

Inicio Inyección C/Mez. A

Durante el incremento suave del caudal en 3 Lpm y manteniéndolo por 5 min en cada paso:
 Determinar P_{MAX}
 O
 Aumentar a Q_{MAX} de 20 Lpm

Cada 400 lit inyectados CHEQUEAR SI La Penetrabilidad esta:
 Disminuyendo
 O
 Constante
 O
 El Cierre ha sido Alcanzado


ENGROSAR MEZCLA:
 A 400 L a MEZCLA B:
 SI $P' < 20\% P_{MAX}$ O Pent. es CONSTANTE
 A > 800 L a la siguiente mezcla "mas gruesa":
 SI $P' < 30\% P_{MAX}$ O Pent. es CONSTANTE
 A 4000 L a MEZCLA E:
 SI $P' < 30\% P_{MAX}$ Y Pent. < 10 Lpm/m/bar
 A 8000 L a MEZCLA Celbex:

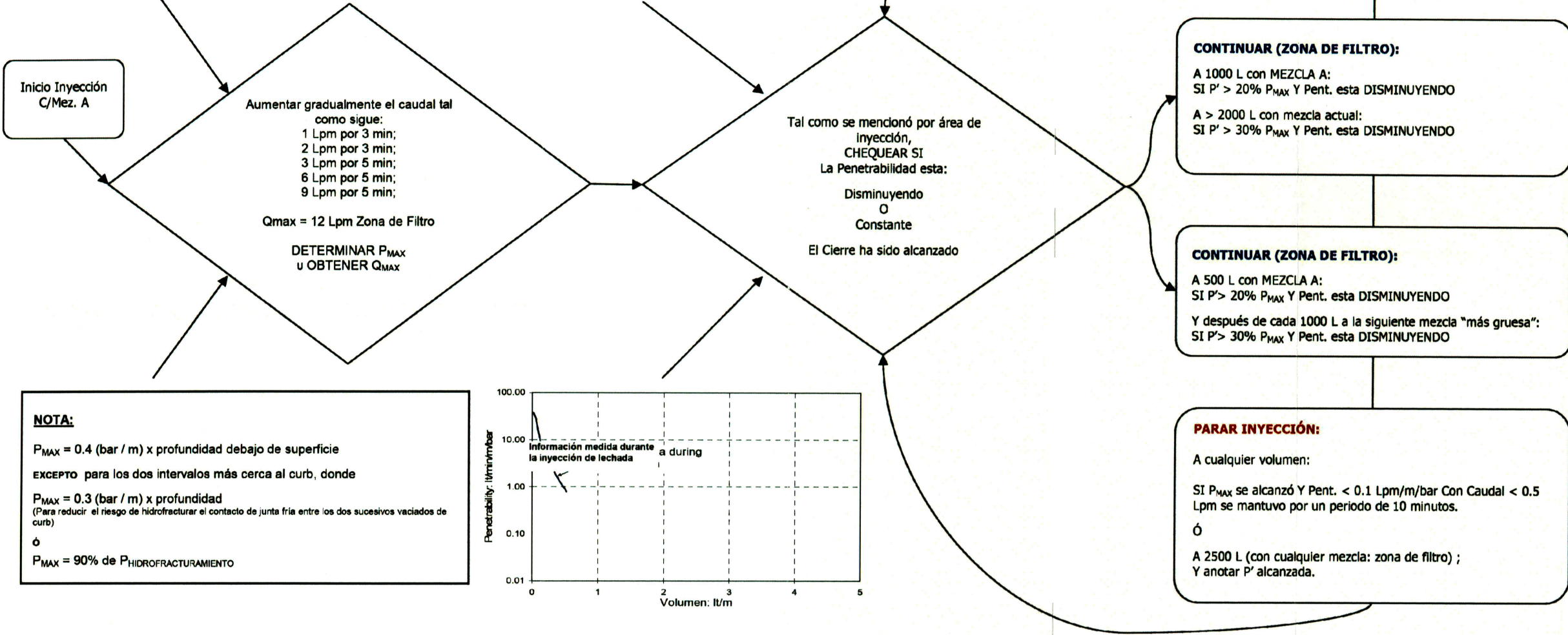
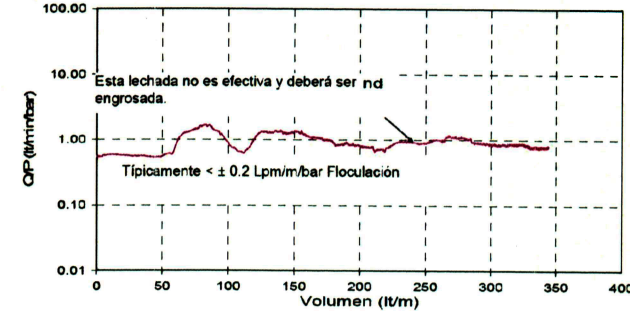
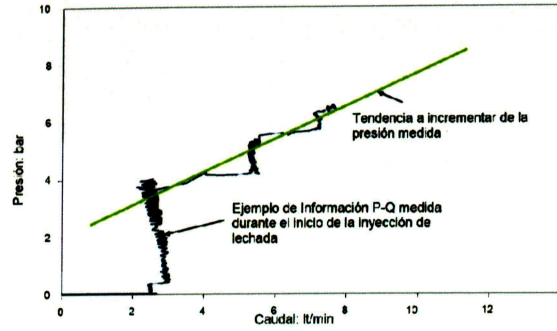
LLAMAR AL SUPERVISOR DE INYECCIONES :
 A 4000 L:
 SI $P' < 5\% P_{MAX}$ Y Pent. > 10 Lpm/m/bar
 A 8000 L:
 SI $P' < 30\% P_{MAX}$

CONTINUAR:
 A 400 L con MEZCLA A:
 SI $P' > 20\% P_{MAX}$ Y Pent esta DISMINUYENDO
 A > 800 L con la mezcla actual:
 SI $P' > 30\% P_{MAX}$ Y Pent esta DISMINUYENDO
 A 4000 L con la mezcla actual:
 SI $P' > 30\% P_{MAX}$ Y Pent < 10 Lpm/m/bar
 A 8000 L con la mezcla actual:
 SI $P' > 30\% P_{MAX}$ Y Pent esta DISMINUYENDO

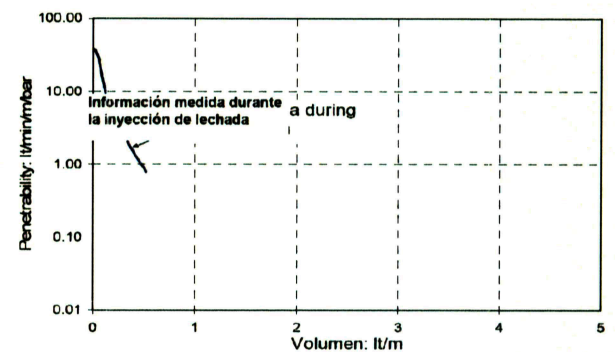
PARAR LA INYECCIÓN:
 En cualquier Volumen:
 SI P_{MAX} se alcanzó Y Penetrabilidad. < 0.1 Lpm/m/bar Y mantener por un periodo de 10 minutos.
 O
 A 10,000 L (con cualquier mezcla): Y anotar la P' alcanzada.

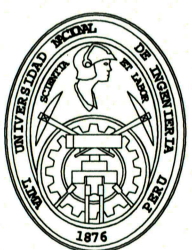
NOTA:
 $P_{MAX} = 0.5 \text{ (bar / m)} \times \text{profundidad debajo de cobertura / contacto roca} \text{ } \hat{O} \text{ } 90\% P_{HIDROFRACTURAMIENTO}$

| | | |
|---|--|---|
|  | TESIS "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD" | DIAGRAMA DE FLUJO PARA INYECCIÓN EN ROCA FIGURA II-2 |
| | FACULTAD INGENIERÍA CIVIL | |
| | AUTOR JUAN VELARDE M. | |
| | FECHA FEBRERO, 2009 | |

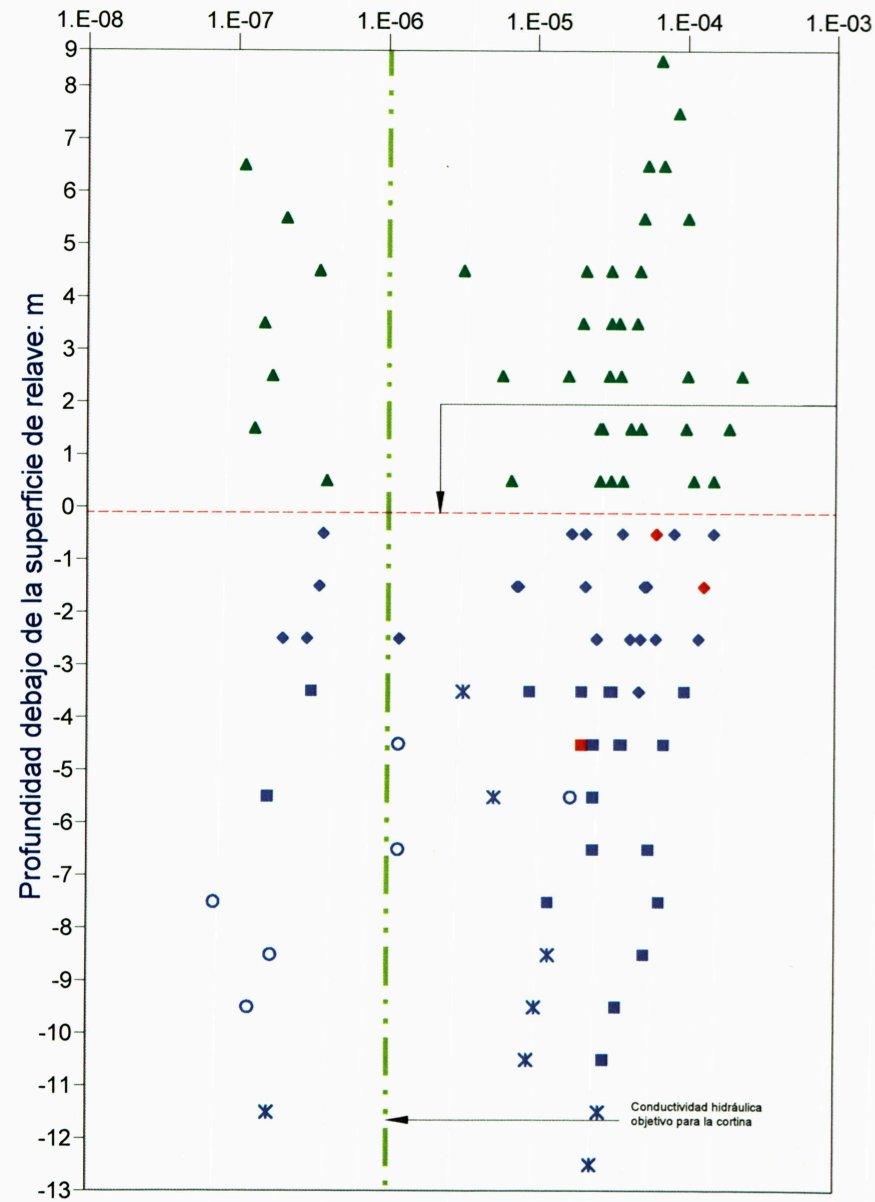


NOTA:
 $P_{MAX} = 0.4 \text{ (bar / m)} \times \text{profundidad debajo de superficie}$
 EXCEPTO para los dos intervalos más cerca al curb, donde
 $P_{MAX} = 0.3 \text{ (bar / m)} \times \text{profundidad}$
 (Para reducir el riesgo de hidrofracturar el contacto de junta fría entre los dos sucesivos vaciados de curb)
 ó
 $P_{MAX} = 90\%$ de $P_{HIDROFRACTURAMIENTO}$

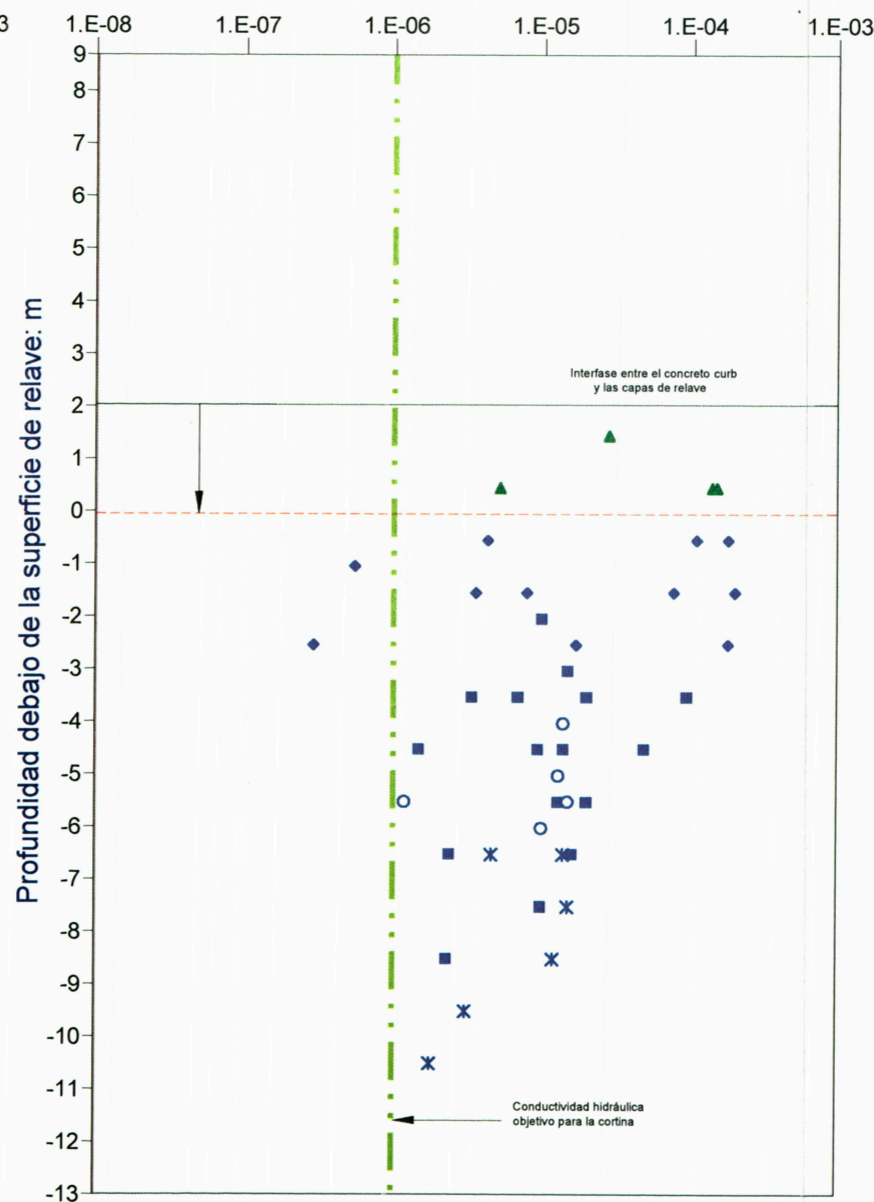


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|---|---|--|------------------|
|  | TESIS "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD" | DIAGRAMA DE FLUJO PARA INYECCIÓN EN SUELO FIGURA II-3 | |
| | FACULTAD | | INGENIERÍA CIVIL |
| | AUTOR | | JUAN VELARDE M. |
| FECHA | FEBRERO, 2009 | | |

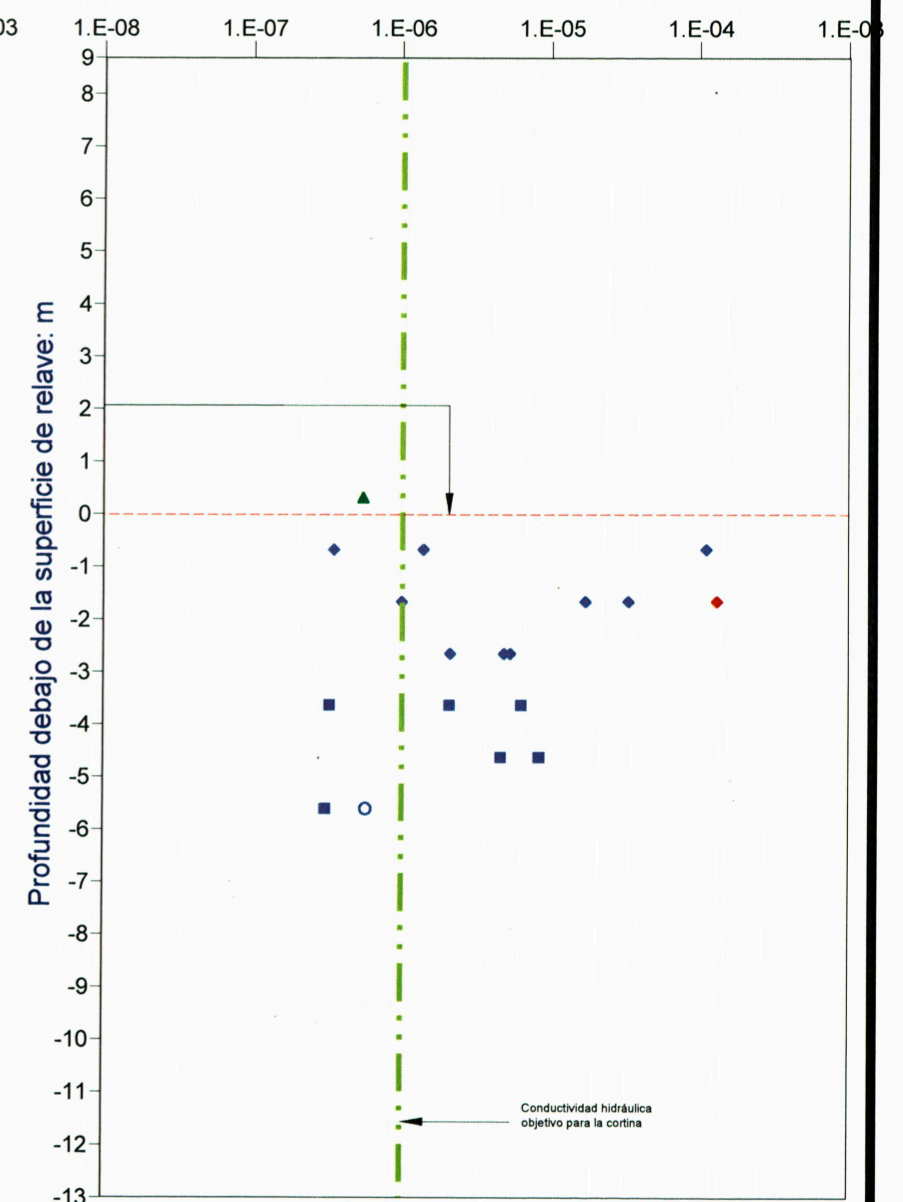
(a) Antes de la Inyección
(previo a inyección primaria de filas externas)
Conductividad Hidráulica: m/s



(b) En progreso
(después de inyección secundaria de fila central TB)
Conductividad Hidráulica: m/s



(c) Cerca al Cierre
(después de inyección terciaria en la fila central MF)
Conductividad Hidráulica: m/s



- ◆ Filtro 2B; Absorción de lechada baja
- ◆ Filtro 2B; Absorción de lechada alta
- Filtro 3A; Absorción de lechada baja
- Filtro 3A; Absorción de lechada alta
- Filtro 3B; Absorción de lechada baja
- Filtro 3B; Absorción de lechada alta
- ✕ Roca; Absorción de lechada baja
- ✖ Roca; Absorción de lechada alta
- ▲ Relaves

| | | |
|--|--|------------------|
| | TESIS "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD" | |
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| | FECHA | FEBRERO, 2009 |

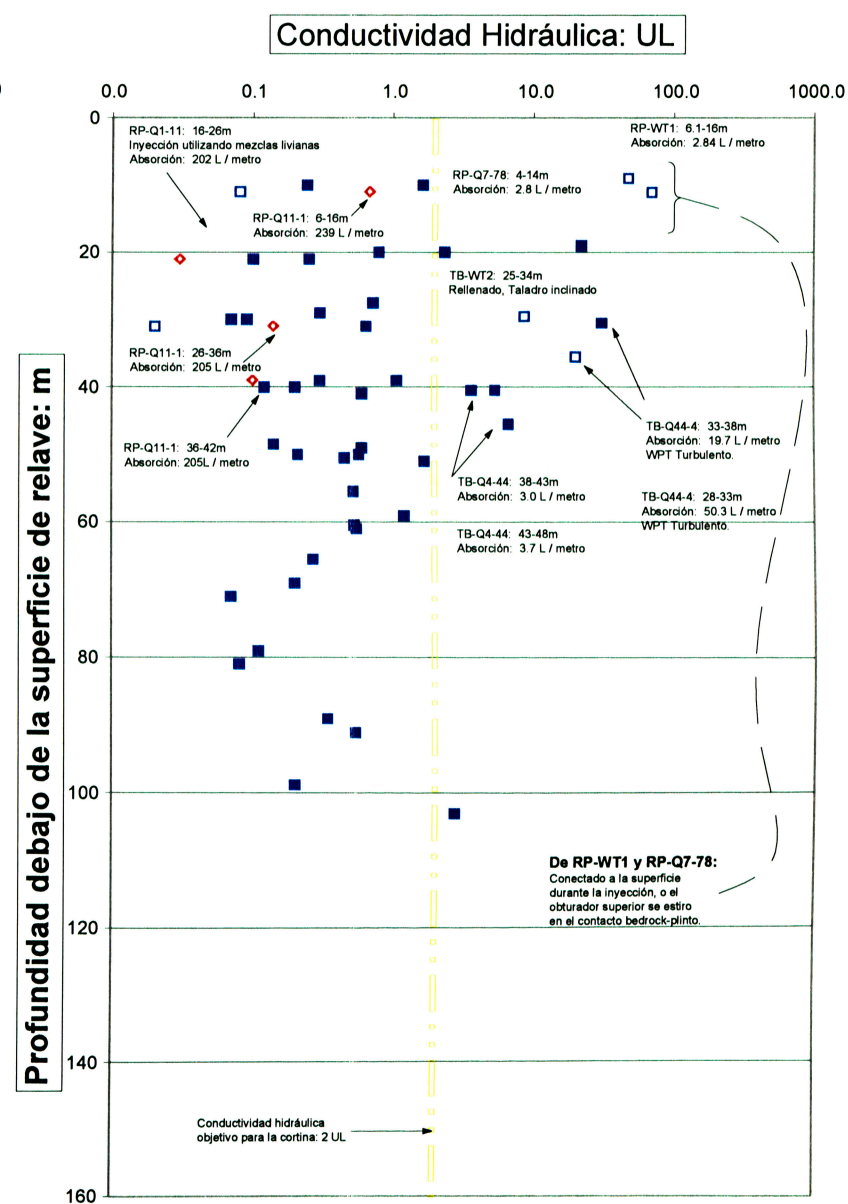
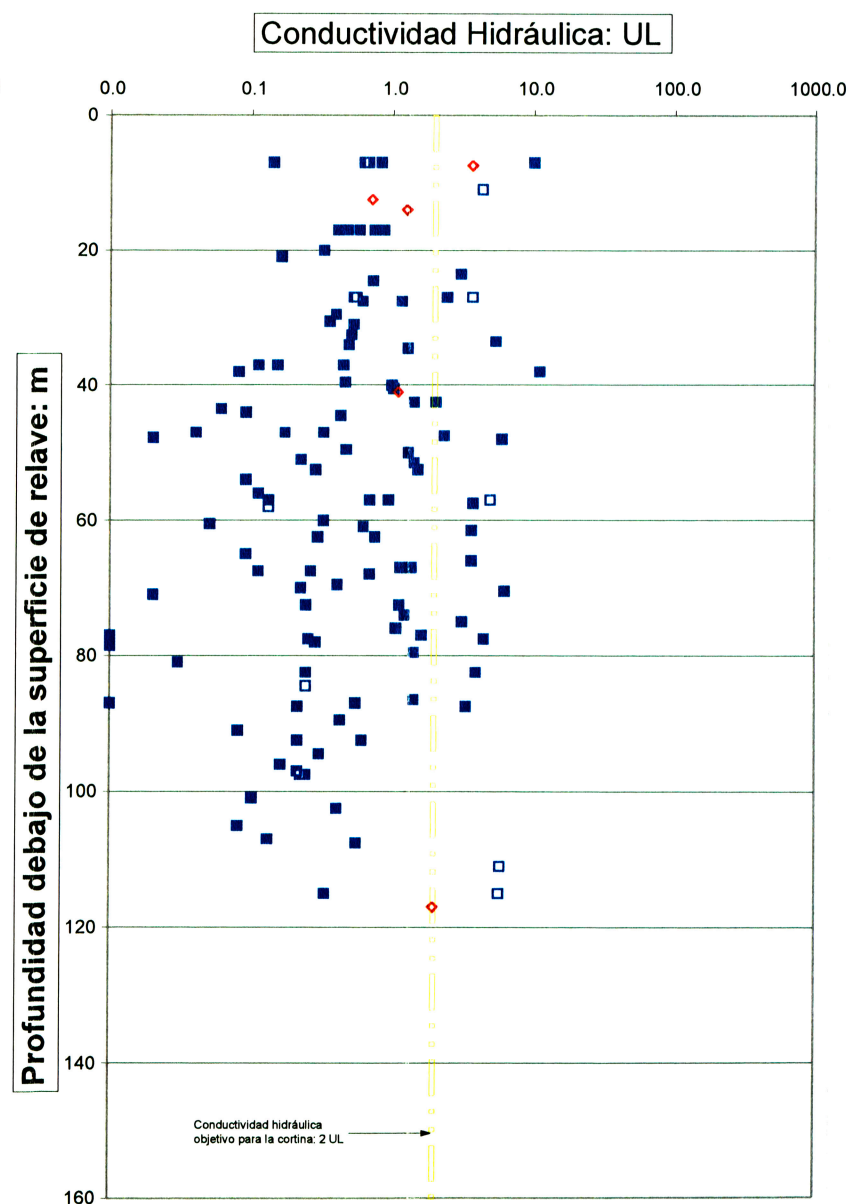
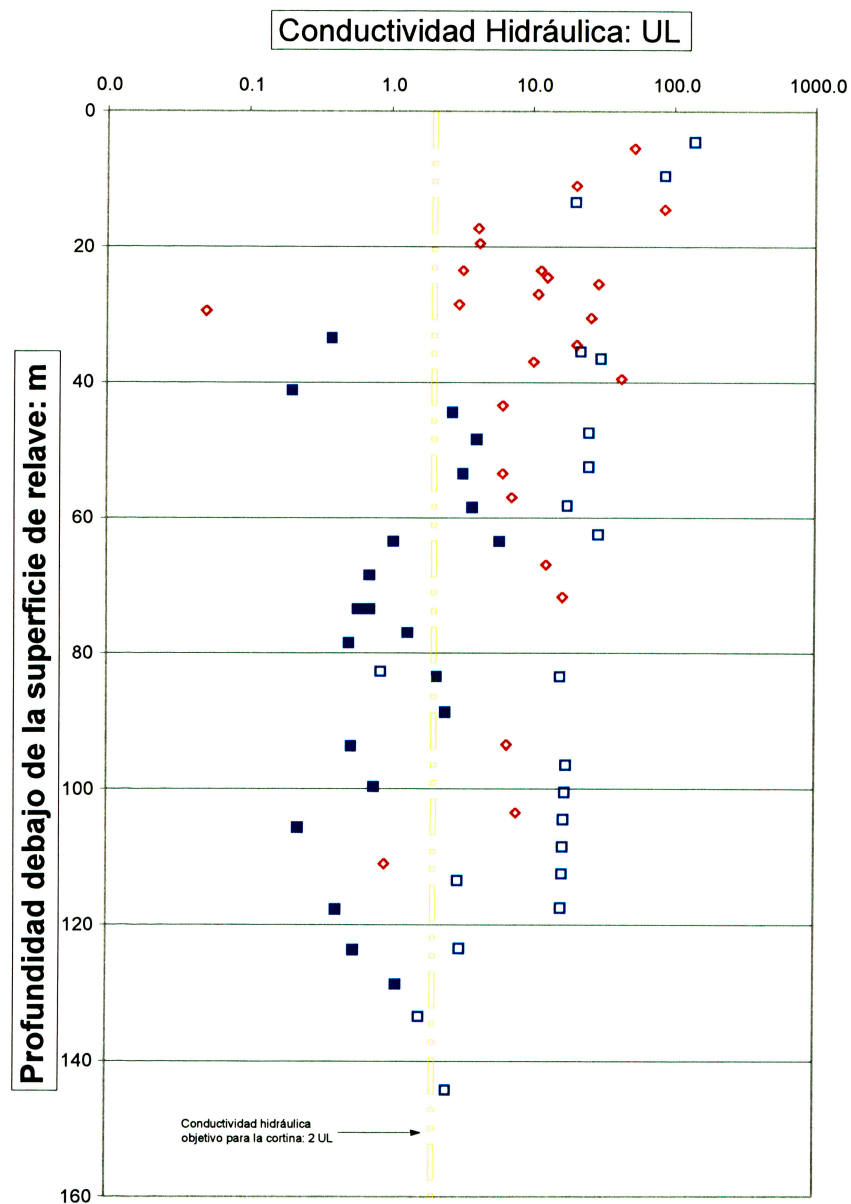
GRÁFICOS RESUMEN DE LAS PRUEBAS DE AGUA TUBOS MANGUITO ZONA DE FILTRO

FIGURA IX-1

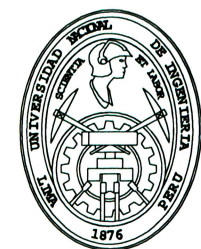
(a) Antes de la Inyección (previo a inyección primaria)

(b) En progreso (después de inyección secundaria)

(c) Cerca al Cierre (después de inyección terciaria y dentro de taladros de confirmación)



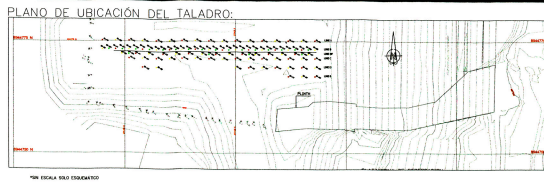
- Prueba de agua completa cierre alcanzado durante la inyección de este tramo
- Prueba de agua limitada por el caudal o Lavado cierre alcanzado durante la inyección de este tramo
- ◇ Prueba de agua completa; pero el cierre no fue alcanzado durante la inyección de este tramo.
- ◇ Prueba de agua limitada por el caudal o Lavado; pero el cierre no fue alcanzado durante la inyección de este tramo



| | |
|----------|--|
| TESIS | "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD" |
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| FECHA | FEBRERO, 2009 |

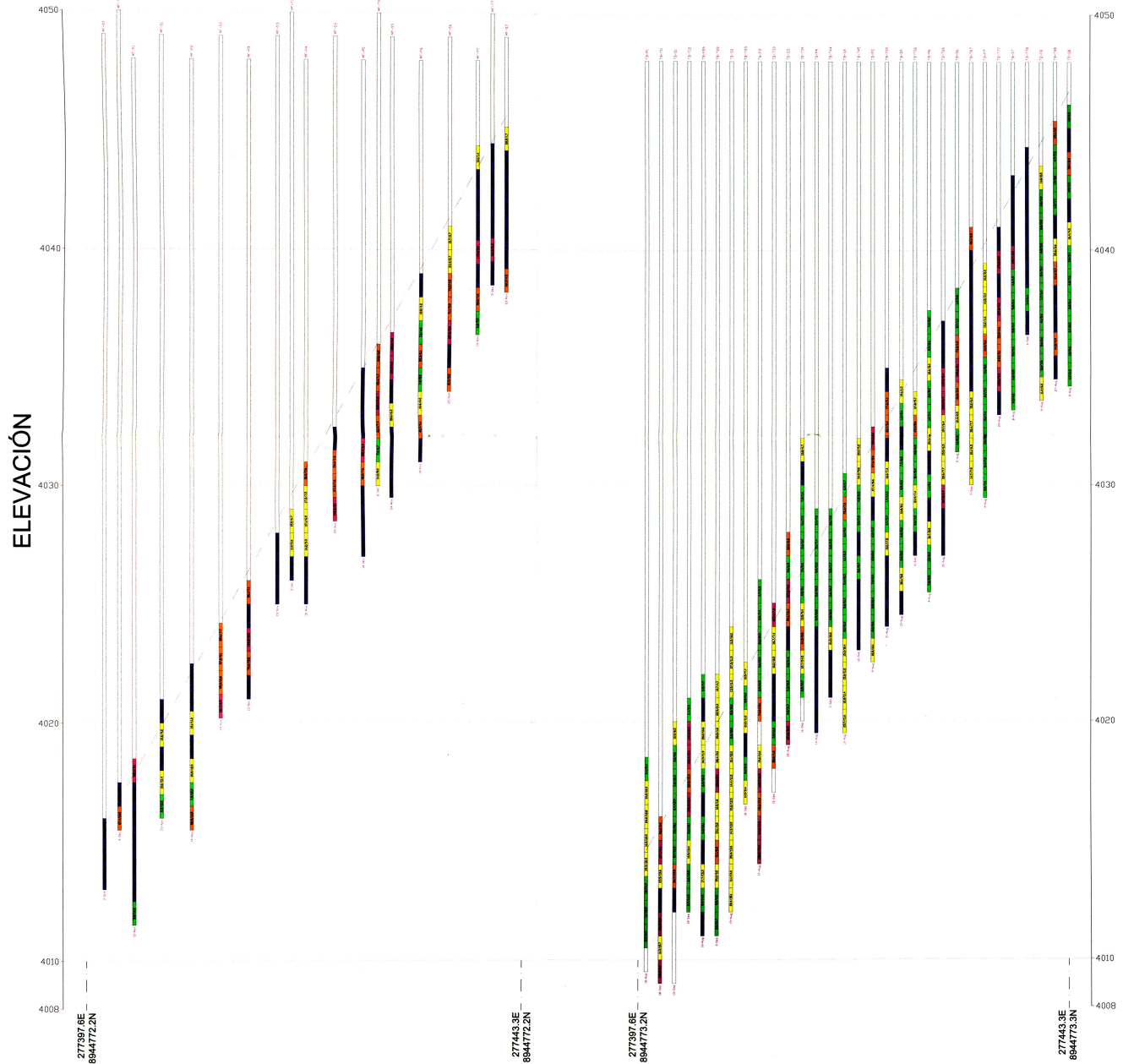
GRÁFICOS RESUMEN DE LAS PRUEBAS DE AGUA PLINTO Y EXTENSIÓN DE CORTINA

FIGURA IX-2



FILA MF

FILA TB



LEYENDA:

| ABSORCIÓN DE LECHADA: | |
|-----------------------|---------------|
| MUY BAJA | 0.0 - 10.0 |
| BAJA | 10.0 - 40.0 |
| MODERADA | 40.0 - 100.0 |
| ALTA | 100.0 - 200.0 |
| MUY ALTA | > 200.0 |

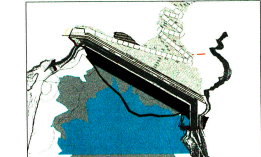
VOLUMEN INYECTADO POR TRAMO (LITROS) 4.7/6.9 PRESIÓN OBTENIDA (BARS)

CONCRETO CURB

NOTAS:

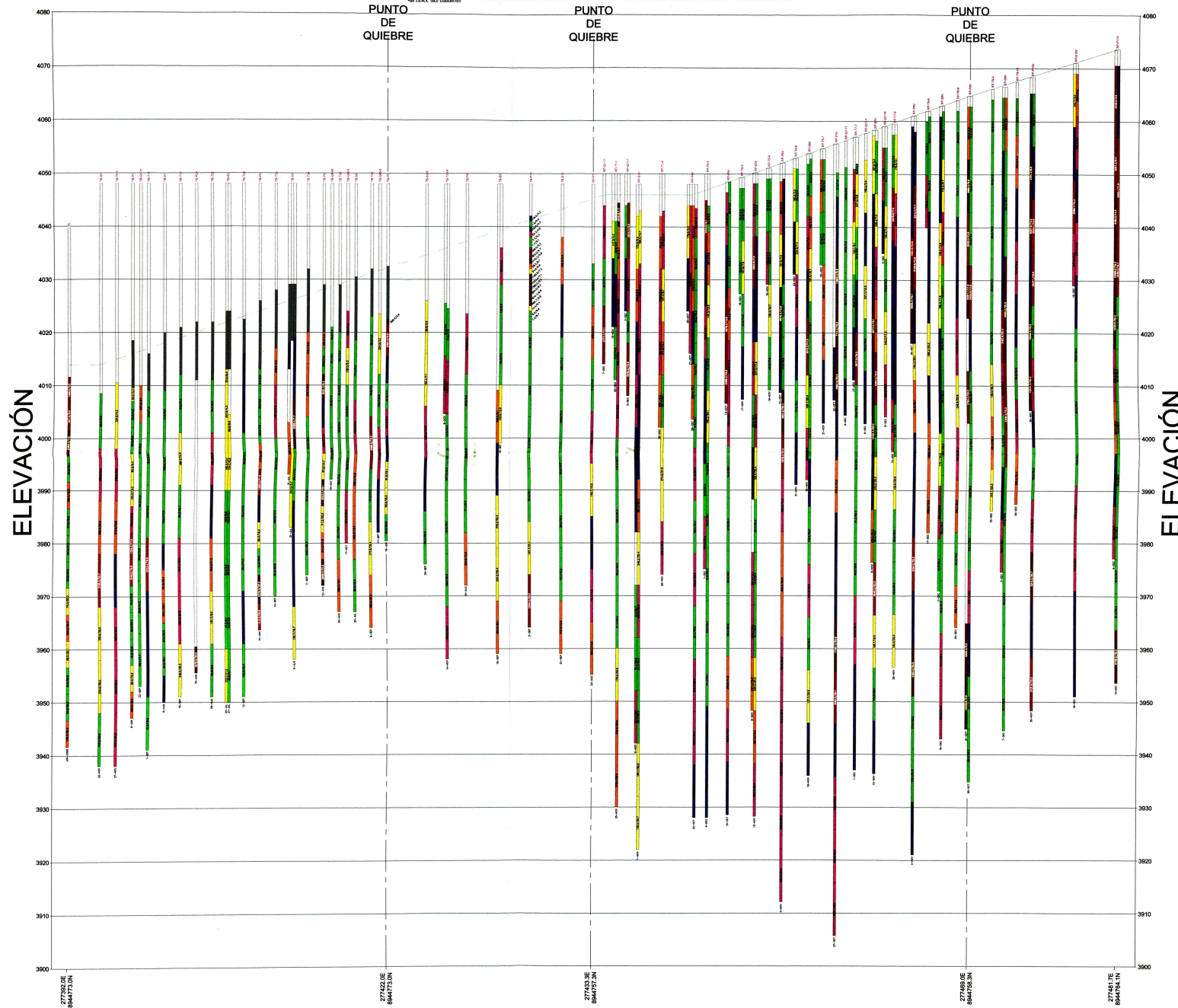
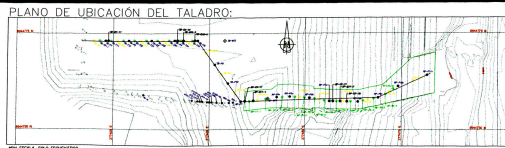
- DATUM: COORDENADAS UTM ZONA 18S, ELIPSOIDE PSAD56
- TODAS LAS DIMENSIONES MOSTRADAS ESTAN EN METROS
- LAS PIEDRAS DE INYECCIÓN DADAS CORRESPONDEN A 60-MM.
- PARA UNA PRESENTACIÓN VISUAL, ESTE PERFIL ESTA ESCALADO A UNA PROPORCIÓN DE HORIZONTAL:VERTICAL DE 1:2.5
- LA FILA MF ESTA UBICADA 1m AGUAS ARRIBA DE LA FILA CENTRAL TB.
- EL CRITERIO DE SUBDIVISIÓN DE LAS ABSORCIONES DE LECHADA SE DESARROLLÓ ESPECIFICAMENTE PARA LA INYECCIÓN DE MATERIALES GRANULARES.

UBICACIÓN DEL ÁREA DE TRABAJO:



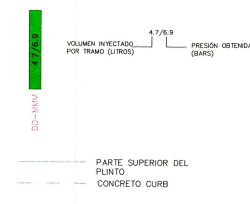
TÍTULO: IMPERMEABILIZACIÓN DEL MACIZO PROYECTO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES. APLICACIÓN METODOLÓGICA Y ASESORAMIENTO DE CALIDAD.
 AUTOR: JUAN VELARDE M.
 FECHA: FEBRERO, 2009

PRESA DE RELAVES - ESTRIBO DERECHO
 PERFIL DE ABSORCIÓN DE LECHADA DE LA ZONA DE FILTRO
 FIGURA VI-1

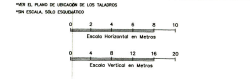
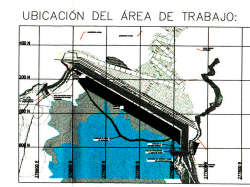


LEYENDA:

| | ABSORCIÓN DE LECHADA: (L/m ³) |
|-------------|--|
| Verde | MEY BAJA 0.0 - 12.5 |
| Amarillo | BAJO 12.5 - 25.0 |
| Naranja | MODERADAMENTE BAJA 25.0 - 50.0 |
| Rojo | MODERADO 50.0 - 100.0 |
| Púrpura | MODERADAMENTE ALTO 100.0 - 200.0 |
| Negro | ALTO 200.0 - 400.0 |
| Rojo oscuro | MEY ALTO > 400.0 |



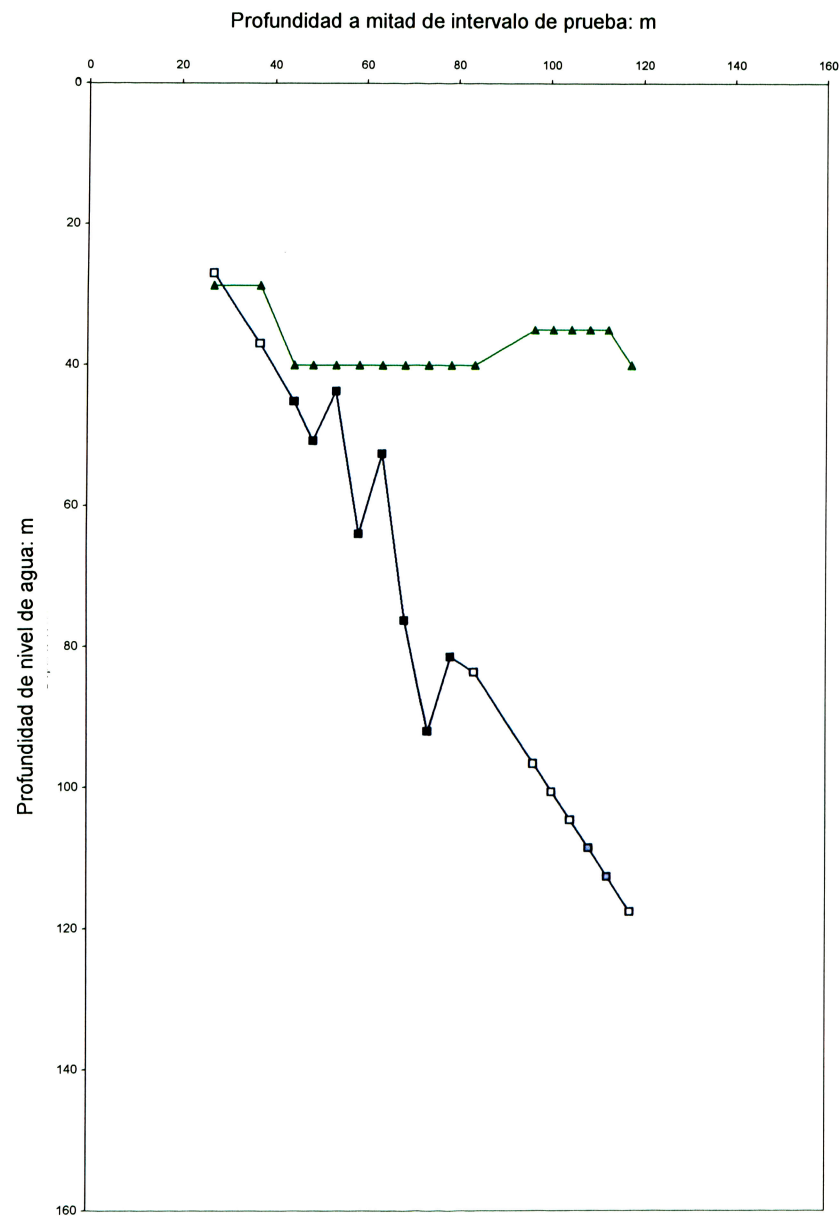
- NOTAS:
1. DATUM COORDINADO UN ZONA 16S, ELIPSOIDE PSAD56.
 2. TODAS LAS DIMENSIONES MOSTRADAS ESTAN EN METROS.
 3. LAS ABSORCIONES Y PRESION DENTRO DE LA ZONA DE FILTRO SE MOSTRÓ EN LA FIGURA VI-1.
 4. LOS 30CM SUPERIORES DEL TALADRO 18-110 EN UNA Roca MUY DERCANAMENTE FRACTURADA FUE TERMINADO MEDIANTE TUBOS MANDILTO.
 5. LAS FECHAS DE INYECCION DADAS CORRESPONDIEN A 00-00M.



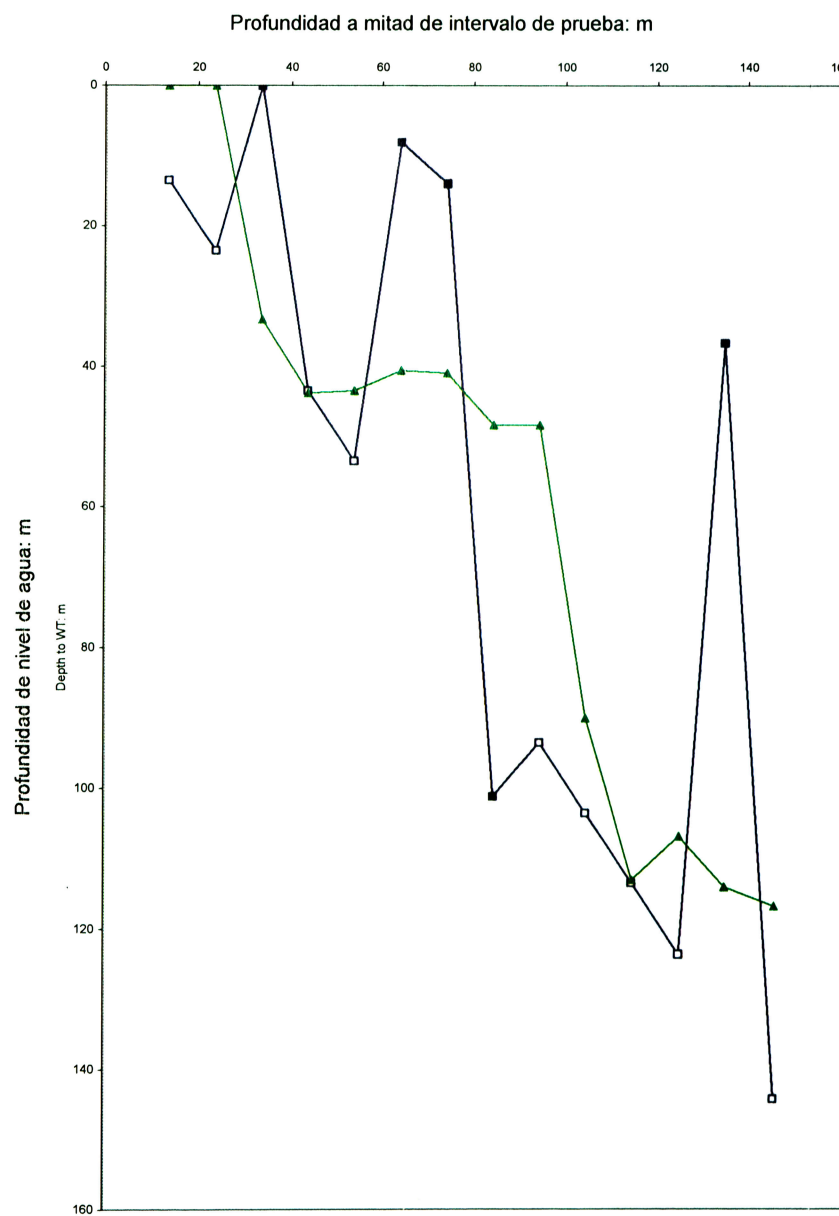
TRABAJOS DE IMPERMEABILIZACIÓN DEL MAZACO ROCOSO EN UNA PRESA DE RELIEVES EMPLEANDO INYECCIONES- APLICACIÓN METODOLÓGICA Y ASEGURAMIENTO DE CALIDAD
 PROYECTO: INGENIERÍA CIVIL
 AUTOR: JUAN VELARDE M.
 FECHA: FEBRERO, 2009

PRESA DE RELAVES - ESTRIBO DERECHO
 PERFIL DE ABSORCIÓN DE LECHADA PLINTO Y EXTENSIÓN DE CORTINA
 FIGURA VI-2

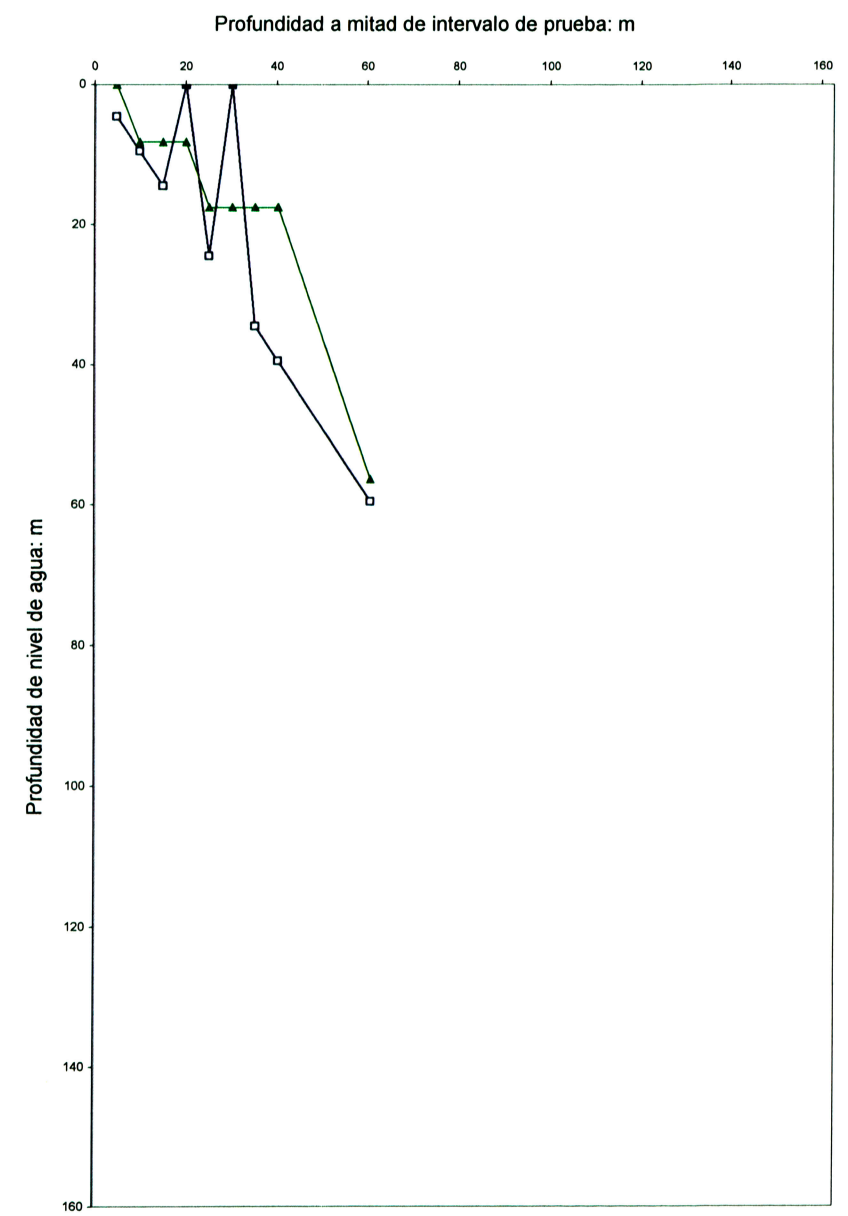
(a) RP-P5v: Profundidad a mitad de intervalo de prueba vs. Profundidad de nivel de agua



(b) RP-P7v: Profundidad a mitad de intervalo de prueba vs. Profundidad de nivel de agua



(c) RP-P9v: Profundidad a mitad de intervalo de prueba vs. Profundidad de nivel de agua



LEYENDA

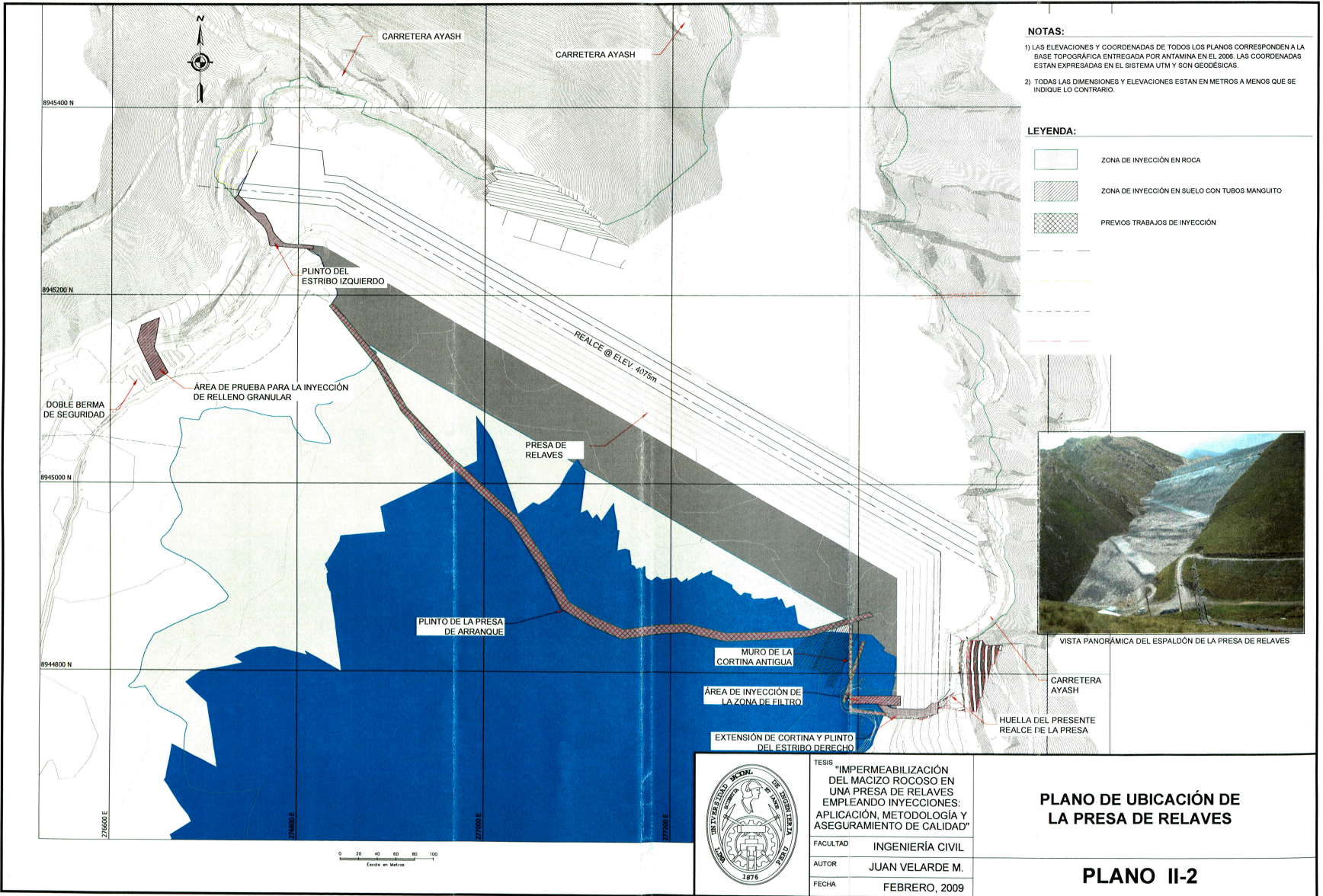
- Análisis Detallado: Prueba de agua en 5 etapas
- Análisis Detallado: Limitado por capacidad de la bomba
- ▲ Análisis de Prueba Lugeon estándar: Formato de campo



TESIS
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 FECHA FEBRERO, 2009

SUPERPOSICIÓN DE PRUEBAS DE AGUA, ABSORCIÓN DE LECHADA Y GEOLOGÍA PLINTO Y EXTENSIÓN DE CORTINA

FIGURA XI-1



NOTAS:

- 1) LAS ELEVACIONES Y COORDENADAS DE TODOS LOS PLANOS CORRESPONDEN A LA BASE TOPOGRÁFICA ENTREGADA POR ANTA MINA EN EL 2006. LAS COORDENADAS ESTAN EXPRESADAS EN EL SISTEMA UTM Y SON GEODÉSICAS.
- 2) TODAS LAS DIMENSIONES Y ELEVACIONES ESTAN EN METROS A MENOS QUE SE INDIQUE LO CONTRARIO.

LEYENDA:

- ZONA DE INYECCIÓN EN ROCA
- ZONA DE INYECCIÓN EN SUELO CON TUBOS MANGUITO
- PREVIOS TRABAJOS DE INYECCIÓN



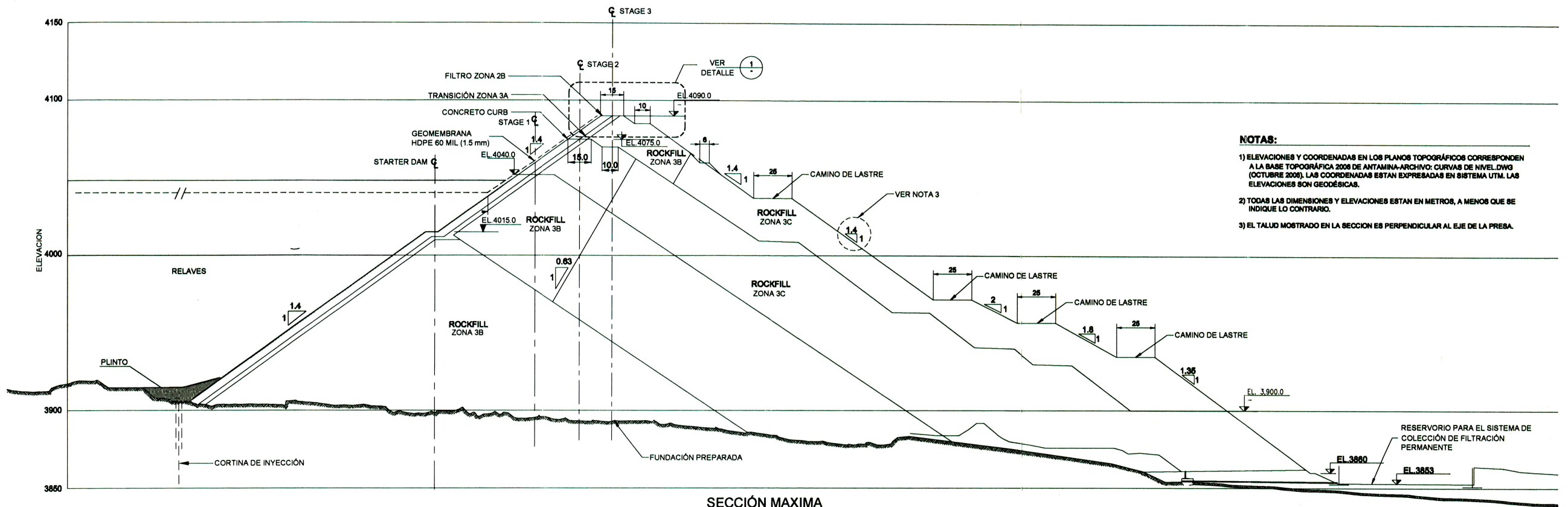
VISTA PANORÁMICA DEL ESPALDÓN DE LA PRESA DE RELAVES



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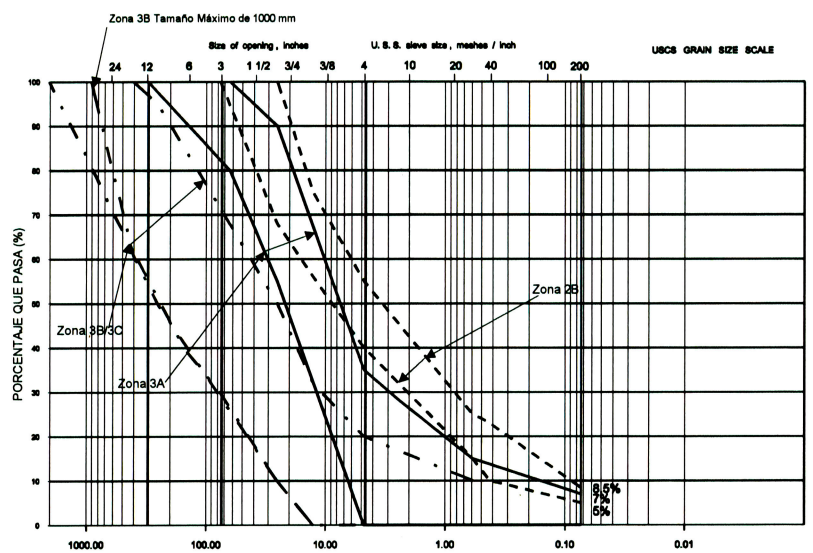
PLANO DE UBICACIÓN DE LA PRESA DE RELAVES

PLANO II-2

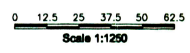


- NOTAS:**
- 1) ELEVACIONES Y COORDENADAS EN LOS PLANOS TOPOGRÁFICOS CORRESPONDEN A LA BASE TOPOGRÁFICA 2008 DE ANTIMINA-ARCHIVO: CURVAS DE NIVEL.DWG (OCTUBRE 2008). LAS COORDENADAS ESTAN EXPRESADAS EN SISTEMA UTM. LAS ELEVACIONES SON GEODÉSICAS.
 - 2) TODAS LAS DIMENSIONES Y ELEVACIONES ESTAN EN METROS, A MENOS QUE SE INDIQUE LO CONTRARIO.
 - 3) EL TALUD MOSTRADO EN LA SECCION ES PERPENDICULAR AL EJE DE LA PRESA.

LIMITES DE GRANULOMETRÍA



SECCIÓN MAXIMA

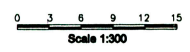


CUADRO RESUMEN DE LAS ZONAS DE PRESA

| ZONA | FUNCIÓN | DESCRIPCIÓN | TAMAÑO MÁXIMO (mm) | CAPA DE COLOCACIÓN (mm) | EQUIPO DE COMPACTACIÓN | NÚMERO DE PASADAS |
|------|------------------------------------|----------------------------------|--------------------|-------------------------|------------------------|-------------------|
| 2B | Filtro | Grava y Arena Procesada | 75 | 0.60 | 10 t | 7 |
| 3A | Zona de transición | Cantos procesados, grava y arena | 300 | 0.60 | Vibración de 10 t | 4 |
| 3B | Enrocado Principal | Roca del tajo abierto | 1000 | 1.00 | Vibración de 10 t | 6 |
| 3C | Enrocado del Terraplén Aguas Abajo | Roca del tajo abierto | 2000 | 2.00 | Vibración de 10 t | 6 |

* COMPACTADO A UNA DENSIDAD SECA DE AL MENOS 95% DE LA MÁXIMA DENSIDAD SECA PARA LA COMPACTACIÓN DE PROCTOR STANDARD

DETALLE DE LA CRESTA



TESIS "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD"

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FECHA FEBRERO, 2009

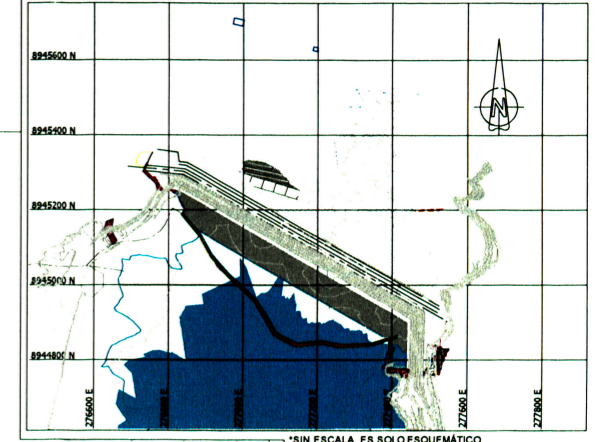
ZONIFICACIÓN Y SECCIÓN DE LA PRESA DE RELAVES DE ANTIMINA

PLANO II-3

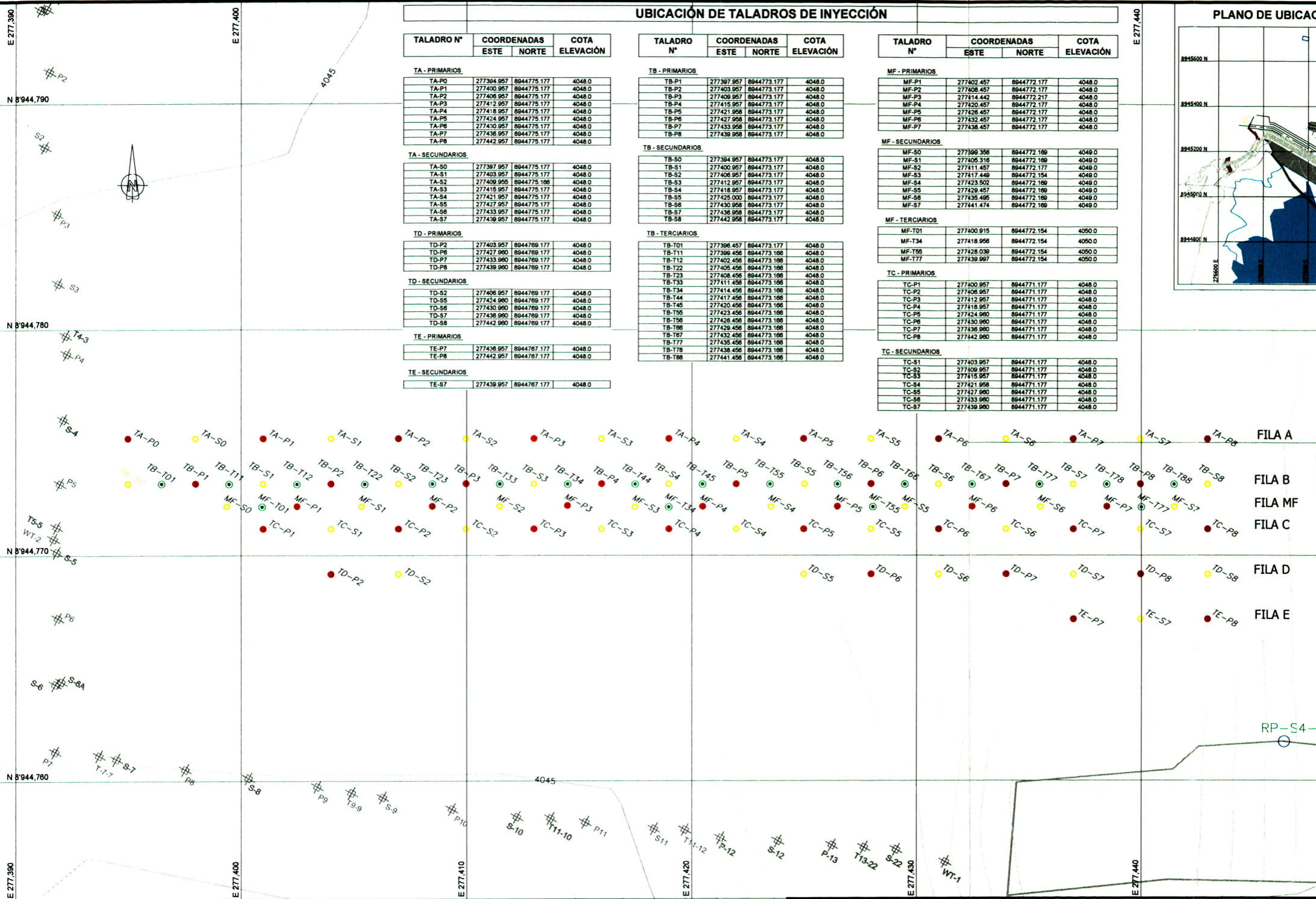
UBICACIÓN DE TALADROS DE INYECCIÓN

| TALADRO N° | COORDENADAS | | COTA ELEVACIÓN | TALADRO N° | COORDENADAS | | COTA ELEVACIÓN | TALADRO N° | COORDENADAS | | COTA ELEVACIÓN | | | | |
|-------------------------|-------------|-------------|----------------|------------|-------------|-------|----------------|------------|-------------|-------|----------------|--|--|--|--|
| | ESTE | NORTE | | | ESTE | NORTE | | | ESTE | NORTE | | | | | |
| TA - PRIMARIOS | | | | | | | | | | | | | | | |
| TA-P0 | 277394.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P1 | 277400.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P2 | 277406.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P3 | 277412.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P4 | 277418.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P5 | 277424.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P6 | 277430.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P7 | 277436.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-P8 | 277442.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA - SECUNDARIOS | | | | | | | | | | | | | | | |
| TA-S0 | 277397.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-S1 | 277403.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-S2 | 277409.956 | 8944775.196 | 4048.0 | | | | | | | | | | | | |
| TA-S3 | 277415.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-S4 | 277421.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-S5 | 277427.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-S6 | 277433.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TA-S7 | 277439.957 | 8944775.177 | 4048.0 | | | | | | | | | | | | |
| TD - PRIMARIOS | | | | | | | | | | | | | | | |
| TD-P2 | 277403.957 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-P6 | 277427.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-P7 | 277433.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-P8 | 277439.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD - SECUNDARIOS | | | | | | | | | | | | | | | |
| TD-S2 | 277406.957 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-S5 | 277424.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-S6 | 277430.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-S7 | 277436.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TD-S8 | 277442.960 | 8944769.177 | 4048.0 | | | | | | | | | | | | |
| TE - PRIMARIOS | | | | | | | | | | | | | | | |
| TE-P7 | 277436.957 | 8944767.177 | 4048.0 | | | | | | | | | | | | |
| TE-P8 | 277442.957 | 8944767.177 | 4048.0 | | | | | | | | | | | | |
| TE - SECUNDARIOS | | | | | | | | | | | | | | | |
| TE-S7 | 277439.957 | 8944767.177 | 4048.0 | | | | | | | | | | | | |
| TB - PRIMARIOS | | | | | | | | | | | | | | | |
| TB-P1 | 277397.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P2 | 277403.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P3 | 277409.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P4 | 277415.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P5 | 277421.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P6 | 277427.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P7 | 277433.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-P8 | 277439.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB - SECUNDARIOS | | | | | | | | | | | | | | | |
| TB-S0 | 277394.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S1 | 277400.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S2 | 277406.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S3 | 277412.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S4 | 277418.957 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S5 | 277425.000 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S6 | 277430.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S7 | 277436.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-S8 | 277442.956 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB - TERCARIOS | | | | | | | | | | | | | | | |
| TB-T01 | 277396.457 | 8944773.177 | 4048.0 | | | | | | | | | | | | |
| TB-T11 | 277399.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T12 | 277402.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T22 | 277405.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T23 | 277408.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T33 | 277411.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T34 | 277414.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T44 | 277417.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T45 | 277420.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T55 | 277423.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T56 | 277426.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T66 | 277429.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T67 | 277432.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T77 | 277435.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T78 | 277438.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| TB-T88 | 277441.456 | 8944773.166 | 4048.0 | | | | | | | | | | | | |
| MF - PRIMARIOS | | | | | | | | | | | | | | | |
| MF-P1 | 277402.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF-P2 | 277408.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF-P3 | 277414.442 | 8944772.217 | 4048.0 | | | | | | | | | | | | |
| MF-P4 | 277420.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF-P5 | 277426.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF-P6 | 277432.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF-P7 | 277438.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF - SECUNDARIOS | | | | | | | | | | | | | | | |
| MF-S0 | 277399.356 | 8944772.169 | 4048.0 | | | | | | | | | | | | |
| MF-S1 | 277405.316 | 8944772.169 | 4048.0 | | | | | | | | | | | | |
| MF-S2 | 277411.457 | 8944772.177 | 4048.0 | | | | | | | | | | | | |
| MF-S3 | 277417.449 | 8944772.154 | 4048.0 | | | | | | | | | | | | |
| MF-S4 | 277423.502 | 8944772.169 | 4048.0 | | | | | | | | | | | | |
| MF-S5 | 277429.457 | 8944772.169 | 4048.0 | | | | | | | | | | | | |
| MF-S6 | 277435.495 | 8944772.169 | 4048.0 | | | | | | | | | | | | |
| MF-S7 | 277441.474 | 8944772.169 | 4048.0 | | | | | | | | | | | | |
| MF - TERCARIOS | | | | | | | | | | | | | | | |
| MF-T01 | 277400.915 | 8944772.154 | 4050.0 | | | | | | | | | | | | |
| MF-T34 | 277418.956 | 8944772.154 | 4050.0 | | | | | | | | | | | | |
| MF-T55 | 277428.039 | 8944772.154 | 4050.0 | | | | | | | | | | | | |
| MF-T77 | 277439.997 | 8944772.154 | 4050.0 | | | | | | | | | | | | |
| TC - PRIMARIOS | | | | | | | | | | | | | | | |
| TC-P1 | 277400.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P2 | 277406.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P3 | 277412.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P4 | 277418.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P5 | 277424.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P6 | 277430.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P7 | 277436.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-P8 | 277442.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC - SECUNDARIOS | | | | | | | | | | | | | | | |
| TC-S1 | 277403.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-S2 | 277409.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-S3 | 277415.957 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-S4 | 277421.956 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-S5 | 277427.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-S6 | 277433.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |
| TC-S7 | 277439.960 | 8944771.177 | 4048.0 | | | | | | | | | | | | |

PLANO DE UBICACIÓN DEL ÁREA DE TRABAJO:



*SIN ESCALA, ES SOLO ESQUEMÁTICO



LEYENDA:

| | |
|---|-----------------|
| ● | PRIMARIOS |
| ● | SECUNDARIOS |
| ● | TERCIARIOS |
| ⊕ | CORTINA ANTIGUA |

- NOTAS:**
- 1.- TODOS LOS TALADROS DE INYECCIÓN FUERON PERFORADOS CON UNA TOLERANCIA DE ± 20cm, TAL COMO SE MENCIONA EN LAS ESPECIFICACIONES.
 - 2.- LAS ELEVACIONES DE LA BOCA DEL TALADRO SON NOMINALES EN BASE A LA PLATAFORMA DE TRABAJO CONSTRUIDA

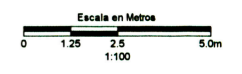


TESIS
"IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD"
 FACULTAD INGENIERÍA CIVIL
 AUTOR JUAN VELARDE M.
 FECHA FEBRERO, 2009

PRESA DE RELAVES - ESTRIBO DERECHO

ÁREA DE INYECCIÓN DE LA ZONA DE FILTRO

PLANO II-4



UBICACIÓN DE TALADROS DE INYECCIÓN

| TALADRO N° | COORDENADAS | | COTA ELEVACIÓN |
|------------|-------------|-------|----------------|
| | ESTE | NORTE | |

| TB - PRIMARIOS | | | |
|----------------|------------|-------------|--------|
| TB-P1 | 277397.957 | 8944773.177 | 4048.0 |
| TB-P2 | 277403.957 | 8944773.177 | 4048.0 |
| TB-P3 | 277409.957 | 8944773.177 | 4048.0 |
| TB-P4 | 277415.957 | 8944773.177 | 4048.0 |
| TB-P5 | 277421.958 | 8944773.177 | 4048.0 |
| TB-P9 | 277426.396 | 8944766.962 | 4048.0 |
| TB-P10 | 277429.883 | 8944762.079 | 4048.0 |

| TB - SECUNDARIOS | | | |
|------------------|------------|-------------|--------|
| TB-S0 | 277394.957 | 8944773.177 | 4048.0 |
| TB-S1 | 277400.957 | 8944773.177 | 4048.0 |
| TB-S2 | 277406.957 | 8944773.177 | 4048.0 |
| TB-S3 | 277412.957 | 8944773.177 | 4048.0 |
| TB-S4 | 277418.957 | 8944773.177 | 4048.0 |
| TB-S5-9 | 277424.176 | 8944770.069 | 4048.0 |
| TB-S9 | 277428.190 | 8944764.453 | 4048.0 |
| TB-S10 | 277431.626 | 8944759.645 | 4048.0 |

| TB - TERCARIOS | | | |
|----------------|------------|-------------|--------|
| TB-T01 | 277396.457 | 8944773.177 | 4048.0 |
| TB-T11 | 277399.456 | 8944773.166 | 4048.0 |
| TB-T12 | 277402.456 | 8944773.166 | 4048.0 |
| TB-T22 | 277405.456 | 8944773.166 | 4048.0 |
| TB-T23 | 277408.456 | 8944773.166 | 4048.0 |
| TB-T33 | 277411.456 | 8944773.166 | 4048.0 |
| TB-T34 | 277414.456 | 8944773.166 | 4048.0 |
| TB-T44 | 277417.456 | 8944773.166 | 4048.0 |
| TB-T45 | 277420.456 | 8944773.166 | 4048.0 |
| TB-T59-9 | 277425.286 | 8944768.516 | 4048.0 |

| TB - CUATERNARIOS | | | |
|-------------------|------------|-------------|--------|
| TB-Q1-11 | 277398.706 | 8944773.171 | 4048.0 |
| TB-Q4-44 | 277416.706 | 8944773.171 | 4048.0 |
| TB-Q44-4 | 277418.206 | 8944773.171 | 4048.0 |
| TB-Q45-5 | 277421.207 | 8944773.172 | 4048.0 |

| CORTINA DEL 2006 - TERCARIOS | | | |
|------------------------------|------------|-------------|--------|
| T9-10 | 277407.800 | 8944759.011 | 4048.0 |
| T12-12 | 277422.551 | 8944757.396 | 4048.0 |
| T12-13 | 277425.024 | 8944757.236 | 4048.0 |
| T22-1 | 277431.228 | 8944757.077 | 4048.0 |

| CORTINA DEL 2006 - CUATERNARIOS | | | |
|---------------------------------|------------|-------------|--------|
| Q1211-12 | 277420.474 | 8944757.653 | 4048.0 |
| Q12-1212 | 277421.914 | 8944757.439 | 4048.0 |
| Q1212-12 | 277423.192 | 8944757.368 | 4048.0 |
| Q12-12 | 277424.429 | 8944757.288 | 4048.0 |
| Q13-13 | 277425.626 | 8944757.192 | 4048.0 |
| Q13-1322 | 277426.938 | 8944757.088 | 4048.0 |
| Q1322-22 | 277428.370 | 8944756.997 | 4048.0 |
| Q-22-221 | 277430.158 | 8944757.014 | 4048.0 |

| TALADRO N° | COORDENADAS | | COTA ELEVACIÓN |
|------------|-------------|-------|----------------|
| | ESTE | NORTE | |

| PLINTO DERECHO - PRIMARIOS | | | |
|----------------------------|------------|-------------|--------|
| RP-P1 | 277433.319 | 8944757.265 | 4048.0 |
| RP-P4V | 277442.658 | 8944758.397 | 4048.0 |
| RP-P4AV | 277442.658 | 8944758.397 | 4048.0 |
| RP-P5V | 277446.058 | 8944758.506 | 4048.5 |
| RP-P6V | 277451.200 | 8944758.190 | 4052.1 |
| RP-P7V | 277456.324 | 8944757.360 | 4055.7 |
| RP-P8V | 277463.704 | 8944757.259 | 4061.0 |
| RP-P9V | 277468.980 | 8944758.330 | 4064.8 |
| RP-P10V | 277474.165 | 8944761.259 | 4068.3 |
| RP-P11V | 277481.654 | 8944764.130 | 4073.6 |

| PLINTO DERECHO - SECUNDARIOS | | | |
|------------------------------|------------|-------------|--------|
| RP-S1V | 277437.615 | 8944757.546 | 4048.0 |
| RP-S5 | 277448.637 | 8944758.344 | 4050.2 |
| RP-S6 | 277453.766 | 8944757.766 | 4053.9 |
| RP-S7 | 277460.012 | 8944757.299 | 4058.3 |
| RP-S8 | 277466.346 | 8944757.794 | 4062.9 |
| RP-S9 | 277471.908 | 8944759.889 | 4066.5 |
| RP-S10 | 277477.975 | 8944762.771 | 4071.0 |

| PLINTO DERECHO - TERCARIOS | | | |
|----------------------------|------------|-------------|--------|
| RP-T1-1 | 277435.464 | 8944757.375 | 4048.0 |
| RP-T1-4 | 277439.825 | 8944757.900 | 4048.0 |
| RP-T4-5 | 277444.091 | 8944758.304 | 4048.0 |
| RP-T5-5 | 277447.348 | 8944758.425 | 4049.3 |
| RP-T5-6 | 277449.919 | 8944758.267 | 4051.1 |
| RP-T6-6 | 277452.483 | 8944757.978 | 4053.0 |
| RP-T6-7 | 277455.045 | 8944757.563 | 4054.8 |
| RP-T7-7 | 277458.168 | 8944757.330 | 4057.0 |
| RP-T7-8 | 277461.858 | 8944757.279 | 4059.4 |
| RP-T8-8 | 277465.046 | 8944757.512 | 4061.9 |
| RP-T8-9 | 277467.839 | 8944758.140 | 4064.0 |
| RP-T9-9 | 277470.937 | 8944759.218 | 4066.1 |
| RP-T9-10 | 277472.878 | 8944760.560 | 4067.4 |

| PLINTO DERECHO - CUATERNARIOS | | | |
|-------------------------------|------------|-------------|--------|
| RP-Q1-11 | 277434.355 | 8944757.390 | 4048.0 |
| RP-Q1-1-1 | 277436.540 | 8944757.461 | 4048.0 |
| RP-Q7-77 | 277457.242 | 8944757.371 | 4056.3 |
| RP-Q77-7 | 277459.128 | 8944757.329 | 4057.7 |
| RP-Q7-78 | 277460.935 | 8944757.289 | 4059.0 |

| TALADROS DE COMPROBACIÓN | | | |
|--------------------------|------------|-------------|--------|
| RP-WT1 | 277440.308 | 8944758.030 | 4048.0 |
| TB-WT2 | 277429.017 | 8944773.178 | 4048.0 |

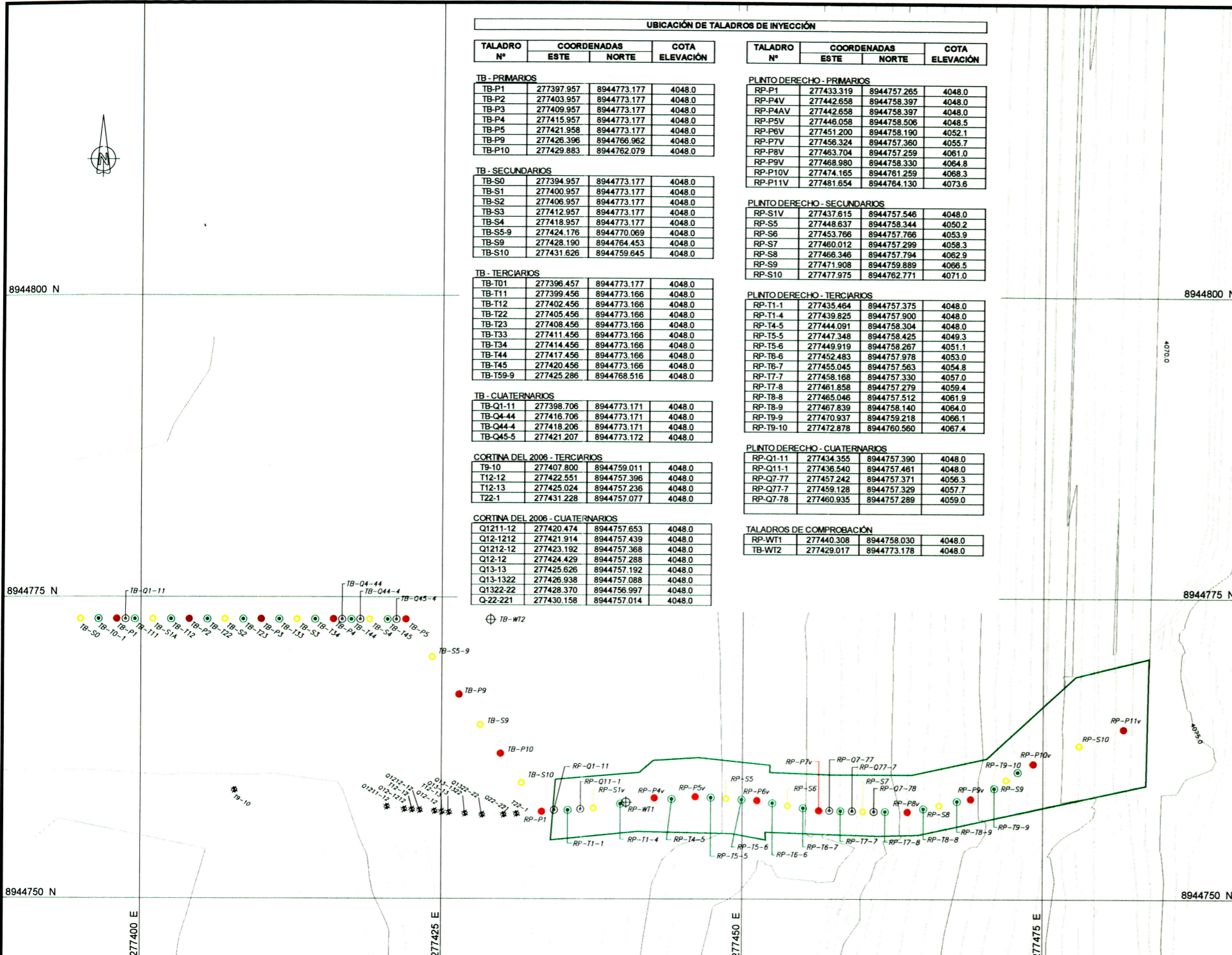
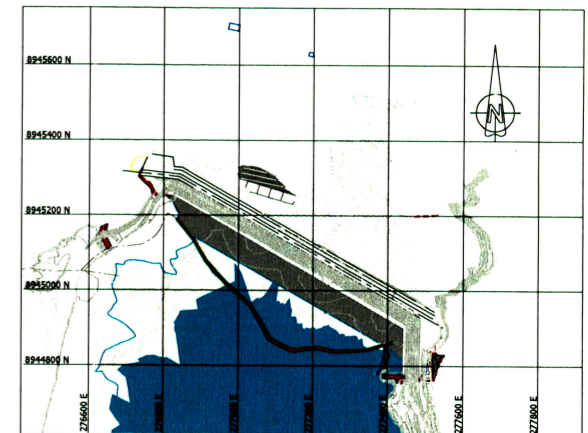
LEYENDA:

- PRIMARIOS
- SECUNDARIOS
- TERCARIOS
- CUATERNARIOS
- ⊕ DE COMPROBACIÓN
- CORTINA DEL 2005
- ⊕ CORTINA DEL 2006

NOTAS:

- 1.- LAS ELEVACIONES DE LA BOCA DE LOS TALADROS DE LAS FILAS TB, T y Q, TAMBIÉN DE LOS TALADROS RP-P1, RP-P4, RP-P4AV, RP-S1V, RP-T1-1, RP-T1-4, RP-T4-5, RP-WT1 y TB-WT2 SON ELEVACIONES NOMINALES DE LA PLATAFORMA DE TRABAJO CONSTRUIDA.
- 2.- LAS ELEVACIONES DE LA BOCA DE LOS TALADROS DE LA FILA RP, EXCEPTO AQUELLOS MENCIONADOS EN LA NOTA 1, SON ELEVACIONES AS-BUILT SOBRE EL PLINTO DE CONCRETO.
- 3.- TODOS LOS TALADROS DE INYECCIÓN FUERON PERFORADOS CON UNA TOLERANCIA DE + - 20cm, TAL COMO SE MENCIONA EN LAS ESPECIFICACIONES.

PLANO DE UBICACIÓN DEL ÁREA DE TRABAJO:

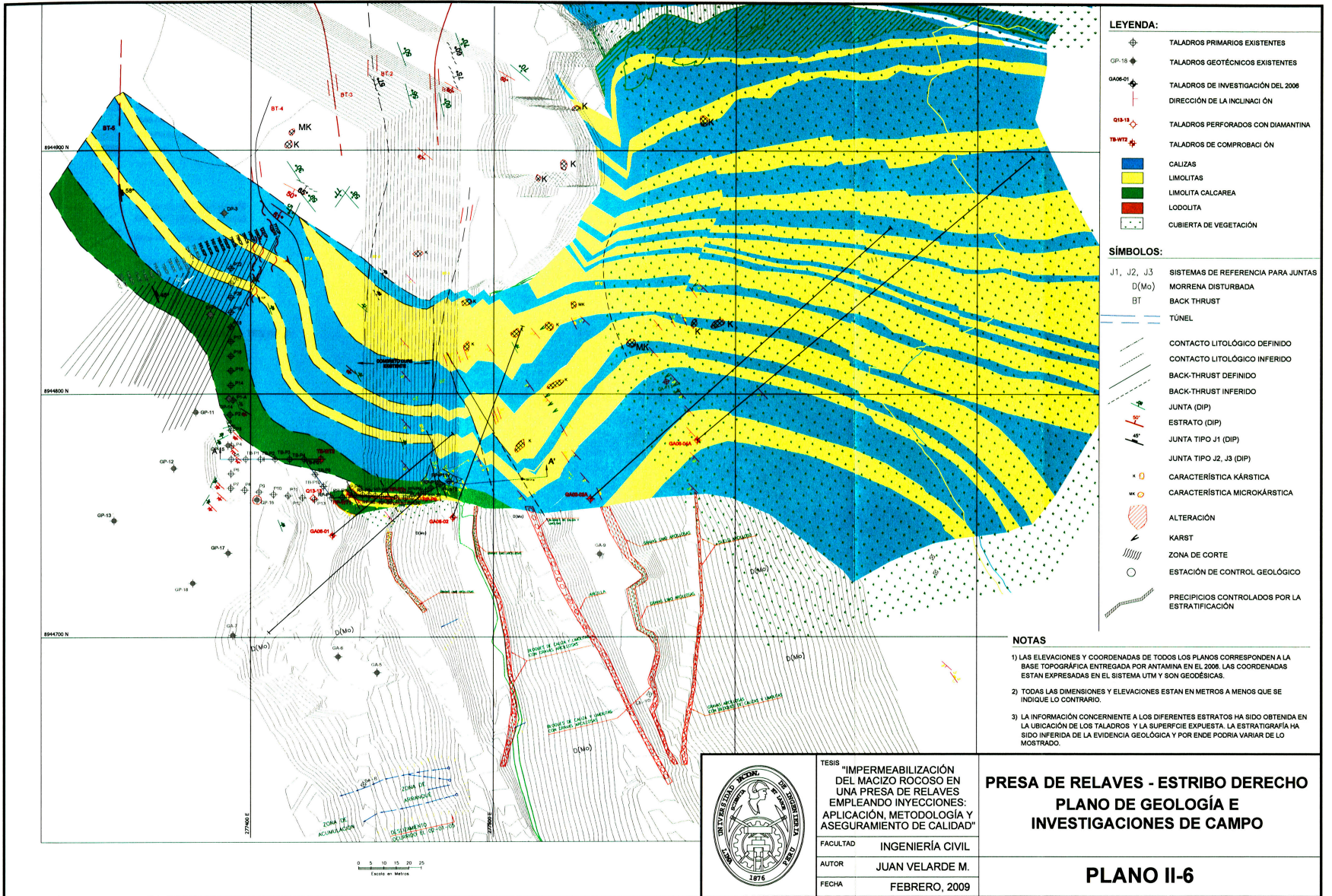


TESIS "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD"

FACULTAD INGENIERÍA CIVIL
 AUTOR JUAN VELARDE M.
 FECHA FEBRERO, 2009

PRESA DE RELAVES - ESTRIBO DERECHO
ÁREA DE INYECCIÓN DEL PLINTO Y
EXTENSIÓN DE LA CORTINA

PLANO II-5



LEYENDA:

| | |
|--|---|
| | TALADROS PRIMARIOS EXISTENTES |
| | TALADROS GEOTÉCNICOS EXISTENTES |
| | TALADROS DE INVESTIGACIÓN DEL 2008 |
| | DIRECCIÓN DE LA INCLINACIÓN |
| | TALADROS PERFORADOS CON DIAMANTINA |
| | TALADROS DE COMPROBACIÓN |
| | CALIZAS LIMOLITAS LIMOLITA CALCAREA LÓDOLITA |
| | CUBIERTA DE VEGETACIÓN |

SÍMBOLOS:

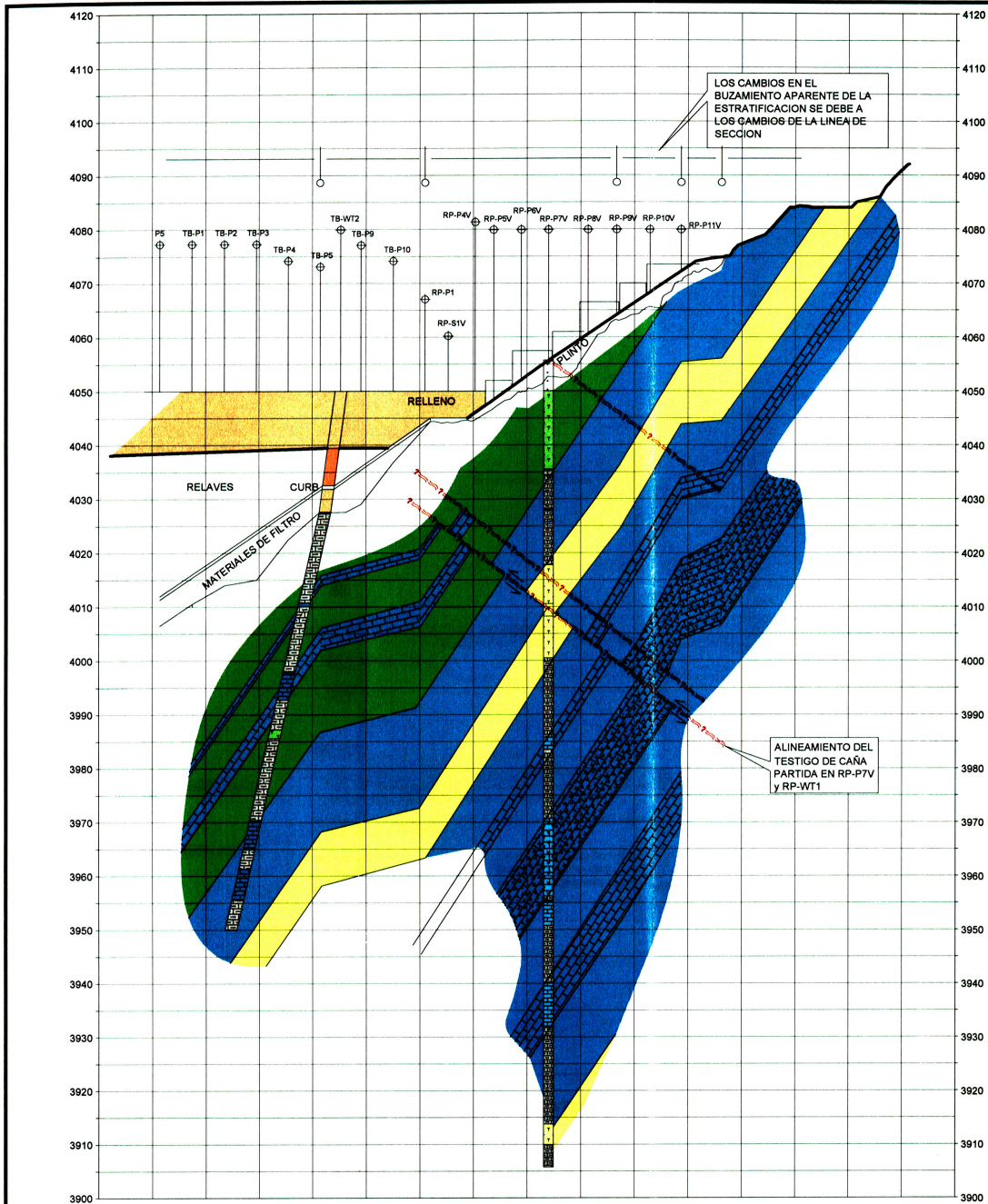
| | |
|------------|--|
| J1, J2, J3 | SISTEMAS DE REFERENCIA PARA JUNTAS |
| D(Mo) | MORRENA DISTURBADA |
| BT | BACK THRUST |
| | TÚNEL |
| | CONTACTO LITOLÓGICO DEFINIDO |
| | CONTACTO LITOLÓGICO INFERIDO |
| | BACK-THRUST DEFINIDO |
| | BACK-THRUST INFERIDO |
| | JUNTA (DIP) |
| | ESTRATO (DIP) |
| | JUNTA TIPO J1 (DIP) |
| | JUNTA TIPO J2, J3 (DIP) |
| | CARACTERÍSTICA KÁRSTICA |
| | CARACTERÍSTICA MICROKÁRSTICA |
| | ALTERACIÓN |
| | KARST |
| | ZONA DE CORTE |
| | ESTACIÓN DE CONTROL GEOLÓGICO |
| | PRECIPICIOS CONTROLADOS POR LA ESTRATIFICACIÓN |

- NOTAS**
- 1) LAS ELEVACIONES Y COORDENADAS DE TODOS LOS PLANOS CORRESPONDEN A LA BASE TOPOGRÁFICA ENTREGADA POR ANTIMAN EN EL 2008. LAS COORDENADAS ESTAN EXPRESADAS EN EL SISTEMA UTM Y SON GEODÉSICAS.
 - 2) TODAS LAS DIMENSIONES Y ELEVACIONES ESTAN EN METROS A MENOS QUE SE INDIQUE LO CONTRARIO.
 - 3) LA INFORMACIÓN CONCERNENTE A LOS DIFERENTES ESTRATOS HA SIDO OBTENIDA EN LA UBICACIÓN DE LOS TALADROS Y LA SUPERFICIE EXPUESTA. LA ESTRATIGRAFÍA HA SIDO INFERIDA DE LA EVIDENCIA GEOLÓGICA Y POR ENDE PODRÍA VARIAR DE LO MOSTRADO.



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 AUTOR JUAN VELARDE M.
 FECHA FEBRERO, 2009

PRESA DE RELAVES - ESTRIBO DERECHO
PLANO DE GEOLOGÍA E INVESTIGACIONES DE CAMPO
PLANO II-6



LEYENDA:

- ⊕ TALADROS DE INYECCIÓN EXISTENTES
- | | | | |
|--|-------------------|---|-------------------|
| | CALIZA | } | MAPEO SUPERFICIAL |
| | LIMOLITA | | |
| | LIMOLITA CALCAREA | | |
| | LODOLITA | | |
- CONTACTO LITOLÓGICO DEFINIDO
- CONTACTO LITOLÓGICO INFERIDO
- BACK-THRUST INFERIDO
- INTERFACE APROXIMADA DEL BEDROCK
- CONCRETO CURB

LEYENDA DE GEOLOGÍA EN EL TESTIGO:

- LIMOLITA CALCAREA
- LIMOLITA
- CALIZA LIMOSA
- CALIZA + KARST
- CALIZA

NOTAS

- 1) LAS ELEVACIONES Y COORDENADAS DE TODOS LOS PLANOS CORRESPONDEN A LA BASE TOPOGRÁFICA ENTREGADA POR ANTAMINA EN EL 2006. LAS COORDENADAS ESTAN EXPRESADAS EN EL SISTEMA UTM Y SON GEODÉSICAS.
- 2) TODAS LAS DIMENSIONES Y ELEVACIONES ESTAN EN METROS A MENOS QUE SE INDIQUE LO CONTRARIO.
- 3) LA INFORMACIÓN CONCERNIENTE A LOS DIFERENTES ESTRATOS HA SIDO OBTENIDA EN LA UBICACIÓN DE LOS TALADROS Y LA SUPERFICIE EXPUESTA. LA ESTRATIGRAFÍA HA SIDO INFERIDA DE LA EVIDENCIA GEOLÓGICA Y POR ENDE PODRÍA VARIAR DE LO MOSTRADO.

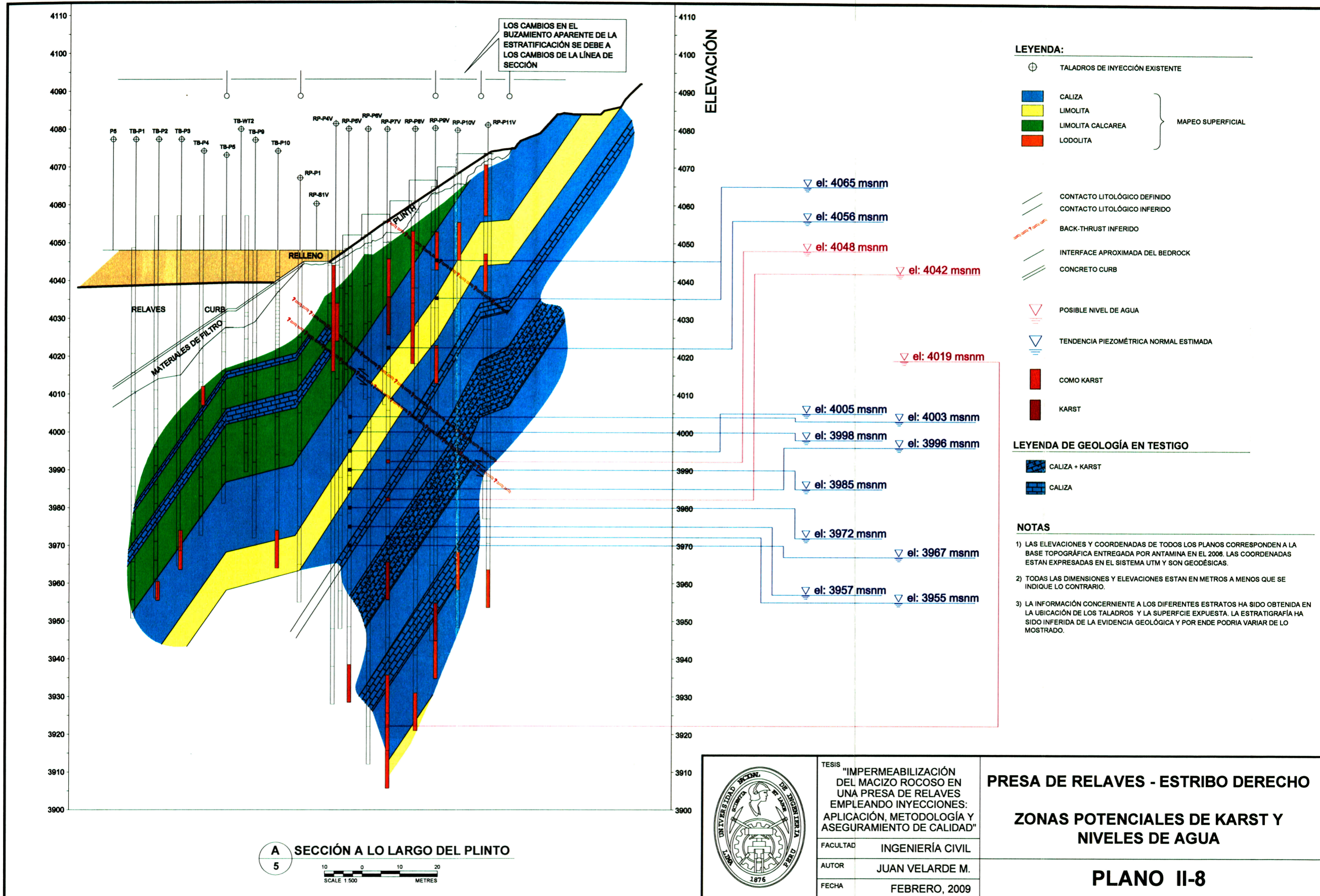
A SECCIÓN A LO LARGO DEL PLINTO
5



| | |
|--|------------------|
| TESIS "IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD" | |
| FACULTAD | INGENIERÍA CIVIL |
| AUTOR | JUAN VELARDE M. |
| FECHA | FEBRERO, 2009 |

PRESA DE RELAVES - ESTRIBO DERECHO
SECCIÓN A LO LARGO DEL PLINTO

PLANO II-7



A SECCIÓN A LO LARGO DEL PLINTO
5



TESIS
"IMPERMEABILIZACIÓN DEL MACIZO ROCOSO EN UNA PRESA DE RELAVES EMPLEANDO INYECCIONES: APLICACIÓN, METODOLOGÍA Y ASEGURAMIENTO DE CALIDAD"

FACULTAD INGENIERÍA CIVIL

AUTOR JUAN VELARDE M.

FECHA FEBRERO, 2009

PRESA DE RELAVES - ESTRIBO DERECHO

ZONAS POTENCIALES DE KARST Y NIVELES DE AGUA

PLANO II-8

TABLA X-1: Resumen de Absorción de Lechada para Tubos Manguito – Zona de Filtro

| Estribo Derecho - Tubos Manguito Zona de Filtro - Filas de Consolidación | | | | | | | | | | | | | | | |
|--|-------------|-------------------|--------------|---------------|--------------------|-------------|-------------------|--------------|---------------|--------------------|------------|------------------|-------------|---------------|--------------------|
| Taladro | Primario | | | | | Secundario | | | | | Terciario | | | | |
| | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) |
| TA-P8 | 7.5 | | 561.4 | 5.0 | 260.0 | | | | | | | | | | |
| TA-P7 | 17.8 | | 1007.0 | 12.0 | 801.0 | | | | | | | | | | |
| TA-P6 | 20.0 | | 2610.9 | 10.0 | 765.0 | | | | | | | | | | |
| TA-P5 | 24.0 | | 1102.2 | 11.0 | 389.0 | | | | | | | | | | |
| TA-P4 | 26.9 | | 2715.6 | 8.0 | 364.0 | | | | | | | | | | |
| TA-P3 | 30.0 | | 269.0 | 7.0 | 233.0 | | | | | | | | | | |
| TA-P2 | 36.0 | | 1606.1 | 8.0 | 245.0 | | | | | | | | | | |
| TA-P1 | 39.0 | | 83.0 | 10.0 | 92.0 | | | | | | | | | | |
| TA-P0 | 42.0 | | 10462.8 | 11.0 | 1182.0 | | | | | | | | | | |
| TC-P8 | 11.8 | | 1504.10 | 10.0 | 779.0 | | | | | | | | | | |
| TC-P7 | 17.8 | | 2518.57 | 12.0 | 981.0 | | | | | | | | | | |
| TC-P6 | 16.5 | | 4763.36 | 12.0 | 1101.0 | | | | | | | | | | |
| TC-P5 | 21.0 | | 681.40 | 7.0 | 295.0 | | | | | | | | | | |
| TC-P4 | 22.5 | | 983.40 | 4.5 | 127.0 | | | | | | | | | | |
| TC-P3 | 29.5 | | 1867.80 | 7.5 | 447.0 | | | | | | | | | | |
| TC-P2 | 30.0 | | 2416.90 | 5.0 | 514.0 | | | | | | | | | | |
| TC-P1 | 36.0 | 33.0 | 933.80 | 6.0 | 193.0 | | | | | | | | | | |
| TD-P8 | 8.5 | | 190.60 | 6.0 | 121.0 | | | | | | | | | | |
| TD-P7 | 12.0 | | 1716.50 | 4.0 | 358.0 | | | | | | | | | | |
| TD-P6 | 17.5 | | 8902.03 | 12.0 | 1200.0 | | | | | | | | | | |
| TD-P2 | 34.5 | | 4188.10 | 7.0 | 531.0 | | | | | | | | | | |
| TE-P8 | 10.5 | | 4972.90 | 8.0 | 920.0 | | | | | | | | | | |
| TA-S7 | | | | | | 11.7 | | 3390.17 | 8.0 | 698.0 | | | | | |
| TA-S6 | | | | | | 19.0 | | 2594.8 | 11.0 | 728.0 | | | | | |
| TA-S5 | | | | | | 21.0 | | 5488.7 | 10.0 | 1397.0 | | | | | |
| TA-S4 | | | | | | 24.0 | | 154.62 | 8.0 | 81.0 | | | | | |
| TA-S3 | | | | | | 28.5 | | 6290.3 | 9.0 | 1001.0 | | | | | |
| TA-S2 | | | | | | 36.0 | | 5763.3 | 13.0 | 845.0 | | | | | |
| TA-S1 | | | | | | 37.7 | | 7787.2 | 10.0 | 885.0 | | | | | |
| TA-S0 | | | | | | 39.0 | | 5775.9 | 7.0 | 637.0 | | | | | |
| TC-S7 | | | | | | 10.5 | | 2221.22 | 9.0 | 1538.0 | | | | | |
| TC-S6 | | | | | | 15.0 | | 4789.90 | 6.0 | 780.0 | | | | | |
| TC-S5 | | | | | | 18.0 | | 1703.42 | 6.0 | 503.0 | | | | | |
| TC-S4 | | | | | | 21.0 | | 1168.60 | 5.0 | 331.0 | | | | | |
| TC-S3 | | | | | | 25.3 | | 2818.43 | 5.3 | 313.0 | | | | | |
| TC-S2 | | | | | | 31.0 | 30.0 | 132.80 | 7.0 | 67.0 | | | | | |
| TC-S1 | | | | | | 36.0 | | 5400.61 | 9.0 | 611.0 | | | | | |
| TD-S8 | | | | | | 7.0 | | 115.20 | 6.0 | 78.0 | | | | | |
| TD-S7 | | | | | | 11.2 | | 939.30 | 6.0 | 225.0 | | | | | |
| TD-S6 | | | | | | 14.8 | | 3863.20 | 6.0 | 508.0 | | | | | |
| TD-S5 | | | | | | 17.9 | | 66.60 | 6.0 | 42.0 | | | | | |
| TD-S2 | | | | | | 30.0 | | 2203.10 | 5.0 | 380.0 | | | | | |
| TE-S7 | | | | | | 8.8 | | 784.40 | 3.0 | 207.0 | | | | | |
| Subtotales | 511.3 | 33.0 | 56057.5 | 183.0 | 11898.0 | 463.3 | 30.0 | 63451.8 | 155.3 | 11855.0 | | | | | |
| | Perforacion | 544.3 | Abs. Prom= | 306.3 | L/m | Perforacion | 493.3 | Abs. Prom= | 408.6 | L/m | | | | | |
| Longitud en Planta de Cortina (m) | 48.1 | Conversion | 0.72 | kg/L | En Planta(m) | 48.1 | Conversion | 0.72 | kg/L | | | | | | |
| m Perforacion / m Long. Planta = | 11.3 | Abs. Prom= | 220.6 | kg/m | m/m | 10.3 | Abs. Prom= | 294.2 | kg/m | | | | | | |

TABLA X-1: Resumen de Absorción de Lechada para Tubos Manguito – Zona de Filtro

| Estribo Derecho - Tubos Manguito Zona de Filtro - Fila Central | | | | | | | | | | | | | | | |
|--|-------------|------------------|-------------------|---------------|--------------------|--------------|------------------|-------------------|---------------|--------------------|--------------|------------------|-------------------|---------------|--------------------|
| Taladro | Primario | | | | | Secundario | | | | | Terciario | | | | |
| | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) |
| TB-P8 | 11.2 | | 54.0 | 10.0 | 98.0 | | | | | | | | | | |
| TB-P7 | 13.3 | | 112.5 | 10.0 | 133.0 | | | | | | | | | | |
| TB-P6 | 19.6 | | 696.0 | 12.0 | 491.0 | | | | | | | | | | |
| TB-P5 | 25.6 | | 1308.5 | 10.0 | 222.0 | | | | | | | | | | |
| TB-P4 | 25.0 | | 5595.6 | 9.5 | 817.0 | | | | | | | | | | |
| TB-P3A | 35.0 | | 610.2 | 11.0 | 244.0 | | | | | | | | | | |
| TB-P2A | 36.5 | | 6704.1 | 12.0 | 837.0 | | | | | | | | | | |
| TB-P1 | 37.5 | | 106.3 | 8.0 | 61.0 | | | | | | | | | | |
| TB-S8 | | | | | | 13.8 | | 1136.6 | 12.0 | 601.0 | | | | | |
| TB-S7 | | | | | | 14.8 | | 4791.4 | 10.0 | 869.0 | | | | | |
| TB-S6 | | | | | | 16.6 | | 281.60 | 7.0 | 166.0 | | | | | |
| TB-S5 | | | | | | 23.5 | | 2383.4 | 10.0 | 288.0 | | | | | |
| TB-S4 | | | | | | 28.5 | | 176.0 | 11.0 | 252.0 | | | | | |
| TB-S3 | | | | | | 28.5 | | 1498.2 | 9.0 | 283.0 | | | | | |
| TB-S2 | | | | | | 36.0 | | 182.6 | 12.0 | 99.0 | | | | | |
| TB-S1 | | | | | | 38.5 | | 1237.3 | 8.0 | 218.0 | | | | | |
| TB-T88 | | | | | | | | | | | 13.5 | | 2357.3 | 11.0 | 1149.0 |
| TB-T78 | | | | | | | | | | | 11.6 | | 10062.91 | 8.0 | 1652.0 |
| TB-T77 | | | | | | | | | | | 15.0 | | 2448.8 | 8.0 | 555.0 |
| TB-T67 | | | | | | | | | | | 18.0 | | 8640.8 | 12.0 | 1020.0 |
| TB-T66 | | | | | | | | | | | 21.0 | | 6603.8 | 10.0 | 998.0 |
| TB-T56 | | | | | | | | | | | 21.0 | | 2565.1 | 7.0 | 302.0 |
| TB-T55 | | | | | | | | | | | 24.0 | | 11694.6 | 11.0 | 1405.0 |
| TB-T45 | | | | | | | | | | | 25.5 | | 6654.9 | 9.0 | 1022.0 |
| TB-T44 | | | | | | | | | | | 27.0 | | 1544.7 | 8.0 | 218.0 |
| TB-T34 | | | | | | | | | | | 26.5 | | 750.8 | 12.0 | 53.0 |
| TB-T33 | | | | | | | | | | | 29.5 | | 773.3 | 8.0 | 228.0 |
| TB-T23 | | | | | | | | | | | 31.0 | | 731.80 | 6.0 | 106.0 |
| TB-T22 | | | | | | | | | | | 36.5 | | 316.71 | 11.0 | 170.0 |
| TB-T12 | | | | | | | | | | | 35.5 | | 597.30 | 9.0 | 173.0 |
| TB-T11 | | | | | | | | | | | 39.0 | 39.0 | 804.40 | 7.0 | 279.0 |
| Subtotales | 203.7 | 0.0 | 15187.2 | 82.5 | 2903.0 | 200.2 | 0.0 | 11687.1 | 79.0 | 2776.0 | 374.6 | 39.0 | 56547.2 | 137.0 | 9330.0 |
| | Perforacion | 203.7 | Abs. Prom= | 184.1 | L/m | Perforacion | 200.2 | Abs. Prom= | 147.9 | L/m | Perforacion | 413.6 | Abs. Prom= | 412.8 | L/m |
| Longitud en Planta de Cortina (m) | 48.1 | | Conversion | 0.72 | kg/L | En Planta(m) | 48.1 | Conversion | 0.72 | kg/L | En Planta(m) | 48.1 | Conversion | 0.72 | kg/L |
| m Perforacion / m Long. Planta = | 4.2 | | Abs. Prom= | 132.5 | kg/m | m/m | 4.2 | Abs. Prom= | 106.5 | kg/m | m/m | 8.6 | Abs. Prom= | 297.2 | kg/m |

| Estribo Derecho - Tubos Manguito Zona de Filtro - Fila MF (c/microfino) | | | | | | | | | | | | | | | |
|---|-------------|------------------|-------------------|---------------|--------------------|--------------|------------------|-------------------|---------------|--------------------|--------------|------------------|-------------------|---------------|--------------------|
| Taladro | Primario | | | | | Secundario | | | | | Terciario | | | | |
| | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) |
| MF-P1 | 36.5 | | 6734.70 | 7.0 | 770.0 | | | | | | | | | | |
| MF-P2 | 32.5 | | 2341.04 | 7.0 | 362.0 | | | | | | | | | | |
| MF-P3 | 27 | | 1241.20 | 5.0 | 176.0 | | | | | | | | | | |
| MF-P4 | 23.5 | | 1804.57 | 6.0 | 320.0 | | | | | | | | | | |
| MF-P5 | 21.0 | | 7005.94 | 8.0 | 839.0 | | | | | | | | | | |
| MF-P6 | 17 | | 1031.00 | 8.0 | 314.0 | | | | | | | | | | |
| MF-P7 | 12 | | 3430.75 | 9.0 | 595.0 | | | | | | | | | | |
| MF-S0 | | | | | | 36 | | 2896.53 | 4.2 | 347.0 | | | | | |
| MF-S1 | | | | | | 9.0 | | 1174.02 | 5.0 | 324.0 | | | | | |
| MF-S2 | | | | | | 28.8 | | 418.13 | 4.0 | 117.0 | | | | | |
| MF-S3 | | | | | | 24 | | 1408.62 | 3.0 | 265.0 | | | | | |
| MF-S4 | | | | | | 21.0 | | 1554.18 | 4.0 | 350.0 | | | | | |
| MF-S5 | | | | | | 19.5 | | 4045.77 | 7.0 | 677.0 | | | | | |
| MF-S6 | | | | | | 15 | | 875.66 | 7.0 | 307.0 | | | | | |
| MF-S7 | | | | | | 10.8 | | 4086.72 | 8.0 | 631.0 | | | | | |
| MF-T0-1 | | | | | | | | | | | 34.5 | | 2037.60 | 2.0 | 242.0 |
| MF-T3-4 | | | | | | | | | | | 24 | | 1227.93 | 3.0 | 249.0 |
| MF-T5-5 | | | | | | | | | | | 19.5 | | 276.90 | 6.0 | 197.0 |
| MF-T7-7 | | | | | | | | | | | 11.5 | | 7288.64 | 6.0 | 954.0 |
| Subtotales | 21.0 | 0.0 | 23589.2 | 50.0 | 3376.0 | 49.8 | 0.0 | 16459.6 | 42.2 | 3018.0 | 65.5 | 0.0 | 10831.1 | 17.0 | 1642.0 |
| | Perforacion | 21.0 | Abs. Prom= | 471.8 | L/m | Perforacion | 49.8 | Abs. Prom= | 390.0 | L/m | Perforacion | 65.5 | Abs. Prom= | 637.1 | L/m |
| Longitud en Planta de Cortina (m) | 48.1 | | Conversion | 0.72 | kg/L | En Planta(m) | 48.1 | Conversion | 0.72 | kg/L | En Planta(m) | 48.1 | Conversion | 0.72 | kg/L |
| m Perforacion / m Long. Planta = | 0.4 | | Abs. Prom= | 339.7 | kg/m | m/m | 1.0 | Abs. Prom= | 280.8 | kg/m | m/m | 1.4 | Abs. Prom= | 458.7 | kg/m |

TABLA X-2: Resumen de Absorción de Lechada para Plinto y Extensión de Cortina

| Taladro | Estribo Derecho - Plinto de Concreto Armado y Extensión de Cortina | | | | | | | | | | | | | | | | | | | |
|---|--|-------------------|--------------|---------------|--------------------|-------------|-------------------|-------------|---------------|--------------------|-------------|-------------------|-------------|---------------|--------------------|-------------|-------------------|-------------|---------------|--------------------|
| | Primario | | | | | Secundario | | | | | Terciario | | | | | Cuaternario | | | | |
| | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) |
| TB-S0 | | | | | | 72.0 | | 3570.29 | 70.5 | 415 | | | | | | | | | | |
| TB-T01 | | | | | | | | | | | 73.0 | | 5043.5 | 72.5 | 792.0 | | | | | |
| TB-P1 | 63.5 | | 4087.5 | 62.5 | 861.0 | | | | | | | | | | | | | | | |
| TB-Q1-11 | | | | | | | | | | | | | | | 56.0 | | 612.2 | 57.0 | 145.0 | |
| TB-T11 | | | | | | | | | | | 68.5 | 7.5 | 4855.8 | 68.0 | 457.0 | | | | | |
| TB-S1 | | | | | | 60.0 | 2.5 | 2144.4 | 59.0 | 493.0 | | | | | | | | | | |
| TB-T12 | | | | | | | | | | | 62.0 | | 1918.6 | 61.0 | 295.0 | | | | | |
| TB-P2 | 55.7 | 10.0 | 5589.2 | 5.0 | 491.0 | | | | | | | | | | | | | | | |
| TB-T22 | | | | | | | | | | | | | | | | | | | | |
| TB-S2 | | | | | | 63.0 | 46.7 | 1289.3 | 67.5 | 402.0 | | | | | | | | | | |
| TB-T23 | | | | | | | | | | | | | | | | | | | | |
| TB-P3 | 51.6 | | 6622.4 | 49.4 | 900.0 | | | | | | | | | | | | | | | |
| TB-T33 | | | | | | | | | | | | | | | | | | | | |
| TB-S3 | | | | | | 61.0 | 16.0 | 11112.9 | 91.0 | 1099.0 | | | | | | | | | | |
| TB-T34 | | | | | | | | | | | | | | | | | | | | |
| TB-P4 | 50.5 | 11.8 | 12136.1 | 48.0 | 1380.0 | | | | | | | | | | | | | | | |
| TB-Q4-44 | | | | | | | | | | | | | | | | | | | | |
| TB-T44 | | | | | | | | | | | 54.5 | | 444.0 | 53.0 | 167.0 | | | 136.5 | 29.0 | 53.0 |
| TB-Q44-4 | | | | | | | | | | | | | | | | | | | | |
| TB-S4 | | | | | | 53.0 | | 1287.8 | 51.5 | 264.0 | | | | | 44.5 | | 1419.0 | 44.0 | 199.0 | |
| TB-T45 | | | | | | | | | | | | | | | | | | | | |
| TB-Q45-5 | | | | | | | | | | | | | | | | | | | | |
| TB-P5 | 42.7 | | 5211.0 | 42.0 | 824.0 | | | | | | | | | | | | | | | |
| TB-S5-9 | | | | | | 51.0 | | 2312.3 | 50.0 | 462.0 | | | | | | | | | | |
| TB-T59-9 | | | | | | | | | | | | | | | | | | | | |
| TB-P9 | 56.5 | 57.0 | 2564.1 | 58.0 | 205.0 | | | | | | 67.5 | 20.5 | 2546.7 | 87.5 | 386.0 | | | | | |
| TB-S9 | | | | | | 78.0 | | 2981.1 | 87.0 | 656.0 | | | | | | | | | | |
| TB-P10 | 72.8 | 12.0 | 1605.6 | 51.5 | 335.0 | | | | | | | | | | | | | | | |
| TB-S10 | | | | | | 80.0 | | 2231.6 | 79.0 | 285.0 | | | | | | | | | | |
| RP-P1 | 81.5 | | 3924.6 | 78.0 | 481.0 | | | | | | | | | | | | | | | |
| RP-Q1-11 | | | | | | | | | | | | | | | 29.0 | 4.5 | 3145.5 | 40.0 | 331.0 | |
| RP-T1-1 | | | | | | | | | | | 115.5 | 26.0 | 12273.2 | 187.5 | 1311.0 | | | | | |
| RP-Q11-1 | | | | | | | | | | | | | | | 36.5 | 20.0 | 6432.7 | 56.5 | 574.0 | |
| RP-S1V | | | | | | 122.2 | 91.0 | 13041.3 | 221.0 | 1391.0 | | | | | | | | | | |
| RP-T1-4 | | | | | | | | | | | 89.5 | 20.0 | 5062.6 | 132.0 | 798.0 | | | | | |
| RP-P4V | 117.0 | 195.3 | 11281.3 | 204.0 | 1396.0 | | | | | | | | | | | | | | | |
| RP-T4-5 | | | | | | | | | | | | | | | | | | | | |
| RP-P5V | 120.0 | 43.0 | 11224.4 | 160.0 | 998.0 | | | | | | 117.5 | 66.0 | 12956.0 | 206.0 | 1254.0 | | | | | |
| RP-T5-5 | | | | | | | | | | | | | | | | | | | | |
| RP-S5V | | | | | | 122.0 | 80.0 | 13591.2 | 220.0 | 1450.0 | | | | | | | | | | |
| RP-T5-6 | | | | | | | | | | | 42.0 | 22.0 | 1566.2 | 60.0 | 222.0 | | | | | |
| RP-P6V | 140.0 | 20.0 | 24220.6 | 187.0 | 2172.0 | | | | | | 42.0 | 22.0 | 1078.7 | 60.0 | 217.0 | | | | | |
| RP-T6-6 | | | | | | | | | | | | | | | | | | | | |
| RP-S6V | | | | | | 118.0 | | 6363.1 | 217.0 | 964.0 | | | | | | | | | | |
| RP-T6-7 | | | | | | | | | | | 62.0 | 20.0 | 5852.0 | 80.0 | 761.0 | | | | | |
| RP-P7V | 150.0 | 12.5 | 53186.4 | 154.6 | 3455.0 | | | | | | 52.0 | 21.0 | 2224.2 | 91.0 | 401.0 | | | | | |
| Subtotales | 1511.8 | 652.1 | 331843.6 | 1888.5 | 28122.0 | 1364.2 | 486.2 | 130988.3 | 2058.5 | 13685.0 | 1692.5 | 323.0 | 107264.2 | 2215.5 | 12951.0 | 400.7 | 44.5 | 23802.4 | 540.0 | 2666.0 |
| | Perforacion | 2163.9 | Abs. Prom= | 175.7 | L/m | Perforacion | 1850.4 | Abs. Prom= | 63.6 | L/m | Perforacion | 2015.5 | Abs. Prom= | 48.4 | L/m | Perforacion | 445.2 | Abs. Prom= | 43.7 | L/m |
| Longitud en Planta de Cortina (m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) |
| m Perforacion / m Long. Planta = | 22.4 | Abs. Prom= | 126.5 | kg/m | m/m | 19.2 | Abs. Prom= | 45.8 | kg/m | m/m | 20.9 | Abs. Prom= | 34.9 | kg/m | m/m | 4.6 | Abs. Prom= | 31.5 | kg/m | m/m |

| Taladro | Estribo Derecho - Plinto de Concreto Armado (Taladros Inclinados) | | | | | | | | | | | | | | | | | | | |
|---|---|-------------------|-------------|---------------|--------------------|-------------|-------------------|-------------|---------------|--------------------|------------|------------------|-------------|---------------|--------------------|-------------|------------------|-------------|---------------|--------------------|
| | Primario | | | | | Secundario | | | | | Terciario | | | | | Cuaternario | | | | |
| | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) | Avance (m) | Re-Perforac. (m) | Volumen (L) | Inyectado (m) | Duración (minutos) |
| RP-S1 | | | | | | 98.0 | 9.0 | 7708.3 | 96.0 | 732.0 | | | | | | | | | | |
| RP-P2 | 95.0 | 91.0 | 10249.6 | 88.0 | 2523.0 | | | | | | | | | | | | | | | |
| RP-P3 | 103.0 | 91.0 | 14470.7 | 141.0 | 1427.0 | | | | | | | | | | | | | | | |
| RP-P4 | 121.0 | 22.0 | 23280.1 | 187.0 | 1733.0 | | | | | | | | | | | | | | | |
| RP-P5 | 124.0 | 190.2 | 18214.9 | 218.0 | 1505.0 | | | | | | | | | | | | | | | |
| RP-P6 | 124.0 | 75.1 | 21606.1 | 189.5 | 2163.0 | | | | | | | | | | | | | | | |
| RP-P7 | 124.0 | 106.0 | 23874.0 | 193.0 | 1856.0 | | | | | | | | | | | | | | | |
| RP-P9 | 131.0 | 141.6 | 31663.93 | 265.5 | 2581.0 | | | | | | | | | | | | | | | |
| Subtotales | 822.0 | 716.9 | 143359.2 | 1282.0 | 13788.0 | 98.0 | 9.0 | 7708.3 | 96.0 | 732.0 | | | | | | | | | | |
| | Perforacion | 1538.9 | Abs. Prom= | 111.8 | L/m | Perforacion | 107 | Abs. Prom= | 80.3 | L/m | | | | | | | | | | |
| Longitud en Planta de Cortina (m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) | 96.6 | Conversion | 0.72 | kg/L | En Planta(m) |
| m Perforacion / m Long. Planta = | 15.9 | Abs. Prom= | 80.5 | kg/m | m/m | 1.1 | Abs. Prom= | 57.8 | kg/m | m/m | | | | | | | | | | |