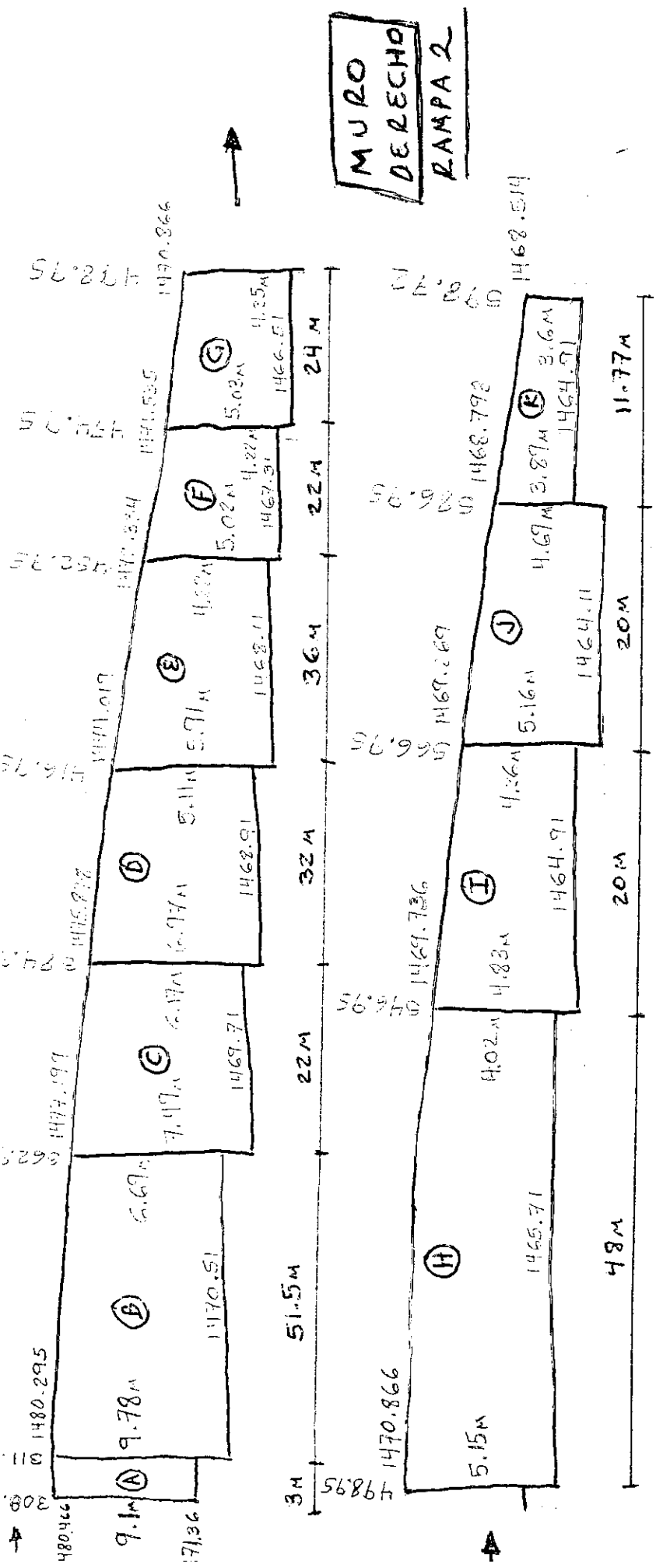


**MURO FRONTAL**



- (A)  $4m \times \frac{(2.76 + 2.74)}{2} = 11m^2$
  - (B)  $6m \times \frac{(3.54 + 3.5)}{2} = 21.12m^2$
  - (C)  $6m \times \frac{(4.3 + 4.26)}{2} = 25.68m^2$
  - (D)  $8m \times \frac{(5.06 + 5.01)}{2} = 40.28m^2$
  - (E)  $6m \times \frac{(5.81 + 5.77)}{2} = 34.74m^2$
  - (F)  $6m \times \frac{(6.57 + 6.53)}{2} = 39.30m^2$
  - (G)  $3.27m \times \frac{(4.33 + 7.3)}{2} = 23.92m^2$
  - (H)  $4.24m \times (7.9 + 8.17) = 34.07m^2$
- $\Sigma = 230.11$

*[Handwritten signature]*



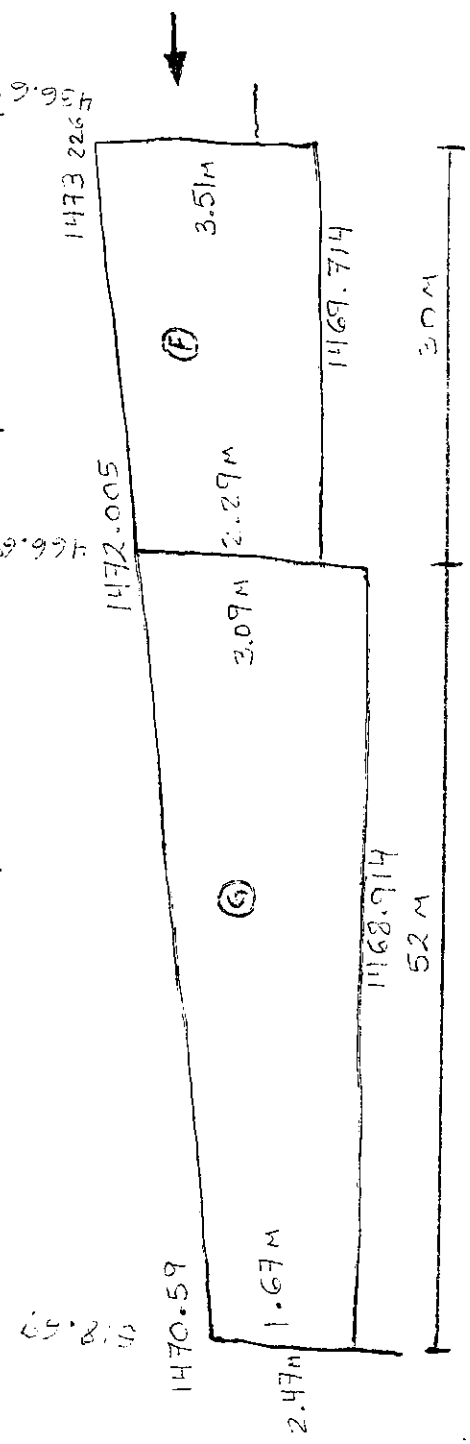
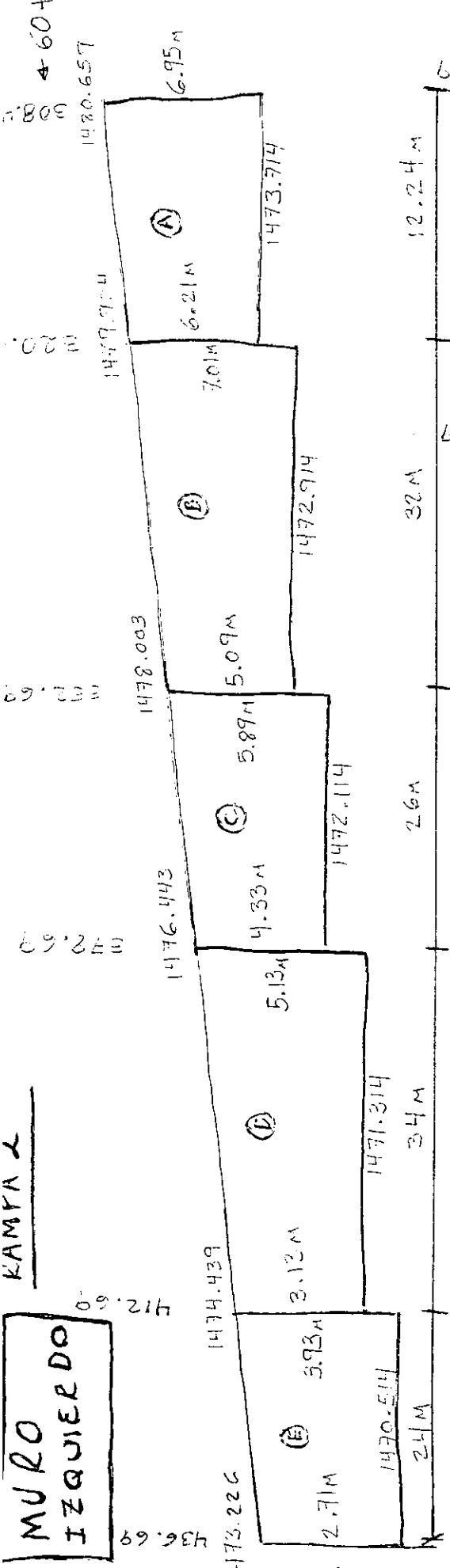
$$\sum T = 1,646.04 \text{ m}^2$$

$$\begin{aligned}
 & \text{A} \quad 3 \text{ m} \times 9.1 \text{ m} = 27.30 \text{ m}^2 \\
 & \text{B} \quad 51.5 \text{ m} \times (9.78 + 6.69) = 424.10 \text{ m}^2 \\
 & \text{C} \quad 22 \text{ m} \times (7.49 + 6.17) = 150.26 \text{ m}^2 \\
 & \text{D} \quad 32 \text{ m} \times (6.97 + 5.11) = 193.28 \text{ m}^2 \\
 & \text{E} \quad 36 \text{ m} \times (5.91 + 4.22) = 182.34 \text{ m}^2 \\
 & \text{F} \quad 22 \text{ m} \times (5.02 + 4.22) = 101.64 \text{ m}^2 \\
 & \text{G} \quad 24 \text{ m} \times (5.03 + 4.35) = 112.56 \text{ m}^2 \\
 & \text{H} \quad 48 \text{ m} \times (5.15 + 4.02) = 220.08 \text{ m}^2 \\
 & \text{I} \quad 20 \text{ m} \times (4.83 + 4.36) = 91.90 \text{ m}^2 \\
 & \text{J} \quad 20 \text{ m} \times (5.16 + 4.69) = 98.50 \text{ m}^2 \\
 & \text{K} \quad 11.77 \text{ m} \times (3.89 + 3.6) = 44.08 \text{ m}^2
 \end{aligned}$$

# MURO IZQUIERDO

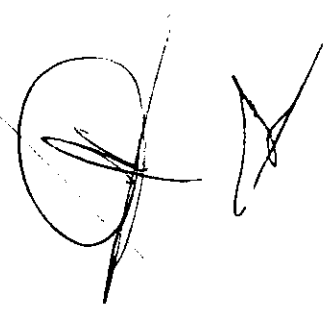
KAMPA 2

60+



$$\begin{aligned} \text{A)} & 12.24 \times \frac{(6.95 + 6.21)}{2} = 80.51 \text{ m}^2 \\ \text{B)} & 32 \times \frac{(7.01 + 5.09)}{2} = 193.60 \text{ m}^2 \\ \text{C)} & 26 \times \frac{(5.89 + 4.33)}{2} = 132.86 \text{ m}^2 \\ \text{D)} & 34 \times \frac{(5.13 + 3.12)}{2} = 140.42 \text{ m}^2 \\ \text{E)} & 24 \times \frac{(3.93 + 2.71)}{2} = 77.68 \text{ m}^2 \\ \text{F)} & 30 \times \frac{(3.51 + 2.29)}{2} = 87 \text{ m}^2 \\ \text{G)} & 52 \times \frac{(2.07 + 1.67)}{2} = 123.76 \text{ m}^2 \end{aligned}$$

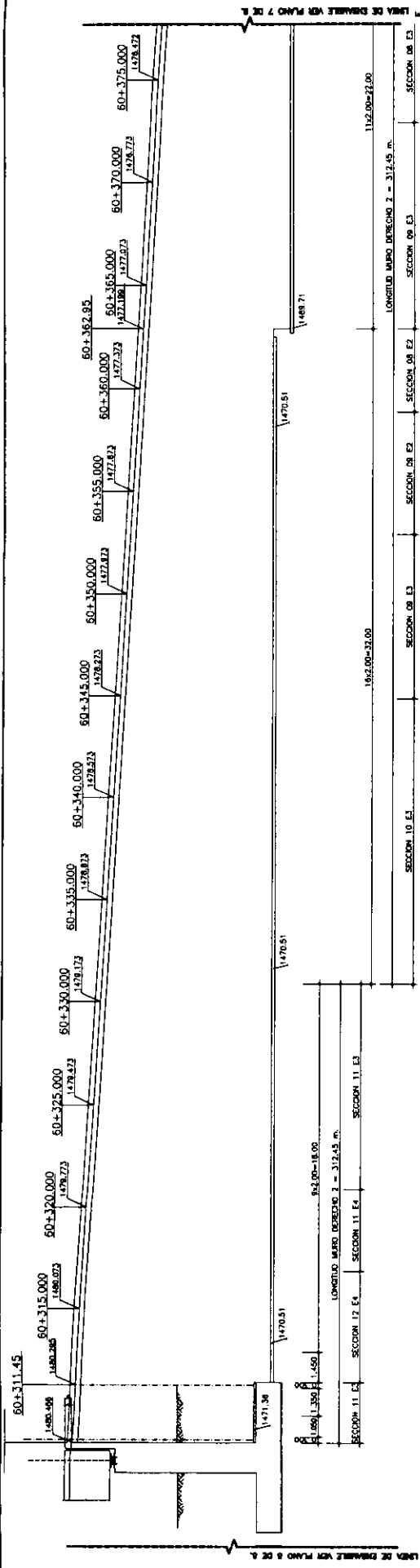
$$\Sigma T = 837.86 \text{ m}^2$$







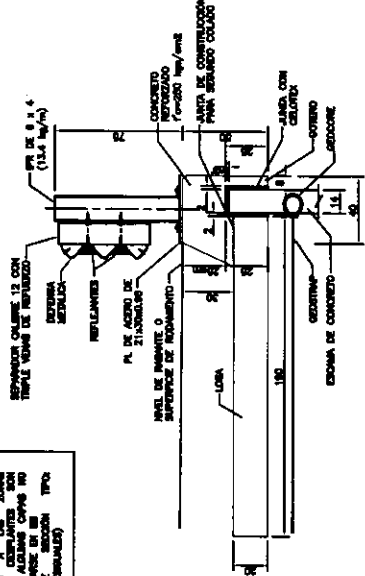




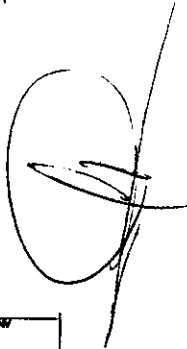
**MURO DERECHO 2 (CONTINUACIÓN)**

[illegible]

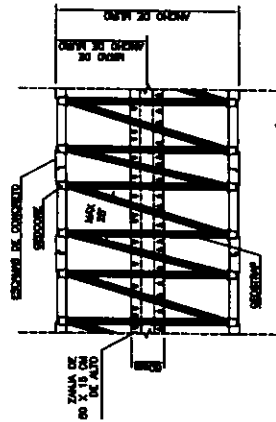
NOTA 2:  
LAS SECCIONES  
CORRESPONDEN A LAS ZONAS  
DONDE LOS CEMENTANTES SON  
DESIGUALES Y AQUELLOS QUE NO  
PUEDAN COLOCARSE EN EL  
(VER DETALLE SECCIÓN TIPO;  
DESPLAZAMIENTOS DESIGUALES)



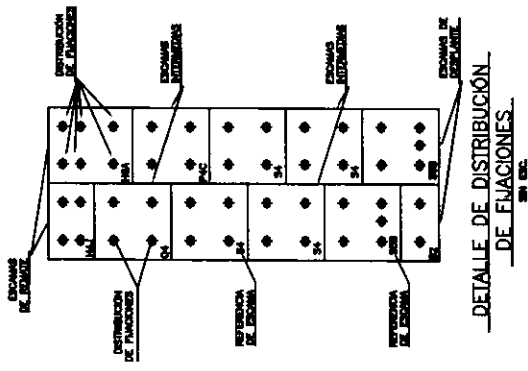
GEOMETRÍA DE REMATE  
PROPUESTO POR TIERRA AR



### SECCIONES DE CÁLCULO



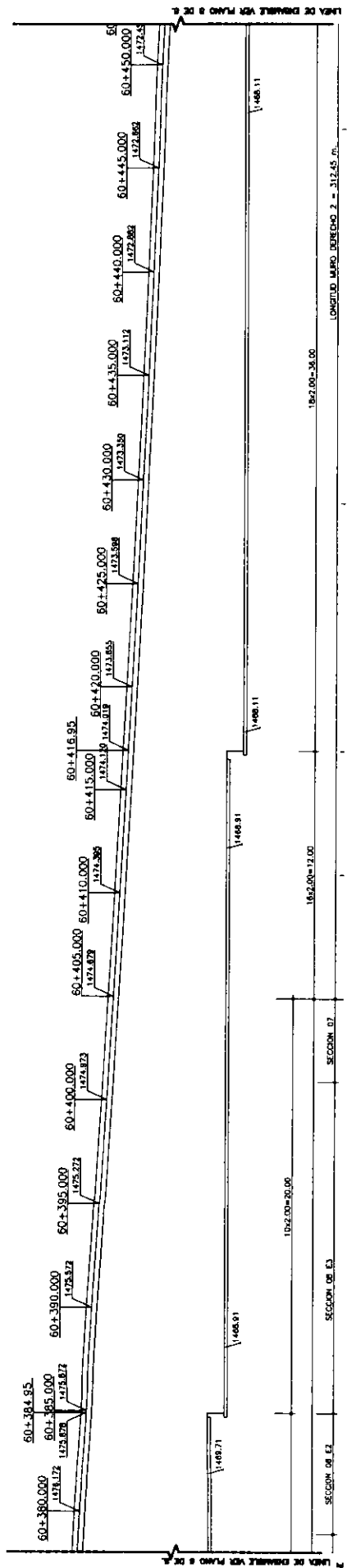
### DETALLE COLOCACIÓN DEL REFUERZO EN BR



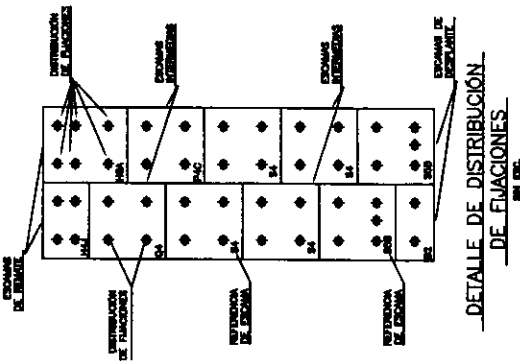
**DETALLE DE DISTRIBUCIÓN  
DE EJECUCIONES**  
EN C.C.

|                                                                                      |                   |
|--------------------------------------------------------------------------------------|-------------------|
| DIRECCIÓN DE OBRAS<br>PUBLICAS MUNICIPALES<br>SUBDIRECCIÓN DE INFRAESTRUCTURA URBANA |                   |
| DEPARTAMENTO DE CONSTRUCCIÓN<br>OFICINA DE TOPOGRAFIA                                |                   |
| DISTRIBUIDOR VIAL "ZOOTECNIA" (EJE 60)                                               |                   |
|                                                                                      | FECHA: JUNIO 2016 |
| NOMBRE DE PLANO:<br><br>ARREGLO GENERAL DE MUROS<br>GEORE.                           |                   |

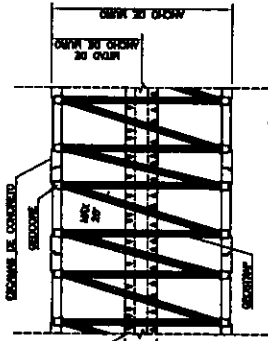
[illegible]



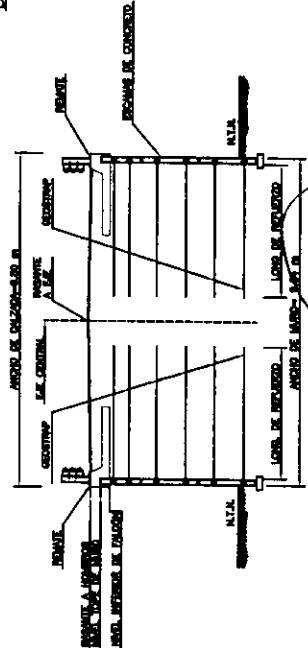
MURO DERECHO 2 (CONTINUACIÓN)



DETALLE DE DISTRIBUCIÓN DE FUNDACIONES



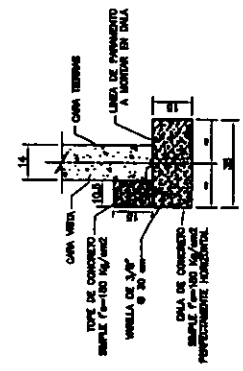
DETALLE COLOCACIÓN DEL REFORZO EN BB



SECCION TÍPICA

SECCIONES DE CÁLCULO

| SECCION   | 07   | 08   | 09   | 10   |
|-----------|------|------|------|------|
| ANCHO     | 1.00 | 1.00 | 1.00 | 1.00 |
| ALTO      | 1.00 | 1.00 | 1.00 | 1.00 |
| VOLUMEN   | 1.00 | 1.00 | 1.00 | 1.00 |
| REINFORZO | 1.00 | 1.00 | 1.00 | 1.00 |
| CONCRETO  | 1.00 | 1.00 | 1.00 | 1.00 |
| SUELO     | 1.00 | 1.00 | 1.00 | 1.00 |
| TOTAL     | 1.00 | 1.00 | 1.00 | 1.00 |



DETALLE "1"

ALA DE DESPLANTE CON TOPE

DIRECCIÓN DE OBRAS  
PUBLICAS MUNICIPALES  
SUBDIRECCIÓN DE INFRAESTRUCTURA URBANA  
DEPARTAMENTO DE CONSTRUCCION  
OFICINA DE TOPOGRAFIA

DISTRIBUIDOR VIAL "ZOOTECNIA" (EJE 60)  
FECHA: JUNIO 2016  
NOMBRE DE PLANO:  
ARREGLO GENERAL DE MUROS  
GEOCORE

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PROYECTO: MURO DERECHO 2  
TÍTULO DE PLANO: ARREGLO GENERAL DE MUROS  
SECCIONES: CÁLCULO Y DETALLES  
FECHA: JUNIO 2016  
Escala: 1:50

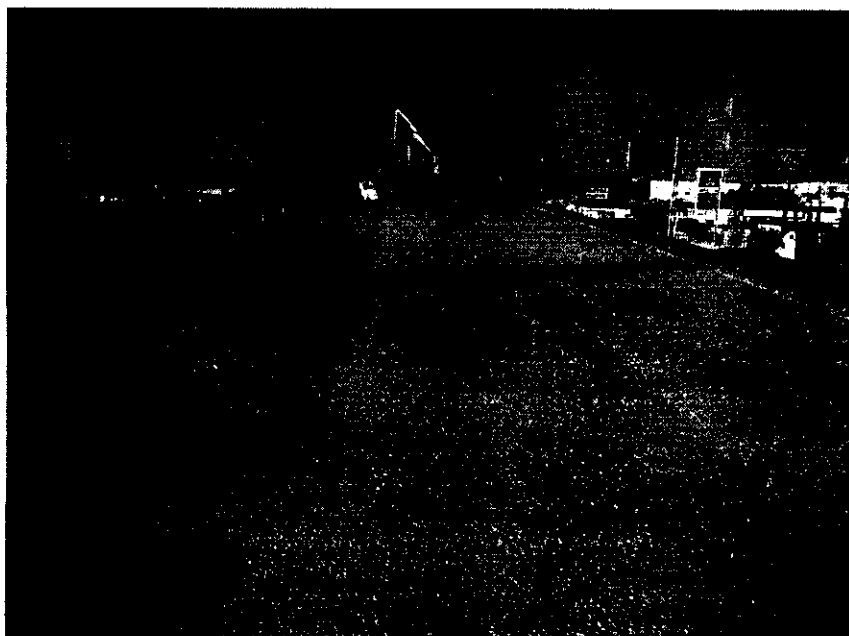
REVISOR: [Firma]  
DISEÑADOR: [Firma]  
AUTOR: [Firma]



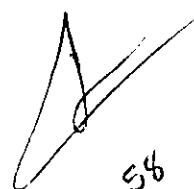




COLANDO LOSAS DE PUENTE

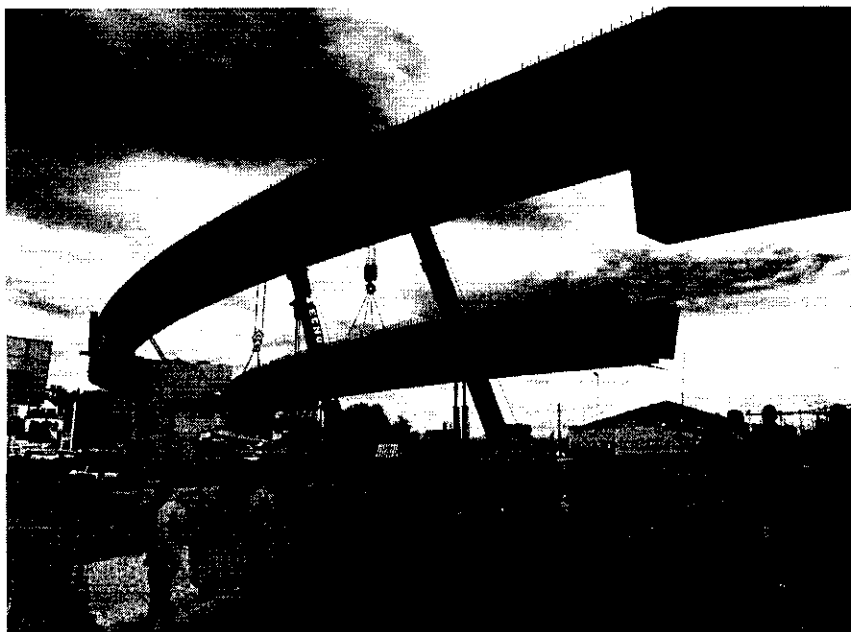


LOSA DE PUENTE





MONTAJE DE VIGAS DE ACERO



MONTAJE DE VIGAS



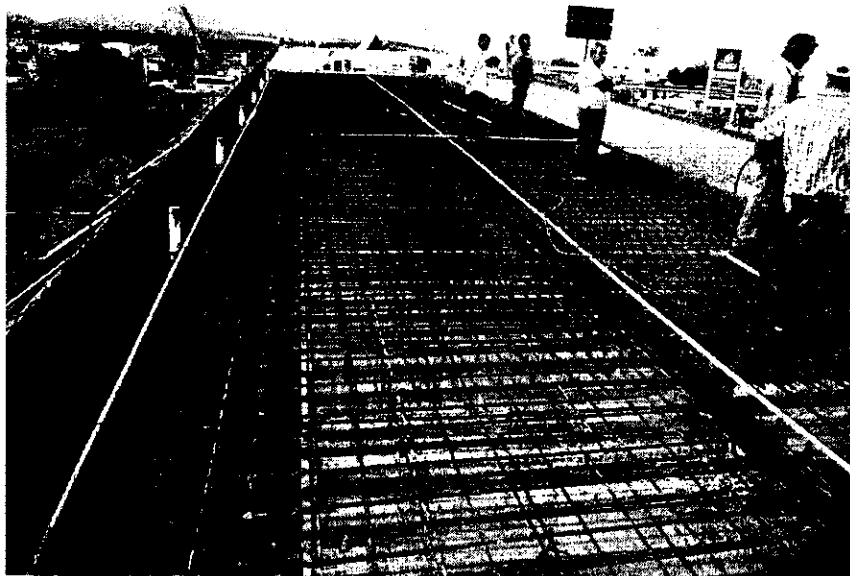
RELLENO DE ESTRUCTURAS



APROCHE DE MUROS

*(Handwritten signature or mark)*

*(Handwritten signature or mark)*



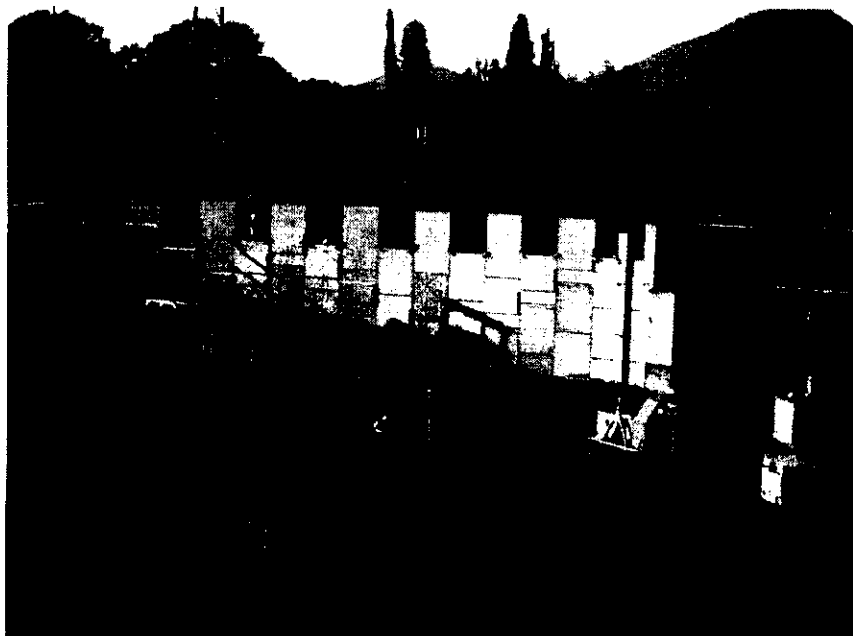
ACERO DE REFUERZO EN LOSA



ARMANDO LOSA DE PUENTE



INSTALANDO ESCAMAS EN RAMPA DE SALIDA



MUROS DE CONTENSION MECANICAMENTE ESTABILIZADOS



# LABORATORIO Y CONSULTORIA, S.A. DE C.V.

CALLE MANUEL GARCIA GARCIA NO. 10102 COL. COL.DEPORTISTAS 6144170033 Chihuahua Chihuahua. 31125

## INFORME DE COMPACTACIONES

METODOS DE PRUEBA EMPLEADOS: ASTM-D-690, 698, 1557, 2216, 2922, 3017 VIGENTES

OBRA: 92 DISTRIBUIDOR ZOOTECHNIA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

Fecha de muestreo: 2016-09-02

REPRESENTANTE: ING. JUAN MANUEL RUACHO

Fecha de Informe: 2016-09-03

LOCALIDAD: Chihuahua Chihuahua

CONTRATISTA:

| No. | Ensaye             | Estación | Lado | Profundidad<br>Sondeo (cm) | MASA VOLUMÉTRICA                                 |        | Humedad (%)               |           | %<br>Compactación |
|-----|--------------------|----------|------|----------------------------|--------------------------------------------------|--------|---------------------------|-----------|-------------------|
|     |                    |          |      |                            | Del Lugar                                        | Máxima | Optima                    | Del Lugar |                   |
| 23  | Prueba: 1          |          |      |                            | Tipo de Capa: 2A CAPA MURO DE TIERRA ARMADA      |        |                           |           |                   |
|     | % Especificado: 90 |          |      |                            | Localización: RAMPA ESTRIBO NO.1 60+025 AL 6+039 |        |                           |           |                   |
|     | A                  |          | D    | 30                         | 1832                                             | 1970   | 11,0                      | 8,0       | 93,00             |
|     | B                  |          | C    | 30                         | 1899                                             | 1970   | 11,0                      | 8,4       | 96,40             |
|     | C                  |          | I    | 30                         | 1857                                             | 1970   | 11,0                      | 8,8       | 94,30             |
|     |                    |          |      |                            |                                                  |        | Promedio de Compactación: |           | 94,57             |

LOS GRADOS DE COMPACTACION OBTENIDOS CUMPLEN CON EL ESPECIFICADO.

OBS:

ATENTAMENTE:

ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

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# INFORME DE RESISTENCIA A LA COMPRESION DE CILINDROS DE CONCRETO

**MÉTODOS DE PRUEBA EMPLEADOS:** NMX-C-083-2014, 109-2013, 156-2010, 160-2004, 161-2013, 435-2010, ONNCCE

OBRA: 92 DISTRIBUIDOR ZOOTECNIA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

**REPRESENTANTE: ING. JUAN MANUEL RUACHO**

**LOCALIDAD: CHIHUAHUA, CHIHUAHUA.**

**CONTRATISTA:**

**Fecha Informe:**

2016-09-14

**Fecha Ruptura:**

2016-09-13

| No. | Elemento                                        |             |           | Localidad   |            |            | Equipo de Mezclado |             |                 |                       | Aditivo  | Vibrado Tipo de Falla |                    |            |
|-----|-------------------------------------------------|-------------|-----------|-------------|------------|------------|--------------------|-------------|-----------------|-----------------------|----------|-----------------------|--------------------|------------|
|     | CIL                                             | Edad (días) | Diam (cm) | Altura (cm) | Masa (kg)  | Area (cm²) | Rev (cm)           | Carga (kgf) | Resistencia (N) | Resistencia (kgf/cm²) |          |                       | f'c Proy (kgf/cm²) | % Resis    |
| 43  | CABEZAL                                         |             |           |             |            | PILA NO.2  |                    |             |                 |                       |          |                       |                    |            |
|     | A                                               | 3           | 15.0      | 30.0        | 12.5       | 176.6      | 11.0               | 33896       | 332418          | 191.90                | 18818.96 | 300                   | 64.0               | 2016-09-10 |
|     | LA RESISTENCIA OBTENIDA SE CONSIDERA ACEPTABLE. |             |           |             |            |            |                    |             |                 |                       |          |                       |                    |            |
| RN: | SI(X) NO()                                      | BOMBEADO:   |           |             | SI(X) NO() | T. MAX.:   | 19.00              | mm          | VOLUMEN COLADO: | 36.00                 | m³       | REV PROJ.:            | 14                 | cm         |
|     |                                                 |             |           |             |            |            |                    |             |                 |                       | GCC      |                       | NO                 |            |
|     |                                                 |             |           |             |            |            |                    |             |                 |                       |          |                       |                    | Si         |
|     |                                                 |             |           |             |            |            |                    |             |                 |                       |          |                       |                    | 0          |

30°C

**ATENTAMENTE:**

**ING. MYRNA IBARRA APARICIO**  
**GERENTE TECNICO**

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# LABORATORIO Y CONSULTORIA, S.A. DE C.V.

CALLE MANUEL GARCIA GARCIA NO. 10102 COL. COL.DEPORTISTAS 6144170033 Chihuahua Chihuahua. 31125

## INFORME DE COMPACTACIONES

METODOS DE PRUEBA EMPLEADOS: ASTM-D-690, 698, 1557, 2216, 2922, 3017 VIGENTES

OBRA: 92 DISTRIBUIDOR ZOOTECHNIA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

Fecha de muestreo: 2016-09-12

REPRESENTANTE: ING. JUAN MANUEL RUACHO

Fecha de Informe: 2016-09-13

LOCALIDAD: Chihuahua Chihuahua

CONTRATISTA:

| No. | Ensaye             | Estación | Lado | Profundidad<br>Sondeo (cm) | MASA VOLUMÉTRICA                      |        | Humedad (%)               |           | %<br>Compactación |
|-----|--------------------|----------|------|----------------------------|---------------------------------------|--------|---------------------------|-----------|-------------------|
|     |                    |          |      |                            | Del Lugar                             | Máxima | Óptima                    | Del Lugar |                   |
| 33  | Prueba: 1          |          |      |                            | Tipo de Capa: 10A. CAPA RAMPA ESTRIBO |        |                           |           |                   |
|     | % Especificado: 90 |          |      |                            | Localización: NO.7 60+351 AL 60+399   |        |                           |           |                   |
|     | A                  |          | D    | 30                         | 1907                                  | 1970   | 11,0                      | 6,2       | 96,80             |
|     | B                  |          | C    | 30                         | 1903                                  | 1970   | 11,0                      | 7,1       | 96,60             |
|     | C                  |          | I    | 30                         | 1877                                  | 1970   | 11,0                      | 7,4       | 95,30             |
|     |                    |          |      |                            |                                       |        | Promedio de Compactación: |           | 96,23             |

LOS GRADOS DE COMPACTACION OBTENIDOS CUMPLEN CON EL ESPECIFICADO.

OBS:

ATENTAMENTE:

ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

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# LABORATORIO Y CONSULTORIA, S.A. DE C.V.

CALLE MANUEL GARCIA GARCIA NO. 10102 COL. COL.DEPORTISTAS 6144170033 Chihuahua Chihuahua. 31125

## INFORME DE COMPACTACIONES

METODOS DE PRUEBA EMPLEADOS: ASTM-D-690, 698, 1557, 2216, 2922, 3017 VIGENTES

OBRA: 92 DISTRIBUIDOR ZOOTECHNIA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

Fecha de muestreo: 2016-09-10

REPRESENTANTE: ING. JUAN MANUEL RUACHO

Fecha de Informe: 2016-09-12

LOCALIDAD: Chihuahua Chihuahua

CONTRATISTA:

| No.                       | Ensaye             | Estación | Lado | Profundidad<br>Sondeo (cm) | MASA VOLUMÉTRICA                               |        | Humedad (%) |           | %<br>Compactación |
|---------------------------|--------------------|----------|------|----------------------------|------------------------------------------------|--------|-------------|-----------|-------------------|
|                           |                    |          |      |                            | Del Lugar                                      | Máxima | Optima      | Del Lugar |                   |
| 32                        | Prueba: 1          |          |      |                            | Tipo de Capa: 9A CAPA MURO DE TIERRA ARMADA    |        |             |           |                   |
|                           | % Especificado: 90 |          |      |                            | Localización: RAMPA ESTRIBO 1 60+025 AL 60+061 |        |             |           |                   |
|                           | A                  |          | D    | 30                         | 1870                                           | 1970   | 11,0        | 7,9       | 94,90             |
|                           | B                  |          | C    | 30                         | 1918                                           | 1970   | 11,0        | 6,0       | 97,40             |
|                           | C                  |          | I    | 30                         | 1852                                           | 1970   | 11,0        | 7,5       | 94,00             |
| Promedio de Compactación: |                    |          |      |                            |                                                |        |             |           | 95,43             |

LOS GRADOS DE COMPACTACION OBTENIDOS CUMPLEN CON EL ESPECIFICADO.

OBS:

ATENTAMENTE:

ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

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# LABORATORIO Y CONSULTORIA, S.A. DE C.V.

CALLE MANUEL GARCIA GARCIA NO. 10102 COL. COL.DEPORTISTAS 6144170033 Chihuahua Chihuahua. 31125

## INFORME DE COMPACTACIONES

METODOS DE PRUEBA EMPLEADOS: ASTM-D-690, 698, 1557, 2216, 2922, 3017 VIGENTES

OBRA: 92 DISTRIBUIDOR ZOOTECHNIA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

Fecha de muestreo: 2016-09-09

REPRESENTANTE: ING. JUAN MANUEL RUACHO

Fecha de Informe: 2016-09-10

LOCALIDAD: Chihuahua Chihuahua

CONTRATISTA:

| No.                       | Ensaye             | Estación | Lado | Profundidad<br>Sondeo (cm) | MASA VOLUMÉTRICA                               |        | Humedad (%) |           | %<br>Compactación |
|---------------------------|--------------------|----------|------|----------------------------|------------------------------------------------|--------|-------------|-----------|-------------------|
|                           |                    |          |      |                            | Del Lugar                                      | Máxima | Optima      | Del Lugar |                   |
| 31                        | Prueba: 1          |          |      |                            | Tipo de Capa: 8A CAPA MURO DE TIERRA ARMADA    |        |             |           |                   |
|                           | % Especificado: 90 |          |      |                            | Localización: RAMPA ESTRIBO 1 60+025 AL 60+061 |        |             |           |                   |
|                           | A                  |          | D    | 30                         | 1904                                           | 1970   | 11,0        | 9,3       | 96,60             |
|                           | B                  |          | C    | 30                         | 1908                                           | 1970   | 11,0        | 7,3       | 96,90             |
|                           | C                  |          | I    | 30                         | 1871                                           | 1970   | 11,0        | 8,5       | 95,00             |
| Promedio de Compactación: |                    |          |      |                            |                                                |        |             |           | 96,17             |

LOS GRADOS DE COMPACTACION OBTENIDOS CUMPLEN CON EL ESPECIFICADO.

OBS:

ATENTAMENTE:

ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

LCO-COMP  
Página 1 de 1

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# LABORATORIO Y CONSULTORIA, S.A. DE C.V.

CALLE MANUEL GARCIA GARCIA NO. 10102 COL. COL.DEPORTISTAS 6144170033 Chihuahua Chihuahua. 31125

## INFORME DE COMPACTACIONES

METODOS DE PRUEBA EMPLEADOS: ASTM-D-690, 698, 1557, 2216, 2922, 3017 VIGENTES

OBRA: 92 DISTRIBUIDOR ZOOTECHNIA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

Fecha de muestreo: 2016-09-08

REPRESENTANTE: ING. JUAN MANUEL RUACHO

Fecha de Informe: 2016-09-09

LOCALIDAD: Chihuahua Chihuahua

CONTRATISTA:

| No.                       | Ensaye             | Estación | Lado | Profundidad<br>Sondeo (cm) | MASA VOLUMÉTRICA                               |        | Humedad (%) |           | %<br>Compactación |
|---------------------------|--------------------|----------|------|----------------------------|------------------------------------------------|--------|-------------|-----------|-------------------|
|                           |                    |          |      |                            | Del Lugar                                      | Máxima | Optima      | Del Lugar |                   |
| 30                        | Prueba: 1          |          |      |                            | Tipo de Capa: 7A CAPA MURO DE TIERRA ARMADA    |        |             |           |                   |
|                           | % Especificado: 90 |          |      |                            | Localización: RAMPA ESTRIBO 1 60+025 AL 60+061 |        |             |           |                   |
|                           | A                  |          | D    | 30                         | 1925                                           | 1970   | 11,0        | 7,1       | 97,70             |
|                           | B                  |          | C    | 30                         | 1966                                           | 1970   | 11,0        | 6,7       | 99,80             |
|                           | C                  |          | I    | 30                         | 1949                                           | 1970   | 11,0        | 7,1       | 98,90             |
| Promedio de Compactación: |                    |          |      |                            |                                                |        |             |           | 98,80             |

LOS GRADOS DE COMPACTACION OBTENIDOS CUMPLEN CON EL ESPECIFICADO.

OBS:

ATENTAMENTE:

ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

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# LABORATORIO Y CONSULTORIA, S.A. DE C.V.

CALLE MANUEL GARCIA GARCIA NO. 10102 COL. COL.DEPORTISTAS 6144170033 Chihuahua Chihuahua. 31125

## INFORME DE COMPACTACIONES

METODOS DE PRUEBA EMPLEADOS: ASTM-D-690, 698, 1557, 2216, 2922, 3017 VIGENTES

OBRA: 92 DISTRIBUIDOR ZOOTECA EJE 60

CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.

Fecha de muestreo: 2016-09-15

REPRESENTANTE: ING. JUAN MANUEL RUACHO

Fecha de Informe: 2016-09-16

LOCALIDAD: Chihuahua Chihuahua

CONTRATISTA:

| No.                       | Ensaye             | Estación | Lado | Profundidad<br>Sondeo (cm) | MASA VOLUMÉTRICA                          |        | Humedad (%) |           | %<br>Compactación |
|---------------------------|--------------------|----------|------|----------------------------|-------------------------------------------|--------|-------------|-----------|-------------------|
|                           |                    |          |      |                            | Del Lugar                                 | Máxima | Optima      | Del Lugar |                   |
| 35                        | Prueba: 1          |          |      |                            | Tipo de Capa: MURO DE TIERRA ARMADA       |        |             |           |                   |
|                           | % Especificado: 90 |          |      |                            | Localización: 8A. CAPA RAMPA ESTRIBO NO.7 |        |             |           |                   |
|                           | A                  |          | D    | 30                         | 1804                                      | 1970   | 11,0        | 8,1       | 91,60             |
|                           | B                  |          | C    | 30                         | 1894                                      | 1970   | 11,0        | 7,0       | 96,10             |
|                           | C                  |          | I    | 30                         | 1873                                      | 1970   | 11,0        | 6,7       | 95,10             |
| Promedio de Compactación: |                    |          |      |                            |                                           |        |             |           | 94,27             |

LOS GRADOS DE COMPACTACION OBTENIDOS CUMPLEN CON EL ESPECIFICADO.

OBS:

ATENTAMENTE:

ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

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INFORME DE RESISTENCIA A LA COMPRESION DE CILINDROS DE CONCRETO

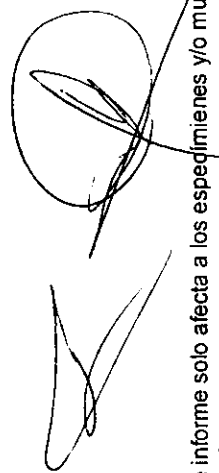
METODOS DE PRUEBA EMPLEADOS: NMX-C-083-2014, 109-2013, 156-2010, 160-2004, 161-2013, 435-2010 ONNCCE

OBRA: 92 DISTRIBUIDOR ZOOTECNIA EJE 60  
CLIENTE: CONSTRUCTORA SANTA ROSALIA S.A. DE C.V.  
REPRESENTANTE: ING. JUAN MANUEL RUACHO  
LOCALIDAD: CHIHUAHUA, CHIHUAHUA.

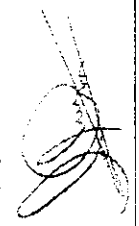
Fecha Informe:  
2016-09-12  
Fecha Ruptura:  
2016-09-10

CONTRATISTA:

| No.  | Elemento                                        |                | Localidad    |                | Rev          |               | Carga       |                 | Resistencia |           | Equipo de Mezclado |                       | Aditivo |            | Vibrado<br>Tipo de<br>Falla |
|------|-------------------------------------------------|----------------|--------------|----------------|--------------|---------------|-------------|-----------------|-------------|-----------|--------------------|-----------------------|---------|------------|-----------------------------|
|      | CIL                                             | Edad<br>(días) | Diam<br>(cm) | Altura<br>(cm) | Masa<br>(kg) | Area<br>(cm²) | Rev<br>(cm) | (Kgf)           | (N)         | (kgf/cm²) | (kPa)              | f'c Proy<br>(kgf/cm²) | % Resis | Fecha      |                             |
| 41   | LOSA DE PUENTE                                  |                |              |                |              |               |             |                 |             |           |                    |                       |         |            |                             |
|      | A                                               | 7              | 15.0         | 30.0           | 12.5         | 176.6         | 12.0        | 30948           | 303507      | 175.21    | 17182,23           | 250                   | 70.1    | 2016-09-03 | Si                          |
|      | LA RESISTENCIA OBTENIDA SE CONSIDERA ACEPTABLE. |                |              |                |              |               |             |                 |             |           |                    |                       |         |            |                             |
| RN:  |                                                 | SI(X) NO()     | BOMBEADO:    |                | SI(X) NO()   | T. MAX.:      |             | VOLUMEN COLADO: |             | 91,00     | m³                 | REV PROY.:            |         | 14         | cm                          |
| 29°C |                                                 |                |              |                |              |               |             |                 |             |           |                    |                       |         |            |                             |
| 42   | LOSA DE PUENTE                                  |                |              |                |              |               |             |                 |             |           |                    |                       |         |            |                             |
|      | A                                               | 7              | 15.0         | 30.0           | 12.5         | 176.6         | 11,0        | 32024           | 314059      | 181,31    | 17780,44           | 250                   | 72,5    | 2016-09-03 | Si                          |
|      | LA RESISTENCIA OBTENIDA SE CONSIDERA ACEPTABLE. |                |              |                |              |               |             |                 |             |           |                    |                       |         |            |                             |
| RN:  |                                                 | SI(X) NO()     | BOMBEADO:    |                | SI(X) NO(X)  | T. MAX.:      |             | VOLUMEN COLADO: |             | 91,00     | m³                 | REV PROY.:            |         | 14         | cm                          |
| 29°C |                                                 |                |              |                |              |               |             |                 |             |           |                    |                       |         |            |                             |



ATENTAMENTE:



ING. MYRNA IBARRA APARICIO  
GERENTE TECNICO

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