# DGTFM2112-ME-H03-ESTRU-00101 CÁLCULO DE PANTALLAS TRINCHERA ZAPOPAN




Secretaría de Comunicaciones y Transportes
Dirección General de Transporte Ferroviario y Multimodal
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ELABORACIÓN DE LOS "ESTUDIOS DE PRE-INVERSIÓN, RELACIONADOS CON EL ANÁLISIS DE FACTIBILIDAD TÉCNICA, ECONÓMICA, FINANCIERA, LEGAL Y AMBIENTAL, ANÁLISIS COSTO-BENEFICIO, ANTEPROYECTO Y PROYECTO EJECUTIVO PARA EL SERVICIO DE TRANSPORTE MASIVO DE PASAJEROS EN LA MODALIDAD DE TREN LIGERO ENTRE LOS MUNICIPIOS DE ZAPOPAN, GUADALAJARA Y TLAQUEPAQUE, JALISCO"

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# 1. OBJETO DEL DOCUMENTO

En el presente documento se muestra el cálculo y diseño de las pantallas correspondientes a la trinchera Zapopan de la Línea 3 del Metro de Guadalajara.

Se indicará en el mismo las bases de cálculo consideradas, las tipologías de pantallas consideradas y los diferentes resultados obtenidos en cada caso.

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# 2. BASES DE CÁLCULO

## 2.1. NORMATIVA DE REFERENCIA

Para el dimensionamiento de las pantallas se han considerado las siguientes normativas de referencia:

- Normativa AASHTO-LRFD 2004.
- Manual de Diseño de Obras Civiles. Diseño por Sismo de la Comisión Federal de la Electricidad (CFE-2008).
- Normativa ACI 318-08

## 2.2. FACTORES DE CARGA Y COMBINACIONES DE CARGAS

Se considerarán los factores de carga y las combinaciones de cargas indicados en el artículo 3.4. de la normativa AASHTO LRFD 2004 que sean de aplicación para el cálculo de pantallas:

- Estado límite de resistencia, RESISTENCIA I = 1,50*EH + 1,00*WA
- Estado de evento extremo, EVENTO EXTREMO I = 1,00*EH + 1,00*WA + 1,00*EQ
- Estado límite de servicio, SERVICIO I = 1,00*EH + 1,00*WA
- Estado límite de estabilidad, FLOTABILIDAD I = 0,90*DC + 1,00*WA

Siendo:

EH = empuje horizontal del terreno.

WA = empuje del agua.

EQ = acciones sísmicas.

DC = peso propio de la estructura.

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## 2.3. FACTORES DE RESISTENCIA

Se considerarán los factores de resistencia indicados en el artículo 5.5.4.2. de la normativa AASHTO LRFD 2004 que sean de aplicación para el cálculo de pantallas:

- Para flexión y tracción del hormigón armado, Φ = 0,90.
- Para corte y flexión en hormigón de densidad normal, Φ = 0,90.
- Para el estado de evento extremo, Φ = 1,00. (Según artículo 11.8.6. de la AASTHO LRFD 2004)

## 2.4. CARACTERÍSTICAS DE LOS MATERIALES

Las características del hormigón y acero considerados son:

- Hormigón Clase A de resistencia característica f'c = 30 MPa. (Pilotes secundarios)
  - Ambiente de exposición: Categoría y clase de exposición S1. (Según indicaciones de la norma ACI 318-08).
  - Cemento tipo: ASTM C150 II (Según indicaciones de la norma ACI 318-08).
  - Tamaño máximo del agregado: 20 mm.
  - Máxima relación agua/cemento: 0,45.
  - Cantidad mínima de cemento = 375 kg/m3.
  - Módulo de elasticidad: $E = 4800\sqrt{f_c'} = 26290\ MPa$.
  - Resistencia a la tracción: $f_r = 0{,}62\sqrt{f_c'} = 3{,}39\ MPa$.
- Hormigón Clase A de resistencia característica f'c = 11 MPa. (Pilotes primarios)
  - Tamaño máximo del agregado: 20 mm.
  - Módulo de elasticidad: $E = 4800\sqrt{f_c'} = 15919\ MPa$.
- Acero ASTM A706 grado 60 para refuerzo.

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- Tensión de fluencia, fy = 420 MPa.
- Módulo de elasticidad: E = 200.000 MPa.
- Recubrimiento mínimo: 75 mm.

## 2.5. CARACTERÍSTICAS DE LAS BARRAS DE ARMADO

Se considerarán para el armado los siguientes tipos de barras, con el diámetro y área indicados en la siguiente tabla:

| Imperial | Soft | Mass per unit length | Nominal Diameter | Nominal Area |
|---|---|---|---|---|
| Bar Size | Metric Size | (kg/m) | (mm) | (mm²) |
| #3 | d10 | 0,561 | 9,5 | 71 |
| #4 | d13 | 0,996 | 12,7 | 129 |
| #5 | d16 | 1,556 | 15,9 | 200 |
| #6 | d19 | 2,240 | 19,1 | 284 |
| #7 | d22 | 3,049 | 22,2 | 387 |
| #8 | d25 | 3,982 | 25,4 | 509 |
| #9 | d29 | 5,071 | 28,7 | 645 |
| #10 | d32 | 6,418 | 32,3 | 819 |
| #11 | d36 | 7,924 | 35,8 | 1006 |

Se considerarán las siguientes longitudes de anclaje y solape en función de la posición de las barras y de la forma de trabajo de las mismas, que cumplen con las limitaciones indicadas en la normativa AASHTO LRFD 2004:

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| | Longitud Anclaje Básica (ldb) (cm) | | | Longitud Solape (ls) (cm) | | |
|---|---|---|---|---|---|---|
| | Tracción | | Compresión y Patillas | Tracción | | Compresión |
| #CALIBRE | Posición I | Posición II | | Posición I | Posición II | |
| #3 | 25 | 35 | 20 | 45 | 60 | 30 |
| #4 | 35 | 50 | 25 | 60 | 85 | 40 |
| #5 | 40 | 60 | 30 | 70 | 105 | 50 |
| #6 | 50 | 70 | 35 | 85 | 120 | 60 |
| #7 | 60 | 85 | 45 | 105 | 145 | 70 |
| #8 | 80 | 115 | 50 | 140 | 200 | 80 |
| #9 | 100 | 140 | 55 | 170 | 240 | 90 |
| #10 | 130 | 185 | 60 | 225 | 315 | 100 |
| #11 | 155 | 220 | 70 | 265 | 375 | 110 |
| Posición I = Barras Verticales y horizontales en capa inferior | | | | | | |
| Posición II = Barras Horizontales en capa superior con > 30cm. de hormigón debajo | | | | | | |

En cuanto a los radios de doblado y las longitudes de las patillas de las barras se considerarán los siguientes valores, que cumplen con las limitaciones indicadas en la normativa AASHTO LRFD 2004:

| | Radio Doblado (cm) | | Longitud Patillas (cm) | |
|---|---|---|---|---|
| #CALIBRE | Arm. Long. | Estribos | Arm. Long. (90°) | Estribos (135°) |
| #3 | 3 | 1.9 | 11 | 7.5 |
| #4 | 4 | 2.5 | 15 | 8 |
| #5 | 5 | 3.2 | 19 | 10 |
| #6 | 6 | 4.0 | 23 | 12 |
| #7 | 7 | - | 27 | 13 |
| #8 | 8 | - | 30 | 15 |
| #9 | 11 | - | 34 | - |
| #10 | 13 | - | 39 | - |
| #11 | 14 | - | 43 | - |

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## 3. ACCIONES CONSIDERADAS EN EL CÁLCULO

Las acciones consideradas en el cálculo de las pantallas son las siguientes:

- Empujes del terreno (EH).
- Empujes del agua freática (WA).
- Empujes en situación sísmica (EQ). Se expone el cálculo sísmico en el apartado 6.5. del presente documento.
- Sobrecargas sobre el terreno debido a situaciones de obra: se considera una sobrecarga uniforme de 10 kN/m$^2$ sobre el terreno del trasdós de la pantalla. La sobrecarga sobre el terreno debido a situaciones de obra se transforma en un empuje horizontal equivalente según procedimiento de cálculo.

Las pantallas se dimensionan principalmente para ser capaces de resistir los empujes del terreno que están soportando, tanto en situación de construcción como en situación de explotación (definitiva).

En toda la traza de la obra, el terreno se compone de distintos estratos con diferentes características mecánicas en función de su tipología.

Para el dimensionamiento de las pantallas de esta trinchera se considerará un perfil geotécnico de cálculo de tal manera que los empujes considerados en el cálculo representen una envolvente conservadora de las condiciones geotécnicas la zona de implantación.

Las secciones de cálculo a considerar deberán ser correspondientes para las diferentes zonas en las que se puede dividir la trinchera en función de los distintos niveles de arriostramiento considerados.

Así, el perfil geológico de la zona de implantación de la estación es el siguiente:

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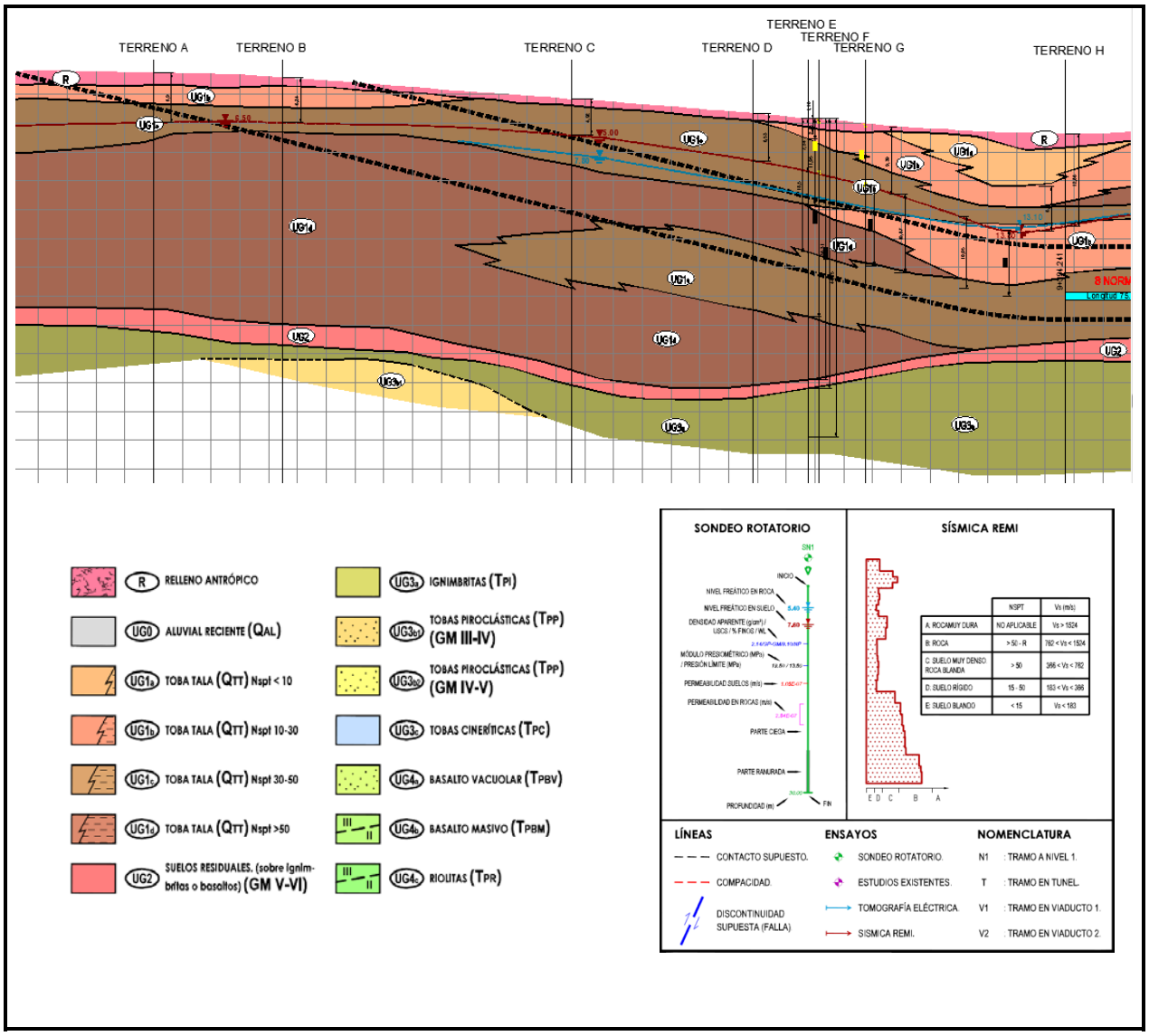



Figura 1. Perfil Geotécnico Longitudinal en la zona de implantación.

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Así se definen nueve secciones de cálculo de pantallas para cada tramo de la trinchera. Estas secciones estratigráficas de cálculo se definen en la siguiente tabla:

| TRINCHERA ZAPOPAN (de Pk 8+715.50 a 9+377.15) | | | | |
|---|---|---|---|---|
| TIPO DE TERRENO A | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 1.90 | 1.9 |
| UG1b | Toba Tala | 1.9 | 4.35 | 2.45 |
| UG1c | Suelo Residual | 4.35 | 9.20 | 4.85 |
| UG1d | Basaltos vacuolares-MEDIA | 9.2 | 32.90 | 23.7 |
| UG2 | Basaltos masivos-MEDIA | 32.90 | 35.90 | - |
| UG3a | Ignimbritas-Media | >35.90 | | |
| Prof. del nivel freático (m) | 6.5 | | | |
| TIPO DE TERRENO B | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 1.05 | 1.05 |
| UG1b | Toba Tala | 1.05 | 4.05 | 3 |
| UG1c | Toba Tala | 4.05 | 7.45 | 3.40 |
| UG1d | Suelo Residual | 7.45 | 34.10 | 26.65 |
| UG2 | Basaltos masivos-MEDIA | 34.10 | 37.10 | 3 |
| UG3a | Ignimbritas-Media | >37.10 | | |
| Prof. del nivel freático (m) | 6.0 | | | |
| TIPO DE TERRENO C | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 0.90 | 0.9 |
| UG1c | Toba Tala | 0.9 | 9.20 | 8.3 |
| UG1d | Suelo Residual | 9.20 | 37.90 | 28.7 |
| UG2 | Basaltos masivos-MEDIA | 37.90 | 39.80 | 1.9 |
| UG3a | Ignimbritas-Media | >39.80 | - | - |
| Prof. del nivel freático (m) | 5.0 | | | |

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| TRINCHERA ZAPOPAN (de Pk 8+715.50 a 9+377.15) | | | | |
|---|---|---|---|---|
| TIPO DE TERRENO D | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 0.90 | 0.9 |
| UG1c | Toba Tala | 0.9 | 11.20 | 10.3 |
| UG1d | Toba Tala | 11.20 | 17.90 | 6.7 |
| UG1c | Toba Tala | 17.90 | 27.30 | 9.4 |
| UG1d | Toba Tala | 27.30 | 37.70 | 10.4 |
| UG2 | Suelo Residual | 37.70 | 39.30 | 1.6 |
| UG3a | Ignimbritas-Media | >39.30 | - | - |
| Prof. del nivel freático (m) | 7.0 | | | |
| TIPO DE TERRENO E | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 1.20 | 1.2 |
| UG1b | Toba Tala | 1.20 | 2.80 | 1.6 |
| UG1c | Toba Tala | 2.80 | 12.00 | 9.2 |
| UG1d | Toba Tala | 12.00 | 18.50 | 6.5 |
| UG1c | Toba Tala | 18.50 | 27.50 | 9.0 |
| UG1d | Toba Tala | 27.50 | 36.30 | 8.8 |
| UG2 | Suelo Residual | 36.30 | 37.50 | 1.2 |
| UG3a | Ignimbritas-Media | >37.50 | - | - |
| Prof. del nivel freático (m) | 7.0 | | | |

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| TRINCHERA ZAPOPAN (de Pk 8+715.50 a 9+377.15) | | | | |
|---|---|---|---|---|
| TIPO DE TERRENO F | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 1.35 | 1.35 |
| UG1b | Toba Tala | 1.35 | 3.40 | 2.05 |
| UG1c | Toba Tala | 3.40 | 12.10 | 8.7 |
| UG1d | Toba Tala | 12.10 | 19.00 | 6.9 |
| UG1c | Toba Tala | 19.00 | 28.00 | 9.0 |
| UG1d | Toba Tala | 28.00 | 36.00 | 8.0 |
| UG2 | Suelo Residual | 36.00 | 37.00 | 1.0 |
| UG3a | Ignimbritas-Media | >37.00 | - | - |
| Prof. del nivel freático (m) | 7.5 | | | |
| TIPO DE TERRENO G | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 1.20 | 1.2 |
| UG1b | Toba Tala | 1.20 | 5.40 | 4.2 |
| UG1c | Toba Tala | 5.40 | 14.60 | 9.2 |
| UG1d | Toba Tala | 14.60 | 20.00 | 5.4 |
| UG1c | Toba Tala | 20.00 | 28.00 | 8.0 |
| UG1d | Toba Tala | 28.00 | 34.00 | 8.0 |
| UG2 | Suelo Residual | 34.00 | 35.30 | 1.3 |
| UG3a | Ignimbritas-Media | >35.30 | - | - |
| Prof. del nivel freático (m) | 8.5 | | | |

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| TRINCHERA ZAPOPAN (de Pk 8+715.50 a 9+377.15) | | | | |
|---|---|---|---|---|
| TIPO DE TERRENO H | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 2.20 | 2.2 |
| UG1a | Toba Tala | 2.20 | 7.10 | 4.9 |
| UG1b | Toba Tala | 7.10 | 10.20 | 3.1 |
| UG1c | Toba Tala | 10.20 | 12.60 | 2.4 |
| UG1b | Toba Tala | 12.60 | 20.60 | 8.0 |
| UG1c | Toba Tala | 20.60 | 29.20 | 8.6 |
| UG2 | Suelo Residual | 29.20 | 31.70 | 2.5 |
| UG3a | Ignimbritas-Media | >31.70 | - | - |
| Prof. del nivel freático (m) | 12.7 | | | |
| TIPO DE TERRENO I | | PROFUNDIDAD (m) | | Espesor (m) |
| Unidad geotécnica | Litología/calidad macizo rocoso | Inicial | Final | |
| R | Rellenos | 0 | 2.20 | 2.2 |
| UG1a | Toba Tala | 2.20 | 7.10 | 4.9 |
| UG1b | Toba Tala | 7.10 | 10.20 | 3.1 |
| UG1c | Toba Tala | 10.20 | 12.60 | 2.4 |
| UG1b | Toba Tala | 12.60 | 20.60 | 8.0 |
| UG1c | Toba Tala | 20.60 | 29.20 | 8.6 |
| UG2 | Suelo Residual | 29.20 | 31.70 | 2.5 |
| UG3a | Ignimbritas-Media | >31.70 | - | - |
| Prof. del nivel freático (m) | 12.7 | | | |

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Las características geotécnicas de cálculo de cada una de las unidades geotécnicas se indican en la siguiente tabla:

| ESTRATOS | γ (kN/m3) | γsum (kN/m3) | ka | kr | kp | c' (kN/m2) | Φ'(º) | Φ'(Rad) | δa/Φ' | δa (rad) | δp/Φ' | δp (rad) | Kh (kN/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 8.00 | 0.317 | 0.515 | 2.882 | 5 | 29 | 0.51 | 0.333 | 0.17 | 0.000 | 0.00 | 4900 |
| UG1a | 18.00 | 8.00 | 0.317 | 0.515 | 2.882 | 5 | 29 | 0.51 | 0.333 | 0.17 | 0.000 | 0.00 | 4900 |
| UG1b | 18.50 | 8.50 | 0.291 | 0.485 | 3.124 | 15 | 31 | 0.54 | 0.333 | 0.18 | 0.000 | 0.00 | 15100 |
| UG1c | 19.00 | 9.00 | 0.268 | 0.455 | 3.392 | 20 | 33 | 0.58 | 0.333 | 0.19 | 0.000 | 0.00 | 20600 |
| UG1d | 19.50 | 9.50 | 0.235 | 0.412 | 3.852 | 25 | 36 | 0.63 | 0.333 | 0.21 | 0.000 | 0.00 | 29000 |
| UG2 | 20.00 | 10.00 | 0.246 | 0.426 | 3.690 | 30 | 35 | 0.61 | 0.333 | 0.20 | 0.000 | 0.00 | 43800 |
| UG3b2 | 20.50 | 10.50 | 0.225 | 0.398 | 4.023 | 30 | 37 | 0.65 | 0.333 | 0.22 | 0.000 | 0.00 | 71000 |
| UG3a | 23.00 | 13.00 | 0.075 | 0.152 | 12.162 | 246 | 58 | 1.01 | 0.333 | 0.34 | 0.000 | 0.00 | 300000 |
| UG3b1 | 21.00 | 11.00 | 0.206 | 0.371 | 4.395 | 60 | 39 | 0.68 | 0.333 | 0.23 | 0.000 | 0.00 | 150000 |
| UG4a | 24.00 | 14.00 | 0.085 | 0.171 | 10.698 | 220 | 56 | 0.98 | 0.333 | 0.33 | 0.000 | 0.00 | 300000 |
| UG4b | 27.00 | 17.00 | 0.059 | 0.121 | 15.504 | 360 | 62 | 1.07 | 0.333 | 0.36 | 0.000 | 0.00 | 350000 |

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## 4. DESPLAZAMIENTOS ADMISIBLES Y SUBSIDENCIA

Los movimientos horizontales de las pantallas deben ser limitados en zonas urbanas especialmente de tal manera que se mantenga la integridad de los edificios o servicios próximos.

siguiendo las propuestas de Bjerrum, para asegurar la no aparición de fisuras en las edificaciones cercanas, la distorsión límite a considerar debe ser de 1/500. Para edificaciones con cimentaciones superficiales y con separación entre pilares habituales (aprox. 6 m.) el asiento máximo admisible en arenas correspondiente a dicha distorsión límite será de 2,5 cm.

Por otro lado, según la teoría de Ou, se puede considerar que el asiento máximo en el trasdós en arenas es aproximadamente $\delta v = 0{,}75^* \delta h$ por lo que el desplazamiento máximo admisible para las pantallas sería de 3,33 cm.

Así, como consideración suficientemente conservadora, se aplicarán los siguientes límites para los asientos y las deformaciones horizontales de las pantallas:

- Distorsión límite = 1/500.
- Asiento máximo = 2,5 cm.
- Máximo desplazamiento horizontal de la pantalla = 3,5 cm.

Para el estudio de subsidencias, se ha realizado el siguiente procedimiento de comprobación:

- Identificación de los edificios en riesgo, definiendo dos zonas de influencia (Primaria = 2 veces la profundidad de excavación y Secundaria = 2 – 4 veces la profundidad de excavación).
- Determinación, a partir de las deformaciones horizontales de las pantallas ubicadas frente a las edificaciones en riesgo, del perfil de asientos con modelos semi-empíricos (según teoría de Hsieh & Ou) sin considerar la interacción suelo-estructura.
- En caso de rebasar los valores límite, se realiza un modelo de interacción suelo-estructura mediante elementos finitos modelizado con Plaxis 2D, en el que se introducirá toda la información disponible del edificio considerado para obtener un perfil de asientos más parecido al real.

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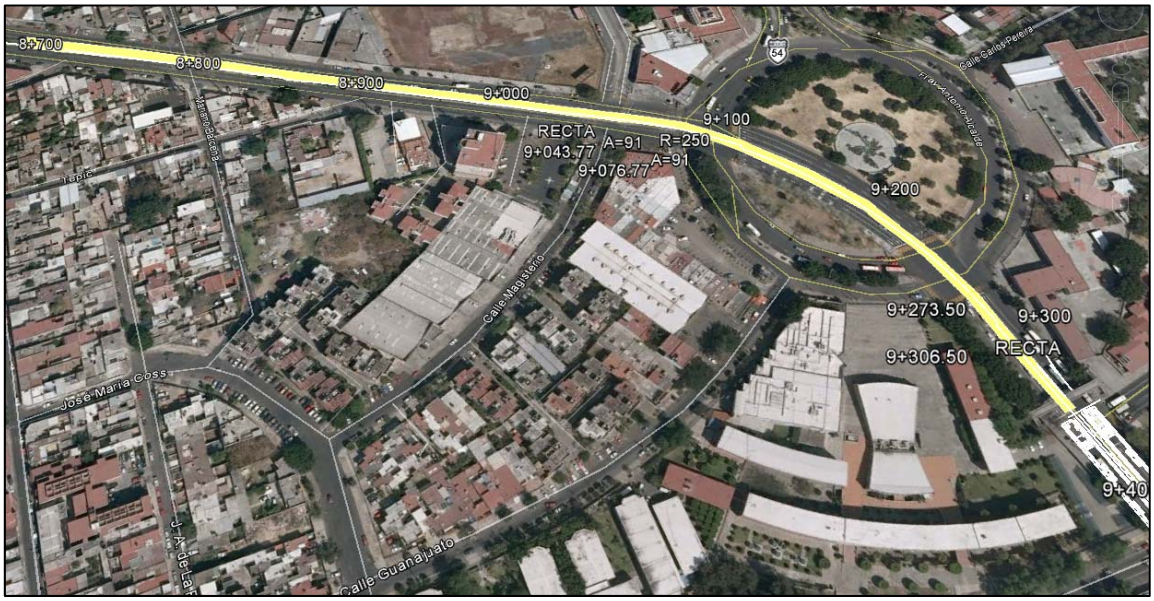
Si con esta modelización se siguen rebasando los límites será necesario disponer medidas preventivas, pero no se espera llegar a este punto porque el diseño de las pantallas ya se ha dispuesto para que no se llegue a este punto.

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# 5. DESCRIPCIÓN DE LA TRINCHERA Y DE LAS PANTALLAS

## 5.1. UBICACIÓN DE LA TRINCHERA

La trinchera Zapopan se desarrolla a lo largo de la Avenida Ávila Camacho, desde el comienzo de la rampa soterrada en el PK 8+700 hasta la su encuentro con la estación Normal en la calle Fray Antonio Alcalde.




La trinchera propuesta se ejecuta a lo largo de la mediana de la avenida de manera que la afección al tráfico se reduce. La distancia media a los edificios será de unos 20.00m lo que beneficia al ritmo de los trabajos y reduce los riesgos de la ejecución.

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Para la trinchera se pueden diferenciar once tramos diferentes, de los cuales nueve de ellos se corresponden con las secciones de cálculo de pantallas consideradas. Estos once tramos son:

- Tramo A: Zona sección en U. (P.K. 8+715.50 a P.K 8+749.50)
- Tramo B: Zona en la que no existe cubierta, las pantallas están en voladizo. (P.K. 8+749.50 a P.K . 8+795.50)
- Tramo C: Zona en la que no existe cubierta, se ejecutan puntales provisionales y losa de fondo. (P.K. 8+795.50 a P.K 8+869.52)
- Tramo D: Zona en la que existe cubierta, un nivel de anclaje provisional y losa de fondo(P.K 8+869.52 a P.K 9+074.20)
- Tramo E: Zona en la que existe cubierta, un nivel de estampidores, un nivel de puntales provisionales y losa de fondo. (P.K. 9+074.20 a P.K 9+198.32)
- Zona F: Zona en la que existe cubierta, un nivel de estampidores, un nivel de puntales provisionales y losa de fondo. (P.K. 9+198.32 a 9+215.70)
- Tramo G: Zona en la que existe cubierta, dos niveles de estampidores y losa de fondo (P.K. 9+215.70 a P.K 9+ 223.70)
- Tramo H: Zona en la que existe cubierta de vigas pretensadas, cuatro niveles de anclajes y losa de fondo. (P.K. 9+223.70 a P.K 9+257.70)
- Tramo I: Zona en la que existe cubierta, losa intermedia de acceso rodado, 2 niveles de puntales provisionales y losa de fondo. (P.K.9+257.70 a P.K 9+337.15)
- Tramo J: Zona en la que existe cubierta, losa intermedia de acceso rodado, losa peatonal de acceso a Estación Normal,nivel de anclaje provisional y losa de fondo. (P.K.9+337.15 a P.K 9+371.25)
- Tramo K: Zona en la que existe cubierta, losa intermedia de acceso rodado, losa peatonal de acceso a Estación Normal, niveles de anclajes provisionales y losas de pozo de bombeo. (P.K.9+371.25 a P.K 9+377.15)

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## *5.2. CARACTERÍSTICAS DE LAS PANTALLAS*

Las pantallas de la trinchera disponen de diferentes niveles posibles de arriostramiento:

- Losa de cubierta.
- Losa intermedia de acceso rodado de autobuses
- Losa de acceso peatonal a Estación Normal
- Niveles de anclajes provisionales.
- Nivel de estampidores.
- Niveles de puntales provisionales.
- Losa de fondo

En función de la cota de vía y los gálibos a respetar, aparecerán diferentes elementos de arriostramiento o alguno de ellos en cada sección de cálculo.

Tanto la losa de cubierta como la losa de fondo son de cota variable para adaptarse a las irregularidades del terreno y al trazado. Asimismo, los niveles de arriostramiento son de cota variables.

Por necesidades de mínima afección al tráfico, la construcción de la trinchera será mediante proceso constructivo de “cut and cover”, apoyando todos los niveles intermedios en el terreno de excavación.

Debido también a las limitaciones de espacio disponible que se tendrá durante la ejecución de las pantallas, ya que el tráfico debería estar restablecido cuando se ejecute la trinchera, se propone ejecutar dos tipologías de pantallas:

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**Tipo 1**

- Tipología = Pilotes ejecutados con camisa recuperable con excavación a roto-percusión (Tipo CPI-4).
- Diámetro de los pilotes y separación = Pilotes de 1 metro de diámetro con separación entre ejes de 70 cm.
- Profundidad estructural máxima de pilotes = 34 metros.
- Excavación máxima en el intradós = 20 metros.
- Distancia interior entre pantallas de la trinchera = 9,55 metros.

**Tipo 2**

- Tipología =Pantallas de H.A.
- Espesor de las pantallas = 1 metro.
- Profundidad estructural máxima de pantallas = 38 metros.
- Excavación máxima en el intradós = 27.65 metros.
- Distancia interior entre pantallas de la trinchera = Según zona de 15 a 26,20 metros.

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# 6. PROCEDIMIENTO DE CÁLCULO

Las pantallas se han calculado mediante el programa de cálculo RIDO Vr.4.12.01.

## 6.1. CARACTERÍSTICAS DEL PROGRAMA DE CÁLCULO UTILIZADO

El programa RIDO se basa en un modelo interacción terreno-estructura (Tipo Winkler). El programa calcula el equilibrio elastoplástico de las pantallas en diferentes tipos de suelo. El cálculo sigue fase a fase la secuencia de construcción de la obra ya que ello condiciona las fuerzas internas, el comportamiento del suelo y la incidencia de la geometría durante las diferentes operaciones (instalación de puntales, anclajes…..).

El modelo de cálculo empleado por el programa consiste en una barra vertical, discretizada en elementos finitos tipo viga, cuyas características mecánicas se obtienen por metro transversal de pantalla.

Sobre dicha pantalla actúa el terreno, tanto en el trasdós como en el intradós, los elementos de contención lateral como puntales, anclajes activos y anclajes pasivos, los elementos constructivos como son los forjados y las cargas aplicadas en la coronación.

Existe otro tipo de cargas exteriores, que actúan sobre el terreno y que aumentan los empujes que sobre la pantalla realiza el terreno. Dichas cargas se tienen en cuenta a la hora de calcular los empujes activo, pasivo y reposo de cada punto del terreno.

La introducción de elementos de sostenimiento como puntales, anclajes activos y anclajes pasivos introducen condiciones de contorno a la pantalla que se materializan a través de muelles de rigidez igual a la rigidez axil del elemento.

Los resultados obtenidos con RIDO son, para cada una de las fases de cálculo:

- Desplazamientos
- Momentos flectores
- Esfuerzos cortantes
- Reacciones en los apoyos/ Diferencia de presiones

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- Presión de suelos.
- Envolvente de esfuerzos de todas las fases

En los listados de cálculo, se obtienen todos los valores numéricos de las características señaladas, así como el porcentaje de pasivo movilizado en el intradós (suelo 2).

## *6.2. DESCRIPCIÓN DE LAS FASES DE CÁLCULO CONSIDERADAS*

Como se ha indicado en el apartado anterior, el programa RIDO realiza un cálculo fase a fase de la pantalla, por lo que es necesario definirle las diferentes fases de excavación que sufrirá la pantalla.

Así, en función de la zona de la trinchera a calcular, se considerarán las siguientes fases de excavación:

- **Zona A (sección en U):**

FASE 1. Excavación hasta la losa de fondo.
FASE 2. Ejecución de la losa de fondo apoyada sobre el terreno.

- **Zona B:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.
FASE 2. Ejecución de la losa de fondo apoyada sobre el terreno.
FASE 3. Restitución del Nivel Freático.
FASE 4. Cálculo sísmico.

- **Zona C:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la línea de puntales provisionales.
FASE 2. Ejecución del nivel de puntales provisionales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.
FASE 3. Ejecución de la losa de fondo apoyada sobre el terreno.
FASE 4. Restitución del Nivel Freático.
FASE 5. Cálculo sísmico.

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- **Zona D:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior del nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución del nivel de puntales y excavación hasta la cara inferior de la losa de fondo,rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 5. Restitución del Nivel Freático.

FASE 6. Cálculo sísmico.

- **Zona E:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior del primer nivel de estampidores, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución del nivel de estampidores apoyado sobre el terreno y excavación hasta el nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución del nivel de puntales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 5. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 6. Restitución del Nivel Freático.

FASE 7. Cálculo sísmico.

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- **Zona F:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior del primer nivel de estampidores, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución del nivel de estampidores apoyado sobre el terreno y excavación hasta el nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución del nivel de puntales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 5. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 6. Restitución del Nivel Freático.

FASE 7. Cálculo sísmico.

- **Zona G:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior del primer nivel de estampidores, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución del nivel de estampidores apoyado sobre el terreno y excavación hasta el nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución del nivel de puntales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 5. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 6. Restitución del Nivel Freático.

FASE 7. Cálculo sísmico.

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- **Zona H:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta de vigas pretensadas apoyada sobre el terreno y excavación hasta la cara inferior del primer nivel de anclajes, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución del primer nivel de anclajes y excavación hasta la cara inferior del segundo nivel de anclajes, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución del segundo nivel de anclajes y excavación hasta la cara inferior del tercer nivel de anclajes, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 5. Ejecución del tercer nivel de anclajes y excavación hasta la cara inferior del cuarto nivel de anclajes, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 6. Ejecución del cuarto nivel de anclajes y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 7. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 8. Restitución del Nivel Freático.

FASE 9. Cálculo sísmico.

- **Zona I:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior de la losa intermedia de acceso rodado, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución de la losa apoyada sobre el terreno y excavación hasta la cara inferior del primer nivel de estampidores, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución del nivel de estampidores apoyado sobre el terreno y excavación hasta el segundo nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

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FASE 5. Ejecución del nivel de puntales provisionales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 6. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 7. Restitución del Nivel Freático.

FASE 8. Cálculo sísmico.

- **Zona J:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior de la losa intermedia de acceso rodado, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 3. Ejecución de la losa apoyada sobre el terreno y excavación hasta la cara inferior de la losa de acceso peatonal a Estación Normal, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución de losa de acceso peatonal apoyado sobre el terreno y excavación hasta el nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 5. Ejecución del nivel de puntales provisionales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 6. Ejecución de la losa de fondo apoyada sobre el terreno.

FASE 7. Restitución del Nivel Freático.

FASE 8. Cálculo sísmico.

- **Zona K:**

FASE 1. Introducción de cargas sobre el trasdós y excavación hasta la cara inferior del nivel de cubierta.

FASE 2. Ejecución del nivel de cubierta apoyado sobre el terreno y excavación hasta la cara inferior de la losa intermedia de acceso rodado, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

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FASE 3. Ejecución de la losa apoyada sobre el terreno y excavación hasta la cara inferior de la losa de acceso peatonal a Estación Normal, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 4. Ejecución de losa de acceso peatonal apoyado sobre el terreno y excavación hasta el nivel de puntales provisionales, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 5. Ejecución del nivel de puntales provisionales y excavación hasta la cara inferior de la losa de fondo, rebajando el N.F. en el intradós 50 cm. por debajo de la cota de excavación.

FASE 6. Ejecución de puntal provisional a nivel de losa de fondo, en la parte del pozo de bombeo

FASE 7. Excavación hasta la cara inferior de la losa del pozo de bombeo.

FASE 8. Ejecución de la losa del pozo de bombeo.

FASE 9. Restitución del Nivel Freático, retirada de puntal provisional y ejecución de tapa de pozo.

FASE 10. Colocación nivel puntales para soporte de la ventilación.

FASE 11. Cálculo sísmico.

## *6.3. TIPOLOGÍAS DE TERRENO CONSIDERADOS EN LOS MODELOS*

Para cada zona de la trinchera se estudiará una sección de cálculo pésima en la que se consideren las mayores distancias entre niveles de arriostramiento, para que la solución obtenida para cada zona sea válida en todo su desarrollo.

En cuanto a los terrenos de cálculo, los niveles son los considerados en el apartado de acciones, y se considerará que el terreno se localiza a la cota del terreno actual, por lo que será necesario cambiar la cota de los distintos niveles de arriostramiento, que serán variables en los cuatro modelos.

Así los perfiles de terrenos considerados en los diferentes modelos:

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| TERRENO TIPO | A | TERRENO TIPO | B | TERRENO TIPO | C | TERRENO TIPO | D |
|---|---|---|---|---|---|---|---|
| Cota Sup. Terreno = | 0.00 | Cota Sup. Terreno = | 0.00 | Cota Sup. Terreno = | 0.00 | Cota Sup. Terreno = | 0.00 |
| Cota NF = | -6.50 | Cota NF = | -6.00 | Cota NF = | -5.00 | Cota NF = | -7.00 |
| ESTRATIGRAFÍA | Cota Inf. | ESTRATIGRAFÍA | Cota Inf. | ESTRATIGRAFÍA | Cota Inf. | ESTRATIGRAFÍA | Cota Inf. |
| R | -1.90 | R | -1.05 | R | -0.90 | R | -0.90 |
| UG1b | -4.35 | UG1b | -4.05 | UG1c | -9.20 | UG1c | -11.20 |
| UG1c | -9.20 | UG1c | -7.45 | UG1d | -37.90 | UG1d | -17.90 |
| UG1d | -32.90 | UG1d | -34.10 | UG2 | -39.80 | UG1c | -27.30 |
| UG2 | -35.90 | UG2 | -37.10 | UG3a | -45.50 | UG1d | -37.70 |
| UG3a | -40.40 | UG3a | -39.00 | | | UG2 | -39.30 |
| | | | | | | UG3a | -47.20 |
| | | | | | | | |

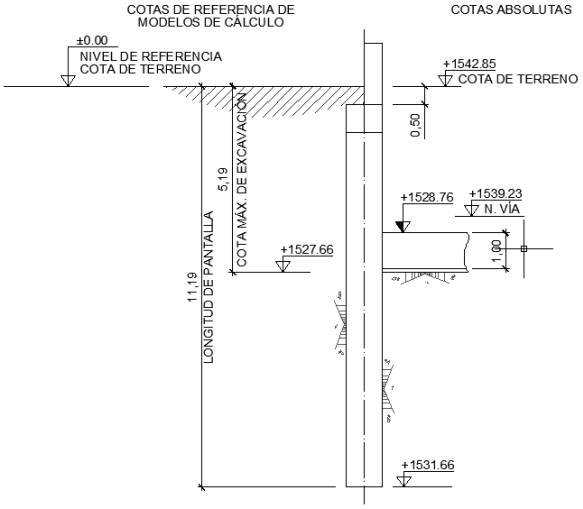
**TERRENOS CONSIDERADOS EN EL CÁLCULO**

| TERRENO TIPO | E | TERRENO TIPO | F | TERRENO TIPO | G | TERRENO TIPO | H |
|---|---|---|---|---|---|---|---|
| Cota Sup. Terreno = | 0.00 | Cota Sup. Terreno = | 0.00 | Cota Sup. Terreno = | 0.00 | Cota Sup. Terreno = | 0.00 |
| Cota NF = | -7.00 | Cota NF = | -7.50 | Cota NF = | -8.50 | Cota NF = | -12.70 |
| ESTRATIGRAFÍA | Cota Inf. | ESTRATIGRAFÍA | Cota Inf. | ESTRATIGRAFÍA | Cota Inf. | ESTRATIGRAFÍA | Cota Inf. |
| R | -1.20 | R | -1.35 | R | -1.20 | R | -2.20 |
| UG1b | -2.80 | UG1b | -3.40 | UG1b | -5.40 | UG1a | -7.10 |
| UG1c | -12.00 | UG1c | -12.10 | UG1c | -14.60 | UG1b | -10.20 |
| UG1d | -18.50 | UG1d | -19.00 | UG1d | -20.00 | UG1c | -12.60 |
| UG1c | -27.50 | UG1c | -28.00 | UG1c | -28.00 | UG1b | -20.60 |
| UG1d | -36.30 | UG1d | -36.00 | UG1d | -34.00 | UG1c | -29.20 |
| UG2 | -37.50 | UG2 | -37.00 | UG2 | -35.30 | UG2 | -31.70 |
| UG3a | -46.50 | UG3a | -46.30 | UG3a | -46.50 | UG3a | -47.30 |

**Nota**: el terreno tipo I, que no se muestra en la tabla, es semejante al tipo H

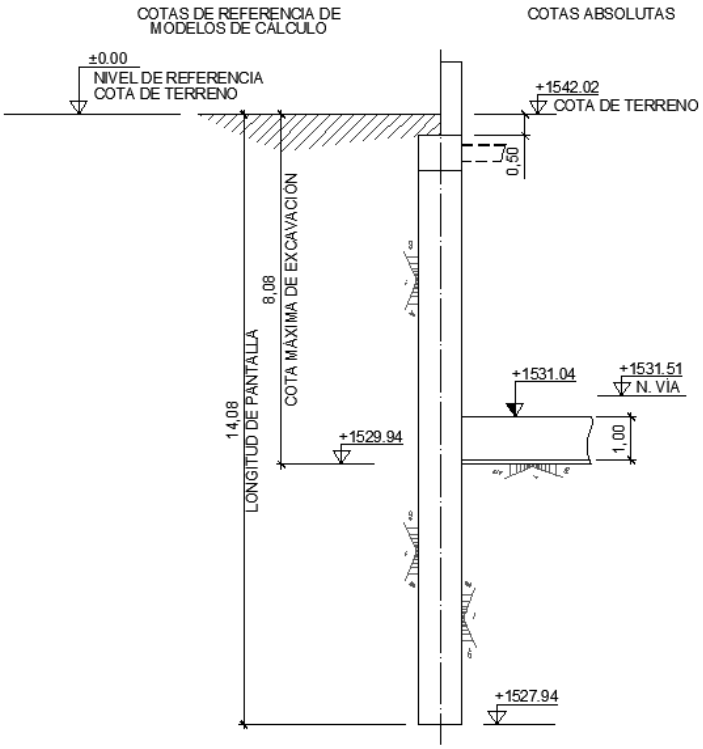
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Y las secciones de cálculo son las siguientes:



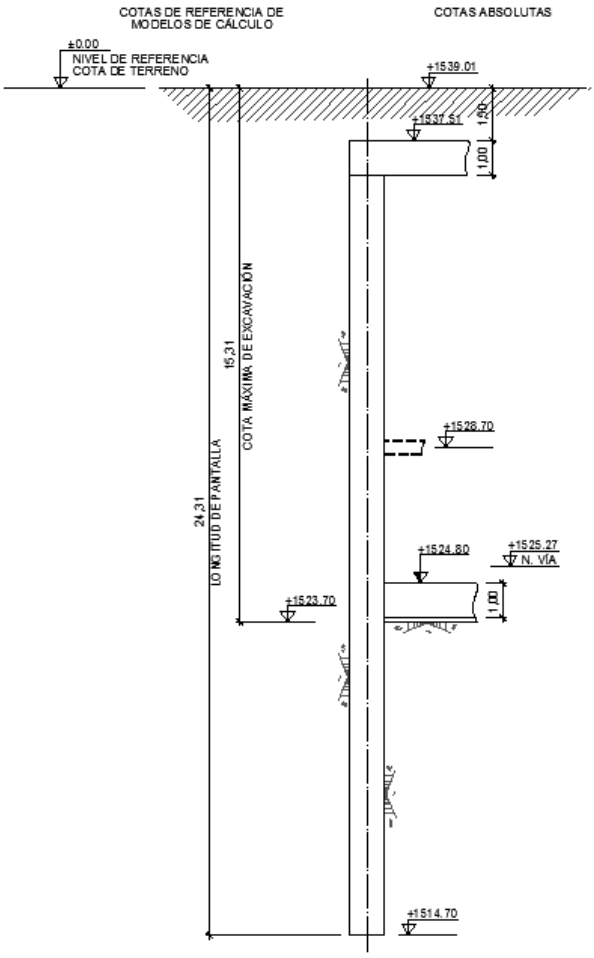

SECCIÓN CÁLCULO TIPO A

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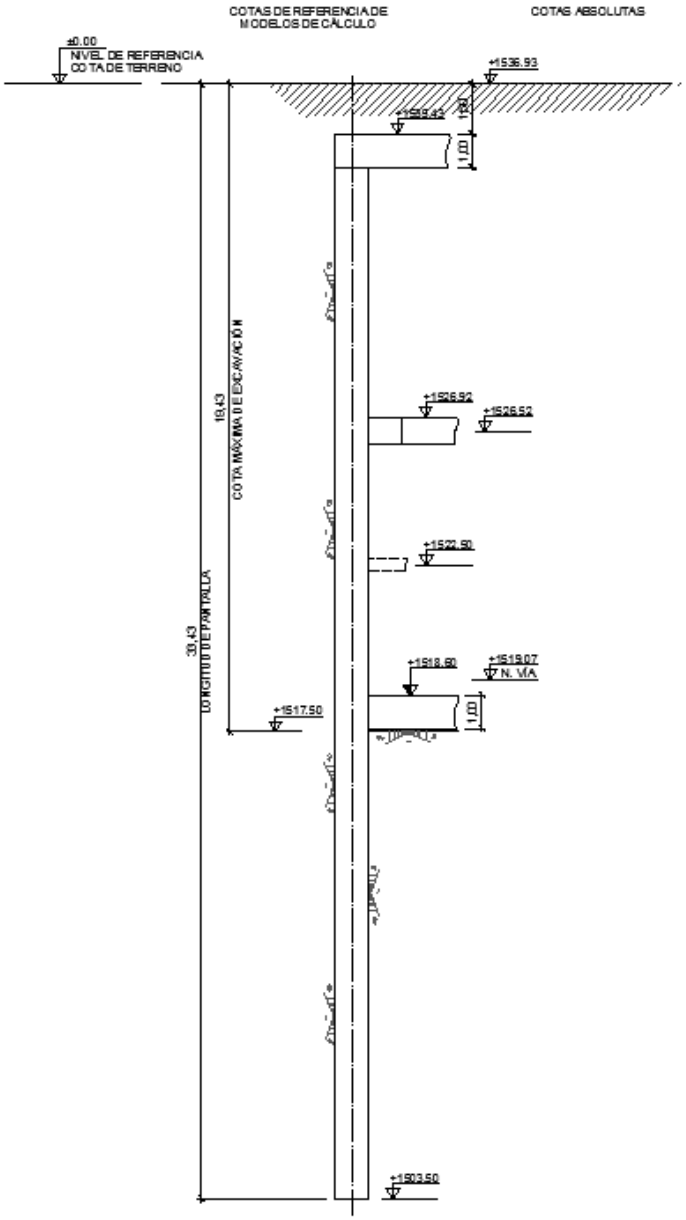

SECCIÓN CÁLCULO TIPO B

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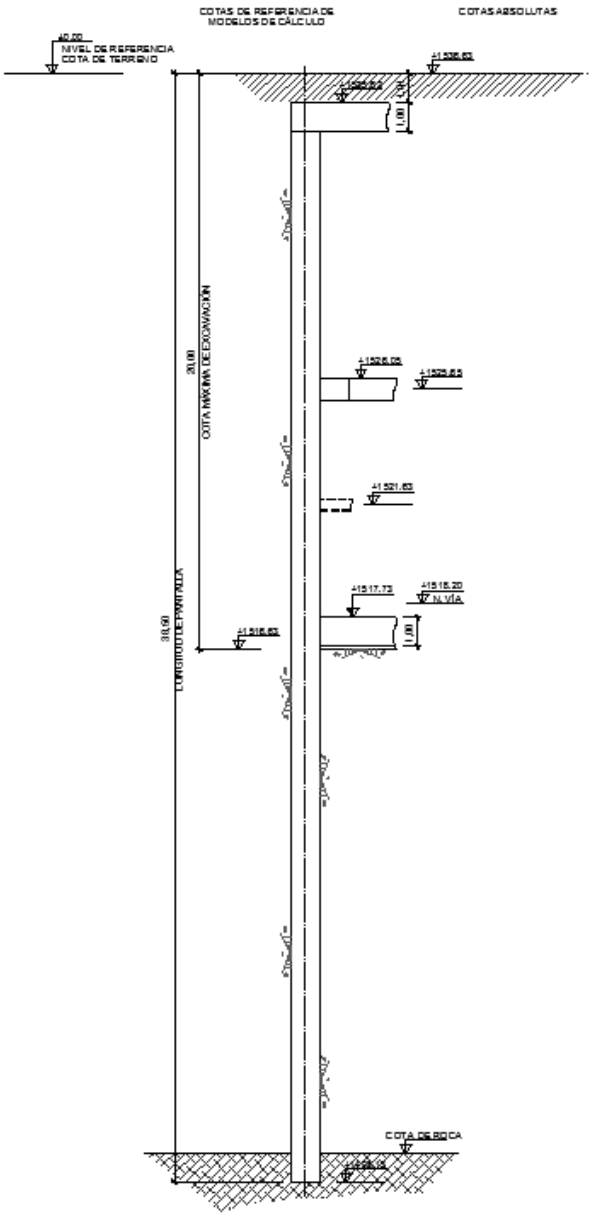

SECCIÓN CÁLCULO TIPO C

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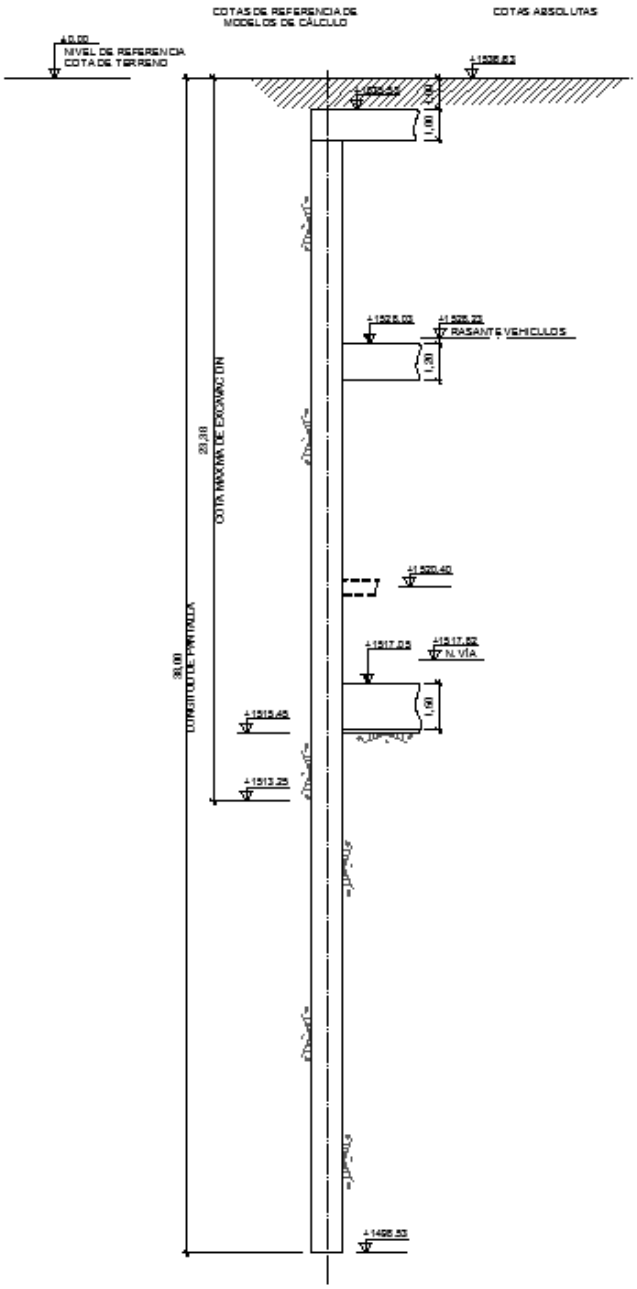

SECCIÓN CÁLCULO TIPO D

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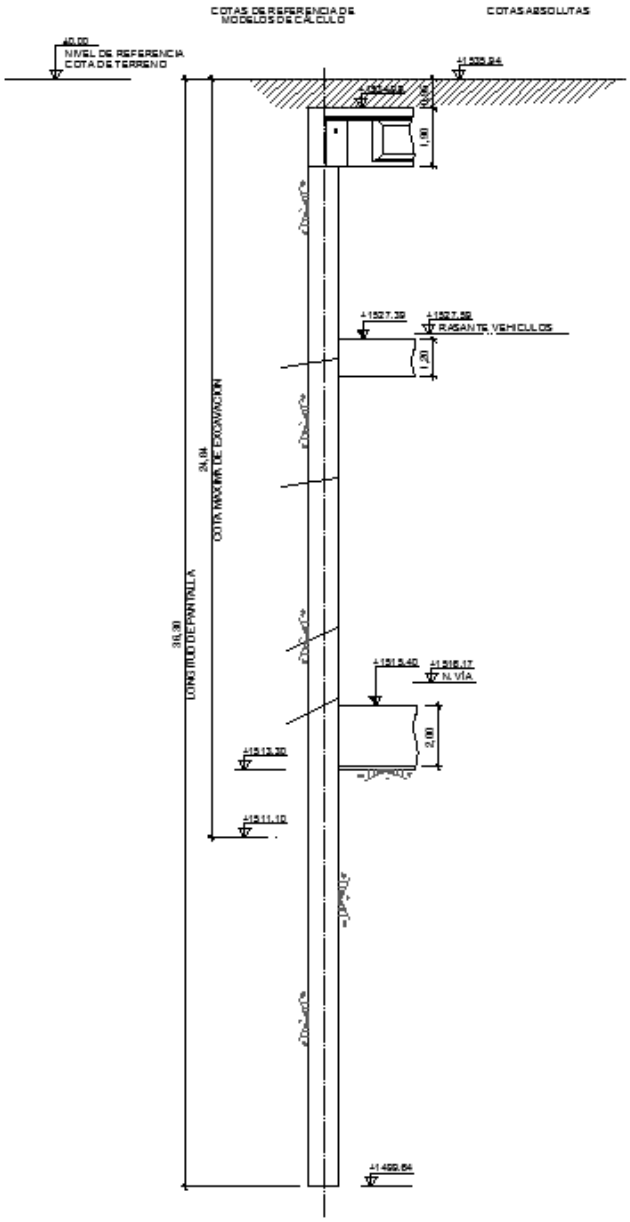

SECCIÓN CÁLCULO TIPO E

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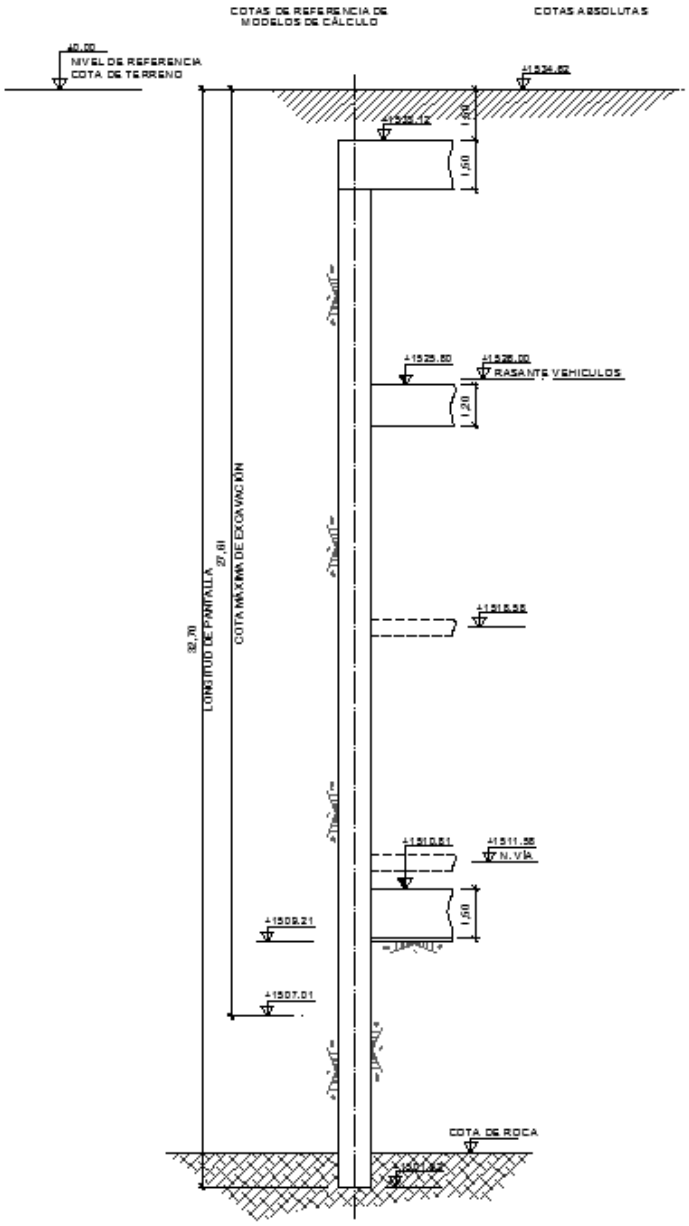

SECCIÓN CÁLCULO TIPO F

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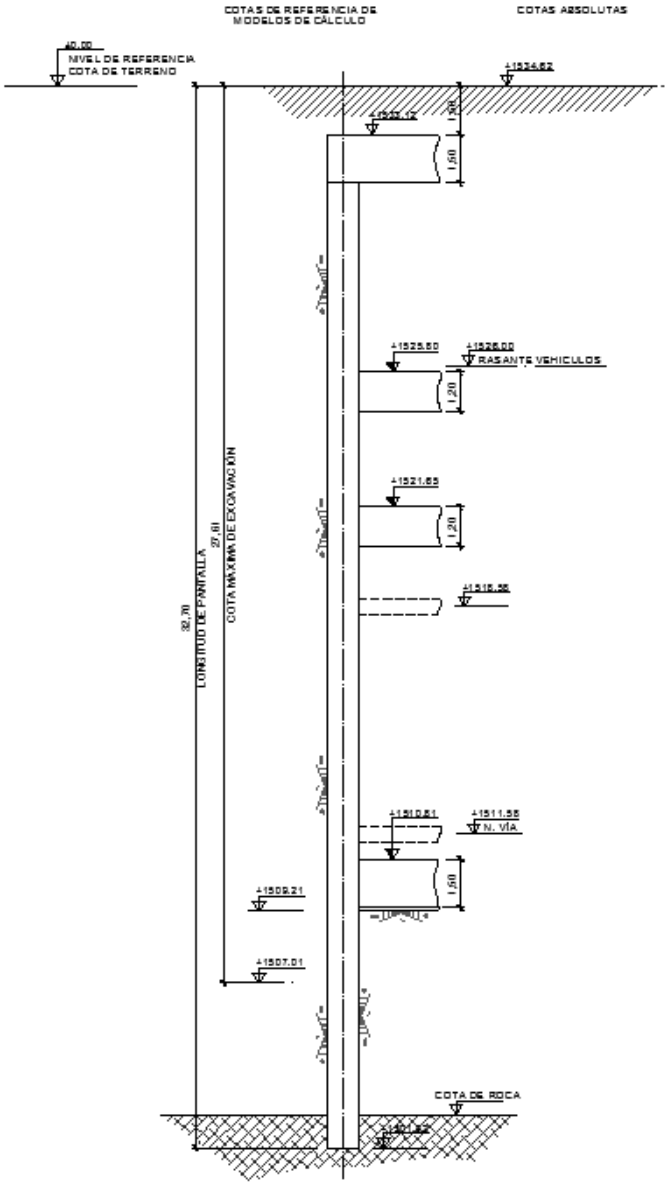

SECCIÓN CÁLCULO TIPO G

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SECCIÓN CÁLCULO TIPO H

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SECCIÓN CÁLCULO TIPO I

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## 6.4. RESTRICCIONES CONSIDERADAS EN EL CÁLCULO

Para el empuje activo del terreno, se ha considerado un ángulo de inclinación de las fuerzas igual a $\delta a = \Phi/3$, de tal manera que se consigue modelizar un comportamiento más real de la interacción suelo-pantalla.

Sin embargo, para el empuje pasivo, se ha supuesto nulo dicho ángulo de inclinación, $\delta p = 0$, ya que para algunos casos en los que el ángulo de rozamiento interno del terreno es muy grande, el considerar un cierto ángulo de inclinación del empuje puede ser una suposición del lado de la inseguridad, ya que el perfil de terreno movilizado sería mayor que el que realmente se llegaría a movilizar.

Por otro lado, la longitud de las pantallas se determinará de tal manera que no se movilice más del 60% del empuje pasivo movilizable, ya que considerar un mayor porcentaje podría estar del lado de la inseguridad porque precisaría de deformaciones muy grandes que no tienen porque producirse en realidad. Para el caso de pantallas en voladizo, como las deformaciones son generalmente mayores que en pantallas atadas en cabeza, dicho límite se subirá hasta el 70% en caso de sismo.

De cara a la comprobación de la longitud de la pantalla, la fase crítica corresponde a la fase en la que se excava hasta la cota inferior de la losa de fondo ya que es cuando el terreno del intradós tiene que aguantar el empuje activo del trasdós.

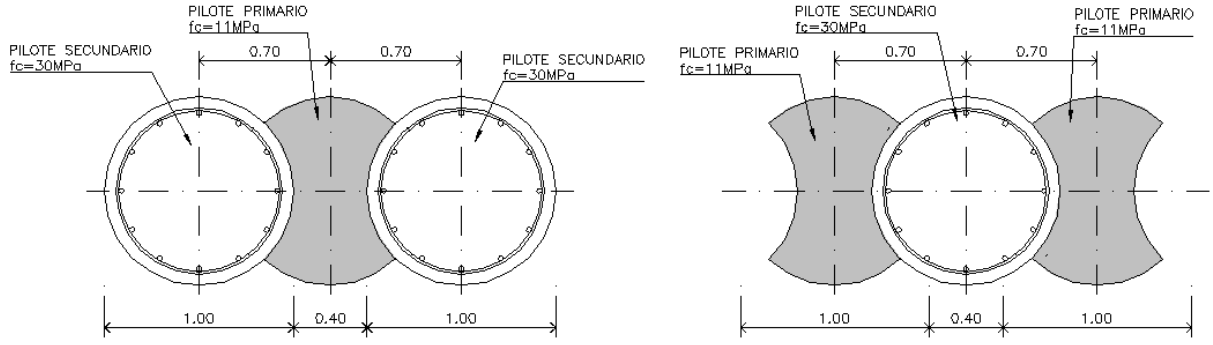
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# 7. CARACTERÍSTICAS MECÁNICAS DE LOS ELEMENTOS ESTRUCTURALES

## 7.1. PANTALLAS

Para obtener la rigidez de las pantallas de pilotes, correspondientes al primer tramo de la trinchera, se considerarán las distintas rigideces de los pilotes primarios y secundarios en función de la calidad del hormigón utilizado para cada uno de ellos.

Se tienen dos posibles disposiciones según los siguientes esquemas:




En ambas posiciones la rigidez que se obtendrá es la misma, porque la inercia de pilote primario y pilote secundario es la misma para los 1,40 metros que hay entre ejes de pilotes. Así la rigidez que se obtiene es una rigidez ponderada por los módulos de elasticidad de los dos tipos de hormigones considerados:

- I pilote primario = 0.041 $m^4$ – E pilote primario = 15919 MPa.
- I pilote secundario = 0.049 $m^4$ – E pilote secundario = 26290 MPa.

$$EI = \frac{0.041 \cdot 15919 + 0.049 \cdot 26290}{1.4} \cdot 10^3 = 1386349\ kN \cdot m^2/ml$$

En cuanto a las pantallas del último tramo de la trinchera, la rigidez, para 1 metro de canto, es de: EI = 2.190.833 kN·m2/m

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## 7.2. NIVELES DE APUNTALAMIENTO DEFINITIVOS

Para los diferentes elementos de arriostramiento definitivos de las pantallas se muestra la siguiente tabla resumen de propiedades consideradas en el cálculo:

| SECCIÓN CÁLCULO A | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa de fondo | Losa H.A. e=1,0 m. | 4 000 000 | -4.60 | -5.20 |

| SECCIÓN CÁLCULO B | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa de fondo | Losa H.A. e=1,00 m. | 4 000 000 | -7.45 | -8.05 |

| SECCIÓN CÁLCULO C | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa cubierta | Losa H.A. e=1,00 m. | 4 000 000 | -2.00 | -2.60 |
| Losa de fondo | Losa H.A. e=1,00 m. | 4 000 000 | -14.70 | -15.30 |

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| SECCIÓN CÁLCULO D | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa cubierta | Losa H.A. e=1,00 m. | 4 000 000 | -2.00 | -2.60 |
| Nivel Estampidores | Estampidores 80x80cm Sep. 5m. Viga Borde 100x80cm. | 705 000 | -10.95 | -10.45 |
| Losa de fondo | Losa H.A. e=1,00 m. | 4 000 000 | -18.85 | -19.45 |

| SECCIÓN CÁLCULO E | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa cubierta | Losa H.A. e=1,00 m. | 4 000 000 | -1.70 | -2.30 |
| Nivel Estampidores | Estampidores 80x80cm Sep. 5m. Viga Borde 100x80cm. | 705 000 | -11.00 | -11.50 |
| Losa de fondo | Losa H.A. e=1,00 m. | 4 000 000 | -19.40 | -20.00 |

| SECCIÓN CÁLCULO F | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa cubierta | Losa H.A. e=1,50 m. | 4 000 000 | -1.50 | -2.10 |
| Losa acceso rodado | Losa H.A. e=1,20 m. | 3 366 667 | -9.00 | -9.60 |
| Losa de fondo | Losa H.A. e=1,50 m. | 850 000 | -20.15 | -21.00<br>-23.20 |

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| SECCIÓN CÁLCULO G | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Cubierta vigas pretensadas | Vigas pretensadas + capa compresión. e=1,90 m. | 855 500 | -1.15 | -2.90 |
| Losa acceso rodado | Losa H.A. e=1,20 m. | 3 366 667 | -8.95 | -9.65 |
| Losa de fondo | Losa H.A. e=2,00 m. | 1 340 000 | -21.42 | -22.52<br>-24.72 |

| SECCIÓN CÁLCULO H | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa cubierta | Losa H.A. e=1,50 m. | 5 200 000 | -2.25 | -3.10 |
| Losa acceso rodado | Losa H.A. e=1,20 m. | 3 366 667 | -10.15 | -9.45 |
| Losa de fondo | Losa H.A. e=1,50 m. | 850 000 | -24.55 | -25.40<br>-27.60 |

| SECCIÓN CÁLCULO I | | | | |
|---|---|---|---|---|
| Tipo de elemento | Descripción | K (kN/m/m) | Cota Puntal.(m) | Cota Excav.(m) |
| Losa cubierta | Losa H.A. e=1,50 m. | 5 200 000 | -2.25 | -3.10 |
| Losa acceso rodado | Losa H.A. e=1,20 m. | 3 366 667 | -10.15 | -9.45 |
| Losa de acceso peatonal | Losa H.A. e=1,20 m. | 3 366 667 | -14.30 | -13.60 |
| Losa de fondo | Losa H.A. e=1,50 m. | 850 000 | -24.55 | -25.40<br>-27.60 |

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Para las losas continuas se ha considerado una distancia entre pantallas de 10 m., obteniendo la rigidez como:

$$k = \frac{EA}{L/2}$$

(Se toma como límite superior de la rigidez un valor de k = 4000000 kN/m porque para valores de rigidez tan altos los resultados son invariables).

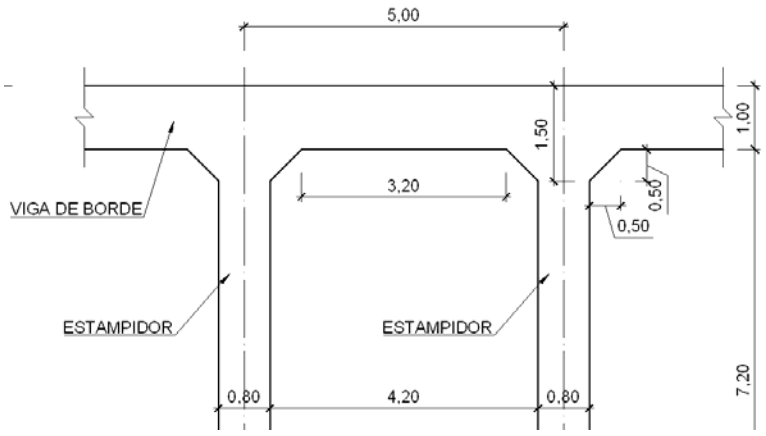
Para el nivel de estampidores, la rigidez máxima que se puede considerar es la del efecto axil de los propios estampidores. Dicha rigidez se obtiene como:

$$k = \frac{EA_{Estampidor}}{L/2 \cdot Sep} = \frac{26290 \cdot 0.8 \cdot 0.8}{\frac{10}{2} \cdot 5} \cdot 10^3 = 673024\ kN/m$$

Por lo tanto la rigidez máxima que se podrá considerar en el cálculo es de k = 650.000 kN/m.

El diseño de la viga de borde se hace de tal manera que la rigidez de la misma sea igual o mayor a la de los puntales de tal manera que el arriostramiento sea homogéneo en todos los pilotes independientemente de caer en zona de estampidor o en zona de viga de borde.

Así, para una viga de borde de 100x80 cm con apoyos cada 5 m. con chaflan de 50 cm. se obtiene:

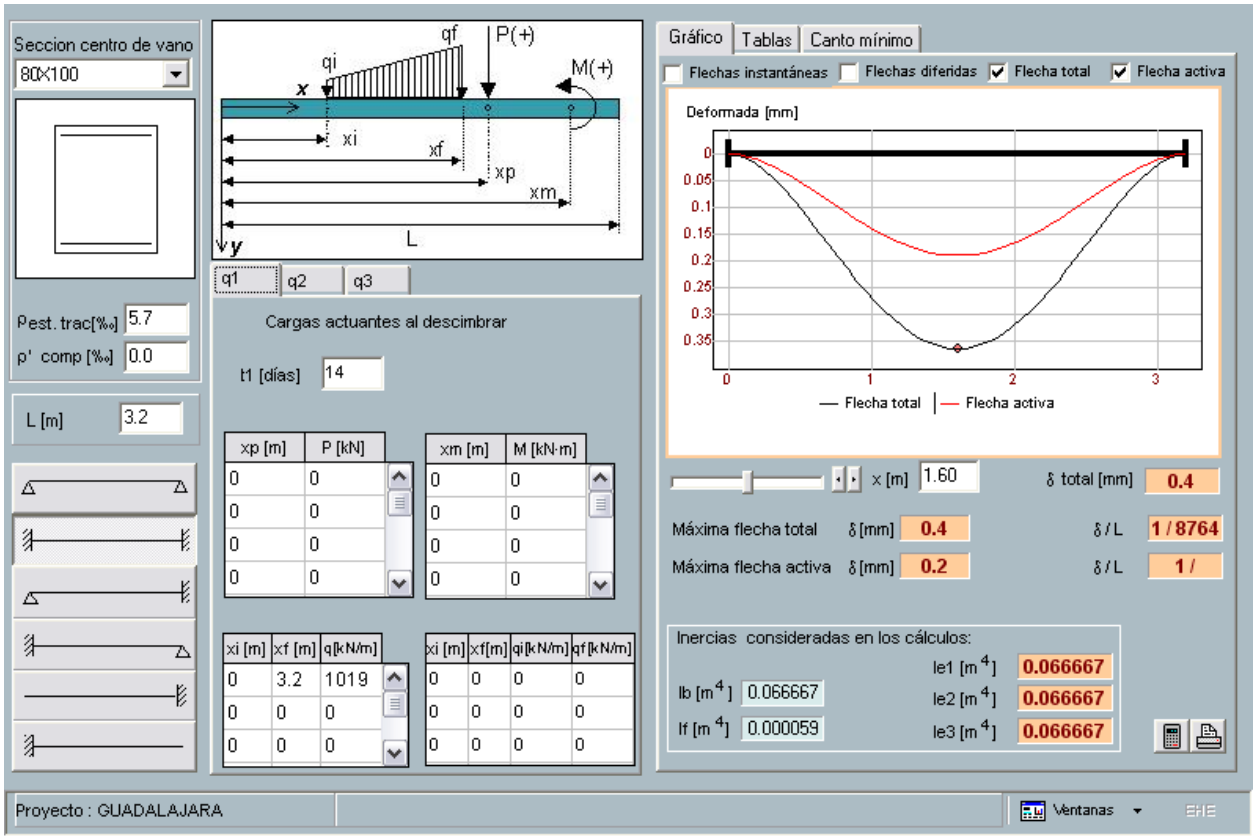



Para la reacción máxima obtenida en el modelo RIDO con k = 650.000 kN/m para los niveles de estampidores se obtiene que la siguiente rigidez:

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$$k = \frac{1019}{0.4} \cdot 1000 = 2547500\ kN/m$$

Por lo que el efecto arriostramiento será constante en todo el nivel y la rigidez también y la suposición hecha en los cálculos es correcta.



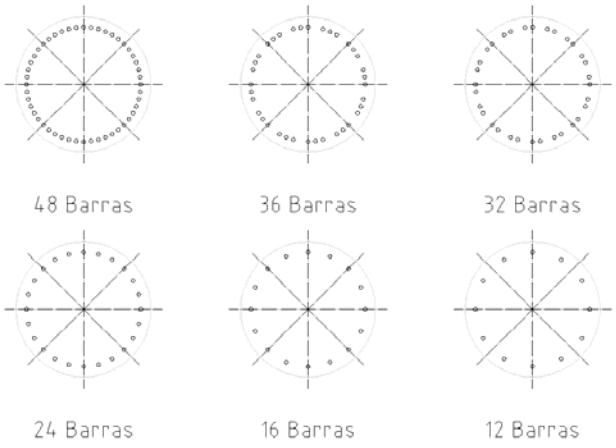
# 8. ARMADO TIPO PARA CADA TIPOLOGÍA DE PANTALLA

Se muestran a continuación los armados tipo considerados para cada tipología de pantalla.

## 8.1. PILOTES SECANTES

Para el armado de las diferentes pantallas se han definido una serie de secciones tipo que se distribuirán en función de los esfuerzos obtenidos.

En el caso de los pilotes, la distribución de barras viene marcada por la disposición de huecos en la plancha de armado para los pilotes, por lo que el número de redondos a disponer se deberá ajustar a dicha disposición según el siguiente esquema:




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### *8.1.1. Secciones tipo para Armado a flexión*

Las secciones tipo consideradas son las siguientes:

| Sección Tipo | Φ·Mu (kN.m) | Φ·Mu Sismo (kN.m) | As (cm2/m) | Nº Barras por pilote |
|---|---|---|---|---|
| ST-01 | 924 | 1027 | 61.2 | 12#8 |
| ST-02 | 1461 | 1623 | 103.2 | 16#9 |
| ST-03 | 1797 | 1997 | 131.0 | 16#10 |
| ST-04 | 2151 | 2390 | 161.0 | 16#11 |
| ST-05 | 3049 | 3388 | 241.4 | 24#11 |
| ST-06 | 3894 | 4327 | 321.9 | 32#11 |

Los momentos últimos obtenidos para cada una de las secciones tipo se han obtenido según las indicaciones de la normativa AASHTO-LRFD-2004.

### *8.1.2. Secciones tipo para Armado a cortante*

Las secciones tipo consideradas son las siguientes:

| Sección Tipo | Φ·Vu (kN) | Φ·Vu Sismo (kN) | As (kg/m.l.) | Armado por pilote |
|---|---|---|---|---|
| ST-01 | 1021 | 1134 | 12.6 | 1h#4/20 |
| ST-02 | 1235 | 1372 | 20.8 | 1h#5/20 |
| ST-03 | 1840 | 2044 | 41.5 | 1h#5/10 |
| ST-04 | 2348 | 2609 | 59.7 | 1h#6/10 |

Los cortantes últimos obtenidos para cada una de las secciones tipo se han obtenido según las indicaciones de la normativa AASHTO-LRFD-2004.

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## 8.2. ARMADO DE LAS PANTALLAS E=1.00M

Para el armado de las diferentes pantallas se han definido una serie de secciones tipo que se distribuirán en función de los esfuerzos obtenidos.

### 8.2.1. Secciones tipo para Armado a flexión

Las secciones tipo consideradas son las siguientes:

| PANTALLA DE 1 METRO DE ESPESOR | | | | | | |
|---|---|---|---|---|---|---|
| Sección Tipo | ΦMu (kN.m/m) | ΦMu Sismo (kN.m/m) | Mserv (kN.m/m) | As (cm2/m) | Nº Barras para jaula de 1 m. | Distribución por m.l. |
| STL-00 | 344 | 382 | --- | 0 | --- | --- |
| STL-01 | 1077 | 1197 | 688 | 32.3 | 5#9 | #9/0,20 |
| STL-02 | 1354 | 1504 | 866 | 41.0 | 5#10 | #10/0,20 |
| STL-03 | 1674 | 1860 | 1074 | 50.9 | 10#8 | #8/0,10 |
| STL-04 | 2090 | 2322 | 1347 | 64.5 | 10#9 | #9/0,10 |
| STL-05 | 2604 | 2893 | 1692 | 81.9 | 10#10 | #10/0,10 |
| STL-06 | 3134 | 3482 | 2056 | 100.6 | 10#11 | #11/0,10 |
| STL-07 | 3912 | 4347 | 2539 | 132.9 | 10#11+5#9(2ªCapa) | #11/0,10 + #9/0,20(2ªCapa) |
| STL-08 | 4108 | 4564 | 2662 | 141.6 | 10#11+5#10(2ªCapa) | #11/0,10 + #10/0,20(2ªCapa) |
| STL-09 | 4626 | 5140 | 3008 | 165.1 | 10#11+10#9(2ªCapa) | #11/0,10 + #9/0,10(2ªCapa) |
| STL-10 | 4978 | 5531 | 3249 | 182.5 | 10#11+10#10(2ªCapa) | #11/0,10 + #10/0,10(2ªCapa) |
| STL-11 | 5334 | 5927 | 3501 | 201.2 | 10#11+10#11(2ªCapa) | #11/0,10 + #11/0,10(2ªCapa) |

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Los momentos últimos obtenidos para cada una de las secciones tipo se han obtenido según las indicaciones de la normativa AASHTO-LRFD-2004.

### *8.2.2. Secciones tipo para Armado a cortante*

Las secciones tipo consideradas son las siguientes:

| PANTALLA DE 1 METRO DE ESPESOR Y JAULA DE 2,5 METROS DE ANCHO | | | | |
|---|---|---|---|---|
| **Sección Tipo** | **ΦVu (kN)** | **ΦVu Sismo (kN)** | **As (kg/m.l.)** | **Armado para batache b = bw** |
| STC-00 | 1080 | 1200 | 0 | --- |
| STC-01 | 1264 | 1404 | 57.3 | 1c#5/20 |
| STC-02 | 3644 | 4049 | 74.5 | 1c#5+4r#4/20 |
| STC-03 | 4095 | 4550 | 83.1 | 1c#5+6r#4/20 |
| STC-04 | 4840 | 5378 | 97.3 | 1c#5+6r#5/20 |
| STC-05 | 5772 | 6413 | 129.8 | 1c#5+6r#5/15 |
| STC-06 | 6164 | 6849 | 161.9 | 1c#6+6r#5/15 |
| STC-07 | 6988 | 7764 | 194.2 | 1c#6+6r#5/12.5 |
| STC-08 | 8398 | 9331 | 221.1 | 1c#6+6r#6/12.5 |
| STC-09 | 9987 | 11097 | 276.4 | 1c#6+6r#6/10 |

Se ha considerado un ancho tipo de jaula de bw = 2,50 m.

Los cortantes últimos obtenidos para cada una de las secciones tipo se han obtenido según las indicaciones de la normativa AASHTO-LRFD-2004.

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# 9. DIMENSIONAMIENTO DE CADA TIPOLOGÍA DE PANTALLA

## 9.1. CONSIDERACIONES DEL CÁLCULO

### 9.1.1. Pilotes secantes

En las hojas de cálculo TZ_A, TZ_B, TZ_C, TZ_D, TZ_E se muestran las envolventes de esfuerzos proporcionados por RIDO para el cálculo estático y para el cálculo dinámico. Dichos esfuerzos se multiplican por la separación entre pilotes secundarios, que es de 1,40m. para obtener los esfuerzos a resistir por cada pilote aislado Se muestran también los momentos en el estado final, para la comprobación de fisuración de la pantalla.

En cuanto al coeficiente de mayoración de los empujes, debido a que el programa RIDO realiza un cálculo conjunto de los empujes del terreno y del agua, siendo consideraciones no-lineales, se considerará que el coeficiente de mayoración de los esfuerzos es el mismo tanto para el empuje del terreno (EH) como para el empuje del agua (WA), siendo éste de 1,5. (Suposición del lado de la seguridad)

Para tener en cuenta que los apoyos de los forjados no son puntuales sino que se producen en un ancho igual al espesor del elemento, el momento de cálculo considerado corresponde a disminuir el momento de salida del RIDO en $\Delta M_d = F_{Ed,sup} * t/8$. El valor t corresponde con el espesor del forjado y $F_{Ed,sup}$ con la reacciónpantalla-forjado. (Según indicaciones del Eurocódigo 2)

Respecto a lo que aparece en el gráfico de los momentos, el refuerzo finalmente dispuesto en planos se prolonga una distancia igual al canto útil más la longitud de anclaje (decalaje).

El esfuerzo cortante de cálculo que se ha considerado para el dimensionamiento del refuerzo a nivel de los apoyos corresponde al esfuerzo de cálculo obtenido a un canto útil del borde del forjado.

Para el cálculo de los armados de cada tipología de pantallas, se ha realizado una única comprobación en la que se ha supuesto una envolvente de cálculo obtenida a partir de los esfuerzos en dos situaciones:

- Envolvente de esfuerzos en situación estática, mayorados por 1,5.

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- Esfuerzos en situación dinámica, mayorados por 1.

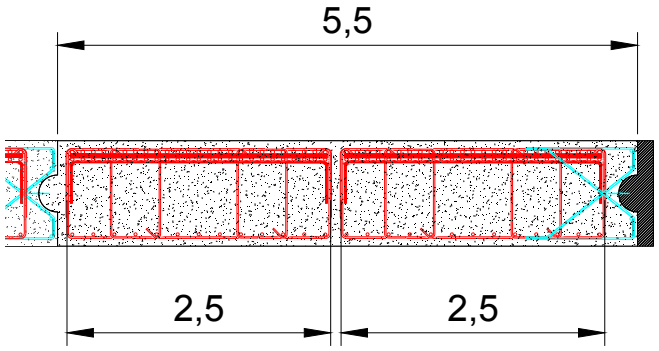
La envolvente de esfuerzos obtenida será la que se considere en los cálculos (y se indique en las hojas de cálculo) y se comprobará con las secciones tipo de cálculo en situación estática (consideración conservadora).

### *9.1.1. Pantallas*

En las hojas de cálculo TZ_F, TZ_G, TZ_H, TZ_I se muestran las envolventes de esfuerzos proporcionados por RIDO para el cálculo estático y para el cálculo dinámico. Dichos esfuerzos se multiplican por el ancho del módulo tipo, que es de 5,50m. Se muestran también los momentos en el estado final, para la comprobación de fisuración de la pantalla.

Para tener en cuenta la disposición de armado y los recubrimientos laterales que hay que dejar entre las jaulas para la excavación de los distintos bataches, se propone un coeficiente de mayoración de los esfuerzos en el que se tenga en cuenta el ancho real de la jaula y el ancho realmente armado.

Así, para el caso de la excavación con cuchara tendremos un esquema similar al siguiente:




por lo que la relación ancho real / ancho armado es de K = 5,50 / 5,00 = 1,10. Así que se multiplicarán los esfuerzos de RIDO por este coeficiente.

En cuanto al coeficiente de mayoración de los empujes, debido a que el programa RIDO realiza un cálculo conjunto de los empujes del terreno y del agua, siendo consideraciones no-lineales, se considerará que el coeficiente de mayoración de los esfuerzos es el mismo tanto para el empuje del

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terreno (EH) como para el empuje del agua (WA), siendo éste de 1,5. (Suposición del lado de la seguridad)

Para tener en cuenta que los apoyos de los forjados no son puntuales sino que se producen en un ancho igual al espesor del elemento, el momento de cálculo considerado corresponde a disminuir el momento de salida del RIDO en $\Delta M_d = F_{Ed,sup} * t/8$. El valor t corresponde con el espesor del forjado y $F_{Ed,sup}$ con la reacciónpantalla-forjado. (Según indicaciones del Eurocódigo 2)

Respecto a lo que aparece en el gráfico de los momentos, el refuerzo finalmente dispuesto en planos se prolonga una distancia igual al canto útil más la longitud de anclaje.

El esfuerzo cortante de cálculo que se ha considerado para el dimensionamiento del refuerzo a nivel de los apoyos corresponde al esfuerzo de cálculo obtenido a un canto útil del borde del forjado.

Para el cálculo de los armados de cada tipología de pantallas, se ha realizado una única comprobación en la que se ha supuesto una envolvente de cálculo obtenida a partir de los esfuerzos en dos situaciones:

- Envolvente de esfuerzos en situación estática, mayorados por 1,5.
- Esfuerzos en situación dinámica, mayorados por 1.

La envolvente de esfuerzos obtenida será la que se considere en los cálculos (y se indique en las hojas de cálculo) y se comprobará con las secciones tipo de cálculo en situación estática (consideración conservadora).

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## *9.2. NOMENCLATURA TIPOLOGÍA DE PANTALLAS*

Para las pantallas que forman la trinchera de Zapopan se ha pensado un sistema de nomenclatura del tipo TZ_XX según corresponde en el siguiente cuadro:

| NOMENCLATURA ESTACIONES | |
|---|---|
| TRINCHERA ZAPOPAN | TZ |
| EST. NORMAL | NO |
| EST. ALCALDE | AL |
| EST. CATEDRAL | CA |
| EST. INDEPENDENCIA | IN |
| EST. PLAZA DE LA BANDERA | PB |
| TRINCHERA TLAQUEPAQUE | TT |

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## 9.3. PANTALLAS TIPO TZ_A

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- A**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Pilotes — Relación Ancho Real/Útil = 1.00
Coef. May. Momentos, γ = 1.50 — Sep. entre pilotes, S (m) = 1.4
Coef. May. Cortantes, γ = 1.50 — Diámetro pilote, D (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -10.8

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 1 | 0.0 | -10.8 | 1 | 0.0 | -10.8 | 1 | 0.0 | -10.8 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

% Desp. y Solp. = 20%

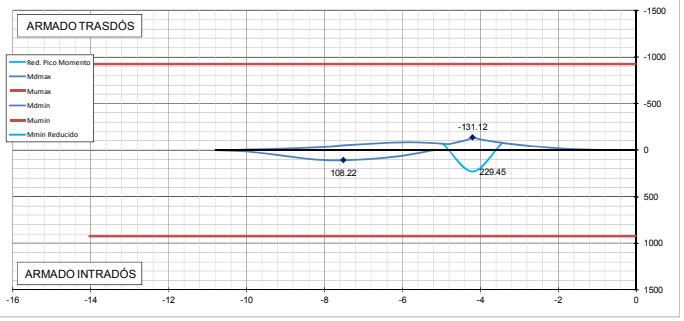
| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 48 | -9 | 39 |
| kg/m3 | 73 | -14 | 60 |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 48 | 13 | 61 |
| kg/m3 | 73 | 19 | 93 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm) | Mf intr. (kNm) | Mf tras. (kNm) | As cm2 | ST | Armado Cortante | Para Un Pilote Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12#8 | 924 | 615 | 615 | 61.2 | 1 | 1hl#4/20 | 1021 | 12.8 |
| 2 | 16#9 | 1461 | 1036 | 1036 | 103.2 | 2 | 1hl#5/20 | 1235 | 20.8 |
| 3 | 16#10 | 1797 | 1266 | 1266 | 131.0 | 3 | 1hl#5/10 | 1840 | 41.5 |
| 4 | 16#11 | 2151 | 1554 | 1554 | 161.0 | 4 | 1hl#6/10 | 2348 | 59.7 |
| 5 | 24#11 | 3049 | 2238 | 2238 | 241.4 | 5 | | | |
| 6 | 32#11 | 3894 | 2880 | 2880 | 321.9 | 6 | | | |
| 7 | 36#11 | | | | | 7 | | | |
| 8 | | | | | | 8 | | | |
| 9 | | | | | | 9 | | | |
| 10 | | | | | | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |

**MOMENTOS DE CÁLCULO Y MOMENTOS ÚLTIMOS PARA ARMADO DISPUESTO (kNm/pil)**

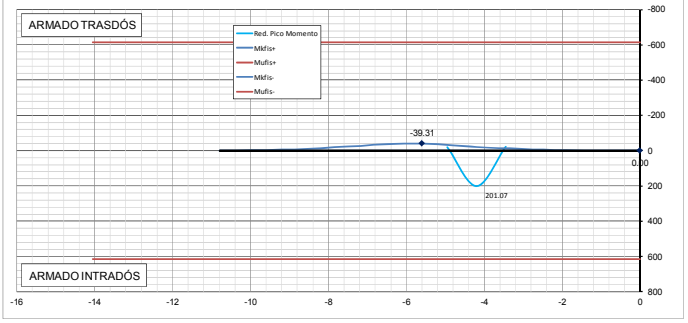



ADVERTENCIAS As LONG. PARA ELU:

NOTAS As LONG. PARA ELU:
Se redistribuye el pico de momentos

| REDUCCIÓN DEL PICO DE MOMENTOS (EC-2) | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/pil) = | 1923 |
| Reducción de momento, ΔM (kNm/pil) = | 360.5625 |

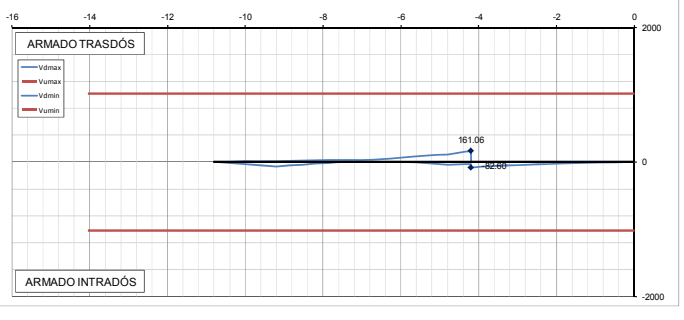
**MOMENTOS ELS Y MOMENTOS FISURACIÓN PARA ARMADO DISPUESTO (kNm/pil)**




ADVERTENCIAS As LONG. PARA ELS:

NOTAS As LONG. PARA ELS:

**ENVOLVENTE DE CORTANTES Y CORTANTES ÚLTIMOS PARA ARMADO DISPUESTO (kN)**




ADVERTENCIAS As CORTANTE:

NOTAS As CORTANTE:
Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.4. PANTALLAS TIPO TZ_B

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- B**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Pilotes — Relación Ancho Real/Útil = 1.00
Coef. May. Momentos, γ = 1.50 — Sep. entre pilotes, S (m) = 1.4
Coef. May. Cortantes, γ = 1.50 — Diámetro pilote, D (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -14.1

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 1 | 0.0 | -14.1 | 1 | 0.0 | -14.1 | 1 | 0.0 | -14.1 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

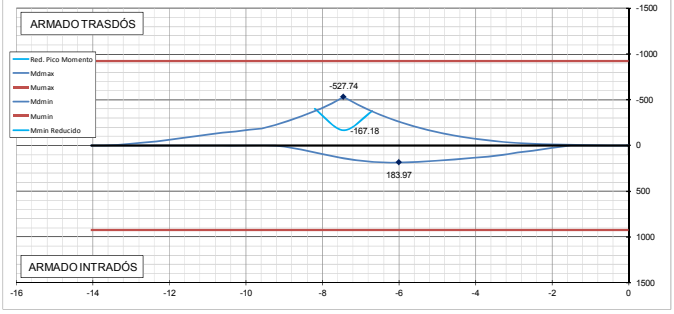
% Desp. y Solp. = 50%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 48 | -7 | 41 |
| kg/m3 | 73 | -11 | 63 |
| EST. KG ACERO DISEÑO | | | |
| Peso | M | V | Total |
| kg/m | 48 | 13 | 61 |
| kg/m3 | 73 | 19 | 93 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm) | Mf intr. (kNm) | Mf tras. (kNm) | As cm2 | ST | Armado Cortante | Para Un Pilote Vu (kN) | Para Un Pilote Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12#8 | 924 | 615 | 615 | 61.2 | 1 | 1h#4/20 | 1021 | 12.6 |
| 2 | 16#9 | 1461 | 1036 | 1036 | 103.2 | 2 | 1h#5/20 | 1235 | 20.8 |
| 3 | 16#10 | 1797 | 1266 | 1266 | 131.0 | 3 | 1h#5/10 | 1840 | 41.5 |
| 4 | 16#11 | 2151 | 1554 | 1554 | 161.9 | 4 | 1h#6/10 | 2348 | 59.7 |
| 5 | 24#11 | 3049 | 2238 | 2238 | 241.4 | 5 | | | |
| 6 | 32#11 | 3894 | 2880 | 2880 | 321.9 | 6 | | | |
| 7 | 36#11 | | | | | 7 | | | |
| 8 | | | | | | 8 | | | |
| 9 | | | | | | 9 | | | |
| 10 | | | | | | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |

**MOMENTOS DE CÁLCULO Y MOMENTOS ÚLTIMOS PARA ARMADO DISPUESTO (kNm/pil)**

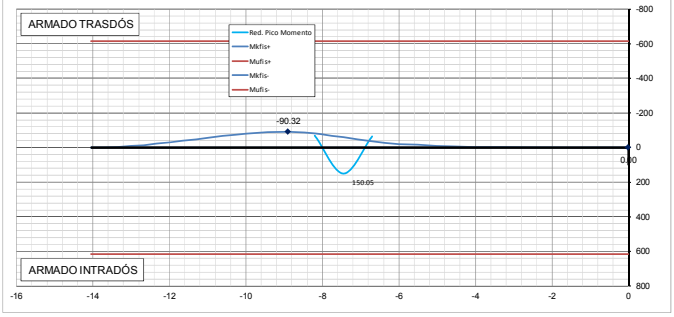



**ADVERTENCIAS As LONG. PARA ELU:**

**NOTAS As LONG. PARA ELU:**
Se redistribuye el pico de momentos

| REDUCCIÓN DEL PICO DE MOMENTOS (EC-2) | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/pil) = | 1923 |
| Reducción de momento, ΔM (kNm/pil) = | 360.5625 |

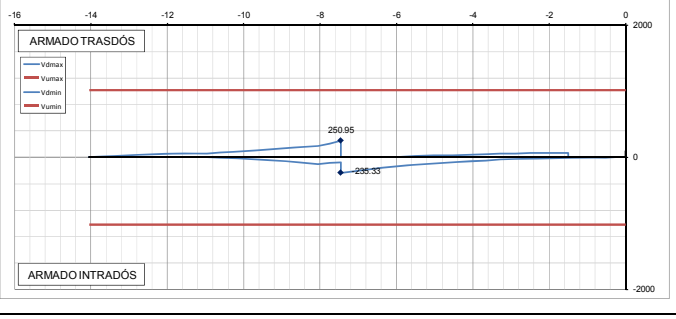
**MOMENTOS ELS Y MOMENTOS FISURACIÓN PARA ARMADO DISPUESTO (kNm/pil)**




**ADVERTENCIAS As LONG. PARA ELS:**

**NOTAS As LONG. PARA ELS:**

**ENVOLVENTE DE CORTANTES Y CORTANTES ÚLTIMOS PARA ARMADO DISPUESTO (kN)**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**
Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.5. PANTALLAS TIPO TZ_C

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- C**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Pilotes — Relación Ancho Real/Útil = 1.00
Coef. May. Momentos, γ = 1.50 — Sep. entre pilotes, S (m) = 1.4
Coef. May. Cortantes, γ = 1.50 — Diámetro pilote, D (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -24.3

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 5 | 0.0 | -12.0 | 5 | 0.0 | -12.0 | 1 | 0.0 | -10.0 |
| 4 | -12.0 | -24.3 | 4 | -12.0 | -24.3 | 3 | -10.0 | -24.3 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

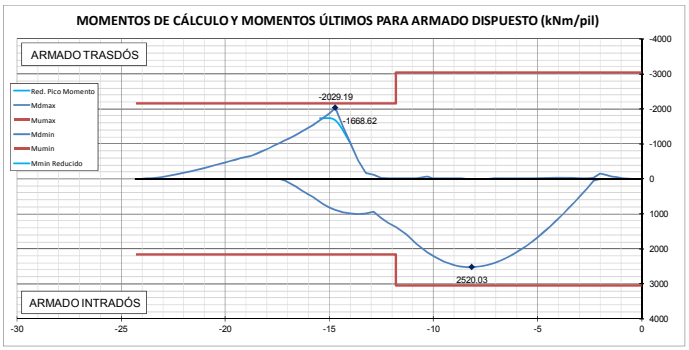
% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 85 | -4 | 81 |
| kg/m3 | 130 | -6 | 124 |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 158 | 30 | 187 |
| kg/m3 | 241 | 45 | 286 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm) | Mf intr. (kNm) | Mf tras. (kNm) | As cm2 | ST | Armado Cortante | Para Un Pilote Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12#8 | 924 | 615 | 615 | 61.2 | 1 | 1ht#4/20 | 1021 | 12.6 |
| 2 | 16#9 | 1461 | 1036 | 1036 | 103.2 | 2 | 1ht#5/20 | 1235 | 20.8 |
| 3 | 16#10 | 1797 | 1266 | 1266 | 131.0 | 3 | 1ht#5/10 | 1840 | 41.5 |
| 4 | 16#11 | 2151 | 1554 | 1554 | 161.0 | 4 | 1ht#6/10 | 2348 | 59.7 |
| 5 | 24#11 | 3049 | 2238 | 2238 | 241.4 | 5 | | | |
| 6 | 32#11 | 3894 | 2880 | 2880 | 321.9 | 6 | | | |
| 7 | 36#11 | | | | | 7 | | | |
| 8 | | | | | | 8 | | | |
| 9 | | | | | | 9 | | | |
| 10 | | | | | | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |

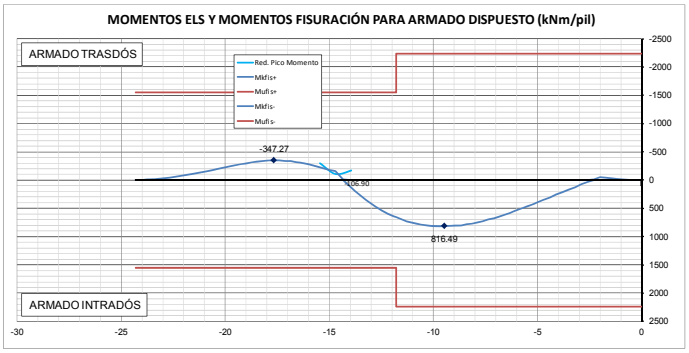



ADVERTENCIAS As LONG. PARA ELU:

NOTAS As LONG. PARA ELU:
Se redistribuye el pico de momentos

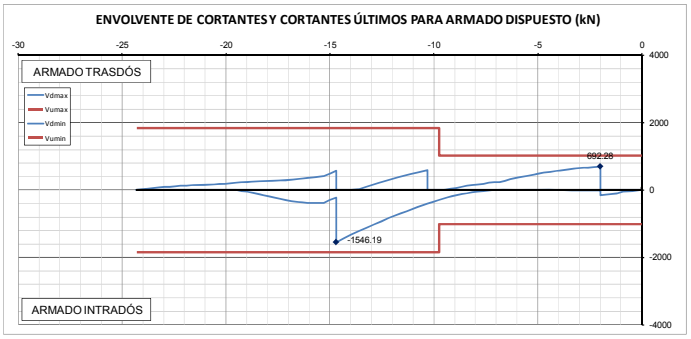
REDUCCIÓN DEL PICO DE MOMENTOS (EC-2)

| | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/pil) = | 1923 |
| Reducción de momento, ΔM (kNm/pil) = | 360.5625 |




ADVERTENCIAS As LONG. PARA ELS:

NOTAS As LONG. PARA ELS:




ADVERTENCIAS As CORTANTE:

NOTAS As CORTANTE:
Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.6. PANTALLAS TIPO TZ_D

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- D**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Pilotes — Relación Ancho Real/Útil = 1.00
Coef. May. Momentos, γ = 1.50 — Sep. entre pilotes, S (m) = 1.4
Coef. May. Cortantes, γ = 1.50 — Diámetro pilote, D (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -33.5

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 2 | 0.0 | -8.0 | 2 | 0.0 | -8.0 | 1 | 0.0 | -9.0 |
| 4 | -8.0 | -22.0 | 4 | -8.0 | -22.0 | 3 | -9.0 | -20.0 |
| 2 | -22.0 | -33.5 | 2 | -22.0 | -33.5 | 1 | -20.0 | -33.5 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

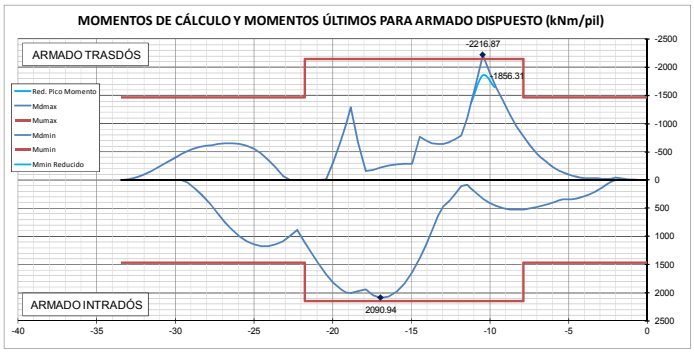
% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 67 | -3 | 64 |
| kg/m3 | 103 | -4 | 98 |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 100 | 22 | 122 |
| kg/m3 | 153 | 34 | 187 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm) | Mf Intr. (kNm) | Mf tras. (kNm) | As cm2 | ST | Armado Cortante | Para Un Pilote Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12#8 | 924 | 615 | 615 | 61.2 | 1 | 1h#4/20 | 1021 | 12.6 |
| 2 | 16#9 | 1461 | 1036 | 1036 | 103.2 | 2 | 1h#5/20 | 1235 | 20.8 |
| 3 | 16#10 | 1797 | 1266 | 1266 | 131.0 | 3 | 1h#5/10 | 1840 | 41.5 |
| 4 | 16#11 | 2151 | 1554 | 1554 | 161.0 | 4 | 1h#6/10 | 2348 | 59.7 |
| 5 | 24#11 | 3049 | 2238 | 2238 | 241.4 | 5 | | | |
| 6 | 32#11 | 3894 | 2880 | 2880 | 321.9 | 6 | | | |
| 7 | 36#11 | | | | | 7 | | | |
| 8 | | | | | | 8 | | | |
| 9 | | | | | | 9 | | | |
| 10 | | | | | | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |



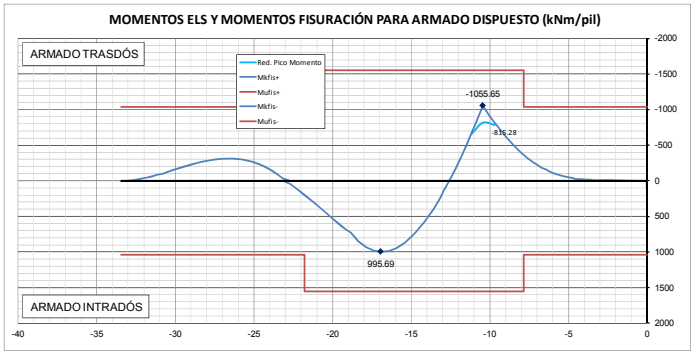

**ADVERTENCIAS As LONG. PARA ELU:**

MODIFICAR ARMADO A MOMENTO DE CÁLCULO NEGATIVO

**NOTAS As LONG. PARA ELU:**

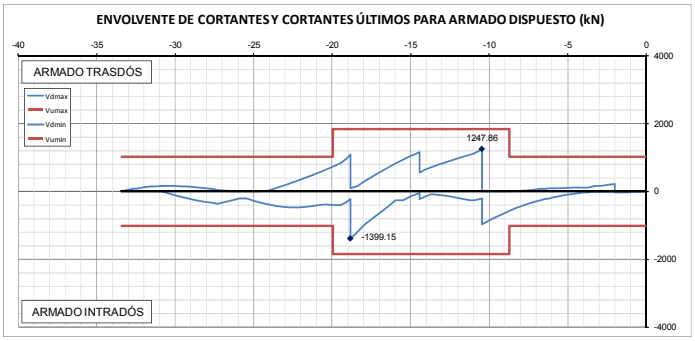
Se redistribuye el pico de momentos

| REDUCCIÓN DEL PICO DE MOMENTOS (EC-2) | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/pil) = | 1923 |
| Reducción de momento, ΔM (kNm/pil) = | 360.5625 |




**ADVERTENCIAS As LONG. PARA ELS:**

**NOTAS As LONG. PARA ELS:**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**

Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.7. PANTALLAS TIPO TZ_E

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- E**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Pilotes — Relación Ancho Real/Útil = 1.00
Coef. May. Momentos, γ = 1.50 — Sep. entre pilotes, S (m) = 1.4
Coef. May. Cortantes, γ = 1.50 — Diámetro pilote, D (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -34.0

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 2 | 0.0 | -8.0 | 2 | 0.0 | -8.0 | 1 | 0.0 | -9.0 |
| 5 | -8.0 | -25.0 | 5 | -8.0 | -25.0 | 3 | -9.0 | -20.0 |
| 2 | -25.0 | -34.0 | 2 | -25.0 | -34.0 | 1 | -20.0 | -34.0 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

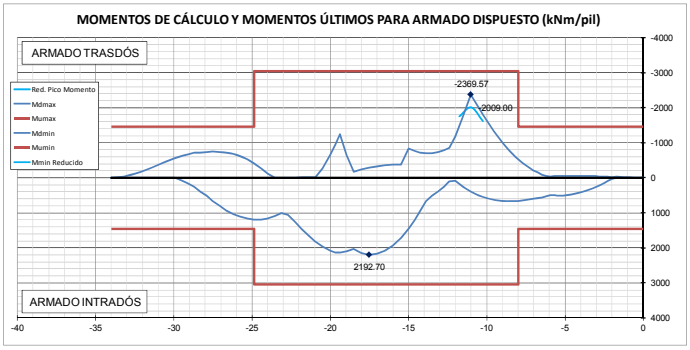
% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 70 | -3 | 67 |
| kg/m3 | 108 | -4 | 103 |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 135 | 22 | 157 |
| kg/m3 | 207 | 34 | 240 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm) | Mf intr. (kNm) | Mf tras. (kNm) | As cm2 | ST | Armado Cortante | Para Un Pilote Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12#8 | 924 | 615 | 615 | 61.2 | 1 | 1h#4/20 | 1021 | 12.6 |
| 2 | 16#9 | 1461 | 1036 | 1036 | 103.2 | 2 | 1h#5/20 | 1235 | 20.8 |
| 3 | 16#10 | 1797 | 1266 | 1266 | 131.0 | 3 | 1h#5/10 | 1840 | 41.5 |
| 4 | 16#11 | 2151 | 1554 | 1554 | 161.0 | 4 | 1h#6/10 | 2348 | 59.7 |
| 5 | 24#11 | 3049 | 2238 | 2238 | 241.4 | 5 | | | |
| 6 | 32#11 | 3894 | 2880 | 2880 | 321.9 | 6 | | | |
| 7 | 36#11 | | | | | 7 | | | |
| 8 | | | | | | 8 | | | |
| 9 | | | | | | 9 | | | |
| 10 | | | | | | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |

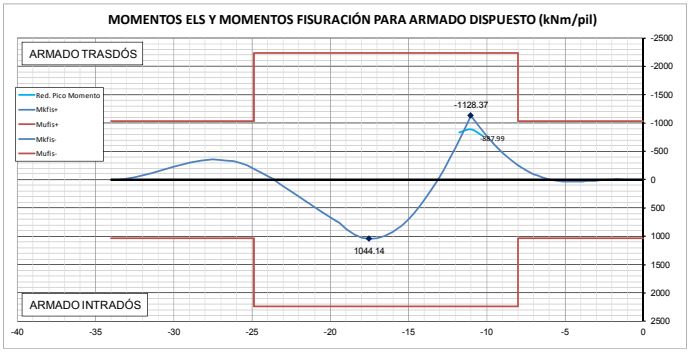



**ADVERTENCIAS As LONG. PARA ELU:**

**NOTAS As LONG. PARA ELU:**
Se redistribuye el pico de momentos

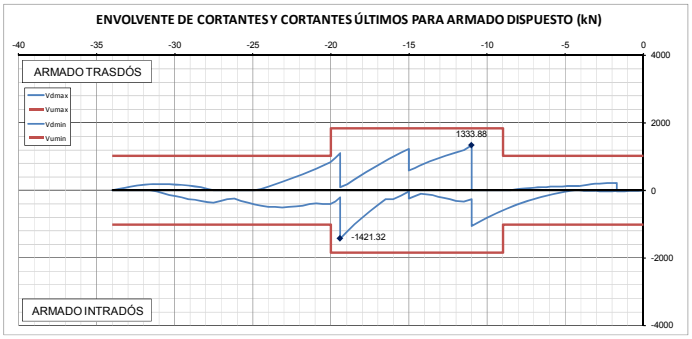
**REDUCCIÓN DEL PICO DE MOMENTOS (EC-2)**

| | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/pil) = | 1923 |
| Reducción de momento, ΔM (kNm/pil) = | 360.5625 |




**ADVERTENCIAS As LONG. PARA ELS:**

**NOTAS As LONG. PARA ELS:**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**
Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.8. PANTALLAS TIPO TZ_F

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- F**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Cuchar: | Relación Ancho Real/Útil = 1.10
Coef. May. Momentos, γ = 1.50 | Ancho batache, bw (m) = 5.5
Coef. May. Cortantes, γ = 1.50 | Espesor de pantalla, h (m) = 1.0
Cota superior, Zsup (m) = 0.00 | Cota inferior, Zinf (m) = -38.0

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 2 | 0.0 | -13.0 | 2 | 0.0 | -5.0 | 1 | 0.0 | -8.0 |
| 5 | -13.0 | -32.0 | 5 | -5.0 | -13.0 | 2 | -8.0 | -11.0 |
| 2 | -32.0 | -38.0 | 2 | -13.0 | -18.0 | 1 | -11.0 | -17.0 |
| | | | 5 | -18.0 | -23.0 | 3 | -17.0 | -22.0 |
| | | | 2 | -23.0 | -38.0 | 1 | -22.0 | -38.0 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

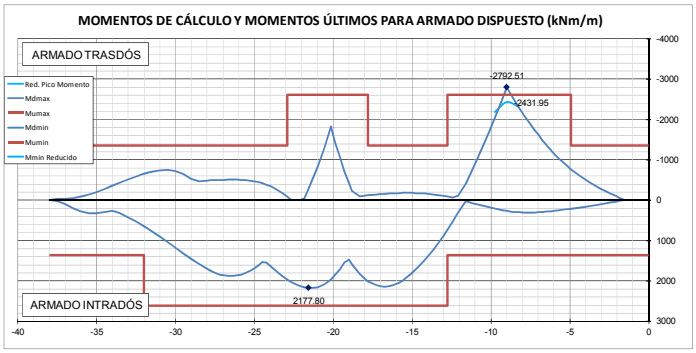
% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 359 | 52 | 410 |
| kg/m3 | 78 | 11 | 90 |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 503 | 55 | 557 |
| kg/m3 | 110 | 12 | 122 |

**SECCIONES TIPO DE CÁLCULO** — Para b = bw

| ST | Armado Flexión | Mu (kNm/m) | Mf intr. (kNm/m) | Mf tras. (kNm/m) | As cm2/m | ST | Armado Cortante | Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5#9 | 1078 | 688 | 688 | 32.3 | 1 | 1c#5/20 | 5484 | 50.2 |
| 2 | 5#10 | 1355 | 866 | 866 | 41.0 | 2 | 1c#5+4r#4/20 | 7288 | 66.4 |
| 3 | 10#8 | 1678 | 1074 | 1074 | 50.9 | 3 | 1c#5+6r#4/20 | 8190 | 74.5 |
| 4 | 10#9 | 2091 | 1347 | 1347 | 64.5 | 4 | 1c#5+6r#5/20 | 9678 | 87.9 |
| 5 | 10#10 | 2605 | 1692 | 1692 | 81.9 | 5 | 1c#5+6r#5/15 | 11544 | 117.2 |
| 6 | 10#11 | 3137 | 2056 | 2056 | 100.8 | 6 | 1c#6+6r#5/15 | 12326 | 145.4 |
| 7 | 10#11+5#9(2ªCapa) | 3891 | 2413 | 2413 | 132.9 | 7 | 1c#6+6r#5/12.5 | 13976 | 174.4 |
| 8 | 10#11+5#10(2ªCapa) | 4080 | 2504 | 2504 | 141.6 | 8 | 1c#6+6r#6/12.5 | 16796 | 199.8 |
| 9 | 10#11+10#9(2ªCapa) | 4580 | 2762 | 2762 | 165.1 | 9 | | | |
| 10 | 10#11+10#10(2ªCapa) | 4919 | 2938 | 2938 | 182.5 | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |



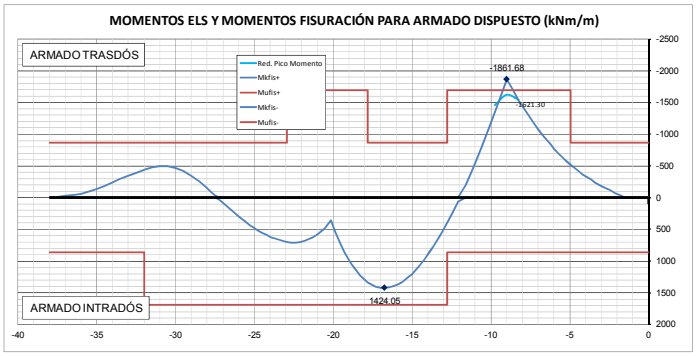

**ADVERTENCIAS As LONG. PARA ELU:**

MODIFICAR ARMADO A MOMENTO DE CÁLCULO NEGATIVO

**NOTAS As LONG. PARA ELU:**

Se redistribuye el pico de momentos

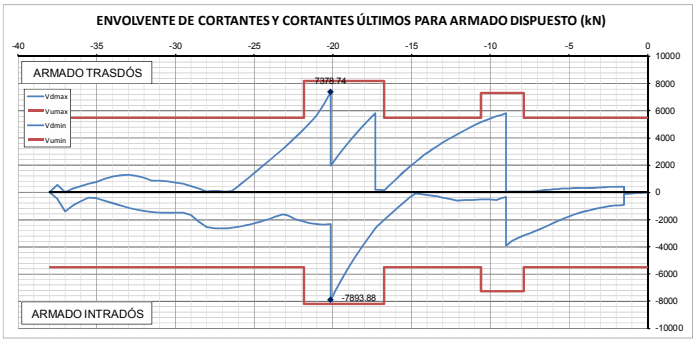
| REDUCCIÓN DEL PICO DE MOMENTOS (EC-2) | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/m) = | 1923 |
| Reducción de momento, ΔM (kNm/m) = | 360.5625 |




**ADVERTENCIAS As LONG. PARA ELS:**

MODIFICAR ARMADO A MOMENTO FISURACIÓN NEGATIVO

**NOTAS As LONG. PARA ELS:**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**

Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.9. PANTALLAS TIPO TZ_G

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- G**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Cucharı — Relación Ancho Real/Útil = 1.10
Coef. May. Momentos, γ = 1.50 — Ancho batache, bw (m) = 5.5
Coef. May. Cortantes, γ = 1.50 — Espesor de pantalla, h (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -36.3

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 2 | 0.0 | -11.0 | 2 | 0.0 | -6.0 | 1 | 0.0 | -8.0 |
| 6 | -11.0 | -18.0 | 5 | -6.0 | -11.0 | 3 | -8.0 | -12.0 |
| 5 | -18.0 | -30.0 | 2 | -11.0 | -19.0 | 1 | -12.0 | -18.0 |
| 2 | -30.0 | -36.3 | 6 | -19.0 | -24.0 | 5 | -18.0 | -24.0 |
| | | | 2 | -24.0 | -36.3 | 1 | -24.0 | -36.3 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

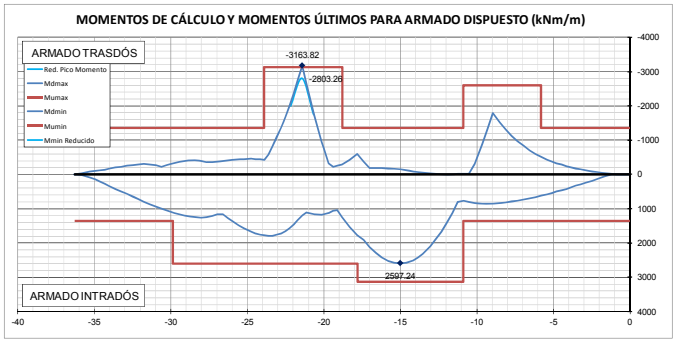
% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 333 | 54 | 387 |
| kg/m3 | 73 | 12 | 85 |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 522 | 64 | 586 |
| kg/m3 | 114 | 14 | 128 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm/m) | Mf intr. (kNm/m) | Mf tras. (kNm/m) | As cm2/m | ST | Armado Cortante | Para b = bw Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5#9 | 1078 | 688 | 688 | 32.3 | 1 | 1c#5/20 | 5484 | 50.2 |
| 2 | 5#10 | 1355 | 866 | 866 | 41.0 | 2 | 1c#5+4r#4/20 | 7288 | 66.4 |
| 3 | 10#8 | 1678 | 1074 | 1074 | 50.9 | 3 | 1c#5+6r#4/20 | 8190 | 74.5 |
| 4 | 10#9 | 2091 | 1347 | 1347 | 64.5 | 4 | 1c#5+6r#5/20 | 9678 | 87.9 |
| 5 | 10#10 | 2605 | 1692 | 1692 | 81.9 | 5 | 1c#5+6r#5/15 | 11544 | 117.2 |
| 6 | 10#11 | 3137 | 2056 | 2056 | 100.6 | 6 | 1c#6+6r#5/15 | 12326 | 145.4 |
| 7 | 10#11+5#9(2ºCapa) | 3891 | 2413 | 2413 | 132.9 | 7 | 1c#6+6r#5/12.5 | 13976 | 174.4 |
| 8 | 10#11+5#10(2ºCapa) | 4080 | 2504 | 2504 | 141.6 | 8 | 1c#6+6r#6/12.5 | 16796 | 199.8 |
| 9 | 10#11+10#9(2ºCapa) | 4580 | 2762 | 2762 | 165.1 | 9 | | | |
| 10 | 10#11+10#10(2ºCapa) | 4919 | 2938 | 2938 | 182.5 | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |




**ADVERTENCIAS As LONG. PARA ELU:**

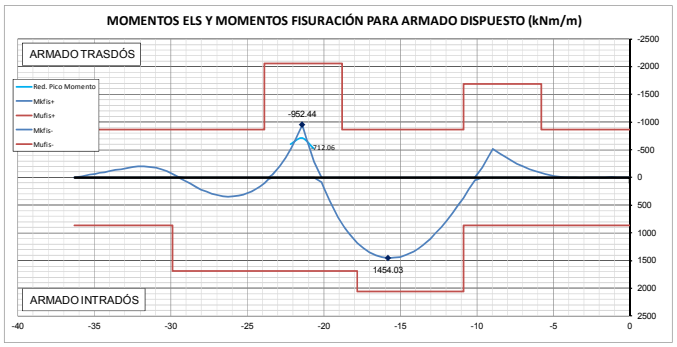
MODIFICAR ARMADO A MOMENTO DE CÁLCULO NEGATIVO

**NOTAS As LONG. PARA ELU:**

Se redistribuye el pico de momentos

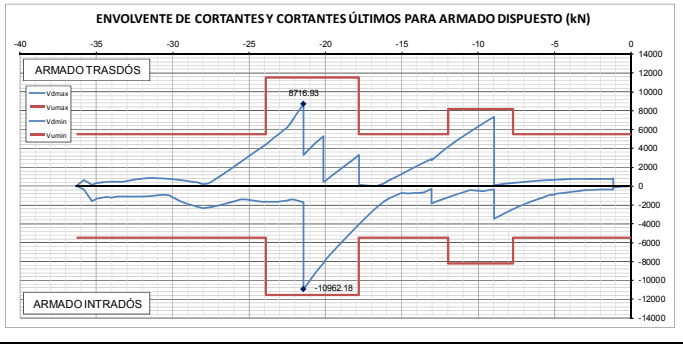
**REDUCCIÓN DEL PICO DE MOMENTOS (EC-2)**

| | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/m) = | 1923 |
| Reducción de momento, ΔM (kNm/m) = | 360.5625 |




**ADVERTENCIAS As LONG. PARA ELS:**

**NOTAS As LONG. PARA ELS:**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**

Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.10. PANTALLAS TIPO TZ_H

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- H**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Cucharı — Relación Ancho Real/Útil = 1.10
Coef. May. Momentos, γ = 1.50 — Ancho batache, bw (m) = 5.5
Coef. May. Cortantes, γ = 1.50 — Espesor de pantalla, h (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -32.7

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 2 | 0.0 | -13.0 | 2 | 0.0 | -5.0 | 1 | 0.0 | -9.0 |
| 6 | -13.0 | -17.0 | 6 | -5.0 | -8.0 | 3 | -9.0 | -15.0 |
| 8 | -17.0 | -28.0 | 8 | -8.0 | -13.0 | 4 | -15.0 | -19.0 |
| 6 | -28.0 | -32.7 | 6 | -13.0 | -18.0 | 1 | -19.0 | -22.0 |
| | | | 2 | -18.0 | -24.0 | 5 | -21.0 | -26.0 |
| | | | 5 | -24.0 | -26.0 | 1 | -26.0 | -32.7 |
| | | | 2 | -26.0 | -32.7 | | | |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

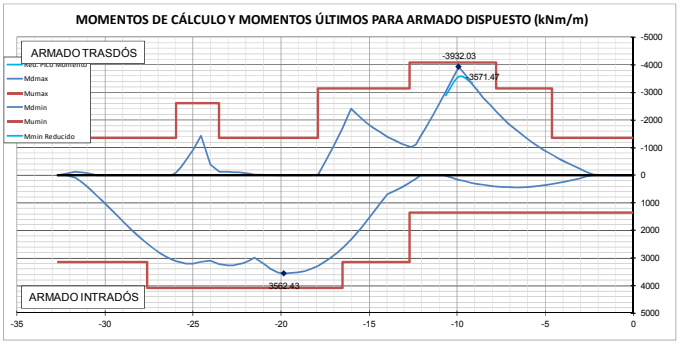
2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 475 | 57 | 533 |
| kg/m3 | 104 | 12 | 116 |
| **EST. KG ACERO DISEÑO** | | | |
| Peso | M | V | Total |
| kg/m | 709 | 71 | 780 |
| kg/m3 | 155 | 16 | 170 |

**SECCIONES TIPO DE CÁLCULO** — Para b = bw

| ST | Armado Flexión | Mu (kNm/m) | Mf intr. (kNm/m) | Mf tras. (kNm/m) | As cm2/m | ST | Armado Cortante | Vu (kN) | Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5#9 | 1078 | 688 | 688 | 32.3 | 1 | 1c#5/20 | 5484 | 50.2 |
| 2 | 5#10 | 1355 | 866 | 866 | 41.0 | 2 | 1c#5+4r#4/20 | 7288 | 66.4 |
| 3 | 10#8 | 1678 | 1074 | 1074 | 50.9 | 3 | 1c#5+6r#4/20 | 8190 | 74.5 |
| 4 | 10#9 | 2091 | 1347 | 1347 | 64.5 | 4 | 1c#5+6r#5/20 | 9678 | 87.9 |
| 5 | 10#10 | 2605 | 1692 | 1692 | 81.9 | 5 | 1c#5+6r#5/15 | 11544 | 117.2 |
| 6 | 10#11 | 3137 | 2056 | 2056 | 100.6 | 6 | 1c#6+6r#5/15 | 12326 | 145.4 |
| 7 | 10#11+5#9(2ªCapa) | 3891 | 2413 | 2413 | 132.9 | 7 | 1c#6+6r#5/12.5 | 13976 | 174.4 |
| 8 | 10#11+5#10(2ªCapa) | 4080 | 2504 | 2504 | 141.6 | 8 | 1c#6+6r#6/12.5 | 16796 | 199.8 |
| 9 | 10#11+10#9(2ªCapa) | 4580 | 2762 | 2762 | 165.1 | 9 | | | |
| 10 | 10#11+10#10(2ªCapa) | 4919 | 2938 | 2938 | 182.5 | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |

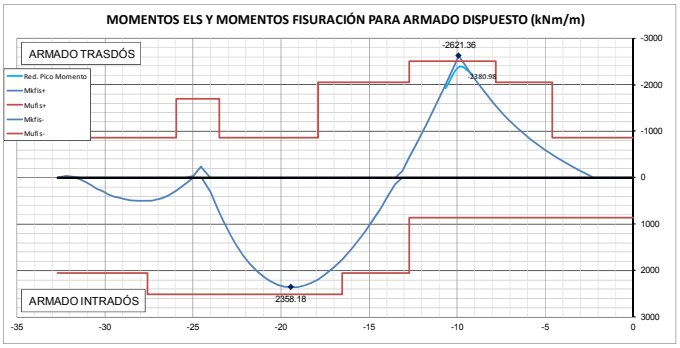



**ADVERTENCIAS As LONG. PARA ELU:**

**NOTAS As LONG. PARA ELU:**
Se redistribuye el pico de momentos

**REDUCCIÓN DEL PICO DE MOMENTOS (EC-2)**

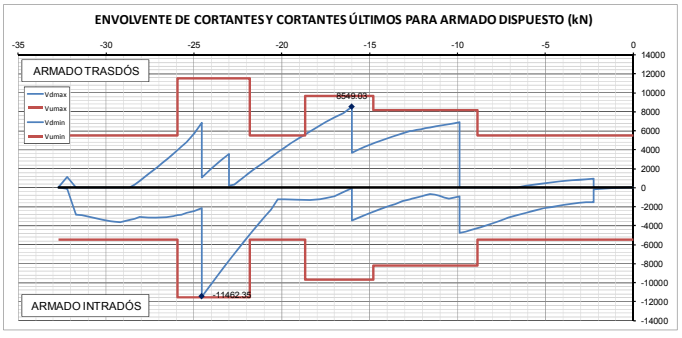
| | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/m) = | 1923 |
| Reducción de momento, ΔM (kNm/m) = | 360.5625 |




**ADVERTENCIAS As LONG. PARA ELS:**

MODIFICAR ARMADO A MOMENTO FISURACIÓN NEGATIVO

**NOTAS As LONG. PARA ELS:**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**
Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.11. PANTALLAS TIPO TZ_I

**TRINCHERA ZAPOPAN- PANTALLAS TIPO TZ- I**

**DISEÑO DEL ARMADO A PARTIR DE LAS SECCIONES TIPO**

Tipología Pantalla = Cucharı — Relación Ancho Real/Útil = 1.10
Coef. May. Momentos, γ = 1.50 — Ancho batache, bw (m) = 5.5
Coef. May. Cortantes, γ = 1.50 — Espesor de pantalla, h (m) = 1.0
Cota superior, Zsup (m) = 0.00 — Cota inferior, Zinf (m) = -32.7

| ARMADO INTRADOS | | | ARMADO TRASDOS | | | ARMADO CORTANTE | | |
|---|---|---|---|---|---|---|---|---|
| ST | ZSUP | ZINF | ST | ZSUP | ZINF | ST | ZSUP | ZINF |
| 2 | 0.0 | -15.0 | 2 | 0.0 | -10.0 | 1 | 0.0 | -9.0 |
| 6 | -15.0 | -18.0 | 6 | -10.0 | -12.0 | 3 | -9.0 | -13.0 |
| 8 | -18.0 | -28.0 | 10 | -12.0 | -16.0 | 5 | -13.0 | -19.0 |
| 6 | -28.0 | -32.7 | 6 | -16.0 | -18.0 | 1 | -19.0 | -23.0 |
| | | | 2 | -18.0 | -32.7 | 4 | -23.0 | -26.0 |
| | | | | | | 1 | -26.0 | -32.7 |

1º PULSAR UNA VEZ INTRODUCIDAS LAS SECCIONES TIPO

2º PULSAR UNA VEZ DEFINIDAS LAS SECCIONES DE ARMADO

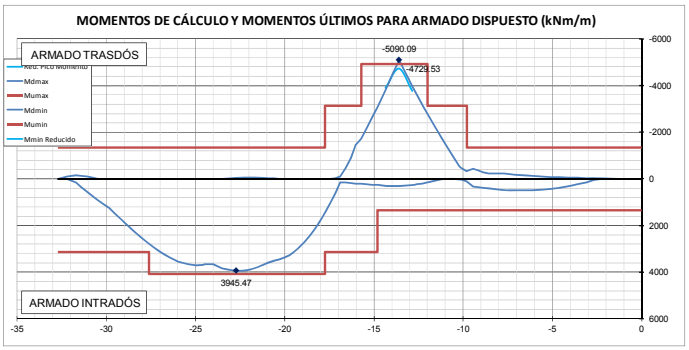
% Desp. y Solp. = 20%

| EST. KG ACERO CALC. | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | #N/A | 59 | #N/A |
| kg/m3 | #N/A | 13 | #N/A |

| EST. KG ACERO DISEÑO | | | |
|---|---|---|---|
| Peso | M | V | Total |
| kg/m | 654 | 69 | 723 |
| kg/m3 | 143 | 15 | 158 |

**SECCIONES TIPO DE CÁLCULO**

| ST | Armado Flexión | Mu (kNm/m) | Mf intr. (kNm/m) | Mf tras. (kNm/m) | As cm2/m | ST | Armado Cortante | Para b = bw Vu (kN) | Para b = bw Asc kg/ml |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5#9 | 1078 | 688 | 688 | 32.3 | 1 | 1c#5/20 | 5484 | 50.2 |
| 2 | 5#10 | 1355 | 866 | 866 | 41.0 | 2 | 1c#5+4r#4/20 | 7288 | 66.4 |
| 3 | 10#8 | 1678 | 1074 | 1074 | 50.9 | 3 | 1c#5+6r#4/20 | 8190 | 74.5 |
| 4 | 10#9 | 2091 | 1347 | 1347 | 64.5 | 4 | 1c#5+6r#5/20 | 9678 | 87.9 |
| 5 | 10#10 | 2605 | 1692 | 1692 | 81.9 | 5 | 1c#5+6r#5/15 | 11544 | 117.2 |
| 6 | 10#11 | 3137 | 2056 | 2056 | 100.6 | 6 | 1c#6+6r#5/15 | 12326 | 145.4 |
| 7 | 10#11+5#9(2ºCapa) | 3891 | 2413 | 2413 | 132.9 | 7 | 1c#6+6r#5/12.5 | 13976 | 174.4 |
| 8 | 10#11+5#10(2ºCapa) | 4080 | 2504 | 2504 | 141.6 | 8 | 1c#6+6r#6/12.5 | 16796 | 199.8 |
| 9 | 10#11+10#9(2ºCapa) | 4580 | 2762 | 2762 | 165.1 | 9 | | | |
| 10 | 10#11+10#10(2ºCapa) | 4919 | 2938 | 2938 | 182.5 | 10 | | | |
| 11 | | | | | | 11 | | | |
| 12 | | | | | | 12 | | | |
| 13 | | | | | | 13 | | | |
| 14 | | | | | | 14 | | | |



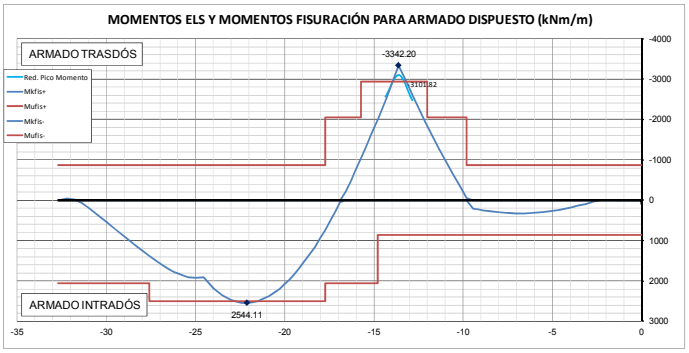

**ADVERTENCIAS As LONG. PARA ELU:**

MODIFICAR ARMADO A MOMENTO DE CÁLCULO NEGATIVO

**NOTAS As LONG. PARA ELU:**

Se redistribuye el pico de momentos

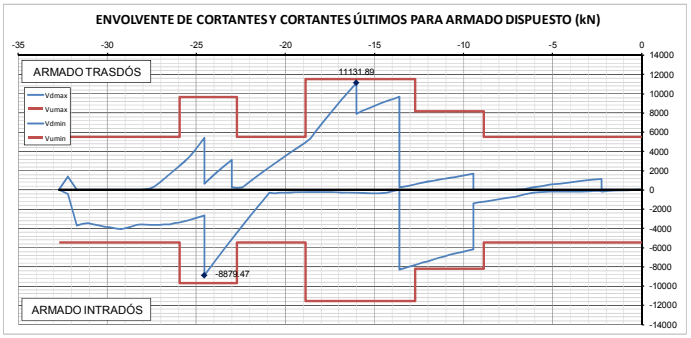
| REDUCCIÓN DEL PICO DE MOMENTOS (EC-2) | |
|---|---|
| Canto forjado, h (m) = | 1.50 |
| Reacción máx. en forjado, N (kN/m) = | 1923 |
| Reducción de momento, ΔM (kNm/m) = | 360.5625 |




**ADVERTENCIAS As LONG. PARA ELS:**

MODIFICAR ARMADO A MOMENTO FISURACIÓN POSITIVO
MODIFICAR ARMADO A MOMENTO FISURACIÓN NEGATIVO

**NOTAS As LONG. PARA ELS:**




**ADVERTENCIAS As CORTANTE:**

**NOTAS As CORTANTE:**

Se considerar para el diseño el cortante a un canto útil del apoyo de la losa de fondo.

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## 9.12. REACCIONES EN NIVELES DE ARRIOSTRAMIENTO

Para las diferentes tipologías de pantallas se obtienen unas cargas sobre cada nivel de arriostramiento en situación estática y en situación dinámica, que se resumen en la siguiente tabla (Positivo = Compresión, Negativo = Tracción):

| | SITUACIÓN ESTÁTICA | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Nmin (kN/m) | | | | Nmax (kN/m) | | | |
| | TZ- A | TZ- B | TZ- C | TZ- D | TZ- A | TZ- B | TZ- C | TZ- D |
| CUBIERTA | --- | 32 | 70.8 | 9.4 | --- | 63 | 203 | 71.2 |
| NIVEL ESTAMPIDOR | --- | --- | --- | 436 | --- | --- | --- | 902 |
| NIVEL ESTAMPIDOR | --- | --- | --- | 661 | --- | --- | --- | --- |
| LOSA FONDO | --- | 26 | 546 | 175 | --- | 50 | 375 | 470 |

| | SITUACIÓN DINÁMICA | | | |
|---|---|---|---|---|
| | TZ- A | TZ- B | TZ- C | TZ- D |
| CUBIERTA | --- | -157 | 600 | 177 |
| NIVEL ESTAMPIDOR | --- | --- | --- | 1579 |
| NIVEL ESTAMPIDOR | --- | --- | --- | --- |
| LOSA FONDO | 216 | 347 | 1518 | 1779 |

| | | SITUACIÓN ESTÁTICA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Nmin (kN/m) | | | | Nmax (kN/m) | | | | |
| | TZ- E | TZ- F | TZ- G | TZ- H | TZ-I | TZ- E | TZ- F | TZ- G | TZ- H | TZ-I |
| CUBIERTA | 36 | -94 | -23 | -157 | 69 | 80 | 59 | 97 | 119 | 128 |
| NIVEL LOSA ACCESO RODADO | --- | 761 | 607 | 193 | -598 | --- | 923 | 634 | 1278 | 339 |
| NIVEL 1 ANCLAJES/LOSA PEATONAL TZ-I | --- | --- | 326 | --- | 1873 | --- | --- | 634 | --- | 1970 |
| NIVEL 2 ANCLAJES | --- | --- | 326 | --- | --- | --- | --- | 347 | --- | --- |
| NIVEL 3 ANCLAJES | --- | --- | 541 | --- | --- | --- | --- | 552 | --- | --- |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **NIVEL 4 ANCLAJES** | --- | --- | 541 | --- | --- | --- | --- | --- | --- | --- |
| **NIVEL ESTAMPIDOR** | 497 | --- | --- | 1233 | --- | 993 | --- | --- | 1295 | --- |
| **NIVEL ESTAMPIDOR** | 707 | 932 | --- | 480 | --- | --- | --- | --- | --- | --- |
| **LOSA FONDO** | 196 | 838 | 249 | -14 | 453 | 503 | 939 | 1644 | 1410 | 561 |

| | **SITUACIÓN DINÁMICA** | | | | |
|---|---|---|---|---|---|
| | **TZ- E** | **TZ- F** | **TZ- G** | **TZ- H** | **TZ-I** |
| **CUBIERTA** | 177 | 63 | -44 | -156 | 214 |
| **NIVEL LOSA ACCESO RODADO** | --- | 1585 | 1780 | 1626 | -607 |
| **NIVEL 1 ANCLAJES/LOSA PEATONAL TZ-I** | --- | --- | --- | --- | 2812 |
| **NIVEL 2 ANCLAJES** | --- | --- | --- | --- | --- |
| **NIVEL 3 ANCLAJES** | --- | --- | --- | --- | --- |
| **NIVEL 4 ANCLAJES** | --- | --- | --- | --- | --- |
| **NIVEL ESTAMPIDOR** | 1710 | 291 | --- | 1707 | --- |
| **NIVEL ESTAMPIDOR** | --- | --- | --- | --- | --- |
| LOSA **FONDO** | 1805 | 2524 | 3235 | 3010 | 2360 |

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# 10. COMPROBACIÓN A FLOTABILIDAD

Es necesario, debido a la presencia del nivel freático de realizar una comprobación de la flotabilidad de la trinchera, estudiando ésta como un elemento conjunto a modo de sólido rígido.

Para la comprobación de la flotabilidad de la trinchera se estudiarán las diferentes secciones de cálculo en las que la cota de excavación sea más profunda que el nivel freático, realizando la comprobación a flotabilidad en los supuestos de considerar:

- Únicamente el peso propio, PP.
- Considerando el peso propio y las cargas muertas sobre los forjados, PP+CM.
- Considerando el peso propio, las cargas muertas y el rozamiento terreno-pantallas, PP+CM+ROZ.
- Considerando el peso propio y el rozamiento terreno-pantallas, PP+ROZ.

Para el cálculo del rozamiento entre el terreno y las pantallas se han seguido las indicaciones del artículo 10.8.1.9. de la normativa AASTHO-LRFD-04, considerando suelos granulares y roca, según cada caso. Se despreciará el efecto de rozamiento de las capas superiores, y se limitará el aporte de rozamiento en las zonas de roca tal como se indica en la normativa.

Para las diferentes secciones tipo de cálculo se han obtenido los siguientes resultados:

## 10.1. SECCIÓN TIPO TZ-A

No tiene sentido realizar la comprobación de flotabilidad porque la cota de excavación está por encima de la cota del nivel freático en este tramo de trinchera.

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## 10.2. SECCIÓN TIPO TZ-B

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-B**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 9.15 |
| Prof. N.F. (m) = | 6.00 |
| Prof. Pantalla (m) = | 14.10 |
| Altura Relleno (m) = | 1.50 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD |
|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 933.75 | 840.38 | *PP* 2.37 |
| CARGA MUERTA, CM | 0.9 | 320.25 | 288.23 | *PP+CM* 3.19 |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 518.47 | 518.47 | *PP+CM+ROZ* 4.65 |
| SUBPRESIÓN AGUA, E | 1 | 354.15 | 354.15 | *PP+ROZ* 3.84 |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| --- | 0.00 | 0.00 | 0.00 | 30.00 | 0% | 0.00 | 274.50 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 7.10 | 1.00 | 25.00 | 5.00 | 0% | 228.75 | 45.75 |
| Prof. Trinch. (m) = | 8.10 | | | | TOTAL = | 228.75 | 320.25 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 14.10 | 1.00 | 352.50 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 2.10 | 21.00 | 192.15 |
| Base Pantalla | 8.10 | 81.00 | 81.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 1.05 | 1.05 | 18.90 | 0.00 | 18.90 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 3.00 | 4.05 | 55.50 | 0.00 | 55.50 | 0.7 | 23.34 | 47.27 | 0.55 | 26.00 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 3.40 | 7.45 | 83.50 | 14.50 | 69.00 | 0.7 | 31.35 | 100.31 | 0.55 | 55.17 | 0.00 |
| UG1d | 19.50 | 36 | 0.726 | 26.65 | 34.10 | 575.18 | 281.00 | 294.18 | 0.5 | 106.79 | 653.90 | 0.55 | 359.64 | 350.87 |
| UG2 | 20.00 | 35 | 0.700 | 3.00 | 37.10 | 143.50 | 311.00 | -167.50 | 0.5 | -58.64 | -90.76 | 0.55 | -49.92 | -482.53 |
| | | | | | | | | | | | | SubTotal = | 390.90 | -131.66 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 1.90 | 39.00 | 939.15 | 0.00 | 0.55 | 0.00 | 0.00 |
| | | | | | | SubTotal = | 0.00 | 0.00 |

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## 10.3. SECCIÓN TIPO TZ-C

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-C**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 9.15 |
| Prof. N.F. (m) = | 5.00 |
| Prof. Pantalla (m) = | 24.30 |
| Altura Relleno (m) = | 1.50 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD |
|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 1672.50 | 1505.25 | *PP* 1.14 |
| CARGA MUERTA, CM | 0.9 | 320.25 | 288.23 | *PP+CM* 1.36 |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 3182.65 | 3182.65 | *PP+CM+ROZ* 3.77 |
| SUBPRESIÓN AGUA, E | 1 | 1319.30 | 1319.30 | *PP+ROZ* 3.55 |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.50 | 1.00 | 25.00 | 30.00 | 0% | 228.75 | 274.50 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 12.70 | 1.00 | 25.00 | 5.00 | 0% | 228.75 | 45.75 |
| Prof. Trinch. (m) = | 15.20 | | | | TOTAL = | 457.50 | 320.25 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 24.30 | 1.00 | 607.50 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 10.20 | 102.00 | 933.30 |
| Base Pantalla | 19.30 | 193.00 | 193.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 0.90 | 0.90 | 16.20 | 0.00 | 16.20 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 8.30 | 9.20 | 173.90 | 42.00 | 131.90 | 0.6 | 51.36 | 213.15 | 0.55 | 117.23 | 0.00 |
| UG1d | 19.50 | 36 | 0.726 | 28.70 | 37.90 | 733.55 | 329.00 | 404.55 | 0.5 | 146.85 | 1496.51 | 0.55 | 823.08 | 651.01 |
| UG2 | 20.00 | 35 | 0.700 | 1.90 | 39.80 | 771.55 | 348.00 | 423.55 | 0.5 | 148.29 | 0.00 | 0.55 | 0.00 | 0.00 |
| | | | | | | | | | | | | SubTotal = | 940.32 | 651.01 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 5.70 | 45.50 | 939.15 | 0.00 | 0.55 | 0.00 | 0.00 |
| | | | | | | SubTotal = | 0.00 | 0.00 |

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## 10.4. SECCIÓN TIPO TZ-D

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-D**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 9.55 |
| Prof. N.F. (m) = | 7.00 |
| Prof. Pantalla (m) = | 33.45 |
| Altura Relleno (m) = | 1.50 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD | |
|---|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 2188.20 | 1969.38 | *PP* | *1.15* |
| CARGA MUERTA, CM | 0.9 | 334.25 | 300.83 | *PP+CM* | *1.33* |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 4450.58 | 4450.58 | *PP+CM+ROZ* | *3.94* |
| SUBPRESIÓN AGUA, E | 1 | 1705.56 | 1705.56 | *PP+ROZ* | *3.76* |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.50 | 1.00 | 25.00 | 30.00 | 0% | 238.75 | 286.50 |
| Estampidores | 8.50 | 0.80 | 20.00 | 0.00 | 80% | 38.20 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 8.32 | 1.00 | 25.00 | 5.00 | 0% | 238.75 | 47.75 |
| Prof. Trinch. (m) = | 19.32 | | | | TOTAL = | 515.70 | 334.25 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 33.45 | 1.00 | 836.25 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 12.32 | 123.20 | 1176.56 |
| Base Pantalla | 26.45 | 264.50 | 264.50 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 0.90 | 0.90 | 16.20 | 0.00 | 16.20 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 10.30 | 11.20 | 211.90 | 42.00 | 169.90 | 0.6 | 66.16 | 340.72 | 0.55 | 187.40 | 0.00 |
| UG1d | 19.50 | 36 | 0.726 | 6.70 | 17.90 | 342.55 | 109.00 | 233.55 | 0.5 | 84.78 | 505.64 | 0.55 | 278.10 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 9.40 | 27.30 | 521.15 | 203.00 | 318.15 | 0.5 | 103.24 | 883.69 | 0.55 | 486.03 | 412.61 |
| UG1d | 19.50 | 36 | 0.726 | 10.40 | 37.70 | 723.95 | 307.00 | 416.95 | 0.5 | 151.35 | 782.87 | 0.55 | 430.58 | 430.58 |
| UG2 | 20.00 | 35 | 0.700 | 1.60 | 39.30 | 755.95 | 323.00 | 432.95 | 0.5 | 151.58 | 0.00 | 0.55 | 0.00 | 0.00 |
| | | | | | | | | | | | | SubTotal = | 1382.11 | 843.19 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 7.90 | 47.20 | 939.15 | 0.00 | 0.55 | 0.00 | 0.00 |
| | | | | | | SubTotal = | 0.00 | 0.00 |

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## 10.5. SECCIÓN TIPO TZ-E

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-E**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 9.55 |
| Prof. N.F. (m) = | 7.00 |
| Prof. Pantalla (m) = | 34.00 |
| Altura Relleno (m) = | 1.01 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD | |
|---|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 2215.70 | 1994.13 | *PP* | *1.13* |
| CARGA MUERTA, CM | 0.9 | 240.66 | 216.59 | *PP+CM* | *1.25* |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 6181.22 | 6181.22 | *PP+CM+ROZ* | *4.74* |
| SUBPRESIÓN AGUA, E | 1 | 1771.95 | 1771.95 | *PP+ROZ* | *4.61* |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.01 | 1.00 | 25.00 | 20.20 | 0% | 238.75 | 192.91 |
| Estampidores | 9.57 | 0.80 | 20.00 | 0.00 | 80% | 38.20 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 8.32 | 1.00 | 25.00 | 5.00 | 0% | 238.75 | 47.75 |
| Prof. Trinch. (m) = | 19.90 | | | | TOTAL = | 515.70 | 240.66 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 34.00 | 1.00 | 850.00 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 12.90 | 129.00 | 1231.95 |
| Base Pantalla | 27.00 | 270.00 | 270.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 1.20 | 1.20 | 21.60 | 0.00 | 21.60 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 1.60 | 2.80 | 29.60 | 0.00 | 29.60 | 0.7 | 12.45 | 17.43 | 0.55 | 9.59 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 9.20 | 12.00 | 196.40 | 50.00 | 146.40 | 0.5 | 47.51 | 256.54 | 0.55 | 141.10 | 0.00 |
| UG1d | 19.50 | 36 | 0.726 | 6.50 | 18.50 | 156.35 | 115.00 | 41.35 | 0.5 | 15.01 | 215.56 | 0.55 | 118.56 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 9.00 | 27.50 | 367.40 | 205.00 | 162.40 | 0.5 | 52.70 | 776.59 | 0.55 | 427.13 | 360.68 |
| UG1d | 19.50 | 36 | 0.726 | 8.80 | 36.30 | 327.95 | 293.00 | 34.95 | 0.5 | 12.69 | 214.65 | 0.55 | 118.06 | 220.02 |
| UG2 | 20.00 | 35 | 0.700 | 1.20 | 37.50 | 220.40 | 305.00 | -84.60 | 0.5 | -29.62 | 196.77 | 0.55 | 108.22 | 1587.26 |
| | | | | | | | | | | | | SubTotal = | 922.65 | 2167.97 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 9.00 | 46.50 | 939.15 | 0.00 | 0.55 | 0.00 | 0.00 |
| | | | | | | SubTotal = | 0.00 | 0.00 |

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## *10.6. SECCIÓN TIPO TZ-F*

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-F**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 15.00 |
| Prof. N.F. (m) = | 7.50 |
| Prof. Pantalla (m) = | 38.00 |
| Altura Relleno (m) = | 1.50 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD | |
|---|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 2897.50 | 2607.75 | *PP* | *0.96* |
| CARGA MUERTA, CM | 0.9 | 531.00 | 477.90 | *PP+CM* | *1.14* |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 8886.75 | 8886.75 | *PP+CM+ROZ* | *4.42* |
| SUBPRESIÓN AGUA, E | 1 | 2710.00 | 2710.00 | *PP+ROZ* | *4.24* |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.50 | 1.00 | 25.00 | 30.00 | 0% | 375.00 | 450.00 |
| Losa acceso rodado | 7.50 | 0.80 | 20.00 | 2.00 | 80% | 60.00 | 6.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 11.00 | 1.50 | 37.50 | 5.00 | 0% | 562.50 | 75.00 |
| Prof. Trinch. (m) = | 21.50 | | | | TOTAL = | 997.50 | 531.00 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 38.00 | 1.00 | 950.00 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 14.00 | 140.00 | 2100.00 |
| Base Pantalla | 30.50 | 305.00 | 305.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 1.35 | 1.35 | 24.30 | 0.00 | 24.30 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 2.05 | 3.40 | 37.93 | 0.00 | 37.93 | 0.7 | 15.95 | 27.12 | 0.55 | 14.91 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 8.70 | 12.10 | 189.60 | 46.00 | 143.60 | 0.5 | 46.60 | 250.47 | 0.55 | 137.76 | 0.00 |
| UG1d | 19.50 | 36 | 0.726 | 6.90 | 19.00 | 172.48 | 115.00 | 57.48 | 0.5 | 20.86 | 287.16 | 0.55 | 157.94 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 9.00 | 28.00 | 360.60 | 205.00 | 155.60 | 0.5 | 50.49 | 771.87 | 0.55 | 424.53 | 306.60 |
| UG1d | 19.50 | 36 | 0.726 | 8.00 | 36.00 | 328.48 | 285.00 | 43.48 | 0.5 | 15.78 | 311.48 | 0.55 | 171.31 | 310.51 |
| UG2 | 20.00 | 35 | 0.700 | 1.00 | 37.00 | 209.60 | 295.00 | -85.40 | 0.5 | -29.90 | 207.91 | 0.55 | 114.35 | 1772.41 |
| | | | | | | | | | | | | SubTotal = | 1020.80 | 2389.52 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 9.30 | 46.30 | 939.15 | 939.15 | 0.55 | 516.53 | 516.53 |
| | | | | | | SubTotal = | 516.53 | 516.53 |

Aunque en situación de PP y PP+CM se ha obtenido un coeficiente de seguridad menor a 1, queda sobradamente compensado al considerar el rozamiento de las pantallas, que al quedar encastadas en roca proporcionan un rozamiento al levantamiento muy elevado que proporciona un coeficiente de seguridad mucho mayor que 1.

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## 10.7. SECCIÓN TIPO TZ-G

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-G**

DATOS DE ENTRADA

| | | |
|---|---|---|
| Espesor Pantallas (m) = | 1.00 | |
| Ancho Trinchera (m) = | 15.00 | Variable |
| Prof. N.F. (m) = | 8.50 | |
| Prof. Pantalla (m) = | 37.30 | |
| Altura Relleno (m) = | 1.50 | |
| γ Relleno (kN/m3) = | 20 | |
| γ Hormigón (kN/m3) = | 25 | |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD | |
|---|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 3417.50 | 3075.75 | *PP* | *1.11* |
| CARGA MUERTA, CM | 0.9 | 531.00 | 477.90 | *PP+CM* | *1.28* |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 10324.30 | 10324.30 | *PP+CM+ROZ* | *5.02* |
| SUBPRESIÓN AGUA, E | 1 | 2766.00 | 2766.00 | *PP+ROZ* | *4.84* |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.50 | 1.90 | 47.50 | 30.00 | 0% | 712.50 | 450.00 |
| Losa acceso rodado | 7.60 | 1.20 | 30.00 | 2.00 | 80% | 90.00 | 6.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 12.00 | 2.00 | 50.00 | 5.00 | 0% | 750.00 | 75.00 |
| Prof. Trinch. (m) = | 23.10 | | | | TOTAL = | 1552.50 | 531.00 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 37.30 | 1.00 | 932.50 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 14.60 | 146.00 | 2190.00 |
| Base Pantalla | 28.80 | 288.00 | 288.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 1.20 | 1.20 | 21.60 | 0.00 | 21.60 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 4.20 | 5.40 | 77.70 | 0.00 | 77.70 | 0.7 | 32.68 | 88.24 | 0.55 | 48.53 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 9.20 | 14.60 | 196.40 | 61.00 | 135.40 | 0.5 | 43.94 | 294.38 | 0.55 | 161.91 | 0.00 |
| UG1d | 19.50 | 36 | 0.726 | 5.40 | 20.00 | 183.00 | 115.00 | 68.00 | 0.5 | 24.68 | 418.76 | 0.55 | 230.32 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 8.00 | 28.00 | 348.40 | 195.00 | 153.40 | 0.5 | 49.78 | 627.89 | 0.55 | 345.34 | 211.52 |
| UG1d | 19.50 | 36 | 0.726 | 6.00 | 34.00 | 300.00 | 255.00 | 45.00 | 0.5 | 16.34 | 287.13 | 0.55 | 157.92 | 286.89 |
| UG2 | 20.00 | 35 | 0.700 | 1.30 | 35.30 | 222.40 | 268.00 | -45.60 | 0.5 | -15.96 | 289.52 | 0.55 | 159.23 | 1494.35 |
| | | | | | | | | | | | | SubTotal = | 1103.26 | 1992.76 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 11.20 | 46.50 | 939.15 | 1878.30 | 0.55 | 1033.06 | 1033.06 |
| | | | | | | SubTotal = | 1033.06 | 1033.06 |

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## 10.8. SECCIÓN TIPO TZ-H

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-H**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 15.00 |
| Prof. N.F. (m) = | 12.70 |
| Prof. Pantalla (m) = | 32.70 |
| Altura Relleno (m) = | 1.50 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD | |
|---|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 2662.50 | 2396.25 | *PP* | *1.05* |
| CARGA MUERTA, CM | 0.9 | 531.00 | 477.90 | *PP+CM* | *1.25* |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 5052.03 | 5052.03 | *PP+CM+ROZ* | *3.46* |
| SUBPRESIÓN AGUA, E | 1 | 2293.00 | 2293.00 | *PP+ROZ* | *3.25* |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.50 | 1.00 | 25.00 | 30.00 | 0% | 375.00 | 450.00 |
| Losa acceso rodado | 7.32 | 1.20 | 30.00 | 2.00 | 80% | 90.00 | 6.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 80% | 0.00 | 0.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 15.00 | 1.50 | 37.50 | 5.00 | 0% | 562.50 | 75.00 |
| Prof. Trinch. (m) = | 25.32 | | | | TOTAL = | 1027.50 | 531.00 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 32.70 | 1.00 | 817.50 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 12.62 | 126.20 | 1893.00 |
| Base Pantalla | 20.00 | 200.00 | 200.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 2.20 | 2.20 | 39.60 | 0.00 | 39.60 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1a | 18.00 | 29 | 0.554 | 4.90 | 7.10 | 88.20 | 0.00 | 88.20 | 0.7 | 34.20 | 121.42 | 0.55 | 66.78 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 3.10 | 10.20 | 96.95 | 0.00 | 96.95 | 0.6 | 34.95 | 139.81 | 0.55 | 76.89 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 2.40 | 12.60 | 133.80 | 0.00 | 133.80 | 0.5 | 43.42 | 213.46 | 0.55 | 117.40 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 8.00 | 20.60 | 244.95 | 79.00 | 165.95 | 0.5 | 49.86 | 441.00 | 0.55 | 242.55 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 8.60 | 29.20 | 297.20 | 165.00 | 132.20 | 0.5 | 42.90 | 716.43 | 0.55 | 394.04 | 177.77 |
| UG2 | 20.00 | 35 | 0.700 | 2.50 | 31.70 | 146.95 | 190.00 | -43.05 | 0.5 | -15.07 | 213.71 | 0.55 | 117.54 | 299.96 |
| | | | | | | | | | | | | SubTotal = | 1015.21 | 477.74 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 15.60 | 47.30 | 939.15 | 939.15 | 0.55 | 516.53 | 516.53 |
| | | | | | | SubTotal = | 516.53 | 516.53 |

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## *10.9. SECCIÓN TIPO TZ-I*

**COMPROBACIÓN DE LA FLOTABILIDAD DE LA TRINCHERA SEGÚN AASHTO LRFD 2004- TZ-I**

DATOS DE ENTRADA

| | |
|---|---|
| Espesor Pantallas (m) = | 1.00 |
| Ancho Trinchera (m) = | 15.00 |
| Prof. N.F. (m) = | 12.70 |
| Prof. Pantalla (m) = | 32.70 |
| Altura Relleno (m) = | 1.50 |
| γ Relleno (kN/m3) = | 20 |
| γ Hormigón (kN/m3) = | 25 |

| HIPÓTESIS DE CARGAS | Coef. Φ | Qn (kN/m) | ΦQn (kN/m) | COEF. SEGURIDAD | |
|---|---|---|---|---|---|
| PESO PROPIO, PP | 0.9 | 2752.50 | 2477.25 | *PP* | *1.08* |
| CARGA MUERTA, CM | 0.9 | 537.00 | 483.30 | *PP+CM* | *1.29* |
| ROZAMIENTO PANTALLAS, ROZ | 1 | 5052.03 | 5052.03 | *PP+CM+ROZ* | *3.49* |
| SUBPRESIÓN AGUA, E | 1 | 2293.00 | 2293.00 | *PP+ROZ* | *3.28* |

| NIVELES ESTACIÓN | h (m) | e (m) | PP (kN/m2) | CM (kN/m2) | % Red. | PP (kN/m) | CM (kN/m) |
|---|---|---|---|---|---|---|---|
| Cubierta | 1.50 | 1.00 | 25.00 | 30.00 | 0% | 375.00 | 450.00 |
| Losa acceso rodado | 7.32 | 1.20 | 30.00 | 2.00 | 80% | 90.00 | 6.00 |
| Losa acceso peatonal | 4.15 | 1.20 | 30.00 | 2.00 | 80% | 90.00 | 6.00 |
| --- | 0.00 | 0.00 | 0.00 | 0.00 | 0% | 0.00 | 0.00 |
| Losa de Fondo | 10.85 | 1.50 | 37.50 | 5.00 | 0% | 562.50 | 75.00 |
| Prof. Trinch. (m) = | 25.32 | | | | TOTAL = | 1117.50 | 537.00 |

| PANTALLAS | h (m) | e (m) | PP (kN/m) |
|---|---|---|---|
| PP Pantallas | 32.70 | 1.00 | 817.50 |

| SUBPRESIÓN | h (m) | W (kN/m2) | W (kN/m) |
|---|---|---|---|
| Losa de Fondo | 12.62 | 126.20 | 1893.00 |
| Base Pantalla | 20.00 | 200.00 | 200.00 |

ROZAMIENTO DE LAS PANTALLAS

| Estratos Granulares | γ (kN/m3) | Φ(°) | tgΦ | esp (m) | z (m) | σv (kN/m2) | σw (kN/m2) | σ'v (kN/m2) | k | qs (kN/m2) | Qn (kN/m) | Coef. Φ | TRASDOS ΦQn (kN/m) | INTRADOS ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | 18.00 | 0 | 0.000 | 2.20 | 2.20 | 39.60 | 0.00 | 39.60 | 0.7 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 |
| UG1a | 18.00 | 29 | 0.554 | 4.90 | 7.10 | 88.20 | 0.00 | 88.20 | 0.7 | 34.20 | 121.42 | 0.55 | 66.78 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 3.10 | 10.20 | 96.95 | 0.00 | 96.95 | 0.6 | 34.95 | 139.81 | 0.55 | 76.89 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 2.40 | 12.60 | 133.80 | 0.00 | 133.80 | 0.5 | 43.42 | 213.46 | 0.55 | 117.40 | 0.00 |
| UG1b | 18.50 | 31 | 0.601 | 8.00 | 20.60 | 244.95 | 79.00 | 165.95 | 0.5 | 49.86 | 441.00 | 0.55 | 242.55 | 0.00 |
| UG1c | 19.00 | 33 | 0.649 | 8.60 | 29.20 | 297.20 | 165.00 | 132.20 | 0.5 | 42.90 | 716.43 | 0.55 | 394.04 | 177.77 |
| UG2 | 20.00 | 35 | 0.700 | 2.50 | 31.70 | 146.95 | 190.00 | -43.05 | 0.5 | -15.07 | 213.71 | 0.55 | 117.54 | 299.96 |
| | | | | | | | | | | | | SubTotal = | 1015.21 | 477.74 |

| Estratos Rocosos | qu (MPa) | esp (m) | z (m) | qs (kN/m2) | Qn (kN/m) | Coef. Φ | ΦQn (kN/m) | ΦQn (kN/m) |
|---|---|---|---|---|---|---|---|---|
| UG3a | 20 | 15.60 | 47.30 | 939.15 | 939.15 | 0.55 | 516.53 | 516.53 |
| | | | | | | SubTotal = | 516.53 | 516.53 |

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# APÉNDICE 1.
# JUSTIFICACIÓN DE LAS SECCIONES TIPO DE CÁLCULO

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# 1. SECCIONES TIPO DE CÁLCULO PANTALLAS E=1.00M

## 1.1. SECCIONES TIPO PARA ARMADO A FLEXIÓN

Las secciones tipo consideradas son las siguientes:

| PANTALLA DE 1 METRO DE ESPESOR | | | | | | |
|---|---|---|---|---|---|---|
| Sección Tipo | ΦMu (kN.m/m) | ΦMu Sismo (kN.m/m) | Mserv (kN.m/m) | As (cm2/m) | Nº Barras para jaula de 1 m. | Distribución por m.l. |
| STL-00 | 344 | 382 | --- | 0 | --- | --- |
| STL-01 | 1077 | 1197 | 688 | 32.3 | 5#9 | #9/0,20 |
| STL-02 | 1354 | 1504 | 866 | 41.0 | 5#10 | #10/0,20 |
| STL-03 | 1674 | 1860 | 1074 | 50.9 | 10#8 | #8/0,10 |
| STL-04 | 2090 | 2322 | 1347 | 64.5 | 10#9 | #9/0,10 |
| STL-05 | 2604 | 2893 | 1692 | 81.9 | 10#10 | #10/0,10 |
| STL-06 | 3134 | 3482 | 2056 | 100.6 | 10#11 | #11/0,10 |
| STL-07 | 3912 | 4347 | 2539 | 132.9 | 10#11+5#9(2ªCapa) | #11/0,10 + #9/0,20(2ªCapa) |
| STL-08 | 4108 | 4564 | 2662 | 141.6 | 10#11+5#10(2ªCapa) | #11/0,10 + #10/0,20(2ªCapa) |
| STL-09 | 4626 | 5140 | 3008 | 165.1 | 10#11+10#9(2ªCapa) | #11/0,10 + #9/0,10(2ªCapa) |
| STL-10 | 4978 | 5531 | 3249 | 182.5 | 10#11+10#10(2ªCapa) | #11/0,10 + #10/0,10(2ªCapa) |
| STL-11 | 5334 | 5927 | 3501 | 201.2 | 10#11+10#11(2ªCapa) | #11/0,10 + #11/0,10(2ªCapa) |

Los momentos últimos obtenidos para cada una de las secciones tipo se han obtenido según la sindicaciones de la normativa AASHTO-LRFD-2004.

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Para la sección tipo de cálculo STL-00 se obtiene el momento último resistido mediante la formulación del artículo 22 de la normativa ACI318-08:

$$M_n = 0{,}42 \cdot \sqrt{f_c'} \cdot S_m = 0{,}42 \cdot \sqrt{30} \cdot \frac{1000^3}{6} \cdot 10^{-6} = 383\ kNm/m$$

Aplicando el coeficiente de capacidad de carga correspondiente a cada estado se obtienen los valores indicados en la tabla anterior.

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-01**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 911 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #9 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 5 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3225 | 0 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 89 | 155 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 3225 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 89 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 390 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 6217.62 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5595.86 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 1354.50 |
| Tracción a nivel del armado, T (kN) = | -1354.50 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 64 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 220.03 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 30.36 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 1197.50 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **1077.75** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-01**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #9 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 5 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3225 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 89 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 200 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 3225 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 89 | | |
| Canto útil a cara superior, d (mm) = | 911 | | |
| Cuantía de acero traccionado, ρ = | 0.0035 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0042 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | 2 | 8.333E+10 | 4.399E+06 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -412 | 0.000E+00 | 5.242E+09 |
| Acero Inf. Homogeneizado (Trac) = | 25760 | 911 | 2.346E+07 | 413 | 0.000E+00 | 4.388E+09 |

Fibra neutra homogeneizada, $x_{hom}$ (mm) = 498

Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = 9.297E+10

***2.1. Inercia fisurada.***

Auxiliar, ρ'/ρ = 1.200

Auxiliar, d'/d = 0.095

Profundidad relativa fibra neutra fisurada, xfis/d = 0.196

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 178810 | 89 | -89 | 4.764E+08 | 1.429E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -93 | 0.000E+00 | 2.657E+08 |
| Acero Inf. Homogeneizado (Trac) = | 25760 | 911 | 732 | 0.000E+00 | 1.380E+10 |

Fibra neutra fisuración, $x_{fis}$ (mm) = 179

Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = 1.597E+10

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 628.00 |
| Momento en situación de servicio, Ms (kNm) = | 688.37 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | |
|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 7.71 OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 31.92 OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 252.00 OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-02**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 909 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #10 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 5 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 4095 | 0 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 91 | 155 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 4095 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 91 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 390 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 6193.06 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5573.76 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 1719.90 |
| Tracción a nivel del armado, T (kN) = | -1719.90 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 81 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 219.59 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 30.30 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 1505.13 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **1354.62** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-02**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #10 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 5 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 4095 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 91 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 200 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 4095 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 91 | | |
| Canto útil a cara superior, d (mm) = | 909 | | |
| Cuantía de acero traccionado, ρ = | 0.0045 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0043 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -1 | 8.333E+10 | 2.960E+05 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -414 | 0.000E+00 | 5.310E+09 |
| Acero Inf. Homogeneizado (Trac) = | 32709 | 909 | 2.973E+07 | 408 | 0.000E+00 | 5.453E+09 |

Fibra neutra homogeneizada, $x_{hom}$ (mm) = 501

Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = 9.410E+10

***2.1. Inercia fisurada.***

Auxiliar, ρ'/ρ = 0.945

Auxiliar, d'/d = 0.095

Profundidad relativa fibra neutra fisurada, xfis/d = 0.219

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 198727 | 99 | -99 | 6.540E+08 | 1.962E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -113 | 0.000E+00 | 3.921E+08 |
| Acero Inf. Homogeneizado (Trac) = | 32709 | 909 | 710 | 0.000E+00 | 1.649E+10 |

Fibra neutra fisuración, $x_{fis}$ (mm) = 199

Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = 1.950E+10

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 639.00 |
| Momento en situación de servicio, Ms (kNm) = | 866.45 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 8.83 | OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 39.97 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 252.00 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-03**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 912 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #8 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 5090 | 0 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 88 | 155 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 5090 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 88 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 391 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 6240.17 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5616.15 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 2137.80 |
| Tracción a nivel del armado, T (kN) = | -2137.80 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 100 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 220.43 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 30.41 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 1860.70 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **1674.63** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-03**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #8 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 5090 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 88 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 5090 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 88 | | |
| Canto útil a cara superior, d (mm) = | 912 | | |
| Cuantía de acero traccionado, ρ = | 0.0056 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0042 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -4 | 8.333E+10 | 1.371E+07 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -418 | 0.000E+00 | 5.391E+09 |
| Acero Inf. Homogeneizado (Trac) = | 40657 | 912 | 3.709E+07 | 409 | 0.000E+00 | 6.788E+09 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 504 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 9.553E+10 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, d'/ρ = | 0.760 |
| Auxiliar, d'/d = | 0.094 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.240 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 219340 | 110 | -110 | 8.794E+08 | 2.638E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -133 | 0.000E+00 | 5.488E+08 |
| Acero Inf. Homogeneizado (Trac) = | 40657 | 912 | 693 | 0.000E+00 | 1.952E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 219 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 2.359E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 653.00 |
| Momento en situación de servicio, Ms (kNm) = | 1073.97 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 9.99 | OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 48.45 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 252.00 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-04**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 911 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #9 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 6450 | 0 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 89 | 155 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 6450 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 89 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 390 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 6217.62 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5595.86 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 2709.00 |
| Tracción a nivel del armado, T (kN) = | -2709.00 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 127 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 220.03 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 30.36 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 2323.06 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **2090.75** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-04**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #9 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 6450 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 89 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 6450 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 89 | | |
| Canto útil a cara superior, d (mm) = | 911 | | |
| Cuantía de acero traccionado, ρ = | 0.0071 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0042 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -8 | 8.333E+10 | 5.968E+07 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -422 | 0.000E+00 | 5.495E+09 |
| Acero Inf. Homogeneizado (Trac) = | 51520 | 911 | 4.692E+07 | 403 | 0.000E+00 | 8.364E+09 |

Fibra neutra homogeneizada, $x_{hom}$ (mm) = 508

Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = 9.725E+10

***2.1. Inercia fisurada.***

Auxiliar, ρ'/ρ = 0.600

Auxiliar, d'/d = 0.095

Profundidad relativa fibra neutra fisurada, xfis/d = 0.267

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 243070 | 122 | -122 | 1.197E+09 | 3.590E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -157 | 0.000E+00 | 7.617E+08 |
| Acero Inf. Homogeneizado (Trac) = | 51520 | 911 | 668 | 0.000E+00 | 2.296E+10 |

Fibra neutra fisuración, $x_{fis}$ (mm) = 243

Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = 2.851E+10

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 670.00 |
| Momento en situación de servicio, Ms (kNm) = | 1347.31 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 11.49 | OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 59.25 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 252.00 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-05**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 909 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #10 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 8190 | 0 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 91 | 155 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 8190 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 91 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 390 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 6193.06 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5573.76 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 3439.80 |
| Tracción a nivel del armado, T (kN) = | -3439.80 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 161 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 219.59 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 30.30 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 2894.26 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **2604.83** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-05**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #10 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 8190 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 91 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 8190 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 91 | | |
| Canto útil a cara superior, d (mm) = | 909 | | |
| Cuantía de acero traccionado, ρ = | 0.0090 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0043 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -13 | 8.333E+10 | 1.620E+08 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -427 | 0.000E+00 | 5.626E+09 |
| Acero Inf. Homogeneizado (Trac) = | 65419 | 909 | 5.946E+07 | 396 | 0.000E+00 | 1.027E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 513 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 9.939E+10 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, d'/ρ = | 0.473 |
| Auxiliar, d'/d = | 0.095 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.296 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 269065 | 135 | -135 | 1.623E+09 | 4.870E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -183 | 0.000E+00 | 1.035E+09 |
| Acero Inf. Homogeneizado (Trac) = | 65419 | 909 | 640 | 0.000E+00 | 2.678E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 269 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 3.431E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 692.00 |
| Momento en situación de servicio, Ms (kNm) = | 1691.65 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 13.27 | OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 72.07 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 252.00 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-06**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 907 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #11 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 0 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 155 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 10060 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 93 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 389 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 6169.24 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5552.31 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 4225.20 |
| Tracción a nivel del armado, T (kN) = | -4225.20 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 198 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 219.17 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 30.24 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 3482.63 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **3134.37** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-06**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #11 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 10060 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 93 | | |
| Canto útil a cara superior, d (mm) = | 907 | | |
| Cuantía de acero traccionado, ρ = | 0.0111 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0043 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -18 | 8.333E+10 | 3.213E+08 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -432 | 0.000E+00 | 5.764E+09 |
| Acero Inf. Homogeneizado (Trac) = | 80355 | 907 | 7.289E+07 | 389 | 0.000E+00 | 1.217E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 518 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 1.016E+11 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, d'/ρ = | 0.385 |
| Auxiliar, d'/d = | 0.095 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.323 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 293065 | 147 | -147 | 2.098E+09 | 6.293E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -207 | 0.000E+00 | 1.324E+09 |
| Acero Inf. Homogeneizado (Trac) = | 80355 | 907 | 614 | 0.000E+00 | 3.030E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 293 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 4.001E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 715.00 |
| Momento en situación de servicio, Ms (kNm) = | 2055.77 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 15.06 | OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 84.94 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 252.00 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-07**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 889 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #11 | #9 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 5 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 3225 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 169 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 13285 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 111 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 381 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 5919.38 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5327.45 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 5579.70 |
| Tracción a nivel del armado, T (kN) = | -5579.70 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 262 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 214.69 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 29.62 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 4347.34 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **3912.61** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-07**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #11 | #9 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 5 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 3225 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 169 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 200 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 13285 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 111 | | |
| Canto útil a cara superior, d (mm) = | 889 | | |
| Cuantía de acero traccionado, ρ = | 0.0150 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0044 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -25 | 8.333E+10 | 6.254E+08 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -439 | 0.000E+00 | 5.955E+09 |
| Acero Inf. Homogeneizado (Trac) = | 106116 | 889 | 9.429E+07 | 364 | 0.000E+00 | 1.402E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 525 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 1.039E+11 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, d'/ρ = | 0.291 |
| Auxiliar, d'/d = | 0.097 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.365 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 324140 | 162 | -162 | 2.838E+09 | 8.514E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -238 | 0.000E+00 | 1.752E+09 |
| Acero Inf. Homogeneizado (Trac) = | 106116 | 889 | 564 | 0.000E+00 | 3.380E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 324 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 4.691E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 743.00 |
| Momento en situación de servicio, Ms (kNm) = | 2538.51 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 17.54 | OK |
| Tensión Compresión en armado superior, σ's (MPa) = | 102.90 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 243.98 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-08**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 884 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #11 | #10 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 5 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 4095 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 171 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 14155 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 116 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 379 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 5865.16 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5278.65 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 5945.10 |
| Tracción a nivel del armado, T (kN) = | -5945.10 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 279 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 213.70 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 29.48 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 4565.19 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **4108.67** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-08**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #11 | #10 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 5 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 4095 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 171 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 200 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 14155 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 116 | | |
| Canto útil a cara superior, d (mm) = | 884 | | |
| Cuantía de acero traccionado, ρ = | 0.0160 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0044 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -27 | 8.333E+10 | 7.190E+08 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -441 | 0.000E+00 | 6.004E+09 |
| Acero Inf. Homogeneizado (Trac) = | 113065 | 884 | 1.000E+08 | 358 | 0.000E+00 | 1.446E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 527 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 1.045E+11 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, d'/ρ = | 0.273 |
| Auxiliar, d'/d = | 0.097 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.375 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 331476 | 166 | -166 | 3.035E+09 | 9.105E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -245 | 0.000E+00 | 1.861E+09 |
| Acero Inf. Homogeneizado (Trac) = | 113065 | 884 | 553 | 0.000E+00 | 3.457E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 331 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 4.858E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 750.00 |
| Momento en situación de servicio, Ms (kNm) = | 2662.37 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 18.17 | σ EXCESIVA |
| Tensión Compresión en armado superior, σ's (MPa) = | 107.42 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 242.09 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-09**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 877 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #11 | #9 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 6450 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 169 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 16510 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 123 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 376 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 5769.67 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5192.71 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 6934.20 |
| Tracción a nivel del armado, T (kN) = | -6934.20 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 325 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 211.96 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 29.24 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 5140.10 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **4626.09** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-09**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #11 | #9 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 6450 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 169 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 16510 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 123 | | |
| Canto útil a cara superior, d (mm) = | 877 | | |
| Cuantía de acero traccionado, ρ = | 0.0188 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0044 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -32 | 8.333E+10 | 1.010E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -446 | 0.000E+00 | 6.140E+09 |
| Acero Inf. Homogeneizado (Trac) = | 131876 | 877 | 1.157E+08 | 345 | 0.000E+00 | 1.574E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 532 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 1.062E+11 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, d'/ρ = | 0.234 |
| Auxiliar, d'/d = | 0.098 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.399 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 350237 | 175 | -175 | 3.580E+09 | 1.074E+10 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -264 | 0.000E+00 | 2.157E+09 |
| Acero Inf. Homogeneizado (Trac) = | 131876 | 877 | 527 | 0.000E+00 | 3.663E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 350 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 5.310E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 770.00 |
| Momento en situación de servicio, Ms (kNm) = | 3008.50 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 19.84 | σ EXCESIVA |
| Tensión Compresión en armado superior, σ's (MPa) = | 119.53 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 238.48 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-10**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 872 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #11 | #10 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 8190 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 171 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 18250 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 128 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 374 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 5700.83 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5130.75 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 7665.00 |
| Tracción a nivel del armado, T (kN) = | -7665.00 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 360 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 210.69 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 29.07 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 5531.75 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **4978.58** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-10**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #11 | #10 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 8190 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 171 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 18250 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 128 | | |
| Canto útil a cara superior, d (mm) = | 872 | | |
| Cuantía de acero traccionado, ρ = | 0.0209 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0044 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -35 | 8.333E+10 | 1.240E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -449 | 0.000E+00 | 6.235E+09 |
| Acero Inf. Homogeneizado (Trac) = | 145774 | 872 | 1.271E+08 | 337 | 0.000E+00 | 1.653E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 535 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 1.073E+11 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, ρ'/ρ = | 0.212 |
| Auxiliar, d'/d = | 0.099 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.416 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 362541 | 181 | -181 | 3.971E+09 | 1.191E+10 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -276 | 0.000E+00 | 2.362E+09 |
| Acero Inf. Homogeneizado (Trac) = | 145774 | 872 | 509 | 0.000E+00 | 3.783E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 363 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 5.608E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 784.00 |
| Momento en situación de servicio, Ms (kNm) = | 3248.92 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 21.00 | σ EXCESIVA |
| Tensión Compresión en armado superior, σ's (MPa) = | 127.93 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 235.75 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## COMPROBACIÓN DE MOMENTO ÚLTIMO RESISTIDO A FLEXIÓN SIMPLE EN SECCIONES RECTANGULARES SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-11**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Canto útil de la sección, d (mm) = | 867 |

***1.2. Armado de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura longitudinal, # = | #11 | #11 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 10060 | 0 |
| Separación vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 173 | 235 |
| Área de armado total, $A_s$ ($mm^2$) = | 20120 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 133 | | |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Deformación última hormigón a flexión simple, $\varepsilon_c$ = | 0.003 |
| Coeficiente de diagrama tensión-deformación, $\eta$ = | 0.850 |
| Coeficiente de diagrama tensión-deformación, $\beta_1$ = | 0.836 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Deformación última del acero a flexión simple, $\varepsilon_t$ = | 0.004 |
| Módulo de elasticidad del acero, Es (MPa) = | 200 000 |

### 2. LÍMITES DE DIMENSIONAMIENTO

***2.1. Límites de dimensionamiento.***

| | |
|---|---|
| Prof. Fibra Neutra máxima, $x_{lim}$ (mm) = | 372 |
| Momento último en capa armado, $M_1(x_{lim})$ (kNm) = | 5637.15 |
| Momento reducido en capa de armado, $\Phi M_1(x_{lim})$ (kNm) = | 5073.43 |

### 3. CÁLCULO ARMADO FLEXOCOMPRESIÓN

***3.1. Cálculo tensiones en las sección.***

| | |
|---|---|
| Compresión en cara superior, C (kN) = | 8450.40 |
| Tracción a nivel del armado, T (kN) = | -8450.40 |

***3.2. Obtención de la fibra néutra.***

| | |
|---|---|
| Profundidad fibra neutra, x (mm) = | 397 |

***3.2. Comprobación armados mínimos y máximos.***

| | |
|---|---|
| Armado máximo para control tracción, $A_{s,max}$ ($cm^2$) = | 209.51 |
| Armado mínimo mecánico, $A_{s,mec}$ ($cm^2$) = | 28.90 |
| Armado mínimo geométrico, $A_{geo}$ ($cm^2$) = | 18.00 |

***3.2. Obtención del momento último resistido.***

| | |
|---|---|
| Coeficiente Capacidad de Carga, $\Phi$ = | 0.90 |
| Momento último resistido, $M_u$ (kNm) = | 5927.16 |
| **MOMENTO ÚLTIMO REDUCIDO, $\Phi M_u$ (kNm) =** | **5334.44** |

## COMPROBACIÓN DEL ESTADO LÍMITE DE SERVICIO DE FISURACIÓN SEGÚN CAP.10 DE LA ACI 318-08

**PANTALLAS E=1,00M - STL-11**

### 1. DATOS DE LA SECCIÓN Y DE LOS MATERIALES.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho de la sección, b (mm) = | 1 000 |
| Altura de la sección, h (mm) = | 1 000 |
| Recubrimiento lateral, $c_{lat}$ (mm) = | 0 |

***1.2. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. A la tracción, fr (MPa) = | 3.396 |
| Módulo de elasticidad del hormigón, Ec (MPa) = | 26 291 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Módulo de elasticidad del acero, Es (MPa) = | 210 000 |
| Coeficiente de homogeneización, n = | 7.99 |

***1.3. Armado Tracción de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Tracción longitudinal, # = | #11 | #11 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 10060 | 10060 | 0 |
| Sep. vertical entre ejes de capas de armadura, $s_c$ (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 93 | 173 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero traccionada, $A_s$ ($mm^2$) = | 20120 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 133 | | |
| Canto útil a cara superior, d (mm) = | 867 | | |
| Cuantía de acero traccionado, ρ = | 0.0232 | | |

***1.3. Armado Compresión de la sección.***

| | CAPA1 | CAPA 2 | CAPA 3 |
|---|---|---|---|
| Calibre Armadura Compresión longitudinal, # = | #7 | 0 | 0 |
| Agrupaciones de las barras = | 1 | 1 | 1 |
| Nº de barras por capa de armado = | 10 | 10 | 10 |
| Área de armado por capa, As ($mm^2$) = | 3870 | 0 | 0 |
| Sep. vertical entre ejes de capas de armadura, sc (mm) = | --- | 80 | 80 |
| Recubrimiento a la armadura longitudinal, c (mm) = | 75 | 155 | 235 |
| Recubrimientro mecánico por capa, $r_{mec}$ (mm) = | 86 | 155 | 235 |
| Separación entre ejes de barras por capa, s (mm) = | 100 | 100 | 100 |
| Área de acero comprimida, $A'_s$ ($mm^2$) = | 3870 | | |
| Recubrimientro mecánico equivalente, $r_{mec}$ (mm) = | 86 | | |
| Canto útil a cara superior, d' (mm) = | 86 | | |
| Cuantía de acero traccionado, ρ' = | 0.0045 | | |

### 2. CÁLCULO DE LA INERCIA HOMOGENEIZADA Y LA INERCIA FISURADA

***2.1. Inercia homogeneizada.***

| | Área (mm2) | y cdg (mm) | A*y (mm3) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|---|
| Hormigón = | 1000000 | 500 | 5.000E+08 | -39 | 8.333E+10 | 1.503E+09 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | 2.662E+06 | -453 | 0.000E+00 | 6.334E+09 |
| Acero Inf. Homogeneizado (Trac) = | 160711 | 867 | 1.394E+08 | 328 | 0.000E+00 | 1.732E+10 |

| | |
|---|---|
| Fibra neutra homogeneizada, $x_{hom}$ (mm) = | 539 |
| Inercia homogeneizada de la sección, $I_{hom}$ ($mm^4$) = | 1.085E+11 |

***2.1. Inercia fisurada.***

| | |
|---|---|
| Auxiliar, ρ'/ρ = | 0.192 |
| Auxiliar, d'/d = | 0.099 |
| Profundidad relativa fibra neutra fisurada, xfis/d = | 0.432 |

| | Área (mm2) | y cdg (mm) | Brazo (mm) | I cdg (mm4) | A*brazo^2 (mm3) |
|---|---|---|---|---|---|
| Hormigón = | 374723 | 187 | -187 | 4.385E+09 | 1.315E+10 |
| Acero Sup. Homogeneizado (Comp) = | 30912 | 86 | -289 | 0.000E+00 | 2.575E+09 |
| Acero Inf. Homogeneizado (Trac) = | 160711 | 867 | 492 | 0.000E+00 | 3.896E+10 |

| | |
|---|---|
| Fibra neutra fisuración, $x_{fis}$ (mm) = | 375 |
| Inercia fisurada de la sección, $I_{fis}$ ($mm^4$) = | 5.908E+10 |

### 3. LÍMITES DE TENSIÓN EN LOS MATERIALES Y COMPROBACIÓN EN ESTADO LÍMITE DE SERVICIO

***3.1. Momento de fisuración y momento de servicio.***

| | |
|---|---|
| Momento de fisuración de la sección, $M_{fis}$ (kNm) = | 798.00 |
| Momento en situación de servicio, Ms (kNm) = | 3500.87 |

***3.2. Límites admisibles de tensión en el hormigón y en el acero.***

| | |
|---|---|
| Límite de tracción admisible en el acero, fs,adm (MPa) = | 252.00 |
| Límite de compresión admisible en el hormigón, σc,lim (MPa) = | 18.00 |

***3.2. Cálculo de las tensiones en las armaduras.***

| | | |
|---|---|---|
| Tensión Compresión máxima en el hormigón, σc (MPa) = | 22.21 | σ EXCESIVA |
| Tensión Compresión en armado superior, σ's (MPa) = | 136.62 | OK |
| Tensión Tracción en c.d.g. armado inferior, σs (MPa) = | 233.07 | OK |
| Tensión Tracción en armadura extrema inferior, σs (MPa) = | 252.00 | OK |

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## 1.2. SECCIONES TIPO PARA ARMADO A CORTANTE

Las secciones tipo consideradas son las siguientes:

| PANTALLA DE 1 METRO DE ESPESOR Y BATACHE DE 2,8 METROS DE ANCHO | | | | |
|---|---|---|---|---|
| **Sección Tipo** | **ΦVu (kN)** | **ΦVu Sismo (kN)** | **As (kg/m.l.)** | **Armado para batache b = bw** |
| STC-00 | 1080 | 1200 | 0 | --- |
| STC-01 | 1264 | 1404 | 57.3 | 1c#5/20 |
| STC-02 | 3644 | 4049 | 74.5 | 1c#5+4r#4/20 |
| STC-03 | 4095 | 4550 | 83.1 | 1c#5+6r#4/20 |
| STC-04 | 4840 | 5378 | 97.3 | 1c#5+6r#5/20 |
| STC-05 | 5772 | 6413 | 129.8 | 1c#5+6r#5/15 |
| STC-06 | 6164 | 6849 | 161.9 | 1c#6+6r#5/15 |
| STC-07 | 6988 | 7764 | 194.2 | 1c#6+6r#5/12.5 |
| STC-08 | 8398 | 9331 | 221.1 | 1c#6+6r#6/12.5 |
| STC-09 | 9987 | 11097 | 276.4 | 1c#6+6r#6/10 |

Se ha considerado un ancho tipo de batache de bw = 2,80 m.

Los cortantes últimos obtenidos para cada una de las secciones tipo se han obtenido según la sindicaciones de la normativa AASHTO-LRFD-2004.

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Para la sección tipo de cálculo STC-00, se considera que la sección no tiene armado a cortante debido a que la separación ente ramas es muy grande, por lo que se considerará que el hormigón es el único que resiste a cortante. Así, como la norma indica que no es preciso disponer armado a cortante si el momento actuante es menor a la mitad de la resistencia a cortante del hormigón (Vc), se considerará como resistencia de la sección STC-00 a la mitad de la resistencia a cortante del hormigón.

Así se obtiene que:

$$V_n = \cdot 0{,}5 \cdot V_c = 0{,}5 \cdot 2400 = \ 1200\ kNm/m$$

Aplicando el coeficiente de capacidad de carga correspondiente a cada estado se obtienen los valores indicados en la tabla anterior.

Para la sección tipo de cálculo STL-01 se obtiene el momento último resistido mediante la formulación del artículo 22 de la normativa ACI318-08:

$$V_n = 0{,}11 \cdot \sqrt{f_c'} \cdot b_w \cdot h = 0{,}11 \cdot \sqrt{30} \cdot 2{,}8 \cdot 1{,}0 \cdot 10^{-3} = 1686\ kNm/m$$

Aplicando el coeficiente de capacidad de carga correspondiente a cada estado se obtienen los valores indicados en la tabla anterior. (Se debe considerar el coeficiente Φ marcado por la ACI, que es de 0,75).

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## COMPROBACIÓN A CORTANTE DE SECCIONES RECTANGULARES SEGÚN CAP.11 DE LA ACI 318-08

**PANTALLAS E=1,00M - STC-XX**

### 1. DATOS DE LA SECCIÓN.

***1.1. Geometría de la sección.***

| | |
|---|---|
| Ancho efectivo de la sección, $b_W$ (mm) = | 2800 |
| Canto de la sección, h (mm) = | 1000 |
| Área bruta de la sección, $A_c$ ($mm^2$) = | 2800000 |
| Recubrimiento mecánico, $r_{mec}$ (mm) = | 75 |
| Cánto útil de la sección, d (mm) = | 925 |
| Recubrimiento lateral, $r_{lat}$ (mm) = | 0 |

***1.2. Armado de la sección.***

| | |
|---|---|
| Inclinación de las armaduras transversales, α (º) = | 90 |
| Área de arm. long. traccionada, $A_s$ ($cm^2$) = | 0 |
| Cuantía arm. long. traccionada, $\rho_l$ (‰) = | 0.0000 |

***1.3. Características de los materiales.***

| | |
|---|---|
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 |
| Resist. efectiva del hormigón, Raiz($f'_c$) (MPa) = | 5.477 |
| Límite elástico del acero, $f_y$ (MPa) = | 420 |
| Límite elástico del acero máximo, $f_y$ (MPa) = | 420 |

### 2. CARGAS DE DIMENSIONAMIENTO.

***2.1. Cargas de dimensionamiento concomitantes en la sección.***

| | |
|---|---|
| Axil de cálculo de la sección, Nd (kN) = | 0.00 |
| Momento de cálculo en la sección, Md (kNm) = | 0.00 |
| Cortante de cálculo en la sección, Vd (kN) = | 0.00 |
| Coeficiente Capacidad de Carga, Φ = | 0.90 |

### 3. CÁLCULOS.

***3.1. Cálculo de cortante resistido por el hormigón, Vc.***

| | |
|---|---|
| Método general Art. 11.2.1, Vc (kN) = | 2411.62 |
| Método detallado Art. 11.2.2, Vc (kN) = | 2269.76 |
| Momento equivalente cálculo, $M_m$ (kNm) = | 0.00 |
| Coeficiente Vu*d/Mu = | 1.00 |
| Valor límite del cortante, $V_{c,lim}$ (kN) = | 4113.94 |
| **Cortante resistido por el hormigón, Vc (kN) =** | **2269.76** |

***3.2. Cálculo del armado mínimo necesario, As.***

| | |
|---|---|
| Armado mínimo, Asmin/sep (cm2/m) = | 0.00 |

## CORTANTE RESISTIDO PARA CADA ARMADO PROPUESTO

El cortante soportado por el hormigón es el mismo que se indica en la tabla anterior para todos los armados.

| ARMADO PRED. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Cercos | | Ramas | | Sep (cm) | ARMADO PRED. | As (cm2/m) | As (Kg/m) | Vs (kN) | $S_{Max}$ (cm) | ΦVu (kN) |
| nº | Φ | nº | Φ | | | | | | | |
| 1 | #5 | 0 | 0 | 20 | 1c#5/20 | 20.00 | 57.31 | 777.00 | 46 | 2742.09 |
| 1 | #5 | 4 | #4 | 20 | 1c#5+4r#4/20 | 45.80 | 74.52 | 1779.33 | 46 | 3644.18 |
| 1 | #5 | 6 | #4 | 20 | 1c#5+6r#4/20 | 58.70 | 83.13 | 2280.50 | 46 | 4095.23 |
| 1 | #5 | 6 | #5 | 20 | 1c#5+6r#5/20 | 80.00 | 97.34 | 3108.00 | 46 | 4839.99 |
| 1 | #5 | 6 | #5 | 15 | 1c#5+6r#5/15 | 106.67 | 129.79 | 4144.00 | 46 | 5772.39 |
| 1 | #6 | 6 | #5 | 15 | 1c#6+6r#5/15 | 117.87 | 161.88 | 4579.12 | 46 | 6163.99 |
| 1 | #6 | 6 | #5 | 12.5 | 1c#6+6r#5/12.5 | 141.44 | 194.25 | 5494.94 | 23 | 6988.24 |
| 1 | #6 | 6 | #6 | 12.5 | 1c#6+6r#6/12.5 | 181.76 | 221.16 | 7061.38 | 23 | 8398.02 |
| 1 | #6 | 6 | #6 | 10 | 1c#6+6r#6/10 | 227.20 | 276.45 | 8826.72 | 23 | 9986.83 |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |

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## 2. SECCIONES TIPO DE CÁLCULO PILOTES D=1.00M

Para el armado de las diferentes pantallas de pilotes se han definido una serie de secciones tipo que se distribuirán en función de los esfuerzos obtenidos.

### 2.1. SECCIONES TIPO PARA ARMADO A FLEXIÓN

Las secciones tipo consideradas son las siguientes:

| PANTALLA PILOTES DE 1 METRO DE DIÁMETRO | | | | | |
|---|---|---|---|---|---|
| Sección Tipo | ΦMu (kN.m/pilote) | ΦMu Sismo (kN.m/pilote) | Mserv (kN.m/pilote) | As (cm2/m) | Nº Barras por pilote |
| STL-01 | 924 | 1027 | 615 | 61.2 | 12#8 |
| STL-02 | 1461 | 1623 | 1036 | 103.2 | 16#9 |
| STL-03 | 1797 | 1997 | 1266 | 131.0 | 16#10 |
| STL-04 | 2151 | 2390 | 1554 | 161.0 | 16#11 |
| STL-05 | 3049 | 3388 | 2238 | 241.4 | 24#11 |
| STL-06 | 3894 | 4327 | 2880 | 321.9 | 32#11 |

Los momentos últimos obtenidos para cada una de las secciones tipo se han obtenido según la sindicaciones de la normativa AASHTO-LRFD-2004.

Para la obtención del momento de servicio máximo resistido por el armado dispuesto. Se realiza un cálculo ficticio en rotura considerando un acero de fy = 0,6·420 = 252 MPa. Siendo una aproximación suficientemente conservadora al comportamiento de la sección circular frente a fisuración.

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## DIMENSIONAMIENTO DE SECCIONES CIRCULARES EN FLEXION COMPUESTA RECTA

VOLVER AL INICIO

### 1.- DATOS GENERALES

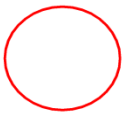
| REGLAMENTO DE REFERENCIA: ACI 318-08 | | | |
|---|---|---|---|
| Resististencia especificada a compresión del hormigón = | $f'_c$ = | 30 | MPa |
| Tensión de fluencia especificada de la armadura = | $f_y$ = | 420 | MPa |
| Tipo de Estribado : 1 = estribos cerrados ; 2 = zunchos | | 1 | |
| ∴ $P_n$ (max) = | 0.8 Po | | |
| $P_o$ = | 0,85 $f'_c$ ($A_g$ - $A_{st}$) + $f_y$ $A_{st}$ | | |
| Módulo de elasticidad del acero = | $E_s$ = | 200000 | MPa |
| Deformación de fluencia del acero = | $\varepsilon_y$ = | 2.100 | ‰ |
| Factor que relaciona la altura del bloque de tensiones de compresión rectangular equivalente con la profundidad del eje neutro = | $\beta_1$ = | 0.832 | |
| Cuantía minima de la armadura traccionada = | $\rho_{min}$ = | 0.0033 | |

| | | | |
|---|---|---|---|
| Factor de reducción de la resistencia. Secciones controladas por compresión = | $\phi$ = | 0.65 | |
| Factor de reducción de la resistencia. Secciones controladas por tracción = | $\phi$ = | 0.90 | |

### 2.- DATOS DE LA SECCION TRANSVERSAL

| | | | |
|---|---|---|---|
| Diámetro exterior del elemento = | D = | 1.00 | m |
| Diámetro interior del elemento = | D int= | 0.00 | m |
| Recubrimiento efectivo a eje de barra = | $d'_s$ = | 0.09 | m |
| Relación de diámetros = | $\chi$ | 0.00 | |
| | | | |

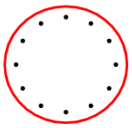
Esquema



### 3.- DISTRIBUCIÓN DE ARMADURAS

| | | | |
|---|---|---|---|
| Área de acero individual = | $A_{si}$ = | 5.10 | cm2 |
| Número de barras (máx. 48) = | N° = | 12 | |
| Area total de la armadura longitudinal no tesa = | $A_{st}$ = | 61.20 | cm2 |
| Cuantía geométrica total = | $\rho$ = | 0.00779 | |
| Ubicación de armadura : favorable = 1 ; desfavorable = 0 | | 1 | |

Esquema

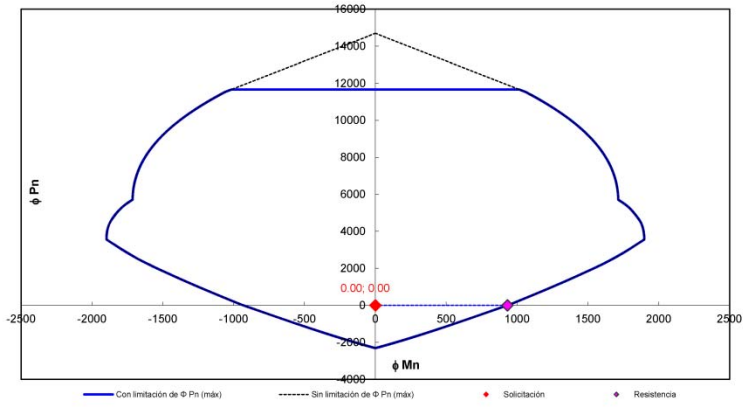


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**4.- CONDICIÓN DE SEGURIDAD PARA UNA SOLICITACIÓN DADA**

Si no se desea graficar una solicitación en el diagrama, introducir valores nulos para Pu y Mu

| | | | | |
|---|---|---|---|---|
| Esfuerzo axial mayorado; se debe considerar positivo para compresión y negativo para tracción = | $P_u$ = | 0.00 | kN | |
| Momento mayorado = | $M_u$ = | 0.00 | kN·m | (positivo tracciona fibra inferior) |
| | $M_u$ / $P_u$ = | Infinito | m | |




**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

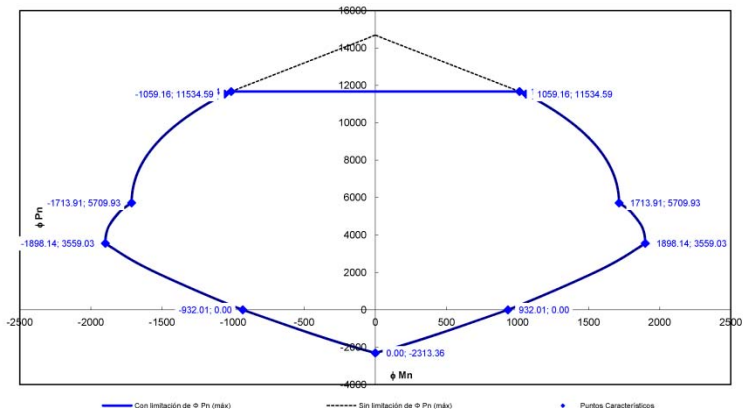
En el diagrama anterior el rombo rojo indica la solicitación y el rombo magenta la resistencia correspondiente a una excentricidad igual a la de la solicitación.

Si se mantiene la excentricidad de las solicitaciones se obtienen los siguientes valores en el diagrama resistente:

| | | |
|---|---|---|
| $P_{u\,res}$ = | 0.00 | kN |
| $M_{u\,res}$ = | 932.01 | kN·m |
| MV sol = $[ (P_{u\,sol})^2 + (M_{u\,sol})^2 ]^{1/2}$ = | 0.00 | = Módulo vector solicitante |
| MV res = $[ (P_{u\,res})^2 + (M_{u\,res})^2 ]^{1/2}$ = | 932.01 | = Módulo vector resistente |
| MV res / MV sol = | #¡DIV/0! | Debe ser mayor o igual que 1 para cumplir con la condición de seguridad. |

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**5.- PUNTOS CARACTERÍSTICOS DEL DIAGRAMA DE INTERACCIÓN**

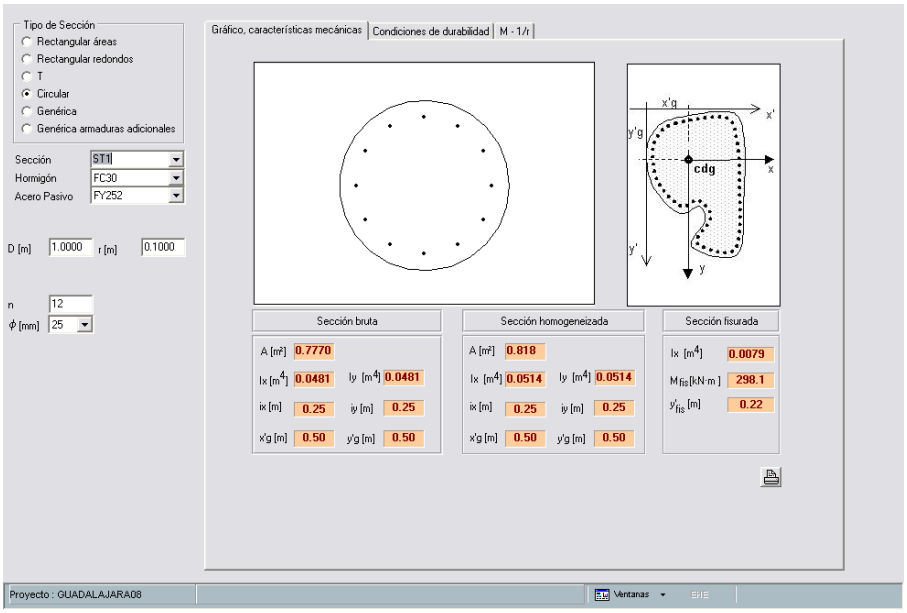


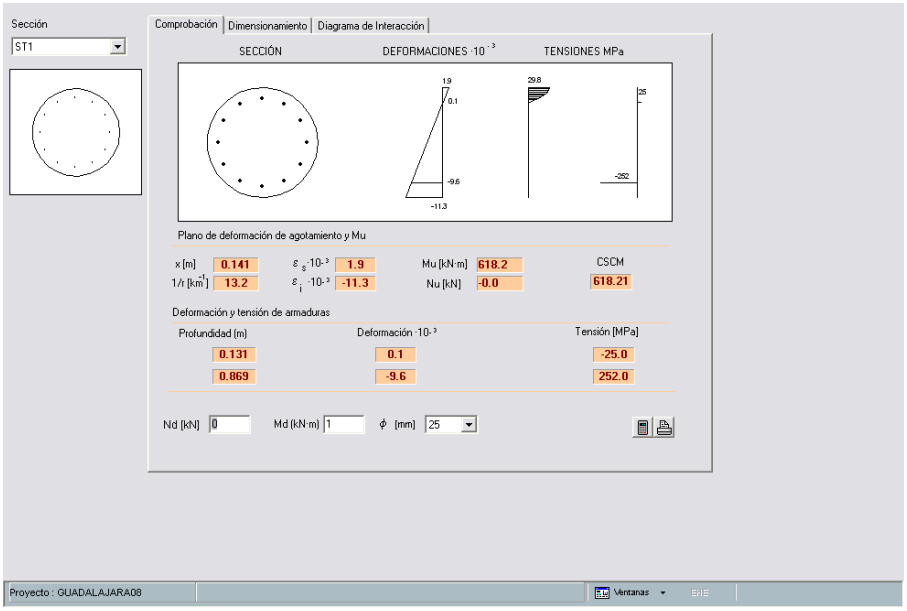

**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

| | Resultados suponiendo al borde inferior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | -1013.66 | 11669.84 | 0.65 |
| Deformación nula en la armadura superior = | -1059.16 | 11534.59 | 0.65 |
| Deformación de fluencia por tracción en la armadura superior = | -1713.91 | 5709.93 | 0.65 |
| Deformación de 0,005 de tracción en la armadura superior = | -1898.14 | 3559.03 | 0.90 |
| Resistencia a flexión pura = | -932.01 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -2313.36 | 0.90 |

| | Resultados suponiendo al borde superior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | 1013.66 | 11669.84 | 0.65 |
| Deformación nula en la armadura inferior = | 1059.16 | 11534.59 | 0.65 |
| Deformación de fluencia por tracción en la armadura inferior = | 1713.91 | 5709.93 | 0.65 |
| Deformación de 0,005 de tracción en la armadura inferior = | 1898.14 | 3559.03 | 0.90 |
| Resistencia a flexión pura = | 932.01 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -2313.36 | 0.90 |

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## DIMENSIONAMIENTO DE SECCIONES CIRCULARES EN FLEXION COMPUESTA RECTA

VOLVER AL INICIO

### 1.- DATOS GENERALES

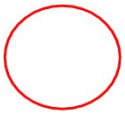
| REGLAMENTO DE REFERENCIA: ACI 318-08 | | | |
|---|---|---|---|
| Resististencia especificada a compresión del hormigón = | $f'_c$ = | 30 | MPa |
| Tensión de fluencia especificada de la armadura = | $f_y$ = | 420 | MPa |
| Tipo de Estribado : 1 = estribos cerrados ; 2 = zunchos | | 1 | |
| ∴ $P_n$ (max) = | 0.8 Po | | |
| $P_o$ = | 0,85 $f'_c$ ($A_g$ - $A_{st}$) + $f_y$ $A_{st}$ | | |
| Módulo de elasticidad del acero = | $E_s$ = | 200000 | MPa |
| Deformación de fluencia del acero = | $\varepsilon_y$ = | 2.100 | ‰ |
| Factor que relaciona la altura del bloque de tensiones de compresión rectangular equivalente con la profundidad del eje neutro = | $\beta_1$ = | 0.832 | |
| Cuantía mínima de la armadura traccionada = | $\rho_{min}$ = | 0.0033 | |

| | | | |
|---|---|---|---|
| Factor de reducción de la resistencia. Secciones controladas por compresión = | $\phi$ = | 0.65 | |
| Factor de reducción de la resistencia. Secciones controladas por tracción = | $\phi$ = | 0.90 | |

### 2.- DATOS DE LA SECCION TRANSVERSAL

| | | | |
|---|---|---|---|
| Diámetro exterior del elemento = | D = | 1.00 | m |
| Diámetro interior del elemento = | D int= | 0.00 | m |
| Recubrimiento efectivo a eje de barra = | $d'_s$ = | 0.09 | m |
| Relación de diámetros = | $\chi$ | 0.00 | |
| | | | |

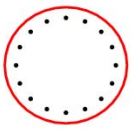
Esquema



### 3.- DISTRIBUCIÓN DE ARMADURAS

| | | | |
|---|---|---|---|
| Área de acero individual = | $A_{sj}$ = | 6.45 | cm2 |
| Número de barras (máx. 48) = | N° = | 16 | |
| Area total de la armadura longitudinal no tesa = | $A_{st}$ = | 103.20 | cm2 |
| Cuantía geométrica total = | $\rho$ = | 0.01314 | |
| Ubicación de armadura : favorable = 1 ; desfavorable = 0 | | 1 | |

Esquema

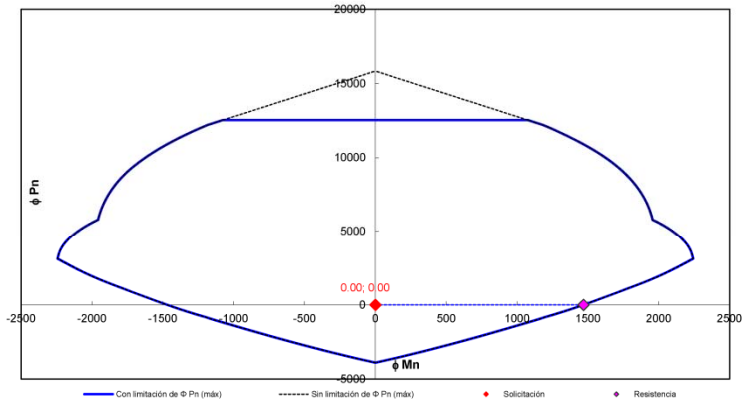


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**4.- CONDICIÓN DE SEGURIDAD PARA UNA SOLICITACIÓN DADA**

Si no se desea graficar una solicitación en el diagrama, introducir valores nulos para Pu y Mu

| | | | | |
|---|---|---|---|---|
| Esfuerzo axial mayorado; se debe considerar positivo para compresión y negativo para tracción = | $P_u$ = | 0.00 | kN | |
| Momento mayorado = | $M_u$ = | 0.00 | kN·m | (positivo tracciona fibra inferior) |
| | $M_u$ / $P_u$ = | Infinito | m | |




**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

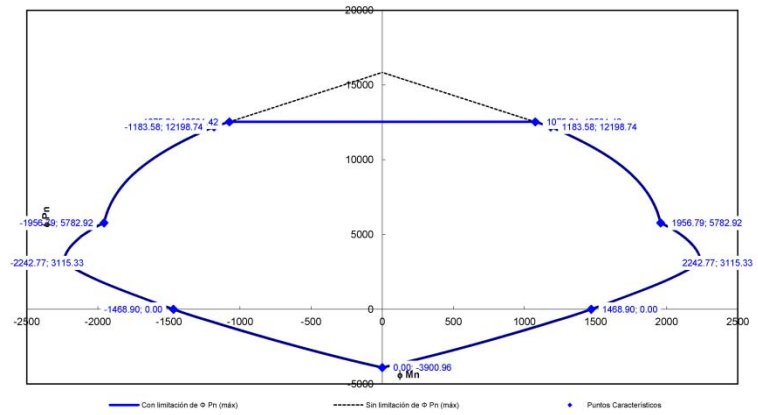
En el diagrama anterior el rombo rojo indica la solicitación y el rombo magenta la resistencia correspondiente a una excentricidad igual a la de la solicitación.

Si se mantiene la excentricidad de las solicitaciones se obtienen los siguientes valores en el diagrama resistente:

| | | |
|---|---|---|
| $P_{u\,res}$ = | 0.00 | kN |
| $M_{u\,res}$ = | 1468.90 | kN·m |
| MV sol = $[ (P_{u\,sol})^2 + (M_{u\,sol})^2 ]^{1/2}$ = | 0.00 | = Módulo vector solicitante |
| MV res = $[ (P_{u\,res})^2 + (M_{u\,res})^2 ]^{1/2}$ = | 1468.90 | = Módulo vector resistente |
| MV res / MV sol = | #¡DIV/0! | Debe ser mayor o igual que 1 para cumplir con la condición de seguridad. |

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**5.- PUNTOS CARACTERÍSTICOS DEL DIAGRAMA DE INTERACCIÓN**

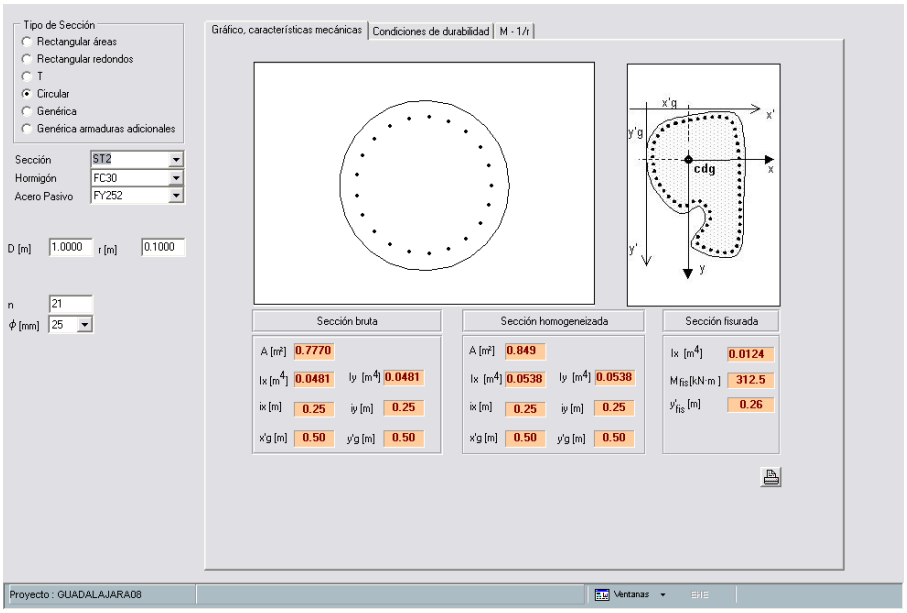


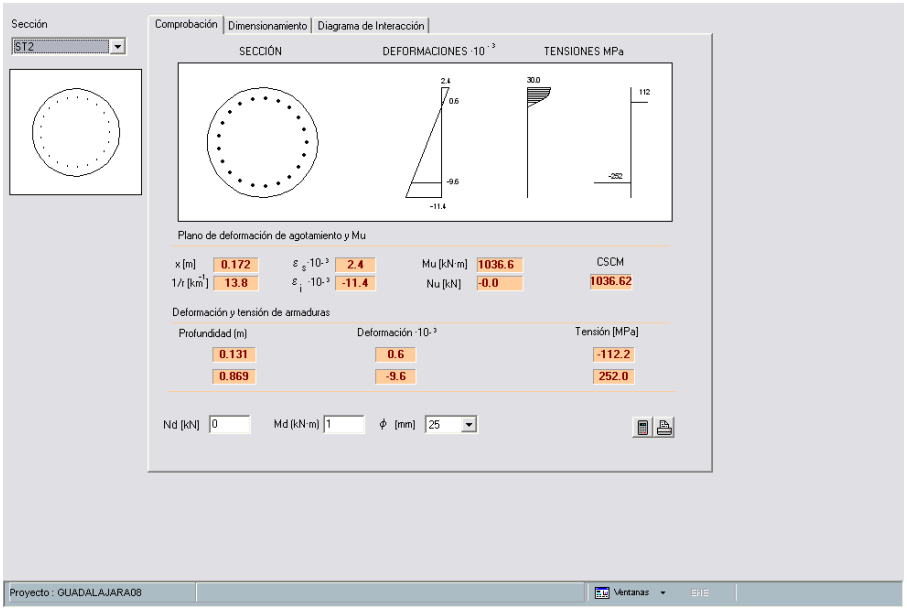

**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

| | Resultados suponiendo al borde inferior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | -1075.21 | 12531.42 | 0.65 |
| Deformación nula en la armadura superior = | -1183.58 | 12198.74 | 0.65 |
| Deformación de fluencia por tracción en la armadura superior = | -1956.79 | 5782.92 | 0.65 |
| Deformación de 0,005 de tracción en la armadura superior = | -2242.77 | 3115.33 | 0.90 |
| Resistencia a flexión pura = | -1468.90 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -3900.96 | 0.90 |

| | Resultados suponiendo al borde superior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | 1075.21 | 12531.42 | 0.65 |
| Deformación nula en la armadura inferior = | 1183.58 | 12198.74 | 0.65 |
| Deformación de fluencia por tracción en la armadura inferior = | 1956.79 | 5782.92 | 0.65 |
| Deformación de 0,005 de tracción en la armadura inferior = | 2242.77 | 3115.33 | 0.90 |
| Resistencia a flexión pura = | 1468.90 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -3900.96 | 0.90 |

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## DIMENSIONAMIENTO DE SECCIONES CIRCULARES EN FLEXION COMPUESTA RECTA

VOLVER AL INICIO

### 1.- DATOS GENERALES

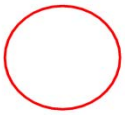
| REGLAMENTO DE REFERENCIA: ACI 318-08 | | | |
|---|---|---|---|
| Resististencia especificada a compresión del hormigón = | $f'_c$ = | 30 | MPa |
| Tensión de fluencia especificada de la armadura = | $f_y$ = | 420 | MPa |
| Tipo de Estribado : 1 = estribos cerrados ; 2 = zunchos | | 1 | |
| ∴ $P_n$ (max) = | 0.8 Po | | |
| $P_o$ = | 0,85 $f'_c$ ($A_g$ - $A_{st}$) + $f_y$ $A_{st}$ | | |
| Módulo de elasticidad del acero = | $E_s$ = | 200000 | MPa |
| Deformación de fluencia del acero = | $\varepsilon_y$ = | 2.100 | ‰ |
| Factor que relaciona la altura del bloque de tensiones de compresión rectangular equivalente con la profundidad del eje neutro = | $\beta_1$ = | 0.832 | |
| Cuantía mínima de la armadura traccionada = | $\rho_{min}$ = | 0.0033 | |

| | | | |
|---|---|---|---|
| Factor de reducción de la resistencia. Secciones controladas por compresión = | $\phi$ = | 0.65 | |
| Factor de reducción de la resistencia. Secciones controladas por tracción = | $\phi$ = | 0.90 | |

### 2.- DATOS DE LA SECCION TRANSVERSAL

| | | | |
|---|---|---|---|
| Diámetro exterior del elemento = | D = | 1.00 | m |
| Diámetro interior del elemento = | D int= | 0.00 | m |
| Recubrimiento efectivo a eje de barra = | $d'_s$ = | 0.09 | m |
| Relación de diámetros = | $\chi$ | 0.00 | |
| | | | |

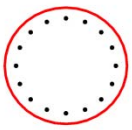
Esquema



### 3.- DISTRIBUCIÓN DE ARMADURAS

| | | | |
|---|---|---|---|
| Área de acero individual = | $A_{si}$ = | 8.19 | cm2 |
| Número de barras (máx. 48) = | N° = | 16 | |
| Area total de la armadura longitudinal no tesa = | $A_{st}$ = | 131.04 | cm2 |
| Cuantía geométrica total = | $\rho$ = | 0.01668 | |
| Ubicación de armadura : favorable = 1 ; desfavorable = 0 | | 1 | |

Esquema

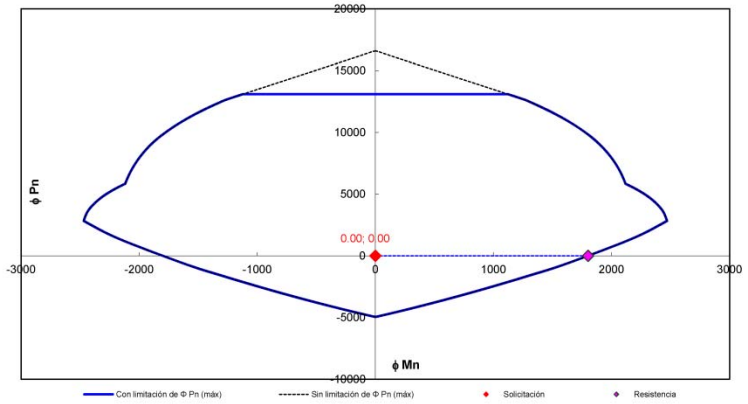


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**4.- CONDICIÓN DE SEGURIDAD PARA UNA SOLICITACIÓN DADA**

Si no se desea graficar una solicitación en el diagrama, introducir valores nulos para Pu y Mu

| | | | | |
|---|---|---|---|---|
| Esfuerzo axial mayorado; se debe considerar positivo para compresión y negativo para tracción = | $P_u$ = | 0.00 | kN | |
| Momento mayorado = | $M_u$ = | 0.00 | kN·m | (positivo tracciona fibra inferior) |
| | $M_u / P_u$ = | Infinito | m | |




**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

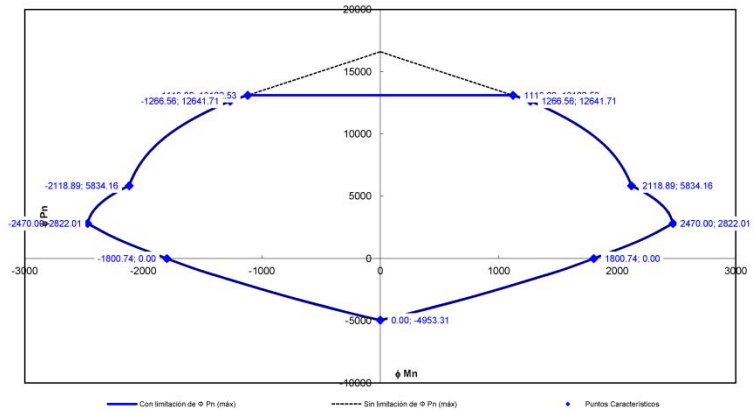
En el diagrama anterior el rombo rojo indica la solicitación y el rombo magenta la resistencia correspondiente a una excentricidad igual a la de la solicitación.

Si se mantiene la excentricidad de las solicitaciones se obtienen los siguientes valores en el diagrama resistente:

| | | |
|---|---|---|
| $P_{u\,res}$ = | 0.00 | kN |
| $M_{u\,res}$ = | 1800.74 | kN·m |
| MV sol = $[ (P_{u\,sol})^2 + (M_{u\,sol})^2 ]^{1/2}$ = | 0.00 | = Módulo vector solicitante |
| MV res = $[ (P_{u\,res})^2 + (M_{u\,res})^2 ]^{1/2}$ = | 1800.74 | = Módulo vector resistente |
| MV res / MV sol = | #¡DIV/0! | Debe ser mayor o igual que 1 para cumplir con la condición de seguridad. |

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**5.- PUNTOS CARACTERÍSTICOS DEL DIAGRAMA DE INTERACCIÓN**

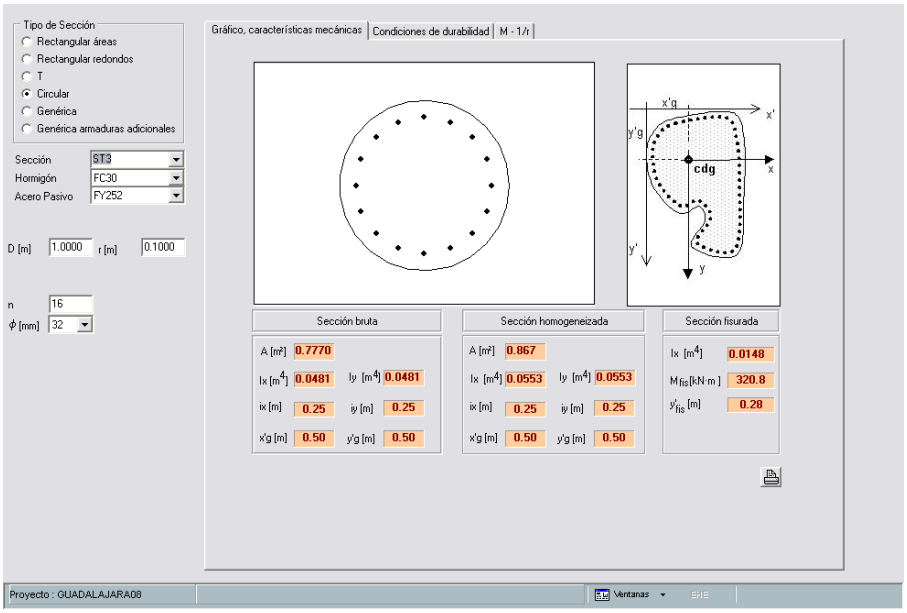


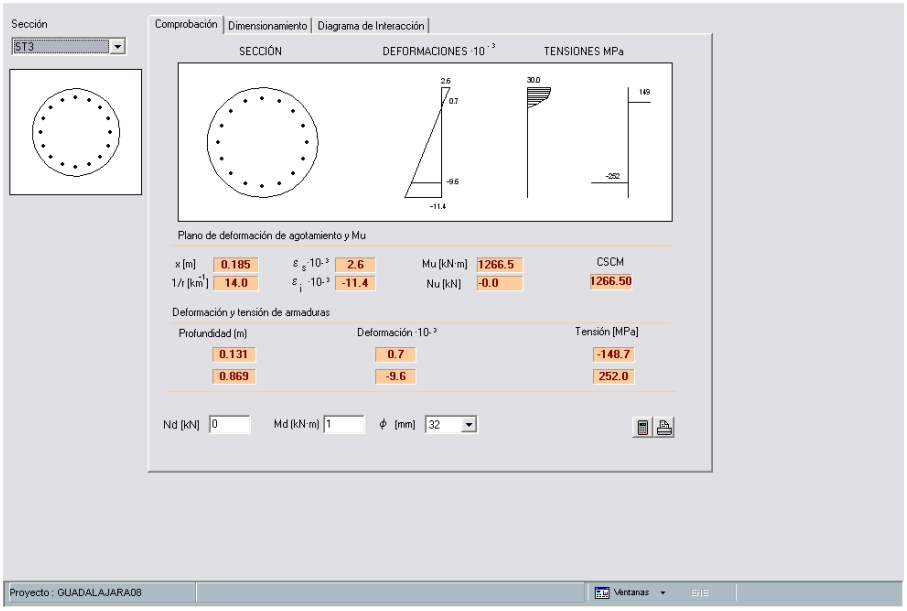

**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

| | Resultados suponiendo al borde inferior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | -1119.06 | 13102.53 | 0.65 |
| Deformación nula en la armadura superior = | -1266.56 | 12641.71 | 0.65 |
| Deformación de fluencia por tracción en la armadura superior = | -2118.89 | 5834.16 | 0.65 |
| Deformación de 0,005 de tracción en la armadura superior = | -2470.00 | 2822.01 | 0.90 |
| Resistencia a flexión pura = | -1800.74 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -4953.31 | 0.90 |

| | Resultados suponiendo al borde superior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | 1119.06 | 13102.53 | 0.65 |
| Deformación nula en la armadura inferior = | 1266.56 | 12641.71 | 0.65 |
| Deformación de fluencia por tracción en la armadura inferior = | 2118.89 | 5834.16 | 0.65 |
| Deformación de 0,005 de tracción en la armadura inferior = | 2470.00 | 2822.01 | 0.90 |
| Resistencia a flexión pura = | 1800.74 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -4953.31 | 0.90 |

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## DIMENSIONAMIENTO DE SECCIONES CIRCULARES EN FLEXION COMPUESTA RECTA

VOLVER AL INICIO

### 1.- DATOS GENERALES

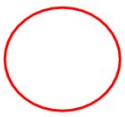
| REGLAMENTO DE REFERENCIA: ACI 318-08 | | | |
|---|---|---|---|
| Resististencia especificada a compresión del hormigón = | $f'_c$ = | 30 | MPa |
| Tensión de fluencia especificada de la armadura = | $f_y$ = | 420 | MPa |
| Tipo de Estribado : 1 = estribos cerrados ; 2 = zunchos | | 1 | |
| $\therefore$ $P_n$ (max) = | 0.8 Po | | |
| $P_o$ = | 0,85 $f'_c$ ($A_g$ - $A_{st}$) + $f_y$ $A_{st}$ | | |
| Módulo de elasticidad del acero = | $E_s$ = | 200000 | MPa |
| Deformación de fluencia del acero = | $\varepsilon_y$ = | 2.100 | ‰ |
| Factor que relaciona la altura del bloque de tensiones de compresión rectangular equivalente con la profundidad del eje neutro = | $\beta_1$ = | 0.832 | |
| Cuantía mínima de la armadura traccionada = | $\rho_{min}$ = | 0.0033 | |

| | | | |
|---|---|---|---|
| Factor de reducción de la resistencia. Secciones controladas por compresión = | $\phi$ = | 0.65 | |
| Factor de reducción de la resistencia. Secciones controladas por tracción = | $\phi$ = | 0.90 | |

### 2.- DATOS DE LA SECCION TRANSVERSAL

| | | | |
|---|---|---|---|
| Diámetro exterior del elemento = | D = | 1.00 | m |
| Diámetro interior del elemento = | D int= | 0.00 | m |
| Recubrimiento efectivo a eje de barra = | $d'_s$ = | 0.09 | m |
| Relación de diámetros = | $\chi$ | 0.00 | |
| | | | |

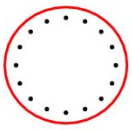
Esquema



### 3.- DISTRIBUCIÓN DE ARMADURAS

| | | | |
|---|---|---|---|
| Área de acero individual = | $A_{si}$ = | 10.06 | cm2 |
| Número de barras (máx. 48) = | N° = | 16 | |
| Area total de la armadura longitudinal no tesa = | $A_{st}$ = | 160.96 | cm2 |
| Cuantía geométrica total = | $\rho$ = | 0.02049 | |
| Ubicación de armadura : favorable = 1 ; desfavorable = 0 | | 1 | |

Esquema

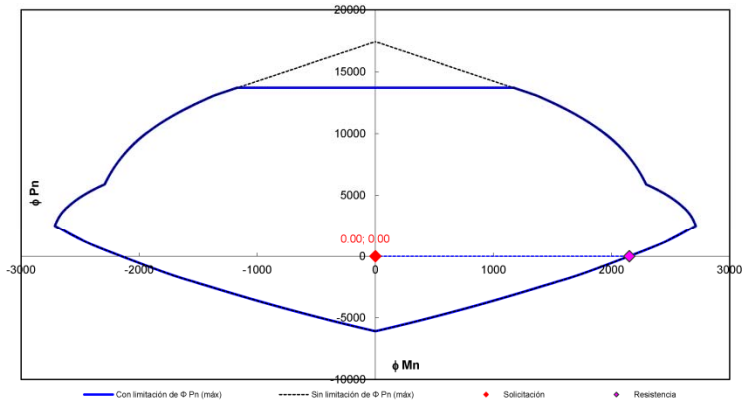


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**4.- CONDICIÓN DE SEGURIDAD PARA UNA SOLICITACIÓN DADA**

Si no se desea graficar una solicitación en el diagrama, introducir valores nulos para Pu y Mu

| | | | | |
|---|---|---|---|---|
| Esfuerzo axial mayorado; se debe considerar positivo para compresión y negativo para tracción = | $P_u$ = | 0.00 | kN | |
| Momento mayorado = | $M_u$ = | 0.00 | kN·m | (positivo tracciona fibra inferior) |
| | $M_u / P_u$ = | Infinito | m | |




**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

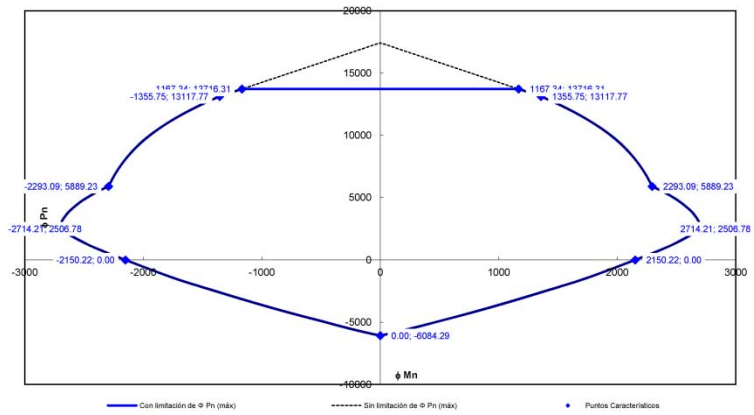
En el diagrama anterior el rombo rojo indica la solicitación y el rombo magenta la resistencia correspondiente a una excentricidad igual a la de la solicitación.

Si se mantiene la excentricidad de las solicitaciones se obtienen los siguientes valores en el diagrama resistente:

| | | |
|---|---|---|
| $P_{u\,res}$ = | 0.00 | kN |
| $M_{u\,res}$ = | 2150.22 | kN·m |
| MV sol = $[ (P_{u\,sol})^2 + (M_{u\,sol})^2 ]^{1/2}$ = | 0.00 | = Módulo vector solicitante |
| MV res = $[ (P_{u\,res})^2 + (M_{u\,res})^2 ]^{1/2}$ = | 2150.22 | = Módulo vector resistente |
| MV res / MV sol = | #¡DIV/0! | Debe ser mayor o igual que 1 para cumplir con la condición de seguridad. |

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**5.- PUNTOS CARACTERÍSTICOS DEL DIAGRAMA DE INTERACCIÓN**

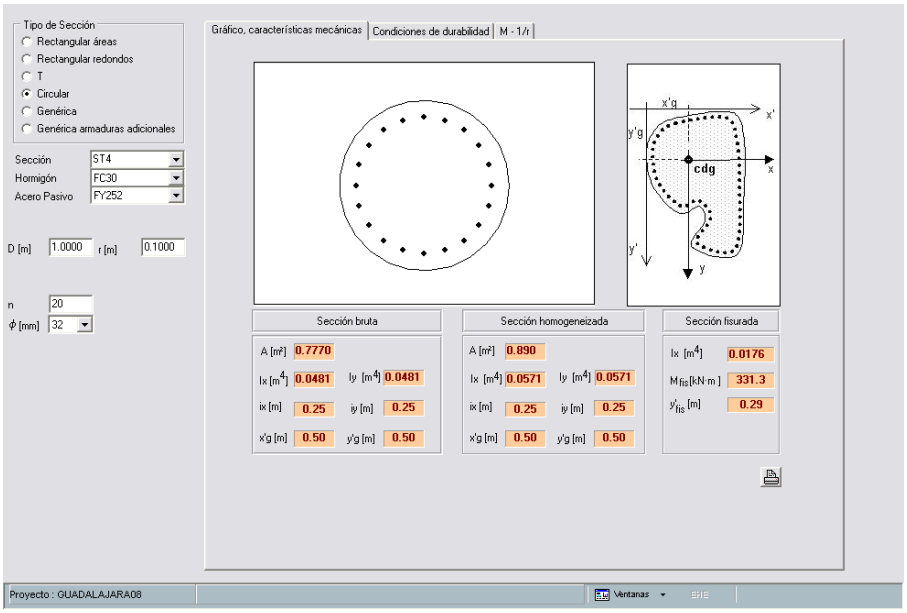


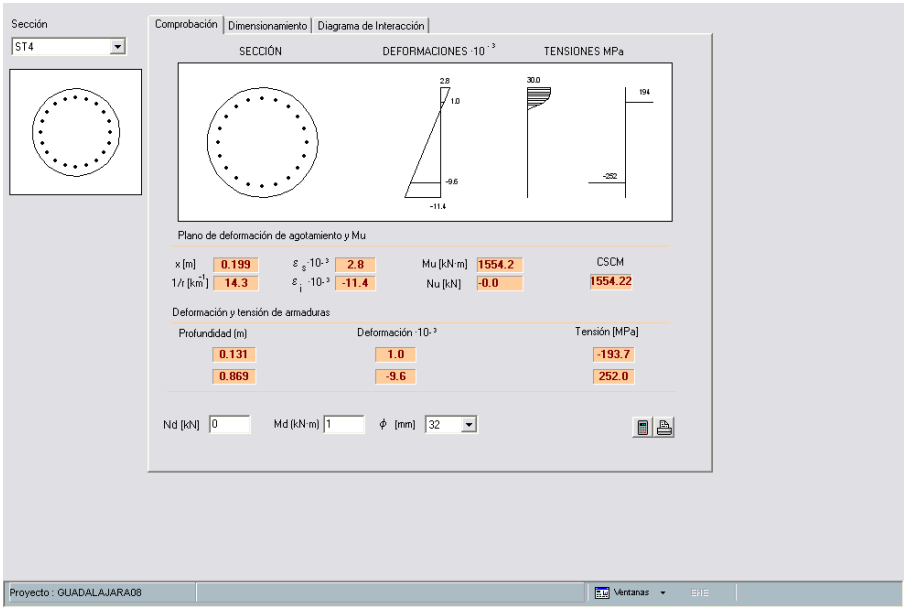

**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

| | Resultados suponiendo al borde inferior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | -1167.34 | 13716.31 | 0.65 |
| Deformación nula en la armadura superior = | -1355.75 | 13117.77 | 0.65 |
| Deformación de fluencia por tracción en la armadura superior = | -2293.09 | 5889.23 | 0.65 |
| Deformación de 0,005 de tracción en la armadura superior = | -2714.21 | 2506.78 | 0.90 |
| Resistencia a flexión pura = | -2150.22 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -6084.29 | 0.90 |

| | Resultados suponiendo al borde superior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | 1167.34 | 13716.31 | 0.65 |
| Deformación nula en la armadura inferior = | 1355.75 | 13117.77 | 0.65 |
| Deformación de fluencia por tracción en la armadura inferior = | 2293.09 | 5889.23 | 0.65 |
| Deformación de 0,005 de tracción en la armadura inferior = | 2714.21 | 2506.78 | 0.90 |
| Resistencia a flexión pura = | 2150.22 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -6084.29 | 0.90 |

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## DIMENSIONAMIENTO DE SECCIONES CIRCULARES EN FLEXION COMPUESTA RECTA

VOLVER AL INICIO

### 1.- DATOS GENERALES

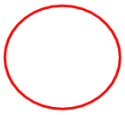
| REGLAMENTO DE REFERENCIA: ACI 318-08 | | | |
|---|---|---|---|
| Resististencia especificada a compresión del hormigón = | $f'_c$ = | 30 | MPa |
| Tensión de fluencia especificada de la armadura = | $f_y$ = | 420 | MPa |
| Tipo de Estribado : 1 = estribos cerrados ; 2 = zunchos | | 1 | |
| ∴ $P_n$ (max) = | 0.8 Po | | |
| $P_o$ = | 0,85 $f'_c$ ($A_g$ - $A_{st}$) + $f_y$ $A_{st}$ | | |
| Módulo de elasticidad del acero = | $E_s$ = | 200000 | MPa |
| Deformación de fluencia del acero = | $\varepsilon_y$ = | 2.100 | ‰ |
| Factor que relaciona la altura del bloque de tensiones de compresión rectangular equivalente con la profundidad del eje neutro = | $\beta_1$ = | 0.832 | |
| Cuantía mínima de la armadura traccionada = | $\rho_{min}$ = | 0.0033 | |

| | | | |
|---|---|---|---|
| Factor de reducción de la resistencia. Secciones controladas por compresión = | $\phi$ = | 0.65 | |
| Factor de reducción de la resistencia. Secciones controladas por tracción = | $\phi$ = | 0.90 | |

### 2.- DATOS DE LA SECCION TRANSVERSAL

| | | | |
|---|---|---|---|
| Diámetro exterior del elemento = | D = | 1.00 | m |
| Diámetro interior del elemento = | D int= | 0.00 | m |
| Recubrimiento efectivo a eje de barra = | $d'_s$ = | 0.09 | m |
| Relación de diámetros = | $\chi$ | 0.00 | |
| | | | |

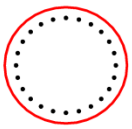
Esquema



### 3.- DISTRIBUCIÓN DE ARMADURAS

| | | | |
|---|---|---|---|
| Área de acero individual = | $A_{st}$ = | 10.06 | cm2 |
| Número de barras (máx. 48) = | N° = | 24 | |
| Area total de la armadura longitudinal no tesa = | $A_{st}$ = | 241.44 | cm2 |
| Cuantía geométrica total = | $\rho$ = | 0.03074 | |
| Ubicación de armadura : favorable = 1 ; desfavorable = 0 | | 1 | |

Esquema

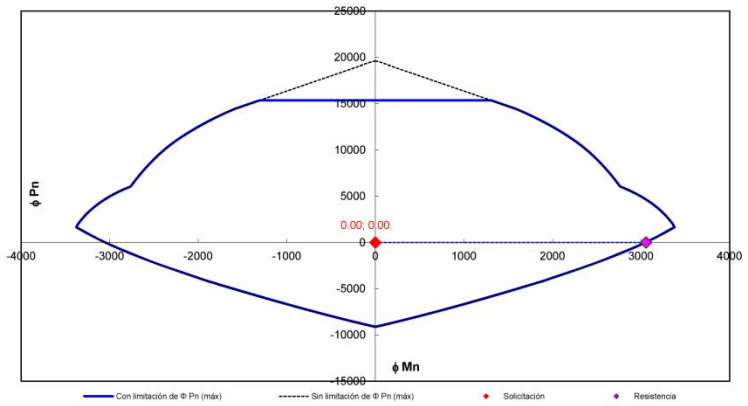


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**4.- CONDICIÓN DE SEGURIDAD PARA UNA SOLICITACIÓN DADA**

Si no se desea graficar una solicitación en el diagrama, introducir valores nulos para Pu y Mu

| | | | | |
|---|---|---|---|---|
| Esfuerzo axial mayorado; se debe considerar positivo para compresión y negativo para tracción = | $P_u$ = | 0.00 | kN | |
| Momento mayorado = | $M_u$ = | 0.00 | kN·m | (positivo tracciona fibra inferior) |
| | $M_u$ / $P_u$ = | Infinito | m | |




**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

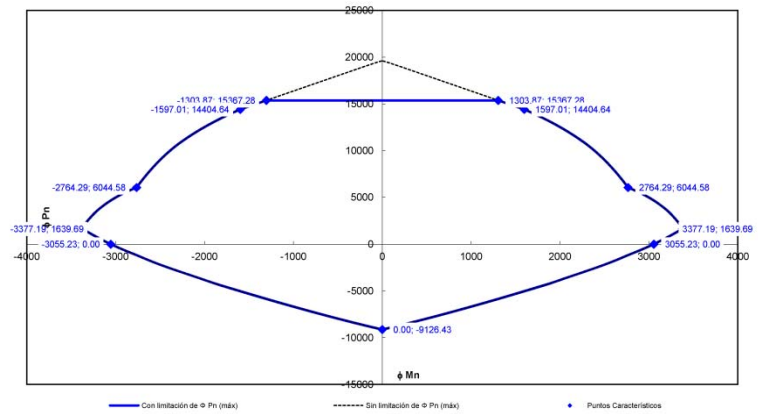
En el diagrama anterior el rombo rojo indica la solicitación y el rombo magenta la resistencia correspondiente a una excentricidad igual a la de la solicitación.

Si se mantiene la excentricidad de las solicitaciones se obtienen los siguientes valores en el diagrama resistente:

| | | |
|---|---|---|
| $P_{u\,res}$ = | 0.00 | kN |
| $M_{u\,res}$ = | 3055.23 | kN·m |
| MV sol = $[ (P_{u\,sol})^2 + (M_{u\,sol})^2 ]^{1/2}$ = | 0.00 | = Módulo vector solicitante |
| MV res = $[ (P_{u\,res})^2 + (M_{u\,res})^2 ]^{1/2}$ = | 3055.23 | = Módulo vector resistente |
| MV res / MV sol = | #¡DIV/0! | Debe ser mayor o igual que 1 para cumplir con la condición de seguridad. |

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**5.- PUNTOS CARACTERÍSTICOS DEL DIAGRAMA DE INTERACCIÓN**

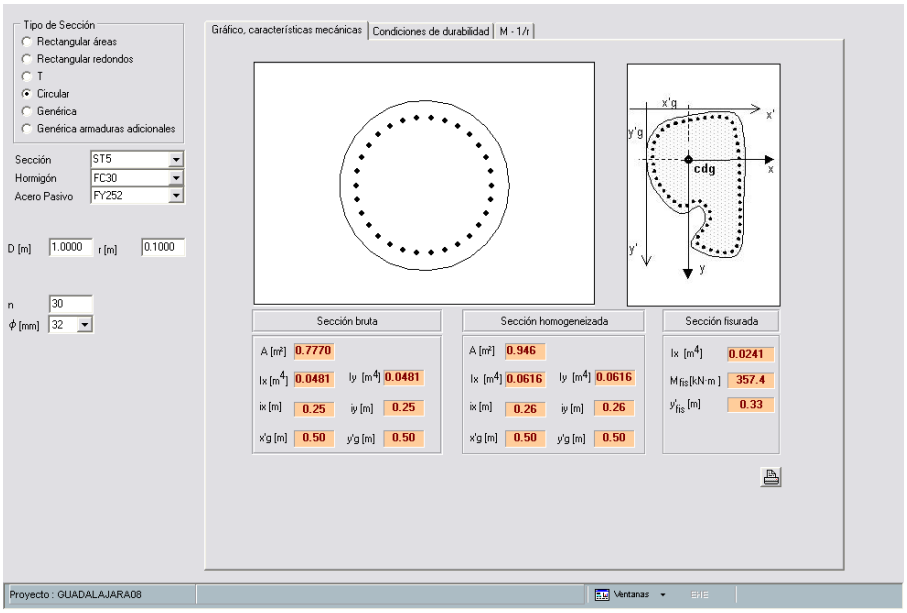


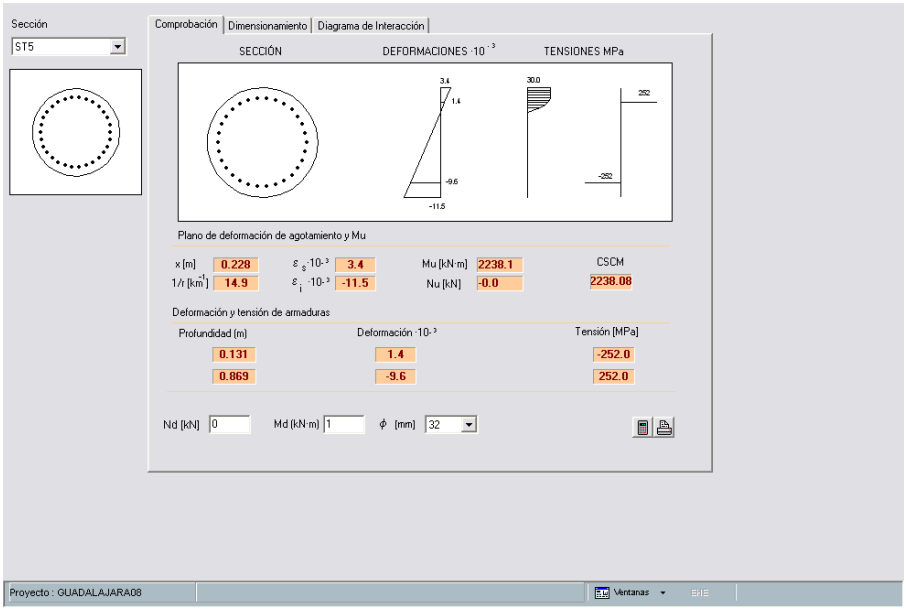

**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

| | Resultados suponiendo al borde inferior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Limite carga axial como columna = | -1303.87 | 15367.28 | 0.65 |
| Deformación nula en la armadura superior = | -1597.01 | 14404.64 | 0.65 |
| Deformación de fluencia por tracción en la armadura superior = | -2764.29 | 6044.58 | 0.65 |
| Deformación de 0,005 de tracción en la armadura superior = | -3377.19 | 1639.69 | 0.90 |
| Resistencia a flexión pura = | -3055.23 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -9126.43 | 0.90 |

| | Resultados suponiendo al borde superior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Limite carga axial como columna = | 1303.87 | 15367.28 | 0.65 |
| Deformación nula en la armadura inferior = | 1597.01 | 14404.64 | 0.65 |
| Deformación de fluencia por tracción en la armadura inferior = | 2764.29 | 6044.58 | 0.65 |
| Deformación de 0,005 de tracción en la armadura inferior = | 3377.19 | 1639.69 | 0.90 |
| Resistencia a flexión pura = | 3055.23 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -9126.43 | 0.90 |

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## DIMENSIONAMIENTO DE SECCIONES CIRCULARES EN FLEXION COMPUESTA RECTA

VOLVER AL INICIO

### 1.- DATOS GENERALES

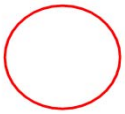
| REGLAMENTO DE REFERENCIA: ACI 318-08 | | | |
|---|---|---|---|
| Resististencia especificada a compresión del hormigón = | $f'_c$ = | 30 | MPa |
| Tensión de fluencia especificada de la armadura = | $f_y$ = | 420 | MPa |
| Tipo de Estribado : 1 = estribos cerrados ; 2 = zunchos | | 1 | |
| ∴ $P_n$ (max) = | 0.8 Po | | |
| $P_o$ = | 0,85 $f'_c$ ($A_g$ - $A_{st}$) + $f_y$ $A_{st}$ | | |
| Módulo de elasticidad del acero = | $E_s$ = | 200000 | MPa |
| Deformación de fluencia del acero = | $\varepsilon_y$ = | 2.100 | ‰ |
| Factor que relaciona la altura del bloque de tensiones de compresión rectangular equivalente con la profundidad del eje neutro = | $\beta_1$ = | 0.832 | |
| Cuantía mínima de la armadura traccionada = | $\rho_{min}$ = | 0.0033 | |

| | | | |
|---|---|---|---|
| Factor de reducción de la resistencia. Secciones controladas por compresión = | $\phi$ = | 0.65 | |
| Factor de reducción de la resistencia. Secciones controladas por tracción = | $\phi$ = | 0.90 | |

### 2.- DATOS DE LA SECCION TRANSVERSAL

| | | | |
|---|---|---|---|
| Diámetro exterior del elemento = | D = | 1.00 | m |
| Diámetro interior del elemento = | D int= | 0.00 | m |
| Recubrimiento efectivo a eje de barra = | $d'_s$ = | 0.09 | m |
| Relación de diámetros = | $\chi$ | 0.00 | |
| | | | |

Esquema



### 3.- DISTRIBUCIÓN DE ARMADURAS

| | | | |
|---|---|---|---|
| Área de acero individual = | $A_{si}$ = | 10.06 | cm2 |
| Número de barras (máx. 48) = | N° = | 32 | |
| Area total de la armadura longitudinal no tesa = | $A_{st}$ = | 321.92 | cm2 |
| Cuantía geométrica total = | $\rho$ = | 0.04099 | |
| Ubicación de armadura : favorable = 1 ; desfavorable = 0 | | 1 | |

Esquema

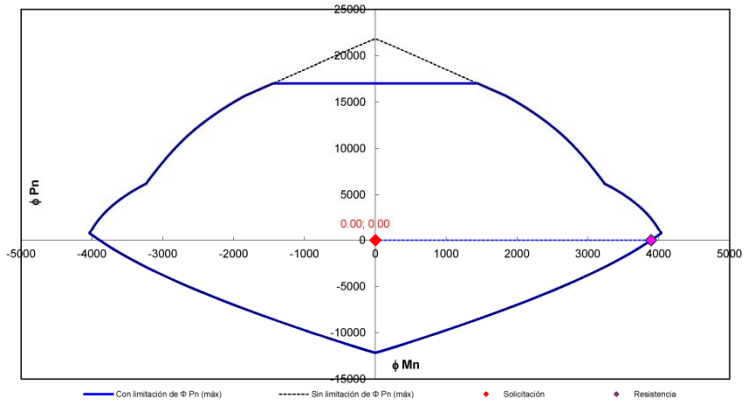


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**4.- CONDICIÓN DE SEGURIDAD PARA UNA SOLICITACIÓN DADA**

Si no se desea graficar una solicitación en el diagrama, introducir valores nulos para Pu y Mu

| | | | | |
|---|---|---|---|---|
| Esfuerzo axial mayorado; se debe considerar positivo para compresión y negativo para tracción = | $P_u$ = | 0.00 | kN | |
| Momento mayorado = | $M_u$ = | 0.00 | kN·m | (positivo tracciona fibra inferior) |
| | $M_u$ / $P_u$ = | Infinito | m | |




**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

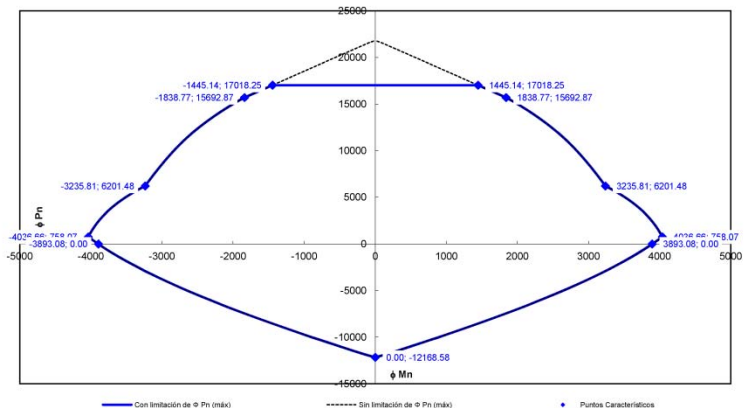
En el diagrama anterior el rombo rojo indica la solicitación y el rombo magenta la resistencia correspondiente a una excentricidad igual a la de la solicitación.

Si se mantiene la excentricidad de las solicitaciones se obtienen los siguientes valores en el diagrama resistente:

| | | |
|---|---|---|
| $P_{u\,res}$ = | 0.00 | kN |
| $M_{u\,res}$ = | 3893.08 | kN·m |
| MV sol = $[ (P_{u\,sol})^2 + (M_{u\,sol})^2 ]^{1/2}$ = | 0.00 | = Módulo vector solicitante |
| MV res = $[ (P_{u\,res})^2 + (M_{u\,res})^2 ]^{1/2}$ = | 3893.08 | = Módulo vector resistente |
| MV res / MV sol = | #¡DIV/0! | Debe ser mayor o igual que 1 para cumplir con la condición de seguridad. |

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**5.- PUNTOS CARACTERÍSTICOS DEL DIAGRAMA DE INTERACCIÓN**

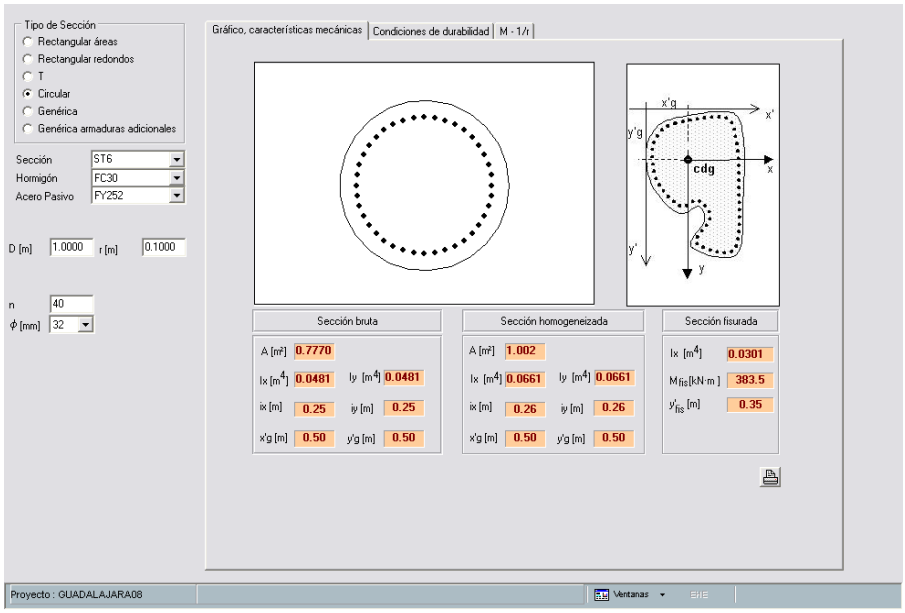


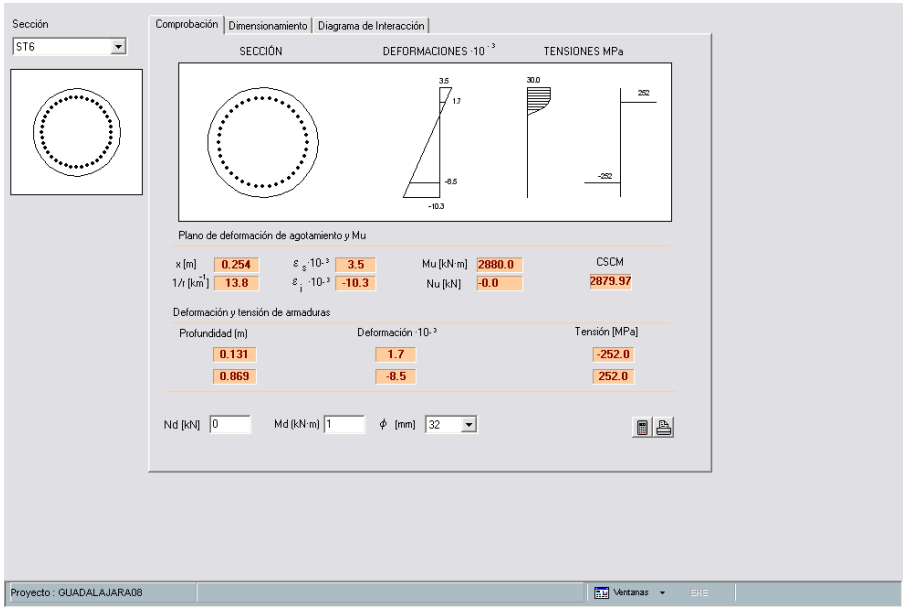

**Eje x (Mu) = [kN·m] ; Eje y (Pu) = [kN]**

| | Resultados suponiendo al borde inferior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | -1445.14 | 17018.25 | 0.65 |
| Deformación nula en la armadura superior = | -1838.77 | 15692.87 | 0.65 |
| Deformación de fluencia por tracción en la armadura superior = | -3235.81 | 6201.48 | 0.65 |
| Deformación de 0,005 de tracción en la armadura superior = | -4036.66 | 758.07 | 0.90 |
| Resistencia a flexión pura = | -3893.08 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -12168.58 | 0.90 |

| | Resultados suponiendo al borde superior como el más comprimido | | |
|---|---|---|---|
| | $\phi M_n$ [kN·m] | $\phi P_n$ [kN] | $\phi$ |
| Límite carga axial como columna = | 1445.14 | 17018.25 | 0.65 |
| Deformación nula en la armadura inferior = | 1838.77 | 15692.87 | 0.65 |
| Deformación de fluencia por tracción en la armadura inferior = | 3235.81 | 6201.48 | 0.65 |
| Deformación de 0,005 de tracción en la armadura inferior = | 4036.66 | 758.07 | 0.90 |
| Resistencia a flexión pura = | 3893.08 | 0.00 | 0.90 |
| Máxima resistencia a tracción = | 0.00 | -12168.58 | 0.90 |

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## 2.2. SECCIONES TIPO PARA ARMADO A CORTANTE

Las secciones tipo consideradas son las siguientes:

| PANTALLA PILOTES DE 1 METRO DE DIÁMETRO | | | | |
|---|---|---|---|---|
| **Sección Tipo** | **Φ·Vu (kN/pilote)** | **Φ·Vu Sismo (kN/pilote)** | **As (kg/m.l.)** | **Armado por pilote** |
| STC-01 | 1021 | 1134 | 12.6 | 1h#4/20 |
| STC-02 | 1235 | 1372 | 20.8 | 1h#5/20 |
| STC-03 | 1840 | 2044 | 41.5 | 1h#5/10 |
| STC-04 | 2348 | 2609 | 59.7 | 1h#6/10 |

Los cortantes últimos obtenidos para cada una de las secciones tipo se han obtenido según la sindicaciones de la normativa AASHTO-LRFD-2004.

Para el cálculo se considera que el canto útil es igual a d = 0,8·D, siendo D el diámetro del pilote; y el área de la sección es igual a Ac = D·d.

| COMPROBACIÓN A CORTANTE DE SECCIONES RECTANGULARES SEGÚN CAP.11 DE LA ACI 318-08 | | | |
|---|---|---|---|
| PANTALLAS PILOTES D=1,00M - STC-XX | | | |
| **1. DATOS DE LA SECCIÓN.** | | **2. CARGAS DE DIMENSIONAMIENTO.** | |
| ***1.1. Geometría de la sección.*** | | ***2.1. Cargas de dimensionamiento concomitantes en la sección.*** | |
| Ancho efectivo de la sección, $b_W$ (mm) = | 1000 | Axil de cálculo de la sección, Nd (kN) = | 0.00 |
| Canto de la sección, h (mm) = | 1000 | Momento de cálculo en la sección, Md (kNm) = | 0.00 |
| Área bruta de la sección, $A_c$ ($mm^2$) = | 800000 | Cortante de cálculo en la sección, Vd (kN) = | 0.00 |
| Recubrimiento mecánico, $r_{mec}$ (mm) = | 75 | Coeficiente Capacidad de Carga, Φ = | 0.90 |
| Cánto útil de la sección, d (mm) = | 800 | **3. CÁLCULOS.** | |
| Recubrimiento lateral, $r_{lat}$ (mm) = | 0 | ***3.1. Cálculo de cortante resistido por el hormigón, Vc.*** | |
| ***1.2. Armado de la sección.*** | | Método general Art. 11.2.1, Vc (kN) = | 744.90 |
| Inclinación de las armaduras transversales, α (º) = | 90 | Método detallado Art. 11.2.2, Vc (kN) = | 701.08 |
| Área de arm. long. traccionada, $A_s$ ($cm^2$) = | 0 | Momento equivalente cálculo, $M_m$ (kNm) = | 0.00 |
| Cuantía arm. long. traccionada, $\rho_l$ (‰) = | 0.0000 | Coeficiente Vu*d/Mu = | 1.00 |
| ***1.3. Características de los materiales.*** | | Valor límite del cortante, $V_{c,lim}$ (kN) = | 1270.72 |
| Resist. característica del hormigón, $f'_c$ (MPa) = | 30 | **Cortante resistido por el hormigón, Vc (kN) =** | **701.08** |
| Resist. efectiva del hormigón, Raiz($f'_c$) (MPa) = | 5.477 | ***3.2. Cálculo del armado mínimo necesario, As.*** | |
| Límite elástico del acero, $f_y$ (MPa) = | 420 | Armado mínimo, Asmin/sep (cm2/m) = | 0.00 |
| Límite elástico del acero máximo, $f_y$ (MPa) = | 420 | | |

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## CORTANTE RESISTIDO PARA CADA ARMADO PROPUESTO

| ARMADO PRED. | | | | | El cortante soportado por el hormigón es el mismo que se indica en la tabla anterior para todos los armados. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Cercos | | Ramas | | Sep (cm) | | | | | | |
| nº | Φ | nº | Φ | | ARMADO PRED. | As (cm2/m) | As (Kg/m) | Vs (kN) | $S_{Max}$ (cm) | ΦVu (kN) |
| 1 | #4 | 0 | 0 | 20 | 1h#4/20 | 12.90 | 12.64 | 433.44 | 40 | 1021.07 |
| 1 | #5 | 0 | 0 | 20 | 1h#5/20 | 19.90 | 20.78 | 668.64 | 40 | 1232.75 |
| 1 | #5 | 0 | 0 | 10 | 1h#5/10 | 39.80 | 41.47 | 1337.28 | 40 | 1834.53 |
| 1 | #6 | 0 | 0 | 10 | 1h#6/10 | 56.80 | 59.72 | 1908.48 | 20 | 2348.61 |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |
| 0 | 0 | 0 | 0 | 20 | | | | | | |

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# APÉNDICE 2.
# LISTADOS DE CÁLCULO DE LOS MODELOS RIDO

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```
***** NOMBRE DE FICHERO DE DATOS : TZ_ A.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_A                        *60L  U:NN*
      : 0
 1 ...  0
      *PILOTES SECANTE DE 1.00 m SEP 70 cm
      : -11.20 1386349
 2 ...  -11.2 1386349
      : 0.00
 3 ...  0
      * R
      : -1.90 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -1.9 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -4.35 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 5 ...  -4.35 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -9.20 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 6 ...  -9.2 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -32.90 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 7 ...  -32.9 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG2
      : -35.90 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
 8 ...  -35.9 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -40.40 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
 9 ...  -40.4 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -6.50 0.50
10 ...  -6.5 0.5
      *Fase 1
      *Excavación hasta nivel losa de fondo
      : SUC(1) 10
11 ... SUC(1)  10
      : EXC(2) -5.20
12 ... EXC(2)  -5.2
      : COE 0 -5.6 1 0.6
13 ... COE 0 -5.6 1 0.6
      : CAL(2)
14 ... CAL(2)
      *Fase 2
      *Ejecucion de la losa de fondo
      : STR(0) -4.60 1.00 0.00 0.00 4000000
15 ... STR(0)  -4.6 1 0 0 4000000
      : CAL(2,1)
16 ... CAL(2,1)
      *Fase 3
      *Sismo
      *SISMO_ R
      : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
17 ... PLA(1)  0.56 2.367 5 29 0 0
      *SISMO_ UG1b
      : PLA(2) 0.522 2.594 15.00 31 0.00 0.00
18 ... PLA(2)  0.522 2.594 15 31 0 0
      *SISMO_ UG1c
      : PLA(3) 0.948 1.991 20.00 33 0.00 0.00
19 ... PLA(3)  0.948 1.991 20 33 0 0
      *SISMO_ UG1d
      : PLA(4) 0.789 2.509 25.00 36 0.00 0.00
20 ... PLA(4)  0.789 2.509 25 36 0 0
      *SISMO_ UG2
      : PLA(5) 0.795 2.402 30.00 35 0.00 0.00
21 ... PLA(5)  0.795 2.402 30 35 0 0
      *SISMO_ UG3a
      : PLA(6) 0.302 10.398 246.00 58 0.00 0.00
22 ... PLA(6)  0.302 10.398 246 58 0 0
      : CAL(2)
23 ... CAL(2)
      : FIN
24 ... FIN
      : GRF
25 ... GRF
      : STA
26 ... STA
      : EVP
27 ... EVP
      : ASC
28 ... ASC
      *XLS
      : STOP
29 ... STOP
```



*PILOTES SECANTE DE 1.00 m SEP 70 cm

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -11.200 m : | 1386349. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -1.900 m :

PESO ESPECIFOCO HÚMEDO GH = 18.000 kN/m3

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 | |
| COHESIÓN | C | = | 5.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG1b

CAPA N° 2 DE -1.900 m A -4.350 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 | |
| COHESIÓN | C | = | 15.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG1c



CAPA N° 3 DE -4.350 m A -9.200 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 | |
| COHESIÓN | C | = | 20.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG1d

CAPA N° 4 DE -9.200 m A -32.900 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.235 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.852 | |
| COHESIÓN | C | = | 25.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG2

CAPA N° 5 DE -32.900 m A -35.900 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.246 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.690 | |
| COHESIÓN | C | = | 30.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG3a



CAPA N° 6 DE -35.900 m A -40.400 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.075 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 12.162 | |
| COHESIÓN | C | = | 246.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* NF



**  FASE No  1  **

*Fase 1
*Excavación hasta nivel losa de fondo

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -5.200 m

* DE 0.000 m A -5.600 m COEFICIENTE APLICADO A PRESIONES = 1.000
COEF. ADICIONAL SOBRE PRESIÓN PASIVA = 0.600



FASE 1

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -6.50 m S. DE CAQUOT: 10.00 kPa | | | | SOIL 2 EXCAVACIÓN: -5.20 m NIVEL AGUA: -6.50 m S. DE CAQUOT: 0.00 kPa | | | | PUNTALES/ ANCLAS |
|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. ROTACIÓN MOMENTO ESF.CO. C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° FUERZA |
| 0.000 | 3.353 -0.309 0.00 0.00 | -1 | | | | 0 | | | | |
| -0.475 | 3.206 -0.309 0.00 0.00 | -1 | | | | 0 | | | | |
| -0.950 | 3.059 -0.309 0.09 0.58 | 1 | 2.44 | 2.44 | 4900 | 0 | | | | |
| -1.425 | 2.912 -0.309 0.74 2.38 | 1 | 5.15 | 3.17 | 4900 | 0 | | | | |
| -1.900 | 2.765 -0.309 2.61 5.79 | 2 | 9.21 | 4.52 | 4900 | 0 | | | | |
| | | -1 | | | | 0 | | | | |
| -2.206 | 2.671 -0.308 4.38 5.79 | -1 | | | | 0 | | | | |
| -2.513 | 2.577 -0.307 6.16 5.79 | -1 | | | | 0 | | | | |
| -2.819 | 2.483 -0.305 7.94 5.82 | 1 | 0.15 | 0.15 | 15100 | 0 | | | | |
| -3.125 | 2.390 -0.303 9.75 6.12 | 1 | 1.80 | 1.80 | 15100 | 0 | | | | |
| -3.431 | 2.297 -0.301 11.73 6.92 | 1 | 3.45 | 2.91 | 15100 | 0 | | | | |
| -3.737 | 2.205 -0.298 14.04 8.23 | 1 | 5.10 | 2.91 | 15100 | 0 | | | | |
| -4.044 | 2.115 -0.295 16.86 10.35 | 2 | 8.74 | 4.85 | 15100 | 0 | | | | |
| -4.350 | 2.025 -0.290 20.50 13.65 | 2 | 12.84 | 4.85 | 15100 | 0 | | | | |
| | | 1 | 1.48 | 1.48 | 20600 | 0 | | | | |
| -4.600 | 1.953 -0.286 23.98 14.18 | 1 | 2.75 | 2.68 | 20600 | 0 | | | | |
| -4.900 | 1.868 -0.281 28.42 15.65 | 2 | 7.01 | 4.55 | 20600 | 0 | | | | |
| -5.200 | 1.785 -0.274 33.49 18.40 | 2 | 11.32 | 4.55 | 20600 | 0 | | | | |
| | | 2 | 11.32 | 4.55 | 20600 | 2 | 36.76 | | 20600 | |
| -5.600 | 1.677 -0.264 38.94 9.11 | 2 | 16.99 | 4.55 | 20600 | 2 | 38.00 | | 20600 | |
| -6.050 | 1.561 -0.251 41.07 0.73 | 2 | 23.27 | 4.55 | 20600 | 2 | 39.51 | | 20600 | |
| -6.500 | 1.452 -0.237 39.90 -5.57 | 2 | 29.42 | 4.55 | 20600 | 2 | 41.14 | | 20600 | |
| -6.838 | 1.373 -0.228 37.42 -8.98 | 2 | 32.42 | 4.55 | 20600 | 2 | 40.91 | | 20600 | |
| -7.175 | 1.298 -0.219 33.96 -11.32 | 2 | 35.35 | 4.55 | 20600 | 2 | 40.73 | | 20600 | |
| -7.512 | 1.225 -0.211 29.89 -12.63 | 2 | 38.23 | 4.55 | 20600 | 2 | 40.62 | | 20600 | |
| -7.850 | 1.155 -0.205 25.55 -12.95 | 2 | 41.06 | 4.55 | 20600 | 2 | 40.56 | | 20600 | |
| -8.188 | 1.087 -0.199 21.26 -12.31 | 2 | 43.84 | 4.55 | 20600 | 2 | 40.54 | | 20600 | |
| -8.525 | 1.020 -0.194 17.35 -10.73 | 2 | 46.59 | 4.55 | 20600 | 2 | 40.55 | | 20600 | |
| -8.862 | 0.956 -0.190 14.12 -8.24 | 2 | 49.31 | 4.55 | 20600 | 2 | 40.60 | | 20600 | |
| -9.200 | 0.892 -0.187 11.89 -4.86 | 2 | 52.00 | 4.55 | 20600 | 2 | 40.67 | | 20600 | |
| | | 2 | 37.86 | 4.12 | 29000 | 2 | 46.05 | | 29000 | |
| -9.700 | 0.799 -0.184 8.66 -7.61 | 2 | 42.51 | 4.12 | 29000 | 2 | 45.32 | | 29000 | |
| -10.200 | 0.708 -0.181 4.72 -7.70 | 2 | 47.10 | 4.12 | 29000 | 2 | 44.64 | | 29000 | |
| -10.700 | 0.618 -0.180 1.40 -5.16 | 2 | 51.68 | 4.12 | 29000 | 2 | 43.98 | | 29000 | |
| -11.200 | 0.528 -0.180 0.00 0.00 | 2 | 56.24 | 4.12 | 29000 | 2 | 43.33 | | 29000 | |
| m | mm /1000 kN.m/m kN/m kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 3.35 mm
MOMENTO MÁXIMO = 41.07 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 4 IT.)



EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 37.76 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.059 = (249.68 kN/m)/(4210.09 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.189 = (249.68 kN/m)/(1319.72 kN/m)



** FASE No 2 **

*Fase 2
*Ejecucion de la losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -4.600 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 4000000.000 kN/m
CONEXIÓN BILATERAL



FASE 2

| | SOIL 1 | SOIL 2 | |
|---|---|---|---|

| | P A R E D | EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -6.50 m<br>S. DE CAQUOT: 10.00 kPa | EXCAVACIÓN: -5.20 m<br>NIVEL AGUA: -6.50 m<br>S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 3.353 | -0.309 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.475 | 3.206 | -0.309 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.950 | 3.059 | -0.309 | 0.09 | 0.58 | | 1 | 2.44 | 2.44 4900 | 0 | | | | |
| -1.425 | 2.912 | -0.309 | 0.74 | 2.38 | | 1 | 5.15 | 3.17 4900 | 0 | | | | |
| -1.900 | 2.765 | -0.309 | 2.61 | 5.79 | | 2 | 9.21 | 4.52 4900 | 0 | | | | |
| | | | | | | -1 | | | 0 | | | | |
| -2.206 | 2.671 | -0.308 | 4.38 | 5.79 | | -1 | | | 0 | | | | |
| -2.513 | 2.577 | -0.307 | 6.16 | 5.79 | | -1 | | | 0 | | | | |
| -2.819 | 2.483 | -0.305 | 7.94 | 5.82 | | 1 | 0.15 | 0.15 15100 | 0 | | | | |
| -3.125 | 2.390 | -0.303 | 9.75 | 6.12 | | 1 | 1.80 | 1.80 15100 | 0 | | | | |
| -3.431 | 2.297 | -0.301 | 11.73 | 6.92 | | 1 | 3.45 | 2.91 15100 | 0 | | | | |
| -3.737 | 2.205 | -0.298 | 14.04 | 8.23 | | 1 | 5.10 | 2.91 15100 | 0 | | | | |
| -4.044 | 2.115 | -0.295 | 16.86 | 10.35 | | 2 | 8.74 | 4.85 15100 | 0 | | | | |
| -4.350 | 2.025 | -0.290 | 20.50 | 13.65 | | 2 | 12.84 | 4.85 15100 | 0 | | | | |
| | | | | | | 1 | 1.48 | 1.48 20600 | 0 | | | | |
| -4.600 | 1.953 | -0.286 | 23.98 | 14.18 | | 1 | 2.75 | 2.68 20600 | 0 | | | | |
| | | | | | | 1 | 2.75 | 2.68 20600 | 0 | | | 1 | 0.00 |
| -4.900 | 1.868 | -0.281 | 28.42 | 15.65 | | 2 | 7.01 | 4.55 20600 | 0 | | | | |
| -5.200 | 1.785 | -0.274 | 33.49 | 18.40 | | 2 | 11.32 | 4.55 20600 | 0 | | | | |
| | | | | | | 2 | 11.32 | 4.55 20600 | 2 | 36.76 | 20600 | | |
| -5.600 | 1.677 | -0.264 | 38.94 | 9.11 | | 2 | 16.99 | 4.55 20600 | 2 | 38.00 | 20600 | | |
| -6.050 | 1.561 | -0.251 | 41.07 | 0.73 | | 2 | 23.27 | 4.55 20600 | 2 | 39.51 | 20600 | | |
| -6.500 | 1.452 | -0.237 | 39.90 | -5.57 | | 2 | 29.42 | 4.55 20600 | 2 | 41.14 | 20600 | | |
| -6.838 | 1.373 | -0.228 | 37.42 | -8.98 | | 2 | 32.42 | 4.55 20600 | 2 | 40.91 | 20600 | | |
| -7.175 | 1.298 | -0.219 | 33.96 | -11.32 | | 2 | 35.35 | 4.55 20600 | 2 | 40.73 | 20600 | | |
| -7.512 | 1.225 | -0.211 | 29.89 | -12.63 | | 2 | 38.23 | 4.55 20600 | 2 | 40.62 | 20600 | | |
| -7.850 | 1.155 | -0.205 | 25.55 | -12.95 | | 2 | 41.06 | 4.55 20600 | 2 | 40.56 | 20600 | | |
| -8.188 | 1.087 | -0.199 | 21.26 | -12.31 | | 2 | 43.84 | 4.55 20600 | 2 | 40.54 | 20600 | | |
| -8.525 | 1.020 | -0.194 | 17.35 | -10.73 | | 2 | 46.59 | 4.55 20600 | 2 | 40.55 | 20600 | | |
| -8.862 | 0.956 | -0.190 | 14.12 | -8.24 | | 2 | 49.31 | 4.55 20600 | 2 | 40.60 | 20600 | | |
| -9.200 | 0.892 | -0.187 | 11.89 | -4.86 | | 2 | 52.00 | 4.55 20600 | 2 | 40.67 | 20600 | | |
| | | | | | | 2 | 37.86 | 4.12 29000 | 2 | 46.05 | 29000 | | |
| -9.700 | 0.799 | -0.184 | 8.66 | -7.61 | | 2 | 42.51 | 4.12 29000 | 2 | 45.32 | 29000 | | |
| -10.200 | 0.708 | -0.181 | 4.72 | -7.70 | | 2 | 47.10 | 4.12 29000 | 2 | 44.64 | 29000 | | |
| -10.700 | 0.618 | -0.180 | 1.40 | -5.16 | | 2 | 51.68 | 4.12 29000 | 2 | 43.98 | 29000 | | |
| -11.200 | 0.528 | -0.180 | 0.00 | 0.00 | | 2 | 56.24 | 4.12 29000 | 2 | 43.33 | 29000 | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |



FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 3.35 mm

MOMENTO MÁXIMO = 41.07 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 37.76 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.059 = (249.68 kN/m)/(4210.09 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.189 = (249.68 kN/m)/(1319.72 kN/m)



**  FASE No  3  **

*Fase 3
*Sismo
*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -1.900 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -4.350 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.522 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.594 |
| COHESIÓN | C | = | 15.000 kPa |

ANGULO DE ROZAMIENTO INTERNO PHI = 31.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 15100.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -9.200 m

PESO ESPECIFOCO HÚMEDO GH = 19.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.948
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.455
COEFIC. DE EMPUJE PASIVO HOR. KP = 1.991
COHESIÓN C = 20.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 33.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 20600.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG1d

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -32.900 m

PESO ESPECIFOCO HÚMEDO GH = 19.500 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.500 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.789
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.412
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.509
COHESIÓN C = 25.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 36.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 29000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -35.900 m

PESO ESPECIFOCO HÚMEDO GH = 20.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 10.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.795
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.426
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.402
COHESIÓN C = 30.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 35.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 43800.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG3a



* NUEVOS PARÁMETROS PARA CAPA No. 6 HASTA NIVEL -40.400 m

PESO ESPECIFOCO HÚMEDO GH = 23.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 13.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.302
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.152
COEFIC. DE EMPUJE PASIVO HOR. KP = 10.398
COHESIÓN C = 246.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 58.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m



FASE 3

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m, NIVEL AGUA: -6.50 m, S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -5.20 m, NIVEL AGUA: -6.50 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.034 | 0.188 | 0.00 | 0.00 | | 2 | 0.08 | 0.08 | 4900 | 0 | | | | | |
| -0.475 | 1.123 | 0.188 | 0.18 | 1.09 | | 1 | 4.50 | 4.50 | 4900 | 0 | | | | | |
| -0.950 | 1.213 | 0.189 | 1.46 | 4.88 | | 2 | 11.49 | 5.15 | 4900 | 0 | | | | | |
| -1.425 | 1.302 | 0.190 | 5.18 | 10.96 | | 1 | 14.07 | 5.60 | 4900 | 0 | | | | | |
| -1.900 | 1.393 | 0.192 | 12.15 | 18.78 | | 1 | 18.86 | 5.60 | 4900 | 0 | | | | | |
| | | | | | | 1 | 6.10 | 5.22 | 15100 | 0 | | | | | |
| -2.206 | 1.452 | 0.196 | 18.23 | 21.10 | | 1 | 9.06 | 5.22 | 15100 | 0 | | | | | |
| -2.513 | 1.513 | 0.201 | 25.16 | 24.32 | | 1 | 12.01 | 5.22 | 15100 | 0 | | | | | |
| -2.819 | 1.575 | 0.207 | 33.22 | 28.46 | | 1 | 14.97 | 5.22 | 15100 | 0 | | | | | |
| -3.125 | 1.640 | 0.215 | 42.68 | 33.49 | | 1 | 17.93 | 5.22 | 15100 | 0 | | | | | |
| -3.431 | 1.708 | 0.226 | 53.83 | 39.44 | | 1 | 20.89 | 5.22 | 15100 | 0 | | | | | |
| -3.737 | 1.779 | 0.239 | 66.93 | 46.29 | | 1 | 23.84 | 5.22 | 15100 | 0 | | | | | |
| -4.044 | 1.854 | 0.256 | 82.27 | 54.04 | | 1 | 26.80 | 5.22 | 15100 | 0 | | | | | |
| -4.350 | 1.936 | 0.276 | 100.13 | 62.70 | | 1 | 29.76 | 5.22 | 15100 | 0 | | | | | |
| | | | | | | 1 | 63.15 | 9.48 | 20600 | 0 | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -4.600 | 2.007 | 0.295 | 117.82 | 79.05 | | 1 | 67.65 | 9.48 | 20600 | 0 | | | | | | | |
| | | | | -137.19 | | 1 | 67.65 | 9.48 | 20600 | 0 | | | | | | 1 | -216.25 |
| -4.900 | 2.099 | 0.317 | 79.79 | -116.09 | | 1 | 73.06 | 9.48 | 20600 | 0 | | | | | | | |
| -5.200 | 2.196 | 0.330 | 48.33 | -93.36 | | 1 | 78.46 | 9.48 | 20600 | 0 | | | | | | | |
| | | | | | | 1 | 78.46 | 9.48 | 20600 | 3 | 44.20 | | 20600 | | | | |
| -5.600 | 2.331 | 0.339 | 13.73 | -79.67 | | 1 | 85.67 | 9.48 | 20600 | 2 | 51.47 | | 20600 | | | | |
| -6.050 | 2.483 | 0.338 | -18.62 | -64.04 | | 1 | 93.77 | 9.48 | 20600 | 2 | 58.51 | | 20600 | | | | |
| -6.500 | 2.634 | 0.328 | -43.83 | -47.91 | | 1 | 101.88 | 9.48 | 20600 | 2 | 65.49 | | 20600 | | | | |
| -6.838 | 2.742 | 0.315 | -57.94 | -35.76 | | 1 | 104.76 | 9.48 | 20600 | 2 | 69.11 | | 20600 | | | | |
| -7.175 | 2.846 | 0.300 | -67.99 | -23.84 | | 1 | 107.64 | 9.48 | 20600 | 2 | 72.63 | | 20600 | | | | |
| -7.512 | 2.944 | 0.283 | -74.05 | -12.11 | | 1 | 110.52 | 9.48 | 20600 | 2 | 76.04 | | 20600 | | | | |
| -7.850 | 3.037 | 0.264 | -76.19 | -0.54 | | 1 | 113.40 | 9.48 | 20600 | 2 | 79.32 | | 20600 | | | | |
| -8.188 | 3.123 | 0.246 | -74.43 | 10.91 | | 1 | 116.28 | 9.48 | 20600 | 2 | 82.48 | | 20600 | | | | |
| -8.525 | 3.203 | 0.228 | -68.83 | 22.29 | | 1 | 119.15 | 9.48 | 20600 | 2 | 85.51 | | 20600 | | | | |
| -8.862 | 3.277 | 0.213 | -59.39 | 33.64 | | 1 | 122.03 | 9.48 | 20600 | 2 | 88.42 | | 20600 | | | | |
| -9.200 | 3.347 | 0.200 | -46.13 | 44.99 | | 1 | 124.91 | 9.48 | 20600 | 2 | 91.24 | | 20600 | | | | |
| | | | | | | 1 | 96.56 | 7.89 | 29000 | 2 | 117.24 | | 29000 | | | | |
| -9.700 | 3.443 | 0.187 | -26.26 | 34.40 | | 1 | 100.31 | 7.89 | 29000 | 2 | 121.99 | | 29000 | | | | |
| -10.200 | 3.535 | 0.180 | -11.80 | 23.34 | | 1 | 104.06 | 7.89 | 29000 | 2 | 126.61 | | 29000 | | | | |
| -10.700 | 3.624 | 0.178 | -2.98 | 11.87 | | 1 | 107.81 | 7.89 | 29000 | 2 | 131.15 | | 29000 | | | | |
| -11.200 | 3.713 | 0.177 | 0.00 | 0.00 | | 1 | 111.55 | 7.89 | 29000 | 2 | 135.68 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. SOPRAC. | ELAST. | | ESTADO PR. SOPRAC. | ELAST. | | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 3.71 mm

MOMENTO MÁXIMO = 117.82 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 83.14 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.260 = (754.39 kN/m)/(2901.83 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.537 = (538.15 kN/m)/(1001.56 kN/m)

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 2 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| m | kN/m | kN/m |
| 0.000 | 0.00 | 0.00 |
| -0.475 | 0.00 | 0.00 |
| -0.950 | 0.00 | 0.58 |
| -1.425 | 0.00 | 2.38 |
| -1.900 | 0.00 | 5.79 |
| -2.206 | 0.00 | 5.79 |
| -2.513 | 0.00 | 5.79 |
| -2.819 | 0.00 | 5.82 |
| -3.125 | 0.00 | 6.12 |
| -3.431 | 0.00 | 6.92 |
| -3.737 | 0.00 | 8.23 |
| -4.044 | 0.00 | 10.35 |
| -4.350 | 0.00 | 13.65 |
| -4.600 | 0.00 | 14.18 |
| -4.900 | 0.00 | 15.65 |
| -5.200 | 0.00 | 18.40 |
| -5.600 | 0.00 | 9.11 |
| -6.050 | 0.00 | 0.73 |
| -6.500 | -5.57 | 0.00 |
| -6.838 | -8.98 | 0.00 |
| -7.175 | -11.32 | 0.00 |
| -7.512 | -12.63 | 0.00 |
| -7.850 | -12.95 | 0.00 |
| -8.188 | -12.31 | 0.00 |
| -8.525 | -10.73 | 0.00 |
| -8.862 | -8.24 | 0.00 |
| -9.200 | -4.86 | 0.00 |
| -9.700 | -7.61 | 0.00 |
| -10.200 | -7.70 | 0.00 |
| -10.700 | -5.16 | 0.00 |
| -11.200 | 0.00 | 0.00 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| m | kN.m/m | kN.m/m |
| 0.000 | 0.00 | 0.00 |
| -0.475 | 0.00 | 0.00 |
| -0.950 | 0.00 | 0.09 |
| -1.425 | 0.00 | 0.74 |
| -1.900 | 0.00 | 2.61 |
| -2.206 | 0.00 | 4.38 |
| -2.513 | 0.00 | 6.16 |
| -2.819 | 0.00 | 7.94 |
| -3.125 | 0.00 | 9.75 |
| -3.431 | 0.00 | 11.73 |
| -3.737 | 0.00 | 14.04 |
| -4.044 | 0.00 | 16.86 |
| -4.350 | 0.00 | 20.50 |
| -4.600 | 0.00 | 23.98 |
| -4.900 | 0.00 | 28.42 |
| -5.200 | 0.00 | 33.49 |
| -5.600 | 0.00 | 38.94 |
| -6.050 | 0.00 | 41.07 |
| -6.500 | 0.00 | 39.90 |
| -6.838 | 0.00 | 37.42 |
| -7.175 | 0.00 | 33.96 |
| -7.512 | 0.00 | 29.89 |
| -7.850 | 0.00 | 25.55 |
| -8.188 | 0.00 | 21.26 |
| -8.525 | 0.00 | 17.35 |
| -8.862 | 0.00 | 14.12 |
| -9.200 | 0.00 | 11.89 |
| -9.700 | 0.00 | 8.66 |
| -10.200 | 0.00 | 4.72 |
| -10.700 | 0.00 | 1.40 |
| -11.200 | 0.00 | 0.00 |



*** DESPLAZAMIENTO MÁXIMO EN FASE N° 3 = 3.713 mm EN FASE FINAL N° 3 = 3.713 mm

*** MAXIMUM MOMENT IN PHASE Nb 3 = 117.823 kN.m/m IN FINAL PHASE Nb 3 = 117.823 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -4.60 | 2 | 0.00 | 3 | -216.25 | 3 | -216.25 |
| | m | | kN | | kN | | kN |



* CURVAS ENVOLVENTES DE FASE 3 A FASE 3 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.475 | 0.00 | 1.09 |
| -0.950 | 0.00 | 4.88 |
| -1.425 | 0.00 | 10.96 |
| -1.900 | 0.00 | 18.78 |
| -2.206 | 0.00 | 21.10 |
| -2.513 | 0.00 | 24.32 |
| -2.819 | 0.00 | 28.46 |
| -3.125 | 0.00 | 33.49 |
| -3.431 | 0.00 | 39.44 |
| -3.737 | 0.00 | 46.29 |
| -4.044 | 0.00 | 54.04 |
| -4.350 | 0.00 | 62.70 |
| -4.600 | 0.00 | 79.05 |
| | -137.19 | 0.00 |
| -4.900 | -116.09 | 0.00 |
| -5.200 | -93.36 | 0.00 |
| -5.600 | -79.67 | 0.00 |
| -6.050 | -64.04 | 0.00 |
| -6.500 | -47.91 | 0.00 |
| -6.838 | -35.76 | 0.00 |
| -7.175 | -23.84 | 0.00 |
| -7.512 | -12.11 | 0.00 |
| -7.850 | -0.54 | 0.00 |
| -8.188 | 0.00 | 10.91 |
| -8.525 | 0.00 | 22.29 |
| -8.862 | 0.00 | 33.64 |
| -9.200 | 0.00 | 44.99 |
| -9.700 | 0.00 | 34.40 |
| -10.200 | 0.00 | 23.34 |
| -10.700 | 0.00 | 11.87 |
| -11.200 | 0.00 | 0.00 |
| m | kN/m | kN/m |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.475 | 0.00 | 0.18 |
| -0.950 | 0.00 | 1.46 |
| -1.425 | 0.00 | 5.18 |
| -1.900 | 0.00 | 12.15 |
| -2.206 | 0.00 | 18.23 |
| -2.513 | 0.00 | 25.16 |
| -2.819 | 0.00 | 33.22 |
| -3.125 | 0.00 | 42.68 |
| -3.431 | 0.00 | 53.83 |
| -3.737 | 0.00 | 66.93 |
| -4.044 | 0.00 | 82.27 |
| -4.350 | 0.00 | 100.13 |
| -4.600 | 0.00 | 117.82 |
| | 0.00 | 117.82 |
| -4.900 | 0.00 | 79.79 |
| -5.200 | 0.00 | 48.33 |
| -5.600 | 0.00 | 13.73 |
| -6.050 | -18.62 | 0.00 |
| -6.500 | -43.83 | 0.00 |
| -6.838 | -57.94 | 0.00 |
| -7.175 | -67.99 | 0.00 |
| -7.512 | -74.05 | 0.00 |
| -7.850 | -76.19 | 0.00 |
| -8.188 | -74.43 | 0.00 |
| -8.525 | -68.83 | 0.00 |
| -8.862 | -59.39 | 0.00 |
| -9.200 | -46.13 | 0.00 |
| -9.700 | -26.26 | 0.00 |
| -10.200 | -11.80 | 0.00 |
| -10.700 | -2.98 | 0.00 |
| -11.200 | 0.00 | 0.00 |
| m | kN.m/m | kN.m/m |

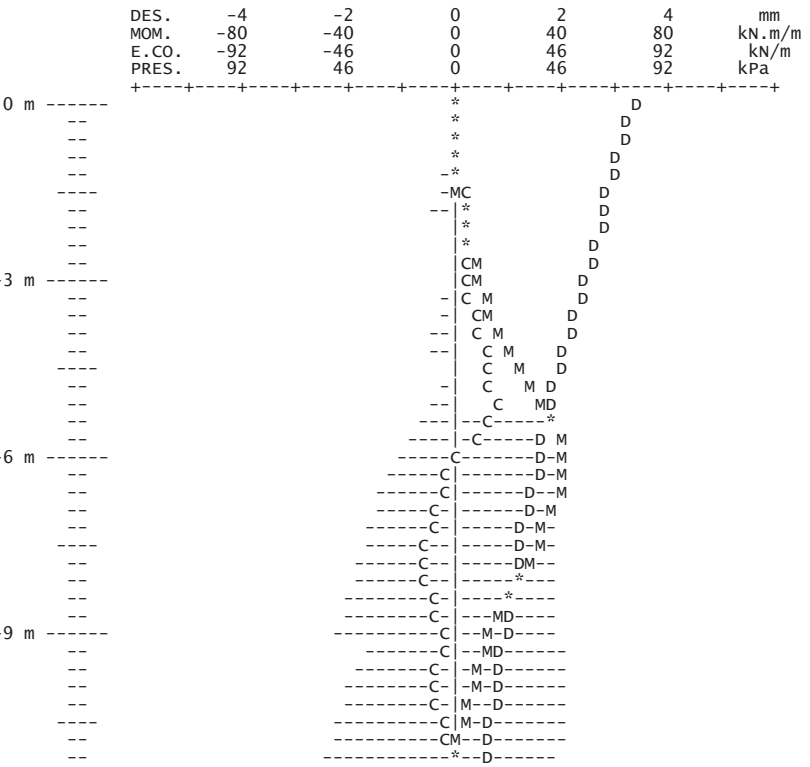


* CURVAS ENVOLVENTES DE FASE 1 A FASE 3 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.475 | 0.00 | 1.09 |
| -0.950 | 0.00 | 4.88 |
| -1.425 | 0.00 | 10.96 |
| -1.900 | 0.00 | 18.78 |
| -2.206 | 0.00 | 21.10 |
| -2.513 | 0.00 | 24.32 |
| -2.819 | 0.00 | 28.46 |
| -3.125 | 0.00 | 33.49 |
| -3.431 | 0.00 | 39.44 |
| -3.737 | 0.00 | 46.29 |
| -4.044 | 0.00 | 54.04 |
| -4.350 | 0.00 | 62.70 |
| -4.600 | 0.00 | 79.05 |
| | -137.19 | 14.18 |
| -4.900 | -116.09 | 15.65 |
| -5.200 | -93.36 | 18.40 |
| -5.600 | -79.67 | 9.11 |
| -6.050 | -64.04 | 0.73 |
| -6.500 | -47.91 | 0.00 |
| -6.838 | -35.76 | 0.00 |
| -7.175 | -23.84 | 0.00 |
| -7.512 | -12.63 | 0.00 |
| -7.850 | -12.95 | 0.00 |
| -8.188 | -12.31 | 10.91 |
| -8.525 | -10.73 | 22.29 |
| -8.862 | -8.24 | 33.64 |
| -9.200 | -4.86 | 44.99 |
| -9.700 | -7.61 | 34.40 |
| -10.200 | -7.70 | 23.34 |
| -10.700 | -5.16 | 11.87 |
| -11.200 | 0.00 | 0.00 |
| m | kN/m | kN/m |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.475 | 0.00 | 0.18 |
| -0.950 | 0.00 | 1.46 |
| -1.425 | 0.00 | 5.18 |
| -1.900 | 0.00 | 12.15 |
| -2.206 | 0.00 | 18.23 |
| -2.513 | 0.00 | 25.16 |
| -2.819 | 0.00 | 33.22 |
| -3.125 | 0.00 | 42.68 |
| -3.431 | 0.00 | 53.83 |
| -3.737 | 0.00 | 66.93 |
| -4.044 | 0.00 | 82.27 |
| -4.350 | 0.00 | 100.13 |
| -4.600 | 0.00 | 117.82 |
| | 0.00 | 117.82 |
| -4.900 | 0.00 | 79.79 |
| -5.200 | 0.00 | 48.33 |
| -5.600 | 0.00 | 38.94 |
| -6.050 | -18.62 | 41.07 |
| -6.500 | -43.83 | 39.90 |
| -6.838 | -57.94 | 37.42 |
| -7.175 | -67.99 | 33.96 |
| -7.512 | -74.05 | 29.89 |
| -7.850 | -76.19 | 25.55 |
| -8.188 | -74.43 | 21.26 |
| -8.525 | -68.83 | 17.35 |
| -8.862 | -59.39 | 14.12 |
| -9.200 | -46.13 | 11.89 |
| -9.700 | -26.26 | 8.66 |
| -10.200 | -11.80 | 4.72 |
| -10.700 | -2.98 | 1.40 |
| -11.200 | 0.00 | 0.00 |
| m | kN.m/m | kN.m/m |

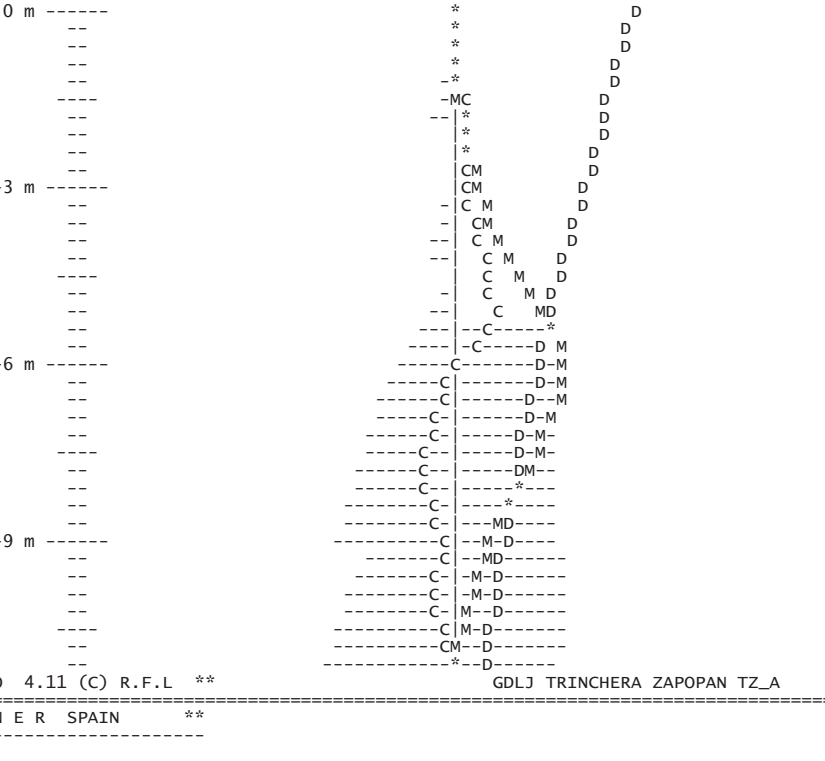
* CURVAS DE LA FASE 1 *







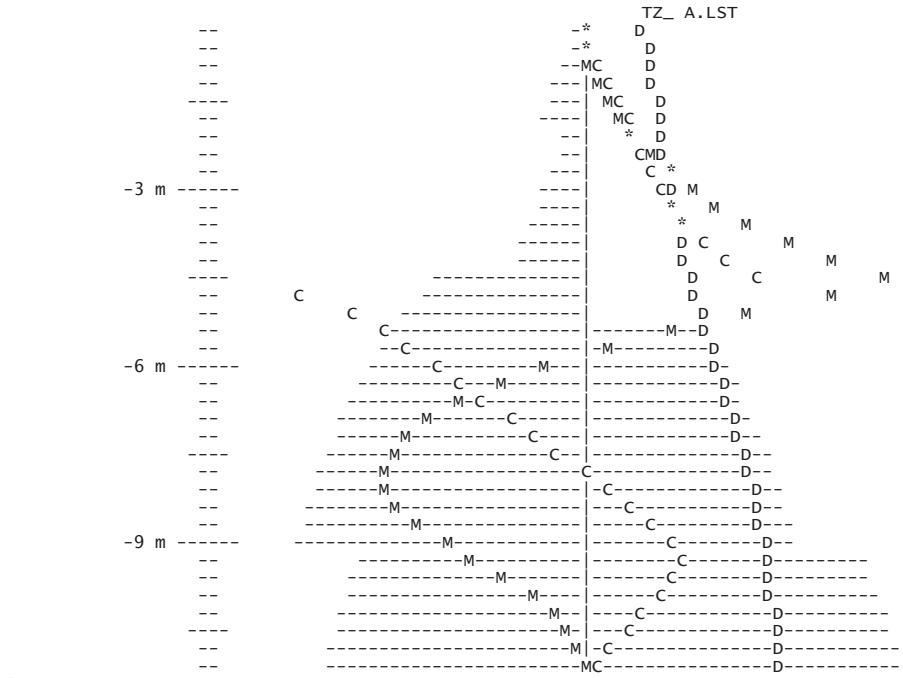

* CURVAS DE LA FASE 2 *








* CURVAS DE LA FASE 3 *


TZ_ A.LST
-3 m
-6 m
-9 m

```
***** NOMBRE DE FICHERO DE DATOS : TZ_ B.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_B                                        *60L  U:NN*
      : 0
 1 ...  0
      *PILOTES SECANTE DE 1.00 m SEP 70 cm
      : -14.05 1386349
 2 ...  -14.05 1386349
      : 0.00
 3 ...  0
      * R
      : -1.05 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -1.05 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -4.05 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 5 ...  -4.05 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -7.45 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 6 ...  -7.45 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -34.10 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 7 ...  -34.1 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG2
      : -37.10 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
 8 ...  -37.1 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -39.00 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
 9 ...  -39 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -6.00 0.50
10 ...  -6 0.5
      *Fase 1
      *Excavacion hasta nivel puntal provisional
      : SUC(1) 10
11 ... SUC(1)  10
      : EXC(2) -1.90
12 ... EXC(2)  -1.9
      : CAL(2)
13 ... CAL(2)
      *Fase 2
      *Ejecucion del puntal metalico provisional
      *Excavacion hasta nivel losa de fondo
      : STR(0) -0.90 1.00 0.00 0.00 165000
14 ... STR(0)  -0.9 1 0 0 165000
      : EXC(2) -8.05
15 ... EXC(2)  -8.05
      : WAT(2) -8.55
16 ... WAT(2)  -8.55
      : CAL(2)
17 ... CAL(2)
      *Fase 3
      *Ejecucion de la losa de fondo
      *Eliminacion puntal provisional
      : STR(0) -7.45 1.00 0.00 0.00 4000000
18 ... STR(0)  -7.45 1 0 0 4000000
      : STR(0,1)
19 ... STR(0,1)
      : CAL(2)
20 ... CAL(2)
      *Fase 4
      *Restitucion del nf
      : WAT(2,1) -8.05 0 21
21 ... WAT(2,1)  -8.05 0 21
      : CAL(2,1)
22 ... CAL(2,1)
      *Fase 5
      *Sismo
      *SISMO_ R
      : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
23 ... PLA(1)  0.56 2.367 5 29 0 0
      *SISMO_ UG1b
      : PLA(2) 0.522 2.594 15.00 31 0.00 0.00
24 ... PLA(2)  0.522 2.594 15 31 0 0
      *SISMO_ UG1c
      : PLA(3) 0.487 2.846 20.00 33 0.00 0.00
25 ... PLA(3)  0.487 2.846 20 33 0 0
      *SISMO_ UG1d
      : PLA(4) 0.789 2.509 25.00 36 0.00 0.00
26 ... PLA(4)  0.789 2.509 25 36 0 0
      *SISMO_ UG2
      : PLA(5) 0.795 2.402 30.00 35 0.00 0.00
27 ... PLA(5)  0.795 2.402 30 35 0 0
      *SISMO_ UG3a
      : PLA(6) 0.302 10.398 246.00 58 0.00 0.00
28 ... PLA(6)  0.302 10.398 246 58 0 0
      : CAL(2)
29 ... CAL(2)
      : FIN
30 ... FIN
      : GRF
31 ... GRF
      : STA
32 ... STA
      : EVP
33 ... EVP
      : ASC
34 ... ASC
      *XLS
      : STOP
35 ... STOP
```



*PILOTES SECANTE DE 1.00 m SEP 70 cm

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -14.050 m : | 1386349. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -1.050 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1b

CAPA N° 2 DE -1.050 m A -4.050 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1c



CAPA N° 3 DE -4.050 m A -7.450 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1d

CAPA N° 4 DE -7.450 m A -34.100 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.235 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.852 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG2

CAPA N° 5 DE -34.100 m A -37.100 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.246 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.690 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG3a



CAPA N° 6 DE -37.100 m A -39.000 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.075 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |

COEFIC. DE EMPUJE PASIVO HOR. KP = 12.162
COHESIÓN C = 246.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 58.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* NF



** FASE No 1 **

*Fase 1
*Excavacion hasta nivel puntal provisional

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -1.900 m



FASE 1

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -6.00 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -1.90 m NIVEL AGUA: -6.00 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 1.124 | -0.122 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.450 | 1.069 | -0.122 | 0.14 | 0.92 | | 2 | 4.08 | 4900 | 0 | | | | |
| -0.900 | 1.014 | -0.122 | 1.11 | 3.76 | | 2 | 8.52 | 4900 | 0 | | | | |
| -1.050 | 0.996 | -0.122 | 1.78 | 5.15 | | 2 | 10.00 | 4900 | 0 | | | | |
| | | | | | | -1 | | | 0 | | | | |
| -1.475 | 0.944 | -0.121 | 4.07 | 5.90 | | 2 | 3.57 | 15100 | 0 | | | | |
| -1.900 | 0.893 | -0.119 | 7.04 | 8.39 | | 2 | 8.15 | 15100 | 0 | | | | |
| | | | | | | 2 | 8.15 | 15100 | 2 | 13.49 | 15100 | | |
| -2.169 | 0.862 | -0.117 | 9.12 | 7.09 | | 2 | 11.04 | 15100 | 2 | 15.42 | 15100 | | |
| -2.438 | 0.830 | -0.115 | 10.88 | 6.04 | | 2 | 13.93 | 15100 | 2 | 17.36 | 15100 | | |
| -2.706 | 0.800 | -0.113 | 12.39 | 5.24 | | 2 | 16.80 | 15100 | 2 | 19.31 | 15100 | | |
| -2.975 | 0.770 | -0.111 | 13.71 | 4.69 | | 2 | 19.67 | 15100 | 2 | 21.27 | 15100 | | |
| -3.244 | 0.740 | -0.108 | 14.93 | 4.38 | | 2 | 22.52 | 15100 | 2 | 23.23 | 15100 | | |
| -3.513 | 0.712 | -0.105 | 16.09 | 4.30 | | 2 | 25.37 | 15100 | 2 | 25.21 | 15100 | | |
| -3.781 | 0.684 | -0.102 | 17.26 | 4.46 | | 2 | 28.20 | 15100 | 2 | 27.21 | 15100 | | |
| -4.050 | 0.657 | -0.098 | 18.51 | 4.83 | | 2 | 31.01 | 15100 | 2 | 29.21 | 15100 | | |
| | | | | | | 2 | 24.87 | 20600 | 2 | 31.63 | 20600 | | |
| -4.538 | 0.611 | -0.091 | 20.13 | 2.00 | | 2 | 30.04 | 20600 | 2 | 34.89 | 20600 | | |
| -5.025 | 0.568 | -0.084 | 20.60 | 0.06 | | 2 | 35.13 | 20600 | 2 | 38.23 | 20600 | | |
| -5.512 | 0.529 | -0.077 | 20.33 | -1.05 | | 2 | 40.15 | 20600 | 2 | 41.63 | 20600 | | |
| -6.000 | 0.493 | -0.070 | 19.70 | -1.41 | | 2 | 45.11 | 20600 | 2 | 45.11 | 20600 | | |
| -6.363 | 0.468 | -0.065 | 19.21 | -1.23 | | 2 | 47.09 | 20600 | 2 | 46.09 | 20600 | | |
| -6.725 | 0.446 | -0.060 | 18.85 | -0.70 | | 2 | 49.04 | 20600 | 2 | 47.11 | 20600 | | |
| -7.087 | 0.425 | -0.055 | 18.74 | 0.16 | | 2 | 50.96 | 20600 | 2 | 48.17 | 20600 | | |
| -7.450 | 0.406 | -0.050 | 19.00 | 1.31 | | 2 | 52.83 | 20600 | 2 | 49.26 | 20600 | | |
| | | | | | | 2 | 43.64 | 29000 | 2 | 48.80 | 29000 | | |
| -7.750 | 0.392 | -0.046 | 19.17 | -0.11 | | 2 | 45.23 | 29000 | 2 | 49.56 | 29000 | | |
| -8.050 | 0.379 | -0.042 | 18.96 | -1.30 | | 2 | 46.79 | 29000 | 2 | 50.35 | 29000 | | |
| -8.550 | 0.359 | -0.035 | 17.91 | -2.80 | | 2 | 49.30 | 29000 | 2 | 51.75 | 29000 | | |
| -8.894 | 0.348 | -0.031 | 16.81 | -3.54 | | 2 | 50.97 | 29000 | 2 | 52.77 | 29000 | | |
| -9.238 | 0.338 | -0.027 | 15.50 | -4.06 | | 2 | 52.60 | 29000 | 2 | 53.83 | 29000 | | |
| -9.581 | 0.330 | -0.023 | 14.04 | -4.39 | | 2 | 54.20 | 29000 | 2 | 54.93 | 29000 | | |
| -9.925 | 0.322 | -0.020 | 12.50 | -4.57 | | 2 | 55.76 | 29000 | 2 | 56.06 | 29000 | | |
| -10.269 | 0.316 | -0.017 | 10.92 | -4.61 | | 2 | 57.28 | 29000 | 2 | 57.22 | 29000 | | |
| -10.613 | 0.311 | -0.014 | 9.34 | -4.54 | | 2 | 58.79 | 29000 | 2 | 58.41 | 29000 | | |
| -10.956 | 0.306 | -0.012 | 7.81 | -4.36 | | 2 | 60.26 | 29000 | 2 | 59.63 | 29000 | | |
| -11.300 | 0.302 | -0.011 | 6.35 | -4.11 | | 2 | 61.72 | 29000 | 2 | 60.86 | 29000 | | |
| -11.644 | 0.299 | -0.009 | 4.99 | -3.78 | | 2 | 63.17 | 29000 | 2 | 62.11 | 29000 | | |
| -11.988 | 0.296 | -0.008 | 3.76 | -3.38 | | 2 | 64.60 | 29000 | 2 | 63.37 | 29000 | | |
| -12.331 | 0.293 | -0.007 | 2.68 | -2.93 | | 2 | 66.02 | 29000 | 2 | 64.64 | 29000 | | |
| -12.675 | 0.291 | -0.007 | 1.75 | -2.43 | | 2 | 67.43 | 29000 | 2 | 65.91 | 29000 | | |
| -13.019 | 0.289 | -0.006 | 1.01 | -1.89 | | 2 | 68.84 | 29000 | 2 | 67.19 | 29000 | | |
| -13.363 | 0.286 | -0.006 | 0.46 | -1.30 | | 2 | 70.25 | 29000 | 2 | 68.48 | 29000 | | |
| -13.706 | 0.284 | -0.006 | 0.12 | -0.67 | | 2 | 71.66 | 29000 | 2 | 69.76 | 29000 | | |
| -14.050 | 0.282 | -0.006 | 0.00 | 0.00 | | 2 | 73.06 | 29000 | 2 | 71.05 | 29000 | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 1.12 mm
MOMENTO MÁXIMO = 20.60 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 59.41 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.081 = (579.74 kN/m)/(7191.48 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.115 = (579.74 kN/m)/(5023.22 kN/m)



**  FASE No  2  **

*Fase 2
*Ejecucion del puntal metalico provisional
*Excavacion hasta nivel losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1

NIVEL = -0.900 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 164999.984 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2  PARA NIVEL = -8.050 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2  PARA NIVEL = -8.550 m



FASE 2

| | PARED | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -6.00 m<br>S. DE CAQUOT: 10.00 kPa | SOIL 2<br>EXCAVACIÓN: -8.05 m<br>NIVEL AGUA: -8.55 m<br>S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.006 | 0.227 | 0.00 | 0.00 | | 2 | 0.22 | 0.22 | 4900 | 0 | | | |
| -0.450 | 1.108 | 0.227 | 0.15 | 0.93 | | 2 | 3.89 | 3.89 | 4900 | 0 | | | |
| -0.900 | 1.210 | 0.227 | 1.08 | 3.50 | | 2 | 7.57 | 5.15 | 4900 | 0 | | | |
| | | | | -28.78 | | 2 | 7.57 | 5.15 | 4900 | 0 | | 1 | -32.28 |
| -1.050 | 1.244 | 0.227 | -3.15 | -27.55 | | 2 | 8.79 | 5.15 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.475 | 1.340 | 0.224 | -14.86 | -27.55 | | -1 | | | | 0 | | | |
| -1.900 | 1.434 | 0.218 | -26.57 | -27.55 | | -1 | | | | 0 | | | |
| -2.169 | 1.491 | 0.212 | -33.95 | -27.35 | | 2 | 1.53 | 1.53 | 15100 | 0 | | | |
| -2.438 | 1.547 | 0.204 | -41.23 | -26.72 | | 2 | 3.10 | 3.10 | 15100 | 0 | | | |
| -2.706 | 1.601 | 0.196 | -48.28 | -25.68 | | 2 | 4.70 | 4.70 | 15100 | 0 | | | |
| -2.975 | 1.652 | 0.186 | -54.99 | -24.19 | | 2 | 6.34 | 4.85 | 15100 | 0 | | | |
| -3.244 | 1.701 | 0.174 | -61.24 | -22.26 | | 2 | 8.02 | 4.85 | 15100 | 0 | | | |
| -3.513 | 1.746 | 0.162 | -66.92 | -19.88 | | 2 | 9.74 | 4.85 | 15100 | 0 | | | |
| -3.781 | 1.788 | 0.149 | -71.88 | -17.02 | | 2 | 11.53 | 4.85 | 15100 | 0 | | | |
| -4.050 | 1.826 | 0.134 | -76.02 | -13.68 | | 2 | 13.36 | 4.85 | 15100 | 0 | | | |
| | | | | | | 2 | 0.79 | 0.79 | 20600 | 0 | | | |
| -4.538 | 1.885 | 0.106 | -82.47 | -12.56 | | 2 | 3.79 | 3.79 | 20600 | 0 | | | |
| -5.025 | 1.929 | 0.076 | -88.02 | -9.91 | | 2 | 7.09 | 4.55 | 20600 | 0 | | | |
| -5.512 | 1.959 | 0.045 | -91.86 | -5.57 | | 2 | 10.69 | 4.55 | 20600 | 0 | | | |
| -6.000 | 1.973 | 0.012 | -93.15 | 0.60 | | 2 | 14.62 | 4.55 | 20600 | 0 | | | |
| -6.363 | 1.973 | -0.012 | -91.86 | 6.81 | 3.56 | 2 | 16.11 | 4.55 | 20600 | 0 | | | |
| -6.725 | 1.964 | -0.036 | -87.99 | 14.89 | 7.11 | 2 | 17.77 | 4.55 | 20600 | 0 | | | |
| -7.087 | 1.947 | -0.058 | -80.84 | 24.88 | 10.67 | 2 | 19.61 | 4.55 | 20600 | 0 | | | |
| -7.450 | 1.922 | -0.078 | -69.71 | 36.87 | 14.22 | 2 | 21.60 | 4.55 | 20600 | 0 | | | |
| | | | | | 14.22 | 1 | 5.33 | 2.35 | 29000 | 0 | | | |
| -7.750 | 1.897 | -0.092 | -57.71 | 43.27 | 17.17 | 1 | 6.00 | 2.35 | 29000 | 0 | | | |
| -8.050 | 1.868 | -0.103 | -43.63 | 50.76 | 20.11 | 1 | 6.67 | 2.35 | 29000 | 0 | | | |
| | | | | | 20.11 | 1 | 6.67 | 2.35 | 29000 | 2 | 54.16 | 29000 | |
| -8.550 | 1.813 | -0.114 | -21.53 | 37.97 | 25.02 | 1 | 7.78 | 2.35 | 29000 | 2 | 56.60 | 29000 | |
| -8.894 | 1.773 | -0.118 | -9.85 | 30.08 | 25.02 | 2 | 9.64 | 3.44 | 29000 | 2 | 56.78 | 29000 | |
| -9.238 | 1.732 | -0.119 | -0.77 | 22.88 | 25.02 | 2 | 12.17 | 4.12 | 29000 | 2 | 56.94 | 29000 | |
| -9.581 | 1.691 | -0.118 | 5.98 | 16.50 | 25.02 | 2 | 14.71 | 4.12 | 29000 | 2 | 57.10 | 29000 | |
| -9.925 | 1.651 | -0.116 | 10.67 | 10.93 | 25.02 | 2 | 17.22 | 4.12 | 29000 | 2 | 57.28 | 29000 | |
| -10.269 | 1.611 | -0.113 | 13.58 | 6.15 | 25.02 | 2 | 19.71 | 4.12 | 29000 | 2 | 57.48 | 29000 | |
| -10.613 | 1.573 | -0.110 | 14.98 | 2.15 | 25.02 | 2 | 22.17 | 4.12 | 29000 | 2 | 57.71 | 29000 | |
| -10.956 | 1.536 | -0.106 | 15.14 | -1.10 | 25.02 | 2 | 24.59 | 4.12 | 29000 | 2 | 57.98 | 29000 | |
| -11.300 | 1.500 | -0.102 | 14.31 | -3.62 | 25.02 | 2 | 26.98 | 4.12 | 29000 | 2 | 58.29 | 29000 | |
| -11.644 | 1.466 | -0.099 | 12.74 | -5.44 | 25.02 | 2 | 29.33 | 4.12 | 29000 | 2 | 58.63 | 29000 | |
| -11.988 | 1.432 | -0.096 | 10.65 | -6.58 | 25.02 | 2 | 31.64 | 4.12 | 29000 | 2 | 59.00 | 29000 | |
| -12.331 | 1.399 | -0.094 | 8.29 | -7.06 | 25.02 | 2 | 33.93 | 4.12 | 29000 | 2 | 59.40 | 29000 | |
| -12.675 | 1.368 | -0.092 | 5.88 | -6.90 | 25.02 | 2 | 36.20 | 4.12 | 29000 | 2 | 59.82 | 29000 | |
| -13.019 | 1.336 | -0.091 | 3.62 | -6.10 | 25.02 | 2 | 38.46 | 4.12 | 29000 | 2 | 60.26 | 29000 | |
| -13.363 | 1.305 | -0.090 | 1.75 | -4.69 | 25.02 | 2 | 40.71 | 4.12 | 29000 | 2 | 60.70 | 29000 | |
| -13.706 | 1.274 | -0.090 | 0.47 | -2.65 | 25.02 | 2 | 42.95 | 4.12 | 29000 | 2 | 61.15 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | kN |



FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.050 | 1.243 | -0.090 | 0.00 | 0.00 | 25.02 | 2 | 45.19 | 4.12 | 29000 | 2 | 61.60 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 1.97 mm
MOMENTO MÁXIMO = -93.15 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 51.00 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.030 = (212.80 kN/m)/(7191.48 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.258 = (350.00 kN/m)/(1358.22 kN/m)



**  FASE No 3  **

*Fase 3
*Ejecucion de la losa de fondo
*Eliminacion puntal provisional

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 2
NIVEL = -7.450 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 4000000.000 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE PUNTALES N° 1



FASE 3

| | PARED | | | | | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -6.00 m<br>S. DE CAQUOT: 10.00 kPa | | | SOIL 2<br>EXCAVACIÓN: -8.05 m<br>NIVEL AGUA: -8.55 m<br>S. DE CAQUOT: 0.00 kPa | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
| 0.000 | 4.045 | -0.293 | 0.00 | 0.00 | | -1 | | | 0 | | | |
| -0.450 | 3.913 | -0.293 | 0.00 | 0.00 | | -1 | | | 0 | | | |
| -0.900 | 3.781 | -0.293 | 0.07 | 0.48 | | 1 | 2.16 | 2.16 4900 | 0 | | | |
| -1.050 | 3.737 | -0.293 | 0.17 | 0.87 | | 1 | 3.01 | 3.01 4900 | 0 | | | |
| | | | | | | -1 | | | 0 | | | |
| -1.475 | 3.612 | -0.293 | 0.54 | 0.87 | | -1 | | | 0 | | | |
| -1.900 | 3.488 | -0.293 | 0.91 | 0.87 | | -1 | | | 0 | | | |
| -2.169 | 3.409 | -0.293 | 1.15 | 0.87 | | -1 | | | 0 | | | |
| -2.438 | 3.330 | -0.293 | 1.38 | 0.87 | | -1 | | | 0 | | | |
| -2.706 | 3.252 | -0.292 | 1.62 | 0.87 | | -1 | | | 0 | | | |
| -2.975 | 3.173 | -0.292 | 1.87 | 1.02 | | 1 | 1.12 | 1.12 15100 | 0 | | | |
| -3.244 | 3.095 | -0.292 | 2.20 | 1.52 | | 1 | 2.57 | 2.57 15100 | 0 | | | |
| -3.513 | 3.017 | -0.291 | 2.72 | 2.40 | | 1 | 4.01 | 2.91 15100 | 0 | | | |
| -3.781 | 2.938 | -0.291 | 3.52 | 3.67 | | 1 | 5.46 | 2.91 15100 | 0 | | | |
| -4.050 | 2.860 | -0.290 | 4.73 | 5.34 | | 1 | 6.91 | 2.91 15100 | 0 | | | |
| | | | | | | 1 | 0.11 | 0.11 20600 | 0 | | | |
| -4.538 | 2.720 | -0.288 | 7.44 | 5.99 | | 1 | 2.59 | 2.59 20600 | 0 | | | |
| -5.025 | 2.580 | -0.284 | 10.77 | 7.86 | | 1 | 5.07 | 2.68 20600 | 0 | | | |
| -5.512 | 2.442 | -0.280 | 15.30 | 10.94 | | 1 | 7.56 | 2.68 20600 | 0 | | | |
| -6.000 | 2.307 | -0.273 | 21.63 | 15.23 | | 1 | 10.04 | 2.68 20600 | 0 | | | |
| -6.363 | 2.209 | -0.267 | 27.91 | 19.73 | 3.56 | 2 | 11.23 | 3.00 20600 | 0 | | | |
| -6.725 | 2.114 | -0.259 | 36.19 | 26.36 | 7.11 | 2 | 14.68 | 4.55 20600 | 0 | | | |
| -7.087 | 2.022 | -0.248 | 47.33 | 35.51 | 10.67 | 2 | 18.06 | 4.55 20600 | 0 | | | |
| -7.450 | 1.935 | -0.234 | 62.24 | 47.16 | 14.22 | 2 | 21.34 | 4.55 20600 | 0 | | | |
| | | | | -3.37 | 14.22 | 1 | 5.33 | 2.35 29000 | 0 | | | 2 -50.54 |
| -7.750 | 1.867 | -0.220 | 62.17 | 3.16 | 17.17 | 2 | 6.87 | 3.22 29000 | 0 | | | |
| -8.050 | 1.803 | -0.207 | 64.27 | 11.07 | 20.11 | 2 | 8.55 | 4.12 29000 | 0 | | | |
| | | | | | 20.11 | 2 | 8.55 | 4.12 29000 | 2 | 52.28 | 29000 | |
| -8.550 | 1.705 | -0.183 | 67.11 | 0.78 | 25.02 | 2 | 10.91 | 4.12 29000 | 2 | 53.47 | 29000 | |
| -8.894 | 1.645 | -0.166 | 66.39 | -4.77 | 25.02 | 2 | 13.35 | 4.12 29000 | 2 | 53.08 | 29000 | |
| -9.238 | 1.591 | -0.150 | 63.94 | -9.29 | 25.02 | 2 | 16.27 | 4.12 29000 | 2 | 52.85 | 29000 | |
| -9.581 | 1.542 | -0.135 | 60.12 | -12.78 | 25.02 | 2 | 19.03 | 4.12 29000 | 2 | 52.78 | 29000 | |
| -9.925 | 1.498 | -0.120 | 55.27 | -15.34 | 25.02 | 2 | 21.64 | 4.12 29000 | 2 | 52.85 | 29000 | |
| -10.269 | 1.459 | -0.107 | 49.67 | -17.08 | 25.02 | 2 | 24.12 | 4.12 29000 | 2 | 53.07 | 29000 | |
| -10.613 | 1.425 | -0.096 | 43.61 | -18.09 | 25.02 | 2 | 26.48 | 4.12 29000 | 2 | 53.40 | 29000 | |
| -10.956 | 1.394 | -0.086 | 37.31 | -18.43 | 25.02 | 2 | 28.72 | 4.12 29000 | 2 | 53.85 | 29000 | |
| -11.300 | 1.366 | -0.077 | 31.00 | -18.19 | 25.02 | 2 | 30.88 | 4.12 29000 | 2 | 54.38 | 29000 | |
| -11.644 | 1.340 | -0.070 | 24.87 | -17.42 | 25.02 | 2 | 32.96 | 4.12 29000 | 2 | 55.00 | 29000 | |
| -11.988 | 1.317 | -0.065 | 19.08 | -16.16 | 25.02 | 2 | 34.98 | 4.12 29000 | 2 | 55.67 | 29000 | |
| -12.331 | 1.296 | -0.061 | 13.80 | -14.46 | 25.02 | 2 | 36.94 | 4.12 29000 | 2 | 56.39 | 29000 | |
| -12.675 | 1.275 | -0.058 | 9.18 | -12.35 | 25.02 | 2 | 38.88 | 4.12 29000 | 2 | 57.15 | 29000 | |
| -13.019 | 1.256 | -0.056 | 5.36 | -9.83 | 25.02 | 2 | 40.79 | 4.12 29000 | 2 | 57.93 | 29000 | |
| -13.363 | 1.237 | -0.055 | 2.47 | -6.93 | 25.02 | 2 | 42.69 | 4.12 29000 | 2 | 58.72 | 29000 | |
| -13.706 | 1.218 | -0.055 | 0.64 | -3.65 | 25.02 | 2 | 44.58 | 4.12 29000 | 2 | 59.52 | 29000 | |
| -14.050 | 1.199 | -0.055 | 0.00 | 0.00 | 25.02 | 2 | 46.48 | 4.12 29000 | 2 | 60.32 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 4.05 mm
MOMENTO MÁXIMO = 67.11 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 40.73 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.029 = (211.21 kN/m)/(7191.48 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.243 = (330.15 kN/m)/(1358.22 kN/m)



**  FASE No 4  **

*Fase 4
*Restitucion del nf

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2  PARA NIVEL = -8.050 m
PRESIÓN DEL AGUA EN SUELO 2  PARA NIVEL = -8.050 m  PR. = 0.000 kPa
PR. = 21.000 kPa



FASE 4

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -6.00 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -8.05 m NIVEL AGUA: -8.05 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 4.964 | -0.418 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.450 | 4.776 | -0.418 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.900 | 4.588 | -0.418 | 0.07 | 0.48 | | 1 | 2.16 | 2.16 4900 | 0 | | | | |
| -1.050 | 4.526 | -0.418 | 0.17 | 0.87 | | 1 | 3.01 | 3.01 4900 | 0 | | | | |
| | | | | | | -1 | | | 0 | | | | |
| -1.475 | 4.348 | -0.417 | 0.54 | 0.87 | | -1 | | | 0 | | | | |
| -1.900 | 4.171 | -0.417 | 0.91 | 0.87 | | -1 | | | 0 | | | | |
| -2.169 | 4.059 | -0.417 | 1.15 | 0.87 | | -1 | | | 0 | | | | |
| -2.438 | 3.947 | -0.417 | 1.38 | 0.87 | | -1 | | | 0 | | | | |
| -2.706 | 3.835 | -0.416 | 1.62 | 0.87 | | -1 | | | 0 | | | | |
| -2.975 | 3.723 | -0.416 | 1.87 | 1.02 | | 1 | 1.12 | 1.12 15100 | 0 | | | | |
| -3.244 | 3.611 | -0.416 | 2.20 | 1.52 | | 1 | 2.57 | 2.57 15100 | 0 | | | | |
| -3.513 | 3.499 | -0.415 | 2.72 | 2.40 | | 1 | 4.01 | 2.91 15100 | 0 | | | | |
| -3.781 | 3.388 | -0.415 | 3.52 | 3.67 | | 1 | 5.46 | 2.91 15100 | 0 | | | | |
| -4.050 | 3.276 | -0.414 | 4.73 | 5.34 | | 1 | 6.91 | 2.91 15100 | 0 | | | | |
| | | | | | | 1 | 0.11 | 0.11 20600 | 0 | | | | |
| -4.538 | 3.075 | -0.412 | 7.44 | 5.99 | | 1 | 2.59 | 2.59 20600 | 0 | | | | |
| -5.025 | 2.875 | -0.409 | 10.77 | 7.86 | | 1 | 5.07 | 2.68 20600 | 0 | | | | |
| -5.512 | 2.677 | -0.404 | 15.30 | 10.94 | | 1 | 7.56 | 2.68 20600 | 0 | | | | |
| -6.000 | 2.481 | -0.398 | 21.63 | 15.23 | | 1 | 10.04 | 2.68 20600 | 0 | | | | |
| -6.363 | 2.338 | -0.391 | 27.91 | 19.67 | 3.56 | 1 | 10.91 | 2.68 20600 | 0 | | | | |
| -6.725 | 2.198 | -0.383 | 36.11 | 25.93 | 7.11 | 2 | 12.95 | 3.84 20600 | 0 | | | | |
| -7.087 | 2.061 | -0.372 | 47.00 | 34.62 | 10.67 | 2 | 17.25 | 4.55 20600 | 0 | | | | |
| -7.450 | 1.929 | -0.358 | 61.55 | 46.15 | 14.22 | 2 | 21.47 | 4.55 20600 | 0 | | | | |
| | | | | 19.90 | 14.22 | 2 | 5.50 | 2.53 29000 | 0 | | | 2 | -26.26 |
| -7.750 | 1.823 | -0.344 | 68.49 | 26.65 | 17.17 | 2 | 8.12 | 4.12 29000 | 0 | | | | |
| -8.050 | 1.723 | -0.328 | 77.40 | 31.94 | -0.89 | 2 | 10.87 | 4.12 29000 | 0 | | | | |
| | | | | | -0.89 | 2 | 10.87 | 4.12 29000 | 2 | 49.95 | 29000 | | |
| -8.550 | 1.566 | -0.298 | 88.65 | 13.62 | -0.89 | 2 | 14.95 | 4.12 29000 | 2 | 47.37 | 29000 | | |
| -8.894 | 1.467 | -0.276 | 91.46 | 3.04 | -0.89 | 2 | 18.51 | 4.12 29000 | 2 | 45.85 | 29000 | | |
| -9.238 | 1.376 | -0.253 | 90.94 | -5.75 | -0.89 | 2 | 22.49 | 4.12 29000 | 2 | 44.57 | 29000 | | |
| -9.581 | 1.293 | -0.231 | 87.70 | -12.82 | -0.89 | 2 | 26.25 | 4.12 29000 | 2 | 43.50 | 29000 | | |
| -9.925 | 1.218 | -0.210 | 82.31 | -18.30 | -0.89 | 2 | 29.79 | 4.12 29000 | 2 | 42.65 | 29000 | | |
| -10.269 | 1.149 | -0.190 | 75.29 | -22.35 | -0.89 | 2 | 33.12 | 4.12 29000 | 2 | 42.01 | 29000 | | |
| -10.613 | 1.087 | -0.172 | 67.10 | -25.09 | -0.89 | 2 | 36.27 | 4.12 29000 | 2 | 41.55 | 29000 | | |
| -10.956 | 1.030 | -0.157 | 58.17 | -26.65 | -0.89 | 2 | 39.25 | 4.12 29000 | 2 | 41.26 | 29000 | | |
| -11.300 | 0.979 | -0.143 | 48.90 | -27.13 | -0.89 | 2 | 42.09 | 4.12 29000 | 2 | 41.11 | 29000 | | |
| -11.644 | 0.932 | -0.133 | 39.64 | -26.62 | -0.89 | 2 | 44.81 | 4.12 29000 | 2 | 41.08 | 29000 | | |
| -11.988 | 0.888 | -0.124 | 30.70 | -25.21 | -0.89 | 2 | 47.43 | 4.12 29000 | 2 | 41.15 | 29000 | | |
| -12.331 | 0.846 | -0.117 | 22.40 | -22.94 | -0.89 | 2 | 49.98 | 4.12 29000 | 2 | 41.30 | 29000 | | |
| -12.675 | 0.807 | -0.113 | 15.02 | -19.87 | -0.89 | 2 | 52.47 | 4.12 29000 | 2 | 41.50 | 29000 | | |
| -13.019 | 0.769 | -0.110 | 8.83 | -16.02 | -0.89 | 2 | 54.92 | 4.12 29000 | 2 | 41.74 | 29000 | | |
| -13.363 | 0.731 | -0.108 | 4.10 | -11.42 | -0.89 | 2 | 57.35 | 4.12 29000 | 2 | 42.00 | 29000 | | |
| -13.706 | 0.694 | -0.108 | 1.07 | -6.08 | -0.89 | 2 | 59.77 | 4.12 29000 | 2 | 42.27 | 29000 | | |
| -14.050 | 0.657 | -0.107 | 0.00 | 0.00 | -0.89 | 2 | 62.19 | 4.12 29000 | 2 | 42.54 | 29000 | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 4.96 mm
MOMENTO MÁXIMO = 91.46 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 40.65 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.038 = (271.69 kN/m)/(7191.48 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.206 = (257.56 kN/m)/(1247.48 kN/m)

**  FASE No  5  **

*Fase 5
*Sismo
*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No.  1 HASTA NIVEL  -1.050 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No.  2 HASTA NIVEL  -4.050 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.522 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.594 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No.  3 HASTA NIVEL  -7.450 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.487 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.846 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d

* NUEVOS PARÁMETROS PARA CAPA No.  4 HASTA NIVEL -34.100 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No.  5 HASTA NIVEL -37.100 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.795 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.402 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG3a



* NUEVOS PARÁMETROS PARA CAPA No.  6 HASTA NIVEL -39.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.302 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 10.398 |
| COHESIÓN | C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |



FASE 5

| | PARED | SOIL 1 — EXCAVACIÓN: 0.00 m; NIVEL AGUA: -6.00 m; S. DE CAQUOT: 10.00 kPa | SOIL 2 — EXCAVACIÓN: -8.05 m; NIVEL AGUA: -8.05 m; S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |
| 0.000 | 6.092 | -0.643 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.450 | 5.803 | -0.643 | 0.14 | 0.96 | | 1 | 4.25 | 4.25 | 4900 | 0 | | | |
| -0.900 | 5.514 | -0.643 | 1.16 | 3.89 | | 1 | 8.78 | 5.60 | 4900 | 0 | | | |
| -1.050 | 5.417 | -0.642 | 1.84 | 5.32 | | 1 | 10.29 | 5.60 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.475 | 5.144 | -0.641 | 4.17 | 5.79 | | 1 | 2.22 | 2.22 | 15100 | 0 | | | |
| -1.900 | 4.872 | -0.640 | 6.95 | 7.60 | | 1 | 6.32 | 5.22 | 15100 | 0 | | | |
| -2.169 | 4.700 | -0.638 | 9.26 | 9.65 | | 1 | 8.92 | 5.22 | 15100 | 0 | | | |
| -2.438 | 4.529 | -0.636 | 12.20 | 12.39 | | 1 | 11.51 | 5.22 | 15100 | 0 | | | |
| -2.706 | 4.358 | -0.633 | 15.98 | 15.84 | | 1 | 14.11 | 5.22 | 15100 | 0 | | | |
| -2.975 | 4.189 | -0.630 | 20.78 | 19.98 | | 1 | 16.70 | 5.22 | 15100 | 0 | | | |
| -3.244 | 4.020 | -0.625 | 26.78 | 24.81 | | 1 | 19.30 | 5.22 | 15100 | 0 | | | |
| -3.513 | 3.853 | -0.619 | 34.18 | 30.35 | | 1 | 21.89 | 5.22 | 15100 | 0 | | | |
| -3.781 | 3.687 | -0.612 | 43.16 | 36.58 | | 1 | 24.49 | 5.22 | 15100 | 0 | | | |
| -4.050 | 3.524 | -0.603 | 53.90 | 43.51 | | 1 | 27.08 | 5.22 | 15100 | 0 | | | |
| | | | | | | 1 | 19.38 | 4.87 | 20600 | 0 | | | |
| -4.538 | 3.235 | -0.580 | 77.60 | 54.06 | | 1 | 23.90 | 4.87 | 20600 | 0 | | | |
| -5.025 | 2.960 | -0.547 | 106.97 | 66.81 | | 1 | 28.41 | 4.87 | 20600 | 0 | | | |
| -5.512 | 2.704 | -0.504 | 143.10 | 81.76 | | 1 | 32.92 | 4.87 | 20600 | 0 | | | |
| -6.000 | 2.472 | -0.446 | 187.04 | 98.90 | | 1 | 37.43 | 4.87 | 20600 | 0 | | | |
| -6.363 | 2.320 | -0.392 | 225.47 | 113.40 | 3.56 | 1 | 39.02 | 4.87 | 20600 | 0 | | | |
| -6.725 | 2.189 | -0.327 | 269.49 | 129.77 | 7.11 | 1 | 40.61 | 4.87 | 20600 | 0 | | | |
| -7.087 | 2.084 | -0.250 | 319.78 | 148.00 | 10.67 | 1 | 42.19 | 4.87 | 20600 | 0 | | | |
| -7.450 | 2.009 | -0.160 | 377.01 | 168.10 | 14.22 | 1 | 43.78 | 4.87 | 20600 | 0 | | | |
| | | | | -178.64 | 14.22 | 1 | 80.64 | 7.89 | 29000 | 0 | | 2 | -346.74 |
| -7.750 | 1.973 | -0.083 | 327.77 | -149.40 | 17.17 | 1 | 82.89 | 7.89 | 29000 | 0 | | | |
| -8.050 | 1.958 | -0.017 | 287.21 | -121.76 | -0.89 | 1 | 85.14 | 7.89 | 29000 | 0 | | | |
| | | | | | -0.89 | 1 | 85.14 | 7.89 | 29000 | 2 | 56.78 | 29000 | |
| -8.550 | 1.973 | 0.076 | 229.82 | -107.69 | -0.89 | 1 | 88.89 | 7.89 | 29000 | 2 | 59.19 | 29000 | |
| -8.894 | 2.009 | 0.129 | 194.51 | -97.75 | -0.89 | 1 | 91.47 | 7.89 | 29000 | 2 | 61.56 | 29000 | |
| -9.238 | 2.061 | 0.173 | 162.62 | -87.82 | -0.89 | 1 | 94.04 | 7.89 | 29000 | 2 | 64.41 | 29000 | |
| -9.581 | 2.127 | 0.209 | 134.12 | -78.06 | -0.89 | 1 | 96.62 | 7.89 | 29000 | 2 | 67.67 | 29000 | |
| -9.925 | 2.204 | 0.239 | 108.92 | -68.58 | -0.89 | 1 | 99.20 | 7.89 | 29000 | 2 | 71.26 | 29000 | |
| -10.269 | 2.291 | 0.264 | 86.92 | -59.51 | -0.89 | 1 | 101.77 | 7.89 | 29000 | 2 | 75.11 | 29000 | |
| -10.613 | 2.385 | 0.283 | 67.96 | -50.90 | -0.89 | 1 | 104.35 | 7.89 | 29000 | 2 | 79.19 | 29000 | |
| -10.956 | 2.485 | 0.298 | 51.86 | -42.85 | -0.89 | 1 | 106.93 | 7.89 | 29000 | 2 | 83.43 | 29000 | |
| -11.300 | 2.589 | 0.309 | 38.43 | -35.39 | -0.89 | 1 | 109.50 | 7.89 | 29000 | 2 | 87.80 | 29000 | |
| -11.644 | 2.697 | 0.317 | 27.46 | -28.56 | -0.89 | 1 | 112.08 | 7.89 | 29000 | 2 | 92.27 | 29000 | |
| -11.988 | 2.807 | 0.323 | 18.72 | -22.39 | -0.89 | 1 | 114.66 | 7.89 | 29000 | 2 | 96.80 | 29000 | |
| -12.331 | 2.918 | 0.326 | 11.99 | -16.90 | -0.89 | 1 | 117.23 | 7.89 | 29000 | 2 | 101.38 | 29000 | |
| -12.675 | 3.031 | 0.329 | 7.03 | -12.11 | -0.89 | 1 | 119.81 | 7.89 | 29000 | 2 | 105.99 | 29000 | |
| -13.019 | 3.144 | 0.330 | 3.59 | -8.02 | -0.89 | 1 | 122.38 | 7.89 | 29000 | 2 | 110.62 | 29000 | |
| -13.363 | 3.258 | 0.331 | 1.43 | -4.64 | -0.89 | 1 | 124.96 | 7.89 | 29000 | 2 | 115.26 | 29000 | |
| -13.706 | 3.371 | 0.331 | 0.32 | -1.96 | -0.89 | 1 | 127.54 | 7.89 | 29000 | 2 | 119.90 | 29000 | |
| -14.050 | 3.485 | 0.331 | 0.00 | 0.00 | -0.89 | 1 | 130.11 | 7.89 | 29000 | 2 | 124.55 | 29000 | |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 6.09 mm

MOMENTO MÁXIMO = 377.01 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 85.92 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.158 = (853.29 kN/m)/(5409.93 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.510 = (518.67 kN/m)/(1017.82 kN/m)

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 4 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 0.93 |
| -0.900 | 0.00 | 3.76 |
| | -28.78 | 3.76 |
| -1.050 | -27.55 | 5.15 |
| -1.475 | -27.55 | 5.90 |
| -1.900 | -27.55 | 8.39 |
| -2.169 | -27.35 | 7.09 |
| -2.438 | -26.72 | 6.04 |
| -2.706 | -25.68 | 5.24 |
| -2.975 | -24.19 | 4.69 |
| -3.244 | -22.26 | 4.38 |
| -3.513 | -19.88 | 4.30 |
| -3.781 | -17.02 | 4.46 |
| -4.050 | -13.68 | 5.34 |
| -4.538 | -12.56 | 5.99 |
| -5.025 | -9.91 | 7.86 |
| -5.512 | -5.57 | 10.94 |
| -6.000 | -1.41 | 15.23 |
| -6.363 | -1.23 | 19.73 |
| -6.725 | -0.70 | 26.36 |
| -7.087 | 0.00 | 35.51 |
| -7.450 | 0.00 | 47.16 |
| | -3.37 | 36.87 |
| -7.750 | -0.11 | 43.27 |
| -8.050 | -1.30 | 50.76 |
| -8.550 | -2.80 | 37.97 |
| -8.894 | -4.77 | 30.08 |
| -9.238 | -9.29 | 22.88 |
| -9.581 | -12.82 | 16.50 |
| -9.925 | -18.30 | 10.93 |
| -10.269 | -22.35 | 6.15 |
| -10.613 | -25.09 | 2.15 |
| -10.956 | -26.65 | 0.00 |
| -11.300 | -27.13 | 0.00 |
| -11.644 | -26.62 | 0.00 |
| -11.988 | -25.21 | 0.00 |
| -12.331 | -22.94 | 0.00 |
| -12.675 | -19.87 | 0.00 |
| -13.019 | -16.02 | 0.00 |
| -13.363 | -11.42 | 0.00 |
| -13.706 | -6.08 | 0.00 |
| -14.050 | 0.00 | 0.00 |
| m | kN/m | kN/m |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 0.15 |
| -0.900 | 0.00 | 1.11 |
| | 0.00 | 1.11 |
| -1.050 | -3.15 | 1.78 |
| -1.475 | -14.86 | 4.07 |
| -1.900 | -26.57 | 7.04 |
| -2.169 | -33.95 | 9.12 |
| -2.438 | -41.23 | 10.88 |
| -2.706 | -48.28 | 12.39 |
| -2.975 | -54.99 | 13.71 |
| -3.244 | -61.24 | 14.93 |
| -3.513 | -66.92 | 16.09 |
| -3.781 | -71.88 | 17.26 |
| -4.050 | -76.02 | 18.51 |
| -4.538 | -82.47 | 20.13 |
| -5.025 | -88.02 | 20.60 |
| -5.512 | -91.86 | 20.33 |
| -6.000 | -93.15 | 21.63 |
| -6.363 | -91.86 | 27.91 |
| -6.725 | -87.99 | 36.19 |
| -7.087 | -80.84 | 47.33 |
| -7.450 | -69.71 | 62.24 |
| | -69.71 | 62.24 |
| -7.750 | -57.71 | 68.49 |
| -8.050 | -43.63 | 77.40 |
| -8.550 | -21.53 | 88.65 |
| -8.894 | -9.85 | 91.46 |
| -9.238 | -0.77 | 90.94 |
| -9.581 | 0.00 | 87.70 |
| -9.925 | 0.00 | 82.31 |
| -10.269 | 0.00 | 75.29 |
| -10.613 | 0.00 | 67.10 |
| -10.956 | 0.00 | 58.17 |
| -11.300 | 0.00 | 48.90 |
| -11.644 | 0.00 | 39.64 |
| -11.988 | 0.00 | 30.70 |
| -12.331 | 0.00 | 22.40 |
| -12.675 | 0.00 | 15.02 |
| -13.019 | 0.00 | 8.83 |
| -13.363 | 0.00 | 4.10 |
| -13.706 | 0.00 | 1.07 |
| -14.050 | 0.00 | 0.00 |
| m | kN.m/m | kN.m/m |



*** DESPLAZAMIENTO MÁXIMO EN FASE N° 5 = 6.092 mm EN FASE FINAL N° 5 = 6.092 mm

*** MAXIMUM MOMENT IN PHASE Nb 5 = 377.012 kN.m/m IN FINAL PHASE Nb 5 = 377.012 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -0.90 | 2 | 0.00 | 2 | -32.28 | 3 | QUITADO |
| 2 | -7.45 | 3 | 0.00 | 5 | -346.74 | 5 | -346.74 |
| | m | | kN | | kN | | kN |



* CURVAS ENVOLVENTES DE FASE 5 A FASE 5 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 0.96 |
| -0.900 | 0.00 | 3.89 |
| -1.050 | 0.00 | 5.32 |
| -1.475 | 0.00 | 5.79 |
| -1.900 | 0.00 | 7.60 |
| -2.169 | 0.00 | 9.65 |
| -2.438 | 0.00 | 12.39 |
| -2.706 | 0.00 | 15.84 |
| -2.975 | 0.00 | 19.98 |
| -3.244 | 0.00 | 24.81 |
| -3.513 | 0.00 | 30.35 |
| -3.781 | 0.00 | 36.58 |
| -4.050 | 0.00 | 43.51 |
| -4.538 | 0.00 | 54.06 |
| -5.025 | 0.00 | 66.81 |
| -5.512 | 0.00 | 81.76 |
| -6.000 | 0.00 | 98.90 |
| -6.363 | 0.00 | 113.40 |
| -6.725 | 0.00 | 129.77 |
| -7.087 | 0.00 | 148.00 |
| -7.450 | 0.00 | 168.10 |
| | -178.64 | 0.00 |
| -7.750 | -149.40 | 0.00 |
| -8.050 | -121.76 | 0.00 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 0.14 |
| -0.900 | 0.00 | 1.16 |
| -1.050 | 0.00 | 1.84 |
| -1.475 | 0.00 | 4.17 |
| -1.900 | 0.00 | 6.95 |
| -2.169 | 0.00 | 9.26 |
| -2.438 | 0.00 | 12.20 |
| -2.706 | 0.00 | 15.98 |
| -2.975 | 0.00 | 20.78 |
| -3.244 | 0.00 | 26.78 |
| -3.513 | 0.00 | 34.18 |
| -3.781 | 0.00 | 43.16 |
| -4.050 | 0.00 | 53.90 |
| -4.538 | 0.00 | 77.60 |
| -5.025 | 0.00 | 106.97 |
| -5.512 | 0.00 | 143.10 |
| -6.000 | 0.00 | 187.04 |
| -6.363 | 0.00 | 225.47 |
| -6.725 | 0.00 | 269.49 |
| -7.087 | 0.00 | 319.78 |
| -7.450 | 0.00 | 377.01 |
| | 0.00 | 377.01 |
| -7.750 | 0.00 | 327.77 |
| -8.050 | 0.00 | 287.21 |

| | | | | | |
|---|---|---|---|---|---|
| -8.550 | -107.69 | 0.00 | -8.550 | 0.00 | 229.82 |
| -8.894 | -97.75 | 0.00 | -8.894 | 0.00 | 194.51 |
| -9.238 | -87.82 | 0.00 | -9.238 | 0.00 | 162.62 |
| -9.581 | -78.06 | 0.00 | -9.581 | 0.00 | 134.12 |
| -9.925 | -68.58 | 0.00 | -9.925 | 0.00 | 108.92 |
| -10.269 | -59.51 | 0.00 | -10.269 | 0.00 | 86.92 |
| -10.613 | -50.90 | 0.00 | -10.613 | 0.00 | 67.96 |
| -10.956 | -42.85 | 0.00 | -10.956 | 0.00 | 51.86 |
| -11.300 | -35.39 | 0.00 | -11.300 | 0.00 | 38.43 |
| -11.644 | -28.56 | 0.00 | -11.644 | 0.00 | 27.46 |
| -11.988 | -22.39 | 0.00 | -11.988 | 0.00 | 18.72 |
| -12.331 | -16.90 | 0.00 | -12.331 | 0.00 | 11.99 |
| -12.675 | -12.11 | 0.00 | -12.675 | 0.00 | 7.03 |
| -13.019 | -8.02 | 0.00 | -13.019 | 0.00 | 3.59 |
| -13.363 | -4.64 | 0.00 | -13.363 | 0.00 | 1.43 |
| -13.706 | -1.96 | 0.00 | -13.706 | 0.00 | 0.32 |
| -14.050 | 0.00 | 0.00 | -14.050 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



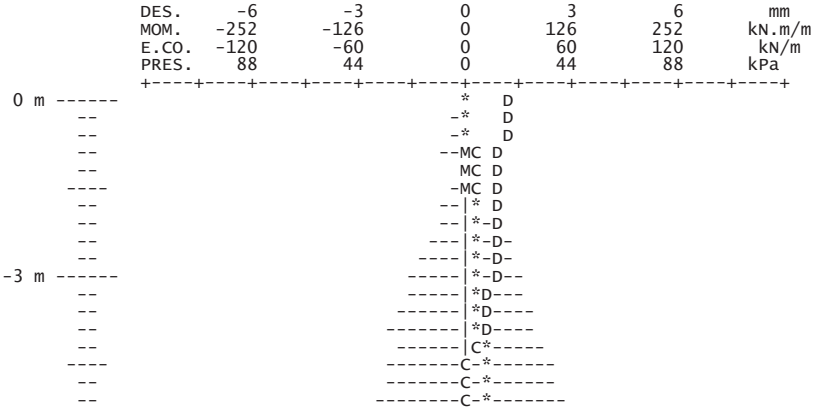
* CURVAS ENVOLVENTES DE FASE  1 A FASE  5 *

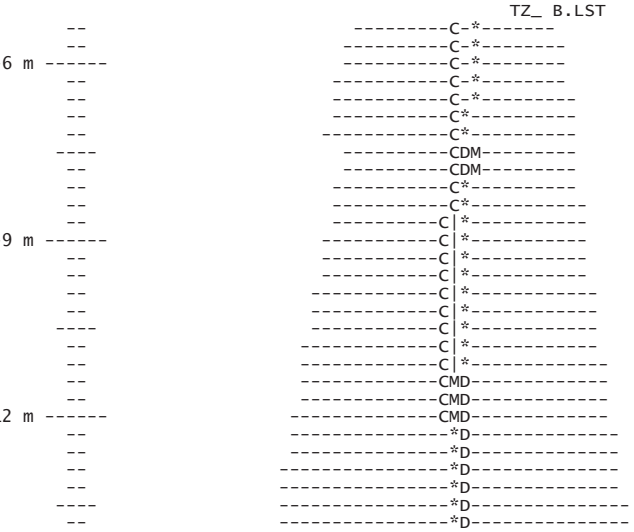
| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 0.96 |
| -0.900 | 0.00 | 3.89 |
| | -28.78 | 3.89 |
| -1.050 | -27.55 | 5.32 |
| -1.475 | -27.55 | 5.90 |
| -1.900 | -27.55 | 8.39 |
| -2.169 | -27.35 | 9.65 |
| -2.438 | -26.72 | 12.39 |
| -2.706 | -25.68 | 15.84 |
| -2.975 | -24.19 | 19.98 |
| -3.244 | -22.26 | 24.81 |
| -3.513 | -19.88 | 30.35 |
| -3.781 | -17.02 | 36.58 |
| -4.050 | -13.68 | 43.51 |
| -4.538 | -12.56 | 54.06 |
| -5.025 | -9.91 | 66.81 |
| -5.512 | -5.57 | 81.76 |
| -6.000 | -1.41 | 98.90 |
| -6.363 | -1.23 | 113.40 |
| -6.725 | -0.70 | 129.77 |
| -7.087 | 0.00 | 148.00 |
| -7.450 | 0.00 | 168.10 |
| | -178.64 | 36.87 |
| -7.750 | -149.40 | 43.27 |
| -8.050 | -121.76 | 50.76 |
| -8.550 | -107.69 | 37.97 |
| -8.894 | -97.75 | 30.08 |
| -9.238 | -87.82 | 22.88 |
| -9.581 | -78.06 | 16.50 |
| -9.925 | -68.58 | 10.93 |
| -10.269 | -59.51 | 6.15 |
| -10.613 | -50.90 | 2.15 |
| -10.956 | -42.85 | 0.00 |
| -11.300 | -35.39 | 0.00 |
| -11.644 | -28.56 | 0.00 |
| -11.988 | -25.21 | 0.00 |
| -12.331 | -22.94 | 0.00 |
| -12.675 | -19.87 | 0.00 |
| -13.019 | -16.02 | 0.00 |
| -13.363 | -11.42 | 0.00 |
| -13.706 | -6.08 | 0.00 |
| -14.050 | 0.00 | 0.00 |
| m | kN/m | kN/m |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 0.15 |
| -0.900 | 0.00 | 1.16 |
| | 0.00 | 1.16 |
| -1.050 | -3.15 | 1.84 |
| -1.475 | -14.86 | 4.17 |
| -1.900 | -26.57 | 7.04 |
| -2.169 | -33.95 | 9.26 |
| -2.438 | -41.23 | 12.20 |
| -2.706 | -48.28 | 15.98 |
| -2.975 | -54.99 | 20.78 |
| -3.244 | -61.24 | 26.78 |
| -3.513 | -66.92 | 34.18 |
| -3.781 | -71.88 | 43.16 |
| -4.050 | -76.02 | 53.90 |
| -4.538 | -82.47 | 77.60 |
| -5.025 | -88.02 | 106.97 |
| -5.512 | -91.86 | 143.10 |
| -6.000 | -93.15 | 187.04 |
| -6.363 | -91.86 | 225.47 |
| -6.725 | -87.99 | 269.49 |
| -7.087 | -80.84 | 319.78 |
| -7.450 | -69.71 | 377.01 |
| | -69.71 | 377.01 |
| -7.750 | -57.71 | 327.77 |
| -8.050 | -43.63 | 287.21 |
| -8.550 | -21.53 | 229.82 |
| -8.894 | -9.85 | 194.51 |
| -9.238 | -0.77 | 162.62 |
| -9.581 | 0.00 | 134.12 |
| -9.925 | 0.00 | 108.92 |
| -10.269 | 0.00 | 86.92 |
| -10.613 | 0.00 | 67.96 |
| -10.956 | 0.00 | 58.17 |
| -11.300 | 0.00 | 48.90 |
| -11.644 | 0.00 | 39.64 |
| -11.988 | 0.00 | 30.70 |
| -12.331 | 0.00 | 22.40 |
| -12.675 | 0.00 | 15.02 |
| -13.019 | 0.00 | 8.83 |
| -13.363 | 0.00 | 4.10 |
| -13.706 | 0.00 | 1.07 |
| -14.050 | 0.00 | 0.00 |
| m | kN.m/m | kN.m/m |



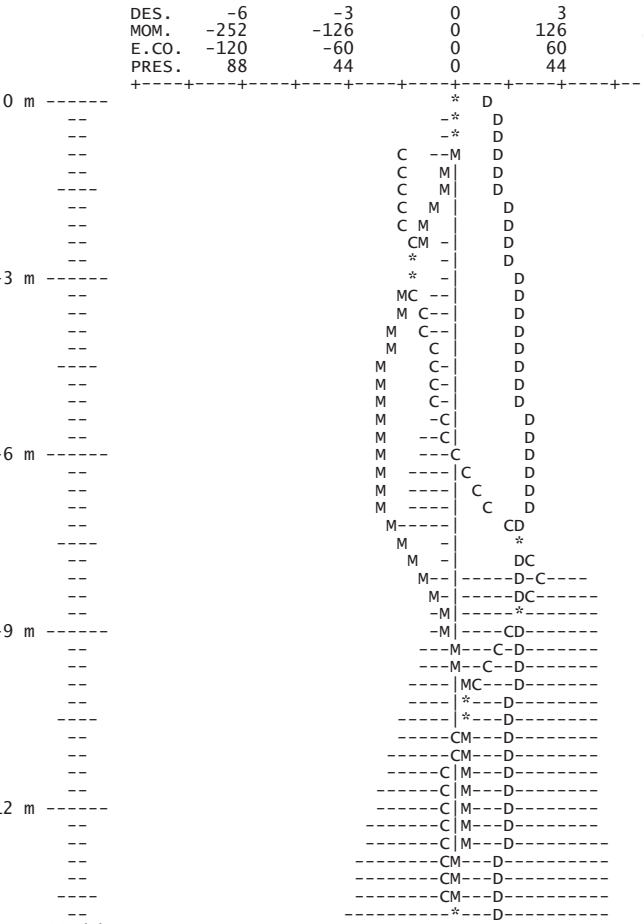
* CURVAS DE LA FASE  1 *





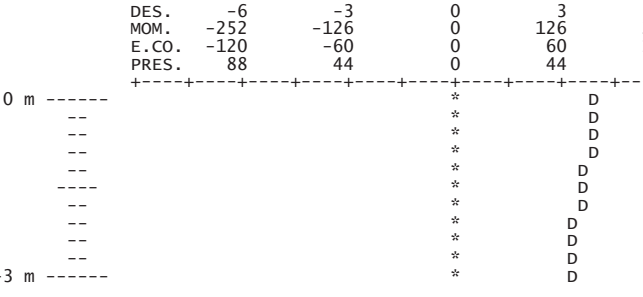


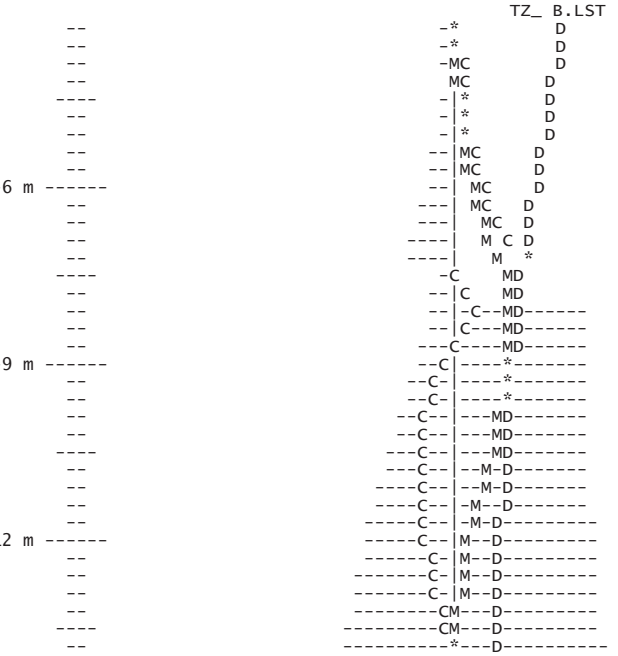
* CURVAS DE LA FASE  2 *






* CURVAS DE LA FASE  3 *

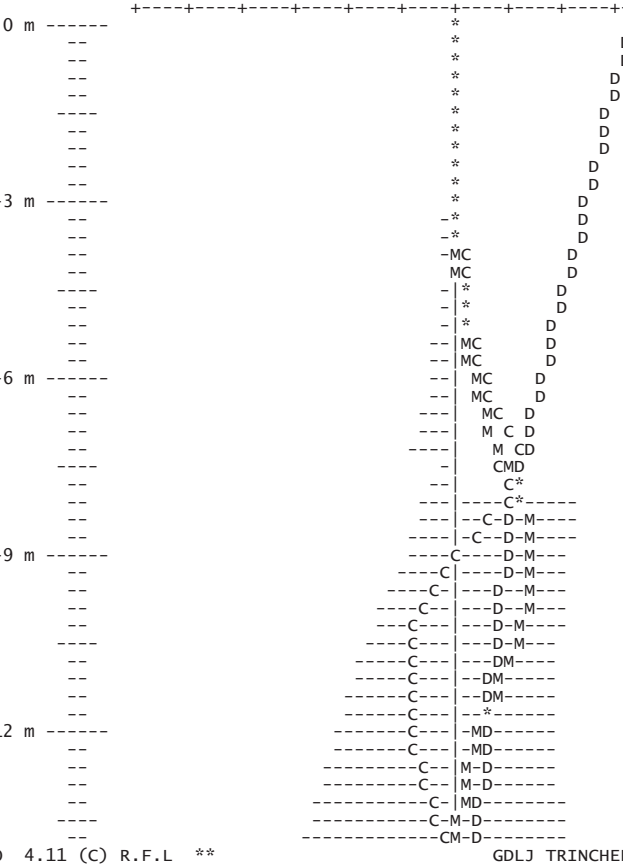






* CURVAS DE LA FASE 4 *

| | DES. | MOM. | E.CO. | PRES. |
|---|---|---|---|---|
| | -6 | -252 | -120 | 88 |
| | -3 | -126 | -60 | 44 |
| | 0 | 0 | 0 | 0 |
| | 3 | 126 | 60 | 44 |
| | 6 | 252 | 120 | 88 |
| | mm | kN.m/m | kN/m | kPa |

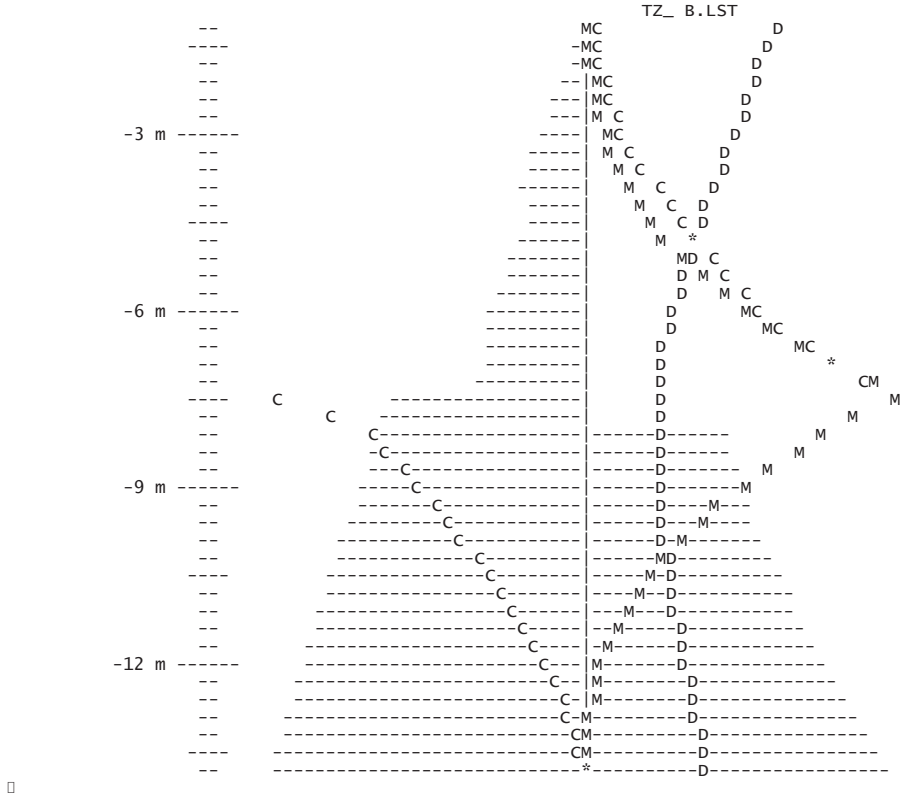




* CURVAS DE LA FASE 5 *

| | DES. | MOM. | E.CO. | PRES. |
|---|---|---|---|---|
| | -6 | -252 | -120 | 88 |
| | -3 | -126 | -60 | 44 |
| | 0 | 0 | 0 | 0 |
| | 3 | 126 | 60 | 44 |
| | 6 | 252 | 120 | 88 |
| | mm | kN.m/m | kN/m | kPa |




TZ_ B.LST
-3 m
-6 m
-9 m
-12 m

```
 ***** NOMBRE DE FICHERO DE DATOS : TZ_ C.RIO

       GDLJ TRINCHERA ZAPOPAN TZ_C                        *60L  U:NN*
       : 0
  1 ...  0
       *PILOTES SECANTE DE 1.00 m SEP 70 cm
       : -24.30 1386349
  2 ...  -24.3 1386349
       : 0.00
  3 ...  0
       * R
       : -0.90 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
  4 ...  -0.9 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
       * UG1c
       : -9.20 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
  5 ...  -9.2 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
       * UG1d
       : -37.90 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
  6 ...  -37.9 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
       * UG2
       : -39.80 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
  7 ...  -39.8 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
       * UG3a
       : -45.50 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
  8 ...  -45.5 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
       * NF
       : -5.00 0.50
  9 ...  -5 0.5
       *Fase 1
       *Excavacion hasta cota inferior nivel cubierta
       : SUC(1) 10
 10 ... SUC(1)  10
       : EXC(2) -2.60
 11 ... EXC(2)  -2.6
       : CAL(2)
 12 ... CAL(2)
       *Fase 2
       *Ejecucion del nivel cubierta
       *Excavacion hasta nivel estampidor
       : STR(0) -2.00 1.00 0.00 0.00 4000000
 13 ... STR(0)  -2 1 0 0 4000000
       : EXC(2) -11.30
 14 ... EXC(2)  -11.3
       : WAT(2) -11.80
 15 ... WAT(2)  -11.8
       : CAL(2)
 16 ... CAL(2)
       *Fase 4
       *Ejecucion del puntal metalico provisional
       *Excavacion hasta nivel losa de fondo
       : STR(0) -10.30 1.00 0.00 0.00 165000
 17 ... STR(0)  -10.3 1 0 0 165000
       : EXC(2) -15.30
 18 ... EXC(2)  -15.3
       : WAT(2) -15.80
 19 ... WAT(2)  -15.8
       : CAL(2)
 20 ... CAL(2)
       *Fase 5
       *Ejecucion de la losa de fondo
       *Retirada puntal provisional
       : STR(0) -14.70 1.00 0.00 0.00 4000000
 21 ... STR(0)  -14.7 1 0 0 4000000
       : STR(0,2)
 22 ... STR(0,2)
       : CAL(2,1)
 23 ... CAL(2,1)
       *Fase 6
       *Restitucion del nf
       : WAT(2,1) -15.30 0 103
 24 ... WAT(2,1)  -15.3 0 103
       : CAL(2,1)
 25 ... CAL(2,1)
       *Fase 7
       *Sismo
       *SISMO_ R
       : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
 26 ... PLA(1)  0.56 2.367 5 29 0 0
       *SISMO_ UG1c
       : PLA(2) 0.948 1.991 20.00 33 0.00 0.00
 27 ... PLA(2)  0.948 1.991 20 33 0 0
       *SISMO_ UG1d
       : PLA(3) 0.789 2.509 25.00 36 0.00 0.00
 28 ... PLA(3)  0.789 2.509 25 36 0 0
       *SISMO_ UG2
       : PLA(4) 0.795 2.402 30.00 35 0.00 0.00
 29 ... PLA(4)  0.795 2.402 30 35 0 0
       *SISMO_ UG3a
       : PLA(5) 0.302 10.398 246.00 58 0.00 0.00
 30 ... PLA(5)  0.302 10.398 246 58 0 0
       : CAL(2)
 31 ... CAL(2)
       : FIN
 32 ... FIN
       : GRF
 33 ... GRF
       : STA
 34 ... STA
       : EVP
 35 ... EVP
       : ASC
 36 ... ASC
       *XLS
       : STOP
 37 ... STOP
```

*PILOTES SECANTE DE 1.00 m SEP 70 cm

---

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -24.300 m : | 1386349. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -0.900 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1c

CAPA N° 2 DE -0.900 m A -9.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1d



CAPA N° 3 DE -9.200 m A -37.900 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.235 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.852 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG2

CAPA N° 4 DE -37.900 m A -39.800 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.246 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.690 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG3a

CAPA N° 5 DE -39.800 m A -45.500 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.075 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 12.162 |
| COHESIÓN | C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* NF



** FASE No 1 **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -2.600 m



FASE 1

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. SOPRAC. | ELAST. | Nº PUNTALES/ANCLAS | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PARED | | | | | EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -5.00 m<br>S. DE CAQUOT: 10.00 kPa | | | EXCAVACIÓN: -2.60 m<br>NIVEL AGUA: -5.00 m<br>S. DE CAQUOT: 0.00 kPa | | | | |
| 0.000 | 1.053 | -0.082 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.450 | 1.016 | -0.082 | 0.15 | 0.98 | | 2 4.34 | 4.34 | 4900 | 0 | | | | |
| -0.900 | 0.979 | -0.082 | 1.17 | 3.91 | | 2 8.69 | 5.15 | 4900 | 0 | | | | |
| | | | | | | -1 | | | 0 | | | | |
| -1.175 | 0.957 | -0.081 | 2.25 | 3.91 | | -1 | | | 0 | | | | |
| -1.450 | 0.935 | -0.081 | 3.32 | 3.91 | | -1 | | | 0 | | | | |
| -1.725 | 0.913 | -0.080 | 4.40 | 3.94 | | 2 0.25 | 0.25 | 20600 | 0 | | | | |
| -2.000 | 0.891 | -0.079 | 5.53 | 4.40 | | 2 3.08 | 3.08 | 20600 | 0 | | | | |
| -2.300 | 0.867 | -0.078 | 7.04 | 5.79 | | 2 6.16 | 4.55 | 20600 | 0 | | | | |
| -2.600 | 0.844 | -0.076 | 9.10 | 8.09 | | 2 9.22 | 4.55 | 20600 | 0 | | | | |
| | | | | | | 2 9.22 | 4.55 | 20600 | 2 17.39 | | 20600 | | |
| -2.900 | 0.822 | -0.074 | 11.17 | 5.78 | | 2 12.28 | 4.55 | 20600 | 2 19.52 | | 20600 | | |
| -3.200 | 0.800 | -0.071 | 12.59 | 3.74 | | 2 15.32 | 4.55 | 20600 | 2 21.67 | | 20600 | | |
| -3.500 | 0.779 | -0.068 | 13.44 | 1.97 | | 2 18.34 | 4.55 | 20600 | 2 23.83 | | 20600 | | |
| -3.800 | 0.759 | -0.065 | 13.80 | 0.44 | | 2 21.35 | 4.55 | 20600 | 2 26.01 | | 20600 | | |
| -4.100 | 0.740 | -0.062 | 13.73 | -0.84 | | 2 24.34 | 4.55 | 20600 | 2 28.21 | | 20600 | | |
| -4.400 | 0.722 | -0.059 | 13.32 | -1.89 | | 2 27.31 | 4.55 | 20600 | 2 30.43 | | 20600 | | |
| -4.700 | 0.704 | -0.057 | 12.62 | -2.72 | | 2 30.26 | 4.55 | 20600 | 2 32.67 | | 20600 | | |
| -5.000 | 0.688 | -0.054 | 11.71 | -3.34 | | 2 33.19 | 4.55 | 20600 | 2 34.92 | | 20600 | | |
| -5.262 | 0.674 | -0.052 | 10.78 | -3.71 | | 2 34.56 | 4.55 | 20600 | 2 35.71 | | 20600 | | |
| -5.525 | 0.661 | -0.050 | 9.77 | -3.94 | | 2 35.91 | 4.55 | 20600 | 2 36.51 | | 20600 | | |
| -5.788 | 0.648 | -0.048 | 8.72 | -4.03 | | 2 37.24 | 4.55 | 20600 | 2 37.32 | | 20600 | | |
| -6.050 | 0.635 | -0.047 | 7.67 | -3.98 | | 2 38.58 | 4.55 | 20600 | 2 38.14 | | 20600 | | |
| -6.312 | 0.623 | -0.045 | 6.64 | -3.80 | | 2 39.90 | 4.55 | 20600 | 2 38.96 | | 20600 | | |
| -6.575 | 0.612 | -0.044 | 5.68 | -3.50 | | 2 41.21 | 4.55 | 20600 | 2 39.80 | | 20600 | | |
| -6.837 | 0.600 | -0.043 | 4.82 | -3.06 | | 2 42.52 | 4.55 | 20600 | 2 40.64 | | 20600 | | |
| -7.100 | 0.589 | -0.042 | 4.09 | -2.51 | | 2 43.83 | 4.55 | 20600 | 2 41.48 | | 20600 | | |
| -7.363 | 0.578 | -0.041 | 3.51 | -1.83 | | 2 45.13 | 4.55 | 20600 | 2 42.33 | | 20600 | | |
| -7.625 | 0.567 | -0.041 | 3.13 | -1.04 | | 2 46.43 | 4.55 | 20600 | 2 43.18 | | 20600 | | |
| -7.887 | 0.557 | -0.040 | 2.98 | -0.13 | | 2 47.72 | 4.55 | 20600 | 2 44.04 | | 20600 | | |
| -8.150 | 0.546 | -0.040 | 3.08 | 0.89 | | 2 49.01 | 4.55 | 20600 | 2 44.90 | | 20600 | | |
| -8.412 | 0.536 | -0.039 | 3.46 | 2.03 | | 2 50.30 | 4.55 | 20600 | 2 45.76 | | 20600 | | |
| -8.675 | 0.526 | -0.038 | 4.15 | 3.28 | | 2 51.59 | 4.55 | 20600 | 2 46.63 | | 20600 | | |
| -8.938 | 0.516 | -0.037 | 5.19 | 4.63 | | 2 52.87 | 4.55 | 20600 | 2 47.50 | | 20600 | | |
| -9.200 | 0.506 | -0.036 | 6.60 | 6.10 | | 2 54.14 | 4.55 | 20600 | 2 48.37 | | 20600 | | |
| | | | | | | 2 43.79 | 4.12 | 29000 | 2 49.03 | | 29000 | | |
| -9.475 | 0.496 | -0.035 | 8.08 | 4.73 | | 2 45.15 | 4.12 | 29000 | 2 49.83 | | 29000 | | |
| -9.750 | 0.487 | -0.033 | 9.21 | 3.52 | | 2 46.50 | 4.12 | 29000 | 2 50.63 | | 29000 | | |
| -10.025 | 0.478 | -0.031 | 10.03 | 2.46 | | 2 47.83 | 4.12 | 29000 | 2 51.45 | | 29000 | | |
| -10.300 | 0.470 | -0.029 | 10.58 | 1.53 | | 2 49.15 | 4.12 | 29000 | 2 52.28 | | 29000 | | |
| -10.800 | 0.456 | -0.025 | 10.98 | 0.16 | | 2 51.50 | 4.12 | 29000 | 2 53.85 | | 29000 | | |
| -11.300 | 0.444 | -0.021 | 10.80 | -0.84 | | 2 53.80 | 4.12 | 29000 | 2 55.46 | | 29000 | | |
| -11.800 | 0.435 | -0.018 | 10.19 | -1.54 | | 2 56.04 | 4.12 | 29000 | 2 57.14 | | 29000 | | |
| -12.163 | 0.429 | -0.015 | 9.57 | -1.87 | | 2 57.63 | 4.12 | 29000 | 2 58.39 | | 29000 | | |
| -12.525 | 0.424 | -0.013 | 8.85 | -2.09 | | 2 59.19 | 4.12 | 29000 | 2 59.66 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. SOPRAC. | ELAST. | Nº PUNTALES/ANCLAS | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.887 | 0.419 | -0.010 | 8.06 | -2.22 | | 2 60.73 | 4.12 | 29000 | 2 60.96 | | 29000 | | |
| -13.250 | 0.416 | -0.008 | 7.25 | -2.27 | | 2 62.25 | 4.12 | 29000 | 2 62.28 | | 29000 | | |
| -13.613 | 0.413 | -0.007 | 6.43 | -2.25 | | 2 63.75 | 4.12 | 29000 | 2 63.62 | | 29000 | | |
| -13.975 | 0.411 | -0.005 | 5.62 | -2.18 | | 2 65.23 | 4.12 | 29000 | 2 64.98 | | 29000 | | |
| -14.337 | 0.410 | -0.004 | 4.85 | -2.07 | | 2 66.69 | 4.12 | 29000 | 2 66.35 | | 29000 | | |
| -14.700 | 0.409 | -0.002 | 4.12 | -1.94 | | 2 68.14 | 4.12 | 29000 | 2 67.74 | | 29000 | | |
| -15.000 | 0.408 | -0.002 | 3.56 | -1.81 | | 2 69.33 | 4.12 | 29000 | 2 68.89 | | 29000 | | |
| -15.300 | 0.408 | -0.001 | 3.03 | -1.68 | | 2 70.52 | 4.12 | 29000 | 2 70.06 | | 29000 | | |
| -15.800 | 0.407 | 0.000 | 2.25 | -1.44 | | 2 72.48 | 4.12 | 29000 | 2 72.01 | | 29000 | | |
| -16.066 | 0.407 | 0.000 | 1.89 | -1.32 | | 2 73.52 | 4.12 | 29000 | 2 73.05 | | 29000 | | |
| -16.331 | 0.408 | 0.001 | 1.56 | -1.19 | | 2 74.56 | 4.12 | 29000 | 2 74.09 | | 29000 | | |
| -16.597 | 0.408 | 0.001 | 1.25 | -1.07 | | 2 75.59 | 4.12 | 29000 | 2 75.14 | | 29000 | | |
| -16.862 | 0.408 | 0.001 | 0.99 | -0.95 | | 2 76.62 | 4.12 | 29000 | 2 76.19 | | 29000 | | |
| -17.128 | 0.408 | 0.001 | 0.75 | -0.84 | | 2 77.65 | 4.12 | 29000 | 2 77.24 | | 29000 | | |
| -17.394 | 0.409 | 0.002 | 0.54 | -0.73 | | 2 78.68 | 4.12 | 29000 | 2 78.29 | | 29000 | | |
| -17.659 | 0.409 | 0.002 | 0.36 | -0.63 | | 2 79.71 | 4.12 | 29000 | 2 79.34 | | 29000 | | |
| -17.925 | 0.410 | 0.002 | 0.20 | -0.54 | | 2 80.73 | 4.12 | 29000 | 2 80.39 | | 29000 | | |
| -18.191 | 0.410 | 0.002 | 0.07 | -0.45 | | 2 81.76 | 4.12 | 29000 | 2 81.44 | | 29000 | | |
| -18.456 | 0.411 | 0.002 | -0.04 | -0.37 | | 2 82.79 | 4.12 | 29000 | 2 82.50 | | 29000 | | |
| -18.722 | 0.411 | 0.002 | -0.13 | -0.30 | | 2 83.81 | 4.12 | 29000 | 2 83.55 | | 29000 | | |
| -18.987 | 0.411 | 0.002 | -0.20 | -0.23 | | 2 84.84 | 4.12 | 29000 | 2 84.60 | | 29000 | | |
| -19.253 | 0.412 | 0.002 | -0.25 | -0.17 | | 2 85.87 | 4.12 | 29000 | 2 85.65 | | 29000 | | |
| -19.519 | 0.412 | 0.002 | -0.29 | -0.12 | | 2 86.90 | 4.12 | 29000 | 2 86.70 | | 29000 | | |
| -19.784 | 0.413 | 0.001 | -0.31 | -0.07 | | 2 87.92 | 4.12 | 29000 | 2 87.75 | | 29000 | | |
| -20.050 | 0.413 | 0.001 | -0.32 | -0.03 | | 2 88.95 | 4.12 | 29000 | 2 88.81 | | 29000 | | |
| -20.316 | 0.413 | 0.001 | -0.33 | 0.01 | | 2 89.98 | 4.12 | 29000 | 2 89.86 | | 29000 | | |
| -20.581 | 0.414 | 0.001 | -0.32 | 0.04 | | 2 91.01 | 4.12 | 29000 | 2 90.91 | | 29000 | | |
| -20.847 | 0.414 | 0.001 | -0.31 | 0.07 | | 2 92.04 | 4.12 | 29000 | 2 91.96 | | 29000 | | |
| -21.112 | 0.414 | 0.001 | -0.29 | 0.09 | | 2 93.07 | 4.12 | 29000 | 2 93.00 | | 29000 | | |
| -21.378 | 0.415 | 0.001 | -0.26 | 0.10 | | 2 94.10 | 4.12 | 29000 | 2 94.05 | | 29000 | | |
| -21.644 | 0.415 | 0.001 | -0.23 | 0.11 | | 2 95.13 | 4.12 | 29000 | 2 95.10 | | 29000 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -21.909 | 0.415 | 0.001 | -0.20 | 0.12 | | 2 | 96.16 | 4.12 | 29000 | 2 | 96.15 | | 29000 | | |
| -22.175 | 0.416 | 0.001 | -0.17 | 0.12 | | 2 | 97.20 | 4.12 | 29000 | 2 | 97.20 | | 29000 | | |
| -22.441 | 0.416 | 0.001 | -0.14 | 0.12 | | 2 | 98.23 | 4.12 | 29000 | 2 | 98.24 | | 29000 | | |
| -22.706 | 0.416 | 0.001 | -0.11 | 0.11 | | 2 | 99.26 | 4.12 | 29000 | 2 | 99.29 | | 29000 | | |
| -22.972 | 0.416 | 0.001 | -0.08 | 0.10 | | 2 | 100.29 | 4.12 | 29000 | 2 | 100.34 | | 29000 | | |
| -23.237 | 0.417 | 0.001 | -0.05 | 0.09 | | 2 | 101.33 | 4.12 | 29000 | 2 | 101.38 | | 29000 | | |
| -23.503 | 0.417 | 0.001 | -0.03 | 0.07 | | 2 | 102.36 | 4.12 | 29000 | 2 | 102.43 | | 29000 | | |
| -23.769 | 0.417 | 0.001 | -0.01 | 0.05 | | 2 | 103.39 | 4.12 | 29000 | 2 | 103.48 | | 29000 | | |
| -24.034 | 0.417 | 0.001 | 0.00 | 0.03 | | 2 | 104.42 | 4.12 | 29000 | 2 | 104.52 | | 29000 | | |
| -24.300 | 0.417 | 0.001 | 0.00 | 0.00 | | 2 | 105.46 | 4.12 | 29000 | 2 | 105.57 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 1.05 mm

MOMENTO MÁXIMO = 13.80 kN.m/m

CODIFICACIÓN : -1 = SEPARACIÓN
DE ESTADO : 0 = EXCAVACIÓN
DE SUELO : 1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 98.36 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.080 = (1387.08 kN/m)/(17239.37 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.115 = (1387.08 kN/m)/(12095.38 kN/m)



** FASE No 2 **

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel estampidor

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -2.000 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 4000000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -11.300 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -11.800 m



FASE 2

PARED

SOIL 1: EXCAVACIÓN: 0.00 m; NIVEL AGUA: -5.00 m; S. DE CAQUOT: 10.00 kPa

SOIL 2: EXCAVACIÓN: -11.30 m; NIVEL AGUA: -11.80 m; S. DE CAQUOT: 0.00 kPa

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -1.405 | 1.159 | 0.00 | 0.00 | | 2 | 12.03 | 5.15 | 4900 | 0 | | | |
| -0.450 | -0.883 | 1.159 | 1.27 | 5.78 | | 2 | 13.65 | 5.15 | 4900 | 0 | | | |
| -0.900 | -0.362 | 1.160 | 5.31 | 12.29 | | 2 | 15.27 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 19.38 | 4.55 | 20600 | 0 | | | |
| -1.175 | -0.043 | 1.161 | 9.37 | 17.04 | | 2 | 15.18 | 4.55 | 20600 | 0 | | | |
| -1.450 | 0.277 | 1.163 | 14.57 | 20.63 | | 2 | 10.97 | 4.55 | 20600 | 0 | | | |
| -1.725 | 0.597 | 1.167 | 20.61 | 23.07 | | 2 | 6.75 | 4.55 | 20600 | 0 | | | |
| -2.000 | 0.919 | 1.172 | 27.16 | 24.34 | | 2 | 2.51 | 2.51 | 20600 | 0 | | | |
| | | | | -86.98 | | 2 | 2.51 | 2.51 | 20600 | 0 | | 1 | -111.33 |
| -2.300 | 1.271 | 1.175 | 1.14 | -86.61 | | -1 | | | | 0 | | | |
| -2.600 | 1.623 | 1.172 | -24.85 | -86.61 | | -1 | | | | 0 | | | |
| -2.900 | 1.974 | 1.164 | -50.83 | -86.61 | | -1 | | | | 0 | | | |
| -3.200 | 2.321 | 1.150 | -76.81 | -86.61 | | -1 | | | | 0 | | | |
| -3.500 | 2.663 | 1.131 | -102.79 | -86.61 | | -1 | | | | 0 | | | |
| -3.800 | 2.999 | 1.106 | -128.77 | -86.61 | | -1 | | | | 0 | | | |
| -4.100 | 3.326 | 1.075 | -154.74 | -86.49 | | 1 | 0.80 | 0.80 | 20600 | 0 | | | |
| -4.400 | 3.643 | 1.039 | -180.63 | -86.02 | | 1 | 2.33 | 2.33 | 20600 | 0 | | | |
| -4.700 | 3.949 | 0.997 | -206.31 | -85.09 | | 1 | 3.86 | 2.68 | 20600 | 0 | | | |
| -5.000 | 4.241 | 0.949 | -231.64 | -83.70 | | 1 | 5.39 | 2.68 | 20600 | 0 | | | |
| -5.262 | 4.484 | 0.903 | -253.38 | -81.86 | 2.58 | 1 | 6.02 | 2.68 | 20600 | 0 | | | |
| -5.525 | 4.715 | 0.854 | -274.54 | -79.19 | 5.15 | 1 | 6.65 | 2.68 | 20600 | 0 | | | |
| -5.788 | 4.932 | 0.800 | -294.88 | -75.67 | 7.73 | 1 | 7.29 | 2.68 | 20600 | 0 | | | |
| -6.050 | 5.134 | 0.742 | -314.19 | -71.30 | 10.30 | 1 | 7.92 | 2.68 | 20600 | 0 | | | |
| -6.312 | 5.321 | 0.681 | -332.24 | -66.10 | 12.88 | 1 | 8.55 | 2.68 | 20600 | 0 | | | |
| -6.575 | 5.491 | 0.616 | -348.82 | -60.05 | 15.45 | 1 | 9.19 | 2.68 | 20600 | 0 | | | |
| -6.837 | 5.644 | 0.549 | -363.70 | -53.17 | 18.03 | 1 | 9.82 | 2.68 | 20600 | 0 | | | |
| -7.100 | 5.779 | 0.479 | -376.66 | -45.44 | 20.60 | 1 | 10.45 | 2.68 | 20600 | 0 | | | |
| -7.363 | 5.895 | 0.406 | -387.48 | -36.86 | 23.18 | 1 | 11.09 | 2.68 | 20600 | 0 | | | |
| -7.625 | 5.992 | 0.332 | -395.94 | -27.45 | 25.75 | 1 | 11.72 | 2.68 | 20600 | 0 | | | |
| -7.887 | 6.069 | 0.256 | -401.82 | -17.19 | 28.33 | 1 | 12.35 | 2.68 | 20600 | 0 | | | |
| -8.150 | 6.127 | 0.180 | -404.89 | -6.09 | 30.90 | 1 | 12.99 | 2.68 | 20600 | 0 | | | |
| -8.412 | 6.164 | 0.103 | -404.94 | 5.85 | 33.48 | 1 | 13.62 | 2.68 | 20600 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -8.675 | 6.181 | 0.027 | -401.75 | 18.63 | 36.05 | 1 | 14.25 | 2.68 | 20600 | 0 | | | | | | | |
| -8.938 | 6.178 | -0.049 | -395.08 | 32.26 | 38.63 | 1 | 14.88 | 2.68 | 20600 | 0 | | | | | | | |
| -9.200 | 6.155 | -0.123 | -384.74 | 46.73 | 41.20 | 1 | 15.52 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 41.20 | 1 | 7.07 | 2.35 | 29000 | 0 | | | | | | | |
| -9.475 | 6.111 | -0.197 | -370.02 | 60.46 | 43.90 | 1 | 7.68 | 2.35 | 29000 | 0 | | | | | | | |
| -9.750 | 6.047 | -0.269 | -351.40 | 75.10 | 46.60 | 1 | 8.30 | 2.35 | 29000 | 0 | | | | | | | |
| -10.025 | 5.964 | -0.337 | -328.63 | 90.65 | 49.30 | 1 | 8.91 | 2.35 | 29000 | 0 | | | | | | | |
| -10.300 | 5.862 | -0.399 | -301.46 | 107.11 | 51.99 | 1 | 9.52 | 2.35 | 29000 | 0 | | | | | | | |
| -10.800 | 5.637 | -0.497 | -239.97 | 139.37 | 56.90 | 1 | 10.64 | 2.35 | 29000 | 0 | | | | | | | |
| -11.300 | 5.369 | -0.570 | -161.59 | 174.65 | 61.80 | 1 | 11.76 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | | 61.80 | 1 | 11.76 | 2.35 | 29000 | 3 | 98.13 | | 29000 | | | | |
| -11.800 | 5.072 | -0.613 | -78.65 | 154.48 | 66.71 | 1 | 12.87 | 2.35 | 29000 | 3 | 135.69 | | 29000 | | | | |
| -12.163 | 4.847 | -0.627 | -26.54 | 132.42 | 66.71 | 1 | 13.68 | 2.35 | 29000 | 2 | 146.00 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.525 | 4.619 | -0.628 | 17.28 | 109.72 | 66.71 | 1 | 14.49 | 2.35 | 29000 | 2 | 140.81 | 29000 | |
| -12.887 | 4.393 | -0.618 | 53.26 | 89.19 | 66.71 | 1 | 15.30 | 2.35 | 29000 | 2 | 135.67 | 29000 | |
| -13.250 | 4.172 | -0.601 | 82.20 | 70.79 | 66.71 | 1 | 16.11 | 2.35 | 29000 | 2 | 130.68 | 29000 | |
| -13.613 | 3.958 | -0.576 | 104.83 | 54.45 | 66.71 | 1 | 16.92 | 2.35 | 29000 | 2 | 125.91 | 29000 | |
| -13.975 | 3.755 | -0.546 | 121.91 | 40.08 | 66.71 | 1 | 17.73 | 2.35 | 29000 | 2 | 121.42 | 29000 | |
| -14.337 | 3.563 | -0.513 | 134.12 | 27.57 | 66.71 | 1 | 18.54 | 2.35 | 29000 | 2 | 117.27 | 29000 | |
| -14.700 | 3.384 | -0.477 | 142.11 | 16.80 | 66.71 | 1 | 19.35 | 2.35 | 29000 | 2 | 113.49 | 29000 | |
| -15.000 | 3.245 | -0.445 | 145.96 | 9.09 | 66.71 | 1 | 20.02 | 2.35 | 29000 | 2 | 110.65 | 29000 | |
| -15.300 | 3.116 | -0.413 | 147.66 | 2.40 | 66.71 | 1 | 20.69 | 2.35 | 29000 | 2 | 108.09 | 29000 | |
| -15.800 | 2.923 | -0.360 | 146.47 | -6.76 | 66.71 | 1 | 21.80 | 2.35 | 29000 | 2 | 104.44 | 29000 | |
| -16.066 | 2.831 | -0.332 | 144.14 | -10.70 | 66.71 | 1 | 22.40 | 2.35 | 29000 | 2 | 102.81 | 29000 | |
| -16.331 | 2.746 | -0.305 | 140.84 | -14.07 | 66.71 | 1 | 22.99 | 2.35 | 29000 | 2 | 101.40 | 29000 | |
| -16.597 | 2.669 | -0.279 | 136.71 | -16.94 | 66.71 | 1 | 23.58 | 2.35 | 29000 | 2 | 100.19 | 29000 | |
| -16.862 | 2.598 | -0.253 | 131.88 | -19.36 | 66.71 | 1 | 24.17 | 2.35 | 29000 | 2 | 99.18 | 29000 | |
| -17.128 | 2.534 | -0.228 | 126.46 | -21.37 | 66.71 | 1 | 24.77 | 2.35 | 29000 | 2 | 98.37 | 29000 | |
| -17.394 | 2.477 | -0.204 | 120.56 | -23.04 | 66.71 | 1 | 25.36 | 2.35 | 29000 | 2 | 97.74 | 29000 | |
| -17.659 | 2.426 | -0.182 | 114.25 | -24.41 | 66.71 | 1 | 25.95 | 2.35 | 29000 | 2 | 97.30 | 29000 | |
| -17.925 | 2.380 | -0.161 | 107.61 | -25.53 | 66.71 | 1 | 26.55 | 2.35 | 29000 | 2 | 97.02 | 29000 | |
| -18.191 | 2.340 | -0.141 | 100.71 | -26.43 | 66.71 | 1 | 27.14 | 2.35 | 29000 | 2 | 96.90 | 29000 | |
| -18.456 | 2.305 | -0.122 | 93.58 | -27.16 | 66.71 | 2 | 27.83 | 2.45 | 29000 | 2 | 96.93 | 29000 | |
| -18.722 | 2.275 | -0.105 | 86.31 | -27.56 | 66.71 | 2 | 29.75 | 3.77 | 29000 | 2 | 97.09 | 29000 | |
| -18.987 | 2.250 | -0.089 | 78.98 | -27.53 | 66.71 | 2 | 31.53 | 4.12 | 29000 | 2 | 97.39 | 29000 | |
| -19.253 | 2.228 | -0.075 | 71.71 | -27.14 | 66.71 | 2 | 33.20 | 4.12 | 29000 | 2 | 97.80 | 29000 | |
| -19.519 | 2.210 | -0.061 | 64.59 | -26.44 | 66.71 | 2 | 34.76 | 4.12 | 29000 | 2 | 98.32 | 29000 | |
| -19.784 | 2.195 | -0.050 | 57.69 | -25.49 | 66.71 | 2 | 36.23 | 4.12 | 29000 | 2 | 98.93 | 29000 | |
| -20.050 | 2.183 | -0.039 | 51.07 | -24.33 | 66.71 | 2 | 37.61 | 4.12 | 29000 | 2 | 99.63 | 29000 | |
| -20.316 | 2.174 | -0.030 | 44.78 | -23.02 | 66.71 | 2 | 38.92 | 4.12 | 29000 | 2 | 100.40 | 29000 | |
| -20.581 | 2.167 | -0.022 | 38.85 | -21.57 | 66.71 | 2 | 40.16 | 4.12 | 29000 | 2 | 101.24 | 29000 | |
| -20.847 | 2.162 | -0.015 | 33.33 | -20.04 | 66.71 | 2 | 41.34 | 4.12 | 29000 | 2 | 102.13 | 29000 | |
| -21.112 | 2.159 | -0.009 | 28.21 | -18.44 | 66.71 | 2 | 42.47 | 4.12 | 29000 | 2 | 103.08 | 29000 | |
| -21.378 | 2.157 | -0.004 | 23.53 | -16.81 | 66.71 | 2 | 43.57 | 4.12 | 29000 | 2 | 104.07 | 29000 | |
| -21.644 | 2.157 | 0.000 | 19.28 | -15.16 | 66.71 | 2 | 44.62 | 4.12 | 29000 | 2 | 105.09 | 29000 | |
| -21.909 | 2.157 | 0.003 | 15.48 | -13.50 | 66.71 | 2 | 45.65 | 4.12 | 29000 | 2 | 106.14 | 29000 | |
| -22.175 | 2.158 | 0.006 | 12.11 | -11.86 | 66.71 | 2 | 46.66 | 4.12 | 29000 | 2 | 107.21 | 29000 | |
| -22.441 | 2.160 | 0.008 | 9.18 | -10.24 | 66.71 | 2 | 47.65 | 4.12 | 29000 | 2 | 108.30 | 29000 | |
| -22.706 | 2.162 | 0.009 | 6.67 | -8.65 | 66.71 | 2 | 48.62 | 4.12 | 29000 | 2 | 109.41 | 29000 | |
| -22.972 | 2.165 | 0.010 | 4.58 | -7.09 | 66.71 | 2 | 49.59 | 4.12 | 29000 | 2 | 110.52 | 29000 | |
| -23.237 | 2.168 | 0.011 | 2.90 | -5.58 | 66.71 | 2 | 50.54 | 4.12 | 29000 | 2 | 111.65 | 29000 | |
| -23.503 | 2.171 | 0.011 | 1.61 | -4.12 | 66.71 | 2 | 51.50 | 4.12 | 29000 | 2 | 112.77 | 29000 | |
| -23.769 | 2.174 | 0.012 | 0.71 | -2.70 | 66.71 | 2 | 52.45 | 4.12 | 29000 | 2 | 113.90 | 29000 | |
| -24.034 | 2.177 | 0.012 | 0.17 | -1.32 | 66.71 | 2 | 53.40 | 4.12 | 29000 | 2 | 115.03 | 29000 | |
| -24.300 | 2.180 | 0.012 | 0.00 | 0.00 | 66.71 | 2 | 54.35 | 4.12 | 29000 | 2 | 116.16 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

| | | | |
|---|---|---|---|
| DESPLAZAMIENTO MÁX. = 6.18 mm | | CODIFICACIÓN DE ESTADO : | -1 = SEPARACIÓN<br>0 = EXCAVACIÓN<br>1 = PRESIÓN ACTIVA |
| MOMENTO MÁXIMO = -404.94 kN.m/m | | DE SUELO : | 2 = ELÁSTICO<br>3 = PRESIÓN PASSIVA |

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 68.67 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.028 = (482.64 kN/m)/(17239.37 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.310 = (1431.97 kN/m)/(4613.45 kN/m)





**  FASE No  3  **

*Fase 4
*Ejecucion del puntal metalico provisional
*Excavacion hasta nivel losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 2 NIVEL = -10.300 m

TZ_ C.LST
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 164999.984 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -15.300 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -15.800 m



FASE 3

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -5.00 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -15.30 m NIVEL AGUA: -15.80 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -1.371 | 1.137 | 0.00 | 0.00 | | 2 | 11.87 | 5.15 | 4900 | 0 | | | |
| -0.450 | -0.860 | 1.137 | 1.26 | 5.72 | | 2 | 13.53 | 5.15 | 4900 | 0 | | | |
| -0.900 | -0.348 | 1.138 | 5.26 | 12.18 | | 2 | 15.20 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 19.09 | 4.55 | 20600 | 0 | | | |
| -1.175 | -0.035 | 1.139 | 9.28 | 16.87 | | 2 | 15.02 | 4.55 | 20600 | 0 | | | |
| -1.450 | 0.279 | 1.142 | 14.43 | 20.44 | | 2 | 10.93 | 4.55 | 20600 | 0 | | | |
| -1.725 | 0.593 | 1.145 | 20.41 | 22.88 | | 2 | 6.84 | 4.55 | 20600 | 0 | | | |
| -2.000 | 0.909 | 1.150 | 26.91 | 24.19 | | 2 | 2.71 | 2.71 | 20600 | 0 | | | |
| | | | | -46.57 | | 2 | 2.71 | 2.71 | 20600 | 0 | | 1 | -70.76 |
| -2.300 | 1.254 | 1.154 | 13.02 | -46.16 | | -1 | | | | 0 | | | |
| -2.600 | 1.601 | 1.155 | -0.82 | -46.16 | | -1 | | | | 0 | | | |
| -2.900 | 1.947 | 1.154 | -14.67 | -46.16 | | -1 | | | | 0 | | | |
| -3.200 | 2.293 | 1.149 | -28.52 | -46.16 | | -1 | | | | 0 | | | |
| -3.500 | 2.636 | 1.141 | -42.37 | -46.16 | | -1 | | | | 0 | | | |
| -3.800 | 2.977 | 1.131 | -56.22 | -46.16 | | -1 | | | | 0 | | | |
| -4.100 | 3.314 | 1.117 | -70.05 | -46.00 | | 2 | 1.05 | 1.05 | 20600 | 0 | | | |
| -4.400 | 3.647 | 1.100 | -83.78 | -45.50 | | 1 | 2.33 | 2.33 | 20600 | 0 | | | |
| -4.700 | 3.974 | 1.081 | -97.31 | -44.57 | | 1 | 3.86 | 2.68 | 20600 | 0 | | | |
| -5.000 | 4.295 | 1.058 | -110.48 | -43.18 | | 1 | 5.39 | 2.68 | 20600 | 0 | | | |
| -5.262 | 4.570 | 1.036 | -121.59 | -41.35 | 2.58 | 1 | 6.02 | 2.68 | 20600 | 0 | | | |
| -5.525 | 4.839 | 1.012 | -132.11 | -38.67 | 5.15 | 1 | 6.65 | 2.68 | 20600 | 0 | | | |
| -5.788 | 5.101 | 0.986 | -141.82 | -35.15 | 7.73 | 1 | 7.29 | 2.68 | 20600 | 0 | | | |
| -6.050 | 5.356 | 0.959 | -150.49 | -30.79 | 10.30 | 1 | 7.92 | 2.68 | 20600 | 0 | | | |
| -6.312 | 5.604 | 0.929 | -157.91 | -25.58 | 12.88 | 1 | 8.55 | 2.68 | 20600 | 0 | | | |
| -6.575 | 5.844 | 0.899 | -163.85 | -19.54 | 15.45 | 1 | 9.19 | 2.68 | 20600 | 0 | | | |
| -6.837 | 6.076 | 0.867 | -168.09 | -12.65 | 18.03 | 1 | 9.82 | 2.68 | 20600 | 0 | | | |
| -7.100 | 6.300 | 0.835 | -170.42 | -4.92 | 20.60 | 1 | 10.45 | 2.68 | 20600 | 0 | | | |
| -7.363 | 6.515 | 0.803 | -170.60 | 3.65 | 23.18 | 1 | 11.09 | 2.68 | 20600 | 0 | | | |
| -7.625 | 6.721 | 0.771 | -168.42 | 13.07 | 25.75 | 1 | 11.72 | 2.68 | 20600 | 0 | | | |
| -7.887 | 6.919 | 0.739 | -163.67 | 23.33 | 28.33 | 1 | 12.35 | 2.68 | 20600 | 0 | | | |
| -8.150 | 7.109 | 0.709 | -156.10 | 34.43 | 30.90 | 1 | 12.99 | 2.68 | 20600 | 0 | | | |
| -8.412 | 7.292 | 0.680 | -145.52 | 46.37 | 33.48 | 1 | 13.62 | 2.68 | 20600 | 0 | | | |
| -8.675 | 7.467 | 0.654 | -131.69 | 59.15 | 36.05 | 1 | 14.25 | 2.68 | 20600 | 0 | | | |
| -8.938 | 7.635 | 0.631 | -114.39 | 72.78 | 38.63 | 1 | 14.88 | 2.68 | 20600 | 0 | | | |
| -9.200 | 7.798 | 0.611 | -93.41 | 87.24 | 41.20 | 1 | 15.52 | 2.68 | 20600 | 0 | | | |
| | | | | | 41.20 | 1 | 7.07 | 2.35 | 29000 | 0 | | | |
| -9.475 | 7.964 | 0.595 | -67.55 | 100.97 | 43.90 | 1 | 7.68 | 2.35 | 29000 | 0 | | | |
| -9.750 | 8.126 | 0.585 | -37.79 | 115.61 | 46.60 | 1 | 8.30 | 2.35 | 29000 | 0 | | | |
| -10.025 | 8.286 | 0.580 | -3.88 | 131.17 | 49.30 | 1 | 8.91 | 2.35 | 29000 | 0 | | | |
| -10.300 | 8.446 | 0.583 | 34.44 | 147.63 | 51.99 | 1 | 9.52 | 2.35 | 29000 | 0 | | | |
| | | | | -278.66 | 51.99 | 1 | 9.52 | 2.35 | 29000 | 0 | | 2 | -426.29 |
| -10.800 | 8.737 | 0.572 | -96.95 | -246.40 | 56.90 | 1 | 10.64 | 2.35 | 29000 | 0 | | | |
| -11.300 | 9.010 | 0.515 | -211.46 | -211.12 | 61.80 | 1 | 11.76 | 2.35 | 29000 | 0 | | | |
| -11.800 | 9.246 | 0.421 | -307.57 | -172.84 | 66.71 | 1 | 12.87 | 2.35 | 29000 | 0 | | | |
| -12.163 | 9.383 | 0.333 | -364.90 | -143.20 | 70.26 | 1 | 13.68 | 2.35 | 29000 | 0 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.525 | 9.486 | 0.231 | -411.20 | -111.98 | 73.82 | 1 | 14.49 | 2.35 | 29000 | 0 | | | |
| -12.887 | 9.549 | 0.119 | -445.89 | -79.17 | 77.38 | 1 | 15.30 | 2.35 | 29000 | 0 | | | |
| -13.250 | 9.571 | -0.001 | -468.41 | -44.79 | 80.93 | 1 | 16.11 | 2.35 | 29000 | 0 | | | |
| -13.613 | 9.548 | -0.125 | -478.17 | -8.82 | 84.49 | 1 | 16.92 | 2.35 | 29000 | 0 | | | |
| -13.975 | 9.480 | -0.250 | -474.61 | 28.74 | 88.04 | 1 | 17.73 | 2.35 | 29000 | 0 | | | |
| -14.337 | 9.368 | -0.372 | -457.15 | 67.87 | 91.60 | 1 | 18.54 | 2.35 | 29000 | 0 | | | |
| -14.700 | 9.212 | -0.487 | -425.21 | 108.59 | 95.16 | 1 | 19.35 | 2.35 | 29000 | 0 | | | |
| -15.000 | 9.052 | -0.576 | -387.43 | 143.48 | 98.10 | 1 | 20.02 | 2.35 | 29000 | 0 | | | |
| -15.300 | 8.867 | -0.654 | -339.02 | 179.46 | 101.04 | 1 | 20.69 | 2.35 | 29000 | 0 | | | |
| | | | | | 101.04 | 1 | 20.69 | 2.35 | 29000 | 3 | 98.13 | 29000 | |
| -15.800 | 8.512 | -0.760 | -247.65 | 183.37 | 105.95 | 1 | 21.80 | 2.35 | 29000 | 3 | 135.69 | 29000 | |
| -16.066 | 8.304 | -0.803 | -199.33 | 180.05 | 105.95 | 1 | 22.40 | 2.35 | 29000 | 3 | 145.41 | 29000 | |
| -16.331 | 8.086 | -0.837 | -152.22 | 174.31 | 105.95 | 1 | 22.99 | 2.35 | 29000 | 3 | 155.13 | 29000 | |
| -16.597 | 7.861 | -0.861 | -106.95 | 166.14 | 105.95 | 1 | 23.58 | 2.35 | 29000 | 3 | 164.85 | 29000 | |
| -16.862 | 7.629 | -0.878 | -64.17 | 155.54 | 105.95 | 1 | 24.17 | 2.35 | 29000 | 3 | 174.57 | 29000 | |
| -17.128 | 7.395 | -0.886 | -24.53 | 142.52 | 105.95 | 1 | 24.77 | 2.35 | 29000 | 3 | 184.29 | 29000 | |
| -17.394 | 7.159 | -0.887 | 11.33 | 127.08 | 105.95 | 1 | 25.36 | 2.35 | 29000 | 3 | 194.01 | 29000 | |
| -17.659 | 6.924 | -0.882 | 42.77 | 109.21 | 105.95 | 1 | 25.95 | 2.35 | 29000 | 3 | 203.73 | 29000 | |
| -17.925 | 6.691 | -0.871 | 69.22 | 89.86 | 105.95 | 1 | 26.55 | 2.35 | 29000 | 2 | 206.37 | 29000 | |
| -18.191 | 6.461 | -0.856 | 90.56 | 71.06 | 105.95 | 1 | 27.14 | 2.35 | 29000 | 2 | 200.76 | 29000 | |
| -18.456 | 6.236 | -0.837 | 107.12 | 53.90 | 105.95 | 1 | 27.73 | 2.35 | 29000 | 2 | 195.27 | 29000 | |
| -18.722 | 6.017 | -0.815 | 119.33 | 38.32 | 105.95 | 1 | 28.33 | 2.35 | 29000 | 2 | 189.95 | 29000 | |
| -18.987 | 5.804 | -0.792 | 127.61 | 24.30 | 105.95 | 1 | 28.92 | 2.35 | 29000 | 2 | 184.80 | 29000 | |
| -19.253 | 5.597 | -0.767 | 132.37 | 11.77 | 105.95 | 1 | 29.51 | 2.35 | 29000 | 2 | 179.83 | 29000 | |
| -19.519 | 5.396 | -0.741 | 134.00 | 0.70 | 105.95 | 1 | 30.10 | 2.35 | 29000 | 2 | 175.07 | 29000 | |
| -19.784 | 5.203 | -0.715 | 132.87 | -8.98 | 105.95 | 1 | 30.70 | 2.35 | 29000 | 2 | 170.50 | 29000 | |
| -20.050 | 5.016 | -0.690 | 129.34 | -17.31 | 105.95 | 1 | 31.29 | 2.35 | 29000 | 2 | 166.12 | 29000 | |
| -20.316 | 4.836 | -0.666 | 123.78 | -24.35 | 105.95 | 1 | 31.88 | 2.35 | 29000 | 2 | 161.94 | 29000 | |
| -20.581 | 4.662 | -0.643 | 116.52 | -30.14 | 105.95 | 1 | 32.48 | 2.35 | 29000 | 2 | 157.94 | 29000 | |
| -20.847 | 4.494 | -0.621 | 107.88 | -34.74 | 105.95 | 1 | 33.07 | 2.35 | 29000 | 2 | 154.11 | 29000 | |
| -21.112 | 4.332 | -0.602 | 98.17 | -38.18 | 105.95 | 1 | 33.66 | 2.35 | 29000 | 2 | 150.44 | 29000 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -21.378 | 4.175 | -0.584 | 87.69 | -40.51 | 105.95 | 1 | 34.26 | 2.35 | 29000 | 2 | 146.91 | | 29000 | | | | | | | | | | | | |
| -21.644 | 4.022 | -0.568 | 76.74 | -41.77 | 105.95 | 1 | 34.85 | 2.35 | 29000 | 2 | 143.52 | | 29000 | | | | | | | | | | | | |
| -21.909 | 3.873 | -0.554 | 65.59 | -41.97 | 105.95 | 1 | 35.44 | 2.35 | 29000 | 2 | 140.24 | | 29000 | | | | | | | | | | | | |
| -22.175 | 3.727 | -0.543 | 54.53 | -41.17 | 105.95 | 1 | 36.03 | 2.35 | 29000 | 2 | 137.05 | | 29000 | | | | | | | | | | | | |
| -22.441 | 3.584 | -0.534 | 43.81 | -39.36 | 105.95 | 1 | 36.63 | 2.35 | 29000 | 2 | 133.95 | | 29000 | | | | | | | | | | | | |
| -22.706 | 3.443 | -0.526 | 33.70 | -36.59 | 105.95 | 1 | 37.22 | 2.35 | 29000 | 2 | 130.91 | | 29000 | | | | | | | | | | | | |
| -22.972 | 3.304 | -0.521 | 24.46 | -32.86 | 105.95 | 1 | 37.81 | 2.35 | 29000 | 2 | 127.91 | | 29000 | | | | | | | | | | | | |
| -23.237 | 3.167 | -0.517 | 16.33 | -28.18 | 105.95 | 1 | 38.41 | 2.35 | 29000 | 2 | 124.96 | | 29000 | | | | | | | | | | | | |
| -23.503 | 3.030 | -0.514 | 9.57 | -22.56 | 105.95 | 1 | 39.00 | 2.35 | 29000 | 2 | 122.03 | | 29000 | | | | | | | | | | | | |
| -23.769 | 2.893 | -0.513 | 4.43 | -16.00 | 105.95 | 1 | 39.59 | 2.35 | 29000 | 2 | 119.11 | | 29000 | | | | | | | | | | | | |
| -24.034 | 2.757 | -0.512 | 1.16 | -8.52 | 105.95 | 1 | 40.19 | 2.35 | 29000 | 2 | 116.21 | | 29000 | | | | | | | | | | | | |
| -24.300 | 2.621 | -0.512 | 0.00 | 0.00 | 105.95 | 2 | 41.55 | 3.12 | 29000 | 2 | 113.30 | | 29000 | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | | | | | | | | | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |
| | DESPLAZAMIENTO MÁX. = 9.57 mm | | | | | CODIFICACIÓN DE ESTADO DE SUELO | | | -1 = SEPARACIÓN<br>0 = EXCAVACIÓN<br>1 = PRESIÓN ACTIVA<br>2 = ELÁSTICO<br>3 = PRESIÓN PASSIVA | | | | |
| | MOMENTO MÁXIMO = -478.17 kN.m/m | | | | | | | | | | | | |

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 58.86 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.025 = (432.83 kN/m)/(17239.37 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.556 = (1408.46 kN/m)/(2533.76 kN/m)



**  FASE No 4  **

*Fase 5
*Ejecucion de la losa de fondo
*Retirada puntal provisional

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 3
NIVEL = -14.700 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 4000000.000 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE PUNTALES N° 2



FASE 4

| | PARED | SOIL 1: EXCAVACIÓN: 0.00 m, NIVEL AGUA: -5.00 m, S. DE CAQUOT: 10.00 kPa | SOIL 2: EXCAVACIÓN: -15.30 m, NIVEL AGUA: -15.80 m, S. DE CAQUOT: 0.00 kPa | |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -4.034 | 2.480 | 0.00 | 0.00 | | 2 | 24.92 | 7.94 | 4900 | 0 | | | |
| -0.450 | -2.918 | 2.480 | 2.48 | 10.92 | | 2 | 23.62 | 5.15 | 4900 | 0 | | | |
| -0.900 | -1.802 | 2.482 | 9.74 | 21.26 | | 2 | 22.32 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 49.03 | 4.55 | 20600 | 0 | | | |
| -1.175 | -1.119 | 2.485 | 17.29 | 33.13 | | 2 | 37.34 | 4.55 | 20600 | 0 | | | |
| -1.450 | -0.435 | 2.489 | 27.67 | 41.79 | | 2 | 25.63 | 4.55 | 20600 | 0 | | | |
| -1.725 | 0.251 | 2.496 | 39.98 | 47.23 | | 2 | 13.89 | 4.55 | 20600 | 0 | | | |
| -2.000 | 0.938 | 2.505 | 53.35 | 49.43 | | 2 | 2.10 | 2.10 | 20600 | 0 | | | |
| | | | | -139.88 | | 2 | 2.10 | 2.10 | 20600 | 0 | | 1 | -189.31 |
| -2.300 | 1.691 | 2.512 | 11.45 | -139.57 | | -1 | | | | 0 | | | |
| -2.600 | 2.445 | 2.510 | -30.42 | -139.57 | | -1 | | | | 0 | | | |
| -2.900 | 3.196 | 2.499 | -72.29 | -139.57 | | -1 | | | | 0 | | | |
| -3.200 | 3.943 | 2.479 | -114.16 | -139.57 | | -1 | | | | 0 | | | |
| -3.500 | 4.683 | 2.450 | -156.03 | -139.57 | | -1 | | | | 0 | | | |
| -3.800 | 5.412 | 2.411 | -197.90 | -139.57 | | -1 | | | | 0 | | | |
| -4.100 | 6.128 | 2.364 | -239.76 | -139.45 | | 1 | 0.80 | 0.80 | 20600 | 0 | | | |
| -4.400 | 6.829 | 2.308 | -281.53 | -138.97 | | 1 | 2.33 | 2.33 | 20600 | 0 | | | |
| -4.700 | 7.512 | 2.242 | -323.10 | -138.05 | | 1 | 3.86 | 2.68 | 20600 | 0 | | | |
| -5.000 | 8.174 | 2.168 | -364.31 | -136.66 | | 1 | 5.39 | 2.68 | 20600 | 0 | | | |
| -5.262 | 8.733 | 2.095 | -399.96 | -134.82 | 2.58 | 1 | 6.02 | 2.68 | 20600 | 0 | | | |
| -5.525 | 9.273 | 2.016 | -435.02 | -132.15 | 5.15 | 1 | 6.65 | 2.68 | 20600 | 0 | | | |
| -5.788 | 9.791 | 1.931 | -469.27 | -128.63 | 7.73 | 1 | 7.29 | 2.68 | 20600 | 0 | | | |
| -6.050 | 10.286 | 1.839 | -502.48 | -124.26 | 10.30 | 1 | 7.92 | 2.68 | 20600 | 0 | | | |
| -6.312 | 10.756 | 1.740 | -534.43 | -119.06 | 12.88 | 1 | 8.55 | 2.68 | 20600 | 0 | | | |
| -6.575 | 11.200 | 1.636 | -564.91 | -113.01 | 15.45 | 1 | 9.19 | 2.68 | 20600 | 0 | | | |
| -6.837 | 11.615 | 1.527 | -593.69 | -106.13 | 18.03 | 1 | 9.82 | 2.68 | 20600 | 0 | | | |
| -7.100 | 12.001 | 1.412 | -620.55 | -98.39 | 20.60 | 1 | 10.45 | 2.68 | 20600 | 0 | | | |
| -7.363 | 12.356 | 1.292 | -645.27 | -89.82 | 23.18 | 1 | 11.09 | 2.68 | 20600 | 0 | | | |
| -7.625 | 12.678 | 1.167 | -667.64 | -80.41 | 25.75 | 1 | 11.72 | 2.68 | 20600 | 0 | | | |
| -7.887 | 12.968 | 1.039 | -687.41 | -70.15 | 28.33 | 1 | 12.35 | 2.68 | 20600 | 0 | | | |
| -8.150 | 13.224 | 0.907 | -704.39 | -59.05 | 30.90 | 1 | 12.99 | 2.68 | 20600 | 0 | | | |
| -8.412 | 13.444 | 0.773 | -718.34 | -47.11 | 33.48 | 1 | 13.62 | 2.68 | 20600 | 0 | | | |
| -8.675 | 13.629 | 0.635 | -729.05 | -34.33 | 36.05 | 1 | 14.25 | 2.68 | 20600 | 0 | | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -8.938 | 13.778 | 0.497 | -736.29 | -20.70 | 38.63 | 1 | 14.88 | 2.68 | 20600 | 0 | | | | | | | | | |
| -9.200 | 13.890 | 0.357 | -739.84 | -6.23 | 41.20 | 1 | 15.52 | 2.68 | 20600 | 0 | | | | | | | | | |
| | | | | | 41.20 | 1 | 7.07 | 2.35 | 29000 | 0 | | | | | | | | | |
| -9.475 | 13.968 | 0.210 | -739.69 | 7.50 | 43.90 | 1 | 7.68 | 2.35 | 29000 | 0 | | | | | | | | | |
| -9.750 | 14.005 | 0.064 | -735.64 | 22.14 | 46.60 | 1 | 8.30 | 2.35 | 29000 | 0 | | | | | | | | | |
| -10.025 | 14.003 | -0.081 | -727.43 | 37.69 | 49.30 | 1 | 8.91 | 2.35 | 29000 | 0 | | | | | | | | | |
| -10.300 | 13.961 | -0.225 | -714.82 | 54.15 | 51.99 | 1 | 9.52 | 2.35 | 29000 | 0 | | | | | | | | | |
| -10.800 | 13.785 | -0.477 | -679.81 | 86.41 | 56.90 | 1 | 10.64 | 2.35 | 29000 | 0 | | | | | | | | | |
| -11.300 | 13.487 | -0.713 | -627.91 | 121.69 | 61.80 | 1 | 11.76 | 2.35 | 29000 | 0 | | | | | | | | | |
| -11.800 | 13.076 | -0.927 | -557.62 | 159.97 | 66.71 | 1 | 12.87 | 2.35 | 29000 | 0 | | | | | | | | | |
| -12.163 | 12.714 | -1.065 | -494.30 | 189.61 | 70.26 | 1 | 13.68 | 2.35 | 29000 | 0 | | | | | | | | | |
| -12.525 | 12.306 | -1.185 | -419.96 | 220.83 | 73.82 | 1 | 14.49 | 2.35 | 29000 | 0 | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | | | |





FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.887 | 11.857 | -1.284 | -334.01 | 253.64 | 77.38 | 1 | 15.30 | 2.35 | 29000 | 0 | | | |
| -13.250 | 11.378 | -1.358 | -235.88 | 288.02 | 80.93 | 1 | 16.11 | 2.35 | 29000 | 0 | | | |
| -13.613 | 10.876 | -1.406 | -125.00 | 323.99 | 84.49 | 1 | 16.92 | 2.35 | 29000 | 0 | | | |
| -13.975 | 10.362 | -1.423 | -0.79 | 361.55 | 88.04 | 1 | 17.73 | 2.35 | 29000 | 0 | | | |
| -14.337 | 9.849 | -1.405 | 137.31 | 400.68 | 91.60 | 1 | 18.54 | 2.35 | 29000 | 0 | | | |
| -14.700 | 9.348 | -1.350 | 289.89 | 441.40 | 95.16 | 1 | 19.35 | 2.35 | 29000 | 0 | | | |
| | | | | -105.05 | 95.16 | 1 | 19.35 | 2.35 | 29000 | 0 | | 3 | -546.44 |
| -15.000 | 8.952 | -1.290 | 263.63 | -69.72 | 98.10 | 2 | 22.90 | 4.12 | 29000 | 0 | | | |
| -15.300 | 8.574 | -1.235 | 248.29 | -32.04 | 101.04 | 2 | 29.19 | 4.12 | 29000 | 0 | | | |
| | | | | | 101.04 | 2 | 29.19 | 4.12 | 29000 | 2 | 89.62 | 29000 | |
| -15.800 | 7.978 | -1.147 | 236.62 | -16.13 | 105.95 | 2 | 37.28 | 4.12 | 29000 | 2 | 120.21 | 29000 | |
| -16.066 | 7.680 | -1.103 | 233.10 | -10.53 | 105.95 | 2 | 40.51 | 4.12 | 29000 | 2 | 127.29 | 29000 | |
| -16.331 | 7.393 | -1.058 | 230.92 | -6.12 | 105.95 | 2 | 43.10 | 4.12 | 29000 | 2 | 135.01 | 29000 | |
| -16.597 | 7.117 | -1.014 | 229.72 | -3.22 | 105.95 | 2 | 45.13 | 4.12 | 29000 | 2 | 143.30 | 29000 | |
| -16.862 | 6.854 | -0.970 | 229.05 | -2.12 | 105.95 | 2 | 46.66 | 4.12 | 29000 | 2 | 152.08 | 29000 | |
| -17.128 | 6.602 | -0.926 | 228.41 | -3.05 | 105.95 | 2 | 47.76 | 4.12 | 29000 | 2 | 161.30 | 29000 | |
| -17.394 | 6.362 | -0.883 | 227.23 | -6.25 | 105.95 | 2 | 48.48 | 4.12 | 29000 | 2 | 170.89 | 29000 | |
| -17.659 | 6.133 | -0.839 | 224.87 | -11.88 | 105.95 | 2 | 48.88 | 4.12 | 29000 | 2 | 180.80 | 29000 | |
| -17.925 | 5.916 | -0.796 | 220.77 | -19.18 | 105.95 | 2 | 49.02 | 4.12 | 29000 | 2 | 183.90 | 29000 | |
| -18.191 | 5.710 | -0.755 | 214.71 | -26.22 | 105.95 | 2 | 48.93 | 4.12 | 29000 | 2 | 178.96 | 29000 | |
| -18.456 | 5.515 | -0.714 | 206.95 | -32.04 | 105.95 | 2 | 48.66 | 4.12 | 29000 | 2 | 174.35 | 29000 | |
| -18.722 | 5.330 | -0.676 | 197.79 | -36.76 | 105.95 | 2 | 48.24 | 4.12 | 29000 | 2 | 170.04 | 29000 | |
| -18.987 | 5.156 | -0.639 | 187.50 | -40.51 | 105.95 | 2 | 47.70 | 4.12 | 29000 | 2 | 166.01 | 29000 | |
| -19.253 | 4.991 | -0.604 | 176.34 | -43.38 | 105.95 | 2 | 47.07 | 4.12 | 29000 | 2 | 162.27 | 29000 | |
| -19.519 | 4.835 | -0.571 | 164.53 | -45.47 | 105.95 | 2 | 46.38 | 4.12 | 29000 | 2 | 158.79 | 29000 | |
| -19.784 | 4.687 | -0.541 | 152.25 | -46.85 | 105.95 | 2 | 45.65 | 4.12 | 29000 | 2 | 155.55 | 29000 | |
| -20.050 | 4.548 | -0.513 | 139.69 | -47.60 | 105.95 | 2 | 44.88 | 4.12 | 29000 | 2 | 152.53 | 29000 | |
| -20.316 | 4.415 | -0.487 | 127.01 | -47.78 | 105.95 | 2 | 44.10 | 4.12 | 29000 | 2 | 149.72 | 29000 | |
| -20.581 | 4.289 | -0.464 | 114.35 | -47.45 | 105.95 | 2 | 43.32 | 4.12 | 29000 | 2 | 147.10 | 29000 | |
| -20.847 | 4.168 | -0.443 | 101.84 | -46.65 | 105.95 | 2 | 42.54 | 4.12 | 29000 | 2 | 144.64 | 29000 | |
| -21.112 | 4.053 | -0.425 | 89.60 | -45.43 | 105.95 | 2 | 41.76 | 4.12 | 29000 | 2 | 142.34 | 29000 | |
| -21.378 | 3.942 | -0.409 | 77.74 | -43.82 | 105.95 | 2 | 41.00 | 4.12 | 29000 | 2 | 140.17 | 29000 | |
| -21.644 | 3.835 | -0.395 | 66.36 | -41.84 | 105.95 | 2 | 40.25 | 4.12 | 29000 | 2 | 138.11 | 29000 | |
| -21.909 | 3.732 | -0.384 | 55.54 | -39.53 | 105.95 | 2 | 39.52 | 4.12 | 29000 | 2 | 136.16 | 29000 | |
| -22.175 | 3.631 | -0.374 | 45.39 | -36.90 | 105.95 | 2 | 38.81 | 4.12 | 29000 | 2 | 134.28 | 29000 | |
| -22.441 | 3.533 | -0.366 | 35.97 | -33.97 | 105.95 | 2 | 38.10 | 3.83 | 29000 | 2 | 132.47 | 29000 | |
| -22.706 | 3.437 | -0.360 | 27.36 | -30.76 | 105.95 | 2 | 37.41 | 2.54 | 29000 | 2 | 130.71 | 29000 | |
| -22.972 | 3.342 | -0.356 | 19.66 | -27.12 | 105.95 | 1 | 37.81 | 2.35 | 29000 | 2 | 129.00 | 29000 | |
| -23.237 | 3.248 | -0.352 | 13.01 | -22.89 | 105.95 | 1 | 38.41 | 2.35 | 29000 | 2 | 127.31 | 29000 | |
| -23.503 | 3.154 | -0.350 | 7.55 | -18.07 | 105.95 | 1 | 39.00 | 2.35 | 29000 | 2 | 125.65 | 29000 | |
| -23.769 | 3.061 | -0.349 | 3.46 | -12.64 | 105.95 | 1 | 39.59 | 2.35 | 29000 | 2 | 123.99 | 29000 | |
| -24.034 | 2.969 | -0.349 | 0.89 | -6.62 | 105.95 | 1 | 40.19 | 2.35 | 29000 | 2 | 122.34 | 29000 | |
| -24.300 | 2.876 | -0.349 | 0.00 | 0.00 | 105.95 | 1 | 40.78 | 2.35 | 29000 | 2 | 120.69 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | | | |





FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 14.01 mm

MOMENTO MÁXIMO = -739.84 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 72.78 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.033 = (568.62 kN/m)/(17239.37 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.515 = (1305.55 kN/m)/(2533.76 kN/m)





** FASE No 5 **

*Fase 6
*Restitucion del nf

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -15.300 m
PRESIÓN DEL AGUA EN SUELO 2 PARA NIVEL = -15.300 m PR. = 0.000 kPa

FASE 5

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. | SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. | SOPRAC. | ELAST. | PUNTALES/ ANCLAS N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXCAVACIÓN: 0.00 m | | | | EXCAVACIÓN: -15.30 m | | | | | |
| | | PARED | | | | NIVEL AGUA: -5.00 m | | | | NIVEL AGUA: -15.30 m | | | | | |
| | | | | | | S. DE CAQUOT: 10.00 kPa | | | | S. DE CAQUOT: 0.00 kPa | | | | | |
| 0.000 | -4.405 | 2.667 | 0.00 | 0.00 | | 2 | 26.73 | 9.76 | 4900 | 0 | | | | | |
| -0.450 | -3.205 | 2.667 | 2.65 | 11.65 | | 2 | 25.02 | 5.15 | 4900 | 0 | | | | | |
| -0.900 | -2.004 | 2.669 | 10.37 | 22.52 | | 2 | 23.31 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 53.20 | 4.55 | 20600 | 0 | | | | | |
| -1.175 | -1.270 | 2.672 | 18.41 | 35.40 | | 2 | 40.46 | 4.55 | 20600 | 0 | | | | | |
| -1.450 | -0.534 | 2.676 | 29.51 | 44.77 | | 2 | 27.69 | 4.55 | 20600 | 0 | | | | | |
| -1.725 | 0.202 | 2.684 | 42.71 | 50.62 | | 2 | 14.88 | 4.55 | 20600 | 0 | | | | | |
| -2.000 | 0.942 | 2.693 | 57.03 | 52.95 | | 2 | 2.03 | 2.03 | 20600 | 0 | | | | | |
| | | | | -150.64 | | 2 | 2.03 | 2.03 | 20600 | 0 | | | | 1 | -203.58 |
| -2.300 | 1.751 | 2.701 | 11.90 | -150.33 | | -1 | | | | 0 | | | | | |
| -2.600 | 2.561 | 2.699 | -33.20 | -150.33 | | -1 | | | | 0 | | | | | |
| -2.900 | 3.369 | 2.687 | -78.30 | -150.33 | | -1 | | | | 0 | | | | | |
| -3.200 | 4.172 | 2.665 | -123.40 | -150.33 | | -1 | | | | 0 | | | | | |
| -3.500 | 4.967 | 2.633 | -168.50 | -150.33 | | -1 | | | | 0 | | | | | |
| -3.800 | 5.751 | 2.592 | -213.60 | -150.33 | | -1 | | | | 0 | | | | | |
| -4.100 | 6.521 | 2.541 | -258.69 | -150.21 | | 1 | 0.80 | 0.80 | 20600 | 0 | | | | | |
| -4.400 | 7.275 | 2.480 | -303.69 | -149.74 | | 1 | 2.33 | 2.33 | 20600 | 0 | | | | | |
| -4.700 | 8.008 | 2.409 | -348.49 | -148.81 | | 1 | 3.86 | 2.68 | 20600 | 0 | | | | | |
| -5.000 | 8.719 | 2.329 | -392.93 | -147.43 | | 1 | 5.39 | 2.68 | 20600 | 0 | | | | | |
| -5.262 | 9.320 | 2.251 | -431.41 | -145.59 | 2.58 | 1 | 6.02 | 2.68 | 20600 | 0 | | | | | |
| -5.525 | 9.900 | 2.166 | -469.29 | -142.91 | 5.15 | 1 | 6.65 | 2.68 | 20600 | 0 | | | | | |
| -5.788 | 10.457 | 2.073 | -506.36 | -139.39 | 7.73 | 1 | 7.29 | 2.68 | 20600 | 0 | | | | | |
| -6.050 | 10.988 | 1.974 | -542.40 | -135.03 | 10.30 | 1 | 7.92 | 2.68 | 20600 | 0 | | | | | |
| -6.312 | 11.493 | 1.868 | -577.18 | -129.83 | 12.88 | 1 | 8.55 | 2.68 | 20600 | 0 | | | | | |
| -6.575 | 11.968 | 1.756 | -610.49 | -123.78 | 15.45 | 1 | 9.19 | 2.68 | 20600 | 0 | | | | | |
| -6.837 | 12.414 | 1.637 | -642.09 | -116.89 | 18.03 | 1 | 9.82 | 2.68 | 20600 | 0 | | | | | |
| -7.100 | 12.827 | 1.512 | -671.78 | -109.16 | 20.60 | 1 | 10.45 | 2.68 | 20600 | 0 | | | | | |
| -7.363 | 13.207 | 1.383 | -699.33 | -100.59 | 23.18 | 1 | 11.09 | 2.68 | 20600 | 0 | | | | | |
| -7.625 | 13.553 | 1.248 | -724.52 | -91.17 | 25.75 | 1 | 11.72 | 2.68 | 20600 | 0 | | | | | |
| -7.887 | 13.862 | 1.108 | -747.12 | -80.92 | 28.33 | 1 | 12.35 | 2.68 | 20600 | 0 | | | | | |
| -8.150 | 14.134 | 0.965 | -766.93 | -69.82 | 30.90 | 1 | 12.99 | 2.68 | 20600 | 0 | | | | | |
| -8.412 | 14.368 | 0.818 | -783.70 | -57.88 | 33.48 | 1 | 13.62 | 2.68 | 20600 | 0 | | | | | |
| -8.675 | 14.563 | 0.668 | -797.24 | -45.09 | 36.05 | 1 | 14.25 | 2.68 | 20600 | 0 | | | | | |
| -8.938 | 14.719 | 0.516 | -807.30 | -31.47 | 38.63 | 1 | 14.88 | 2.68 | 20600 | 0 | | | | | |
| -9.200 | 14.834 | 0.363 | -813.68 | -17.00 | 41.20 | 1 | 15.52 | 2.68 | 20600 | 0 | | | | | |
| | | | | | 41.20 | 1 | 7.07 | 2.35 | 29000 | 0 | | | | | |
| -9.475 | 14.912 | 0.201 | -816.49 | -3.27 | 43.90 | 1 | 7.68 | 2.35 | 29000 | 0 | | | | | |
| -9.750 | 14.945 | 0.039 | -815.40 | 11.37 | 46.60 | 1 | 8.30 | 2.35 | 29000 | 0 | | | | | |
| -10.025 | 14.934 | -0.122 | -810.15 | 26.92 | 49.30 | 1 | 8.91 | 2.35 | 29000 | 0 | | | | | |
| -10.300 | 14.878 | -0.282 | -800.51 | 43.38 | 51.99 | 1 | 9.52 | 2.35 | 29000 | 0 | | | | | |
| -10.800 | 14.666 | -0.566 | -770.88 | 75.65 | 56.90 | 1 | 10.64 | 2.35 | 29000 | 0 | | | | | |
| -11.300 | 14.315 | -0.836 | -724.36 | 110.92 | 61.80 | 1 | 11.76 | 2.35 | 29000 | 0 | | | | | |
| -11.800 | 13.833 | -1.086 | -659.45 | 149.21 | 66.71 | 1 | 12.87 | 2.35 | 29000 | 0 | | | | | |
| -12.163 | 13.409 | -1.251 | -600.04 | 178.85 | 70.26 | 1 | 13.68 | 2.35 | 29000 | 0 | | | | | |
| -12.525 | 12.928 | -1.399 | -529.60 | 210.07 | 73.82 | 1 | 14.49 | 2.35 | 29000 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. | SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. | SOPRAC. | ELAST. | PUNTALES/ ANCLAS N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.887 | 12.398 | -1.527 | -447.55 | 242.87 | 77.38 | 1 | 15.30 | 2.35 | 29000 | 0 | | | | | |
| -13.250 | 11.824 | -1.632 | -353.33 | 277.26 | 80.93 | 1 | 16.11 | 2.35 | 29000 | 0 | | | | | |
| -13.613 | 11.218 | -1.710 | -246.35 | 313.23 | 84.49 | 1 | 16.92 | 2.35 | 29000 | 0 | | | | | |
| -13.975 | 10.588 | -1.759 | -126.05 | 350.78 | 88.04 | 1 | 17.73 | 2.35 | 29000 | 0 | | | | | |
| -14.337 | 9.946 | -1.775 | 8.16 | 389.91 | 91.60 | 1 | 18.54 | 2.35 | 29000 | 0 | | | | | |
| -14.700 | 9.305 | -1.754 | 156.86 | 430.85 | 95.16 | 2 | 20.59 | 3.59 | 29000 | 0 | | | | | |
| | | | | 55.68 | 95.16 | 2 | 20.59 | 3.59 | 29000 | 0 | | | | 3 | -375.17 |
| -15.000 | 8.784 | -1.718 | 178.92 | 91.93 | 98.10 | 2 | 27.77 | 4.12 | 29000 | 0 | | | | | |
| -15.300 | 8.275 | -1.676 | 210.82 | 116.19 | -1.96 | 2 | 37.85 | 4.12 | 29000 | 0 | | | | | |
| | | | | | -1.96 | 2 | 37.85 | 4.12 | 29000 | 2 | 80.97 | | 29000 | | |
| -15.800 | 7.458 | -1.590 | 262.96 | 91.76 | -1.96 | 2 | 52.37 | 4.12 | 29000 | 2 | 103.06 | | 29000 | | |
| -16.066 | 7.043 | -1.537 | 285.51 | 78.16 | -1.96 | 2 | 58.98 | 4.12 | 29000 | 2 | 106.76 | | 29000 | | |
| -16.331 | 6.642 | -1.481 | 304.54 | 65.15 | -1.96 | 2 | 64.88 | 4.12 | 29000 | 2 | 111.18 | | 29000 | | |
| -16.597 | 6.256 | -1.421 | 320.14 | 52.35 | -1.96 | 2 | 70.11 | 4.12 | 29000 | 2 | 116.26 | | 29000 | | |
| -16.862 | 5.887 | -1.358 | 332.34 | 39.42 | -1.96 | 2 | 74.70 | 4.12 | 29000 | 2 | 121.98 | | 29000 | | |
| -17.128 | 5.535 | -1.294 | 341.04 | 26.04 | -1.96 | 2 | 78.71 | 4.12 | 29000 | 2 | 128.29 | | 29000 | | |
| -17.394 | 5.200 | -1.228 | 346.10 | 11.90 | -1.96 | 2 | 82.18 | 4.12 | 29000 | 2 | 135.13 | | 29000 | | |
| -17.659 | 4.883 | -1.161 | 347.27 | -3.27 | -1.96 | 2 | 85.15 | 4.12 | 29000 | 2 | 142.47 | | 29000 | | |
| -17.925 | 4.583 | -1.095 | 344.34 | -18.77 | -1.96 | 2 | 87.68 | 4.12 | 29000 | 2 | 143.18 | | 29000 | | |
| -18.191 | 4.301 | -1.030 | 337.43 | -32.80 | -1.96 | 2 | 89.80 | 4.12 | 29000 | 2 | 136.04 | | 29000 | | |
| -18.456 | 4.036 | -0.966 | 327.12 | -44.49 | -1.96 | 2 | 91.55 | 4.12 | 29000 | 2 | 129.39 | | 29000 | | |
| -18.722 | 3.787 | -0.904 | 313.99 | -54.05 | -1.96 | 2 | 92.98 | 4.12 | 29000 | 2 | 123.23 | | 29000 | | |
| -18.987 | 3.555 | -0.846 | 298.57 | -61.70 | -1.96 | 2 | 94.13 | 4.12 | 29000 | 2 | 117.53 | | 29000 | | |
| -19.253 | 3.338 | -0.790 | 281.36 | -67.62 | -1.96 | 2 | 95.02 | 4.12 | 29000 | 2 | 112.27 | | 29000 | | |
| -19.519 | 3.135 | -0.738 | 262.79 | -71.99 | -1.96 | 2 | 95.69 | 4.12 | 29000 | 2 | 107.43 | | 29000 | | |
| -19.784 | 2.945 | -0.690 | 243.24 | -74.97 | -1.96 | 2 | 96.17 | 4.12 | 29000 | 2 | 102.97 | | 29000 | | |
| -20.050 | 2.768 | -0.645 | 223.07 | -76.71 | -1.96 | 2 | 96.48 | 4.12 | 29000 | 2 | 98.87 | | 29000 | | |
| -20.316 | 2.603 | -0.604 | 202.59 | -77.34 | -1.96 | 2 | 96.66 | 4.12 | 29000 | 2 | 95.10 | | 29000 | | |
| -20.581 | 2.447 | -0.567 | 182.07 | -76.98 | -1.96 | 2 | 96.72 | 4.12 | 29000 | 2 | 91.63 | | 29000 | | |
| -20.847 | 2.301 | -0.534 | 161.77 | -75.73 | -1.96 | 2 | 96.69 | 4.12 | 29000 | 2 | 88.43 | | 29000 | | |
| -21.112 | 2.163 | -0.505 | 141.91 | -73.68 | -1.96 | 2 | 96.57 | 4.12 | 29000 | 2 | 85.47 | | 29000 | | |
| -21.378 | 2.032 | -0.480 | 122.69 | -70.91 | -1.96 | 2 | 96.39 | 4.12 | 29000 | 2 | 82.72 | | 29000 | | |
| -21.644 | 1.908 | -0.458 | 104.30 | -67.49 | -1.96 | 2 | 96.16 | 4.12 | 29000 | 2 | 80.15 | | 29000 | | |
| -21.909 | 1.788 | -0.440 | 86.90 | -63.47 | -1.96 | 2 | 95.89 | 4.12 | 29000 | 2 | 77.73 | | 29000 | | |
| -22.175 | 1.674 | -0.425 | 70.63 | -58.90 | -1.96 | 2 | 95.58 | 4.12 | 29000 | 2 | 75.44 | | 29000 | | |
| -22.441 | 1.562 | -0.413 | 55.65 | -53.83 | -1.96 | 2 | 95.25 | 4.12 | 29000 | 2 | 73.26 | | 29000 | | |
| -22.706 | 1.454 | -0.403 | 42.08 | -48.27 | -1.96 | 2 | 94.91 | 4.12 | 29000 | 2 | 71.16 | | 29000 | | |
| -22.972 | 1.348 | -0.396 | 30.06 | -42.12 | -1.96 | 2 | 95.63 | 4.12 | 29000 | 2 | 69.12 | | 29000 | | |
| -23.237 | 1.243 | -0.392 | 19.77 | -35.21 | -1.96 | 2 | 96.54 | 4.12 | 29000 | 2 | 67.12 | | 29000 | | |
| -23.503 | 1.140 | -0.389 | 11.42 | -27.54 | -1.96 | 2 | 97.43 | 4.12 | 29000 | 2 | 65.16 | | 29000 | | |
| -23.769 | 1.037 | -0.387 | 5.21 | -19.11 | -1.96 | 2 | 98.31 | 4.12 | 29000 | 2 | 63.21 | | 29000 | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -24.034 | 0.934 | -0.387 | 1.34 | -9.93 | -1.96 | 2 | 99.20 | 4.12 | 29000 | 2 | 61.27 | | 29000 | | | | | | |
| -24.300 | 0.831 | -0.387 | 0.00 | 0.00 | -1.96 | 2 | 100.08 | 4.12 | 29000 | 2 | 59.33 | | 29000 | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | | | |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. SOPRAC. | ELAST. | | ESTADO PR. SOPRAC. | ELAST. | | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 14.95 mm

MOMENTO MÁXIMO = -816.49 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 76.66 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.057 = (977.14 kN/m)/(17239.37 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.374 = (885.69 kN/m)/(2365.23 kN/m)



** FASE No 6 **

*Fase 7
*Sismo
*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -0.900 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -9.200 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -37.900 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -39.800 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.795 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.402 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |

TZ_ C.LST

| | | |
|---|---|---|
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |

*SISMO_ UG3a

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -45.500 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.302 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 10.398 |
| COHESIÓN | C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |



FASE 6

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -5.00 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -15.30 m NIVEL AGUA: -15.30 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -10.059 | 5.539 | 0.00 | 0.00 | | 3 | 40.65 | 23.67 | 4900 | 0 | | | | | |
| -0.450 | -7.567 | 5.539 | 4.31 | 19.59 | | 2 | 46.40 | 10.25 | 4900 | 0 | | | | | |
| -0.900 | -5.074 | 5.542 | 17.55 | 38.65 | | 2 | 38.35 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 116.44 | 10.51 | 20600 | 0 | | | | | |
| -1.175 | -3.549 | 5.547 | 32.22 | 66.68 | | 2 | 87.41 | 4.55 | 20600 | 0 | | | | | |
| -1.450 | -2.022 | 5.556 | 53.49 | 86.72 | | 2 | 58.34 | 4.55 | 20600 | 0 | | | | | |
| -1.725 | -0.493 | 5.569 | 79.18 | 98.76 | | 2 | 29.21 | 4.55 | 20600 | 0 | | | | | |
| -2.000 | 1.041 | 5.587 | 107.37 | 105.93 | | 1 | 22.93 | 9.48 | 20600 | 0 | | | | | |
| | | | | -494.48 | | 1 | 22.93 | 9.48 | 20600 | 0 | | | | 1 | -600.41 |
| -2.300 | 2.719 | 5.595 | -39.87 | -486.79 | | 1 | 28.34 | 9.48 | 20600 | 0 | | | | | |
| -2.600 | 4.395 | 5.570 | -184.55 | -477.48 | | 1 | 33.74 | 9.48 | 20600 | 0 | | | | | |
| -2.900 | 6.058 | 5.515 | -326.19 | -466.55 | | 1 | 39.14 | 9.48 | 20600 | 0 | | | | | |
| -3.200 | 7.700 | 5.429 | -464.32 | -454.00 | | 1 | 44.55 | 9.48 | 20600 | 0 | | | | | |
| -3.500 | 9.313 | 5.314 | -598.43 | -439.82 | | 1 | 49.95 | 9.48 | 20600 | 0 | | | | | |
| -3.800 | 10.886 | 5.171 | -728.05 | -424.03 | | 1 | 55.35 | 9.48 | 20600 | 0 | | | | | |
| -4.100 | 12.412 | 5.000 | -852.68 | -406.61 | | 1 | 60.76 | 9.48 | 20600 | 0 | | | | | |
| -4.400 | 13.883 | 4.802 | -971.85 | -387.57 | | 1 | 66.16 | 9.48 | 20600 | 0 | | | | | |
| -4.700 | 15.291 | 4.579 | -1085.06 | -366.91 | | 1 | 71.56 | 9.48 | 20600 | 0 | | | | | |
| -5.000 | 16.628 | 4.333 | -1191.84 | -344.63 | | 1 | 76.97 | 9.48 | 20600 | 0 | | | | | |
| -5.262 | 17.735 | 4.099 | -1279.60 | -323.80 | 2.58 | 1 | 79.21 | 9.48 | 20600 | 0 | | | | | |
| -5.525 | 18.779 | 3.849 | -1361.72 | -301.70 | 5.15 | 1 | 81.45 | 9.48 | 20600 | 0 | | | | | |
| -5.788 | 19.755 | 3.583 | -1437.88 | -278.33 | 7.73 | 1 | 83.69 | 9.48 | 20600 | 0 | | | | | |
| -6.050 | 20.659 | 3.305 | -1507.73 | -253.70 | 10.30 | 1 | 85.93 | 9.48 | 20600 | 0 | | | | | |
| -6.312 | 21.488 | 3.013 | -1570.96 | -227.81 | 12.88 | 1 | 88.17 | 9.48 | 20600 | 0 | | | | | |
| -6.575 | 22.240 | 2.710 | -1627.23 | -200.66 | 15.45 | 1 | 90.41 | 9.48 | 20600 | 0 | | | | | |
| -6.837 | 22.910 | 2.397 | -1676.20 | -172.24 | 18.03 | 1 | 92.65 | 9.48 | 20600 | 0 | | | | | |
| -7.100 | 23.498 | 2.076 | -1717.54 | -142.55 | 20.60 | 1 | 94.89 | 9.48 | 20600 | 0 | | | | | |
| -7.363 | 23.999 | 1.747 | -1750.93 | -111.61 | 23.18 | 1 | 97.13 | 9.48 | 20600 | 0 | | | | | |
| -7.625 | 24.414 | 1.413 | -1776.02 | -79.40 | 25.75 | 1 | 99.37 | 9.48 | 20600 | 0 | | | | | |
| -7.887 | 24.741 | 1.075 | -1792.50 | -45.92 | 28.33 | 1 | 101.60 | 9.48 | 20600 | 0 | | | | | |
| -8.150 | 24.979 | 0.735 | -1800.02 | -11.18 | 30.90 | 1 | 103.84 | 9.48 | 20600 | 0 | | | | | |
| -8.412 | 25.127 | 0.394 | -1798.26 | 24.82 | 33.48 | 1 | 106.08 | 9.48 | 20600 | 0 | | | | | |
| -8.675 | 25.186 | 0.055 | -1786.88 | 62.09 | 36.05 | 1 | 108.32 | 9.48 | 20600 | 0 | | | | | |
| -8.938 | 25.156 | -0.282 | -1765.55 | 100.62 | 38.63 | 1 | 110.56 | 9.48 | 20600 | 0 | | | | | |
| -9.200 | 25.038 | -0.613 | -1733.95 | 140.41 | 41.20 | 1 | 112.80 | 9.48 | 20600 | 0 | | | | | |
| | | | | | 41.20 | 1 | 86.48 | 7.89 | 29000 | 0 | | | | | |
| -9.475 | 24.823 | -0.953 | -1690.44 | 176.18 | 43.90 | 1 | 88.54 | 7.89 | 29000 | 0 | | | | | |
| -9.750 | 24.515 | -1.283 | -1636.93 | 213.26 | 46.60 | 1 | 90.61 | 7.89 | 29000 | 0 | | | | | |
| -10.025 | 24.118 | -1.602 | -1573.03 | 251.64 | 49.30 | 1 | 92.67 | 7.89 | 29000 | 0 | | | | | |
| -10.300 | 23.635 | -1.907 | -1498.40 | 291.33 | 51.99 | 1 | 94.73 | 7.89 | 29000 | 0 | | | | | |
| -10.800 | 22.551 | -2.419 | -1334.04 | 366.86 | 56.90 | 1 | 98.48 | 7.89 | 29000 | 0 | | | | | |
| -11.300 | 21.227 | -2.864 | -1130.82 | 446.71 | 61.80 | 1 | 102.22 | 7.89 | 29000 | 0 | | | | | |
| -11.800 | 19.700 | -3.229 | -886.61 | 530.88 | 66.71 | 1 | 105.97 | 7.89 | 29000 | 0 | | | | | |
| -12.163 | 18.491 | -3.435 | -682.68 | 594.62 | 70.26 | 1 | 108.69 | 7.89 | 29000 | 0 | | | | | |
| -12.525 | 17.217 | -3.584 | -455.23 | 660.63 | 73.82 | 1 | 111.41 | 7.89 | 29000 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.887 | 15.900 | -3.671 | -203.45 | 728.91 | 77.38 | 1 | 114.12 | 7.89 | 29000 | 0 | | | | | |
| -13.250 | 14.564 | -3.689 | 73.50 | 799.46 | 80.93 | 1 | 116.84 | 7.89 | 29000 | 0 | | | | | |
| -13.613 | 13.235 | -3.630 | 376.44 | 872.29 | 84.49 | 1 | 119.56 | 7.89 | 29000 | 0 | | | | | |
| -13.975 | 11.942 | -3.489 | 706.18 | 947.39 | 88.04 | 1 | 122.27 | 7.89 | 29000 | 0 | | | | | |
| -14.337 | 10.716 | -3.259 | 1063.57 | 1024.77 | 91.60 | 1 | 124.99 | 7.89 | 29000 | 0 | | | | | |
| -14.700 | 9.591 | -2.931 | 1449.42 | 1104.42 | 95.16 | 1 | 127.71 | 7.89 | 29000 | 0 | | | | | |
| | | | | -413.73 | 95.16 | 1 | 127.71 | 7.89 | 29000 | 0 | | | | 3 | -1518.15 |
| -15.000 | 8.758 | -2.630 | 1335.41 | -346.09 | 98.10 | 1 | 129.96 | 7.89 | 29000 | 0 | | | | | |
| -15.300 | 8.011 | -2.351 | 1240.38 | -292.34 | -1.96 | 1 | 132.21 | 7.89 | 29000 | 0 | | | | | |
| | | | | | -1.96 | 1 | 132.21 | 7.89 | 29000 | 2 | 73.30 | | 29000 | | |
| -15.800 | 6.943 | -1.929 | 1100.86 | -266.64 | -1.96 | 1 | 135.95 | 7.89 | 29000 | 2 | 88.12 | | 29000 | | |
| -16.066 | 6.458 | -1.725 | 1031.66 | -254.41 | -1.96 | 1 | 137.94 | 7.89 | 29000 | 2 | 89.80 | | 29000 | | |
| -16.331 | 6.025 | -1.534 | 965.70 | -242.34 | -1.96 | 1 | 139.94 | 7.89 | 29000 | 2 | 93.30 | | 29000 | | |
| -16.597 | 5.642 | -1.355 | 902.86 | -230.89 | -1.96 | 1 | 141.93 | 7.89 | 29000 | 2 | 98.45 | | 29000 | | |
| -16.862 | 5.304 | -1.188 | 842.94 | -220.48 | -1.96 | 1 | 143.92 | 7.89 | 29000 | 2 | 105.08 | | 29000 | | |
| -17.128 | 5.010 | -1.032 | 785.61 | -211.48 | -1.96 | 1 | 145.91 | 7.89 | 29000 | 2 | 113.06 | | 29000 | | |
| -17.394 | 4.755 | -0.887 | 730.44 | -204.23 | -1.96 | 1 | 147.90 | 7.89 | 29000 | 2 | 122.24 | | 29000 | | |
| -17.659 | 4.538 | -0.752 | 676.93 | -199.03 | -1.96 | 1 | 149.89 | 7.89 | 29000 | 2 | 132.47 | | 29000 | | |
| -17.925 | 4.355 | -0.627 | 624.58 | -195.20 | -1.96 | 1 | 151.88 | 7.89 | 29000 | 2 | 136.57 | | 29000 | | |
| -18.191 | 4.204 | -0.512 | 573.27 | -190.95 | -1.96 | 1 | 153.87 | 7.89 | 29000 | 2 | 133.23 | | 29000 | | |
| -18.456 | 4.082 | -0.407 | 523.26 | -185.38 | -1.96 | 1 | 155.86 | 7.89 | 29000 | 2 | 130.73 | | 29000 | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -18.722 | 3.987 | -0.312 | 474.88 | -178.74 | -1.96 | 1 | 157.85 | 7.89 | 29000 | 2 | 129.01 | | 29000 | | | | |
| -18.987 | 3.915 | -0.225 | 428.38 | -171.19 | -1.96 | 1 | 159.85 | 7.89 | 29000 | 2 | 127.98 | | 29000 | | | | |
| -19.253 | 3.866 | -0.147 | 383.99 | -162.93 | -1.96 | 1 | 161.84 | 7.89 | 29000 | 2 | 127.59 | | 29000 | | | | |
| -19.519 | 3.836 | -0.078 | 341.88 | -154.11 | -1.96 | 1 | 163.83 | 7.89 | 29000 | 2 | 127.77 | | 29000 | | | | |
| -19.784 | 3.824 | -0.016 | 302.16 | -144.88 | -1.96 | 1 | 165.82 | 7.89 | 29000 | 2 | 128.45 | | 29000 | | | | |
| -20.050 | 3.827 | 0.038 | 264.93 | -135.36 | -1.96 | 1 | 167.81 | 7.89 | 29000 | 2 | 129.58 | | 29000 | | | | |
| -20.316 | 3.844 | 0.085 | 230.26 | -125.66 | -1.96 | 1 | 169.80 | 7.89 | 29000 | 2 | 131.10 | | 29000 | | | | |
| -20.581 | 3.872 | 0.126 | 198.18 | -115.89 | -1.96 | 1 | 171.79 | 7.89 | 29000 | 2 | 132.96 | | 29000 | | | | |
| -20.847 | 3.910 | 0.161 | 168.70 | -106.11 | -1.96 | 1 | 173.78 | 7.89 | 29000 | 2 | 135.11 | | 29000 | | | | |
| -21.112 | 3.957 | 0.191 | 141.80 | -96.41 | -1.96 | 1 | 175.77 | 7.89 | 29000 | 2 | 137.51 | | 29000 | | | | |
| -21.378 | 4.011 | 0.216 | 117.47 | -86.85 | -1.96 | 1 | 177.76 | 7.89 | 29000 | 2 | 140.12 | | 29000 | | | | |
| -21.644 | 4.072 | 0.236 | 95.65 | -77.48 | -1.96 | 1 | 179.75 | 7.89 | 29000 | 2 | 142.90 | | 29000 | | | | |
| -21.909 | 4.137 | 0.253 | 76.29 | -68.33 | -1.96 | 1 | 181.75 | 7.89 | 29000 | 2 | 145.83 | | 29000 | | | | |
| -22.175 | 4.206 | 0.266 | 59.32 | -59.45 | -1.96 | 1 | 183.74 | 7.89 | 29000 | 2 | 148.87 | | 29000 | | | | |
| -22.441 | 4.278 | 0.276 | 44.68 | -50.86 | -1.96 | 1 | 185.73 | 7.89 | 29000 | 2 | 152.00 | | 29000 | | | | |
| -22.706 | 4.352 | 0.283 | 32.28 | -42.58 | -1.96 | 1 | 187.72 | 7.89 | 29000 | 2 | 155.19 | | 29000 | | | | |
| -22.972 | 4.428 | 0.288 | 22.03 | -34.62 | -1.96 | 1 | 189.71 | 7.89 | 29000 | 2 | 158.43 | | 29000 | | | | |
| -23.237 | 4.505 | 0.292 | 13.85 | -27.01 | -1.96 | 1 | 191.70 | 7.89 | 29000 | 2 | 161.70 | | 29000 | | | | |
| -23.503 | 4.582 | 0.294 | 7.65 | -19.73 | -1.96 | 1 | 193.69 | 7.89 | 29000 | 2 | 165.00 | | 29000 | | | | |
| -23.769 | 4.661 | 0.295 | 3.34 | -12.80 | -1.96 | 1 | 195.68 | 7.89 | 29000 | 2 | 168.30 | | 29000 | | | | |
| -24.034 | 4.739 | 0.295 | 0.82 | -6.23 | -1.96 | 1 | 197.67 | 7.89 | 29000 | 2 | 171.62 | | 29000 | | | | |
| -24.300 | 4.817 | 0.295 | 0.00 | 0.00 | -1.96 | 1 | 199.66 | 7.89 | 29000 | 2 | 174.93 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. C. REP. | | ESTADO PR. SOPRAC. ELAST. | | | ESTADO PR. SOPRAC. ELAST. | | | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 25.19 mm

MOMENTO MÁXIMO =-1800.02 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 204.99 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.239 = (2814.72 kN/m)/(11800.83 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.640 = (1183.46 kN/m)/(1848.51 kN/m)

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 4 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 10.92 |
| -0.900 | 0.00 | 21.26 |
| -1.175 | 0.00 | 33.13 |
| -1.450 | 0.00 | 41.79 |
| -1.725 | 0.00 | 47.23 |
| -2.000 | 0.00 | 49.43 |
| | -139.88 | 4.40 |
| -2.300 | -139.57 | 5.79 |
| -2.600 | -139.57 | 8.09 |
| -2.900 | -139.57 | 5.78 |
| -3.200 | -139.57 | 3.74 |
| -3.500 | -139.57 | 1.97 |
| -3.800 | -139.57 | 0.44 |
| -4.100 | -139.45 | 0.00 |
| -4.400 | -138.97 | 0.00 |
| -4.700 | -138.05 | 0.00 |
| -5.000 | -136.66 | 0.00 |
| -5.262 | -134.82 | 0.00 |
| -5.525 | -132.15 | 0.00 |
| -5.788 | -128.63 | 0.00 |
| -6.050 | -124.26 | 0.00 |
| -6.312 | -119.06 | 0.00 |
| -6.575 | -113.01 | 0.00 |
| -6.837 | -106.13 | 0.00 |
| -7.100 | -98.39 | 0.00 |
| -7.363 | -89.82 | 3.65 |
| -7.625 | -80.41 | 13.07 |
| -7.887 | -70.15 | 23.33 |
| -8.150 | -59.05 | 34.43 |
| -8.412 | -47.11 | 46.37 |
| -8.675 | -34.33 | 59.15 |
| -8.938 | -20.70 | 72.78 |
| -9.200 | -6.23 | 87.24 |
| -9.475 | 0.00 | 100.97 |
| -9.750 | 0.00 | 115.61 |
| -10.025 | 0.00 | 131.17 |
| -10.300 | 0.00 | 147.63 |
| | -278.66 | 107.11 |
| -10.800 | -246.40 | 139.37 |
| -11.300 | -211.12 | 174.65 |
| -11.800 | -172.84 | 159.97 |
| -12.163 | -143.20 | 189.61 |
| -12.525 | -111.98 | 220.83 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 2.48 |
| -0.900 | 0.00 | 9.74 |
| -1.175 | 0.00 | 17.29 |
| -1.450 | 0.00 | 27.67 |
| -1.725 | 0.00 | 39.98 |
| -2.000 | 0.00 | 53.35 |
| | 0.00 | 53.35 |
| -2.300 | 0.00 | 13.02 |
| -2.600 | -30.42 | 9.10 |
| -2.900 | -72.29 | 11.17 |
| -3.200 | -114.16 | 12.59 |
| -3.500 | -156.03 | 13.44 |
| -3.800 | -197.90 | 13.80 |
| -4.100 | -239.76 | 13.73 |
| -4.400 | -281.53 | 13.32 |
| -4.700 | -323.10 | 12.62 |
| -5.000 | -364.31 | 11.71 |
| -5.262 | -399.96 | 10.78 |
| -5.525 | -435.02 | 9.77 |
| -5.788 | -469.27 | 8.72 |
| -6.050 | -502.48 | 7.67 |
| -6.312 | -534.43 | 6.64 |
| -6.575 | -564.91 | 5.68 |
| -6.837 | -593.69 | 4.82 |
| -7.100 | -620.55 | 4.09 |
| -7.363 | -645.27 | 3.51 |
| -7.625 | -667.64 | 3.13 |
| -7.887 | -687.41 | 2.98 |
| -8.150 | -704.39 | 3.08 |
| -8.412 | -718.34 | 3.46 |
| -8.675 | -729.05 | 4.15 |
| -8.938 | -736.29 | 5.19 |
| -9.200 | -739.84 | 6.60 |
| -9.475 | -739.69 | 8.08 |
| -9.750 | -735.64 | 9.21 |
| -10.025 | -727.43 | 10.03 |
| -10.300 | -714.82 | 34.44 |
| | -714.82 | 34.44 |
| -10.800 | -679.81 | 10.98 |
| -11.300 | -627.91 | 10.80 |
| -11.800 | -557.62 | 10.19 |
| -12.163 | -494.30 | 9.57 |
| -12.525 | -419.96 | 17.28 |

| | | | | | |
|---|---|---|---|---|---|
| -12.887 | -79.17 | 253.64 | -12.887 | -445.89 | 53.26 |
| -13.250 | -44.79 | 288.02 | -13.250 | -468.41 | 82.20 |
| -13.613 | -8.82 | 323.99 | -13.613 | -478.17 | 104.83 |



| | | | | | |
|---|---|---|---|---|---|
| -13.975 | -2.18 | 361.55 | -13.975 | -474.61 | 121.91 |
| -14.337 | -2.07 | 400.68 | -14.337 | -457.15 | 137.31 |
| -14.700 | -1.94 | 441.40 | -14.700 | -425.21 | 289.89 |
| | -105.05 | 108.59 | | -425.21 | 289.89 |
| -15.000 | -69.72 | 143.48 | -15.000 | -387.43 | 263.63 |
| -15.300 | -32.04 | 179.46 | -15.300 | -339.02 | 248.29 |
| -15.800 | -16.13 | 183.37 | -15.800 | -247.65 | 236.62 |
| -16.066 | -10.70 | 180.05 | -16.066 | -199.33 | 233.10 |
| -16.331 | -14.07 | 174.31 | -16.331 | -152.22 | 230.92 |
| -16.597 | -16.94 | 166.14 | -16.597 | -106.95 | 229.72 |
| -16.862 | -19.36 | 155.54 | -16.862 | -64.17 | 229.05 |
| -17.128 | -21.37 | 142.52 | -17.128 | -24.53 | 228.41 |
| -17.394 | -23.04 | 127.08 | -17.394 | 0.00 | 227.23 |
| -17.659 | -24.41 | 109.21 | -17.659 | 0.00 | 224.87 |
| -17.925 | -25.53 | 89.86 | -17.925 | 0.00 | 220.77 |
| -18.191 | -26.43 | 71.06 | -18.191 | 0.00 | 214.71 |
| -18.456 | -32.04 | 53.90 | -18.456 | -0.04 | 206.95 |
| -18.722 | -36.76 | 38.32 | -18.722 | -0.13 | 197.79 |
| -18.987 | -40.51 | 24.30 | -18.987 | -0.20 | 187.50 |
| -19.253 | -43.38 | 11.77 | -19.253 | -0.25 | 176.34 |
| -19.519 | -45.47 | 0.70 | -19.519 | -0.29 | 164.53 |
| -19.784 | -46.85 | 0.00 | -19.784 | -0.31 | 152.25 |
| -20.050 | -47.60 | 0.00 | -20.050 | -0.32 | 139.69 |
| -20.316 | -47.78 | 0.01 | -20.316 | -0.33 | 127.01 |
| -20.581 | -47.45 | 0.04 | -20.581 | -0.32 | 116.52 |
| -20.847 | -46.65 | 0.07 | -20.847 | -0.31 | 107.88 |
| -21.112 | -45.43 | 0.09 | -21.112 | -0.29 | 98.17 |
| -21.378 | -43.82 | 0.10 | -21.378 | -0.26 | 87.69 |
| -21.644 | -41.84 | 0.11 | -21.644 | -0.23 | 76.74 |
| -21.909 | -41.97 | 0.12 | -21.909 | -0.20 | 65.59 |
| -22.175 | -41.17 | 0.12 | -22.175 | -0.17 | 54.53 |
| -22.441 | -39.36 | 0.12 | -22.441 | -0.14 | 43.81 |
| -22.706 | -36.59 | 0.11 | -22.706 | -0.11 | 33.70 |
| -22.972 | -32.86 | 0.10 | -22.972 | -0.08 | 24.46 |
| -23.237 | -28.18 | 0.09 | -23.237 | -0.05 | 16.33 |
| -23.503 | -22.56 | 0.07 | -23.503 | -0.03 | 9.57 |
| -23.769 | -16.00 | 0.05 | -23.769 | -0.01 | 4.43 |
| -24.034 | -8.52 | 0.03 | -24.034 | 0.00 | 1.16 |
| -24.300 | 0.00 | 0.00 | -24.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS ENVOLVENTES DE FASE  5 A FASE  5 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 11.65 |
| -0.900 | 0.00 | 22.52 |
| -1.175 | 0.00 | 35.40 |
| -1.450 | 0.00 | 44.77 |
| -1.725 | 0.00 | 50.62 |
| -2.000 | 0.00 | 52.95 |
| | -150.64 | 0.00 |
| -2.300 | -150.33 | 0.00 |
| -2.600 | -150.33 | 0.00 |
| -2.900 | -150.33 | 0.00 |
| -3.200 | -150.33 | 0.00 |
| -3.500 | -150.33 | 0.00 |
| -3.800 | -150.33 | 0.00 |
| -4.100 | -150.21 | 0.00 |
| -4.400 | -149.74 | 0.00 |
| -4.700 | -148.81 | 0.00 |
| -5.000 | -147.43 | 0.00 |
| -5.262 | -145.59 | 0.00 |
| -5.525 | -142.91 | 0.00 |
| -5.788 | -139.39 | 0.00 |
| -6.050 | -135.03 | 0.00 |
| -6.312 | -129.83 | 0.00 |
| -6.575 | -123.78 | 0.00 |
| -6.837 | -116.89 | 0.00 |
| -7.100 | -109.16 | 0.00 |
| -7.363 | -100.59 | 0.00 |
| -7.625 | -91.17 | 0.00 |
| -7.887 | -80.92 | 0.00 |
| -8.150 | -69.82 | 0.00 |
| -8.412 | -57.88 | 0.00 |
| -8.675 | -45.09 | 0.00 |
| -8.938 | -31.47 | 0.00 |
| -9.200 | -17.00 | 0.00 |
| -9.475 | -3.27 | 0.00 |
| -9.750 | 0.00 | 11.37 |
| -10.025 | 0.00 | 26.92 |
| -10.300 | 0.00 | 43.38 |
| -10.800 | 0.00 | 75.65 |
| -11.300 | 0.00 | 110.92 |
| -11.800 | 0.00 | 149.21 |
| -12.163 | 0.00 | 178.85 |
| -12.525 | 0.00 | 210.07 |
| -12.887 | 0.00 | 242.87 |
| -13.250 | 0.00 | 277.26 |
| -13.613 | 0.00 | 313.23 |
| -13.975 | 0.00 | 350.78 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 2.65 |
| -0.900 | 0.00 | 10.37 |
| -1.175 | 0.00 | 18.41 |
| -1.450 | 0.00 | 29.51 |
| -1.725 | 0.00 | 42.71 |
| -2.000 | 0.00 | 57.03 |
| | 0.00 | 57.03 |
| -2.300 | 0.00 | 11.90 |
| -2.600 | -33.20 | 0.00 |
| -2.900 | -78.30 | 0.00 |
| -3.200 | -123.40 | 0.00 |
| -3.500 | -168.50 | 0.00 |
| -3.800 | -213.60 | 0.00 |
| -4.100 | -258.69 | 0.00 |
| -4.400 | -303.69 | 0.00 |
| -4.700 | -348.49 | 0.00 |
| -5.000 | -392.93 | 0.00 |
| -5.262 | -431.41 | 0.00 |
| -5.525 | -469.29 | 0.00 |
| -5.788 | -506.36 | 0.00 |
| -6.050 | -542.40 | 0.00 |
| -6.312 | -577.18 | 0.00 |
| -6.575 | -610.49 | 0.00 |
| -6.837 | -642.09 | 0.00 |
| -7.100 | -671.78 | 0.00 |
| -7.363 | -699.33 | 0.00 |
| -7.625 | -724.52 | 0.00 |
| -7.887 | -747.12 | 0.00 |
| -8.150 | -766.93 | 0.00 |
| -8.412 | -783.70 | 0.00 |
| -8.675 | -797.24 | 0.00 |
| -8.938 | -807.30 | 0.00 |
| -9.200 | -813.68 | 0.00 |
| -9.475 | -816.49 | 0.00 |
| -9.750 | -815.40 | 0.00 |
| -10.025 | -810.15 | 0.00 |
| -10.300 | -800.51 | 0.00 |
| -10.800 | -770.88 | 0.00 |
| -11.300 | -724.36 | 0.00 |
| -11.800 | -659.45 | 0.00 |
| -12.163 | -600.04 | 0.00 |
| -12.525 | -529.60 | 0.00 |
| -12.887 | -447.55 | 0.00 |
| -13.250 | -353.33 | 0.00 |
| -13.613 | -246.35 | 0.00 |
| -13.975 | -126.05 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| -14.337 | 0.00 | 389.91 | -14.337 | 0.00 | 8.16 |
| -14.700 | 0.00 | 430.85 | -14.700 | 0.00 | 156.86 |
| | 0.00 | 55.68 | | 0.00 | 156.86 |
| -15.000 | 0.00 | 91.93 | -15.000 | 0.00 | 178.92 |
| -15.300 | 0.00 | 116.19 | -15.300 | 0.00 | 210.82 |
| -15.800 | 0.00 | 91.76 | -15.800 | 0.00 | 262.96 |
| -16.066 | 0.00 | 78.16 | -16.066 | 0.00 | 285.51 |
| -16.331 | 0.00 | 65.15 | -16.331 | 0.00 | 304.54 |
| -16.597 | 0.00 | 52.35 | -16.597 | 0.00 | 320.14 |
| -16.862 | 0.00 | 39.42 | -16.862 | 0.00 | 332.34 |
| -17.128 | 0.00 | 26.04 | -17.128 | 0.00 | 341.04 |
| -17.394 | 0.00 | 11.90 | -17.394 | 0.00 | 346.10 |
| -17.659 | -3.27 | 0.00 | -17.659 | 0.00 | 347.27 |
| -17.925 | -18.77 | 0.00 | -17.925 | 0.00 | 344.34 |
| -18.191 | -32.80 | 0.00 | -18.191 | 0.00 | 337.43 |
| -18.456 | -44.49 | 0.00 | -18.456 | 0.00 | 327.12 |
| -18.722 | -54.05 | 0.00 | -18.722 | 0.00 | 313.99 |
| -18.987 | -61.70 | 0.00 | -18.987 | 0.00 | 298.57 |
| -19.253 | -67.62 | 0.00 | -19.253 | 0.00 | 281.36 |
| -19.519 | -71.99 | 0.00 | -19.519 | 0.00 | 262.79 |
| -19.784 | -74.97 | 0.00 | -19.784 | 0.00 | 243.24 |
| -20.050 | -76.71 | 0.00 | -20.050 | 0.00 | 223.07 |
| -20.316 | -77.34 | 0.00 | -20.316 | 0.00 | 202.59 |
| -20.581 | -76.98 | 0.00 | -20.581 | 0.00 | 182.07 |
| -20.847 | -75.73 | 0.00 | -20.847 | 0.00 | 161.77 |
| -21.112 | -73.68 | 0.00 | -21.112 | 0.00 | 141.91 |
| -21.378 | -70.91 | 0.00 | -21.378 | 0.00 | 122.69 |
| -21.644 | -67.49 | 0.00 | -21.644 | 0.00 | 104.30 |
| -21.909 | -63.47 | 0.00 | -21.909 | 0.00 | 86.90 |
| -22.175 | -58.90 | 0.00 | -22.175 | 0.00 | 70.63 |
| -22.441 | -53.83 | 0.00 | -22.441 | 0.00 | 55.65 |
| -22.706 | -48.27 | 0.00 | -22.706 | 0.00 | 42.08 |
| -22.972 | -42.12 | 0.00 | -22.972 | 0.00 | 30.06 |
| -23.237 | -35.21 | 0.00 | -23.237 | 0.00 | 19.77 |
| -23.503 | -27.54 | 0.00 | -23.503 | 0.00 | 11.42 |
| -23.769 | -19.11 | 0.00 | -23.769 | 0.00 | 5.21 |
| -24.034 | -9.93 | 0.00 | -24.034 | 0.00 | 1.34 |
| -24.300 | 0.00 | 0.00 | -24.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



*** DESPLAZAMIENTO MÁXIMO EN FASE N° 6 = 25.186 mm  EN FASE FINAL N° 6 = 25.186 mm

*** MAXIMUM MOMENT  IN PHASE Nb 6 = -1800.021 kN.m/m  IN FINAL PHASE Nb 6 = -1800.021 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -2.00 | 2 | 0.00 | 6 | -600.41 | 6 | -600.41 |
| 2 | -10.30 | 3 | 0.00 | 3 | -426.29 | 4 | QUITADO |
| 3 | -14.70 | 4 | 0.00 | 6 | -1518.15 | 6 | -1518.15 |
| | m | | kN | | kN | | kN |



* CURVAS ENVOLVENTES DE FASE 6 A FASE 6 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 19.59 | -0.450 | 0.00 | 4.31 |
| -0.900 | 0.00 | 38.65 | -0.900 | 0.00 | 17.55 |
| -1.175 | 0.00 | 66.68 | -1.175 | 0.00 | 32.22 |
| -1.450 | 0.00 | 86.72 | -1.450 | 0.00 | 53.49 |
| -1.725 | 0.00 | 98.76 | -1.725 | 0.00 | 79.18 |
| -2.000 | 0.00 | 105.93 | -2.000 | 0.00 | 107.37 |
| | -494.48 | 0.00 | | 0.00 | 107.37 |
| -2.300 | -486.79 | 0.00 | -2.300 | -39.87 | 0.00 |
| -2.600 | -477.48 | 0.00 | -2.600 | -184.55 | 0.00 |
| -2.900 | -466.55 | 0.00 | -2.900 | -326.19 | 0.00 |
| -3.200 | -454.00 | 0.00 | -3.200 | -464.32 | 0.00 |
| -3.500 | -439.82 | 0.00 | -3.500 | -598.43 | 0.00 |
| -3.800 | -424.03 | 0.00 | -3.800 | -728.05 | 0.00 |
| -4.100 | -406.61 | 0.00 | -4.100 | -852.68 | 0.00 |
| -4.400 | -387.57 | 0.00 | -4.400 | -971.85 | 0.00 |
| -4.700 | -366.91 | 0.00 | -4.700 | -1085.06 | 0.00 |
| -5.000 | -344.63 | 0.00 | -5.000 | -1191.84 | 0.00 |
| -5.262 | -323.80 | 0.00 | -5.262 | -1279.60 | 0.00 |
| -5.525 | -301.70 | 0.00 | -5.525 | -1361.72 | 0.00 |
| -5.788 | -278.33 | 0.00 | -5.788 | -1437.88 | 0.00 |
| -6.050 | -253.70 | 0.00 | -6.050 | -1507.73 | 0.00 |
| -6.312 | -227.81 | 0.00 | -6.312 | -1570.96 | 0.00 |
| -6.575 | -200.66 | 0.00 | -6.575 | -1627.23 | 0.00 |
| -6.837 | -172.24 | 0.00 | -6.837 | -1676.20 | 0.00 |
| -7.100 | -142.55 | 0.00 | -7.100 | -1717.54 | 0.00 |
| -7.363 | -111.61 | 0.00 | -7.363 | -1750.93 | 0.00 |
| -7.625 | -79.40 | 0.00 | -7.625 | -1776.02 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| -7.887 | -45.92 | 0.00 | -7.887 | -1792.50 | 0.00 |
| -8.150 | -11.18 | 0.00 | -8.150 | -1800.02 | 0.00 |
| -8.412 | 0.00 | 24.82 | -8.412 | -1798.26 | 0.00 |
| -8.675 | 0.00 | 62.09 | -8.675 | -1786.88 | 0.00 |
| -8.938 | 0.00 | 100.62 | -8.938 | -1765.55 | 0.00 |
| -9.200 | 0.00 | 140.41 | -9.200 | -1733.95 | 0.00 |
| -9.475 | 0.00 | 176.18 | -9.475 | -1690.44 | 0.00 |
| -9.750 | 0.00 | 213.26 | -9.750 | -1636.93 | 0.00 |
| -10.025 | 0.00 | 251.64 | -10.025 | -1573.03 | 0.00 |
| -10.300 | 0.00 | 291.33 | -10.300 | -1498.40 | 0.00 |
| -10.800 | 0.00 | 366.86 | -10.800 | -1334.04 | 0.00 |
| -11.300 | 0.00 | 446.71 | -11.300 | -1130.82 | 0.00 |
| -11.800 | 0.00 | 530.88 | -11.800 | -886.61 | 0.00 |
| -12.163 | 0.00 | 594.62 | -12.163 | -682.68 | 0.00 |
| -12.525 | 0.00 | 660.63 | -12.525 | -455.23 | 0.00 |
| -12.887 | 0.00 | 728.91 | -12.887 | -203.45 | 0.00 |
| -13.250 | 0.00 | 799.46 | -13.250 | 0.00 | 73.50 |
| -13.613 | 0.00 | 872.29 | -13.613 | 0.00 | 376.44 |
| -13.975 | 0.00 | 947.39 | -13.975 | 0.00 | 706.18 |



| | | | | | |
|---|---|---|---|---|---|
| -14.337 | 0.00 | 1024.77 | -14.337 | 0.00 | 1063.57 |
| -14.700 | 0.00 | 1104.42 | -14.700 | 0.00 | 1449.42 |
| | -413.73 | 0.00 | | 0.00 | 1449.42 |
| -15.000 | -346.09 | 0.00 | -15.000 | 0.00 | 1335.41 |
| -15.300 | -292.34 | 0.00 | -15.300 | 0.00 | 1240.38 |
| -15.800 | -266.64 | 0.00 | -15.800 | 0.00 | 1100.86 |
| -16.066 | -254.41 | 0.00 | -16.066 | 0.00 | 1031.66 |
| -16.331 | -242.34 | 0.00 | -16.331 | 0.00 | 965.70 |
| -16.597 | -230.89 | 0.00 | -16.597 | 0.00 | 902.86 |
| -16.862 | -220.48 | 0.00 | -16.862 | 0.00 | 842.94 |
| -17.128 | -211.48 | 0.00 | -17.128 | 0.00 | 785.61 |
| -17.394 | -204.23 | 0.00 | -17.394 | 0.00 | 730.44 |
| -17.659 | -199.03 | 0.00 | -17.659 | 0.00 | 676.93 |
| -17.925 | -195.20 | 0.00 | -17.925 | 0.00 | 624.58 |
| -18.191 | -190.95 | 0.00 | -18.191 | 0.00 | 573.27 |
| -18.456 | -185.38 | 0.00 | -18.456 | 0.00 | 523.26 |
| -18.722 | -178.74 | 0.00 | -18.722 | 0.00 | 474.88 |
| -18.987 | -171.19 | 0.00 | -18.987 | 0.00 | 428.38 |
| -19.253 | -162.93 | 0.00 | -19.253 | 0.00 | 383.99 |
| -19.519 | -154.11 | 0.00 | -19.519 | 0.00 | 341.88 |
| -19.784 | -144.88 | 0.00 | -19.784 | 0.00 | 302.16 |
| -20.050 | -135.36 | 0.00 | -20.050 | 0.00 | 264.93 |
| -20.316 | -125.66 | 0.00 | -20.316 | 0.00 | 230.26 |
| -20.581 | -115.89 | 0.00 | -20.581 | 0.00 | 198.18 |
| -20.847 | -106.11 | 0.00 | -20.847 | 0.00 | 168.70 |
| -21.112 | -96.41 | 0.00 | -21.112 | 0.00 | 141.80 |
| -21.378 | -86.85 | 0.00 | -21.378 | 0.00 | 117.47 |
| -21.644 | -77.48 | 0.00 | -21.644 | 0.00 | 95.65 |
| -21.909 | -68.33 | 0.00 | -21.909 | 0.00 | 76.29 |
| -22.175 | -59.45 | 0.00 | -22.175 | 0.00 | 59.32 |
| -22.441 | -50.86 | 0.00 | -22.441 | 0.00 | 44.68 |
| -22.706 | -42.58 | 0.00 | -22.706 | 0.00 | 32.28 |
| -22.972 | -34.62 | 0.00 | -22.972 | 0.00 | 22.03 |
| -23.237 | -27.01 | 0.00 | -23.237 | 0.00 | 13.85 |
| -23.503 | -19.73 | 0.00 | -23.503 | 0.00 | 7.65 |
| -23.769 | -12.80 | 0.00 | -23.769 | 0.00 | 3.34 |
| -24.034 | -6.23 | 0.00 | -24.034 | 0.00 | 0.82 |
| -24.300 | 0.00 | 0.00 | -24.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS ENVOLVENTES DE FASE  1 A FASE  6 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 19.59 |
| -0.900 | 0.00 | 38.65 |
| -1.175 | 0.00 | 66.68 |
| -1.450 | 0.00 | 86.72 |
| -1.725 | 0.00 | 98.76 |
| -2.000 | 0.00 | 105.93 |
| | -494.48 | 4.40 |
| -2.300 | -486.79 | 5.79 |
| -2.600 | -477.48 | 8.09 |
| -2.900 | -466.55 | 5.78 |
| -3.200 | -454.00 | 3.74 |
| -3.500 | -439.82 | 1.97 |
| -3.800 | -424.03 | 0.44 |
| -4.100 | -406.61 | 0.00 |
| -4.400 | -387.57 | 0.00 |
| -4.700 | -366.91 | 0.00 |
| -5.000 | -344.63 | 0.00 |
| -5.262 | -323.80 | 0.00 |
| -5.525 | -301.70 | 0.00 |
| -5.788 | -278.33 | 0.00 |
| -6.050 | -253.70 | 0.00 |
| -6.312 | -227.81 | 0.00 |
| -6.575 | -200.66 | 0.00 |
| -6.837 | -172.24 | 0.00 |
| -7.100 | -142.55 | 0.00 |
| -7.363 | -111.61 | 3.65 |
| -7.625 | -91.17 | 13.07 |
| -7.887 | -80.92 | 23.33 |
| -8.150 | -69.82 | 34.43 |
| -8.412 | -57.88 | 46.37 |
| -8.675 | -45.09 | 62.09 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 4.31 |
| -0.900 | 0.00 | 17.55 |
| -1.175 | 0.00 | 32.22 |
| -1.450 | 0.00 | 53.49 |
| -1.725 | 0.00 | 79.18 |
| -2.000 | 0.00 | 107.37 |
| | 0.00 | 107.37 |
| -2.300 | -39.87 | 13.02 |
| -2.600 | -184.55 | 9.10 |
| -2.900 | -326.19 | 11.17 |
| -3.200 | -464.32 | 12.59 |
| -3.500 | -598.43 | 13.44 |
| -3.800 | -728.05 | 13.80 |
| -4.100 | -852.68 | 13.73 |
| -4.400 | -971.85 | 13.32 |
| -4.700 | -1085.06 | 12.62 |
| -5.000 | -1191.84 | 11.71 |
| -5.262 | -1279.60 | 10.78 |
| -5.525 | -1361.72 | 9.77 |
| -5.788 | -1437.88 | 8.72 |
| -6.050 | -1507.73 | 7.67 |
| -6.312 | -1570.96 | 6.64 |
| -6.575 | -1627.23 | 5.68 |
| -6.837 | -1676.20 | 4.82 |
| -7.100 | -1717.54 | 4.09 |
| -7.363 | -1750.93 | 3.51 |
| -7.625 | -1776.02 | 3.13 |
| -7.887 | -1792.50 | 2.98 |
| -8.150 | -1800.02 | 3.08 |
| -8.412 | -1798.26 | 3.46 |
| -8.675 | -1786.88 | 4.15 |

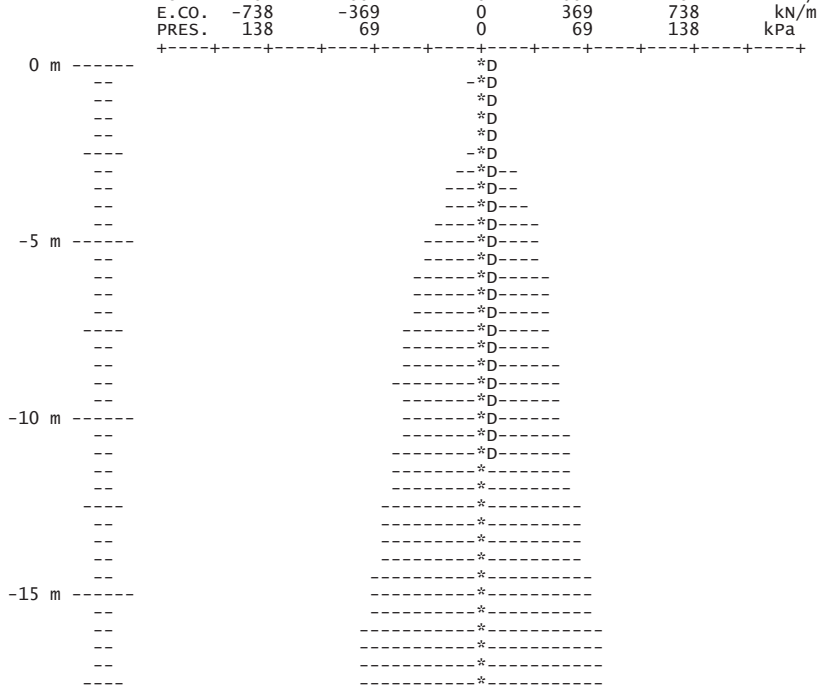
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|---|---|---|---|---|---|
| -8.938 | -31.47 | 100.62 | -8.938 | -1765.55 | 5.19 |
| -9.200 | -17.00 | 140.41 | -9.200 | -1733.95 | 6.60 |
| -9.475 | -3.27 | 176.18 | -9.475 | -1690.44 | 8.08 |
| -9.750 | 0.00 | 213.26 | -9.750 | -1636.93 | 9.21 |
| -10.025 | 0.00 | 251.64 | -10.025 | -1573.03 | 10.03 |
| -10.300 | 0.00 | 291.33 | -10.300 | -1498.40 | 34.44 |
| | -278.66 | 291.33 | | -1498.40 | 34.44 |
| -10.800 | -246.40 | 366.86 | -10.800 | -1334.04 | 10.98 |
| -11.300 | -211.12 | 446.71 | -11.300 | -1130.82 | 10.80 |
| -11.800 | -172.84 | 530.88 | -11.800 | -886.61 | 10.19 |
| -12.163 | -143.20 | 594.62 | -12.163 | -682.68 | 9.57 |
| -12.525 | -111.98 | 660.63 | -12.525 | -529.60 | 17.28 |
| -12.887 | -79.17 | 728.91 | -12.887 | -447.55 | 53.26 |
| -13.250 | -44.79 | 799.46 | -13.250 | -468.41 | 82.20 |
| -13.613 | -8.82 | 872.29 | -13.613 | -478.17 | 376.44 |



| | | | | | |
|---|---|---|---|---|---|
| -13.975 | -2.18 | 947.39 | -13.975 | -474.61 | 706.18 |
| -14.337 | -2.07 | 1024.77 | -14.337 | -457.15 | 1063.57 |
| -14.700 | -1.94 | 1104.42 | -14.700 | -425.21 | 1449.42 |
| | -413.73 | 108.59 | | -425.21 | 1449.42 |
| -15.000 | -346.09 | 143.48 | -15.000 | -387.43 | 1335.41 |
| -15.300 | -292.34 | 179.46 | -15.300 | -339.02 | 1240.38 |
| -15.800 | -266.64 | 183.37 | -15.800 | -247.65 | 1100.86 |
| -16.066 | -254.41 | 180.05 | -16.066 | -199.33 | 1031.66 |
| -16.331 | -242.34 | 174.31 | -16.331 | -152.22 | 965.70 |
| -16.597 | -230.89 | 166.14 | -16.597 | -106.95 | 902.86 |
| -16.862 | -220.48 | 155.54 | -16.862 | -64.17 | 842.94 |
| -17.128 | -211.48 | 142.52 | -17.128 | -24.53 | 785.61 |
| -17.394 | -204.23 | 127.08 | -17.394 | 0.00 | 730.44 |
| -17.659 | -199.03 | 109.21 | -17.659 | 0.00 | 676.93 |
| -17.925 | -195.20 | 89.86 | -17.925 | 0.00 | 624.58 |
| -18.191 | -190.95 | 71.06 | -18.191 | 0.00 | 573.27 |
| -18.456 | -185.38 | 53.90 | -18.456 | -0.04 | 523.26 |
| -18.722 | -178.74 | 38.32 | -18.722 | -0.13 | 474.88 |
| -18.987 | -171.19 | 24.30 | -18.987 | -0.20 | 428.38 |
| -19.253 | -162.93 | 11.77 | -19.253 | -0.25 | 383.99 |
| -19.519 | -154.11 | 0.70 | -19.519 | -0.29 | 341.88 |
| -19.784 | -144.88 | 0.00 | -19.784 | -0.31 | 302.16 |
| -20.050 | -135.36 | 0.00 | -20.050 | -0.32 | 264.93 |
| -20.316 | -125.66 | 0.01 | -20.316 | -0.33 | 230.26 |
| -20.581 | -115.89 | 0.04 | -20.581 | -0.32 | 198.18 |
| -20.847 | -106.11 | 0.07 | -20.847 | -0.31 | 168.70 |
| -21.112 | -96.41 | 0.09 | -21.112 | -0.29 | 141.91 |
| -21.378 | -86.85 | 0.10 | -21.378 | -0.26 | 122.69 |
| -21.644 | -77.48 | 0.11 | -21.644 | -0.23 | 104.30 |
| -21.909 | -68.33 | 0.12 | -21.909 | -0.20 | 86.90 |
| -22.175 | -59.45 | 0.12 | -22.175 | -0.17 | 70.63 |
| -22.441 | -53.83 | 0.12 | -22.441 | -0.14 | 55.65 |
| -22.706 | -48.27 | 0.11 | -22.706 | -0.11 | 42.08 |
| -22.972 | -42.12 | 0.10 | -22.972 | -0.08 | 30.06 |
| -23.237 | -35.21 | 0.09 | -23.237 | -0.05 | 19.77 |
| -23.503 | -27.54 | 0.07 | -23.503 | -0.03 | 11.42 |
| -23.769 | -19.11 | 0.05 | -23.769 | -0.01 | 5.21 |
| -24.034 | -9.93 | 0.03 | -24.034 | 0.00 | 1.34 |
| -24.300 | 0.00 | 0.00 | -24.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS DE LA FASE  1 *



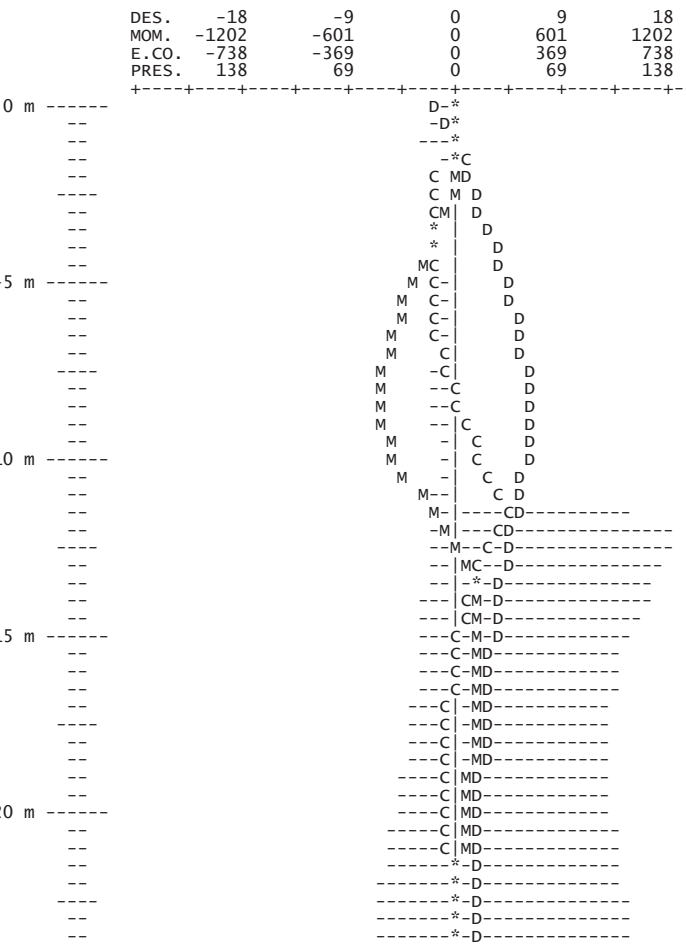








* CURVAS DE LA FASE 2 *

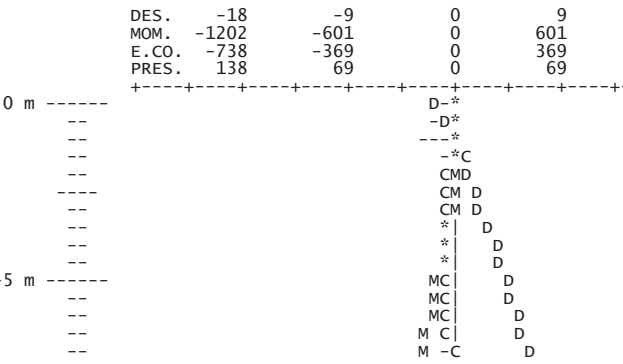









* CURVAS DE LA FASE 3 *



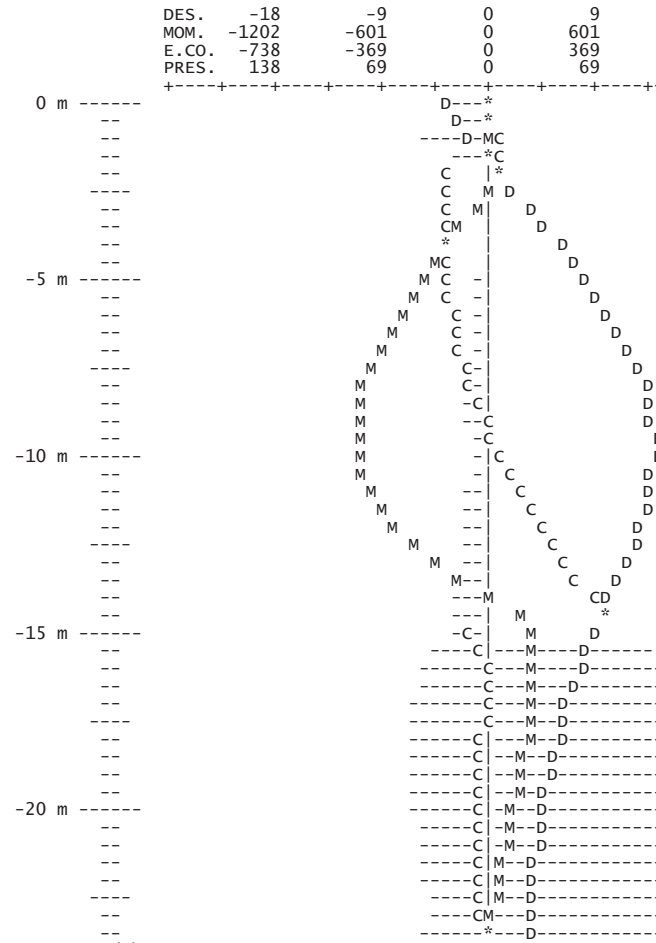









* CURVAS DE LA FASE 4 *

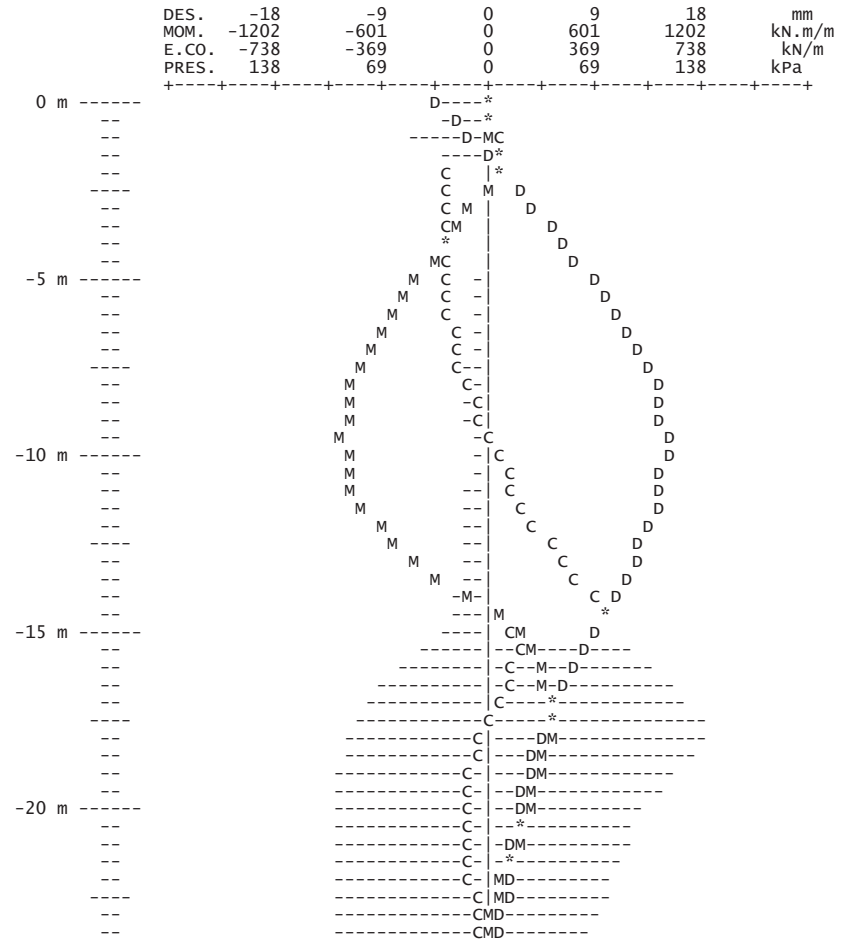




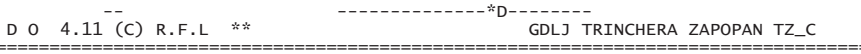





* CURVAS DE LA FASE 5 *

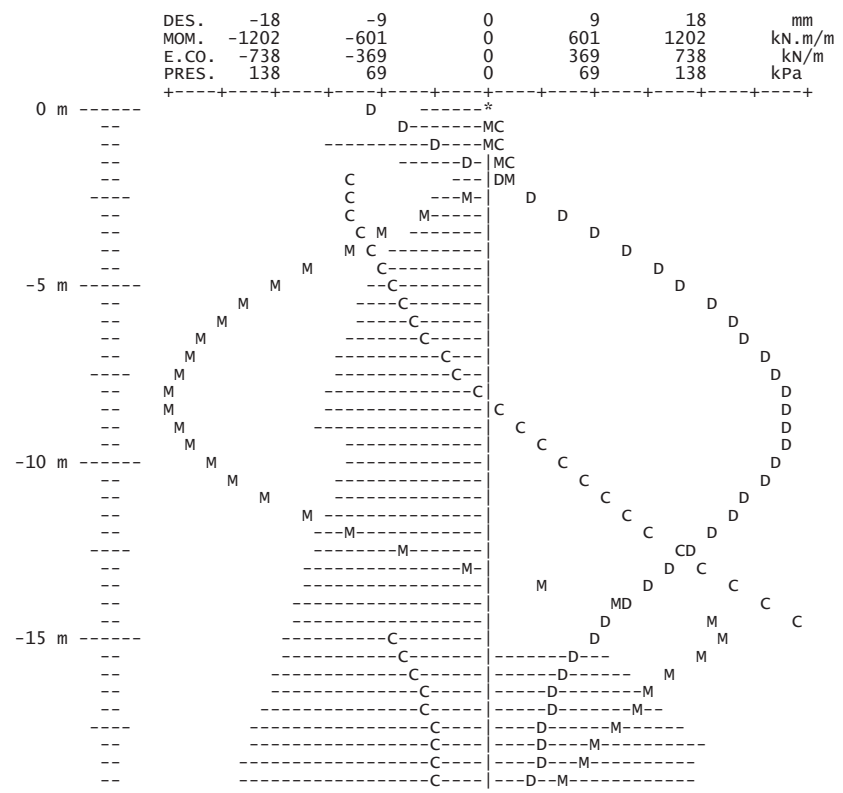






* CURVAS DE LA FASE  6 *




TZ_ C.LST
-20 m

```
***** DATA FILE NAME : TZ_ D.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_D                        *60L  U:NN*
      : 0
 1 ...  0
      *PILOTES SECANTE DE 1.00 m SEP 70 cm
      : -33.45 1386349
 2 ...  -33.45 1386349
      : 0.00
 3 ...  0
      * R
      : -0.90 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -0.9 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1c
      : -11.20 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 5 ...  -11.2 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -17.90 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 6 ...  -17.9 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG1c
      : -27.30 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 7 ...  -27.3 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -37.70 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 8 ...  -37.7 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG2
      : -39.30 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
 9 ...  -39.3 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -47.20 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
10 ...  -47.2 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -7.00 0.50
11 ...  -7 0.5
      *Fase 1
      *Excavacion hasta cota inferior nivel cubierta
      : SUC(1) 10
12 ... SUC(1)  10
      : EXC(2) -2.60
13 ... EXC(2)  -2.6
      : CAL(2)
14 ... CAL(2)
      *Fase 2
      *Ejecucion del nivel cubierta
      *Excavacion hasta nivel estampidor
      : STR(0) -2.00 1.00 0.00 0.00 4000000
15 ... STR(0)  -2 1 0 0 4000000
      : EXC(2) -10.95
16 ... EXC(2)  -10.95
      : WAT(2) -11.45
17 ... WAT(2)  -11.45
      : CAL(2)
18 ... CAL(2)
      *Fase 3
      *Ejecucion del nivel estampidor
      *Excavacion hasta nivel de puntal provisional
      : STR(0) -10.45 1.00 0.00 0.00 705000
19 ... STR(0)  -10.45 1 0 0 705000
      : EXC(2) -15.45
20 ... EXC(2)  -15.45
      : WAT(2) -15.95
21 ... WAT(2)  -15.95
      : CAL(2)
22 ... CAL(2)
      *Fase 4
      *Ejecucion del puntal metalico provisional
      *Excavación hasta losa de fondo
      : STR(0) -14.45 1.00 0.00 0.00 158000
23 ... STR(0)  -14.45 1 0 0 158000
      : EXC(2) -19.45
24 ... EXC(2)  -19.45
      : WAT(2) -19.95
25 ... WAT(2)  -19.95
      : CAL(2)
26 ... CAL(2)
      *Fase 5
      *Ejecucion de la losa de fondo
      : STR(0) -18.85 1.00 0.00 0.00 4000000
27 ... STR(0)  -18.85 1 0 0 4000000
      : STR(0,3)
28 ... STR(0,3)
      : CAL(2)
29 ... CAL(2)
      *Fase 6
      *Restitucion del nf
      : WAT(2,1) -19.45 0 125
30 ... WAT(2,1)  -19.45 0 125
      : CAL(2,1)
31 ... CAL(2,1)
      *Fase 7
      *Sismo
      *SISMO_ R
      : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
32 ... PLA(1)  0.56 2.367 5 29 0 0
      *SISMO_ UG1c
      : PLA(2) 0.948 1.991 20.00 33 0.00 0.00
33 ... PLA(2)  0.948 1.991 20 33 0 0
      *SISMO_ UG1d
      : PLA(3) 0.789 2.509 25.00 36 0.00 0.00
34 ... PLA(3)  0.789 2.509 25 36 0 0
      *SISMO_ UG1c
      : PLA(4) 0.948 1.991 20.00 33 0.00 0.00
35 ... PLA(4)  0.948 1.991 20 33 0 0
      *SISMO_ UG1d
      : PLA(5) 0.789 2.509 25.00 36 0.00 0.00
36 ... PLA(5)  0.789 2.509 25 36 0 0
      *SISMO_ UG2
      : PLA(6) 0.795 2.402 30.00 35 0.00 0.00
37 ... PLA(6)  0.795 2.402 30 35 0 0
      *SISMO_ UG3a
      : PLA(7) 0.302 10.398 246.00 58 0.00 0.00
```

```
  38 ... PLA(7)  0.302 10.398 246 58 0 0
         : CAL(2)
  39 ... CAL(2)
         : FIN
  40 ... FIN
         : GRF
  41 ... GRF
         : STA
  42 ... STA
         : EVP
  43 ... EVP
         : ASC
  44 ... ASC
         *XLS
         : STOP
  45 ... STOP
```



*PILOTES SECANTE DE 1.00 m SEP 70 cm

---

** STARTING DATA **

* BOUSSINESQ SURCHARGES FUNCTION OF STATE OF SOIL

*** WALL DESCRIPTION :

| | INERTIA PRODUCT EI | CYLINDRICAL RIGIDITY |
|---|---|---|
| SECTION Nb 1 FROM 0.000 m TO -33.450 m : | 1386349. kN.m2/m | 0. kPa/m |

*** SOIL DESCRIPTION :

* R

LAYER Nb 1 FROM 0.000 m TO -0.900 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 18.000 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 8.000 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.317 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.515 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 2.882 |
| COHESION | C | = | 5.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 29.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 4900.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* UG1c

LAYER Nb 2 FROM -0.900 m TO -11.200 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.000 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.000 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.268 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.455 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 3.392 |
| COHESION | C | = | 20.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 33.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 20600.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* UG1d



LAYER Nb 3 FROM -11.200 m TO -17.900 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.500 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.500 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.235 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.412 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 3.852 |
| COHESION | C | = | 25.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 36.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 29000.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* UG1c

LAYER Nb 4 FROM -17.900 m TO -27.300 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.000 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.000 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.268 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.455 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 3.392 |
| COHESION | C | = | 20.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 33.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 20600.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* UG1d

LAYER Nb 5 FROM -27.300 m TO -37.700 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.500 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.500 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.235 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.412 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 3.852 |
| COHESION | C | = | 25.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 36.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 29000.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* UG2



LAYER Nb 6 FROM -37.700 m TO -39.300 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 20.000 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 10.000 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.246 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.426 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 3.690 |
| COHESION | C | = | 30.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 35.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 43800.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* UG3a

LAYER Nb 7 FROM -39.300 m TO -47.200 m :

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 23.000 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 13.000 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.075 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.152 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 12.162 |
| COHESION | C | = | 246.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 58.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.333 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 300000.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

* NF



**  PHASE Nb  1  **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* CAQUOT SURCHARGE ON SOIL 1 = 10.000 kPa

* EXCAVATION IN SOIL 2 TO LEVEL = -2.600 m



PHASE 1

| WALL | | | | | SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: -7.00 m CAQUOT SURC.: 10.00 kPa | | | | SOIL 2 EXCAVATION: -2.60 m WATER LEVEL: -7.00 m CAQUOT SURC.: 0.00 kPa | | | | STRUTS/ ANCHORS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
| 0.000 | 1.023 | -0.073 | 0.00 | 0.00 | 2 | 0.14 | 0.14 | 4900 | 0 | | | | | |
| -0.450 | 0.990 | -0.073 | 0.16 | 1.04 | 2 | 4.47 | 4.47 | 4900 | 0 | | | | | |
| -0.900 | 0.957 | -0.073 | 1.23 | 4.02 | 2 | 8.80 | 5.15 | 4900 | 0 | | | | | |
| | | | | | -1 | | | | 0 | | | | | |
| -1.175 | 0.937 | -0.073 | 2.33 | 4.02 | -1 | | | | 0 | | | | | |
| -1.450 | 0.917 | -0.072 | 3.44 | 4.02 | -1 | | | | 0 | | | | | |
| -1.725 | 0.897 | -0.071 | 4.55 | 4.10 | 2 | 0.57 | 0.57 | 20600 | 0 | | | | | |
| -2.000 | 0.878 | -0.070 | 5.74 | 4.64 | 2 | 3.35 | 3.35 | 20600 | 0 | | | | | |
| -2.300 | 0.857 | -0.069 | 7.32 | 6.10 | 2 | 6.37 | 4.55 | 20600 | 0 | | | | | |
| -2.600 | 0.836 | -0.067 | 9.48 | 8.46 | 2 | 9.39 | 4.55 | 20600 | 0 | | | | | |
| | | | | | 2 | 9.39 | 4.55 | 20600 | 2 | 17.23 | | 20600 | | |
| -2.875 | 0.818 | -0.065 | 11.52 | 6.41 | 2 | 12.14 | 4.55 | 20600 | 2 | 19.23 | | 20600 | | |
| -3.150 | 0.801 | -0.063 | 13.03 | 4.56 | 2 | 14.88 | 4.55 | 20600 | 2 | 21.25 | | 20600 | | |
| -3.425 | 0.784 | -0.060 | 14.05 | 2.90 | 2 | 17.60 | 4.55 | 20600 | 2 | 23.28 | | 20600 | | |
| -3.700 | 0.768 | -0.057 | 14.64 | 1.43 | 2 | 20.31 | 4.55 | 20600 | 2 | 25.32 | | 20600 | | |
| -3.975 | 0.752 | -0.054 | 14.85 | 0.14 | 2 | 23.01 | 4.55 | 20600 | 2 | 27.38 | | 20600 | | |
| -4.250 | 0.738 | -0.051 | 14.73 | -0.98 | 2 | 25.68 | 4.55 | 20600 | 2 | 29.46 | | 20600 | | |
| -4.525 | 0.724 | -0.048 | 14.33 | -1.94 | 2 | 28.34 | 4.55 | 20600 | 2 | 31.56 | | 20600 | | |
| -4.800 | 0.711 | -0.046 | 13.68 | -2.75 | 2 | 30.99 | 4.55 | 20600 | 2 | 33.67 | | 20600 | | |
| -5.075 | 0.699 | -0.043 | 12.82 | -3.42 | 2 | 33.61 | 4.55 | 20600 | 2 | 35.80 | | 20600 | | |
| -5.350 | 0.688 | -0.041 | 11.81 | -3.96 | 2 | 36.23 | 4.55 | 20600 | 2 | 37.94 | | 20600 | | |
| -5.625 | 0.677 | -0.038 | 10.66 | -4.37 | 2 | 38.83 | 4.55 | 20600 | 2 | 40.09 | | 20600 | | |
| -5.900 | 0.666 | -0.036 | 9.42 | -4.65 | 2 | 41.42 | 4.55 | 20600 | 2 | 42.26 | | 20600 | | |
| -6.175 | 0.657 | -0.035 | 8.11 | -4.83 | 2 | 44.00 | 4.55 | 20600 | 2 | 44.43 | | 20600 | | |
| -6.450 | 0.647 | -0.033 | 6.77 | -4.90 | 2 | 46.57 | 4.55 | 20600 | 2 | 46.62 | | 20600 | | |
| -6.725 | 0.638 | -0.032 | 5.43 | -4.86 | 2 | 49.13 | 4.55 | 20600 | 2 | 48.81 | | 20600 | | |
| -7.000 | 0.630 | -0.031 | 4.10 | -4.73 | 2 | 51.68 | 4.55 | 20600 | 2 | 51.01 | | 20600 | | |
| -7.431 | 0.617 | -0.030 | 2.15 | -4.32 | 2 | 53.72 | 4.55 | 20600 | 2 | 52.51 | | 20600 | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7.863 | 0.604 | -0.030 | 0.41 | -3.68 | | 2 | 55.75 | 4.55 | 20600 | 2 | 54.01 | | 20600 | | | | |
| -8.294 | 0.591 | -0.030 | -1.00 | -2.82 | | 2 | 57.78 | 4.55 | 20600 | 2 | 55.51 | | 20600 | | | | |
| -8.725 | 0.578 | -0.030 | -1.99 | -1.73 | | 2 | 59.81 | 4.55 | 20600 | 2 | 57.01 | | 20600 | | | | |
| -9.156 | 0.565 | -0.031 | -2.46 | -0.41 | | 2 | 61.85 | 4.55 | 20600 | 2 | 58.51 | | 20600 | | | | |
| -9.587 | 0.552 | -0.032 | -2.31 | 1.15 | | 2 | 63.89 | 4.55 | 20600 | 2 | 60.00 | | 20600 | | | | |
| -10.019 | 0.538 | -0.032 | -1.43 | 2.96 | | 2 | 65.94 | 4.55 | 20600 | 2 | 61.48 | | 20600 | | | | |
| -10.450 | 0.524 | -0.032 | 0.28 | 5.00 | | 2 | 67.99 | 4.55 | 20600 | 2 | 62.96 | | 20600 | | | | |
| -10.950 | 0.508 | -0.032 | 3.44 | 7.69 | | 2 | 70.37 | 4.55 | 20600 | 2 | 64.67 | | 20600 | | | | |
| -11.200 | 0.500 | -0.031 | 5.54 | 9.16 | | 2 | 71.56 | 4.55 | 20600 | 2 | 65.53 | | 20600 | | | | |
| | | | | | | 2 | 59.63 | 4.12 | 29000 | 2 | 64.51 | | 29000 | | | | |
| -11.450 | 0.492 | -0.030 | 7.68 | 7.99 | | 2 | 60.82 | 4.12 | 29000 | 2 | 65.27 | | 29000 | | | | |
| -11.825 | 0.481 | -0.027 | 10.38 | 6.44 | | 2 | 62.60 | 4.12 | 29000 | 2 | 66.42 | | 29000 | | | | |
| -12.200 | 0.472 | -0.024 | 12.54 | 5.11 | | 2 | 64.35 | 4.12 | 29000 | 2 | 67.61 | | 29000 | | | | |
| -12.575 | 0.463 | -0.021 | 14.24 | 3.98 | | 2 | 66.06 | 4.12 | 29000 | 2 | 68.83 | | 29000 | | | | |
| -12.950 | 0.456 | -0.017 | 15.55 | 3.02 | | 2 | 67.74 | 4.12 | 29000 | 2 | 70.10 | | 29000 | | | | |
| -13.325 | 0.451 | -0.012 | 16.52 | 2.19 | | 2 | 69.36 | 4.12 | 29000 | 2 | 71.41 | | 29000 | | | | |
| -13.700 | 0.447 | -0.008 | 17.21 | 1.46 | | 2 | 70.94 | 4.12 | 29000 | 2 | 72.77 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | |



PHASE 1 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.075 | 0.445 | -0.003 | 17.63 | 0.80 | | 2 | 72.46 | 4.12 | 29000 | 2 | 74.18 | | 29000 | | |
| -14.450 | 0.445 | 0.002 | 17.81 | 0.16 | | 2 | 73.94 | 4.12 | 29000 | 2 | 75.64 | | 29000 | | |
| -14.950 | 0.447 | 0.008 | 17.67 | -0.73 | | 2 | 75.82 | 4.12 | 29000 | 2 | 77.67 | | 29000 | | |
| -15.450 | 0.453 | 0.015 | 17.05 | -1.74 | | 2 | 77.61 | 4.12 | 29000 | 2 | 79.79 | | 29000 | | |
| -15.950 | 0.462 | 0.020 | 15.89 | -2.96 | | 2 | 79.31 | 4.12 | 29000 | 2 | 82.01 | | 29000 | | |
| -16.438 | 0.473 | 0.026 | 14.10 | -4.43 | | 2 | 80.89 | 4.12 | 29000 | 2 | 84.24 | | 29000 | | |
| -16.925 | 0.487 | 0.030 | 11.51 | -6.26 | | 2 | 82.40 | 4.12 | 29000 | 2 | 86.55 | | 29000 | | |
| -17.412 | 0.503 | 0.034 | 7.93 | -8.50 | | 2 | 83.86 | 4.12 | 29000 | 2 | 88.91 | | 29000 | | |
| -17.900 | 0.520 | 0.036 | 3.14 | -11.21 | | 2 | 85.27 | 4.12 | 29000 | 2 | 91.31 | | 29000 | | |
| | | | | | | 2 | 100.11 | 4.55 | 20600 | 2 | 94.90 | | 20600 | | |
| -18.375 | 0.537 | 0.036 | -1.62 | -8.90 | | 2 | 101.70 | 4.55 | 20600 | 2 | 97.20 | | 20600 | | |
| -18.850 | 0.554 | 0.035 | -5.37 | -6.93 | | 2 | 103.30 | 4.55 | 20600 | 2 | 99.49 | | 20600 | | |
| -19.150 | 0.564 | 0.033 | -7.28 | -5.85 | | 2 | 104.32 | 4.55 | 20600 | 2 | 100.93 | | 20600 | | |
| -19.450 | 0.574 | 0.032 | -8.89 | -4.89 | | 2 | 105.35 | 4.55 | 20600 | 2 | 102.36 | | 20600 | | |
| -19.950 | 0.589 | 0.028 | -10.99 | -3.55 | | 2 | 107.09 | 4.55 | 20600 | 2 | 104.72 | | 20600 | | |
| -20.409 | 0.601 | 0.024 | -12.39 | -2.58 | | 2 | 108.72 | 4.55 | 20600 | 2 | 106.85 | | 20600 | | |
| -20.869 | 0.611 | 0.020 | -13.39 | -1.81 | | 2 | 110.39 | 4.55 | 20600 | 2 | 108.93 | | 20600 | | |
| -21.328 | 0.619 | 0.015 | -14.08 | -1.22 | | 2 | 112.11 | 4.55 | 20600 | 2 | 110.98 | | 20600 | | |
| -21.788 | 0.625 | 0.011 | -14.53 | -0.76 | | 2 | 113.87 | 4.55 | 20600 | 2 | 112.99 | | 20600 | | |
| -22.247 | 0.628 | 0.006 | -14.79 | -0.39 | | 2 | 115.67 | 4.55 | 20600 | 2 | 114.94 | | 20600 | | |
| -22.706 | 0.630 | 0.001 | -14.90 | -0.07 | | 2 | 117.52 | 4.55 | 20600 | 2 | 116.86 | | 20600 | | |
| -23.166 | 0.629 | -0.004 | -14.86 | 0.24 | | 2 | 119.42 | 4.55 | 20600 | 2 | 118.72 | | 20600 | | |
| -23.625 | 0.626 | -0.009 | -14.67 | 0.59 | | 2 | 121.36 | 4.55 | 20600 | 2 | 120.54 | | 20600 | | |
| -24.084 | 0.621 | -0.014 | -14.31 | 1.02 | | 2 | 123.35 | 4.55 | 20600 | 2 | 122.31 | | 20600 | | |
| -24.544 | 0.613 | -0.019 | -13.72 | 1.56 | | 2 | 125.39 | 4.55 | 20600 | 2 | 124.04 | | 20600 | | |
| -25.003 | 0.604 | -0.023 | -12.84 | 2.27 | | 2 | 127.46 | 4.55 | 20600 | 2 | 125.72 | | 20600 | | |
| -25.462 | 0.592 | -0.027 | -11.60 | 3.18 | | 2 | 129.58 | 4.55 | 20600 | 2 | 127.37 | | 20600 | | |
| -25.922 | 0.579 | -0.031 | -9.89 | 4.32 | | 2 | 131.73 | 4.55 | 20600 | 2 | 128.98 | | 20600 | | |
| -26.381 | 0.564 | -0.033 | -7.59 | 5.73 | | 2 | 133.92 | 4.55 | 20600 | 2 | 130.56 | | 20600 | | |
| -26.841 | 0.549 | -0.036 | -4.58 | 7.42 | | 2 | 136.13 | 4.55 | 20600 | 2 | 132.11 | | 20600 | | |
| -27.300 | 0.532 | -0.036 | -0.72 | 9.43 | | 2 | 138.35 | 4.55 | 20600 | 2 | 133.65 | | 20600 | | |
| | | | | | | 2 | 119.77 | 4.12 | 29000 | 2 | 126.52 | | 29000 | | |
| -27.684 | 0.518 | -0.036 | 2.42 | 6.99 | | 2 | 121.68 | 4.12 | 29000 | 2 | 127.62 | | 29000 | | |
| -28.069 | 0.504 | -0.035 | 4.69 | 4.86 | | 2 | 123.58 | 4.12 | 29000 | 2 | 128.73 | | 29000 | | |
| -28.453 | 0.491 | -0.034 | 6.19 | 3.03 | | 2 | 125.47 | 4.12 | 29000 | 2 | 129.85 | | 29000 | | |
| -28.837 | 0.478 | -0.032 | 7.05 | 1.48 | | 2 | 127.34 | 4.12 | 29000 | 2 | 130.99 | | 29000 | | |
| -29.222 | 0.467 | -0.030 | 7.37 | 0.21 | | 2 | 129.19 | 4.12 | 29000 | 2 | 132.15 | | 29000 | | |
| -29.606 | 0.456 | -0.028 | 7.25 | -0.80 | | 2 | 131.01 | 4.12 | 29000 | 2 | 133.33 | | 29000 | | |
| -29.991 | 0.445 | -0.026 | 6.78 | -1.58 | | 2 | 132.82 | 4.12 | 29000 | 2 | 134.54 | | 29000 | | |
| -30.375 | 0.436 | -0.024 | 6.06 | -2.13 | | 2 | 134.60 | 4.12 | 29000 | 2 | 135.77 | | 29000 | | |
| -30.759 | 0.427 | -0.022 | 5.17 | -2.48 | | 2 | 136.36 | 4.12 | 29000 | 2 | 137.01 | | 29000 | | |
| -31.144 | 0.418 | -0.021 | 4.18 | -2.64 | | 2 | 138.11 | 4.12 | 29000 | 2 | 138.27 | | 29000 | | |
| -31.528 | 0.411 | -0.020 | 3.16 | -2.62 | | 2 | 139.84 | 4.12 | 29000 | 2 | 139.55 | | 29000 | | |
| -31.913 | 0.403 | -0.019 | 2.19 | -2.42 | | 2 | 141.57 | 4.12 | 29000 | 2 | 140.83 | | 29000 | | |
| -32.297 | 0.396 | -0.019 | 1.32 | -2.06 | | 2 | 143.28 | 4.12 | 29000 | 2 | 142.13 | | 29000 | | |
| -32.681 | 0.388 | -0.019 | 0.63 | -1.53 | | 2 | 145.00 | 4.12 | 29000 | 2 | 143.42 | | 29000 | | |
| -33.066 | 0.381 | -0.019 | 0.17 | -0.84 | | 2 | 146.71 | 4.12 | 29000 | 2 | 144.72 | | 29000 | | |
| -33.450 | 0.374 | -0.019 | 0.00 | 0.00 | | 2 | 148.42 | 4.12 | 29000 | 2 | 146.02 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | |



PHASE 1 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | |

MAXIMUM DISPLACEMENT = 1.02 mm

MAXIMUM MOMENT = 17.81 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION, 1 = ACTIVE PR., 2 = ELASTIC
CODIFICATION OF SOIL : 3 = PASSIVE PR.

( 2 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 141.21 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.095 = (2830.80 kN/m)/(29853.75 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.123 = (2830.80 kN/m)/(22954.66 kN/m)

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel estampidor

* INSTALLATION OF A LINE OF STRUTS Nb 1 LEVEL = -2.000 m
SPACING = 1.000 m
INCLINATION = 0.000 DEGREES
PRELOAD = 0.000 kN
STIFFNESS = 4000000.000 kN/m
BILATERAL CONNECTION

* EXCAVATION IN SOIL 2 TO LEVEL = -10.950 m

* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 2 TO LEVEL = -11.450 m



PHASE 2

| | WALL | SOIL 1 EXCAVATION: 0.00 m WATER LEVEL: -7.00 m CAQUOT SURC.: 10.00 kPa | SOIL 2 EXCAVATION: -10.95 m WATER LEVEL: -11.45 m CAQUOT SURC.: 0.00 kPa | STRUTS/ ANCHORS |
|---|---|---|---|---|

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |
| 0.000 | -0.507 | 0.699 | 0.00 | 0.00 | | 2 | 7.63 | 5.15 | 4900 | 0 | | | | | |
| -0.450 | -0.192 | 0.699 | 0.86 | 4.03 | | 2 | 10.26 | 5.15 | 4900 | 0 | | | | | |
| -0.900 | 0.122 | 0.700 | 3.80 | 9.24 | | 2 | 12.89 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 9.40 | 4.55 | 20600 | 0 | | | | | |
| -1.175 | 0.315 | 0.701 | 6.68 | 11.60 | | 2 | 7.81 | 4.55 | 20600 | 0 | | | | | |
| -1.450 | 0.508 | 0.702 | 10.14 | 13.53 | | 2 | 6.21 | 4.55 | 20600 | 0 | | | | | |
| -1.725 | 0.701 | 0.705 | 14.08 | 15.02 | | 2 | 4.60 | 4.55 | 20600 | 0 | | | | | |
| -2.000 | 0.896 | 0.708 | 18.36 | 16.06 | | 2 | 2.98 | 2.98 | 20600 | 0 | | | | | |
| | | | | -55.12 | | 2 | 2.98 | 2.98 | 20600 | 0 | | | | 1 | -71.18 |
| -2.300 | 1.108 | 0.710 | 1.93 | -54.50 | | 2 | 1.19 | 1.19 | 20600 | 0 | | | | | |
| -2.600 | 1.321 | 0.709 | -14.38 | -54.32 | | -1 | | | | 0 | | | | | |
| -2.875 | 1.516 | 0.705 | -29.32 | -54.32 | | -1 | | | | 0 | | | | | |
| -3.150 | 1.709 | 0.697 | -44.25 | -54.32 | | -1 | | | | 0 | | | | | |
| -3.425 | 1.899 | 0.687 | -59.19 | -54.32 | | -1 | | | | 0 | | | | | |
| -3.700 | 2.086 | 0.674 | -74.13 | -54.32 | | -1 | | | | 0 | | | | | |
| -3.975 | 2.269 | 0.658 | -89.06 | -54.29 | | 1 | 0.17 | 0.17 | 20600 | 0 | | | | | |
| -4.250 | 2.448 | 0.638 | -103.97 | -54.05 | | 1 | 1.57 | 1.57 | 20600 | 0 | | | | | |
| -4.525 | 2.620 | 0.616 | -118.76 | -53.43 | | 1 | 2.97 | 2.68 | 20600 | 0 | | | | | |
| -4.800 | 2.786 | 0.591 | -133.32 | -52.42 | | 1 | 4.37 | 2.68 | 20600 | 0 | | | | | |
| -5.075 | 2.945 | 0.564 | -147.55 | -51.03 | | 1 | 5.77 | 2.68 | 20600 | 0 | | | | | |
| -5.350 | 3.096 | 0.533 | -161.35 | -49.25 | | 1 | 7.17 | 2.68 | 20600 | 0 | | | | | |
| -5.625 | 3.238 | 0.500 | -174.61 | -47.08 | | 1 | 8.57 | 2.68 | 20600 | 0 | | | | | |
| -5.900 | 3.371 | 0.464 | -187.21 | -44.54 | | 1 | 9.97 | 2.68 | 20600 | 0 | | | | | |
| -6.175 | 3.493 | 0.425 | -199.06 | -41.60 | | 1 | 11.37 | 2.68 | 20600 | 0 | | | | | |
| -6.450 | 3.604 | 0.385 | -210.06 | -38.28 | | 1 | 12.77 | 2.68 | 20600 | 0 | | | | | |
| -6.725 | 3.704 | 0.342 | -220.08 | -34.58 | | 1 | 14.17 | 2.68 | 20600 | 0 | | | | | |
| -7.000 | 3.792 | 0.297 | -229.04 | -30.49 | | 1 | 15.57 | 2.68 | 20600 | 0 | | | | | |
| -7.431 | 3.905 | 0.224 | -240.57 | -22.64 | 4.23 | 1 | 16.61 | 2.68 | 20600 | 0 | | | | | |
| -7.863 | 3.985 | 0.148 | -248.23 | -12.51 | 8.46 | 1 | 17.65 | 2.68 | 20600 | 0 | | | | | |
| -8.294 | 4.032 | 0.070 | -251.04 | -0.11 | 12.69 | 1 | 18.69 | 2.68 | 20600 | 0 | | | | | |
| -8.725 | 4.046 | -0.007 | -248.01 | 14.56 | 16.92 | 1 | 19.73 | 2.68 | 20600 | 0 | | | | | |
| -9.156 | 4.026 | -0.083 | -238.16 | 31.50 | 21.15 | 1 | 20.77 | 2.68 | 20600 | 0 | | | | | |
| -9.587 | 3.975 | -0.155 | -220.51 | 50.72 | 25.38 | 1 | 21.81 | 2.68 | 20600 | 0 | | | | | |
| -10.019 | 3.894 | -0.219 | -194.08 | 72.21 | 29.61 | 1 | 22.85 | 2.68 | 20600 | 0 | | | | | |
| -10.450 | 3.787 | -0.274 | -157.90 | 95.97 | 33.84 | 1 | 23.89 | 2.68 | 20600 | 0 | | | | | |
| -10.950 | 3.637 | -0.322 | -102.44 | 126.37 | 38.75 | 1 | 25.10 | 2.68 | 20600 | 0 | | | | | |
| | | | | | 38.75 | 1 | 25.10 | 2.68 | 20600 | 3 | 73.67 | | 20600 | | |
| -11.200 | 3.555 | -0.338 | -71.15 | 124.08 | 41.20 | 1 | 25.70 | 2.68 | 20600 | 2 | 75.39 | | 20600 | | |
| | | | | | 41.20 | 1 | 16.00 | 2.35 | 29000 | 2 | 105.04 | | 29000 | | |
| -11.450 | 3.469 | -0.348 | -41.58 | 112.56 | 43.65 | 1 | 16.56 | 2.35 | 29000 | 2 | 104.56 | | 29000 | | |
| -11.825 | 3.337 | -0.353 | -2.42 | 96.52 | 43.65 | 1 | 17.39 | 2.35 | 29000 | 2 | 102.21 | | 29000 | | |
| -12.200 | 3.205 | -0.349 | 30.96 | 81.69 | 43.65 | 1 | 18.23 | 2.35 | 29000 | 2 | 99.84 | | 29000 | | |
| -12.575 | 3.076 | -0.337 | 58.99 | 68.04 | 43.65 | 1 | 19.07 | 2.35 | 29000 | 2 | 97.57 | | 29000 | | |
| -12.950 | 2.953 | -0.318 | 82.13 | 55.52 | 43.65 | 1 | 19.90 | 2.35 | 29000 | 2 | 95.47 | | 29000 | | |
| -13.325 | 2.838 | -0.293 | 100.77 | 44.06 | 43.65 | 1 | 20.74 | 2.35 | 29000 | 2 | 93.61 | | 29000 | | |
| | | | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



PHASE 2 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |
| -13.700 | 2.734 | -0.264 | 115.29 | 33.55 | 43.65 | 1 | 21.58 | 2.35 | 29000 | 2 | 92.05 | | 29000 | | |
| -14.075 | 2.641 | -0.231 | 126.03 | 23.88 | 43.65 | 1 | 22.42 | 2.35 | 29000 | 2 | 90.82 | | 29000 | | |
| -14.450 | 2.561 | -0.196 | 133.29 | 14.92 | 43.65 | 1 | 23.25 | 2.35 | 29000 | 2 | 89.96 | | 29000 | | |
| -14.950 | 2.475 | -0.147 | 137.94 | 3.80 | 43.65 | 1 | 24.37 | 2.35 | 29000 | 2 | 89.43 | | 29000 | | |
| -15.450 | 2.414 | -0.097 | 137.20 | -6.67 | 43.65 | 1 | 25.49 | 2.35 | 29000 | 2 | 89.62 | | 29000 | | |
| -15.950 | 2.377 | -0.049 | 131.31 | -16.86 | 43.65 | 1 | 26.60 | 2.35 | 29000 | 2 | 90.52 | | 29000 | | |
| -16.438 | 2.365 | -0.004 | 120.67 | -26.85 | 43.65 | 1 | 27.69 | 2.35 | 29000 | 2 | 92.06 | | 29000 | | |
| -16.925 | 2.373 | 0.036 | 105.08 | -37.20 | 43.65 | 1 | 28.78 | 2.35 | 29000 | 2 | 94.20 | | 29000 | | |
| -17.412 | 2.399 | 0.069 | 84.29 | -48.20 | 43.65 | 1 | 29.87 | 2.35 | 29000 | 2 | 96.86 | | 29000 | | |
| -17.900 | 2.439 | 0.094 | 57.95 | -60.06 | 43.65 | 1 | 30.96 | 2.35 | 29000 | 2 | 99.94 | | 29000 | | |
| | | | | | 43.65 | 2 | 60.58 | 4.55 | 20600 | 2 | 82.50 | | 20600 | | |
| -18.375 | 2.488 | 0.110 | 31.79 | -50.22 | 43.65 | 2 | 61.52 | 4.55 | 20600 | 2 | 85.45 | | 20600 | | |
| -18.850 | 2.542 | 0.117 | 10.08 | -41.38 | 43.65 | 2 | 62.35 | 4.55 | 20600 | 2 | 88.51 | | 20600 | | |
| -19.150 | 2.577 | 0.118 | -1.57 | -36.35 | 43.65 | 2 | 62.85 | 4.55 | 20600 | 2 | 90.46 | | 20600 | | |
| -19.450 | 2.612 | 0.116 | -11.77 | -31.75 | 43.65 | 2 | 63.36 | 4.55 | 20600 | 2 | 92.41 | | 20600 | | |
| -19.950 | 2.668 | 0.109 | -25.92 | -25.03 | 43.65 | 2 | 64.24 | 4.55 | 20600 | 2 | 95.62 | | 20600 | | |
| -20.409 | 2.716 | 0.099 | -36.19 | -19.85 | 43.65 | 2 | 65.13 | 4.55 | 20600 | 2 | 98.49 | | 20600 | | |
| -20.869 | 2.759 | 0.085 | -44.29 | -15.52 | 43.65 | 2 | 66.14 | 4.55 | 20600 | 2 | 101.25 | | 20600 | | |
| -21.328 | 2.795 | 0.070 | -50.57 | -11.93 | 43.65 | 2 | 67.29 | 4.55 | 20600 | 2 | 103.86 | | 20600 | | |
| -21.788 | 2.823 | 0.052 | -55.34 | -8.95 | 43.65 | 2 | 68.59 | 4.55 | 20600 | 2 | 106.32 | | 20600 | | |
| -22.247 | 2.842 | 0.033 | -58.86 | -6.41 | 43.65 | 2 | 70.07 | 4.55 | 20600 | 2 | 108.61 | | 20600 | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -22.706 | 2.853 | 0.013 | -61.28 | -4.17 | 43.65 | 2 | 71.73 | 4.55 | 20600 | 2 | 110.71 | | 20600 | | | | | |
| -23.166 | 2.854 | -0.007 | -62.70 | -2.03 | 43.65 | 2 | 73.58 | 4.55 | 20600 | 2 | 112.62 | | 20600 | | | | | |
| -23.625 | 2.846 | -0.028 | -63.14 | 0.17 | 43.65 | 2 | 75.63 | 4.55 | 20600 | 2 | 114.33 | | 20600 | | | | | |
| -24.084 | 2.828 | -0.049 | -62.51 | 2.61 | 43.65 | 2 | 77.88 | 4.55 | 20600 | 2 | 115.85 | | 20600 | | | | | |
| -24.544 | 2.801 | -0.070 | -60.67 | 5.48 | 43.65 | 2 | 80.32 | 4.55 | 20600 | 2 | 117.17 | | 20600 | | | | | |
| -25.003 | 2.765 | -0.089 | -57.38 | 8.95 | 43.65 | 2 | 82.95 | 4.55 | 20600 | 2 | 118.30 | | 20600 | | | | | |
| -25.462 | 2.719 | -0.107 | -52.33 | 13.20 | 43.65 | 2 | 85.77 | 4.55 | 20600 | 2 | 119.25 | | 20600 | | | | | |
| -25.922 | 2.666 | -0.124 | -45.11 | 18.38 | 43.65 | 2 | 88.74 | 4.55 | 20600 | 2 | 120.03 | | 20600 | | | | | |
| -26.381 | 2.606 | -0.137 | -35.28 | 24.62 | 43.65 | 2 | 91.86 | 4.55 | 20600 | 2 | 120.68 | | 20600 | | | | | |
| -26.841 | 2.541 | -0.147 | -22.31 | 32.06 | 43.65 | 2 | 95.08 | 4.55 | 20600 | 2 | 121.21 | | 20600 | | | | | |
| -27.300 | 2.472 | -0.151 | -5.63 | 40.76 | 43.65 | 2 | 98.38 | 4.55 | 20600 | 2 | 121.68 | | 20600 | | | | | |
| | | | | | 43.65 | 2 | 63.50 | 4.12 | 29000 | 2 | 135.76 | | 29000 | | | | | |
| -27.684 | 2.414 | -0.151 | 8.01 | 30.41 | 43.65 | 2 | 66.69 | 4.12 | 29000 | 2 | 135.58 | | 29000 | | | | | |
| -28.069 | 2.357 | -0.147 | 17.91 | 21.35 | 43.65 | 2 | 69.86 | 4.12 | 29000 | 2 | 135.42 | | 29000 | | | | | |
| -28.453 | 2.301 | -0.141 | 24.58 | 13.55 | 43.65 | 2 | 72.98 | 4.12 | 29000 | 2 | 135.31 | | 29000 | | | | | |
| -28.837 | 2.248 | -0.134 | 28.49 | 6.96 | 43.65 | 2 | 76.02 | 4.12 | 29000 | 2 | 135.28 | | 29000 | | | | | |
| -29.222 | 2.198 | -0.126 | 30.08 | 1.52 | 43.65 | 2 | 78.97 | 4.12 | 29000 | 2 | 135.34 | | 29000 | | | | | |
| -29.606 | 2.152 | -0.117 | 29.79 | -2.85 | 43.65 | 2 | 81.83 | 4.12 | 29000 | 2 | 135.49 | | 29000 | | | | | |
| -29.991 | 2.108 | -0.109 | 28.02 | -6.21 | 43.65 | 2 | 84.59 | 4.12 | 29000 | 2 | 135.73 | | 29000 | | | | | |
| -30.375 | 2.067 | -0.102 | 25.14 | -8.63 | 43.65 | 2 | 87.28 | 4.12 | 29000 | 2 | 136.06 | | 29000 | | | | | |
| -30.759 | 2.030 | -0.095 | 21.50 | -10.18 | 43.65 | 2 | 89.88 | 4.12 | 29000 | 2 | 136.46 | | 29000 | | | | | |
| -31.144 | 1.994 | -0.090 | 17.42 | -10.91 | 43.65 | 2 | 92.42 | 4.12 | 29000 | 2 | 136.94 | | 29000 | | | | | |
| -31.528 | 1.960 | -0.086 | 13.21 | -10.87 | 43.65 | 2 | 94.90 | 4.12 | 29000 | 2 | 137.46 | | 29000 | | | | | |
| -31.913 | 1.928 | -0.083 | 9.16 | -10.09 | 43.65 | 2 | 97.34 | 4.12 | 29000 | 2 | 138.03 | | 29000 | | | | | |
| -32.297 | 1.897 | -0.081 | 5.54 | -8.60 | 43.65 | 2 | 99.76 | 4.12 | 29000 | 2 | 138.62 | | 29000 | | | | | |
| -32.681 | 1.866 | -0.080 | 2.64 | -6.41 | 43.65 | 2 | 102.15 | 4.12 | 29000 | 2 | 139.23 | | 29000 | | | | | |
| -33.066 | 1.835 | -0.079 | 0.70 | -3.55 | 43.65 | 2 | 104.54 | 4.12 | 29000 | 2 | 139.85 | | 29000 | | | | | |
| -33.450 | 1.805 | -0.079 | 0.00 | 0.00 | 43.65 | 2 | 106.93 | 4.12 | 29000 | 2 | 140.48 | | 29000 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | | |



PHASE 2 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

MAXIMUM DISPLACEMENT = 4.05 mm

MAXIMUM MOMENT = -251.04 kN.m/m

CODIFICATION OF STATE / OF SOIL:
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

( 3 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 112.82 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.051 = (1515.41 kN/m)/(29853.75 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.228 = (2501.75 kN/m)/(10966.34 kN/m)



**  PHASE Nb 3  **

*Fase 3
*Ejecucion del nivel estampidor
*Excavacion hasta nivel de puntal provisional

* INSTALLATION OF A LINE OF STRUTS Nb 2
LEVEL = -10.450 m
SPACING = 1.000 m
INCLINATION = 0.000 DEGREES
PRELOAD = 0.000 kN
STIFFNESS = 705000.000 kN/m
BILATERAL CONNECTION

* EXCAVATION IN SOIL 2 TO LEVEL = -15.450 m

* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 2 TO LEVEL = -15.950 m



PHASE 3

| | WALL | SOIL 1 | SOIL 2 | |
|---|---|---|---|---|
| | | EXCAVATION: 0.00 m | EXCAVATION: -15.45 m | STRUTS/ |
| | | WATER LEVEL: -7.00 m | WATER LEVEL: -15.95 m | ANCHORS |
| | | CAQUOT SURC.: 10.00 kPa | CAQUOT SURC.: 0.00 kPa | |

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -0.128 | 0.506 | 0.00 | 0.00 | | 2 5.78 | 5.15 | 4900 | 0 | | | | |
| -0.450 | 0.100 | 0.506 | 0.69 | 3.29 | | 2 8.83 | 5.15 | 4900 | 0 | | | | |
| -0.900 | 0.328 | 0.507 | 3.16 | 7.95 | | 2 11.88 | 5.15 | 4900 | 0 | | | | |
| | | | | | | 2 5.16 | 4.55 | 20600 | 0 | | | | |
| -1.175 | 0.468 | 0.508 | 5.54 | 9.30 | | 2 4.66 | 4.55 | 20600 | 0 | | | | |
| -1.450 | 0.608 | 0.509 | 8.26 | 10.51 | | 2 4.16 | 4.16 | 20600 | 0 | | | | |
| -1.725 | 0.748 | 0.511 | 11.31 | 11.58 | | 2 3.65 | 3.65 | 20600 | 0 | | | | |
| -2.000 | 0.889 | 0.514 | 14.62 | 12.51 | | 2 3.12 | 3.12 | 20600 | 0 | | | | |
| | | | | -31.66 | | 2 3.12 | 3.12 | 20600 | 0 | | | 1 | -44.17 |
| -2.300 | 1.043 | 0.516 | 5.26 | -30.81 | | 2 2.53 | 2.53 | 20600 | 0 | | | | |
| -2.600 | 1.198 | 0.516 | -3.88 | -30.14 | | 2 1.93 | 1.93 | 20600 | 0 | | | | |
| -2.875 | 1.340 | 0.514 | -12.10 | -29.68 | | 2 1.39 | 1.39 | 20600 | 0 | | | | |
| -3.150 | 1.481 | 0.511 | -20.22 | -29.37 | | 2 0.86 | 0.86 | 20600 | 0 | | | | |
| -3.425 | 1.621 | 0.506 | -28.27 | -29.20 | | 2 0.36 | 0.36 | 20600 | 0 | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -3.700 | 1.759 | 0.500 | -36.29 | -29.15 | | -1 | | | | 0 | | | | | | | |
| -3.975 | 1.896 | 0.492 | -44.21 | -28.07 | | 2 | 7.86 | 4.55 | 20600 | 0 | | | | | | | |
| -4.250 | 2.030 | 0.483 | -51.60 | -25.59 | | 2 | 10.17 | 4.55 | 20600 | 0 | | | | | | | |
| -4.525 | 2.161 | 0.472 | -58.23 | -22.49 | | 2 | 12.43 | 4.55 | 20600 | 0 | | | | | | | |
| -4.800 | 2.289 | 0.460 | -63.91 | -18.77 | | 2 | 14.61 | 4.55 | 20600 | 0 | | | | | | | |
| -5.075 | 2.414 | 0.446 | -68.50 | -14.46 | | 2 | 16.72 | 4.55 | 20600 | 0 | | | | | | | |
| -5.350 | 2.535 | 0.432 | -71.81 | -9.59 | | 2 | 18.73 | 4.55 | 20600 | 0 | | | | | | | |
| -5.625 | 2.652 | 0.418 | -73.72 | -4.17 | | 2 | 20.65 | 4.55 | 20600 | 0 | | | | | | | |
| -5.900 | 2.765 | 0.403 | -74.06 | 1.76 | | 2 | 22.45 | 4.55 | 20600 | 0 | | | | | | | |
| -6.175 | 2.873 | 0.389 | -72.71 | 8.16 | | 2 | 24.13 | 4.55 | 20600 | 0 | | | | | | | |
| -6.450 | 2.978 | 0.375 | -69.53 | 15.01 | | 2 | 25.66 | 4.55 | 20600 | 0 | | | | | | | |
| -6.725 | 3.080 | 0.361 | -64.42 | 22.26 | | 2 | 27.04 | 4.55 | 20600 | 0 | | | | | | | |
| -7.000 | 3.177 | 0.349 | -57.26 | 29.86 | | 2 | 28.24 | 4.55 | 20600 | 0 | | | | | | | |
| -7.431 | 3.324 | 0.334 | -41.62 | 43.02 | 4.23 | 2 | 28.57 | 4.55 | 20600 | 0 | | | | | | | |
| -7.863 | 3.466 | 0.324 | -19.89 | 58.03 | 8.46 | 2 | 28.35 | 4.55 | 20600 | 0 | | | | | | | |
| -8.294 | 3.605 | 0.322 | 8.67 | 74.64 | 12.69 | 2 | 27.50 | 4.55 | 20600 | 0 | | | | | | | |
| -8.725 | 3.745 | 0.330 | 44.67 | 92.55 | 16.92 | 2 | 25.94 | 4.55 | 20600 | 0 | | | | | | | |
| -9.156 | 3.891 | 0.351 | 88.63 | 111.43 | 21.15 | 2 | 23.56 | 4.55 | 20600 | 0 | | | | | | | |
| -9.587 | 4.049 | 0.386 | 140.92 | 131.25 | 25.38 | 1 | 21.81 | 2.68 | 20600 | 0 | | | | | | | |
| -10.019 | 4.227 | 0.439 | 202.07 | 152.74 | 29.61 | 1 | 22.85 | 2.68 | 20600 | 0 | | | | | | | |
| -10.450 | 4.431 | 0.513 | 272.98 | 176.50 | 33.84 | 1 | 23.89 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | -277.60 | 33.84 | 1 | 23.89 | 2.68 | 20600 | 0 | | | | | | 2 | -454.10 |
| -10.950 | 4.708 | 0.587 | 141.65 | -247.20 | 38.75 | 1 | 25.10 | 2.68 | 20600 | 0 | | | | | | | |
| -11.200 | 4.858 | 0.607 | 81.88 | -230.86 | 41.20 | 1 | 25.70 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 41.20 | 1 | 16.00 | 2.35 | 29000 | 0 | | | | | | | |
| -11.450 | 5.011 | 0.617 | 25.98 | -216.18 | 43.65 | 1 | 16.56 | 2.35 | 29000 | 0 | | | | | | | |
| -11.825 | 5.242 | 0.613 | -50.75 | -192.76 | 47.33 | 1 | 17.39 | 2.35 | 29000 | 0 | | | | | | | |
| -12.200 | 5.468 | 0.590 | -118.38 | -167.64 | 51.01 | 1 | 18.23 | 2.35 | 29000 | 0 | | | | | | | |
| -12.575 | 5.683 | 0.550 | -176.27 | -140.82 | 54.69 | 1 | 19.07 | 2.35 | 29000 | 0 | | | | | | | |
| -12.950 | 5.879 | 0.496 | -223.78 | -112.32 | 58.37 | 1 | 19.90 | 2.35 | 29000 | 0 | | | | | | | |
| -13.325 | 6.053 | 0.430 | -260.29 | -82.12 | 62.05 | 1 | 20.74 | 2.35 | 29000 | 0 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | | kN | |



PHASE 3 (CONTINUATION)

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.700 | 6.201 | 0.356 | -285.16 | -50.23 | 65.73 | 1 | 21.58 | 2.35 | 29000 | 0 | | | | | | | |
| -14.075 | 6.319 | 0.277 | -297.75 | -16.64 | 69.41 | 1 | 22.42 | 2.35 | 29000 | 0 | | | | | | | |
| -14.450 | 6.408 | 0.196 | -297.43 | 18.64 | 73.08 | 1 | 23.25 | 2.35 | 29000 | 0 | | | | | | | |
| -14.950 | 6.480 | 0.092 | -275.82 | 68.31 | 77.99 | 1 | 24.37 | 2.35 | 29000 | 0 | | | | | | | |
| -15.450 | 6.502 | 0.000 | -228.61 | 121.00 | 82.89 | 1 | 25.49 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | | 82.89 | 1 | 25.49 | 2.35 | 29000 | 3 | 98.13 | | 29000 | | | | |
| -15.950 | 6.484 | -0.071 | -168.14 | 118.24 | 87.80 | 1 | 26.60 | 2.35 | 29000 | 3 | 135.69 | | 29000 | | | | |
| -16.438 | 6.436 | -0.121 | -113.70 | 103.78 | 87.80 | 1 | 27.69 | 2.35 | 29000 | 3 | 153.53 | | 29000 | | | | |
| -16.925 | 6.369 | -0.152 | -68.29 | 81.16 | 87.80 | 1 | 28.78 | 2.35 | 29000 | 3 | 171.37 | | 29000 | | | | |
| -17.412 | 6.290 | -0.170 | -35.90 | 50.36 | 87.80 | 1 | 29.87 | 2.35 | 29000 | 3 | 189.21 | | 29000 | | | | |
| -17.900 | 6.204 | -0.179 | -19.90 | 15.18 | 87.80 | 1 | 30.96 | 2.35 | 29000 | 2 | 191.57 | | 29000 | | | | |
| | | | | | 87.80 | 1 | 42.76 | 2.68 | 20600 | 2 | 140.67 | | 20600 | | | | |
| -18.375 | 6.118 | -0.185 | -13.79 | 10.61 | 87.80 | 1 | 43.91 | 2.68 | 20600 | 2 | 140.83 | | 20600 | | | | |
| -18.850 | 6.029 | -0.189 | -9.74 | 6.51 | 87.80 | 1 | 45.05 | 2.68 | 20600 | 2 | 140.95 | | 20600 | | | | |
| -19.150 | 5.972 | -0.191 | -8.14 | 4.19 | 87.80 | 1 | 45.78 | 2.68 | 20600 | 2 | 141.00 | | 20600 | | | | |
| -19.450 | 5.914 | -0.193 | -7.21 | 2.06 | 87.80 | 1 | 46.50 | 2.68 | 20600 | 2 | 141.04 | | 20600 | | | | |
| -19.950 | 5.817 | -0.195 | -6.98 | -1.02 | 87.80 | 1 | 47.70 | 2.68 | 20600 | 2 | 141.09 | | 20600 | | | | |
| -20.409 | 5.727 | -0.198 | -8.00 | -3.34 | 87.80 | 1 | 48.81 | 2.68 | 20600 | 2 | 141.11 | | 20600 | | | | |
| -20.869 | 5.635 | -0.201 | -9.97 | -5.15 | 87.80 | 1 | 49.92 | 2.68 | 20600 | 2 | 141.11 | | 20600 | | | | |
| -21.328 | 5.542 | -0.204 | -12.65 | -6.45 | 87.80 | 1 | 51.03 | 2.68 | 20600 | 2 | 141.08 | | 20600 | | | | |
| -21.788 | 5.447 | -0.209 | -15.81 | -7.21 | 87.80 | 1 | 52.14 | 2.68 | 20600 | 2 | 141.00 | | 20600 | | | | |
| -22.247 | 5.350 | -0.215 | -19.19 | -7.41 | 87.80 | 1 | 53.24 | 2.68 | 20600 | 2 | 140.88 | | 20600 | | | | |
| -22.706 | 5.250 | -0.222 | -22.53 | -7.04 | 87.80 | 1 | 54.35 | 2.68 | 20600 | 2 | 140.69 | | 20600 | | | | |
| -23.166 | 5.146 | -0.230 | -25.56 | -6.06 | 87.80 | 1 | 55.46 | 2.68 | 20600 | 2 | 140.44 | | 20600 | | | | |
| -23.625 | 5.039 | -0.239 | -27.99 | -4.43 | 87.80 | 1 | 56.57 | 2.68 | 20600 | 2 | 140.10 | | 20600 | | | | |
| -24.084 | 4.927 | -0.248 | -29.52 | -2.12 | 87.80 | 1 | 57.68 | 2.68 | 20600 | 2 | 139.68 | | 20600 | | | | |
| -24.544 | 4.811 | -0.258 | -29.83 | 0.92 | 87.80 | 1 | 58.78 | 2.68 | 20600 | 2 | 139.17 | | 20600 | | | | |
| -25.003 | 4.690 | -0.268 | -28.57 | 4.72 | 87.80 | 1 | 59.89 | 2.68 | 20600 | 2 | 138.56 | | 20600 | | | | |
| -25.462 | 4.565 | -0.277 | -25.37 | 9.33 | 87.80 | 1 | 61.00 | 2.68 | 20600 | 2 | 137.86 | | 20600 | | | | |
| -25.922 | 4.436 | -0.284 | -19.87 | 14.78 | 87.80 | 1 | 62.11 | 2.68 | 20600 | 2 | 137.09 | | 20600 | | | | |
| -26.381 | 4.304 | -0.290 | -11.66 | 21.12 | 87.80 | 1 | 63.22 | 2.68 | 20600 | 2 | 136.25 | | 20600 | | | | |
| -26.841 | 4.170 | -0.292 | -0.33 | 28.36 | 87.80 | 1 | 64.33 | 2.68 | 20600 | 2 | 135.38 | | 20600 | | | | |
| -27.300 | 4.036 | -0.290 | 14.56 | 36.67 | 87.80 | 2 | 66.16 | 3.41 | 20600 | 2 | 134.50 | | 20600 | | | | |
| | | | | | 87.80 | 1 | 50.84 | 2.35 | 29000 | 2 | 163.56 | | 29000 | | | | |
| -27.684 | 3.926 | -0.284 | 26.88 | 27.58 | 87.80 | 1 | 51.69 | 2.35 | 29000 | 2 | 161.86 | | 29000 | | | | |
| -28.069 | 3.819 | -0.275 | 35.89 | 19.46 | 87.80 | 1 | 52.55 | 2.35 | 29000 | 2 | 160.25 | | 29000 | | | | |
| -28.453 | 3.715 | -0.264 | 41.96 | 12.27 | 87.80 | 1 | 53.41 | 2.35 | 29000 | 2 | 158.75 | | 29000 | | | | |
| -28.837 | 3.616 | -0.252 | 45.43 | 5.95 | 87.80 | 1 | 54.27 | 2.35 | 29000 | 2 | 157.38 | | 29000 | | | | |
| -29.222 | 3.521 | -0.239 | 46.64 | 0.47 | 87.80 | 1 | 55.13 | 2.35 | 29000 | 2 | 156.15 | | 29000 | | | | |
| -29.606 | 3.432 | -0.226 | 45.90 | -4.24 | 87.80 | 1 | 55.99 | 2.35 | 29000 | 2 | 155.06 | | 29000 | | | | |
| -29.991 | 3.347 | -0.214 | 43.48 | -8.22 | 87.80 | 1 | 56.84 | 2.35 | 29000 | 2 | 154.11 | | 29000 | | | | |
| -30.375 | 3.268 | -0.202 | 39.66 | -11.54 | 87.80 | 1 | 57.70 | 2.35 | 29000 | 2 | 153.30 | | 29000 | | | | |
| -30.759 | 3.192 | -0.192 | 34.69 | -14.24 | 87.80 | 1 | 58.56 | 2.35 | 29000 | 2 | 152.61 | | 29000 | | | | |
| -31.144 | 3.120 | -0.183 | 28.79 | -16.30 | 87.80 | 2 | 59.77 | 2.70 | 29000 | 2 | 152.02 | | 29000 | | | | |
| -31.528 | 3.051 | -0.176 | 22.30 | -17.24 | 87.80 | 2 | 63.27 | 4.12 | 29000 | 2 | 151.53 | | 29000 | | | | |
| -31.913 | 2.984 | -0.171 | 15.73 | -16.68 | 87.80 | 2 | 66.71 | 4.12 | 29000 | 2 | 151.10 | | 29000 | | | | |
| -32.297 | 2.919 | -0.167 | 9.67 | -14.64 | 87.80 | 2 | 70.09 | 4.12 | 29000 | 2 | 150.73 | | 29000 | | | | |
| -32.681 | 2.856 | -0.165 | 4.66 | -11.18 | 87.80 | 2 | 73.45 | 4.12 | 29000 | 2 | 150.38 | | 29000 | | | | |
| -33.066 | 2.792 | -0.164 | 1.25 | -6.29 | 87.80 | 2 | 76.79 | 4.12 | 29000 | 2 | 150.05 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | | kN | |



PHASE 3 (CONTINUATION)

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.450 | 2.729 | -0.164 | 0.00 | 0.00 | 87.80 | 2 | 80.13 | 4.12 | 29000 | 2 | 149.72 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | | kN | |

MAXIMUM DISPLACEMENT = 6.50 mm

MAXIMUM MOMENT = -297.75 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION, 1 = ACTIVE PR.

CODIFICATION OF SOIL : 2 = ELASTIC, 3 = PASSIVE PR.

( 4 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 101.10 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.041 = (1220.35 kN/m)/(29853.75 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.363 = (2651.48 kN/m)/(7304.92 kN/m)



** PHASE Nb 4 **

*Fase 4
*Ejecucion del puntal metalico provisional
*Excavación hasta losa de fondo

* INSTALLATION OF A LINE OF STRUTS Nb 3 LEVEL = -14.450 m
SPACING = 1.000 m
INCLINATION = 0.000 DEGREES
PRELOAD = 0.000 kN
STIFFNESS = 158000.000 kN/m
BILATERAL CONNECTION

* EXCAVATION IN SOIL 2 TO LEVEL = -19.450 m

* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 2 TO LEVEL = -19.950 m



PHASE 4

| | WALL | SOIL 1 (EXCAVATION: 0.00 m; WATER LEVEL: -7.00 m; CAQUOT SURC.: 10.00 kPa) | | | SOIL 2 (EXCAVATION: -19.45 m; WATER LEVEL: -19.95 m; CAQUOT SURC.: 0.00 kPa) | | | STRUTS/ ANCHORS | |
|---|---|---|---|---|---|---|---|---|---|
| LEVEL | DISPLAC. ROTATION MOMENT CR.FO. SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
| | | | | | | | | | |
| 0.000 | 0.157 0.363 0.00 0.00 | 2 | 4.38 | 4900 | 0 | | | | |
| -0.450 | 0.320 0.363 0.56 2.73 | 2 | 7.75 | 4900 | 0 | | | | |
| -0.900 | 0.484 0.364 2.69 6.98 | 2 | 11.12 | 4900 | 0 | | | | |
| | | 2 | 1.96 | 20600 | 0 | | | | |
| -1.175 | 0.584 0.365 4.68 7.56 | 2 | 2.27 | 20600 | 0 | | | | |
| -1.450 | 0.684 0.366 6.85 8.23 | 2 | 2.58 | 20600 | 0 | | | | |
| -1.725 | 0.785 0.367 9.21 8.98 | 2 | 2.88 | 20600 | 0 | | | | |
| -2.000 | 0.886 0.369 11.80 9.81 | 2 | 3.17 | 20600 | 0 | | | | |
| | -24.11 | 2 | 3.17 | 20600 | 0 | | | 1 | -33.92 |
| -2.300 | 0.997 0.371 4.71 -23.11 | 2 | 3.48 | 20600 | 0 | | | | |
| -2.600 | 1.109 0.371 -2.06 -22.02 | 2 | 3.77 | 20600 | 0 | | | | |
| -2.875 | 1.211 0.370 -7.97 -20.95 | 2 | 4.05 | 20600 | 0 | | | | |
| -3.150 | 1.313 0.368 -13.57 -19.79 | 2 | 4.33 | 20600 | 0 | | | | |
| -3.425 | 1.413 0.365 -18.85 -18.56 | 2 | 4.63 | 20600 | 0 | | | | |
| -3.700 | 1.513 0.361 -23.77 -17.24 | 2 | 4.95 | 20600 | 0 | | | | |
| -3.975 | 1.612 0.356 -28.22 -14.68 | 2 | 13.71 | 20600 | 0 | | | | |
| -4.250 | 1.709 0.350 -31.70 -10.48 | 2 | 16.79 | 20600 | 0 | | | | |
| -4.525 | 1.804 0.343 -33.91 -5.45 | 2 | 19.78 | 20600 | 0 | | | | |
| -4.800 | 1.898 0.336 -34.62 0.39 | 2 | 22.68 | 20600 | 0 | | | | |
| -5.075 | 1.989 0.330 -33.62 7.01 | 2 | 25.47 | 20600 | 0 | | | | |
| -5.350 | 2.079 0.323 -30.70 14.37 | 2 | 28.12 | 20600 | 0 | | | | |
| -5.625 | 2.167 0.318 -25.65 22.45 | 2 | 30.63 | 20600 | 0 | | | | |
| -5.900 | 2.254 0.313 -18.29 31.20 | 2 | 32.98 | 20600 | 0 | | | | |
| -6.175 | 2.339 0.310 -8.44 40.57 | 2 | 35.13 | 20600 | 0 | | | | |
| -6.450 | 2.425 0.310 4.07 50.49 | 2 | 37.07 | 20600 | 0 | | | | |
| -6.725 | 2.510 0.312 19.38 60.92 | 2 | 38.77 | 20600 | 0 | | | | |
| -7.000 | 2.597 0.318 37.62 71.78 | 2 | 40.20 | 20600 | 0 | | | | |
| -7.431 | 2.737 0.335 72.46 90.13 4.23 | 2 | 40.67 | 20600 | 0 | | | | |
| -7.863 | 2.887 0.364 115.62 110.32 8.46 | 2 | 40.27 | 20600 | 0 | | | | |
| -8.294 | 3.053 0.408 167.82 131.95 12.69 | 2 | 38.87 | 20600 | 0 | | | | |
| -8.725 | 3.241 0.469 229.56 154.54 16.92 | 2 | 36.31 | 20600 | 0 | | | | |
| -9.156 | 3.461 0.552 301.17 177.57 21.15 | 2 | 32.43 | 20600 | 0 | | | | |
| -9.587 | 3.720 0.658 382.74 200.76 25.38 | 2 | 28.59 | 20600 | 0 | | | | |
| -10.019 | 4.032 0.791 474.42 224.58 29.61 | 2 | 26.87 | 20600 | 0 | | | | |
| -10.450 | 4.407 0.954 576.58 249.32 33.84 | 2 | 24.40 | 3.18 | 20600 | 0 | | | |
| | -187.59 | 33.84 | 2 | 24.40 | 3.18 | 20600 | 0 | | | 2 | -436.91 |
| -10.950 | 4.933 1.146 490.29 -157.07 38.75 | 1 | 25.10 | 2.68 | 20600 | 0 | | | |
| -11.200 | 5.230 1.231 453.05 -140.73 41.20 | 1 | 25.70 | 2.68 | 20600 | 0 | | | |
| | 41.20 | 1 | 16.00 | 2.35 | 29000 | 0 | | | |
| -11.450 | 5.548 1.309 419.69 -126.05 43.65 | 1 | 16.56 | 2.35 | 29000 | 0 | | | |
| -11.825 | 6.059 1.417 376.76 -102.62 47.33 | 1 | 17.39 | 2.35 | 29000 | 0 | | | |
| -12.200 | 6.609 1.514 342.93 -77.50 51.01 | 1 | 18.23 | 2.35 | 29000 | 0 | | | |
| -12.575 | 7.194 1.603 318.85 -50.69 54.69 | 1 | 19.07 | 2.35 | 29000 | 0 | | | |
| -12.950 | 7.811 1.687 305.13 -22.19 58.37 | 1 | 19.90 | 2.35 | 29000 | 0 | | | |
| -13.325 | 8.459 1.769 302.42 8.01 62.05 | 1 | 20.74 | 2.35 | 29000 | 0 | | | |
| | | | | | | | | | |
| m | mm /1000 kN.m/m kN/m kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



PHASE 4 (CONTINUATION)

| LEVEL | DISPLAC. ROTATION MOMENT CR.FO. SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| -13.700 | 9.138 1.852 311.35 39.91 65.73 | 1 | 21.58 | 2.35 | 29000 | 0 | | | |
| -14.075 | 9.849 1.939 332.56 73.49 69.41 | 1 | 22.42 | 2.35 | 29000 | 0 | | | |
| -14.450 | 10.593 2.033 366.68 108.77 73.08 | 1 | 23.25 | 2.35 | 29000 | 0 | | | |
| | -552.50 73.08 | 1 | 23.25 | 2.35 | 29000 | 0 | | | 3 -661.27 |
| -14.950 | 11.635 2.117 102.73 -502.82 77.99 | 1 | 24.37 | 2.35 | 29000 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -15.450 | 12.695 | 2.110 | -135.64 | -450.14 | 82.89 | 1 | 25.49 | 2.35 | 29000 | 0 | | | | | | | |
| -15.950 | 13.732 | 2.023 | -346.91 | -394.44 | 87.80 | 1 | 26.60 | 2.35 | 29000 | 0 | | | | | | | |
| -16.438 | 14.683 | 1.868 | -525.38 | -337.24 | 92.58 | 1 | 27.69 | 2.35 | 29000 | 0 | | | | | | | |
| -16.925 | 15.544 | 1.656 | -675.26 | -277.18 | 97.36 | 1 | 28.78 | 2.35 | 29000 | 0 | | | | | | | |
| -17.412 | 16.290 | 1.397 | -795.16 | -214.25 | 102.15 | 1 | 29.87 | 2.35 | 29000 | 0 | | | | | | | |
| -17.900 | 16.900 | 1.101 | -883.69 | -148.46 | 106.93 | 1 | 30.96 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | | 106.93 | 1 | 42.76 | 2.68 | 20600 | 0 | | | | | | | |
| -18.375 | 17.350 | 0.788 | -937.10 | -75.98 | 111.59 | 1 | 43.91 | 2.68 | 20600 | 0 | | | | | | | |
| -18.850 | 17.647 | 0.463 | -955.43 | -0.74 | 116.25 | 1 | 45.05 | 2.68 | 20600 | 0 | | | | | | | |
| -19.150 | 17.755 | 0.256 | -948.34 | 48.20 | 119.19 | 1 | 45.78 | 2.68 | 20600 | 0 | | | | | | | |
| -19.450 | 17.801 | 0.053 | -926.41 | 98.24 | 122.13 | 1 | 46.50 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 122.13 | 1 | 46.50 | 2.68 | 20600 | 3 | 73.67 | | 20600 | | | | |
| -19.950 | 17.746 | -0.271 | -866.51 | 139.19 | 127.04 | 1 | 47.70 | 2.68 | 20600 | 3 | 105.89 | | 20600 | | | | |
| -20.409 | 17.557 | -0.546 | -795.75 | 167.85 | 127.04 | 1 | 48.81 | 2.68 | 20600 | 3 | 119.92 | | 20600 | | | | |
| -20.869 | 17.248 | -0.797 | -713.20 | 190.58 | 127.04 | 1 | 49.92 | 2.68 | 20600 | 3 | 133.94 | | 20600 | | | | |
| -21.328 | 16.830 | -1.018 | -621.57 | 207.37 | 127.04 | 1 | 51.03 | 2.68 | 20600 | 3 | 147.97 | | 20600 | | | | |
| -21.788 | 16.317 | -1.208 | -523.59 | 218.23 | 127.04 | 1 | 52.14 | 2.68 | 20600 | 3 | 161.99 | | 20600 | | | | |
| -22.247 | 15.725 | -1.365 | -421.97 | 223.16 | 127.04 | 1 | 53.24 | 2.68 | 20600 | 3 | 176.01 | | 20600 | | | | |
| -22.706 | 15.069 | -1.487 | -319.46 | 222.16 | 127.04 | 1 | 54.35 | 2.68 | 20600 | 3 | 190.04 | | 20600 | | | | |
| -23.166 | 14.364 | -1.576 | -218.78 | 215.22 | 127.04 | 1 | 55.46 | 2.68 | 20600 | 3 | 204.06 | | 20600 | | | | |
| -23.625 | 13.625 | -1.633 | -122.64 | 202.35 | 127.04 | 1 | 56.57 | 2.68 | 20600 | 3 | 218.09 | | 20600 | | | | |
| -24.084 | 12.868 | -1.659 | -33.78 | 183.54 | 127.04 | 1 | 57.68 | 2.68 | 20600 | 3 | 232.11 | | 20600 | | | | |
| -24.544 | 12.106 | -1.656 | 45.09 | 158.81 | 127.04 | 1 | 58.78 | 2.68 | 20600 | 3 | 246.13 | | 20600 | | | | |
| -25.003 | 11.350 | -1.630 | 111.27 | 128.44 | 127.04 | 1 | 59.89 | 2.68 | 20600 | 2 | 258.83 | | 20600 | | | | |
| -25.462 | 10.611 | -1.584 | 163.19 | 98.73 | 127.04 | 1 | 61.00 | 2.68 | 20600 | 2 | 245.49 | | 20600 | | | | |
| -25.922 | 9.897 | -1.523 | 202.98 | 75.55 | 127.04 | 1 | 62.11 | 2.68 | 20600 | 2 | 232.65 | | 20600 | | | | |
| -26.381 | 9.213 | -1.451 | 233.56 | 58.62 | 127.04 | 1 | 63.22 | 2.68 | 20600 | 2 | 220.46 | | 20600 | | | | |
| -26.841 | 8.565 | -1.369 | 257.74 | 47.63 | 127.04 | 1 | 64.33 | 2.68 | 20600 | 2 | 208.99 | | 20600 | | | | |
| -27.300 | 7.957 | -1.280 | 278.18 | 42.24 | 127.04 | 1 | 65.43 | 2.68 | 20600 | 2 | 198.33 | | 20600 | | | | |
| | | | | | 127.04 | 1 | 50.84 | 2.35 | 29000 | 2 | 261.91 | | 29000 | | | | |
| -27.684 | 7.480 | -1.202 | 288.53 | 12.47 | 127.04 | 1 | 51.69 | 2.35 | 29000 | 2 | 249.58 | | 29000 | | | | |
| -28.069 | 7.033 | -1.121 | 288.39 | -12.39 | 127.04 | 1 | 52.55 | 2.35 | 29000 | 2 | 238.14 | | 29000 | | | | |
| -28.453 | 6.617 | -1.042 | 279.58 | -32.70 | 127.04 | 1 | 53.41 | 2.35 | 29000 | 2 | 227.59 | | 29000 | | | | |
| -28.837 | 6.231 | -0.967 | 263.79 | -48.79 | 127.04 | 1 | 54.27 | 2.35 | 29000 | 2 | 217.89 | | 29000 | | | | |
| -29.222 | 5.873 | -0.897 | 242.57 | -60.99 | 127.04 | 1 | 55.13 | 2.35 | 29000 | 2 | 209.02 | | 29000 | | | | |
| -29.606 | 5.541 | -0.833 | 217.37 | -69.58 | 127.04 | 1 | 55.99 | 2.35 | 29000 | 2 | 200.89 | | 29000 | | | | |
| -29.991 | 5.232 | -0.776 | 189.51 | -74.85 | 127.04 | 1 | 56.84 | 2.35 | 29000 | 2 | 193.43 | | 29000 | | | | |
| -30.375 | 4.943 | -0.728 | 160.22 | -77.03 | 127.04 | 1 | 57.70 | 2.35 | 29000 | 2 | 186.56 | | 29000 | | | | |
| -30.759 | 4.672 | -0.688 | 130.66 | -76.34 | 127.04 | 1 | 58.56 | 2.35 | 29000 | 2 | 180.19 | | 29000 | | | | |
| -31.144 | 4.414 | -0.655 | 101.88 | -72.95 | 127.04 | 1 | 59.42 | 2.35 | 29000 | 2 | 174.21 | | 29000 | | | | |
| -31.528 | 4.167 | -0.631 | 74.91 | -66.99 | 127.04 | 1 | 60.28 | 2.35 | 29000 | 2 | 168.56 | | 29000 | | | | |
| -31.913 | 3.928 | -0.614 | 50.70 | -58.57 | 127.04 | 1 | 61.13 | 2.35 | 29000 | 2 | 163.13 | | 29000 | | | | |
| -32.297 | 3.694 | -0.602 | 30.18 | -47.77 | 127.04 | 1 | 61.99 | 2.35 | 29000 | 2 | 157.86 | | 29000 | | | | |
| -32.681 | 3.464 | -0.596 | 14.27 | -34.63 | 127.04 | 1 | 62.85 | 2.35 | 29000 | 2 | 152.69 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |





PHASE 4 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.066 | 3.236 | -0.594 | 3.85 | -19.19 | 127.04 | 1 63.71 | 2.35 | 29000 | 2 147.57 | | 29000 | | |
| -33.450 | 3.007 | -0.594 | 0.00 | 0.00 | 127.04 | 2 72.06 | 4.12 | 29000 | 2 142.45 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa/m | kPa | | kPa/m | kN | |

MAXIMUM DISPLACEMENT = 17.80 mm

MAXIMUM MOMENT = -955.43 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION, 1 = ACTIVE PR., 2 = ELASTIC
CODIFICATION OF SOIL : 3 = PASSIVE PR.

( 4 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 102.36 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.042 = (1265.68 kN/m)/(29853.75 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.564 = (2671.20 kN/m)/(4735.49 kN/m)





** PHASE Nb 5 **

*Fase 5
*Ejecucion de la losa de fondo

* INSTALLATION OF A LINE OF STRUTS Nb 4
LEVEL = -18.850 m
SPACING = 1.000 m
INCLINATION = 0.000 DEGREES
PRELOAD = 0.000 kN
STIFFNESS = 4000000.000 kN/m
BILATERAL CONNECTION

* REMOVAL LINE OF STRUTS Nb 3





PHASE 5

| WALL | SOIL 1 | SOIL 2 | STRUTS/ ANCHORS |
|---|---|---|---|
| | EXCAVATION: 0.00 m | EXCAVATION: -19.45 m | |
| | WATER LEVEL: -7.00 m | WATER LEVEL: -19.95 m | |
| | CAQUOT SURC.: 10.00 kPa | CAQUOT SURC.: 0.00 kPa | |

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.507 | 0.186 | 0.00 | 0.00 | | 2 | 2.67 | 2.67 | 4900 | 0 | | | | | | |
| -0.450 | 0.591 | 0.186 | 0.40 | 2.05 | | 2 | 6.43 | 5.15 | 4900 | 0 | | | | | | |
| -0.900 | 0.674 | 0.186 | 2.10 | 5.78 | | 2 | 10.19 | 5.15 | 4900 | 0 | | | | | | |
| | | | | | | -1 | | | | 0 | | | | | | |
| -1.175 | 0.726 | 0.187 | 3.69 | 5.78 | | -1 | | | | 0 | | | | | | |
| -1.450 | 0.777 | 0.188 | 5.29 | 5.88 | | 2 | 0.67 | 0.67 | 20600 | 0 | | | | | | |
| -1.725 | 0.829 | 0.189 | 6.94 | 6.24 | | 2 | 1.98 | 1.98 | 20600 | 0 | | | | | | |
| -2.000 | 0.881 | 0.190 | 8.75 | 6.96 | | 2 | 3.28 | 3.28 | 20600 | 0 | | | | | | |
| | | | | -5.75 | | 2 | 3.28 | 3.28 | 20600 | 0 | | | | | 1 | -12.71 |
| -2.300 | 0.938 | 0.192 | 7.19 | -4.55 | | 2 | 4.69 | 4.55 | 20600 | 0 | | | | | | |
| -2.600 | 0.996 | 0.194 | 6.06 | -2.93 | | 2 | 6.09 | 4.55 | 20600 | 0 | | | | | | |
| -2.875 | 1.050 | 0.195 | 5.50 | -1.08 | | 2 | 7.37 | 4.55 | 20600 | 0 | | | | | | |
| -3.150 | 1.103 | 0.196 | 5.50 | 1.12 | | 2 | 8.64 | 4.55 | 20600 | 0 | | | | | | |
| -3.425 | 1.157 | 0.197 | 6.15 | 3.67 | | 2 | 9.91 | 4.55 | 20600 | 0 | | | | | | |
| -3.700 | 1.212 | 0.198 | 7.55 | 6.57 | | 2 | 11.17 | 4.55 | 20600 | 0 | | | | | | |
| -3.975 | 1.266 | 0.200 | 9.90 | 10.97 | | 2 | 20.83 | 4.55 | 20600 | 0 | | | | | | |
| -4.250 | 1.322 | 0.202 | 13.75 | 17.24 | | 2 | 24.76 | 4.55 | 20600 | 0 | | | | | | |
| -4.525 | 1.378 | 0.206 | 19.48 | 24.57 | | 2 | 28.56 | 4.55 | 20600 | 0 | | | | | | |
| -4.800 | 1.435 | 0.210 | 27.36 | 32.93 | | 2 | 32.21 | 4.55 | 20600 | 0 | | | | | | |
| -5.075 | 1.494 | 0.217 | 37.67 | 42.26 | | 2 | 35.67 | 4.55 | 20600 | 0 | | | | | | |
| -5.350 | 1.554 | 0.225 | 50.69 | 52.52 | | 2 | 38.93 | 4.55 | 20600 | 0 | | | | | | |
| -5.625 | 1.618 | 0.237 | 66.64 | 63.64 | | 2 | 41.95 | 4.55 | 20600 | 0 | | | | | | |
| -5.900 | 1.685 | 0.252 | 85.76 | 75.55 | | 2 | 44.70 | 4.55 | 20600 | 0 | | | | | | |
| -6.175 | 1.757 | 0.271 | 108.26 | 88.18 | | 2 | 47.14 | 4.55 | 20600 | 0 | | | | | | |
| -6.450 | 1.834 | 0.295 | 134.32 | 101.43 | | 2 | 49.23 | 4.55 | 20600 | 0 | | | | | | |
| -6.725 | 1.920 | 0.325 | 164.09 | 115.20 | | 2 | 50.94 | 4.55 | 20600 | 0 | | | | | | |
| -7.000 | 2.014 | 0.360 | 197.72 | 129.39 | | 2 | 52.21 | 4.55 | 20600 | 0 | | | | | | |
| -7.431 | 2.184 | 0.431 | 258.49 | 152.78 | 4.23 | 2 | 52.07 | 4.55 | 20600 | 0 | | | | | | |
| -7.863 | 2.388 | 0.522 | 329.70 | 177.65 | 8.46 | 2 | 50.55 | 4.55 | 20600 | 0 | | | | | | |
| -8.294 | 2.638 | 0.637 | 411.83 | 203.33 | 12.69 | 2 | 47.43 | 4.55 | 20600 | 0 | | | | | | |
| -8.725 | 2.942 | 0.780 | 505.09 | 229.10 | 16.92 | 2 | 42.47 | 4.55 | 20600 | 0 | | | | | | |
| -9.156 | 3.315 | 0.953 | 609.33 | 254.11 | 21.15 | 2 | 35.44 | 4.55 | 20600 | 0 | | | | | | |
| -9.587 | 3.769 | 1.160 | 724.06 | 277.74 | 25.38 | 2 | 27.59 | 4.55 | 20600 | 0 | | | | | | |
| -10.019 | 4.320 | 1.404 | 848.75 | 300.47 | 29.61 | 1 | 22.85 | 2.68 | 20600 | 0 | | | | | | |
| -10.450 | 4.986 | 1.689 | 983.37 | 324.24 | 33.84 | 1 | 23.89 | 2.68 | 20600 | 0 | | | | | | |
| | | | | -520.94 | 33.84 | 1 | 23.89 | 2.68 | 20600 | 0 | | | | | 2 | -845.17 |
| -10.950 | 5.911 | 1.998 | 730.37 | -490.54 | 38.75 | 1 | 25.10 | 2.68 | 20600 | 0 | | | | | | |
| -11.200 | 6.426 | 2.118 | 609.77 | -474.20 | 41.20 | 1 | 25.70 | 2.68 | 20600 | 0 | | | | | | |
| | | | | | 41.20 | 1 | 16.00 | 2.35 | 29000 | 0 | | | | | | |
| -11.450 | 6.969 | 2.218 | 493.04 | -459.52 | 43.65 | 1 | 16.56 | 2.35 | 29000 | 0 | | | | | | |
| -11.825 | 7.822 | 2.328 | 325.06 | -436.09 | 47.33 | 1 | 17.39 | 2.35 | 29000 | 0 | | | | | | |
| -12.200 | 8.709 | 2.394 | 166.18 | -410.97 | 51.01 | 1 | 18.23 | 2.35 | 29000 | 0 | | | | | | |
| -12.575 | 9.613 | 2.419 | 17.04 | -384.16 | 54.69 | 1 | 19.07 | 2.35 | 29000 | 0 | | | | | | |
| -12.950 | 10.519 | 2.405 | -121.73 | -355.66 | 58.37 | 1 | 19.90 | 2.35 | 29000 | 0 | | | | | | |
| -13.325 | 11.412 | 2.354 | -249.49 | -325.46 | 62.05 | 1 | 20.74 | 2.35 | 29000 | 0 | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | | kN | |



PHASE 5 (CONTINUATION)

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.700 | 12.280 | 2.271 | -365.61 | -293.56 | 65.73 | 1 | 21.58 | 2.35 | 29000 | 0 | | | | | | |
| -14.075 | 13.111 | 2.157 | -469.45 | -259.98 | 69.41 | 1 | 22.42 | 2.35 | 29000 | 0 | | | | | | |
| -14.450 | 13.895 | 2.018 | -560.38 | -224.70 | 73.08 | 1 | 23.25 | 2.35 | 29000 | 0 | | | | | | |
| -14.950 | 14.850 | 1.797 | -660.44 | -175.02 | 77.99 | 1 | 24.37 | 2.35 | 29000 | 0 | | | | | | |
| -15.450 | 15.687 | 1.545 | -734.90 | -122.34 | 82.89 | 1 | 25.49 | 2.35 | 29000 | 0 | | | | | | |
| -15.950 | 16.391 | 1.270 | -782.28 | -66.64 | 87.80 | 1 | 26.60 | 2.35 | 29000 | 0 | | | | | | |
| -16.438 | 16.942 | 0.991 | -800.94 | -9.44 | 92.58 | 1 | 27.69 | 2.35 | 29000 | 0 | | | | | | |
| -16.925 | 17.357 | 0.710 | -791.01 | 50.62 | 97.36 | 1 | 28.78 | 2.35 | 29000 | 0 | | | | | | |
| -17.412 | 17.636 | 0.438 | -751.11 | 113.55 | 102.15 | 1 | 29.87 | 2.35 | 29000 | 0 | | | | | | |
| -17.900 | 17.787 | 0.186 | -679.84 | 179.34 | 106.93 | 1 | 30.96 | 2.35 | 29000 | 0 | | | | | | |
| | | | | | 106.93 | 1 | 42.76 | 2.68 | 20600 | 0 | | | | | | |
| -18.375 | 17.823 | -0.031 | -577.55 | 251.82 | 111.59 | 1 | 43.91 | 2.68 | 20600 | 0 | | | | | | |
| -18.850 | 17.764 | -0.206 | -440.17 | 327.06 | 116.25 | 1 | 45.05 | 2.68 | 20600 | 0 | | | | | | |
| | | | | -143.18 | 116.25 | 1 | 45.05 | 2.68 | 20600 | 0 | | | | | 4 | -470.23 |
| -19.150 | 17.688 | -0.306 | -475.79 | -94.03 | 119.19 | 2 | 47.15 | 4.06 | 20600 | 0 | | | | | | |
| -19.450 | 17.580 | -0.411 | -496.41 | -43.10 | 122.13 | 2 | 51.04 | 4.55 | 20600 | 0 | | | | | | |
| | | | | | 122.13 | 2 | 51.04 | 4.55 | 20600 | 2 | 69.13 | | 20600 | | | |
| -19.950 | 17.330 | -0.592 | -505.71 | 4.41 | 127.04 | 2 | 56.28 | 4.55 | 20600 | 2 | 97.32 | | 20600 | | | |
| -20.409 | 17.019 | -0.759 | -494.89 | 42.10 | 127.04 | 2 | 59.90 | 4.55 | 20600 | 2 | 108.84 | | 20600 | | | |
| -20.869 | 16.634 | -0.919 | -467.65 | 75.73 | 127.04 | 2 | 62.57 | 4.55 | 20600 | 2 | 121.29 | | 20600 | | | |
| -21.328 | 16.177 | -1.067 | -426.06 | 104.51 | 127.04 | 2 | 64.48 | 4.55 | 20600 | 2 | 134.52 | | 20600 | | | |
| -21.788 | 15.656 | -1.200 | -372.47 | 127.81 | 127.04 | 2 | 65.77 | 4.55 | 20600 | 2 | 148.36 | | 20600 | | | |
| -22.247 | 15.078 | -1.313 | -309.55 | 145.13 | 127.04 | 2 | 66.58 | 4.55 | 20600 | 2 | 162.68 | | 20600 | | | |
| -22.706 | 14.453 | -1.404 | -240.11 | 156.07 | 127.04 | 2 | 67.04 | 4.55 | 20600 | 2 | 177.35 | | 20600 | | | |
| -23.166 | 13.792 | -1.472 | -167.17 | 160.38 | 127.04 | 2 | 67.25 | 4.55 | 20600 | 2 | 192.27 | | 20600 | | | |
| -23.625 | 13.105 | -1.515 | -93.81 | 157.85 | 127.04 | 2 | 67.30 | 4.55 | 20600 | 2 | 207.36 | | 20600 | | | |
| -24.084 | 12.403 | -1.534 | -23.21 | 148.37 | 127.04 | 2 | 67.25 | 4.55 | 20600 | 2 | 222.53 | | 20600 | | | |
| -24.544 | 11.699 | -1.531 | 41.43 | 131.89 | 127.04 | 2 | 67.17 | 4.55 | 20600 | 2 | 237.74 | | 20600 | | | |
| -25.003 | 11.000 | -1.508 | 96.94 | 108.69 | 127.04 | 2 | 67.10 | 4.55 | 20600 | 2 | 251.62 | | 20600 | | | |
| -25.462 | 10.316 | -1.468 | 141.23 | 85.09 | 127.04 | 2 | 67.08 | 4.55 | 20600 | 2 | 239.41 | | 20600 | | | |
| -25.922 | 9.653 | -1.415 | 175.95 | 66.99 | 127.04 | 2 | 67.12 | 4.55 | 20600 | 2 | 227.64 | | 20600 | | | |
| -26.381 | 9.018 | -1.352 | 203.60 | 54.22 | 127.04 | 2 | 67.25 | 4.55 | 20600 | 2 | 216.42 | | 20600 | | | |
| -26.841 | 8.413 | -1.281 | 226.55 | 46.54 | 127.04 | 2 | 67.47 | 4.55 | 20600 | 2 | 205.84 | | 20600 | | | |
| -27.300 | 7.842 | -1.202 | 247.09 | 43.68 | 127.04 | 2 | 67.79 | 4.55 | 20600 | 2 | 195.97 | | 20600 | | | |
| | | | | | 127.04 | 2 | 54.16 | 4.12 | 29000 | 2 | 258.59 | | 29000 | | | |
| -27.684 | 7.393 | -1.132 | 258.45 | 16.15 | 127.04 | 2 | 54.19 | 4.12 | 29000 | 2 | 247.08 | | 29000 | | | |
| -28.069 | 6.972 | -1.060 | 260.06 | -7.08 | 127.04 | 2 | 54.32 | 4.12 | 29000 | 2 | 236.37 | | 29000 | | | |
| -28.453 | 6.579 | -0.988 | 253.52 | -26.28 | 127.04 | 2 | 54.53 | 3.47 | 29000 | 2 | 226.46 | | 29000 | | | |
| -28.837 | 6.212 | -0.920 | 240.34 | -41.72 | 127.04 | 2 | 54.83 | 2.91 | 29000 | 2 | 217.33 | | 29000 | | | |
| -29.222 | 5.871 | -0.856 | 221.89 | -53.67 | 127.04 | 2 | 55.20 | 2.42 | 29000 | 2 | 208.95 | | 29000 | | | |
| -29.606 | 5.554 | -0.797 | 199.50 | -62.31 | 127.04 | 1 | 55.99 | 2.35 | 29000 | 2 | 201.25 | | 29000 | | | |
| -29.991 | 5.257 | -0.745 | 174.40 | -67.79 | 127.04 | 1 | 56.84 | 2.35 | 29000 | 2 | 194.16 | | 29000 | | | |
| -30.375 | 4.980 | -0.701 | 147.77 | -70.32 | 127.04 | 1 | 57.70 | 2.35 | 29000 | 2 | 187.62 | | 29000 | | | |
| -30.759 | 4.718 | -0.663 | 120.70 | -70.09 | 127.04 | 1 | 58.56 | 2.35 | 29000 | 2 | 181.53 | | 29000 | | | |
| -31.144 | 4.469 | -0.634 | 94.22 | -67.26 | 127.04 | 1 | 59.42 | 2.35 | 29000 | 2 | 175.81 | | 29000 | | | |
| -31.528 | 4.230 | -0.611 | 69.31 | -61.96 | 127.04 | 1 | 60.28 | 2.35 | 29000 | 2 | 170.39 | | 29000 | | | |
| -31.913 | 3.998 | -0.595 | 46.90 | -54.28 | 127.04 | 1 | 61.13 | 2.35 | 29000 | 2 | 165.18 | | 29000 | | | |
| -32.297 | 3.772 | -0.585 | 27.88 | -44.30 | 127.04 | 1 | 61.99 | 2.35 | 29000 | 2 | 160.11 | | 29000 | | | |
| -32.681 | 3.548 | -0.579 | 13.13 | -32.07 | 127.04 | 1 | 62.85 | 2.35 | 29000 | 2 | 155.13 | | 29000 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | | kN | |

PHASE 5 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.066 | 3.326 | -0.577 | 3.51 | -17.59 | 127.04 | 1 63.71 | 2.35 | 29000 | 2 150.20 | | 29000 | | |
| -33.450 | 3.105 | -0.577 | 0.00 | 0.00 | 127.04 | 2 69.23 | 4.12 | 29000 | 2 145.28 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

MAXIMUM DISPLACEMENT = 17.82 mm

MAXIMUM MOMENT = 983.37 kN.m/m

CODIFICATION OF STATE OF SOIL : -1 = SEPARATION, 0 = EXCAVATION, 1 = ACTIVE PR., 2 = ELASTIC, 3 = PASSIVE PR.

( 3 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 117.79 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.047 = (1394.16 kN/m)/(29853.75 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.550 = (2603.66 kN/m)/(4735.49 kN/m)



** PHASE Nb 6 **

*Fase 6
*Restitucion del nf

* DISPLACEMENT OF GROUNDWATER TABLE IN SOIL 2 TO LEVEL = -19.450 m
WATER PRESSURE IN SOIL 2 TO LEVEL = -19.450 m PR. = 0.000 kPa
PR. = 125.000 kPa



PHASE 6

WALL | SOIL 1: EXCAVATION 0.00 m, WATER LEVEL -7.00 m, CAQUOT SURC. 10.00 kPa | SOIL 2: EXCAVATION -19.45 m, WATER LEVEL -19.45 m, CAQUOT SURC. 0.00 kPa | STRUTS/ANCHORS

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.571 | 0.153 | 0.00 | 0.00 | | 2 2.35 | 2.35 | 4900 | 0 | | | | |
| -0.450 | 0.640 | 0.154 | 0.37 | 1.92 | | 2 6.19 | 5.15 | 4900 | 0 | | | | |
| -0.900 | 0.709 | 0.154 | 1.99 | 5.57 | | 2 10.02 | 5.15 | 4900 | 0 | | | | |
| | | | | | | -1 | | | 0 | | | | |
| -1.175 | 0.752 | 0.154 | 3.52 | 5.57 | | -1 | | | 0 | | | | |
| -1.450 | 0.794 | 0.155 | 5.05 | 5.61 | | 2 0.32 | 0.32 | 20600 | 0 | | | | |
| -1.725 | 0.837 | 0.156 | 6.63 | 5.90 | | 2 1.81 | 1.81 | 20600 | 0 | | | | |
| -2.000 | 0.880 | 0.158 | 8.34 | 6.61 | | 2 3.30 | 3.30 | 20600 | 0 | | | | |
| | | | | -2.82 | | 2 3.30 | 3.30 | 20600 | 0 | | | 1 | -9.43 |
| -2.300 | 0.928 | 0.160 | 7.66 | -1.59 | | 2 4.91 | 4.55 | 20600 | 0 | | | | |
| -2.600 | 0.976 | 0.161 | 7.43 | 0.13 | | 2 6.51 | 4.55 | 20600 | 0 | | | | |
| -2.875 | 1.021 | 0.163 | 7.73 | 2.12 | | 2 7.97 | 4.55 | 20600 | 0 | | | | |
| -3.150 | 1.065 | 0.164 | 8.63 | 4.51 | | 2 9.42 | 4.55 | 20600 | 0 | | | | |
| -3.425 | 1.111 | 0.166 | 10.25 | 7.30 | | 2 10.86 | 4.55 | 20600 | 0 | | | | |
| -3.700 | 1.157 | 0.168 | 12.68 | 10.48 | | 2 12.29 | 4.55 | 20600 | 0 | | | | |
| -3.975 | 1.204 | 0.171 | 16.16 | 15.22 | | 2 22.12 | 4.55 | 20600 | 0 | | | | |
| -4.250 | 1.251 | 0.175 | 21.23 | 21.86 | | 2 26.22 | 4.55 | 20600 | 0 | | | | |
| -4.525 | 1.300 | 0.180 | 28.28 | 29.61 | | 2 30.17 | 4.55 | 20600 | 0 | | | | |
| -4.800 | 1.350 | 0.186 | 37.61 | 38.43 | | 2 33.95 | 4.55 | 20600 | 0 | | | | |
| -5.075 | 1.403 | 0.195 | 49.51 | 48.26 | | 2 37.55 | 4.55 | 20600 | 0 | | | | |
| -5.350 | 1.458 | 0.206 | 64.25 | 59.05 | | 2 40.92 | 4.55 | 20600 | 0 | | | | |
| -5.625 | 1.516 | 0.221 | 82.07 | 70.73 | | 2 44.04 | 4.55 | 20600 | 0 | | | | |
| -5.900 | 1.579 | 0.239 | 103.22 | 83.23 | | 2 46.87 | 4.55 | 20600 | 0 | | | | |
| -6.175 | 1.648 | 0.262 | 127.92 | 96.46 | | 2 49.37 | 4.55 | 20600 | 0 | | | | |
| -6.450 | 1.724 | 0.290 | 156.34 | 110.33 | | 2 51.51 | 4.55 | 20600 | 0 | | | | |
| -6.725 | 1.808 | 0.324 | 188.65 | 124.74 | | 2 53.23 | 4.55 | 20600 | 0 | | | | |
| -7.000 | 1.903 | 0.365 | 224.98 | 139.55 | | 2 54.49 | 4.55 | 20600 | 0 | | | | |
| -7.431 | 2.077 | 0.445 | 290.35 | 163.91 | 4.23 | 2 54.27 | 4.55 | 20600 | 0 | | | | |
| -7.863 | 2.290 | 0.547 | 366.56 | 189.69 | 8.46 | 2 52.58 | 4.55 | 20600 | 0 | | | | |
| -8.294 | 2.552 | 0.674 | 454.06 | 216.19 | 12.69 | 2 49.19 | 4.55 | 20600 | 0 | | | | |
| -8.725 | 2.875 | 0.831 | 553.01 | 242.64 | 16.92 | 2 43.85 | 4.55 | 20600 | 0 | | | | |
| -9.156 | 3.273 | 1.019 | 663.20 | 268.13 | 21.15 | 2 36.29 | 4.55 | 20600 | 0 | | | | |
| -9.587 | 3.760 | 1.244 | 784.04 | 291.98 | 25.38 | 2 27.78 | 4.55 | 20600 | 0 | | | | |
| -10.019 | 4.352 | 1.508 | 914.87 | 314.75 | 29.61 | 1 22.85 | 2.68 | 20600 | 0 | | | | |
| -10.450 | 5.067 | 1.814 | 1055.65 | 338.51 | 33.84 | 1 23.89 | 2.68 | 20600 | 0 | | | | |
| | | | | -563.71 | 33.84 | 1 23.89 | 2.68 | 20600 | 0 | | | 2 | -902.22 |
| -10.950 | 6.061 | 2.145 | 781.27 | -533.31 | 38.75 | 1 25.10 | 2.68 | 20600 | 0 | | | | |
| -11.200 | 6.614 | 2.274 | 649.97 | -516.97 | 41.20 | 1 25.70 | 2.68 | 20600 | 0 | | | | |
| | | | | | 41.20 | 1 16.00 | 2.35 | 29000 | 0 | | | | |
| -11.450 | 7.196 | 2.380 | 522.55 | -502.29 | 43.65 | 1 16.56 | 2.35 | 29000 | 0 | | | | |
| -11.825 | 8.112 | 2.496 | 338.53 | -478.87 | 47.33 | 1 17.39 | 2.35 | 29000 | 0 | | | | |
| -12.200 | 9.062 | 2.564 | 163.61 | -453.75 | 51.01 | 1 18.23 | 2.35 | 29000 | 0 | | | | |
| -12.575 | 10.029 | 2.586 | -1.57 | -426.94 | 54.69 | 1 19.07 | 2.35 | 29000 | 0 | | | | |
| -12.950 | 10.996 | 2.564 | -156.38 | -398.43 | 58.37 | 1 19.90 | 2.35 | 29000 | 0 | | | | |
| -13.325 | 11.947 | 2.502 | -300.18 | -368.23 | 62.05 | 1 20.74 | 2.35 | 29000 | 0 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |



PHASE 6 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.700 | 12.868 | 2.403 | -432.34 | -336.34 | 65.73 | 1 | 21.58 | 2.35 | 29000 | 0 | | | | | | | | | |
| -14.075 | 13.744 | 2.269 | -552.22 | -302.75 | 69.41 | 1 | 22.42 | 2.35 | 29000 | 0 | | | | | | | | | |
| -14.450 | 14.566 | 2.105 | -659.19 | -267.47 | 73.08 | 1 | 23.25 | 2.35 | 29000 | 0 | | | | | | | | | |
| -14.950 | 15.555 | 1.845 | -780.63 | -217.80 | 77.99 | 1 | 24.37 | 2.35 | 29000 | 0 | | | | | | | | | |
| -15.450 | 16.404 | 1.545 | -876.49 | -165.11 | 82.89 | 1 | 25.49 | 2.35 | 29000 | 0 | | | | | | | | | |
| -15.950 | 17.095 | 1.216 | -945.24 | -109.41 | 87.80 | 1 | 26.60 | 2.35 | 29000 | 0 | | | | | | | | | |
| -16.438 | 17.605 | 0.875 | -984.76 | -52.21 | 92.58 | 1 | 27.69 | 2.35 | 29000 | 0 | | | | | | | | | |
| -16.925 | 17.947 | 0.526 | -995.69 | 7.85 | 97.36 | 1 | 28.78 | 2.35 | 29000 | 0 | | | | | | | | | |
| -17.412 | 18.119 | 0.179 | -976.64 | 70.78 | 102.15 | 1 | 29.87 | 2.35 | 29000 | 0 | | | | | | | | | |
| -17.900 | 18.123 | -0.157 | -926.21 | 136.56 | 106.93 | 1 | 30.96 | 2.35 | 29000 | 0 | | | | | | | | | |
| | | | | | 106.93 | 1 | 42.76 | 2.68 | 20600 | 0 | | | | | | | | | |
| -18.375 | 17.975 | -0.461 | -844.24 | 209.05 | 111.59 | 1 | 43.91 | 2.68 | 20600 | 0 | | | | | | | | | |
| -18.850 | 17.691 | -0.731 | -727.13 | 284.65 | 116.25 | 2 | 46.57 | 4.20 | 20600 | 0 | | | | | | | | | |
| | | | | | 109.58 | 116.25 | 2 | 46.57 | 4.20 | 20600 | 0 | | | | | | | 4 | -175.06 |
| -19.150 | 17.448 | -0.885 | -686.80 | 159.70 | 119.19 | 2 | 52.09 | 4.55 | 20600 | 0 | | | | | | | | | |
| -19.450 | 17.161 | -1.027 | -632.90 | 193.92 | -2.87 | 2 | 59.69 | 4.55 | 20600 | 0 | | | | | | | | | |
| | | | | | -2.87 | 2 | 59.69 | 4.55 | 20600 | 2 | 60.48 | | 20600 | | | | | | |
| -19.950 | 16.593 | -1.238 | -536.71 | 190.18 | -2.87 | 2 | 71.45 | 4.55 | 20600 | 2 | 79.87 | | 20600 | | | | | | |
| -20.409 | 15.985 | -1.402 | -450.39 | 185.99 | -2.87 | 2 | 81.19 | 4.55 | 20600 | 2 | 85.26 | | 20600 | | | | | | |
| -20.869 | 15.309 | -1.537 | -365.60 | 183.31 | -2.87 | 2 | 89.85 | 4.55 | 20600 | 2 | 91.74 | | 20600 | | | | | | |
| -21.328 | 14.578 | -1.644 | -281.90 | 181.13 | -2.87 | 2 | 97.42 | 4.55 | 20600 | 2 | 99.30 | | 20600 | | | | | | |
| -21.788 | 13.803 | -1.724 | -199.27 | 178.46 | -2.87 | 2 | 103.93 | 4.55 | 20600 | 2 | 107.92 | | 20600 | | | | | | |
| -22.247 | 12.998 | -1.776 | -118.15 | 174.36 | -2.87 | 2 | 109.43 | 4.55 | 20600 | 2 | 117.56 | | 20600 | | | | | | |
| -22.706 | 12.175 | -1.802 | -39.43 | 167.92 | -2.87 | 2 | 113.97 | 4.55 | 20600 | 2 | 128.15 | | 20600 | | | | | | |
| -23.166 | 11.346 | -1.803 | 35.64 | 158.30 | -2.87 | 2 | 117.63 | 4.55 | 20600 | 2 | 139.62 | | 20600 | | | | | | |
| -23.625 | 10.522 | -1.779 | 105.40 | 144.73 | -2.87 | 2 | 120.50 | 4.55 | 20600 | 2 | 151.88 | | 20600 | | | | | | |
| -24.084 | 9.714 | -1.734 | 167.89 | 126.51 | -2.87 | 2 | 122.65 | 4.55 | 20600 | 2 | 164.86 | | 20600 | | | | | | |
| -24.544 | 8.932 | -1.669 | 220.82 | 103.02 | -2.87 | 2 | 124.17 | 4.55 | 20600 | 2 | 178.47 | | 20600 | | | | | | |
| -25.003 | 8.183 | -1.589 | 261.70 | 74.03 | -2.87 | 2 | 125.14 | 4.55 | 20600 | 2 | 191.31 | | 20600 | | | | | | |
| -25.462 | 7.474 | -1.497 | 288.89 | 45.35 | -2.87 | 2 | 125.63 | 4.55 | 20600 | 2 | 178.58 | | 20600 | | | | | | |
| -25.922 | 6.808 | -1.399 | 304.25 | 22.45 | -2.87 | 2 | 125.73 | 4.55 | 20600 | 2 | 166.76 | | 20600 | | | | | | |
| -26.381 | 6.189 | -1.297 | 310.31 | 4.74 | -2.87 | 2 | 125.52 | 4.55 | 20600 | 2 | 155.88 | | 20600 | | | | | | |
| -26.841 | 5.617 | -1.194 | 309.31 | -8.36 | -2.87 | 2 | 125.06 | 4.55 | 20600 | 2 | 145.98 | | 20600 | | | | | | |
| -27.300 | 5.092 | -1.092 | 303.26 | -17.37 | -2.87 | 2 | 124.44 | 4.55 | 20600 | 2 | 137.04 | | 20600 | | | | | | |
| | | | | | -2.87 | 2 | 133.91 | 4.12 | 29000 | 2 | 176.78 | | 29000 | | | | | | |
| -27.684 | 4.688 | -1.009 | 293.42 | -33.23 | -2.87 | 2 | 132.64 | 4.12 | 29000 | 2 | 166.57 | | 29000 | | | | | | |
| -28.069 | 4.316 | -0.930 | 278.13 | -45.83 | -2.87 | 2 | 131.36 | 4.12 | 29000 | 2 | 157.27 | | 29000 | | | | | | |
| -28.453 | 3.973 | -0.856 | 258.56 | -55.51 | -2.87 | 2 | 130.11 | 4.12 | 29000 | 2 | 148.83 | | 29000 | | | | | | |
| -28.837 | 3.657 | -0.787 | 235.79 | -62.56 | -2.87 | 2 | 128.92 | 4.12 | 29000 | 2 | 141.18 | | 29000 | | | | | | |
| -29.222 | 3.367 | -0.725 | 210.77 | -67.26 | -2.87 | 2 | 127.82 | 4.12 | 29000 | 2 | 134.26 | | 29000 | | | | | | |
| -29.606 | 3.099 | -0.670 | 184.37 | -69.76 | -2.87 | 2 | 127.18 | 4.12 | 29000 | 2 | 128.00 | | 29000 | | | | | | |
| -29.991 | 2.850 | -0.623 | 157.41 | -70.18 | -2.87 | 2 | 126.65 | 4.12 | 29000 | 2 | 122.30 | | 29000 | | | | | | |
| -30.375 | 2.619 | -0.583 | 130.66 | -68.70 | -2.87 | 2 | 126.17 | 4.12 | 29000 | 2 | 117.09 | | 29000 | | | | | | |
| -30.759 | 2.401 | -0.550 | 104.82 | -65.48 | -2.87 | 2 | 125.74 | 4.12 | 29000 | 2 | 112.29 | | 29000 | | | | | | |
| -31.144 | 2.195 | -0.525 | 80.53 | -60.62 | -2.87 | 2 | 125.36 | 4.12 | 29000 | 2 | 107.80 | | 29000 | | | | | | |
| -31.528 | 1.997 | -0.506 | 58.41 | -54.22 | -2.87 | 2 | 125.03 | 4.12 | 29000 | 2 | 103.57 | | 29000 | | | | | | |
| -31.913 | 1.806 | -0.492 | 39.04 | -46.35 | -2.87 | 2 | 124.73 | 4.12 | 29000 | 2 | 99.52 | | 29000 | | | | | | |
| -32.297 | 1.618 | -0.484 | 22.96 | -37.06 | -2.87 | 2 | 124.45 | 4.12 | 29000 | 2 | 95.59 | | 29000 | | | | | | |
| -32.681 | 1.433 | -0.479 | 10.72 | -26.38 | -2.87 | 2 | 124.19 | 4.12 | 29000 | 2 | 91.74 | | 29000 | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | | | |



PHASE 6 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE PRE. | SURCH. | ELAST. | STATE PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.066 | 1.250 | -0.477 | 2.86 | -14.33 | -2.87 | 2 123.93 | 4.12 | 29000 | 2 87.91 | | 29000 | | |
| -33.450 | 1.066 | -0.477 | 0.00 | 0.00 | -2.87 | 2 128.35 | 4.12 | 29000 | 2 84.10 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |

MAXIMUM DISPLACEMENT = 18.12 mm

MAXIMUM MOMENT = 1055.65 kN.m/m

CODIFICATION OF STATE : -1 = SEPARATION, 0 = EXCAVATION, 1 = ACTIVE PR.

CODIFICATION OF SOIL : 2 = ELASTIC, 3 = PASSIVE PR.

( 2 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 126.49 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.073 = (2183.76 kN/m)/(29853.75 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.401 = (1798.47 kN/m)/(4488.15 kN/m)



**  PHASE Nb 7  **

*Fase 7
*Sismo
*SISMO_ R

* NEW PARAMETERS FOR LAYER NB 1 UP TO LEVEL -0.900 m

| | | | |
|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 18.000 kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 8.000 kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.560 |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.515 |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 2.367 |
| COHESION | C | = | 5.000 kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 29.000 DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 4900.000 kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 1/m |

*SISMO_ UG1c

* NEW PARAMETERS FOR LAYER NB  2 UP TO LEVEL -11.200 m

| | | | | |
|---|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.000 | kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.000 | kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.948 | |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.455 | |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 1.991 | |
| COHESION | C | = | 20.000 | kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 33.000 | DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 | |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 | |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 20600.000 | kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 | 1/m |

*SISMO_ UG1d



* NEW PARAMETERS FOR LAYER NB  3 UP TO LEVEL -17.900 m

| | | | | |
|---|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.500 | kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.500 | kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.789 | |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.412 | |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 2.509 | |
| COHESION | C | = | 25.000 | kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 36.000 | DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 | |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 | |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 29000.000 | kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 | 1/m |

*SISMO_ UG1c

* NEW PARAMETERS FOR LAYER NB  4 UP TO LEVEL -27.300 m

| | | | | |
|---|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.000 | kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.000 | kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.948 | |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.455 | |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 1.991 | |
| COHESION | C | = | 20.000 | kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 33.000 | DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 | |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 | |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 20600.000 | kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 | 1/m |

*SISMO_ UG1d

* NEW PARAMETERS FOR LAYER NB  5 UP TO LEVEL -37.700 m

| | | | | |
|---|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 19.500 | kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 9.500 | kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.789 | |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.412 | |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 2.509 | |
| COHESION | C | = | 25.000 | kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 36.000 | DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 | |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 | |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 29000.000 | kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 | 1/m |

*SISMO_ UG2



* NEW PARAMETERS FOR LAYER NB  6 UP TO LEVEL -39.300 m

| | | | | |
|---|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 20.000 | kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 10.000 | kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.795 | |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.426 | |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 2.402 | |
| COHESION | C | = | 30.000 | kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 35.000 | DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 | |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 | |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 43800.000 | kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 | 1/m |

*SISMO_ UG3a

* NEW PARAMETERS FOR LAYER NB  7 UP TO LEVEL -47.200 m

| | | | | |
|---|---|---|---|---|
| SATURATED UNIT WEIGHT | GH | = | 23.000 | kN/m3 |
| SUBMERGED UNIT WEIGHT | GD | = | 13.000 | kN/m3 |
| HOR. ACTIVE PRESSURE COEFFICIENT | KA | = | 0.302 | |
| HOR. AT REST PRESSURE COEFFICIENT | K0 | = | 0.152 | |
| HOR. PASSIVE PRESSURE COEFFICIENT | KP | = | 10.398 | |
| COHESION | C | = | 246.000 | kPa |
| ANGLE OF INTERNAL FRICTION | PHI | = | 58.000 | DEGREES |
| FOR ACTIVE PRESS. DELTA/PHI | | = | 0.000 | |
| FOR PASSIVE PRESS. DELTA/PHI | | = | 0.000 | |
| ELASTIC REACTION COEFFICIENT (AT P=0) | | = | 300000.000 | kPa/m |
| INCR. OF THIS COEFF. WITH PRESSURE | | = | 0.000 | 1/m |

PHASE 7

| WALL | SOIL 1<br>EXCAVATION: 0.00 m<br>WATER LEVEL: -7.00 m<br>CAQUOT SURC.: 10.00 kPa | SOIL 2<br>EXCAVATION: -19.45 m<br>WATER LEVEL: -19.45 m<br>CAQUOT SURC.: 0.00 kPa | STRUTS/ ANCHORS |
|---|---|---|---|

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -0.784 | 0.850 | 0.00 | 0.00 | | 2 | 8.99 | 5.15 | 4900 | 0 | | | | | |
| -0.450 | -0.401 | 0.850 | 0.99 | 4.56 | | 2 | 11.29 | 5.15 | 4900 | 0 | | | | | |
| -0.900 | -0.018 | 0.851 | 4.26 | 10.16 | | 2 | 13.58 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 12.30 | 4.55 | 20600 | 0 | | | | | |
| -1.175 | 0.216 | 0.852 | 7.49 | 13.20 | | 2 | 9.85 | 4.55 | 20600 | 0 | | | | | |
| -1.450 | 0.451 | 0.854 | 11.53 | 16.35 | | 1 | 13.03 | 9.48 | 20600 | 0 | | | | | |
| -1.725 | 0.686 | 0.857 | 16.58 | 20.61 | | 1 | 17.98 | 9.48 | 20600 | 0 | | | | | |
| -2.000 | 0.922 | 0.861 | 22.99 | 26.24 | | 1 | 22.93 | 9.48 | 20600 | 0 | | | | | |
| | | | | -150.84 | | 1 | 22.93 | 9.48 | 20600 | 0 | | | | 1 | -177.08 |
| -2.300 | 1.181 | 0.861 | -21.15 | -143.15 | | 1 | 28.34 | 9.48 | 20600 | 0 | | | | | |
| -2.600 | 1.438 | 0.852 | -62.74 | -133.84 | | 1 | 33.74 | 9.48 | 20600 | 0 | | | | | |
| -2.875 | 1.670 | 0.836 | -98.20 | -123.88 | | 1 | 38.69 | 9.48 | 20600 | 0 | | | | | |
| -3.150 | 1.897 | 0.813 | -130.74 | -112.56 | | 1 | 43.65 | 9.48 | 20600 | 0 | | | | | |
| -3.425 | 2.117 | 0.784 | -159.99 | -99.88 | | 1 | 48.60 | 9.48 | 20600 | 0 | | | | | |
| -3.700 | 2.328 | 0.750 | -185.55 | -85.83 | | 1 | 53.55 | 9.48 | 20600 | 0 | | | | | |
| -3.975 | 2.529 | 0.711 | -207.07 | -70.42 | | 1 | 58.51 | 9.48 | 20600 | 0 | | | | | |
| -4.250 | 2.719 | 0.668 | -224.16 | -53.65 | | 1 | 63.46 | 9.48 | 20600 | 0 | | | | | |
| -4.525 | 2.896 | 0.622 | -236.45 | -35.52 | | 1 | 68.41 | 9.48 | 20600 | 0 | | | | | |
| -4.800 | 3.061 | 0.575 | -243.57 | -16.02 | | 1 | 73.37 | 9.48 | 20600 | 0 | | | | | |
| -5.075 | 3.212 | 0.526 | -245.14 | 4.83 | | 1 | 78.32 | 9.48 | 20600 | 0 | | | | | |
| -5.350 | 3.350 | 0.478 | -240.79 | 27.05 | | 1 | 83.27 | 9.48 | 20600 | 0 | | | | | |
| -5.625 | 3.475 | 0.431 | -230.13 | 50.63 | | 1 | 88.23 | 9.48 | 20600 | 0 | | | | | |
| -5.900 | 3.587 | 0.387 | -212.81 | 75.58 | | 1 | 93.18 | 9.48 | 20600 | 0 | | | | | |
| -6.175 | 3.688 | 0.347 | -188.44 | 101.88 | | 1 | 98.13 | 9.48 | 20600 | 0 | | | | | |
| -6.450 | 3.779 | 0.313 | -156.65 | 129.55 | | 1 | 103.09 | 9.48 | 20600 | 0 | | | | | |
| -6.725 | 3.861 | 0.285 | -117.07 | 158.58 | | 1 | 108.04 | 9.48 | 20600 | 0 | | | | | |
| -7.000 | 3.936 | 0.267 | -69.31 | 188.97 | | 1 | 112.99 | 9.48 | 20600 | 0 | | | | | |
| -7.431 | 4.049 | 0.259 | 22.94 | 239.40 | 4.23 | 1 | 116.67 | 9.48 | 20600 | 0 | | | | | |
| -7.863 | 4.164 | 0.283 | 137.67 | 293.25 | 8.46 | 1 | 120.35 | 9.48 | 20600 | 0 | | | | | |
| -8.294 | 4.299 | 0.347 | 276.36 | 350.51 | 12.69 | 1 | 124.03 | 9.48 | 20600 | 0 | | | | | |
| -8.725 | 4.471 | 0.458 | 440.47 | 411.17 | 16.92 | 1 | 127.71 | 9.48 | 20600 | 0 | | | | | |
| -9.156 | 4.702 | 0.624 | 631.48 | 475.25 | 21.15 | 1 | 131.39 | 9.48 | 20600 | 0 | | | | | |
| -9.587 | 5.018 | 0.854 | 850.86 | 542.74 | 25.38 | 1 | 135.07 | 9.48 | 20600 | 0 | | | | | |
| -10.019 | 5.449 | 1.156 | 1100.09 | 613.64 | 29.61 | 1 | 138.75 | 9.48 | 20600 | 0 | | | | | |
| -10.450 | 6.027 | 1.541 | 1380.62 | 687.95 | 33.84 | 1 | 142.43 | 9.48 | 20600 | 0 | | | | | |
| | | | | -891.33 | 33.84 | 1 | 142.43 | 9.48 | 20600 | 0 | | | | 2 | -1579.28 |
| -10.950 | 6.909 | 1.962 | 957.37 | -800.90 | 38.75 | 1 | 146.69 | 9.48 | 20600 | 0 | | | | | |
| -11.200 | 7.420 | 2.117 | 762.99 | -753.97 | 41.20 | 1 | 148.83 | 9.48 | 20600 | 0 | | | | | |
| | | | | | 41.20 | 1 | 116.46 | 7.89 | 29000 | 0 | | | | | |
| -11.450 | 7.965 | 2.237 | 579.47 | -714.01 | 43.65 | 1 | 118.34 | 7.89 | 29000 | 0 | | | | | |
| -11.825 | 8.829 | 2.359 | 323.26 | -652.04 | 47.33 | 1 | 121.15 | 7.89 | 29000 | 0 | | | | | |
| -12.200 | 9.726 | 2.414 | 90.74 | -587.65 | 51.01 | 1 | 123.96 | 7.89 | 29000 | 0 | | | | | |
| -12.575 | 10.632 | 2.410 | -117.17 | -520.82 | 54.69 | 1 | 126.77 | 7.89 | 29000 | 0 | | | | | |
| -12.950 | 11.527 | 2.353 | -299.57 | -451.55 | 58.37 | 1 | 129.58 | 7.89 | 29000 | 0 | | | | | |
| -13.325 | 12.391 | 2.251 | -455.53 | -379.85 | 62.05 | 1 | 132.39 | 7.89 | 29000 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |





PHASE 7 (CONTINUATION)

| LEVEL | DISPLAC. | ROTATION | MOMENT | CR.FO. | SH LOAD | STATE | PRE. | SURCH. | ELAST. | STATE | PRE. | SURCH. | ELAST. | NB | LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.700 | 13.210 | 2.109 | -584.15 | -305.72 | 65.73 | 1 | 135.20 | 7.89 | 29000 | 0 | | | | | |
| -14.075 | 13.970 | 1.937 | -684.52 | -229.15 | 69.41 | 1 | 138.01 | 7.89 | 29000 | 0 | | | | | |
| -14.450 | 14.660 | 1.742 | -755.71 | -150.15 | 73.08 | 1 | 140.83 | 7.89 | 29000 | 0 | | | | | |
| -14.950 | 15.461 | 1.459 | -803.69 | -41.04 | 77.99 | 1 | 144.57 | 7.89 | 29000 | 0 | | | | | |
| -15.450 | 16.118 | 1.169 | -796.03 | 72.41 | 82.89 | 1 | 148.32 | 7.89 | 29000 | 0 | | | | | |
| -15.950 | 16.632 | 0.892 | -730.56 | 190.18 | 87.80 | 1 | 152.07 | 7.89 | 29000 | 0 | | | | | |
| -16.438 | 17.007 | 0.654 | -609.01 | 309.17 | 92.58 | 1 | 155.72 | 7.89 | 29000 | 0 | | | | | |
| -16.925 | 17.279 | 0.470 | -428.45 | 432.28 | 97.36 | 1 | 159.38 | 7.89 | 29000 | 0 | | | | | |
| -17.412 | 17.478 | 0.360 | -186.88 | 559.49 | 102.15 | 1 | 163.03 | 7.89 | 29000 | 0 | | | | | |
| -17.900 | 17.645 | 0.346 | 117.72 | 690.82 | 106.93 | 1 | 166.68 | 7.89 | 29000 | 0 | | | | | |
| | | | | | 106.93 | 1 | 209.17 | 9.48 | 20600 | 0 | | | | | |
| -18.375 | 17.829 | 0.447 | 481.85 | 843.04 | 111.59 | 1 | 213.22 | 9.48 | 20600 | 0 | | | | | |
| -18.850 | 18.092 | 0.685 | 919.26 | 999.39 | 116.25 | 1 | 217.27 | 9.48 | 20600 | 0 | | | | | |
| | | | | -780.12 | 116.25 | 1 | 217.27 | 9.48 | 20600 | 0 | | | | 4 | -1779.51 |
| -19.150 | 18.325 | 0.859 | 700.32 | -679.23 | 119.19 | 1 | 219.83 | 9.48 | 20600 | 0 | | | | | |
| -19.450 | 18.603 | 0.990 | 510.01 | -595.45 | -2.87 | 1 | 222.39 | 9.48 | 20600 | 0 | | | | | |
| | | | | | -2.87 | 1 | 222.39 | 9.48 | 20600 | 3 | 73.67 | | 20600 | | |
| -19.950 | 19.135 | 1.122 | 230.32 | -523.70 | -2.87 | 1 | 226.66 | 9.48 | 20600 | 3 | 82.63 | | 20600 | | |
| -20.409 | 19.662 | 1.161 | 4.49 | -459.84 | -2.87 | 1 | 230.58 | 9.48 | 20600 | 3 | 90.86 | | 20600 | | |
| -20.869 | 20.191 | 1.129 | -192.46 | -397.97 | -2.87 | 1 | 234.50 | 9.48 | 20600 | 3 | 99.09 | | 20600 | | |
| -21.328 | 20.690 | 1.036 | -361.44 | -338.07 | -2.87 | 1 | 238.42 | 9.48 | 20600 | 3 | 107.32 | | 20600 | | |
| -21.788 | 21.135 | 0.892 | -503.37 | -280.16 | -2.87 | 1 | 242.34 | 9.48 | 20600 | 3 | 115.56 | | 20600 | | |
| -22.247 | 21.503 | 0.705 | -619.14 | -224.23 | -2.87 | 1 | 246.25 | 9.48 | 20600 | 3 | 123.79 | | 20600 | | |
| -22.706 | 21.778 | 0.485 | -709.68 | -170.28 | -2.87 | 1 | 250.17 | 9.48 | 20600 | 3 | 132.02 | | 20600 | | |
| -23.166 | 21.944 | 0.238 | -775.89 | -118.31 | -2.87 | 1 | 254.09 | 9.48 | 20600 | 3 | 140.25 | | 20600 | | |
| -23.625 | 21.993 | -0.027 | -818.67 | -68.32 | -2.87 | 1 | 258.01 | 9.48 | 20600 | 3 | 148.48 | | 20600 | | |
| -24.084 | 21.918 | -0.302 | -838.95 | -20.31 | -2.87 | 1 | 261.93 | 9.48 | 20600 | 3 | 156.71 | | 20600 | | |
| -24.544 | 21.715 | -0.581 | -837.63 | 25.72 | -2.87 | 1 | 265.85 | 9.48 | 20600 | 3 | 164.95 | | 20600 | | |
| -25.003 | 21.385 | -0.855 | -815.63 | 69.77 | -2.87 | 1 | 269.77 | 9.48 | 20600 | 3 | 173.18 | | 20600 | | |
| -25.462 | 20.931 | -1.119 | -773.84 | 111.83 | -2.87 | 1 | 273.69 | 9.48 | 20600 | 3 | 181.41 | | 20600 | | |
| -25.922 | 20.359 | -1.366 | -713.18 | 151.92 | -2.87 | 1 | 277.61 | 9.48 | 20600 | 3 | 189.64 | | 20600 | | |
| -26.381 | 19.679 | -1.590 | -634.57 | 190.02 | -2.87 | 1 | 281.53 | 9.48 | 20600 | 3 | 197.87 | | 20600 | | |
| -26.841 | 18.903 | -1.785 | -538.90 | 226.15 | -2.87 | 1 | 285.45 | 9.48 | 20600 | 3 | 206.10 | | 20600 | | |
| -27.300 | 18.045 | -1.945 | -427.10 | 260.29 | -2.87 | 1 | 289.37 | 9.48 | 20600 | 3 | 214.33 | | 20600 | | |
| | | | | | -2.87 | 1 | 233.43 | 7.89 | 29000 | 3 | 275.39 | | 29000 | | |
| -27.684 | 17.277 | -2.050 | -330.52 | 241.85 | -2.87 | 1 | 236.32 | 7.89 | 29000 | 3 | 284.55 | | 29000 | | |
| -28.069 | 16.473 | -2.129 | -241.49 | 221.00 | -2.87 | 1 | 239.20 | 7.89 | 29000 | 3 | 293.71 | | 29000 | | |
| -28.453 | 15.643 | -2.185 | -160.93 | 197.74 | -2.87 | 1 | 242.08 | 7.89 | 29000 | 3 | 302.88 | | 29000 | | |
| -28.837 | 14.796 | -2.219 | -89.78 | 172.06 | -2.87 | 1 | 244.96 | 7.89 | 29000 | 3 | 312.04 | | 29000 | | |
| -29.222 | 13.939 | -2.235 | -28.97 | 143.97 | -2.87 | 1 | 247.84 | 7.89 | 29000 | 3 | 321.20 | | 29000 | | |
| -29.606 | 13.079 | -2.236 | 20.58 | 113.46 | -2.87 | 1 | 250.72 | 7.89 | 29000 | 3 | 330.36 | | 29000 | | |
| -29.991 | 12.222 | -2.225 | 57.94 | 80.54 | -2.87 | 1 | 253.60 | 7.89 | 29000 | 3 | 339.52 | | 29000 | | |
| -30.375 | 11.370 | -2.205 | 82.19 | 45.21 | -2.87 | 1 | 256.48 | 7.89 | 29000 | 3 | 348.69 | | 29000 | | |
| -30.759 | 10.527 | -2.181 | 92.63 | 9.36 | -2.87 | 1 | 259.36 | 7.89 | 29000 | 2 | 347.93 | | 29000 | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -31.144 | 9.694 | -2.155 | 90.10 | -20.87 | -2.87 | 1 | 262.24 | 7.89 | 29000 | 2 | 325.27 | | 29000 | | | | | | | |
| -31.528 | 8.870 | -2.132 | 77.84 | -41.34 | -2.87 | 1 | 265.13 | 7.89 | 29000 | 2 | 302.89 | | 29000 | | | | | | | |
| -31.913 | 8.054 | -2.113 | 59.56 | -52.15 | -2.87 | 1 | 268.01 | 7.89 | 29000 | 2 | 280.74 | | 29000 | | | | | | | |
| -32.297 | 7.245 | -2.099 | 38.97 | -53.37 | -2.87 | 1 | 270.89 | 7.89 | 29000 | 2 | 258.78 | | 29000 | | | | | | | |
| -32.681 | 6.440 | -2.091 | 19.75 | -45.07 | -2.87 | 1 | 273.77 | 7.89 | 29000 | 2 | 236.94 | | 29000 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | | | | |





PHASE 7 (CONTINUATION)

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.066 | 5.637 | -2.087 | 5.54 | -27.27 | -2.87 | 1 | 276.65 | 7.89 | 29000 | 2 | 215.16 | | 29000 | | | | | | | |
| -33.450 | 4.835 | -2.087 | 0.00 | 0.00 | -2.87 | 1 | 279.53 | 7.89 | 29000 | 2 | 193.40 | | 29000 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | | | | |

MAXIMUM DISPLACEMENT = 21.99 mm

MAXIMUM MOMENT = 1380.62 kN.m/m

CODIFICATION OF STATE OF SOIL :
-1 = SEPARATION
0 = EXCAVATION
1 = ACTIVE PR.
2 = ELASTIC
3 = PASSIVE PR.

( 5 IT.)

INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 1 = 290.74 kN/m
INTEGRATED HORIZONTAL EFFECT OF SURCHARGES ON THE SOIL 2 = 0.00 kN/m

(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 1 = 0.296 = (5784.90 kN/m)/(19557.64 kN/m) WITHOUT INTEREST
(MOBILIZED PRESSURE)/(PASSIVE PRESSURE) RATIO FOR SOIL NB 2 = 0.901 = (2950.46 kN/m)/(3274.84 kN/m)

*** END OF CALCULUS





* ENVELOPE CURVES FROM PHASE 1 TO PHASE 6 *

| LEVEL | MINI CRO.FO | MAXI CRO.FO | LEVEL | MINI MOMENT | MAXI MOMENT |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 4.03 | -0.450 | 0.00 | 0.86 |
| -0.900 | 0.00 | 9.24 | -0.900 | 0.00 | 3.80 |
| -1.175 | 0.00 | 11.60 | -1.175 | 0.00 | 6.68 |
| -1.450 | 0.00 | 13.53 | -1.450 | 0.00 | 10.14 |
| -1.725 | 0.00 | 15.02 | -1.725 | 0.00 | 14.08 |
| -2.000 | 0.00 | 16.06 | -2.000 | 0.00 | 18.36 |
| | -55.12 | 4.64 | | 0.00 | 18.36 |
| -2.300 | -54.50 | 6.10 | -2.300 | 0.00 | 7.66 |
| -2.600 | -54.32 | 8.46 | -2.600 | -14.38 | 9.48 |
| -2.875 | -54.32 | 6.41 | -2.875 | -29.32 | 11.52 |
| -3.150 | -54.32 | 4.56 | -3.150 | -44.25 | 13.03 |
| -3.425 | -54.32 | 7.30 | -3.425 | -59.19 | 14.05 |
| -3.700 | -54.32 | 10.48 | -3.700 | -74.13 | 14.64 |
| -3.975 | -54.29 | 15.22 | -3.975 | -89.06 | 16.16 |
| -4.250 | -54.05 | 21.86 | -4.250 | -103.97 | 21.23 |
| -4.525 | -53.43 | 29.61 | -4.525 | -118.76 | 28.28 |
| -4.800 | -52.42 | 38.43 | -4.800 | -133.32 | 37.61 |
| -5.075 | -51.03 | 48.26 | -5.075 | -147.55 | 49.51 |
| -5.350 | -49.25 | 59.05 | -5.350 | -161.35 | 64.25 |
| -5.625 | -47.08 | 70.73 | -5.625 | -174.61 | 82.07 |
| -5.900 | -44.54 | 83.23 | -5.900 | -187.21 | 103.22 |
| -6.175 | -41.60 | 96.46 | -6.175 | -199.06 | 127.92 |
| -6.450 | -38.28 | 110.33 | -6.450 | -210.06 | 156.34 |
| -6.725 | -34.58 | 124.74 | -6.725 | -220.08 | 188.65 |
| -7.000 | -30.49 | 139.55 | -7.000 | -229.04 | 224.98 |
| -7.431 | -22.64 | 163.91 | -7.431 | -240.57 | 290.35 |
| -7.863 | -12.51 | 189.69 | -7.863 | -248.23 | 366.56 |
| -8.294 | -2.82 | 216.19 | -8.294 | -251.04 | 454.06 |
| -8.725 | -1.73 | 242.64 | -8.725 | -248.01 | 553.01 |
| -9.156 | -0.41 | 268.13 | -9.156 | -238.16 | 663.20 |
| -9.587 | 0.00 | 291.98 | -9.587 | -220.51 | 784.04 |
| -10.019 | 0.00 | 314.75 | -10.019 | -194.08 | 914.87 |
| -10.450 | 0.00 | 338.51 | -10.450 | -157.90 | 1055.65 |
| | -563.71 | 95.97 | | -157.90 | 1055.65 |
| -10.950 | -533.31 | 126.37 | -10.950 | -102.44 | 781.27 |
| -11.200 | -516.97 | 124.08 | -11.200 | -71.15 | 649.97 |
| -11.450 | -502.29 | 112.56 | -11.450 | -41.58 | 522.55 |
| -11.825 | -478.87 | 96.52 | -11.825 | -50.75 | 376.76 |
| -12.200 | -453.75 | 81.69 | -12.200 | -118.38 | 342.93 |
| -12.575 | -426.94 | 68.04 | -12.575 | -176.27 | 318.85 |
| -12.950 | -398.43 | 55.52 | -12.950 | -223.78 | 305.13 |
| -13.325 | -368.23 | 44.06 | -13.325 | -300.18 | 302.42 |
| -13.700 | -336.34 | 39.91 | -13.700 | -432.34 | 311.35 |
| -14.075 | -302.75 | 73.49 | -14.075 | -552.22 | 332.56 |
| -14.450 | -267.47 | 108.77 | -14.450 | -659.19 | 366.68 |
| | -552.50 | 18.64 | | -659.19 | 366.68 |





| | | | | | |
|---|---|---|---|---|---|
| -14.950 | -502.82 | 68.31 | -14.950 | -780.63 | 137.94 |
| -15.450 | -450.14 | 121.00 | -15.450 | -876.49 | 137.20 |
| -15.950 | -394.44 | 118.24 | -15.950 | -945.24 | 131.31 |
| -16.438 | -337.24 | 103.78 | -16.438 | -984.76 | 120.67 |
| -16.925 | -277.18 | 81.16 | -16.925 | -995.69 | 105.08 |
| -17.412 | -214.25 | 113.55 | -17.412 | -976.64 | 84.29 |
| -17.900 | -148.46 | 179.34 | -17.900 | -926.21 | 57.95 |

| | | | | | |
|---|---|---|---|---|---|
| -18.375 | -75.98 | 251.82 | -18.375 | -937.10 | 31.79 |
| -18.850 | -41.38 | 327.06 | -18.850 | -955.43 | 10.08 |
| | -143.18 | 109.58 | | -955.43 | 10.08 |
| -19.150 | -94.03 | 159.70 | -19.150 | -948.34 | 0.00 |
| -19.450 | -43.10 | 193.92 | -19.450 | -926.41 | 0.00 |
| -19.950 | -25.03 | 190.18 | -19.950 | -866.51 | 0.00 |
| -20.409 | -19.85 | 185.99 | -20.409 | -795.75 | 0.00 |
| -20.869 | -15.52 | 190.58 | -20.869 | -713.20 | 0.00 |
| -21.328 | -11.93 | 207.37 | -21.328 | -621.57 | 0.00 |
| -21.788 | -8.95 | 218.23 | -21.788 | -523.59 | 0.00 |
| -22.247 | -7.41 | 223.16 | -22.247 | -421.97 | 0.00 |
| -22.706 | -7.04 | 222.16 | -22.706 | -319.46 | 0.00 |
| -23.166 | -6.06 | 215.22 | -23.166 | -218.78 | 35.64 |
| -23.625 | -4.43 | 202.35 | -23.625 | -122.64 | 105.40 |
| -24.084 | -2.12 | 183.54 | -24.084 | -62.51 | 167.89 |
| -24.544 | 0.00 | 158.81 | -24.544 | -60.67 | 220.82 |
| -25.003 | 0.00 | 128.44 | -25.003 | -57.38 | 261.70 |
| -25.462 | 0.00 | 98.73 | -25.462 | -52.33 | 288.89 |
| -25.922 | 0.00 | 75.55 | -25.922 | -45.11 | 304.25 |
| -26.381 | 0.00 | 58.62 | -26.381 | -35.28 | 310.31 |
| -26.841 | -8.36 | 47.63 | -26.841 | -22.31 | 309.31 |
| -27.300 | -17.37 | 43.68 | -27.300 | -5.63 | 303.26 |
| -27.684 | -33.23 | 30.41 | -27.684 | 0.00 | 293.42 |
| -28.069 | -45.83 | 21.35 | -28.069 | 0.00 | 288.39 |
| -28.453 | -55.51 | 13.55 | -28.453 | 0.00 | 279.58 |
| -28.837 | -62.56 | 6.96 | -28.837 | 0.00 | 263.79 |
| -29.222 | -67.26 | 1.52 | -29.222 | 0.00 | 242.57 |
| -29.606 | -69.76 | 0.00 | -29.606 | 0.00 | 217.37 |
| -29.991 | -74.85 | 0.00 | -29.991 | 0.00 | 189.51 |
| -30.375 | -77.03 | 0.00 | -30.375 | 0.00 | 160.22 |
| -30.759 | -76.34 | 0.00 | -30.759 | 0.00 | 130.66 |
| -31.144 | -72.95 | 0.00 | -31.144 | 0.00 | 101.88 |
| -31.528 | -66.99 | 0.00 | -31.528 | 0.00 | 74.91 |
| -31.913 | -58.57 | 0.00 | -31.913 | 0.00 | 50.70 |
| -32.297 | -47.77 | 0.00 | -32.297 | 0.00 | 30.18 |
| -32.681 | -34.63 | 0.00 | -32.681 | 0.00 | 14.27 |
| -33.066 | -19.19 | 0.00 | -33.066 | 0.00 | 3.85 |
| -33.450 | 0.00 | 0.00 | -33.450 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



*** MAXIMUM DISPLACEMENT IN PHASE Nb  7 =  21.993 mm  IN FINAL PHASE Nb  7 =  21.993 mm

*** MAXIMUM MOMENT  IN PHASE Nb  7 =  1380.619 kN.m/m  IN FINAL PHASE Nb  7 =  1380.619 kN.m/m

| STRUT/ANCHOR | | PRELOAD | | MAXIMUM | | FINAL STATE | |
|---|---|---|---|---|---|---|---|
| NUMBER | LEVEL | PHASE | FORCE | PHASE | FORCE | PHASE | FORCE |
| 1 | -2.00 | 2 | 0.00 | 7 | -177.08 | 7 | -177.08 |
| 2 | -10.45 | 3 | 0.00 | 7 | -1579.28 | 7 | -1579.28 |
| 3 | -14.45 | 4 | 0.00 | 4 | -661.27 | 5 | REMOVED |
| 4 | -18.85 | 5 | 0.00 | 7 | -1779.51 | 7 | -1779.51 |
| | m | | kN | | kN | | kN |



* ENVELOPE CURVES FROM PHASE  7 TO PHASE  7 *

| LEVEL | MINI CRO.FO | MAXI CRO.FO | LEVEL | MINI MOMENT | MAXI MOMENT |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 4.56 | -0.450 | 0.00 | 0.99 |
| -0.900 | 0.00 | 10.16 | -0.900 | 0.00 | 4.26 |
| -1.175 | 0.00 | 13.20 | -1.175 | 0.00 | 7.49 |
| -1.450 | 0.00 | 16.35 | -1.450 | 0.00 | 11.53 |
| -1.725 | 0.00 | 20.61 | -1.725 | 0.00 | 16.58 |
| -2.000 | 0.00 | 26.24 | -2.000 | 0.00 | 22.99 |
| | -150.84 | 0.00 | | 0.00 | 22.99 |
| -2.300 | -143.15 | 0.00 | -2.300 | -21.15 | 0.00 |
| -2.600 | -133.84 | 0.00 | -2.600 | -62.74 | 0.00 |
| -2.875 | -123.88 | 0.00 | -2.875 | -98.20 | 0.00 |
| -3.150 | -112.56 | 0.00 | -3.150 | -130.74 | 0.00 |
| -3.425 | -99.88 | 0.00 | -3.425 | -159.99 | 0.00 |
| -3.700 | -85.83 | 0.00 | -3.700 | -185.55 | 0.00 |
| -3.975 | -70.42 | 0.00 | -3.975 | -207.07 | 0.00 |
| -4.250 | -53.65 | 0.00 | -4.250 | -224.16 | 0.00 |
| -4.525 | -35.52 | 0.00 | -4.525 | -236.45 | 0.00 |
| -4.800 | -16.02 | 0.00 | -4.800 | -243.57 | 0.00 |
| -5.075 | 0.00 | 4.83 | -5.075 | -245.14 | 0.00 |
| -5.350 | 0.00 | 27.05 | -5.350 | -240.79 | 0.00 |
| -5.625 | 0.00 | 50.63 | -5.625 | -230.13 | 0.00 |
| -5.900 | 0.00 | 75.58 | -5.900 | -212.81 | 0.00 |
| -6.175 | 0.00 | 101.88 | -6.175 | -188.44 | 0.00 |
| -6.450 | 0.00 | 129.55 | -6.450 | -156.65 | 0.00 |
| -6.725 | 0.00 | 158.58 | -6.725 | -117.07 | 0.00 |
| -7.000 | 0.00 | 188.97 | -7.000 | -69.31 | 0.00 |
| -7.431 | 0.00 | 239.40 | -7.431 | 0.00 | 22.94 |
| -7.863 | 0.00 | 293.25 | -7.863 | 0.00 | 137.67 |
| -8.294 | 0.00 | 350.51 | -8.294 | 0.00 | 276.36 |
| -8.725 | 0.00 | 411.17 | -8.725 | 0.00 | 440.47 |
| -9.156 | 0.00 | 475.25 | -9.156 | 0.00 | 631.48 |
| -9.587 | 0.00 | 542.74 | -9.587 | 0.00 | 850.86 |

| | | | | | |
|---|---|---|---|---|---|
| -10.019 | 0.00 | 613.64 | -10.019 | 0.00 | 1100.09 |
| -10.450 | 0.00 | 687.95 | -10.450 | 0.00 | 1380.62 |
| | -891.33 | 0.00 | | 0.00 | 1380.62 |
| -10.950 | -800.90 | 0.00 | -10.950 | 0.00 | 957.37 |
| -11.200 | -753.97 | 0.00 | -11.200 | 0.00 | 762.99 |
| -11.450 | -714.01 | 0.00 | -11.450 | 0.00 | 579.47 |
| -11.825 | -652.04 | 0.00 | -11.825 | 0.00 | 323.26 |
| -12.200 | -587.65 | 0.00 | -12.200 | 0.00 | 90.74 |
| -12.575 | -520.82 | 0.00 | -12.575 | -117.17 | 0.00 |
| -12.950 | -451.55 | 0.00 | -12.950 | -299.57 | 0.00 |
| -13.325 | -379.85 | 0.00 | -13.325 | -455.53 | 0.00 |
| -13.700 | -305.72 | 0.00 | -13.700 | -584.15 | 0.00 |
| -14.075 | -229.15 | 0.00 | -14.075 | -684.52 | 0.00 |
| -14.450 | -150.15 | 0.00 | -14.450 | -755.71 | 0.00 |
| -14.950 | -41.04 | 0.00 | -14.950 | -803.69 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -15.450 | 0.00 | 72.41 | -15.450 | -796.03 | 0.00 |
| -15.950 | 0.00 | 190.18 | -15.950 | -730.56 | 0.00 |
| -16.438 | 0.00 | 309.17 | -16.438 | -609.01 | 0.00 |
| -16.925 | 0.00 | 432.28 | -16.925 | -428.45 | 0.00 |
| -17.412 | 0.00 | 559.49 | -17.412 | -186.88 | 0.00 |
| -17.900 | 0.00 | 690.82 | -17.900 | 0.00 | 117.72 |
| -18.375 | 0.00 | 843.04 | -18.375 | 0.00 | 481.85 |
| -18.850 | 0.00 | 999.39 | -18.850 | 0.00 | 919.26 |
| | -780.12 | 0.00 | | 0.00 | 919.26 |
| -19.150 | -679.23 | 0.00 | -19.150 | 0.00 | 700.32 |
| -19.450 | -595.45 | 0.00 | -19.450 | 0.00 | 510.01 |
| -19.950 | -523.70 | 0.00 | -19.950 | 0.00 | 230.32 |
| -20.409 | -459.84 | 0.00 | -20.409 | 0.00 | 4.49 |
| -20.869 | -397.97 | 0.00 | -20.869 | -192.46 | 0.00 |
| -21.328 | -338.07 | 0.00 | -21.328 | -361.44 | 0.00 |
| -21.788 | -280.16 | 0.00 | -21.788 | -503.37 | 0.00 |
| -22.247 | -224.23 | 0.00 | -22.247 | -619.14 | 0.00 |
| -22.706 | -170.28 | 0.00 | -22.706 | -709.68 | 0.00 |
| -23.166 | -118.31 | 0.00 | -23.166 | -775.89 | 0.00 |
| -23.625 | -68.32 | 0.00 | -23.625 | -818.67 | 0.00 |
| -24.084 | -20.31 | 0.00 | -24.084 | -838.95 | 0.00 |
| -24.544 | 0.00 | 25.72 | -24.544 | -837.63 | 0.00 |
| -25.003 | 0.00 | 69.77 | -25.003 | -815.63 | 0.00 |
| -25.462 | 0.00 | 111.83 | -25.462 | -773.84 | 0.00 |
| -25.922 | 0.00 | 151.92 | -25.922 | -713.18 | 0.00 |
| -26.381 | 0.00 | 190.02 | -26.381 | -634.57 | 0.00 |
| -26.841 | 0.00 | 226.15 | -26.841 | -538.90 | 0.00 |
| -27.300 | 0.00 | 260.29 | -27.300 | -427.10 | 0.00 |
| -27.684 | 0.00 | 241.85 | -27.684 | -330.52 | 0.00 |
| -28.069 | 0.00 | 221.00 | -28.069 | -241.49 | 0.00 |
| -28.453 | 0.00 | 197.74 | -28.453 | -160.93 | 0.00 |
| -28.837 | 0.00 | 172.06 | -28.837 | -89.78 | 0.00 |
| -29.222 | 0.00 | 143.97 | -29.222 | -28.97 | 0.00 |
| -29.606 | 0.00 | 113.46 | -29.606 | 0.00 | 20.58 |
| -29.991 | 0.00 | 80.54 | -29.991 | 0.00 | 57.94 |
| -30.375 | 0.00 | 45.21 | -30.375 | 0.00 | 82.19 |
| -30.759 | 0.00 | 9.36 | -30.759 | 0.00 | 92.63 |
| -31.144 | -20.87 | 0.00 | -31.144 | 0.00 | 90.10 |
| -31.528 | -41.34 | 0.00 | -31.528 | 0.00 | 77.84 |
| -31.913 | -52.15 | 0.00 | -31.913 | 0.00 | 59.56 |
| -32.297 | -53.37 | 0.00 | -32.297 | 0.00 | 38.97 |
| -32.681 | -45.07 | 0.00 | -32.681 | 0.00 | 19.75 |
| -33.066 | -27.27 | 0.00 | -33.066 | 0.00 | 5.54 |
| -33.450 | 0.00 | 0.00 | -33.450 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* ENVELOPE CURVES FROM PHASE  1 TO PHASE  7 *

| LEVEL | MINI CRO.FO | MAXI CRO.FO | LEVEL | MINI MOMENT | MAXI MOMENT |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.450 | 0.00 | 4.56 | -0.450 | 0.00 | 0.99 |
| -0.900 | 0.00 | 10.16 | -0.900 | 0.00 | 4.26 |
| -1.175 | 0.00 | 13.20 | -1.175 | 0.00 | 7.49 |
| -1.450 | 0.00 | 16.35 | -1.450 | 0.00 | 11.53 |
| -1.725 | 0.00 | 20.61 | -1.725 | 0.00 | 16.58 |
| -2.000 | 0.00 | 26.24 | -2.000 | 0.00 | 22.99 |
| | -150.84 | 4.64 | | 0.00 | 22.99 |
| -2.300 | -143.15 | 6.10 | -2.300 | -21.15 | 7.66 |
| -2.600 | -133.84 | 8.46 | -2.600 | -62.74 | 9.48 |
| -2.875 | -123.88 | 6.41 | -2.875 | -98.20 | 11.52 |
| -3.150 | -112.56 | 4.56 | -3.150 | -130.74 | 13.03 |
| -3.425 | -99.88 | 7.30 | -3.425 | -159.99 | 14.05 |
| -3.700 | -85.83 | 10.48 | -3.700 | -185.55 | 14.64 |
| -3.975 | -70.42 | 15.22 | -3.975 | -207.07 | 16.16 |
| -4.250 | -54.05 | 21.86 | -4.250 | -224.16 | 21.23 |
| -4.525 | -53.43 | 29.61 | -4.525 | -236.45 | 28.28 |
| -4.800 | -52.42 | 38.43 | -4.800 | -243.57 | 37.61 |
| -5.075 | -51.03 | 48.26 | -5.075 | -245.14 | 49.51 |
| -5.350 | -49.25 | 59.05 | -5.350 | -240.79 | 64.25 |
| -5.625 | -47.08 | 70.73 | -5.625 | -230.13 | 82.07 |
| -5.900 | -44.54 | 83.23 | -5.900 | -212.81 | 103.22 |
| -6.175 | -41.60 | 101.88 | -6.175 | -199.06 | 127.92 |
| -6.450 | -38.28 | 129.55 | -6.450 | -210.06 | 156.34 |
| -6.725 | -34.58 | 158.58 | -6.725 | -220.08 | 188.65 |
| -7.000 | -30.49 | 188.97 | -7.000 | -229.04 | 224.98 |
| -7.431 | -22.64 | 239.40 | -7.431 | -240.57 | 290.35 |
| -7.863 | -12.51 | 293.25 | -7.863 | -248.23 | 366.56 |
| -8.294 | -2.82 | 350.51 | -8.294 | -251.04 | 454.06 |
| -8.725 | -1.73 | 411.17 | -8.725 | -248.01 | 553.01 |

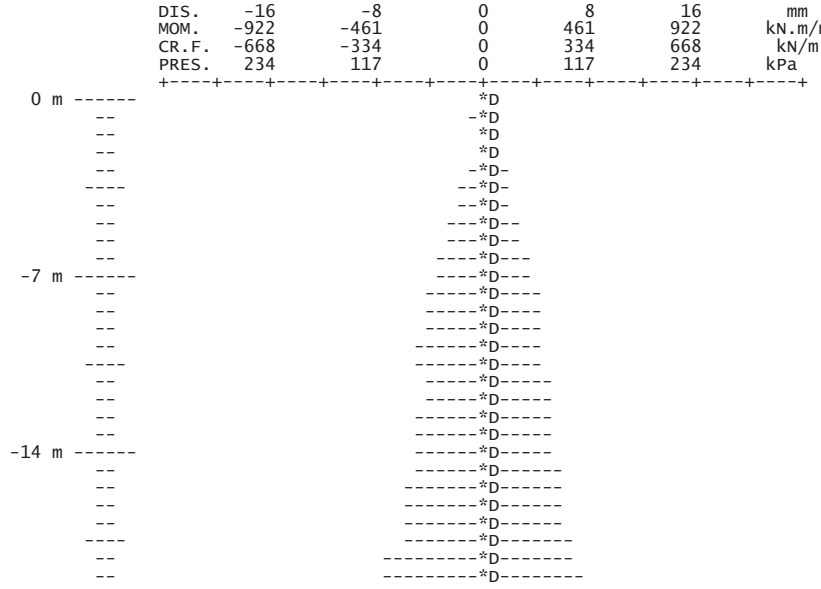
| | | | | | |
|---|---|---|---|---|---|
| -9.156 | -0.41 | 475.25 | -9.156 | -238.16 | 663.20 |
| -9.587 | 0.00 | 542.74 | -9.587 | -220.51 | 850.86 |
| -10.019 | 0.00 | 613.64 | -10.019 | -194.08 | 1100.09 |
| -10.450 | 0.00 | 687.95 | -10.450 | -157.90 | 1380.62 |
| | -891.33 | 95.97 | | -157.90 | 1380.62 |
| -10.950 | -800.90 | 126.37 | -10.950 | -102.44 | 957.37 |
| -11.200 | -753.97 | 124.08 | -11.200 | -71.15 | 762.99 |
| -11.450 | -714.01 | 112.56 | -11.450 | -41.58 | 579.47 |
| -11.825 | -652.04 | 96.52 | -11.825 | -50.75 | 376.76 |
| -12.200 | -587.65 | 81.69 | -12.200 | -118.38 | 342.93 |
| -12.575 | -520.82 | 68.04 | -12.575 | -176.27 | 318.85 |
| -12.950 | -451.55 | 55.52 | -12.950 | -299.57 | 305.13 |
| -13.325 | -379.85 | 44.06 | -13.325 | -455.53 | 302.42 |
| -13.700 | -336.34 | 39.91 | -13.700 | -584.15 | 311.35 |
| -14.075 | -302.75 | 73.49 | -14.075 | -684.52 | 332.56 |
| -14.450 | -267.47 | 108.77 | -14.450 | -755.71 | 366.68 |
| | -552.50 | 18.64 | | -755.71 | 366.68 |

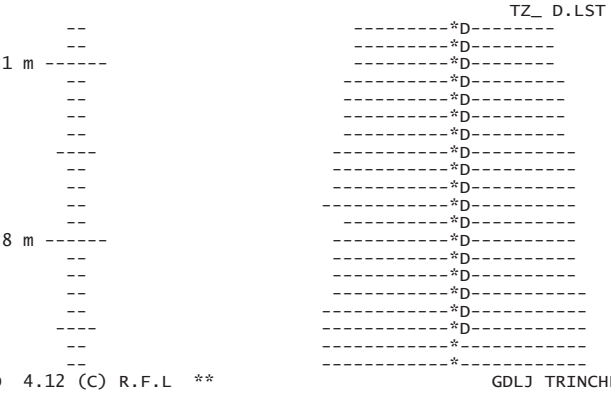


| | | | | | |
|---|---|---|---|---|---|
| -14.950 | -502.82 | 68.31 | -14.950 | -803.69 | 137.94 |
| -15.450 | -450.14 | 121.00 | -15.450 | -876.49 | 137.20 |
| -15.950 | -394.44 | 190.18 | -15.950 | -945.24 | 131.31 |
| -16.438 | -337.24 | 309.17 | -16.438 | -984.76 | 120.67 |
| -16.925 | -277.18 | 432.28 | -16.925 | -995.69 | 105.08 |
| -17.412 | -214.25 | 559.49 | -17.412 | -976.64 | 84.29 |
| -17.900 | -148.46 | 690.82 | -17.900 | -926.21 | 117.72 |
| -18.375 | -75.98 | 843.04 | -18.375 | -937.10 | 481.85 |
| -18.850 | -41.38 | 999.39 | -18.850 | -955.43 | 919.26 |
| | -780.12 | 109.58 | | -955.43 | 919.26 |
| -19.150 | -679.23 | 159.70 | -19.150 | -948.34 | 700.32 |
| -19.450 | -595.45 | 193.92 | -19.450 | -926.41 | 510.01 |
| -19.950 | -523.70 | 190.18 | -19.950 | -866.51 | 230.32 |
| -20.409 | -459.84 | 185.99 | -20.409 | -795.75 | 4.49 |
| -20.869 | -397.97 | 190.58 | -20.869 | -713.20 | 0.00 |
| -21.328 | -338.07 | 207.37 | -21.328 | -621.57 | 0.00 |
| -21.788 | -280.16 | 218.23 | -21.788 | -523.59 | 0.00 |
| -22.247 | -224.23 | 223.16 | -22.247 | -619.14 | 0.00 |
| -22.706 | -170.28 | 222.16 | -22.706 | -709.68 | 0.00 |
| -23.166 | -118.31 | 215.22 | -23.166 | -775.89 | 35.64 |
| -23.625 | -68.32 | 202.35 | -23.625 | -818.67 | 105.40 |
| -24.084 | -20.31 | 183.54 | -24.084 | -838.95 | 167.89 |
| -24.544 | 0.00 | 158.81 | -24.544 | -837.63 | 220.82 |
| -25.003 | 0.00 | 128.44 | -25.003 | -815.63 | 261.70 |
| -25.462 | 0.00 | 111.83 | -25.462 | -773.84 | 288.89 |
| -25.922 | 0.00 | 151.92 | -25.922 | -713.18 | 304.25 |
| -26.381 | 0.00 | 190.02 | -26.381 | -634.57 | 310.31 |
| -26.841 | -8.36 | 226.15 | -26.841 | -538.90 | 309.31 |
| -27.300 | -17.37 | 260.29 | -27.300 | -427.10 | 303.26 |
| -27.684 | -33.23 | 241.85 | -27.684 | -330.52 | 293.42 |
| -28.069 | -45.83 | 221.00 | -28.069 | -241.49 | 288.39 |
| -28.453 | -55.51 | 197.74 | -28.453 | -160.93 | 279.58 |
| -28.837 | -62.56 | 172.06 | -28.837 | -89.78 | 263.79 |
| -29.222 | -67.26 | 143.97 | -29.222 | -28.97 | 242.57 |
| -29.606 | -69.76 | 113.46 | -29.606 | 0.00 | 217.37 |
| -29.991 | -74.85 | 80.54 | -29.991 | 0.00 | 189.51 |
| -30.375 | -77.03 | 45.21 | -30.375 | 0.00 | 160.22 |
| -30.759 | -76.34 | 9.36 | -30.759 | 0.00 | 130.66 |
| -31.144 | -72.95 | 0.00 | -31.144 | 0.00 | 101.88 |
| -31.528 | -66.99 | 0.00 | -31.528 | 0.00 | 77.84 |
| -31.913 | -58.57 | 0.00 | -31.913 | 0.00 | 59.56 |
| -32.297 | -53.37 | 0.00 | -32.297 | 0.00 | 38.97 |
| -32.681 | -45.07 | 0.00 | -32.681 | 0.00 | 19.75 |
| -33.066 | -27.27 | 0.00 | -33.066 | 0.00 | 5.54 |
| -33.450 | 0.00 | 0.00 | -33.450 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



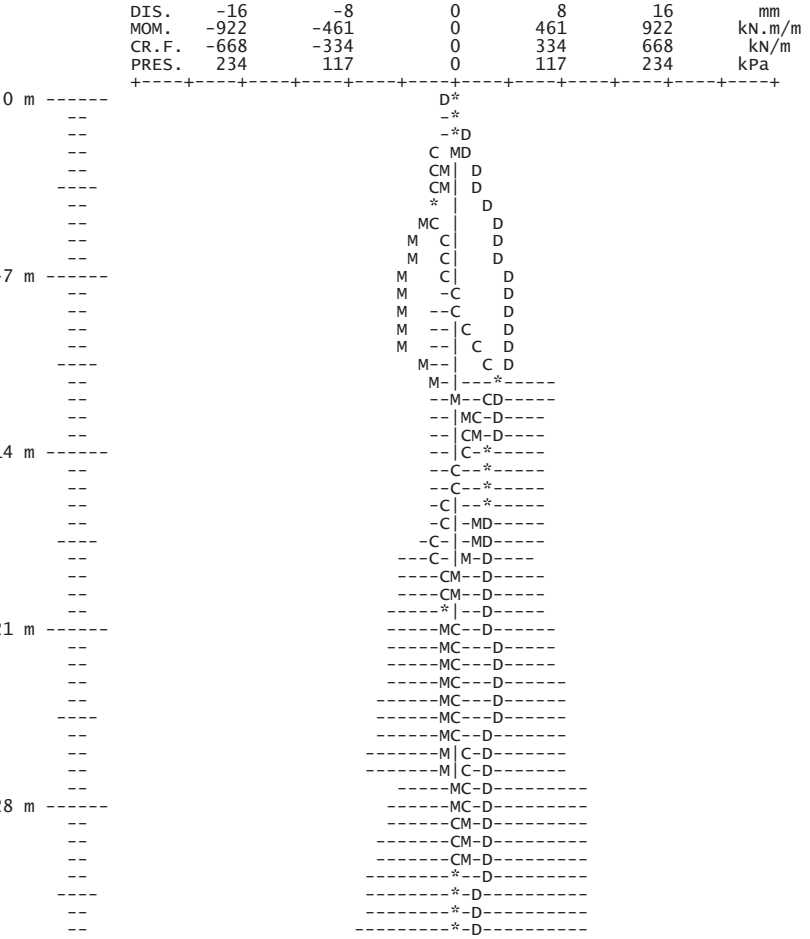
* CURVES TO PHASE Nb  1 *





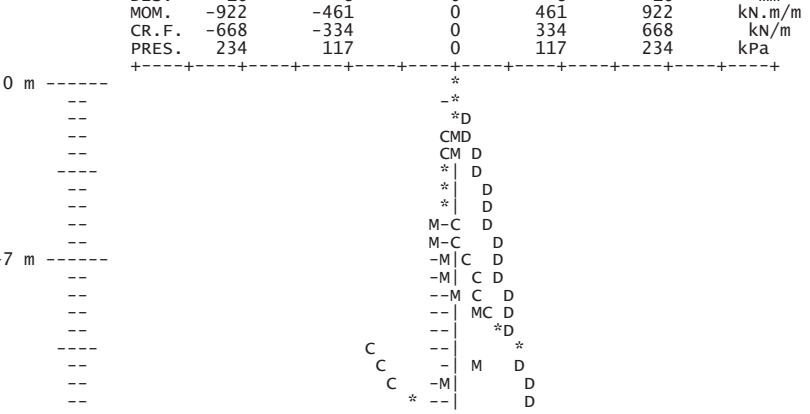


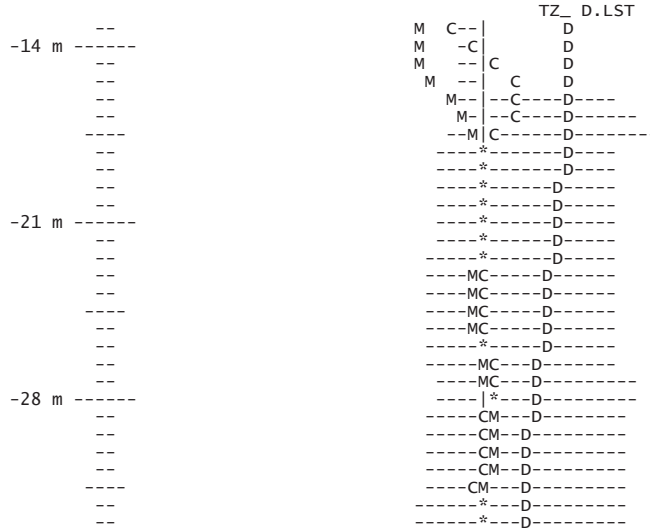
* CURVES TO PHASE Nb  2 *





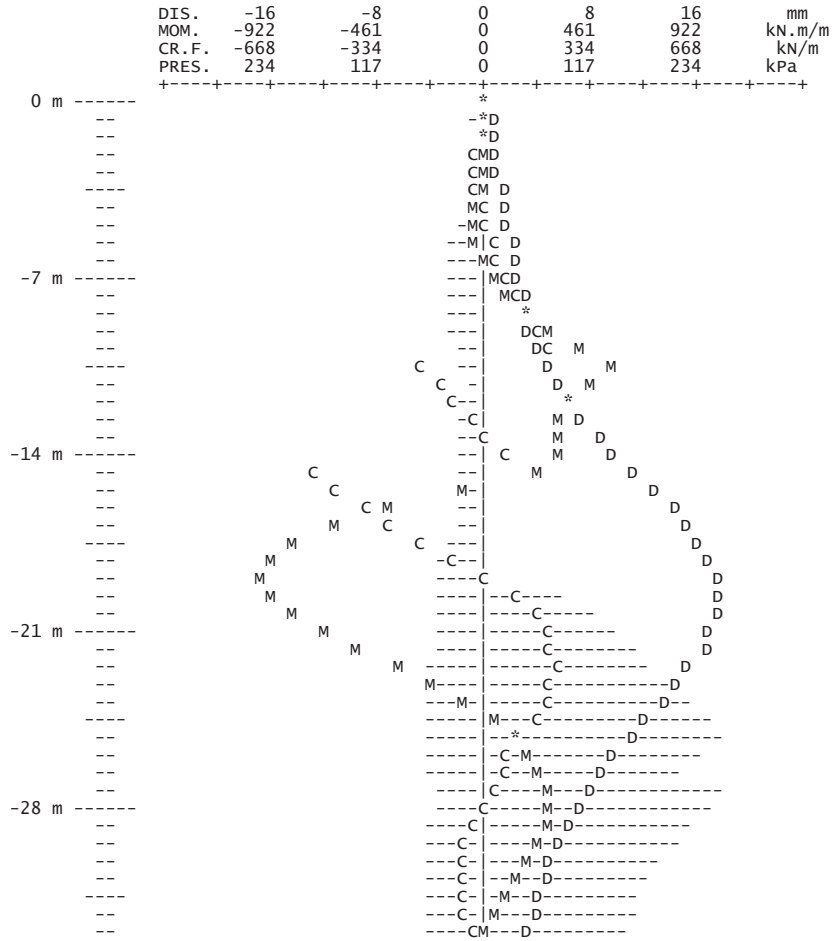

* CURVES TO PHASE Nb  3 *





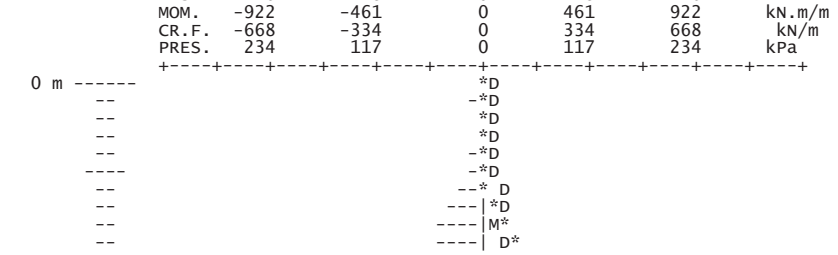


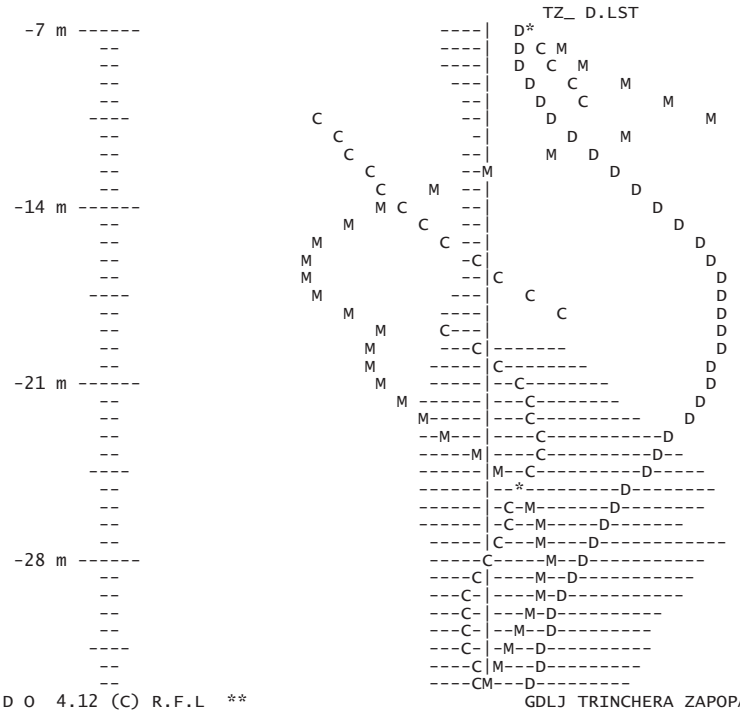
* CURVES TO PHASE Nb  4 *





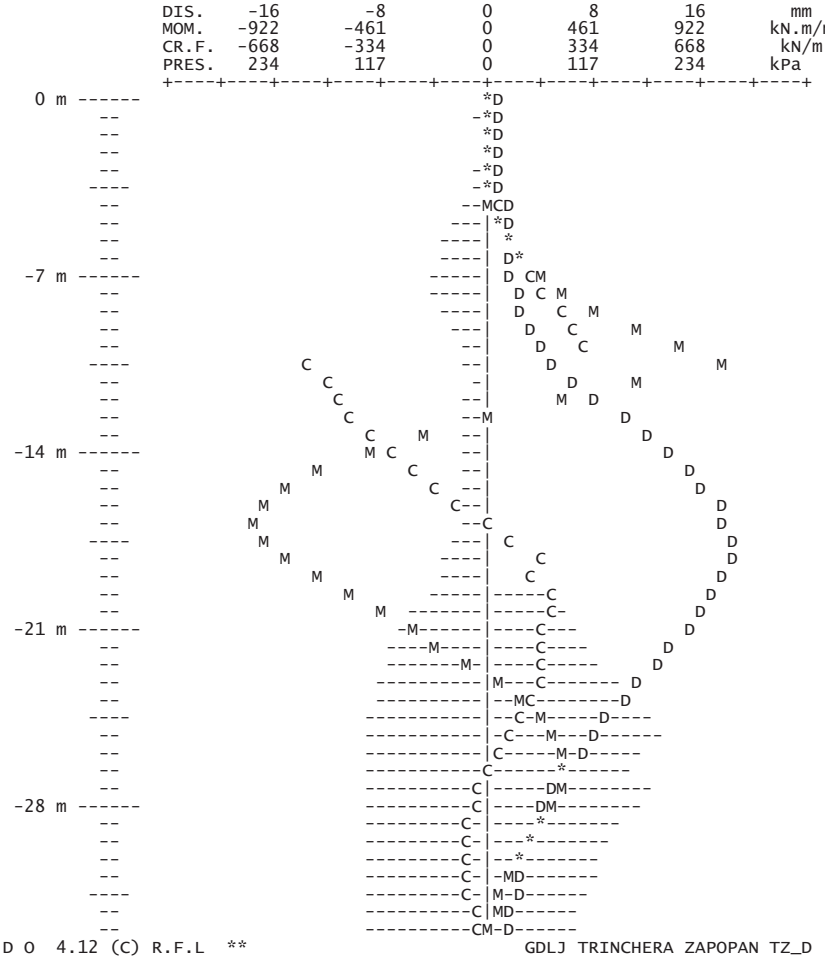

* CURVES TO PHASE Nb  5 *





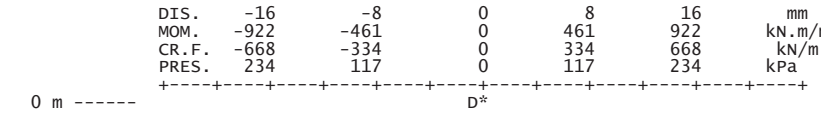


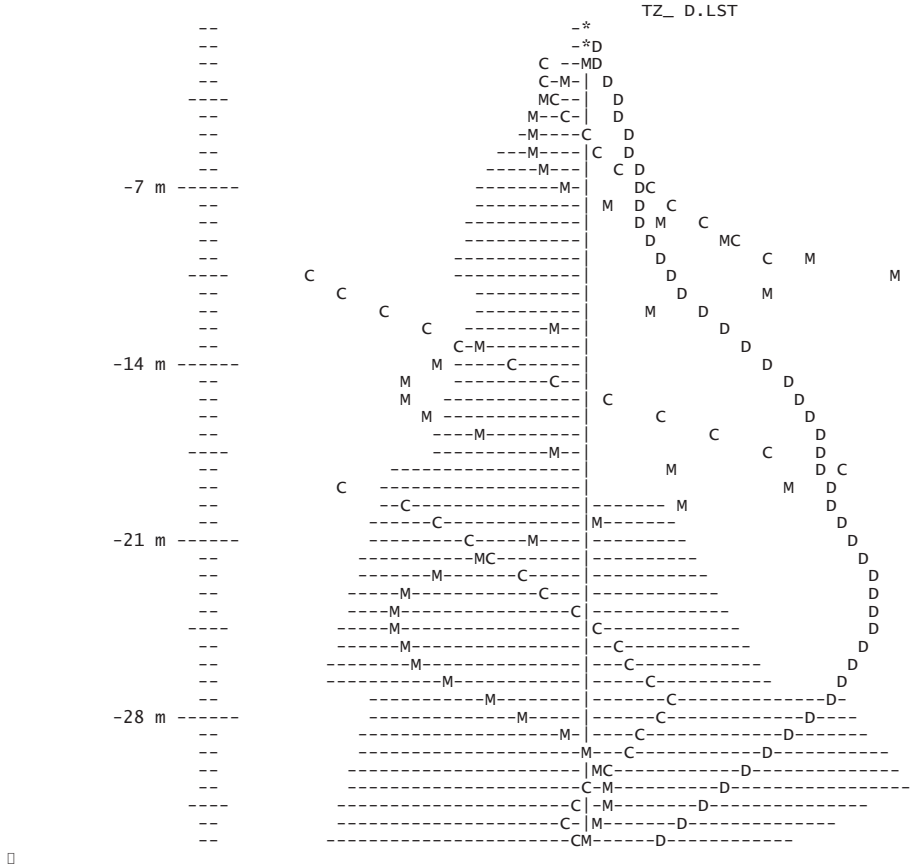

* CURVES TO PHASE Nb  6 *






* CURVES TO PHASE Nb  7 *




-7 m
-14 m
-21 m
-28 m

```
***** NOMBRE DE FICHERO DE DATOS : TZ_ E.RIO

      + GDLJ TRINCHERA ZAPOPAN TZ_E                          *60L  U:NN*
      : 0
 1 ...  0
      *PILOTES SECANTE DE 1.00 m SEP 70 cm
      : -34 1386349
 2 ...  -34 1386349
      : 0.00
 3 ...  0
      * R
      : -1.20 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -1.2 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -2.80 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 5 ...  -2.8 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -12.00 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 6 ...  -12 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -18.50 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 7 ...  -18.5 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG1c
      : -27.50 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 8 ...  -27.5 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -36.30 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 9 ...  -36.3 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG2
      : -37.50 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
10 ...  -37.5 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -46.50 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
11 ...  -46.5 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -7.00 0.50
12 ...  -7 0.5
      *Fase 1
      *Excavacion hasta cota inferior nivel cubierta
      : SUC(1) 10
13 ... SUC(1)  10
      : EXC(2) -2.30
14 ... EXC(2)  -2.3
      : CAL(2)
15 ... CAL(2)
      *Fase 2
      *Ejecucion del nivel cubierta
      *Excavacion hasta nivel estampidor
      : STR(0) -1.70 1.00 0.00 0.00 4000000
16 ... STR(0)  -1.7 1 0 0 4000000
      : EXC(2) -11.50
17 ... EXC(2)  -11.5
      : WAT(2) -12.00
18 ... WAT(2)  -12
      : CAL(2)
19 ... CAL(2)
      *Fase 3
      *Ejecucion del nivel estampidor 80X80
      *Excavacion hasta nivel de puntal provisional
      : STR(0) -11.00 1.00 0.00 0.00 705000
20 ... STR(0)  -11 1 0 0 705000
      : EXC(2) -16.00
21 ... EXC(2)  -16
      : WAT(2) -16.50
22 ... WAT(2)  -16.5
      : CAL(2)
23 ... CAL(2)
      *Fase 4
      *Ejecucion del puntal metalico provisional HEB-400
      *Excavación hasta losa de fondo
      : STR(0) -15.00 1.00 0.00 0.00 158000
24 ... STR(0)  -15 1 0 0 158000
      : EXC(2) -20.00
25 ... EXC(2)  -20
      : WAT(2) -20.50
26 ... WAT(2)  -20.5
      : CAL(2)
27 ... CAL(2)
      *Fase 5
      *Ejecucion de la losa de fondo
      : STR(0) -19.40 1.00 0.00 0.00 4000000
28 ... STR(0)  -19.4 1 0 0 4000000
      : STR(0,3)
29 ... STR(0,3)
      : CAL(2)
30 ... CAL(2)
      *Fase 6
      *Restitucion del nf
      : WAT(2,1) -20.00 0 130
31 ... WAT(2,1)  -20 0 130
      : CAL(2,1)
32 ... CAL(2,1)
      *Fase 7
      *Sismo
      *SISMO_ R
      : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
33 ... PLA(1)  0.56 2.367 5 29 0 0
      *SISMO_ UG1b
      : PLA(2) 0.522 2.594 15.00 31 0.00 0.00
34 ... PLA(2)  0.522 2.594 15 31 0 0
      *SISMO_ UG1c
      : PLA(3) 0.948 1.991 20.00 33 0.00 0.00
35 ... PLA(3)  0.948 1.991 20 33 0 0
      *SISMO_ UG1d
      : PLA(4) 0.789 2.509 25.00 36 0.00 0.00
36 ... PLA(4)  0.789 2.509 25 36 0 0
      *SISMO_ UG1c
      : PLA(5) 0.948 1.991 20.00 33 0.00 0.00
37 ... PLA(5)  0.948 1.991 20 33 0 0
      *SISMO_ UG1d
      : PLA(6) 0.789 2.509 25.00 36 0.00 0.00
```

```
  38 ... PLA(6)  0.789 2.509 25 36 0 0
         *SISMO_ UG2
         : PLA(7) 0.795 2.402 30.00 35 0.00 0.00
  39 ... PLA(7)  0.795 2.402 30 35 0 0
         *SISMO_ UG3a
         : PLA(8) 0.302 10.398 246.00 58 0.00 0.00
  40 ... PLA(8)  0.302 10.398 246 58 0 0
         : CAL(2)
  41 ... CAL(2)
         : FIN
  42 ... FIN
         : GRF
  43 ... GRF
         : STA
  44 ... STA
         : EVP
  45 ... EVP
         : ASC
  46 ... ASC
         *XLS
         : STOP
  47 ... STOP
```



*PILOTES SECANTE DE 1.00 m SEP 70 cm

---

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -34.000 m : | 1386349. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -1.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1b

CAPA N° 2 DE -1.200 m A -2.800 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1c



CAPA N° 3 DE -2.800 m A -12.000 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1d

CAPA N° 4 DE -12.000 m A -18.500 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.235 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.852 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.333 |

PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 29000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1c

CAPA N° 5 DE -18.500 m A -27.500 m :

PESO ESPECIFOCO HÚMEDO GH = 19.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.268
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.455
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.392
COHESIÓN C = 20.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 33.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 20600.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1d



CAPA N° 6 DE -27.500 m A -36.300 m :

PESO ESPECIFOCO HÚMEDO GH = 19.500 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.500 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.235
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.412
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.852
COHESIÓN C = 25.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 36.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 29000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG2

CAPA N° 7 DE -36.300 m A -37.500 m :

PESO ESPECIFOCO HÚMEDO GH = 20.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 10.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.246
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.426
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.690
COHESIÓN C = 30.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 35.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 43800.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG3a

CAPA N° 8 DE -37.500 m A -46.500 m :

PESO ESPECIFOCO HÚMEDO GH = 23.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 13.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.075
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.152
COEFIC. DE EMPUJE PASIVO HOR. KP = 12.162
COHESIÓN C = 246.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 58.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* NF



**  FASE No  1  **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -2.300 m



FASE 1

| | PARED | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -7.00 m<br>S. DE CAQUOT: 10.00 kPa | SOIL 2<br>EXCAVACIÓN: -2.30 m<br>NIVEL AGUA: -7.00 m<br>S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.157 | -0.113 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.300 | 1.123 | -0.113 | 0.04 | 0.36 | | 2 | 2.43 | 2.43 | 4900 | 0 | | | |
| -0.600 | 1.089 | -0.113 | 0.30 | 1.54 | | 2 | 5.38 | 5.15 | 4900 | 0 | | | |
| -0.900 | 1.055 | -0.113 | 1.05 | 3.59 | | 2 | 8.32 | 5.15 | 4900 | 0 | | | |
| -1.200 | 1.021 | -0.112 | 2.54 | 6.53 | | 2 | 11.27 | 5.15 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -1.700 | 0.965 | -0.111 | 6.03 | 7.84 | | 2 | 5.24 | 4.85 | 15100 | 0 | | | | | |
| -2.000 | 0.932 | -0.109 | 8.66 | 9.89 | | 2 | 8.43 | 4.85 | 15100 | 0 | | | | | |
| -2.300 | 0.900 | -0.107 | 12.05 | 12.89 | | 2 | 11.61 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | 2 | 11.61 | 4.85 | 15100 | 2 | 13.59 | | 15100 | | |
| -2.800 | 0.847 | -0.102 | 18.32 | 12.30 | | 2 | 16.88 | 4.85 | 15100 | 2 | 17.28 | | 15100 | | |
| | | | | | | 2 | 10.39 | 4.55 | 20600 | 2 | 21.67 | | 20600 | | |
| -3.062 | 0.821 | -0.098 | 21.17 | 9.48 | | 2 | 13.20 | 4.55 | 20600 | 2 | 23.40 | | 20600 | | |
| -3.325 | 0.796 | -0.094 | 23.32 | 6.94 | | 2 | 15.98 | 4.55 | 20600 | 2 | 25.15 | | 20600 | | |
| -3.587 | 0.772 | -0.089 | 24.84 | 4.66 | | 2 | 18.75 | 4.55 | 20600 | 2 | 26.92 | | 20600 | | |
| -3.850 | 0.749 | -0.084 | 25.79 | 2.64 | | 2 | 21.49 | 4.55 | 20600 | 2 | 28.72 | | 20600 | | |
| -4.113 | 0.728 | -0.079 | 26.25 | 0.86 | | 2 | 24.20 | 4.55 | 20600 | 2 | 30.55 | | 20600 | | |
| -4.375 | 0.708 | -0.074 | 26.26 | -0.70 | | 2 | 26.88 | 4.55 | 20600 | 2 | 32.41 | | 20600 | | |
| -4.637 | 0.689 | -0.069 | 25.90 | -2.05 | | 2 | 29.54 | 4.55 | 20600 | 2 | 34.29 | | 20600 | | |
| -4.900 | 0.671 | -0.065 | 25.20 | -3.20 | | 2 | 32.17 | 4.55 | 20600 | 2 | 36.19 | | 20600 | | |
| -5.163 | 0.655 | -0.060 | 24.23 | -4.17 | | 2 | 34.78 | 4.55 | 20600 | 2 | 38.13 | | 20600 | | |
| -5.425 | 0.640 | -0.055 | 23.03 | -4.97 | | 2 | 37.36 | 4.55 | 20600 | 2 | 40.08 | | 20600 | | |
| -5.688 | 0.626 | -0.051 | 21.64 | -5.61 | | 2 | 39.91 | 4.55 | 20600 | 2 | 42.07 | | 20600 | | |
| -5.950 | 0.613 | -0.047 | 20.10 | -6.10 | | 2 | 42.45 | 4.55 | 20600 | 2 | 44.07 | | 20600 | | |
| -6.212 | 0.601 | -0.044 | 18.44 | -6.46 | | 2 | 44.96 | 4.55 | 20600 | 2 | 46.09 | | 20600 | | |
| -6.475 | 0.590 | -0.040 | 16.71 | -6.70 | | 2 | 47.46 | 4.55 | 20600 | 2 | 48.14 | | 20600 | | |
| -6.738 | 0.580 | -0.037 | 14.94 | -6.82 | | 2 | 49.94 | 4.55 | 20600 | 2 | 50.20 | | 20600 | | |
| -7.000 | 0.571 | -0.035 | 13.14 | -6.84 | | 2 | 52.40 | 4.55 | 20600 | 2 | 52.27 | | 20600 | | |
| -7.500 | 0.554 | -0.030 | 9.77 | -6.61 | | 2 | 54.78 | 4.55 | 20600 | 2 | 53.98 | | 20600 | | |
| -8.000 | 0.540 | -0.028 | 6.59 | -6.06 | | 2 | 57.13 | 4.55 | 20600 | 2 | 55.73 | | 20600 | | |
| -8.500 | 0.527 | -0.026 | 3.76 | -5.23 | | 2 | 59.45 | 4.55 | 20600 | 2 | 57.51 | | 20600 | | |
| -9.000 | 0.514 | -0.025 | 1.41 | -4.13 | | 2 | 61.75 | 4.55 | 20600 | 2 | 59.30 | | 20600 | | |
| -9.500 | 0.502 | -0.025 | -0.33 | -2.77 | | 2 | 64.06 | 4.55 | 20600 | 2 | 61.09 | | 20600 | | |
| -10.000 | 0.489 | -0.025 | -1.32 | -1.16 | | 2 | 66.36 | 4.55 | 20600 | 2 | 62.89 | | 20600 | | |
| -10.500 | 0.477 | -0.025 | -1.45 | 0.70 | | 2 | 68.66 | 4.55 | 20600 | 2 | 64.67 | | 20600 | | |
| -11.000 | 0.464 | -0.026 | -0.58 | 2.83 | | 2 | 70.98 | 4.55 | 20600 | 2 | 66.46 | | 20600 | | |
| -11.500 | 0.451 | -0.026 | 1.42 | 5.22 | | 2 | 73.29 | 4.55 | 20600 | 2 | 68.24 | | 20600 | | |
| -12.000 | 0.439 | -0.025 | 4.69 | 7.88 | | 2 | 75.60 | 4.55 | 20600 | 2 | 70.03 | | 20600 | | |
| | | | | | | 2 | 63.91 | 4.12 | 29000 | 2 | 67.95 | | 29000 | | |
| -12.375 | 0.430 | -0.023 | 7.37 | 6.46 | | 2 | 65.64 | 4.12 | 29000 | 2 | 69.15 | | 29000 | | |
| -12.750 | 0.421 | -0.021 | 9.56 | 5.23 | | 2 | 67.35 | 4.12 | 29000 | 2 | 70.38 | | 29000 | | |
| -13.125 | 0.414 | -0.018 | 11.32 | 4.17 | | 2 | 69.03 | 4.12 | 29000 | 2 | 71.64 | | 29000 | | |
| -13.500 | 0.408 | -0.015 | 12.70 | 3.26 | | 2 | 70.67 | 4.12 | 29000 | 2 | 72.93 | | 29000 | | |
| -13.875 | 0.403 | -0.011 | 13.77 | 2.46 | | 2 | 72.28 | 4.12 | 29000 | 2 | 74.26 | | 29000 | | |
| -14.250 | 0.400 | -0.007 | 14.56 | 1.76 | | 2 | 73.84 | 4.12 | 29000 | 2 | 75.63 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | |





FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.625 | 0.398 | -0.003 | 15.10 | 1.11 | | 2 75.37 | 4.12 | 29000 | 2 77.04 | | 29000 | | |
| -15.000 | 0.397 | 0.001 | 15.40 | 0.49 | | 2 76.85 | 4.12 | 29000 | 2 78.50 | | 29000 | | |
| -15.500 | 0.399 | 0.007 | 15.43 | -0.37 | | 2 78.75 | 4.12 | 29000 | 2 80.51 | | 29000 | | |
| -16.000 | 0.404 | 0.012 | 15.02 | -1.31 | | 2 80.57 | 4.12 | 29000 | 2 82.60 | | 29000 | | |
| -16.500 | 0.411 | 0.017 | 14.09 | -2.43 | | 2 82.32 | 4.12 | 29000 | 2 84.77 | | 29000 | | |
| -17.000 | 0.421 | 0.022 | 12.54 | -3.80 | | 2 83.99 | 4.12 | 29000 | 2 87.01 | | 29000 | | |
| -17.500 | 0.433 | 0.026 | 10.23 | -5.49 | | 2 85.59 | 4.12 | 29000 | 2 89.32 | | 29000 | | |
| -18.000 | 0.447 | 0.029 | 6.99 | -7.56 | | 2 87.14 | 4.12 | 29000 | 2 91.69 | | 29000 | | |
| -18.500 | 0.463 | 0.031 | 2.60 | -10.05 | | 2 88.66 | 4.12 | 29000 | 2 94.08 | | 29000 | | |
| | | | | | | 2 103.20 | 4.55 | 20600 | 2 98.62 | | 20600 | | |
| -18.950 | 0.477 | 0.031 | -1.48 | -8.12 | | 2 104.75 | 4.55 | 20600 | 2 100.75 | | 20600 | | |
| -19.400 | 0.491 | 0.030 | -4.74 | -6.45 | | 2 106.31 | 4.55 | 20600 | 2 102.88 | | 20600 | | |
| -19.700 | 0.499 | 0.029 | -6.53 | -5.48 | | 2 107.35 | 4.55 | 20600 | 2 104.29 | | 20600 | | |
| -20.000 | 0.508 | 0.027 | -8.04 | -4.61 | | 2 108.40 | 4.55 | 20600 | 2 105.70 | | 20600 | | |
| -20.500 | 0.521 | 0.024 | -10.03 | -3.39 | | 2 110.19 | 4.55 | 20600 | 2 108.01 | | 20600 | | |
| -20.938 | 0.531 | 0.021 | -11.32 | -2.53 | | 2 111.77 | 4.55 | 20600 | 2 110.01 | | 20600 | | |
| -21.375 | 0.539 | 0.017 | -12.27 | -1.83 | | 2 113.39 | 4.55 | 20600 | 2 111.97 | | 20600 | | |
| -21.812 | 0.546 | 0.013 | -12.94 | -1.27 | | 2 115.05 | 4.55 | 20600 | 2 113.90 | | 20600 | | |
| -22.250 | 0.551 | 0.009 | -13.39 | -0.81 | | 2 116.74 | 4.55 | 20600 | 2 115.79 | | 20600 | | |
| -22.688 | 0.554 | 0.005 | -13.66 | -0.42 | | 2 118.47 | 4.55 | 20600 | 2 117.64 | | 20600 | | |
| -23.125 | 0.555 | 0.000 | -13.76 | -0.06 | | 2 120.24 | 4.55 | 20600 | 2 119.45 | | 20600 | | |
| -23.562 | 0.554 | -0.004 | -13.71 | 0.29 | | 2 122.05 | 4.55 | 20600 | 2 121.23 | | 20600 | | |
| -24.000 | 0.551 | -0.008 | -13.50 | 0.67 | | 2 123.89 | 4.55 | 20600 | 2 122.97 | | 20600 | | |
| -24.438 | 0.547 | -0.012 | -13.12 | 1.12 | | 2 125.78 | 4.55 | 20600 | 2 124.66 | | 20600 | | |
| -24.875 | 0.540 | -0.017 | -12.51 | 1.66 | | 2 127.70 | 4.55 | 20600 | 2 126.32 | | 20600 | | |
| -25.312 | 0.532 | -0.020 | -11.64 | 2.34 | | 2 129.66 | 4.55 | 20600 | 2 127.95 | | 20600 | | |
| -25.750 | 0.523 | -0.024 | -10.45 | 3.17 | | 2 131.65 | 4.55 | 20600 | 2 129.54 | | 20600 | | |
| -26.188 | 0.511 | -0.027 | -8.84 | 4.19 | | 2 133.67 | 4.55 | 20600 | 2 131.10 | | 20600 | | |
| -26.625 | 0.499 | -0.029 | -6.74 | 5.43 | | 2 135.72 | 4.55 | 20600 | 2 132.64 | | 20600 | | |
| -27.062 | 0.486 | -0.031 | -4.06 | 6.89 | | 2 137.78 | 4.55 | 20600 | 2 134.16 | | 20600 | | |
| -27.500 | 0.472 | -0.032 | -0.68 | 8.60 | | 2 139.86 | 4.55 | 20600 | 2 135.67 | | 20600 | | |
| | | | | | | 2 121.76 | 4.12 | 29000 | 2 127.73 | | 29000 | | |
| -27.906 | 0.459 | -0.032 | 2.34 | 6.33 | | 2 123.72 | 4.12 | 29000 | 2 128.95 | | 29000 | | |
| -28.312 | 0.446 | -0.031 | 4.50 | 4.35 | | 2 125.68 | 4.12 | 29000 | 2 130.17 | | 29000 | | |
| -28.719 | 0.434 | -0.029 | 5.92 | 2.67 | | 2 127.62 | 4.12 | 29000 | 2 131.41 | | 29000 | | |
| -29.125 | 0.423 | -0.027 | 6.71 | 1.27 | | 2 129.54 | 4.12 | 29000 | 2 132.67 | | 29000 | | |
| -29.531 | 0.412 | -0.025 | 6.99 | 0.12 | | 2 131.44 | 4.12 | 29000 | 2 133.95 | | 29000 | | |
| -29.938 | 0.402 | -0.023 | 6.85 | -0.78 | | 2 133.31 | 4.12 | 29000 | 2 135.25 | | 29000 | | |
| -30.344 | 0.393 | -0.021 | 6.38 | -1.46 | | 2 135.16 | 4.12 | 29000 | 2 136.58 | | 29000 | | |
| -30.750 | 0.385 | -0.019 | 5.69 | -1.94 | | 2 136.99 | 4.12 | 29000 | 2 137.93 | | 29000 | | |
| -31.156 | 0.378 | -0.018 | 4.83 | -2.23 | | 2 138.80 | 4.12 | 29000 | 2 139.31 | | 29000 | | |
| -31.562 | 0.371 | -0.017 | 3.89 | -2.36 | | 2 140.59 | 4.12 | 29000 | 2 140.69 | | 29000 | | |
| -31.969 | 0.364 | -0.016 | 2.94 | -2.32 | | 2 142.37 | 4.12 | 29000 | 2 142.09 | | 29000 | | |
| -32.375 | 0.358 | -0.015 | 2.03 | -2.13 | | 2 144.14 | 4.12 | 29000 | 2 143.51 | | 29000 | | |
| -32.781 | 0.352 | -0.014 | 1.22 | -1.81 | | 2 145.90 | 4.12 | 29000 | 2 144.92 | | 29000 | | |
| -33.188 | 0.346 | -0.014 | 0.58 | -1.34 | | 2 147.66 | 4.12 | 29000 | 2 146.35 | | 29000 | | |
| -33.594 | 0.341 | -0.014 | 0.15 | -0.74 | | 2 149.42 | 4.12 | 29000 | 2 147.77 | | 29000 | | |
| -34.000 | 0.335 | -0.014 | 0.00 | 0.00 | | 2 151.17 | 4.12 | 29000 | 2 149.20 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |





FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |

| | | | |
|---|---|---|---|
| DESPLAZAMIENTO MÁX. = 1.16 mm<br>MOMENTO MÁXIMO = 26.26 kN.m/m | CODIFICACIÓN DE ESTADO DE SUELO : | -1 = SEPARACIÓN<br>0 = EXCAVACIÓN<br>1 = PRESIÓN ACTIVA<br>2 = ELÁSTICO<br>3 = PRESIÓN PASSIVA | |

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 147.51 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.097 = (2949.06 kN/m)/(30472.96 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.121 = (2949.06 kN/m)/(24289.07 kN/m)



** FASE No 2 **

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel estampidor

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -1.700 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 4000000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -11.500 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -12.000 m



FASE 2

| | PARED | | | | | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -7.00 m<br>S. DE CAQUOT: 10.00 kPa | | | SOIL 2<br>EXCAVACIÓN: -11.50 m<br>NIVEL AGUA: -12.00 m<br>S. DE CAQUOT: 0.00 kPa | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
| 0.000 | -0.616 | 0.940 | 0.00 | 0.00 | | 2 | 8.17 | 5.15 | 4900 | 0 | | | |
| -0.300 | -0.334 | 0.940 | 0.39 | 2.66 | | 2 | 9.57 | 5.15 | 4900 | 0 | | | |
| -0.600 | -0.051 | 0.940 | 1.64 | 5.74 | | 2 | 10.96 | 5.15 | 4900 | 0 | | | |
| -0.900 | 0.231 | 0.941 | 3.87 | 9.24 | | 2 | 12.36 | 5.15 | 4900 | 0 | | | |
| -1.200 | 0.513 | 0.942 | 7.22 | 13.16 | | 2 | 13.76 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 7.58 | 4.85 | 15100 | 0 | | | |
| -1.700 | 0.985 | 0.946 | 14.64 | 16.28 | | 2 | 4.94 | 4.85 | 15100 | 0 | | | |
| | | | | -63.63 | | 2 | 4.94 | 4.85 | 15100 | 0 | | 1 | -79.91 |
| -2.000 | 1.269 | 0.947 | -4.25 | -62.39 | | 2 | 3.34 | 3.34 | 15100 | 0 | | | |
| -2.300 | 1.553 | 0.944 | -22.84 | -61.63 | | 2 | 1.74 | 1.74 | 15100 | 0 | | | |
| -2.800 | 2.022 | 0.931 | -53.51 | -61.15 | | 1 | 0.15 | 0.15 | 15100 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -3.062 | 2.265 | 0.919 | -69.56 | -61.15 | | -1 | | | | 0 | | | |
| -3.325 | 2.505 | 0.904 | -85.61 | -61.15 | | -1 | | | | 0 | | | |
| -3.587 | 2.740 | 0.886 | -101.66 | -61.15 | | -1 | | | | 0 | | | |
| -3.850 | 2.970 | 0.866 | -117.72 | -61.15 | | -1 | | | | 0 | | | |
| -4.113 | 3.194 | 0.842 | -133.76 | -61.08 | | 1 | 0.57 | 0.57 | 20600 | 0 | | | |
| -4.375 | 3.411 | 0.815 | -149.76 | -60.75 | | 1 | 1.91 | 1.91 | 20600 | 0 | | | |
| -4.637 | 3.622 | 0.785 | -165.63 | -60.07 | | 1 | 3.25 | 2.68 | 20600 | 0 | | | |
| -4.900 | 3.823 | 0.752 | -181.27 | -59.05 | | 1 | 4.58 | 2.68 | 20600 | 0 | | | |
| -5.163 | 4.016 | 0.717 | -196.59 | -57.67 | | 1 | 5.92 | 2.68 | 20600 | 0 | | | |
| -5.425 | 4.199 | 0.678 | -211.51 | -55.94 | | 1 | 7.26 | 2.68 | 20600 | 0 | | | |
| -5.688 | 4.372 | 0.637 | -225.93 | -53.86 | | 1 | 8.59 | 2.68 | 20600 | 0 | | | |
| -5.950 | 4.533 | 0.592 | -239.76 | -51.43 | | 1 | 9.93 | 2.68 | 20600 | 0 | | | |
| -6.212 | 4.683 | 0.546 | -252.90 | -48.64 | | 1 | 11.27 | 2.68 | 20600 | 0 | | | |
| -6.475 | 4.820 | 0.497 | -265.27 | -45.51 | | 1 | 12.60 | 2.68 | 20600 | 0 | | | |
| -6.738 | 4.943 | 0.445 | -276.76 | -42.03 | | 1 | 13.94 | 2.68 | 20600 | 0 | | | |
| -7.000 | 5.053 | 0.392 | -287.30 | -38.19 | | 1 | 15.28 | 2.68 | 20600 | 0 | | | |
| -7.500 | 5.223 | 0.285 | -304.23 | -29.03 | 4.91 | 1 | 16.48 | 2.68 | 20600 | 0 | | | |
| -8.000 | 5.337 | 0.173 | -315.82 | -16.81 | 9.81 | 1 | 17.69 | 2.68 | 20600 | 0 | | | |
| -8.500 | 5.395 | 0.058 | -320.53 | -1.53 | 14.72 | 1 | 18.89 | 2.68 | 20600 | 0 | | | |
| -9.000 | 5.396 | -0.057 | -316.84 | 16.80 | 19.62 | 1 | 20.10 | 2.68 | 20600 | 0 | | | |
| -9.500 | 5.339 | -0.169 | -303.22 | 38.19 | 24.53 | 1 | 21.31 | 2.68 | 20600 | 0 | | | |
| -10.000 | 5.228 | -0.274 | -278.14 | 62.64 | 29.43 | 1 | 22.51 | 2.68 | 20600 | 0 | | | |
| -10.500 | 5.066 | -0.368 | -240.07 | 90.14 | 34.34 | 1 | 23.72 | 2.68 | 20600 | 0 | | | |
| -11.000 | 4.862 | -0.446 | -187.49 | 120.69 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | | |
| -11.500 | 4.624 | -0.502 | -118.87 | 154.30 | 44.15 | 1 | 26.13 | 2.68 | 20600 | 0 | | | |
| | | | | | 44.15 | 1 | 26.13 | 2.68 | 20600 | 3 | 73.67 | 20600 | |
| -12.000 | 4.365 | -0.531 | -42.75 | 148.99 | 49.05 | 1 | 27.34 | 2.68 | 20600 | 2 | 94.24 | 20600 | |
| | | | | | 49.05 | 1 | 17.43 | 2.35 | 29000 | 2 | 130.50 | 29000 | |
| -12.375 | 4.165 | -0.535 | 8.74 | 125.95 | 49.05 | 1 | 18.27 | 2.35 | 29000 | 2 | 126.16 | 29000 | |
| -12.750 | 3.965 | -0.527 | 51.96 | 104.85 | 49.05 | 1 | 19.11 | 2.35 | 29000 | 2 | 121.84 | 29000 | |
| -13.125 | 3.771 | -0.508 | 87.62 | 85.66 | 49.05 | 1 | 19.94 | 2.35 | 29000 | 2 | 117.68 | 29000 | |
| -13.500 | 3.586 | -0.480 | 116.43 | 68.29 | 49.05 | 1 | 20.78 | 2.35 | 29000 | 2 | 113.77 | 29000 | |
| -13.875 | 3.412 | -0.445 | 139.06 | 52.64 | 49.05 | 1 | 21.62 | 2.35 | 29000 | 2 | 110.20 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa/m | kN |



FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
| -14.250 | 3.252 | -0.405 | 156.11 | 38.57 | 49.05 | 1 | 22.45 | 2.35 | 29000 | 2 | 107.04 | | 29000 | | | |
| -14.625 | 3.109 | -0.361 | 168.16 | 25.90 | 49.05 | 1 | 23.29 | 2.35 | 29000 | 2 | 104.34 | | 29000 | | | |
| -15.000 | 2.982 | -0.315 | 175.69 | 14.48 | 49.05 | 1 | 24.13 | 2.35 | 29000 | 2 | 102.13 | | 29000 | | | |
| -15.500 | 2.841 | -0.250 | 179.45 | 0.81 | 49.05 | 1 | 25.25 | 2.35 | 29000 | 2 | 99.99 | | 29000 | | | |
| -16.000 | 2.732 | -0.186 | 176.74 | -11.45 | 49.05 | 1 | 26.36 | 2.35 | 29000 | 2 | 98.79 | | 29000 | | | |
| -16.500 | 2.654 | -0.124 | 168.15 | -22.79 | 49.05 | 1 | 27.48 | 2.35 | 29000 | 2 | 98.50 | | 29000 | | | |
| -17.000 | 2.607 | -0.065 | 154.03 | -33.65 | 49.05 | 1 | 28.59 | 2.35 | 29000 | 2 | 99.10 | | 29000 | | | |
| -17.500 | 2.588 | -0.013 | 134.51 | -44.45 | 49.05 | 1 | 29.71 | 2.35 | 29000 | 2 | 100.49 | | 29000 | | | |
| -18.000 | 2.593 | 0.031 | 109.53 | -55.56 | 49.05 | 1 | 30.83 | 2.35 | 29000 | 2 | 102.59 | | 29000 | | | |
| -18.500 | 2.617 | 0.065 | 78.84 | -67.30 | 49.05 | 1 | 31.94 | 2.35 | 29000 | 2 | 105.26 | | 29000 | | | |
| | | | | | 49.05 | 2 | 58.81 | 4.55 | 20600 | 2 | 86.34 | | 20600 | | | |
| -18.950 | 2.652 | 0.086 | 50.69 | -57.94 | 49.05 | 2 | 59.94 | 4.55 | 20600 | 2 | 88.89 | | 20600 | | | |
| -19.400 | 2.694 | 0.099 | 26.59 | -49.28 | 49.05 | 2 | 60.92 | 4.55 | 20600 | 2 | 91.59 | | 20600 | | | |
| -19.700 | 2.724 | 0.103 | 12.62 | -43.96 | 49.05 | 2 | 61.53 | 4.55 | 20600 | 2 | 93.45 | | 20600 | | | |
| -20.000 | 2.755 | 0.104 | 0.18 | -39.01 | 49.05 | 2 | 62.11 | 4.55 | 20600 | 2 | 95.32 | | 20600 | | | |
| -20.500 | 2.807 | 0.101 | -17.43 | -31.62 | 49.05 | 2 | 63.10 | 4.55 | 20600 | 2 | 98.43 | | 20600 | | | |
| -20.938 | 2.849 | 0.093 | -30.01 | -26.00 | 49.05 | 2 | 64.01 | 4.55 | 20600 | 2 | 101.10 | | 20600 | | | |
| -21.375 | 2.888 | 0.082 | -40.29 | -21.11 | 49.05 | 2 | 65.01 | 4.55 | 20600 | 2 | 103.68 | | 20600 | | | |
| -21.812 | 2.921 | 0.068 | -48.57 | -16.87 | 49.05 | 2 | 66.12 | 4.55 | 20600 | 2 | 106.15 | | 20600 | | | |
| -22.250 | 2.947 | 0.052 | -55.12 | -13.16 | 49.05 | 2 | 67.37 | 4.55 | 20600 | 2 | 108.49 | | 20600 | | | |
| -22.688 | 2.966 | 0.034 | -60.14 | -9.85 | 49.05 | 2 | 68.78 | 4.55 | 20600 | 2 | 110.66 | | 20600 | | | |
| -23.125 | 2.976 | 0.014 | -63.78 | -6.81 | 49.05 | 2 | 70.36 | 4.55 | 20600 | 2 | 112.67 | | 20600 | | | |
| -23.562 | 2.978 | -0.007 | -66.12 | -3.88 | 49.05 | 2 | 72.11 | 4.55 | 20600 | 2 | 114.49 | | 20600 | | | |
| -24.000 | 2.970 | -0.028 | -67.17 | -0.89 | 49.05 | 2 | 74.06 | 4.55 | 20600 | 2 | 116.13 | | 20600 | | | |
| -24.438 | 2.954 | -0.049 | -66.87 | 2.31 | 49.05 | 2 | 76.20 | 4.55 | 20600 | 2 | 117.58 | | 20600 | | | |
| -24.875 | 2.928 | -0.070 | -65.09 | 5.90 | 49.05 | 2 | 78.52 | 4.55 | 20600 | 2 | 118.83 | | 20600 | | | |
| -25.312 | 2.893 | -0.090 | -61.63 | 10.04 | 49.05 | 2 | 81.03 | 4.55 | 20600 | 2 | 119.91 | | 20600 | | | |
| -25.750 | 2.849 | -0.108 | -56.21 | 14.88 | 49.05 | 2 | 83.72 | 4.55 | 20600 | 2 | 120.80 | | 20600 | | | |
| -26.188 | 2.798 | -0.125 | -48.49 | 20.57 | 49.05 | 2 | 86.56 | 4.55 | 20600 | 2 | 121.54 | | 20600 | | | |
| -26.625 | 2.740 | -0.139 | -38.06 | 27.25 | 49.05 | 2 | 89.55 | 4.55 | 20600 | 2 | 122.14 | | 20600 | | | |
| -27.062 | 2.677 | -0.149 | -24.48 | 35.02 | 49.05 | 2 | 92.64 | 4.55 | 20600 | 2 | 122.64 | | 20600 | | | |
| -27.500 | 2.611 | -0.154 | -7.25 | 43.95 | 49.05 | 2 | 95.79 | 4.55 | 20600 | 2 | 123.06 | | 20600 | | | |
| | | | | | 49.05 | 2 | 59.73 | 4.12 | 29000 | 2 | 138.45 | | 29000 | | | |
| -27.906 | 2.548 | -0.154 | 8.26 | 32.63 | 49.05 | 2 | 63.13 | 4.12 | 29000 | 2 | 138.22 | | 29000 | | | |
| -28.312 | 2.487 | -0.149 | 19.46 | 22.78 | 49.05 | 2 | 66.51 | 4.12 | 29000 | 2 | 138.02 | | 29000 | | | |
| -28.719 | 2.427 | -0.142 | 26.96 | 14.35 | 49.05 | 2 | 69.82 | 4.12 | 29000 | 2 | 137.89 | | 29000 | | | |
| -29.125 | 2.371 | -0.134 | 31.31 | 7.29 | 49.05 | 2 | 73.04 | 4.12 | 29000 | 2 | 137.85 | | 29000 | | | |
| -29.531 | 2.319 | -0.124 | 33.06 | 1.50 | 49.05 | 2 | 76.15 | 4.12 | 29000 | 2 | 137.92 | | 29000 | | | |
| -29.938 | 2.270 | -0.115 | 32.69 | -3.09 | 49.05 | 2 | 79.15 | 4.12 | 29000 | 2 | 138.10 | | 29000 | | | |
| -30.344 | 2.226 | -0.105 | 30.69 | -6.59 | 49.05 | 2 | 82.04 | 4.12 | 29000 | 2 | 138.40 | | 29000 | | | |
| -30.750 | 2.184 | -0.097 | 27.48 | -9.08 | 49.05 | 2 | 84.82 | 4.12 | 29000 | 2 | 138.80 | | 29000 | | | |
| -31.156 | 2.147 | -0.089 | 23.44 | -10.63 | 49.05 | 2 | 87.50 | 4.12 | 29000 | 2 | 139.29 | | 29000 | | | |
| -31.562 | 2.112 | -0.083 | 18.95 | -11.34 | 49.05 | 2 | 90.11 | 4.12 | 29000 | 2 | 139.87 | | 29000 | | | |
| -31.969 | 2.079 | -0.078 | 14.34 | -11.24 | 49.05 | 2 | 92.65 | 4.12 | 29000 | 2 | 140.51 | | 29000 | | | |
| -32.375 | 2.048 | -0.075 | 9.92 | -10.39 | 49.05 | 2 | 95.14 | 4.12 | 29000 | 2 | 141.20 | | 29000 | | | |
| -32.781 | 2.018 | -0.072 | 6.00 | -8.82 | 49.05 | 2 | 97.59 | 4.12 | 29000 | 2 | 141.92 | | 29000 | | | |
| -33.188 | 1.989 | -0.071 | 2.85 | -6.56 | 49.05 | 2 | 100.03 | 4.12 | 29000 | 2 | 142.67 | | 29000 | | | |
| -33.594 | 1.960 | -0.071 | 0.76 | -3.62 | 49.05 | 2 | 102.45 | 4.12 | 29000 | 2 | 143.42 | | 29000 | | | |
| -34.000 | 1.931 | -0.071 | 0.00 | 0.00 | 49.05 | 2 | 104.87 | 4.12 | 29000 | 2 | 144.18 | | 29000 | | | |
| | | | | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | |



FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 5.40 mm
MOMENTO MÁXIMO = -320.53 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 114.81 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.049 = (1507.98 kN/m)/(30472.96 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.239 = (2629.79 kN/m)/(10991.12 kN/m)



**  FASE No 3  **

*Fase 3
*Ejecucion del nivel estampidor 80x80
*Excavacion hasta nivel de puntal provisional

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 2
NIVEL = -11.000 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 705000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -16.000 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -16.500 m

FASE 3

| | PARED | | | | | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -7.00 m<br>S. DE CAQUOT: 10.00 kPa | | | | SOIL 2<br>EXCAVACIÓN: -16.00 m<br>NIVEL AGUA: -16.50 m<br>S. DE CAQUOT: 0.00 kPa | | | | PUNTALES/ ANCLAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° FUERZA |
| 0.000 | -0.263 | 0.731 | 0.00 | 0.00 | | 2 | 6.44 | 5.15 | 4900 | 0 | | | | |
| -0.300 | -0.044 | 0.731 | 0.32 | 2.19 | | 2 | 8.15 | 5.15 | 4900 | 0 | | | | |
| -0.600 | 0.175 | 0.731 | 1.36 | 4.89 | | 2 | 9.85 | 5.15 | 4900 | 0 | | | | |
| -0.900 | 0.394 | 0.731 | 3.30 | 8.10 | | 2 | 11.56 | 5.15 | 4900 | 0 | | | | |
| -1.200 | 0.614 | 0.732 | 6.28 | 11.83 | | 2 | 13.27 | 5.15 | 4900 | 0 | | | | |
| | | | | | | 2 | 6.06 | 4.85 | 15100 | 0 | | | | |
| -1.700 | 0.981 | 0.736 | 12.90 | 14.59 | | 2 | 5.01 | 4.85 | 15100 | 0 | | | | |
| | | | | -46.52 | | 2 | 5.01 | 4.85 | 15100 | 0 | | | | 1 -61.11 |
| -2.000 | 1.202 | 0.737 | -0.84 | -45.12 | | 2 | 4.36 | 4.36 | 15100 | 0 | | | | |
| -2.300 | 1.422 | 0.735 | -14.19 | -43.90 | | 2 | 3.72 | 3.72 | 15100 | 0 | | | | |
| -2.800 | 1.788 | 0.726 | -35.68 | -42.05 | | 2 | 3.69 | 3.69 | 15100 | 0 | | | | |
| | | | | | | -1 | | | | 0 | | | | |
| -3.062 | 1.978 | 0.718 | -46.71 | -42.05 | | -1 | | | | 0 | | | | |
| -3.325 | 2.165 | 0.709 | -57.75 | -42.05 | | -1 | | | | 0 | | | | |
| -3.587 | 2.350 | 0.697 | -68.79 | -42.05 | | -1 | | | | 0 | | | | |
| -3.850 | 2.531 | 0.683 | -79.83 | -42.05 | | -1 | | | | 0 | | | | |
| -4.113 | 2.708 | 0.666 | -90.75 | -40.66 | | 2 | 10.59 | 4.55 | 20600 | 0 | | | | |
| -4.375 | 2.880 | 0.648 | -101.03 | -37.59 | | 2 | 12.85 | 4.55 | 20600 | 0 | | | | |
| -4.637 | 3.048 | 0.628 | -110.43 | -33.92 | | 2 | 15.06 | 4.55 | 20600 | 0 | | | | |
| -4.900 | 3.210 | 0.606 | -118.79 | -29.68 | | 2 | 17.22 | 4.55 | 20600 | 0 | | | | |
| -5.163 | 3.366 | 0.583 | -125.96 | -24.89 | | 2 | 19.31 | 4.55 | 20600 | 0 | | | | |
| -5.425 | 3.516 | 0.559 | -131.81 | -19.56 | | 2 | 21.33 | 4.55 | 20600 | 0 | | | | |
| -5.688 | 3.659 | 0.533 | -136.19 | -13.70 | | 2 | 23.27 | 4.55 | 20600 | 0 | | | | |
| -5.950 | 3.796 | 0.507 | -138.96 | -7.35 | | 2 | 25.12 | 4.55 | 20600 | 0 | | | | |
| -6.212 | 3.926 | 0.481 | -140.00 | -0.53 | | 2 | 26.86 | 4.55 | 20600 | 0 | | | | |
| -6.475 | 4.049 | 0.454 | -139.20 | 6.74 | | 2 | 28.49 | 4.55 | 20600 | 0 | | | | |
| -6.738 | 4.164 | 0.428 | -136.43 | 14.41 | | 2 | 29.99 | 4.55 | 20600 | 0 | | | | |
| -7.000 | 4.273 | 0.403 | -131.60 | 22.46 | | 2 | 31.34 | 4.55 | 20600 | 0 | | | | |
| -7.500 | 4.463 | 0.358 | -116.22 | 39.55 | 4.91 | 2 | 32.12 | 4.55 | 20600 | 0 | | | | |
| -8.000 | 4.633 | 0.320 | -91.60 | 59.31 | 9.81 | 2 | 32.21 | 4.55 | 20600 | 0 | | | | |
| -8.500 | 4.785 | 0.293 | -56.52 | 81.36 | 14.72 | 2 | 31.46 | 4.55 | 20600 | 0 | | | | |
| -9.000 | 4.928 | 0.281 | -9.94 | 105.24 | 19.62 | 2 | 29.73 | 4.55 | 20600 | 0 | | | | |
| -9.500 | 5.069 | 0.287 | 48.94 | 130.42 | 24.53 | 2 | 26.86 | 4.55 | 20600 | 0 | | | | |
| -10.000 | 5.220 | 0.318 | 120.60 | 156.26 | 29.43 | 1 | 22.51 | 2.68 | 20600 | 0 | | | | |
| -10.500 | 5.392 | 0.376 | 205.47 | 183.75 | 34.34 | 1 | 23.72 | 2.68 | 20600 | 0 | | | | |
| -11.000 | 5.601 | 0.468 | 304.86 | 214.31 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | | | |
| | | | | -306.83 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | | | 2 -521.14 |
| -11.500 | 5.858 | 0.551 | 159.72 | -273.22 | 44.15 | 1 | 26.13 | 2.68 | 20600 | 0 | | | | |
| -12.000 | 6.144 | 0.585 | 32.15 | -236.55 | 49.05 | 1 | 27.34 | 2.68 | 20600 | 0 | | | | |
| | | | | | 49.05 | 1 | 17.43 | 2.35 | 29000 | 0 | | | | |
| -12.375 | 6.363 | 0.582 | -51.77 | -210.77 | 52.73 | 1 | 18.27 | 2.35 | 29000 | 0 | | | | |
| -12.750 | 6.578 | 0.558 | -125.72 | -183.30 | 56.41 | 1 | 19.11 | 2.35 | 29000 | 0 | | | | |
| -13.125 | 6.779 | 0.515 | -189.04 | -154.14 | 60.09 | 1 | 19.94 | 2.35 | 29000 | 0 | | | | |
| -13.500 | 6.962 | 0.457 | -241.11 | -123.28 | 63.77 | 1 | 20.78 | 2.35 | 29000 | 0 | | | | |
| -13.875 | 7.120 | 0.386 | -281.29 | -90.73 | 67.44 | 1 | 21.62 | 2.35 | 29000 | 0 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | kN |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.250 | 7.250 | 0.306 | -308.94 | -56.49 | 71.12 | 1 | 22.45 | 2.35 | 29000 | 0 | | | | |
| -14.625 | 7.349 | 0.220 | -323.44 | -20.55 | 74.80 | 1 | 23.29 | 2.35 | 29000 | 0 | | | | |
| -15.000 | 7.415 | 0.132 | -324.14 | 17.08 | 78.48 | 1 | 24.13 | 2.35 | 29000 | 0 | | | | |
| -15.500 | 7.452 | 0.018 | -302.52 | 69.89 | 83.39 | 1 | 25.25 | 2.35 | 29000 | 0 | | | | |
| -16.000 | 7.435 | -0.083 | -253.75 | 125.71 | 88.29 | 1 | 26.36 | 2.35 | 29000 | 0 | | | | |
| | | | | | 88.29 | 1 | 26.36 | 2.35 | 29000 | 3 | 98.13 | 29000 | | |
| -16.500 | 7.372 | -0.163 | -190.14 | 126.09 | 93.20 | 1 | 27.48 | 2.35 | 29000 | 3 | 135.69 | 29000 | | |
| -17.000 | 7.275 | -0.221 | -129.68 | 114.29 | 93.20 | 1 | 28.59 | 2.35 | 29000 | 3 | 153.98 | 29000 | | |
| -17.500 | 7.155 | -0.258 | -77.28 | 93.90 | 93.20 | 1 | 29.71 | 2.35 | 29000 | 3 | 172.28 | 29000 | | |
| -18.000 | 7.020 | -0.278 | -37.22 | 64.91 | 93.20 | 1 | 30.83 | 2.35 | 29000 | 3 | 190.58 | 29000 | | |
| -18.500 | 6.879 | -0.287 | -13.80 | 27.34 | 93.20 | 1 | 31.94 | 2.35 | 29000 | 3 | 208.88 | 29000 | | |
| | | | | | 93.20 | 1 | 43.89 | 2.68 | 20600 | 2 | 154.79 | 20600 | | |
| -18.950 | 6.749 | -0.289 | -3.23 | 19.80 | 93.20 | 1 | 44.97 | 2.68 | 20600 | 2 | 153.96 | 20600 | | |
| -19.400 | 6.619 | -0.289 | 4.15 | 13.13 | 93.20 | 1 | 46.06 | 2.68 | 20600 | 2 | 153.12 | 20600 | | |
| -19.700 | 6.533 | -0.288 | 7.48 | 9.16 | 93.20 | 1 | 46.78 | 2.68 | 20600 | 2 | 152.57 | 20600 | | |
| -20.000 | 6.446 | -0.286 | 9.69 | 5.57 | 93.20 | 1 | 47.50 | 2.68 | 20600 | 2 | 152.02 | 20600 | | |
| -20.500 | 6.304 | -0.282 | 11.14 | 0.43 | 93.20 | 1 | 48.71 | 2.68 | 20600 | 2 | 151.14 | 20600 | | |
| -20.938 | 6.182 | -0.279 | 10.51 | -3.22 | 93.20 | 1 | 49.77 | 2.68 | 20600 | 2 | 150.41 | 20600 | | |
| -21.375 | 6.061 | -0.276 | 8.44 | -6.09 | 93.20 | 1 | 50.82 | 2.68 | 20600 | 2 | 149.70 | 20600 | | |
| -21.812 | 5.941 | -0.273 | 5.29 | -8.20 | 93.20 | 1 | 51.88 | 2.68 | 20600 | 2 | 149.02 | 20600 | | |
| -22.250 | 5.821 | -0.272 | 1.37 | -9.55 | 93.20 | 1 | 52.93 | 2.68 | 20600 | 2 | 148.36 | 20600 | | |
| -22.688 | 5.702 | -0.273 | -2.96 | -10.15 | 93.20 | 1 | 53.99 | 2.68 | 20600 | 2 | 147.69 | 20600 | | |
| -23.125 | 5.583 | -0.274 | -7.40 | -10.00 | 93.20 | 1 | 55.04 | 2.68 | 20600 | 2 | 147.02 | 20600 | | |
| -23.562 | 5.462 | -0.277 | -11.60 | -9.09 | 93.20 | 1 | 56.10 | 2.68 | 20600 | 2 | 146.33 | 20600 | | |
| -24.000 | 5.340 | -0.281 | -15.24 | -7.40 | 93.20 | 1 | 57.15 | 2.68 | 20600 | 2 | 145.61 | 20600 | | |
| -24.438 | 5.216 | -0.287 | -17.97 | -4.93 | 93.20 | 1 | 58.21 | 2.68 | 20600 | 2 | 144.84 | 20600 | | |
| -24.875 | 5.089 | -0.293 | -19.44 | -1.65 | 93.20 | 1 | 59.26 | 2.68 | 20600 | 2 | 144.02 | 20600 | | |
| -25.312 | 4.960 | -0.299 | -19.29 | 2.46 | 93.20 | 1 | 60.32 | 2.68 | 20600 | 2 | 143.15 | 20600 | | |
| -25.750 | 4.828 | -0.305 | -17.16 | 7.43 | 93.20 | 1 | 61.37 | 2.68 | 20600 | 2 | 142.22 | 20600 | | |
| -26.188 | 4.693 | -0.309 | -12.66 | 13.28 | 93.20 | 1 | 62.43 | 2.68 | 20600 | 2 | 141.24 | 20600 | | |
| -26.625 | 4.557 | -0.312 | -5.41 | 20.02 | 93.20 | 1 | 63.48 | 2.68 | 20600 | 2 | 140.23 | 20600 | | |
| -27.062 | 4.420 | -0.312 | 4.99 | 27.67 | 93.20 | 1 | 64.54 | 2.68 | 20600 | 2 | 139.20 | 20600 | | |
| -27.500 | 4.284 | -0.309 | 18.94 | 36.23 | 93.20 | 1 | 65.59 | 2.68 | 20600 | 2 | 138.19 | 20600 | | |
| | | | | | 93.20 | 1 | 50.98 | 2.35 | 29000 | 2 | 169.46 | 29000 | | |
| -27.906 | 4.160 | -0.301 | 31.65 | 26.55 | 93.20 | 1 | 51.88 | 2.35 | 29000 | 2 | 167.46 | 29000 | | |
| -28.312 | 4.040 | -0.291 | 40.67 | 18.03 | 93.20 | 1 | 52.79 | 2.35 | 29000 | 2 | 165.56 | 29000 | | |
| -28.719 | 3.924 | -0.278 | 46.45 | 10.62 | 93.20 | 1 | 53.70 | 2.35 | 29000 | 2 | 163.80 | 29000 | | |
| -29.125 | 3.814 | -0.264 | 49.44 | 4.26 | 93.20 | 1 | 54.61 | 2.35 | 29000 | 2 | 162.20 | 29000 | | |
| -29.531 | 3.710 | -0.249 | 50.05 | -1.11 | 93.20 | 1 | 55.51 | 2.35 | 29000 | 2 | 160.77 | 29000 | | |
| -29.938 | 3.612 | -0.234 | 48.66 | -5.57 | 93.20 | 1 | 56.42 | 2.35 | 29000 | 2 | 159.51 | 29000 | | |
| -30.344 | 3.520 | -0.221 | 45.64 | -9.19 | 93.20 | 1 | 57.33 | 2.35 | 29000 | 2 | 158.42 | 29000 | | |
| -30.750 | 3.433 | -0.208 | 41.30 | -12.02 | 93.20 | 1 | 58.23 | 2.35 | 29000 | 2 | 157.49 | 29000 | | |
| -31.156 | 3.351 | -0.197 | 35.97 | -14.14 | 93.20 | 1 | 59.14 | 2.35 | 29000 | 2 | 156.70 | 29000 | | |
| -31.562 | 3.273 | -0.187 | 29.91 | -15.59 | 93.20 | 1 | 60.05 | 2.35 | 29000 | 2 | 156.03 | 29000 | | |
| -31.969 | 3.199 | -0.179 | 23.39 | -16.42 | 93.20 | 1 | 60.95 | 2.35 | 29000 | 2 | 155.47 | 29000 | | |
| -32.375 | 3.127 | -0.173 | 16.70 | -16.27 | 93.20 | 2 | 63.84 | 4.12 | 29000 | 2 | 154.98 | 29000 | | |
| -32.781 | 3.058 | -0.169 | 10.37 | -14.62 | 93.20 | 2 | 67.45 | 4.12 | 29000 | 2 | 154.56 | 29000 | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.188 | 2.989 | -0.167 | 5.04 | -11.34 | 93.20 | 2 | 71.02 | 4.12 | 29000 | 2 | 154.17 | | 29000 | | | |
| -33.594 | 2.922 | -0.166 | 1.37 | -6.47 | 93.20 | 2 | 74.57 | 4.12 | 29000 | 2 | 153.80 | | 29000 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -34.000 | 2.854 | -0.166 | 0.00 | 0.00 | 93.20 | 2 | 78.11 | 4.12 | 29000 | 2 | 153.43 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 7.45 mm

MOMENTO MÁXIMO = -324.14 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 103.23 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.042 = (1267.02 kN/m)/(30472.96 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.376 = (2758.36 kN/m)/(7338.94 kN/m)



**  FASE No  4  **

*Fase 4
*Ejecucion del puntal metalico provisional HEB-400
*Excavación hasta losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 3
NIVEL = -15.000 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 158000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -20.000 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -20.500 m



FASE 4

PARED

SOIL 1: EXCAVACIÓN: 0.00 m; NIVEL AGUA: -7.00 m; S. DE CAQUOT: 10.00 kPa

SOIL 2: EXCAVACIÓN: -20.00 m; NIVEL AGUA: -20.50 m; S. DE CAQUOT: 0.00 kPa

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | PUNTALES/ ANCLAS FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -0.027 | 0.591 | 0.00 | 0.00 | | 2 | 5.28 | 5.15 | 4900 | 0 | | | | | |
| -0.300 | 0.150 | 0.591 | 0.27 | 1.87 | | 2 | 7.20 | 5.15 | 4900 | 0 | | | | | |
| -0.600 | 0.327 | 0.591 | 1.18 | 4.32 | | 2 | 9.11 | 5.15 | 4900 | 0 | | | | | |
| -0.900 | 0.505 | 0.591 | 2.91 | 7.34 | | 2 | 11.02 | 5.15 | 4900 | 0 | | | | | |
| -1.200 | 0.682 | 0.592 | 5.64 | 10.93 | | 2 | 12.93 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 5.03 | 4.85 | 15100 | 0 | | | | | |
| -1.700 | 0.979 | 0.595 | 11.73 | 13.44 | | 2 | 5.03 | 4.85 | 15100 | 0 | | | | | |
| | | | | -41.29 | | 2 | 5.03 | 4.85 | 15100 | 0 | | | | 1 | -54.73 |
| -2.000 | 1.158 | 0.597 | -0.43 | -39.78 | | 2 | 5.02 | 4.85 | 15100 | 0 | | | | | |
| -2.300 | 1.337 | 0.595 | -12.14 | -38.28 | | 2 | 5.01 | 4.85 | 15100 | 0 | | | | | |
| -2.800 | 1.633 | 0.588 | -30.60 | -35.51 | | 2 | 6.04 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | -1 | | | | 0 | | | | | |
| -3.062 | 1.786 | 0.581 | -39.93 | -35.51 | | -1 | | | | 0 | | | | | |
| -3.325 | 1.937 | 0.572 | -49.25 | -35.51 | | -1 | | | | 0 | | | | | |
| -3.587 | 2.086 | 0.562 | -58.57 | -35.51 | | -1 | | | | 0 | | | | | |
| -3.850 | 2.232 | 0.550 | -67.89 | -35.51 | | -1 | | | | 0 | | | | | |
| -4.113 | 2.375 | 0.536 | -77.02 | -33.22 | | 2 | 17.44 | 4.55 | 20600 | 0 | | | | | |
| -4.375 | 2.514 | 0.521 | -85.10 | -28.26 | | 2 | 20.40 | 4.55 | 20600 | 0 | | | | | |
| -4.637 | 2.649 | 0.504 | -91.78 | -22.52 | | 2 | 23.29 | 4.55 | 20600 | 0 | | | | | |
| -4.900 | 2.779 | 0.486 | -96.86 | -16.04 | | 2 | 26.11 | 4.55 | 20600 | 0 | | | | | |
| -5.163 | 2.904 | 0.468 | -100.14 | -8.83 | | 2 | 28.84 | 4.55 | 20600 | 0 | | | | | |
| -5.425 | 3.024 | 0.449 | -101.44 | -0.92 | | 2 | 31.47 | 4.55 | 20600 | 0 | | | | | |
| -5.688 | 3.139 | 0.430 | -100.56 | 7.67 | | 2 | 33.98 | 4.55 | 20600 | 0 | | | | | |
| -5.950 | 3.250 | 0.411 | -97.35 | 16.91 | | 2 | 36.37 | 4.55 | 20600 | 0 | | | | | |
| -6.212 | 3.355 | 0.393 | -91.63 | 26.75 | | 2 | 38.62 | 4.55 | 20600 | 0 | | | | | |
| -6.475 | 3.456 | 0.376 | -83.26 | 37.16 | | 2 | 40.69 | 4.55 | 20600 | 0 | | | | | |
| -6.738 | 3.553 | 0.361 | -72.08 | 48.09 | | 2 | 42.58 | 4.55 | 20600 | 0 | | | | | |
| -7.000 | 3.646 | 0.349 | -57.97 | 59.49 | | 2 | 44.27 | 4.55 | 20600 | 0 | | | | | |
| -7.500 | 3.816 | 0.334 | -22.44 | 83.15 | 4.91 | 2 | 45.46 | 4.55 | 20600 | 0 | | | | | |
| -8.000 | 3.983 | 0.334 | 25.64 | 109.59 | 9.81 | 2 | 45.60 | 4.55 | 20600 | 0 | | | | | |
| -8.500 | 4.154 | 0.354 | 87.52 | 138.24 | 14.72 | 2 | 44.47 | 4.55 | 20600 | 0 | | | | | |
| -9.000 | 4.341 | 0.399 | 164.13 | 168.39 | 19.62 | 2 | 41.82 | 4.55 | 20600 | 0 | | | | | |
| -9.500 | 4.558 | 0.475 | 256.02 | 199.23 | 24.53 | 2 | 37.38 | 4.55 | 20600 | 0 | | | | | |
| -10.000 | 4.822 | 0.586 | 363.30 | 229.74 | 29.43 | 2 | 30.71 | 4.55 | 20600 | 0 | | | | | |
| -10.500 | 5.151 | 0.738 | 485.81 | 260.53 | 34.34 | 2 | 28.68 | 4.55 | 20600 | 0 | | | | | |
| -11.000 | 5.568 | 0.938 | 624.03 | 292.49 | 39.24 | 2 | 25.60 | 3.36 | 20600 | 0 | | | | | |
| | | | | -205.37 | 39.24 | 2 | 25.60 | 3.36 | 20600 | 0 | | | | 2 | -497.86 |
| -11.500 | 6.091 | 1.146 | 529.67 | -171.59 | 44.15 | 1 | 26.13 | 2.68 | 20600 | 0 | | | | | |
| -12.000 | 6.709 | 1.322 | 452.92 | -134.93 | 49.05 | 1 | 27.34 | 2.68 | 20600 | 0 | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 49.05 | 1 | 17.43 | 2.35 | 29000 | 0 | | | | | | | | | | | | | | |
| -12.375 | 7.227 | 1.438 | 407.10 | -109.15 | 52.73 | 1 | 18.27 | 2.35 | 29000 | 0 | | | | | | | | | | | | | | | |
| -12.750 | 7.786 | 1.543 | 371.27 | -81.68 | 56.41 | 1 | 19.11 | 2.35 | 29000 | 0 | | | | | | | | | | | | | | | |
| -13.125 | 8.383 | 1.640 | 346.05 | -52.51 | 60.09 | 1 | 19.94 | 2.35 | 29000 | 0 | | | | | | | | | | | | | | | |
| -13.500 | 9.016 | 1.732 | 332.09 | -21.66 | 63.77 | 1 | 20.78 | 2.35 | 29000 | 0 | | | | | | | | | | | | | | | |
| -13.875 | 9.682 | 1.821 | 330.02 | 10.90 | 67.44 | 1 | 21.62 | 2.35 | 29000 | 0 | | | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.250 | 10.382 | 1.911 | 340.47 | 45.14 | 71.12 | 1 | 22.45 | 2.35 | 29000 | 0 | | | |
| -14.625 | 11.116 | 2.006 | 364.09 | 81.08 | 74.80 | 1 | 23.29 | 2.35 | 29000 | 0 | | | |
| -15.000 | 11.887 | 2.110 | 401.49 | 118.71 | 78.48 | 1 | 24.13 | 2.35 | 29000 | 0 | | | |
| | | | | -587.98 | 78.48 | 1 | 24.13 | 2.35 | 29000 | 0 | | 3 | -706.69 |
| -15.500 | 12.970 | 2.203 | 120.58 | -535.17 | 83.39 | 1 | 25.25 | 2.35 | 29000 | 0 | | | |
| -16.000 | 14.074 | 2.200 | -133.17 | -479.35 | 88.29 | 1 | 26.36 | 2.35 | 29000 | 0 | | | |
| -16.500 | 15.155 | 2.110 | -358.26 | -420.51 | 93.20 | 1 | 27.48 | 2.35 | 29000 | 0 | | | |
| -17.000 | 16.172 | 1.945 | -553.18 | -358.67 | 98.10 | 1 | 28.59 | 2.35 | 29000 | 0 | | | |
| -17.500 | 17.089 | 1.715 | -716.43 | -293.82 | 103.01 | 1 | 29.71 | 2.35 | 29000 | 0 | | | |
| -18.000 | 17.878 | 1.432 | -846.50 | -225.96 | 107.91 | 1 | 30.83 | 2.35 | 29000 | 0 | | | |
| -18.500 | 18.515 | 1.109 | -941.89 | -155.08 | 112.82 | 1 | 31.94 | 2.35 | 29000 | 0 | | | |
| | | | | | 112.82 | 1 | 43.89 | 2.68 | 20600 | 0 | | | |
| -18.950 | 18.943 | 0.793 | -995.62 | -83.33 | 117.23 | 1 | 44.97 | 2.68 | 20600 | 0 | | | |
| -19.400 | 19.227 | 0.466 | -1016.51 | -9.10 | 121.64 | 1 | 46.06 | 2.68 | 20600 | 0 | | | |
| -19.700 | 19.334 | 0.246 | -1011.64 | 41.76 | 124.59 | 1 | 46.78 | 2.68 | 20600 | 0 | | | |
| -20.000 | 19.375 | 0.029 | -991.35 | 93.72 | 127.53 | 1 | 47.50 | 2.68 | 20600 | 0 | | | |
| | | | | | 127.53 | 1 | 47.50 | 2.68 | 20600 | 3 | 73.67 | 20600 | |
| -20.500 | 19.302 | -0.319 | -932.91 | 137.87 | 132.44 | 1 | 48.71 | 2.68 | 20600 | 3 | 105.89 | 20600 | |
| -20.938 | 19.099 | -0.603 | -865.78 | 168.10 | 132.44 | 1 | 49.77 | 2.68 | 20600 | 3 | 119.25 | 20600 | |
| -21.375 | 18.778 | -0.864 | -786.61 | 192.95 | 132.44 | 1 | 50.82 | 2.68 | 20600 | 3 | 132.61 | 20600 | |
| -21.812 | 18.348 | -1.098 | -697.73 | 212.42 | 132.44 | 1 | 51.88 | 2.68 | 20600 | 3 | 145.96 | 20600 | |
| -22.250 | 17.821 | -1.303 | -601.52 | 226.50 | 132.44 | 1 | 52.93 | 2.68 | 20600 | 3 | 159.32 | 20600 | |
| -22.688 | 17.212 | -1.477 | -500.33 | 235.21 | 132.44 | 1 | 53.99 | 2.68 | 20600 | 3 | 172.67 | 20600 | |
| -23.125 | 16.533 | -1.619 | -396.50 | 238.53 | 132.44 | 1 | 55.04 | 2.68 | 20600 | 3 | 186.03 | 20600 | |
| -23.562 | 15.800 | -1.727 | -292.40 | 236.47 | 132.44 | 1 | 56.10 | 2.68 | 20600 | 3 | 199.39 | 20600 | |
| -24.000 | 15.027 | -1.804 | -190.37 | 229.03 | 132.44 | 1 | 57.15 | 2.68 | 20600 | 3 | 212.74 | 20600 | |
| -24.438 | 14.227 | -1.848 | -92.78 | 216.21 | 132.44 | 1 | 58.21 | 2.68 | 20600 | 3 | 226.10 | 20600 | |
| -24.875 | 13.414 | -1.863 | -1.97 | 198.01 | 132.44 | 1 | 59.26 | 2.68 | 20600 | 3 | 239.45 | 20600 | |
| -25.312 | 12.601 | -1.850 | 79.70 | 174.43 | 132.44 | 1 | 60.32 | 2.68 | 20600 | 3 | 252.81 | 20600 | |
| -25.750 | 11.798 | -1.814 | 149.87 | 145.46 | 132.44 | 1 | 61.37 | 2.68 | 20600 | 3 | 266.17 | 20600 | |
| -26.188 | 11.017 | -1.757 | 206.99 | 116.57 | 132.44 | 1 | 62.43 | 2.68 | 20600 | 2 | 254.56 | 20600 | |
| -26.625 | 10.263 | -1.684 | 252.75 | 93.69 | 132.44 | 1 | 63.48 | 2.68 | 20600 | 2 | 240.83 | 20600 | |
| -27.062 | 9.545 | -1.598 | 289.89 | 77.12 | 132.44 | 1 | 64.54 | 2.68 | 20600 | 2 | 227.82 | 20600 | |
| -27.500 | 8.866 | -1.502 | 321.10 | 66.52 | 132.44 | 1 | 65.59 | 2.68 | 20600 | 2 | 215.63 | 20600 | |
| | | | | | 132.44 | 1 | 50.98 | 2.35 | 29000 | 2 | 286.99 | 29000 | |
| -27.906 | 8.276 | -1.405 | 340.03 | 27.78 | 132.44 | 1 | 51.88 | 2.35 | 29000 | 2 | 271.45 | 29000 | |
| -28.312 | 7.725 | -1.304 | 344.54 | -4.51 | 132.44 | 1 | 52.79 | 2.35 | 29000 | 2 | 257.08 | 29000 | |
| -28.719 | 7.216 | -1.204 | 337.17 | -30.84 | 132.44 | 1 | 53.70 | 2.35 | 29000 | 2 | 243.90 | 29000 | |
| -29.125 | 6.747 | -1.107 | 320.23 | -51.68 | 132.44 | 1 | 54.61 | 2.35 | 29000 | 2 | 231.88 | 29000 | |
| -29.531 | 6.315 | -1.017 | 295.86 | -67.50 | 132.44 | 1 | 55.51 | 2.35 | 29000 | 2 | 220.97 | 29000 | |
| -29.938 | 5.919 | -0.935 | 266.01 | -78.72 | 132.44 | 1 | 56.42 | 2.35 | 29000 | 2 | 211.07 | 29000 | |
| -30.344 | 5.555 | -0.861 | 232.47 | -85.73 | 132.44 | 1 | 57.33 | 2.35 | 29000 | 2 | 202.09 | 29000 | |
| -30.750 | 5.218 | -0.798 | 196.87 | -88.90 | 132.44 | 1 | 58.23 | 2.35 | 29000 | 2 | 193.91 | 29000 | |
| -31.156 | 4.905 | -0.746 | 160.72 | -88.51 | 132.44 | 1 | 59.14 | 2.35 | 29000 | 2 | 186.41 | 29000 | |
| -31.562 | 4.610 | -0.704 | 125.41 | -84.82 | 132.44 | 1 | 60.05 | 2.35 | 29000 | 2 | 179.47 | 29000 | |
| -31.969 | 4.331 | -0.672 | 92.23 | -78.02 | 132.44 | 1 | 60.95 | 2.35 | 29000 | 2 | 172.96 | 29000 | |
| -32.375 | 4.063 | -0.650 | 62.41 | -68.28 | 132.44 | 1 | 61.86 | 2.35 | 29000 | 2 | 166.77 | 29000 | |
| -32.781 | 3.802 | -0.635 | 37.13 | -55.70 | 132.44 | 1 | 62.77 | 2.35 | 29000 | 2 | 160.80 | 29000 | |
| -33.188 | 3.546 | -0.628 | 17.53 | -40.35 | 132.44 | 1 | 63.68 | 2.35 | 29000 | 2 | 154.95 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.594 | 3.291 | -0.624 | 4.72 | -22.27 | 132.44 | 1 | 64.58 | 2.35 | 29000 | 2 | 149.17 | 29000 | |
| -34.000 | 3.038 | -0.624 | 0.00 | 0.00 | 132.44 | 2 | 72.79 | 4.12 | 29000 | 2 | 143.41 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 19.37 mm

MOMENTO MÁXIMO =-1016.51 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 103.46 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.044 = (1328.17 kN/m)/(30472.96 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.578 = (2750.70 kN/m)/(4760.24 kN/m)



**  FASE No 5  **

*Fase 5
*Ejecucion de la losa de fondo

TZ_ E.LST

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 4 NIVEL = -19.400 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 4000000.000 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE PUNTALES N° 3



FASE 5

| | PARED | | | | | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -7.00 m S. DE CAQUOT: 10.00 kPa | | | | SOIL 2 EXCAVACIÓN: -20.00 m NIVEL AGUA: -20.50 m S. DE CAQUOT: 0.00 kPa | | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
| 0.000 | 0.282 | 0.407 | 0.00 | 0.00 | | 2 | 3.77 | 3.77 | 4900 | 0 | | | | | |
| -0.300 | 0.404 | 0.407 | 0.20 | 1.46 | | 2 | 5.95 | 5.15 | 4900 | 0 | | | | | |
| -0.600 | 0.526 | 0.407 | 0.94 | 3.57 | | 2 | 8.13 | 5.15 | 4900 | 0 | | | | | |
| -0.900 | 0.648 | 0.407 | 2.41 | 6.34 | | 2 | 10.32 | 5.15 | 4900 | 0 | | | | | |
| -1.200 | 0.770 | 0.408 | 4.81 | 9.76 | | 2 | 12.50 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 3.69 | 3.69 | 15100 | 0 | | | | | |
| -1.700 | 0.975 | 0.411 | 10.21 | 11.96 | | 2 | 5.09 | 4.85 | 15100 | 0 | | | | | |
| | | | | -26.63 | | 2 | 5.09 | 4.85 | 15100 | 0 | | | | 1 | -38.59 |
| -2.000 | 1.098 | 0.412 | 2.46 | -24.98 | | 2 | 5.92 | 4.85 | 15100 | 0 | | | | | |
| -2.300 | 1.222 | 0.412 | -4.75 | -23.08 | | 2 | 6.74 | 4.85 | 15100 | 0 | | | | | |
| -2.800 | 1.427 | 0.408 | -15.35 | -19.11 | | 2 | 9.14 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | -1 | | | | 0 | | | | | |
| -3.062 | 1.534 | 0.405 | -20.37 | -19.11 | | -1 | | | | 0 | | | | | |
| -3.325 | 1.639 | 0.400 | -25.38 | -19.11 | | -1 | | | | 0 | | | | | |
| -3.587 | 1.744 | 0.395 | -30.40 | -19.11 | | -1 | | | | 0 | | | | | |
| -3.850 | 1.847 | 0.389 | -35.42 | -19.11 | | -1 | | | | 0 | | | | | |
| -4.113 | 1.948 | 0.382 | -40.13 | -15.67 | | 2 | 26.24 | 4.55 | 20600 | 0 | | | | | |
| -4.375 | 2.047 | 0.374 | -43.30 | -8.28 | | 2 | 30.01 | 4.55 | 20600 | 0 | | | | | |
| -4.637 | 2.144 | 0.365 | -44.40 | 0.08 | | 2 | 33.68 | 4.55 | 20600 | 0 | | | | | |
| -4.900 | 2.239 | 0.357 | -43.17 | 9.38 | | 2 | 37.22 | 4.55 | 20600 | 0 | | | | | |
| -5.163 | 2.332 | 0.349 | -39.39 | 19.60 | | 2 | 40.62 | 4.55 | 20600 | 0 | | | | | |
| -5.425 | 2.422 | 0.342 | -32.81 | 30.69 | | 2 | 43.86 | 4.55 | 20600 | 0 | | | | | |
| -5.688 | 2.512 | 0.337 | -23.21 | 42.60 | | 2 | 46.92 | 4.55 | 20600 | 0 | | | | | |
| -5.950 | 2.600 | 0.334 | -10.37 | 55.29 | | 2 | 49.76 | 4.55 | 20600 | 0 | | | | | |
| -6.212 | 2.687 | 0.333 | 5.88 | 68.70 | | 2 | 52.38 | 4.55 | 20600 | 0 | | | | | |
| -6.475 | 2.775 | 0.336 | 25.75 | 82.76 | | 2 | 54.73 | 4.55 | 20600 | 0 | | | | | |
| -6.738 | 2.864 | 0.343 | 49.38 | 97.39 | | 2 | 56.77 | 4.55 | 20600 | 0 | | | | | |
| -7.000 | 2.955 | 0.355 | 76.92 | 112.52 | | 2 | 58.49 | 4.55 | 20600 | 0 | | | | | |
| -7.500 | 3.142 | 0.394 | 140.73 | 143.20 | 4.91 | 2 | 59.35 | 4.55 | 20600 | 0 | | | | | |
| -8.000 | 3.354 | 0.459 | 220.54 | 176.36 | 9.81 | 2 | 58.55 | 4.55 | 20600 | 0 | | | | | |
| -8.500 | 3.606 | 0.555 | 317.35 | 211.07 | 14.72 | 2 | 55.76 | 4.55 | 20600 | 0 | | | | | |
| -9.000 | 3.915 | 0.690 | 431.69 | 246.24 | 19.62 | 2 | 50.60 | 4.55 | 20600 | 0 | | | | | |
| -9.500 | 4.303 | 0.869 | 563.46 | 280.59 | 24.53 | 2 | 42.65 | 4.55 | 20600 | 0 | | | | | |
| -10.000 | 4.792 | 1.098 | 711.88 | 312.57 | 29.43 | 2 | 31.32 | 4.55 | 20600 | 0 | | | | | |
| -10.500 | 5.410 | 1.384 | 875.65 | 342.27 | 34.34 | 1 | 23.72 | 2.68 | 20600 | 0 | | | | | |
| -11.000 | 6.186 | 1.731 | 1054.30 | 372.83 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | | | | |
| | | | | -560.88 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | | | 2 | -933.70 |
| -11.500 | 7.139 | 2.062 | 782.13 | -527.27 | 44.15 | 1 | 26.13 | 2.68 | 20600 | 0 | | | | | |
| -12.000 | 8.233 | 2.298 | 527.54 | -490.60 | 49.05 | 1 | 27.34 | 2.68 | 20600 | 0 | | | | | |
| | | | | | 49.05 | 1 | 17.43 | 2.35 | 29000 | 0 | | | | | |
| -12.375 | 9.118 | 2.416 | 348.34 | -464.82 | 52.73 | 1 | 18.27 | 2.35 | 29000 | 0 | | | | | |
| -12.750 | 10.039 | 2.487 | 179.13 | -437.35 | 56.41 | 1 | 19.11 | 2.35 | 29000 | 0 | | | | | |
| -13.125 | 10.978 | 2.514 | 20.54 | -408.19 | 60.09 | 1 | 19.94 | 2.35 | 29000 | 0 | | | | | |
| -13.500 | 11.919 | 2.499 | -126.80 | -377.33 | 63.77 | 1 | 20.78 | 2.35 | 29000 | 0 | | | | | |
| -13.875 | 12.847 | 2.446 | -262.25 | -344.78 | 67.44 | 1 | 21.62 | 2.35 | 29000 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.250 | 13.749 | 2.358 | -385.17 | -310.54 | 71.12 | 1 | 22.45 | 2.35 | 29000 | 0 | | | | | |
| -14.625 | 14.612 | 2.239 | -494.94 | -274.60 | 74.80 | 1 | 23.29 | 2.35 | 29000 | 0 | | | | | |
| -15.000 | 15.425 | 2.092 | -590.91 | -236.97 | 78.48 | 1 | 24.13 | 2.35 | 29000 | 0 | | | | | |
| -15.500 | 16.415 | 1.859 | -696.31 | -184.16 | 83.39 | 1 | 25.25 | 2.35 | 29000 | 0 | | | | | |
| -16.000 | 17.279 | 1.593 | -774.56 | -128.34 | 88.29 | 1 | 26.36 | 2.35 | 29000 | 0 | | | | | |
| -16.500 | 18.004 | 1.304 | -824.15 | -69.50 | 93.20 | 1 | 27.48 | 2.35 | 29000 | 0 | | | | | |
| -17.000 | 18.581 | 1.002 | -843.56 | -7.66 | 98.10 | 1 | 28.59 | 2.35 | 29000 | 0 | | | | | |
| -17.500 | 19.006 | 0.699 | -831.31 | 57.19 | 103.01 | 1 | 29.71 | 2.35 | 29000 | 0 | | | | | |
| -18.000 | 19.281 | 0.406 | -785.87 | 125.05 | 107.91 | 1 | 30.83 | 2.35 | 29000 | 0 | | | | | |
| -18.500 | 19.416 | 0.136 | -705.75 | 195.93 | 112.82 | 1 | 31.94 | 2.35 | 29000 | 0 | | | | | |
| | | | | | 112.82 | 1 | 43.89 | 2.68 | 20600 | 0 | | | | | |
| -18.950 | 19.428 | -0.077 | -601.53 | 267.68 | 117.23 | 1 | 44.97 | 2.68 | 20600 | 0 | | | | | |
| -19.400 | 19.353 | -0.251 | -464.47 | 341.91 | 121.64 | 1 | 46.06 | 2.68 | 20600 | 0 | | | | | |
| | | | | -161.67 | 121.64 | 1 | 46.06 | 2.68 | 20600 | 0 | | | | 4 | -503.58 |
| -19.700 | 19.262 | -0.356 | -505.35 | -110.59 | 124.59 | 2 | 48.26 | 4.15 | 20600 | 0 | | | | | |
| -20.000 | 19.139 | -0.468 | -530.64 | -57.68 | 127.53 | 2 | 52.37 | 4.55 | 20600 | 0 | | | | | |
| | | | | | 127.53 | 2 | 52.37 | 4.55 | 20600 | 2 | 68.80 | | 20600 | | |
| -20.500 | 18.856 | -0.663 | -546.32 | -6.50 | 132.44 | 2 | 57.89 | 4.55 | 20600 | 2 | 96.72 | | 20600 | | |
| -20.938 | 18.528 | -0.835 | -540.43 | 32.89 | 132.44 | 2 | 61.53 | 4.55 | 20600 | 2 | 107.49 | | 20600 | | |
| -21.375 | 18.126 | -1.002 | -518.05 | 68.76 | 132.44 | 2 | 64.24 | 4.55 | 20600 | 2 | 119.18 | | 20600 | | |
| -21.812 | 17.653 | -1.160 | -480.89 | 100.36 | 132.44 | 2 | 66.19 | 4.55 | 20600 | 2 | 131.65 | | 20600 | | |
| -22.250 | 17.113 | -1.305 | -430.94 | 127.10 | 132.44 | 2 | 67.52 | 4.55 | 20600 | 2 | 144.73 | | 20600 | | |
| -22.688 | 16.514 | -1.431 | -370.46 | 148.48 | 132.44 | 2 | 68.37 | 4.55 | 20600 | 2 | 158.29 | | 20600 | | |
| -23.125 | 15.863 | -1.538 | -301.86 | 164.13 | 132.44 | 2 | 68.84 | 4.55 | 20600 | 2 | 172.23 | | 20600 | | |
| -23.562 | 15.172 | -1.621 | -227.72 | 173.78 | 132.44 | 2 | 69.05 | 4.55 | 20600 | 2 | 186.44 | | 20600 | | |
| -24.000 | 14.448 | -1.681 | -150.71 | 177.21 | 132.44 | 2 | 69.06 | 4.55 | 20600 | 2 | 200.83 | | 20600 | | |
| -24.438 | 13.704 | -1.716 | -73.58 | 174.31 | 132.44 | 2 | 68.97 | 4.55 | 20600 | 2 | 215.34 | | 20600 | | |
| -24.875 | 12.950 | -1.728 | 0.88 | 165.00 | 132.44 | 2 | 68.82 | 4.55 | 20600 | 2 | 229.90 | | 20600 | | |
| -25.312 | 12.196 | -1.716 | 69.85 | 149.24 | 132.44 | 2 | 68.66 | 4.55 | 20600 | 2 | 244.47 | | 20600 | | |
| -25.750 | 11.451 | -1.685 | 130.52 | 127.05 | 132.44 | 2 | 68.52 | 4.55 | 20600 | 2 | 259.02 | | 20600 | | |
| -26.188 | 10.725 | -1.635 | 180.88 | 103.93 | 132.44 | 2 | 68.45 | 4.55 | 20600 | 2 | 248.54 | | 20600 | | |
| -26.625 | 10.023 | -1.571 | 222.19 | 85.85 | 132.44 | 2 | 68.44 | 4.55 | 20600 | 2 | 235.87 | | 20600 | | |
| -27.062 | 9.351 | -1.496 | 256.79 | 73.19 | 132.44 | 2 | 68.52 | 4.55 | 20600 | 2 | 223.83 | | 20600 | | |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.500 | 8.715 | -1.410 | 286.98 | 65.69 | 132.44 | 2 | 68.70 | 4.55 | 20600 | 2 | 212.53 | | 20600 | | | | | | | | | | |
| | | | | | 132.44 | 2 | 55.35 | 4.12 | 29000 | 2 | 282.62 | | 29000 | | | | | | | | | | |
| -27.906 | 8.160 | -1.322 | 306.24 | 30.09 | 132.44 | 2 | 55.23 | 4.12 | 29000 | 2 | 268.11 | | 29000 | | | | | | | | | | |
| -28.312 | 7.642 | -1.231 | 312.19 | 0.14 | 132.44 | 2 | 55.22 | 4.12 | 29000 | 2 | 254.65 | | 29000 | | | | | | | | | | |
| -28.719 | 7.160 | -1.141 | 307.06 | -24.55 | 132.44 | 2 | 55.33 | 3.98 | 29000 | 2 | 242.27 | | 29000 | | | | | | | | | | |
| -29.125 | 6.714 | -1.052 | 292.91 | -44.35 | 132.44 | 2 | 55.54 | 3.28 | 29000 | 2 | 230.95 | | 29000 | | | | | | | | | | |
| -29.531 | 6.304 | -0.970 | 271.64 | -59.65 | 132.44 | 2 | 55.84 | 2.68 | 29000 | 2 | 220.64 | | 29000 | | | | | | | | | | |
| -29.938 | 5.926 | -0.894 | 245.01 | -70.77 | 132.44 | 1 | 56.42 | 2.35 | 29000 | 2 | 211.26 | | 29000 | | | | | | | | | | |
| -30.344 | 5.577 | -0.826 | 214.67 | -77.96 | 132.44 | 1 | 57.33 | 2.35 | 29000 | 2 | 202.72 | | 29000 | | | | | | | | | | |
| -30.750 | 5.253 | -0.768 | 182.17 | -81.45 | 132.44 | 1 | 58.23 | 2.35 | 29000 | 2 | 194.93 | | 29000 | | | | | | | | | | |
| -31.156 | 4.951 | -0.720 | 148.95 | -81.55 | 132.44 | 1 | 59.14 | 2.35 | 29000 | 2 | 187.77 | | 29000 | | | | | | | | | | |
| -31.562 | 4.667 | -0.681 | 116.34 | -78.46 | 132.44 | 1 | 60.05 | 2.35 | 29000 | 2 | 181.12 | | 29000 | | | | | | | | | | |
| -31.969 | 4.397 | -0.651 | 85.60 | -72.39 | 132.44 | 1 | 60.95 | 2.35 | 29000 | 2 | 174.87 | | 29000 | | | | | | | | | | |
| -32.375 | 4.137 | -0.630 | 57.91 | -63.48 | 132.44 | 1 | 61.86 | 2.35 | 29000 | 2 | 168.92 | | 29000 | | | | | | | | | | |
| -32.781 | 3.884 | -0.617 | 34.40 | -51.82 | 132.44 | 1 | 62.77 | 2.35 | 29000 | 2 | 163.17 | | 29000 | | | | | | | | | | |
| -33.188 | 3.635 | -0.610 | 16.17 | -37.47 | 132.44 | 1 | 63.68 | 2.35 | 29000 | 2 | 157.54 | | 29000 | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 5 (CONTINUACIÓN)

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.594 | 3.388 | -0.607 | 4.31 | -20.49 | 132.44 | 1 | 64.58 | 2.35 | 29000 | 2 | 151.97 | | 29000 | | | | | | | | | | |
| -34.000 | 3.141 | -0.606 | 0.00 | 0.00 | 132.44 | 2 | 69.79 | 4.12 | 29000 | 2 | 146.41 | | 29000 | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 19.43 mm

MOMENTO MÁXIMO = 1054.30 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 119.41 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.048 = (1472.44 kN/m)/(30472.96 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.563 = (2678.38 kN/m)/(4760.24 kN/m)



**  FASE No 6  **

*Fase 6
*Restitucion del nf

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -20.000 m
PRESIÓN DEL AGUA EN SUELO 2 PARA NIVEL = -20.000 m PR. = 0.000 kPa
PR. = 130.000 kPa



FASE 6

PARED

SOIL 1: EXCAVACIÓN: 0.00 m; NIVEL AGUA: -7.00 m; S. DE CAQUOT: 10.00 kPa

SOIL 2: EXCAVACIÓN: -20.00 m; NIVEL AGUA: -20.00 m; S. DE CAQUOT: 0.00 kPa

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.335 | 0.375 | 0.00 | 0.00 | | 2 | 3.51 | 3.51 | 4900 | 0 | | | | | | | | | | | | | |
| -0.300 | 0.448 | 0.375 | 0.19 | 1.39 | | 2 | 5.74 | 5.15 | 4900 | 0 | | | | | | | | | | | | | |
| -0.600 | 0.560 | 0.375 | 0.90 | 3.44 | | 2 | 7.97 | 5.15 | 4900 | 0 | | | | | | | | | | | | | |
| -0.900 | 0.673 | 0.376 | 2.32 | 6.17 | | 2 | 10.20 | 5.15 | 4900 | 0 | | | | | | | | | | | | | |
| -1.200 | 0.786 | 0.376 | 4.67 | 9.56 | | 2 | 12.42 | 5.15 | 4900 | 0 | | | | | | | | | | | | | |
| | | | | | | 2 | 3.46 | 3.46 | 15100 | 0 | | | | | | | | | | | | | |
| -1.700 | 0.974 | 0.379 | 9.95 | 11.70 | | 2 | 5.10 | 4.85 | 15100 | 0 | | | | | | | | | | | | | |
| | | | | -24.41 | | 2 | 5.10 | 4.85 | 15100 | 0 | | | | | | | | | | | | 1 | -36.11 |
| -2.000 | 1.088 | 0.380 | 2.87 | -22.73 | | 2 | 6.07 | 4.85 | 15100 | 0 | | | | | | | | | | | | | |
| -2.300 | 1.202 | 0.380 | -3.66 | -20.77 | | 2 | 7.04 | 4.85 | 15100 | 0 | | | | | | | | | | | | | |
| -2.800 | 1.392 | 0.377 | -13.06 | -16.59 | | 2 | 9.68 | 4.85 | 15100 | 0 | | | | | | | | | | | | | |
| | | | | | | -1 | | | | 0 | | | | | | | | | | | | | |
| -3.062 | 1.490 | 0.374 | -17.41 | -16.59 | | -1 | | | | 0 | | | | | | | | | | | | | |
| -3.325 | 1.588 | 0.371 | -21.77 | -16.59 | | -1 | | | | 0 | | | | | | | | | | | | | |
| -3.587 | 1.685 | 0.366 | -26.12 | -16.59 | | -1 | | | | 0 | | | | | | | | | | | | | |
| -3.850 | 1.780 | 0.361 | -30.47 | -16.55 | | 2 | 0.25 | 0.25 | 20600 | 0 | | | | | | | | | | | | | |
| -4.113 | 1.874 | 0.354 | -34.49 | -12.88 | | 2 | 27.76 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -4.375 | 1.966 | 0.348 | -36.87 | -5.08 | | 2 | 31.68 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -4.637 | 2.057 | 0.341 | -37.07 | 3.74 | | 2 | 35.48 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -4.900 | 2.145 | 0.334 | -34.82 | 13.54 | | 2 | 39.16 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -5.163 | 2.232 | 0.328 | -29.88 | 24.28 | | 2 | 42.68 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -5.425 | 2.317 | 0.323 | -22.00 | 35.92 | | 2 | 46.03 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -5.688 | 2.401 | 0.319 | -10.95 | 48.42 | | 2 | 49.19 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -5.950 | 2.485 | 0.319 | 3.49 | 61.71 | | 2 | 52.12 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -6.212 | 2.569 | 0.321 | 21.52 | 75.75 | | 2 | 54.81 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -6.475 | 2.654 | 0.327 | 43.32 | 90.45 | | 2 | 57.21 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -6.738 | 2.741 | 0.338 | 69.06 | 105.74 | | 2 | 59.30 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -7.000 | 2.832 | 0.354 | 98.88 | 121.54 | | 2 | 61.04 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -7.500 | 3.019 | 0.401 | 167.52 | 153.49 | 4.91 | 2 | 61.87 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -8.000 | 3.237 | 0.476 | 252.78 | 187.88 | 9.81 | 2 | 60.95 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -8.500 | 3.501 | 0.586 | 355.64 | 223.72 | 14.72 | 2 | 57.91 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -9.000 | 3.830 | 0.735 | 476.55 | 259.87 | 19.62 | 2 | 52.36 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -9.500 | 4.244 | 0.931 | 615.33 | 294.96 | 24.53 | 2 | 43.86 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |
| -10.000 | 4.770 | 1.181 | 771.07 | 327.36 | 29.43 | 2 | 31.78 | 4.55 | 20600 | 0 | | | | | | | | | | | | | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -10.500 | 5.435 | 1.489 | 942.27 | 357.18 | 34.34 | 1 | 23.72 | 2.68 | 20600 | 0 | | |
| -11.000 | 6.270 | 1.862 | 1128.37 | 387.73 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | |
| | | | | -605.02 | 39.24 | 1 | 24.92 | 2.68 | 20600 | 0 | | 2 -992.75 |
| -11.500 | 7.294 | 2.216 | 834.13 | -571.41 | 44.15 | 1 | 26.13 | 2.68 | 20600 | 0 | | |
| -12.000 | 8.469 | 2.466 | 557.47 | -534.74 | 49.05 | 1 | 27.34 | 2.68 | 20600 | 0 | | |
| | | | | | 49.05 | 1 | 17.43 | 2.35 | 29000 | 0 | | |
| -12.375 | 9.419 | 2.590 | 361.72 | -508.96 | 52.73 | 1 | 18.27 | 2.35 | 29000 | 0 | | |
| -12.750 | 10.405 | 2.663 | 175.96 | -481.49 | 56.41 | 1 | 19.11 | 2.35 | 29000 | 0 | | |
| -13.125 | 11.410 | 2.686 | 0.81 | -452.33 | 60.09 | 1 | 19.94 | 2.35 | 29000 | 0 | | |
| -13.500 | 12.414 | 2.664 | -163.08 | -421.47 | 63.77 | 1 | 20.78 | 2.35 | 29000 | 0 | | |
| -13.875 | 13.402 | 2.599 | -315.08 | -388.92 | 67.44 | 1 | 21.62 | 2.35 | 29000 | 0 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.250 | 14.359 | 2.495 | -454.55 | -354.67 | 71.12 | 1 | 22.45 | 2.35 | 29000 | 0 | | |
| -14.625 | 15.269 | 2.355 | -580.87 | -318.74 | 74.80 | 1 | 23.29 | 2.35 | 29000 | 0 | | |
| -15.000 | 16.121 | 2.182 | -693.39 | -281.10 | 78.48 | 1 | 24.13 | 2.35 | 29000 | 0 | | |
| -15.500 | 17.145 | 1.908 | -820.87 | -228.29 | 83.39 | 1 | 25.25 | 2.35 | 29000 | 0 | | |
| -16.000 | 18.022 | 1.593 | -921.19 | -172.47 | 88.29 | 1 | 26.36 | 2.35 | 29000 | 0 | | |
| -16.500 | 18.733 | 1.247 | -992.84 | -113.64 | 93.20 | 1 | 27.48 | 2.35 | 29000 | 0 | | |
| -17.000 | 19.265 | 0.881 | -1034.33 | -51.80 | 98.10 | 1 | 28.59 | 2.35 | 29000 | 0 | | |
| -17.500 | 19.612 | 0.505 | -1044.14 | 13.05 | 103.01 | 1 | 29.71 | 2.35 | 29000 | 0 | | |
| -18.000 | 19.770 | 0.131 | -1020.78 | 80.91 | 107.91 | 1 | 30.83 | 2.35 | 29000 | 0 | | |
| -18.500 | 19.746 | -0.227 | -962.73 | 151.79 | 112.82 | 1 | 31.94 | 2.35 | 29000 | 0 | | |
| | | | | | 112.82 | 1 | 43.89 | 2.68 | 20600 | 0 | | |
| -18.950 | 19.575 | -0.527 | -878.37 | 223.54 | 117.23 | 1 | 44.97 | 2.68 | 20600 | 0 | | |
| -19.400 | 19.276 | -0.794 | -761.12 | 298.12 | 121.64 | 2 | 47.64 | 4.26 | 20600 | 0 | | |
| | | | | 101.58 | 121.64 | 2 | 47.64 | 4.26 | 20600 | 0 | | 4 -196.55 |
| -19.700 | 19.014 | -0.955 | -722.90 | 153.67 | 124.59 | 2 | 53.38 | 4.55 | 20600 | 0 | | |
| -20.000 | 18.704 | -1.106 | -670.57 | 189.19 | -2.47 | 2 | 61.32 | 4.55 | 20600 | 0 | | |
| | | | | | -2.47 | 2 | 61.32 | 4.55 | 20600 | 2 59.85 | 20600 | |
| -20.500 | 18.094 | -1.331 | -576.38 | 187.04 | -2.47 | 2 | 73.60 | 4.55 | 20600 | 2 78.73 | 20600 | |
| -20.938 | 17.474 | -1.500 | -495.12 | 184.78 | -2.47 | 2 | 83.26 | 4.55 | 20600 | 2 83.48 | 20600 | |
| -21.375 | 16.785 | -1.643 | -414.45 | 184.22 | -2.47 | 2 | 91.87 | 4.55 | 20600 | 2 89.28 | 20600 | |
| -21.812 | 16.039 | -1.761 | -333.82 | 184.43 | -2.47 | 2 | 99.43 | 4.55 | 20600 | 2 96.14 | 20600 | |
| -22.250 | 15.248 | -1.854 | -253.10 | 184.48 | -2.47 | 2 | 105.95 | 4.55 | 20600 | 2 104.03 | 20600 | |
| -22.688 | 14.421 | -1.921 | -172.54 | 183.51 | -2.47 | 2 | 111.48 | 4.55 | 20600 | 2 112.91 | 20600 | |
| -23.125 | 13.570 | -1.963 | -92.80 | 180.67 | -2.47 | 2 | 116.08 | 4.55 | 20600 | 2 122.72 | 20600 | |
| -23.562 | 12.707 | -1.980 | -14.85 | 175.16 | -2.47 | 2 | 119.82 | 4.55 | 20600 | 2 133.39 | 20600 | |
| -24.000 | 11.842 | -1.973 | 59.98 | 166.28 | -2.47 | 2 | 122.76 | 4.55 | 20600 | 2 144.85 | 20600 | |
| -24.438 | 10.984 | -1.942 | 130.06 | 153.36 | -2.47 | 2 | 125.00 | 4.55 | 20600 | 2 157.03 | 20600 | |
| -24.875 | 10.145 | -1.891 | 193.50 | 135.82 | -2.47 | 2 | 126.60 | 4.55 | 20600 | 2 169.84 | 20600 | |
| -25.312 | 9.332 | -1.821 | 248.15 | 113.13 | -2.47 | 2 | 127.65 | 4.55 | 20600 | 2 183.20 | 20600 | |
| -25.750 | 8.554 | -1.736 | 291.67 | 84.84 | -2.47 | 2 | 128.22 | 4.55 | 20600 | 2 197.05 | 20600 | |
| -26.188 | 7.815 | -1.639 | 322.30 | 56.02 | -2.47 | 2 | 128.38 | 4.55 | 20600 | 2 186.33 | 20600 | |
| -26.625 | 7.121 | -1.534 | 341.43 | 32.29 | -2.47 | 2 | 128.22 | 4.55 | 20600 | 2 173.82 | 20600 | |
| -27.062 | 6.474 | -1.424 | 351.31 | 13.69 | -2.47 | 2 | 127.80 | 4.55 | 20600 | 2 162.28 | 20600 | |
| -27.500 | 5.875 | -1.313 | 354.08 | -0.30 | -2.47 | 2 | 127.21 | 4.55 | 20600 | 2 151.74 | 20600 | |
| | | | | | -2.47 | 2 | 137.72 | 4.12 | 29000 | 2 198.19 | 29000 | |
| -27.906 | 5.363 | -1.209 | 349.09 | -23.45 | -2.47 | 2 | 136.35 | 4.12 | 29000 | 2 184.93 | 29000 | |
| -28.312 | 4.892 | -1.109 | 335.64 | -42.03 | -2.47 | 2 | 134.95 | 4.12 | 29000 | 2 172.86 | 29000 | |
| -28.719 | 4.461 | -1.013 | 315.50 | -56.49 | -2.47 | 2 | 133.58 | 4.12 | 29000 | 2 161.96 | 29000 | |
| -29.125 | 4.068 | -0.924 | 290.23 | -67.30 | -2.47 | 2 | 132.29 | 4.12 | 29000 | 2 152.14 | 29000 | |
| -29.531 | 3.709 | -0.844 | 261.26 | -74.82 | -2.47 | 2 | 131.09 | 4.12 | 29000 | 2 143.33 | 29000 | |
| -29.938 | 3.381 | -0.772 | 229.85 | -79.36 | -2.47 | 2 | 130.20 | 4.12 | 29000 | 2 135.41 | 29000 | |
| -30.344 | 3.081 | -0.709 | 197.15 | -81.14 | -2.47 | 2 | 129.70 | 4.12 | 29000 | 2 128.29 | 29000 | |
| -30.750 | 2.804 | -0.656 | 164.27 | -80.35 | -2.47 | 2 | 129.25 | 4.12 | 29000 | 2 121.85 | 29000 | |
| -31.156 | 2.547 | -0.613 | 132.18 | -77.23 | -2.47 | 2 | 128.87 | 4.12 | 29000 | 2 115.98 | 29000 | |
| -31.562 | 2.305 | -0.578 | 101.81 | -71.96 | -2.47 | 2 | 128.55 | 4.12 | 29000 | 2 110.56 | 29000 | |
| -31.969 | 2.076 | -0.553 | 73.99 | -64.69 | -2.47 | 2 | 128.27 | 4.12 | 29000 | 2 105.49 | 29000 | |
| -32.375 | 1.855 | -0.535 | 49.51 | -55.51 | -2.47 | 2 | 128.03 | 4.12 | 29000 | 2 100.69 | 29000 | |
| -32.781 | 1.640 | -0.523 | 29.13 | -44.50 | -2.47 | 2 | 127.83 | 4.12 | 29000 | 2 96.05 | 29000 | |
| -33.188 | 1.429 | -0.517 | 13.59 | -31.71 | -2.47 | 2 | 127.64 | 4.12 | 29000 | 2 91.52 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.594 | 1.220 | -0.515 | 3.61 | -17.17 | -2.47 | 2 | 127.46 | 4.12 | 29000 | 2 87.03 | 29000 | |
| -34.000 | 1.011 | -0.514 | 0.00 | 0.00 | -2.47 | 2 | 131.58 | 4.12 | 29000 | 2 82.56 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 19.77 mm

MOMENTO MÁXIMO = 1128.37 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 128.26 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.075 = (2293.69 kN/m)/(30472.96 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.408 = (1843.15 kN/m)/(4512.09 kN/m)





** FASE No 7 **

*Fase 7
*Sismo
*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -1.200 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -2.800 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.522 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.594 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -12.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -18.500 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -27.500 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d



* NUEVOS PARÁMETROS PARA CAPA No. 6 HASTA NIVEL -36.300 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |

PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 29000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 7 HASTA NIVEL -37.500 m

PESO ESPECIFOCO HÚMEDO GH = 20.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 10.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.795
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.426
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.402
COHESIÓN C = 30.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 35.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 43800.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG3a

* NUEVOS PARÁMETROS PARA CAPA No. 8 HASTA NIVEL -46.500 m

PESO ESPECIFOCO HÚMEDO GH = 23.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 13.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.302
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.152
COEFIC. DE EMPUJE PASIVO HOR. KP = 10.398
COHESIÓN C = 246.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 58.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m



FASE 7

| | PARED | SOIL 1 | SOIL 2 | |
|---|---|---|---|---|
| | | EXCAVACIÓN: 0.00 m | EXCAVACIÓN: -20.00 m | PUNTALES/ |
| | | NIVEL AGUA: -7.00 m | NIVEL AGUA: -20.00 m | ANCLAS |
| | | S. DE CAQUOT: 10.00 kPa | S. DE CAQUOT: 0.00 kPa | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -1.059 | 1.215 | 0.00 | 0.00 | | 2 | 10.34 | 5.15 | 4900 | 0 | | | |
| -0.300 | -0.695 | 1.215 | 0.48 | 3.25 | | 2 | 11.34 | 5.15 | 4900 | 0 | | | |
| -0.600 | -0.330 | 1.216 | 1.98 | 6.80 | | 2 | 12.33 | 5.15 | 4900 | 0 | | | |
| -0.900 | 0.035 | 1.216 | 4.59 | 10.65 | | 2 | 13.32 | 5.15 | 4900 | 0 | | | |
| -1.200 | 0.400 | 1.218 | 8.40 | 14.80 | | 2 | 14.32 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 9.29 | 4.85 | 15100 | 0 | | | |
| -1.700 | 1.010 | 1.222 | 16.76 | 18.26 | | 2 | 4.57 | 4.57 | 15100 | 0 | | | |
| | | | | -159.19 | | 2 | 4.57 | 4.57 | 15100 | 0 | | 1 | -177.45 |
| -2.000 | 1.376 | 1.221 | -30.75 | -157.41 | | 1 | 7.25 | 5.22 | 15100 | 0 | | | |
| -2.300 | 1.741 | 1.209 | -77.60 | -154.81 | | 1 | 10.14 | 5.22 | 15100 | 0 | | | |
| -2.800 | 2.336 | 1.167 | -153.54 | -148.53 | | 1 | 14.97 | 5.22 | 15100 | 0 | | | |
| | | | | | | 1 | 36.30 | 9.48 | 20600 | 0 | | | |
| -3.062 | 2.639 | 1.135 | -191.22 | -138.38 | | 1 | 41.03 | 9.48 | 20600 | 0 | | | |
| -3.325 | 2.931 | 1.095 | -226.07 | -126.99 | | 1 | 45.76 | 9.48 | 20600 | 0 | | | |
| -3.587 | 3.213 | 1.049 | -257.78 | -114.35 | | 1 | 50.48 | 9.48 | 20600 | 0 | | | |
| -3.850 | 3.482 | 0.998 | -286.00 | -100.48 | | 1 | 55.21 | 9.48 | 20600 | 0 | | | |
| -4.113 | 3.736 | 0.941 | -310.42 | -85.37 | | 1 | 59.94 | 9.48 | 20600 | 0 | | | |
| -4.375 | 3.975 | 0.880 | -330.71 | -69.01 | | 1 | 64.67 | 9.48 | 20600 | 0 | | | |
| -4.637 | 4.198 | 0.816 | -346.55 | -51.42 | | 1 | 69.40 | 9.48 | 20600 | 0 | | | |
| -4.900 | 4.404 | 0.749 | -357.60 | -32.58 | | 1 | 74.12 | 9.48 | 20600 | 0 | | | |
| -5.163 | 4.591 | 0.681 | -363.54 | -12.50 | | 1 | 78.85 | 9.48 | 20600 | 0 | | | |
| -5.425 | 4.761 | 0.612 | -364.05 | 8.82 | | 1 | 83.58 | 9.48 | 20600 | 0 | | | |
| -5.688 | 4.913 | 0.544 | -358.80 | 31.38 | | 1 | 88.31 | 9.48 | 20600 | 0 | | | |
| -5.950 | 5.046 | 0.477 | -347.47 | 55.18 | | 1 | 93.04 | 9.48 | 20600 | 0 | | | |
| -6.212 | 5.163 | 0.412 | -329.73 | 80.22 | | 1 | 97.77 | 9.48 | 20600 | 0 | | | |
| -6.475 | 5.263 | 0.352 | -305.25 | 106.51 | | 1 | 102.49 | 9.48 | 20600 | 0 | | | |
| -6.738 | 5.348 | 0.297 | -273.70 | 134.03 | | 1 | 107.22 | 9.48 | 20600 | 0 | | | |
| -7.000 | 5.420 | 0.249 | -234.77 | 162.80 | | 1 | 111.95 | 9.48 | 20600 | 0 | | | |
| -7.500 | 5.526 | 0.181 | -139.00 | 221.07 | 4.91 | 1 | 116.22 | 9.48 | 20600 | 0 | | | |
| -8.000 | 5.607 | 0.152 | -12.94 | 283.92 | 9.81 | 1 | 120.48 | 9.48 | 20600 | 0 | | | |
| -8.500 | 5.687 | 0.175 | 145.69 | 351.36 | 14.72 | 1 | 124.75 | 9.48 | 20600 | 0 | | | |
| -9.000 | 5.793 | 0.262 | 339.18 | 423.38 | 19.62 | 1 | 129.01 | 9.48 | 20600 | 0 | | | |
| -9.500 | 5.961 | 0.424 | 569.83 | 499.99 | 24.53 | 1 | 133.28 | 9.48 | 20600 | 0 | | | |
| -10.000 | 6.232 | 0.677 | 839.93 | 581.19 | 29.43 | 1 | 137.55 | 9.48 | 20600 | 0 | | | |
| -10.500 | 6.656 | 1.035 | 1151.78 | 666.97 | 34.34 | 1 | 141.81 | 9.48 | 20600 | 0 | | | |
| -11.000 | 7.288 | 1.513 | 1507.67 | 757.33 | 39.24 | 1 | 146.08 | 9.48 | 20600 | 0 | | | |
| | | | | -952.77 | 39.24 | 1 | 146.08 | 9.48 | 20600 | 0 | | 2 | -1710.10 |
| -11.500 | 8.166 | 1.974 | 1054.83 | -857.82 | 44.15 | 1 | 150.34 | 9.48 | 20600 | 0 | | | |
| -12.000 | 9.236 | 2.280 | 650.61 | -758.28 | 49.05 | 1 | 154.61 | 9.48 | 20600 | 0 | | | |
| | | | | | 49.05 | 1 | 121.28 | 7.89 | 29000 | 0 | | | |
| -12.375 | 10.119 | 2.419 | 378.39 | -693.19 | 52.73 | 1 | 124.09 | 7.89 | 29000 | 0 | | | |
| -12.750 | 11.041 | 2.487 | 131.02 | -625.67 | 56.41 | 1 | 126.90 | 7.89 | 29000 | 0 | | | |
| -13.125 | 11.977 | 2.492 | -90.56 | -555.71 | 60.09 | 1 | 129.71 | 7.89 | 29000 | 0 | | | |
| -13.500 | 12.903 | 2.441 | -285.45 | -483.32 | 63.77 | 1 | 132.52 | 7.89 | 29000 | 0 | | | |
| -13.875 | 13.801 | 2.340 | -452.75 | -408.50 | 67.44 | 1 | 135.33 | 7.89 | 29000 | 0 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.250 | 14.653 | 2.198 | -591.52 | -331.24 | 71.12 | 1 | 138.14 | 7.89 | 29000 | 0 | | | |
| -14.625 | 15.446 | 2.023 | -700.87 | -251.55 | 74.80 | 1 | 140.95 | 7.89 | 29000 | 0 | | | |
| -15.000 | 16.167 | 1.822 | -779.88 | -169.42 | 78.48 | 1 | 143.76 | 7.89 | 29000 | 0 | | | |
| -15.500 | 17.005 | 1.529 | -836.45 | -56.14 | 83.39 | 1 | 147.51 | 7.89 | 29000 | 0 | | | |
| -16.000 | 17.694 | 1.225 | -835.29 | 61.47 | 88.29 | 1 | 151.26 | 7.89 | 29000 | 0 | | | |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -16.500 | 18.233 | 0.933 | -774.25 | 183.41 | 93.20 | 1 | 155.01 | 7.89 | 29000 | 0 | | | | | | | | | | | | | |
| -17.000 | 18.633 | 0.674 | -651.16 | 309.68 | 98.10 | 1 | 158.76 | 7.89 | 29000 | 0 | | | | | | | | | | | | | |
| -17.500 | 18.916 | 0.471 | -463.85 | 440.27 | 103.01 | 1 | 162.50 | 7.89 | 29000 | 0 | | | | | | | | | | | | | |
| -18.000 | 19.117 | 0.348 | -210.17 | 575.19 | 107.91 | 1 | 166.25 | 7.89 | 29000 | 0 | | | | | | | | | | | | | |
| -18.500 | 19.281 | 0.328 | 112.05 | 714.43 | 112.82 | 1 | 170.00 | 7.89 | 29000 | 0 | | | | | | | | | | | | | |
| | | | | | 112.82 | 1 | 213.15 | 9.48 | 20600 | 0 | | | | | | | | | | | | | |
| -18.950 | 19.445 | 0.420 | 466.83 | 862.97 | 117.23 | 1 | 216.99 | 9.48 | 20600 | 0 | | | | | | | | | | | | | |
| -19.400 | 19.678 | 0.638 | 889.28 | 1015.22 | 121.64 | 1 | 220.83 | 9.48 | 20600 | 0 | | | | | | | | | | | | | |
| | | | | -789.60 | 121.64 | 1 | 220.83 | 9.48 | 20600 | 0 | | | | | | | | | | | | 4-1804.82 | |
| -19.700 | 19.896 | 0.806 | 667.90 | -686.03 | 124.59 | 1 | 223.39 | 9.48 | 20600 | 0 | | | | | | | | | | | | | |
| -20.000 | 20.157 | 0.930 | 475.88 | -600.31 | -2.47 | 1 | 225.95 | 9.48 | 20600 | 0 | | | | | | | | | | | | | |
| | | | | | -2.47 | 1 | 225.95 | 9.48 | 20600 | 3 | 73.67 | | | 20600 | | | | | | | | | |
| -20.500 | 20.656 | 1.049 | 194.26 | -526.58 | -2.47 | 1 | 230.21 | 9.48 | 20600 | 3 | 82.63 | | | 20600 | | | | | | | | | |
| -20.938 | 21.124 | 1.076 | -22.37 | -463.99 | -2.47 | 1 | 233.95 | 9.48 | 20600 | 3 | 90.47 | | | 20600 | | | | | | | | | |
| -21.375 | 21.588 | 1.038 | -212.00 | -403.20 | -2.47 | 1 | 237.68 | 9.48 | 20600 | 3 | 98.31 | | | 20600 | | | | | | | | | |
| -21.812 | 22.024 | 0.945 | -375.43 | -344.21 | -2.47 | 1 | 241.41 | 9.48 | 20600 | 3 | 106.15 | | | 20600 | | | | | | | | | |
| -22.250 | 22.408 | 0.804 | -513.44 | -287.01 | -2.47 | 1 | 245.14 | 9.48 | 20600 | 3 | 113.99 | | | 20600 | | | | | | | | | |
| -22.688 | 22.721 | 0.623 | -626.82 | -231.61 | -2.47 | 1 | 248.88 | 9.48 | 20600 | 3 | 121.83 | | | 20600 | | | | | | | | | |
| -23.125 | 22.948 | 0.411 | -716.36 | -178.00 | -2.47 | 1 | 252.61 | 9.48 | 20600 | 3 | 129.67 | | | 20600 | | | | | | | | | |
| -23.562 | 23.077 | 0.173 | -782.84 | -126.19 | -2.47 | 1 | 256.34 | 9.48 | 20600 | 3 | 137.51 | | | 20600 | | | | | | | | | |
| -24.000 | 23.098 | -0.081 | -827.04 | -76.18 | -2.47 | 1 | 260.07 | 9.48 | 20600 | 3 | 145.35 | | | 20600 | | | | | | | | | |
| -24.438 | 23.004 | -0.346 | -849.76 | -27.97 | -2.47 | 1 | 263.81 | 9.48 | 20600 | 3 | 153.19 | | | 20600 | | | | | | | | | |
| -24.875 | 22.794 | -0.615 | -851.78 | 18.45 | -2.47 | 1 | 267.54 | 9.48 | 20600 | 3 | 161.03 | | | 20600 | | | | | | | | | |
| -25.312 | 22.466 | -0.882 | -833.88 | 63.07 | -2.47 | 1 | 271.27 | 9.48 | 20600 | 3 | 168.87 | | | 20600 | | | | | | | | | |
| -25.750 | 22.024 | -1.140 | -796.85 | 105.89 | -2.47 | 1 | 275.01 | 9.48 | 20600 | 3 | 176.71 | | | 20600 | | | | | | | | | |
| -26.188 | 21.471 | -1.383 | -741.48 | 146.92 | -2.47 | 1 | 278.74 | 9.48 | 20600 | 3 | 184.54 | | | 20600 | | | | | | | | | |
| -26.625 | 20.817 | -1.606 | -668.56 | 186.15 | -2.47 | 1 | 282.47 | 9.48 | 20600 | 3 | 192.38 | | | 20600 | | | | | | | | | |
| -27.062 | 20.070 | -1.803 | -578.86 | 223.59 | -2.47 | 1 | 286.20 | 9.48 | 20600 | 3 | 200.22 | | | 20600 | | | | | | | | | |
| -27.500 | 19.244 | -1.969 | -473.18 | 259.22 | -2.47 | 1 | 289.94 | 9.48 | 20600 | 3 | 208.06 | | | 20600 | | | | | | | | | |
| | | | | | -2.47 | 1 | 233.91 | 7.89 | 29000 | 3 | 267.49 | | | 29000 | | | | | | | | | |
| -27.906 | 18.417 | -2.093 | -371.03 | 243.23 | -2.47 | 1 | 236.95 | 7.89 | 29000 | 3 | 277.17 | | | 29000 | | | | | | | | | |
| -28.312 | 17.547 | -2.188 | -275.92 | 224.54 | -2.47 | 1 | 240.00 | 7.89 | 29000 | 3 | 286.85 | | | 29000 | | | | | | | | | |
| -28.719 | 16.644 | -2.255 | -188.95 | 203.15 | -2.47 | 1 | 243.04 | 7.89 | 29000 | 3 | 296.54 | | | 29000 | | | | | | | | | |
| -29.125 | 15.718 | -2.299 | -111.22 | 179.07 | -2.47 | 1 | 246.09 | 7.89 | 29000 | 3 | 306.22 | | | 29000 | | | | | | | | | |
| -29.531 | 14.778 | -2.322 | -43.83 | 152.29 | -2.47 | 1 | 249.13 | 7.89 | 29000 | 3 | 315.90 | | | 29000 | | | | | | | | | |
| -29.938 | 13.834 | -2.326 | 12.15 | 122.81 | -2.47 | 1 | 252.18 | 7.89 | 29000 | 3 | 325.59 | | | 29000 | | | | | | | | | |
| -30.344 | 12.891 | -2.316 | 55.59 | 90.64 | -2.47 | 1 | 255.22 | 7.89 | 29000 | 3 | 335.27 | | | 29000 | | | | | | | | | |
| -30.750 | 11.954 | -2.295 | 85.42 | 55.76 | -2.47 | 1 | 258.27 | 7.89 | 29000 | 3 | 344.95 | | | 29000 | | | | | | | | | |
| -31.156 | 11.027 | -2.267 | 100.54 | 18.20 | -2.47 | 1 | 261.31 | 7.89 | 29000 | 3 | 354.64 | | | 29000 | | | | | | | | | |
| -31.562 | 10.112 | -2.237 | 100.59 | -16.51 | -2.47 | 1 | 264.36 | 7.89 | 29000 | 2 | 336.96 | | | 29000 | | | | | | | | | |
| -31.969 | 9.209 | -2.209 | 88.45 | -41.39 | -2.47 | 1 | 267.40 | 7.89 | 29000 | 2 | 312.36 | | | 29000 | | | | | | | | | |
| -32.375 | 8.316 | -2.186 | 68.48 | -55.10 | -2.47 | 1 | 270.45 | 7.89 | 29000 | 2 | 288.06 | | | 29000 | | | | | | | | | |
| -32.781 | 7.432 | -2.170 | 45.18 | -57.76 | -2.47 | 1 | 273.49 | 7.89 | 29000 | 2 | 264.00 | | | 29000 | | | | | | | | | |
| -33.188 | 6.553 | -2.160 | 23.04 | -49.43 | -2.47 | 1 | 276.54 | 7.89 | 29000 | 2 | 240.09 | | | 29000 | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | | kPa | kPa/m | | | | | | | | kN | |



FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.594 | 5.676 | -2.156 | 6.50 | -30.17 | -2.47 | 1 | 279.58 | 7.89 29000 | 2 | 216.27 | 29000 | | |
| -34.000 | 4.801 | -2.155 | 0.00 | 0.00 | -2.47 | 1 | 282.63 | 7.89 29000 | 2 | 192.47 | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 23.10 mm

MOMENTO MÁXIMO = 1507.67 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 289.28 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.295 = (5895.92 kN/m)/(20013.44 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.903 = (2978.41 kN/m)/(3298.70 kN/m)

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 6 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.300 | 0.00 | 2.66 |
| -0.600 | 0.00 | 5.74 |
| -0.900 | 0.00 | 9.24 |
| -1.200 | 0.00 | 13.16 |
| -1.700 | 0.00 | 16.28 |
| | -63.63 | 7.84 |
| -2.000 | -62.39 | 9.89 |
| -2.300 | -61.63 | 12.89 |
| -2.800 | -61.15 | 12.30 |
| -3.062 | -61.15 | 9.48 |
| -3.325 | -61.15 | 6.94 |
| -3.587 | -61.15 | 4.66 |
| -3.850 | -61.15 | 2.64 |
| -4.113 | -61.08 | 0.86 |
| -4.375 | -60.75 | 0.00 |
| -4.637 | -60.07 | 3.74 |
| -4.900 | -59.05 | 13.54 |
| -5.163 | -57.67 | 24.28 |
| -5.425 | -55.94 | 35.92 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.300 | 0.00 | 0.39 |
| -0.600 | 0.00 | 1.64 |
| -0.900 | 0.00 | 3.87 |
| -1.200 | 0.00 | 7.22 |
| -1.700 | 0.00 | 14.64 |
| | 0.00 | 14.64 |
| -2.000 | -4.25 | 8.66 |
| -2.300 | -22.84 | 12.05 |
| -2.800 | -53.51 | 18.32 |
| -3.062 | -69.56 | 21.17 |
| -3.325 | -85.61 | 23.32 |
| -3.587 | -101.66 | 24.84 |
| -3.850 | -117.72 | 25.79 |
| -4.113 | -133.76 | 26.25 |
| -4.375 | -149.76 | 26.26 |
| -4.637 | -165.63 | 25.90 |
| -4.900 | -181.27 | 25.20 |
| -5.163 | -196.59 | 24.23 |
| -5.425 | -211.51 | 23.03 |

| | | | | | |
|---|---|---|---|---|---|
| -5.688 | -53.86 | 48.42 | -5.688 | -225.93 | 21.64 |
| -5.950 | -51.43 | 61.71 | -5.950 | -239.76 | 20.10 |
| -6.212 | -48.64 | 75.75 | -6.212 | -252.90 | 21.52 |
| -6.475 | -45.51 | 90.45 | -6.475 | -265.27 | 43.32 |
| -6.738 | -42.03 | 105.74 | -6.738 | -276.76 | 69.06 |
| -7.000 | -38.19 | 121.54 | -7.000 | -287.30 | 98.88 |
| -7.500 | -29.03 | 153.49 | -7.500 | -304.23 | 167.52 |
| -8.000 | -16.81 | 187.88 | -8.000 | -315.82 | 252.78 |
| -8.500 | -5.23 | 223.72 | -8.500 | -320.53 | 355.64 |
| -9.000 | -4.13 | 259.87 | -9.000 | -316.84 | 476.55 |
| -9.500 | -2.77 | 294.96 | -9.500 | -303.22 | 615.33 |
| -10.000 | -1.16 | 327.36 | -10.000 | -278.14 | 771.07 |
| -10.500 | 0.00 | 357.18 | -10.500 | -240.07 | 942.27 |
| -11.000 | 0.00 | 387.73 | -11.000 | -187.49 | 1128.37 |
| | -605.02 | 120.69 | | -187.49 | 1128.37 |
| -11.500 | -571.41 | 154.30 | -11.500 | -118.87 | 834.13 |
| -12.000 | -534.74 | 148.99 | -12.000 | -42.75 | 557.47 |
| -12.375 | -508.96 | 125.95 | -12.375 | -51.77 | 407.10 |
| -12.750 | -481.49 | 104.85 | -12.750 | -125.72 | 371.27 |
| -13.125 | -452.33 | 85.66 | -13.125 | -189.04 | 346.05 |
| -13.500 | -421.47 | 68.29 | -13.500 | -241.11 | 332.09 |
| -13.875 | -388.92 | 52.64 | -13.875 | -315.08 | 330.02 |
| -14.250 | -354.67 | 45.14 | -14.250 | -454.55 | 340.47 |
| -14.625 | -318.74 | 81.08 | -14.625 | -580.87 | 364.09 |
| -15.000 | -281.10 | 118.71 | -15.000 | -693.39 | 401.49 |
| | -587.98 | 17.08 | | -693.39 | 401.49 |
| -15.500 | -535.17 | 69.89 | -15.500 | -820.87 | 179.45 |



| | | | | | |
|---|---|---|---|---|---|
| -16.000 | -479.35 | 125.71 | -16.000 | -921.19 | 176.74 |
| -16.500 | -420.51 | 126.09 | -16.500 | -992.84 | 168.15 |
| -17.000 | -358.67 | 114.29 | -17.000 | -1034.33 | 154.03 |
| -17.500 | -293.82 | 93.90 | -17.500 | -1044.14 | 134.51 |
| -18.000 | -225.96 | 125.05 | -18.000 | -1020.78 | 109.53 |
| -18.500 | -155.08 | 195.93 | -18.500 | -962.73 | 78.84 |
| -18.950 | -83.33 | 267.68 | -18.950 | -995.62 | 50.69 |
| -19.400 | -49.28 | 341.91 | -19.400 | -1016.51 | 26.59 |
| | -161.67 | 101.58 | | -1016.51 | 26.59 |
| -19.700 | -110.59 | 153.67 | -19.700 | -1011.64 | 12.62 |
| -20.000 | -57.68 | 189.19 | -20.000 | -991.35 | 9.69 |
| -20.500 | -31.62 | 187.04 | -20.500 | -932.91 | 11.14 |
| -20.938 | -26.00 | 184.78 | -20.938 | -865.78 | 10.51 |
| -21.375 | -21.11 | 192.95 | -21.375 | -786.61 | 8.44 |
| -21.812 | -16.87 | 212.42 | -21.812 | -697.73 | 5.29 |
| -22.250 | -13.16 | 226.50 | -22.250 | -601.52 | 1.37 |
| -22.688 | -10.15 | 235.21 | -22.688 | -500.33 | 0.00 |
| -23.125 | -10.00 | 238.53 | -23.125 | -396.50 | 0.00 |
| -23.562 | -9.09 | 236.47 | -23.562 | -292.40 | 0.00 |
| -24.000 | -7.40 | 229.03 | -24.000 | -190.37 | 59.98 |
| -24.438 | -4.93 | 216.21 | -24.438 | -92.78 | 130.06 |
| -24.875 | -1.65 | 198.01 | -24.875 | -65.09 | 193.50 |
| -25.312 | 0.00 | 174.43 | -25.312 | -61.63 | 248.15 |
| -25.750 | 0.00 | 145.46 | -25.750 | -56.21 | 291.67 |
| -26.188 | 0.00 | 116.57 | -26.188 | -48.49 | 322.30 |
| -26.625 | 0.00 | 93.69 | -26.625 | -38.06 | 341.43 |
| -27.062 | 0.00 | 77.12 | -27.062 | -24.48 | 351.31 |
| -27.500 | -0.30 | 66.52 | -27.500 | -7.25 | 354.08 |
| -27.906 | -23.45 | 32.63 | -27.906 | 0.00 | 349.09 |
| -28.312 | -42.03 | 22.78 | -28.312 | 0.00 | 344.54 |
| -28.719 | -56.49 | 14.35 | -28.719 | 0.00 | 337.17 |
| -29.125 | -67.30 | 7.29 | -29.125 | 0.00 | 320.23 |
| -29.531 | -74.82 | 1.50 | -29.531 | 0.00 | 295.86 |
| -29.938 | -79.36 | 0.00 | -29.938 | 0.00 | 266.01 |
| -30.344 | -85.73 | 0.00 | -30.344 | 0.00 | 232.47 |
| -30.750 | -88.90 | 0.00 | -30.750 | 0.00 | 196.87 |
| -31.156 | -88.51 | 0.00 | -31.156 | 0.00 | 160.72 |
| -31.562 | -84.82 | 0.00 | -31.562 | 0.00 | 125.41 |
| -31.969 | -78.02 | 0.00 | -31.969 | 0.00 | 92.23 |
| -32.375 | -68.28 | 0.00 | -32.375 | 0.00 | 62.41 |
| -32.781 | -55.70 | 0.00 | -32.781 | 0.00 | 37.13 |
| -33.188 | -40.35 | 0.00 | -33.188 | 0.00 | 17.53 |
| -33.594 | -22.27 | 0.00 | -33.594 | 0.00 | 4.72 |
| -34.000 | 0.00 | 0.00 | -34.000 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



*** DESPLAZAMIENTO MÁXIMO EN FASE N° 7 = 23.098 mm EN FASE FINAL N° 7 = 23.098 mm

*** MAXIMUM MOMENT IN PHASE Nb 7 = 1507.666 kN.m/m IN FINAL PHASE Nb 7 = 1507.666 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -1.70 | 2 | 0.00 | 7 | -177.45 | 7 | -177.45 |
| 2 | -11.00 | 3 | 0.00 | 7 | -1710.10 | 7 | -1710.10 |
| 3 | -15.00 | 4 | 0.00 | 4 | -706.69 | 5 | QUITADO |
| 4 | -19.40 | 5 | 0.00 | 7 | -1804.82 | 7 | -1804.82 |
| | m | | kN | | kN | | kN |



* CURVAS ENVOLVENTES DE FASE 7 A FASE 7 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.300 | 0.00 | 3.25 |
| -0.600 | 0.00 | 6.80 |
| -0.900 | 0.00 | 10.65 |
| -1.200 | 0.00 | 14.80 |
| -1.700 | 0.00 | 18.26 |
| | -159.19 | 0.00 |
| -2.000 | -157.41 | 0.00 |
| -2.300 | -154.81 | 0.00 |
| -2.800 | -148.53 | 0.00 |
| -3.062 | -138.38 | 0.00 |
| -3.325 | -126.99 | 0.00 |
| -3.587 | -114.35 | 0.00 |
| -3.850 | -100.48 | 0.00 |
| -4.113 | -85.37 | 0.00 |
| -4.375 | -69.01 | 0.00 |
| -4.637 | -51.42 | 0.00 |
| -4.900 | -32.58 | 0.00 |
| -5.163 | -12.50 | 0.00 |
| -5.425 | 0.00 | 8.82 |
| -5.688 | 0.00 | 31.38 |
| -5.950 | 0.00 | 55.18 |
| -6.212 | 0.00 | 80.22 |
| -6.475 | 0.00 | 106.51 |
| -6.738 | 0.00 | 134.03 |
| -7.000 | 0.00 | 162.80 |
| -7.500 | 0.00 | 221.07 |
| -8.000 | 0.00 | 283.92 |
| -8.500 | 0.00 | 351.36 |
| -9.000 | 0.00 | 423.38 |
| -9.500 | 0.00 | 499.99 |
| -10.000 | 0.00 | 581.19 |
| -10.500 | 0.00 | 666.97 |
| -11.000 | 0.00 | 757.33 |
| | -952.77 | 0.00 |
| -11.500 | -857.82 | 0.00 |
| -12.000 | -758.28 | 0.00 |
| -12.375 | -693.19 | 0.00 |
| -12.750 | -625.67 | 0.00 |
| -13.125 | -555.71 | 0.00 |
| -13.500 | -483.32 | 0.00 |
| -13.875 | -408.50 | 0.00 |
| -14.250 | -331.24 | 0.00 |
| -14.625 | -251.55 | 0.00 |
| -15.000 | -169.42 | 0.00 |
| -15.500 | -56.14 | 0.00 |
| -16.000 | 0.00 | 61.47 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.300 | 0.00 | 0.48 |
| -0.600 | 0.00 | 1.98 |
| -0.900 | 0.00 | 4.59 |
| -1.200 | 0.00 | 8.40 |
| -1.700 | 0.00 | 16.76 |
| | 0.00 | 16.76 |
| -2.000 | -30.75 | 0.00 |
| -2.300 | -77.60 | 0.00 |
| -2.800 | -153.54 | 0.00 |
| -3.062 | -191.22 | 0.00 |
| -3.325 | -226.07 | 0.00 |
| -3.587 | -257.78 | 0.00 |
| -3.850 | -286.00 | 0.00 |
| -4.113 | -310.42 | 0.00 |
| -4.375 | -330.71 | 0.00 |
| -4.637 | -346.55 | 0.00 |
| -4.900 | -357.60 | 0.00 |
| -5.163 | -363.54 | 0.00 |
| -5.425 | -364.05 | 0.00 |
| -5.688 | -358.80 | 0.00 |
| -5.950 | -347.47 | 0.00 |
| -6.212 | -329.73 | 0.00 |
| -6.475 | -305.25 | 0.00 |
| -6.738 | -273.70 | 0.00 |
| -7.000 | -234.77 | 0.00 |
| -7.500 | -139.00 | 0.00 |
| -8.000 | -12.94 | 0.00 |
| -8.500 | 0.00 | 145.69 |
| -9.000 | 0.00 | 339.18 |
| -9.500 | 0.00 | 569.83 |
| -10.000 | 0.00 | 839.93 |
| -10.500 | 0.00 | 1151.78 |
| -11.000 | 0.00 | 1507.67 |
| | 0.00 | 1507.67 |
| -11.500 | 0.00 | 1054.83 |
| -12.000 | 0.00 | 650.61 |
| -12.375 | 0.00 | 378.39 |
| -12.750 | 0.00 | 131.02 |
| -13.125 | -90.56 | 0.00 |
| -13.500 | -285.45 | 0.00 |
| -13.875 | -452.75 | 0.00 |
| -14.250 | -591.52 | 0.00 |
| -14.625 | -700.87 | 0.00 |
| -15.000 | -779.88 | 0.00 |
| -15.500 | -836.45 | 0.00 |
| -16.000 | -835.29 | 0.00 |



| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| -16.500 | 0.00 | 183.41 |
| -17.000 | 0.00 | 309.68 |
| -17.500 | 0.00 | 440.27 |
| -18.000 | 0.00 | 575.19 |
| -18.500 | 0.00 | 714.43 |
| -18.950 | 0.00 | 862.97 |
| -19.400 | 0.00 | 1015.22 |
| | -789.60 | 0.00 |
| -19.700 | -686.03 | 0.00 |
| -20.000 | -600.31 | 0.00 |
| -20.500 | -526.58 | 0.00 |
| -20.938 | -463.99 | 0.00 |
| -21.375 | -403.20 | 0.00 |
| -21.812 | -344.21 | 0.00 |
| -22.250 | -287.01 | 0.00 |
| -22.688 | -231.61 | 0.00 |
| -23.125 | -178.00 | 0.00 |
| -23.562 | -126.19 | 0.00 |
| -24.000 | -76.18 | 0.00 |
| -24.438 | -27.97 | 0.00 |
| -24.875 | 0.00 | 18.45 |
| -25.312 | 0.00 | 63.07 |
| -25.750 | 0.00 | 105.89 |
| -26.188 | 0.00 | 146.92 |
| -26.625 | 0.00 | 186.15 |
| -27.062 | 0.00 | 223.59 |
| -27.500 | 0.00 | 259.22 |
| -27.906 | 0.00 | 243.23 |
| -28.312 | 0.00 | 224.54 |
| -28.719 | 0.00 | 203.15 |
| -29.125 | 0.00 | 179.07 |
| -29.531 | 0.00 | 152.29 |
| -29.938 | 0.00 | 122.81 |
| -30.344 | 0.00 | 90.64 |
| -30.750 | 0.00 | 55.76 |
| -31.156 | 0.00 | 18.20 |
| -31.562 | -16.51 | 0.00 |
| -31.969 | -41.39 | 0.00 |
| -32.375 | -55.10 | 0.00 |
| -32.781 | -57.76 | 0.00 |
| -33.188 | -49.43 | 0.00 |
| -33.594 | -30.17 | 0.00 |
| -34.000 | 0.00 | 0.00 |
| m | kN/m | kN/m |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| -16.500 | -774.25 | 0.00 |
| -17.000 | -651.16 | 0.00 |
| -17.500 | -463.85 | 0.00 |
| -18.000 | -210.17 | 0.00 |
| -18.500 | 0.00 | 112.05 |
| -18.950 | 0.00 | 466.83 |
| -19.400 | 0.00 | 889.28 |
| | 0.00 | 889.28 |
| -19.700 | 0.00 | 667.90 |
| -20.000 | 0.00 | 475.88 |
| -20.500 | 0.00 | 194.26 |
| -20.938 | -22.37 | 0.00 |
| -21.375 | -212.00 | 0.00 |
| -21.812 | -375.43 | 0.00 |
| -22.250 | -513.44 | 0.00 |
| -22.688 | -626.82 | 0.00 |
| -23.125 | -716.36 | 0.00 |
| -23.562 | -782.84 | 0.00 |
| -24.000 | -827.04 | 0.00 |
| -24.438 | -849.76 | 0.00 |
| -24.875 | -851.78 | 0.00 |
| -25.312 | -833.88 | 0.00 |
| -25.750 | -796.85 | 0.00 |
| -26.188 | -741.48 | 0.00 |
| -26.625 | -668.56 | 0.00 |
| -27.062 | -578.86 | 0.00 |
| -27.500 | -473.18 | 0.00 |
| -27.906 | -371.03 | 0.00 |
| -28.312 | -275.92 | 0.00 |
| -28.719 | -188.95 | 0.00 |
| -29.125 | -111.22 | 0.00 |
| -29.531 | -43.83 | 0.00 |
| -29.938 | 0.00 | 12.15 |
| -30.344 | 0.00 | 55.59 |
| -30.750 | 0.00 | 85.42 |
| -31.156 | 0.00 | 100.54 |
| -31.562 | 0.00 | 100.59 |
| -31.969 | 0.00 | 88.45 |
| -32.375 | 0.00 | 68.48 |
| -32.781 | 0.00 | 45.18 |
| -33.188 | 0.00 | 23.04 |
| -33.594 | 0.00 | 6.50 |
| -34.000 | 0.00 | 0.00 |
| m | kN.m/m | kN.m/m |

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.300 | 0.00 | 3.25 |
| -0.600 | 0.00 | 6.80 |
| -0.900 | 0.00 | 10.65 |
| -1.200 | 0.00 | 14.80 |
| -1.700 | 0.00 | 18.26 |
| | -159.19 | 7.84 |
| -2.000 | -157.41 | 9.89 |
| -2.300 | -154.81 | 12.89 |
| -2.800 | -148.53 | 12.30 |
| -3.062 | -138.38 | 9.48 |
| -3.325 | -126.99 | 6.94 |
| -3.587 | -114.35 | 4.66 |
| -3.850 | -100.48 | 2.64 |
| -4.113 | -85.37 | 0.86 |
| -4.375 | -69.01 | 0.00 |
| -4.637 | -60.07 | 3.74 |
| -4.900 | -59.05 | 13.54 |
| -5.163 | -57.67 | 24.28 |
| -5.425 | -55.94 | 35.92 |
| -5.688 | -53.86 | 48.42 |
| -5.950 | -51.43 | 61.71 |
| -6.212 | -48.64 | 80.22 |
| -6.475 | -45.51 | 106.51 |
| -6.738 | -42.03 | 134.03 |
| -7.000 | -38.19 | 162.80 |
| -7.500 | -29.03 | 221.07 |
| -8.000 | -16.81 | 283.92 |
| -8.500 | -5.23 | 351.36 |
| -9.000 | -4.13 | 423.38 |
| -9.500 | -2.77 | 499.99 |
| -10.000 | -1.16 | 581.19 |
| -10.500 | 0.00 | 666.97 |
| -11.000 | 0.00 | 757.33 |
| | -952.77 | 120.69 |
| -11.500 | -857.82 | 154.30 |
| -12.000 | -758.28 | 148.99 |
| -12.375 | -693.19 | 125.95 |
| -12.750 | -625.67 | 104.85 |
| -13.125 | -555.71 | 85.66 |
| -13.500 | -483.32 | 68.29 |
| -13.875 | -408.50 | 52.64 |
| -14.250 | -354.67 | 45.14 |
| -14.625 | -318.74 | 81.08 |
| -15.000 | -281.10 | 118.71 |
| | -587.98 | 17.08 |
| -15.500 | -535.17 | 69.89 |

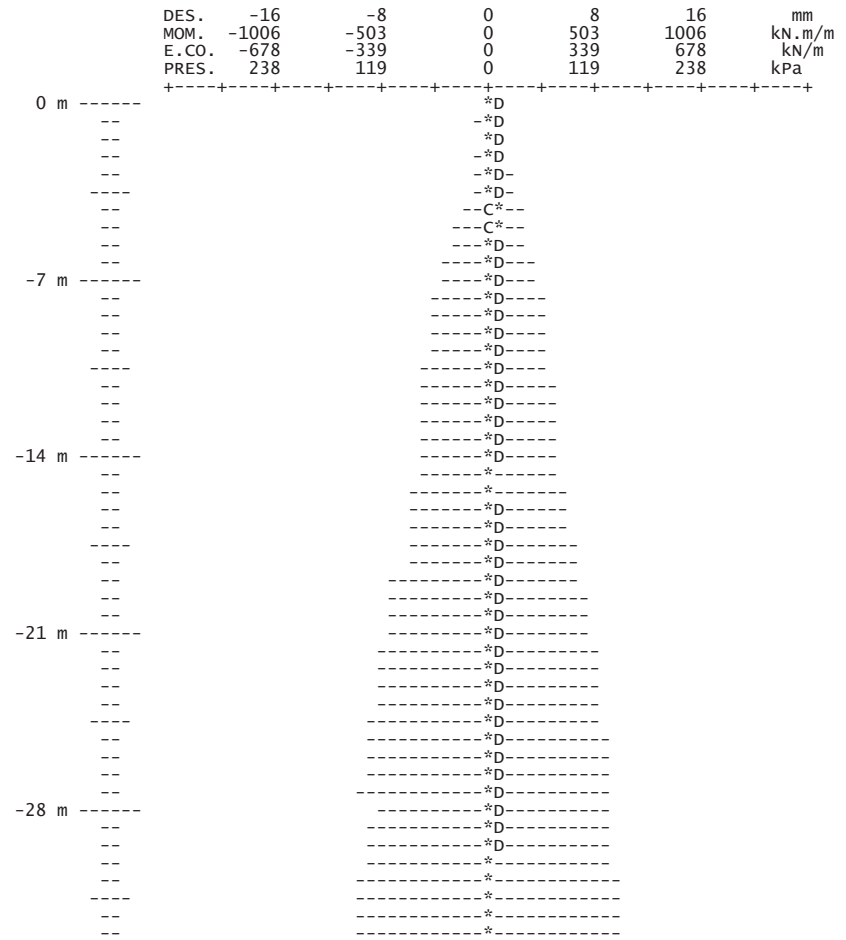
| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.300 | 0.00 | 0.48 |
| -0.600 | 0.00 | 1.98 |
| -0.900 | 0.00 | 4.59 |
| -1.200 | 0.00 | 8.40 |
| -1.700 | 0.00 | 16.76 |
| | 0.00 | 16.76 |
| -2.000 | -30.75 | 8.66 |
| -2.300 | -77.60 | 12.05 |
| -2.800 | -153.54 | 18.32 |
| -3.062 | -191.22 | 21.17 |
| -3.325 | -226.07 | 23.32 |
| -3.587 | -257.78 | 24.84 |
| -3.850 | -286.00 | 25.79 |
| -4.113 | -310.42 | 26.25 |
| -4.375 | -330.71 | 26.26 |
| -4.637 | -346.55 | 25.90 |
| -4.900 | -357.60 | 25.20 |
| -5.163 | -363.54 | 24.23 |
| -5.425 | -364.05 | 23.03 |
| -5.688 | -358.80 | 21.64 |
| -5.950 | -347.47 | 20.10 |
| -6.212 | -329.73 | 21.52 |
| -6.475 | -305.25 | 43.32 |
| -6.738 | -276.76 | 69.06 |
| -7.000 | -287.30 | 98.88 |
| -7.500 | -304.23 | 167.52 |
| -8.000 | -315.82 | 252.78 |
| -8.500 | -320.53 | 355.64 |
| -9.000 | -316.84 | 476.55 |
| -9.500 | -303.22 | 615.33 |
| -10.000 | -278.14 | 839.93 |
| -10.500 | -240.07 | 1151.78 |
| -11.000 | -187.49 | 1507.67 |
| | -187.49 | 1507.67 |
| -11.500 | -118.87 | 1054.83 |
| -12.000 | -42.75 | 650.61 |
| -12.375 | -51.77 | 407.10 |
| -12.750 | -125.72 | 371.27 |
| -13.125 | -189.04 | 346.05 |
| -13.500 | -285.45 | 332.09 |
| -13.875 | -452.75 | 330.02 |
| -14.250 | -591.52 | 340.47 |
| -14.625 | -700.87 | 364.09 |
| -15.000 | -779.88 | 401.49 |
| | -779.88 | 401.49 |
| -15.500 | -836.45 | 179.45 |



| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| -16.000 | -479.35 | 125.71 |
| -16.500 | -420.51 | 183.41 |
| -17.000 | -358.67 | 309.68 |
| -17.500 | -293.82 | 440.27 |
| -18.000 | -225.96 | 575.19 |
| -18.500 | -155.08 | 714.43 |
| -18.950 | -83.33 | 862.97 |
| -19.400 | -49.28 | 1015.22 |
| | -789.60 | 101.58 |
| -19.700 | -686.03 | 153.67 |
| -20.000 | -600.31 | 189.19 |
| -20.500 | -526.58 | 187.04 |
| -20.938 | -463.99 | 184.78 |
| -21.375 | -403.20 | 192.95 |
| -21.812 | -344.21 | 212.42 |
| -22.250 | -287.01 | 226.50 |
| -22.688 | -231.61 | 235.21 |
| -23.125 | -178.00 | 238.53 |
| -23.562 | -126.19 | 236.47 |
| -24.000 | -76.18 | 229.03 |
| -24.438 | -27.97 | 216.21 |
| -24.875 | -1.65 | 198.01 |
| -25.312 | 0.00 | 174.43 |
| -25.750 | 0.00 | 145.46 |
| -26.188 | 0.00 | 146.92 |
| -26.625 | 0.00 | 186.15 |
| -27.062 | 0.00 | 223.59 |
| -27.500 | -0.30 | 259.22 |
| -27.906 | -23.45 | 243.23 |
| -28.312 | -42.03 | 224.54 |
| -28.719 | -56.49 | 203.15 |
| -29.125 | -67.30 | 179.07 |
| -29.531 | -74.82 | 152.29 |
| -29.938 | -79.36 | 122.81 |
| -30.344 | -85.73 | 90.64 |
| -30.750 | -88.90 | 55.76 |
| -31.156 | -88.51 | 18.20 |
| -31.562 | -84.82 | 0.00 |
| -31.969 | -78.02 | 0.00 |
| -32.375 | -68.28 | 0.00 |
| -32.781 | -57.76 | 0.00 |
| -33.188 | -49.43 | 0.00 |
| -33.594 | -30.17 | 0.00 |
| -34.000 | 0.00 | 0.00 |
| m | kN/m | kN/m |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| -16.000 | -921.19 | 176.74 |
| -16.500 | -992.84 | 168.15 |
| -17.000 | -1034.33 | 154.03 |
| -17.500 | -1044.14 | 134.51 |
| -18.000 | -1020.78 | 109.53 |
| -18.500 | -962.73 | 112.05 |
| -18.950 | -995.62 | 466.83 |
| -19.400 | -1016.51 | 889.28 |
| | -1016.51 | 889.28 |
| -19.700 | -1011.64 | 667.90 |
| -20.000 | -991.35 | 475.88 |
| -20.500 | -932.91 | 194.26 |
| -20.938 | -865.78 | 10.51 |
| -21.375 | -786.61 | 8.44 |
| -21.812 | -697.73 | 5.29 |
| -22.250 | -601.52 | 1.37 |
| -22.688 | -626.82 | 0.00 |
| -23.125 | -716.36 | 0.00 |
| -23.562 | -782.84 | 0.00 |
| -24.000 | -827.04 | 59.98 |
| -24.438 | -849.76 | 130.06 |
| -24.875 | -851.78 | 193.50 |
| -25.312 | -833.88 | 248.15 |
| -25.750 | -796.85 | 291.67 |
| -26.188 | -741.48 | 322.30 |
| -26.625 | -668.56 | 341.43 |
| -27.062 | -578.86 | 351.31 |
| -27.500 | -473.18 | 354.08 |
| -27.906 | -371.03 | 349.09 |
| -28.312 | -275.92 | 344.54 |
| -28.719 | -188.95 | 337.17 |
| -29.125 | -111.22 | 320.23 |
| -29.531 | -43.83 | 295.86 |
| -29.938 | 0.00 | 266.01 |
| -30.344 | 0.00 | 232.47 |
| -30.750 | 0.00 | 196.87 |
| -31.156 | 0.00 | 160.72 |
| -31.562 | 0.00 | 125.41 |
| -31.969 | 0.00 | 92.23 |
| -32.375 | 0.00 | 68.48 |
| -32.781 | 0.00 | 45.18 |
| -33.188 | 0.00 | 23.04 |
| -33.594 | 0.00 | 6.50 |
| -34.000 | 0.00 | 0.00 |
| m | kN.m/m | kN.m/m |

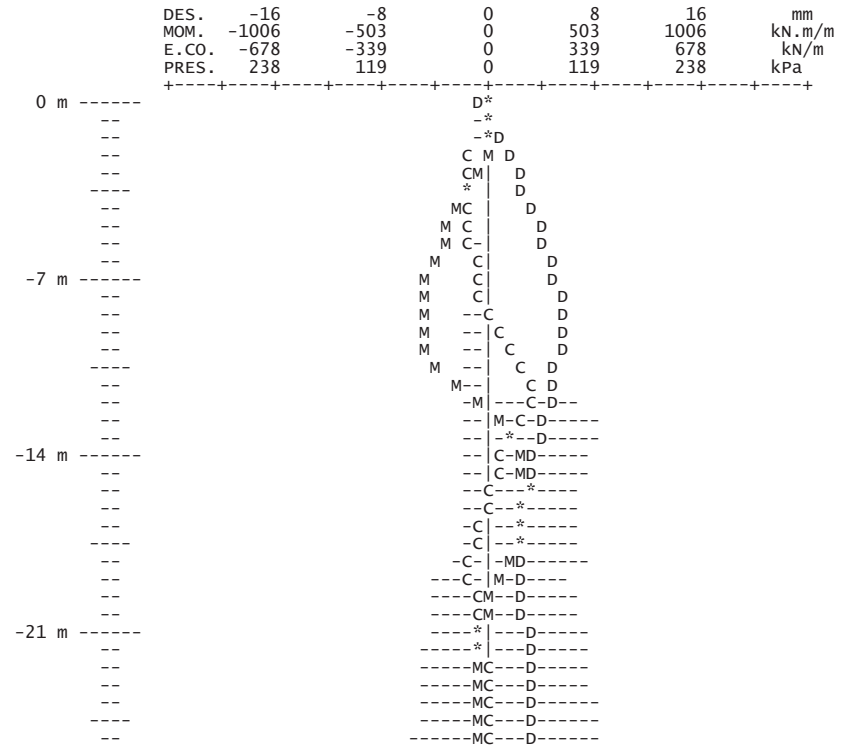
* CURVAS DE LA FASE 1 *

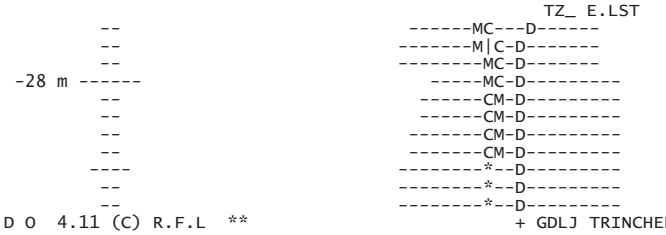







* CURVAS DE LA FASE 2 *



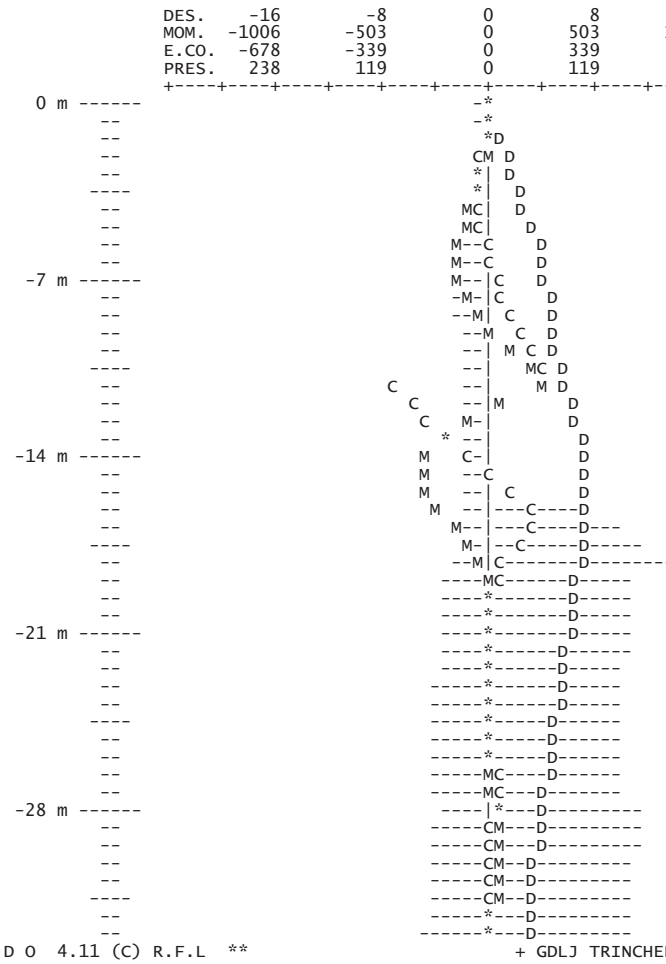








* CURVAS DE LA FASE  3 *

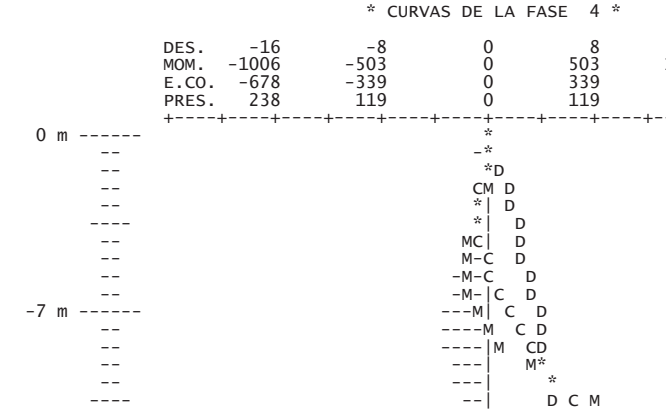


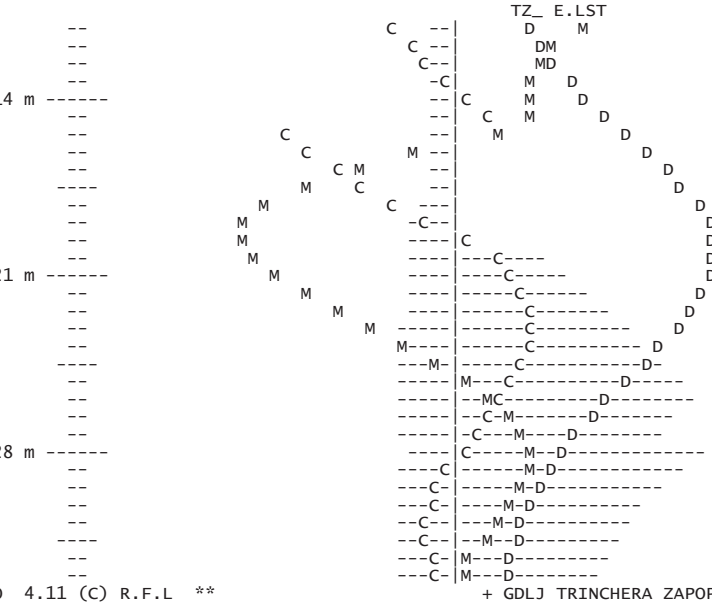







* CURVAS DE LA FASE  4 *



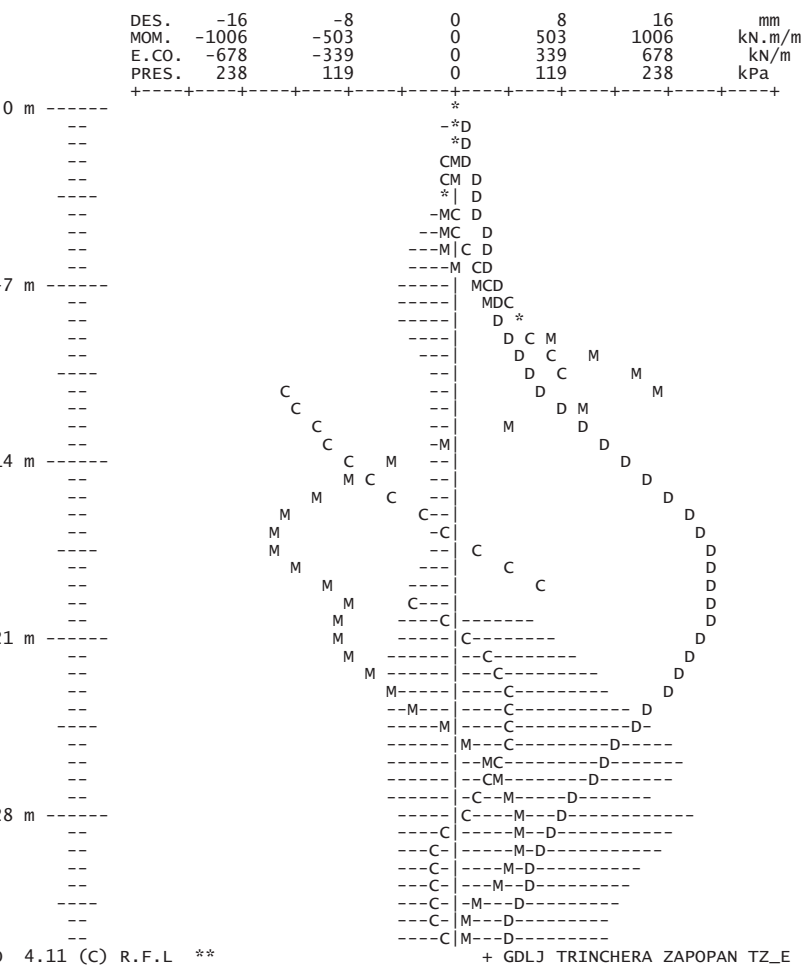









* CURVAS DE LA FASE  5 *

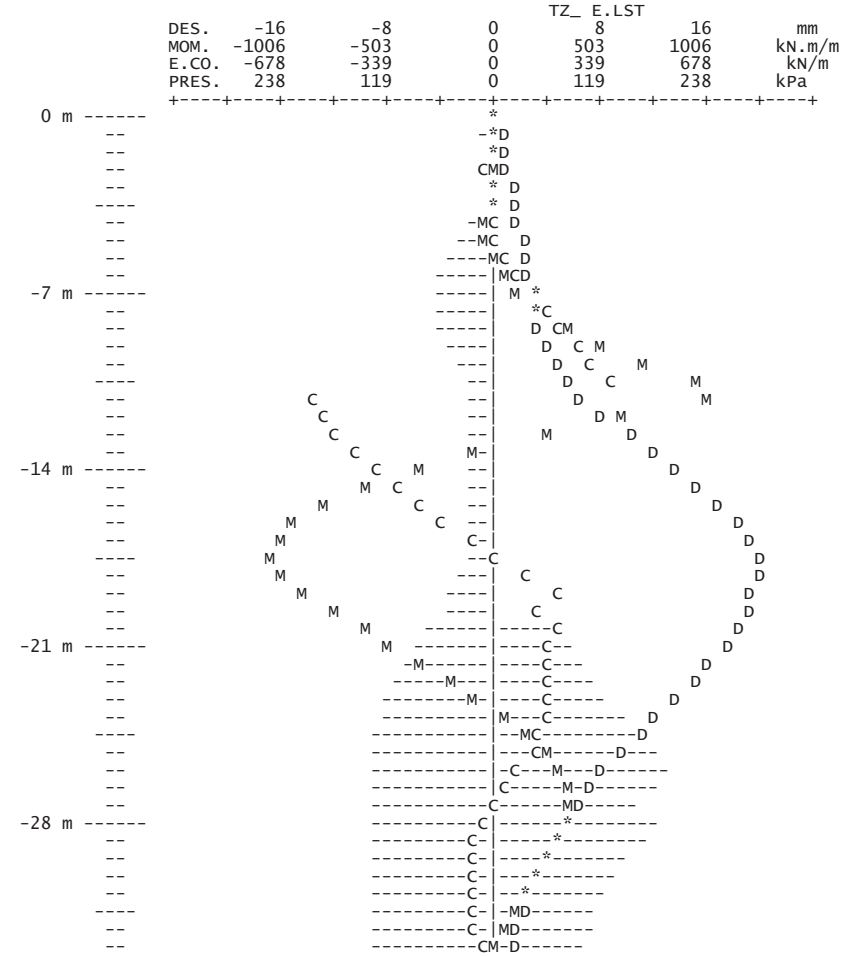




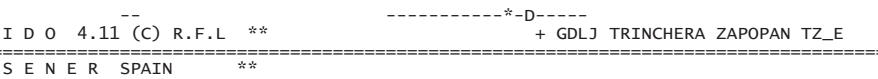





* CURVAS DE LA FASE  6 *

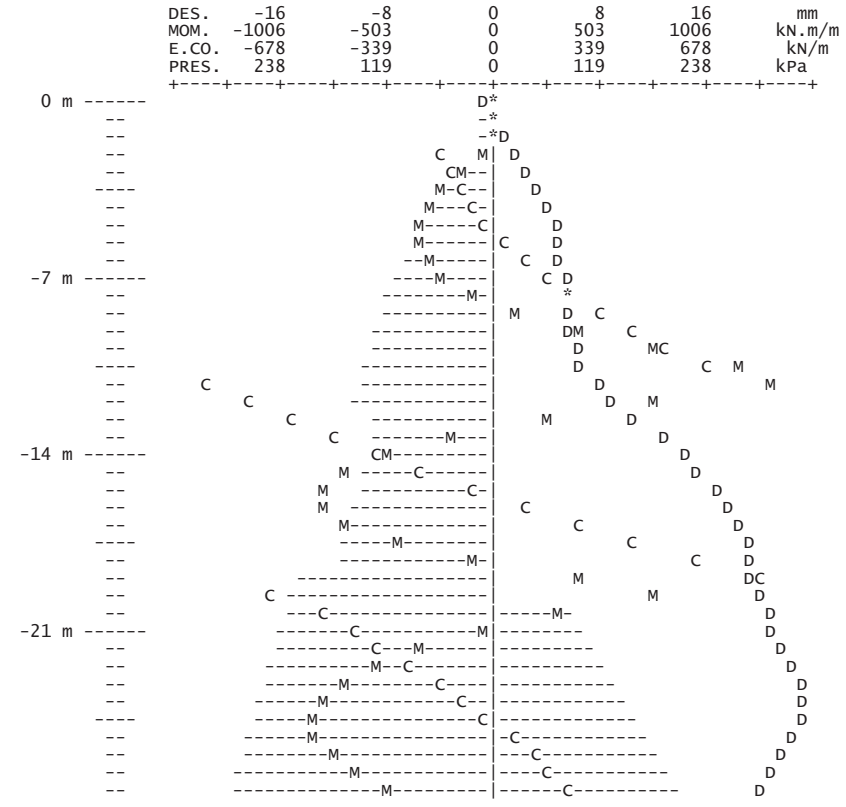


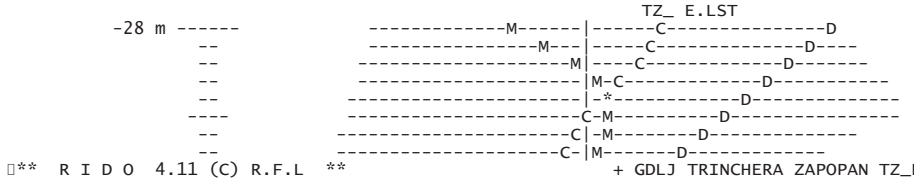




* CURVAS DE LA FASE  7 *




TZ_ E.LST
-28 m
M
C
D
M
C
D
M
C
D
M
C
D
C
M
D
C
M
D
C
M
D
CM
D

```
***** NOMBRE DE FICHERO DE DATOS : TZ_ F.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_F                                    *60L  U:NN*
      : 0
 1 ...  0
      *PANTALLA DE 1.00 m
      : -38.00 2190000
 2 ...  -38 2190000
      : 0.00
 3 ...  0
      * R
      : -1.35 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -1.35 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -3.40 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 5 ...  -3.4 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -12.10 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 6 ...  -12.1 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -19.00 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 7 ...  -19 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG1c
      : -28.00 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 8 ...  -28 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -36.00 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 9 ...  -36 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG2
      : -37.00 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
10 ...  -37 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -46.30 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
11 ...  -46.3 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -7.50 0.50
12 ...  -7.5 0.5
      *Fase 1
      *Excavacion hasta cota inferior nivel cubierta
      : SUC(1) 10
13 ... SUC(1)  10
      : EXC(2) -2.10
14 ... EXC(2)  -2.1
      : CAL(2)
15 ... CAL(2)
      *Fase 2
      *Ejecucion del nivel cubierta
      *Excavacion hasta nivel rampa de autobuses.
      : STR(0) -1.5 1.00 0.00 0.00 5200000
16 ... STR(0)  -1.5 1 0 0 5200000
      : EXC(2) -9.6
17 ... EXC(2)  -9.6
      : WAT(2) -10.1
18 ... WAT(2)  -10.1
      : CAL(2)
19 ... CAL(2)
      *Fase 3
      *Ejecucion del nivel de autobuses
      *Excavacion hasta 1er puntal provisional
      : STR(0) -9.00 1.00 0.00 0.00 3466667
20 ... STR(0)  -9 1 0 0 3466667
      : EXC(2) -18.30
21 ... EXC(2)  -18.3
      : WAT(2) -18.80
22 ... WAT(2)  -18.8
      : CAL(2)
23 ... CAL(2)
      *Fase 4
      *Ejecucion del 1er nivel de puntales provisionales
      *Excavacion hasta el nivel de losa de fondo
      : STR(0) -17.30 1.00 0.00 0.00 453000
24 ... STR(0)  -17.3 1 0 0 453000
      : EXC(2) -21.00 -23.20 2.47 4.67
25 ... EXC(2)  -21 -23.2 2.47 4.67
      : WAT(2) -23.70
26 ... WAT(2)  -23.7
      : CAL(2)
27 ... CAL(2)
      *Fase 5
      *Ejecucion de la losa de fondo y retirada de puntales provisionales
      : STR(0) -20.15 1.00 0.00 0.00 850000
28 ... STR(0)  -20.15 1 0 0 850000
      : STR(0,3)
29 ... STR(0,3)
      : CAL(2)
30 ... CAL(2)
      *Fase 6
      *Restitucion del nf y paso de la tuneladora
      : STR(0,4)
31 ... STR(0,4)
      : STR(0) -20.15 1.00 0.00 -541-398 430000
32 ... STR(0)  -20.15 1 0 -939 430000
      : WAT(2) -21.0 130
33 ... WAT(2)  -21 130
      : CAL(2,1)
34 ... CAL(2,1)
      *Fase 7
      *Restitucion del puntal provisional y Sismo
      : STR(0) -12.77 1.00 0.00 0.00 453000
35 ... STR(0)  -12.77 1 0 0 453000
      *SISMO_ R
      : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
36 ... PLA(1)  0.56 2.367 5 29 0 0
      *SISMO_ UG1b
      : PLA(2) 0.522 2.594 15.00 31 0.00 0.00
37 ... PLA(2)  0.522 2.594 15 31 0 0
      *SISMO_ UG1c
      : PLA(3) 0.948 1.991 20.00 33 0.00 0.00
38 ... PLA(3)  0.948 1.991 20 33 0 0
      *SISMO_ UG1d
      : PLA(4) 0.789 2.509 25.00 36 0.00 0.00
```

```
  39 ... PLA(4)  0.789 2.509 25 36 0 0
         *SISMO_ UG1c
         : PLA(5) 0.948 1.991 20.00 33 0.00 0.00
  40 ... PLA(5)  0.948 1.991 20 33 0 0
         *SISMO_ UG1d
         : PLA(6) 0.789 2.509 25.00 36 0.00 0.00
  41 ... PLA(6)  0.789 2.509 25 36 0 0
         *SISMO_ UG2
         : PLA(7) 0.795 2.402 30.00 35 0.00 0.00
  42 ... PLA(7)  0.795 2.402 30 35 0 0
         *SISMO_ UG3a
         : PLA(8) 0.302 10.398 246.00 58 0.00 0.00
  43 ... PLA(8)  0.302 10.398 246 58 0 0
         : CAL(2)
  44 ... CAL(2)
         : FIN
  45 ... FIN
         : GRF
  46 ... GRF
         : STA
  47 ... STA
         : EVP
  48 ... EVP
         : ASC
  49 ... ASC
         *XLS
         : STOP
  50 ... STOP
```



*PANTALLA DE 1.00 m

---

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -38.000 m : | 2190000. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -1.350 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 | |
| COHESIÓN | C | = | 5.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG1b

CAPA N° 2 DE -1.350 m A -3.400 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 | |
| COHESIÓN | C | = | 15.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG1c



CAPA N° 3 DE -3.400 m A -12.100 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 | |
| COHESIÓN | C | = | 20.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

* UG1d

CAPA N° 4 DE -12.100 m A -19.000 m :

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 | kN/m3 |

COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.235
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.412
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.852
COHESIÓN C = 25.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 36.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 29000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1c

CAPA N° 5 DE -19.000 m A -28.000 m :

PESO ESPECIFOCO HÚMEDO GH = 19.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.268
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.455
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.392
COHESIÓN C = 20.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 33.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 20600.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1d



CAPA N° 6 DE -28.000 m A -36.000 m :

PESO ESPECIFOCO HÚMEDO GH = 19.500 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.500 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.235
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.412
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.852
COHESIÓN C = 25.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 36.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 29000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG2

CAPA N° 7 DE -36.000 m A -37.000 m :

PESO ESPECIFOCO HÚMEDO GH = 20.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 10.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.246
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.426
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.690
COHESIÓN C = 30.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 35.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 43800.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG3a

CAPA N° 8 DE -37.000 m A -46.300 m :

PESO ESPECIFOCO HÚMEDO GH = 23.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 13.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.075
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.152
COEFIC. DE EMPUJE PASIVO HOR. KP = 12.162
COHESIÓN C = 246.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 58.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* NF



** FASE No 1 **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -2.100 m



FASE 1

| | PARED | SOIL 1 | SOIL 2 | PUNTALES/ ANCLAS |
|---|---|---|---|---|
| | | EXCAVACIÓN: 0.00 m | EXCAVACIÓN: -2.10 m | |
| | | NIVEL AGUA: -7.50 m | NIVEL AGUA: -7.50 m | |
| | | S. DE CAQUOT: 10.00 kPa | S. DE CAQUOT: 0.00 kPa | |

| NIVEL | DESPLAZ. ROTACIÓN MOMENTO ESF.CO. C. REP. | ESTADO PR. SOPRAC. ELAST. | ESTADO PR. SOPRAC. ELAST. | N° FUERZA |
|---|---|---|---|---|

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.119 | -0.104 | 0.00 | 0.00 | | -1 | | | | | 0 | | | | | | |
| -0.338 | 1.084 | -0.104 | 0.06 | 0.50 | | 2 | 2.97 | 2.97 | 4900 | | 0 | | | | | | |
| -0.675 | 1.049 | -0.104 | 0.46 | 2.06 | | 2 | 6.27 | 5.15 | 4900 | | 0 | | | | | | |
| -1.013 | 1.014 | -0.103 | 1.57 | 4.73 | | 2 | 9.57 | 5.15 | 4900 | | 0 | | | | | | |
| -1.350 | 0.980 | -0.103 | 3.77 | 8.51 | | 2 | 12.86 | 5.15 | 4900 | | 0 | | | | | | |
| | | | | | | 2 | 1.84 | 1.84 | 15100 | | 0 | | | | | | |
| -1.500 | 0.964 | -0.103 | 5.08 | 8.91 | | 2 | 3.42 | 3.42 | 15100 | | 0 | | | | | | |
| -1.800 | 0.933 | -0.102 | 7.95 | 10.41 | | 2 | 6.58 | 4.85 | 15100 | | 0 | | | | | | |
| -2.100 | 0.903 | -0.100 | 11.42 | 12.86 | | 2 | 9.73 | 4.85 | 15100 | | 0 | | | | | | |
| | | | | | | 2 | 9.73 | 4.85 | 15100 | | 2 | 13.64 | | 15100 | | | |
| -2.425 | 0.871 | -0.098 | 15.41 | 11.74 | | 2 | 13.13 | 4.85 | 15100 | | 2 | 16.07 | | 15100 | | | |
| -2.750 | 0.839 | -0.096 | 19.09 | 10.94 | | 2 | 16.52 | 4.85 | 15100 | | 2 | 18.50 | | 15100 | | | |
| -3.075 | 0.809 | -0.093 | 22.55 | 10.45 | | 2 | 19.90 | 4.85 | 15100 | | 2 | 20.96 | | 15100 | | | |
| -3.400 | 0.779 | -0.089 | 25.91 | 10.26 | | 2 | 23.27 | 4.85 | 15100 | | 2 | 23.43 | | 15100 | | | |
| | | | | | | 2 | 16.82 | 4.55 | 20600 | | 2 | 26.99 | | 20600 | | | |
| -3.656 | 0.756 | -0.086 | 28.22 | 7.77 | | 2 | 19.49 | 4.55 | 20600 | | 2 | 28.74 | | 20600 | | | |
| -3.913 | 0.735 | -0.083 | 29.91 | 5.51 | | 2 | 22.16 | 4.55 | 20600 | | 2 | 30.51 | | 20600 | | | |
| -4.169 | 0.714 | -0.079 | 31.06 | 3.48 | | 2 | 24.80 | 4.55 | 20600 | | 2 | 32.30 | | 20600 | | | |
| -4.425 | 0.694 | -0.075 | 31.71 | 1.66 | | 2 | 27.42 | 4.55 | 20600 | | 2 | 34.11 | | 20600 | | | |
| -4.681 | 0.675 | -0.072 | 31.93 | 0.05 | | 2 | 30.02 | 4.55 | 20600 | | 2 | 35.93 | | 20600 | | | |
| -4.938 | 0.658 | -0.068 | 31.75 | -1.37 | | 2 | 32.61 | 4.55 | 20600 | | 2 | 37.78 | | 20600 | | | |
| -5.194 | 0.641 | -0.064 | 31.24 | -2.61 | | 2 | 35.17 | 4.55 | 20600 | | 2 | 39.65 | | 20600 | | | |
| -5.450 | 0.625 | -0.061 | 30.43 | -3.67 | | 2 | 37.72 | 4.55 | 20600 | | 2 | 41.53 | | 20600 | | | |
| -5.706 | 0.610 | -0.057 | 29.37 | -4.57 | | 2 | 40.24 | 4.55 | 20600 | | 2 | 43.44 | | 20600 | | | |
| -5.962 | 0.595 | -0.054 | 28.10 | -5.31 | | 2 | 42.75 | 4.55 | 20600 | | 2 | 45.36 | | 20600 | | | |
| -6.219 | 0.582 | -0.051 | 26.66 | -5.91 | | 2 | 45.24 | 4.55 | 20600 | | 2 | 47.30 | | 20600 | | | |
| -6.475 | 0.569 | -0.048 | 25.09 | -6.37 | | 2 | 47.71 | 4.55 | 20600 | | 2 | 49.26 | | 20600 | | | |
| -6.731 | 0.558 | -0.045 | 23.41 | -6.71 | | 2 | 50.17 | 4.55 | 20600 | | 2 | 51.23 | | 20600 | | | |
| -6.988 | 0.547 | -0.042 | 21.66 | -6.92 | | 2 | 52.62 | 4.55 | 20600 | | 2 | 53.22 | | 20600 | | | |
| -7.244 | 0.536 | -0.040 | 19.87 | -7.02 | | 2 | 55.05 | 4.55 | 20600 | | 2 | 55.22 | | 20600 | | | |
| -7.500 | 0.526 | -0.037 | 18.07 | -7.01 | | 2 | 57.47 | 4.55 | 20600 | | 2 | 57.23 | | 20600 | | | |
| -7.875 | 0.513 | -0.035 | 15.47 | -6.81 | | 2 | 59.28 | 4.55 | 20600 | | 2 | 58.49 | | 20600 | | | |
| -8.250 | 0.500 | -0.032 | 12.99 | -6.42 | | 2 | 61.07 | 4.55 | 20600 | | 2 | 59.76 | | 20600 | | | |
| -8.625 | 0.489 | -0.030 | 10.68 | -5.84 | | 2 | 62.85 | 4.55 | 20600 | | 2 | 61.06 | | 20600 | | | |
| -9.000 | 0.478 | -0.028 | 8.63 | -5.08 | | 2 | 64.61 | 4.55 | 20600 | | 2 | 62.37 | | 20600 | | | |
| -9.300 | 0.469 | -0.027 | 7.21 | -4.36 | | 2 | 66.01 | 4.55 | 20600 | | 2 | 63.43 | | 20600 | | | |
| -9.600 | 0.461 | -0.026 | 6.03 | -3.53 | | 2 | 67.41 | 4.55 | 20600 | | 2 | 64.49 | | 20600 | | | |
| -10.100 | 0.448 | -0.025 | 4.65 | -1.94 | | 2 | 69.72 | 4.55 | 20600 | | 2 | 66.27 | | 20600 | | | |
| -10.600 | 0.436 | -0.024 | 4.13 | -0.09 | | 2 | 72.02 | 4.55 | 20600 | | 2 | 68.06 | | 20600 | | | |
| -11.100 | 0.424 | -0.023 | 4.60 | 2.01 | | 2 | 74.31 | 4.55 | 20600 | | 2 | 69.86 | | 20600 | | | |
| -11.600 | 0.413 | -0.022 | 6.18 | 4.36 | | 2 | 76.59 | 4.55 | 20600 | | 2 | 71.68 | | 20600 | | | |
| -12.100 | 0.402 | -0.020 | 8.99 | 6.92 | | 2 | 78.86 | 4.55 | 20600 | | 2 | 73.51 | | 20600 | | | |
| | | | | | | 2 | 67.25 | 4.12 | 29000 | | 2 | 70.72 | | 29000 | | | |
| -12.435 | 0.395 | -0.019 | 11.13 | 5.82 | | 2 | 68.75 | 4.12 | 29000 | | 2 | 71.84 | | 29000 | | | |
| -12.770 | 0.389 | -0.017 | 12.91 | 4.85 | | 2 | 70.24 | 4.12 | 29000 | | 2 | 72.98 | | 29000 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.053 | 0.385 | -0.015 | 14.18 | 4.11 | | 2 71.48 | 4.12 | 29000 | 2 73.95 | | 29000 | |
| -13.336 | 0.381 | -0.013 | 15.24 | 3.44 | | 2 72.70 | 4.12 | 29000 | 2 74.94 | | 29000 | |
| -13.619 | 0.377 | -0.011 | 16.13 | 2.83 | | 2 73.91 | 4.12 | 29000 | 2 75.95 | | 29000 | |
| -13.903 | 0.374 | -0.009 | 16.85 | 2.28 | | 2 75.10 | 4.12 | 29000 | 2 76.98 | | 29000 | |
| -14.186 | 0.372 | -0.007 | 17.43 | 1.77 | | 2 76.28 | 4.12 | 29000 | 2 78.02 | | 29000 | |
| -14.469 | 0.371 | -0.005 | 17.86 | 1.29 | | 2 77.43 | 4.12 | 29000 | 2 79.08 | | 29000 | |
| -14.752 | 0.370 | -0.002 | 18.16 | 0.83 | | 2 78.57 | 4.12 | 29000 | 2 80.16 | | 29000 | |
| -15.035 | 0.369 | 0.000 | 18.33 | 0.38 | | 2 79.69 | 4.12 | 29000 | 2 81.26 | | 29000 | |
| -15.318 | 0.370 | 0.002 | 18.38 | -0.06 | | 2 80.79 | 4.12 | 29000 | 2 82.37 | | 29000 | |
| -15.601 | 0.371 | 0.005 | 18.29 | -0.52 | | 2 81.86 | 4.12 | 29000 | 2 83.51 | | 29000 | |
| -15.884 | 0.372 | 0.007 | 18.08 | -1.00 | | 2 82.92 | 4.12 | 29000 | 2 84.67 | | 29000 | |
| -16.167 | 0.375 | 0.009 | 17.72 | -1.51 | | 2 83.96 | 4.12 | 29000 | 2 85.85 | | 29000 | |
| -16.451 | 0.378 | 0.012 | 17.22 | -2.07 | | 2 84.98 | 4.12 | 29000 | 2 87.04 | | 29000 | |
| -16.734 | 0.381 | 0.014 | 16.55 | -2.68 | | 2 85.99 | 4.12 | 29000 | 2 88.25 | | 29000 | |
| -17.017 | 0.386 | 0.016 | 15.69 | -3.36 | | 2 86.97 | 4.12 | 29000 | 2 89.48 | | 29000 | |
| -17.300 | 0.390 | 0.018 | 14.64 | -4.11 | | 2 87.94 | 4.12 | 29000 | 2 90.73 | | 29000 | |
| -17.800 | 0.400 | 0.021 | 12.21 | -5.65 | | 2 89.62 | 4.12 | 29000 | 2 92.97 | | 29000 | |
| -18.300 | 0.411 | 0.023 | 8.94 | -7.49 | | 2 91.25 | 4.12 | 29000 | 2 95.25 | | 29000 | |
| -18.800 | 0.423 | 0.025 | 4.67 | -9.66 | | 2 92.85 | 4.12 | 29000 | 2 97.56 | | 29000 | |
| -19.000 | 0.428 | 0.025 | 2.64 | -10.63 | | 2 93.49 | 4.12 | 29000 | 2 98.49 | | 29000 | |
| | | | | | | 2 108.14 | 4.55 | 20600 | 2 103.87 | | 20600 | |
| -19.288 | 0.436 | 0.026 | -0.25 | -9.45 | | 2 109.17 | 4.55 | 20600 | 2 105.20 | | 20600 | |
| -19.575 | 0.443 | 0.025 | -2.81 | -8.35 | | 2 110.20 | 4.55 | 20600 | 2 106.53 | | 20600 | |
| -19.862 | 0.450 | 0.025 | -5.06 | -7.34 | | 2 111.23 | 4.55 | 20600 | 2 107.86 | | 20600 | |
| -20.150 | 0.457 | 0.024 | -7.04 | -6.42 | | 2 112.26 | 4.55 | 20600 | 2 109.18 | | 20600 | |
| -20.575 | 0.467 | 0.022 | -9.50 | -5.19 | | 2 113.80 | 4.55 | 20600 | 2 111.12 | | 20600 | |
| -21.000 | 0.476 | 0.020 | -11.47 | -4.14 | | 2 115.35 | 4.55 | 20600 | 2 113.05 | | 20600 | |
| -21.275 | 0.482 | 0.019 | -12.53 | -3.54 | | 2 116.36 | 4.55 | 20600 | 2 114.29 | | 20600 | |
| -21.550 | 0.487 | 0.017 | -13.42 | -2.99 | | 2 117.39 | 4.55 | 20600 | 2 115.52 | | 20600 | |
| -21.825 | 0.491 | 0.015 | -14.18 | -2.50 | | 2 118.42 | 4.55 | 20600 | 2 116.73 | | 20600 | |
| -22.100 | 0.495 | 0.014 | -14.81 | -2.06 | | 2 119.46 | 4.55 | 20600 | 2 117.94 | | 20600 | |
| -22.375 | 0.499 | 0.012 | -15.32 | -1.66 | | 2 120.52 | 4.55 | 20600 | 2 119.14 | | 20600 | |
| -22.650 | 0.502 | 0.010 | -15.72 | -1.30 | | 2 121.58 | 4.55 | 20600 | 2 120.33 | | 20600 | |
| -22.925 | 0.504 | 0.008 | -16.04 | -0.97 | | 2 122.66 | 4.55 | 20600 | 2 121.50 | | 20600 | |
| -23.200 | 0.506 | 0.006 | -16.26 | -0.66 | | 2 123.75 | 4.55 | 20600 | 2 122.67 | | 20600 | |
| -23.700 | 0.508 | 0.002 | -16.46 | -0.14 | | 2 125.76 | 4.55 | 20600 | 2 124.76 | | 20600 | |
| -23.969 | 0.508 | 0.000 | -16.46 | 0.12 | | 2 126.85 | 4.55 | 20600 | 2 125.86 | | 20600 | |
| -24.238 | 0.508 | -0.002 | -16.39 | 0.39 | | 2 127.96 | 4.55 | 20600 | 2 126.96 | | 20600 | |
| -24.506 | 0.507 | -0.004 | -16.25 | 0.66 | | 2 129.07 | 4.55 | 20600 | 2 128.04 | | 20600 | |
| -24.775 | 0.506 | -0.006 | -16.03 | 0.95 | | 2 130.20 | 4.55 | 20600 | 2 129.11 | | 20600 | |
| -25.044 | 0.504 | -0.008 | -15.74 | 1.25 | | 2 131.34 | 4.55 | 20600 | 2 130.18 | | 20600 | |
| -25.312 | 0.501 | -0.010 | -15.36 | 1.58 | | 2 132.49 | 4.55 | 20600 | 2 131.23 | | 20600 | |
| -25.581 | 0.498 | -0.012 | -14.89 | 1.93 | | 2 133.65 | 4.55 | 20600 | 2 132.27 | | 20600 | |
| -25.850 | 0.495 | -0.013 | -14.32 | 2.32 | | 2 134.82 | 4.55 | 20600 | 2 133.30 | | 20600 | |
| -26.119 | 0.491 | -0.015 | -13.64 | 2.75 | | 2 136.00 | 4.55 | 20600 | 2 134.32 | | 20600 | |
| -26.388 | 0.487 | -0.017 | -12.84 | 3.23 | | 2 137.19 | 4.55 | 20600 | 2 135.33 | | 20600 | |
| -26.656 | 0.482 | -0.018 | -11.90 | 3.75 | | 2 138.39 | 4.55 | 20600 | 2 136.34 | | 20600 | |
| -26.925 | 0.477 | -0.020 | -10.81 | 4.33 | | 2 139.59 | 4.55 | 20600 | 2 137.33 | | 20600 | |
| -27.194 | 0.472 | -0.021 | -9.56 | 4.97 | | 2 140.81 | 4.55 | 20600 | 2 138.32 | | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.462 | 0.466 | -0.022 | -8.13 | 5.67 | | 2 | 142.03 | 4.55 | 20600 | 2 | 139.30 | 20600 | |
| -27.731 | 0.460 | -0.023 | -6.51 | 6.44 | | 2 | 143.25 | 4.55 | 20600 | 2 | 140.27 | 20600 | |
| -28.000 | 0.453 | -0.024 | -4.67 | 7.28 | | 2 | 144.48 | 4.55 | 20600 | 2 | 141.25 | 20600 | |
| | | | | | | 2 | 126.14 | 4.12 | 29000 | 2 | 132.59 | 29000 | |
| -28.500 | 0.441 | -0.024 | -1.81 | 4.22 | | 2 | 128.44 | 4.12 | 29000 | 2 | 134.20 | 29000 | |
| -29.000 | 0.429 | -0.025 | -0.39 | 1.52 | | 2 | 130.76 | 4.12 | 29000 | 2 | 135.80 | 29000 | |
| -29.500 | 0.417 | -0.025 | -0.22 | -0.82 | | 2 | 133.07 | 4.12 | 29000 | 2 | 137.40 | 29000 | |
| -30.000 | 0.404 | -0.025 | -1.14 | -2.80 | | 2 | 135.38 | 4.12 | 29000 | 2 | 139.00 | 29000 | |
| -30.500 | 0.392 | -0.025 | -2.97 | -4.43 | | 2 | 137.70 | 4.12 | 29000 | 2 | 140.59 | 29000 | |
| -31.000 | 0.379 | -0.026 | -5.51 | -5.69 | | 2 | 140.03 | 4.12 | 29000 | 2 | 142.18 | 29000 | |
| -31.500 | 0.366 | -0.028 | -8.59 | -6.56 | | 2 | 142.38 | 4.12 | 29000 | 2 | 143.74 | 29000 | |
| -32.000 | 0.351 | -0.030 | -12.01 | -7.03 | | 2 | 144.76 | 4.12 | 29000 | 2 | 145.28 | 29000 | |
| -32.500 | 0.335 | -0.033 | -15.55 | -7.06 | | 2 | 147.17 | 4.12 | 29000 | 2 | 146.78 | 29000 | |
| -33.000 | 0.318 | -0.037 | -18.99 | -6.61 | | 2 | 149.64 | 4.12 | 29000 | 2 | 148.22 | 29000 | |
| -33.500 | 0.298 | -0.042 | -22.07 | -5.61 | | 2 | 152.17 | 4.12 | 29000 | 2 | 149.61 | 29000 | |
| -34.000 | 0.276 | -0.047 | -24.50 | -4.01 | | 2 | 154.77 | 4.12 | 29000 | 2 | 150.92 | 29000 | |
| -34.500 | 0.251 | -0.053 | -25.96 | -1.72 | | 2 | 157.46 | 4.12 | 29000 | 2 | 152.15 | 29000 | |
| -35.000 | 0.223 | -0.059 | -26.09 | 1.34 | | 2 | 160.23 | 4.12 | 29000 | 2 | 153.29 | 29000 | |
| -35.500 | 0.192 | -0.065 | -24.48 | 5.26 | | 2 | 163.08 | 4.12 | 29000 | 2 | 154.35 | 29000 | |
| -36.000 | 0.158 | -0.070 | -20.67 | 10.12 | | 2 | 166.02 | 4.12 | 29000 | 2 | 155.33 | 29000 | |
| | | | | | | 2 | 169.48 | 4.26 | 43800 | 2 | 162.79 | 43800 | |
| -36.500 | 0.122 | -0.074 | -14.65 | 14.25 | | 2 | 173.19 | 4.26 | 43800 | 2 | 163.34 | 43800 | |
| -37.000 | 0.084 | -0.077 | -6.15 | 20.01 | | 2 | 176.97 | 4.26 | 43800 | 2 | 163.81 | 43800 | |
| | | | | | | 2 | 39.24 | 1.52 | 300000 | 2 | 82.35 | 300000 | |
| -37.500 | 0.046 | -0.077 | -0.57 | 4.22 | | 2 | 51.77 | 1.52 | 300000 | 2 | 71.80 | 300000 | |
| -38.000 | 0.007 | -0.077 | 0.00 | 0.00 | | 2 | 64.34 | 1.52 | 300000 | 2 | 61.21 | 300000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 1.12 mm

MOMENTO MÁXIMO = 31.93 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 162.44 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.084 = (3578.08 kN/m)/(42785.78 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.100 = (3578.08 kN/m)/(35923.64 kN/m)



**  FASE No  2  **

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel rampa de autobuses.

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -1.500 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 5200000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -9.600 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -10.100 m



FASE 2

PARED | SOIL 1: EXCAVACIÓN: 0.00 m, NIVEL AGUA: -7.50 m, S. DE CAQUOT: 10.00 kPa | SOIL 2: EXCAVACIÓN: -9.60 m, NIVEL AGUA: -10.10 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ANCLAS

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.434 | 0.361 | 0.00 | 0.00 | | 2 | 3.02 | 3.02 | 4900 | 0 | | | |
| -0.338 | 0.556 | 0.361 | 0.22 | 1.45 | | 2 | 5.56 | 5.15 | 4900 | 0 | | | |
| -0.675 | 0.678 | 0.361 | 1.07 | 3.75 | | 2 | 8.09 | 5.15 | 4900 | 0 | | | |
| -1.013 | 0.799 | 0.361 | 2.85 | 6.91 | | 2 | 10.62 | 5.15 | 4900 | 0 | | | |
| -1.350 | 0.921 | 0.362 | 5.83 | 10.92 | | 2 | 13.15 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 2.72 | 2.72 | 15100 | 0 | | | |
| -1.500 | 0.976 | 0.362 | 7.50 | 11.37 | | 2 | 3.25 | 3.25 | 15100 | 0 | | | |
| | | | | -47.98 | | 2 | 3.25 | 3.25 | 15100 | 0 | | 1 | -59.34 |
| -1.800 | 1.084 | 0.362 | -6.73 | -46.85 | | 2 | 4.30 | 4.30 | 15100 | 0 | | | |
| -2.100 | 1.193 | 0.360 | -20.57 | -45.40 | | 2 | 5.35 | 4.85 | 15100 | 0 | | | |
| -2.425 | 1.309 | 0.356 | -35.03 | -43.47 | | 2 | 6.51 | 4.85 | 15100 | 0 | | | |
| -2.750 | 1.424 | 0.350 | -48.79 | -41.16 | | 2 | 7.69 | 4.85 | 15100 | 0 | | | |
| -3.075 | 1.537 | 0.342 | -61.74 | -38.46 | | 2 | 8.91 | 4.85 | 15100 | 0 | | | |
| -3.400 | 1.646 | 0.332 | -73.74 | -35.36 | | 2 | 10.17 | 4.85 | 15100 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -3.656 | 1.730 | 0.323 | -82.81 | -35.36 | | -1 | | | | 0 | | | |
| -3.913 | 1.811 | 0.312 | -91.87 | -35.36 | | -1 | | | | 0 | | | |
| -4.169 | 1.890 | 0.301 | -100.92 | -35.26 | | 1 | 0.76 | 0.76 | 20600 | 0 | | | |
| -4.425 | 1.966 | 0.289 | -109.92 | -34.90 | | 1 | 2.06 | 2.06 | 20600 | 0 | | | |
| -4.681 | 2.038 | 0.275 | -118.78 | -34.21 | | 1 | 3.37 | 2.68 | 20600 | 0 | | | |
| -4.938 | 2.107 | 0.261 | -127.42 | -33.18 | | 1 | 4.67 | 2.68 | 20600 | 0 | | | |
| -5.194 | 2.171 | 0.246 | -135.75 | -31.81 | | 1 | 5.98 | 2.68 | 20600 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -5.450 | 2.232 | 0.229 | -143.69 | -30.11 | | 1 | 7.28 | 2.68 | 20600 | 0 | | | | | | | |
| -5.706 | 2.289 | 0.212 | -151.16 | -28.08 | | 1 | 8.59 | 2.68 | 20600 | 0 | | | | | | | |
| -5.962 | 2.341 | 0.194 | -158.06 | -25.71 | | 1 | 9.89 | 2.68 | 20600 | 0 | | | | | | | |
| -6.219 | 2.388 | 0.175 | -164.30 | -23.01 | | 1 | 11.20 | 2.68 | 20600 | 0 | | | | | | | |
| -6.475 | 2.430 | 0.155 | -169.82 | -19.97 | | 1 | 12.50 | 2.68 | 20600 | 0 | | | | | | | |
| -6.731 | 2.468 | 0.135 | -174.51 | -16.60 | | 1 | 13.81 | 2.68 | 20600 | 0 | | | | | | | |
| -6.988 | 2.500 | 0.115 | -178.30 | -12.89 | | 1 | 15.11 | 2.68 | 20600 | 0 | | | | | | | |
| -7.244 | 2.526 | 0.094 | -181.09 | -8.85 | | 1 | 16.42 | 2.68 | 20600 | 0 | | | | | | | |
| -7.500 | 2.548 | 0.072 | -182.81 | -4.48 | | 1 | 17.72 | 2.68 | 20600 | 0 | | | | | | | |
| -7.875 | 2.569 | 0.041 | -183.13 | 3.03 | 3.68 | 1 | 18.63 | 2.68 | 20600 | 0 | | | | | | | |
| -8.250 | 2.578 | 0.010 | -180.32 | 12.25 | 7.36 | 1 | 19.53 | 2.68 | 20600 | 0 | | | | | | | |
| -8.625 | 2.576 | -0.021 | -173.73 | 23.19 | 11.04 | 1 | 20.44 | 2.68 | 20600 | 0 | | | | | | | |
| -9.000 | 2.563 | -0.049 | -162.71 | 35.91 | 14.72 | 2 | 21.65 | 2.99 | 20600 | 0 | | | | | | | |
| -9.300 | 2.545 | -0.071 | -150.23 | 47.50 | 17.66 | 2 | 23.25 | 3.87 | 20600 | 0 | | | | | | | |
| -9.600 | 2.521 | -0.090 | -134.07 | 60.47 | 20.60 | 2 | 24.98 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | | 20.60 | 2 | 24.98 | 4.55 | 20600 | 2 | 51.93 | | 20600 | | | | |
| -10.100 | 2.468 | -0.118 | -104.43 | 58.50 | 25.51 | 2 | 28.10 | 4.55 | 20600 | 2 | 55.17 | | 20600 | | | | |
| -10.600 | 2.404 | -0.138 | -75.26 | 58.38 | 25.51 | 2 | 31.47 | 4.55 | 20600 | 2 | 55.90 | | 20600 | | | | |
| -11.100 | 2.331 | -0.152 | -45.81 | 59.67 | 25.51 | 2 | 35.02 | 4.55 | 20600 | 2 | 56.44 | | 20600 | | | | |
| -11.600 | 2.253 | -0.159 | -15.33 | 62.51 | 25.51 | 2 | 38.68 | 4.55 | 20600 | 2 | 56.88 | | 20600 | | | | |
| -12.100 | 2.174 | -0.159 | 16.97 | 66.99 | 25.51 | 2 | 42.37 | 4.55 | 20600 | 2 | 57.29 | | 20600 | | | | |
| | | | | | 25.51 | 1 | 18.73 | 2.35 | 29000 | 2 | 74.36 | | 29000 | | | | |
| -12.435 | 2.121 | -0.155 | 37.74 | 57.06 | 25.51 | 1 | 19.48 | 2.35 | 29000 | 2 | 74.15 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.770 | 2.070 | -0.148 | 55.26 | 47.65 | 25.51 | 2 21.49 | 3.62 | 29000 | 2 73.99 | | 29000 | |
| -13.053 | 2.030 | -0.140 | 67.70 | 40.34 | 25.51 | 2 23.78 | 4.12 | 29000 | 2 73.92 | | 29000 | |
| -13.336 | 1.991 | -0.130 | 78.16 | 33.68 | 25.51 | 2 26.00 | 4.12 | 29000 | 2 73.92 | | 29000 | |
| -13.619 | 1.956 | -0.119 | 86.83 | 27.63 | 25.51 | 2 28.13 | 4.12 | 29000 | 2 74.00 | | 29000 | |
| -13.903 | 1.924 | -0.108 | 93.86 | 22.12 | 25.51 | 2 30.17 | 4.12 | 29000 | 2 74.18 | | 29000 | |
| -14.186 | 1.895 | -0.095 | 99.40 | 17.12 | 25.51 | 2 32.11 | 4.12 | 29000 | 2 74.45 | | 29000 | |
| -14.469 | 1.870 | -0.082 | 103.60 | 12.56 | 25.51 | 2 33.95 | 4.12 | 29000 | 2 74.83 | | 29000 | |
| -14.752 | 1.849 | -0.068 | 106.55 | 8.39 | 25.51 | 2 35.68 | 4.12 | 29000 | 2 75.32 | | 29000 | |
| -15.035 | 1.831 | -0.055 | 108.38 | 4.53 | 25.51 | 2 37.29 | 4.12 | 29000 | 2 75.92 | | 29000 | |
| -15.318 | 1.818 | -0.040 | 109.14 | 0.92 | 25.51 | 2 38.79 | 4.12 | 29000 | 2 76.64 | | 29000 | |
| -15.601 | 1.808 | -0.026 | 108.91 | -2.50 | 25.51 | 2 40.17 | 4.12 | 29000 | 2 77.48 | | 29000 | |
| -15.884 | 1.803 | -0.012 | 107.74 | -5.79 | 25.51 | 2 41.44 | 4.12 | 29000 | 2 78.42 | | 29000 | |
| -16.167 | 1.801 | 0.001 | 105.64 | -9.03 | 25.51 | 2 42.59 | 4.12 | 29000 | 2 79.49 | | 29000 | |
| -16.451 | 1.804 | 0.015 | 102.62 | -12.27 | 25.51 | 2 43.63 | 4.12 | 29000 | 2 80.66 | | 29000 | |
| -16.734 | 1.810 | 0.028 | 98.68 | -15.59 | 25.51 | 2 44.56 | 4.12 | 29000 | 2 81.95 | | 29000 | |
| -17.017 | 1.819 | 0.040 | 93.79 | -19.03 | 25.51 | 2 45.39 | 4.12 | 29000 | 2 83.34 | | 29000 | |
| -17.300 | 1.832 | 0.052 | 87.89 | -22.66 | 25.51 | 2 46.12 | 4.12 | 29000 | 2 84.82 | | 29000 | |
| -17.800 | 1.863 | 0.071 | 74.83 | -29.71 | 25.51 | 2 47.18 | 4.12 | 29000 | 2 87.68 | | 29000 | |
| -18.300 | 1.903 | 0.086 | 58.01 | -37.77 | 25.51 | 2 48.00 | 4.12 | 29000 | 2 90.77 | | 29000 | |
| -18.800 | 1.949 | 0.097 | 36.86 | -47.07 | 25.51 | 2 48.62 | 4.12 | 29000 | 2 94.06 | | 29000 | |
| -19.000 | 1.968 | 0.100 | 27.04 | -51.17 | 25.51 | 2 48.83 | 4.12 | 29000 | 2 95.42 | | 29000 | |
| | | | | | 25.51 | 2 76.42 | 4.55 | 20600 | 2 82.88 | | 20600 | |
| -19.288 | 1.997 | 0.102 | 13.09 | -45.87 | 25.51 | 2 77.00 | 4.55 | 20600 | 2 84.66 | | 20600 | |
| -19.575 | 2.027 | 0.103 | 0.63 | -40.92 | 25.51 | 2 77.57 | 4.55 | 20600 | 2 86.45 | | 20600 | |
| -19.862 | 2.057 | 0.103 | -10.47 | -36.31 | 25.51 | 2 78.13 | 4.55 | 20600 | 2 88.24 | | 20600 | |
| -20.150 | 2.086 | 0.101 | -20.29 | -32.06 | 25.51 | 2 78.71 | 4.55 | 20600 | 2 90.02 | | 20600 | |
| -20.575 | 2.128 | 0.095 | -32.68 | -26.39 | 25.51 | 2 79.59 | 4.55 | 20600 | 2 92.62 | | 20600 | |
| -21.000 | 2.167 | 0.088 | -42.82 | -21.43 | 25.51 | 2 80.52 | 4.55 | 20600 | 2 95.16 | | 20600 | |
| -21.275 | 2.190 | 0.082 | -48.32 | -18.58 | 25.51 | 2 81.17 | 4.55 | 20600 | 2 96.77 | | 20600 | |
| -21.550 | 2.212 | 0.076 | -53.06 | -15.98 | 25.51 | 2 81.84 | 4.55 | 20600 | 2 98.35 | | 20600 | |
| -21.825 | 2.232 | 0.069 | -57.13 | -13.62 | 25.51 | 2 82.56 | 4.55 | 20600 | 2 99.89 | | 20600 | |
| -22.100 | 2.250 | 0.062 | -60.57 | -11.47 | 25.51 | 2 83.31 | 4.55 | 20600 | 2 101.38 | | 20600 | |
| -22.375 | 2.266 | 0.054 | -63.45 | -9.52 | 25.51 | 2 84.11 | 4.55 | 20600 | 2 102.84 | | 20600 | |
| -22.650 | 2.280 | 0.046 | -65.82 | -7.73 | 25.51 | 2 84.95 | 4.55 | 20600 | 2 104.25 | | 20600 | |
| -22.925 | 2.291 | 0.037 | -67.72 | -6.09 | 25.51 | 2 85.85 | 4.55 | 20600 | 2 105.61 | | 20600 | |
| -23.200 | 2.300 | 0.029 | -69.18 | -4.56 | 25.51 | 2 86.78 | 4.55 | 20600 | 2 106.92 | | 20600 | |
| -23.700 | 2.311 | 0.013 | -70.81 | -1.98 | 25.51 | 2 88.62 | 4.55 | 20600 | 2 109.18 | | 20600 | |
| -23.969 | 2.313 | 0.004 | -71.16 | -0.67 | 25.51 | 2 89.67 | 4.55 | 20600 | 2 110.33 | | 20600 | |
| -24.238 | 2.313 | -0.005 | -71.17 | 0.64 | 25.51 | 2 90.77 | 4.55 | 20600 | 2 111.43 | | 20600 | |
| -24.506 | 2.310 | -0.013 | -70.82 | 1.95 | 25.51 | 2 91.92 | 4.55 | 20600 | 2 112.48 | | 20600 | |
| -24.775 | 2.306 | -0.022 | -70.11 | 3.31 | 25.51 | 2 93.12 | 4.55 | 20600 | 2 113.48 | | 20600 | |
| -25.044 | 2.299 | -0.031 | -69.03 | 4.73 | 25.51 | 2 94.37 | 4.55 | 20600 | 2 114.44 | | 20600 | |
| -25.312 | 2.289 | -0.039 | -67.56 | 6.24 | 25.51 | 2 95.66 | 4.55 | 20600 | 2 115.35 | | 20600 | |
| -25.581 | 2.278 | -0.047 | -65.67 | 7.87 | 25.51 | 2 97.00 | 4.55 | 20600 | 2 116.21 | | 20600 | |
| -25.850 | 2.264 | -0.055 | -63.32 | 9.64 | 25.51 | 2 98.38 | 4.55 | 20600 | 2 117.03 | | 20600 | |
| -26.119 | 2.248 | -0.063 | -60.47 | 11.57 | 25.51 | 2 99.81 | 4.55 | 20600 | 2 117.80 | | 20600 | |
| -26.388 | 2.230 | -0.070 | -57.08 | 13.69 | 25.51 | 2 101.28 | 4.55 | 20600 | 2 118.53 | | 20600 | |
| -26.656 | 2.211 | -0.077 | -53.09 | 16.02 | 25.51 | 2 102.78 | 4.55 | 20600 | 2 119.23 | | 20600 | |
| -26.925 | 2.189 | -0.083 | -48.45 | 18.57 | 25.51 | 2 104.33 | 4.55 | 20600 | 2 119.89 | | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.194 | 2.166 | -0.089 | -43.09 | 21.37 | 25.51 | 2 105.90 | 4.55 | 20600 | 2 120.51 | | 20600 | |
| -27.462 | 2.142 | -0.093 | -36.94 | 24.44 | 25.51 | 2 107.51 | 4.55 | 20600 | 2 121.11 | | 20600 | |
| -27.731 | 2.116 | -0.098 | -29.93 | 27.78 | 25.51 | 2 109.14 | 4.55 | 20600 | 2 121.68 | | 20600 | |
| -28.000 | 2.089 | -0.101 | -21.98 | 31.41 | 25.51 | 2 110.78 | 4.55 | 20600 | 2 122.23 | | 20600 | |
| | | | | | 25.51 | 2 78.70 | 4.12 | 29000 | 2 132.30 | | 29000 | |
| -28.500 | 2.038 | -0.104 | -9.67 | 18.11 | 25.51 | 2 82.14 | 4.12 | 29000 | 2 132.77 | | 29000 | |
| -29.000 | 1.985 | -0.106 | -3.63 | 6.31 | 25.51 | 2 85.62 | 4.12 | 29000 | 2 133.20 | | 29000 | |
| -29.500 | 1.932 | -0.106 | -3.10 | -3.96 | 25.51 | 2 89.12 | 4.12 | 29000 | 2 133.62 | | 29000 | |
| -30.000 | 1.879 | -0.107 | -7.33 | -12.68 | 25.51 | 2 92.62 | 4.12 | 29000 | 2 134.03 | | 29000 | |
| -30.500 | 1.825 | -0.110 | -15.52 | -19.84 | 25.51 | 2 96.15 | 4.12 | 29000 | 2 134.41 | | 29000 | |
| -31.000 | 1.769 | -0.115 | -26.91 | -25.41 | 25.51 | 2 99.74 | 4.12 | 29000 | 2 134.74 | | 29000 | |
| -31.500 | 1.710 | -0.122 | -40.65 | -29.30 | 25.51 | 2 103.41 | 4.12 | 29000 | 2 134.99 | | 29000 | |
| -32.000 | 1.646 | -0.133 | -55.91 | -31.41 | 25.51 | 2 107.22 | 4.12 | 29000 | 2 135.09 | | 29000 | |
| -32.500 | 1.576 | -0.148 | -71.74 | -31.58 | 25.51 | 2 111.21 | 4.12 | 29000 | 2 135.01 | | 29000 | |
| -33.000 | 1.497 | -0.166 | -87.13 | -29.59 | 25.51 | 2 115.44 | 4.12 | 29000 | 2 134.70 | | 29000 | |
| -33.500 | 1.409 | -0.188 | -100.93 | -25.19 | 25.51 | 2 119.96 | 4.12 | 29000 | 2 134.09 | | 29000 | |
| -34.000 | 1.309 | -0.212 | -111.87 | -18.06 | 25.51 | 2 124.81 | 4.12 | 29000 | 2 133.16 | | 29000 | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -34.500 | 1.197 | -0.238 | -118.48 | -7.85 | 25.51 | 2 | 130.03 | 4.12 | 29000 | 2 | 131.85 | | 29000 | | | | |
| -35.000 | 1.071 | -0.266 | -119.13 | 5.82 | 25.51 | 2 | 135.64 | 4.12 | 29000 | 2 | 130.15 | | 29000 | | | | |
| -35.500 | 0.931 | -0.292 | -112.01 | 23.34 | 25.51 | 2 | 141.64 | 4.12 | 29000 | 2 | 128.06 | | 29000 | | | | |
| -36.000 | 0.779 | -0.316 | -95.09 | 45.09 | 25.51 | 2 | 148.01 | 4.12 | 29000 | 2 | 125.61 | | 29000 | | | | |
| | | | | | 25.51 | 2 | 142.29 | 4.26 | 43800 | 2 | 140.63 | | 43800 | | | | |
| -36.500 | 0.616 | -0.335 | -68.55 | 62.24 | 25.51 | 2 | 151.55 | 4.26 | 43800 | 2 | 135.62 | | 43800 | | | | |
| -37.000 | 0.445 | -0.347 | -31.63 | 86.70 | 25.51 | 2 | 161.16 | 4.26 | 43800 | 2 | 130.28 | | 43800 | | | | |
| | | | | | 25.51 | -1 | | | | 2 | 173.05 | | 300000 | | | | |
| -37.500 | 0.271 | -0.350 | -4.58 | 25.76 | 25.51 | -1 | | | | 2 | 121.71 | | 300000 | | | | |
| -38.000 | 0.095 | -0.350 | 0.00 | 0.00 | 25.51 | 2 | 37.79 | 1.52 | 300000 | 2 | 70.15 | | 300000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |

DESPLAZAMIENTO MÁX. = 2.58 mm

MOMENTO MÁXIMO = -183.13 kN.m/m

CODIFICACIÓN : -1 = SEPARACIÓN
DE ESTADO : 0 = EXCAVACIÓN
DE SUELO : 1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 148.15 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.053 = (2283.83 kN/m)/(42785.78 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.144 = (2969.26 kN/m)/(20670.49 kN/m)



** FASE No 3 **

*Fase 3
*Ejecucion del nivel de autobuses
*Excavacion hasta 1er puntal provisional

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 2
NIVEL = -9.000 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 3466667.250 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -18.300 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -18.800 m



FASE 3

| | PARED | | | | | SOIL 1 | | | | SOIL 2 | | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXCAVACIÓN: 0.00 m | | | | EXCAVACIÓN: -18.30 m | | | | | |
| | | | | | | NIVEL AGUA: -7.50 m | | | | NIVEL AGUA: -18.80 m | | | | | |
| | | | | | | S. DE CAQUOT: 10.00 kPa | | | | S. DE CAQUOT: 0.00 kPa | | | | | |
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | | ELAST. | ESTADO | PR. SOPRAC. | | ELAST. | N° | FUERZA |
| 0.000 | 1.334 | -0.256 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.338 | 1.248 | -0.256 | 0.04 | 0.37 | | 2 | 2.16 | 2.16 | 4900 | 0 | | | | | |
| -0.675 | 1.161 | -0.256 | 0.36 | 1.70 | | 2 | 5.72 | 5.15 | 4900 | 0 | | | | | |
| -1.013 | 1.075 | -0.255 | 1.32 | 4.22 | | 2 | 9.27 | 5.15 | 4900 | 0 | | | | | |
| -1.350 | 0.989 | -0.255 | 3.34 | 7.95 | | 2 | 12.82 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 1.70 | 1.70 | 15100 | 0 | | | | | |
| -1.500 | 0.951 | -0.255 | 4.56 | 8.35 | | 2 | 3.63 | 3.63 | 15100 | 0 | | | | | |
| | | | | 78.16 | | 2 | 3.63 | 3.63 | 15100 | 0 | | | | 1 | 69.81 |
| -1.800 | 0.875 | -0.253 | 28.23 | 79.82 | | 2 | 7.47 | 4.85 | 15100 | 0 | | | | | |
| -2.100 | 0.799 | -0.247 | 52.57 | 82.63 | | 2 | 11.29 | 4.85 | 15100 | 0 | | | | | |
| -2.425 | 0.721 | -0.237 | 80.09 | 86.97 | | 2 | 15.40 | 4.85 | 15100 | 0 | | | | | |
| -2.750 | 0.646 | -0.223 | 109.24 | 92.63 | | 2 | 19.45 | 4.85 | 15100 | 0 | | | | | |
| -3.075 | 0.576 | -0.205 | 140.45 | 99.60 | | 2 | 23.42 | 4.85 | 15100 | 0 | | | | | |
| -3.400 | 0.513 | -0.181 | 174.12 | 107.84 | | 2 | 27.28 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | 2 | 22.29 | 4.55 | 20600 | 0 | | | | | |
| -3.656 | 0.469 | -0.159 | 202.52 | 113.95 | | 2 | 25.41 | 4.55 | 20600 | 0 | | | | | |
| -3.913 | 0.432 | -0.134 | 232.59 | 120.84 | | 2 | 28.40 | 4.55 | 20600 | 0 | | | | | |
| -4.169 | 0.401 | -0.105 | 264.52 | 128.51 | | 2 | 31.43 | 4.55 | 20600 | 0 | | | | | |
| -4.425 | 0.378 | -0.072 | 298.52 | 136.99 | | 2 | 34.76 | 4.55 | 20600 | 0 | | | | | |
| -4.681 | 0.364 | -0.035 | 334.80 | 146.29 | | 2 | 37.84 | 4.55 | 20600 | 0 | | | | | |
| -4.938 | 0.361 | 0.006 | 373.56 | 156.35 | | 2 | 40.64 | 4.55 | 20600 | 0 | | | | | |
| -5.194 | 0.368 | 0.053 | 414.98 | 167.08 | | 2 | 43.13 | 4.55 | 20600 | 0 | | | | | |
| -5.450 | 0.388 | 0.104 | 459.24 | 178.41 | | 2 | 45.28 | 4.55 | 20600 | 0 | | | | | |
| -5.706 | 0.422 | 0.160 | 506.46 | 190.24 | | 2 | 47.05 | 4.55 | 20600 | 0 | | | | | |
| -5.962 | 0.471 | 0.222 | 556.77 | 202.47 | | 2 | 48.42 | 4.55 | 20600 | 0 | | | | | |
| -6.219 | 0.536 | 0.291 | 610.25 | 215.00 | | 2 | 49.35 | 4.55 | 20600 | 0 | | | | | |
| -6.475 | 0.620 | 0.365 | 666.97 | 227.70 | | 2 | 49.80 | 4.55 | 20600 | 0 | | | | | |
| -6.731 | 0.724 | 0.447 | 726.95 | 240.45 | | 2 | 49.73 | 4.55 | 20600 | 0 | | | | | |
| -6.988 | 0.850 | 0.535 | 790.19 | 253.11 | | 2 | 49.11 | 4.55 | 20600 | 0 | | | | | |
| -7.244 | 0.999 | 0.632 | 856.65 | 265.54 | | 2 | 47.88 | 4.55 | 20600 | 0 | | | | | |
| -7.500 | 1.174 | 0.736 | 926.25 | 277.57 | | 2 | 46.02 | 4.55 | 20600 | 0 | | | | | |
| -7.875 | 1.481 | 0.904 | 1033.54 | 294.59 | 3.68 | 2 | 41.04 | 4.55 | 20600 | 0 | | | | | |
| -8.250 | 1.854 | 1.090 | 1147.09 | 310.81 | 7.36 | 2 | 34.45 | 4.55 | 20600 | 0 | | | | | |
| -8.625 | 2.301 | 1.297 | 1266.47 | 325.61 | 11.04 | 2 | 26.10 | 4.55 | 20600 | 0 | | | | | |
| -9.000 | 2.830 | 1.524 | 1391.16 | 339.34 | 14.72 | 1 | 21.34 | 2.68 | 20600 | 0 | | | | | |
| | | | | -584.24 | 14.72 | 1 | 21.34 | 2.68 | 20600 | 0 | | | | 2 | -923.58 |
| -9.300 | 3.314 | 1.703 | 1217.57 | -572.88 | 17.66 | 1 | 22.06 | 2.68 | 20600 | 0 | | | | | |
| -9.600 | 3.849 | 1.858 | 1047.55 | -560.41 | 20.60 | 1 | 22.79 | 2.68 | 20600 | 0 | | | | | |
| -10.100 | 4.833 | 2.066 | 773.02 | -537.19 | 25.51 | 1 | 23.99 | 2.68 | 20600 | 0 | | | | | |
| -10.600 | 5.905 | 2.212 | 510.87 | -510.91 | 30.41 | 1 | 25.20 | 2.68 | 20600 | 0 | | | | | |
| -11.100 | 7.035 | 2.300 | 262.62 | -481.58 | 35.32 | 1 | 26.41 | 2.68 | 20600 | 0 | | | | | |
| -11.600 | 8.196 | 2.333 | 29.80 | -449.19 | 40.22 | 1 | 27.61 | 2.68 | 20600 | 0 | | | | | |
| -12.100 | 9.360 | 2.315 | -186.06 | -413.74 | 45.13 | 1 | 28.82 | 2.68 | 20600 | 0 | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 45.13 | 1 | 18.73 | 2.35 | 29000 | 0 | | | | | | | |
| -12.435 | 10.129 | 2.276 | -321.01 | -391.68 | 48.41 | 1 | 19.48 | 2.35 | 29000 | 0 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | | kN |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.770 | 10.882 | 2.217 | -448.33 | -368.26 | 51.70 | 1 | 20.23 | 2.35 | 29000 | 0 | | | |
| -13.053 | 11.501 | 2.153 | -549.67 | -347.41 | 54.48 | 1 | 20.86 | 2.35 | 29000 | 0 | | | |
| -13.336 | 12.100 | 2.075 | -644.96 | -325.60 | 57.25 | 1 | 21.49 | 2.35 | 29000 | 0 | | | |
| -13.619 | 12.675 | 1.986 | -733.95 | -302.82 | 60.03 | 1 | 22.12 | 2.35 | 29000 | 0 | | | |
| -13.903 | 13.224 | 1.886 | -816.35 | -279.08 | 62.81 | 1 | 22.75 | 2.35 | 29000 | 0 | | | |
| -14.186 | 13.742 | 1.775 | -891.89 | -254.37 | 65.59 | 1 | 23.39 | 2.35 | 29000 | 0 | | | |
| -14.469 | 14.228 | 1.656 | -960.29 | -228.70 | 68.36 | 1 | 24.02 | 2.35 | 29000 | 0 | | | |
| -14.752 | 14.679 | 1.527 | -1021.30 | -202.06 | 71.14 | 1 | 24.65 | 2.35 | 29000 | 0 | | | |
| -15.035 | 15.092 | 1.392 | -1074.62 | -174.46 | 73.92 | 1 | 25.28 | 2.35 | 29000 | 0 | | | |
| -15.318 | 15.466 | 1.250 | -1119.99 | -145.89 | 76.70 | 1 | 25.91 | 2.35 | 29000 | 0 | | | |
| -15.601 | 15.799 | 1.103 | -1157.14 | -116.36 | 79.47 | 1 | 26.55 | 2.35 | 29000 | 0 | | | |
| -15.884 | 16.090 | 0.951 | -1185.79 | -85.86 | 82.25 | 1 | 27.18 | 2.35 | 29000 | 0 | | | |
| -16.167 | 16.338 | 0.796 | -1205.66 | -54.39 | 85.03 | 1 | 27.81 | 2.35 | 29000 | 0 | | | |
| -16.451 | 16.541 | 0.640 | -1216.50 | -21.96 | 87.81 | 1 | 28.44 | 2.35 | 29000 | 0 | | | |
| -16.734 | 16.700 | 0.482 | -1218.01 | 11.43 | 90.58 | 1 | 29.07 | 2.35 | 29000 | 0 | | | |
| -17.017 | 16.814 | 0.325 | -1209.93 | 45.79 | 93.36 | 1 | 29.71 | 2.35 | 29000 | 0 | | | |
| -17.300 | 16.884 | 0.170 | -1191.99 | 81.12 | 96.14 | 1 | 30.34 | 2.35 | 29000 | 0 | | | |
| -17.800 | 16.902 | -0.097 | -1135.37 | 145.86 | 101.04 | 1 | 31.46 | 2.35 | 29000 | 0 | | | |
| -18.300 | 16.790 | -0.346 | -1045.62 | 213.62 | 105.95 | 1 | 32.57 | 2.35 | 29000 | 0 | | | |
| | | | | | 105.95 | 1 | 32.57 | 2.35 | 29000 | 3 | 98.13 | 29000 | |
| -18.800 | 16.560 | -0.572 | -935.08 | 225.93 | 110.85 | 1 | 33.69 | 2.35 | 29000 | 3 | 135.69 | 29000 | |
| -19.000 | 16.437 | -0.656 | -889.76 | 227.01 | 110.85 | 1 | 34.13 | 2.35 | 29000 | 3 | 143.01 | 29000 | |
| | | | | | 110.85 | 1 | 46.38 | 2.68 | 20600 | 3 | 113.19 | 20600 | |
| -19.288 | 16.232 | -0.768 | -822.78 | 238.51 | 110.85 | 1 | 47.08 | 2.68 | 20600 | 3 | 121.96 | 20600 | |
| -19.575 | 15.996 | -0.872 | -752.84 | 247.69 | 110.85 | 1 | 47.77 | 2.68 | 20600 | 3 | 130.74 | 20600 | |
| -19.862 | 15.732 | -0.966 | -680.58 | 254.55 | 110.85 | 1 | 48.47 | 2.68 | 20600 | 3 | 139.52 | 20600 | |
| -20.150 | 15.441 | -1.050 | -606.69 | 259.08 | 110.85 | 1 | 49.16 | 2.68 | 20600 | 3 | 148.29 | 20600 | |
| -20.575 | 14.972 | -1.157 | -495.89 | 261.52 | 110.85 | 1 | 50.18 | 2.68 | 20600 | 3 | 161.27 | 20600 | |
| -21.000 | 14.461 | -1.243 | -385.12 | 258.88 | 110.85 | 1 | 51.21 | 2.68 | 20600 | 3 | 174.24 | 20600 | |
| -21.275 | 14.113 | -1.287 | -314.49 | 254.47 | 110.85 | 1 | 51.87 | 2.68 | 20600 | 3 | 182.64 | 20600 | |
| -21.550 | 13.754 | -1.322 | -245.36 | 247.93 | 110.85 | 1 | 52.54 | 2.68 | 20600 | 3 | 191.03 | 20600 | |
| -21.825 | 13.387 | -1.348 | -178.32 | 239.26 | 110.85 | 1 | 53.20 | 2.68 | 20600 | 3 | 199.43 | 20600 | |
| -22.100 | 13.013 | -1.367 | -113.96 | 228.47 | 110.85 | 1 | 53.86 | 2.68 | 20600 | 3 | 207.82 | 20600 | |
| -22.375 | 12.636 | -1.377 | -52.86 | 215.55 | 110.85 | 1 | 54.53 | 2.68 | 20600 | 3 | 216.22 | 20600 | |
| -22.650 | 12.257 | -1.380 | 4.40 | 200.51 | 110.85 | 1 | 55.19 | 2.68 | 20600 | 3 | 224.61 | 20600 | |
| -22.925 | 11.877 | -1.376 | 57.23 | 183.34 | 110.85 | 1 | 55.85 | 2.68 | 20600 | 3 | 233.01 | 20600 | |
| -23.200 | 11.500 | -1.366 | 105.04 | 164.04 | 110.85 | 1 | 56.52 | 2.68 | 20600 | 3 | 241.41 | 20600 | |
| -23.700 | 10.825 | -1.333 | 177.60 | 125.79 | 110.85 | 1 | 57.72 | 2.68 | 20600 | 2 | 247.54 | 20600 | |
| -23.969 | 10.470 | -1.310 | 208.64 | 105.49 | 110.85 | 1 | 58.37 | 2.68 | 20600 | 2 | 241.32 | 20600 | |
| -24.238 | 10.121 | -1.282 | 234.47 | 87.02 | 110.85 | 1 | 59.02 | 2.68 | 20600 | 2 | 235.25 | 20600 | |
| -24.506 | 9.781 | -1.252 | 255.57 | 70.33 | 110.85 | 1 | 59.67 | 2.68 | 20600 | 2 | 229.33 | 20600 | |
| -24.775 | 9.448 | -1.220 | 272.42 | 55.38 | 110.85 | 1 | 60.31 | 2.68 | 20600 | 2 | 223.59 | 20600 | |
| -25.044 | 9.125 | -1.185 | 285.49 | 42.13 | 110.85 | 1 | 60.96 | 2.68 | 20600 | 2 | 218.03 | 20600 | |
| -25.312 | 8.811 | -1.150 | 295.22 | 30.52 | 110.85 | 1 | 61.61 | 2.68 | 20600 | 2 | 212.66 | 20600 | |
| -25.581 | 8.507 | -1.113 | 302.04 | 20.50 | 110.85 | 1 | 62.26 | 2.68 | 20600 | 2 | 207.50 | 20600 | |
| -25.850 | 8.213 | -1.076 | 306.37 | 12.01 | 110.85 | 1 | 62.91 | 2.68 | 20600 | 2 | 202.54 | 20600 | |
| -26.119 | 7.929 | -1.038 | 308.62 | 5.00 | 110.85 | 1 | 63.56 | 2.68 | 20600 | 2 | 197.79 | 20600 | |
| -26.388 | 7.655 | -1.000 | 309.19 | -0.59 | 110.85 | 1 | 64.20 | 2.68 | 20600 | 2 | 193.25 | 20600 | |
| -26.656 | 7.391 | -0.962 | 308.43 | -4.81 | 110.85 | 1 | 64.85 | 2.68 | 20600 | 2 | 188.92 | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | | kN |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -26.925 | 7.138 | -0.924 | 306.72 | -7.72 | 110.85 | 1 | 65.50 | 2.68 | 20600 | 2 | 184.80 | 20600 | |
| -27.194 | 6.895 | -0.887 | 304.40 | -9.37 | 110.85 | 1 | 66.15 | 2.68 | 20600 | 2 | 180.88 | 20600 | |
| -27.462 | 6.661 | -0.850 | 301.79 | -9.83 | 110.85 | 1 | 66.80 | 2.68 | 20600 | 2 | 177.18 | 20600 | |
| -27.731 | 6.438 | -0.813 | 299.21 | -9.15 | 110.85 | 1 | 67.44 | 2.68 | 20600 | 2 | 173.67 | 20600 | |
| -28.000 | 6.224 | -0.776 | 296.97 | -7.37 | 110.85 | 1 | 68.09 | 2.68 | 20600 | 2 | 170.38 | 20600 | |
| | | | | | 110.85 | 1 | 53.17 | 2.35 | 29000 | 2 | 218.68 | 29000 | |
| -28.500 | 5.853 | -0.709 | 286.87 | -32.22 | 110.85 | 1 | 54.29 | 2.35 | 29000 | 2 | 209.86 | 29000 | |
| -29.000 | 5.514 | -0.646 | 265.54 | -52.34 | 110.85 | 1 | 55.40 | 2.35 | 29000 | 2 | 202.00 | 29000 | |
| -29.500 | 5.206 | -0.589 | 235.24 | -68.18 | 110.85 | 1 | 56.52 | 2.35 | 29000 | 2 | 195.01 | 29000 | |
| -30.000 | 4.924 | -0.539 | 198.00 | -80.17 | 110.85 | 1 | 57.63 | 2.35 | 29000 | 2 | 188.80 | 29000 | |
| -30.500 | 4.665 | -0.499 | 155.65 | -88.66 | 110.85 | 1 | 58.75 | 2.35 | 29000 | 2 | 183.24 | 29000 | |
| -31.000 | 4.424 | -0.468 | 109.87 | -93.94 | 110.85 | 1 | 59.87 | 2.35 | 29000 | 2 | 178.20 | 29000 | |
| -31.500 | 4.195 | -0.449 | 62.21 | -96.23 | 110.85 | 1 | 60.98 | 2.35 | 29000 | 2 | 173.52 | 29000 | |
| -32.000 | 3.973 | -0.440 | 14.12 | -95.68 | 110.85 | 1 | 62.10 | 2.35 | 29000 | 2 | 169.05 | 29000 | |
| -32.500 | 3.753 | -0.442 | -33.00 | -92.34 | 110.85 | 1 | 63.22 | 2.35 | 29000 | 2 | 164.62 | 29000 | |
| -33.000 | 3.529 | -0.455 | -77.75 | -86.20 | 110.85 | 1 | 64.33 | 2.35 | 29000 | 2 | 160.08 | 29000 | |
| -33.500 | 3.296 | -0.477 | -118.72 | -77.17 | 110.85 | 1 | 65.45 | 2.35 | 29000 | 2 | 155.29 | 29000 | |
| -34.000 | 3.050 | -0.509 | -154.09 | -63.15 | 110.85 | 2 | 74.32 | 4.12 | 29000 | 2 | 150.11 | 29000 | |
| -34.500 | 2.786 | -0.547 | -180.65 | -41.80 | 110.85 | 2 | 83.92 | 4.12 | 29000 | 2 | 144.42 | 29000 | |
| -35.000 | 2.502 | -0.590 | -194.57 | -12.50 | 110.85 | 2 | 94.12 | 4.12 | 29000 | 2 | 138.13 | 29000 | |
| -35.500 | 2.196 | -0.635 | -191.72 | 25.36 | 110.85 | 2 | 104.96 | 4.12 | 29000 | 2 | 131.21 | 29000 | |
| -36.000 | 1.868 | -0.676 | -167.67 | 72.42 | 110.85 | 2 | 116.43 | 4.12 | 29000 | 2 | 123.65 | 29000 | |
| | | | | | 110.85 | 2 | 94.58 | 4.26 | 43800 | 2 | 153.66 | 43800 | |
| -36.500 | 1.521 | -0.710 | -123.72 | 105.91 | 110.85 | 2 | 111.91 | 4.26 | 43800 | 2 | 140.59 | 43800 | |
| -37.000 | 1.160 | -0.731 | -59.18 | 154.89 | 110.85 | 2 | 129.84 | 4.26 | 43800 | 2 | 126.92 | 43800 | |
| | | | | | 110.85 | -1 | | | | 2 | 375.20 | 300000 | |
| -37.500 | 0.792 | -0.738 | -10.23 | 50.05 | 110.85 | -1 | | | | 2 | 265.86 | 300000 | |
| -38.000 | 0.423 | -0.739 | 0.00 | 0.00 | 110.85 | -1 | | | | 2 | 156.06 | 300000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | | kN |

DESPLAZAMIENTO MÁX. = 16.90 mm

MOMENTO MÁXIMO = 1391.16 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :

-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 115.32 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.040 = (1696.15 kN/m)/(42785.78 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.303 = (3597.08 kN/m)/(11876.18 kN/m)



** FASE No 4 **

*Fase 4
*Ejecucion del 1er nivel de puntales provisionales
*Excavacion hasta el nivel de losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 3
NIVEL = -17.300 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2
PARA NIVEL = -21.000 m
CON BERMA EN NIVEL = -23.200 m A = 2.470 m B = 4.670 m
SIMULACIÓN CON LAS SOBRECARGAS DE BOUSSINESQ

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -23.700 m



FASE 4

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -7.50 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -21.00 m NIVEL AGUA: -23.70 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.234 | -0.187 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.338 | 1.171 | -0.187 | 0.05 | 0.43 | | 2 | 2.54 | 2.54 | 4900 | 0 | | | | | |
| -0.675 | 1.108 | -0.187 | 0.40 | 1.87 | | 2 | 5.98 | 5.15 | 4900 | 0 | | | | | |
| -1.013 | 1.045 | -0.187 | 1.44 | 4.46 | | 2 | 9.42 | 5.15 | 4900 | 0 | | | | | |
| -1.350 | 0.982 | -0.187 | 3.55 | 8.22 | | 2 | 12.85 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 1.81 | 1.81 | 15100 | 0 | | | | | |
| -1.500 | 0.954 | -0.187 | 4.81 | 8.63 | | 2 | 3.58 | 3.58 | 15100 | 0 | | | | | |
| | | | | 63.67 | | 2 | 3.58 | 3.58 | 15100 | 0 | | | | 1 | 55.04 |
| -1.800 | 0.898 | -0.185 | 24.12 | 65.28 | | 2 | 7.12 | 4.85 | 15100 | 0 | | | | | |
| -2.100 | 0.843 | -0.180 | 44.08 | 67.94 | | 2 | 10.63 | 4.85 | 15100 | 0 | | | | | |
| -2.425 | 0.786 | -0.172 | 66.79 | 72.01 | | 2 | 14.41 | 4.85 | 15100 | 0 | | | | | |
| -2.750 | 0.732 | -0.160 | 91.02 | 77.30 | | 2 | 18.15 | 4.85 | 15100 | 0 | | | | | |
| -3.075 | 0.682 | -0.145 | 117.16 | 83.79 | | 2 | 21.81 | 4.85 | 15100 | 0 | | | | | |
| -3.400 | 0.638 | -0.125 | 145.61 | 91.46 | | 2 | 25.39 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | 2 | 19.71 | 4.55 | 20600 | 0 | | | | | |
| -3.656 | 0.609 | -0.107 | 169.72 | 96.87 | | 2 | 22.54 | 4.55 | 20600 | 0 | | | | | |
| -3.913 | 0.584 | -0.085 | 195.32 | 103.00 | | 2 | 25.26 | 4.55 | 20600 | 0 | | | | | |
| -4.169 | 0.565 | -0.061 | 222.57 | 109.83 | | 2 | 28.05 | 4.55 | 20600 | 0 | | | | | |
| -4.425 | 0.553 | -0.033 | 251.67 | 117.42 | | 2 | 31.16 | 4.55 | 20600 | 0 | | | | | |
| -4.681 | 0.548 | -0.002 | 282.81 | 125.77 | | 2 | 34.05 | 4.55 | 20600 | 0 | | | | | |
| -4.938 | 0.552 | 0.033 | 316.19 | 134.84 | | 2 | 36.69 | 4.55 | 20600 | 0 | | | | | |
| -5.194 | 0.566 | 0.072 | 351.97 | 144.54 | | 2 | 39.06 | 4.55 | 20600 | 0 | | | | | |
| -5.450 | 0.590 | 0.116 | 390.31 | 154.81 | | 2 | 41.12 | 4.55 | 20600 | 0 | | | | | |
| -5.706 | 0.625 | 0.164 | 431.35 | 165.57 | | 2 | 42.86 | 4.55 | 20600 | 0 | | | | | |
| -5.962 | 0.674 | 0.217 | 475.20 | 176.73 | | 2 | 44.23 | 4.55 | 20600 | 0 | | | | | |
| -6.219 | 0.737 | 0.275 | 521.95 | 188.19 | | 2 | 45.22 | 4.55 | 20600 | 0 | | | | | |
| -6.475 | 0.815 | 0.339 | 571.67 | 199.85 | | 2 | 45.77 | 4.55 | 20600 | 0 | | | | | |
| -6.731 | 0.911 | 0.409 | 624.38 | 211.59 | | 2 | 45.88 | 4.55 | 20600 | 0 | | | | | |
| -6.988 | 1.025 | 0.485 | 680.11 | 223.30 | | 2 | 45.48 | 4.55 | 20600 | 0 | | | | | |
| -7.244 | 1.160 | 0.568 | 738.81 | 234.84 | | 2 | 44.56 | 4.55 | 20600 | 0 | | | | | |
| -7.500 | 1.317 | 0.658 | 800.43 | 246.06 | | 2 | 43.07 | 4.55 | 20600 | 0 | | | | | |
| -7.875 | 1.591 | 0.803 | 895.72 | 262.10 | 3.68 | 2 | 38.78 | 4.55 | 20600 | 0 | | | | | |
| -8.250 | 1.922 | 0.965 | 996.95 | 277.64 | 7.36 | 2 | 33.06 | 4.55 | 20600 | 0 | | | | | |
| -8.625 | 2.317 | 1.145 | 1103.82 | 292.12 | 11.04 | 2 | 25.78 | 4.55 | 20600 | 0 | | | | | |
| -9.000 | 2.783 | 1.344 | 1215.96 | 305.97 | 14.72 | 2 | 22.30 | 3.64 | 20600 | 0 | | | | | |
| | | | | -455.47 | 14.72 | 2 | 22.30 | 3.64 | 20600 | 0 | | | | 2 | -761.43 |
| -9.300 | 3.210 | 1.501 | 1081.06 | -443.64 | 17.66 | 2 | 24.21 | 4.55 | 20600 | 0 | | | | | |
| -9.600 | 3.681 | 1.640 | 949.92 | -430.33 | 20.60 | 2 | 26.24 | 4.55 | 20600 | 0 | | | | | |
| -10.100 | 4.552 | 1.833 | 740.97 | -404.80 | 25.51 | 2 | 29.78 | 4.55 | 20600 | 0 | | | | | |
| -10.600 | 5.506 | 1.979 | 545.84 | -375.02 | 30.41 | 2 | 33.40 | 4.55 | 20600 | 0 | | | | | |
| -11.100 | 6.524 | 2.083 | 366.65 | -341.00 | 35.32 | 2 | 36.94 | 4.55 | 20600 | 0 | | | | | |
| -11.600 | 7.583 | 2.148 | 205.52 | -302.83 | 40.22 | 2 | 40.23 | 4.55 | 20600 | 0 | | | | | |
| -12.100 | 8.666 | 2.179 | 64.49 | -260.66 | 45.13 | 2 | 43.10 | 4.55 | 20600 | 0 | | | | | |
| | | | | | 45.13 | 2 | 38.84 | 4.12 | 29000 | 0 | | | | | |
| -12.435 | 9.397 | 2.182 | -18.02 | -231.67 | 48.41 | 2 | 40.72 | 4.12 | 29000 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.770 | 10.127 | 2.173 | -90.54 | -201.02 | 51.70 | 2 | 42.14 | 4.12 | 29000 | 0 | | | | | |
| -13.053 | 10.740 | 2.158 | -143.65 | -173.95 | 54.48 | 2 | 42.93 | 4.12 | 29000 | 0 | | | | | |
| -13.336 | 11.348 | 2.137 | -188.95 | -145.92 | 57.25 | 2 | 43.29 | 4.12 | 29000 | 0 | | | | | |
| -13.619 | 11.949 | 2.110 | -226.20 | -117.08 | 60.03 | 2 | 43.17 | 4.12 | 29000 | 0 | | | | | |
| -13.903 | 12.542 | 2.079 | -255.18 | -87.56 | 62.81 | 2 | 42.51 | 4.12 | 29000 | 0 | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.186 | 13.126 | 2.044 | -275.73 | -57.53 | 65.59 | 2 | 41.25 | 4.12 | 29000 | 0 | | | | | | | |
| -14.469 | 13.700 | 2.008 | -287.72 | -27.16 | 68.36 | 2 | 39.34 | 4.12 | 29000 | 0 | | | | | | | |
| -14.752 | 14.263 | 1.970 | -291.09 | 3.36 | 71.14 | 2 | 36.71 | 4.12 | 29000 | 0 | | | | | | | |
| -15.035 | 14.815 | 1.933 | -285.83 | 33.81 | 73.92 | 2 | 33.31 | 4.12 | 29000 | 0 | | | | | | | |
| -15.318 | 15.357 | 1.897 | -271.98 | 63.96 | 76.70 | 2 | 29.07 | 4.12 | 29000 | 0 | | | | | | | |
| -15.601 | 15.889 | 1.863 | -249.63 | 93.94 | 79.47 | 1 | 26.55 | 2.35 | 29000 | 0 | | | | | | | |
| -15.884 | 16.413 | 1.832 | -218.74 | 124.44 | 82.25 | 1 | 27.18 | 2.35 | 29000 | 0 | | | | | | | |
| -16.167 | 16.928 | 1.807 | -179.07 | 155.90 | 85.03 | 1 | 27.81 | 2.35 | 29000 | 0 | | | | | | | |
| -16.451 | 17.436 | 1.787 | -130.37 | 188.33 | 87.81 | 1 | 28.44 | 2.35 | 29000 | 0 | | | | | | | |
| -16.734 | 17.940 | 1.773 | -72.34 | 221.73 | 90.58 | 1 | 29.07 | 2.35 | 29000 | 0 | | | | | | | |
| -17.017 | 18.441 | 1.768 | -4.72 | 256.09 | 93.36 | 1 | 29.71 | 2.35 | 29000 | 0 | | | | | | | |
| -17.300 | 18.942 | 1.773 | 72.76 | 291.42 | 96.14 | 1 | 30.34 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | -640.84 | 96.14 | 1 | 30.34 | 2.35 | 29000 | 0 | | | | | | 3 | -932.25 |
| -17.800 | 19.826 | 1.754 | -231.60 | -576.09 | 101.04 | 1 | 31.46 | 2.35 | 29000 | 0 | | | | | | | |
| -18.300 | 20.685 | 1.669 | -502.83 | -508.34 | 105.95 | 1 | 32.57 | 2.35 | 29000 | 0 | | | | | | | |
| -18.800 | 21.486 | 1.527 | -739.43 | -437.57 | 110.85 | 1 | 33.69 | 2.35 | 29000 | 0 | | | | | | | |
| -19.000 | 21.784 | 1.455 | -824.04 | -408.42 | 112.82 | 1 | 34.13 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | | 112.82 | 1 | 46.38 | 2.68 | 20600 | 0 | | | | | | | |
| -19.288 | 22.186 | 1.340 | -934.84 | -362.15 | 115.64 | 1 | 47.08 | 2.68 | 20600 | 0 | | | | | | | |
| -19.575 | 22.553 | 1.210 | -1032.18 | -314.86 | 118.46 | 1 | 47.77 | 2.68 | 20600 | 0 | | | | | | | |
| -19.862 | 22.881 | 1.069 | -1115.79 | -266.57 | 121.28 | 1 | 48.47 | 2.68 | 20600 | 0 | | | | | | | |
| -20.150 | 23.167 | 0.918 | -1185.36 | -217.26 | 124.10 | 1 | 49.16 | 2.68 | 20600 | 0 | | | | | | | |
| -20.575 | 23.507 | 0.680 | -1261.89 | -142.53 | 128.27 | 1 | 50.18 | 2.68 | 20600 | 0 | | | | | | | |
| -21.000 | 23.744 | 0.430 | -1306.19 | -65.58 | 132.44 | 1 | 51.21 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 132.44 | 1 | 51.21 | 2.68 | 20600 | 3 | 31.37 | | 20600 | | | | |
| -21.275 | 23.840 | 0.266 | -1318.55 | -24.53 | 135.13 | 1 | 51.87 | 2.68 | 20600 | 3 | 40.77 | | 20600 | | | | |
| -21.550 | 23.890 | 0.100 | -1319.88 | 14.46 | 137.83 | 1 | 52.54 | 2.68 | 20600 | 3 | 53.04 | | 20600 | | | | |
| -21.825 | 23.894 | -0.065 | -1310.87 | 50.48 | 140.53 | 1 | 53.20 | 2.68 | 20600 | 3 | 69.04 | | 20600 | | | | |
| -22.100 | 23.854 | -0.229 | -1292.38 | 83.57 | 143.23 | 1 | 53.86 | 2.68 | 20600 | 3 | 81.16 | | 20600 | | | | |
| -22.375 | 23.769 | -0.390 | -1265.18 | 113.67 | 145.92 | 1 | 54.53 | 2.68 | 20600 | 3 | 97.44 | | 20600 | | | | |
| -22.650 | 23.640 | -0.546 | -1230.26 | 139.47 | 148.62 | 1 | 55.19 | 2.68 | 20600 | 3 | 119.16 | | 20600 | | | | |
| -22.925 | 23.469 | -0.698 | -1188.87 | 160.91 | 151.32 | 1 | 55.85 | 2.68 | 20600 | 3 | 135.90 | | 20600 | | | | |
| -23.200 | 23.256 | -0.845 | -1142.17 | 177.83 | 154.02 | 1 | 56.52 | 2.68 | 20600 | 3 | 158.75 | | 20600 | | | | |
| -23.700 | 22.770 | -1.095 | -1047.31 | 200.51 | 158.92 | 1 | 57.72 | 2.68 | 20600 | 3 | 177.70 | | 20600 | | | | |
| -23.969 | 22.459 | -1.220 | -992.01 | 211.07 | 158.92 | 1 | 58.37 | 2.68 | 20600 | 3 | 177.66 | | 20600 | | | | |
| -24.238 | 22.115 | -1.338 | -933.85 | 221.70 | 158.92 | 1 | 59.02 | 2.68 | 20600 | 3 | 178.47 | | 20600 | | | | |
| -24.506 | 21.741 | -1.449 | -872.86 | 232.18 | 158.92 | 1 | 59.67 | 2.68 | 20600 | 3 | 180.09 | | 20600 | | | | |
| -24.775 | 21.337 | -1.552 | -809.09 | 242.29 | 158.92 | 1 | 60.31 | 2.68 | 20600 | 3 | 182.46 | | 20600 | | | | |
| -25.044 | 20.907 | -1.648 | -742.67 | 251.85 | 158.92 | 1 | 60.96 | 2.68 | 20600 | 3 | 185.52 | | 20600 | | | | |
| -25.312 | 20.452 | -1.735 | -673.78 | 260.68 | 158.92 | 1 | 61.61 | 2.68 | 20600 | 3 | 189.20 | | 20600 | | | | |
| -25.581 | 19.975 | -1.813 | -602.64 | 268.62 | 158.92 | 1 | 62.26 | 2.68 | 20600 | 3 | 193.44 | | 20600 | | | | |
| -25.850 | 19.478 | -1.882 | -529.49 | 275.53 | 158.92 | 1 | 62.91 | 2.68 | 20600 | 3 | 198.17 | | 20600 | | | | |
| -26.119 | 18.964 | -1.943 | -454.64 | 281.28 | 158.92 | 1 | 63.56 | 2.68 | 20600 | 3 | 203.34 | | 20600 | | | | |
| -26.388 | 18.435 | -1.994 | -378.42 | 285.76 | 158.92 | 1 | 64.20 | 2.68 | 20600 | 3 | 208.89 | | 20600 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |





FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -26.656 | 17.893 | -2.036 | -301.17 | 288.89 | 158.92 | 1 | 64.85 | 2.68 | 20600 | 3 | 214.78 | | 20600 |
| -26.925 | 17.342 | -2.068 | -223.27 | 290.56 | 158.92 | 1 | 65.50 | 2.68 | 20600 | 3 | 220.96 | | 20600 |
| -27.194 | 16.783 | -2.090 | -145.13 | 290.71 | 158.92 | 1 | 66.15 | 2.68 | 20600 | 3 | 227.39 | | 20600 |
| -27.462 | 16.219 | -2.103 | -67.16 | 289.28 | 158.92 | 1 | 66.80 | 2.68 | 20600 | 3 | 234.04 | | 20600 |
| -27.731 | 15.653 | -2.107 | 10.21 | 286.22 | 158.92 | 1 | 67.44 | 2.68 | 20600 | 3 | 240.88 | | 20600 |
| -28.000 | 15.087 | -2.101 | 86.53 | 281.46 | 158.92 | 1 | 68.09 | 2.68 | 20600 | 3 | 247.89 | | 20600 |
| | | | | | 158.92 | 1 | 53.17 | 2.35 | 29000 | 3 | 295.97 | | 29000 |
| -28.500 | 14.044 | -2.066 | 216.15 | 235.75 | 158.92 | 1 | 54.29 | 2.35 | 29000 | 3 | 312.16 | | 29000 |
| -29.000 | 13.026 | -2.004 | 321.01 | 182.40 | 158.92 | 1 | 55.40 | 2.35 | 29000 | 3 | 328.77 | | 29000 |
| -29.500 | 12.044 | -1.922 | 397.25 | 121.22 | 158.92 | 1 | 56.52 | 2.35 | 29000 | 3 | 345.72 | | 29000 |
| -30.000 | 11.106 | -1.825 | 441.43 | 55.19 | 158.92 | 1 | 57.63 | 2.35 | 29000 | 2 | 350.41 | | 29000 |
| -30.500 | 10.219 | -1.723 | 453.33 | -5.50 | 158.92 | 1 | 58.75 | 2.35 | 29000 | 2 | 326.55 | | 29000 |
| -31.000 | 9.384 | -1.620 | 437.95 | -54.07 | 158.92 | 1 | 59.87 | 2.35 | 29000 | 2 | 304.20 | | 29000 |
| -31.500 | 8.598 | -1.524 | 401.16 | -91.27 | 158.92 | 1 | 60.98 | 2.35 | 29000 | 2 | 283.30 | | 29000 |
| -32.000 | 7.858 | -1.438 | 348.46 | -117.80 | 158.92 | 1 | 62.10 | 2.35 | 29000 | 2 | 263.74 | | 29000 |
| -32.500 | 7.157 | -1.366 | 285.03 | -134.28 | 158.92 | 1 | 63.22 | 2.35 | 29000 | 2 | 245.34 | | 29000 |
| -33.000 | 6.489 | -1.309 | 215.77 | -141.24 | 158.92 | 1 | 64.33 | 2.35 | 29000 | 2 | 227.89 | | 29000 |
| -33.500 | 5.846 | -1.267 | 145.31 | -139.09 | 158.92 | 1 | 65.45 | 2.35 | 29000 | 2 | 211.16 | | 29000 |
| -34.000 | 5.219 | -1.242 | 78.14 | -128.15 | 158.92 | 1 | 66.56 | 2.35 | 29000 | 2 | 194.91 | | 29000 |
| -34.500 | 4.602 | -1.231 | 18.60 | -108.59 | 158.92 | 1 | 67.68 | 2.35 | 29000 | 2 | 178.93 | | 29000 |
| -35.000 | 3.986 | -1.233 | -29.03 | -80.49 | 158.92 | 1 | 68.80 | 2.35 | 29000 | 2 | 163.02 | | 29000 |
| -35.500 | 3.367 | -1.243 | -60.43 | -43.60 | 158.92 | 2 | 70.99 | 3.42 | 29000 | 2 | 147.02 | | 29000 |
| -36.000 | 2.742 | -1.259 | -70.35 | 6.92 | 158.92 | 2 | 91.08 | 4.12 | 29000 | 2 | 130.82 | | 29000 |
| | | | | | 158.92 | 1 | 69.59 | 2.46 | 43800 | 2 | 173.15 | | 43800 |
| -36.500 | 2.109 | -1.274 | -58.22 | 45.15 | 158.92 | 2 | 86.16 | 4.26 | 43800 | 2 | 147.53 | | 43800 |
| -37.000 | 1.469 | -1.283 | -21.11 | 107.93 | 158.92 | 2 | 116.30 | 4.26 | 43800 | 2 | 121.64 | | 43800 |
| | | | | | 158.92 | -1 | | | | 2 | 461.23 | | 300000 |
| -37.500 | 0.827 | -1.284 | 3.05 | 4.69 | 158.92 | -1 | | | | 2 | 269.57 | | 300000 |
| -38.000 | 0.185 | -1.284 | 0.00 | 0.00 | 158.92 | 2 | 10.91 | 1.52 | 300000 | 2 | 77.94 | | 300000 |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |

DESPLAZAMIENTO MÁX. = 23.89 mm

MOMENTO MÁXIMO =-1319.88 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 124.16 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.040 = (1691.30 kN/m)/(42785.78 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.418 = (3612.51 kN/m)/(8645.97 kN/m)





** FASE No 5 **

*Fase 5
*Ejecucion de la losa de fondo y retirada de puntales provisionales

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 4

NIVEL = -20.150 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 850000.000 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE PUNTALES N° 3



FASE 5

| | PARED | | | | | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -7.50 m S. DE CAQUOT: 10.00 kPa | | | SOIL 2 EXCAVACIÓN: -21.00 m NIVEL AGUA: -23.70 m S. DE CAQUOT: 0.00 kPa | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
| 0.000 | 1.508 | -0.375 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.338 | 1.382 | -0.375 | 0.03 | 0.25 | | 2 | 1.51 | 1.51 | 4900 | 0 | | | |
| -0.675 | 1.255 | -0.375 | 0.27 | 1.40 | | 2 | 5.26 | 5.15 | 4900 | 0 | | | |
| -1.013 | 1.129 | -0.375 | 1.11 | 3.80 | | 2 | 9.00 | 5.15 | 4900 | 0 | | | |
| -1.350 | 1.002 | -0.375 | 2.98 | 7.47 | | 2 | 12.75 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 1.50 | 1.50 | 15100 | 0 | | | |
| -1.500 | 0.946 | -0.374 | 4.13 | 7.86 | | 2 | 3.69 | 3.69 | 15100 | 0 | | | |
| | | | | 101.64 | | 2 | 3.69 | 3.69 | 15100 | 0 | | 1 | 93.78 |
| -1.800 | 0.834 | -0.372 | 34.85 | 103.40 | | 2 | 8.08 | 4.85 | 15100 | 0 | | | |
| -2.100 | 0.724 | -0.365 | 66.30 | 106.48 | | 2 | 12.44 | 4.85 | 15100 | 0 | | | |
| -2.425 | 0.607 | -0.352 | 101.65 | 111.28 | | 2 | 17.12 | 4.85 | 15100 | 0 | | | |
| -2.750 | 0.495 | -0.334 | 138.80 | 117.60 | | 2 | 21.72 | 4.85 | 15100 | 0 | | | |
| -3.075 | 0.390 | -0.311 | 178.24 | 125.39 | | 2 | 26.22 | 4.85 | 15100 | 0 | | | |
| -3.400 | 0.294 | -0.281 | 220.46 | 134.62 | | 2 | 30.59 | 4.85 | 15100 | 0 | | | |
| | | | | | | 2 | 26.81 | 4.55 | 20600 | 0 | | | |
| -3.656 | 0.225 | -0.254 | 255.87 | 141.95 | | 2 | 30.44 | 4.55 | 20600 | 0 | | | |
| -3.913 | 0.164 | -0.221 | 293.29 | 150.20 | | 2 | 33.91 | 4.55 | 20600 | 0 | | | |
| -4.169 | 0.112 | -0.185 | 332.93 | 159.33 | | 2 | 37.38 | 4.55 | 20600 | 0 | | | |
| -4.425 | 0.070 | -0.143 | 375.02 | 169.39 | | 2 | 41.12 | 4.55 | 20600 | 0 | | | |
| -4.681 | 0.039 | -0.097 | 419.82 | 180.37 | | 2 | 44.55 | 4.55 | 20600 | 0 | | | |
| -4.938 | 0.021 | -0.045 | 467.53 | 192.18 | | 2 | 47.64 | 4.55 | 20600 | 0 | | | |
| -5.194 | 0.016 | 0.013 | 518.37 | 204.74 | | 2 | 50.38 | 4.55 | 20600 | 0 | | | |
| -5.450 | 0.028 | 0.076 | 572.52 | 217.94 | | 2 | 52.70 | 4.55 | 20600 | 0 | | | |
| -5.706 | 0.056 | 0.147 | 630.12 | 231.69 | | 2 | 54.59 | 4.55 | 20600 | 0 | | | |
| -5.962 | 0.103 | 0.224 | 691.29 | 245.86 | | 2 | 55.99 | 4.55 | 20600 | 0 | | | |
| -6.219 | 0.171 | 0.309 | 756.14 | 260.32 | | 2 | 56.86 | 4.55 | 20600 | 0 | | | |
| -6.475 | 0.262 | 0.401 | 824.72 | 274.93 | | 2 | 57.17 | 4.55 | 20600 | 0 | | | |
| -6.731 | 0.378 | 0.502 | 897.04 | 289.54 | | 2 | 56.86 | 4.55 | 20600 | 0 | | | |
| -6.988 | 0.520 | 0.611 | 973.09 | 303.99 | | 2 | 55.90 | 4.55 | 20600 | 0 | | | |
| -7.244 | 0.692 | 0.730 | 1052.81 | 318.09 | | 2 | 54.22 | 4.55 | 20600 | 0 | | | |
| -7.500 | 0.895 | 0.858 | 1136.07 | 331.67 | | 2 | 51.77 | 4.55 | 20600 | 0 | | | |
| -7.875 | 1.254 | 1.063 | 1264.03 | 350.64 | 3.68 | 2 | 45.71 | 4.55 | 20600 | 0 | | | |
| -8.250 | 1.695 | 1.291 | 1398.90 | 368.36 | 7.36 | 2 | 37.73 | 4.55 | 20600 | 0 | | | |
| -8.625 | 2.225 | 1.542 | 1540.05 | 384.07 | 11.04 | 2 | 27.67 | 4.55 | 20600 | 0 | | | |
| -9.000 | 2.855 | 1.819 | 1686.73 | 398.09 | 14.72 | 1 | 21.34 | 2.68 | 20600 | 0 | | | |
| | | | | -612.77 | 14.72 | 1 | 21.34 | 2.68 | 20600 | 0 | | 2 | -1010.86 |
| -9.300 | 3.434 | 2.037 | 1504.58 | -601.41 | 17.66 | 1 | 22.06 | 2.68 | 20600 | 0 | | | |
| -9.600 | 4.075 | 2.231 | 1326.00 | -588.94 | 20.60 | 1 | 22.79 | 2.68 | 20600 | 0 | | | |
| -10.100 | 5.260 | 2.501 | 1037.21 | -565.72 | 25.51 | 1 | 23.99 | 2.68 | 20600 | 0 | | | |
| -10.600 | 6.564 | 2.706 | 760.79 | -539.44 | 30.41 | 1 | 25.20 | 2.68 | 20600 | 0 | | | |
| -11.100 | 7.956 | 2.849 | 498.28 | -510.11 | 35.32 | 1 | 26.41 | 2.68 | 20600 | 0 | | | |
| -11.600 | 9.404 | 2.934 | 251.19 | -477.72 | 40.22 | 1 | 27.61 | 2.68 | 20600 | 0 | | | |
| -12.100 | 10.881 | 2.965 | 21.07 | -442.28 | 45.13 | 1 | 28.82 | 2.68 | 20600 | 0 | | | |
| | | | | | 45.13 | 1 | 18.73 | 2.35 | 29000 | 0 | | | |
| -12.435 | 11.873 | 2.957 | -123.44 | -420.21 | 48.41 | 1 | 19.48 | 2.35 | 29000 | 0 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.770 | 12.860 | 2.928 | -260.32 | -396.79 | 51.70 | 1 | 20.23 | 2.35 | 29000 | 0 | | | |
| -13.053 | 13.683 | 2.887 | -369.74 | -375.94 | 54.48 | 1 | 20.86 | 2.35 | 29000 | 0 | | | |
| -13.336 | 14.493 | 2.832 | -473.11 | -354.13 | 57.25 | 1 | 21.49 | 2.35 | 29000 | 0 | | | |
| -13.619 | 15.286 | 2.765 | -570.17 | -331.35 | 60.03 | 1 | 22.12 | 2.35 | 29000 | 0 | | | |
| -13.903 | 16.057 | 2.685 | -660.65 | -307.61 | 62.81 | 1 | 22.75 | 2.35 | 29000 | 0 | | | |
| -14.186 | 16.805 | 2.594 | -744.27 | -282.90 | 65.59 | 1 | 23.39 | 2.35 | 29000 | 0 | | | |
| -14.469 | 17.525 | 2.493 | -820.75 | -257.23 | 68.36 | 1 | 24.02 | 2.35 | 29000 | 0 | | | |
| -14.752 | 18.216 | 2.382 | -889.83 | -230.59 | 71.14 | 1 | 24.65 | 2.35 | 29000 | 0 | | | |
| -15.035 | 18.874 | 2.263 | -951.23 | -202.99 | 73.92 | 1 | 25.28 | 2.35 | 29000 | 0 | | | |
| -15.318 | 19.497 | 2.137 | -1004.68 | -174.42 | 76.70 | 1 | 25.91 | 2.35 | 29000 | 0 | | | |
| -15.601 | 20.083 | 2.004 | -1049.91 | -144.89 | 79.47 | 1 | 26.55 | 2.35 | 29000 | 0 | | | |
| -15.884 | 20.631 | 1.866 | -1086.64 | -114.39 | 82.25 | 1 | 27.18 | 2.35 | 29000 | 0 | | | |
| -16.167 | 21.139 | 1.723 | -1114.59 | -82.92 | 85.03 | 1 | 27.81 | 2.35 | 29000 | 0 | | | |
| -16.451 | 21.606 | 1.578 | -1133.50 | -50.49 | 87.81 | 1 | 28.44 | 2.35 | 29000 | 0 | | | |
| -16.734 | 22.032 | 1.431 | -1143.09 | -17.10 | 90.58 | 1 | 29.07 | 2.35 | 29000 | 0 | | | |
| -17.017 | 22.416 | 1.283 | -1143.09 | 17.26 | 93.36 | 1 | 29.71 | 2.35 | 29000 | 0 | | | |
| -17.300 | 22.759 | 1.135 | -1133.23 | 52.59 | 96.14 | 1 | 30.34 | 2.35 | 29000 | 0 | | | |
| -17.800 | 23.262 | 0.881 | -1090.87 | 117.33 | 101.04 | 1 | 31.46 | 2.35 | 29000 | 0 | | | |
| -18.300 | 23.642 | 0.640 | -1015.39 | 185.09 | 105.95 | 1 | 32.57 | 2.35 | 29000 | 0 | | | |
| -18.800 | 23.906 | 0.420 | -905.28 | 255.85 | 110.85 | 1 | 33.69 | 2.35 | 29000 | 0 | | | |
| -19.000 | 23.982 | 0.340 | -851.20 | 285.00 | 112.82 | 1 | 34.13 | 2.35 | 29000 | 0 | | | |
| | | | | | 112.82 | 1 | 46.38 | 2.68 | 20600 | 0 | | | |
| -19.288 | 24.064 | 0.234 | -762.64 | 331.28 | 115.64 | 1 | 47.08 | 2.68 | 20600 | 0 | | | |
| -19.575 | 24.117 | 0.140 | -660.62 | 378.56 | 118.46 | 1 | 47.77 | 2.68 | 20600 | 0 | | | |
| -19.862 | 24.146 | 0.061 | -544.87 | 426.86 | 121.28 | 1 | 48.47 | 2.68 | 20600 | 0 | | | |
| -20.150 | 24.154 | -0.002 | -415.08 | 476.16 | 124.10 | 1 | 49.16 | 2.68 | 20600 | 0 | | | |
| | | | | -362.26 | 124.10 | 1 | 49.16 | 2.68 | 20600 | 0 | | 4 | -838.42 |
| -20.575 | 24.134 | -0.097 | -553.24 | -287.52 | 128.27 | 1 | 50.18 | 2.68 | 20600 | 0 | | | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -21.000 | 24.068 | -0.215 | -659.16 | -210.57 | 132.44 | 1 | 51.21 | 2.68 20600 | 0 | | | |
| | | | | | 132.44 | 1 | 51.21 | 2.68 20600 | 2 | 38.05 | 20600 | |
| -21.275 | 23.997 | -0.301 | -711.60 | -170.89 | 135.13 | 1 | 51.87 | 2.68 20600 | 2 | 44.01 | 20600 | |
| -21.550 | 23.902 | -0.393 | -753.26 | -132.38 | 137.83 | 1 | 52.54 | 2.68 20600 | 2 | 53.29 | 20600 | |
| -21.825 | 23.780 | -0.490 | -784.58 | -95.74 | 140.53 | 2 | 55.55 | 4.55 20600 | 2 | 66.69 | 20600 | |
| -22.100 | 23.632 | -0.590 | -806.07 | -60.76 | 143.23 | 2 | 58.43 | 4.55 20600 | 2 | 76.59 | 20600 | |
| -22.375 | 23.456 | -0.692 | -818.17 | -27.62 | 145.92 | 2 | 60.97 | 4.55 20600 | 2 | 91.00 | 20600 | |
| -22.650 | 23.251 | -0.795 | -821.57 | 2.16 | 148.62 | 2 | 63.19 | 4.55 20600 | 2 | 111.16 | 20600 | |
| -22.925 | 23.018 | -0.898 | -817.31 | 28.35 | 151.32 | 2 | 65.13 | 4.55 20600 | 2 | 126.62 | 20600 | |
| -23.200 | 22.757 | -1.000 | -806.34 | 50.64 | 154.02 | 2 | 66.79 | 4.55 20600 | 2 | 148.47 | 20600 | |
| -23.700 | 22.212 | -1.181 | -772.41 | 84.21 | 158.92 | 2 | 69.23 | 4.55 20600 | 2 | 166.20 | 20600 | |
| -23.969 | 21.882 | -1.274 | -747.52 | 101.06 | 158.92 | 2 | 70.26 | 4.55 20600 | 2 | 165.77 | 20600 | |
| -24.238 | 21.528 | -1.364 | -718.07 | 118.14 | 158.92 | 2 | 71.12 | 4.55 20600 | 2 | 166.36 | 20600 | |
| -24.506 | 21.149 | -1.450 | -684.03 | 135.14 | 158.92 | 2 | 71.84 | 4.55 20600 | 2 | 167.91 | 20600 | |
| -24.775 | 20.749 | -1.532 | -645.46 | 151.79 | 158.92 | 2 | 72.43 | 4.55 20600 | 2 | 170.34 | 20600 | |
| -25.044 | 20.327 | -1.608 | -602.50 | 167.81 | 158.92 | 2 | 72.91 | 4.55 20600 | 2 | 173.57 | 20600 | |
| -25.312 | 19.885 | -1.679 | -555.34 | 183.00 | 158.92 | 2 | 73.30 | 4.55 20600 | 2 | 177.51 | 20600 | |
| -25.581 | 19.425 | -1.744 | -504.23 | 197.12 | 158.92 | 2 | 73.60 | 4.55 20600 | 2 | 182.09 | 20600 | |
| -25.850 | 18.948 | -1.803 | -449.49 | 210.02 | 158.92 | 2 | 73.84 | 4.55 20600 | 2 | 187.24 | 20600 | |
| -26.119 | 18.456 | -1.854 | -391.47 | 221.52 | 158.92 | 2 | 74.02 | 4.55 20600 | 2 | 192.87 | 20600 | |
| -26.388 | 17.952 | -1.899 | -330.56 | 231.49 | 158.92 | 2 | 74.16 | 4.55 20600 | 2 | 198.93 | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -26.656 | 17.436 | -1.936 | -267.19 | 239.82 | 158.92 | 2 | 74.27 | 4.55 20600 | 2 | 205.36 | 20600 | |
| -26.925 | 16.912 | -1.964 | -201.82 | 246.41 | 158.92 | 2 | 74.35 | 4.55 20600 | 2 | 212.11 | 20600 | |
| -27.194 | 16.381 | -1.985 | -134.91 | 251.16 | 158.92 | 2 | 74.42 | 4.55 20600 | 2 | 219.12 | 20600 | |
| -27.462 | 15.846 | -1.997 | -66.99 | 254.02 | 158.92 | 2 | 74.48 | 4.55 20600 | 2 | 226.35 | 20600 | |
| -27.731 | 15.308 | -2.001 | 1.45 | 254.93 | 158.92 | 2 | 74.54 | 4.55 20600 | 2 | 233.78 | 20600 | |
| -28.000 | 14.771 | -1.997 | 69.86 | 253.83 | 158.92 | 2 | 74.61 | 4.55 20600 | 2 | 241.37 | 20600 | |
| | | | | | 158.92 | 2 | 62.35 | 4.12 29000 | 2 | 286.80 | 29000 | |
| -28.500 | 13.779 | -1.967 | 187.83 | 216.56 | 158.92 | 2 | 61.99 | 4.12 29000 | 2 | 304.45 | 29000 | |
| -29.000 | 12.808 | -1.913 | 284.91 | 170.23 | 158.92 | 2 | 61.73 | 4.12 29000 | 2 | 322.45 | 29000 | |
| -29.500 | 11.869 | -1.839 | 356.53 | 114.74 | 158.92 | 2 | 61.58 | 4.12 29000 | 2 | 340.66 | 29000 | |
| -30.000 | 10.971 | -1.752 | 398.64 | 53.20 | 158.92 | 2 | 61.57 | 4.12 29000 | 2 | 346.48 | 29000 | |
| -30.500 | 10.118 | -1.659 | 410.45 | -4.04 | 158.92 | 2 | 61.70 | 4.12 29000 | 2 | 323.60 | 29000 | |
| -31.000 | 9.311 | -1.567 | 396.47 | -50.08 | 158.92 | 2 | 61.97 | 4.12 29000 | 2 | 302.09 | 29000 | |
| -31.500 | 8.550 | -1.480 | 362.13 | -85.54 | 158.92 | 2 | 62.38 | 3.74 29000 | 2 | 281.91 | 29000 | |
| -32.000 | 7.830 | -1.403 | 312.60 | -110.96 | 158.92 | 2 | 62.91 | 3.17 29000 | 2 | 262.93 | 29000 | |
| -32.500 | 7.145 | -1.338 | 252.76 | -126.86 | 158.92 | 2 | 63.57 | 2.70 29000 | 2 | 244.99 | 29000 | |
| -33.000 | 6.489 | -1.288 | 187.27 | -133.64 | 158.92 | 1 | 64.33 | 2.35 29000 | 2 | 227.89 | 29000 | |
| -33.500 | 5.855 | -1.253 | 120.60 | -131.56 | 158.92 | 1 | 65.45 | 2.35 29000 | 2 | 211.42 | 29000 | |
| -34.000 | 5.234 | -1.232 | 57.15 | -120.79 | 158.92 | 1 | 66.56 | 2.35 29000 | 2 | 195.35 | 29000 | |
| -34.500 | 4.620 | -1.226 | 1.24 | -101.47 | 158.92 | 1 | 67.68 | 2.35 29000 | 2 | 179.48 | 29000 | |
| -35.000 | 4.007 | -1.231 | -42.90 | -73.66 | 158.92 | 1 | 68.80 | 2.35 29000 | 2 | 163.61 | 29000 | |
| -35.500 | 3.388 | -1.244 | -70.99 | -37.21 | 158.92 | 2 | 70.39 | 2.82 29000 | 2 | 147.62 | 29000 | |
| -36.000 | 2.762 | -1.262 | -77.87 | 12.72 | 158.92 | 2 | 90.51 | 4.12 29000 | 2 | 131.39 | 29000 | |
| | | | | | 158.92 | 1 | 69.59 | 2.46 43800 | 2 | 174.01 | 43800 | |
| -36.500 | 2.127 | -1.278 | -62.97 | 50.34 | 158.92 | 2 | 85.38 | 4.26 43800 | 2 | 148.31 | 43800 | |
| -37.000 | 1.485 | -1.289 | -23.45 | 112.40 | 158.92 | 2 | 115.63 | 4.26 43800 | 2 | 122.31 | 43800 | |
| | | | | | 158.92 | -1 | | | 2 | 465.80 | 300000 | |
| -37.500 | 0.840 | -1.290 | 2.41 | 7.08 | 158.92 | -1 | | | 2 | 273.32 | 300000 | |
| -38.000 | 0.195 | -1.290 | 0.00 | 0.00 | 158.92 | 2 | 8.00 | 1.52 300000 | 2 | 80.85 | 300000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 24.15 mm
MOMENTO MÁXIMO = 1686.73 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 130.57 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.041 = (1738.68 kN/m)/(42785.78 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.406 = (3543.03 kN/m)/(8724.72 kN/m)



**  FASE No  6  **

*Fase 6
*Restitucion del nf y paso de la tuneladora

* RETIRO DE LA LÍNEA DE PUNTALES N° 4

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 5
NIVEL = -20.150 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = -939.000 kN
RIGIDEZ = 430000.000 kN/m
CONEXIÓN BILATERAL

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -21.000 m
PRESIÓN DEL AGUA EN SUELO 2 PARA NIVEL = -21.000 m PR. = 0.000 kPa
PR. = 130.000 kPa

FASE 6

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. | SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. | SOPRAC. | ELAST. | PUNTALES/ANCLAS N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -7.50 m<br>S. DE CAQUOT: 10.00 kPa | | | | EXCAVACIÓN: -21.00 m<br>NIVEL AGUA: -21.00 m<br>S. DE CAQUOT: 0.00 kPa | | | | | |
| 0.000 | 1.511 | -0.377 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.338 | 1.384 | -0.377 | 0.03 | 0.25 | | 2 | 1.50 | 1.50 | 4900 | 0 | | | | | |
| -0.675 | 1.257 | -0.377 | 0.27 | 1.39 | | 2 | 5.25 | 5.15 | 4900 | 0 | | | | | |
| -1.013 | 1.129 | -0.377 | 1.11 | 3.80 | | 2 | 9.00 | 5.15 | 4900 | 0 | | | | | |
| -1.350 | 1.002 | -0.376 | 2.98 | 7.47 | | 2 | 12.75 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 1.50 | 1.50 | 15100 | 0 | | | | | |
| -1.500 | 0.946 | -0.376 | 4.12 | 7.86 | | 2 | 3.70 | 3.70 | 15100 | 0 | | | | | |
| | | | | 102.23 | | 2 | 3.70 | 3.70 | 15100 | 0 | | | | 1 | 94.37 |
| -1.800 | 0.834 | -0.373 | 35.02 | 103.99 | | 2 | 8.09 | 4.85 | 15100 | 0 | | | | | |
| -2.100 | 0.722 | -0.366 | 66.65 | 107.08 | | 2 | 12.46 | 4.85 | 15100 | 0 | | | | | |
| -2.425 | 0.605 | -0.354 | 102.19 | 111.89 | | 2 | 17.14 | 4.85 | 15100 | 0 | | | | | |
| -2.750 | 0.493 | -0.336 | 139.54 | 118.21 | | 2 | 21.75 | 4.85 | 15100 | 0 | | | | | |
| -3.075 | 0.388 | -0.312 | 179.18 | 126.01 | | 2 | 26.26 | 4.85 | 15100 | 0 | | | | | |
| -3.400 | 0.291 | -0.283 | 221.60 | 135.25 | | 2 | 30.64 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | 2 | 26.87 | 4.55 | 20600 | 0 | | | | | |
| -3.656 | 0.222 | -0.255 | 257.18 | 142.61 | | 2 | 30.51 | 4.55 | 20600 | 0 | | | | | |
| -3.913 | 0.161 | -0.222 | 294.76 | 150.87 | | 2 | 33.99 | 4.55 | 20600 | 0 | | | | | |
| -4.169 | 0.108 | -0.186 | 334.58 | 160.03 | | 2 | 37.46 | 4.55 | 20600 | 0 | | | | | |
| -4.425 | 0.066 | -0.144 | 376.86 | 170.10 | | 2 | 41.20 | 4.55 | 20600 | 0 | | | | | |
| -4.681 | 0.035 | -0.097 | 421.84 | 181.10 | | 2 | 44.63 | 4.55 | 20600 | 0 | | | | | |
| -4.938 | 0.016 | -0.045 | 469.74 | 192.93 | | 2 | 47.73 | 4.55 | 20600 | 0 | | | | | |
| -5.194 | 0.012 | 0.013 | 520.78 | 205.52 | | 2 | 50.46 | 4.55 | 20600 | 0 | | | | | |
| -5.450 | 0.023 | 0.077 | 575.12 | 218.74 | | 2 | 52.79 | 4.55 | 20600 | 0 | | | | | |
| -5.706 | 0.052 | 0.147 | 632.93 | 232.51 | | 2 | 54.67 | 4.55 | 20600 | 0 | | | | | |
| -5.962 | 0.100 | 0.225 | 694.32 | 246.70 | | 2 | 56.06 | 4.55 | 20600 | 0 | | | | | |
| -6.219 | 0.168 | 0.310 | 759.39 | 261.18 | | 2 | 56.93 | 4.55 | 20600 | 0 | | | | | |
| -6.475 | 0.259 | 0.403 | 828.19 | 275.80 | | 2 | 57.23 | 4.55 | 20600 | 0 | | | | | |
| -6.731 | 0.375 | 0.504 | 900.74 | 290.43 | | 2 | 56.91 | 4.55 | 20600 | 0 | | | | | |
| -6.988 | 0.518 | 0.614 | 977.02 | 304.88 | | 2 | 55.93 | 4.55 | 20600 | 0 | | | | | |
| -7.244 | 0.691 | 0.733 | 1056.96 | 319.00 | | 2 | 54.23 | 4.55 | 20600 | 0 | | | | | |
| -7.500 | 0.895 | 0.861 | 1140.46 | 332.58 | | 2 | 51.77 | 4.55 | 20600 | 0 | | | | | |
| -7.875 | 1.256 | 1.068 | 1268.76 | 351.54 | 3.68 | 2 | 45.68 | 4.55 | 20600 | 0 | | | | | |
| -8.250 | 1.698 | 1.296 | 1403.96 | 369.24 | 7.36 | 2 | 37.66 | 4.55 | 20600 | 0 | | | | | |
| -8.625 | 2.231 | 1.549 | 1545.44 | 384.92 | 11.04 | 2 | 27.55 | 4.55 | 20600 | 0 | | | | | |
| -9.000 | 2.863 | 1.826 | 1692.43 | 398.91 | 14.72 | 1 | 21.34 | 2.68 | 20600 | 0 | | | | | |
| | | | | -640.11 | 14.72 | 1 | 21.34 | 2.68 | 20600 | 0 | | | | 2 | -1039.02 |
| -9.300 | 3.444 | 2.045 | 1502.08 | -628.74 | 17.66 | 1 | 22.06 | 2.68 | 20600 | 0 | | | | | |
| -9.600 | 4.087 | 2.238 | 1315.30 | -616.28 | 20.60 | 1 | 22.79 | 2.68 | 20600 | 0 | | | | | |
| -10.100 | 5.275 | 2.503 | 1012.84 | -593.05 | 25.51 | 1 | 23.99 | 2.68 | 20600 | 0 | | | | | |
| -10.600 | 6.579 | 2.701 | 722.75 | -566.78 | 30.41 | 1 | 25.20 | 2.68 | 20600 | 0 | | | | | |
| -11.100 | 7.965 | 2.834 | 446.57 | -537.44 | 35.32 | 1 | 26.41 | 2.68 | 20600 | 0 | | | | | |
| -11.600 | 9.403 | 2.906 | 185.82 | -505.05 | 40.22 | 2 | 27.63 | 2.70 | 20600 | 0 | | | | | |
| -12.100 | 10.862 | 2.920 | -57.96 | -469.50 | 45.13 | 2 | 29.21 | 3.07 | 20600 | 0 | | | | | |
| | | | | | 45.13 | 2 | 19.28 | 2.90 | 29000 | 0 | | | | | |
| -12.435 | 11.837 | 2.900 | -211.54 | -447.17 | 48.41 | 2 | 20.52 | 3.40 | 29000 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. | SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. | SOPRAC. | ELAST. | PUNTALES/ANCLAS N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.770 | 12.802 | 2.856 | -357.39 | -423.30 | 51.70 | 2 | 21.90 | 4.02 | 29000 | 0 | | | | | |
| -13.053 | 13.603 | 2.802 | -474.23 | -401.89 | 54.48 | 2 | 23.17 | 4.12 | 29000 | 0 | | | | | |
| -13.336 | 14.387 | 2.734 | -584.85 | -379.31 | 57.25 | 2 | 24.55 | 4.12 | 29000 | 0 | | | | | |
| -13.619 | 15.150 | 2.651 | -688.90 | -355.54 | 60.03 | 2 | 26.06 | 4.12 | 29000 | 0 | | | | | |
| -13.903 | 15.887 | 2.556 | -786.06 | -330.55 | 62.81 | 2 | 27.69 | 4.12 | 29000 | 0 | | | | | |
| -14.186 | 16.596 | 2.448 | -875.96 | -304.28 | 65.59 | 2 | 29.45 | 4.12 | 29000 | 0 | | | | | |
| -14.469 | 17.273 | 2.330 | -958.24 | -276.71 | 68.36 | 2 | 31.35 | 4.12 | 29000 | 0 | | | | | |
| -14.752 | 17.914 | 2.201 | -1032.52 | -247.80 | 71.14 | 2 | 33.40 | 4.12 | 29000 | 0 | | | | | |
| -15.035 | 18.518 | 2.063 | -1098.42 | -217.50 | 73.92 | 2 | 35.60 | 4.12 | 29000 | 0 | | | | | |
| -15.318 | 19.082 | 1.917 | -1155.54 | -185.77 | 76.70 | 2 | 37.95 | 4.12 | 29000 | 0 | | | | | |
| -15.601 | 19.603 | 1.765 | -1203.47 | -152.56 | 79.47 | 2 | 40.46 | 4.12 | 29000 | 0 | | | | | |
| -15.884 | 20.080 | 1.606 | -1241.79 | -117.83 | 82.25 | 2 | 43.14 | 4.12 | 29000 | 0 | | | | | |
| -16.167 | 20.512 | 1.444 | -1270.05 | -81.53 | 85.03 | 2 | 45.99 | 4.12 | 29000 | 0 | | | | | |
| -16.451 | 20.898 | 1.279 | -1287.80 | -43.62 | 87.81 | 2 | 48.99 | 4.12 | 29000 | 0 | | | | | |
| -16.734 | 21.236 | 1.112 | -1294.59 | -4.05 | 90.58 | 2 | 52.16 | 4.12 | 29000 | 0 | | | | | |
| -17.017 | 21.527 | 0.944 | -1289.93 | 37.23 | 93.36 | 2 | 55.49 | 4.12 | 29000 | 0 | | | | | |
| -17.300 | 21.771 | 0.779 | -1273.34 | 80.27 | 96.14 | 2 | 58.98 | 4.12 | 29000 | 0 | | | | | |
| -17.800 | 22.089 | 0.494 | -1213.34 | 160.68 | 101.04 | 2 | 65.50 | 4.12 | 29000 | 0 | | | | | |
| -18.300 | 22.268 | 0.228 | -1111.69 | 246.91 | 105.95 | 2 | 72.42 | 4.12 | 29000 | 0 | | | | | |
| -18.800 | 22.321 | -0.010 | -965.44 | 339.12 | 110.85 | 2 | 79.65 | 4.12 | 29000 | 0 | | | | | |
| -19.000 | 22.310 | -0.095 | -893.77 | 377.72 | 112.82 | 2 | 82.61 | 4.12 | 29000 | 0 | | | | | |
| | | | | | 112.82 | 2 | 80.82 | 4.55 | 20600 | 0 | | | | | |
| -19.288 | 22.267 | -0.205 | -777.09 | 434.26 | 115.64 | 2 | 84.10 | 4.55 | 20600 | 0 | | | | | |
| -19.575 | 22.194 | -0.299 | -643.90 | 492.57 | 118.46 | 2 | 87.39 | 4.55 | 20600 | 0 | | | | | |
| -19.862 | 22.097 | -0.373 | -493.69 | 552.62 | 121.28 | 2 | 90.67 | 4.55 | 20600 | 0 | | | | | |
| -20.150 | 21.981 | -0.427 | -325.97 | 614.43 | 124.10 | 2 | 93.92 | 4.55 | 20600 | 0 | | | | | |
| | | | | -324.57 | 124.10 | 2 | 93.92 | 4.55 | 20600 | 0 | | | | 5 | -939.00 |
| -20.575 | 21.784 | -0.503 | -443.96 | -230.04 | 128.27 | 2 | 98.58 | 4.55 | 20600 | 0 | | | | | |
| -21.000 | 21.551 | -0.597 | -524.89 | -159.41 | 2.44 | 2 | 103.06 | 4.55 | 20600 | 0 | | | | | |
| -21.275 | 21.377 | -0.666 | -564.70 | -130.02 | 2.44 | 2 | 105.84 | 4.55 | 20600 | -1 | | | | | |
| -21.550 | 21.184 | -0.739 | -596.33 | -99.88 | 2.44 | 2 | 108.51 | 4.55 | 20600 | -1 | | | | | |
| -21.825 | 20.971 | -0.815 | -619.61 | -69.47 | 2.44 | 2 | 113.43 | 4.55 | 20600 | 2 | 5.70 | | 20600 | | |
| -22.100 | 20.736 | -0.894 | -634.59 | -39.59 | 2.44 | 2 | 118.10 | 4.55 | 20600 | 2 | 13.34 | | 20600 | | |
| -22.375 | 20.479 | -0.974 | -641.52 | -11.19 | 2.44 | 2 | 122.30 | 4.55 | 20600 | 2 | 25.40 | | 20600 | | |
| -22.650 | 20.200 | -1.055 | -641.02 | 14.21 | 2.44 | 2 | 126.05 | 4.55 | 20600 | 2 | 43.08 | | 20600 | | |
| -22.925 | 19.899 | -1.135 | -634.01 | 36.26 | 2.44 | 2 | 129.39 | 4.55 | 20600 | 2 | 56.88 | | 20600 | | |
| -23.200 | 19.576 | -1.214 | -621.42 | 54.52 | 2.44 | 2 | 132.34 | 4.55 | 20600 | 2 | 76.92 | | 20600 | | |
| -23.700 | 18.934 | -1.352 | -587.35 | 80.95 | 2.44 | 2 | 136.75 | 4.55 | 20600 | 2 | 91.33 | | 20600 | | |
| -23.969 | 18.561 | -1.423 | -563.83 | 94.17 | 2.44 | 2 | 138.67 | 4.55 | 20600 | 2 | 90.59 | | 20600 | | |
| -24.238 | 18.169 | -1.490 | -536.68 | 107.91 | 2.44 | 2 | 140.30 | 4.55 | 20600 | 2 | 90.95 | | 20600 | | |
| -24.506 | 17.760 | -1.554 | -505.81 | 121.83 | 2.44 | 2 | 141.66 | 4.55 | 20600 | 2 | 92.32 | | 20600 | | |
| -24.775 | 17.334 | -1.614 | -471.21 | 135.58 | 2.44 | 2 | 142.77 | 4.55 | 20600 | 2 | 94.64 | | 20600 | | |
| -25.044 | 16.893 | -1.670 | -432.98 | 148.86 | 2.44 | 2 | 143.65 | 4.55 | 20600 | 2 | 97.83 | | 20600 | | |
| -25.312 | 16.437 | -1.720 | -391.27 | 161.38 | 2.44 | 2 | 144.32 | 4.55 | 20600 | 2 | 101.81 | | 20600 | | |
| -25.581 | 15.969 | -1.766 | -346.33 | 172.90 | 2.44 | 2 | 144.79 | 4.55 | 20600 | 2 | 106.50 | | 20600 | | |
| -25.850 | 15.489 | -1.805 | -298.45 | 183.17 | 2.44 | 2 | 145.10 | 4.55 | 20600 | 2 | 111.82 | | 20600 | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -26.119 | 14.999 | -1.839 | -248.00 | 191.99 | 2.44 | 2 | 145.24 | 4.55 | 20600 | 2 | 117.71 | | 20600 | | | | |
| -26.388 | 14.501 | -1.866 | -195.40 | 199.19 | 2.44 | 2 | 145.25 | 4.55 | 20600 | 2 | 124.09 | | 20600 | | | | |
| -26.656 | 13.996 | -1.887 | -141.10 | 204.60 | 2.44 | 2 | 145.13 | 4.55 | 20600 | 2 | 130.91 | | 20600 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -26.925 | 13.487 | -1.901 | -85.60 | 208.08 | 2.44 | 2 | 144.90 | 4.55 | 20600 | 2 | 138.11 | | 20600 |
| -27.194 | 12.975 | -1.908 | -29.44 | 209.50 | 2.44 | 2 | 144.58 | 4.55 | 20600 | 2 | 145.63 | | 20600 |
| -27.462 | 12.463 | -1.908 | 26.81 | 208.77 | 2.44 | 2 | 144.18 | 4.55 | 20600 | 2 | 153.44 | | 20600 |
| -27.731 | 11.951 | -1.901 | 82.57 | 205.79 | 2.44 | 2 | 143.72 | 4.55 | 20600 | 2 | 161.49 | | 20600 |
| -28.000 | 11.441 | -1.888 | 137.22 | 200.49 | 2.44 | 2 | 143.20 | 4.55 | 20600 | 2 | 169.75 | | 20600 |
| | | | | | 2.44 | 2 | 158.91 | 4.12 | 29000 | 2 | 187.49 | | 29000 |
| -28.500 | 10.507 | -1.845 | 233.30 | 182.04 | 2.44 | 2 | 156.86 | 4.12 | 29000 | 2 | 206.95 | | 29000 |
| -29.000 | 9.599 | -1.782 | 317.44 | 152.71 | 2.44 | 2 | 154.76 | 4.12 | 29000 | 2 | 226.88 | | 29000 |
| -29.500 | 8.728 | -1.702 | 384.15 | 112.28 | 2.44 | 2 | 152.67 | 4.12 | 29000 | 2 | 247.11 | | 29000 |
| -30.000 | 7.900 | -1.608 | 428.38 | 63.79 | 2.44 | 2 | 150.62 | 4.12 | 29000 | 2 | 255.03 | | 29000 |
| -30.500 | 7.121 | -1.508 | 448.31 | 17.47 | 2.44 | 2 | 148.61 | 4.12 | 29000 | 2 | 234.34 | | 29000 |
| -31.000 | 6.392 | -1.405 | 447.35 | -19.88 | 2.44 | 2 | 146.62 | 4.12 | 29000 | 2 | 215.14 | | 29000 |
| -31.500 | 5.715 | -1.305 | 429.80 | -49.00 | 2.44 | 2 | 144.59 | 4.12 | 29000 | 2 | 197.43 | | 29000 |
| -32.000 | 5.087 | -1.210 | 399.59 | -70.66 | 2.44 | 2 | 142.46 | 4.12 | 29000 | 2 | 181.13 | | 29000 |
| -32.500 | 4.504 | -1.123 | 360.26 | -85.61 | 2.44 | 2 | 140.17 | 4.12 | 29000 | 2 | 166.17 | | 29000 |
| -33.000 | 3.962 | -1.046 | 314.98 | -94.58 | 2.44 | 2 | 137.63 | 4.12 | 29000 | 2 | 152.39 | | 29000 |
| -33.500 | 3.456 | -0.979 | 266.57 | -98.22 | 2.44 | 2 | 135.02 | 4.12 | 29000 | 2 | 139.66 | | 29000 |
| -34.000 | 2.981 | -0.924 | 217.55 | -97.14 | 2.44 | 2 | 131.92 | 4.12 | 29000 | 2 | 127.82 | | 29000 |
| -34.500 | 2.530 | -0.880 | 170.11 | -91.99 | 2.44 | 2 | 128.30 | 4.12 | 29000 | 2 | 116.70 | | 29000 |
| -35.000 | 2.099 | -0.846 | 126.13 | -83.38 | 2.44 | 2 | 124.12 | 4.12 | 29000 | 2 | 106.14 | | 29000 |
| -35.500 | 1.682 | -0.822 | 87.24 | -71.70 | 2.44 | 2 | 119.86 | 4.12 | 29000 | 2 | 96.01 | | 29000 |
| -36.000 | 1.275 | -0.806 | 55.66 | -52.66 | 2.44 | 2 | 133.61 | 4.12 | 29000 | 2 | 86.16 | | 29000 |
| | | | | | 2.44 | 2 | 134.69 | 4.26 | 43800 | 2 | 106.71 | | 43800 |
| -36.500 | 0.875 | -0.796 | 34.00 | -32.23 | 2.44 | 2 | 140.19 | 4.26 | 43800 | 2 | 91.30 | | 43800 |
| -37.000 | 0.479 | -0.789 | 25.75 | 2.11 | 2.44 | 2 | 159.68 | 4.26 | 43800 | 2 | 76.07 | | 43800 |
| | | | | | 2.44 | -1 | | | | 2 | 163.35 | | 300000 |
| -37.500 | 0.086 | -0.785 | 13.22 | -39.15 | 2.44 | 2 | 39.76 | 1.52 | 300000 | 2 | 46.33 | | 300000 |
| -38.000 | -0.306 | -0.783 | 0.00 | 0.00 | 2.44 | 2 | 158.30 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | |

DESPLAZAMIENTO MÁX. = 22.32 mm

MOMENTO MÁXIMO = 1692.43 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 155.09 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.073 = (3134.02 kN/m)/(42785.78 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.262 = (2158.07 kN/m)/(8245.90 kN/m) SIN INTERÉS



** FASE No 7 **

*Fase 7
*Restitucion del puntal provisional y Sismo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 6
NIVEL = -12.770 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -1.350 m

PESO ESPECIFOCO HÚMEDO GH = 18.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.560
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.515
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.367
COHESIÓN C = 5.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 29.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 4900.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -3.400 m

PESO ESPECIFOCO HÚMEDO GH = 18.500 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.500 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.522
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.485
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.594
COHESIÓN C = 15.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 31.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000

PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 15100.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -12.100 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -19.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -28.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d



* NUEVOS PARÁMETROS PARA CAPA No. 6 HASTA NIVEL -36.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 7 HASTA NIVEL -37.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.795 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.402 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG3a

* NUEVOS PARÁMETROS PARA CAPA No. 8 HASTA NIVEL -46.300 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.302 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 10.398 |
| COHESIÓN | C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 GRADOS |

PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m



FASE 7

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m, NIVEL AGUA: -7.50 m, S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -21.00 m, NIVEL AGUA: -21.00 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 1.384 | -0.288 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.338 | 1.287 | -0.288 | 0.06 | 0.53 | | 1 | 3.11 | 3.11 4900 | 0 | | | | |
| -0.675 | 1.190 | -0.288 | 0.48 | 2.15 | | 1 | 6.51 | 5.60 4900 | 0 | | | | |
| -1.013 | 1.092 | -0.288 | 1.64 | 4.92 | | 1 | 9.92 | 5.60 4900 | 0 | | | | |
| -1.350 | 0.995 | -0.288 | 3.93 | 8.84 | | 1 | 13.32 | 5.60 4900 | 0 | | | | |
| | | | | | | 2 | 1.61 | 1.61 15100 | 0 | | | | |
| -1.500 | 0.952 | -0.287 | 5.28 | 9.23 | | 2 | 3.60 | 3.60 15100 | 0 | | | | |
| | | | | 71.94 | | 2 | 3.60 | 3.60 15100 | 0 | | | 1 | 62.70 |
| -1.800 | 0.866 | -0.285 | 27.08 | 73.62 | | 2 | 7.59 | 4.85 15100 | 0 | | | | |
| -2.100 | 0.781 | -0.280 | 49.57 | 76.49 | | 2 | 11.57 | 4.85 15100 | 0 | | | | |
| -2.425 | 0.692 | -0.271 | 75.12 | 80.94 | | 2 | 15.84 | 4.85 15100 | 0 | | | | |
| -2.750 | 0.606 | -0.258 | 102.33 | 86.78 | | 2 | 20.05 | 4.85 15100 | 0 | | | | |
| -3.075 | 0.525 | -0.240 | 131.67 | 93.96 | | 2 | 24.19 | 4.85 15100 | 0 | | | | |
| -3.400 | 0.450 | -0.218 | 163.56 | 102.48 | | 2 | 28.23 | 4.85 15100 | 0 | | | | |
| | | | | | | 1 | 46.75 | 9.48 20600 | 0 | | | | |
| -3.656 | 0.397 | -0.198 | 191.40 | 115.05 | | 1 | 51.37 | 9.48 20600 | 0 | | | | |
| -3.913 | 0.349 | -0.173 | 222.62 | 128.81 | | 1 | 55.98 | 9.48 20600 | 0 | | | | |
| -4.169 | 0.308 | -0.145 | 257.52 | 143.74 | | 1 | 60.60 | 9.48 20600 | 0 | | | | |
| -4.425 | 0.275 | -0.113 | 296.39 | 159.86 | | 1 | 65.21 | 9.48 20600 | 0 | | | | |
| -4.681 | 0.251 | -0.076 | 339.55 | 177.17 | | 1 | 69.83 | 9.48 20600 | 0 | | | | |
| -4.938 | 0.237 | -0.033 | 387.29 | 195.65 | | 1 | 74.44 | 9.48 20600 | 0 | | | | |
| -5.194 | 0.234 | 0.015 | 439.92 | 215.32 | | 1 | 79.06 | 9.48 20600 | 0 | | | | |
| -5.450 | 0.245 | 0.070 | 497.74 | 236.17 | | 1 | 83.68 | 9.48 20600 | 0 | | | | |
| -5.706 | 0.271 | 0.132 | 561.06 | 258.20 | | 1 | 88.29 | 9.48 20600 | 0 | | | | |
| -5.962 | 0.313 | 0.201 | 630.17 | 281.42 | | 1 | 92.91 | 9.48 20600 | 0 | | | | |
| -6.219 | 0.375 | 0.279 | 705.39 | 305.82 | | 1 | 97.52 | 9.48 20600 | 0 | | | | |
| -6.475 | 0.457 | 0.367 | 787.01 | 331.40 | | 1 | 102.14 | 9.48 20600 | 0 | | | | |
| -6.731 | 0.563 | 0.464 | 875.33 | 358.16 | | 1 | 106.75 | 9.48 20600 | 0 | | | | |
| -6.988 | 0.696 | 0.572 | 970.67 | 386.11 | | 1 | 111.37 | 9.48 20600 | 0 | | | | |
| -7.244 | 0.857 | 0.691 | 1073.31 | 415.24 | | 1 | 115.98 | 9.48 20600 | 0 | | | | |
| -7.500 | 1.051 | 0.823 | 1183.58 | 445.55 | | 1 | 120.60 | 9.48 20600 | 0 | | | | |
| -7.875 | 1.400 | 1.041 | 1359.30 | 492.07 | 3.68 | 1 | 123.80 | 9.48 20600 | 0 | | | | |
| -8.250 | 1.836 | 1.290 | 1552.95 | 541.16 | 7.36 | 1 | 127.00 | 9.48 20600 | 0 | | | | |
| -8.625 | 2.371 | 1.574 | 1765.49 | 592.84 | 11.04 | 1 | 130.20 | 9.48 20600 | 0 | | | | |
| -9.000 | 3.021 | 1.896 | 1997.90 | 647.09 | 14.72 | 1 | 133.40 | 9.48 20600 | 0 | | | | |
| | | | | -938.43 | 14.72 | 1 | 133.40 | 9.48 20600 | 0 | | | 2 | -1585.51 |
| -9.300 | 3.628 | 2.150 | 1723.12 | -893.17 | 17.66 | 1 | 135.96 | 9.48 20600 | 0 | | | | |
| -9.600 | 4.307 | 2.368 | 1462.16 | -846.26 | 20.60 | 1 | 138.52 | 9.48 20600 | 0 | | | | |
| -10.100 | 5.567 | 2.655 | 1059.31 | -764.41 | 25.51 | 1 | 142.78 | 9.48 20600 | 0 | | | | |
| -10.600 | 6.948 | 2.855 | 698.52 | -677.97 | 30.41 | 1 | 147.05 | 9.48 20600 | 0 | | | | |
| -11.100 | 8.409 | 2.978 | 382.10 | -586.95 | 35.32 | 1 | 151.32 | 9.48 20600 | 0 | | | | |
| -11.600 | 9.914 | 3.033 | 112.34 | -491.34 | 40.22 | 1 | 155.58 | 9.48 20600 | 0 | | | | |
| -12.100 | 11.433 | 3.033 | -108.47 | -391.14 | 45.13 | 1 | 159.85 | 9.48 20600 | 0 | | | | |
| | | | | | 45.13 | 1 | 125.64 | 7.89 29000 | 0 | | | | |
| -12.435 | 12.445 | 3.007 | -229.81 | -332.97 | 48.41 | 1 | 128.15 | 7.89 29000 | 0 | | | | |
| | | | | | | | | | | | | | |
| m | mm | | /1000 | kN.m/m | kN/m kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -12.770 | 13.445 | 2.963 | -331.34 | -272.85 | 51.70 | 1 | 130.66 | 7.89 29000 | 0 | | | | |
| | | | | -564.30 | 51.70 | 1 | 130.66 | 7.89 29000 | 0 | | | 6 | -291.46 |
| -13.053 | 14.277 | 2.911 | -483.74 | -511.98 | 54.48 | 1 | 132.78 | 7.89 29000 | 0 | | | | |
| -13.336 | 15.092 | 2.839 | -621.12 | -458.27 | 57.25 | 1 | 134.90 | 7.89 29000 | 0 | | | | |
| -13.619 | 15.883 | 2.751 | -743.10 | -403.17 | 60.03 | 1 | 137.03 | 7.89 29000 | 0 | | | | |
| -13.903 | 16.648 | 2.647 | -849.28 | -346.69 | 62.81 | 1 | 139.15 | 7.89 29000 | 0 | | | | |
| -14.186 | 17.381 | 2.532 | -939.28 | -288.81 | 65.59 | 1 | 141.27 | 7.89 29000 | 0 | | | | |
| -14.469 | 18.080 | 2.405 | -1012.69 | -229.56 | 68.36 | 1 | 143.39 | 7.89 29000 | 0 | | | | |
| -14.752 | 18.742 | 2.271 | -1069.13 | -168.91 | 71.14 | 1 | 145.51 | 7.89 29000 | 0 | | | | |
| -15.035 | 19.366 | 2.130 | -1108.21 | -106.87 | 73.92 | 1 | 147.64 | 7.89 29000 | 0 | | | | |
| -15.318 | 19.948 | 1.985 | -1129.52 | -43.45 | 76.70 | 1 | 149.76 | 7.89 29000 | 0 | | | | |
| -15.601 | 20.489 | 1.838 | -1132.68 | 21.36 | 79.47 | 1 | 151.88 | 7.89 29000 | 0 | | | | |
| -15.884 | 20.989 | 1.693 | -1117.30 | 87.55 | 82.25 | 1 | 154.00 | 7.89 29000 | 0 | | | | |
| -16.167 | 21.448 | 1.550 | -1082.98 | 155.13 | 85.03 | 1 | 156.12 | 7.89 29000 | 0 | | | | |
| -16.451 | 21.867 | 1.414 | -1029.32 | 224.10 | 87.81 | 1 | 158.25 | 7.89 29000 | 0 | | | | |
| -16.734 | 22.249 | 1.285 | -955.95 | 294.46 | 90.58 | 1 | 160.37 | 7.89 29000 | 0 | | | | |
| -17.017 | 22.596 | 1.167 | -862.45 | 366.21 | 93.36 | 1 | 162.49 | 7.89 29000 | 0 | | | | |
| -17.300 | 22.912 | 1.063 | -748.45 | 439.34 | 96.14 | 1 | 164.61 | 7.89 29000 | 0 | | | | |
| -17.800 | 23.405 | 0.920 | -495.83 | 571.88 | 101.04 | 1 | 168.36 | 7.89 29000 | 0 | | | | |
| -18.300 | 23.842 | 0.842 | -175.85 | 708.74 | 105.95 | 1 | 172.11 | 7.89 29000 | 0 | | | | |
| -18.800 | 24.260 | 0.845 | 213.63 | 849.93 | 110.85 | 1 | 175.86 | 7.89 29000 | 0 | | | | |
| -19.000 | 24.431 | 0.872 | 389.38 | 907.62 | 112.82 | 1 | 177.36 | 7.89 29000 | 0 | | | | |
| | | | | | 112.82 | 1 | 221.99 | 9.48 20600 | 0 | | | | |
| -19.288 | 24.691 | 0.941 | 664.23 | 1004.64 | 115.64 | 1 | 224.44 | 9.48 20600 | 0 | | | | |
| -19.575 | 24.976 | 1.048 | 967.19 | 1103.17 | 118.46 | 1 | 226.89 | 9.48 20600 | 0 | | | | |
| -19.862 | 25.297 | 1.196 | 1298.69 | 1203.21 | 121.28 | 1 | 229.35 | 9.48 20600 | 0 | | | | |
| -20.150 | 25.668 | 1.390 | 1659.18 | 1304.77 | 124.10 | 1 | 231.80 | 9.48 20600 | 0 | | | | |
| | | | | -1219.63 | 124.10 | 1 | 231.80 | 9.48 20600 | 0 | | | 5 | -2524.40 |
| -20.575 | 26.320 | 1.664 | 1173.21 | -1066.71 | 128.27 | 1 | 235.43 | 9.48 20600 | 0 | | | | |
| -21.000 | 27.070 | 1.849 | 749.03 | -938.11 | 2.44 | 1 | 239.05 | 9.48 20600 | 0 | | | | |
| | | | | | 2.44 | 1 | 239.05 | 9.48 20600 | 3 | 35.97 | 20600 | | |
| -21.275 | 27.590 | 1.928 | 498.78 | -881.99 | 2.44 | 1 | 241.40 | 9.48 20600 | 3 | 41.18 | 20600 | | |
| -21.550 | 28.127 | 1.975 | 263.85 | -826.80 | 2.44 | 1 | 243.75 | 9.48 20600 | 3 | 47.41 | 20600 | | |
| -21.825 | 28.673 | 1.994 | 43.93 | -772.84 | 2.44 | 1 | 246.09 | 9.48 20600 | 3 | 54.89 | 20600 | | |
| -22.100 | 29.222 | 1.987 | -161.33 | -720.15 | 2.44 | 1 | 248.44 | 9.48 20600 | 3 | 61.33 | 20600 | | |
| -22.375 | 29.764 | 1.954 | -352.27 | -668.78 | 2.44 | 1 | 250.78 | 9.48 20600 | 3 | 69.17 | 20600 | | |
| -22.650 | 30.294 | 1.899 | -529.32 | -619.16 | 2.44 | 1 | 253.13 | 9.48 20600 | 3 | 78.75 | 20600 | | |
| -22.925 | 30.807 | 1.822 | -692.98 | -571.36 | 2.44 | 1 | 255.48 | 9.48 20600 | 3 | 87.07 | 20600 | | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -23.200 | 31.295 | 1.726 | -843.74 | -525.47 | 2.44 | 1 | 257.82 | 9.48 | 20600 | 3 | 97.33 | 20600 | |
| -23.700 | 32.105 | 1.504 | -1086.15 | -444.25 | 2.44 | 1 | 262.09 | 9.48 | 20600 | 3 | 102.60 | 20600 | |
| -23.969 | 32.490 | 1.364 | -1199.70 | -400.76 | 2.44 | 1 | 264.38 | 9.48 | 20600 | 3 | 105.12 | 20600 | |
| -24.238 | 32.837 | 1.210 | -1301.57 | -357.37 | 2.44 | 1 | 266.68 | 9.48 | 20600 | 3 | 107.88 | 20600 | |
| -24.506 | 33.140 | 1.045 | -1391.80 | -314.13 | 2.44 | 1 | 268.97 | 9.48 | 20600 | 3 | 110.86 | 20600 | |
| -24.775 | 33.397 | 0.869 | -1470.43 | -271.11 | 2.44 | 1 | 271.26 | 9.48 | 20600 | 3 | 114.06 | 20600 | |
| -25.044 | 33.606 | 0.685 | -1537.54 | -228.35 | 2.44 | 1 | 273.55 | 9.48 | 20600 | 3 | 117.44 | 20600 | |
| -25.312 | 33.765 | 0.492 | -1593.20 | -185.91 | 2.44 | 1 | 275.85 | 9.48 | 20600 | 3 | 121.00 | 20600 | |
| -25.581 | 33.870 | 0.294 | -1637.50 | -143.83 | 2.44 | 1 | 278.14 | 9.48 | 20600 | 3 | 124.71 | 20600 | |
| -25.850 | 33.922 | 0.091 | -1670.55 | -102.15 | 2.44 | 1 | 280.43 | 9.48 | 20600 | 3 | 128.56 | 20600 | |
| -26.119 | 33.919 | -0.115 | -1692.45 | -60.91 | 2.44 | 1 | 282.73 | 9.48 | 20600 | 3 | 132.53 | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |



FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -26.388 | 33.860 | -0.324 | -1703.33 | -20.13 | 2.44 | 1 | 285.02 | 9.48 | 20600 | 3 | 136.61 | 20600 | |
| -26.656 | 33.745 | -0.533 | -1703.31 | 20.15 | 2.44 | 1 | 287.31 | 9.48 | 20600 | 3 | 140.78 | 20600 | |
| -26.925 | 33.574 | -0.742 | -1692.54 | 59.92 | 2.44 | 1 | 289.60 | 9.48 | 20600 | 3 | 145.04 | 20600 | |
| -27.194 | 33.347 | -0.948 | -1671.15 | 99.16 | 2.44 | 1 | 291.90 | 9.48 | 20600 | 3 | 149.36 | 20600 | |
| -27.462 | 33.064 | -1.151 | -1639.29 | 137.84 | 2.44 | 1 | 294.19 | 9.48 | 20600 | 3 | 153.74 | 20600 | |
| -27.731 | 32.728 | -1.350 | -1597.11 | 175.95 | 2.44 | 1 | 296.48 | 9.48 | 20600 | 3 | 158.18 | 20600 | |
| -28.000 | 32.339 | -1.543 | -1544.77 | 213.48 | 2.44 | 1 | 298.78 | 9.48 | 20600 | 3 | 162.66 | 20600 | |
| | | | | | 2.44 | 1 | 241.26 | 7.89 | 29000 | 3 | 210.28 | 29000 | |
| -28.500 | 31.482 | -1.883 | -1434.17 | 228.31 | 2.44 | 1 | 245.01 | 7.89 | 29000 | 3 | 221.54 | 29000 | |
| -29.000 | 30.461 | -2.197 | -1317.09 | 239.35 | 2.44 | 1 | 248.76 | 7.89 | 29000 | 3 | 232.94 | 29000 | |
| -29.500 | 29.289 | -2.484 | -1195.46 | 246.54 | 2.44 | 1 | 252.51 | 7.89 | 29000 | 3 | 244.44 | 29000 | |
| -30.000 | 27.981 | -2.743 | -1071.20 | 249.83 | 2.44 | 1 | 256.26 | 7.89 | 29000 | 3 | 256.03 | 29000 | |
| -30.500 | 26.551 | -2.973 | -946.28 | 249.19 | 2.44 | 1 | 260.00 | 7.89 | 29000 | 3 | 267.67 | 29000 | |
| -31.000 | 25.013 | -3.175 | -822.67 | 244.59 | 2.44 | 1 | 263.75 | 7.89 | 29000 | 3 | 279.37 | 29000 | |
| -31.500 | 23.381 | -3.349 | -702.36 | 236.00 | 2.44 | 1 | 267.50 | 7.89 | 29000 | 3 | 291.10 | 29000 | |
| -32.000 | 21.668 | -3.496 | -587.34 | 223.41 | 2.44 | 1 | 271.25 | 7.89 | 29000 | 3 | 302.87 | 29000 | |
| -32.500 | 19.889 | -3.618 | -479.61 | 206.81 | 2.44 | 1 | 274.99 | 7.89 | 29000 | 3 | 314.66 | 29000 | |
| -33.000 | 18.054 | -3.716 | -381.20 | 186.18 | 2.44 | 1 | 278.74 | 7.89 | 29000 | 3 | 326.47 | 29000 | |
| -33.500 | 16.176 | -3.793 | -294.10 | 161.52 | 2.44 | 1 | 282.49 | 7.89 | 29000 | 3 | 338.29 | 29000 | |
| -34.000 | 14.265 | -3.851 | -220.35 | 132.81 | 2.44 | 1 | 286.24 | 7.89 | 29000 | 3 | 350.13 | 29000 | |
| -34.500 | 12.328 | -3.895 | -161.97 | 100.05 | 2.44 | 1 | 289.99 | 7.89 | 29000 | 3 | 361.98 | 29000 | |
| -35.000 | 10.372 | -3.926 | -119.82 | 70.19 | 2.44 | 1 | 293.73 | 7.89 | 29000 | 2 | 346.06 | 29000 | |
| -35.500 | 8.402 | -3.950 | -88.50 | 59.97 | 2.44 | 1 | 297.48 | 7.89 | 29000 | 2 | 290.89 | 29000 | |
| -36.000 | 6.423 | -3.967 | -54.92 | 79.28 | 2.44 | 1 | 301.23 | 7.89 | 29000 | 2 | 235.44 | 29000 | |
| | | | | | 2.44 | 1 | 297.96 | 7.95 | 43800 | 2 | 332.17 | 43800 | |
| -36.500 | 4.437 | -3.975 | -15.55 | 85.60 | 2.44 | 1 | 301.93 | 7.95 | 43800 | 2 | 247.32 | 43800 | |
| -37.000 | 2.450 | -3.973 | 38.08 | 136.35 | 2.44 | 1 | 305.91 | 7.95 | 43800 | 2 | 162.40 | 43800 | |
| | | | | | 2.44 | -1 | | | | 2 | 754.61 | 300000 | |
| -37.500 | 0.466 | -3.962 | 36.99 | -91.21 | 2.44 | -1 | | | | 2 | 160.51 | 300000 | |
| -38.000 | -1.514 | -3.959 | 0.00 | 0.00 | 2.44 | 2 | 520.49 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 33.92 mm

MOMENTO MÁXIMO = 1997.90 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 308.88 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.236 = (7018.68 kN/m)/(29802.52 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.534 = (3587.71 kN/m)/(6715.27 kN/m) SIN INTERÉS

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 6 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.338 | 0.00 | 1.45 |
| -0.675 | 0.00 | 3.75 |
| -1.013 | 0.00 | 6.91 |
| -1.350 | 0.00 | 10.92 |
| -1.500 | 0.00 | 11.37 |
| | -47.98 | 102.23 |
| -1.800 | -46.85 | 103.99 |
| -2.100 | -45.40 | 107.08 |
| -2.425 | -43.47 | 111.89 |
| -2.750 | -41.16 | 118.21 |
| -3.075 | -38.46 | 126.01 |
| -3.400 | -35.36 | 135.25 |
| -3.656 | -35.36 | 142.61 |
| -3.913 | -35.36 | 150.87 |
| -4.169 | -35.26 | 160.03 |
| -4.425 | -34.90 | 170.10 |
| -4.681 | -34.21 | 181.10 |
| -4.938 | -33.18 | 192.93 |
| -5.194 | -31.81 | 205.52 |
| -5.450 | -30.11 | 218.74 |
| -5.706 | -28.08 | 232.51 |
| -5.962 | -25.71 | 246.70 |
| -6.219 | -23.01 | 261.18 |
| -6.475 | -19.97 | 275.80 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.338 | 0.00 | 0.22 |
| -0.675 | 0.00 | 1.07 |
| -1.013 | 0.00 | 2.85 |
| -1.350 | 0.00 | 5.83 |
| -1.500 | 0.00 | 7.50 |
| | 0.00 | 7.50 |
| -1.800 | -6.73 | 35.02 |
| -2.100 | -20.57 | 66.65 |
| -2.425 | -35.03 | 102.19 |
| -2.750 | -48.79 | 139.54 |
| -3.075 | -61.74 | 179.18 |
| -3.400 | -73.74 | 221.60 |
| -3.656 | -82.81 | 257.18 |
| -3.913 | -91.87 | 294.76 |
| -4.169 | -100.92 | 334.58 |
| -4.425 | -109.92 | 376.86 |
| -4.681 | -118.78 | 421.84 |
| -4.938 | -127.42 | 469.74 |
| -5.194 | -135.75 | 520.78 |
| -5.450 | -143.69 | 575.12 |
| -5.706 | -151.16 | 632.93 |
| -5.962 | -158.06 | 694.32 |
| -6.219 | -164.30 | 759.39 |
| -6.475 | -169.82 | 828.19 |

| | | | | | |
|---|---|---|---|---|---|
| -6.731 | -16.60 | 290.43 | -6.731 | -174.51 | 900.74 |
| -6.988 | -12.89 | 304.88 | -6.988 | -178.30 | 977.02 |
| -7.244 | -8.85 | 319.00 | -7.244 | -181.09 | 1056.96 |
| -7.500 | -7.01 | 332.58 | -7.500 | -182.81 | 1140.46 |
| -7.875 | -6.81 | 351.54 | -7.875 | -183.13 | 1268.76 |
| -8.250 | -6.42 | 369.24 | -8.250 | -180.32 | 1403.96 |
| -8.625 | -5.84 | 384.92 | -8.625 | -173.73 | 1545.44 |
| -9.000 | -5.08 | 398.91 | -9.000 | -162.71 | 1692.43 |
| | -640.11 | 35.91 | | -162.71 | 1692.43 |
| -9.300 | -628.74 | 47.50 | -9.300 | -150.23 | 1504.58 |
| -9.600 | -616.28 | 60.47 | -9.600 | -134.07 | 1326.00 |
| -10.100 | -593.05 | 58.50 | -10.100 | -104.43 | 1037.21 |
| -10.600 | -566.78 | 58.38 | -10.600 | -75.26 | 760.79 |
| -11.100 | -537.44 | 59.67 | -11.100 | -45.81 | 498.28 |
| -11.600 | -505.05 | 62.51 | -11.600 | -15.33 | 251.19 |
| -12.100 | -469.50 | 66.99 | -12.100 | -186.06 | 64.49 |
| -12.435 | -447.17 | 57.06 | -12.435 | -321.01 | 37.74 |
| -12.770 | -423.30 | 47.65 | -12.770 | -448.33 | 55.26 |
| -13.053 | -401.89 | 40.34 | -13.053 | -549.67 | 67.70 |
| -13.336 | -379.31 | 33.68 | -13.336 | -644.96 | 78.16 |
| -13.619 | -355.54 | 27.63 | -13.619 | -733.95 | 86.83 |
| -13.903 | -330.55 | 22.12 | -13.903 | -816.35 | 93.86 |



| | | | | | |
|---|---|---|---|---|---|
| -14.186 | -304.28 | 17.12 | -14.186 | -891.89 | 99.40 |
| -14.469 | -276.71 | 12.56 | -14.469 | -960.29 | 103.60 |
| -14.752 | -247.80 | 8.39 | -14.752 | -1032.52 | 106.55 |
| -15.035 | -217.50 | 33.81 | -15.035 | -1098.42 | 108.38 |
| -15.318 | -185.77 | 63.96 | -15.318 | -1155.54 | 109.14 |
| -15.601 | -152.56 | 93.94 | -15.601 | -1203.47 | 108.91 |
| -15.884 | -117.83 | 124.44 | -15.884 | -1241.79 | 107.74 |
| -16.167 | -82.92 | 155.90 | -16.167 | -1270.05 | 105.64 |
| -16.451 | -50.49 | 188.33 | -16.451 | -1287.80 | 102.62 |
| -16.734 | -17.10 | 221.73 | -16.734 | -1294.59 | 98.68 |
| -17.017 | -19.03 | 256.09 | -17.017 | -1289.93 | 93.79 |
| -17.300 | -22.66 | 291.42 | -17.300 | -1273.34 | 87.89 |
| | -640.84 | 81.12 | | -1273.34 | 87.89 |
| -17.800 | -576.09 | 160.68 | -17.800 | -1213.34 | 74.83 |
| -18.300 | -508.34 | 246.91 | -18.300 | -1111.69 | 58.01 |
| -18.800 | -437.57 | 339.12 | -18.800 | -965.44 | 36.86 |
| -19.000 | -408.42 | 377.72 | -19.000 | -893.77 | 27.04 |
| -19.288 | -362.15 | 434.26 | -19.288 | -934.84 | 13.09 |
| -19.575 | -314.86 | 492.57 | -19.575 | -1032.18 | 0.63 |
| -19.862 | -266.57 | 552.62 | -19.862 | -1115.79 | 0.00 |
| -20.150 | -217.26 | 614.43 | -20.150 | -1185.36 | 0.00 |
| | -362.26 | 259.08 | | -1185.36 | 0.00 |
| -20.575 | -287.52 | 261.52 | -20.575 | -1261.89 | 0.00 |
| -21.000 | -210.57 | 258.88 | -21.000 | -1306.19 | 0.00 |
| -21.275 | -170.89 | 254.47 | -21.275 | -1318.55 | 0.00 |
| -21.550 | -132.38 | 247.93 | -21.550 | -1319.88 | 0.00 |
| -21.825 | -95.74 | 239.26 | -21.825 | -1310.87 | 0.00 |
| -22.100 | -60.76 | 228.47 | -22.100 | -1292.38 | 0.00 |
| -22.375 | -27.62 | 215.55 | -22.375 | -1265.18 | 0.00 |
| -22.650 | -7.73 | 200.51 | -22.650 | -1230.26 | 4.40 |
| -22.925 | -6.09 | 183.34 | -22.925 | -1188.87 | 57.23 |
| -23.200 | -4.56 | 177.83 | -23.200 | -1142.17 | 105.04 |
| -23.700 | -1.98 | 200.51 | -23.700 | -1047.31 | 177.60 |
| -23.969 | -0.67 | 211.07 | -23.969 | -992.01 | 208.64 |
| -24.238 | 0.00 | 221.70 | -24.238 | -933.85 | 234.47 |
| -24.506 | 0.00 | 232.18 | -24.506 | -872.86 | 255.57 |
| -24.775 | 0.00 | 242.29 | -24.775 | -809.09 | 272.42 |
| -25.044 | 0.00 | 251.85 | -25.044 | -742.67 | 285.49 |
| -25.312 | 0.00 | 260.68 | -25.312 | -673.78 | 295.22 |
| -25.581 | 0.00 | 268.62 | -25.581 | -602.64 | 302.04 |
| -25.850 | 0.00 | 275.53 | -25.850 | -529.49 | 306.37 |
| -26.119 | 0.00 | 281.28 | -26.119 | -454.64 | 308.62 |
| -26.388 | -0.59 | 285.76 | -26.388 | -378.42 | 309.19 |
| -26.656 | -4.81 | 288.89 | -26.656 | -301.17 | 308.43 |
| -26.925 | -7.72 | 290.56 | -26.925 | -223.27 | 306.72 |
| -27.194 | -9.37 | 290.71 | -27.194 | -145.13 | 304.40 |
| -27.462 | -9.83 | 289.28 | -27.462 | -67.16 | 301.79 |
| -27.731 | -9.15 | 286.22 | -27.731 | -29.93 | 299.21 |
| -28.000 | -7.37 | 281.46 | -28.000 | -21.98 | 296.97 |
| -28.500 | -32.22 | 235.75 | -28.500 | -9.67 | 286.87 |
| -29.000 | -52.34 | 182.40 | -29.000 | -3.63 | 321.01 |
| -29.500 | -68.18 | 121.22 | -29.500 | -3.10 | 397.25 |
| -30.000 | -80.17 | 63.79 | -30.000 | -7.33 | 441.43 |
| -30.500 | -88.66 | 17.47 | -30.500 | -15.52 | 453.33 |
| -31.000 | -93.94 | 0.00 | -31.000 | -26.91 | 447.35 |



| | | | | | |
|---|---|---|---|---|---|
| -31.500 | -96.23 | 0.00 | -31.500 | -40.65 | 429.80 |
| -32.000 | -117.80 | 0.00 | -32.000 | -55.91 | 399.59 |
| -32.500 | -134.28 | 0.00 | -32.500 | -71.74 | 360.26 |
| -33.000 | -141.24 | 0.00 | -33.000 | -87.13 | 314.98 |
| -33.500 | -139.09 | 0.00 | -33.500 | -118.72 | 266.57 |
| -34.000 | -128.15 | 0.00 | -34.000 | -154.09 | 217.55 |
| -34.500 | -108.59 | 0.00 | -34.500 | -180.65 | 170.11 |
| -35.000 | -83.38 | 5.82 | -35.000 | -194.57 | 126.13 |
| -35.500 | -71.70 | 25.36 | -35.500 | -191.72 | 87.24 |
| -36.000 | -52.66 | 72.42 | -36.000 | -167.67 | 55.66 |
| -36.500 | -32.23 | 105.91 | -36.500 | -123.72 | 34.00 |
| -37.000 | 0.00 | 154.89 | -37.000 | -59.18 | 25.75 |
| -37.500 | -39.15 | 50.05 | -37.500 | -10.23 | 13.22 |
| -38.000 | 0.00 | 0.00 | -38.000 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |

*** DESPLAZAMIENTO MÁXIMO EN FASE N° 7 = 33.922 mm EN FASE FINAL N° 7 = 33.922 mm

*** MAXIMUM MOMENT IN PHASE Nb 7 = 1997.898 kN.m/m IN FINAL PHASE Nb 7 = 1997.898 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -1.50 | 2 | 0.00 | 6 | 94.37 | 7 | 62.70 |
| 2 | -9.00 | 3 | 0.00 | 7 | -1585.52 | 7 | -1585.51 |
| 3 | -17.30 | 4 | 0.00 | 4 | -932.25 | 5 | QUITADO |
| 4 | -20.15 | 5 | 0.00 | 5 | -838.42 | 6 | QUITADO |
| 5 | -20.15 | 6 | -939.00 | 7 | -2524.40 | 7 | -2524.40 |
| 6 | -12.77 | 7 | 0.00 | 7 | -291.46 | 7 | -291.46 |
| | m | | kN | | kN | | kN |



* CURVAS ENVOLVENTES DE FASE 7 A FASE 7 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.338 | 0.00 | 0.53 | -0.338 | 0.00 | 0.06 |
| -0.675 | 0.00 | 2.15 | -0.675 | 0.00 | 0.48 |
| -1.013 | 0.00 | 4.92 | -1.013 | 0.00 | 1.64 |
| -1.350 | 0.00 | 8.84 | -1.350 | 0.00 | 3.93 |
| -1.500 | 0.00 | 9.23 | -1.500 | 0.00 | 5.28 |
| | 0.00 | 71.94 | | 0.00 | 5.28 |
| -1.800 | 0.00 | 73.62 | -1.800 | 0.00 | 27.08 |
| -2.100 | 0.00 | 76.49 | -2.100 | 0.00 | 49.57 |
| -2.425 | 0.00 | 80.94 | -2.425 | 0.00 | 75.12 |
| -2.750 | 0.00 | 86.78 | -2.750 | 0.00 | 102.33 |
| -3.075 | 0.00 | 93.96 | -3.075 | 0.00 | 131.67 |
| -3.400 | 0.00 | 102.48 | -3.400 | 0.00 | 163.56 |
| -3.656 | 0.00 | 115.05 | -3.656 | 0.00 | 191.40 |
| -3.913 | 0.00 | 128.81 | -3.913 | 0.00 | 222.62 |
| -4.169 | 0.00 | 143.74 | -4.169 | 0.00 | 257.52 |
| -4.425 | 0.00 | 159.86 | -4.425 | 0.00 | 296.39 |
| -4.681 | 0.00 | 177.17 | -4.681 | 0.00 | 339.55 |
| -4.938 | 0.00 | 195.65 | -4.938 | 0.00 | 387.29 |
| -5.194 | 0.00 | 215.32 | -5.194 | 0.00 | 439.92 |
| -5.450 | 0.00 | 236.17 | -5.450 | 0.00 | 497.74 |
| -5.706 | 0.00 | 258.20 | -5.706 | 0.00 | 561.06 |
| -5.962 | 0.00 | 281.42 | -5.962 | 0.00 | 630.17 |
| -6.219 | 0.00 | 305.82 | -6.219 | 0.00 | 705.39 |
| -6.475 | 0.00 | 331.40 | -6.475 | 0.00 | 787.01 |
| -6.731 | 0.00 | 358.16 | -6.731 | 0.00 | 875.33 |
| -6.988 | 0.00 | 386.11 | -6.988 | 0.00 | 970.67 |
| -7.244 | 0.00 | 415.24 | -7.244 | 0.00 | 1073.31 |
| -7.500 | 0.00 | 445.55 | -7.500 | 0.00 | 1183.58 |
| -7.875 | 0.00 | 492.07 | -7.875 | 0.00 | 1359.30 |
| -8.250 | 0.00 | 541.16 | -8.250 | 0.00 | 1552.95 |
| -8.625 | 0.00 | 592.84 | -8.625 | 0.00 | 1765.49 |
| -9.000 | 0.00 | 647.09 | -9.000 | 0.00 | 1997.90 |
| | -938.43 | 0.00 | | 0.00 | 1997.90 |
| -9.300 | -893.17 | 0.00 | -9.300 | 0.00 | 1723.12 |
| -9.600 | -846.26 | 0.00 | -9.600 | 0.00 | 1462.16 |
| -10.100 | -764.41 | 0.00 | -10.100 | 0.00 | 1059.31 |
| -10.600 | -677.97 | 0.00 | -10.600 | 0.00 | 698.52 |
| -11.100 | -586.95 | 0.00 | -11.100 | 0.00 | 382.10 |
| -11.600 | -491.34 | 0.00 | -11.600 | 0.00 | 112.34 |
| -12.100 | -391.14 | 0.00 | -12.100 | -108.47 | 0.00 |
| -12.435 | -332.97 | 0.00 | -12.435 | -229.81 | 0.00 |
| -12.770 | -272.85 | 0.00 | -12.770 | -331.34 | 0.00 |
| | -564.30 | 0.00 | | -331.34 | 0.00 |
| -13.053 | -511.98 | 0.00 | -13.053 | -483.74 | 0.00 |
| -13.336 | -458.27 | 0.00 | -13.336 | -621.12 | 0.00 |
| -13.619 | -403.17 | 0.00 | -13.619 | -743.10 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -13.903 | -346.69 | 0.00 | -13.903 | -849.28 | 0.00 |
| -14.186 | -288.81 | 0.00 | -14.186 | -939.28 | 0.00 |
| -14.469 | -229.56 | 0.00 | -14.469 | -1012.69 | 0.00 |
| -14.752 | -168.91 | 0.00 | -14.752 | -1069.13 | 0.00 |
| -15.035 | -106.87 | 0.00 | -15.035 | -1108.21 | 0.00 |
| -15.318 | -43.45 | 0.00 | -15.318 | -1129.52 | 0.00 |
| -15.601 | 0.00 | 21.36 | -15.601 | -1132.68 | 0.00 |
| -15.884 | 0.00 | 87.55 | -15.884 | -1117.30 | 0.00 |
| -16.167 | 0.00 | 155.13 | -16.167 | -1082.98 | 0.00 |
| -16.451 | 0.00 | 224.10 | -16.451 | -1029.32 | 0.00 |
| -16.734 | 0.00 | 294.46 | -16.734 | -955.95 | 0.00 |
| -17.017 | 0.00 | 366.21 | -17.017 | -862.45 | 0.00 |
| -17.300 | 0.00 | 439.34 | -17.300 | -748.45 | 0.00 |
| -17.800 | 0.00 | 571.88 | -17.800 | -495.83 | 0.00 |
| -18.300 | 0.00 | 708.74 | -18.300 | -175.85 | 0.00 |
| -18.800 | 0.00 | 849.93 | -18.800 | 0.00 | 213.63 |
| -19.000 | 0.00 | 907.62 | -19.000 | 0.00 | 389.38 |
| -19.288 | 0.00 | 1004.64 | -19.288 | 0.00 | 664.23 |
| -19.575 | 0.00 | 1103.17 | -19.575 | 0.00 | 967.19 |
| -19.862 | 0.00 | 1203.21 | -19.862 | 0.00 | 1298.69 |
| -20.150 | 0.00 | 1304.77 | -20.150 | 0.00 | 1659.18 |
| | -1219.63 | 0.00 | | 0.00 | 1659.18 |
| -20.575 | -1066.71 | 0.00 | -20.575 | 0.00 | 1173.21 |
| -21.000 | -938.11 | 0.00 | -21.000 | 0.00 | 749.03 |
| -21.275 | -881.99 | 0.00 | -21.275 | 0.00 | 498.78 |
| -21.550 | -826.80 | 0.00 | -21.550 | 0.00 | 263.85 |

| | | | | | |
|---|---|---|---|---|---|
| -21.825 | -772.84 | 0.00 | -21.825 | 0.00 | 43.93 |
| -22.100 | -720.15 | 0.00 | -22.100 | -161.33 | 0.00 |
| -22.375 | -668.78 | 0.00 | -22.375 | -352.27 | 0.00 |
| -22.650 | -619.16 | 0.00 | -22.650 | -529.32 | 0.00 |
| -22.925 | -571.36 | 0.00 | -22.925 | -692.98 | 0.00 |
| -23.200 | -525.47 | 0.00 | -23.200 | -843.74 | 0.00 |
| -23.700 | -444.25 | 0.00 | -23.700 | -1086.15 | 0.00 |
| -23.969 | -400.76 | 0.00 | -23.969 | -1199.70 | 0.00 |
| -24.238 | -357.37 | 0.00 | -24.238 | -1301.57 | 0.00 |
| -24.506 | -314.13 | 0.00 | -24.506 | -1391.80 | 0.00 |
| -24.775 | -271.11 | 0.00 | -24.775 | -1470.43 | 0.00 |
| -25.044 | -228.35 | 0.00 | -25.044 | -1537.54 | 0.00 |
| -25.312 | -185.91 | 0.00 | -25.312 | -1593.20 | 0.00 |
| -25.581 | -143.83 | 0.00 | -25.581 | -1637.50 | 0.00 |
| -25.850 | -102.15 | 0.00 | -25.850 | -1670.55 | 0.00 |
| -26.119 | -60.91 | 0.00 | -26.119 | -1692.45 | 0.00 |
| -26.388 | -20.13 | 0.00 | -26.388 | -1703.33 | 0.00 |
| -26.656 | 0.00 | 20.15 | -26.656 | -1703.31 | 0.00 |
| -26.925 | 0.00 | 59.92 | -26.925 | -1692.54 | 0.00 |
| -27.194 | 0.00 | 99.16 | -27.194 | -1671.15 | 0.00 |
| -27.462 | 0.00 | 137.84 | -27.462 | -1639.29 | 0.00 |
| -27.731 | 0.00 | 175.95 | -27.731 | -1597.11 | 0.00 |
| -28.000 | 0.00 | 213.48 | -28.000 | -1544.77 | 0.00 |
| -28.500 | 0.00 | 228.31 | -28.500 | -1434.17 | 0.00 |
| -29.000 | 0.00 | 239.35 | -29.000 | -1317.09 | 0.00 |
| -29.500 | 0.00 | 246.54 | -29.500 | -1195.46 | 0.00 |
| -30.000 | 0.00 | 249.83 | -30.000 | -1071.20 | 0.00 |
| -30.500 | 0.00 | 249.19 | -30.500 | -946.28 | 0.00 |
| -31.000 | 0.00 | 244.59 | -31.000 | -822.67 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -31.500 | 0.00 | 236.00 | -31.500 | -702.36 | 0.00 |
| -32.000 | 0.00 | 223.41 | -32.000 | -587.34 | 0.00 |
| -32.500 | 0.00 | 206.81 | -32.500 | -479.61 | 0.00 |
| -33.000 | 0.00 | 186.18 | -33.000 | -381.20 | 0.00 |
| -33.500 | 0.00 | 161.52 | -33.500 | -294.10 | 0.00 |
| -34.000 | 0.00 | 132.81 | -34.000 | -220.35 | 0.00 |
| -34.500 | 0.00 | 100.05 | -34.500 | -161.97 | 0.00 |
| -35.000 | 0.00 | 70.19 | -35.000 | -119.82 | 0.00 |
| -35.500 | 0.00 | 59.97 | -35.500 | -88.50 | 0.00 |
| -36.000 | 0.00 | 79.28 | -36.000 | -54.92 | 0.00 |
| -36.500 | 0.00 | 85.60 | -36.500 | -15.55 | 0.00 |
| -37.000 | 0.00 | 136.35 | -37.000 | 0.00 | 38.08 |
| -37.500 | -91.21 | 0.00 | -37.500 | 0.00 | 36.99 |
| -38.000 | 0.00 | 0.00 | -38.000 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS ENVOLVENTES DE FASE  1 A FASE  7 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.338 | 0.00 | 1.45 | -0.338 | 0.00 | 0.22 |
| -0.675 | 0.00 | 3.75 | -0.675 | 0.00 | 1.07 |
| -1.013 | 0.00 | 6.91 | -1.013 | 0.00 | 2.85 |
| -1.350 | 0.00 | 10.92 | -1.350 | 0.00 | 5.83 |
| -1.500 | 0.00 | 11.37 | -1.500 | 0.00 | 7.50 |
| | -47.98 | 102.23 | | 0.00 | 7.50 |
| -1.800 | -46.85 | 103.99 | -1.800 | -6.73 | 35.02 |
| -2.100 | -45.40 | 107.08 | -2.100 | -20.57 | 66.65 |
| -2.425 | -43.47 | 111.89 | -2.425 | -35.03 | 102.19 |
| -2.750 | -41.16 | 118.21 | -2.750 | -48.79 | 139.54 |
| -3.075 | -38.46 | 126.01 | -3.075 | -61.74 | 179.18 |
| -3.400 | -35.36 | 135.25 | -3.400 | -73.74 | 221.60 |
| -3.656 | -35.36 | 142.61 | -3.656 | -82.81 | 257.18 |
| -3.913 | -35.36 | 150.87 | -3.913 | -91.87 | 294.76 |
| -4.169 | -35.26 | 160.03 | -4.169 | -100.92 | 334.58 |
| -4.425 | -34.90 | 170.10 | -4.425 | -109.92 | 376.86 |
| -4.681 | -34.21 | 181.10 | -4.681 | -118.78 | 421.84 |
| -4.938 | -33.18 | 195.65 | -4.938 | -127.42 | 469.74 |
| -5.194 | -31.81 | 215.32 | -5.194 | -135.75 | 520.78 |
| -5.450 | -30.11 | 236.17 | -5.450 | -143.69 | 575.12 |
| -5.706 | -28.08 | 258.20 | -5.706 | -151.16 | 632.93 |
| -5.962 | -25.71 | 281.42 | -5.962 | -158.06 | 694.32 |
| -6.219 | -23.01 | 305.82 | -6.219 | -164.30 | 759.39 |
| -6.475 | -19.97 | 331.40 | -6.475 | -169.82 | 828.19 |
| -6.731 | -16.60 | 358.16 | -6.731 | -174.51 | 900.74 |
| -6.988 | -12.89 | 386.11 | -6.988 | -178.30 | 977.02 |
| -7.244 | -8.85 | 415.24 | -7.244 | -181.09 | 1073.31 |
| -7.500 | -7.01 | 445.55 | -7.500 | -182.81 | 1183.58 |
| -7.875 | -6.81 | 492.07 | -7.875 | -183.13 | 1359.30 |
| -8.250 | -6.42 | 541.16 | -8.250 | -180.32 | 1552.95 |
| -8.625 | -5.84 | 592.84 | -8.625 | -173.73 | 1765.49 |
| -9.000 | -5.08 | 647.09 | -9.000 | -162.71 | 1997.90 |
| | -938.43 | 35.91 | | -162.71 | 1997.90 |
| -9.300 | -893.17 | 47.50 | -9.300 | -150.23 | 1723.12 |
| -9.600 | -846.26 | 60.47 | -9.600 | -134.07 | 1462.16 |
| -10.100 | -764.41 | 58.50 | -10.100 | -104.43 | 1059.31 |
| -10.600 | -677.97 | 58.38 | -10.600 | -75.26 | 760.79 |
| -11.100 | -586.95 | 59.67 | -11.100 | -45.81 | 498.28 |
| -11.600 | -505.05 | 62.51 | -11.600 | -15.33 | 251.19 |
| -12.100 | -469.50 | 66.99 | -12.100 | -186.06 | 64.49 |
| -12.435 | -447.17 | 57.06 | -12.435 | -321.01 | 37.74 |
| -12.770 | -423.30 | 47.65 | -12.770 | -448.33 | 55.26 |
| | -564.30 | 47.65 | | -448.33 | 55.26 |
| -13.053 | -511.98 | 40.34 | -13.053 | -549.67 | 67.70 |
| -13.336 | -458.27 | 33.68 | -13.336 | -644.96 | 78.16 |

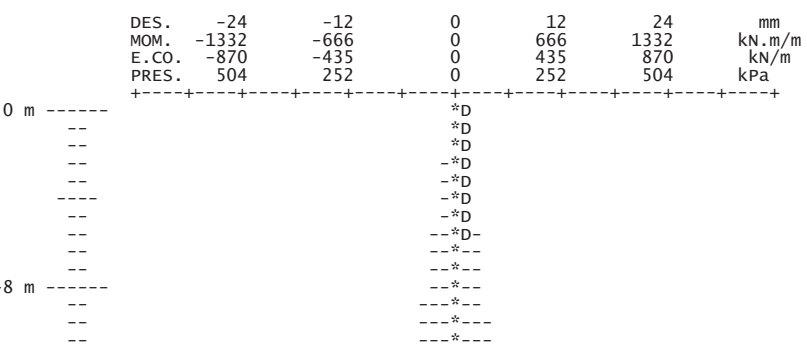
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|---|---|---|---|---|---|---|
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| -14.186 | -304.28 | 17.12 | | -14.186 | -939.28 | 99.40 |
| -14.469 | -276.71 | 12.56 | | -14.469 | -1012.69 | 103.60 |
| -14.752 | -247.80 | 8.39 | | -14.752 | -1069.13 | 106.55 |
| -15.035 | -217.50 | 33.81 | | -15.035 | -1108.21 | 108.38 |
| -15.318 | -185.77 | 63.96 | | -15.318 | -1155.54 | 109.14 |
| -15.601 | -152.56 | 93.94 | | -15.601 | -1203.47 | 108.91 |
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| -16.167 | -82.92 | 155.90 | | -16.167 | -1270.05 | 105.64 |
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| -16.734 | -17.10 | 294.46 | | -16.734 | -1294.59 | 98.68 |
| -17.017 | -19.03 | 366.21 | | -17.017 | -1289.93 | 93.79 |
| -17.300 | -22.66 | 439.34 | | -17.300 | -1273.34 | 87.89 |
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| -17.800 | -576.09 | 571.88 | | -17.800 | -1213.34 | 74.83 |
| -18.300 | -508.34 | 708.74 | | -18.300 | -1111.69 | 58.01 |
| -18.800 | -437.57 | 849.93 | | -18.800 | -965.44 | 213.63 |
| -19.000 | -408.42 | 907.62 | | -19.000 | -893.77 | 389.38 |
| -19.288 | -362.15 | 1004.64 | | -19.288 | -934.84 | 664.23 |
| -19.575 | -314.86 | 1103.17 | | -19.575 | -1032.18 | 967.19 |
| -19.862 | -266.57 | 1203.21 | | -19.862 | -1115.79 | 1298.69 |
| -20.150 | -217.26 | 1304.77 | | -20.150 | -1185.36 | 1659.18 |
| | -1219.63 | 259.08 | | | -1185.36 | 1659.18 |
| -20.575 | -1066.71 | 261.52 | | -20.575 | -1261.89 | 1173.21 |
| -21.000 | -938.11 | 258.88 | | -21.000 | -1306.19 | 749.03 |
| -21.275 | -881.99 | 254.47 | | -21.275 | -1318.55 | 498.78 |
| -21.550 | -826.80 | 247.93 | | -21.550 | -1319.88 | 263.85 |
| -21.825 | -772.84 | 239.26 | | -21.825 | -1310.87 | 43.93 |
| -22.100 | -720.15 | 228.47 | | -22.100 | -1292.38 | 0.00 |
| -22.375 | -668.78 | 215.55 | | -22.375 | -1265.18 | 0.00 |
| -22.650 | -619.16 | 200.51 | | -22.650 | -1230.26 | 4.40 |
| -22.925 | -571.36 | 183.34 | | -22.925 | -1188.87 | 57.23 |
| -23.200 | -525.47 | 177.83 | | -23.200 | -1142.17 | 105.04 |
| -23.700 | -444.25 | 200.51 | | -23.700 | -1086.15 | 177.60 |
| -23.969 | -400.76 | 211.07 | | -23.969 | -1199.70 | 208.64 |
| -24.238 | -357.37 | 221.70 | | -24.238 | -1301.57 | 234.47 |
| -24.506 | -314.13 | 232.18 | | -24.506 | -1391.80 | 255.57 |
| -24.775 | -271.11 | 242.29 | | -24.775 | -1470.43 | 272.42 |
| -25.044 | -228.35 | 251.85 | | -25.044 | -1537.54 | 285.49 |
| -25.312 | -185.91 | 260.68 | | -25.312 | -1593.20 | 295.22 |
| -25.581 | -143.83 | 268.62 | | -25.581 | -1637.50 | 302.04 |
| -25.850 | -102.15 | 275.53 | | -25.850 | -1670.55 | 306.37 |
| -26.119 | -60.91 | 281.28 | | -26.119 | -1692.45 | 308.62 |
| -26.388 | -20.13 | 285.76 | | -26.388 | -1703.33 | 309.19 |
| -26.656 | -4.81 | 288.89 | | -26.656 | -1703.31 | 308.43 |
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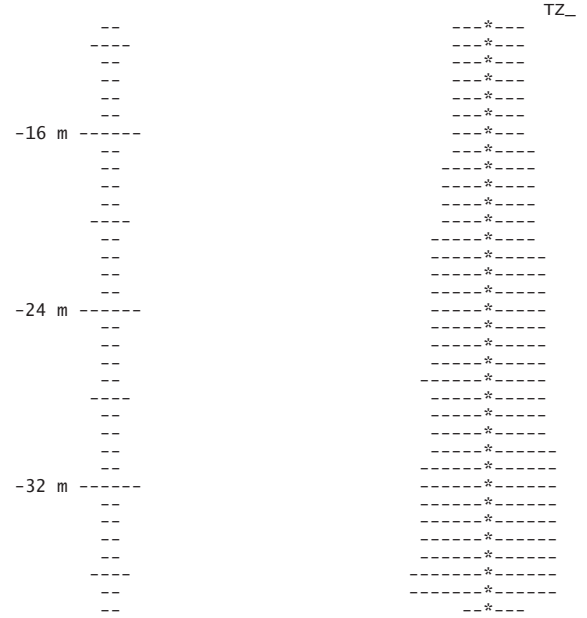


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|---|---|---|---|---|---|---|
| -31.000 | -93.94 | 244.59 | | -31.000 | -822.67 | 447.35 |
| -31.500 | -96.23 | 236.00 | | -31.500 | -702.36 | 429.80 |
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| -33.000 | -141.24 | 186.18 | | -33.000 | -381.20 | 314.98 |
| -33.500 | -139.09 | 161.52 | | -33.500 | -294.10 | 266.57 |
| -34.000 | -128.15 | 132.81 | | -34.000 | -220.35 | 217.55 |
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| -36.000 | -52.66 | 79.28 | | -36.000 | -167.67 | 55.66 |
| -36.500 | -32.23 | 105.91 | | -36.500 | -123.72 | 34.00 |
| -37.000 | 0.00 | 154.89 | | -37.000 | -59.18 | 38.08 |
| -37.500 | -91.21 | 50.05 | | -37.500 | -10.23 | 36.99 |
| -38.000 | 0.00 | 0.00 | | -38.000 | 0.00 | 0.00 |
| m | kN/m | kN/m | | m | kN.m/m | kN.m/m |



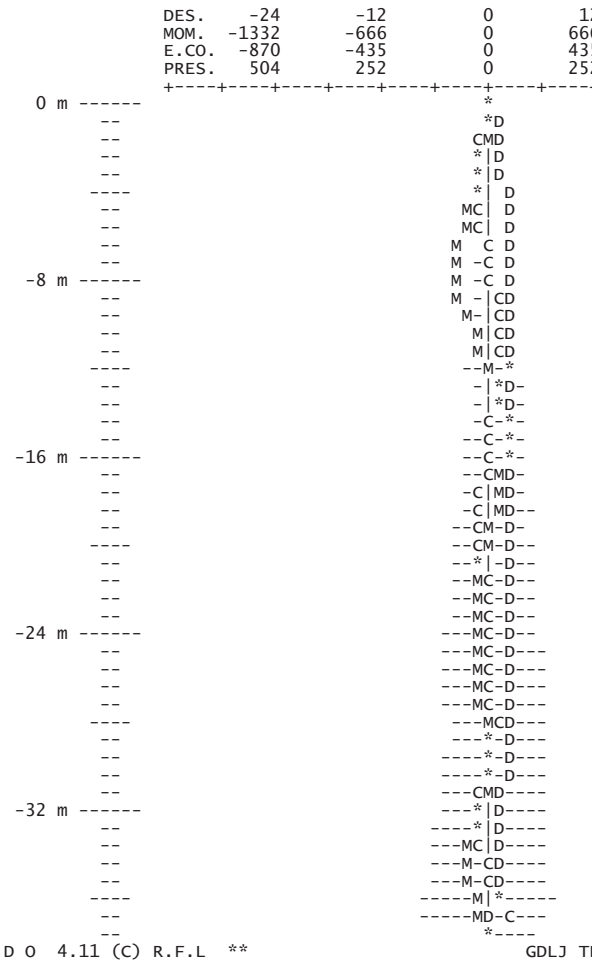
* CURVAS DE LA FASE  1 *





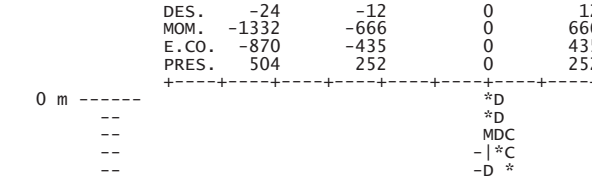


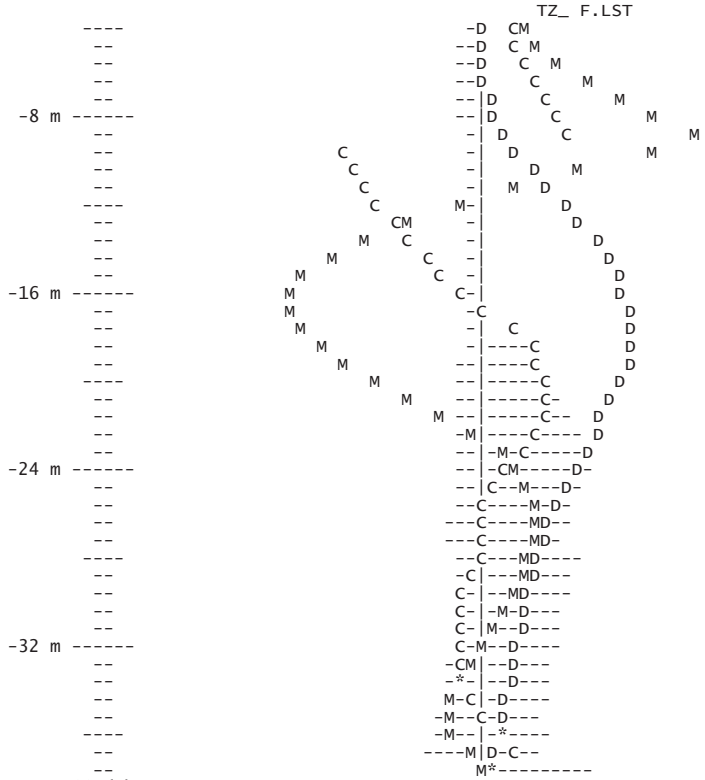
* CURVAS DE LA FASE  2 *





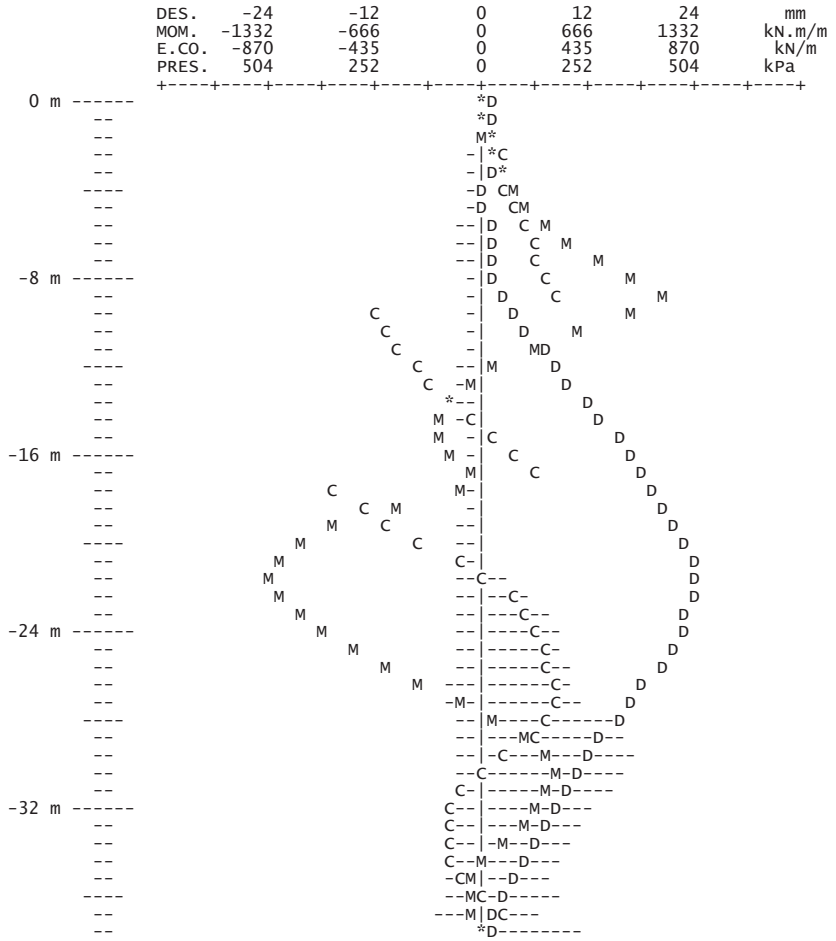

* CURVAS DE LA FASE  3 *







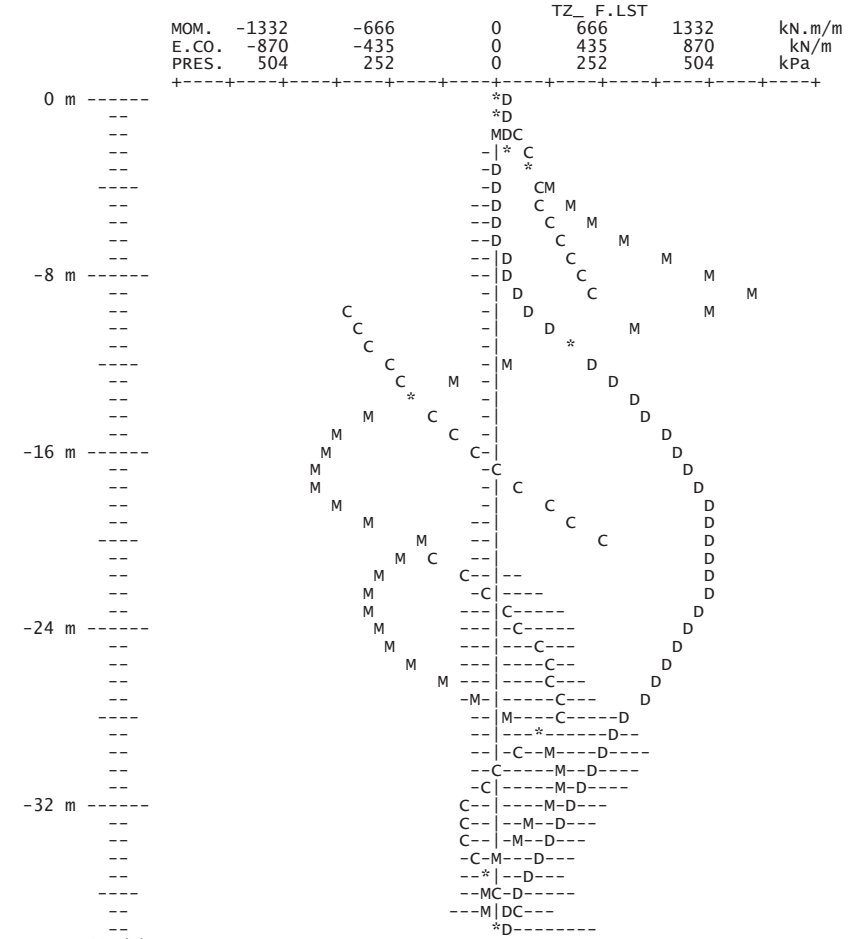
* CURVAS DE LA FASE  4 *





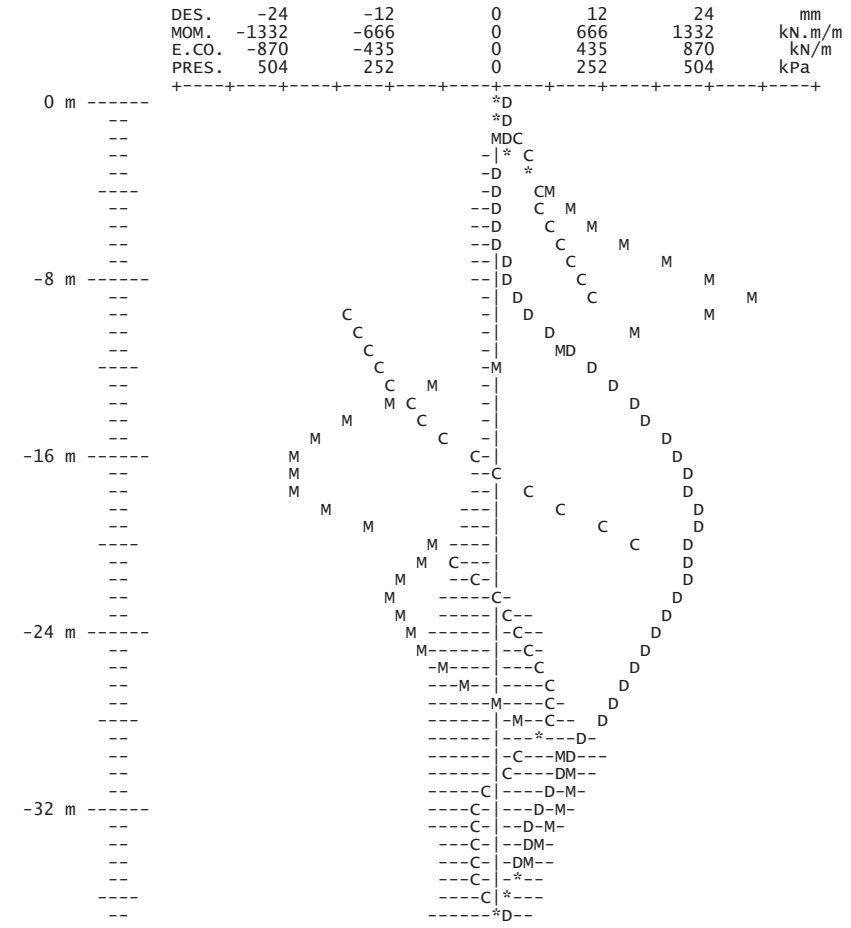

* CURVAS DE LA FASE  5 *

DES. -24 -12 0 12 24 mm

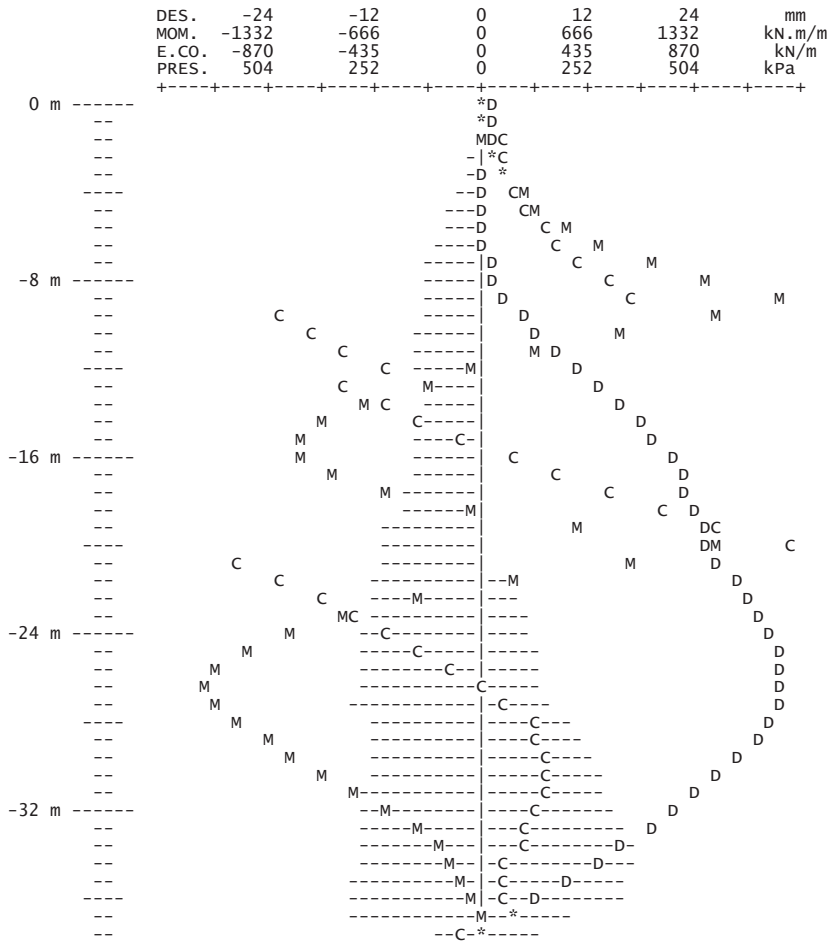





* CURVAS DE LA FASE 6 *



* CURVAS DE LA FASE  7 *



```
***** NOMBRE DE FICHERO DE DATOS : TZ_ G.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_G                                        *60L  U:NN*
      : 0
 1 ...  0
      # PT=912
      # PR=1642
      *PANTALLA DE 1.00 m
      : -37.30 2190000
 2 ...  -37.3 2190000
      : 0.00
 3 ...  0
      * R
      : -1.20 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -1.2 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -5.40 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 5 ...  -5.4 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -14.60 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 6 ...  -14.6 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -20.00 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 7 ...  -20 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG1c
      : -28.00 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 8 ...  -28 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1d
      : -34.00 19.50 9.50 0.235 0.412 3.852 25.00 36 0.333 0.000 29000
 9 ...  -34 19.5 9.5 0.235 0.412 3.852 25 36 0.333 0 29000
      * UG2
      : -35.30 20.00 10.00 0.246 0.426 3.690 30.00 35 0.333 0.000 43800
10 ...  -35.3 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -46.50 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
11 ...  -46.5 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -8.5 0.50
12 ...  -8.5 0.5
      *Fase 1
      *Excavacion hasta cota inferior nivel cubierta
      : SUC(1) 10
13 ... SUC(1)  10
      : EXC(2) -2.90
14 ... EXC(2)  -2.9
      : CAL(2)
15 ... CAL(2)
      *Fase 2
      *Ejecucion del nivel cubierta
      *Excavacion hasta nivel rampa de autobuses.
      : STR(0) -1.15 1.00 0.00 0.00 855500
16 ... STR(0)  -1.15 1 0 0 855500
      : EXC(2) -9.65
17 ... EXC(2)  -9.65
      : WAT(2) -10.15
18 ... WAT(2)  -10.15
      : CAL(2)
19 ... CAL(2)
      *Fase 3
      *Ejecucion del 1er nivel de anclajes
      *Excavacion hasta 2º nivel de anclajes
      : ANC(1) -8.95 2.75 10 -PT 6391
20 ... ANC(1)  -8.95 2.75 10 -912 6391
      : EXC(2) -13.55
21 ... EXC(2)  -13.55
      : WAT(2) -14.15
22 ... WAT(2)  -14.15
      : CAL(2)
23 ... CAL(2)
      *Fase 4
      *Ejecucion del segundo nivel de anclajes
      *Excavacion hasta 3º nivel de anclajes
      : ANC(1) -13.05 2.75 10 -PT 6391
24 ... ANC(1)  -13.05 2.75 10 -912 6391
      : EXC(2) -18.30
25 ... EXC(2)  -18.3
      : WAT(2) -18.80
26 ... WAT(2)  -18.8
      : CAL(2)
27 ... CAL(2)
      *Fase 5
      *Ejecucion del 3º nivel de anclajes
      *Excavacion hasta 4º nivel de anclajes
      : ANC(1) -17.80 2.75 25 -PR 5630
28 ... ANC(1)  -17.8 2.75 25 -1642 5630
      : EXC(2) -20.65
29 ... EXC(2)  -20.65
      : WAT(2) -21.15
30 ... WAT(2)  -21.15
      : CAL(2)
31 ... CAL(2)
      *Fase 6
      *Ejecucion del 4º nivel de anclajes
      *Excavacion hasta el nivel de losa de fondo
      : ANC(1) -20.15 2.75 25 -PR 5630
32 ... ANC(1)  -20.15 2.75 25 -1642 5630
      : EXC(2) -22.52 -24.72 2.47 4.67
33 ... EXC(2)  -22.52 -24.72 2.47 4.67
      : WAT(2) -25.22
34 ... WAT(2)  -25.22
      : CAL(2)
35 ... CAL(2)
      *Fase 7
      *Ejecucion de la losa de fondo y retirada de anclajes provisionales
      : STR(0) -21.42 1.00 0.00 0.00 1340000
36 ... STR(0)  -21.42 1 0 0 1340000
      : ANC(0,2)
37 ... ANC(0,2)
      : CAL(2)
38 ... CAL(2)
      *Fase 8
```

```
        *Ejecucion nivel de autobuses y retirada de resto de anclajes
        : STR(0) -8.95 1.00 0.00 0.00 3466667
  39 ... STR(0)  -8.95 1 0 0 3466667
        : ANC(0,3)
  40 ... ANC(0,3)
        : ANC(0,4)
  41 ... ANC(0,4)
        : ANC(0,5)
  42 ... ANC(0,5)
        : CAL(2,1)
  43 ... CAL(2,1)
        *Fase 9
        *Restitucion del nf y paso de la tuneladora
        : STR(0,6)
  44 ... STR(0,6)
        : STR(0) -21.42 1.00 0.00 -1246-398 850000
  45 ... STR(0)  -21.42 1 0 -1644 850000
        : WAT(2) -22.52 135.2
  46 ... WAT(2)  -22.52 135.2
        : CAL(2,1)
  47 ... CAL(2,1)
        *Fase 10
        *Sismo
        *SISMO_ R
        : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
  48 ... PLA(1)  0.56 2.367 5 29 0 0
        *SISMO_ UG1b
        : PLA(2) 0.522 2.594 15.00 31 0.00 0.00
  49 ... PLA(2)  0.522 2.594 15 31 0 0
        *SISMO_ UG1c
        : PLA(3) 0.948 1.991 20.00 33 0.00 0.00
  50 ... PLA(3)  0.948 1.991 20 33 0 0
        *SISMO_ UG1d
        : PLA(4) 0.789 2.509 25.00 36 0.00 0.00
  51 ... PLA(4)  0.789 2.509 25 36 0 0
        *SISMO_ UG1c
        : PLA(5) 0.948 1.991 20.00 33 0.00 0.00
  52 ... PLA(5)  0.948 1.991 20 33 0 0
        *SISMO_ UG1d
        : PLA(6) 0.789 2.509 25.00 36 0.00 0.00
  53 ... PLA(6)  0.789 2.509 25 36 0 0
        *SISMO_ UG2
        : PLA(7) 0.795 2.402 30.00 35 0.00 0.00
  54 ... PLA(7)  0.795 2.402 30 35 0 0
        *SISMO_ UG3a
        : PLA(8) 0.302 10.398 246.00 58 0.00 0.00
  55 ... PLA(8)  0.302 10.398 246 58 0 0
        : CAL(2)
  56 ... CAL(2)
        : FIN
  57 ... FIN
        : GRF
  58 ... GRF
        : STA
  59 ... STA
        : EVP
  60 ... EVP
        : ASC
  61 ... ASC
        *XLS
        : STOP
  62 ... STOP
```



*PANTALLA DE 1.00 m

---

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -37.300 m : | 2190000. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -1.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1b

CAPA N° 2 DE -1.200 m A -5.400 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 |

| | | | |
|---|---|---|---|
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1c



CAPA N° 3 DE -5.400 m A -14.600 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1d

CAPA N° 4 DE -14.600 m A -20.000 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.235 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.852 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1c

CAPA N° 5 DE -20.000 m A -28.000 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.268 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.392 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1d



CAPA N° 6 DE -28.000 m A -34.000 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.235 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.852 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG2

CAPA N° 7 DE -34.000 m A -35.300 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.246 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.690 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG3a

CAPA N° 8 DE -35.300 m A -46.500 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.075 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 12.162 |
| COHESIÓN | C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 kPa/m |

MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* NF



** FASE No 1 **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -2.900 m



FASE 1

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -8.50 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -2.90 m NIVEL AGUA: -8.50 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.561 | -0.124 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.287 | 1.525 | -0.124 | 0.00 | 0.05 | | 2 | 0.34 | 0.34 | 4900 | 0 | | | |
| -0.575 | 1.490 | -0.124 | 0.07 | 0.56 | | 2 | 3.18 | 3.18 | 4900 | 0 | | | |
| -0.862 | 1.454 | -0.124 | 0.40 | 1.88 | | 2 | 6.02 | 5.15 | 4900 | 0 | | | |
| -1.150 | 1.419 | -0.123 | 1.23 | 4.02 | | 2 | 8.86 | 5.15 | 4900 | 0 | | | |
| -1.200 | 1.413 | -0.123 | 1.44 | 4.47 | | 2 | 9.35 | 5.15 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.625 | 1.360 | -0.123 | 3.34 | 4.47 | | -1 | | | | 0 | | | |
| -2.050 | 1.308 | -0.122 | 5.34 | 5.15 | | 2 | 3.20 | 3.20 | 15100 | 0 | | | |
| -2.475 | 1.256 | -0.121 | 7.96 | 7.49 | | 2 | 7.79 | 4.85 | 15100 | 0 | | | |
| -2.900 | 1.205 | -0.119 | 11.98 | 11.77 | | 2 | 12.38 | 4.85 | 15100 | 0 | | | |
| | | | | | | 2 | 12.38 | 4.85 | 15100 | 2 | 18.20 | 15100 | |
| -3.213 | 1.169 | -0.117 | 15.39 | 10.13 | | 2 | 15.74 | 4.85 | 15100 | 2 | 20.45 | 15100 | |
| -3.525 | 1.132 | -0.115 | 18.35 | 8.83 | | 2 | 19.09 | 4.85 | 15100 | 2 | 22.71 | 15100 | |
| -3.838 | 1.097 | -0.112 | 20.94 | 7.86 | | 2 | 22.43 | 4.85 | 15100 | 2 | 24.98 | 15100 | |
| -4.150 | 1.063 | -0.109 | 23.29 | 7.23 | | 2 | 25.75 | 4.85 | 15100 | 2 | 27.26 | 15100 | |
| -4.463 | 1.029 | -0.105 | 25.49 | 6.91 | | 2 | 29.06 | 4.85 | 15100 | 2 | 29.56 | 15100 | |
| -4.775 | 0.997 | -0.101 | 27.64 | 6.91 | | 2 | 32.35 | 4.85 | 15100 | 2 | 31.88 | 15100 | |
| -5.088 | 0.966 | -0.097 | 29.84 | 7.20 | | 2 | 35.62 | 4.85 | 15100 | 2 | 34.21 | 15100 | |
| -5.400 | 0.936 | -0.093 | 32.17 | 7.78 | | 2 | 38.87 | 4.85 | 15100 | 2 | 36.57 | 15100 | |
| | | | | | | 2 | 30.45 | 4.55 | 20600 | 2 | 40.33 | 20600 | |
| -5.788 | 0.901 | -0.087 | 34.48 | 4.23 | | 2 | 34.51 | 4.55 | 20600 | 2 | 42.96 | 20600 | |
| -6.175 | 0.869 | -0.081 | 35.52 | 1.21 | | 2 | 38.53 | 4.55 | 20600 | 2 | 45.64 | 20600 | |
| -6.562 | 0.839 | -0.074 | 35.49 | -1.30 | | 2 | 42.50 | 4.55 | 20600 | 2 | 48.37 | 20600 | |
| -6.950 | 0.811 | -0.068 | 34.57 | -3.36 | | 2 | 46.42 | 4.55 | 20600 | 2 | 51.15 | 20600 | |
| -7.337 | 0.786 | -0.062 | 32.94 | -4.99 | | 2 | 50.29 | 4.55 | 20600 | 2 | 53.98 | 20600 | |
| -7.725 | 0.763 | -0.057 | 30.76 | -6.24 | | 2 | 54.11 | 4.55 | 20600 | 2 | 56.86 | 20600 | |
| -8.113 | 0.742 | -0.051 | 28.15 | -7.14 | | 2 | 57.89 | 4.55 | 20600 | 2 | 59.78 | 20600 | |
| -8.500 | 0.723 | -0.047 | 25.27 | -7.72 | | 2 | 61.63 | 4.55 | 20600 | 2 | 62.74 | 20600 | |
| -8.950 | 0.703 | -0.042 | 21.71 | -8.03 | | 2 | 63.89 | 4.55 | 20600 | 2 | 64.17 | 20600 | |
| -9.300 | 0.689 | -0.039 | 18.89 | -8.03 | | 2 | 65.61 | 4.55 | 20600 | 2 | 65.32 | 20600 | |
| -9.650 | 0.676 | -0.036 | 16.11 | -7.83 | | 2 | 67.31 | 4.55 | 20600 | 2 | 66.48 | 20600 | |
| -10.150 | 0.659 | -0.032 | 12.33 | -7.24 | | 2 | 69.71 | 4.55 | 20600 | 2 | 68.18 | 20600 | |
| -10.512 | 0.648 | -0.031 | 9.81 | -6.61 | | 2 | 71.43 | 4.55 | 20600 | 2 | 69.43 | 20600 | |
| -10.875 | 0.637 | -0.029 | 7.56 | -5.80 | | 2 | 73.14 | 4.55 | 20600 | 2 | 70.69 | 20600 | |
| -11.238 | 0.627 | -0.028 | 5.63 | -4.84 | | 2 | 74.83 | 4.55 | 20600 | 2 | 71.96 | 20600 | |
| -11.600 | 0.617 | -0.027 | 4.07 | -3.72 | | 2 | 76.53 | 4.55 | 20600 | 2 | 73.24 | 20600 | |
| -11.963 | 0.607 | -0.027 | 2.95 | -2.46 | | 2 | 78.21 | 4.55 | 20600 | 2 | 74.52 | 20600 | |
| -12.325 | 0.597 | -0.026 | 2.31 | -1.05 | | 2 | 79.89 | 4.55 | 20600 | 2 | 75.81 | 20600 | |
| -12.688 | 0.588 | -0.026 | 2.21 | 0.51 | | 2 | 81.57 | 4.55 | 20600 | 2 | 77.10 | 20600 | |
| -13.050 | 0.578 | -0.026 | 2.69 | 2.20 | | 2 | 83.25 | 4.55 | 20600 | 2 | 78.39 | 20600 | |
| -13.550 | 0.566 | -0.025 | 4.42 | 4.76 | | 2 | 85.56 | 4.55 | 20600 | 2 | 80.18 | 20600 | |
| -13.850 | 0.558 | -0.024 | 6.10 | 6.42 | | 2 | 86.94 | 4.55 | 20600 | 2 | 81.25 | 20600 | |
| -14.150 | 0.551 | -0.023 | 8.28 | 8.17 | | 2 | 88.31 | 4.55 | 20600 | 2 | 82.34 | 20600 | |
| -14.600 | 0.541 | -0.021 | 12.58 | 10.95 | | 2 | 90.36 | 4.55 | 20600 | 2 | 83.97 | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2 | 76.22 | 4.12 | 29000 | 2 | 81.64 | 29000 | |
| -15.000 | 0.533 | -0.018 | 16.54 | 8.88 | | 2 | 78.01 | 4.12 | 29000 | 2 | 82.98 | 29000 | |
| -15.400 | 0.527 | -0.015 | 19.70 | 6.97 | | 2 | 79.77 | 4.12 | 29000 | 2 | 84.35 | 29000 | |
| -15.800 | 0.521 | -0.011 | 22.13 | 5.20 | | 2 | 81.49 | 4.12 | 29000 | 2 | 85.76 | 29000 | |
| -16.200 | 0.518 | -0.007 | 23.88 | 3.54 | | 2 | 83.16 | 4.12 | 29000 | 2 | 87.22 | 29000 | |
| -16.600 | 0.516 | -0.002 | 24.97 | 1.93 | | 2 | 84.78 | 4.12 | 29000 | 2 | 88.73 | 29000 | |
| -17.000 | 0.516 | 0.002 | 25.43 | 0.35 | | 2 | 86.35 | 4.12 | 29000 | 2 | 90.30 | 29000 | |
| -17.400 | 0.518 | 0.007 | 25.25 | -1.24 | | 2 | 87.86 | 4.12 | 29000 | 2 | 91.91 | 29000 | |
| -17.800 | 0.521 | 0.011 | 24.42 | -2.91 | | 2 | 89.32 | 4.12 | 29000 | 2 | 93.58 | 29000 | |
| -18.300 | 0.528 | 0.017 | 22.42 | -5.14 | | 2 | 91.08 | 4.12 | 29000 | 2 | 95.74 | 29000 | |
| -18.800 | 0.538 | 0.021 | 19.25 | -7.61 | | 2 | 92.76 | 4.12 | 29000 | 2 | 97.98 | 29000 | |
| -19.100 | 0.545 | 0.024 | 16.72 | -9.24 | | 2 | 93.73 | 4.12 | 29000 | 2 | 99.35 | 29000 | |
| -19.400 | 0.552 | 0.026 | 13.69 | -10.99 | | 2 | 94.69 | 4.12 | 29000 | 2 | 100.74 | 29000 | |
| -19.700 | 0.560 | 0.028 | 10.11 | -12.87 | | 2 | 95.63 | 4.12 | 29000 | 2 | 102.15 | 29000 | |
| -20.000 | 0.569 | 0.029 | 5.95 | -14.90 | | 2 | 96.56 | 4.12 | 29000 | 2 | 103.57 | 29000 | |
| | | | | | | 2 | 113.13 | 4.55 | 20600 | 2 | 107.88 | 20600 | |
| -20.150 | 0.573 | 0.029 | 3.77 | -14.13 | | 2 | 113.66 | 4.55 | 20600 | 2 | 108.59 | 20600 | |
| -20.650 | 0.588 | 0.029 | -2.68 | -11.74 | | 2 | 115.41 | 4.55 | 20600 | 2 | 110.93 | 20600 | |
| -21.150 | 0.602 | 0.028 | -8.02 | -9.66 | | 2 | 117.16 | 4.55 | 20600 | 2 | 113.28 | 20600 | |
| -21.420 | 0.610 | 0.027 | -10.49 | -8.65 | | 2 | 118.11 | 4.55 | 20600 | 2 | 114.54 | 20600 | |
| -21.695 | 0.617 | 0.025 | -12.74 | -7.71 | | 2 | 119.09 | 4.55 | 20600 | 2 | 115.81 | 20600 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -21.970 | 0.623 | 0.024 | -14.73 | -6.84 | | 2 | 120.08 | 4.55 | 20600 | 2 | 117.07 | | 20600 | | |
| -22.245 | 0.630 | 0.022 | -16.51 | -6.05 | | 2 | 121.07 | 4.55 | 20600 | 2 | 118.33 | | 20600 | | |
| -22.520 | 0.635 | 0.020 | -18.07 | -5.33 | | 2 | 122.08 | 4.55 | 20600 | 2 | 119.57 | | 20600 | | |
| -22.795 | 0.640 | 0.017 | -19.44 | -4.67 | | 2 | 123.11 | 4.55 | 20600 | 2 | 120.80 | | 20600 | | |
| -23.070 | 0.645 | 0.015 | -20.64 | -4.06 | | 2 | 124.14 | 4.55 | 20600 | 2 | 122.02 | | 20600 | | |
| -23.345 | 0.648 | 0.012 | -21.68 | -3.50 | | 2 | 125.19 | 4.55 | 20600 | 2 | 123.22 | | 20600 | | |
| -23.620 | 0.651 | 0.009 | -22.57 | -2.97 | | 2 | 126.26 | 4.55 | 20600 | 2 | 124.41 | | 20600 | | |
| -23.895 | 0.653 | 0.006 | -23.32 | -2.47 | | 2 | 127.34 | 4.55 | 20600 | 2 | 125.58 | | 20600 | | |
| -24.170 | 0.655 | 0.003 | -23.93 | -2.00 | | 2 | 128.44 | 4.55 | 20600 | 2 | 126.73 | | 20600 | | |
| -24.445 | 0.655 | 0.000 | -24.42 | -1.53 | | 2 | 129.55 | 4.55 | 20600 | 2 | 127.87 | | 20600 | | |
| -24.720 | 0.655 | -0.003 | -24.78 | -1.06 | | 2 | 130.69 | 4.55 | 20600 | 2 | 128.99 | | 20600 | | |
| -25.220 | 0.652 | -0.008 | -25.09 | -0.18 | | 2 | 132.79 | 4.55 | 20600 | 2 | 130.97 | | 20600 | | |
| -25.568 | 0.649 | -0.012 | -25.04 | 0.47 | | 2 | 134.29 | 4.55 | 20600 | 2 | 132.32 | | 20600 | | |
| -25.915 | 0.643 | -0.016 | -24.75 | 1.19 | | 2 | 135.82 | 4.55 | 20600 | 2 | 133.64 | | 20600 | | |
| -26.263 | 0.637 | -0.020 | -24.20 | 2.00 | | 2 | 137.37 | 4.55 | 20600 | 2 | 134.93 | | 20600 | | |
| -26.610 | 0.629 | -0.024 | -23.35 | 2.90 | | 2 | 138.95 | 4.55 | 20600 | 2 | 136.20 | | 20600 | | |
| -26.958 | 0.620 | -0.028 | -22.17 | 3.92 | | 2 | 140.56 | 4.55 | 20600 | 2 | 137.44 | | 20600 | | |
| -27.305 | 0.610 | -0.031 | -20.61 | 5.08 | | 2 | 142.20 | 4.55 | 20600 | 2 | 138.65 | | 20600 | | |
| -27.653 | 0.599 | -0.034 | -18.62 | 6.40 | | 2 | 143.85 | 4.55 | 20600 | 2 | 139.84 | | 20600 | | |
| -28.000 | 0.586 | -0.037 | -16.15 | 7.88 | | 2 | 145.53 | 4.55 | 20600 | 2 | 141.00 | | 20600 | | |
| | | | | | | 2 | 125.71 | 4.12 | 29000 | 2 | 133.75 | | 29000 | | |
| -28.375 | 0.572 | -0.040 | -13.74 | 5.02 | | 2 | 127.59 | 4.12 | 29000 | 2 | 134.80 | | 29000 | | |
| -28.750 | 0.557 | -0.042 | -12.34 | 2.49 | | 2 | 129.50 | 4.12 | 29000 | 2 | 135.82 | | 29000 | | |
| -29.125 | 0.541 | -0.044 | -11.83 | 0.29 | | 2 | 131.44 | 4.12 | 29000 | 2 | 136.83 | | 29000 | | |
| -29.500 | 0.524 | -0.046 | -12.07 | -1.54 | | 2 | 133.39 | 4.12 | 29000 | 2 | 137.81 | | 29000 | | |
| -29.875 | 0.506 | -0.048 | -12.94 | -3.01 | | 2 | 135.37 | 4.12 | 29000 | 2 | 138.76 | | 29000 | | |
| -30.250 | 0.488 | -0.050 | -14.28 | -4.08 | | 2 | 137.37 | 4.12 | 29000 | 2 | 139.70 | | 29000 | | |
| -30.625 | 0.469 | -0.053 | -15.95 | -4.74 | | 2 | 139.40 | 4.12 | 29000 | 2 | 140.60 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | |





FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. C. REP. | | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -31.000 | 0.448 | -0.056 | -17.78 | -4.97 | | 2 141.46 | 4.12 | 29000 | | 2 141.48 | | 29000 | | |
| -31.375 | 0.427 | -0.059 | -19.62 | -4.75 | | 2 143.55 | 4.12 | 29000 | | 2 142.33 | | 29000 | | |
| -31.750 | 0.404 | -0.062 | -21.28 | -4.04 | | 2 145.68 | 4.12 | 29000 | | 2 143.13 | | 29000 | | |
| -32.125 | 0.380 | -0.066 | -22.59 | -2.82 | | 2 147.85 | 4.12 | 29000 | | 2 143.90 | | 29000 | | |
| -32.500 | 0.354 | -0.070 | -23.33 | -1.06 | | 2 150.06 | 4.12 | 29000 | | 2 144.63 | | 29000 | | |
| -32.875 | 0.327 | -0.074 | -23.31 | 1.27 | | 2 152.31 | 4.12 | 29000 | | 2 145.31 | | 29000 | | |
| -33.250 | 0.299 | -0.078 | -22.31 | 4.20 | | 2 154.60 | 4.12 | 29000 | | 2 145.95 | | 29000 | | |
| -33.625 | 0.269 | -0.082 | -20.08 | 7.77 | | 2 156.94 | 4.12 | 29000 | | 2 146.55 | | 29000 | | |
| -34.000 | 0.237 | -0.085 | -16.39 | 12.01 | | 2 159.32 | 4.12 | 29000 | | 2 147.11 | | 29000 | | |
| | | | | | | 2 161.45 | 4.26 | 43800 | | 2 155.39 | | 43800 | | |
| -34.325 | 0.209 | -0.087 | -12.13 | 14.38 | | 2 164.06 | 4.26 | 43800 | | 2 155.55 | | 43800 | | |
| -34.650 | 0.181 | -0.088 | -6.96 | 17.55 | | 2 166.69 | 4.26 | 43800 | | 2 155.68 | | 43800 | | |
| -34.975 | 0.152 | -0.089 | -0.63 | 21.54 | | 2 169.34 | 4.26 | 43800 | | 2 155.80 | | 43800 | | |
| -35.300 | 0.123 | -0.089 | 7.13 | 26.36 | | 2 171.99 | 4.26 | 43800 | | 2 155.92 | | 43800 | | |
| | | | | | | 2 26.36 | 1.52 | 300000 | | 2 90.64 | | 300000 | | |
| -35.800 | 0.079 | -0.086 | 13.37 | 0.77 | | 2 40.46 | 1.52 | 300000 | | 2 78.52 | | 300000 | | |
| -36.300 | 0.037 | -0.083 | 10.05 | -11.92 | | 2 54.13 | 1.52 | 300000 | | 2 66.83 | | 300000 | | |
| -36.800 | -0.004 | -0.082 | 3.53 | -12.10 | | 2 67.46 | 1.52 | 300000 | | 2 55.47 | | 300000 | | |
| -37.300 | -0.045 | -0.081 | 0.00 | 0.00 | | 2 80.66 | 1.52 | 300000 | | 2 44.24 | | 300000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 1.56 mm
MOMENTO MÁXIMO = 35.52 kN.m/m

CODIFICACIÓN DE ESTADO : 0 = EXCAVACIÓN; 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : -1 = SEPARACIÓN; 2 = ELÁSTICO; 3 = PRESIÓN PASSIVA

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 153.87 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.071 = (3356.63 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.088 = (3356.63 kN/m)/(38177.31 kN/m) SIN INTERÉS





**  FASE No  2  **

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel rampa de autobuses.

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -1.150 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 855500.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -9.650 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -10.150 m





FASE 2

| PARED | SOIL 1 EXCAVACIÓN: 0.00 m | SOIL 2 EXCAVACIÓN: -9.65 m | PUNTALES/ |
|---|---|---|---|

| | | NIVEL AGUA: -8.50 m | NIVEL AGUA: -10.15 m | ANCLAS |
|---|---|---|---|---|
| | | S. DE CAQUOT: 10.00 kPa | S. DE CAQUOT: 0.00 kPa | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.086 | 0.334 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.287 | 1.182 | 0.334 | 0.03 | 0.29 | | 2 | 2.02 | 2.02 4900 | 0 | | | | |
| -0.575 | 1.279 | 0.334 | 0.23 | 1.19 | | 2 | 4.22 | 4.22 4900 | 0 | | | | |
| -0.862 | 1.375 | 0.334 | 0.77 | 2.71 | | 2 | 6.41 | 5.15 4900 | 0 | | | | |
| -1.150 | 1.471 | 0.334 | 1.85 | 4.87 | | 2 | 8.60 | 5.15 4900 | 0 | | | | |
| | | | | -39.66 | | 2 | 8.60 | 5.15 4900 | 0 | | | 1 | -44.53 |
| -1.200 | 1.488 | 0.334 | -0.13 | -39.22 | | 2 | 8.99 | 5.15 4900 | 0 | | | | |
| | | | | | | -1 | | | 0 | | | | |
| -1.625 | 1.629 | 0.333 | -16.79 | -39.22 | | -1 | | | 0 | | | | |
| -2.050 | 1.770 | 0.328 | -33.46 | -39.22 | | -1 | | | 0 | | | | |
| -2.475 | 1.908 | 0.320 | -50.13 | -39.22 | | -1 | | | 0 | | | | |
| -2.900 | 2.041 | 0.308 | -66.77 | -39.07 | | 1 | 0.69 | 0.69 15100 | 0 | | | | |
| -3.213 | 2.136 | 0.298 | -78.92 | -38.59 | | 1 | 2.38 | 2.38 15100 | 0 | | | | |
| -3.525 | 2.228 | 0.286 | -90.84 | -37.58 | | 1 | 4.06 | 2.91 15100 | 0 | | | | |
| -3.838 | 2.315 | 0.272 | -102.36 | -36.05 | | 1 | 5.74 | 2.91 15100 | 0 | | | | |
| -4.150 | 2.397 | 0.257 | -113.32 | -34.00 | | 1 | 7.42 | 2.91 15100 | 0 | | | | |
| -4.463 | 2.475 | 0.240 | -123.55 | -31.41 | | 1 | 9.10 | 2.91 15100 | 0 | | | | |
| -4.775 | 2.547 | 0.222 | -132.89 | -28.31 | | 1 | 10.79 | 2.91 15100 | 0 | | | | |
| -5.088 | 2.613 | 0.202 | -141.19 | -24.67 | | 1 | 12.47 | 2.91 15100 | 0 | | | | |
| -5.400 | 2.673 | 0.181 | -148.26 | -20.51 | | 1 | 14.15 | 2.91 15100 | 0 | | | | |
| | | | | | | 1 | 6.78 | 2.68 20600 | 0 | | | | |
| -5.788 | 2.739 | 0.154 | -155.65 | -17.50 | | 1 | 8.75 | 2.68 20600 | 0 | | | | |
| -6.175 | 2.793 | 0.126 | -161.73 | -13.73 | | 1 | 10.73 | 2.68 20600 | 0 | | | | |
| -6.562 | 2.836 | 0.097 | -166.19 | -9.19 | | 1 | 12.70 | 2.68 20600 | 0 | | | | |
| -6.950 | 2.868 | 0.068 | -168.75 | -3.89 | | 1 | 14.67 | 2.68 20600 | 0 | | | | |
| -7.337 | 2.889 | 0.038 | -169.11 | 2.18 | | 1 | 16.65 | 2.68 20600 | 0 | | | | |
| -7.725 | 2.898 | 0.008 | -166.96 | 9.02 | | 1 | 18.62 | 2.68 20600 | 0 | | | | |
| -8.113 | 2.895 | -0.021 | -162.02 | 16.61 | | 1 | 20.59 | 2.68 20600 | 0 | | | | |
| -8.500 | 2.881 | -0.049 | -153.99 | 24.98 | | 1 | 22.57 | 2.68 20600 | 0 | | | | |
| -8.950 | 2.852 | -0.080 | -140.28 | 36.37 | 4.41 | 1 | 23.65 | 2.68 20600 | 0 | | | | |
| -9.300 | 2.821 | -0.101 | -125.74 | 46.94 | 7.85 | 1 | 24.50 | 2.68 20600 | 0 | | | | |
| -9.650 | 2.782 | -0.120 | -107.24 | 59.01 | 11.28 | 1 | 25.34 | 2.68 20600 | 0 | | | | |
| | | | | | 11.28 | 1 | 25.34 | 2.68 20600 | 2 | 57.31 | 20600 | | |
| -10.150 | 2.717 | -0.141 | -80.16 | 49.64 | 16.19 | 2 | 27.33 | 3.46 20600 | 2 | 60.28 | 20600 | | |
| -10.512 | 2.663 | -0.153 | -63.22 | 43.96 | 16.19 | 2 | 29.91 | 4.55 20600 | 2 | 60.67 | 20600 | | |
| -10.875 | 2.606 | -0.162 | -48.19 | 39.11 | 16.19 | 2 | 32.57 | 4.55 20600 | 2 | 60.98 | 20600 | | |
| -11.238 | 2.546 | -0.169 | -34.76 | 35.12 | 16.19 | 2 | 35.29 | 4.55 20600 | 2 | 61.23 | 20600 | | |
| -11.600 | 2.484 | -0.173 | -22.62 | 32.05 | 16.19 | 2 | 38.05 | 4.55 20600 | 2 | 61.43 | 20600 | | |
| -11.963 | 2.421 | -0.176 | -11.41 | 29.91 | 16.19 | 2 | 40.84 | 4.55 20600 | 2 | 61.61 | 20600 | | |
| -12.325 | 2.357 | -0.177 | -0.81 | 28.73 | 16.19 | 2 | 43.65 | 4.55 20600 | 2 | 61.78 | 20600 | | |
| -12.688 | 2.292 | -0.177 | 9.53 | 28.51 | 16.19 | 2 | 46.45 | 4.55 20600 | 2 | 61.94 | 20600 | | |
| -13.050 | 2.229 | -0.174 | 19.97 | 29.24 | 16.19 | 2 | 49.25 | 4.55 20600 | 2 | 62.11 | 20600 | | |
| -13.550 | 2.143 | -0.168 | 35.15 | 31.78 | 16.19 | 2 | 53.06 | 4.55 20600 | 2 | 62.40 | 20600 | | |
| -13.850 | 2.094 | -0.162 | 45.02 | 34.14 | 16.19 | 2 | 55.31 | 4.55 20600 | 2 | 62.60 | 20600 | | |
| -14.150 | 2.046 | -0.155 | 55.69 | 37.10 | 16.19 | 2 | 57.52 | 4.55 20600 | 2 | 62.85 | 20600 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.600 | 1.979 | -0.142 | 73.58 | 42.61 | 16.19 | 2 | 60.75 | 4.55 20600 | 2 | 63.31 | 20600 | | |
| | | | | | 16.19 | 2 | 34.53 | 4.12 29000 | 2 | 77.80 | 29000 | | |
| -15.000 | 1.925 | -0.127 | 88.55 | 32.40 | 16.19 | 2 | 37.66 | 4.12 29000 | 2 | 77.80 | 29000 | | |
| -15.400 | 1.877 | -0.110 | 99.66 | 23.37 | 16.19 | 2 | 40.61 | 4.12 29000 | 2 | 77.99 | 29000 | | |
| -15.800 | 1.837 | -0.091 | 107.38 | 15.36 | 16.19 | 2 | 43.34 | 4.12 29000 | 2 | 78.39 | 29000 | | |
| -16.200 | 1.805 | -0.071 | 112.06 | 8.19 | 16.19 | 2 | 45.85 | 4.12 29000 | 2 | 79.01 | 29000 | | |
| -16.600 | 1.780 | -0.050 | 114.02 | 1.68 | 16.19 | 2 | 48.12 | 4.12 29000 | 2 | 79.87 | 29000 | | |
| -17.000 | 1.764 | -0.030 | 113.47 | -4.36 | 16.19 | 2 | 50.15 | 4.12 29000 | 2 | 80.97 | 29000 | | |
| -17.400 | 1.757 | -0.009 | 110.57 | -10.12 | 16.19 | 2 | 51.93 | 4.12 29000 | 2 | 82.32 | 29000 | | |
| -17.800 | 1.757 | 0.011 | 105.39 | -15.81 | 16.19 | 2 | 53.49 | 4.12 29000 | 2 | 83.89 | 29000 | | |
| -18.300 | 1.768 | 0.034 | 95.68 | -23.08 | 16.19 | 2 | 55.12 | 4.12 29000 | 2 | 86.17 | 29000 | | |
| -18.800 | 1.790 | 0.054 | 82.23 | -30.83 | 16.19 | 2 | 56.44 | 4.12 29000 | 2 | 88.77 | 29000 | | |
| -19.100 | 1.808 | 0.065 | 72.24 | -35.83 | 16.19 | 2 | 57.09 | 4.12 29000 | 2 | 90.46 | 29000 | | |
| -19.400 | 1.829 | 0.074 | 60.70 | -41.17 | 16.19 | 2 | 57.66 | 4.12 29000 | 2 | 92.24 | 29000 | | |
| -19.700 | 1.852 | 0.081 | 47.50 | -46.89 | 16.19 | 2 | 58.16 | 4.12 29000 | 2 | 94.09 | 29000 | | |
| -20.000 | 1.878 | 0.087 | 32.52 | -53.03 | 16.19 | 2 | 58.60 | 4.12 29000 | 2 | 96.00 | 29000 | | |
| | | | | | 16.19 | 2 | 86.17 | 4.55 20600 | 2 | 84.56 | 20600 | | |
| -20.150 | 1.891 | 0.089 | 24.77 | -50.40 | 16.19 | 2 | 86.52 | 4.55 20600 | 2 | 85.45 | 20600 | | |
| -20.650 | 1.936 | 0.092 | 1.64 | -42.24 | 16.19 | 2 | 87.63 | 4.55 20600 | 2 | 88.43 | 20600 | | |
| -21.150 | 1.982 | 0.090 | -17.63 | -35.01 | 16.19 | 2 | 88.74 | 4.55 20600 | 2 | 91.42 | 20600 | | |
| -21.420 | 2.005 | 0.087 | -26.60 | -31.50 | 16.19 | 2 | 89.35 | 4.55 20600 | 2 | 93.01 | 20600 | | |
| -21.695 | 2.029 | 0.083 | -34.80 | -28.19 | 16.19 | 2 | 90.00 | 4.55 20600 | 2 | 94.62 | 20600 | | |
| -21.970 | 2.051 | 0.078 | -42.13 | -25.13 | 16.19 | 2 | 90.67 | 4.55 20600 | 2 | 96.21 | 20600 | | |
| -22.245 | 2.072 | 0.073 | -48.65 | -22.32 | 16.19 | 2 | 91.36 | 4.55 20600 | 2 | 97.76 | 20600 | | |
| -22.520 | 2.091 | 0.066 | -54.43 | -19.74 | 16.19 | 2 | 92.10 | 4.55 20600 | 2 | 99.28 | 20600 | | |
| -22.795 | 2.108 | 0.059 | -59.52 | -17.36 | 16.19 | 2 | 92.87 | 4.55 20600 | 2 | 100.76 | 20600 | | |
| -23.070 | 2.123 | 0.051 | -63.99 | -15.17 | 16.19 | 2 | 93.68 | 4.55 20600 | 2 | 102.20 | 20600 | | |
| -23.345 | 2.136 | 0.043 | -67.88 | -13.13 | 16.19 | 2 | 94.54 | 4.55 20600 | 2 | 103.59 | 20600 | | |
| -23.620 | 2.147 | 0.034 | -71.23 | -11.23 | 16.19 | 2 | 95.45 | 4.55 20600 | 2 | 104.94 | 20600 | | |
| -23.895 | 2.155 | 0.025 | -74.07 | -9.43 | 16.19 | 2 | 96.41 | 4.55 20600 | 2 | 106.23 | 20600 | | |
| -24.170 | 2.161 | 0.016 | -76.42 | -7.71 | 16.19 | 2 | 97.42 | 4.55 20600 | 2 | 107.47 | 20600 | | |
| -24.445 | 2.164 | 0.006 | -78.31 | -6.04 | 16.19 | 2 | 98.48 | 4.55 20600 | 2 | 108.66 | 20600 | | |
| -24.720 | 2.164 | -0.004 | -79.75 | -4.39 | 16.19 | 2 | 99.60 | 4.55 20600 | 2 | 109.79 | 20600 | | |
| -25.220 | 2.157 | -0.022 | -81.18 | -1.33 | 16.19 | 2 | 101.79 | 4.55 20600 | 2 | 111.70 | 20600 | | |
| -25.568 | 2.147 | -0.035 | -81.26 | 0.92 | 16.19 | 2 | 103.42 | 4.55 20600 | 2 | 112.92 | 20600 | | |
| -25.915 | 2.133 | -0.048 | -80.52 | 3.35 | 16.19 | 2 | 105.14 | 4.55 20600 | 2 | 114.04 | 20600 | | |
| -26.263 | 2.114 | -0.061 | -78.90 | 6.02 | 16.19 | 2 | 106.95 | 4.55 20600 | 2 | 115.08 | 20600 | | |
| -26.610 | 2.091 | -0.073 | -76.30 | 8.99 | 16.19 | 2 | 108.86 | 4.55 20600 | 2 | 116.02 | 20600 | | |
| -26.958 | 2.063 | -0.085 | -72.61 | 12.32 | 16.19 | 2 | 110.84 | 4.55 20600 | 2 | 116.88 | 20600 | | |
| -27.305 | 2.032 | -0.096 | -67.69 | 16.07 | 16.19 | 2 | 112.92 | 4.55 20600 | 2 | 117.65 | 20600 | | |
| -27.653 | 1.996 | -0.106 | -61.39 | 20.31 | 16.19 | 2 | 115.07 | 4.55 20600 | 2 | 118.35 | 20600 | | |
| -28.000 | 1.958 | -0.116 | -53.52 | 25.07 | 16.19 | 2 | 117.28 | 4.55 20600 | 2 | 118.98 | 20600 | | |
| | | | | | 16.19 | 2 | 85.94 | 4.12 29000 | 2 | 127.99 | 29000 | | |
| -28.375 | 1.913 | -0.124 | -45.88 | 15.86 | 16.19 | 2 | 88.72 | 4.12 29000 | 2 | 128.15 | 29000 | | |
| -28.750 | 1.865 | -0.131 | -41.50 | 7.66 | 16.19 | 2 | 91.57 | 4.12 29000 | 2 | 128.23 | 29000 | | |
| -29.125 | 1.814 | -0.138 | -40.00 | 0.53 | 16.19 | 2 | 94.51 | 4.12 29000 | 2 | 128.23 | 29000 | | |
| -29.500 | 1.761 | -0.145 | -40.96 | -5.46 | 16.19 | 2 | 97.52 | 4.12 29000 | 2 | 128.16 | 29000 | | |
| -29.875 | 1.705 | -0.153 | -43.95 | -10.27 | 16.19 | 2 | 100.60 | 4.12 29000 | 2 | 128.00 | 29000 | | |
| -30.250 | 1.647 | -0.160 | -48.51 | -13.84 | 16.19 | 2 | 103.77 | 4.12 29000 | 2 | 127.77 | 29000 | | |

FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |
| -30.625 | 1.585 | -0.169 | -54.16 | -16.10 | 16.19 | 2 | 107.03 | 4.12 | 29000 | 2 | 127.45 | 29000 | |
| -31.000 | 1.520 | -0.179 | -60.41 | -16.98 | 16.19 | 2 | 110.39 | 4.12 | 29000 | 2 | 127.02 | 29000 | |
| -31.375 | 1.450 | -0.190 | -66.71 | -16.39 | 16.19 | 2 | 113.86 | 4.12 | 29000 | 2 | 126.49 | 29000 | |
| -31.750 | 1.377 | -0.202 | -72.51 | -14.26 | 16.19 | 2 | 117.46 | 4.12 | 29000 | 2 | 125.82 | 29000 | |
| -32.125 | 1.299 | -0.215 | -77.20 | -10.47 | 16.19 | 2 | 121.19 | 4.12 | 29000 | 2 | 125.03 | 29000 | |
| -32.500 | 1.216 | -0.228 | -80.14 | -4.94 | 16.19 | 2 | 125.07 | 4.12 | 29000 | 2 | 124.09 | 29000 | |
| -32.875 | 1.128 | -0.242 | -80.67 | 2.46 | 16.19 | 2 | 129.09 | 4.12 | 29000 | 2 | 123.00 | 29000 | |
| -33.250 | 1.034 | -0.256 | -78.05 | 11.83 | 16.19 | 2 | 133.27 | 4.12 | 29000 | 2 | 121.76 | 29000 | |
| -33.625 | 0.936 | -0.268 | -71.54 | 23.28 | 16.19 | 2 | 137.58 | 4.12 | 29000 | 2 | 120.38 | 29000 | |
| -34.000 | 0.833 | -0.280 | -60.32 | 36.92 | 16.19 | 2 | 142.04 | 4.12 | 29000 | 2 | 118.86 | 29000 | |
| | | | | | 16.19 | 2 | 135.35 | 4.26 | 43800 | 2 | 134.41 | 43800 | |
| -34.325 | 0.741 | -0.288 | -47.27 | 43.80 | 16.19 | 2 | 140.78 | 4.26 | 43800 | 2 | 131.76 | 43800 | |
| -34.650 | 0.646 | -0.294 | -31.56 | 53.34 | 16.19 | 2 | 146.30 | 4.26 | 43800 | 2 | 129.00 | 43800 | |
| -34.975 | 0.550 | -0.297 | -12.31 | 65.59 | 16.19 | 2 | 151.90 | 4.26 | 43800 | 2 | 126.17 | 43800 | |
| -35.300 | 0.454 | -0.297 | 11.37 | 80.59 | 16.19 | 2 | 157.51 | 4.26 | 43800 | 2 | 123.33 | 43800 | |
| | | | | | 16.19 | -1 | | | | 2 | 173.02 | 300000 | |
| -35.800 | 0.306 | -0.291 | 33.86 | 12.97 | 16.19 | -1 | | | | 2 | 129.80 | 300000 | |
| -36.300 | 0.163 | -0.284 | 28.59 | -29.18 | 16.19 | 2 | 16.49 | 1.52 | 300000 | 2 | 87.67 | 300000 | |
| -36.800 | 0.022 | -0.279 | 10.64 | -35.58 | 16.19 | 2 | 59.66 | 1.52 | 300000 | 2 | 46.47 | 300000 | |
| -37.300 | -0.117 | -0.278 | 0.00 | 0.00 | 16.19 | 2 | 102.44 | 1.52 | 300000 | 2 | 5.67 | 300000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 2.90 mm

MOMENTO MÁXIMO = -169.11 kN.m/m

-1 = SEPARACIÓN
CODIFICACIÓN : 0 = EXCAVACIÓN
DE ESTADO : 1 = PRESIÓN ACTIVA
DE SUELO : 2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 134.96 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.048 = (2286.86 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.115 = (2695.14 kN/m)/(23396.34 kN/m) SIN INTERÉS



## ** FASE No 3 **

*Fase 3
*Ejecucion del 1er nivel de anclajes
*Excavacion hasta 2º nivel de anclajes

* INSTALACIÓN DE LA LÍNEA DE ANCLAS N° 2
NIVEL = -8.950 m
ESPACIADO = 2.750 m
INCLINACIÓN = 10.000 GRADOS
PRECARGA = -912.000 kN
RIGIDEZ = 6391.000 kN/m
CONEXION UNILATERAL : PARED LIBERA PARA DESPLAZAR HACIA SUELO 1

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -13.550 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -14.150 m



FASE 3

| | PARED | SOIL 1: EXCAVACIÓN 0.00 m, NIVEL AGUA -8.50 m, S. DE CAQUOT 10.00 kPa | SOIL 2: EXCAVACIÓN -13.55 m, NIVEL AGUA -14.15 m, S. DE CAQUOT 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1.273 | 0.150 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.287 | 1.316 | 0.150 | 0.02 | 0.20 | | 2 | 1.37 | 1.37 | 4900 | 0 | | | |
| -0.575 | 1.359 | 0.150 | 0.17 | 0.94 | | 2 | 3.82 | 3.82 | 4900 | 0 | | | |
| -0.862 | 1.402 | 0.150 | 0.63 | 2.39 | | 2 | 6.27 | 5.15 | 4900 | 0 | | | |
| -1.150 | 1.445 | 0.150 | 1.61 | 4.55 | | 2 | 8.73 | 5.15 | 4900 | 0 | | | |
| | | | | -18.14 | | 2 | 8.73 | 5.15 | 4900 | 0 | | 1 | -22.69 |
| -1.200 | 1.453 | 0.150 | 0.71 | -17.70 | | 2 | 9.16 | 5.15 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.625 | 1.517 | 0.150 | -6.81 | -17.70 | | -1 | | | | 0 | | | |
| -2.050 | 1.580 | 0.148 | -14.33 | -17.70 | | -1 | | | | 0 | | | |
| -2.475 | 1.642 | 0.144 | -21.79 | -17.28 | | 2 | 1.98 | 1.98 | 15100 | 0 | | | |
| -2.900 | 1.702 | 0.139 | -28.84 | -15.62 | | 2 | 5.82 | 4.85 | 15100 | 0 | | | |
| -3.213 | 1.745 | 0.135 | -33.39 | -13.42 | | 2 | 8.29 | 4.85 | 15100 | 0 | | | |
| -3.525 | 1.786 | 0.130 | -37.14 | -10.45 | | 2 | 10.72 | 4.85 | 15100 | 0 | | | |
| -3.838 | 1.826 | 0.124 | -39.84 | -6.72 | | 2 | 13.12 | 4.85 | 15100 | 0 | | | |
| -4.150 | 1.864 | 0.118 | -41.26 | -2.25 | | 2 | 15.48 | 4.85 | 15100 | 0 | | | |
| -4.463 | 1.900 | 0.112 | -41.17 | 2.95 | | 2 | 17.79 | 4.85 | 15100 | 0 | | | |
| -4.775 | 1.934 | 0.107 | -39.35 | 8.86 | | 2 | 20.05 | 4.85 | 15100 | 0 | | | |
| -5.088 | 1.966 | 0.101 | -35.56 | 15.47 | | 2 | 22.24 | 4.85 | 15100 | 0 | | | |
| -5.400 | 1.997 | 0.097 | -29.61 | 22.75 | | 2 | 24.36 | 4.85 | 15100 | 0 | | | |
| | | | | | | 2 | 20.71 | 4.55 | 20600 | 0 | | | |
| -5.788 | 2.034 | 0.092 | -19.17 | 31.27 | | 2 | 23.27 | 4.55 | 20600 | 0 | | | |
| -6.175 | 2.069 | 0.090 | -5.25 | 40.75 | | 2 | 25.64 | 4.55 | 20600 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -6.562 | 2.104 | 0.091 | 12.52 | 51.10 | | 2 | 27.79 | 4.55 | 20600 | 0 | | | | | | | |
| -6.950 | 2.140 | 0.095 | 34.46 | 62.24 | | 2 | 29.68 | 4.55 | 20600 | 0 | | | | | | | |
| -7.337 | 2.178 | 0.103 | 60.84 | 74.05 | | 2 | 31.29 | 4.55 | 20600 | 0 | | | | | | | |
| -7.725 | 2.220 | 0.117 | 91.92 | 86.42 | | 2 | 32.57 | 4.55 | 20600 | 0 | | | | | | | |
| -8.113 | 2.269 | 0.136 | 127.88 | 99.22 | | 2 | 33.49 | 4.55 | 20600 | 0 | | | | | | | |
| -8.500 | 2.326 | 0.162 | 168.85 | 112.30 | | 2 | 34.00 | 4.55 | 20600 | 0 | | | | | | | |
| -8.950 | 2.408 | 0.202 | 222.94 | 128.32 | 4.41 | 2 | 32.80 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | -198.28 | 4.41 | 2 | 32.80 | 4.55 | 20600 | 0 | | | | | | 2 | -912.00 |
| -9.300 | 2.484 | 0.232 | 155.86 | -184.89 | 7.85 | 2 | 31.42 | 4.55 | 20600 | 0 | | | | | | | |
| -9.650 | 2.569 | 0.252 | 93.59 | -170.85 | 11.28 | 2 | 29.72 | 4.55 | 20600 | 0 | | | | | | | |
| -10.150 | 2.699 | 0.264 | 13.41 | -149.63 | 16.19 | 2 | 27.68 | 3.82 | 20600 | 0 | | | | | | | |
| -10.512 | 2.795 | 0.262 | -37.87 | -133.13 | 19.74 | 1 | 27.42 | 2.68 | 20600 | 0 | | | | | | | |
| -10.875 | 2.888 | 0.252 | -82.94 | -115.23 | 23.30 | 1 | 28.29 | 2.68 | 20600 | 0 | | | | | | | |
| -11.238 | 2.977 | 0.235 | -121.22 | -95.72 | 26.85 | 1 | 29.17 | 2.68 | 20600 | 0 | | | | | | | |
| -11.600 | 3.058 | 0.212 | -152.14 | -74.61 | 30.41 | 1 | 30.04 | 2.68 | 20600 | 0 | | | | | | | |
| -11.963 | 3.130 | 0.185 | -175.12 | -51.89 | 33.97 | 1 | 30.92 | 2.68 | 20600 | 0 | | | | | | | |
| -12.325 | 3.192 | 0.155 | -189.57 | -27.57 | 37.52 | 1 | 31.79 | 2.68 | 20600 | 0 | | | | | | | |
| -12.688 | 3.242 | 0.123 | -194.92 | -1.64 | 41.08 | 1 | 32.67 | 2.68 | 20600 | 0 | | | | | | | |
| -13.050 | 3.281 | 0.091 | -190.57 | 25.90 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | | | | | |
| -13.550 | 3.316 | 0.050 | -167.59 | 66.51 | 49.54 | 1 | 34.75 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 49.54 | 1 | 34.75 | 2.68 | 20600 | 2 | 68.31 | | 20600 | | | | |
| -13.850 | 3.328 | 0.028 | -146.91 | 71.43 | 52.48 | 1 | 35.47 | 2.68 | 20600 | 2 | 71.14 | | 20600 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | | kN | |





FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.150 | 3.333 | 0.009 | -124.71 | 76.62 | 55.43 | 1 | 36.19 | 2.68 | 20600 | 2 | 73.85 | | 20600 | | |
| -14.600 | 3.332 | -0.013 | -88.46 | 84.45 | 55.43 | 1 | 37.28 | 2.68 | 20600 | 2 | 75.67 | | 20600 | | |
| | | | | | 55.43 | 1 | 26.15 | 2.35 | 29000 | 2 | 103.00 | | 29000 | | |
| -15.000 | 3.324 | -0.026 | -56.40 | 75.79 | 55.43 | 1 | 27.04 | 2.35 | 29000 | 2 | 104.34 | | 29000 | | |
| -15.400 | 3.312 | -0.033 | -27.84 | 66.98 | 55.43 | 1 | 27.94 | 2.35 | 29000 | 2 | 105.55 | | 29000 | | |
| -15.800 | 3.298 | -0.036 | -2.84 | 58.05 | 55.43 | 1 | 28.83 | 2.35 | 29000 | 2 | 106.71 | | 29000 | | |
| -16.200 | 3.284 | -0.035 | 18.58 | 49.02 | 55.43 | 1 | 29.72 | 2.35 | 29000 | 2 | 107.86 | | 29000 | | |
| -16.600 | 3.271 | -0.030 | 36.36 | 39.87 | 55.43 | 1 | 30.61 | 2.35 | 29000 | 2 | 109.05 | | 29000 | | |
| -17.000 | 3.261 | -0.022 | 50.46 | 30.59 | 55.43 | 1 | 31.51 | 2.35 | 29000 | 2 | 110.32 | | 29000 | | |
| -17.400 | 3.254 | -0.011 | 60.81 | 21.14 | 55.43 | 1 | 32.40 | 2.35 | 29000 | 2 | 111.69 | | 29000 | | |
| -17.800 | 3.252 | 0.000 | 67.34 | 11.47 | 55.43 | 1 | 33.29 | 2.35 | 29000 | 2 | 113.19 | | 29000 | | |
| -18.300 | 3.256 | 0.016 | 69.98 | -1.00 | 55.43 | 1 | 34.41 | 2.35 | 29000 | 2 | 115.27 | | 29000 | | |
| -18.800 | 3.268 | 0.032 | 66.25 | -14.02 | 55.43 | 1 | 35.53 | 2.35 | 29000 | 2 | 117.58 | | 29000 | | |
| -19.100 | 3.279 | 0.041 | 60.83 | -22.13 | 55.43 | 1 | 36.20 | 2.35 | 29000 | 2 | 119.07 | | 29000 | | |
| -19.400 | 3.292 | 0.048 | 52.95 | -30.50 | 55.43 | 1 | 36.87 | 2.35 | 29000 | 2 | 120.63 | | 29000 | | |
| -19.700 | 3.308 | 0.055 | 42.51 | -39.14 | 55.43 | 1 | 37.54 | 2.35 | 29000 | 2 | 122.26 | | 29000 | | |
| -20.000 | 3.325 | 0.060 | 29.43 | -48.08 | 55.43 | 1 | 38.21 | 2.35 | 29000 | 2 | 123.93 | | 29000 | | |
| | | | | | 55.43 | 2 | 56.35 | 4.55 | 20600 | 2 | 98.87 | | 20600 | | |
| -20.150 | 3.334 | 0.062 | 22.36 | -46.17 | 55.43 | 2 | 56.78 | 4.55 | 20600 | 2 | 99.67 | | 20600 | | |
| -20.650 | 3.366 | 0.064 | 0.79 | -40.23 | 55.43 | 2 | 58.17 | 4.55 | 20600 | 2 | 102.37 | | 20600 | | |
| -21.150 | 3.398 | 0.062 | -17.98 | -34.95 | 55.43 | 2 | 59.57 | 4.55 | 20600 | 2 | 105.08 | | 20600 | | |
| -21.420 | 3.414 | 0.060 | -27.06 | -32.36 | 55.43 | 2 | 60.33 | 4.55 | 20600 | 2 | 106.52 | | 20600 | | |
| -21.695 | 3.430 | 0.056 | -35.62 | -29.91 | 55.43 | 2 | 61.13 | 4.55 | 20600 | 2 | 107.97 | | 20600 | | |
| -21.970 | 3.445 | 0.051 | -43.53 | -27.63 | 55.43 | 2 | 61.96 | 4.55 | 20600 | 2 | 109.40 | | 20600 | | |
| -22.245 | 3.458 | 0.045 | -50.83 | -25.51 | 55.43 | 2 | 62.81 | 4.55 | 20600 | 2 | 110.80 | | 20600 | | |
| -22.520 | 3.469 | 0.038 | -57.57 | -23.53 | 55.43 | 2 | 63.70 | 4.55 | 20600 | 2 | 112.16 | | 20600 | | |
| -22.795 | 3.479 | 0.030 | -63.78 | -21.67 | 55.43 | 2 | 64.64 | 4.55 | 20600 | 2 | 113.48 | | 20600 | | |
| -23.070 | 3.486 | 0.022 | -69.50 | -19.90 | 55.43 | 2 | 65.61 | 4.55 | 20600 | 2 | 114.75 | | 20600 | | |
| -23.345 | 3.491 | 0.013 | -74.73 | -18.19 | 55.43 | 2 | 66.64 | 4.55 | 20600 | 2 | 115.98 | | 20600 | | |
| -23.620 | 3.493 | 0.003 | -79.51 | -16.53 | 55.43 | 2 | 67.72 | 4.55 | 20600 | 2 | 117.15 | | 20600 | | |
| -23.895 | 3.492 | -0.007 | -83.83 | -14.88 | 55.43 | 2 | 68.86 | 4.55 | 20600 | 2 | 118.26 | | 20600 | | |
| -24.170 | 3.489 | -0.018 | -87.69 | -13.20 | 55.43 | 2 | 70.06 | 4.55 | 20600 | 2 | 119.32 | | 20600 | | |
| -24.445 | 3.482 | -0.029 | -91.08 | -11.47 | 55.43 | 2 | 71.32 | 4.55 | 20600 | 2 | 120.31 | | 20600 | | |
| -24.720 | 3.473 | -0.041 | -93.99 | -9.65 | 55.43 | 2 | 72.64 | 4.55 | 20600 | 2 | 121.24 | | 20600 | | |
| -25.220 | 3.447 | -0.063 | -97.92 | -5.97 | 55.43 | 2 | 75.22 | 4.55 | 20600 | 2 | 122.76 | | 20600 | | |
| -25.568 | 3.422 | -0.078 | -99.49 | -3.05 | 55.43 | 2 | 77.15 | 4.55 | 20600 | 2 | 123.67 | | 20600 | | |
| -25.915 | 3.393 | -0.094 | -99.99 | 0.26 | 55.43 | 2 | 79.19 | 4.55 | 20600 | 2 | 124.48 | | 20600 | | |
| -26.263 | 3.357 | -0.110 | -99.26 | 4.03 | 55.43 | 2 | 81.34 | 4.55 | 20600 | 2 | 125.17 | | 20600 | | |
| -26.610 | 3.316 | -0.126 | -97.12 | 8.36 | 55.43 | 2 | 83.61 | 4.55 | 20600 | 2 | 125.75 | | 20600 | | |
| -26.958 | 3.270 | -0.141 | -93.38 | 13.31 | 55.43 | 2 | 85.99 | 4.55 | 20600 | 2 | 126.22 | | 20600 | | |
| -27.305 | 3.218 | -0.155 | -87.80 | 18.95 | 55.43 | 2 | 88.47 | 4.55 | 20600 | 2 | 126.58 | | 20600 | | |
| -27.653 | 3.162 | -0.169 | -80.12 | 25.37 | 55.43 | 2 | 91.05 | 4.55 | 20600 | 2 | 126.85 | | 20600 | | |
| -28.000 | 3.101 | -0.180 | -70.06 | 32.63 | 55.43 | 2 | 93.73 | 4.55 | 20600 | 2 | 127.02 | | 20600 | | |
| | | | | | 55.43 | 1 | 55.13 | 2.35 | 29000 | 2 | 147.10 | | 29000 | | |
| -28.375 | 3.031 | -0.192 | -60.36 | 19.24 | 55.43 | 2 | 56.27 | 2.66 | 29000 | 2 | 146.55 | | 29000 | | |
| -28.750 | 2.958 | -0.201 | -55.49 | 6.98 | 55.43 | 2 | 59.88 | 4.12 | 29000 | 2 | 145.88 | | 29000 | | |
| -29.125 | 2.880 | -0.211 | -54.92 | -3.65 | 55.43 | 2 | 63.59 | 4.12 | 29000 | 2 | 145.10 | | 29000 | | |
| -29.500 | 2.800 | -0.220 | -58.01 | -12.55 | 55.43 | 2 | 67.40 | 4.12 | 29000 | 2 | 144.23 | | 29000 | | |
| -29.875 | 2.715 | -0.231 | -64.11 | -19.66 | 55.43 | 2 | 71.32 | 4.12 | 29000 | 2 | 143.24 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |





FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -30.250 | 2.626 | -0.243 | -72.52 | -24.88 | 55.43 | 2 | 75.36 | 4.12 | 29000 | 2 | 142.13 | | 29000 | | |
| -30.625 | 2.533 | -0.256 | -82.52 | -28.12 | 55.43 | 2 | 79.54 | 4.12 | 29000 | 2 | 140.89 | | 29000 | | |
| -31.000 | 2.434 | -0.271 | -93.35 | -29.27 | 55.43 | 2 | 83.87 | 4.12 | 29000 | 2 | 139.50 | | 29000 | | |
| -31.375 | 2.330 | -0.288 | -104.19 | -28.21 | 55.43 | 2 | 88.37 | 4.12 | 29000 | 2 | 137.93 | | 29000 | | |
| -31.750 | 2.218 | -0.306 | -114.21 | -24.80 | 55.43 | 2 | 93.07 | 4.12 | 29000 | 2 | 136.17 | | 29000 | | |
| -32.125 | 2.100 | -0.327 | -122.48 | -18.89 | 55.43 | 2 | 97.98 | 4.12 | 29000 | 2 | 134.20 | | 29000 | | |
| -32.500 | 1.973 | -0.348 | -128.04 | -10.31 | 55.43 | 2 | 103.11 | 4.12 | 29000 | 2 | 131.99 | | 29000 | | |
| -32.875 | 1.838 | -0.370 | -129.85 | 1.11 | 55.43 | 2 | 108.49 | 4.12 | 29000 | 2 | 129.55 | | 29000 | | |
| -33.250 | 1.695 | -0.392 | -126.83 | 15.55 | 55.43 | 2 | 114.11 | 4.12 | 29000 | 2 | 126.87 | | 29000 | | |
| -33.625 | 1.544 | -0.414 | -117.79 | 33.20 | 55.43 | 2 | 119.96 | 4.12 | 29000 | 2 | 123.96 | | 29000 | | |
| -34.000 | 1.385 | -0.432 | -101.51 | 54.21 | 55.43 | 2 | 126.03 | 4.12 | 29000 | 2 | 120.82 | | 29000 | | |
| | | | | | 55.43 | 2 | 111.17 | 4.26 | 43800 | 2 | 144.07 | | 43800 | | |
| -34.325 | 1.242 | -0.446 | -82.48 | 63.56 | 55.43 | 2 | 118.81 | 4.26 | 43800 | 2 | 139.19 | | 43800 | | |
| -34.650 | 1.096 | -0.457 | -59.75 | 77.04 | 55.43 | 2 | 126.63 | 4.26 | 43800 | 2 | 134.15 | | 43800 | | |
| -34.975 | 0.946 | -0.464 | -31.95 | 94.74 | 55.43 | 2 | 134.57 | 4.26 | 43800 | 2 | 128.98 | | 43800 | | |
| -35.300 | 0.795 | -0.466 | 2.30 | 116.72 | 55.43 | 2 | 142.57 | 4.26 | 43800 | 2 | 123.74 | | 43800 | | |
| | | | | | 55.43 | -1 | | | | 2 | 270.19 | | 300000 | | |
| -35.800 | 0.563 | -0.461 | 36.67 | 26.49 | 55.43 | -1 | | | | 2 | 201.60 | | 300000 | | |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -36.300 | 0.335 | -0.452 | 34.46 | -29.74 | 55.43 | -1 | | | | | | 2 | 134.16 | | 300000 | | | | | | | | |
| -36.800 | 0.111 | -0.446 | 13.89 | -44.25 | 55.43 | 2 | 33.10 | | 1.52 | 300000 | | 2 | 67.85 | | 300000 | | | | | | | | |
| -37.300 | -0.112 | -0.445 | 0.00 | 0.00 | 55.43 | 2 | 100.90 | | 1.52 | 300000 | | -1 | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | | kPa | kPa/m | | | kPa | | kPa | kPa/m | | | | | | | kN |

DESPLAZAMIENTO MÁX. = 3.49 mm

MOMENTO MÁXIMO = 222.94 kN.m/m

-1 = SEPARACIÓN
CODIFICACIÓN DE ESTADO DE SUELO :
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 131.13 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = -0.51 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.038 = (1794.21 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.150 = (2884.62 kN/m)/(19271.61 kN/m) SIN INTERÉS



** FASE No 4 **

*Fase 4
*Ejecucion del segundo nivel de anclajes
*Excavacion hasta 3º nivel de anclajes

* INSTALACIÓN DE LA LÍNEA DE ANCLAS N° 3
NIVEL = -13.050 m
ESPACIADO = 2.750 m
INCLINACIÓN = 10.000 GRADOS
PRECARGA = -912.000 kN
RIGIDEZ = 6391.000 kN/m
CONEXION UNILATERAL : PARED LIBERA PARA DESPLAZAR HACIA SUELO 1

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -18.300 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -18.800 m



FASE 4

PARED | SOIL 1: EXCAVACIÓN: 0.00 m, NIVEL AGUA: -8.50 m, S. DE CAQUOT: 10.00 kPa | SOIL 2: EXCAVACIÓN: -18.30 m, NIVEL AGUA: -18.80 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 0.806 | 0.510 | 0.00 | 0.00 | | 2 | 1.20 | 1.20 | 4900 | 0 | | | | | |
| -0.287 | 0.952 | 0.510 | 0.08 | 0.63 | | 2 | 3.15 | 3.15 | 4900 | 0 | | | | | |
| -0.575 | 1.099 | 0.510 | 0.41 | 1.81 | | 2 | 5.09 | 5.09 | 4900 | 0 | | | | | |
| -0.862 | 1.246 | 0.510 | 1.17 | 3.55 | | 2 | 7.04 | 5.15 | 4900 | 0 | | | | | |
| -1.150 | 1.392 | 0.510 | 2.51 | 5.86 | | 2 | 8.99 | 5.15 | 4900 | 0 | | | | | |
| | | | | 28.53 | | 2 | 8.99 | 5.15 | 4900 | 0 | | | | 1 | 22.67 |
| -1.200 | 1.418 | 0.510 | 3.95 | 28.98 | | 2 | 9.33 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | -1 | | | | 0 | | | | | |
| -1.625 | 1.635 | 0.512 | 16.27 | 28.98 | | -1 | | | | 0 | | | | | |
| -2.050 | 1.853 | 0.517 | 28.58 | 28.98 | | -1 | | | | 0 | | | | | |
| -2.475 | 2.074 | 0.523 | 40.90 | 28.98 | | -1 | | | | 0 | | | | | |
| -2.900 | 2.299 | 0.532 | 53.24 | 29.13 | | 1 | 0.69 | 0.69 | 15100 | 0 | | | | | |
| -3.213 | 2.466 | 0.541 | 62.40 | 29.61 | | 1 | 2.38 | 2.38 | 15100 | 0 | | | | | |
| -3.525 | 2.637 | 0.550 | 71.80 | 30.61 | | 1 | 4.06 | 2.91 | 15100 | 0 | | | | | |
| -3.838 | 2.810 | 0.561 | 81.59 | 32.15 | | 1 | 5.74 | 2.91 | 15100 | 0 | | | | | |
| -4.150 | 2.987 | 0.574 | 91.95 | 34.20 | | 1 | 7.42 | 2.91 | 15100 | 0 | | | | | |
| -4.463 | 3.169 | 0.587 | 103.03 | 36.78 | | 1 | 9.10 | 2.91 | 15100 | 0 | | | | | |
| -4.775 | 3.355 | 0.603 | 114.99 | 39.89 | | 1 | 10.79 | 2.91 | 15100 | 0 | | | | | |
| -5.088 | 3.546 | 0.620 | 128.01 | 43.53 | | 1 | 12.47 | 2.91 | 15100 | 0 | | | | | |
| -5.400 | 3.743 | 0.640 | 142.25 | 47.69 | | 1 | 14.15 | 2.91 | 15100 | 0 | | | | | |
| | | | | | | 1 | 6.78 | 2.68 | 20600 | 0 | | | | | |
| -5.788 | 3.996 | 0.666 | 161.29 | 50.70 | | 1 | 8.75 | 2.68 | 20600 | 0 | | | | | |
| -6.175 | 4.260 | 0.697 | 181.64 | 54.47 | | 1 | 10.73 | 2.68 | 20600 | 0 | | | | | |
| -6.562 | 4.536 | 0.731 | 203.60 | 59.01 | | 1 | 12.70 | 2.68 | 20600 | 0 | | | | | |
| -6.950 | 4.826 | 0.769 | 227.47 | 64.31 | | 1 | 14.67 | 2.68 | 20600 | 0 | | | | | |
| -7.337 | 5.133 | 0.811 | 253.54 | 70.38 | | 1 | 16.65 | 2.68 | 20600 | 0 | | | | | |
| -7.725 | 5.456 | 0.859 | 282.12 | 77.22 | | 1 | 18.62 | 2.68 | 20600 | 0 | | | | | |
| -8.113 | 5.799 | 0.911 | 313.48 | 84.81 | | 1 | 20.59 | 2.68 | 20600 | 0 | | | | | |
| -8.500 | 6.163 | 0.970 | 347.94 | 93.17 | | 1 | 22.57 | 2.68 | 20600 | 0 | | | | | |
| -8.950 | 6.616 | 1.046 | 392.34 | 104.57 | 4.41 | 1 | 23.65 | 2.68 | 20600 | 0 | | | | | |
| | | | | -231.52 | 4.41 | 1 | 23.65 | 2.68 | 20600 | 0 | | | | 2 | -938.49 |
| -9.300 | 6.992 | 1.102 | 313.12 | -220.94 | 7.85 | 1 | 24.50 | 2.68 | 20600 | 0 | | | | | |
| -9.650 | 7.386 | 1.146 | 237.86 | -208.88 | 11.28 | 1 | 25.34 | 2.68 | 20600 | 0 | | | | | |
| -10.150 | 7.971 | 1.189 | 138.25 | -189.04 | 16.19 | 1 | 26.55 | 2.68 | 20600 | 0 | | | | | |
| -10.512 | 8.405 | 1.206 | 72.63 | -172.74 | 19.74 | 1 | 27.42 | 2.68 | 20600 | 0 | | | | | |
| -10.875 | 8.844 | 1.213 | 13.21 | -154.84 | 23.30 | 1 | 28.29 | 2.68 | 20600 | 0 | | | | | |
| -11.238 | 9.284 | 1.211 | -39.44 | -135.34 | 26.85 | 1 | 29.17 | 2.68 | 20600 | 0 | | | | | |
| -11.600 | 9.721 | 1.201 | -84.72 | -114.23 | 30.41 | 1 | 30.04 | 2.68 | 20600 | 0 | | | | | |
| -11.963 | 10.154 | 1.183 | -122.06 | -91.51 | 33.97 | 1 | 30.92 | 2.68 | 20600 | 0 | | | | | |
| -12.325 | 10.579 | 1.161 | -150.87 | -67.18 | 37.52 | 1 | 31.79 | 2.68 | 20600 | 0 | | | | | |
| -12.688 | 10.995 | 1.134 | -170.57 | -41.25 | 41.08 | 1 | 32.67 | 2.68 | 20600 | 0 | | | | | |
| -13.050 | 11.400 | 1.105 | -180.58 | -13.72 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | | | |
| | | | | -340.32 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | | 3 | -912.00 |
| -13.550 | 11.939 | 1.045 | -340.71 | -299.70 | 49.54 | 1 | 34.75 | 2.68 | 20600 | 0 | | | | | |
| -13.850 | 12.245 | 0.992 | -426.78 | -273.86 | 52.48 | 1 | 35.47 | 2.68 | 20600 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | | kPa | kPa/m | | | kPa | | kPa | kPa/m | | | | | | | kN |

FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.150 | 12.534 | 0.928 | -504.92 | -246.93 | 55.43 | 1 | 36.19 | 2.68 20600 | 0 | | | |
| -14.600 | 12.926 | 0.814 | -606.58 | -204.46 | 59.84 | 1 | 37.28 | 2.68 20600 | 0 | | | |
| | | | | | 59.84 | 1 | 26.15 | 2.35 29000 | 0 | | | |
| -15.000 | 13.229 | 0.696 | -681.36 | -169.10 | 63.77 | 1 | 27.04 | 2.35 29000 | 0 | | | |
| -15.400 | 13.481 | 0.566 | -741.60 | -131.81 | 67.69 | 1 | 27.94 | 2.35 29000 | 0 | | | |
| -15.800 | 13.680 | 0.426 | -786.55 | -92.60 | 71.61 | 1 | 28.83 | 2.35 29000 | 0 | | | |
| -16.200 | 13.821 | 0.279 | -815.43 | -51.46 | 75.54 | 1 | 29.72 | 2.35 29000 | 0 | | | |
| -16.600 | 13.903 | 0.129 | -827.46 | -8.39 | 79.46 | 1 | 30.61 | 2.35 29000 | 0 | | | |
| -17.000 | 13.924 | -0.022 | -821.89 | 36.60 | 83.39 | 1 | 31.51 | 2.35 29000 | 0 | | | |
| -17.400 | 13.886 | -0.170 | -797.93 | 83.52 | 87.31 | 1 | 32.40 | 2.35 29000 | 0 | | | |
| -17.800 | 13.789 | -0.312 | -754.81 | 132.37 | 91.23 | 1 | 33.29 | 2.35 29000 | 0 | | | |
| -18.300 | 13.592 | -0.476 | -672.81 | 196.14 | 96.14 | 1 | 34.41 | 2.35 29000 | 0 | | | |
| | | | | | 96.14 | 1 | 34.41 | 2.35 29000 | 3 | 98.13 | 29000 | |
| -18.800 | 13.317 | -0.618 | -572.01 | 204.46 | 101.04 | 1 | 35.53 | 2.35 29000 | 3 | 135.69 | 29000 | |
| -19.100 | 13.120 | -0.692 | -510.78 | 203.18 | 101.04 | 1 | 36.20 | 2.35 29000 | 3 | 146.67 | 29000 | |
| -19.400 | 12.903 | -0.758 | -450.41 | 198.81 | 101.04 | 1 | 36.87 | 2.35 29000 | 3 | 157.64 | 29000 | |
| -19.700 | 12.667 | -0.815 | -391.81 | 191.34 | 101.04 | 1 | 37.54 | 2.35 29000 | 3 | 168.62 | 29000 | |
| -20.000 | 12.414 | -0.865 | -335.91 | 180.78 | 101.04 | 1 | 38.21 | 2.35 29000 | 3 | 179.60 | 29000 | |
| | | | | | 101.04 | 1 | 51.03 | 2.68 20600 | 3 | 145.41 | 20600 | |
| -20.150 | 12.283 | -0.887 | -308.74 | 181.46 | 101.04 | 1 | 51.39 | 2.68 20600 | 3 | 149.99 | 20600 | |
| -20.650 | 11.823 | -0.948 | -218.29 | 179.17 | 101.04 | 1 | 52.60 | 2.68 20600 | 3 | 165.25 | 20600 | |
| -21.150 | 11.339 | -0.987 | -130.74 | 169.85 | 101.04 | 1 | 53.80 | 2.68 20600 | 3 | 180.52 | 20600 | |
| -21.420 | 11.070 | -1.001 | -85.91 | 161.89 | 101.04 | 1 | 54.45 | 2.68 20600 | 3 | 188.76 | 20600 | |
| -21.695 | 10.794 | -1.009 | -42.75 | 151.68 | 101.04 | 1 | 55.12 | 2.68 20600 | 3 | 197.16 | 20600 | |
| -21.970 | 10.516 | -1.011 | -2.68 | 139.34 | 101.04 | 1 | 55.78 | 2.68 20600 | 3 | 205.55 | 20600 | |
| -22.245 | 10.238 | -1.009 | 33.70 | 124.88 | 101.04 | 1 | 56.44 | 2.68 20600 | 3 | 213.95 | 20600 | |
| -22.520 | 9.961 | -1.003 | 65.81 | 108.29 | 101.04 | 1 | 57.11 | 2.68 20600 | 3 | 222.34 | 20600 | |
| -22.795 | 9.687 | -0.993 | 93.19 | 90.96 | 101.04 | 1 | 57.77 | 2.68 20600 | 2 | 220.61 | 20600 | |
| -23.070 | 9.415 | -0.980 | 115.93 | 74.67 | 101.04 | 1 | 58.43 | 2.68 20600 | 2 | 216.15 | 20600 | |
| -23.345 | 9.148 | -0.964 | 134.39 | 59.78 | 101.04 | 1 | 59.10 | 2.68 20600 | 2 | 211.77 | 20600 | |
| -23.620 | 8.885 | -0.946 | 148.94 | 46.27 | 101.04 | 1 | 59.76 | 2.68 20600 | 2 | 207.48 | 20600 | |
| -23.895 | 8.627 | -0.927 | 159.96 | 34.10 | 101.04 | 1 | 60.42 | 2.68 20600 | 2 | 203.30 | 20600 | |
| -24.170 | 8.375 | -0.906 | 167.81 | 23.24 | 101.04 | 1 | 61.09 | 2.68 20600 | 2 | 199.23 | 20600 | |
| -24.445 | 8.129 | -0.885 | 172.86 | 13.67 | 101.04 | 1 | 61.75 | 2.68 20600 | 2 | 195.28 | 20600 | |
| -24.720 | 7.889 | -0.863 | 175.44 | 5.36 | 101.04 | 1 | 62.41 | 2.68 20600 | 2 | 191.46 | 20600 | |
| -25.220 | 7.467 | -0.823 | 174.95 | -6.68 | 101.04 | 1 | 63.62 | 2.68 20600 | 2 | 184.82 | 20600 | |
| -25.568 | 7.186 | -0.795 | 171.51 | -12.79 | 101.04 | 1 | 64.46 | 2.68 20600 | 2 | 180.45 | 20600 | |
| -25.915 | 6.914 | -0.769 | 166.27 | -17.11 | 101.04 | 1 | 65.30 | 2.68 20600 | 2 | 176.28 | 20600 | |
| -26.263 | 6.652 | -0.743 | 159.82 | -19.73 | 101.04 | 1 | 66.13 | 2.68 20600 | 2 | 172.29 | 20600 | |
| -26.610 | 6.398 | -0.718 | 152.75 | -20.70 | 101.04 | 1 | 66.97 | 2.68 20600 | 2 | 168.49 | 20600 | |
| -26.958 | 6.153 | -0.694 | 145.62 | -20.09 | 101.04 | 1 | 67.81 | 2.68 20600 | 2 | 164.86 | 20600 | |
| -27.305 | 5.915 | -0.672 | 138.97 | -17.95 | 101.04 | 1 | 68.65 | 2.68 20600 | 2 | 161.39 | 20600 | |
| -27.653 | 5.686 | -0.650 | 133.31 | -14.35 | 101.04 | 1 | 69.49 | 2.68 20600 | 2 | 158.08 | 20600 | |
| -28.000 | 5.463 | -0.629 | 129.16 | -9.33 | 101.04 | 1 | 70.32 | 2.68 20600 | 2 | 154.93 | 20600 | |
| | | | | | 101.04 | 1 | 55.13 | 2.35 29000 | 2 | 196.82 | 29000 | |
| -28.375 | 5.231 | -0.608 | 122.95 | -23.43 | 101.04 | 1 | 55.96 | 2.35 29000 | 2 | 191.56 | 29000 | |
| -28.750 | 5.007 | -0.587 | 111.87 | -35.29 | 101.04 | 1 | 56.80 | 2.35 29000 | 2 | 186.53 | 29000 | |
| -29.125 | 4.791 | -0.570 | 96.75 | -44.98 | 101.04 | 1 | 57.64 | 2.35 29000 | 2 | 181.71 | 29000 | |
| -29.500 | 4.580 | -0.555 | 78.39 | -52.59 | 101.04 | 1 | 58.47 | 2.35 29000 | 2 | 177.07 | 29000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.875 | 4.374 | -0.543 | 57.56 | -58.17 | 101.04 | 1 | 59.31 | 2.35 29000 | 2 | 172.57 | 29000 | |
| -30.250 | 4.172 | -0.535 | 35.01 | -61.77 | 101.04 | 1 | 60.15 | 2.35 29000 | 2 | 168.18 | 29000 | |
| -30.625 | 3.973 | -0.531 | 11.47 | -63.43 | 101.04 | 1 | 60.99 | 2.35 29000 | 2 | 163.86 | 29000 | |
| -31.000 | 3.774 | -0.531 | -12.32 | -63.15 | 101.04 | 1 | 61.82 | 2.35 29000 | 2 | 159.56 | 29000 | |
| -31.375 | 3.574 | -0.535 | -35.65 | -60.94 | 101.04 | 1 | 62.66 | 2.35 29000 | 2 | 155.23 | 29000 | |
| -31.750 | 3.372 | -0.543 | -57.78 | -56.78 | 101.04 | 1 | 63.50 | 2.35 29000 | 2 | 150.84 | 29000 | |
| -32.125 | 3.166 | -0.555 | -77.92 | -50.14 | 101.04 | 2 | 67.05 | 4.12 29000 | 2 | 146.34 | 29000 | |
| -32.500 | 2.955 | -0.570 | -94.91 | -39.69 | 101.04 | 2 | 74.62 | 4.12 29000 | 2 | 141.70 | 29000 | |
| -32.875 | 2.739 | -0.587 | -107.11 | -24.59 | 101.04 | 2 | 82.38 | 4.12 29000 | 2 | 136.88 | 29000 | |
| -33.250 | 2.515 | -0.606 | -112.76 | -4.71 | 101.04 | 2 | 90.33 | 4.12 29000 | 2 | 131.86 | 29000 | |
| -33.625 | 2.284 | -0.625 | -110.02 | 20.12 | 101.04 | 2 | 98.50 | 4.12 29000 | 2 | 126.63 | 29000 | |
| -34.000 | 2.046 | -0.643 | -97.03 | 50.05 | 101.04 | 2 | 106.86 | 4.12 29000 | 2 | 121.20 | 29000 | |
| | | | | | 101.04 | 2 | 82.22 | 4.26 43800 | 2 | 153.59 | 43800 | |
| -34.325 | 1.835 | -0.656 | -78.87 | 62.70 | 101.04 | 2 | 92.86 | 4.26 43800 | 2 | 145.72 | 43800 | |
| -34.650 | 1.620 | -0.666 | -55.61 | 81.42 | 101.04 | 2 | 103.66 | 4.26 43800 | 2 | 137.69 | 43800 | |
| -34.975 | 1.402 | -0.672 | -25.28 | 106.30 | 101.04 | 2 | 114.58 | 4.26 43800 | 2 | 129.54 | 43800 | |
| -35.300 | 1.184 | -0.673 | 14.15 | 137.39 | 101.04 | 2 | 125.54 | 4.26 43800 | 2 | 121.34 | 43800 | |
| | | | | | 101.04 | -1 | | | 2 | 379.88 | 300000 | |
| -35.800 | 0.849 | -0.665 | 52.14 | 22.83 | 101.04 | -1 | | | 2 | 280.43 | 300000 | |
| -36.300 | 0.520 | -0.653 | 45.20 | -42.41 | 101.04 | -1 | | | 2 | 182.63 | 300000 | |
| -36.800 | 0.195 | -0.645 | 18.13 | -57.20 | 101.04 | 2 | 7.70 | 1.52 300000 | 2 | 86.32 | 300000 | |
| -37.300 | -0.127 | -0.644 | 0.00 | 0.00 | 101.04 | 2 | 105.34 | 1.52 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 13.92 mm
MOMENTO MÁXIMO = -827.46 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 6 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 95.14 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.031 = (1486.45 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.225 = (3236.10 kN/m)/(14405.75 kN/m) SIN INTERÉS

*Fase 5
*Ejecucion del 3º nivel de anclajes
*Excavacion hasta 4º nivel de anclajes

* INSTALACIÓN DE LA LÍNEA DE ANCLAS N° 4 NIVEL = -17.800 m
ESPACIADO = 2.750 m
INCLINACIÓN = 25.000 GRADOS
PRECARGA = -1642.000 kN
RIGIDEZ = 5630.000 kN/m
CONEXION UNILATERAL : PARED LIBERA PARA DESPLAZAR HACIA SUELO 1

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -20.650 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -21.150 m



FASE 5

| | PARED | | | | | SOIL 1 | | | | SOIL 2 | | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | EXCAVACIÓN: 0.00 m | | | | EXCAVACIÓN: -20.65 m | | | | | |
| | | | | | | NIVEL AGUA: -8.50 m | | | | NIVEL AGUA: -21.15 m | | | | | |
| | | | | | | S. DE CAQUOT: 10.00 kPa | | | | S. DE CAQUOT: 0.00 kPa | | | | | |
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
| 0.000 | 0.853 | 0.471 | 0.00 | 0.00 | | 2 | 0.97 | 0.97 | 4900 | 0 | | | | | |
| -0.287 | 0.989 | 0.471 | 0.07 | 0.57 | | 2 | 2.97 | 2.97 | 4900 | 0 | | | | | |
| -0.575 | 1.124 | 0.471 | 0.38 | 1.71 | | 2 | 4.97 | 4.97 | 4900 | 0 | | | | | |
| -0.862 | 1.260 | 0.471 | 1.10 | 3.43 | | 2 | 6.97 | 5.15 | 4900 | 0 | | | | | |
| -1.150 | 1.395 | 0.471 | 2.41 | 5.72 | | 2 | 8.97 | 5.15 | 4900 | 0 | | | | | |
| | | | | 26.02 | | 2 | 8.97 | 5.15 | 4900 | 0 | | | | 1 | 20.30 |
| -1.200 | 1.419 | 0.471 | 3.72 | 26.47 | | 2 | 9.32 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | -1 | | | | 0 | | | | | |
| -1.625 | 1.619 | 0.473 | 14.97 | 26.47 | | -1 | | | | 0 | | | | | |
| -2.050 | 1.821 | 0.477 | 26.22 | 26.47 | | -1 | | | | 0 | | | | | |
| -2.475 | 2.025 | 0.483 | 37.47 | 26.47 | | -1 | | | | 0 | | | | | |
| -2.900 | 2.232 | 0.492 | 48.77 | 26.83 | | 2 | 1.69 | 1.69 | 15100 | 0 | | | | | |
| -3.213 | 2.387 | 0.499 | 57.27 | 27.65 | | 2 | 3.57 | 3.57 | 15100 | 0 | | | | | |
| -3.525 | 2.545 | 0.508 | 66.12 | 29.06 | | 2 | 5.45 | 4.30 | 15100 | 0 | | | | | |
| -3.838 | 2.705 | 0.518 | 75.50 | 31.06 | | 2 | 7.33 | 4.50 | 15100 | 0 | | | | | |
| -4.150 | 2.869 | 0.530 | 85.59 | 33.65 | | 2 | 9.22 | 4.71 | 15100 | 0 | | | | | |
| -4.463 | 3.036 | 0.543 | 96.59 | 36.82 | | 2 | 11.11 | 4.85 | 15100 | 0 | | | | | |
| -4.775 | 3.208 | 0.557 | 108.67 | 40.59 | | 2 | 13.00 | 4.85 | 15100 | 0 | | | | | |
| -5.088 | 3.385 | 0.574 | 122.02 | 44.95 | | 2 | 14.90 | 4.85 | 15100 | 0 | | | | | |
| -5.400 | 3.567 | 0.592 | 136.82 | 49.91 | | 2 | 16.81 | 4.85 | 15100 | 0 | | | | | |
| | | | | | | 2 | 10.41 | 4.55 | 20600 | 0 | | | | | |
| -5.788 | 3.801 | 0.618 | 157.00 | 54.39 | | 2 | 12.76 | 4.55 | 20600 | 0 | | | | | |
| -6.175 | 4.046 | 0.648 | 179.10 | 59.80 | | 2 | 15.12 | 4.55 | 20600 | 0 | | | | | |
| -6.562 | 4.304 | 0.682 | 203.46 | 66.12 | | 2 | 17.49 | 4.55 | 20600 | 0 | | | | | |
| -6.950 | 4.575 | 0.720 | 230.46 | 73.35 | | 2 | 19.85 | 4.55 | 20600 | 0 | | | | | |
| -7.337 | 4.862 | 0.763 | 260.43 | 81.50 | | 2 | 22.21 | 4.55 | 20600 | 0 | | | | | |
| -7.725 | 5.168 | 0.812 | 293.73 | 90.56 | | 2 | 24.56 | 4.55 | 20600 | 0 | | | | | |
| -8.113 | 5.493 | 0.868 | 330.73 | 100.53 | | 2 | 26.89 | 4.55 | 20600 | 0 | | | | | |
| -8.500 | 5.841 | 0.930 | 371.76 | 111.40 | | 2 | 29.20 | 4.55 | 20600 | 0 | | | | | |
| -8.950 | 6.277 | 1.011 | 425.05 | 125.86 | 4.41 | 2 | 30.64 | 4.55 | 20600 | 0 | | | | | |
| | | | | -209.46 | 4.41 | 2 | 30.64 | 4.55 | 20600 | 0 | | | | 2 | -936.35 |
| -9.300 | 6.642 | 1.074 | 353.97 | -196.41 | 7.85 | 2 | 31.71 | 4.55 | 20600 | 0 | | | | | |
| -9.650 | 7.027 | 1.125 | 287.74 | -181.78 | 11.28 | 2 | 32.73 | 4.55 | 20600 | 0 | | | | | |
| -10.150 | 7.605 | 1.181 | 202.62 | -158.21 | 16.19 | 2 | 34.09 | 4.55 | 20600 | 0 | | | | | |
| -10.512 | 8.038 | 1.210 | 148.67 | -139.17 | 19.74 | 2 | 34.99 | 4.55 | 20600 | 0 | | | | | |
| -10.875 | 8.480 | 1.230 | 101.91 | -118.54 | 23.30 | 2 | 35.79 | 4.55 | 20600 | 0 | | | | | |
| -11.238 | 8.929 | 1.244 | 62.91 | -96.35 | 26.85 | 2 | 36.48 | 4.55 | 20600 | 0 | | | | | |
| -11.600 | 9.381 | 1.251 | 32.23 | -72.65 | 30.41 | 2 | 37.04 | 4.55 | 20600 | 0 | | | | | |
| -11.963 | 9.836 | 1.255 | 10.42 | -47.48 | 33.97 | 2 | 37.46 | 4.55 | 20600 | 0 | | | | | |
| -12.325 | 10.291 | 1.255 | -2.02 | -20.89 | 37.52 | 2 | 37.72 | 4.55 | 20600 | 0 | | | | | |
| -12.688 | 10.746 | 1.255 | -4.57 | 7.04 | 41.08 | 2 | 37.79 | 4.55 | 20600 | 0 | | | | | |
| -13.050 | 11.201 | 1.255 | 3.24 | 36.25 | 44.64 | 2 | 37.66 | 4.55 | 20600 | 0 | | | | | |
| | | | | -289.90 | 44.64 | 2 | 37.66 | 4.55 | 20600 | 0 | | | | 3 | -910.74 |
| -13.550 | 11.825 | 1.239 | -131.24 | -247.67 | 49.54 | 2 | 37.09 | 4.55 | 20600 | 0 | | | | | |
| -13.850 | 12.194 | 1.217 | -201.60 | -221.32 | 52.48 | 2 | 36.52 | 3.73 | 20600 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.150 | 12.554 | 1.185 | -263.96 | -194.23 | 55.43 | 1 | 36.19 | 2.68 | 20600 | 0 | | | | | |
| -14.600 | 13.074 | 1.122 | -341.89 | -151.76 | 59.84 | 1 | 37.28 | 2.68 | 20600 | 0 | | | | | |
| | | | | | 59.84 | 1 | 26.15 | 2.35 | 29000 | 0 | | | | | |
| -15.000 | 13.510 | 1.054 | -395.59 | -116.40 | 63.77 | 1 | 27.04 | 2.35 | 29000 | 0 | | | | | |
| -15.400 | 13.917 | 0.978 | -434.76 | -79.11 | 67.69 | 1 | 27.94 | 2.35 | 29000 | 0 | | | | | |
| -15.800 | 14.292 | 0.897 | -458.62 | -39.90 | 71.61 | 1 | 28.83 | 2.35 | 29000 | 0 | | | | | |
| -16.200 | 14.633 | 0.812 | -466.42 | 1.24 | 75.54 | 1 | 29.72 | 2.35 | 29000 | 0 | | | | | |
| -16.600 | 14.941 | 0.727 | -457.38 | 44.31 | 79.46 | 1 | 30.61 | 2.35 | 29000 | 0 | | | | | |
| -17.000 | 15.216 | 0.646 | -430.72 | 89.30 | 83.39 | 1 | 31.51 | 2.35 | 29000 | 0 | | | | | |
| -17.400 | 15.459 | 0.571 | -385.68 | 136.22 | 87.31 | 1 | 32.40 | 2.35 | 29000 | 0 | | | | | |
| -17.800 | 15.674 | 0.506 | -321.48 | 185.07 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | | | | |
| | | | | -356.08 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | | | 4 | -1642.00 |
| -18.300 | 15.905 | 0.414 | -483.71 | -292.31 | 96.14 | 1 | 34.41 | 2.35 | 29000 | 0 | | | | | |
| -18.800 | 16.082 | 0.288 | -613.29 | -225.53 | 101.04 | 1 | 35.53 | 2.35 | 29000 | 0 | | | | | |
| -19.100 | 16.155 | 0.199 | -674.75 | -184.02 | 103.99 | 1 | 36.20 | 2.35 | 29000 | 0 | | | | | |
| -19.400 | 16.201 | 0.103 | -723.60 | -141.42 | 106.93 | 1 | 36.87 | 2.35 | 29000 | 0 | | | | | |
| -19.700 | 16.217 | 0.002 | -759.50 | -97.74 | 109.87 | 1 | 37.54 | 2.35 | 29000 | 0 | | | | | |
| -20.000 | 16.201 | -0.104 | -782.14 | -52.98 | 112.82 | 1 | 38.21 | 2.35 | 29000 | 0 | | | | | |
| | | | | | 112.82 | 1 | 51.03 | 2.68 | 20600 | 0 | | | | | |
| -20.150 | 16.182 | -0.158 | -788.23 | -28.26 | 114.29 | 1 | 51.39 | 2.68 | 20600 | 0 | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -20.650 | 16.058 | -0.338 | -781.40 | 56.10 | 119.19 | 1 | 52.60 | 2.68 | 20600 | 0 | | | | | |
| | | | | | 119.19 | 1 | 52.60 | 2.68 | 20600 | 3 | 73.67 | | 20600 | | |
| -21.150 | 15.845 | -0.512 | -742.17 | 98.63 | 124.10 | 1 | 53.80 | 2.68 | 20600 | 3 | 105.89 | | 20600 | | |
| -21.420 | 15.694 | -0.602 | -713.01 | 117.05 | 124.10 | 1 | 54.45 | 2.68 | 20600 | 3 | 114.14 | | 20600 | | |
| -21.695 | 15.517 | -0.689 | -678.48 | 133.70 | 124.10 | 1 | 55.12 | 2.68 | 20600 | 3 | 122.53 | | 20600 | | |
| -21.970 | 15.316 | -0.772 | -639.67 | 148.22 | 124.10 | 1 | 55.78 | 2.68 | 20600 | 3 | 130.93 | | 20600 | | |
| -22.245 | 15.093 | -0.850 | -597.16 | 160.62 | 124.10 | 1 | 56.44 | 2.68 | 20600 | 3 | 139.32 | | 20600 | | |
| -22.520 | 14.849 | -0.922 | -551.53 | 170.89 | 124.10 | 1 | 57.11 | 2.68 | 20600 | 3 | 147.72 | | 20600 | | |
| -22.795 | 14.586 | -0.988 | -503.36 | 179.04 | 124.10 | 1 | 57.77 | 2.68 | 20600 | 3 | 156.11 | | 20600 | | |
| -23.070 | 14.306 | -1.048 | -453.25 | 185.05 | 124.10 | 1 | 58.43 | 2.68 | 20600 | 3 | 164.51 | | 20600 | | |
| -23.345 | 14.010 | -1.102 | -401.78 | 188.95 | 124.10 | 1 | 59.10 | 2.68 | 20600 | 3 | 172.90 | | 20600 | | |
| -23.620 | 13.700 | -1.149 | -349.53 | 190.71 | 124.10 | 1 | 59.76 | 2.68 | 20600 | 3 | 181.30 | | 20600 | | |
| -23.895 | 13.379 | -1.190 | -297.08 | 190.35 | 124.10 | 1 | 60.42 | 2.68 | 20600 | 3 | 189.69 | | 20600 | | |
| -24.170 | 13.047 | -1.224 | -245.03 | 187.87 | 124.10 | 1 | 61.09 | 2.68 | 20600 | 3 | 198.09 | | 20600 | | |
| -24.445 | 12.706 | -1.251 | -193.95 | 183.25 | 124.10 | 1 | 61.75 | 2.68 | 20600 | 3 | 206.48 | | 20600 | | |
| -24.720 | 12.359 | -1.273 | -144.43 | 176.52 | 124.10 | 1 | 62.41 | 2.68 | 20600 | 3 | 214.88 | | 20600 | | |
| -25.220 | 11.716 | -1.296 | -60.31 | 158.82 | 124.10 | 1 | 63.62 | 2.68 | 20600 | 3 | 230.14 | | 20600 | | |
| -25.568 | 11.265 | -1.301 | -7.88 | 142.37 | 124.10 | 1 | 64.46 | 2.68 | 20600 | 3 | 240.75 | | 20600 | | |
| -25.915 | 10.813 | -1.299 | 38.35 | 123.37 | 124.10 | 1 | 65.30 | 2.68 | 20600 | 2 | 246.58 | | 20600 | | |
| -26.263 | 10.363 | -1.289 | 77.94 | 105.00 | 124.10 | 1 | 66.13 | 2.68 | 20600 | 2 | 238.74 | | 20600 | | |
| -26.610 | 9.918 | -1.274 | 111.67 | 89.64 | 124.10 | 1 | 66.97 | 2.68 | 20600 | 2 | 230.98 | | 20600 | | |
| -26.958 | 9.478 | -1.254 | 140.58 | 77.24 | 124.10 | 1 | 67.81 | 2.68 | 20600 | 2 | 223.35 | | 20600 | | |
| -27.305 | 9.046 | -1.230 | 165.69 | 67.76 | 124.10 | 1 | 68.65 | 2.68 | 20600 | 2 | 215.88 | | 20600 | | |
| -27.653 | 8.624 | -1.202 | 188.00 | 61.13 | 124.10 | 1 | 69.49 | 2.68 | 20600 | 2 | 208.60 | | 20600 | | |
| -28.000 | 8.212 | -1.170 | 208.50 | 57.28 | 124.10 | 1 | 70.32 | 2.68 | 20600 | 2 | 201.53 | | 20600 | | |
| | | | | | 124.10 | 1 | 55.13 | 2.35 | 29000 | 2 | 267.45 | | 29000 | | |
| -28.375 | 7.780 | -1.133 | 224.05 | 26.42 | 124.10 | 1 | 55.96 | 2.35 | 29000 | 2 | 256.39 | | 29000 | | |
| -28.750 | 7.362 | -1.094 | 228.86 | -0.05 | 124.10 | 1 | 56.80 | 2.35 | 29000 | 2 | 245.75 | | 29000 | | |
| -29.125 | 6.959 | -1.055 | 224.55 | -22.30 | 124.10 | 1 | 57.64 | 2.35 | 29000 | 2 | 235.53 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | | ESTADO | PR. SOPRAC. | ELAST. | | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.500 | 6.571 | -1.018 | 212.65 | -40.48 | 124.10 | 1 | 58.47 | 2.35 | 29000 | 2 | 225.73 | | 29000 | | |
| -29.875 | 6.196 | -0.983 | 194.68 | -54.74 | 124.10 | 1 | 59.31 | 2.35 | 29000 | 2 | 216.33 | | 29000 | | |
| -30.250 | 5.833 | -0.951 | 172.06 | -65.24 | 124.10 | 1 | 60.15 | 2.35 | 29000 | 2 | 207.28 | | 29000 | | |
| -30.625 | 5.482 | -0.924 | 146.20 | -72.08 | 124.10 | 1 | 60.99 | 2.35 | 29000 | 2 | 198.56 | | 29000 | | |
| -31.000 | 5.140 | -0.901 | 118.44 | -75.40 | 124.10 | 1 | 61.82 | 2.35 | 29000 | 2 | 190.11 | | 29000 | | |
| -31.375 | 4.805 | -0.883 | 90.09 | -75.27 | 124.10 | 1 | 62.66 | 2.35 | 29000 | 2 | 181.88 | | 29000 | | |
| -31.750 | 4.477 | -0.870 | 62.41 | -71.77 | 124.10 | 1 | 63.50 | 2.35 | 29000 | 2 | 173.81 | | 29000 | | |
| -32.125 | 4.152 | -0.862 | 36.68 | -64.95 | 124.10 | 1 | 64.33 | 2.35 | 29000 | 2 | 165.87 | | 29000 | | |
| -32.500 | 3.830 | -0.858 | 14.11 | -54.86 | 124.10 | 1 | 65.17 | 2.35 | 29000 | 2 | 157.99 | | 29000 | | |
| -32.875 | 3.508 | -0.857 | -4.06 | -41.50 | 124.10 | 1 | 66.01 | 2.35 | 29000 | 2 | 150.14 | | 29000 | | |
| -33.250 | 3.187 | -0.859 | -16.51 | -24.13 | 124.10 | 2 | 70.85 | 4.12 | 29000 | 2 | 142.28 | | 29000 | | |
| -33.625 | 2.864 | -0.862 | -21.42 | -0.87 | 124.10 | 2 | 81.67 | 4.12 | 29000 | 2 | 134.39 | | 29000 | | |
| -34.000 | 2.540 | -0.865 | -16.29 | 29.42 | 124.10 | 2 | 92.53 | 4.12 | 29000 | 2 | 126.47 | | 29000 | | |
| | | | | | 124.10 | 1 | 66.97 | 2.46 | 43800 | 2 | 165.86 | | 43800 | | |
| -34.325 | 2.259 | -0.867 | -5.07 | 40.58 | 124.10 | 2 | 74.30 | 4.26 | 43800 | 2 | 154.91 | | 43800 | | |
| -34.650 | 1.977 | -0.867 | 10.85 | 58.73 | 124.10 | 2 | 88.03 | 4.26 | 43800 | 2 | 143.95 | | 43800 | | |
| -34.975 | 1.696 | -0.863 | 33.97 | 84.89 | 124.10 | 2 | 101.73 | 4.26 | 43800 | 2 | 133.02 | | 43800 | | |
| -35.300 | 1.416 | -0.856 | 66.89 | 119.03 | 124.10 | 2 | 115.36 | 4.26 | 43800 | 2 | 122.16 | | 43800 | | |
| | | | | | 124.10 | -1 | | | | 2 | 446.29 | | 300000 | | |
| -35.800 | 0.993 | -0.837 | 91.38 | -10.55 | 124.10 | -1 | | | | 2 | 320.24 | | 300000 | | |
| -36.300 | 0.579 | -0.818 | 66.71 | -77.86 | 124.10 | -1 | | | | 2 | 197.17 | | 300000 | | |
| -36.800 | 0.173 | -0.808 | 24.28 | -80.61 | 124.10 | 2 | 14.33 | 1.52 | 300000 | 2 | 76.35 | | 300000 | | |
| -37.300 | -0.230 | -0.806 | 0.00 | 0.00 | 124.10 | 2 | 136.25 | 1.52 | 300000 | -1 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | |

DESPLAZAMIENTO MÁX. = 16.22 mm

MOMENTO MÁXIMO = -788.23 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 7 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 112.93 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.032 = (1504.93 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.252 = (3111.67 kN/m)/(12355.30 kN/m) SIN INTERÉS



** FASE No 6 **

*Fase 6
*Ejecucion del 4º nivel de anclajes
*Excavacion hasta el nivel de losa de fondo

* INSTALACIÓN DE LA LÍNEA DE ANCLAS N° 5
NIVEL = -20.150 m
ESPACIADO = 2.750 m
INCLINACIÓN = 25.000 GRADOS
PRECARGA = -1642.000 kN
RIGIDEZ = 5630.000 kN/m
CONEXION UNILATERAL : PARED LIBERA PARA DESPLAZAR HACIA SUELO 1

* EXCAVACIÓN EN SUELO 2
PARA NIVEL = -22.520 m
CON BERMA EN NIVEL = -24.720 m A = 2.470 m B = 4.670 m
SIMULACIÓN CON LAS SOBRECARGAS DE BOUSSINESQ

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -25.220 m

FASE 6

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -8.50 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -22.52 m NIVEL AGUA: -25.22 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 0.908 | 0.421 | 0.00 | 0.00 | | 2 | 0.70 | 0.70 | 4900 | 0 | | | |
| -0.287 | 1.029 | 0.421 | 0.06 | 0.50 | | 2 | 2.77 | 2.77 | 4900 | 0 | | | |
| -0.575 | 1.150 | 0.421 | 0.34 | 1.59 | | 2 | 4.84 | 4.84 | 4900 | 0 | | | |
| -0.862 | 1.271 | 0.421 | 1.03 | 3.28 | | 2 | 6.92 | 5.15 | 4900 | 0 | | | |
| -1.150 | 1.392 | 0.421 | 2.29 | 5.57 | | 2 | 8.99 | 5.15 | 4900 | 0 | | | |
| | | | | 28.26 | | 2 | 8.99 | 5.15 | 4900 | 0 | | 1 | 22.69 |
| -1.200 | 1.413 | 0.421 | 3.71 | 28.72 | | 2 | 9.35 | 5.15 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.625 | 1.593 | 0.423 | 15.92 | 28.72 | | -1 | | | | 0 | | | |
| -2.050 | 1.773 | 0.427 | 28.13 | 28.72 | | -1 | | | | 0 | | | |
| -2.475 | 1.956 | 0.434 | 40.33 | 28.72 | | -1 | | | | 0 | | | |
| -2.900 | 2.143 | 0.443 | 52.63 | 29.37 | | 2 | 3.05 | 3.05 | 15100 | 0 | | | |
| -3.213 | 2.282 | 0.451 | 61.99 | 30.65 | | 2 | 5.15 | 4.85 | 15100 | 0 | | | |
| -3.525 | 2.425 | 0.461 | 71.86 | 32.59 | | 2 | 7.26 | 4.85 | 15100 | 0 | | | |
| -3.838 | 2.570 | 0.472 | 82.43 | 35.19 | | 2 | 9.36 | 4.85 | 15100 | 0 | | | |
| -4.150 | 2.720 | 0.484 | 93.92 | 38.44 | | 2 | 11.47 | 4.85 | 15100 | 0 | | | |
| -4.463 | 2.873 | 0.499 | 106.52 | 42.35 | | 2 | 13.57 | 4.85 | 15100 | 0 | | | |
| -4.775 | 3.031 | 0.515 | 120.46 | 46.92 | | 2 | 15.67 | 4.85 | 15100 | 0 | | | |
| -5.088 | 3.195 | 0.533 | 135.92 | 52.15 | | 2 | 17.77 | 4.85 | 15100 | 0 | | | |
| -5.400 | 3.365 | 0.554 | 153.11 | 58.02 | | 2 | 19.86 | 4.85 | 15100 | 0 | | | |
| | | | | | | 2 | 14.56 | 4.55 | 20600 | 0 | | | |
| -5.788 | 3.585 | 0.583 | 176.76 | 64.18 | | 2 | 17.21 | 4.55 | 20600 | 0 | | | |
| -6.175 | 3.817 | 0.616 | 202.99 | 71.36 | | 2 | 19.84 | 4.55 | 20600 | 0 | | | |
| -6.562 | 4.063 | 0.655 | 232.19 | 79.55 | | 2 | 22.44 | 4.55 | 20600 | 0 | | | |
| -6.950 | 4.325 | 0.699 | 264.77 | 88.74 | | 2 | 25.00 | 4.55 | 20600 | 0 | | | |
| -7.337 | 4.606 | 0.749 | 301.10 | 98.92 | | 2 | 27.50 | 4.55 | 20600 | 0 | | | |
| -7.725 | 4.906 | 0.806 | 341.55 | 110.04 | | 2 | 29.94 | 4.55 | 20600 | 0 | | | |
| -8.113 | 5.231 | 0.870 | 386.50 | 122.10 | | 2 | 32.29 | 4.55 | 20600 | 0 | | | |
| -8.500 | 5.582 | 0.943 | 436.30 | 135.05 | | 2 | 34.54 | 4.55 | 20600 | 0 | | | |
| -8.950 | 6.027 | 1.039 | 500.76 | 151.87 | 4.41 | 2 | 35.79 | 4.55 | 20600 | 0 | | | |
| | | | | -182.89 | 4.41 | 2 | 35.79 | 4.55 | 20600 | 0 | | 2 | -934.78 |
| -9.300 | 6.404 | 1.114 | 439.30 | -168.07 | 7.85 | 2 | 36.62 | 4.55 | 20600 | 0 | | | |
| -9.650 | 6.806 | 1.179 | 383.28 | -151.78 | 11.28 | 2 | 37.30 | 4.55 | 20600 | 0 | | | |
| -10.150 | 7.416 | 1.259 | 313.70 | -126.09 | 16.19 | 2 | 37.98 | 4.55 | 20600 | 0 | | | |
| -10.512 | 7.881 | 1.307 | 271.63 | -105.77 | 19.74 | 2 | 38.22 | 4.55 | 20600 | 0 | | | |
| -10.875 | 8.363 | 1.349 | 237.17 | -84.11 | 23.30 | 2 | 38.22 | 4.55 | 20600 | 0 | | | |
| -11.238 | 8.858 | 1.386 | 210.80 | -61.22 | 26.85 | 2 | 37.93 | 4.55 | 20600 | 0 | | | |
| -11.600 | 9.367 | 1.419 | 192.93 | -37.20 | 30.41 | 2 | 37.34 | 4.55 | 20600 | 0 | | | |
| -11.963 | 9.887 | 1.450 | 183.95 | -12.16 | 33.97 | 2 | 36.40 | 4.55 | 20600 | 0 | | | |
| -12.325 | 10.418 | 1.481 | 184.22 | 13.75 | 37.52 | 2 | 35.09 | 4.55 | 20600 | 0 | | | |
| -12.688 | 10.961 | 1.512 | 194.01 | 40.41 | 41.08 | 2 | 33.36 | 3.37 | 20600 | 0 | | | |
| -13.050 | 11.515 | 1.546 | 213.63 | 68.07 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | |
| | | | | -258.79 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | 3 | -912.72 |
| -13.550 | 12.298 | 1.580 | 94.27 | -218.17 | 49.54 | 1 | 34.75 | 2.68 | 20600 | 0 | | | |
| -13.850 | 12.773 | 1.589 | 32.66 | -192.33 | 52.48 | 1 | 35.47 | 2.68 | 20600 | 0 | | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -14.150 | 13.250 | 1.590 | -21.02 | -165.40 | 55.43 | 1 | 36.19 | 2.68 | 20600 | 0 | | | |
| -14.600 | 13.963 | 1.578 | -85.99 | -122.93 | 59.84 | 1 | 37.28 | 2.68 | 20600 | 0 | | | |
| | | | | | 59.84 | 1 | 26.15 | 2.35 | 29000 | 0 | | | |
| -15.000 | 14.591 | 1.558 | -128.16 | -87.57 | 63.77 | 1 | 27.04 | 2.35 | 29000 | 0 | | | |
| -15.400 | 15.209 | 1.532 | -155.79 | -50.29 | 67.69 | 1 | 27.94 | 2.35 | 29000 | 0 | | | |
| -15.800 | 15.816 | 1.503 | -168.13 | -11.07 | 71.61 | 1 | 28.83 | 2.35 | 29000 | 0 | | | |
| -16.200 | 16.411 | 1.472 | -164.39 | 30.07 | 75.54 | 1 | 29.72 | 2.35 | 29000 | 0 | | | |
| -16.600 | 16.994 | 1.443 | -143.82 | 73.14 | 79.46 | 1 | 30.61 | 2.35 | 29000 | 0 | | | |
| -17.000 | 17.567 | 1.420 | -105.63 | 118.13 | 83.39 | 1 | 31.51 | 2.35 | 29000 | 0 | | | |
| -17.400 | 18.132 | 1.406 | -49.06 | 165.05 | 87.31 | 1 | 32.40 | 2.35 | 29000 | 0 | | | |
| -17.800 | 18.693 | 1.404 | 26.67 | 213.90 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | | |
| | | | | -332.33 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | 4 | -1657.41 |
| -18.300 | 19.393 | 1.392 | -123.68 | -268.56 | 96.14 | 1 | 34.41 | 2.35 | 29000 | 0 | | | |
| -18.800 | 20.080 | 1.350 | -241.39 | -201.78 | 101.04 | 1 | 35.53 | 2.35 | 29000 | 0 | | | |
| -19.100 | 20.480 | 1.313 | -295.73 | -160.27 | 103.99 | 1 | 36.20 | 2.35 | 29000 | 0 | | | |
| -19.400 | 20.867 | 1.269 | -337.45 | -117.67 | 106.93 | 1 | 36.87 | 2.35 | 29000 | 0 | | | |
| -19.700 | 21.241 | 1.221 | -366.22 | -73.99 | 109.87 | 1 | 37.54 | 2.35 | 29000 | 0 | | | |
| -20.000 | 21.599 | 1.170 | -381.73 | -29.23 | 112.82 | 1 | 38.21 | 2.35 | 29000 | 0 | | | |
| | | | | | 112.82 | 1 | 51.03 | 2.68 | 20600 | 0 | | | |
| -20.150 | 21.773 | 1.143 | -384.27 | -4.51 | 114.29 | 1 | 51.39 | 2.68 | 20600 | 0 | | | |
| | | | | -545.66 | 114.29 | 1 | 51.39 | 2.68 | 20600 | 0 | | 5 | -1642.00 |
| -20.650 | 22.317 | 1.026 | -636.13 | -461.30 | 119.19 | 1 | 52.60 | 2.68 | 20600 | 0 | | | |
| -21.150 | 22.790 | 0.856 | -845.06 | -373.88 | 124.10 | 1 | 53.80 | 2.68 | 20600 | 0 | | | |
| -21.420 | 23.006 | 0.746 | -939.48 | -325.40 | 126.75 | 1 | 54.45 | 2.68 | 20600 | 0 | | | |
| -21.695 | 23.195 | 0.623 | -1022.07 | -275.11 | 129.44 | 1 | 55.12 | 2.68 | 20600 | 0 | | | |
| -21.970 | 23.348 | 0.490 | -1090.70 | -223.89 | 132.14 | 1 | 55.78 | 2.68 | 20600 | 0 | | | |
| -22.245 | 23.464 | 0.349 | -1145.12 | -171.75 | 134.84 | 1 | 56.44 | 2.68 | 20600 | 0 | | | |
| -22.520 | 23.540 | 0.203 | -1185.08 | -118.69 | 137.54 | 1 | 57.11 | 2.68 | 20600 | 0 | | | |
| | | | | | 137.54 | 1 | 57.11 | 2.68 | 20600 | 3 | 31.66 | 20600 | |
| -22.795 | 23.575 | 0.052 | -1211.63 | -74.70 | 140.23 | 1 | 57.77 | 2.68 | 20600 | 3 | 41.09 | 20600 | |
| -23.070 | 23.568 | -0.101 | -1226.36 | -32.78 | 142.93 | 1 | 58.43 | 2.68 | 20600 | 3 | 53.40 | 20600 | |
| -23.345 | 23.519 | -0.255 | -1229.90 | 6.53 | 145.63 | 1 | 59.10 | 2.68 | 20600 | 3 | 66.82 | 20600 | |
| -23.620 | 23.428 | -0.409 | -1223.04 | 42.89 | 148.33 | 1 | 59.76 | 2.68 | 20600 | 3 | 81.53 | 20600 | |
| -23.895 | 23.294 | -0.562 | -1206.62 | 75.92 | 151.02 | 1 | 60.42 | 2.68 | 20600 | 3 | 97.78 | 20600 | |
| -24.170 | 23.119 | -0.712 | -1181.63 | 105.16 | 153.72 | 1 | 61.09 | 2.68 | 20600 | 3 | 115.85 | 20600 | |
| -24.445 | 22.903 | -0.858 | -1149.23 | 129.51 | 156.42 | 1 | 61.75 | 2.68 | 20600 | 3 | 140.04 | 20600 | |
| -24.720 | 22.647 | -1.000 | -1110.85 | 148.88 | 159.12 | 1 | 62.41 | 2.68 | 20600 | 3 | 158.75 | 20600 | |
| -25.220 | 22.085 | -1.245 | -1029.10 | 177.06 | 164.02 | 1 | 63.62 | 2.68 | 20600 | 3 | 177.70 | 20600 | |
| -25.568 | 21.624 | -1.403 | -964.54 | 194.54 | 164.02 | 1 | 64.46 | 2.68 | 20600 | 3 | 177.81 | 20600 | |
| -25.915 | 21.111 | -1.551 | -893.89 | 212.03 | 164.02 | 1 | 65.30 | 2.68 | 20600 | 3 | 179.32 | 20600 | |
| -26.263 | 20.548 | -1.687 | -817.23 | 229.06 | 164.02 | 1 | 66.13 | 2.68 | 20600 | 3 | 182.13 | 20600 | |
| -26.610 | 19.940 | -1.810 | -734.79 | 245.21 | 164.02 | 1 | 66.97 | 2.68 | 20600 | 3 | 186.11 | 20600 | |
| -26.958 | 19.292 | -1.920 | -646.96 | 260.08 | 164.02 | 1 | 67.81 | 2.68 | 20600 | 3 | 191.10 | 20600 | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.305 | 18.608 | -2.015 | -554.22 | 273.36 | 164.02 | 1 | 68.65 | 2.68 | 20600 | 3 | 196.98 | | 20600 | | | |
| -27.653 | 17.893 | -2.095 | -457.19 | 284.76 | 164.02 | 1 | 69.49 | 2.68 | 20600 | 3 | 203.61 | | 20600 | | | |
| -28.000 | 17.153 | -2.160 | -356.56 | 294.03 | 164.02 | 1 | 70.32 | 2.68 | 20600 | 3 | 210.88 | | 20600 | | | |
| | | | | | 164.02 | 1 | 55.13 | 2.35 | 29000 | 3 | 253.95 | | 29000 | | | |
| -28.375 | 16.333 | -2.212 | -248.97 | 279.20 | 164.02 | 1 | 55.96 | 2.35 | 29000 | 3 | 264.26 | | 29000 | | | |
| -28.750 | 15.497 | -2.245 | -147.62 | 260.71 | 164.02 | 1 | 56.80 | 2.35 | 29000 | 3 | 275.14 | | 29000 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.125 | 14.651 | -2.263 | -53.92 | 238.37 | 164.02 | 1 | 57.64 | 2.35 | 29000 | 3 | 286.51 | 29000 | | | |
| -29.500 | 13.802 | -2.264 | 30.66 | 212.01 | 164.02 | 1 | 58.47 | 2.35 | 29000 | 3 | 298.26 | 29000 | | | |
| -29.875 | 12.955 | -2.253 | 104.57 | 181.49 | 164.02 | 1 | 59.31 | 2.35 | 29000 | 3 | 310.34 | 29000 | | | |
| -30.250 | 12.114 | -2.229 | 166.24 | 146.70 | 164.02 | 1 | 60.15 | 2.35 | 29000 | 3 | 322.68 | 29000 | | | |
| -30.625 | 11.284 | -2.196 | 214.05 | 107.56 | 164.02 | 1 | 60.99 | 2.35 | 29000 | 3 | 335.23 | 29000 | | | |
| -31.000 | 10.468 | -2.157 | 246.77 | 67.32 | 164.02 | 1 | 61.82 | 2.35 | 29000 | 2 | 330.28 | 29000 | | | |
| -31.375 | 9.667 | -2.113 | 265.21 | 32.40 | 164.02 | 1 | 62.66 | 2.35 | 29000 | 2 | 308.44 | 29000 | | | |
| -31.750 | 8.883 | -2.067 | 272.13 | 5.90 | 164.02 | 1 | 63.50 | 2.35 | 29000 | 2 | 287.10 | 29000 | | | |
| -32.125 | 8.117 | -2.020 | 270.66 | -12.38 | 164.02 | 1 | 64.33 | 2.35 | 29000 | 2 | 266.28 | 29000 | | | |
| -32.500 | 7.368 | -1.974 | 263.85 | -22.64 | 164.02 | 1 | 65.17 | 2.35 | 29000 | 2 | 245.98 | 29000 | | | |
| -32.875 | 6.636 | -1.930 | 254.66 | -25.06 | 164.02 | 1 | 66.01 | 2.35 | 29000 | 2 | 226.17 | 29000 | | | |
| -33.250 | 5.920 | -1.887 | 246.01 | -19.83 | 164.02 | 1 | 66.85 | 2.35 | 29000 | 2 | 206.84 | 29000 | | | |
| -33.625 | 5.221 | -1.845 | 240.73 | -7.12 | 164.02 | 1 | 67.68 | 2.35 | 29000 | 2 | 187.98 | 29000 | | | |
| -34.000 | 4.536 | -1.804 | 241.58 | 12.88 | 164.02 | 1 | 68.52 | 2.35 | 29000 | 2 | 169.57 | 29000 | | | |
| | | | | | 164.02 | 1 | 66.97 | 2.46 | 43800 | 2 | 238.00 | 43800 | | | |
| -34.325 | 3.956 | -1.768 | 245.83 | 14.65 | 164.02 | 1 | 67.77 | 2.46 | 43800 | 2 | 213.93 | 43800 | | | |
| -34.650 | 3.387 | -1.731 | 251.97 | 24.41 | 164.02 | 1 | 68.57 | 2.46 | 43800 | 2 | 190.38 | 43800 | | | |
| -34.975 | 2.831 | -1.693 | 262.55 | 42.00 | 164.02 | 1 | 69.37 | 2.46 | 43800 | 2 | 167.37 | 43800 | | | |
| -35.300 | 2.287 | -1.653 | 280.22 | 68.38 | 164.02 | 2 | 77.22 | 4.26 | 43800 | 2 | 144.92 | 43800 | | | |
| | | | | | 164.02 | -1 | | | | 2 | 702.04 | 300000 | | | |
| -35.800 | 1.477 | -1.590 | 257.25 | -140.09 | 164.02 | -1 | | | | 2 | 459.90 | 300000 | | | |
| -36.300 | 0.695 | -1.541 | 159.94 | -229.65 | 164.02 | -1 | | | | 2 | 226.36 | 300000 | | | |
| -36.800 | -0.069 | -1.518 | 50.38 | -182.50 | 164.02 | 2 | 86.90 | 1.52 | 300000 | -1 | | | | | |
| -37.300 | -0.826 | -1.514 | 0.00 | 0.00 | 164.02 | 2 | 315.07 | 1.52 | 300000 | -1 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | |

DESPLAZAMIENTO MÁX. = 23.57 mm

MOMENTO MÁXIMO =-1229.90 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 7 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 108.32 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.033 = (1576.08 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.326 = (3202.42 kN/m)/(9821.72 kN/m) SIN INTERÉS



**  FASE No 7  **

*Fase 7
*Ejecucion de la losa de fondo y retirada de anclajes provisionales

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 6
NIVEL = -21.420 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 1340000.125 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE ANCLAS N° 2



FASE 7

| | PARED | SOIL 1 | SOIL 2 | |
|---|---|---|---|---|
| | | EXCAVACIÓN: 0.00 m | EXCAVACIÓN: -22.52 m | PUNTALES/ |
| | | NIVEL AGUA: -8.50 m | NIVEL AGUA: -25.22 m | ANCLAS |
| | | S. DE CAQUOT: 10.00 kPa | S. DE CAQUOT: 0.00 kPa | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | -1.185 | 2.363 | 0.00 | 0.00 | | 2 | 10.96 | 5.15 | 4900 | 0 | | | |
| -0.287 | -0.506 | 2.363 | 0.44 | 3.05 | | 2 | 10.29 | 5.15 | 4900 | 0 | | | |
| -0.575 | 0.174 | 2.363 | 1.74 | 5.92 | | 2 | 9.63 | 5.15 | 4900 | 0 | | | |
| -0.862 | 0.853 | 2.363 | 3.83 | 8.59 | | 2 | 8.97 | 5.15 | 4900 | 0 | | | |
| -1.150 | 1.533 | 2.364 | 6.66 | 11.07 | | 2 | 8.30 | 5.15 | 4900 | 0 | | | |
| | | | | -86.30 | | 2 | 8.30 | 5.15 | 4900 | 0 | | 1 | -97.38 |
| -1.200 | 1.651 | 2.364 | 2.36 | -85.89 | | 2 | 8.19 | 5.15 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.625 | 2.655 | 2.361 | -34.15 | -85.89 | | -1 | | | | 0 | | | |
| -2.050 | 3.657 | 2.351 | -70.65 | -85.89 | | -1 | | | | 0 | | | |
| -2.475 | 4.653 | 2.334 | -107.15 | -85.89 | | -1 | | | | 0 | | | |
| -2.900 | 5.639 | 2.309 | -143.64 | -85.74 | | 1 | 0.69 | 0.69 | 15100 | 0 | | | |
| -3.213 | 6.358 | 2.287 | -170.37 | -85.26 | | 1 | 2.38 | 2.38 | 15100 | 0 | | | |
| -3.525 | 7.068 | 2.261 | -196.87 | -84.26 | | 1 | 4.06 | 2.91 | 15100 | 0 | | | |
| -3.838 | 7.770 | 2.231 | -222.98 | -82.73 | | 1 | 5.74 | 2.91 | 15100 | 0 | | | |
| -4.150 | 8.462 | 2.197 | -248.52 | -80.67 | | 1 | 7.42 | 2.91 | 15100 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -4.463 | 9.143 | 2.160 | -273.34 | -78.09 | | 1 | 9.10 | 2.91 | 15100 | 0 | | | | | | | |
| -4.775 | 9.812 | 2.119 | -297.27 | -74.98 | | 1 | 10.79 | 2.91 | 15100 | 0 | | | | | | | |
| -5.088 | 10.467 | 2.075 | -320.15 | -71.35 | | 1 | 12.47 | 2.91 | 15100 | 0 | | | | | | | |
| -5.400 | 11.109 | 2.028 | -341.81 | -67.19 | | 1 | 14.15 | 2.91 | 15100 | 0 | | | | | | | |
| | | | | | | 1 | 6.78 | 2.68 | 20600 | 0 | | | | | | | |
| -5.788 | 11.882 | 1.965 | -367.29 | -64.18 | | 1 | 8.75 | 2.68 | 20600 | 0 | | | | | | | |
| -6.175 | 12.631 | 1.898 | -391.45 | -60.40 | | 1 | 10.73 | 2.68 | 20600 | 0 | | | | | | | |
| -6.562 | 13.353 | 1.827 | -414.00 | -55.86 | | 1 | 12.70 | 2.68 | 20600 | 0 | | | | | | | |
| -6.950 | 14.046 | 1.752 | -434.64 | -50.56 | | 1 | 14.67 | 2.68 | 20600 | 0 | | | | | | | |
| -7.337 | 14.710 | 1.673 | -453.08 | -44.49 | | 1 | 16.65 | 2.68 | 20600 | 0 | | | | | | | |
| -7.725 | 15.342 | 1.591 | -469.02 | -37.66 | | 1 | 18.62 | 2.68 | 20600 | 0 | | | | | | | |
| -8.113 | 15.943 | 1.507 | -482.17 | -30.06 | | 1 | 20.59 | 2.68 | 20600 | 0 | | | | | | | |
| -8.500 | 16.510 | 1.421 | -492.22 | -21.70 | | 1 | 22.57 | 2.68 | 20600 | 0 | | | | | | | |
| -8.950 | 17.127 | 1.319 | -499.52 | -10.31 | 4.41 | 1 | 23.65 | 2.68 | 20600 | 0 | | | | | | | |
| -9.300 | 17.574 | 1.239 | -501.32 | 0.27 | 7.85 | 1 | 24.50 | 2.68 | 20600 | 0 | | | | | | | |
| -9.650 | 17.994 | 1.159 | -499.16 | 12.33 | 11.28 | 1 | 25.34 | 2.68 | 20600 | 0 | | | | | | | |
| -10.150 | 18.545 | 1.046 | -488.16 | 32.17 | 16.19 | 1 | 26.55 | 2.68 | 20600 | 0 | | | | | | | |
| -10.512 | 18.910 | 0.966 | -473.59 | 48.47 | 19.74 | 1 | 27.42 | 2.68 | 20600 | 0 | | | | | | | |
| -10.875 | 19.246 | 0.890 | -452.82 | 66.37 | 23.30 | 1 | 28.29 | 2.68 | 20600 | 0 | | | | | | | |
| -11.238 | 19.555 | 0.817 | -425.28 | 85.87 | 26.85 | 1 | 29.17 | 2.68 | 20600 | 0 | | | | | | | |
| -11.600 | 19.839 | 0.749 | -390.37 | 106.98 | 30.41 | 1 | 30.04 | 2.68 | 20600 | 0 | | | | | | | |
| -11.963 | 20.099 | 0.688 | -347.52 | 129.70 | 33.97 | 1 | 30.92 | 2.68 | 20600 | 0 | | | | | | | |
| -12.325 | 20.339 | 0.635 | -296.14 | 154.03 | 37.52 | 1 | 31.79 | 2.68 | 20600 | 0 | | | | | | | |
| -12.688 | 20.561 | 0.591 | -235.66 | 179.96 | 41.08 | 1 | 32.67 | 2.68 | 20600 | 0 | | | | | | | |
| -13.050 | 20.768 | 0.557 | -165.48 | 207.49 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | -140.22 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | | | | 3 | -970.96 |
| -13.550 | 21.036 | 0.512 | -225.57 | -99.60 | 49.54 | 1 | 34.75 | 2.68 | 20600 | 0 | | | | | | | |
| -13.850 | 21.185 | 0.479 | -251.60 | -73.77 | 52.48 | 1 | 35.47 | 2.68 | 20600 | 0 | | | | | | | |
| -14.150 | 21.323 | 0.444 | -269.72 | -46.83 | 55.43 | 1 | 36.19 | 2.68 | 20600 | 0 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | | | kN | |



FASE 7 (CONTINUACIÓN)

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.600 | 21.510 | 0.387 | -281.33 | -4.37 | 59.84 | 1 | 37.28 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 59.84 | 1 | 26.15 | 2.35 | 29000 | 0 | | | | | | | |
| -15.000 | 21.655 | 0.336 | -276.07 | 30.99 | 63.77 | 1 | 27.04 | 2.35 | 29000 | 0 | | | | | | | |
| -15.400 | 21.779 | 0.287 | -256.28 | 68.28 | 67.69 | 1 | 27.94 | 2.35 | 29000 | 0 | | | | | | | |
| -15.800 | 21.885 | 0.243 | -221.19 | 107.49 | 71.61 | 1 | 28.83 | 2.35 | 29000 | 0 | | | | | | | |
| -16.200 | 21.974 | 0.207 | -170.02 | 148.63 | 75.54 | 1 | 29.72 | 2.35 | 29000 | 0 | | | | | | | |
| -16.600 | 22.052 | 0.182 | -102.02 | 191.70 | 79.46 | 1 | 30.61 | 2.35 | 29000 | 0 | | | | | | | |
| -17.000 | 22.122 | 0.171 | -16.41 | 236.70 | 83.39 | 1 | 31.51 | 2.35 | 29000 | 0 | | | | | | | |
| -17.400 | 22.191 | 0.177 | 87.59 | 283.62 | 87.31 | 1 | 32.40 | 2.35 | 29000 | 0 | | | | | | | |
| -17.800 | 22.266 | 0.204 | 210.74 | 332.46 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | -219.77 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | | | | | 4 | -1675.64 |
| -18.300 | 22.378 | 0.241 | 116.67 | -156.00 | 96.14 | 1 | 34.41 | 2.35 | 29000 | 0 | | | | | | | |
| -18.800 | 22.504 | 0.260 | 55.24 | -89.22 | 101.04 | 1 | 35.53 | 2.35 | 29000 | 0 | | | | | | | |
| -19.100 | 22.582 | 0.266 | 34.67 | -47.71 | 103.99 | 1 | 36.20 | 2.35 | 29000 | 0 | | | | | | | |
| -19.400 | 22.663 | 0.270 | 26.72 | -5.11 | 106.93 | 1 | 36.87 | 2.35 | 29000 | 0 | | | | | | | |
| -19.700 | 22.744 | 0.274 | 31.71 | 38.57 | 109.87 | 1 | 37.54 | 2.35 | 29000 | 0 | | | | | | | |
| -20.000 | 22.827 | 0.279 | 49.97 | 83.33 | 112.82 | 1 | 38.21 | 2.35 | 29000 | 0 | | | | | | | |
| | | | | | 112.82 | 1 | 51.03 | 2.68 | 20600 | 0 | | | | | | | |
| -20.150 | 22.869 | 0.283 | 64.32 | 108.04 | 114.29 | 1 | 51.39 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | -434.95 | 114.29 | 1 | 51.39 | 2.68 | 20600 | 0 | | | | | | 5 | -1647.59 |
| -20.650 | 23.010 | 0.274 | -132.19 | -350.58 | 119.19 | 1 | 52.60 | 2.68 | 20600 | 0 | | | | | | | |
| -21.150 | 23.137 | 0.226 | -285.75 | -263.16 | 124.10 | 1 | 53.80 | 2.68 | 20600 | 0 | | | | | | | |
| -21.420 | 23.193 | 0.186 | -350.28 | -214.68 | 126.75 | 1 | 54.45 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | -464.09 | 126.75 | 1 | 54.45 | 2.68 | 20600 | 0 | | | | | | 6 | -249.41 |
| -21.695 | 23.237 | 0.135 | -471.01 | -413.80 | 129.44 | 1 | 55.12 | 2.68 | 20600 | 0 | | | | | | | |
| -21.970 | 23.265 | 0.069 | -577.77 | -362.35 | 132.14 | 2 | 57.48 | 4.38 | 20600 | 0 | | | | | | | |
| -22.245 | 23.274 | -0.010 | -670.17 | -309.44 | 134.84 | 2 | 60.35 | 4.55 | 20600 | 0 | | | | | | | |
| -22.520 | 23.259 | -0.099 | -747.82 | -255.04 | 137.54 | 2 | 62.89 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | | 137.54 | 2 | 62.89 | 4.55 | 20600 | 2 | 25.88 | | 20600 | | | | |
| -22.795 | 23.218 | -0.197 | -811.39 | -207.45 | 140.23 | 2 | 65.11 | 4.55 | 20600 | 2 | 33.75 | | 20600 | | | | |
| -23.070 | 23.150 | -0.302 | -862.03 | -161.14 | 142.93 | 2 | 67.05 | 4.55 | 20600 | 2 | 44.79 | | 20600 | | | | |
| -23.345 | 23.052 | -0.413 | -900.20 | -116.82 | 145.63 | 2 | 68.72 | 4.55 | 20600 | 2 | 57.19 | | 20600 | | | | |
| -23.620 | 22.922 | -0.528 | -926.51 | -74.94 | 148.33 | 2 | 70.17 | 4.55 | 20600 | 2 | 71.12 | | 20600 | | | | |
| -23.895 | 22.761 | -0.645 | -941.69 | -36.03 | 151.02 | 2 | 71.40 | 4.55 | 20600 | 2 | 86.80 | | 20600 | | | | |
| -24.170 | 22.568 | -0.764 | -946.65 | -0.65 | 153.72 | 2 | 72.44 | 4.55 | 20600 | 2 | 104.49 | | 20600 | | | | |
| -24.445 | 22.341 | -0.883 | -942.48 | 30.00 | 156.42 | 2 | 73.32 | 4.55 | 20600 | 2 | 128.47 | | 20600 | | | | |
| -24.720 | 22.082 | -1.000 | -930.60 | 55.76 | 159.12 | 2 | 74.05 | 4.55 | 20600 | 2 | 147.11 | | 20600 | | | | |
| -25.220 | 21.530 | -1.209 | -892.51 | 95.48 | 164.02 | 2 | 75.06 | 4.55 | 20600 | 2 | 166.26 | | 20600 | | | | |
| -25.568 | 21.085 | -1.347 | -854.93 | 120.79 | 164.02 | 2 | 75.56 | 4.55 | 20600 | 2 | 166.70 | | 20600 | | | | |
| -25.915 | 20.594 | -1.480 | -808.59 | 145.84 | 164.02 | 2 | 75.95 | 4.55 | 20600 | 2 | 168.67 | | 20600 | | | | |
| -26.263 | 20.058 | -1.604 | -753.67 | 170.08 | 164.02 | 2 | 76.23 | 4.55 | 20600 | 2 | 172.04 | | 20600 | | | | |
| -26.610 | 19.480 | -1.718 | -690.53 | 193.03 | 164.02 | 2 | 76.44 | 4.55 | 20600 | 2 | 176.64 | | 20600 | | | | |
| -26.958 | 18.865 | -1.822 | -619.71 | 214.25 | 164.02 | 2 | 76.60 | 4.55 | 20600 | 2 | 182.31 | | 20600 | | | | |
| -27.305 | 18.215 | -1.915 | -541.87 | 233.39 | 164.02 | 2 | 76.73 | 4.55 | 20600 | 2 | 188.90 | | 20600 | | | | |
| -27.653 | 17.536 | -1.994 | -457.78 | 250.16 | 164.02 | 2 | 76.85 | 4.55 | 20600 | 2 | 196.25 | | 20600 | | | | |
| -28.000 | 16.831 | -2.060 | -368.31 | 264.30 | 164.02 | 2 | 76.97 | 4.55 | 20600 | 2 | 204.24 | | 20600 | | | | |
| | | | | | 164.02 | 2 | 64.48 | 4.12 | 29000 | 2 | 244.60 | | 29000 | | | | |
| -28.375 | 16.048 | -2.114 | -270.61 | 256.08 | 164.02 | 2 | 64.24 | 4.12 | 29000 | 2 | 255.98 | | 29000 | | | | |
| -28.750 | 15.247 | -2.153 | -176.81 | 243.41 | 164.02 | 2 | 64.04 | 4.12 | 29000 | 2 | 267.90 | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | | | kN | |



FASE 7 (CONTINUACIÓN)

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.125 | 14.435 | -2.175 | -88.62 | 226.13 | 164.02 | 2 | 63.90 | 4.12 | 29000 | 2 | 280.25 | | 29000 | | | | |
| -29.500 | 13.618 | -2.183 | -7.80 | 204.12 | 164.02 | 2 | 63.82 | 4.12 | 29000 | 2 | 292.92 | | 29000 | | | | |
| -29.875 | 12.800 | -2.178 | 63.86 | 177.29 | 164.02 | 2 | 63.81 | 4.12 | 29000 | 2 | 305.84 | | 29000 | | | | |
| -30.250 | 11.985 | -2.162 | 124.55 | 145.59 | 164.02 | 2 | 63.88 | 4.12 | 29000 | 2 | 318.95 | | 29000 | | | | |
| -30.625 | 11.179 | -2.136 | 172.44 | 108.99 | 164.02 | 2 | 64.02 | 4.12 | 29000 | 2 | 332.20 | | 29000 | | | | |
| -31.000 | 10.384 | -2.104 | 206.10 | 70.79 | 164.02 | 2 | 64.24 | 4.12 | 29000 | 2 | 327.86 | | 29000 | | | | |
| -31.375 | 9.602 | -2.067 | 226.14 | 37.49 | 164.02 | 2 | 64.54 | 4.12 | 29000 | 2 | 306.56 | | 29000 | | | | |
| -31.750 | 8.834 | -2.027 | 235.22 | 12.22 | 164.02 | 2 | 64.91 | 3.77 | 29000 | 2 | 285.69 | | 29000 | | | | |
| -32.125 | 8.082 | -1.987 | 236.30 | -5.15 | 164.02 | 2 | 65.35 | 3.37 | 29000 | 2 | 265.27 | | 29000 | | | | |
| -32.500 | 7.344 | -1.946 | 232.32 | -14.77 | 164.02 | 2 | 65.85 | 3.03 | 29000 | 2 | 245.29 | | 29000 | | | | |
| -32.875 | 6.622 | -1.907 | 226.17 | -16.78 | 164.02 | 2 | 66.42 | 2.76 | 29000 | 2 | 225.76 | | 29000 | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -33.250 | 5.914 | -1.869 | 220.67 | -11.33 | 164.02 | 2 | 67.03 | 2.54 | 29000 | 2 | 206.65 | | 29000 | | | |
| -33.625 | 5.220 | -1.831 | 218.59 | 1.45 | 164.02 | 2 | 67.69 | 2.36 | 29000 | 2 | 187.97 | | 29000 | | | |
| -34.000 | 4.541 | -1.794 | 222.66 | 21.44 | 164.02 | 1 | 68.52 | 2.35 | 29000 | 2 | 169.69 | | 29000 | | | |
| | | | | | 164.02 | 1 | 66.97 | 2.46 | 43800 | 2 | 238.18 | | 43800 | | | |
| -34.325 | 3.963 | -1.760 | 229.68 | 23.12 | 164.02 | 1 | 67.77 | 2.46 | 43800 | 2 | 214.25 | | 43800 | | | |
| -34.650 | 3.397 | -1.725 | 238.55 | 32.77 | 164.02 | 1 | 68.57 | 2.46 | 43800 | 2 | 190.80 | | 43800 | | | |
| -34.975 | 2.842 | -1.689 | 251.83 | 50.21 | 164.02 | 1 | 69.37 | 2.46 | 43800 | 2 | 167.86 | | 43800 | | | |
| -35.300 | 2.299 | -1.650 | 272.13 | 76.33 | 164.02 | 2 | 76.69 | 4.26 | 43800 | 2 | 145.45 | | 43800 | | | |
| | | | | | 164.02 | -1 | | | | 2 | 705.68 | | 300000 | | | |
| -35.800 | 1.490 | -1.588 | 252.67 | -134.03 | 164.02 | -1 | | | | 2 | 463.82 | | 300000 | | | |
| -36.300 | 0.708 | -1.541 | 157.90 | -225.57 | 164.02 | -1 | | | | 2 | 230.40 | | 300000 | | | |
| -36.800 | -0.055 | -1.517 | 49.87 | -180.46 | 164.02 | 2 | 82.82 | 1.52 | 300000 | -1 | | | | | | |
| -37.300 | -0.812 | -1.513 | 0.00 | 0.00 | 164.02 | 2 | 310.97 | 1.52 | 300000 | -1 | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | | |

DESPLAZAMIENTO MÁX. = 23.27 mm

MOMENTO MÁXIMO = -946.65 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 109.79 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = -1.17 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.033 = (1572.47 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.317 = (3135.38 kN/m)/(9899.21 kN/m) SIN INTERÉS



** FASE No 8 **

*Fase 8
*Ejecucion nivel de autobuses y retirada de resto de anclajes

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 7
NIVEL = -8.950 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 3466667.250 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE ANCLAS N° 3

* RETIRO DE LA LÍNEA DE ANCLAS N° 4

* RETIRO DE LA LÍNEA DE ANCLAS N° 5



FASE 8

| | PARED | | | | | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -8.50 m<br>S. DE CAQUOT: 10.00 kPa | | | | SOIL 2<br>EXCAVACIÓN: -22.52 m<br>NIVEL AGUA: -25.22 m<br>S. DE CAQUOT: 0.00 kPa | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. SOPRAC. | ELAST. | | ESTADO | PR. SOPRAC. | ELAST. | N° | FUERZA |
| 0.000 | -0.838 | 1.981 | 0.00 | 0.00 | | 2 | 9.26 | 5.15 | 4900 | 0 | | | | |
| -0.287 | -0.268 | 1.981 | 0.38 | 2.64 | | 2 | 9.13 | 5.15 | 4900 | 0 | | | | |
| -0.575 | 0.301 | 1.982 | 1.52 | 5.25 | | 2 | 9.00 | 5.15 | 4900 | 0 | | | | |
| -0.862 | 0.871 | 1.982 | 3.40 | 7.82 | | 2 | 8.88 | 5.15 | 4900 | 0 | | | | |
| -1.150 | 1.441 | 1.982 | 6.01 | 10.35 | | 2 | 8.75 | 5.15 | 4900 | 0 | | | | |
| | | | | -8.69 | | 2 | 8.75 | 5.15 | 4900 | 0 | | | 1 | -19.04 |
| -1.200 | 1.540 | 1.983 | 5.59 | -8.25 | | 2 | 8.73 | 5.15 | 4900 | 0 | | | | |
| | | | | | | -1 | | | | 0 | | | | |
| -1.625 | 2.383 | 1.983 | 2.08 | -8.25 | | -1 | | | | 0 | | | | |
| -2.050 | 3.226 | 1.983 | -1.43 | -8.25 | | -1 | | | | 0 | | | | |
| -2.475 | 4.069 | 1.983 | -4.93 | -8.25 | | -1 | | | | 0 | | | | |
| -2.900 | 4.911 | 1.981 | -8.08 | -5.76 | | 2 | 11.69 | 4.85 | 15100 | 0 | | | | |
| -3.213 | 5.530 | 1.980 | -9.26 | -1.61 | | 2 | 14.87 | 4.85 | 15100 | 0 | | | | |
| -3.525 | 6.149 | 1.979 | -8.99 | 3.51 | | 2 | 17.94 | 4.85 | 15100 | 0 | | | | |
| -3.838 | 6.767 | 1.978 | -6.97 | 9.58 | | 2 | 20.89 | 4.85 | 15100 | 0 | | | | |
| -4.150 | 7.385 | 1.977 | -2.91 | 16.55 | | 2 | 23.69 | 4.85 | 15100 | 0 | | | | |
| -4.463 | 8.003 | 1.977 | 3.46 | 24.36 | | 2 | 26.33 | 4.85 | 15100 | 0 | | | | |
| -4.775 | 8.621 | 1.978 | 12.40 | 32.97 | | 2 | 28.77 | 4.85 | 15100 | 0 | | | | |
| -5.088 | 9.239 | 1.981 | 24.14 | 42.31 | | 2 | 31.01 | 4.85 | 15100 | 0 | | | | |
| -5.400 | 9.859 | 1.985 | 38.91 | 52.32 | | 2 | 33.02 | 4.85 | 15100 | 0 | | | | |
| | | | | | | 2 | 32.52 | 4.55 | 20600 | 0 | | | | |
| -5.788 | 10.630 | 1.994 | 61.68 | 65.32 | | 2 | 34.56 | 4.55 | 20600 | 0 | | | | |
| -6.175 | 11.405 | 2.007 | 89.62 | 78.98 | | 2 | 35.99 | 4.55 | 20600 | 0 | | | | |
| -6.562 | 12.186 | 2.026 | 122.95 | 93.07 | | 2 | 36.73 | 4.55 | 20600 | 0 | | | | |
| -6.950 | 12.976 | 2.051 | 161.77 | 107.31 | | 2 | 36.72 | 4.55 | 20600 | 0 | | | | |
| -7.337 | 13.777 | 2.084 | 206.09 | 121.37 | | 2 | 35.87 | 4.55 | 20600 | 0 | | | | |
| -7.725 | 14.592 | 2.124 | 255.77 | 134.93 | | 2 | 34.09 | 4.55 | 20600 | 0 | | | | |
| -8.113 | 15.424 | 2.174 | 310.54 | 147.59 | | 2 | 31.28 | 4.55 | 20600 | 0 | | | | |
| -8.500 | 16.278 | 2.235 | 369.98 | 158.95 | | 2 | 27.35 | 4.55 | 20600 | 0 | | | | |
| -8.950 | 17.302 | 2.318 | 444.30 | 171.42 | 4.41 | 1 | 23.65 | 2.68 | 20600 | 0 | | | | |
| | | | | -435.74 | 4.41 | 1 | 23.65 | 2.68 | 20600 | 0 | | | 7 | -607.16 |
| -9.300 | 18.124 | 2.377 | 293.60 | -425.17 | 7.85 | 1 | 24.50 | 2.68 | 20600 | 0 | | | | |
| -9.650 | 18.963 | 2.412 | 146.86 | -413.10 | 11.28 | 1 | 25.34 | 2.68 | 20600 | 0 | | | | |
| -10.150 | 20.174 | 2.422 | -54.86 | -393.26 | 16.19 | 1 | 26.55 | 2.68 | 20600 | 0 | | | | |
| -10.512 | 21.049 | 2.402 | -194.51 | -376.97 | 19.74 | 1 | 27.42 | 2.68 | 20600 | 0 | | | | |
| -10.875 | 21.912 | 2.358 | -327.97 | -359.07 | 23.30 | 1 | 28.29 | 2.68 | 20600 | 0 | | | | |
| -11.238 | 22.756 | 2.294 | -454.65 | -339.56 | 26.85 | 1 | 29.17 | 2.68 | 20600 | 0 | | | | |
| -11.600 | 23.573 | 2.208 | -573.96 | -318.45 | 30.41 | 1 | 30.04 | 2.68 | 20600 | 0 | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -11.963 | 24.355 | 2.104 | -685.33 | -295.74 | 33.97 | 1 | 30.92 | 2.68 | 20600 | 0 | | | | | | | | |
| -12.325 | 25.096 | 1.982 | -788.18 | -271.41 | 37.52 | 1 | 31.79 | 2.68 | 20600 | 0 | | | | | | | | |
| -12.688 | 25.790 | 1.844 | -881.91 | -245.48 | 41.08 | 1 | 32.67 | 2.68 | 20600 | 0 | | | | | | | | |
| -13.050 | 26.431 | 1.690 | -965.96 | -217.95 | 44.64 | 1 | 33.54 | 2.68 | 20600 | 0 | | | | | | | | |
| -13.550 | 27.219 | 1.458 | -1064.90 | -177.33 | 49.54 | 1 | 34.75 | 2.68 | 20600 | 0 | | | | | | | | |
| -13.850 | 27.634 | 1.309 | -1114.25 | -151.49 | 52.48 | 1 | 35.47 | 2.68 | 20600 | 0 | | | | | | | | |
| -14.150 | 28.003 | 1.153 | -1155.69 | -124.56 | 55.43 | 1 | 36.19 | 2.68 | 20600 | 0 | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 8 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.600 | 28.468 | 0.911 | -1202.28 | -82.09 | 59.84 | 1 | 37.28 | 2.68 | 20600 | 0 | | | | | |
| | | | | | 59.84 | 1 | 26.15 | 2.35 | 29000 | 0 | | | | | |
| -15.000 | 28.788 | 0.689 | -1228.10 | -46.73 | 63.77 | 1 | 27.04 | 2.35 | 29000 | 0 | | | | | |
| -15.400 | 29.019 | 0.463 | -1239.40 | -9.44 | 67.69 | 1 | 27.94 | 2.35 | 29000 | 0 | | | | | |
| -15.800 | 29.159 | 0.237 | -1235.40 | 29.77 | 71.61 | 1 | 28.83 | 2.35 | 29000 | 0 | | | | | |
| -16.200 | 29.208 | 0.013 | -1215.33 | 70.91 | 75.54 | 1 | 29.72 | 2.35 | 29000 | 0 | | | | | |
| -16.600 | 29.170 | -0.206 | -1178.42 | 113.98 | 79.46 | 1 | 30.61 | 2.35 | 29000 | 0 | | | | | |
| -17.000 | 29.045 | -0.417 | -1123.89 | 158.97 | 83.39 | 1 | 31.51 | 2.35 | 29000 | 0 | | | | | |
| -17.400 | 28.838 | -0.616 | -1050.98 | 205.89 | 87.31 | 1 | 32.40 | 2.35 | 29000 | 0 | | | | | |
| -17.800 | 28.554 | -0.799 | -958.92 | 254.74 | 91.23 | 1 | 33.29 | 2.35 | 29000 | 0 | | | | | |
| -18.300 | 28.102 | -1.003 | -815.74 | 318.51 | 96.14 | 1 | 34.41 | 2.35 | 29000 | 0 | | | | | |
| -18.800 | 27.558 | -1.169 | -639.91 | 385.29 | 101.04 | 1 | 35.53 | 2.35 | 29000 | 0 | | | | | |
| -19.100 | 27.194 | -1.249 | -518.13 | 426.80 | 103.99 | 1 | 36.20 | 2.35 | 29000 | 0 | | | | | |
| -19.400 | 26.810 | -1.311 | -383.72 | 469.40 | 106.93 | 1 | 36.87 | 2.35 | 29000 | 0 | | | | | |
| -19.700 | 26.410 | -1.353 | -236.38 | 513.08 | 109.87 | 1 | 37.54 | 2.35 | 29000 | 0 | | | | | |
| -20.000 | 26.000 | -1.375 | -75.77 | 557.84 | 112.82 | 1 | 38.21 | 2.35 | 29000 | 0 | | | | | |
| | | | | | 112.82 | 1 | 51.03 | 2.68 | 20600 | 0 | | | | | |
| -20.150 | 25.794 | -1.377 | 9.76 | 582.55 | 114.29 | 1 | 51.39 | 2.68 | 20600 | 0 | | | | | |
| -20.650 | 25.111 | -1.340 | 322.00 | 666.92 | 119.19 | 1 | 52.60 | 2.68 | 20600 | 0 | | | | | |
| -21.150 | 24.466 | -1.227 | 677.19 | 754.34 | 124.10 | 1 | 53.80 | 2.68 | 20600 | 0 | | | | | |
| -21.420 | 24.147 | -1.131 | 887.38 | 802.82 | 126.75 | 1 | 54.45 | 2.68 | 20600 | 0 | | | | | |
| | | | | -725.90 | 126.75 | 1 | 54.45 | 2.68 | 20600 | 0 | | | | | 6-1528.72 |
| -21.695 | 23.851 | -1.031 | 694.65 | -675.61 | 129.44 | 1 | 55.12 | 2.68 | 20600 | 0 | | | | | |
| -21.970 | 23.578 | -0.956 | 515.88 | -624.39 | 132.14 | 1 | 55.78 | 2.68 | 20600 | 0 | | | | | |
| -22.245 | 23.323 | -0.901 | 351.36 | -571.85 | 134.84 | 2 | 59.34 | 4.55 | 20600 | 0 | | | | | |
| -22.520 | 23.080 | -0.867 | 201.57 | -517.09 | 137.54 | 2 | 66.57 | 4.55 | 20600 | 0 | | | | | |
| | | | | | 137.54 | 2 | 66.57 | 4.55 | 20600 | 2 | 22.19 | | 20600 | | |
| -22.795 | 22.845 | -0.850 | 66.31 | -466.37 | 140.23 | 2 | 72.81 | 4.55 | 20600 | 2 | 26.05 | | 20600 | | |
| -23.070 | 22.611 | -0.849 | -54.86 | -414.89 | 142.93 | 2 | 78.14 | 4.55 | 20600 | 2 | 33.69 | | 20600 | | |
| -23.345 | 22.376 | -0.863 | -161.90 | -363.69 | 145.63 | 2 | 82.64 | 4.55 | 20600 | 2 | 43.27 | | 20600 | | |
| -23.620 | 22.135 | -0.890 | -254.99 | -313.53 | 148.33 | 2 | 86.38 | 4.55 | 20600 | 2 | 54.91 | | 20600 | | |
| -23.895 | 21.886 | -0.927 | -334.51 | -265.20 | 151.02 | 2 | 89.43 | 4.55 | 20600 | 2 | 68.77 | | 20600 | | |
| -24.170 | 21.625 | -0.973 | -401.09 | -219.52 | 153.72 | 2 | 91.86 | 4.55 | 20600 | 2 | 85.07 | | 20600 | | |
| -24.445 | 21.350 | -1.027 | -455.62 | -177.91 | 156.42 | 2 | 93.74 | 4.55 | 20600 | 2 | 108.05 | | 20600 | | |
| -24.720 | 21.060 | -1.087 | -499.35 | -140.75 | 159.12 | 2 | 95.12 | 4.55 | 20600 | 2 | 126.05 | | 20600 | | |
| -25.220 | 20.486 | -1.208 | -554.22 | -79.75 | 164.02 | 2 | 96.55 | 4.55 | 20600 | 2 | 144.77 | | 20600 | | |
| -25.568 | 20.051 | -1.298 | -574.95 | -39.56 | 164.02 | 2 | 96.87 | 4.55 | 20600 | 2 | 145.40 | | 20600 | | |
| -25.915 | 19.584 | -1.390 | -581.77 | 0.12 | 164.02 | 2 | 96.74 | 4.55 | 20600 | 2 | 147.87 | | 20600 | | |
| -26.263 | 19.085 | -1.482 | -575.01 | 38.55 | 164.02 | 2 | 96.27 | 4.55 | 20600 | 2 | 152.00 | | 20600 | | |
| -26.610 | 18.555 | -1.571 | -555.20 | 75.08 | 164.02 | 2 | 95.51 | 4.55 | 20600 | 2 | 157.57 | | 20600 | | |
| -26.958 | 17.994 | -1.657 | -523.11 | 109.16 | 164.02 | 2 | 94.55 | 4.55 | 20600 | 2 | 164.36 | | 20600 | | |
| -27.305 | 17.404 | -1.737 | -479.67 | 140.35 | 164.02 | 2 | 93.45 | 4.55 | 20600 | 2 | 172.18 | | 20600 | | |
| -27.653 | 16.788 | -1.809 | -425.95 | 168.28 | 164.02 | 2 | 92.26 | 4.55 | 20600 | 2 | 180.84 | | 20600 | | |
| -28.000 | 16.148 | -1.871 | -363.13 | 192.67 | 164.02 | 2 | 91.04 | 4.55 | 20600 | 2 | 190.17 | | 20600 | | |
| | | | | | 164.02 | 2 | 84.29 | 4.12 | 29000 | 2 | 224.79 | | 29000 | | |
| -28.375 | 15.435 | -1.927 | -289.59 | 198.54 | 164.02 | 2 | 82.01 | 4.12 | 29000 | 2 | 238.21 | | 29000 | | |
| -28.750 | 14.704 | -1.971 | -214.97 | 198.45 | 164.02 | 2 | 79.80 | 4.12 | 29000 | 2 | 252.14 | | 29000 | | |
| -29.125 | 13.959 | -2.001 | -141.51 | 192.26 | 164.02 | 2 | 77.72 | 4.12 | 29000 | 2 | 266.43 | | 29000 | | |
| -29.500 | 13.205 | -2.019 | -71.54 | 179.93 | 164.02 | 2 | 75.80 | 4.12 | 29000 | 2 | 280.94 | | 29000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 8 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.875 | 12.446 | -2.026 | -7.34 | 161.44 | 164.02 | 2 | 74.07 | 4.12 | 29000 | 2 | 295.58 | | 29000 | | |
| -30.250 | 11.686 | -2.022 | 48.78 | 136.84 | 164.02 | 2 | 72.55 | 4.12 | 29000 | 2 | 310.28 | | 29000 | | |
| -30.625 | 10.930 | -2.010 | 94.53 | 106.20 | 164.02 | 2 | 71.24 | 4.12 | 29000 | 2 | 324.98 | | 29000 | | |
| -31.000 | 10.180 | -1.991 | 128.10 | 72.92 | 164.02 | 2 | 70.16 | 4.12 | 29000 | 2 | 321.94 | | 29000 | | |
| -31.375 | 9.438 | -1.967 | 149.72 | 43.63 | 164.02 | 2 | 69.30 | 4.12 | 29000 | 2 | 301.80 | | 29000 | | |
| -31.750 | 8.705 | -1.940 | 161.72 | 21.55 | 164.02 | 2 | 68.65 | 4.12 | 29000 | 2 | 281.95 | | 29000 | | |
| -32.125 | 7.983 | -1.912 | 166.78 | 6.66 | 164.02 | 2 | 68.21 | 4.12 | 29000 | 2 | 262.41 | | 29000 | | |
| -32.500 | 7.272 | -1.883 | 167.60 | -1.10 | 164.02 | 2 | 67.96 | 4.12 | 29000 | 2 | 243.18 | | 29000 | | |
| -32.875 | 6.571 | -1.854 | 166.85 | -1.77 | 164.02 | 2 | 67.90 | 4.12 | 29000 | 2 | 224.28 | | 29000 | | |
| -33.250 | 5.881 | -1.826 | 167.16 | 4.60 | 164.02 | 2 | 67.99 | 3.49 | 29000 | 2 | 205.70 | | 29000 | | |
| -33.625 | 5.202 | -1.797 | 171.17 | 17.94 | 164.02 | 2 | 68.23 | 2.90 | 29000 | 2 | 187.43 | | 29000 | | |
| -34.000 | 4.534 | -1.767 | 181.48 | 38.21 | 164.02 | 2 | 68.73 | 2.56 | 29000 | 2 | 169.48 | | 29000 | | |
| | | | | | 164.02 | 2 | 67.28 | 2.77 | 43800 | 2 | 237.87 | | 43800 | | |
| -34.325 | 3.964 | -1.739 | 193.97 | 39.98 | 164.02 | 1 | 67.77 | 2.46 | 43800 | 2 | 214.28 | | 43800 | | |
| -34.650 | 3.403 | -1.709 | 208.31 | 49.57 | 164.02 | 1 | 68.57 | 2.46 | 43800 | 2 | 191.09 | | 43800 | | |
| -34.975 | 2.853 | -1.677 | 227.03 | 66.89 | 164.02 | 1 | 69.37 | 2.46 | 43800 | 2 | 168.35 | | 43800 | | |
| -35.300 | 2.314 | -1.641 | 252.71 | 92.72 | 164.02 | 2 | 76.04 | 4.26 | 43800 | 2 | 146.10 | | 43800 | | |
| | | | | | 164.02 | -1 | | | | 2 | 710.12 | | 300000 | | |
| -35.800 | 1.508 | -1.583 | 240.85 | -120.12 | 164.02 | -1 | | | | 2 | 469.30 | | 300000 | | |
| -36.300 | 0.729 | -1.537 | 152.33 | -214.57 | 164.02 | -1 | | | | 2 | 236.52 | | 300000 | | |
| -36.800 | -0.033 | -1.515 | 48.64 | -174.85 | 164.02 | 2 | 76.25 | 1.52 | 300000 | 2 | 8.91 | | 300000 | | |
| -37.300 | -0.789 | -1.511 | 0.00 | 0.00 | 164.02 | 2 | 304.01 | 1.52 | 300000 | -1 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 29.21 mm

MOMENTO MÁXIMO =-1239.40 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA

CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 123.77 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.038 = (1809.94 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.304 = (3007.66 kN/m)/(9899.21 kN/m) SIN INTERÉS



**  FASE No 9  **

*Fase 9
*Restitucion del nf y paso de la tuneladora

* RETIRO DE LA LÍNEA DE PUNTALES N° 6

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 8
NIVEL = -21.420 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = -1644.000 kN
RIGIDEZ = 850000.000 kN/m
CONEXIÓN BILATERAL

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -22.520 m
PRESIÓN DEL AGUA EN SUELO 2 PARA NIVEL = -22.520 m PR. = 0.000 kPa
PR. = 135.200 kPa



FASE 9

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m, NIVEL AGUA: -8.50 m, S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -22.52 m, NIVEL AGUA: -22.52 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|
| NIVEL | DESPLAZ. ROTACIÓN MOMENTO ESF.CO. C. REP. | ESTADO PR. SOPRAC. ELAST. | ESTADO PR. SOPRAC. ELAST. | N° FUERZA |
| | | | | |
| 0.000 | -0.832 1.975 0.00 0.00 | 2 9.23 5.15 4900 | 0 | |
| -0.287 | -0.264 1.975 0.38 2.64 | 2 9.11 5.15 4900 | 0 | |
| -0.575 | 0.304 1.975 1.51 5.24 | 2 8.99 5.15 4900 | 0 | |
| -0.862 | 0.871 1.975 3.39 7.81 | 2 8.88 5.15 4900 | 0 | |
| -1.150 | 1.439 1.976 6.00 10.34 | 2 8.76 5.15 4900 | 0 | |
| | -7.18 | 2 8.76 5.15 4900 | 0 | 1 -17.52 |
| -1.200 | 1.538 1.976 5.65 -6.74 | 2 8.74 5.15 4900 | 0 | |
| | | -1 | 0 | |
| -1.625 | 2.378 1.977 2.78 -6.74 | -1 | 0 | |
| -2.050 | 3.218 1.977 -0.08 -6.74 | -1 | 0 | |
| -2.475 | 4.058 1.977 -2.95 -6.74 | -1 | 0 | |
| -2.900 | 4.898 1.976 -5.46 -4.22 | 2 11.89 4.85 15100 | 0 | |
| -3.213 | 5.516 1.975 -6.14 0.00 | 2 15.09 4.85 15100 | 0 | |
| -3.525 | 6.133 1.974 -5.36 5.20 | 2 18.19 4.85 15100 | 0 | |
| -3.838 | 6.749 1.974 -2.79 11.34 | 2 21.16 4.85 15100 | 0 | |
| -4.150 | 7.366 1.973 1.83 18.40 | 2 23.97 4.85 15100 | 0 | |
| -4.463 | 7.983 1.974 8.79 26.30 | 2 26.62 4.85 15100 | 0 | |
| -4.775 | 8.600 1.976 18.35 35.01 | 2 29.08 4.85 15100 | 0 | |
| -5.088 | 9.218 1.980 30.75 44.45 | 2 31.33 4.85 15100 | 0 | |
| -5.400 | 9.838 1.985 46.20 54.55 | 2 33.34 4.85 15100 | 0 | |
| | | 2 32.96 4.55 20600 | 0 | |
| -5.788 | 10.609 1.995 69.86 67.72 | 2 34.99 4.55 20600 | 0 | |
| -6.175 | 11.384 2.010 98.77 81.55 | 2 36.41 4.55 20600 | 0 | |
| -6.562 | 12.167 2.030 133.12 95.80 | 2 37.13 4.55 20600 | 0 | |
| -6.950 | 12.959 2.057 173.03 110.18 | 2 37.07 4.55 20600 | 0 | |
| -7.337 | 13.763 2.092 218.48 124.36 | 2 36.16 4.55 20600 | 0 | |
| -7.725 | 14.581 2.135 269.34 138.02 | 2 34.30 4.55 20600 | 0 | |
| -8.113 | 15.418 2.188 325.33 150.74 | 2 31.39 4.55 20600 | 0 | |
| -8.500 | 16.278 2.251 386.00 162.12 | 2 27.35 4.55 20600 | 0 | |
| -8.950 | 17.310 2.338 461.74 174.59 4.41 | 1 23.65 2.68 20600 | 0 | |
| | -459.93 4.41 | 1 23.65 2.68 20600 | 0 | 7 -634.52 |
| -9.300 | 18.139 2.399 302.58 -449.36 7.85 | 1 24.50 2.68 20600 | 0 | |
| -9.650 | 18.986 2.434 147.37 -437.29 11.28 | 1 25.34 2.68 20600 | 0 | |
| -10.150 | 20.207 2.443 -66.44 -417.45 16.19 | 1 26.55 2.68 20600 | 0 | |
| -10.512 | 21.090 2.420 -214.87 -401.16 19.74 | 1 27.42 2.68 20600 | 0 | |
| -10.875 | 21.959 2.373 -357.09 -383.26 23.30 | 1 28.29 2.68 20600 | 0 | |
| -11.238 | 22.807 2.302 -492.53 -363.75 26.85 | 1 29.17 2.68 20600 | 0 | |
| -11.600 | 23.626 2.210 -620.62 -342.64 30.41 | 1 30.04 2.68 20600 | 0 | |
| -11.963 | 24.407 2.097 -740.75 -319.92 33.97 | 1 30.92 2.68 20600 | 0 | |
| -12.325 | 25.144 1.965 -852.37 -295.60 37.52 | 1 31.79 2.68 20600 | 0 | |
| -12.688 | 25.830 1.816 -954.87 -269.67 41.08 | 1 32.67 2.68 20600 | 0 | |
| -13.050 | 26.458 1.650-1047.68 -242.13 44.64 | 1 33.54 2.68 20600 | 0 | |
| -13.550 | 27.221 1.397-1158.72 -201.52 49.54 | 1 34.75 2.68 20600 | 0 | |
| -13.850 | 27.616 1.235-1215.32 -175.63 52.48 | 2 35.84 3.05 20600 | 0 | |
| -14.150 | 27.961 1.065-1263.97 -148.50 55.43 | 2 37.07 3.55 20600 | 0 | |
| | | | | |
| m | mm /1000 kN.m/m kN/m kPa | kPa kPa kPa/m | kPa kPa kPa/m | kN |



FASE 9 (CONTINUACIÓN)

| NIVEL | DESPLAZ. ROTACIÓN MOMENTO ESF.CO. C. REP. | ESTADO PR. SOPRAC. ELAST. | ESTADO PR. SOPRAC. ELAST. | N° FUERZA |
|---|---|---|---|---|
| -14.600 | 28.381 0.799-1321.22 -105.43 59.84 | 2 39.08 4.48 20600 | 0 | |
| | 59.84 | 2 28.68 4.12 29000 | 0 | |
| -15.000 | 28.652 0.554-1356.14 -68.77 63.77 | 2 31.00 4.12 29000 | 0 | |
| -15.400 | 28.824 0.304-1375.90 -29.56 67.69 | 2 33.60 4.12 29000 | 0 | |
| -15.800 | 28.895 0.053-1379.44 12.31 71.61 | 2 36.48 4.12 29000 | 0 | |
| -16.200 | 28.866 -0.198-1365.68 56.97 75.54 | 2 39.66 4.12 29000 | 0 | |
| -16.600 | 28.737 -0.445-1333.48 104.53 79.46 | 2 43.16 4.12 29000 | 0 | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -17.000 | 28.511 | -0.684 | -1281.65 | 155.13 | 83.39 | 2 | 47.00 | 4.12 | 29000 | 0 | | | | | | | | |
| -17.400 | 28.191 | -0.912 | -1208.95 | 208.90 | 87.31 | 2 | 51.16 | 4.12 | 29000 | 0 | | | | | | | | |
| -17.800 | 27.783 | -1.125 | -1114.08 | 265.98 | 91.23 | 2 | 55.66 | 4.12 | 29000 | 0 | | | | | | | | |
| -18.300 | 27.160 | -1.362 | -962.27 | 342.17 | 96.14 | 2 | 61.74 | 4.12 | 29000 | 0 | | | | | | | | |
| -18.800 | 26.427 | -1.561 | -770.98 | 423.98 | 101.04 | 2 | 68.31 | 4.12 | 29000 | 0 | | | | | | | | |
| -19.100 | 25.944 | -1.658 | -636.05 | 475.85 | 103.99 | 2 | 72.46 | 4.12 | 29000 | 0 | | | | | | | | |
| -19.400 | 25.435 | -1.735 | -485.25 | 529.87 | 106.93 | 2 | 76.76 | 4.12 | 29000 | 0 | | | | | | | | |
| -19.700 | 24.905 | -1.790 | -317.91 | 586.08 | 109.87 | 2 | 81.17 | 4.12 | 29000 | 0 | | | | | | | | |
| -20.000 | 24.363 | -1.821 | -133.38 | 644.51 | 112.82 | 2 | 85.68 | 4.12 | 29000 | 0 | | | | | | | | |
| | | | | | 112.82 | 2 | 84.75 | 4.55 | 20600 | 0 | | | | | | | | |
| -20.150 | 24.089 | -1.827 | -34.47 | 674.39 | 114.29 | 2 | 86.50 | 4.55 | 20600 | 0 | | | | | | | | |
| -20.650 | 23.181 | -1.794 | 328.27 | 777.47 | 119.19 | 2 | 92.36 | 4.55 | 20600 | 0 | | | | | | | | |
| -21.150 | 22.310 | -1.673 | 743.90 | 885.94 | 124.10 | 2 | 98.21 | 4.55 | 20600 | 0 | | | | | | | | |
| -21.420 | 21.872 | -1.566 | 991.27 | 946.74 | 126.75 | 2 | 101.32 | 4.55 | 20600 | 0 | | | | | | | | |
| | | | | -697.26 | 126.75 | 2 | 101.32 | 4.55 | 20600 | 0 | | | | | | | 8-1644.00 | |
| -21.695 | 21.458 | -1.453 | 808.22 | -633.75 | 129.44 | 2 | 104.41 | 4.55 | 20600 | 0 | | | | | | | | |
| -21.970 | 21.071 | -1.362 | 642.86 | -568.66 | 132.14 | 2 | 107.42 | 4.55 | 20600 | 0 | | | | | | | | |
| -22.245 | 20.707 | -1.291 | 495.64 | -501.61 | 134.84 | 2 | 113.23 | 4.55 | 20600 | 0 | | | | | | | | |
| -22.520 | 20.360 | -1.237 | 365.53 | -450.32 | 2.34 | 2 | 122.62 | 4.55 | 20600 | 0 | | | | | | | | |
| -22.795 | 20.025 | -1.199 | 246.52 | -414.81 | 2.34 | 2 | 130.90 | 4.55 | 20600 | -1 | | | | | | | | |
| -23.070 | 19.699 | -1.175 | 137.58 | -377.18 | 2.34 | 2 | 138.14 | 4.55 | 20600 | -1 | | | | | | | | |
| -23.345 | 19.378 | -1.164 | 39.24 | -337.69 | 2.34 | 2 | 144.41 | 4.55 | 20600 | -1 | | | | | | | | |
| -23.620 | 19.058 | -1.164 | -48.00 | -296.60 | 2.34 | 2 | 149.78 | 4.55 | 20600 | -1 | | | | | | | | |
| -23.895 | 18.736 | -1.175 | -123.76 | -254.14 | 2.34 | 2 | 154.31 | 4.55 | 20600 | -1 | | | | | | | | |
| -24.170 | 18.411 | -1.195 | -187.85 | -212.46 | 2.34 | 2 | 158.07 | 4.55 | 20600 | 2 | 13.96 | | | 20600 | | | | |
| -24.445 | 18.079 | -1.222 | -240.97 | -174.65 | 2.34 | 2 | 161.13 | 4.55 | 20600 | 2 | 34.87 | | | 20600 | | | | |
| -24.720 | 17.738 | -1.255 | -284.31 | -141.25 | 2.34 | 2 | 163.54 | 4.55 | 20600 | 2 | 51.62 | | | 20600 | | | | |
| -25.220 | 17.093 | -1.327 | -341.20 | -87.38 | 2.34 | 2 | 166.45 | 4.55 | 20600 | 2 | 67.53 | | | 20600 | | | | |
| -25.568 | 16.622 | -1.383 | -365.44 | -52.12 | 2.34 | 2 | 167.50 | 4.55 | 20600 | 2 | 68.16 | | | 20600 | | | | |
| -25.915 | 16.132 | -1.442 | -377.46 | -17.18 | 2.34 | 2 | 167.87 | 4.55 | 20600 | 2 | 70.79 | | | 20600 | | | | |
| -26.263 | 15.620 | -1.502 | -377.52 | 16.56 | 2.34 | 2 | 167.65 | 4.55 | 20600 | 2 | 75.20 | | | 20600 | | | | |
| -26.610 | 15.088 | -1.561 | -366.18 | 48.34 | 2.34 | 2 | 166.94 | 4.55 | 20600 | 2 | 81.20 | | | 20600 | | | | |
| -26.958 | 14.535 | -1.618 | -344.23 | 77.46 | 2.34 | 2 | 165.80 | 4.55 | 20600 | 2 | 88.57 | | | 20600 | | | | |
| -27.305 | 13.964 | -1.670 | -312.71 | 103.37 | 2.34 | 2 | 164.32 | 4.55 | 20600 | 2 | 97.10 | | | 20600 | | | | |
| -27.653 | 13.375 | -1.717 | -272.82 | 125.59 | 2.34 | 2 | 162.56 | 4.55 | 20600 | 2 | 106.61 | | | 20600 | | | | |
| -28.000 | 12.771 | -1.756 | -225.90 | 143.71 | 2.34 | 2 | 160.60 | 4.55 | 20600 | 2 | 116.91 | | | 20600 | | | | |
| | | | | | 2.34 | 2 | 182.21 | 4.12 | 29000 | 2 | 123.52 | | | 29000 | | | | |
| -28.375 | 12.106 | -1.790 | -168.15 | 163.10 | 2.34 | 2 | 178.56 | 4.12 | 29000 | 2 | 138.51 | | | 29000 | | | | |
| -28.750 | 11.430 | -1.814 | -104.47 | 175.34 | 2.34 | 2 | 174.75 | 4.12 | 29000 | 2 | 154.20 | | | 29000 | | | | |
| -29.125 | 10.747 | -1.826 | -37.58 | 180.15 | 2.34 | 2 | 170.86 | 4.12 | 29000 | 2 | 170.42 | | | 29000 | | | | |
| -29.500 | 10.062 | -1.826 | 29.69 | 177.34 | 2.34 | 2 | 166.94 | 4.12 | 29000 | 2 | 187.05 | | | 29000 | | | | |
| -29.875 | 9.379 | -1.816 | 94.46 | 166.77 | 2.34 | 2 | 163.02 | 4.12 | 29000 | 2 | 203.97 | | | 29000 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | | |





FASE 9 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -30.250 | 8.701 | -1.794 | 153.79 | 148.34 | 2.34 | 2 | 159.12 | 4.12 | 29000 | 2 | 221.13 | | 29000 |
| -30.625 | 8.034 | -1.764 | 204.72 | 121.98 | 2.34 | 2 | 155.24 | 4.12 | 29000 | 2 | 238.47 | | 29000 |
| -31.000 | 7.380 | -1.725 | 244.69 | 90.96 | 2.34 | 2 | 151.37 | 4.12 | 29000 | 2 | 238.27 | | 29000 |
| -31.375 | 6.741 | -1.680 | 273.16 | 61.73 | 2.34 | 2 | 147.51 | 4.12 | 29000 | 2 | 221.18 | | 29000 |
| -31.750 | 6.120 | -1.632 | 291.59 | 37.36 | 2.34 | 2 | 143.64 | 4.12 | 29000 | 2 | 204.59 | | 29000 |
| -32.125 | 5.517 | -1.581 | 301.77 | 17.66 | 2.34 | 2 | 139.73 | 4.12 | 29000 | 2 | 188.56 | | 29000 |
| -32.500 | 4.934 | -1.529 | 305.39 | 2.38 | 2.34 | 2 | 135.76 | 4.12 | 29000 | 2 | 173.08 | | 29000 |
| -32.875 | 4.370 | -1.477 | 304.08 | -8.71 | 2.34 | 2 | 131.71 | 4.12 | 29000 | 2 | 158.18 | | 29000 |
| -33.250 | 3.826 | -1.425 | 299.35 | -15.85 | 2.34 | 2 | 127.57 | 4.12 | 29000 | 2 | 143.85 | | 29000 |
| -33.625 | 3.302 | -1.374 | 292.65 | -19.29 | 2.34 | 2 | 123.34 | 4.12 | 29000 | 2 | 130.08 | | 29000 |
| -34.000 | 2.795 | -1.325 | 285.32 | -19.25 | 2.34 | 2 | 119.13 | 4.12 | 29000 | 2 | 116.86 | | 29000 |
| | | | | | 2.34 | 2 | 143.41 | 4.26 | 43800 | 2 | 159.45 | | 43800 |
| -34.325 | 2.372 | -1.283 | 278.54 | -21.87 | 2.34 | 2 | 137.50 | 4.26 | 43800 | 2 | 142.26 | | 43800 |
| -34.650 | 1.961 | -1.242 | 271.49 | -20.90 | 2.34 | 2 | 131.73 | 4.26 | 43800 | 2 | 125.66 | | 43800 |
| -34.975 | 1.564 | -1.202 | 265.32 | -16.52 | 2.34 | 2 | 125.83 | 4.26 | 43800 | 2 | 109.64 | | 43800 |
| -35.300 | 1.180 | -1.163 | 261.20 | -8.01 | 2.34 | 2 | 125.72 | 4.26 | 43800 | 2 | 94.17 | | 43800 |
| | | | | | 2.34 | -1 | | | | 2 | 369.07 | | 300000 |
| -35.800 | 0.612 | -1.107 | 218.40 | -149.08 | 2.34 | -1 | | | | 2 | 199.88 | | 300000 |
| -36.300 | 0.070 | -1.067 | 127.76 | -196.29 | 2.34 | 2 | 44.38 | 1.52 | 300000 | 2 | 38.02 | | 300000 |
| -36.800 | -0.459 | -1.049 | 38.93 | -142.57 | 2.34 | 2 | 203.83 | 1.52 | 300000 | -1 | | | |
| -37.300 | -0.982 | -1.046 | 0.00 | 0.00 | 2.34 | 2 | 361.79 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kN |

DESPLAZAMIENTO MÁX. = 28.89 mm

MOMENTO MÁXIMO =-1379.44 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 141.86 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.065 = (3062.08 kN/m)/(47386.79 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.185 = (1746.10 kN/m)/(9415.93 kN/m) SIN INTERÉS





**  FASE No 10  **

*Fase 10
*Sismo
*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -1.200 m

PESO ESPECIFOCO HÚMEDO GH = 18.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.000 kN/m3

| | | | |
|---|---|---|---|
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -5.400 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.522 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.594 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -14.600 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -20.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1c

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -28.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 |
| COHESIÓN | C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG1d



* NUEVOS PARÁMETROS PARA CAPA No. 6 HASTA NIVEL -34.000 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.789 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.412 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.509 |
| COHESIÓN | C | = | 25.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 36.000 GRADOS |
| PARA PRESIÓN ACTIVA | DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA | DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 29000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 7 HASTA NIVEL -35.300 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |

TZ_ G.LST

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.795 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.402 | |
| COHESIÓN | C | = | 30.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG3a

* NUEVOS PARÁMETROS PARA CAPA No. 8 HASTA NIVEL -46.500 m

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.302 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 10.398 | |
| COHESIÓN | C | = | 246.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |



FASE 10

| | PARED | SOIL 1 (EXCAVACIÓN: 0.00 m; NIVEL AGUA: -8.50 m; S. DE CAQUOT: 10.00 kPa) | SOIL 2 (EXCAVACIÓN: -22.52 m; NIVEL AGUA: -22.52 m; S. DE CAQUOT: 0.00 kPa) | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | -0.531 | 1.651 | 0.00 | 0.00 | | 2 | 7.75 | 5.15 | 4900 | 0 | | | |
| -0.287 | -0.057 | 1.651 | 0.33 | 2.28 | | 2 | 8.09 | 5.15 | 4900 | 0 | | | |
| -0.575 | 0.418 | 1.651 | 1.32 | 4.65 | | 2 | 8.43 | 5.15 | 4900 | 0 | | | |
| -0.862 | 0.893 | 1.652 | 3.01 | 7.13 | | 2 | 8.77 | 5.15 | 4900 | 0 | | | |
| -1.150 | 1.368 | 1.652 | 5.46 | 10.01 | | 1 | 11.30 | 5.60 | 4900 | 0 | | | |
| | | | | 53.76 | | 1 | 11.30 | 5.60 | 4900 | 0 | | 1 | 43.75 |
| -1.200 | 1.450 | 1.652 | 8.16 | 54.34 | | 1 | 11.81 | 5.60 | 4900 | 0 | | | |
| | | | | | | -1 | | | | 0 | | | |
| -1.625 | 2.153 | 1.656 | 31.36 | 55.11 | | 1 | 3.63 | 3.63 | 15100 | 0 | | | |
| -2.050 | 2.859 | 1.664 | 55.23 | 57.52 | | 1 | 7.73 | 5.22 | 15100 | 0 | | | |
| -2.475 | 3.569 | 1.678 | 80.50 | 61.68 | | 1 | 11.83 | 5.22 | 15100 | 0 | | | |
| -2.900 | 4.285 | 1.696 | 108.06 | 68.69 | | 2 | 21.14 | 4.85 | 15100 | 0 | | | |
| -3.213 | 4.818 | 1.713 | 130.63 | 75.99 | | 2 | 25.63 | 4.85 | 15100 | 0 | | | |
| -3.525 | 5.356 | 1.733 | 155.70 | 84.67 | | 2 | 29.91 | 4.85 | 15100 | 0 | | | |
| -3.838 | 5.901 | 1.757 | 183.69 | 94.65 | | 2 | 33.96 | 4.85 | 15100 | 0 | | | |
| -4.150 | 6.455 | 1.786 | 214.99 | 105.86 | | 2 | 37.73 | 4.85 | 15100 | 0 | | | |
| -4.463 | 7.018 | 1.819 | 249.97 | 118.19 | | 2 | 41.19 | 4.85 | 15100 | 0 | | | |
| -4.775 | 7.592 | 1.857 | 288.96 | 131.55 | | 2 | 44.30 | 4.85 | 15100 | 0 | | | |
| -5.088 | 8.179 | 1.902 | 332.28 | 145.82 | | 2 | 47.02 | 4.85 | 15100 | 0 | | | |
| -5.400 | 8.781 | 1.952 | 380.18 | 160.86 | | 2 | 49.29 | 4.85 | 15100 | 0 | | | |
| | | | | | | 1 | 81.90 | 9.48 | 20600 | 0 | | | |
| -5.788 | 9.552 | 2.026 | 448.84 | 193.95 | | 1 | 88.88 | 9.48 | 20600 | 0 | | | |
| -6.175 | 10.353 | 2.112 | 530.84 | 229.74 | | 1 | 95.86 | 9.48 | 20600 | 0 | | | |
| -6.562 | 11.191 | 2.214 | 627.24 | 268.24 | | 1 | 102.84 | 9.48 | 20600 | 0 | | | |
| -6.950 | 12.071 | 2.335 | 739.08 | 309.44 | | 1 | 109.82 | 9.48 | 20600 | 0 | | | |
| -7.337 | 13.003 | 2.477 | 867.41 | 353.35 | | 1 | 116.80 | 9.48 | 20600 | 0 | | | |
| -7.725 | 13.994 | 2.643 | 1013.27 | 399.96 | | 1 | 123.78 | 9.48 | 20600 | 0 | | | |
| -8.113 | 15.055 | 2.836 | 1177.72 | 449.28 | | 1 | 130.76 | 9.48 | 20600 | 0 | | | |
| -8.500 | 16.196 | 3.061 | 1361.81 | 501.30 | | 1 | 137.74 | 9.48 | 20600 | 0 | | | |
| -8.950 | 17.640 | 3.365 | 1601.62 | 565.13 | 4.41 | 1 | 141.57 | 9.48 | 20600 | 0 | | | |
| | | | | -1214.70 | 4.41 | 1 | 141.57 | 9.48 | 20600 | 0 | | 7 | -1779.83 |
| -9.300 | 18.859 | 3.587 | 1185.55 | -1162.48 | 7.85 | 1 | 144.56 | 9.48 | 20600 | 0 | | | |
| -9.650 | 20.144 | 3.745 | 788.14 | -1108.01 | 11.28 | 1 | 147.55 | 9.48 | 20600 | 0 | | | |
| -10.150 | 22.051 | 3.863 | 254.38 | -1026.30 | 16.19 | 1 | 151.81 | 9.48 | 20600 | 0 | | | |
| -10.512 | 23.455 | 3.875 | -106.48 | -964.20 | 19.74 | 1 | 154.91 | 9.48 | 20600 | 0 | | | |
| -10.875 | 24.853 | 3.829 | -444.38 | -899.68 | 23.30 | 1 | 158.00 | 9.48 | 20600 | 0 | | | |
| -11.238 | 26.224 | 3.729 | -758.46 | -832.76 | 26.85 | 1 | 161.09 | 9.48 | 20600 | 0 | | | |
| -11.600 | 27.550 | 3.579 | -1047.84 | -763.42 | 30.41 | 1 | 164.18 | 9.48 | 20600 | 0 | | | |
| -11.963 | 28.814 | 3.384 | -1311.65 | -691.68 | 33.97 | 1 | 167.28 | 9.48 | 20600 | 0 | | | |
| -12.325 | 29.999 | 3.146 | -1549.01 | -617.52 | 37.52 | 1 | 170.37 | 9.48 | 20600 | 0 | | | |
| -12.688 | 31.091 | 2.872 | -1759.06 | -540.95 | 41.08 | 1 | 173.46 | 9.48 | 20600 | 0 | | | |
| -13.050 | 32.077 | 2.566 | -1940.91 | -461.98 | 44.64 | 1 | 176.56 | 9.48 | 20600 | 0 | | | |
| -13.550 | 33.245 | 2.098 | -2143.87 | -349.09 | 49.54 | 1 | 180.82 | 9.48 | 20600 | 0 | | | |
| -13.850 | 33.830 | 1.798 | -2238.14 | -279.15 | 52.48 | 1 | 183.38 | 9.48 | 20600 | 0 | | | |
| -14.150 | 34.323 | 1.486 | -2311.19 | -207.57 | 55.43 | 1 | 185.94 | 9.48 | 20600 | 0 | | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 10 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -14.600 | 34.883 | 1.003 | -2379.88 | -97.10 | 59.84 | 1 | 189.78 | 9.48 | 20600 | 0 | | | |
| | | | | | 59.84 | 1 | 150.55 | 7.89 | 29000 | 0 | | | |
| -15.000 | 35.197 | 0.566 | -2401.70 | -11.56 | 63.77 | 1 | 153.55 | 7.89 | 29000 | 0 | | | |
| -15.400 | 35.336 | 0.128 | -2388.76 | 76.75 | 67.69 | 1 | 156.55 | 7.89 | 29000 | 0 | | | |
| -15.800 | 35.301 | -0.304 | -2339.93 | 167.83 | 71.61 | 1 | 159.54 | 7.89 | 29000 | 0 | | | |
| -16.200 | 35.094 | -0.724 | -2254.12 | 261.68 | 75.54 | 1 | 162.54 | 7.89 | 29000 | 0 | | | |
| -16.600 | 34.724 | -1.125 | -2130.22 | 358.30 | 79.46 | 1 | 165.54 | 7.89 | 29000 | 0 | | | |
| -17.000 | 34.197 | -1.500 | -1967.12 | 457.68 | 83.39 | 1 | 168.54 | 7.89 | 29000 | 0 | | | |
| -17.400 | 33.528 | -1.842 | -1763.71 | 559.84 | 87.31 | 1 | 171.54 | 7.89 | 29000 | 0 | | | |
| -17.800 | 32.730 | -2.142 | -1518.88 | 664.76 | 91.23 | 1 | 174.54 | 7.89 | 29000 | 0 | | | |
| -18.300 | 31.579 | -2.448 | -1152.92 | 799.81 | 96.14 | 1 | 178.28 | 7.89 | 29000 | 0 | | | |
| -18.800 | 30.297 | -2.663 | -718.35 | 939.18 | 101.04 | 1 | 182.03 | 7.89 | 29000 | 0 | | | |
| -19.100 | 29.485 | -2.742 | -423.78 | 1024.88 | 103.99 | 1 | 184.28 | 7.89 | 29000 | 0 | | | |
| -19.400 | 28.656 | -2.778 | -103.27 | 1112.14 | 106.93 | 1 | 186.53 | 7.89 | 29000 | 0 | | | |
| -19.700 | 27.823 | -2.769 | 243.66 | 1200.95 | 109.87 | 1 | 188.78 | 7.89 | 29000 | 0 | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -20.000 | 26.999 | -2.710 | 617.46 | 1291.33 | 112.82 | 1 | 191.03 | 7.89 | 29000 | 0 | | | | | | | | | | | | | | | |
| | | | | | 112.82 | 1 | 238.41 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -20.150 | 26.596 | -2.661 | 815.12 | 1344.22 | 114.29 | 1 | 239.69 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -20.650 | 25.326 | -2.395 | 1531.86 | 1523.50 | 119.19 | 1 | 243.96 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -21.150 | 24.230 | -1.955 | 2339.38 | 1707.37 | 124.10 | 1 | 248.22 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -21.420 | 23.744 | -1.637 | 2814.01 | 1808.56 | 126.75 | 1 | 250.53 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| | | | | -1426.57 | 126.75 | 1 | 250.53 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | 8-3235.13 | |
| -21.695 | 23.340 | -1.308 | 2436.03 | -1322.13 | 129.44 | 1 | 252.87 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -21.970 | 23.021 | -1.024 | 2086.96 | -1216.30 | 132.14 | 1 | 255.22 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -22.245 | 22.773 | -0.783 | 1767.19 | -1109.08 | 134.84 | 1 | 257.57 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| -22.520 | 22.587 | -0.579 | 1475.39 | -1019.06 | 2.34 | 1 | 259.91 | 9.48 | 20600 | 0 | | | | | | | | | | | | | | | |
| | | | | | 2.34 | 1 | 259.91 | 9.48 | 20600 | 2 | 12.03 | | | 20600 | | | | | | | | | | | |
| -22.795 | 22.451 | -0.411 | 1204.58 | -950.62 | 2.34 | 1 | 262.26 | 9.48 | 20600 | 2 | 17.08 | | | 20600 | | | | | | | | | | | |
| -23.070 | 22.357 | -0.276 | 952.43 | -883.54 | 2.34 | 1 | 264.61 | 9.48 | 20600 | 2 | 26.56 | | | 20600 | | | | | | | | | | | |
| -23.345 | 22.297 | -0.171 | 718.42 | -818.80 | 2.34 | 1 | 266.95 | 9.48 | 20600 | 2 | 38.84 | | | 20600 | | | | | | | | | | | |
| -23.620 | 22.261 | -0.095 | 501.80 | -757.17 | 2.34 | 1 | 269.30 | 9.48 | 20600 | 2 | 53.91 | | | 20600 | | | | | | | | | | | |
| -23.895 | 22.242 | -0.045 | 301.62 | -699.44 | 2.34 | 1 | 271.65 | 9.48 | 20600 | 2 | 71.83 | | | 20600 | | | | | | | | | | | |
| -24.170 | 22.234 | -0.018 | 116.68 | -646.40 | 2.34 | 1 | 273.99 | 9.48 | 20600 | 2 | 92.72 | | | 20600 | | | | | | | | | | | |
| -24.445 | 22.230 | -0.015 | -54.15 | -596.10 | 2.34 | 1 | 276.34 | 9.48 | 20600 | 3 | 96.46 | | | 20600 | | | | | | | | | | | |
| -24.720 | 22.224 | -0.032 | -211.17 | -545.78 | 2.34 | 1 | 278.68 | 9.48 | 20600 | 3 | 97.33 | | | 20600 | | | | | | | | | | | |
| -25.220 | 22.191 | -0.109 | -461.14 | -454.19 | 2.34 | 1 | 282.95 | 9.48 | 20600 | 3 | 102.60 | | | 20600 | | | | | | | | | | | |
| -25.568 | 22.139 | -0.194 | -607.95 | -390.76 | 2.34 | 1 | 285.91 | 9.48 | 20600 | 3 | 105.90 | | | 20600 | | | | | | | | | | | |
| -25.915 | 22.054 | -0.301 | -732.74 | -327.52 | 2.34 | 1 | 288.88 | 9.48 | 20600 | 3 | 109.60 | | | 20600 | | | | | | | | | | | |
| -26.263 | 21.928 | -0.426 | -835.61 | -264.60 | 2.34 | 1 | 291.84 | 9.48 | 20600 | 3 | 113.66 | | | 20600 | | | | | | | | | | | |
| -26.610 | 21.756 | -0.565 | -916.69 | -202.12 | 2.34 | 1 | 294.81 | 9.48 | 20600 | 3 | 118.04 | | | 20600 | | | | | | | | | | | |
| -26.958 | 21.534 | -0.715 | -976.15 | -140.17 | 2.34 | 1 | 297.77 | 9.48 | 20600 | 3 | 122.71 | | | 20600 | | | | | | | | | | | |
| -27.305 | 21.258 | -0.874 | -1014.19 | -78.87 | 2.34 | 1 | 300.74 | 9.48 | 20600 | 3 | 127.62 | | | 20600 | | | | | | | | | | | |
| -27.653 | 20.926 | -1.036 | -1031.04 | -18.27 | 2.34 | 1 | 303.70 | 9.48 | 20600 | 3 | 132.74 | | | 20600 | | | | | | | | | | | |
| -28.000 | 20.538 | -1.200 | -1026.97 | 41.55 | 2.34 | 1 | 306.67 | 9.48 | 20600 | 3 | 138.04 | | | 20600 | | | | | | | | | | | |
| | | | | | 2.34 | 1 | 247.83 | 7.89 | 29000 | 3 | 179.25 | | | 29000 | | | | | | | | | | | |
| -28.375 | 20.055 | -1.374 | -1006.53 | 67.19 | 2.34 | 1 | 250.64 | 7.89 | 29000 | 3 | 187.13 | | | 29000 | | | | | | | | | | | |
| -28.750 | 19.508 | -1.544 | -976.82 | 90.90 | 2.34 | 1 | 253.45 | 7.89 | 29000 | 3 | 195.19 | | | 29000 | | | | | | | | | | | |
| -29.125 | 18.898 | -1.708 | -938.60 | 112.61 | 2.34 | 1 | 256.27 | 7.89 | 29000 | 3 | 203.40 | | | 29000 | | | | | | | | | | | |
| -29.500 | 18.228 | -1.865 | -892.62 | 132.28 | 2.34 | 1 | 259.08 | 7.89 | 29000 | 3 | 211.74 | | | 29000 | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | | kPa/m | kN | | | | | | | | | | | |



FASE 10 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.875 | 17.500 | -2.013 | -839.65 | 149.85 | 2.34 | 1 | 261.89 | 7.89 | 29000 | 3 | 220.17 | | 29000 | | |
| -30.250 | 16.719 | -2.152 | -780.50 | 165.30 | 2.34 | 1 | 264.70 | 7.89 | 29000 | 3 | 228.68 | | 29000 | | |
| -30.625 | 15.888 | -2.280 | -715.95 | 178.61 | 2.34 | 1 | 267.51 | 7.89 | 29000 | 3 | 237.26 | | 29000 | | |
| -31.000 | 15.010 | -2.397 | -646.81 | 189.74 | 2.34 | 1 | 270.32 | 7.89 | 29000 | 3 | 245.89 | | 29000 | | |
| -31.375 | 14.092 | -2.502 | -573.92 | 198.67 | 2.34 | 1 | 273.13 | 7.89 | 29000 | 3 | 254.57 | | 29000 | | |
| -31.750 | 13.136 | -2.593 | -498.08 | 205.40 | 2.34 | 1 | 275.94 | 7.89 | 29000 | 3 | 263.28 | | 29000 | | |
| -32.125 | 12.148 | -2.672 | -420.14 | 209.91 | 2.34 | 1 | 278.75 | 7.89 | 29000 | 3 | 272.03 | | 29000 | | |
| -32.500 | 11.134 | -2.737 | -340.93 | 212.19 | 2.34 | 1 | 281.56 | 7.89 | 29000 | 3 | 280.80 | | 29000 | | |
| -32.875 | 10.097 | -2.789 | -261.28 | 212.23 | 2.34 | 1 | 284.37 | 7.89 | 29000 | 3 | 289.60 | | 29000 | | |
| -33.250 | 9.044 | -2.827 | -181.96 | 210.63 | 2.34 | 1 | 287.18 | 7.89 | 29000 | 2 | 295.16 | | 29000 | | |
| -33.625 | 7.979 | -2.851 | -102.61 | 214.56 | 2.34 | 1 | 290.00 | 7.89 | 29000 | 2 | 265.72 | | 29000 | | |
| -34.000 | 6.907 | -2.862 | -19.52 | 230.63 | 2.34 | 1 | 292.81 | 7.89 | 29000 | 2 | 236.10 | | 29000 | | |
| | | | | | 2.34 | 1 | 289.47 | 7.95 | 43800 | 3 | 323.92 | | 43800 | | |
| -34.325 | 5.977 | -2.859 | 54.20 | 224.46 | 2.34 | 1 | 292.05 | 7.95 | 43800 | 2 | 300.18 | | 43800 | | |
| -34.650 | 5.050 | -2.846 | 127.58 | 229.38 | 2.34 | 1 | 294.64 | 7.95 | 43800 | 2 | 260.94 | | 43800 | | |
| -34.975 | 4.129 | -2.821 | 204.76 | 247.84 | 2.34 | 1 | 297.22 | 7.95 | 43800 | 2 | 221.97 | | 43800 | | |
| -35.300 | 3.218 | -2.784 | 290.13 | 279.74 | 2.34 | 1 | 299.80 | 7.95 | 43800 | 2 | 183.44 | | 43800 | | |
| | | | | | 2.34 | -1 | | | | 2 | 980.47 | | 300000 | | |
| -35.800 | 1.844 | -2.710 | 324.87 | -106.53 | 2.34 | -1 | | | | 2 | 569.25 | | 300000 | | |
| -36.300 | 0.505 | -2.647 | 217.43 | -289.86 | 2.34 | -1 | | | | 2 | 168.75 | | 300000 | | |
| -36.800 | -0.808 | -2.614 | 71.60 | -253.68 | 2.34 | 2 | 308.79 | 1.52 | 300000 | -1 | | | | | |
| -37.300 | -2.113 | -2.608 | 0.00 | 0.00 | 2.34 | 2 | 701.26 | 1.52 | 300000 | -1 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | | kPa/m | kN | | | | | | | | | | | |

DESPLAZAMIENTO MÁX. = 35.34 mm
MOMENTO MÁXIMO = 2814.01 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 289.88 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.200 = (6893.71 kN/m)/(34437.31 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.351 = (2902.56 kN/m)/(8267.43 kN/m) SIN INTERÉS

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 8 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.287 | 0.00 | 3.05 |
| -0.575 | 0.00 | 5.92 |
| -0.862 | 0.00 | 8.59 |
| -1.150 | 0.00 | 11.07 |
| | -86.30 | 28.53 |
| -1.200 | -85.89 | 28.98 |
| -1.625 | -85.89 | 28.98 |
| -2.050 | -85.89 | 28.98 |
| -2.475 | -85.89 | 28.98 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.287 | 0.00 | 0.44 |
| -0.575 | 0.00 | 1.74 |
| -0.862 | 0.00 | 3.83 |
| -1.150 | 0.00 | 6.66 |
| | 0.00 | 6.66 |
| -1.200 | -0.13 | 5.59 |
| -1.625 | -34.15 | 16.27 |
| -2.050 | -70.65 | 28.58 |
| -2.475 | -107.15 | 40.90 |

| | | | | | | |
|---|---|---|---|---|---|---|
| -2.900 | -85.74 | 29.37 | -2.900 | -143.64 | 53.24 |
| -3.213 | -85.26 | 30.65 | -3.213 | -170.37 | 62.40 |
| -3.525 | -84.26 | 32.59 | -3.525 | -196.87 | 71.86 |
| -3.838 | -82.73 | 35.19 | -3.838 | -222.98 | 82.43 |
| -4.150 | -80.67 | 38.44 | -4.150 | -248.52 | 93.92 |
| -4.463 | -78.09 | 42.35 | -4.463 | -273.34 | 106.52 |
| -4.775 | -74.98 | 46.92 | -4.775 | -297.27 | 120.46 |
| -5.088 | -71.35 | 52.15 | -5.088 | -320.15 | 135.92 |
| -5.400 | -67.19 | 58.02 | -5.400 | -341.81 | 153.11 |
| -5.788 | -64.18 | 65.32 | -5.788 | -367.29 | 176.76 |
| -6.175 | -60.40 | 78.98 | -6.175 | -391.45 | 202.99 |
| -6.562 | -55.86 | 93.07 | -6.562 | -414.00 | 232.19 |
| -6.950 | -50.56 | 107.31 | -6.950 | -434.64 | 264.77 |
| -7.337 | -44.49 | 121.37 | -7.337 | -453.08 | 301.10 |
| -7.725 | -37.66 | 134.93 | -7.725 | -469.02 | 341.55 |
| -8.113 | -30.06 | 147.59 | -8.113 | -482.17 | 386.50 |
| -8.500 | -21.70 | 158.95 | -8.500 | -492.22 | 436.30 |
| -8.950 | -10.31 | 171.42 | -8.950 | -499.52 | 500.76 |
| | -435.74 | 36.37 | | -499.52 | 500.76 |
| -9.300 | -425.17 | 46.94 | -9.300 | -501.32 | 439.30 |
| -9.650 | -413.10 | 59.01 | -9.650 | -499.16 | 383.28 |
| -10.150 | -393.26 | 49.64 | -10.150 | -488.16 | 313.70 |
| -10.512 | -376.97 | 48.47 | -10.512 | -473.59 | 271.63 |
| -10.875 | -359.07 | 66.37 | -10.875 | -452.82 | 237.17 |
| -11.238 | -339.56 | 85.87 | -11.238 | -454.65 | 210.80 |
| -11.600 | -318.45 | 106.98 | -11.600 | -573.96 | 192.93 |
| -11.963 | -295.74 | 129.70 | -11.963 | -685.33 | 183.95 |
| -12.325 | -271.41 | 154.03 | -12.325 | -788.18 | 184.22 |
| -12.688 | -245.48 | 179.96 | -12.688 | -881.91 | 194.01 |
| -13.050 | -217.95 | 207.49 | -13.050 | -965.96 | 213.63 |
| | -340.32 | 29.24 | | -965.96 | 213.63 |
| -13.550 | -299.70 | 66.51 | -13.550 | -1064.90 | 94.27 |
| -13.850 | -273.86 | 71.43 | -13.850 | -1114.25 | 45.02 |
| -14.150 | -246.93 | 76.62 | -14.150 | -1155.69 | 55.69 |
| -14.600 | -204.46 | 84.45 | -14.600 | -1202.28 | 73.58 |
| -15.000 | -169.10 | 75.79 | -15.000 | -1228.10 | 88.55 |
| -15.400 | -131.81 | 68.28 | -15.400 | -1239.40 | 99.66 |



| | | | | | | |
|---|---|---|---|---|---|---|
| -15.800 | -92.60 | 107.49 | -15.800 | -1235.40 | 107.38 |
| -16.200 | -51.46 | 148.63 | -16.200 | -1215.33 | 112.06 |
| -16.600 | -8.39 | 191.70 | -16.600 | -1178.42 | 114.02 |
| -17.000 | -4.36 | 236.70 | -17.000 | -1123.89 | 113.47 |
| -17.400 | -10.12 | 283.62 | -17.400 | -1050.98 | 110.57 |
| -17.800 | -15.81 | 332.46 | -17.800 | -958.92 | 210.74 |
| | -356.08 | 254.74 | | -958.92 | 210.74 |
| -18.300 | -292.31 | 318.51 | -18.300 | -815.74 | 116.67 |
| -18.800 | -225.53 | 385.29 | -18.800 | -639.91 | 82.23 |
| -19.100 | -184.02 | 426.80 | -19.100 | -674.75 | 72.24 |
| -19.400 | -141.42 | 469.40 | -19.400 | -723.60 | 60.70 |
| -19.700 | -97.74 | 513.08 | -19.700 | -759.50 | 47.50 |
| -20.000 | -53.03 | 557.84 | -20.000 | -782.14 | 49.97 |
| -20.150 | -50.40 | 582.55 | -20.150 | -788.23 | 64.32 |
| | -545.66 | 582.55 | | -788.23 | 64.32 |
| -20.650 | -461.30 | 666.92 | -20.650 | -781.40 | 322.00 |
| -21.150 | -373.88 | 754.34 | -21.150 | -845.06 | 677.19 |
| -21.420 | -325.40 | 802.82 | -21.420 | -939.48 | 887.38 |
| | -725.90 | 161.89 | | -939.48 | 887.38 |
| -21.695 | -675.61 | 151.68 | -21.695 | -1022.07 | 694.65 |
| -21.970 | -624.39 | 148.22 | -21.970 | -1090.70 | 515.88 |
| -22.245 | -571.85 | 160.62 | -22.245 | -1145.12 | 351.36 |
| -22.520 | -517.09 | 170.89 | -22.520 | -1185.08 | 201.57 |
| -22.795 | -466.37 | 179.04 | -22.795 | -1211.63 | 93.19 |
| -23.070 | -414.89 | 185.05 | -23.070 | -1226.36 | 115.93 |
| -23.345 | -363.69 | 188.95 | -23.345 | -1229.90 | 134.39 |
| -23.620 | -313.53 | 190.71 | -23.620 | -1223.04 | 148.94 |
| -23.895 | -265.20 | 190.35 | -23.895 | -1206.62 | 159.96 |
| -24.170 | -219.52 | 187.87 | -24.170 | -1181.63 | 167.81 |
| -24.445 | -177.91 | 183.25 | -24.445 | -1149.23 | 172.86 |
| -24.720 | -140.75 | 176.52 | -24.720 | -1110.85 | 175.44 |
| -25.220 | -79.75 | 177.06 | -25.220 | -1029.10 | 174.95 |
| -25.568 | -39.56 | 194.54 | -25.568 | -964.54 | 171.51 |
| -25.915 | -17.11 | 212.03 | -25.915 | -893.89 | 166.27 |
| -26.263 | -19.73 | 229.06 | -26.263 | -817.23 | 159.82 |
| -26.610 | -20.70 | 245.21 | -26.610 | -734.79 | 152.75 |
| -26.958 | -20.09 | 260.08 | -26.958 | -646.96 | 145.62 |
| -27.305 | -17.95 | 273.36 | -27.305 | -554.22 | 165.69 |
| -27.653 | -14.35 | 284.76 | -27.653 | -457.78 | 188.00 |
| -28.000 | -9.33 | 294.03 | -28.000 | -368.31 | 208.50 |
| -28.375 | -23.43 | 279.20 | -28.375 | -289.59 | 224.05 |
| -28.750 | -35.29 | 260.71 | -28.750 | -214.97 | 228.86 |
| -29.125 | -44.98 | 238.37 | -29.125 | -141.51 | 224.55 |
| -29.500 | -52.59 | 212.01 | -29.500 | -71.54 | 212.65 |
| -29.875 | -58.17 | 181.49 | -29.875 | -64.11 | 194.68 |
| -30.250 | -65.24 | 146.70 | -30.250 | -72.52 | 172.06 |
| -30.625 | -72.08 | 108.99 | -30.625 | -82.52 | 214.05 |
| -31.000 | -75.40 | 72.92 | -31.000 | -93.35 | 246.77 |
| -31.375 | -75.27 | 43.63 | -31.375 | -104.19 | 265.21 |
| -31.750 | -71.77 | 21.55 | -31.750 | -114.21 | 272.13 |
| -32.125 | -64.95 | 6.66 | -32.125 | -122.48 | 270.66 |
| -32.500 | -54.86 | 0.00 | -32.500 | -128.04 | 263.85 |
| -32.875 | -41.50 | 2.46 | -32.875 | -129.85 | 254.66 |
| -33.250 | -24.13 | 15.55 | -33.250 | -126.83 | 246.01 |
| -33.625 | -7.12 | 33.20 | -33.625 | -117.79 | 240.73 |



| | | | | | | |
|---|---|---|---|---|---|---|
| -34.000 | 0.00 | 54.21 | -34.000 | -101.51 | 241.58 |
| -34.325 | 0.00 | 63.56 | -34.325 | -82.48 | 245.83 |
| -34.650 | 0.00 | 81.42 | -34.650 | -59.75 | 251.97 |
| -34.975 | 0.00 | 106.30 | -34.975 | -31.95 | 262.55 |
| -35.300 | 0.00 | 137.39 | -35.300 | 0.00 | 280.22 |
| -35.800 | -140.09 | 26.49 | -35.800 | 0.00 | 257.25 |
| -36.300 | -229.65 | 0.00 | -36.300 | 0.00 | 159.94 |
| -36.800 | -182.50 | 0.00 | -36.800 | 0.00 | 50.38 |
| -37.300 | 0.00 | 0.00 | -37.300 | 0.00 | 0.00 |

| m | kN/m | kN/m | m | kN.m/m | kN.m/m |
|---|---|---|---|---|---|



* CURVAS ENVOLVENTES DE FASE  9 A FASE  9 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.287 | 0.00 | 2.64 | -0.287 | 0.00 | 0.38 |
| -0.575 | 0.00 | 5.24 | -0.575 | 0.00 | 1.51 |
| -0.862 | 0.00 | 7.81 | -0.862 | 0.00 | 3.39 |
| -1.150 | 0.00 | 10.34 | -1.150 | 0.00 | 6.00 |
| | -7.18 | 0.00 | | 0.00 | 6.00 |
| -1.200 | -6.74 | 0.00 | -1.200 | 0.00 | 5.65 |
| -1.625 | -6.74 | 0.00 | -1.625 | 0.00 | 2.78 |
| -2.050 | -6.74 | 0.00 | -2.050 | -0.08 | 0.00 |
| -2.475 | -6.74 | 0.00 | -2.475 | -2.95 | 0.00 |
| -2.900 | -4.22 | 0.00 | -2.900 | -5.46 | 0.00 |
| -3.213 | 0.00 | 0.00 | -3.213 | -6.14 | 0.00 |
| -3.525 | 0.00 | 5.20 | -3.525 | -5.36 | 0.00 |
| -3.838 | 0.00 | 11.34 | -3.838 | -2.79 | 0.00 |
| -4.150 | 0.00 | 18.40 | -4.150 | 0.00 | 1.83 |
| -4.463 | 0.00 | 26.30 | -4.463 | 0.00 | 8.79 |
| -4.775 | 0.00 | 35.01 | -4.775 | 0.00 | 18.35 |
| -5.088 | 0.00 | 44.45 | -5.088 | 0.00 | 30.75 |
| -5.400 | 0.00 | 54.55 | -5.400 | 0.00 | 46.20 |
| -5.788 | 0.00 | 67.72 | -5.788 | 0.00 | 69.86 |
| -6.175 | 0.00 | 81.55 | -6.175 | 0.00 | 98.77 |
| -6.562 | 0.00 | 95.80 | -6.562 | 0.00 | 133.12 |
| -6.950 | 0.00 | 110.18 | -6.950 | 0.00 | 173.03 |
| -7.337 | 0.00 | 124.36 | -7.337 | 0.00 | 218.48 |
| -7.725 | 0.00 | 138.02 | -7.725 | 0.00 | 269.34 |
| -8.113 | 0.00 | 150.74 | -8.113 | 0.00 | 325.33 |
| -8.500 | 0.00 | 162.12 | -8.500 | 0.00 | 386.00 |
| -8.950 | 0.00 | 174.59 | -8.950 | 0.00 | 461.74 |
| | -459.93 | 0.00 | | 0.00 | 461.74 |
| -9.300 | -449.36 | 0.00 | -9.300 | 0.00 | 302.58 |
| -9.650 | -437.29 | 0.00 | -9.650 | 0.00 | 147.37 |
| -10.150 | -417.45 | 0.00 | -10.150 | -66.44 | 0.00 |
| -10.512 | -401.16 | 0.00 | -10.512 | -214.87 | 0.00 |
| -10.875 | -383.26 | 0.00 | -10.875 | -357.09 | 0.00 |
| -11.238 | -363.75 | 0.00 | -11.238 | -492.53 | 0.00 |
| -11.600 | -342.64 | 0.00 | -11.600 | -620.62 | 0.00 |
| -11.963 | -319.92 | 0.00 | -11.963 | -740.75 | 0.00 |
| -12.325 | -295.60 | 0.00 | -12.325 | -852.37 | 0.00 |
| -12.688 | -269.67 | 0.00 | -12.688 | -954.87 | 0.00 |
| -13.050 | -242.13 | 0.00 | -13.050 | -1047.68 | 0.00 |
| -13.550 | -201.52 | 0.00 | -13.550 | -1158.72 | 0.00 |
| -13.850 | -175.63 | 0.00 | -13.850 | -1215.32 | 0.00 |
| -14.150 | -148.50 | 0.00 | -14.150 | -1263.97 | 0.00 |
| -14.600 | -105.43 | 0.00 | -14.600 | -1321.22 | 0.00 |
| -15.000 | -68.77 | 0.00 | -15.000 | -1356.14 | 0.00 |
| -15.400 | -29.56 | 0.00 | -15.400 | -1375.90 | 0.00 |
| -15.800 | 0.00 | 12.31 | -15.800 | -1379.44 | 0.00 |



| -16.200 | 0.00 | 56.97 | -16.200 | -1365.68 | 0.00 |
|---|---|---|---|---|---|
| -16.600 | 0.00 | 104.53 | -16.600 | -1333.48 | 0.00 |
| -17.000 | 0.00 | 155.13 | -17.000 | -1281.65 | 0.00 |
| -17.400 | 0.00 | 208.90 | -17.400 | -1208.95 | 0.00 |
| -17.800 | 0.00 | 265.98 | -17.800 | -1114.08 | 0.00 |
| -18.300 | 0.00 | 342.17 | -18.300 | -962.27 | 0.00 |
| -18.800 | 0.00 | 423.98 | -18.800 | -770.98 | 0.00 |
| -19.100 | 0.00 | 475.85 | -19.100 | -636.05 | 0.00 |
| -19.400 | 0.00 | 529.87 | -19.400 | -485.25 | 0.00 |
| -19.700 | 0.00 | 586.08 | -19.700 | -317.91 | 0.00 |
| -20.000 | 0.00 | 644.51 | -20.000 | -133.38 | 0.00 |
| -20.150 | 0.00 | 674.39 | -20.150 | -34.47 | 0.00 |
| -20.650 | 0.00 | 777.47 | -20.650 | 0.00 | 328.27 |
| -21.150 | 0.00 | 885.94 | -21.150 | 0.00 | 743.90 |
| -21.420 | 0.00 | 946.74 | -21.420 | 0.00 | 991.27 |
| | -697.26 | 0.00 | | 0.00 | 991.27 |
| -21.695 | -633.75 | 0.00 | -21.695 | 0.00 | 808.22 |
| -21.970 | -568.66 | 0.00 | -21.970 | 0.00 | 642.86 |
| -22.245 | -501.61 | 0.00 | -22.245 | 0.00 | 495.64 |
| -22.520 | -450.32 | 0.00 | -22.520 | 0.00 | 365.53 |
| -22.795 | -414.81 | 0.00 | -22.795 | 0.00 | 246.52 |
| -23.070 | -377.18 | 0.00 | -23.070 | 0.00 | 137.58 |
| -23.345 | -337.69 | 0.00 | -23.345 | 0.00 | 39.24 |
| -23.620 | -296.60 | 0.00 | -23.620 | -48.00 | 0.00 |
| -23.895 | -254.14 | 0.00 | -23.895 | -123.76 | 0.00 |
| -24.170 | -212.46 | 0.00 | -24.170 | -187.85 | 0.00 |
| -24.445 | -174.65 | 0.00 | -24.445 | -240.97 | 0.00 |
| -24.720 | -141.25 | 0.00 | -24.720 | -284.31 | 0.00 |
| -25.220 | -87.38 | 0.00 | -25.220 | -341.20 | 0.00 |
| -25.568 | -52.12 | 0.00 | -25.568 | -365.44 | 0.00 |
| -25.915 | -17.18 | 0.00 | -25.915 | -377.46 | 0.00 |
| -26.263 | 0.00 | 16.56 | -26.263 | -377.52 | 0.00 |
| -26.610 | 0.00 | 48.34 | -26.610 | -366.18 | 0.00 |
| -26.958 | 0.00 | 77.46 | -26.958 | -344.23 | 0.00 |
| -27.305 | 0.00 | 103.37 | -27.305 | -312.71 | 0.00 |
| -27.653 | 0.00 | 125.59 | -27.653 | -272.82 | 0.00 |
| -28.000 | 0.00 | 143.71 | -28.000 | -225.90 | 0.00 |
| -28.375 | 0.00 | 163.10 | -28.375 | -168.15 | 0.00 |
| -28.750 | 0.00 | 175.34 | -28.750 | -104.47 | 0.00 |
| -29.125 | 0.00 | 180.15 | -29.125 | -37.58 | 0.00 |
| -29.500 | 0.00 | 177.34 | -29.500 | 0.00 | 29.69 |
| -29.875 | 0.00 | 166.77 | -29.875 | 0.00 | 94.46 |

| | | | | | |
|---|---|---|---|---|---|
| -30.250 | 0.00 | 148.34 | -30.250 | 0.00 | 153.79 |
| -30.625 | 0.00 | 121.98 | -30.625 | 0.00 | 204.72 |
| -31.000 | 0.00 | 90.96 | -31.000 | 0.00 | 244.69 |
| -31.375 | 0.00 | 61.73 | -31.375 | 0.00 | 273.16 |
| -31.750 | 0.00 | 37.36 | -31.750 | 0.00 | 291.59 |
| -32.125 | 0.00 | 17.66 | -32.125 | 0.00 | 301.77 |
| -32.500 | 0.00 | 2.38 | -32.500 | 0.00 | 305.39 |
| -32.875 | -8.71 | 0.00 | -32.875 | 0.00 | 304.08 |
| -33.250 | -15.85 | 0.00 | -33.250 | 0.00 | 299.35 |
| -33.625 | -19.29 | 0.00 | -33.625 | 0.00 | 292.65 |
| -34.000 | -19.25 | 0.00 | -34.000 | 0.00 | 285.32 |
| -34.325 | -21.87 | 0.00 | -34.325 | 0.00 | 278.54 |
| -34.650 | -20.90 | 0.00 | -34.650 | 0.00 | 271.49 |



| | | | | | |
|---|---|---|---|---|---|
| -34.975 | -16.52 | 0.00 | -34.975 | 0.00 | 265.32 |
| -35.300 | -8.01 | 0.00 | -35.300 | 0.00 | 261.20 |
| -35.800 | -149.08 | 0.00 | -35.800 | 0.00 | 218.40 |
| -36.300 | -196.29 | 0.00 | -36.300 | 0.00 | 127.76 |
| -36.800 | -142.57 | 0.00 | -36.800 | 0.00 | 38.93 |
| -37.300 | 0.00 | 0.00 | -37.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



*** DESPLAZAMIENTO MÁXIMO EN FASE N° 10 =  35.336 mm  EN FASE FINAL N° 10 =  35.336 mm

*** MAXIMUM MOMENT  IN PHASE Nb 10 =  2814.006 kN.m/m  IN FINAL PHASE Nb 10 =  2814.006 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -1.15 | 2 | 0.00 | 7 | -97.38 | 10 | 43.75 |
| 2 | -8.95 | 3 | -912.00 | 4 | -938.49 | 7 | QUITADO |
| 3 | -13.05 | 4 | -912.00 | 7 | -970.96 | 8 | QUITADO |
| 4 | -17.80 | 5 | -1642.00 | 7 | -1675.64 | 8 | QUITADO |
| 5 | -20.15 | 6 | -1642.00 | 7 | -1647.59 | 8 | QUITADO |
| 6 | -21.42 | 7 | 0.00 | 8 | -1528.72 | 9 | QUITADO |
| 7 | -8.95 | 8 | 0.00 | 10 | -1779.83 | 10 | -1779.83 |
| 8 | -21.42 | 9 | -1644.00 | 10 | -3235.13 | 10 | -3235.13 |
| m | | kN | | kN | | kN | |



* CURVAS ENVOLVENTES DE FASE 10 A FASE 10 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.287 | 0.00 | 2.28 |
| -0.575 | 0.00 | 4.65 |
| -0.862 | 0.00 | 7.13 |
| -1.150 | 0.00 | 10.01 |
| | 0.00 | 53.76 |
| -1.200 | 0.00 | 54.34 |
| -1.625 | 0.00 | 55.11 |
| -2.050 | 0.00 | 57.52 |
| -2.475 | 0.00 | 61.68 |
| -2.900 | 0.00 | 68.69 |
| -3.213 | 0.00 | 75.99 |
| -3.525 | 0.00 | 84.67 |
| -3.838 | 0.00 | 94.65 |
| -4.150 | 0.00 | 105.86 |
| -4.463 | 0.00 | 118.19 |
| -4.775 | 0.00 | 131.55 |
| -5.088 | 0.00 | 145.82 |
| -5.400 | 0.00 | 160.86 |
| -5.788 | 0.00 | 193.95 |
| -6.175 | 0.00 | 229.74 |
| -6.562 | 0.00 | 268.24 |
| -6.950 | 0.00 | 309.44 |
| -7.337 | 0.00 | 353.35 |
| -7.725 | 0.00 | 399.96 |
| -8.113 | 0.00 | 449.28 |
| -8.500 | 0.00 | 501.30 |
| -8.950 | 0.00 | 565.13 |
| | -1214.70 | 0.00 |
| -9.300 | -1162.48 | 0.00 |
| -9.650 | -1108.01 | 0.00 |
| -10.150 | -1026.30 | 0.00 |
| -10.512 | -964.20 | 0.00 |
| -10.875 | -899.68 | 0.00 |
| -11.238 | -832.76 | 0.00 |
| -11.600 | -763.42 | 0.00 |
| -11.963 | -691.68 | 0.00 |
| -12.325 | -617.52 | 0.00 |
| -12.688 | -540.95 | 0.00 |
| -13.050 | -461.98 | 0.00 |
| -13.550 | -349.09 | 0.00 |
| -13.850 | -279.15 | 0.00 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.287 | 0.00 | 0.33 |
| -0.575 | 0.00 | 1.32 |
| -0.862 | 0.00 | 3.01 |
| -1.150 | 0.00 | 5.46 |
| | 0.00 | 5.46 |
| -1.200 | 0.00 | 8.16 |
| -1.625 | 0.00 | 31.36 |
| -2.050 | 0.00 | 55.23 |
| -2.475 | 0.00 | 80.50 |
| -2.900 | 0.00 | 108.06 |
| -3.213 | 0.00 | 130.63 |
| -3.525 | 0.00 | 155.70 |
| -3.838 | 0.00 | 183.69 |
| -4.150 | 0.00 | 214.99 |
| -4.463 | 0.00 | 249.97 |
| -4.775 | 0.00 | 288.96 |
| -5.088 | 0.00 | 332.28 |
| -5.400 | 0.00 | 380.18 |
| -5.788 | 0.00 | 448.84 |
| -6.175 | 0.00 | 530.84 |
| -6.562 | 0.00 | 627.24 |
| -6.950 | 0.00 | 739.08 |
| -7.337 | 0.00 | 867.41 |
| -7.725 | 0.00 | 1013.27 |
| -8.113 | 0.00 | 1177.72 |
| -8.500 | 0.00 | 1361.81 |
| -8.950 | 0.00 | 1601.62 |
| | 0.00 | 1601.62 |
| -9.300 | 0.00 | 1185.55 |
| -9.650 | 0.00 | 788.14 |
| -10.150 | 0.00 | 254.38 |
| -10.512 | -106.48 | 0.00 |
| -10.875 | -444.38 | 0.00 |
| -11.238 | -758.46 | 0.00 |
| -11.600 | -1047.84 | 0.00 |
| -11.963 | -1311.65 | 0.00 |
| -12.325 | -1549.01 | 0.00 |
| -12.688 | -1759.06 | 0.00 |
| -13.050 | -1940.91 | 0.00 |
| -13.550 | -2143.87 | 0.00 |
| -13.850 | -2238.14 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| -14.150 | -207.57 | 0.00 | -14.150 | -2311.19 | 0.00 |
| -14.600 | -97.10 | 0.00 | -14.600 | -2379.88 | 0.00 |
| -15.000 | -11.56 | 0.00 | -15.000 | -2401.70 | 0.00 |
| -15.400 | 0.00 | 76.75 | -15.400 | -2388.76 | 0.00 |
| -15.800 | 0.00 | 167.83 | -15.800 | -2339.93 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -16.200 | 0.00 | 261.68 | -16.200 | -2254.12 | 0.00 |
| -16.600 | 0.00 | 358.30 | -16.600 | -2130.22 | 0.00 |
| -17.000 | 0.00 | 457.68 | -17.000 | -1967.12 | 0.00 |
| -17.400 | 0.00 | 559.84 | -17.400 | -1763.71 | 0.00 |
| -17.800 | 0.00 | 664.76 | -17.800 | -1518.88 | 0.00 |
| -18.300 | 0.00 | 799.81 | -18.300 | -1152.92 | 0.00 |
| -18.800 | 0.00 | 939.18 | -18.800 | -718.35 | 0.00 |
| -19.100 | 0.00 | 1024.88 | -19.100 | -423.78 | 0.00 |
| -19.400 | 0.00 | 1112.14 | -19.400 | -103.27 | 0.00 |
| -19.700 | 0.00 | 1200.95 | -19.700 | 0.00 | 243.66 |
| -20.000 | 0.00 | 1291.33 | -20.000 | 0.00 | 617.46 |
| -20.150 | 0.00 | 1344.22 | -20.150 | 0.00 | 815.12 |
| -20.650 | 0.00 | 1523.50 | -20.650 | 0.00 | 1531.86 |
| -21.150 | 0.00 | 1707.37 | -21.150 | 0.00 | 2339.38 |
| -21.420 | 0.00 | 1808.56 | -21.420 | 0.00 | 2814.01 |
| | -1426.57 | 0.00 | | 0.00 | 2814.01 |
| -21.695 | -1322.13 | 0.00 | -21.695 | 0.00 | 2436.03 |
| -21.970 | -1216.30 | 0.00 | -21.970 | 0.00 | 2086.96 |
| -22.245 | -1109.08 | 0.00 | -22.245 | 0.00 | 1767.19 |
| -22.520 | -1019.06 | 0.00 | -22.520 | 0.00 | 1475.39 |
| -22.795 | -950.62 | 0.00 | -22.795 | 0.00 | 1204.58 |
| -23.070 | -883.54 | 0.00 | -23.070 | 0.00 | 952.43 |
| -23.345 | -818.80 | 0.00 | -23.345 | 0.00 | 718.42 |
| -23.620 | -757.17 | 0.00 | -23.620 | 0.00 | 501.80 |
| -23.895 | -699.44 | 0.00 | -23.895 | 0.00 | 301.62 |
| -24.170 | -646.40 | 0.00 | -24.170 | 0.00 | 116.68 |
| -24.445 | -596.10 | 0.00 | -24.445 | -54.15 | 0.00 |
| -24.720 | -545.78 | 0.00 | -24.720 | -211.17 | 0.00 |
| -25.220 | -454.19 | 0.00 | -25.220 | -461.14 | 0.00 |
| -25.568 | -390.76 | 0.00 | -25.568 | -607.95 | 0.00 |
| -25.915 | -327.52 | 0.00 | -25.915 | -732.74 | 0.00 |
| -26.263 | -264.60 | 0.00 | -26.263 | -835.61 | 0.00 |
| -26.610 | -202.12 | 0.00 | -26.610 | -916.69 | 0.00 |
| -26.958 | -140.17 | 0.00 | -26.958 | -976.15 | 0.00 |
| -27.305 | -78.87 | 0.00 | -27.305 | -1014.19 | 0.00 |
| -27.653 | -18.27 | 0.00 | -27.653 | -1031.04 | 0.00 |
| -28.000 | 0.00 | 41.55 | -28.000 | -1026.97 | 0.00 |
| -28.375 | 0.00 | 67.19 | -28.375 | -1006.53 | 0.00 |
| -28.750 | 0.00 | 90.90 | -28.750 | -976.82 | 0.00 |
| -29.125 | 0.00 | 112.61 | -29.125 | -938.60 | 0.00 |
| -29.500 | 0.00 | 132.28 | -29.500 | -892.62 | 0.00 |
| -29.875 | 0.00 | 149.85 | -29.875 | -839.65 | 0.00 |
| -30.250 | 0.00 | 165.30 | -30.250 | -780.50 | 0.00 |
| -30.625 | 0.00 | 178.61 | -30.625 | -715.95 | 0.00 |
| -31.000 | 0.00 | 189.74 | -31.000 | -646.81 | 0.00 |
| -31.375 | 0.00 | 198.67 | -31.375 | -573.92 | 0.00 |
| -31.750 | 0.00 | 205.40 | -31.750 | -498.08 | 0.00 |
| -32.125 | 0.00 | 209.91 | -32.125 | -420.14 | 0.00 |
| -32.500 | 0.00 | 212.19 | -32.500 | -340.93 | 0.00 |
| -32.875 | 0.00 | 212.23 | -32.875 | -261.28 | 0.00 |
| -33.250 | 0.00 | 210.63 | -33.250 | -181.96 | 0.00 |
| -33.625 | 0.00 | 214.56 | -33.625 | -102.61 | 0.00 |
| -34.000 | 0.00 | 230.63 | -34.000 | -19.52 | 0.00 |
| -34.325 | 0.00 | 224.46 | -34.325 | 0.00 | 54.20 |
| -34.650 | 0.00 | 229.38 | -34.650 | 0.00 | 127.58 |



| | | | | | |
|---|---|---|---|---|---|
| -34.975 | 0.00 | 247.84 | -34.975 | 0.00 | 204.76 |
| -35.300 | 0.00 | 279.74 | -35.300 | 0.00 | 290.13 |
| -35.800 | -106.53 | 0.00 | -35.800 | 0.00 | 324.87 |
| -36.300 | -289.86 | 0.00 | -36.300 | 0.00 | 217.43 |
| -36.800 | -253.68 | 0.00 | -36.800 | 0.00 | 71.60 |
| -37.300 | 0.00 | 0.00 | -37.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS ENVOLVENTES DE FASE  1 A FASE 10 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.287 | 0.00 | 3.05 | -0.287 | 0.00 | 0.44 |
| -0.575 | 0.00 | 5.92 | -0.575 | 0.00 | 1.74 |
| -0.862 | 0.00 | 8.59 | -0.862 | 0.00 | 3.83 |
| -1.150 | 0.00 | 11.07 | -1.150 | 0.00 | 6.66 |
| | -86.30 | 53.76 | | 0.00 | 6.66 |
| -1.200 | -85.89 | 54.34 | -1.200 | -0.13 | 8.16 |
| -1.625 | -85.89 | 55.11 | -1.625 | -34.15 | 31.36 |
| -2.050 | -85.89 | 57.52 | -2.050 | -70.65 | 55.23 |
| -2.475 | -85.89 | 61.68 | -2.475 | -107.15 | 80.50 |
| -2.900 | -85.74 | 68.69 | -2.900 | -143.64 | 108.06 |
| -3.213 | -85.26 | 75.99 | -3.213 | -170.37 | 130.63 |
| -3.525 | -84.26 | 84.67 | -3.525 | -196.87 | 155.70 |
| -3.838 | -82.73 | 94.65 | -3.838 | -222.98 | 183.69 |
| -4.150 | -80.67 | 105.86 | -4.150 | -248.52 | 214.99 |
| -4.463 | -78.09 | 118.19 | -4.463 | -273.34 | 249.97 |
| -4.775 | -74.98 | 131.55 | -4.775 | -297.27 | 288.96 |
| -5.088 | -71.35 | 145.82 | -5.088 | -320.15 | 332.28 |

| | | | | | |
|---|---|---|---|---|---|
| -5.400 | -67.19 | 160.86 | -5.400 | -341.81 | 380.18 |
| -5.788 | -64.18 | 193.95 | -5.788 | -367.29 | 448.84 |
| -6.175 | -60.40 | 229.74 | -6.175 | -391.45 | 530.84 |
| -6.562 | -55.86 | 268.24 | -6.562 | -414.00 | 627.24 |
| -6.950 | -50.56 | 309.44 | -6.950 | -434.64 | 739.08 |
| -7.337 | -44.49 | 353.35 | -7.337 | -453.08 | 867.41 |
| -7.725 | -37.66 | 399.96 | -7.725 | -469.02 | 1013.27 |
| -8.113 | -30.06 | 449.28 | -8.113 | -482.17 | 1177.72 |
| -8.500 | -21.70 | 501.30 | -8.500 | -492.22 | 1361.81 |
| -8.950 | -10.31 | 565.13 | -8.950 | -499.52 | 1601.62 |
| | -1214.70 | 36.37 | | -499.52 | 1601.62 |
| -9.300 | -1162.48 | 46.94 | -9.300 | -501.32 | 1185.55 |
| -9.650 | -1108.01 | 59.01 | -9.650 | -499.16 | 788.14 |
| -10.150 | -1026.30 | 49.64 | -10.150 | -488.16 | 313.70 |
| -10.512 | -964.20 | 48.47 | -10.512 | -473.59 | 271.63 |
| -10.875 | -899.68 | 66.37 | -10.875 | -452.82 | 237.17 |
| -11.238 | -832.76 | 85.87 | -11.238 | -758.46 | 210.80 |
| -11.600 | -763.42 | 106.98 | -11.600 | -1047.84 | 192.93 |
| -11.963 | -691.68 | 129.70 | -11.963 | -1311.65 | 183.95 |
| -12.325 | -617.52 | 154.03 | -12.325 | -1549.01 | 184.22 |
| -12.688 | -540.95 | 179.96 | -12.688 | -1759.06 | 194.01 |
| -13.050 | -461.98 | 207.49 | -13.050 | -1940.91 | 213.63 |
| | -461.98 | 29.24 | | -1940.91 | 213.63 |
| -13.550 | -349.09 | 66.51 | -13.550 | -2143.87 | 94.27 |
| -13.850 | -279.15 | 71.43 | -13.850 | -2238.14 | 45.02 |
| -14.150 | -246.93 | 76.62 | -14.150 | -2311.19 | 55.69 |
| -14.600 | -204.46 | 84.45 | -14.600 | -2379.88 | 73.58 |
| -15.000 | -169.10 | 75.79 | -15.000 | -2401.70 | 88.55 |
| -15.400 | -131.81 | 76.75 | -15.400 | -2388.76 | 99.66 |





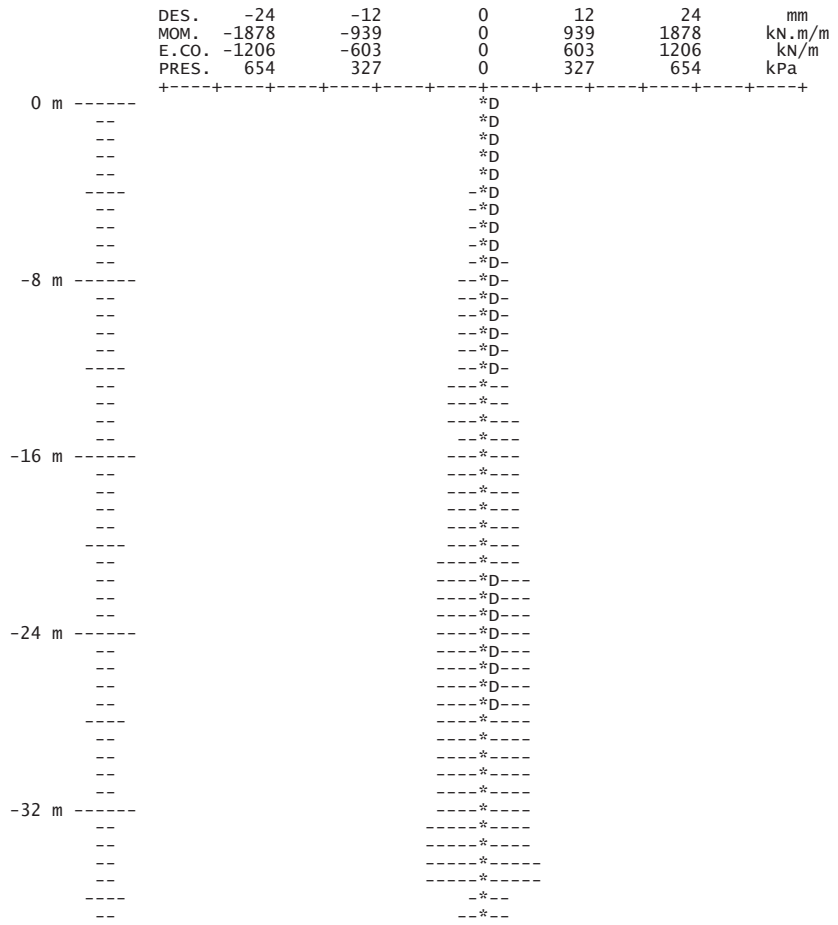
| | | | | | |
|---|---|---|---|---|---|
| -15.800 | -92.60 | 167.83 | -15.800 | -2339.93 | 107.38 |
| -16.200 | -51.46 | 261.68 | -16.200 | -2254.12 | 112.06 |
| -16.600 | -8.39 | 358.30 | -16.600 | -2130.22 | 114.02 |
| -17.000 | -4.36 | 457.68 | -17.000 | -1967.12 | 113.47 |
| -17.400 | -10.12 | 559.84 | -17.400 | -1763.71 | 110.57 |
| -17.800 | -15.81 | 664.76 | -17.800 | -1518.88 | 210.74 |
| | -356.08 | 664.76 | | -1518.88 | 210.74 |
| -18.300 | -292.31 | 799.81 | -18.300 | -1152.92 | 116.67 |
| -18.800 | -225.53 | 939.18 | -18.800 | -770.98 | 82.23 |
| -19.100 | -184.02 | 1024.88 | -19.100 | -674.75 | 72.24 |
| -19.400 | -141.42 | 1112.14 | -19.400 | -723.60 | 60.70 |
| -19.700 | -97.74 | 1200.95 | -19.700 | -759.50 | 243.66 |
| -20.000 | -53.03 | 1291.33 | -20.000 | -782.14 | 617.46 |
| -20.150 | -50.40 | 1344.22 | -20.150 | -788.23 | 815.12 |
| | -545.66 | 1344.22 | | -788.23 | 815.12 |
| -20.650 | -461.30 | 1523.50 | -20.650 | -781.40 | 1531.86 |
| -21.150 | -373.88 | 1707.37 | -21.150 | -845.06 | 2339.38 |
| -21.420 | -325.40 | 1808.56 | -21.420 | -939.48 | 2814.01 |
| | -1426.57 | 161.89 | | -939.48 | 2814.01 |
| -21.695 | -1322.13 | 151.68 | -21.695 | -1022.07 | 2436.03 |
| -21.970 | -1216.30 | 148.22 | -21.970 | -1090.70 | 2086.96 |
| -22.245 | -1109.08 | 160.62 | -22.245 | -1145.12 | 1767.19 |
| -22.520 | -1019.06 | 170.89 | -22.520 | -1185.08 | 1475.39 |
| -22.795 | -950.62 | 179.04 | -22.795 | -1211.63 | 1204.58 |
| -23.070 | -883.54 | 185.05 | -23.070 | -1226.36 | 952.43 |
| -23.345 | -818.80 | 188.95 | -23.345 | -1229.90 | 718.42 |
| -23.620 | -757.17 | 190.71 | -23.620 | -1223.04 | 501.80 |
| -23.895 | -699.44 | 190.35 | -23.895 | -1206.62 | 301.62 |
| -24.170 | -646.40 | 187.87 | -24.170 | -1181.63 | 167.81 |
| -24.445 | -596.10 | 183.25 | -24.445 | -1149.23 | 172.86 |
| -24.720 | -545.78 | 176.52 | -24.720 | -1110.85 | 175.44 |
| -25.220 | -454.19 | 177.06 | -25.220 | -1029.10 | 174.95 |
| -25.568 | -390.76 | 194.54 | -25.568 | -964.54 | 171.51 |
| -25.915 | -327.52 | 212.03 | -25.915 | -893.89 | 166.27 |
| -26.263 | -264.60 | 229.06 | -26.263 | -835.61 | 159.82 |
| -26.610 | -202.12 | 245.21 | -26.610 | -916.69 | 152.75 |
| -26.958 | -140.17 | 260.08 | -26.958 | -976.15 | 145.62 |
| -27.305 | -78.87 | 273.36 | -27.305 | -1014.19 | 165.69 |
| -27.653 | -18.27 | 284.76 | -27.653 | -1031.04 | 188.00 |
| -28.000 | -9.33 | 294.03 | -28.000 | -1026.97 | 208.50 |
| -28.375 | -23.43 | 279.20 | -28.375 | -1006.53 | 224.05 |
| -28.750 | -35.29 | 260.71 | -28.750 | -976.82 | 228.86 |
| -29.125 | -44.98 | 238.37 | -29.125 | -938.60 | 224.55 |
| -29.500 | -52.59 | 212.01 | -29.500 | -892.62 | 212.65 |
| -29.875 | -58.17 | 181.49 | -29.875 | -839.65 | 194.68 |
| -30.250 | -65.24 | 165.30 | -30.250 | -780.50 | 172.06 |
| -30.625 | -72.08 | 178.61 | -30.625 | -715.95 | 214.05 |
| -31.000 | -75.40 | 189.74 | -31.000 | -646.81 | 246.77 |
| -31.375 | -75.27 | 198.67 | -31.375 | -573.92 | 273.16 |
| -31.750 | -71.77 | 205.40 | -31.750 | -498.08 | 291.59 |
| -32.125 | -64.95 | 209.91 | -32.125 | -420.14 | 301.77 |
| -32.500 | -54.86 | 212.19 | -32.500 | -340.93 | 305.39 |
| -32.875 | -41.50 | 212.23 | -32.875 | -261.28 | 304.08 |
| -33.250 | -24.13 | 210.63 | -33.250 | -181.96 | 299.35 |
| -33.625 | -19.29 | 214.56 | -33.625 | -117.79 | 292.65 |





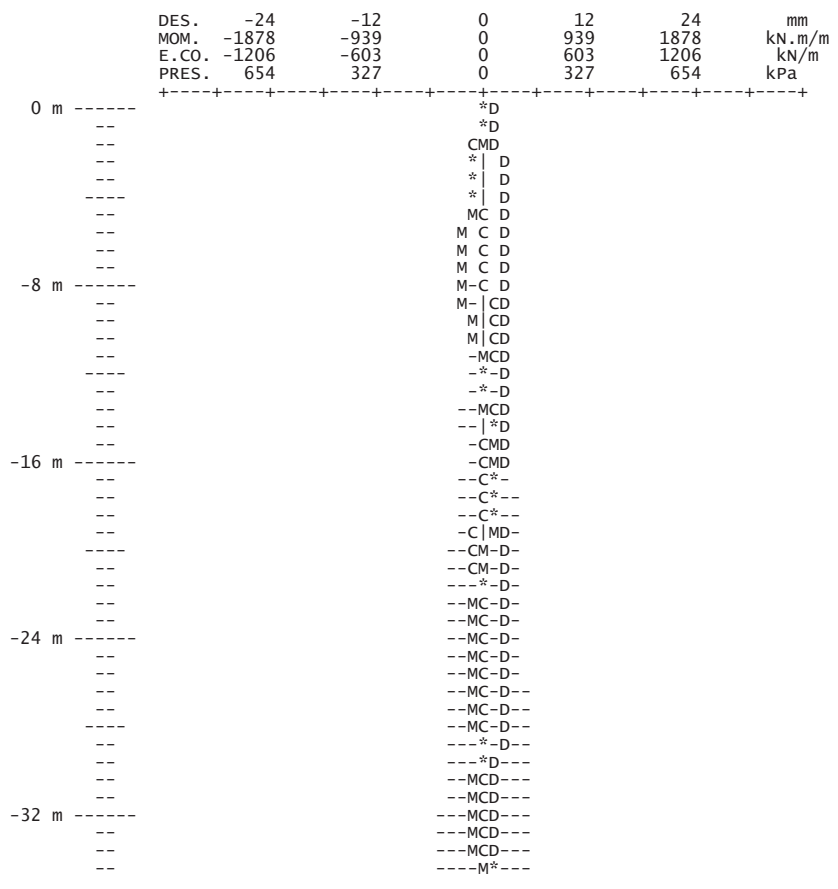
| | | | | | |
|---|---|---|---|---|---|
| -34.000 | -19.25 | 230.63 | -34.000 | -101.51 | 285.32 |
| -34.325 | -21.87 | 224.46 | -34.325 | -82.48 | 278.54 |
| -34.650 | -20.90 | 229.38 | -34.650 | -59.75 | 271.49 |
| -34.975 | -16.52 | 247.84 | -34.975 | -31.95 | 265.32 |
| -35.300 | -8.01 | 279.74 | -35.300 | 0.00 | 290.13 |
| -35.800 | -149.08 | 26.49 | -35.800 | 0.00 | 324.87 |
| -36.300 | -289.86 | 0.00 | -36.300 | 0.00 | 217.43 |
| -36.800 | -253.68 | 0.00 | -36.800 | 0.00 | 71.60 |
| -37.300 | 0.00 | 0.00 | -37.300 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |

* CURVAS DE LA FASE 1 *





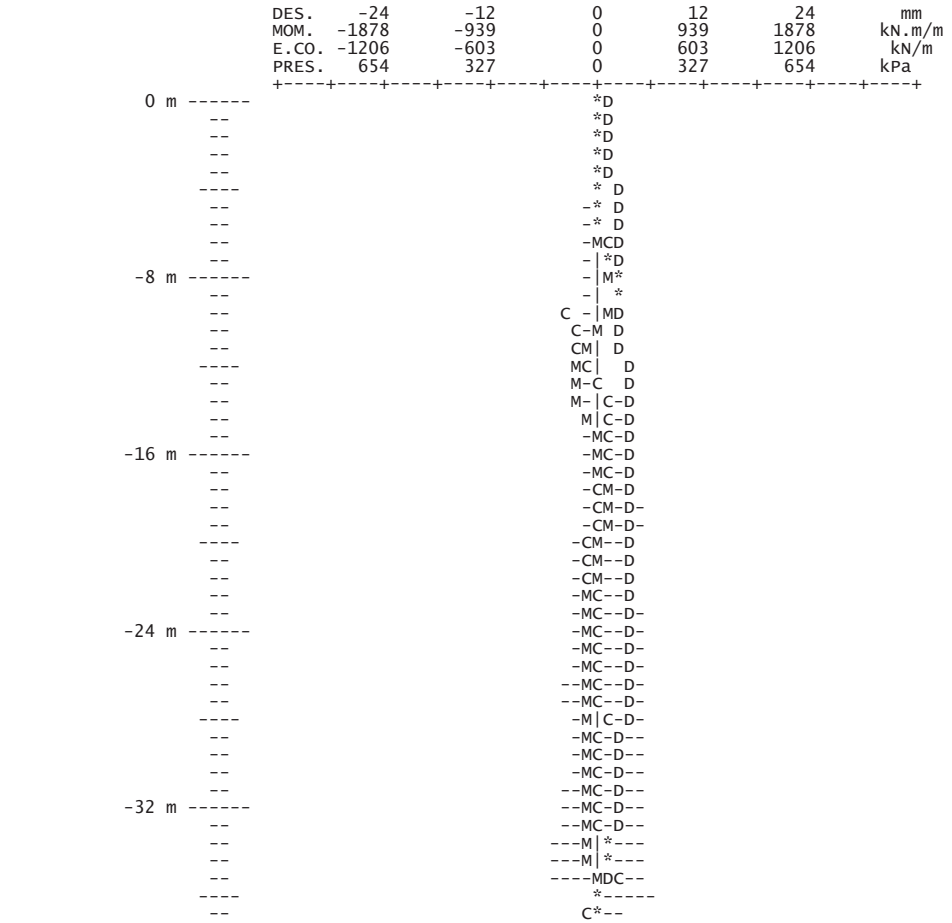

* CURVAS DE LA FASE 2 *





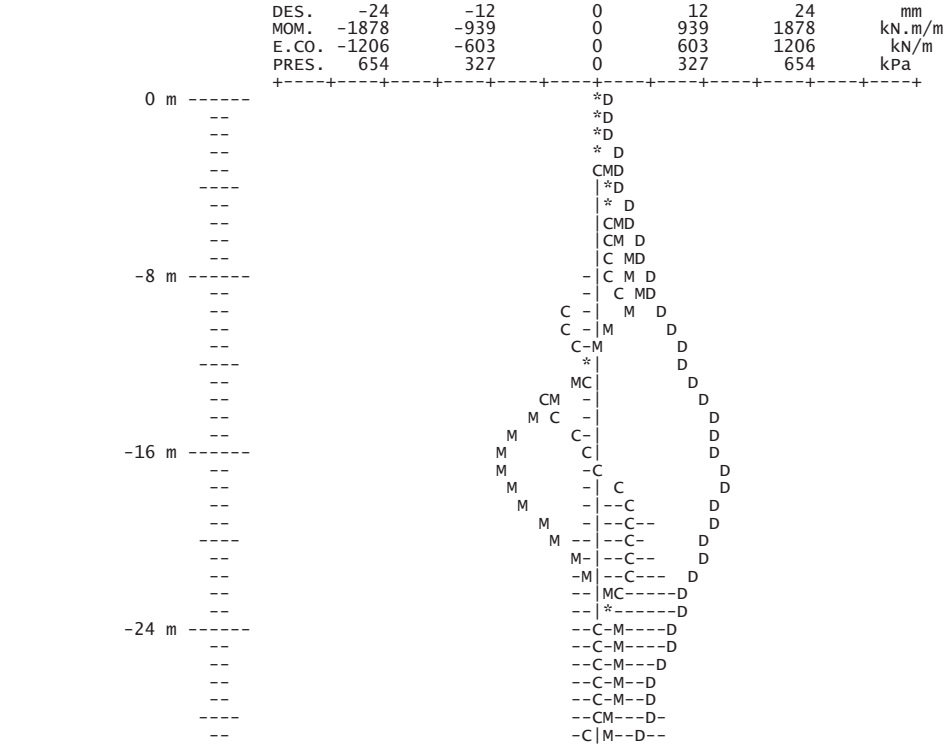


* CURVAS DE LA FASE  3 *





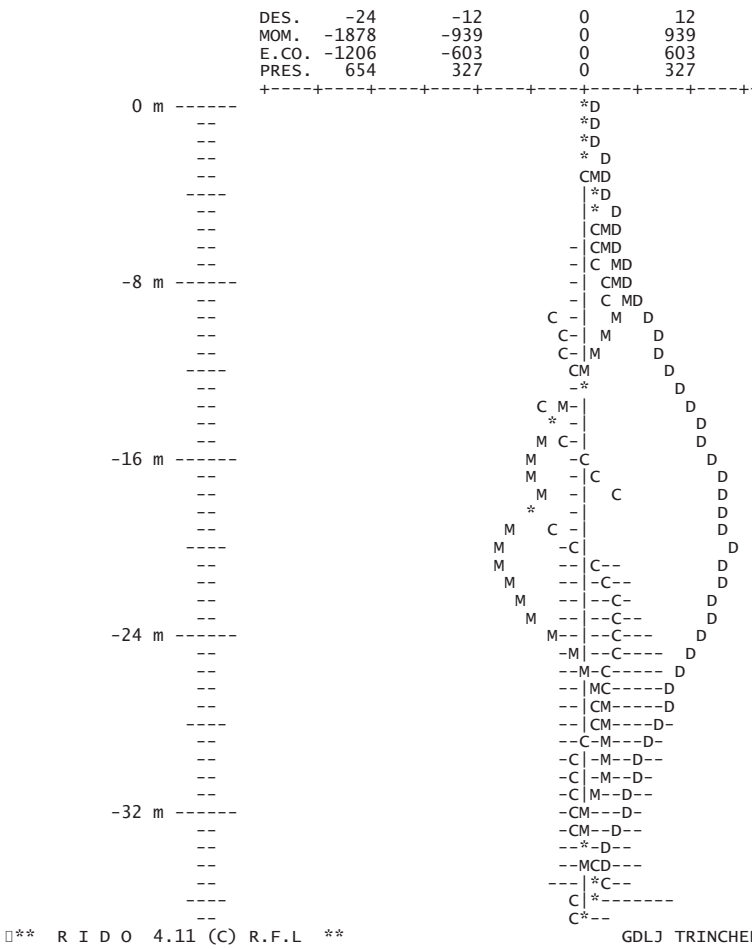

* CURVAS DE LA FASE  4 *





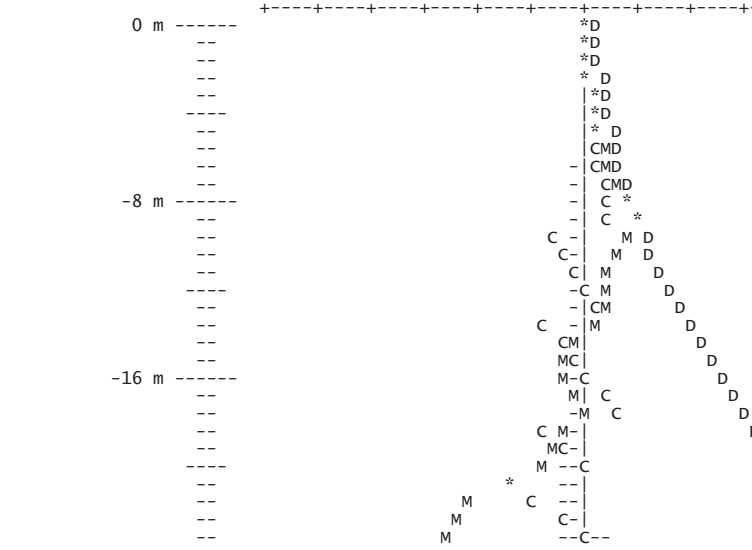


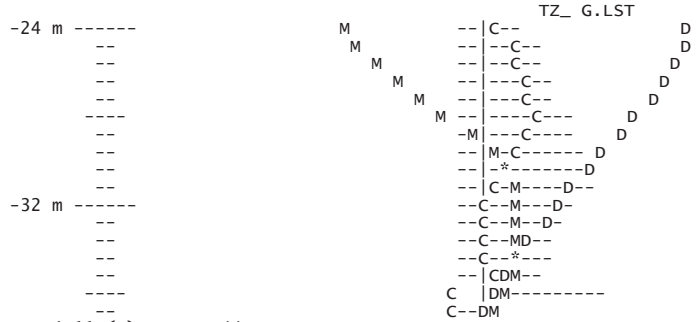
* CURVAS DE LA FASE  5 *





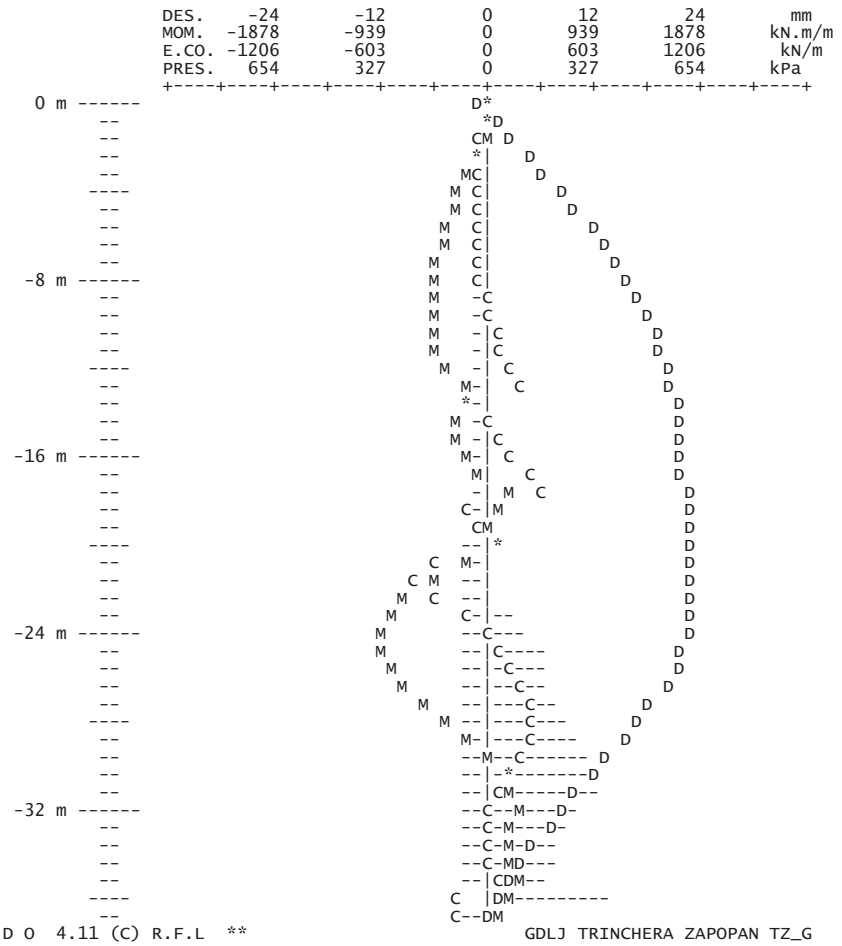

* CURVAS DE LA FASE  6 *





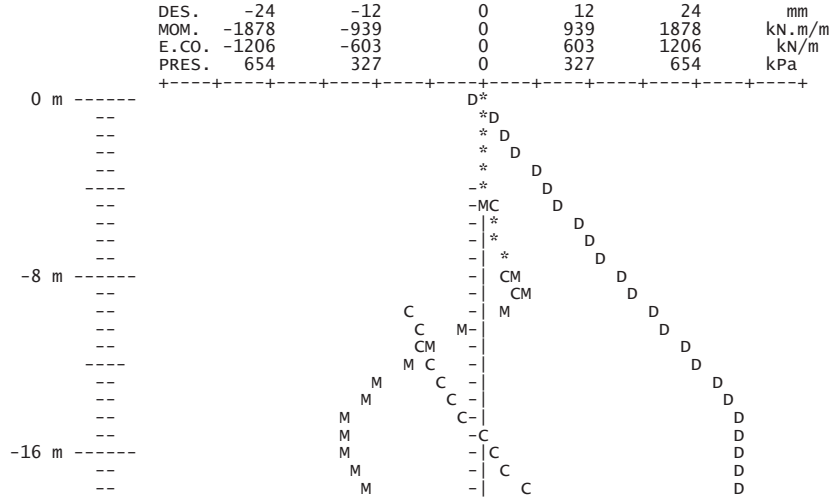


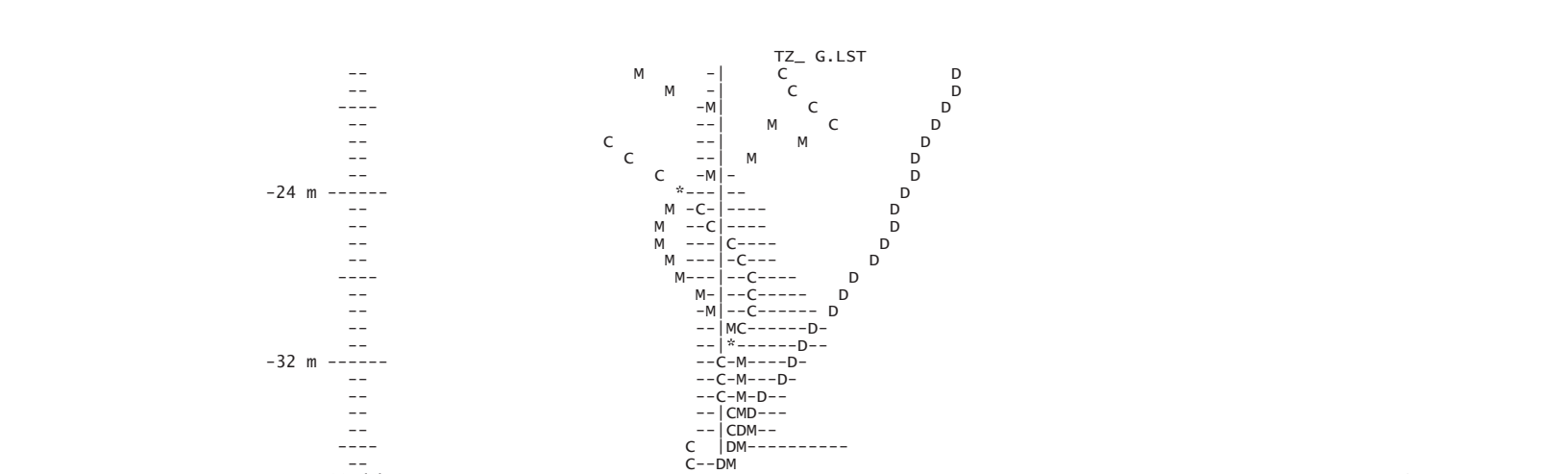
* CURVAS DE LA FASE  7 *





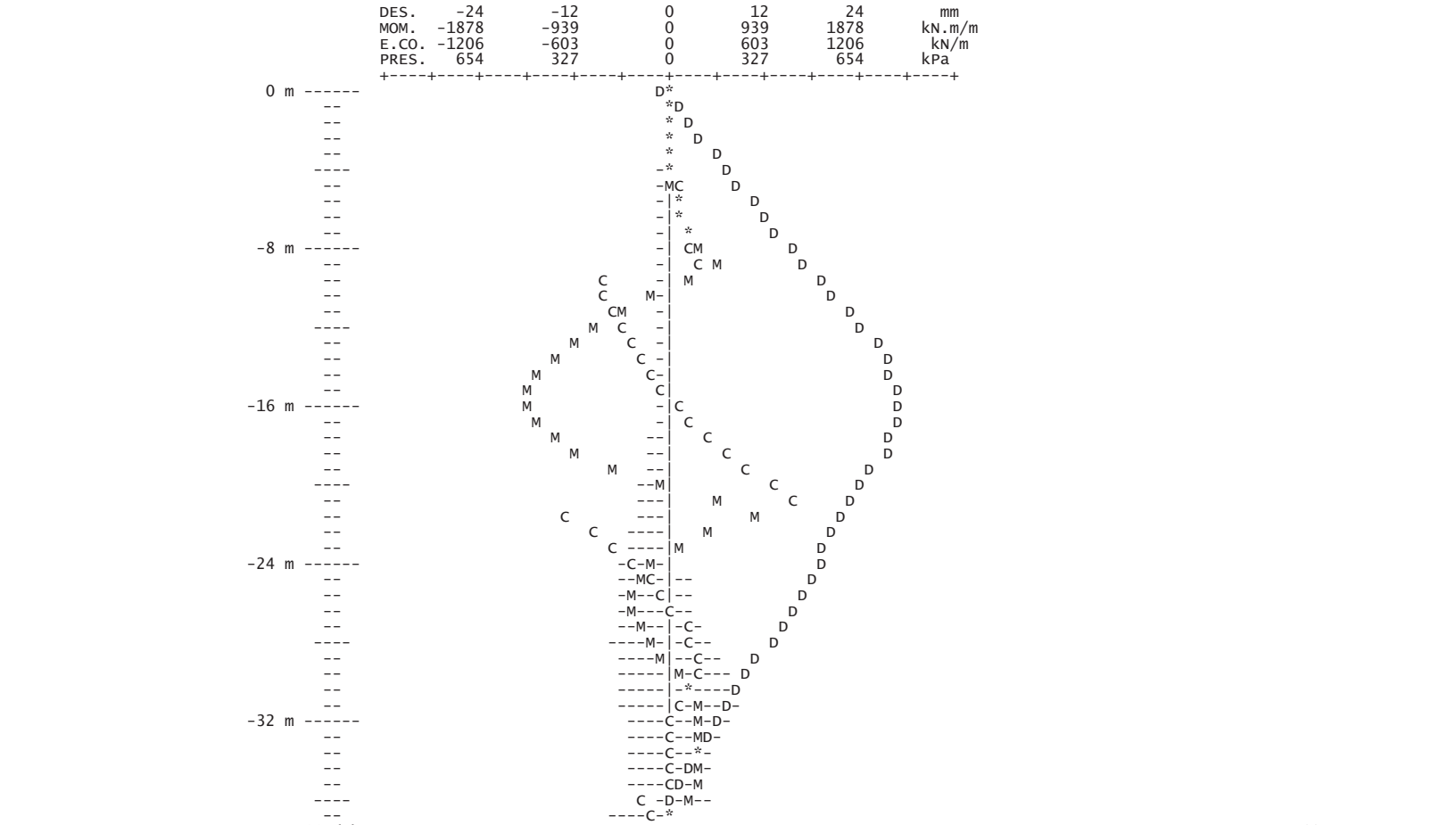

* CURVAS DE LA FASE  8 *





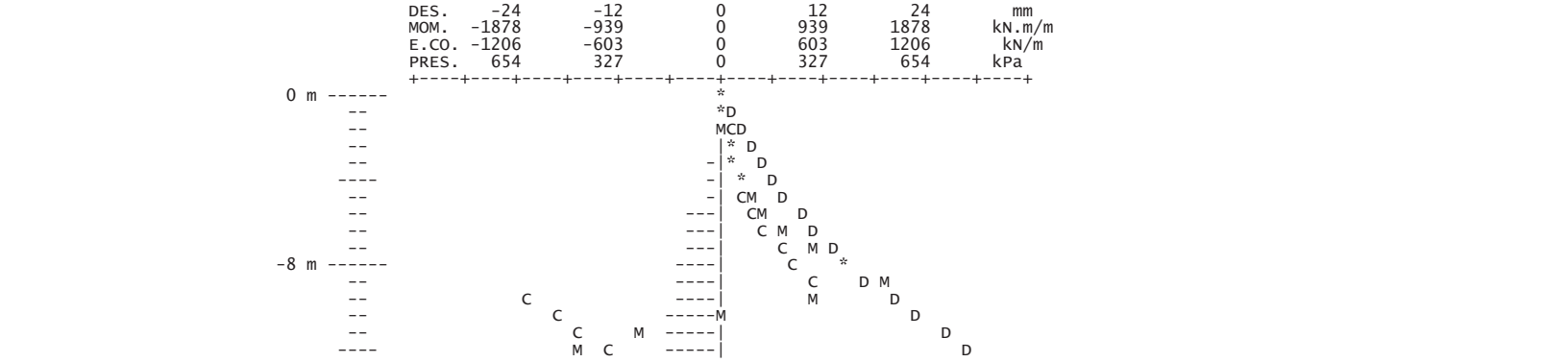


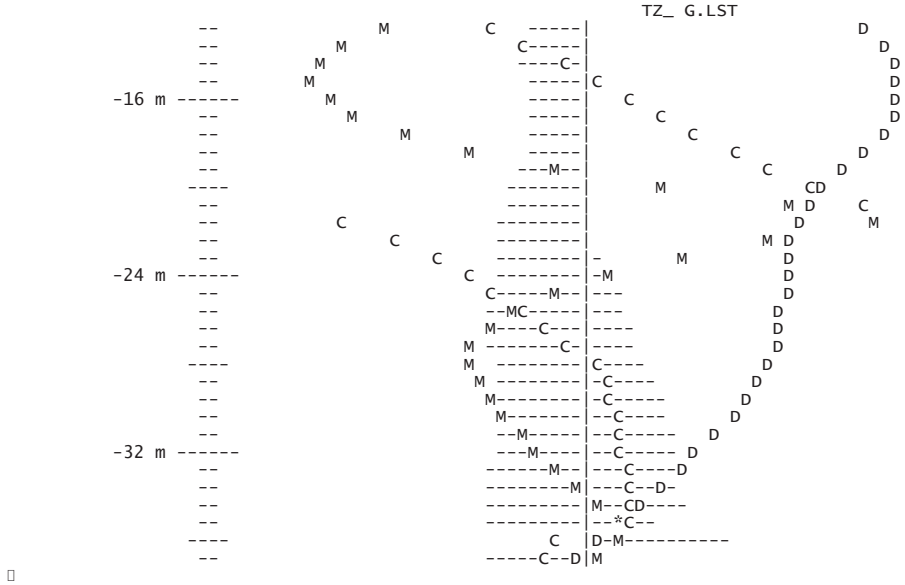

* CURVAS DE LA FASE  9 *






* CURVAS DE LA FASE 10 *




-16 m
-24 m
-32 m

```
***** NOMBRE DE FICHERO DE DATOS : TZ_ H.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_H                                    *60L  U:NN*
      : 0
 1 ...  0
      *PANTALLA DE 1.00 m
      : -32.70 2190000
 2 ...  -32.7 2190000
      : 0.00
 3 ...  0
      * R
      : -2.20 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -2.2 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1a
      : -7.10 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 5 ...  -7.1 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -10.20 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 6 ...  -10.2 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -12.60 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 7 ...  -12.6 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1b
      : -20.60 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 8 ...  -20.6 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -29.20 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 9 ...  -29.2 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG2
      : -31.70 20.00 10.00 0.246 0.426 3.69 30.00 35 0.333 0.000 43800
10 ...  -31.7 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -47.30 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
11 ...  -47.3 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -12.70 0.50
12 ...  -12.7 0.5
      *Fase 1
      *Excavacion hasta cota inferior nivel cubierta
      : SUC(1) 10
13 ... SUC(1)  10
      : EXC(2) -3.10
14 ... EXC(2)  -3.1
      : CAL(2)
15 ... CAL(2)
      *Fase 2
      *Ejecucion del nivel cubierta
      *Excavacion hasta nivel rampa de autobuses.
      : STR(0) -2.25 1.00 0.00 0.00 5200000
16 ... STR(0)  -2.25 1 0 0 5200000
      : EXC(2) -10.5
17 ... EXC(2)  -10.5
      : CAL(2)
18 ... CAL(2)
      *Fase 3
      *Ejecucion del nivel de autobuses
      *Excavacion hasta 1er puntal provisional
      : STR(0) -9.90 1.00 0.00 0.00 3466667
19 ... STR(0)  -9.9 1 0 0 3466667
      : EXC(2) -17.02
20 ... EXC(2)  -17.02
      : WAT(2) -17.52
21 ... WAT(2)  -17.52
      : CAL(2)
22 ... CAL(2)
      *Fase 4
      *Ejecucion del primer nivel de puntales provisionales
      *Excavacion hasta 2º nivel puntales provisionales
      : STR(0) -16.02 1.00 0.00 0.00 453000
23 ... STR(0)  -16.02 1 0 0 453000
      : EXC(2) -24.02
24 ... EXC(2)  -24.02
      : WAT(2) -24.52
25 ... WAT(2)  -24.52
      : CAL(2)
26 ... CAL(2)
      *Fase 5
      *Ejecucion del 2º nivel de puntales provisionales
      *Excavacion hasta el nivel de losa de fondo
      : STR(0) -23.02 1.00 0.00 0.00 453000
27 ... STR(0)  -23.02 1 0 0 453000
      : EXC(2) -25.4 -27.6 2.47 4.67
28 ... EXC(2)  -25.4 -27.6 2.47 4.67
      : WAT(2) -28.1
29 ... WAT(2)  -28.1
      : CAL(2)
30 ... CAL(2)
      *Fase 6
      *Ejecucion de la losa de fondo y retirada de puntales provisionales
      : STR(0) -24.55 1.00 0.00 0.00 850000
31 ... STR(0)  -24.55 1 0 0 850000
      : STR(0,3)
32 ... STR(0,3)
      : STR(0,4)
33 ... STR(0,4)
      : CAL(2,1)
34 ... CAL(2,1)
      *Fase 7
      *Restitucion del nf y paso de la tuneladora
      : STR(0,5)
35 ... STR(0,5)
      : STR(0) -24.55 1.00 0.00 -1012-398 430000
36 ... STR(0)  -24.55 1 0 -1410 430000
      : WAT(2) -25.4 129.0
37 ... WAT(2)  -25.4 129
      : CAL(2,1)
38 ... CAL(2,1)
      *Fase 8
      *Restitucion del puntal provisional y Sismo
      : STR(0) -16.02 1.00 0.00 0.00 453000
39 ... STR(0)  -16.02 1 0 0 453000
```

```
        *SISMO_ R
        : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
  40 ... PLA(1)  0.56 2.367 5 29 0 0
        *SISMO_ UG1a
        : PLA(2) 0.560 2.367 5.00 29 0.00 0.00
  41 ... PLA(2)  0.56 2.367 5 29 0 0
        *SISMO_ UG1b
        : PLA(3) 0.522 2.594 15.00 31 0.00 0.00
  42 ... PLA(3)  0.522 2.594 15 31 0 0
        *SISMO_ UG1c
        : PLA(4) 0.487 2.846 20.00 33 0.00 0.00
  43 ... PLA(4)  0.487 2.846 20 33 0 0
        *SISMO_ UG1b
        : PLA(5) 1.211 1.520 15.00 31 0.00 0.00
  44 ... PLA(5)  1.211 1.52 15 31 0 0
        *SISMO_ UG1c
        : PLA(6) 0.948 1.991 20.00 33 0.00 0.00
  45 ... PLA(6)  0.948 1.991 20 33 0 0
        *SISMO_ UG2
        : PLA(7) 0.795 2.402 30.00 35 0.00 0.00
  46 ... PLA(7)  0.795 2.402 30 35 0 0
        *SISMO_ UG3a
        : PLA(8) 0.302 10.398 246.00 58 0.00 0.00
  47 ... PLA(8)  0.302 10.398 246 58 0 0
        : CAL(2)
  48 ... CAL(2)
        : FIN
  49 ... FIN
        : GRF
  50 ... GRF
        : STA
  51 ... STA
        : EVP
  52 ... EVP
        : ASC
  53 ... ASC
        *XLS
        : STOP
  54 ... STOP
```



*PANTALLA DE 1.00 m

---

** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -32.700 m : | 2190000. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -2.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1a

CAPA N° 2 DE -2.200 m A -7.100 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1b



CAPA N° 3 DE -7.100 m A -10.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |

| | | | |
|---|---|---|---|
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 15100.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 | 1/m |

* UG1c

CAPA N° 4 DE -10.200 m A -12.600 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 19.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 9.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.268 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.455 | |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 3.392 | |
| COHESIÓN C | = | 20.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 33.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 20600.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 | 1/m |

* UG1b

CAPA N° 5 DE -12.600 m A -20.600 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 18.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 8.500 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.291 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.485 | |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 3.124 | |
| COHESIÓN C | = | 15.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 31.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 15100.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 | 1/m |

* UG1c



CAPA N° 6 DE -20.600 m A -29.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 19.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 9.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.268 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.455 | |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 3.392 | |
| COHESIÓN C | = | 20.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 33.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 20600.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 | 1/m |

* UG2

CAPA N° 7 DE -29.200 m A -31.700 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 20.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 10.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.246 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.426 | |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 3.690 | |
| COHESIÓN C | = | 30.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 35.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 43800.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 | 1/m |

* UG3a

CAPA N° 8 DE -31.700 m A -47.300 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 23.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 13.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.075 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.152 | |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 12.162 | |
| COHESIÓN C | = | 246.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 58.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.333 | |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 300000.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 | 1/m |

* NF



**  FASE No  1  **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2  PARA NIVEL = -3.100 m

FASE 1

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -3.10 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 5.375 | -0.492 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 5.240 | -0.492 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 5.104 | -0.492 | 0.00 | 0.02 | | 1 | 0.16 | 0.16 | 4900 | 0 | | | |
| -0.825 | 4.969 | -0.492 | 0.03 | 0.28 | | 1 | 1.73 | 1.73 | 4900 | 0 | | | |
| -1.100 | 4.834 | -0.492 | 0.20 | 0.97 | | 1 | 3.30 | 3.17 | 4900 | 0 | | | |
| -1.375 | 4.699 | -0.492 | 0.61 | 2.09 | | 1 | 4.87 | 3.17 | 4900 | 0 | | | |
| -1.650 | 4.563 | -0.492 | 1.39 | 3.65 | | 1 | 6.44 | 3.17 | 4900 | 0 | | | |
| -1.925 | 4.428 | -0.492 | 2.65 | 5.63 | | 1 | 8.00 | 3.17 | 4900 | 0 | | | |
| -2.200 | 4.293 | -0.491 | 4.53 | 8.05 | | 1 | 9.57 | 3.17 | 4900 | 0 | | | |
| -2.250 | 4.268 | -0.491 | 4.94 | 8.54 | | 1 | 9.86 | 3.17 | 4900 | 0 | | | |
| -2.675 | 4.060 | -0.490 | 9.53 | 13.24 | | 1 | 12.28 | 3.17 | 4900 | 0 | | | |
| -3.100 | 3.852 | -0.487 | 16.35 | 19.04 | | 2 | 15.01 | 3.47 | 4900 | 0 | | | |
| | | | | | | 2 | 15.01 | 3.47 | 4900 | 3 | 16.98 | 4900 | |
| -3.600 | 3.610 | -0.482 | 25.65 | 18.18 | | 2 | 20.83 | 5.15 | 4900 | 2 | 22.32 | 4900 | |
| -4.100 | 3.370 | -0.476 | 34.65 | 18.02 | | 2 | 26.64 | 5.15 | 4900 | 2 | 25.78 | 4900 | |
| -4.600 | 3.134 | -0.467 | 43.86 | 19.03 | | 2 | 32.43 | 5.15 | 4900 | 2 | 29.26 | 4900 | |
| -5.100 | 2.904 | -0.455 | 53.87 | 21.18 | | 2 | 38.20 | 5.15 | 4900 | 2 | 32.77 | 4900 | |
| -5.600 | 2.679 | -0.442 | 65.23 | 24.44 | | 2 | 43.93 | 5.15 | 4900 | 2 | 36.30 | 4900 | |
| -6.100 | 2.462 | -0.426 | 78.49 | 28.79 | | 2 | 49.63 | 5.15 | 4900 | 2 | 39.88 | 4900 | |
| -6.600 | 2.254 | -0.406 | 94.19 | 34.18 | | 2 | 55.29 | 5.15 | 4900 | 2 | 43.49 | 4900 | |
| -7.100 | 2.057 | -0.382 | 112.83 | 40.56 | | 2 | 60.89 | 5.15 | 4900 | 2 | 47.16 | 4900 | |
| | | | | | | 2 | 35.77 | 4.85 | 15100 | 2 | 65.98 | 15100 | |
| -7.450 | 1.927 | -0.363 | 125.26 | 30.67 | | 2 | 40.88 | 4.85 | 15100 | 2 | 67.15 | 15100 | |
| -7.800 | 1.803 | -0.342 | 134.46 | 22.13 | | 2 | 45.89 | 4.85 | 15100 | 2 | 68.43 | 15100 | |
| -8.150 | 1.687 | -0.320 | 140.90 | 14.85 | | 2 | 50.78 | 4.85 | 15100 | 2 | 69.82 | 15100 | |
| -8.500 | 1.579 | -0.298 | 145.00 | 8.76 | | 2 | 55.55 | 4.85 | 15100 | 2 | 71.32 | 15100 | |
| -8.850 | 1.479 | -0.274 | 147.16 | 3.77 | | 2 | 60.20 | 4.85 | 15100 | 2 | 72.95 | 15100 | |
| -9.200 | 1.387 | -0.251 | 147.76 | -0.20 | | 2 | 64.73 | 4.85 | 15100 | 2 | 74.71 | 15100 | |
| -9.550 | 1.303 | -0.227 | 147.13 | -3.25 | | 2 | 69.13 | 4.85 | 15100 | 2 | 76.58 | 15100 | |
| -9.900 | 1.228 | -0.204 | 145.58 | -5.46 | | 2 | 73.41 | 4.85 | 15100 | 2 | 78.59 | 15100 | |
| -10.200 | 1.170 | -0.184 | 143.73 | -6.75 | | 2 | 76.98 | 4.85 | 15100 | 2 | 80.40 | 15100 | |
| | | | | | | 2 | 64.69 | 4.55 | 20600 | 2 | 82.96 | 20600 | |
| -10.500 | 1.118 | -0.164 | 140.92 | -11.91 | | 2 | 68.36 | 4.55 | 20600 | 2 | 84.47 | 20600 | |
| -10.762 | 1.077 | -0.148 | 137.26 | -15.92 | | 2 | 71.47 | 4.55 | 20600 | 2 | 85.90 | 20600 | |
| -11.025 | 1.040 | -0.131 | 132.60 | -19.51 | | 2 | 74.50 | 4.55 | 20600 | 2 | 87.42 | 20600 | |
| -11.288 | 1.008 | -0.116 | 127.05 | -22.72 | | 2 | 77.43 | 4.55 | 20600 | 2 | 89.02 | 20600 | |
| -11.550 | 0.979 | -0.101 | 120.70 | -25.61 | | 2 | 80.29 | 4.55 | 20600 | 2 | 90.70 | 20600 | |
| -11.812 | 0.955 | -0.087 | 113.63 | -28.21 | | 2 | 83.07 | 4.55 | 20600 | 2 | 92.46 | 20600 | |
| -12.075 | 0.934 | -0.074 | 105.91 | -30.56 | | 2 | 85.77 | 4.55 | 20600 | 2 | 94.30 | 20600 | |
| -12.338 | 0.916 | -0.062 | 97.60 | -32.70 | | 2 | 88.40 | 4.55 | 20600 | 2 | 96.20 | 20600 | |
| -12.600 | 0.901 | -0.050 | 88.76 | -34.67 | | 2 | 90.98 | 4.55 | 20600 | 2 | 98.17 | 20600 | |
| | | | | | | 2 | 103.16 | 4.85 | 15100 | 2 | 98.46 | 15100 | |
| -12.700 | 0.896 | -0.046 | 85.32 | -34.19 | | 2 | 104.13 | 4.85 | 15100 | 2 | 99.28 | 15100 | |
| -13.115 | 0.880 | -0.032 | 71.56 | -32.08 | | 2 | 106.08 | 4.85 | 15100 | 2 | 100.75 | 15100 | |
| -13.530 | 0.870 | -0.019 | 58.71 | -29.81 | | 2 | 107.95 | 4.85 | 15100 | 2 | 102.30 | 15100 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |





FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.945 | 0.864 | -0.009 | 46.83 | -27.43 | | 2 | 109.75 | 4.85 | 15100 | 2 | 103.93 | 15100 | |
| -14.360 | 0.862 | -0.001 | 35.95 | -25.00 | | 2 | 111.49 | 4.85 | 15100 | 2 | 105.61 | 15100 | |
| -14.775 | 0.863 | 0.004 | 26.08 | -22.56 | | 2 | 113.19 | 4.85 | 15100 | 2 | 107.33 | 15100 | |
| -15.190 | 0.865 | 0.009 | 17.22 | -20.14 | | 2 | 114.86 | 4.85 | 15100 | 2 | 109.08 | 15100 | |
| -15.605 | 0.869 | 0.011 | 9.36 | -17.77 | | 2 | 116.51 | 4.85 | 15100 | 2 | 110.85 | 15100 | |
| -16.020 | 0.874 | 0.012 | 2.47 | -15.45 | | 2 | 118.15 | 4.85 | 15100 | 2 | 112.64 | 15100 | |
| -16.520 | 0.880 | 0.012 | -4.58 | -12.74 | | 2 | 120.12 | 4.85 | 15100 | 2 | 114.79 | 15100 | |
| -17.020 | 0.886 | 0.010 | -10.29 | -10.12 | | 2 | 122.09 | 4.85 | 15100 | 2 | 116.93 | 15100 | |
| -17.520 | 0.890 | 0.007 | -14.71 | -7.58 | | 2 | 124.09 | 4.85 | 15100 | 2 | 119.06 | 15100 | |
| -17.905 | 0.893 | 0.004 | -17.26 | -5.65 | | 2 | 125.64 | 4.85 | 15100 | 2 | 120.68 | 15100 | |
| -18.290 | 0.894 | 0.001 | -19.07 | -3.75 | | 2 | 127.21 | 4.85 | 15100 | 2 | 122.29 | 15100 | |
| -18.675 | 0.893 | -0.002 | -20.15 | -1.85 | | 2 | 128.80 | 4.85 | 15100 | 2 | 123.87 | 15100 | |
| -19.060 | 0.892 | -0.006 | -20.50 | 0.05 | | 2 | 130.41 | 4.85 | 15100 | 2 | 125.44 | 15100 | |
| -19.445 | 0.889 | -0.009 | -20.11 | 1.99 | | 2 | 132.04 | 4.85 | 15100 | 2 | 126.98 | 15100 | |
| -19.830 | 0.885 | -0.013 | -18.96 | 3.96 | | 2 | 133.70 | 4.85 | 15100 | 2 | 128.50 | 15100 | |
| -20.215 | 0.879 | -0.016 | -17.05 | 5.99 | | 2 | 135.37 | 4.85 | 15100 | 2 | 130.00 | 15100 | |
| -20.600 | 0.872 | -0.019 | -14.34 | 8.10 | | 2 | 137.05 | 4.85 | 15100 | 2 | 131.49 | 15100 | |
| | | | | | | 2 | 122.96 | 4.55 | 20600 | 2 | 128.97 | 20600 | |
| -20.903 | 0.866 | -0.021 | -12.16 | 6.32 | | 2 | 124.33 | 4.55 | 20600 | 2 | 130.09 | 20600 | |
| -21.205 | 0.860 | -0.022 | -10.51 | 4.62 | | 2 | 125.70 | 4.55 | 20600 | 2 | 131.19 | 20600 | |
| -21.508 | 0.853 | -0.024 | -9.36 | 3.00 | | 2 | 127.08 | 4.55 | 20600 | 2 | 132.29 | 20600 | |
| -21.810 | 0.846 | -0.025 | -8.69 | 1.47 | | 2 | 128.47 | 4.55 | 20600 | 2 | 133.38 | 20600 | |
| -22.113 | 0.838 | -0.026 | -8.46 | 0.03 | | 2 | 129.86 | 4.55 | 20600 | 2 | 134.46 | 20600 | |
| -22.415 | 0.830 | -0.027 | -8.66 | -1.31 | | 2 | 131.27 | 4.55 | 20600 | 2 | 135.53 | 20600 | |
| -22.718 | 0.822 | -0.028 | -9.25 | -2.55 | | 2 | 132.68 | 4.55 | 20600 | 2 | 136.60 | 20600 | |
| -23.020 | 0.813 | -0.030 | -10.19 | -3.67 | | 2 | 134.10 | 4.55 | 20600 | 2 | 137.65 | 20600 | |
| -23.520 | 0.797 | -0.032 | -12.44 | -5.29 | | 2 | 136.47 | 4.55 | 20600 | 2 | 139.38 | 20600 | |
| -24.020 | 0.781 | -0.035 | -15.43 | -6.58 | | 2 | 138.86 | 4.55 | 20600 | 2 | 141.08 | 20600 | |
| -24.520 | 0.762 | -0.039 | -18.96 | -7.49 | | 2 | 141.29 | 4.55 | 20600 | 2 | 142.74 | 20600 | |
| -24.550 | 0.761 | -0.040 | -19.18 | -7.54 | | 2 | 141.44 | 4.55 | 20600 | 2 | 142.84 | 20600 | |
| -24.975 | 0.743 | -0.044 | -22.49 | -7.98 | | 2 | 143.55 | 4.55 | 20600 | 2 | 144.22 | 20600 | |
| -25.400 | 0.724 | -0.048 | -25.92 | -8.09 | | 2 | 145.69 | 4.55 | 20600 | 2 | 145.56 | 20600 | |
| -25.675 | 0.710 | -0.052 | -28.13 | -7.98 | | 2 | 147.10 | 4.55 | 20600 | 2 | 146.40 | 20600 | |
| -25.950 | 0.695 | -0.055 | -30.29 | -7.70 | | 2 | 148.53 | 4.55 | 20600 | 2 | 147.22 | 20600 | |
| -26.225 | 0.679 | -0.059 | -32.35 | -7.26 | | 2 | 149.98 | 4.55 | 20600 | 2 | 148.02 | 20600 | |
| -26.500 | 0.662 | -0.064 | -34.27 | -6.62 | | 2 | 151.45 | 4.55 | 20600 | 2 | 148.80 | 20600 | |
| -26.775 | 0.644 | -0.068 | -35.98 | -5.79 | | 2 | 152.95 | 4.55 | 20600 | 2 | 149.56 | 20600 | |
| -27.050 | 0.625 | -0.073 | -37.43 | -4.75 | | 2 | 154.47 | 4.55 | 20600 | 2 | 150.28 | 20600 | |
| -27.325 | 0.604 | -0.077 | -38.57 | -3.48 | | 2 | 156.03 | 4.55 | 20600 | 2 | 150.99 | 20600 | |
| -27.600 | 0.582 | -0.082 | -39.32 | -1.97 | | 2 | 157.60 | 4.55 | 20600 | 2 | 151.66 | 20600 | |
| -28.100 | 0.539 | -0.091 | -39.49 | 1.45 | | 2 | 160.54 | 4.55 | 20600 | 2 | 152.81 | 20600 | |
| -28.375 | 0.513 | -0.096 | -38.79 | 3.72 | | 2 | 162.20 | 4.55 | 20600 | 2 | 153.41 | 20600 | |
| -28.650 | 0.486 | -0.101 | -37.42 | 6.29 | | 2 | 163.89 | 4.55 | 20600 | 2 | 153.98 | 20600 | |
| -28.925 | 0.458 | -0.106 | -35.30 | 9.18 | | 2 | 165.60 | 4.55 | 20600 | 2 | 154.52 | 20600 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.200 | 0.428 | -0.110 | -32.34 | 12.39 | | 2 | 167.33 | 4.55 | 20600 | 2 | 155.03 | | 20600 | | |
| | | | | | | 2 | 146.17 | 4.26 | 43800 | 2 | 155.65 | | 43800 | | |
| -29.513 | 0.393 | -0.114 | -28.88 | 9.91 | | 2 | 149.04 | 4.26 | 43800 | 2 | 155.45 | | 43800 | | |
| -29.825 | 0.357 | -0.118 | -26.04 | 8.40 | | 2 | 151.96 | 4.26 | 43800 | 2 | 155.19 | | 43800 | | |
| -30.138 | 0.319 | -0.122 | -23.52 | 7.91 | | 2 | 154.93 | 4.26 | 43800 | 2 | 154.88 | | 43800 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -30.450 | 0.281 | -0.125 | -20.99 | 8.45 | | 2 | 157.95 | 4.26 | 43800 | 2 | 154.52 | | 43800 | | |
| -30.763 | 0.241 | -0.128 | -18.13 | 10.06 | | 2 | 161.01 | 4.26 | 43800 | 2 | 154.13 | | 43800 | | |
| -31.075 | 0.201 | -0.130 | -14.59 | 12.76 | | 2 | 164.10 | 4.26 | 43800 | 2 | 153.70 | | 43800 | | |
| -31.388 | 0.160 | -0.132 | -10.03 | 16.57 | | 2 | 167.22 | 4.26 | 43800 | 2 | 153.24 | | 43800 | | |
| -31.700 | 0.119 | -0.133 | -4.11 | 21.51 | | 2 | 170.37 | 4.26 | 43800 | 2 | 152.76 | | 43800 | | |
| | | | | | | 2 | 26.96 | 1.52 | 300000 | 2 | 88.34 | | 300000 | | |
| -32.200 | 0.053 | -0.133 | 0.63 | 0.79 | | 2 | 47.88 | 1.52 | 300000 | 2 | 69.39 | | 300000 | | |
| -32.700 | -0.014 | -0.133 | 0.00 | 0.00 | | 2 | 68.80 | 1.52 | 300000 | 2 | 50.45 | | 300000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 5.38 mm

MOMENTO MÁXIMO = 147.76 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 143.59 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.093 = (3180.33 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.118 = (3180.33 kN/m)/(26962.71 kN/m) SIN INTERÉS



**  FASE No  2  **

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel rampa de autobuses.

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -2.250 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 5200000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -10.500 m



FASE 2

| | PARED | | | | | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 10.00 kPa | | | SOIL 2 EXCAVACIÓN: -10.50 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 0.00 kPa | | | PUNTALES/ ANCLAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
| 0.000 | 3.542 | 0.332 | 0.00 | 0.00 | | -1 | | | 0 | | | |
| -0.275 | 3.633 | 0.332 | 0.00 | 0.00 | | -1 | | | 0 | | | |
| -0.550 | 3.725 | 0.332 | 0.09 | 0.95 | | 2 | 6.92 | 5.15 | 4900 | 0 | | |
| -0.825 | 3.816 | 0.332 | 0.62 | 2.92 | | 2 | 7.38 | 5.15 | 4900 | 0 | | |
| -1.100 | 3.908 | 0.333 | 1.70 | 5.01 | | 2 | 7.84 | 5.15 | 4900 | 0 | | |
| -1.375 | 3.999 | 0.333 | 3.38 | 7.23 | | 2 | 8.29 | 5.15 | 4900 | 0 | | |
| -1.650 | 4.091 | 0.333 | 5.69 | 9.57 | | 2 | 8.75 | 5.15 | 4900 | 0 | | |
| -1.925 | 4.182 | 0.334 | 8.66 | 12.04 | | 2 | 9.21 | 4.37 | 4900 | 0 | | |
| -2.200 | 4.274 | 0.336 | 12.32 | 14.63 | | 2 | 9.66 | 3.26 | 4900 | 0 | | |
| -2.250 | 4.291 | 0.336 | 13.07 | 15.12 | | 1 | 9.86 | 3.17 | 4900 | 0 | | |
| | | | | -104.49 | | 1 | 9.86 | 3.17 | 4900 | 0 | | 1 -119.61 |
| -2.675 | 4.434 | 0.334 | -30.38 | -99.79 | | 1 | 12.28 | 3.17 | 4900 | 0 | | |
| -3.100 | 4.574 | 0.324 | -71.61 | -94.05 | | 1 | 14.71 | 3.17 | 4900 | 0 | | |
| -3.600 | 4.731 | 0.303 | -116.67 | -85.98 | | 1 | 17.56 | 3.17 | 4900 | 0 | | |
| -4.100 | 4.875 | 0.271 | -157.35 | -76.49 | | 1 | 20.41 | 3.17 | 4900 | 0 | | |
| -4.600 | 5.001 | 0.231 | -192.92 | -65.56 | | 2 | 23.29 | 3.19 | 4900 | 0 | | |
| -5.100 | 5.105 | 0.184 | -222.62 | -52.89 | | 2 | 27.41 | 4.46 | 4900 | 0 | | |
| -5.600 | 5.184 | 0.130 | -245.46 | -38.12 | | 2 | 31.66 | 5.15 | 4900 | 0 | | |
| -6.100 | 5.234 | 0.072 | -260.38 | -21.19 | | 2 | 36.05 | 5.15 | 4900 | 0 | | |
| -6.600 | 5.256 | 0.012 | -266.29 | -2.04 | | 2 | 40.58 | 5.15 | 4900 | 0 | | |
| -7.100 | 5.246 | -0.049 | -262.04 | 19.42 | | 2 | 45.26 | 5.15 | 4900 | 0 | | |
| | | | | | | 1 | 22.45 | 2.91 | 15100 | 0 | | |
| -7.450 | 5.222 | -0.090 | -253.83 | 27.61 | | 1 | 24.33 | 2.91 | 15100 | 0 | | |
| -7.800 | 5.184 | -0.130 | -242.63 | 36.45 | | 1 | 26.21 | 2.91 | 15100 | 0 | | |
| -8.150 | 5.132 | -0.167 | -228.23 | 45.96 | | 1 | 28.10 | 2.91 | 15100 | 0 | | |
| -8.500 | 5.067 | -0.202 | -210.39 | 56.12 | | 1 | 29.98 | 2.91 | 15100 | 0 | | |
| -8.850 | 4.990 | -0.234 | -188.87 | 66.95 | | 1 | 31.87 | 2.91 | 15100 | 0 | | |
| -9.200 | 4.903 | -0.263 | -163.45 | 78.43 | | 1 | 33.75 | 2.91 | 15100 | 0 | | |
| -9.550 | 4.807 | -0.286 | -133.89 | 90.57 | | 1 | 35.63 | 2.91 | 15100 | 0 | | |
| -9.900 | 4.703 | -0.305 | -99.97 | 103.37 | | 1 | 37.52 | 2.91 | 15100 | 0 | | |
| -10.200 | 4.610 | -0.317 | -67.25 | 114.87 | | 1 | 39.13 | 2.91 | 15100 | 0 | | |
| | | | | | | 1 | 29.79 | 2.68 | 20600 | 0 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -10.500 | 4.514 | -0.323 | -31.42 | 124.04 | | 1 | 31.32 | 2.68 | 20600 | 0 | | | | | |
| | | | | | | 1 | 31.32 | 2.68 | 20600 | 3 | 73.67 | | 20600 | | |
| -10.762 | 4.429 | -0.325 | -0.50 | 110.87 | | 1 | 32.65 | 2.68 | 20600 | 3 | 90.59 | | 20600 | | |
| -11.025 | 4.343 | -0.324 | 26.58 | 95.39 | | 1 | 33.99 | 2.68 | 20600 | 2 | 94.01 | | 20600 | | |
| -11.288 | 4.259 | -0.319 | 49.57 | 79.74 | | 1 | 35.33 | 2.68 | 20600 | 2 | 94.54 | | 20600 | | |
| -11.550 | 4.176 | -0.312 | 68.47 | 64.30 | | 1 | 36.66 | 2.68 | 20600 | 2 | 95.10 | | 20600 | | |
| -11.812 | 4.095 | -0.303 | 83.34 | 49.06 | | 1 | 38.00 | 2.68 | 20600 | 2 | 95.71 | | 20600 | | |
| -12.075 | 4.017 | -0.292 | 94.24 | 34.00 | | 1 | 39.34 | 2.68 | 20600 | 2 | 96.37 | | 20600 | | |
| -12.338 | 3.942 | -0.280 | 101.20 | 19.11 | | 1 | 40.67 | 2.68 | 20600 | 2 | 97.09 | | 20600 | | |
| -12.600 | 3.870 | -0.268 | 104.28 | 4.37 | | 1 | 42.01 | 2.68 | 20600 | 2 | 97.88 | | 20600 | | |
| | | | | | | 2 | 58.33 | 4.85 | 15100 | 2 | 77.79 | | 15100 | | |
| -12.700 | 3.843 | -0.263 | 104.62 | 2.46 | | 2 | 59.62 | 4.85 | 15100 | 2 | 78.28 | | 15100 | | |
| -13.115 | 3.738 | -0.243 | 104.13 | -4.62 | | 2 | 62.92 | 4.85 | 15100 | 2 | 78.41 | | 15100 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.530 | 3.641 | -0.224 | 100.96 | -10.44 | | 2 | 66.10 | 4.85 | 15100 | 2 | 78.65 | | 15100 | | |
| -13.945 | 3.552 | -0.205 | 95.62 | -15.09 | | 2 | 69.15 | 4.85 | 15100 | 2 | 79.02 | | 15100 | | |
| -14.360 | 3.471 | -0.188 | 88.58 | -18.68 | | 2 | 72.10 | 4.85 | 15100 | 2 | 79.50 | | 15100 | | |
| -14.775 | 3.396 | -0.172 | 80.26 | -21.28 | | 2 | 74.93 | 4.85 | 15100 | 2 | 80.09 | | 15100 | | |
| -15.190 | 3.328 | -0.157 | 71.04 | -22.99 | | 2 | 77.67 | 4.85 | 15100 | 2 | 80.77 | | 15100 | | |
| -15.605 | 3.265 | -0.145 | 61.28 | -23.88 | | 2 | 80.33 | 4.85 | 15100 | 2 | 81.53 | | 15100 | | |
| -16.020 | 3.207 | -0.134 | 51.32 | -24.02 | | 2 | 82.92 | 4.85 | 15100 | 2 | 82.37 | | 15100 | | |
| -16.520 | 3.143 | -0.124 | 39.46 | -23.26 | | 2 | 85.95 | 4.85 | 15100 | 2 | 83.46 | | 15100 | | |
| -17.020 | 3.083 | -0.116 | 28.22 | -21.56 | | 2 | 88.92 | 4.85 | 15100 | 2 | 84.61 | | 15100 | | |
| -17.520 | 3.026 | -0.111 | 18.05 | -18.98 | | 2 | 91.83 | 4.85 | 15100 | 2 | 85.82 | | 15100 | | |
| -17.905 | 2.984 | -0.108 | 11.22 | -16.42 | | 2 | 94.06 | 4.85 | 15100 | 2 | 86.77 | | 15100 | | |
| -18.290 | 2.943 | -0.107 | 5.47 | -13.37 | | 2 | 96.27 | 4.85 | 15100 | 2 | 87.73 | | 15100 | | |
| -18.675 | 2.902 | -0.106 | 0.99 | -9.84 | | 2 | 98.48 | 4.85 | 15100 | 2 | 88.70 | | 15100 | | |
| -19.060 | 2.861 | -0.106 | -2.05 | -5.84 | | 2 | 100.68 | 4.85 | 15100 | 2 | 89.67 | | 15100 | | |
| -19.445 | 2.820 | -0.107 | -3.45 | -1.36 | | 2 | 102.89 | 4.85 | 15100 | 2 | 90.63 | | 15100 | | |
| -19.830 | 2.778 | -0.108 | -3.03 | 3.60 | | 2 | 105.10 | 4.85 | 15100 | 2 | 91.60 | | 15100 | | |
| -20.215 | 2.737 | -0.108 | -0.61 | 9.04 | | 2 | 107.32 | 4.85 | 15100 | 2 | 92.56 | | 15100 | | |
| -20.600 | 2.695 | -0.108 | 3.99 | 14.97 | | 2 | 109.53 | 4.85 | 15100 | 2 | 93.52 | | 15100 | | |
| | | | | | | 2 | 85.41 | 4.55 | 20600 | 2 | 105.07 | | 20600 | | |
| -20.903 | 2.663 | -0.107 | 7.64 | 9.22 | | 2 | 87.32 | 4.55 | 20600 | 2 | 105.64 | | 20600 | | |
| -21.205 | 2.631 | -0.106 | 9.61 | 3.88 | | 2 | 89.22 | 4.55 | 20600 | 2 | 106.22 | | 20600 | | |
| -21.508 | 2.599 | -0.104 | 10.03 | -1.06 | | 2 | 91.11 | 4.55 | 20600 | 2 | 106.80 | | 20600 | | |
| -21.810 | 2.568 | -0.103 | 9.01 | -5.61 | | 2 | 93.00 | 4.55 | 20600 | 2 | 107.40 | | 20600 | | |
| -22.113 | 2.537 | -0.102 | 6.67 | -9.78 | | 2 | 94.88 | 4.55 | 20600 | 2 | 108.00 | | 20600 | | |
| -22.415 | 2.506 | -0.101 | 3.13 | -13.55 | | 2 | 96.75 | 4.55 | 20600 | 2 | 108.60 | | 20600 | | |
| -22.718 | 2.475 | -0.101 | -1.49 | -16.95 | | 2 | 98.62 | 4.55 | 20600 | 2 | 109.21 | | 20600 | | |
| -23.020 | 2.445 | -0.102 | -7.08 | -19.97 | | 2 | 100.48 | 4.55 | 20600 | 2 | 109.82 | | 20600 | | |
| -23.520 | 2.393 | -0.104 | -18.14 | -24.10 | | 2 | 103.59 | 4.55 | 20600 | 2 | 110.81 | | 20600 | | |
| -24.020 | 2.340 | -0.110 | -31.01 | -27.16 | | 2 | 106.74 | 4.55 | 20600 | 2 | 111.75 | | 20600 | | |
| -24.520 | 2.283 | -0.119 | -45.12 | -29.08 | | 2 | 109.96 | 4.55 | 20600 | 2 | 112.63 | | 20600 | | |
| -24.550 | 2.279 | -0.119 | -45.99 | -29.16 | | 2 | 110.16 | 4.55 | 20600 | 2 | 112.68 | | 20600 | | |
| -24.975 | 2.226 | -0.129 | -58.54 | -29.76 | | 2 | 112.99 | 4.55 | 20600 | 2 | 113.33 | | 20600 | | |
| -25.400 | 2.169 | -0.142 | -71.15 | -29.40 | | 2 | 115.92 | 4.55 | 20600 | 2 | 113.88 | | 20600 | | |
| -25.675 | 2.128 | -0.152 | -79.14 | -28.62 | | 2 | 117.87 | 4.55 | 20600 | 2 | 114.18 | | 20600 | | |
| -25.950 | 2.085 | -0.162 | -86.85 | -27.36 | | 2 | 119.89 | 4.55 | 20600 | 2 | 114.42 | | 20600 | | |
| -26.225 | 2.039 | -0.173 | -94.14 | -25.59 | | 2 | 121.96 | 4.55 | 20600 | 2 | 114.59 | | 20600 | | |
| -26.500 | 1.990 | -0.186 | -100.87 | -23.29 | | 2 | 124.10 | 4.55 | 20600 | 2 | 114.70 | | 20600 | | |
| -26.775 | 1.937 | -0.199 | -106.90 | -20.40 | | 2 | 126.32 | 4.55 | 20600 | 2 | 114.74 | | 20600 | | |
| -27.050 | 1.881 | -0.212 | -112.04 | -16.90 | | 2 | 128.61 | 4.55 | 20600 | 2 | 114.70 | | 20600 | | |
| -27.325 | 1.820 | -0.227 | -116.13 | -12.73 | | 2 | 130.98 | 4.55 | 20600 | 2 | 114.59 | | 20600 | | |
| -27.600 | 1.756 | -0.241 | -118.98 | -7.86 | | 2 | 133.43 | 4.55 | 20600 | 2 | 114.39 | | 20600 | | |
| -28.100 | 1.628 | -0.269 | -120.31 | 2.97 | | 2 | 138.10 | 4.55 | 20600 | 2 | 113.81 | | 20600 | | |
| -28.375 | 1.552 | -0.284 | -118.53 | 10.09 | | 2 | 140.80 | 4.55 | 20600 | 2 | 113.37 | | 20600 | | |
| -28.650 | 1.472 | -0.299 | -114.68 | 18.08 | | 2 | 143.57 | 4.55 | 20600 | 2 | 112.84 | | 20600 | | |
| -28.925 | 1.388 | -0.313 | -108.50 | 27.01 | | 2 | 146.43 | 4.55 | 20600 | 2 | 112.24 | | 20600 | | |
| -29.200 | 1.300 | -0.326 | -99.73 | 36.91 | | 2 | 149.37 | 4.55 | 20600 | 2 | 111.55 | | 20600 | | |
| | | | | | | 2 | 107.97 | 4.26 | 43800 | 2 | 136.32 | | 43800 | | |
| -29.513 | 1.196 | -0.339 | -89.43 | 29.47 | | 2 | 113.85 | 4.26 | 43800 | 2 | 133.10 | | 43800 | | |
| -29.825 | 1.089 | -0.351 | -81.01 | 24.94 | | 2 | 119.91 | 4.26 | 43800 | 2 | 129.70 | | 43800 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -30.138 | 0.977 | -0.362 | -73.54 | 23.40 | | 2 | 126.13 | 4.26 | 43800 | 2 | 126.15 | | 43800 | | |
| -30.450 | 0.862 | -0.372 | -66.06 | 24.97 | | 2 | 132.49 | 4.26 | 43800 | 2 | 122.45 | | 43800 | | |
| -30.763 | 0.744 | -0.381 | -57.60 | 29.71 | | 2 | 138.98 | 4.26 | 43800 | 2 | 118.63 | | 43800 | | |
| -31.075 | 0.624 | -0.389 | -47.15 | 37.72 | | 2 | 145.58 | 4.26 | 43800 | 2 | 114.69 | | 43800 | | |
| -31.388 | 0.502 | -0.394 | -33.68 | 49.05 | | 2 | 152.27 | 4.26 | 43800 | 2 | 110.66 | | 43800 | | |
| -31.700 | 0.378 | -0.398 | -16.14 | 63.75 | | 2 | 159.03 | 4.26 | 43800 | 2 | 106.56 | | 43800 | | |
| | | | | | | -1 | | | | 2 | 145.46 | | 300000 | | |
| -32.200 | 0.178 | -0.399 | 0.43 | 8.28 | | 2 | 10.15 | 1.52 | 300000 | 2 | 86.59 | | 300000 | | |
| -32.700 | -0.021 | -0.399 | 0.00 | 0.00 | | 2 | 71.03 | 1.52 | 300000 | 2 | 27.69 | | 300000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 5.26 mm

MOMENTO MÁXIMO = -266.29 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 133.56 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.068 = (2342.60 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.159 = (2222.99 kN/m)/(14018.77 kN/m) SIN INTERÉS

**  FASE No  3  **

*Fase 3
*Ejecucion del nivel de autobuses
*Excavacion hasta 1er puntal provisional

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 2
NIVEL = -9.900 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 3466667.250 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2  PARA NIVEL = -17.020 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2  PARA NIVEL = -17.520 m



FASE 3

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m, NIVEL AGUA: -12.70 m, S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -17.02 m, NIVEL AGUA: -17.52 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 4.342 | -0.030 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 4.334 | -0.030 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 4.325 | -0.030 | 0.05 | 0.55 | | 2 | 3.98 | 4900 | 0 | | | | |
| -0.825 | 4.317 | -0.030 | 0.36 | 1.77 | | 2 | 4.92 | 4900 | 0 | | | | |
| -1.100 | 4.309 | -0.030 | 1.05 | 3.25 | | 2 | 5.87 | 4900 | 0 | | | | |
| -1.375 | 4.300 | -0.030 | 2.18 | 5.00 | | 2 | 6.82 | 4900 | 0 | | | | |
| -1.650 | 4.292 | -0.030 | 3.82 | 7.00 | | 2 | 7.76 | 4900 | 0 | | | | |
| -1.925 | 4.284 | -0.029 | 6.05 | 9.27 | | 2 | 8.71 | 4900 | 0 | | | | |
| -2.200 | 4.276 | -0.028 | 8.94 | 11.79 | | 2 | 9.66 | 4900 | 0 | | | | |
| -2.250 | 4.275 | -0.028 | 9.54 | 12.28 | | 2 | 9.94 | 4900 | 0 | | | | |
| | | | | -21.00 | | 2 | 9.94 | 4900 | 0 | | | 1 | -33.29 |
| -2.675 | 4.263 | -0.027 | 1.61 | -16.10 | | 2 | 13.12 | 4900 | 0 | | | | |
| -3.100 | 4.252 | -0.027 | -3.95 | -9.85 | | 2 | 16.29 | 4900 | 0 | | | | |
| -3.600 | 4.238 | -0.029 | -6.69 | -0.79 | | 2 | 19.98 | 4900 | 0 | | | | |
| -4.100 | 4.223 | -0.030 | -4.43 | 10.11 | | 2 | 23.61 | 4900 | 0 | | | | |
| -4.600 | 4.208 | -0.030 | 3.72 | 22.81 | | 2 | 27.17 | 4900 | 0 | | | | |
| -5.100 | 4.193 | -0.028 | 18.72 | 37.57 | | 2 | 31.88 | 4900 | 0 | | | | |
| -5.600 | 4.181 | -0.021 | 41.69 | 54.69 | | 2 | 36.58 | 4900 | 0 | | | | |
| -6.100 | 4.173 | -0.008 | 73.80 | 74.14 | | 2 | 41.25 | 4900 | 0 | | | | |
| -6.600 | 4.174 | 0.014 | 116.22 | 95.92 | | 2 | 45.88 | 4900 | 0 | | | | |
| -7.100 | 4.189 | 0.046 | 170.10 | 120.00 | | 2 | 50.44 | 4900 | 0 | | | | |
| | | | | | | 2 | 38.42 | 15100 | 0 | | | | |
| -7.450 | 4.210 | 0.077 | 214.48 | 133.66 | | 2 | 39.61 | 15100 | 0 | | | | |
| -7.800 | 4.243 | 0.115 | 263.70 | 147.66 | | 2 | 40.41 | 15100 | 0 | | | | |
| -8.150 | 4.291 | 0.161 | 317.87 | 161.87 | | 2 | 40.79 | 15100 | 0 | | | | |
| -8.500 | 4.357 | 0.217 | 377.02 | 176.13 | | 2 | 40.70 | 15100 | 0 | | | | |
| -8.850 | 4.444 | 0.282 | 441.15 | 190.27 | | 2 | 40.11 | 15100 | 0 | | | | |
| -9.200 | 4.556 | 0.358 | 510.18 | 204.12 | | 2 | 39.00 | 15100 | 0 | | | | |
| -9.550 | 4.696 | 0.445 | 583.97 | 217.47 | | 2 | 37.31 | 15100 | 0 | | | | |
| -9.900 | 4.869 | 0.545 | 662.38 | 230.57 | | 1 | 37.52 | 15100 | 0 | | | | |
| | | | | -343.30 | | 1 | 37.52 | 15100 | 0 | | | 2 | -573.86 |
| -10.200 | 5.045 | 0.629 | 561.10 | -331.80 | | 1 | 39.13 | 15100 | 0 | | | | |
| | | | | | | 1 | 29.79 | 20600 | 0 | | | | |
| -10.500 | 5.245 | 0.699 | 462.93 | -322.63 | | 1 | 31.32 | 20600 | 0 | | | | |
| -10.762 | 5.435 | 0.749 | 379.33 | -314.24 | | 1 | 32.65 | 20600 | 0 | | | | |
| -11.025 | 5.637 | 0.790 | 297.98 | -305.49 | | 1 | 33.99 | 20600 | 0 | | | | |
| -11.288 | 5.849 | 0.821 | 218.98 | -296.39 | | 1 | 35.33 | 20600 | 0 | | | | |
| -11.550 | 6.067 | 0.842 | 142.41 | -286.94 | | 1 | 36.66 | 20600 | 0 | | | | |
| -11.812 | 6.290 | 0.855 | 68.36 | -277.14 | | 1 | 38.00 | 20600 | 0 | | | | |
| -12.075 | 6.515 | 0.859 | -3.06 | -266.99 | | 1 | 39.34 | 20600 | 0 | | | | |
| -12.338 | 6.740 | 0.854 | -71.78 | -256.49 | | 1 | 40.67 | 20600 | 0 | | | | |
| -12.600 | 6.963 | 0.842 | -137.69 | -245.64 | | 1 | 42.01 | 20600 | 0 | | | | |
| | | | | | | 1 | 52.40 | 15100 | 0 | | | | |
| -12.700 | 7.047 | 0.835 | -161.99 | -240.37 | | 1 | 52.94 | 15100 | 0 | | | | |
| -13.115 | 7.386 | 0.795 | -257.04 | -217.34 | 4.07 | 1 | 53.97 | 15100 | 0 | | | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -13.530 | 7.704 | 0.738 | -342.09 | -192.20 | 8.14 | 1 | 54.99 | 2.91 15100 | 0 | | | | |
| -13.945 | 7.996 | 0.666 | -416.27 | -164.94 | 12.21 | 1 | 56.02 | 2.91 15100 | 0 | | | | |
| -14.360 | 8.255 | 0.581 | -478.70 | -135.56 | 16.28 | 1 | 57.05 | 2.91 15100 | 0 | | | | |
| -14.775 | 8.477 | 0.485 | -528.50 | -104.07 | 20.36 | 1 | 58.07 | 2.91 15100 | 0 | | | | |
| -15.190 | 8.657 | 0.382 | -564.79 | -70.47 | 24.43 | 1 | 59.10 | 2.91 15100 | 0 | | | | |
| -15.605 | 8.793 | 0.272 | -586.69 | -34.75 | 28.50 | 1 | 60.13 | 2.91 15100 | 0 | | | | |
| -16.020 | 8.883 | 0.160 | -593.34 | 3.09 | 32.57 | 1 | 61.15 | 2.91 15100 | 0 | | | | |
| -16.520 | 8.929 | 0.026 | -579.82 | 51.49 | 37.47 | 1 | 62.39 | 2.91 15100 | 0 | | | | |
| -17.020 | 8.909 | -0.103 | -541.34 | 102.96 | 42.38 | 1 | 63.63 | 2.91 15100 | 0 | | | | |
| | | | | | 42.38 | 1 | 63.63 | 2.91 15100 | 3 | 53.02 | 15100 | | |
| -17.520 | 8.828 | -0.220 | -484.18 | 123.76 | 47.28 | 1 | 64.86 | 2.91 15100 | 3 | 81.92 | 15100 | | |
| -17.905 | 8.728 | -0.301 | -434.52 | 133.61 | 47.28 | 1 | 65.82 | 2.91 15100 | 3 | 92.15 | 15100 | | |
| -18.290 | 8.598 | -0.373 | -381.76 | 139.89 | 47.28 | 1 | 66.77 | 2.91 15100 | 3 | 102.37 | 15100 | | |
| -18.675 | 8.442 | -0.435 | -327.26 | 142.61 | 47.28 | 1 | 67.72 | 2.91 15100 | 3 | 112.59 | 15100 | | |
| -19.060 | 8.264 | -0.488 | -272.41 | 141.75 | 47.28 | 1 | 68.67 | 2.91 15100 | 3 | 122.82 | 15100 | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -19.445 | 8.068 | -0.531 | -218.57 | 137.33 | 47.28 | 1 | 69.63 | 2.91 | 15100 | 3 | 133.04 | | 15100 | | | |
| -19.830 | 7.857 | -0.565 | -166.86 | 131.38 | 47.28 | 1 | 70.58 | 2.91 | 15100 | 2 | 132.65 | | 15100 | | | |
| -20.215 | 7.634 | -0.589 | -117.31 | 126.21 | 47.28 | 1 | 71.53 | 2.91 | 15100 | 2 | 130.88 | | 15100 | | | |
| -20.600 | 7.404 | -0.606 | -69.54 | 122.11 | 47.28 | 1 | 72.48 | 2.91 | 15100 | 2 | 128.98 | | 15100 | | | |
| | | | | | 47.28 | 1 | 60.50 | 2.68 | 20600 | 2 | 168.64 | | 20600 | | | |
| -20.903 | 7.219 | -0.613 | -35.34 | 104.20 | 47.28 | 1 | 61.23 | 2.68 | 20600 | 2 | 166.08 | | 20600 | | | |
| -21.205 | 7.034 | -0.616 | -6.40 | 87.29 | 47.28 | 1 | 61.96 | 2.68 | 20600 | 2 | 163.49 | | 20600 | | | |
| -21.508 | 6.847 | -0.615 | 17.58 | 71.39 | 47.28 | 1 | 62.69 | 2.68 | 20600 | 2 | 160.89 | | 20600 | | | |
| -21.810 | 6.662 | -0.611 | 36.89 | 56.49 | 47.28 | 1 | 63.42 | 2.68 | 20600 | 2 | 158.31 | | 20600 | | | |
| -22.113 | 6.478 | -0.605 | 51.85 | 42.58 | 47.28 | 1 | 64.15 | 2.68 | 20600 | 2 | 155.75 | | 20600 | | | |
| -22.415 | 6.296 | -0.597 | 62.75 | 29.67 | 47.28 | 1 | 64.88 | 2.68 | 20600 | 2 | 153.25 | | 20600 | | | |
| -22.718 | 6.117 | -0.588 | 69.90 | 17.72 | 47.28 | 1 | 65.61 | 2.68 | 20600 | 2 | 150.79 | | 20600 | | | |
| -23.020 | 5.940 | -0.578 | 73.57 | 6.73 | 47.28 | 1 | 66.34 | 2.68 | 20600 | 2 | 148.40 | | 20600 | | | |
| -23.520 | 5.655 | -0.561 | 72.79 | -9.40 | 47.28 | 1 | 67.54 | 2.68 | 20600 | 2 | 144.58 | | 20600 | | | |
| -24.020 | 5.379 | -0.545 | 64.58 | -23.07 | 47.28 | 1 | 68.75 | 2.68 | 20600 | 2 | 140.93 | | 20600 | | | |
| -24.520 | 5.110 | -0.532 | 50.13 | -34.34 | 47.28 | 1 | 69.96 | 2.68 | 20600 | 2 | 137.43 | | 20600 | | | |
| -24.550 | 5.094 | -0.531 | 49.09 | -34.94 | 47.28 | 1 | 70.03 | 2.68 | 20600 | 2 | 137.23 | | 20600 | | | |
| -24.975 | 4.870 | -0.523 | 32.56 | -42.57 | 47.28 | 1 | 71.05 | 2.68 | 20600 | 2 | 134.35 | | 20600 | | | |
| -25.400 | 4.648 | -0.519 | 13.13 | -48.56 | 47.28 | 1 | 72.08 | 2.68 | 20600 | 2 | 131.53 | | 20600 | | | |
| -25.675 | 4.506 | -0.518 | -0.65 | -51.57 | 47.28 | 1 | 72.74 | 2.68 | 20600 | 2 | 129.72 | | 20600 | | | |
| -25.950 | 4.363 | -0.519 | -15.17 | -53.90 | 47.28 | 1 | 73.41 | 2.68 | 20600 | 2 | 127.91 | | 20600 | | | |
| -26.225 | 4.220 | -0.522 | -30.19 | -55.13 | 47.28 | 2 | 77.04 | 4.55 | 20600 | 2 | 126.09 | | 20600 | | | |
| -26.500 | 4.076 | -0.527 | -45.35 | -54.80 | 47.28 | 2 | 81.13 | 4.55 | 20600 | 2 | 124.25 | | 20600 | | | |
| -26.775 | 3.930 | -0.533 | -60.18 | -52.83 | 47.28 | 2 | 85.26 | 4.55 | 20600 | 2 | 122.37 | | 20600 | | | |
| -27.050 | 3.782 | -0.542 | -74.25 | -49.19 | 47.28 | 2 | 89.43 | 4.55 | 20600 | 2 | 120.45 | | 20600 | | | |
| -27.325 | 3.632 | -0.552 | -87.08 | -43.87 | 47.28 | 2 | 93.66 | 4.55 | 20600 | 2 | 118.48 | | 20600 | | | |
| -27.600 | 3.479 | -0.564 | -98.22 | -36.82 | 47.28 | 2 | 97.94 | 4.55 | 20600 | 2 | 116.45 | | 20600 | | | |
| -28.100 | 3.191 | -0.588 | -112.54 | -19.47 | 47.28 | 2 | 105.92 | 4.55 | 20600 | 2 | 112.57 | | 20600 | | | |
| -28.375 | 3.027 | -0.602 | -116.27 | -7.37 | 47.28 | 2 | 110.41 | 4.55 | 20600 | 2 | 110.32 | | 20600 | | | |
| -28.650 | 2.860 | -0.617 | -116.42 | 6.61 | 47.28 | 2 | 114.99 | 4.55 | 20600 | 2 | 107.99 | | 20600 | | | |
| -28.925 | 2.688 | -0.631 | -112.46 | 22.51 | 47.28 | 2 | 119.65 | 4.55 | 20600 | 2 | 105.59 | | 20600 | | | |
| -29.200 | 2.513 | -0.645 | -103.86 | 40.38 | 47.28 | 2 | 124.40 | 4.55 | 20600 | 2 | 103.10 | | 20600 | | | |
| | | | | | 47.28 | 1 | 62.97 | 2.46 | 43800 | 2 | 158.11 | | 43800 | | | |
| -29.513 | 2.309 | -0.659 | -93.42 | 26.94 | 47.28 | 2 | 65.13 | 3.85 | 43800 | 2 | 150.52 | | 43800 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.825 | 2.101 | -0.672 | -86.56 | 17.88 | 47.28 | 2 | 75.57 | 4.26 | 43800 | 2 | 142.74 | 43800 | |
| -30.138 | 1.889 | -0.684 | -81.64 | 14.57 | 47.28 | 2 | 86.18 | 4.26 | 43800 | 2 | 134.80 | 43800 | |
| -30.450 | 1.674 | -0.695 | -76.85 | 17.10 | 47.28 | 2 | 96.95 | 4.26 | 43800 | 2 | 126.69 | 43800 | |
| -30.763 | 1.455 | -0.706 | -70.34 | 25.58 | 47.28 | 2 | 107.87 | 4.26 | 43800 | 2 | 118.43 | 43800 | |
| -31.075 | 1.233 | -0.715 | -60.23 | 40.09 | 47.28 | 2 | 118.92 | 4.26 | 43800 | 2 | 110.04 | 43800 | |
| -31.388 | 1.008 | -0.723 | -44.64 | 60.72 | 47.28 | 2 | 130.10 | 4.26 | 43800 | 2 | 101.53 | 43800 | |
| -31.700 | 0.781 | -0.727 | -21.64 | 87.53 | 47.28 | 2 | 141.35 | 4.26 | 43800 | 2 | 92.94 | 43800 | |
| | | | | | 47.28 | -1 | | | | 2 | 255.34 | 300000 | |
| -32.200 | 0.417 | -0.729 | 0.63 | 10.57 | 47.28 | -1 | | | | 2 | 147.04 | 300000 | |
| -32.700 | 0.053 | -0.729 | 0.00 | 0.00 | 47.28 | 2 | 48.86 | 1.52 | 300000 | 2 | 38.69 | 300000 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 8.93 mm

MOMENTO MÁXIMO = 662.38 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 115.31 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.052 = (1795.65 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.249 = (2020.23 kN/m)/(8123.50 kN/m)



**  FASE No 4  **

*Fase 4
*Ejecucion del primer nivel de puntales provisionales
*Excavacion hasta 2º nivel puntales provisionales

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 3
NIVEL = -16.020 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -24.020 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -24.520 m



FASE 4

| PARED | SOIL 1 | SOIL 2 | PUNTALES/ ANCLAS |
|---|---|---|---|
| | EXCAVACIÓN: 0.00 m | EXCAVACIÓN: -24.02 m | |
| | NIVEL AGUA: -12.70 m | NIVEL AGUA: -24.52 m | |
| | S. DE CAQUOT: 10.00 kPa | S. DE CAQUOT: 0.00 kPa | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 4.137 | 0.063 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 4.154 | 0.063 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 4.172 | 0.063 | 0.06 | 0.65 | | 2 | 4.73 | 4900 | 0 | | | | |
| -0.825 | 4.189 | 0.063 | 0.43 | 2.06 | | 2 | 5.55 | 5.15 4900 | 0 | | | | |
| -1.100 | 4.206 | 0.063 | 1.22 | 3.70 | | 2 | 6.37 | 5.15 4900 | 0 | | | | |
| -1.375 | 4.223 | 0.063 | 2.49 | 5.57 | | 2 | 7.19 | 5.15 4900 | 0 | | | | |
| -1.650 | 4.241 | 0.063 | 4.30 | 7.66 | | 2 | 8.02 | 4.75 4900 | 0 | | | | |
| -1.925 | 4.258 | 0.064 | 6.72 | 9.98 | | 2 | 8.84 | 4.00 4900 | 0 | | | | |
| -2.200 | 4.276 | 0.065 | 9.81 | 12.52 | | 2 | 9.66 | 3.25 4900 | 0 | | | | |
| -2.250 | 4.279 | 0.065 | 10.45 | 13.01 | | 2 | 9.92 | 3.23 4900 | 0 | | | | |
| | | | | -44.44 | | 2 | 9.92 | 3.23 4900 | 0 | | | 1 | -57.45 |
| -2.675 | 4.307 | 0.066 | -7.46 | -39.59 | | 2 | 12.90 | 3.79 4900 | 0 | | | | |
| -3.100 | 4.335 | 0.063 | -23.03 | -33.47 | | 2 | 15.88 | 4.34 4900 | 0 | | | | |
| -3.600 | 4.364 | 0.056 | -37.63 | -24.66 | | 2 | 19.36 | 4.97 4900 | 0 | | | | |
| -4.100 | 4.390 | 0.046 | -47.40 | -14.13 | | 2 | 22.79 | 5.15 4900 | 0 | | | | |
| -4.600 | 4.410 | 0.034 | -51.48 | -1.88 | | 2 | 26.18 | 5.15 4900 | 0 | | | | |
| -5.100 | 4.424 | 0.023 | -48.95 | 12.35 | | 2 | 30.75 | 5.15 4900 | 0 | | | | |
| -5.600 | 4.433 | 0.013 | -38.74 | 28.87 | | 2 | 35.34 | 5.15 4900 | 0 | | | | |
| -6.100 | 4.437 | 0.006 | -19.70 | 47.70 | | 2 | 39.95 | 5.15 4900 | 0 | | | | |
| -6.600 | 4.440 | 0.004 | 9.34 | 68.83 | | 2 | 44.58 | 5.15 4900 | 0 | | | | |
| -7.100 | 4.443 | 0.011 | 49.52 | 92.27 | | 2 | 49.20 | 5.15 4900 | 0 | | | | |
| | | | | | | 2 | 34.57 | 4.85 15100 | 0 | | | | |
| -7.450 | 4.449 | 0.022 | 83.96 | 104.63 | | 2 | 36.01 | 4.85 15100 | 0 | | | | |
| -7.800 | 4.459 | 0.038 | 122.81 | 117.43 | | 2 | 37.16 | 4.85 15100 | 0 | | | | |
| -8.150 | 4.476 | 0.061 | 166.20 | 130.58 | | 2 | 38.00 | 4.85 15100 | 0 | | | | |
| -8.500 | 4.502 | 0.091 | 214.24 | 143.97 | | 2 | 38.50 | 4.85 15100 | 0 | | | | |
| -8.850 | 4.541 | 0.130 | 267.00 | 157.47 | | 2 | 38.65 | 4.85 15100 | 0 | | | | |
| -9.200 | 4.594 | 0.177 | 324.47 | 170.96 | | 2 | 38.41 | 4.85 15100 | 0 | | | | |
| -9.550 | 4.666 | 0.234 | 386.65 | 184.29 | | 2 | 37.77 | 4.85 15100 | 0 | | | | |
| -9.900 | 4.759 | 0.301 | 453.49 | 197.75 | | 2 | 39.18 | 4.57 15100 | 0 | | | | |
| | | | | 4.30 | | 2 | 39.18 | 4.57 15100 | 0 | | | 2 | -193.46 |
| -10.200 | 4.859 | 0.363 | 456.58 | 16.46 | | 2 | 41.95 | 4.85 15100 | 0 | | | | |
| | | | | | | 2 | 33.63 | 4.55 20600 | 0 | | | | |
| -10.500 | 4.977 | 0.426 | 463.08 | 27.03 | | 2 | 36.83 | 4.55 20600 | 0 | | | | |
| -10.762 | 5.096 | 0.482 | 471.48 | 37.07 | | 2 | 39.63 | 4.55 20600 | 0 | | | | |
| -11.025 | 5.230 | 0.539 | 482.61 | 47.83 | | 2 | 42.37 | 4.55 20600 | 0 | | | | |
| -11.288 | 5.379 | 0.598 | 496.65 | 59.30 | | 2 | 44.99 | 4.55 20600 | 0 | | | | |
| -11.550 | 5.544 | 0.658 | 513.80 | 71.43 | | 2 | 47.43 | 4.55 20600 | 0 | | | | |
| -11.812 | 5.725 | 0.721 | 534.21 | 84.17 | | 2 | 49.64 | 4.55 20600 | 0 | | | | |
| -12.075 | 5.923 | 0.787 | 558.03 | 97.45 | | 2 | 51.53 | 4.55 20600 | 0 | | | | |
| -12.338 | 6.138 | 0.855 | 585.41 | 111.18 | | 2 | 53.07 | 4.55 20600 | 0 | | | | |
| -12.600 | 6.372 | 0.927 | 616.43 | 125.25 | | 2 | 54.18 | 4.55 20600 | 0 | | | | |
| | | | | | | 2 | 61.32 | 4.85 15100 | 0 | | | | |
| -12.700 | 6.466 | 0.955 | 629.26 | 131.41 | | 2 | 61.71 | 4.85 15100 | 0 | | | | |
| -13.115 | 6.888 | 1.080 | 689.22 | 157.81 | 4.07 | 2 | 61.48 | 4.85 15100 | 0 | | | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |





FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -13.530 | 7.365 | 1.217 | 760.44 | 185.58 | 8.14 | 2 | 60.12 | 4.85 15100 | 0 | | | | |
| -13.945 | 7.901 | 1.369 | 843.37 | 214.20 | 12.21 | 2 | 57.46 | 4.35 15100 | 0 | | | | |
| -14.360 | 8.503 | 1.538 | 938.37 | 243.87 | 16.28 | 1 | 57.05 | 2.91 15100 | 0 | | | | |
| -14.775 | 9.180 | 1.726 | 1046.04 | 275.36 | 20.36 | 1 | 58.07 | 2.91 15100 | 0 | | | | |
| -15.190 | 9.939 | 1.935 | 1167.21 | 308.97 | 24.43 | 1 | 59.10 | 2.91 15100 | 0 | | | | |
| -15.605 | 10.789 | 2.169 | 1302.77 | 344.69 | 28.50 | 1 | 60.13 | 2.91 15100 | 0 | | | | |
| -16.020 | 11.742 | 2.430 | 1453.60 | 382.53 | 32.57 | 1 | 61.15 | 2.91 15100 | 0 | | | | |
| | | | | -913.01 | 32.57 | 1 | 61.15 | 2.91 15100 | 0 | | | 3 | -1295.54 |
| -16.520 | 13.032 | 2.710 | 1009.07 | -864.61 | 37.47 | 1 | 62.39 | 2.91 15100 | 0 | | | | |
| -17.020 | 14.437 | 2.892 | 589.50 | -813.14 | 42.38 | 1 | 63.63 | 2.91 15100 | 0 | | | | |
| -17.520 | 15.909 | 2.982 | 196.44 | -758.60 | 47.28 | 1 | 64.86 | 2.91 15100 | 0 | | | | |
| -17.905 | 17.060 | 2.991 | -87.20 | -714.52 | 51.06 | 1 | 65.82 | 2.91 15100 | 0 | | | | |
| -18.290 | 18.206 | 2.952 | -353.51 | -668.61 | 54.84 | 1 | 66.77 | 2.91 15100 | 0 | | | | |
| -18.675 | 19.327 | 2.868 | -601.79 | -620.88 | 58.61 | 1 | 67.72 | 2.91 15100 | 0 | | | | |
| -19.060 | 20.408 | 2.742 | -831.35 | -571.33 | 62.39 | 1 | 68.67 | 2.91 15100 | 0 | | | | |
| -19.445 | 21.433 | 2.577 | -1041.48 | -519.96 | 66.17 | 1 | 69.63 | 2.91 15100 | 0 | | | | |
| -19.830 | 22.388 | 2.377 | -1231.49 | -466.77 | 69.95 | 1 | 70.58 | 2.91 15100 | 0 | | | | |
| -20.215 | 23.259 | 2.145 | -1400.66 | -411.76 | 73.72 | 1 | 71.53 | 2.91 15100 | 0 | | | | |
| -20.600 | 24.036 | 1.885 | -1548.30 | -354.92 | 77.50 | 1 | 72.48 | 2.91 15100 | 0 | | | | |
| | | | | | 77.50 | 1 | 60.50 | 2.68 20600 | 0 | | | | |
| -20.903 | 24.573 | 1.664 | -1649.30 | -312.62 | 80.47 | 1 | 61.23 | 2.68 20600 | 0 | | | | |
| -21.205 | 25.041 | 1.430 | -1737.32 | -269.20 | 83.43 | 1 | 61.96 | 2.68 20600 | 0 | | | | |
| -21.508 | 25.437 | 1.185 | -1812.05 | -224.65 | 86.40 | 1 | 62.69 | 2.68 20600 | 0 | | | | |
| -21.810 | 25.757 | 0.930 | -1873.13 | -178.99 | 89.37 | 1 | 63.42 | 2.68 20600 | 0 | | | | |
| -22.113 | 25.999 | 0.668 | -1920.23 | -132.22 | 92.34 | 1 | 64.15 | 2.68 20600 | 0 | | | | |
| -22.415 | 26.161 | 0.401 | -1953.01 | -84.32 | 95.30 | 1 | 64.88 | 2.68 20600 | 0 | | | | |
| -22.718 | 26.241 | 0.129 | -1971.13 | -35.31 | 98.27 | 1 | 65.61 | 2.68 20600 | 0 | | | | |
| -23.020 | 26.239 | -0.143 | -1974.25 | 14.83 | 101.24 | 1 | 66.34 | 2.68 20600 | 0 | | | | |
| -23.520 | 26.055 | -0.592 | -1945.64 | 100.14 | 106.14 | 1 | 67.54 | 2.68 20600 | 0 | | | | |
| -24.020 | 25.649 | -1.028 | -1873.60 | 188.52 | 111.05 | 1 | 68.75 | 2.68 20600 | 0 | | | | |
| | | | | | 111.05 | 1 | 68.75 | 2.68 20600 | 3 | 73.67 | 20600 | | |
| -24.520 | 25.030 | -1.445 | -1767.16 | 235.05 | 115.95 | 1 | 69.96 | 2.68 20600 | 3 | 105.89 | 20600 | | |
| -24.550 | 24.987 | -1.469 | -1760.08 | 237.44 | 115.95 | 1 | 70.03 | 2.68 20600 | 3 | 106.81 | 20600 | | |
| -24.975 | 24.291 | -1.800 | -1652.37 | 268.55 | 115.95 | 1 | 71.05 | 2.68 20600 | 3 | 119.79 | 20600 | | |
| -25.400 | 23.460 | -2.109 | -1532.53 | 294.58 | 115.95 | 1 | 72.08 | 2.68 20600 | 3 | 132.76 | 20600 | | |
| -25.675 | 22.854 | -2.296 | -1449.53 | 308.72 | 115.95 | 1 | 72.74 | 2.68 20600 | 3 | 141.15 | 20600 | | |
| -25.950 | 22.198 | -2.473 | -1362.93 | 320.73 | 115.95 | 1 | 73.41 | 2.68 20600 | 3 | 149.55 | 20600 | | |
| -26.225 | 21.494 | -2.639 | -1273.32 | 330.61 | 115.95 | 1 | 74.07 | 2.68 20600 | 3 | 157.95 | 20600 | | |
| -26.500 | 20.747 | -2.793 | -1181.29 | 338.37 | 115.95 | 1 | 74.73 | 2.68 20600 | 3 | 166.34 | 20600 | | |
| -26.775 | 19.959 | -2.935 | -1087.41 | 344.00 | 115.95 | 1 | 75.40 | 2.68 20600 | 3 | 174.74 | 20600 | | |
| -27.050 | 19.134 | -3.066 | -992.28 | 347.51 | 115.95 | 1 | 76.06 | 2.68 20600 | 3 | 183.13 | 20600 | | |
| -27.325 | 18.274 | -3.184 | -896.47 | 348.89 | 115.95 | 1 | 76.72 | 2.68 20600 | 3 | 191.53 | 20600 | | |
| -27.600 | 17.384 | -3.291 | -800.58 | 348.14 | 115.95 | 1 | 77.39 | 2.68 20600 | 3 | 199.92 | 20600 | | |
| -28.100 | 15.696 | -3.454 | -627.92 | 341.34 | 115.95 | 1 | 78.59 | 2.68 20600 | 3 | 215.19 | 20600 | | |
| -28.375 | 14.736 | -3.527 | -534.93 | 334.60 | 115.95 | 1 | 79.26 | 2.68 20600 | 3 | 223.58 | 20600 | | |
| -28.650 | 13.757 | -3.588 | -444.08 | 325.73 | 115.95 | 1 | 79.92 | 2.68 20600 | 3 | 231.98 | 20600 | | |
| -28.925 | 12.763 | -3.639 | -355.97 | 314.74 | 115.95 | 1 | 80.58 | 2.68 20600 | 3 | 240.37 | 20600 | | |
| -29.200 | 11.757 | -3.678 | -271.17 | 301.63 | 115.95 | 1 | 81.25 | 2.68 20600 | 3 | 248.77 | 20600 | | |
| | | | | | 115.95 | 1 | 62.97 | 2.46 43800 | 3 | 305.74 | 43800 | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |

FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -29.513 | 10.602 | -3.710 | -183.28 | 260.31 | 115.95 | 1 | 63.74 | 2.46 43800 | 3 | 317.27 | 43800 | | |
| -29.825 | 9.439 | -3.731 | -108.82 | 215.64 | 115.95 | 1 | 64.51 | 2.46 43800 | 3 | 328.80 | 43800 | | |
| -30.138 | 8.271 | -3.742 | -48.86 | 167.60 | 115.95 | 1 | 65.28 | 2.46 43800 | 3 | 340.33 | 43800 | | |
| -30.450 | 7.101 | -3.746 | -4.20 | 118.32 | 115.95 | 1 | 66.05 | 2.46 43800 | 2 | 338.35 | 43800 | | |
| -30.763 | 5.931 | -3.744 | 25.96 | 77.38 | 115.95 | 1 | 66.81 | 2.46 43800 | 2 | 288.42 | 43800 | | |
| -31.075 | 4.762 | -3.739 | 45.81 | 52.28 | 115.95 | 1 | 67.58 | 2.46 43800 | 2 | 238.54 | 43800 | | |
| -31.388 | 3.594 | -3.731 | 60.28 | 42.99 | 115.95 | 1 | 68.35 | 2.46 43800 | 2 | 188.75 | 43800 | | |
| -31.700 | 2.430 | -3.721 | 74.32 | 49.49 | 115.95 | 2 | 69.14 | 2.48 43800 | 2 | 139.07 | 43800 | | |
| | | | | | 115.95 | -1 | | | 2 | 740.64 | 300000 | | |
| -32.200 | 0.573 | -3.706 | 44.15 | -123.85 | 115.95 | -1 | | | 2 | 184.64 | 300000 | | |
| -32.700 | -1.278 | -3.702 | 0.00 | 0.00 | 115.95 | 2 | 448.14 | 1.52 300000 | -1 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 26.24 mm

MOMENTO MÁXIMO =-1974.25 kN.m/m

CODIFICACIÓN -1 = SEPARACIÓN
DE ESTADO : 0 = EXCAVACIÓN
DE SUELO : 1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 113.62 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.052 = (1772.07 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.415 = (1859.42 kN/m)/(4481.17 kN/m) SIN INTERÉS



** FASE No 5 **

*Fase 5
*Ejecucion del 2º nivel de puntales provisionales
*Excavacion hasta el nivel de losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 4
NIVEL = -23.020 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2
PARA NIVEL = -25.400 m
CON BERMA EN NIVEL = -27.600 m A = 2.470 m B = 4.670 m
SIMULACIÓN CON LAS SOBRECARGAS DE BOUSSINESQ

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -28.100 m



FASE 5

| | PARED | SOIL 1: EXCAVACIÓN: 0.00 m, NIVEL AGUA: -12.70 m, S. DE CAQUOT: 10.00 kPa | SOIL 2: EXCAVACIÓN: -25.40 m, NIVEL AGUA: -28.10 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 4.131 | 0.065 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 4.149 | 0.065 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 4.167 | 0.065 | 0.06 | 0.65 | | 2 | 4.75 | 4.75 4900 | 0 | | | | |
| -0.825 | 4.185 | 0.065 | 0.43 | 2.07 | | 2 | 5.57 | 5.15 4900 | 0 | | | | |
| -1.100 | 4.203 | 0.065 | 1.22 | 3.72 | | 2 | 6.39 | 5.15 4900 | 0 | | | | |
| -1.375 | 4.221 | 0.066 | 2.49 | 5.59 | | 2 | 7.20 | 5.15 4900 | 0 | | | | |
| -1.650 | 4.239 | 0.066 | 4.31 | 7.68 | | 2 | 8.02 | 4.76 4900 | 0 | | | | |
| -1.925 | 4.258 | 0.067 | 6.74 | 10.00 | | 2 | 8.84 | 4.01 4900 | 0 | | | | |
| -2.200 | 4.276 | 0.068 | 9.83 | 12.54 | | 2 | 9.66 | 3.25 4900 | 0 | | | | |
| -2.250 | 4.279 | 0.068 | 10.47 | 13.03 | | 2 | 9.92 | 3.23 4900 | 0 | | | | |
| | | | | -45.00 | | 2 | 9.92 | 3.23 4900 | 0 | | | 1 | -58.03 |
| -2.675 | 4.309 | 0.068 | -7.67 | -40.15 | | 2 | 12.90 | 3.78 4900 | 0 | | | | |
| -3.100 | 4.337 | 0.065 | -23.48 | -34.04 | | 2 | 15.87 | 4.33 4900 | 0 | | | | |
| -3.600 | 4.368 | 0.058 | -38.37 | -25.23 | | 2 | 19.34 | 4.95 4900 | 0 | | | | |
| -4.100 | 4.395 | 0.048 | -48.42 | -14.71 | | 2 | 22.77 | 5.15 4900 | 0 | | | | |
| -4.600 | 4.416 | 0.036 | -52.79 | -2.47 | | 2 | 26.15 | 5.15 4900 | 0 | | | | |
| -5.100 | 4.431 | 0.024 | -50.57 | 11.74 | | 2 | 30.71 | 5.15 4900 | 0 | | | | |
| -5.600 | 4.441 | 0.014 | -40.66 | 28.25 | | 2 | 35.30 | 5.15 4900 | 0 | | | | |
| -6.100 | 4.445 | 0.007 | -21.94 | 47.05 | | 2 | 39.91 | 5.15 4900 | 0 | | | | |
| -6.600 | 4.448 | 0.005 | 6.77 | 68.16 | | 2 | 44.54 | 5.15 4900 | 0 | | | | |
| -7.100 | 4.451 | 0.011 | 46.61 | 91.59 | | 2 | 49.15 | 5.15 4900 | 0 | | | | |
| | | | | | | 2 | 34.45 | 4.85 15100 | 0 | | | | |
| -7.450 | 4.457 | 0.021 | 80.81 | 103.90 | | 2 | 35.89 | 4.85 15100 | 0 | | | | |
| -7.800 | 4.467 | 0.037 | 119.39 | 116.66 | | 2 | 37.04 | 4.85 15100 | 0 | | | | |
| -8.150 | 4.483 | 0.059 | 162.51 | 129.77 | | 2 | 37.89 | 4.85 15100 | 0 | | | | |
| -8.500 | 4.509 | 0.089 | 210.26 | 143.12 | | 2 | 38.41 | 4.85 15100 | 0 | | | | |
| -8.850 | 4.546 | 0.127 | 262.71 | 156.59 | | 2 | 38.57 | 4.85 15100 | 0 | | | | |
| -9.200 | 4.598 | 0.173 | 319.88 | 170.05 | | 2 | 38.35 | 4.85 15100 | 0 | | | | |
| -9.550 | 4.668 | 0.229 | 381.73 | 183.37 | | 2 | 37.73 | 4.85 15100 | 0 | | | | |
| -9.900 | 4.760 | 0.295 | 448.25 | 196.82 | | 2 | 39.16 | 4.56 15100 | 0 | | | | |
| | | | | 0.64 | | 2 | 39.16 | 4.56 15100 | 0 | | | 2 | -196.18 |
| -10.200 | 4.858 | 0.357 | 450.25 | 12.81 | | 2 | 41.97 | 4.85 15100 | 0 | | | | |
| | | | | | | 2 | 33.65 | 4.55 20600 | 0 | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -10.500 | 4.974 | 0.419 | 455.65 | 23.39 | | 2 | 36.89 | 4.55 | 20600 | 0 | | | | | | | |
| -10.762 | 5.091 | 0.474 | 463.10 | 33.45 | | 2 | 39.73 | 4.55 | 20600 | 0 | | | | | | | |
| -11.025 | 5.223 | 0.530 | 473.28 | 44.24 | | 2 | 42.52 | 4.55 | 20600 | 0 | | | | | | | |
| -11.288 | 5.369 | 0.587 | 486.39 | 55.76 | | 2 | 45.20 | 4.55 | 20600 | 0 | | | | | | | |
| -11.550 | 5.531 | 0.647 | 502.61 | 67.95 | | 2 | 47.70 | 4.55 | 20600 | 0 | | | | | | | |
| -11.812 | 5.709 | 0.708 | 522.12 | 80.77 | | 2 | 49.97 | 4.55 | 20600 | 0 | | | | | | | |
| -12.075 | 5.903 | 0.772 | 545.06 | 94.14 | | 2 | 51.94 | 4.55 | 20600 | 0 | | | | | | | |
| -12.338 | 6.115 | 0.839 | 571.58 | 107.99 | | 2 | 53.56 | 4.55 | 20600 | 0 | | | | | | | |
| -12.600 | 6.344 | 0.909 | 601.79 | 122.21 | | 2 | 54.76 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | | | 2 | 61.75 | 4.85 | 15100 | 0 | | | | | | | |
| -12.700 | 6.436 | 0.937 | 614.32 | 128.40 | | 2 | 62.16 | 4.85 | 15100 | 0 | | | | | | | |
| -13.115 | 6.850 | 1.059 | 673.07 | 155.02 | 4.07 | 2 | 62.06 | 4.85 | 15100 | 0 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.530 | 7.317 | 1.193 | 743.19 | 183.06 | 8.14 | 2 | 60.85 | 4.85 | 15100 | 0 | | | |
| -13.945 | 7.842 | 1.341 | 825.14 | 212.02 | 12.21 | 2 | 58.35 | 4.85 | 15100 | 0 | | | |
| -14.360 | 8.432 | 1.506 | 919.32 | 242.10 | 16.28 | 2 | 58.12 | 3.99 | 15100 | 0 | | | |
| -14.775 | 9.095 | 1.690 | 1026.35 | 274.08 | 20.36 | 2 | 59.36 | 4.20 | 15100 | 0 | | | |
| -15.190 | 9.838 | 1.896 | 1147.11 | 308.27 | 24.43 | 2 | 60.62 | 4.43 | 15100 | 0 | | | |
| -15.605 | 10.672 | 2.126 | 1282.52 | 344.67 | 28.50 | 2 | 61.90 | 4.69 | 15100 | 0 | | | |
| -16.020 | 11.606 | 2.383 | 1433.49 | 383.31 | 32.57 | 2 | 63.21 | 4.85 | 15100 | 0 | | | |
| | | | | -850.54 | 32.57 | 2 | 63.21 | 4.85 | 15100 | 0 | | 3 | -1233.84 |
| -16.520 | 12.872 | 2.663 | 1020.47 | -801.02 | 37.47 | 2 | 64.81 | 4.85 | 15100 | 0 | | | |
| -17.020 | 14.254 | 2.851 | 633.02 | -748.26 | 42.38 | 2 | 66.39 | 4.85 | 15100 | 0 | | | |
| -17.520 | 15.708 | 2.954 | 272.75 | -692.27 | 47.28 | 2 | 67.89 | 4.85 | 15100 | 0 | | | |
| -17.905 | 16.852 | 2.979 | 14.88 | -647.00 | 51.06 | 2 | 68.96 | 4.85 | 15100 | 0 | | | |
| -18.290 | 17.997 | 2.960 | -225.20 | -599.88 | 54.84 | 2 | 69.93 | 4.85 | 15100 | 0 | | | |
| -18.675 | 19.126 | 2.901 | -446.80 | -550.96 | 58.61 | 2 | 70.76 | 4.85 | 15100 | 0 | | | |
| -19.060 | 20.225 | 2.804 | -649.21 | -500.29 | 62.39 | 2 | 71.44 | 4.85 | 15100 | 0 | | | |
| -19.445 | 21.281 | 2.674 | -831.80 | -447.94 | 66.17 | 2 | 71.93 | 4.85 | 15100 | 0 | | | |
| -19.830 | 22.280 | 2.513 | -993.92 | -394.00 | 69.95 | 2 | 72.20 | 4.54 | 15100 | 0 | | | |
| -20.215 | 23.212 | 2.325 | -1134.98 | -338.53 | 73.72 | 2 | 72.24 | 3.62 | 15100 | 0 | | | |
| -20.600 | 24.068 | 2.115 | -1254.40 | -281.57 | 77.50 | 1 | 72.48 | 2.91 | 15100 | 0 | | | |
| | | | | | 77.50 | 1 | 60.50 | 2.68 | 20600 | 0 | | | |
| -20.903 | 24.681 | 1.936 | -1333.21 | -239.26 | 80.47 | 1 | 61.23 | 2.68 | 20600 | 0 | | | |
| -21.205 | 25.238 | 1.747 | -1399.04 | -195.84 | 83.43 | 1 | 61.96 | 2.68 | 20600 | 0 | | | |
| -21.508 | 25.737 | 1.550 | -1451.58 | -151.30 | 86.40 | 1 | 62.69 | 2.68 | 20600 | 0 | | | |
| -21.810 | 26.176 | 1.347 | -1490.46 | -105.64 | 89.37 | 1 | 63.42 | 2.68 | 20600 | 0 | | | |
| -22.113 | 26.552 | 1.139 | -1515.37 | -58.86 | 92.34 | 1 | 64.15 | 2.68 | 20600 | 0 | | | |
| -22.415 | 26.865 | 0.929 | -1525.96 | -10.96 | 95.30 | 1 | 64.88 | 2.68 | 20600 | 0 | | | |
| -22.718 | 27.114 | 0.718 | -1521.89 | 38.05 | 98.27 | 1 | 65.61 | 2.68 | 20600 | 0 | | | |
| -23.020 | 27.299 | 0.509 | -1502.83 | 88.18 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | | |
| | | | | -392.10 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | 4 | -480.28 |
| -23.520 | 27.465 | 0.145 | -1677.68 | -306.78 | 106.14 | 1 | 67.54 | 2.68 | 20600 | 0 | | | |
| -24.020 | 27.439 | -0.253 | -1809.10 | -218.41 | 111.05 | 1 | 68.75 | 2.68 | 20600 | 0 | | | |
| -24.520 | 27.207 | -0.677 | -1895.57 | -126.98 | 115.95 | 1 | 69.96 | 2.68 | 20600 | 0 | | | |
| -24.550 | 27.186 | -0.703 | -1899.30 | -121.40 | 116.25 | 1 | 70.03 | 2.68 | 20600 | 0 | | | |
| -24.975 | 26.809 | -1.076 | -1933.92 | -41.13 | 120.42 | 1 | 71.05 | 2.68 | 20600 | 0 | | | |
| -25.400 | 26.272 | -1.452 | -1933.95 | 41.35 | 124.59 | 1 | 72.08 | 2.68 | 20600 | 0 | | | |
| | | | | | 124.59 | 1 | 72.08 | 2.68 | 20600 | 3 | 31.37 | 20600 | |
| -25.675 | 25.839 | -1.693 | -1916.40 | 85.98 | 127.28 | 1 | 72.74 | 2.68 | 20600 | 3 | 40.77 | 20600 | |
| -25.950 | 25.340 | -1.932 | -1886.87 | 128.23 | 129.98 | 1 | 73.41 | 2.68 | 20600 | 3 | 55.37 | 20600 | |
| -26.225 | 24.777 | -2.167 | -1846.11 | 167.88 | 132.68 | 1 | 74.07 | 2.68 | 20600 | 3 | 66.44 | 20600 | |
| -26.500 | 24.149 | -2.396 | -1794.78 | 204.90 | 135.38 | 1 | 74.73 | 2.68 | 20600 | 3 | 81.16 | 20600 | |
| -26.775 | 23.460 | -2.617 | -1733.72 | 238.58 | 138.08 | 1 | 75.40 | 2.68 | 20600 | 3 | 97.44 | 20600 | |
| -27.050 | 22.711 | -2.831 | -1663.91 | 268.46 | 140.77 | 1 | 76.06 | 2.68 | 20600 | 3 | 115.58 | 20600 | |
| -27.325 | 21.904 | -3.035 | -1586.52 | 293.42 | 143.47 | 1 | 76.72 | 2.68 | 20600 | 3 | 139.88 | 20600 | |
| -27.600 | 21.042 | -3.229 | -1502.99 | 313.38 | 146.17 | 1 | 77.39 | 2.68 | 20600 | 3 | 158.75 | 20600 | |
| -28.100 | 19.345 | -3.553 | -1338.73 | 342.57 | 151.07 | 1 | 78.59 | 2.68 | 20600 | 3 | 177.70 | 20600 | |
| -28.375 | 18.345 | -3.716 | -1242.55 | 356.96 | 151.07 | 1 | 79.26 | 2.68 | 20600 | 3 | 177.67 | 20600 | |
| -28.650 | 17.303 | -3.865 | -1142.40 | 371.41 | 151.07 | 1 | 79.92 | 2.68 | 20600 | 3 | 178.53 | 20600 | |
| -28.925 | 16.221 | -4.002 | -1038.29 | 385.70 | 151.07 | 1 | 80.58 | 2.68 | 20600 | 3 | 180.23 | 20600 | |
| -29.200 | 15.103 | -4.126 | -930.30 | 399.59 | 151.07 | 1 | 81.25 | 2.68 | 20600 | 3 | 182.72 | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |





FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 151.07 | 1 | 62.97 | 2.46 | 43800 | 3 | 233.88 | 43800 | |
| -29.513 | 13.794 | -4.250 | -806.47 | 392.70 | 151.07 | 1 | 63.74 | 2.46 | 43800 | 3 | 239.05 | 43800 | |
| -29.825 | 12.448 | -4.356 | -685.02 | 384.30 | 151.07 | 1 | 64.51 | 2.46 | 43800 | 3 | 245.10 | 43800 | |
| -30.138 | 11.073 | -4.445 | -566.47 | 374.13 | 151.07 | 1 | 65.28 | 2.46 | 43800 | 3 | 251.94 | 43800 | |
| -30.450 | 9.672 | -4.518 | -451.40 | 361.95 | 151.07 | 1 | 66.05 | 2.46 | 43800 | 3 | 259.45 | 43800 | |
| -30.763 | 8.251 | -4.575 | -340.48 | 347.58 | 151.07 | 1 | 66.81 | 2.46 | 43800 | 3 | 267.55 | 43800 | |
| -31.075 | 6.814 | -4.615 | -234.41 | 330.84 | 151.07 | 1 | 67.58 | 2.46 | 43800 | 3 | 276.14 | 43800 | |
| -31.388 | 5.367 | -4.642 | -133.47 | 316.34 | 151.07 | 1 | 68.35 | 2.46 | 43800 | 2 | 254.71 | 43800 | |
| -31.700 | 3.915 | -4.654 | -35.30 | 315.21 | 151.07 | 1 | 69.12 | 2.46 | 43800 | 2 | 192.16 | 43800 | |
| | | | | | 151.07 | -1 | | | | 2 | 1181.79 | 300000 | |
| -32.200 | 1.588 | -4.652 | 22.51 | -25.85 | 151.07 | -1 | | | | 2 | 484.59 | 300000 | |
| -32.700 | -0.737 | -4.650 | 0.00 | 0.00 | 151.07 | 2 | 285.83 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 27.46 mm

MOMENTO MÁXIMO =-1933.95 kN.m/m

CODIFICACIÓN DE ESTADO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA

CODIFICACIÓN DE SUELO :
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 124.48 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.051 = (1746.45 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.467 = (1636.32 kN/m)/(3501.03 kN/m) SIN INTERÉS



**  FASE No  6  **

*Fase 6
*Ejecucion de la losa de fondo y retirada de puntales provisionales

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 5

NIVEL = -24.550 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 850000.000 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE PUNTALES N° 3

* RETIRO DE LA LÍNEA DE PUNTALES N° 4



FASE 6

| | PARED | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -12.70 m<br>S. DE CAQUOT: 10.00 kPa | SOIL 2<br>EXCAVACIÓN: -25.40 m<br>NIVEL AGUA: -28.10 m<br>S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 6.191 | -0.868 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 5.952 | -0.868 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 5.713 | -0.868 | 0.00 | 0.02 | | 1 | 0.16 | 0.16 | 4900 | 0 | | | |
| -0.825 | 5.475 | -0.868 | 0.03 | 0.28 | | 1 | 1.73 | 1.73 | 4900 | 0 | | | |
| -1.100 | 5.236 | -0.868 | 0.20 | 0.97 | | 1 | 3.30 | 3.17 | 4900 | 0 | | | |
| -1.375 | 4.997 | -0.868 | 0.61 | 2.09 | | 1 | 4.87 | 3.17 | 4900 | 0 | | | |
| -1.650 | 4.759 | -0.868 | 1.39 | 3.65 | | 1 | 6.44 | 3.17 | 4900 | 0 | | | |
| -1.925 | 4.520 | -0.868 | 2.65 | 5.63 | | 1 | 8.00 | 3.17 | 4900 | 0 | | | |
| -2.200 | 4.282 | -0.867 | 4.53 | 8.06 | | 2 | 9.63 | 3.22 | 4900 | 0 | | | |
| -2.250 | 4.238 | -0.867 | 4.94 | 8.55 | | 2 | 10.12 | 3.43 | 4900 | 0 | | | |
| | | | | 164.61 | | 2 | 10.12 | 3.43 | 4900 | 0 | | 1 | 156.06 |
| -2.675 | 3.871 | -0.859 | 75.96 | 169.95 | | 2 | 15.04 | 5.15 | 4900 | 0 | | | |
| -3.100 | 3.510 | -0.837 | 149.70 | 177.38 | | 2 | 19.92 | 5.15 | 4900 | 0 | | | |
| -3.600 | 3.102 | -0.793 | 241.11 | 188.75 | | 2 | 25.55 | 5.15 | 4900 | 0 | | | |
| -4.100 | 2.721 | -0.727 | 338.91 | 202.88 | | 2 | 30.97 | 5.15 | 4900 | 0 | | | |
| -4.600 | 2.379 | -0.637 | 444.44 | 219.66 | | 2 | 36.14 | 5.15 | 4900 | 0 | | | |
| -5.100 | 2.088 | -0.523 | 559.04 | 239.24 | | 2 | 42.20 | 5.15 | 4900 | 0 | | | |
| -5.600 | 1.860 | -0.381 | 684.17 | 261.78 | | 2 | 47.95 | 5.15 | 4900 | 0 | | | |
| -6.100 | 1.711 | -0.210 | 821.28 | 287.09 | | 2 | 53.31 | 5.15 | 4900 | 0 | | | |
| -6.600 | 1.656 | -0.005 | 971.69 | 314.98 | | 2 | 58.22 | 5.15 | 4900 | 0 | | | |
| -7.100 | 1.712 | 0.235 | 1136.64 | 345.17 | | 2 | 62.58 | 5.15 | 4900 | 0 | | | |
| | | | | | | 2 | 75.82 | 4.85 | 15100 | 0 | | | |
| -7.450 | 1.827 | 0.427 | 1262.09 | 371.67 | | 2 | 75.59 | 4.85 | 15100 | 0 | | | |
| -7.800 | 2.013 | 0.639 | 1396.78 | 397.87 | | 2 | 74.09 | 4.85 | 15100 | 0 | | | |
| -8.150 | 2.277 | 0.874 | 1540.51 | 423.29 | | 2 | 71.20 | 4.85 | 15100 | 0 | | | |
| -8.500 | 2.627 | 1.132 | 1692.93 | 447.45 | | 2 | 66.82 | 4.85 | 15100 | 0 | | | |
| -8.850 | 3.072 | 1.415 | 1853.51 | 469.79 | | 2 | 60.83 | 4.85 | 15100 | 0 | | | |
| -9.200 | 3.621 | 1.725 | 2021.50 | 489.73 | | 2 | 53.12 | 4.85 | 15100 | 0 | | | |
| -9.550 | 4.282 | 2.062 | 2195.96 | 506.64 | | 2 | 43.55 | 4.85 | 15100 | 0 | | | |
| -9.900 | 5.067 | 2.427 | 2375.83 | 520.83 | | 1 | 37.52 | 2.91 | 15100 | 0 | | | |
| | | | | -740.54 | | 1 | 37.52 | 2.91 | 15100 | 0 | | 2 | -1261.37 |
| -10.200 | 5.842 | 2.737 | 2155.39 | -729.04 | | 1 | 39.13 | 2.91 | 15100 | 0 | | | |
| | | | | | | 1 | 29.79 | 2.68 | 20600 | 0 | | | |
| -10.500 | 6.706 | 3.017 | 1938.04 | -719.87 | | 1 | 31.32 | 2.68 | 20600 | 0 | | | |
| -10.762 | 7.528 | 3.239 | 1750.17 | -711.48 | | 1 | 32.65 | 2.68 | 20600 | 0 | | | |
| -11.025 | 8.405 | 3.437 | 1564.54 | -702.73 | | 1 | 33.99 | 2.68 | 20600 | 0 | | | |
| -11.288 | 9.331 | 3.614 | 1381.26 | -693.63 | | 1 | 35.33 | 2.68 | 20600 | 0 | | | |
| -11.550 | 10.300 | 3.768 | 1200.42 | -684.18 | | 1 | 36.66 | 2.68 | 20600 | 0 | | | |
| -11.812 | 11.307 | 3.902 | 1022.10 | -674.38 | | 1 | 38.00 | 2.68 | 20600 | 0 | | | |
| -12.075 | 12.346 | 4.014 | 846.40 | -664.23 | | 1 | 39.34 | 2.68 | 20600 | 0 | | | |
| -12.338 | 13.412 | 4.105 | 673.41 | -653.73 | | 1 | 40.67 | 2.68 | 20600 | 0 | | | |
| -12.600 | 14.500 | 4.175 | 503.22 | -642.88 | | 1 | 42.01 | 2.68 | 20600 | 0 | | | |
| | | | | | | 1 | 52.40 | 2.91 | 15100 | 0 | | | |
| -12.700 | 14.918 | 4.197 | 439.20 | -637.61 | | 1 | 52.94 | 2.91 | 15100 | 0 | | | |
| -13.115 | 16.674 | 4.255 | 179.29 | -614.58 | 4.07 | 1 | 53.97 | 2.91 | 15100 | 0 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa kPa kPa/m | | kN |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.530 | 18.443 | 4.265 | -70.62 | -589.44 | 8.14 | 1 | 54.99 | 2.91 | 15100 | 0 | | | |
| -13.945 | 20.207 | 4.229 | -309.65 | -562.18 | 12.21 | 1 | 56.02 | 2.91 | 15100 | 0 | | | |
| -14.360 | 21.947 | 4.149 | -536.93 | -532.80 | 16.28 | 1 | 57.05 | 2.91 | 15100 | 0 | | | |
| -14.775 | 23.645 | 4.026 | -751.59 | -501.31 | 20.36 | 1 | 58.07 | 2.91 | 15100 | 0 | | | |
| -15.190 | 25.283 | 3.865 | -952.73 | -467.71 | 24.43 | 1 | 59.10 | 2.91 | 15100 | 0 | | | |
| -15.605 | 26.847 | 3.666 | -1139.49 | -431.99 | 28.50 | 1 | 60.13 | 2.91 | 15100 | 0 | | | |
| -16.020 | 28.321 | 3.434 | -1310.98 | -394.15 | 32.57 | 1 | 61.15 | 2.91 | 15100 | 0 | | | |
| -16.520 | 29.960 | 3.113 | -1496.09 | -345.75 | 37.47 | 1 | 62.39 | 2.91 | 15100 | 0 | | | |
| -17.020 | 31.428 | 2.752 | -1656.22 | -294.28 | 42.38 | 1 | 63.63 | 2.91 | 15100 | 0 | | | |
| -17.520 | 32.707 | 2.358 | -1789.86 | -239.74 | 47.28 | 1 | 64.86 | 2.91 | 15100 | 0 | | | |
| -17.905 | 33.553 | 2.036 | -1873.73 | -195.66 | 51.06 | 1 | 65.82 | 2.91 | 15100 | 0 | | | |
| -18.290 | 34.273 | 1.701 | -1940.28 | -149.75 | 54.84 | 1 | 66.77 | 2.91 | 15100 | 0 | | | |
| -18.675 | 34.861 | 1.355 | -1988.80 | -102.02 | 58.61 | 1 | 67.72 | 2.91 | 15100 | 0 | | | |
| -19.060 | 35.315 | 1.003 | -2018.60 | -52.47 | 62.39 | 1 | 68.67 | 2.91 | 15100 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -19.445 | 35.633 | 0.646 | -2028.97 | -1.10 | 66.17 | 1 | 69.63 | 2.91 | 15100 | 0 | | | | | | | |
| -19.830 | 35.813 | 0.290 | -2019.21 | 52.09 | 69.95 | 1 | 70.58 | 2.91 | 15100 | 0 | | | | | | | |
| -20.215 | 35.857 | -0.062 | -1988.63 | 107.10 | 73.72 | 1 | 71.53 | 2.91 | 15100 | 0 | | | | | | | |
| -20.600 | 35.766 | -0.408 | -1936.51 | 163.94 | 77.50 | 1 | 72.48 | 2.91 | 15100 | 0 | | | | | | | |
| | | | | | 77.50 | 1 | 60.50 | 2.68 | 20600 | 0 | | | | | | | |
| -20.903 | 35.603 | -0.671 | -1880.55 | 206.24 | 80.47 | 1 | 61.23 | 2.68 | 20600 | 0 | | | | | | | |
| -21.205 | 35.361 | -0.927 | -1811.62 | 249.66 | 83.43 | 1 | 61.96 | 2.68 | 20600 | 0 | | | | | | | |
| -21.508 | 35.043 | -1.171 | -1729.39 | 294.20 | 86.40 | 1 | 62.69 | 2.68 | 20600 | 0 | | | | | | | |
| -21.810 | 34.653 | -1.404 | -1633.52 | 339.86 | 89.37 | 1 | 63.42 | 2.68 | 20600 | 0 | | | | | | | |
| -22.113 | 34.195 | -1.622 | -1523.66 | 386.64 | 92.34 | 1 | 64.15 | 2.68 | 20600 | 0 | | | | | | | |
| -22.415 | 33.674 | -1.824 | -1399.48 | 434.54 | 95.30 | 1 | 64.88 | 2.68 | 20600 | 0 | | | | | | | |
| -22.718 | 33.094 | -2.008 | -1260.65 | 483.55 | 98.27 | 1 | 65.61 | 2.68 | 20600 | 0 | | | | | | | |
| -23.020 | 32.461 | -2.171 | -1106.82 | 533.69 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | | | | | | |
| -23.520 | 31.317 | -2.392 | -818.78 | 619.00 | 106.14 | 1 | 67.54 | 2.68 | 20600 | 0 | | | | | | | |
| -24.020 | 30.081 | -2.542 | -487.31 | 707.38 | 111.05 | 1 | 68.75 | 2.68 | 20600 | 0 | | | | | | | |
| -24.520 | 28.789 | -2.611 | -110.89 | 798.80 | 115.95 | 1 | 69.96 | 2.68 | 20600 | 0 | | | | | | | |
| -24.550 | 28.711 | -2.613 | -86.84 | 804.39 | 116.25 | 1 | 70.03 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | -491.09 | 116.25 | 1 | 70.03 | 2.68 | 20600 | 0 | | | | | | | 5-1295.48 |
| -24.975 | 27.594 | -2.649 | -278.58 | -410.82 | 120.42 | 1 | 71.05 | 2.68 | 20600 | 0 | | | | | | | |
| -25.400 | 26.454 | -2.718 | -435.73 | -328.34 | 124.59 | 1 | 72.08 | 2.68 | 20600 | 0 | | | | | | | |
| | | | | | 124.59 | 1 | 72.08 | 2.68 | 20600 | 2 | 35.13 | | 20600 | | | | |
| -25.675 | 25.699 | -2.779 | -519.87 | -283.44 | 127.28 | 2 | 75.63 | 4.55 | 20600 | 2 | 37.88 | | 20600 | | | | |
| -25.950 | 24.925 | -2.848 | -591.58 | -238.04 | 129.98 | 2 | 81.96 | 4.55 | 20600 | 2 | 46.82 | | 20600 | | | | |
| -26.225 | 24.131 | -2.927 | -650.77 | -192.39 | 132.68 | 2 | 87.36 | 4.55 | 20600 | 2 | 53.14 | | 20600 | | | | |
| -26.500 | 23.315 | -3.011 | -697.42 | -146.99 | 135.38 | 2 | 91.92 | 4.55 | 20600 | 2 | 63.98 | | 20600 | | | | |
| -26.775 | 22.475 | -3.101 | -731.75 | -103.00 | 138.08 | 2 | 95.69 | 4.55 | 20600 | 2 | 77.15 | | 20600 | | | | |
| -27.050 | 21.609 | -3.195 | -754.27 | -61.30 | 140.77 | 2 | 98.75 | 4.55 | 20600 | 2 | 92.89 | | 20600 | | | | |
| -27.325 | 20.717 | -3.290 | -765.81 | -23.37 | 143.47 | 2 | 101.16 | 4.55 | 20600 | 2 | 115.44 | | 20600 | | | | |
| -27.600 | 19.799 | -3.387 | -767.51 | 10.34 | 146.17 | 2 | 102.99 | 4.55 | 20600 | 2 | 133.15 | | 20600 | | | | |
| -28.100 | 18.063 | -3.560 | -748.31 | 65.55 | 151.07 | 2 | 105.01 | 4.55 | 20600 | 2 | 151.28 | | 20600 | | | | |
| -28.375 | 17.071 | -3.653 | -726.32 | 94.42 | 151.07 | 2 | 105.51 | 4.55 | 20600 | 2 | 151.41 | | 20600 | | | | |
| -28.650 | 16.054 | -3.742 | -696.39 | 123.17 | 151.07 | 2 | 105.65 | 4.55 | 20600 | 2 | 152.80 | | 20600 | | | | |
| -28.925 | 15.013 | -3.827 | -658.62 | 151.37 | 151.07 | 2 | 105.46 | 4.55 | 20600 | 2 | 155.35 | | 20600 | | | | |
| -29.200 | 13.949 | -3.907 | -613.22 | 178.64 | 151.07 | 2 | 105.01 | 4.55 | 20600 | 2 | 158.95 | | 20600 | | | | |
| | | | | | 151.07 | 2 | 113.49 | 4.26 | 43800 | 2 | 183.36 | | 43800 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | |



FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.513 | 12.715 | -3.991 | -553.60 | 202.31 | 151.07 | 2 | 110.98 | 4.26 | 43800 | 2 | 191.80 | 43800 | |
| -29.825 | 11.456 | -4.065 | -487.16 | 222.26 | 151.07 | 2 | 107.98 | 4.26 | 43800 | 2 | 201.64 | 43800 | |
| -30.138 | 10.175 | -4.129 | -415.14 | 237.95 | 151.07 | 2 | 104.58 | 4.26 | 43800 | 2 | 212.63 | 43800 | |
| -30.450 | 8.876 | -4.183 | -338.93 | 248.95 | 151.07 | 2 | 100.89 | 4.26 | 43800 | 2 | 224.61 | 43800 | |
| -30.763 | 7.562 | -4.226 | -260.07 | 254.89 | 151.07 | 2 | 96.98 | 4.26 | 43800 | 2 | 237.39 | 43800 | |
| -31.075 | 6.236 | -4.257 | -180.19 | 255.48 | 151.07 | 2 | 92.91 | 4.26 | 43800 | 2 | 250.82 | 43800 | |
| -31.388 | 4.902 | -4.277 | -100.48 | 255.27 | 151.07 | 2 | 88.73 | 4.26 | 43800 | 2 | 234.33 | 43800 | |
| -31.700 | 3.564 | -4.286 | -19.58 | 265.30 | 151.07 | 2 | 84.49 | 4.26 | 43800 | 2 | 176.80 | 43800 | |
| | | | | | 151.07 | -1 | | | | 2 | 1076.56 | 300000 | |
| -32.200 | 1.421 | -4.283 | 24.14 | -36.96 | 151.07 | -1 | | | | 2 | 434.66 | 300000 | |
| -32.700 | -0.719 | -4.280 | 0.00 | 0.00 | 151.07 | 2 | 280.36 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 35.86 mm

MOMENTO MÁXIMO = 2375.83 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 113.98 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.057 = (1968.00 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.398 = (1425.42 kN/m)/(3579.74 kN/m) SIN INTERÉS



**  FASE No 7  **

*Fase 7
*Restitucion del nf y paso de la tuneladora

* RETIRO DE LA LÍNEA DE PUNTALES N° 5

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 6
NIVEL = -24.550 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = -1410.000 kN
RIGIDEZ = 430000.000 kN/m
CONEXIÓN BILATERAL

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -25.400 m
PRESIÓN DEL AGUA EN SUELO 2 PARA NIVEL = -25.400 m PR. = 0.000 kPa
PR. = 129.000 kPa



FASE 7

| PARED | SOIL 1 EXCAVACIÓN: 0.00 m | SOIL 2 EXCAVACIÓN: -25.40 m | PUNTALES/ |
|---|---|---|---|

| | | NIVEL AGUA: -12.70 m<br>S. DE CAQUOT: 10.00 kPa | NIVEL AGUA: -25.40 m<br>S. DE CAQUOT: 0.00 kPa | ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 6.200 | -0.872 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 5.960 | -0.872 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 5.720 | -0.872 | 0.00 | 0.02 | | 1 | 0.16 | 0.16 4900 | 0 | | | | |
| -0.825 | 5.480 | -0.872 | 0.03 | 0.28 | | 1 | 1.73 | 1.73 4900 | 0 | | | | |
| -1.100 | 5.241 | -0.872 | 0.20 | 0.97 | | 1 | 3.30 | 3.17 4900 | 0 | | | | |
| -1.375 | 5.001 | -0.872 | 0.61 | 2.09 | | 1 | 4.87 | 3.17 4900 | 0 | | | | |
| -1.650 | 4.761 | -0.872 | 1.39 | 3.65 | | 1 | 6.44 | 3.17 4900 | 0 | | | | |
| -1.925 | 4.521 | -0.872 | 2.65 | 5.63 | | 1 | 8.00 | 3.17 4900 | 0 | | | | |
| -2.200 | 4.282 | -0.871 | 4.53 | 8.06 | | 2 | 9.63 | 3.22 4900 | 0 | | | | |
| -2.250 | 4.238 | -0.871 | 4.94 | 8.55 | | 2 | 10.12 | 3.43 4900 | 0 | | | | |
| | | | | 165.62 | | 2 | 10.12 | 3.43 4900 | 0 | | | 1 | 157.06 |
| -2.675 | 3.869 | -0.863 | 76.39 | 170.96 | | 2 | 15.05 | 5.15 4900 | 0 | | | | |
| -3.100 | 3.506 | -0.841 | 150.56 | 178.40 | | 2 | 19.94 | 5.15 4900 | 0 | | | | |
| -3.600 | 3.096 | -0.796 | 242.48 | 189.78 | | 2 | 25.57 | 5.15 4900 | 0 | | | | |
| -4.100 | 2.714 | -0.730 | 340.80 | 203.92 | | 2 | 31.01 | 5.15 4900 | 0 | | | | |
| -4.600 | 2.370 | -0.640 | 446.85 | 220.72 | | 2 | 36.18 | 5.15 4900 | 0 | | | | |
| -5.100 | 2.078 | -0.525 | 561.99 | 240.33 | | 2 | 42.25 | 5.15 4900 | 0 | | | | |
| -5.600 | 1.849 | -0.383 | 687.67 | 262.89 | | 2 | 48.00 | 5.15 4900 | 0 | | | | |
| -6.100 | 1.700 | -0.210 | 825.34 | 288.23 | | 2 | 53.37 | 5.15 4900 | 0 | | | | |
| -6.600 | 1.644 | -0.005 | 976.33 | 316.14 | | 2 | 58.27 | 5.15 4900 | 0 | | | | |
| -7.100 | 1.701 | 0.237 | 1141.87 | 346.37 | | 2 | 62.63 | 5.15 4900 | 0 | | | | |
| | | | | | | 2 | 75.98 | 4.85 15100 | 0 | | | | |
| -7.450 | 1.817 | 0.429 | 1267.74 | 372.92 | | 2 | 75.75 | 4.85 15100 | 0 | | | | |
| -7.800 | 2.004 | 0.642 | 1402.88 | 399.17 | | 2 | 74.23 | 4.85 15100 | 0 | | | | |
| -8.150 | 2.269 | 0.878 | 1547.07 | 424.64 | | 2 | 71.32 | 4.85 15100 | 0 | | | | |
| -8.500 | 2.621 | 1.137 | 1699.97 | 448.83 | | 2 | 66.92 | 4.85 15100 | 0 | | | | |
| -8.850 | 3.068 | 1.422 | 1861.04 | 471.20 | | 2 | 60.89 | 4.85 15100 | 0 | | | | |
| -9.200 | 3.619 | 1.732 | 2029.53 | 491.16 | | 2 | 53.14 | 4.85 15100 | 0 | | | | |
| -9.550 | 4.284 | 2.071 | 2204.50 | 508.07 | | 2 | 43.53 | 4.85 15100 | 0 | | | | |
| -9.900 | 5.072 | 2.437 | 2384.87 | 522.26 | | 1 | 37.52 | 2.91 15100 | 0 | | | | |
| | | | | -755.78 | | 1 | 37.52 | 2.91 15100 | 0 | | | 2 | -1278.03 |
| -10.200 | 5.851 | 2.749 | 2159.84 | -744.28 | | 1 | 39.13 | 2.91 15100 | 0 | | | | |
| | | | | | | 1 | 29.79 | 2.68 20600 | 0 | | | | |
| -10.500 | 6.718 | 3.029 | 1937.92 | -735.11 | | 1 | 31.32 | 2.68 20600 | 0 | | | | |
| -10.762 | 7.543 | 3.250 | 1746.05 | -726.72 | | 1 | 32.65 | 2.68 20600 | 0 | | | | |
| -11.025 | 8.422 | 3.448 | 1556.43 | -717.97 | | 1 | 33.99 | 2.68 20600 | 0 | | | | |
| -11.288 | 9.351 | 3.623 | 1369.15 | -708.87 | | 1 | 35.33 | 2.68 20600 | 0 | | | | |
| -11.550 | 10.323 | 3.776 | 1184.30 | -699.42 | | 1 | 36.66 | 2.68 20600 | 0 | | | | |
| -11.812 | 11.332 | 3.907 | 1001.98 | -689.62 | | 1 | 38.00 | 2.68 20600 | 0 | | | | |
| -12.075 | 12.372 | 4.017 | 822.28 | -679.47 | | 1 | 39.34 | 2.68 20600 | 0 | | | | |
| -12.338 | 13.438 | 4.105 | 645.29 | -668.97 | | 1 | 40.67 | 2.68 20600 | 0 | | | | |
| -12.600 | 14.525 | 4.171 | 471.10 | -658.12 | | 1 | 42.01 | 2.68 20600 | 0 | | | | |
| | | | | | | 1 | 52.40 | 2.91 15100 | 0 | | | | |
| -12.700 | 14.943 | 4.191 | 405.55 | -652.85 | | 1 | 52.94 | 2.91 15100 | 0 | | | | |
| -13.115 | 16.695 | 4.243 | 139.32 | -629.82 | 4.07 | 1 | 53.97 | 2.91 15100 | 0 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.530 | 18.458 | 4.245 | -116.91 | -604.68 | 8.14 | 1 | 54.99 | 2.91 15100 | 0 | | | | |
| -13.945 | 20.212 | 4.199 | -362.27 | -577.42 | 12.21 | 1 | 56.02 | 2.91 15100 | 0 | | | | |
| -14.360 | 21.937 | 4.108 | -595.87 | -548.01 | 16.28 | 2 | 57.20 | 3.06 15100 | 0 | | | | |
| -14.775 | 23.616 | 3.974 | -816.81 | -516.40 | 20.36 | 2 | 58.51 | 3.35 15100 | 0 | | | | |
| -15.190 | 25.230 | 3.800 | -1024.17 | -482.54 | 24.43 | 2 | 59.90 | 3.71 15100 | 0 | | | | |
| -15.605 | 26.764 | 3.587 | -1217.00 | -446.39 | 28.50 | 2 | 61.38 | 4.16 15100 | 0 | | | | |
| -16.020 | 28.202 | 3.339 | -1394.35 | -407.92 | 32.57 | 2 | 62.95 | 4.71 15100 | 0 | | | | |
| -16.520 | 29.789 | 2.999 | -1586.08 | -358.42 | 37.47 | 2 | 64.97 | 4.85 15100 | 0 | | | | |
| -17.020 | 31.194 | 2.617 | -1752.19 | -305.43 | 42.38 | 2 | 67.15 | 4.85 15100 | 0 | | | | |
| -17.520 | 32.400 | 2.201 | -1890.91 | -248.85 | 47.28 | 2 | 69.49 | 4.85 15100 | 0 | | | | |
| -17.905 | 33.182 | 1.860 | -1977.93 | -202.80 | 51.06 | 2 | 71.42 | 4.85 15100 | 0 | | | | |
| -18.290 | 33.831 | 1.506 | -2046.78 | -154.52 | 54.84 | 2 | 73.45 | 4.85 15100 | 0 | | | | |
| -18.675 | 34.341 | 1.142 | -2096.62 | -104.00 | 58.61 | 2 | 75.58 | 4.85 15100 | 0 | | | | |
| -19.060 | 34.709 | 0.770 | -2126.56 | -51.17 | 62.39 | 2 | 77.83 | 4.85 15100 | 0 | | | | |
| -19.445 | 34.933 | 0.395 | -2135.72 | 4.00 | 66.17 | 2 | 80.19 | 4.85 15100 | 0 | | | | |
| -19.830 | 35.013 | 0.021 | -2123.18 | 61.55 | 69.95 | 2 | 82.66 | 4.85 15100 | 0 | | | | |
| -20.215 | 34.950 | -0.350 | -2088.02 | 121.52 | 73.72 | 2 | 85.23 | 4.85 15100 | 0 | | | | |
| -20.600 | 34.745 | -0.712 | -2029.30 | 183.96 | 77.50 | 2 | 87.90 | 4.85 15100 | 0 | | | | |
| | | | | | 77.50 | 2 | 81.54 | 4.55 20600 | 0 | | | | |
| -20.903 | 34.487 | -0.988 | -1966.29 | 232.92 | 80.47 | 2 | 84.20 | 4.55 20600 | 0 | | | | |
| -21.205 | 34.148 | -1.255 | -1888.21 | 283.59 | 83.43 | 2 | 86.95 | 4.55 20600 | 0 | | | | |
| -21.508 | 33.730 | -1.509 | -1794.54 | 336.01 | 86.40 | 2 | 89.75 | 4.55 20600 | 0 | | | | |
| -21.810 | 33.236 | -1.750 | -1684.75 | 390.17 | 89.37 | 2 | 92.61 | 4.55 20600 | 0 | | | | |
| -22.113 | 32.673 | -1.974 | -1558.30 | 446.11 | 92.34 | 2 | 95.52 | 4.55 20600 | 0 | | | | |
| -22.415 | 32.044 | -2.179 | -1414.67 | 503.83 | 95.30 | 2 | 98.45 | 4.55 20600 | 0 | | | | |
| -22.718 | 31.356 | -2.364 | -1253.30 | 563.34 | 98.27 | 2 | 101.40 | 4.55 20600 | 0 | | | | |
| -23.020 | 30.616 | -2.525 | -1073.67 | 624.63 | 101.24 | 2 | 104.34 | 4.55 20600 | 0 | | | | |
| -23.520 | 29.299 | -2.732 | -735.25 | 729.85 | 106.14 | 2 | 109.13 | 4.55 20600 | 0 | | | | |
| -24.020 | 27.898 | -2.856 | -343.02 | 839.86 | 111.05 | 2 | 113.72 | 4.55 20600 | 0 | | | | |
| -24.520 | 26.458 | -2.885 | 105.39 | 954.53 | 115.95 | 2 | 117.97 | 4.55 20600 | 0 | | | | |
| -24.550 | 26.372 | -2.883 | 134.13 | 961.56 | 116.25 | 2 | 118.21 | 4.55 20600 | 0 | | | | |
| | | | | -448.44 | 116.25 | 2 | 118.21 | 4.55 20600 | 0 | | | 6 | -1410.00 |
| -24.975 | 25.150 | -2.874 | -35.07 | -347.23 | 120.42 | 2 | 121.41 | 4.55 20600 | 0 | | | | |
| -25.400 | 23.925 | -2.894 | -164.47 | -270.39 | -4.41 | 2 | 124.19 | 4.55 20600 | 0 | | | | |
| -25.675 | 23.126 | -2.919 | -234.25 | -236.84 | -4.41 | 2 | 128.64 | 4.55 20600 | -1 | | | | |
| -25.950 | 22.319 | -2.952 | -294.59 | -201.71 | -4.41 | 2 | 135.66 | 4.55 20600 | -1 | | | | |
| -26.225 | 21.501 | -2.993 | -345.03 | -164.81 | -4.41 | 2 | 141.55 | 4.55 20600 | -1 | | | | |
| -26.500 | 20.672 | -3.039 | -385.18 | -127.26 | -4.41 | 2 | 146.36 | 4.55 20600 | 2 | 5.95 | 20600 | | |
| -26.775 | 19.830 | -3.089 | -415.14 | -91.04 | -4.41 | 2 | 150.18 | 4.55 20600 | 2 | 18.39 | 20600 | | |
| -27.050 | 18.973 | -3.142 | -435.52 | -57.72 | -4.41 | 2 | 153.06 | 4.55 20600 | 2 | 33.68 | 20600 | | |
| -27.325 | 18.101 | -3.198 | -447.30 | -28.86 | -4.41 | 2 | 155.06 | 4.55 20600 | 2 | 55.75 | 20600 | | |
| -27.600 | 17.214 | -3.255 | -451.86 | -5.10 | -4.41 | 2 | 156.25 | 4.55 20600 | 2 | 73.88 | 20600 | | |
| -28.100 | 15.561 | -3.357 | -445.42 | 29.33 | -4.41 | 2 | 156.55 | 4.55 20600 | 2 | 92.40 | 20600 | | |
| -28.375 | 14.630 | -3.413 | -435.13 | 45.38 | -4.41 | 2 | 155.79 | 4.55 20600 | 2 | 94.38 | 20600 | | |
| -28.650 | 13.684 | -3.466 | -420.56 | 60.41 | -4.41 | 2 | 154.46 | 4.55 20600 | 2 | 97.76 | 20600 | | |
| -28.925 | 12.724 | -3.518 | -402.05 | 73.89 | -4.41 | 2 | 152.62 | 4.55 20600 | 2 | 102.45 | 20600 | | |
| -29.200 | 11.749 | -3.567 | -380.10 | 85.35 | -4.41 | 2 | 150.32 | 4.55 20600 | 2 | 108.31 | 20600 | | |
| | | | | | -4.41 | 2 | 209.85 | 4.26 43800 | 2 | 82.02 | 43800 | | |
| -29.513 | 10.626 | -3.619 | -347.75 | 120.63 | -4.41 | 2 | 202.46 | 4.26 43800 | 2 | 95.72 | 43800 | | |

FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -29.825 | 9.488 | -3.666 | -305.44 | 148.90 | -4.41 | 2 | 194.18 | 4.26 | 43800 | 2 | 111.16 | 43800 | | |
| -30.138 | 8.336 | -3.706 | -255.49 | 169.41 | -4.41 | 2 | 185.15 | 4.26 | 43800 | 2 | 128.08 | 43800 | | |
| -30.450 | 7.172 | -3.739 | -200.44 | 181.52 | -4.41 | 2 | 175.52 | 4.26 | 43800 | 2 | 146.24 | 43800 | | |
| -30.763 | 6.000 | -3.763 | -142.97 | 184.71 | -4.41 | 2 | 165.39 | 4.26 | 43800 | 2 | 165.44 | 43800 | | |
| -31.075 | 4.821 | -3.779 | -85.97 | 178.54 | -4.41 | 2 | 154.88 | 4.26 | 43800 | 2 | 185.50 | 43800 | | |
| -31.388 | 3.639 | -3.788 | -31.91 | 167.42 | -4.41 | 2 | 144.07 | 4.26 | 43800 | 2 | 175.79 | 43800 | | |
| -31.700 | 2.455 | -3.789 | 19.29 | 162.32 | -4.41 | 2 | 133.07 | 4.26 | 43800 | 2 | 125.14 | 43800 | | |
| | | | | | -4.41 | -1 | | | | 2 | 742.68 | 300000 | | |
| -32.200 | 0.562 | -3.781 | 30.69 | -69.52 | -4.41 | -1 | | | | 2 | 175.87 | 300000 | | |
| -32.700 | -1.327 | -3.778 | 0.00 | 0.00 | -4.41 | 2 | 462.78 | 1.52 | 300000 | -1 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa/m | | kPa | | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 35.01 mm

MOMENTO MÁXIMO = 2384.87 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 133.53 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.076 = (2612.05 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.248 = (812.58 kN/m)/(3281.20 kN/m) SIN INTERÉS



## **  FASE No 8  **

*Fase 8
*Restitucion del puntal provisional y Sismo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 7
NIVEL = -16.020 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -2.200 m

PESO ESPECIFOCO HÚMEDO GH = 18.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.560
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.515
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.367
COHESIÓN C = 5.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 29.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 4900.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG1a

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -7.100 m

PESO ESPECIFOCO HÚMEDO GH = 18.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.560
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.515
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.367
COHESIÓN C = 5.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 29.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 4900.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

*SISMO_ UG1b



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -10.200 m

PESO ESPECIFOCO HÚMEDO GH = 18.500 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.500 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.522
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.485
COEFIC. DE EMPUJE PASIVO HOR. KP = 2.594
COHESIÓN C = 15.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 31.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.000

| | | |
|---|---|---|
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |

*SISMO_ UG1c

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -12.600 m

| | | |
|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.487 |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 2.846 |
| COHESIÓN C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -20.600 m

| | | |
|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 1.211 |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 1.520 |
| COHESIÓN C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 15100.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No. 6 HASTA NIVEL -29.200 m

| | | |
|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 19.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 9.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.948 |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.455 |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 1.991 |
| COHESIÓN C | = | 20.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 33.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 20600.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 7 HASTA NIVEL -31.700 m

| | | |
|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.795 |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 2.402 |
| COHESIÓN C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |

*SISMO_ UG3a

* NUEVOS PARÁMETROS PARA CAPA No. 8 HASTA NIVEL -47.300 m

| | | |
|---|---|---|
| PESO ESPECIFOCO HÚMEDO GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. KA | = | 0.302 |
| COEFIC. DE EMPUJE EN REPOSO HOR. K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. KP | = | 10.398 |
| COHESIÓN C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO PHI | = | 58.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | = | 300000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | = | 0.000 1/m |



FASE 8

| PARED | SOIL 1 EXCAVACIÓN: 0.00 m, NIVEL AGUA: -12.70 m, S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -25.40 m, NIVEL AGUA: -25.40 m, S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 6.586 | -1.044 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 6.299 | -1.044 | 0.03 | 0.34 | | 1 | 2.48 | 2.48 | 4900 | 0 | | | |
| -0.550 | 6.012 | -1.044 | 0.25 | 1.40 | | 1 | 5.25 | 5.25 | 4900 | 0 | | | |
| -0.825 | 5.724 | -1.044 | 0.87 | 3.23 | | 1 | 8.03 | 5.60 | 4900 | 0 | | | |
| -1.100 | 5.437 | -1.044 | 2.10 | 5.82 | | 1 | 10.80 | 5.60 | 4900 | 0 | | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -1.375 | 5.150 | -1.044 | 4.14 | 9.17 | | 1 | 13.57 | 5.60 | 4900 | 0 | | | | | | | | | |
| -1.650 | 4.863 | -1.043 | 7.21 | 13.28 | | 1 | 16.34 | 5.60 | 4900 | 0 | | | | | | | | | |
| -1.925 | 4.577 | -1.042 | 11.52 | 18.16 | | 1 | 19.11 | 5.60 | 4900 | 0 | | | | | | | | | |
| -2.200 | 4.290 | -1.040 | 17.27 | 23.79 | | 1 | 21.89 | 5.60 | 4900 | 0 | | | | | | | | | |
| -2.250 | 4.238 | -1.040 | 18.49 | 24.90 | | 1 | 22.39 | 5.60 | 4900 | 0 | | | | | | | | | |
| | | | | 181.17 | | 1 | 22.39 | 5.60 | 4900 | 0 | | | | | | | | 1 | 156.27 |
| -2.675 | 3.798 | -1.029 | 97.64 | 191.60 | | 1 | 26.67 | 5.60 | 4900 | 0 | | | | | | | | | |
| -3.100 | 3.366 | -1.002 | 181.60 | 203.84 | | 1 | 30.96 | 5.60 | 4900 | 0 | | | | | | | | | |
| -3.600 | 2.878 | -0.948 | 287.60 | 220.58 | | 1 | 36.00 | 5.60 | 4900 | 0 | | | | | | | | | |
| -4.100 | 2.422 | -0.870 | 402.60 | 239.84 | | 1 | 41.04 | 5.60 | 4900 | 0 | | | | | | | | | |
| -4.600 | 2.013 | -0.763 | 527.86 | 261.62 | | 1 | 46.08 | 5.60 | 4900 | 0 | | | | | | | | | |
| -5.100 | 1.664 | -0.628 | 664.64 | 285.92 | | 1 | 51.12 | 5.60 | 4900 | 0 | | | | | | | | | |
| -5.600 | 1.391 | -0.459 | 814.20 | 312.74 | | 1 | 56.16 | 5.60 | 4900 | 0 | | | | | | | | | |
| -6.100 | 1.211 | -0.255 | 977.80 | 342.07 | | 1 | 61.20 | 5.60 | 4900 | 0 | | | | | | | | | |
| -6.600 | 1.142 | -0.011 | 1156.69 | 373.93 | | 1 | 66.24 | 5.60 | 4900 | 0 | | | | | | | | | |
| -7.100 | 1.206 | 0.275 | 1352.15 | 408.31 | | 1 | 71.28 | 5.60 | 4900 | 0 | | | | | | | | | |
| | | | | | | 2 | 83.45 | 4.85 | 15100 | 0 | | | | | | | | | |
| -7.450 | 1.342 | 0.502 | 1500.16 | 437.43 | | 2 | 82.92 | 4.85 | 15100 | 0 | | | | | | | | | |
| -7.800 | 1.561 | 0.755 | 1658.30 | 466.10 | | 2 | 80.91 | 4.85 | 15100 | 0 | | | | | | | | | |
| -8.150 | 1.873 | 1.033 | 1826.31 | 493.79 | | 2 | 77.30 | 4.85 | 15100 | 0 | | | | | | | | | |
| -8.500 | 2.287 | 1.339 | 2003.76 | 519.90 | | 2 | 71.95 | 4.85 | 15100 | 0 | | | | | | | | | |
| -8.850 | 2.814 | 1.674 | 2190.14 | 545.07 | | 1 | 71.86 | 5.22 | 15100 | 0 | | | | | | | | | |
| -9.200 | 3.463 | 2.039 | 2385.38 | 570.81 | | 1 | 75.24 | 5.22 | 15100 | 0 | | | | | | | | | |
| -9.550 | 4.245 | 2.437 | 2589.84 | 597.74 | | 1 | 78.62 | 5.22 | 15100 | 0 | | | | | | | | | |
| -9.900 | 5.172 | 2.868 | 2803.94 | 625.85 | | 1 | 82.00 | 5.22 | 15100 | 0 | | | | | | | | | |
| | | | | -1000.71 | | 1 | 82.00 | 5.22 | 15100 | 0 | | | | | | | | 2 | -1626.55 |
| -10.200 | 6.088 | 3.232 | 2507.46 | -975.67 | | 1 | 84.90 | 5.22 | 15100 | 0 | | | | | | | | | |
| | | | | | | 1 | 73.32 | 4.87 | 20600 | 0 | | | | | | | | | |
| -10.500 | 7.107 | 3.555 | 2218.09 | -953.26 | | 1 | 76.10 | 4.87 | 20600 | 0 | | | | | | | | | |
| -10.762 | 8.074 | 3.806 | 1970.51 | -932.97 | | 1 | 78.52 | 4.87 | 20600 | 0 | | | | | | | | | |
| -11.025 | 9.103 | 4.028 | 1728.34 | -912.04 | | 1 | 80.95 | 4.87 | 20600 | 0 | | | | | | | | | |
| -11.288 | 10.186 | 4.221 | 1491.75 | -890.47 | | 1 | 83.38 | 4.87 | 20600 | 0 | | | | | | | | | |
| -11.550 | 11.316 | 4.386 | 1260.90 | -868.26 | | 1 | 85.81 | 4.87 | 20600 | 0 | | | | | | | | | |
| -11.812 | 12.486 | 4.523 | 1035.97 | -845.42 | | 1 | 88.24 | 4.87 | 20600 | 0 | | | | | | | | | |
| -12.075 | 13.689 | 4.634 | 817.12 | -821.93 | | 1 | 90.67 | 4.87 | 20600 | 0 | | | | | | | | | |
| -12.338 | 14.917 | 4.719 | 604.51 | -797.81 | | 1 | 93.10 | 4.87 | 20600 | 0 | | | | | | | | | |
| -12.600 | 16.164 | 4.779 | 398.32 | -773.06 | | 1 | 95.53 | 4.87 | 20600 | 0 | | | | | | | | | |
| | | | | | | 1 | 274.58 | 12.11 | 15100 | 0 | | | | | | | | | |
| -12.700 | 16.643 | 4.796 | 322.39 | -745.49 | | 1 | 276.82 | 12.11 | 15100 | 0 | | | | | | | | | |
| -13.115 | 18.642 | 4.829 | 37.09 | -628.88 | 4.07 | 1 | 281.09 | 12.11 | 15100 | 0 | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | | kPa | kPa/m | | | | | kN | |



FASE 8 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.530 | 20.644 | 4.813 | -199.10 | -508.81 | 8.14 | 1 285.36 | 12.11 | 15100 | 0 | | | | |
| -13.945 | 22.631 | 4.757 | -384.74 | -385.27 | 12.21 | 1 289.63 | 12.11 | 15100 | 0 | | | | |
| -14.360 | 24.588 | 4.670 | -518.40 | -258.28 | 16.28 | 1 293.90 | 12.11 | 15100 | 0 | | | | |
| -14.775 | 26.505 | 4.564 | -598.63 | -127.82 | 20.36 | 1 298.17 | 12.11 | 15100 | 0 | | | | |
| -15.190 | 28.375 | 4.447 | -624.00 | 6.10 | 24.43 | 1 302.45 | 12.11 | 15100 | 0 | | | | |
| -15.605 | 30.196 | 4.331 | -593.08 | 143.49 | 28.50 | 1 306.72 | 12.11 | 15100 | 0 | | | | |
| -16.020 | 31.971 | 4.226 | -504.43 | 284.33 | 32.57 | 1 310.99 | 12.11 | 15100 | 0 | | | | |
| | | | | -1422.70 | 32.57 | 1 310.99 | 12.11 | 15100 | 0 | | | | 7-1707.03 |
| -16.520 | 34.042 | 4.033 | -1172.42 | -1248.41 | 37.47 | 1 316.14 | 12.11 | 15100 | 0 | | | | |
| -17.020 | 35.980 | 3.697 | -1752.00 | -1069.09 | 42.38 | 1 321.28 | 12.11 | 15100 | 0 | | | | |
| -17.520 | 37.719 | 3.240 | -2240.67 | -884.74 | 47.28 | 1 326.43 | 12.11 | 15100 | 0 | | | | |
| -17.905 | 38.886 | 2.817 | -2553.41 | -739.37 | 51.06 | 1 330.39 | 12.11 | 15100 | 0 | | | | |
| -18.290 | 39.882 | 2.345 | -2809.60 | -591.02 | 54.84 | 1 334.36 | 12.11 | 15100 | 0 | | | | |
| -18.675 | 40.687 | 1.833 | -3008.11 | -439.69 | 58.61 | 1 338.32 | 12.11 | 15100 | 0 | | | | |
| -19.060 | 41.289 | 1.291 | -3147.79 | -285.39 | 62.39 | 1 342.28 | 12.11 | 15100 | 0 | | | | |
| -19.445 | 41.679 | 0.730 | -3227.48 | -128.10 | 66.17 | 1 346.25 | 12.11 | 15100 | 0 | | | | |
| -19.830 | 41.850 | 0.160 | -3246.04 | 32.17 | 69.95 | 1 350.21 | 12.11 | 15100 | 0 | | | | |
| -20.215 | 41.802 | -0.408 | -3202.32 | 195.42 | 73.72 | 1 354.17 | 12.11 | 15100 | 0 | | | | |
| -20.600 | 41.538 | -0.962 | -3095.18 | 361.65 | 77.50 | 1 358.13 | 12.11 | 15100 | 0 | | | | |
| | | | | | 77.50 | 1 271.92 | 9.48 | 20600 | 0 | | | | |
| -20.903 | 41.183 | -1.382 | -2969.71 | 468.19 | 80.47 | 1 274.51 | 9.48 | 20600 | 0 | | | | |
| -21.205 | 40.704 | -1.781 | -2811.75 | 576.41 | 83.43 | 1 277.09 | 9.48 | 20600 | 0 | | | | |
| -21.508 | 40.107 | -2.157 | -2620.81 | 686.31 | 86.40 | 1 279.67 | 9.48 | 20600 | 0 | | | | |
| -21.810 | 39.402 | -2.504 | -2396.37 | 797.88 | 89.37 | 1 282.25 | 9.48 | 20600 | 0 | | | | |
| -22.113 | 38.596 | -2.817 | -2137.92 | 911.13 | 92.34 | 1 284.83 | 9.48 | 20600 | 0 | | | | |
| -22.415 | 37.701 | -3.093 | -1844.96 | 1026.07 | 95.30 | 1 287.41 | 9.48 | 20600 | 0 | | | | |
| -22.718 | 36.729 | -3.325 | -1516.98 | 1142.68 | 98.27 | 1 289.99 | 9.48 | 20600 | 0 | | | | |
| -23.020 | 35.694 | -3.510 | -1153.48 | 1260.97 | 101.24 | 1 292.57 | 9.48 | 20600 | 0 | | | | |
| -23.520 | 33.886 | -3.698 | -473.39 | 1460.16 | 106.14 | 1 296.84 | 9.48 | 20600 | 0 | | | | |
| -24.020 | 32.024 | -3.719 | 307.45 | 1663.95 | 111.05 | 1 301.10 | 9.48 | 20600 | 0 | | | | |
| -24.520 | 30.199 | -3.550 | 1191.33 | 1872.32 | 115.95 | 1 305.37 | 9.48 | 20600 | 0 | | | | |
| -24.550 | 30.092 | -3.533 | 1247.68 | 1884.97 | 116.25 | 1 305.63 | 9.48 | 20600 | 0 | | | | |
| | | | | -1124.86 | 116.25 | 1 305.63 | 9.48 | 20600 | 0 | | | | 6-3009.83 |
| -24.975 | 28.636 | -3.335 | 807.95 | -943.91 | 120.42 | 1 309.25 | 9.48 | 20600 | 0 | | | | |
| -25.400 | 27.247 | -3.214 | 441.95 | -787.06 | -4.41 | 1 312.88 | 9.48 | 20600 | 0 | | | | |
| | | | | | -4.41 | 1 312.88 | 9.48 | 20600 | 3 | 35.97 | 20600 | | |
| -25.675 | 26.369 | -3.172 | 235.77 | -712.51 | -4.41 | 1 315.22 | 9.48 | 20600 | 3 | 41.18 | 20600 | | |
| -25.950 | 25.500 | -3.154 | 49.97 | -639.00 | -4.41 | 1 317.57 | 9.48 | 20600 | 3 | 48.13 | 20600 | | |
| -26.225 | 24.632 | -3.159 | -115.78 | -566.61 | -4.41 | 1 319.92 | 9.48 | 20600 | 3 | 54.10 | 20600 | | |
| -26.500 | 23.761 | -3.183 | -261.78 | -495.40 | -4.41 | 1 322.26 | 9.48 | 20600 | 3 | 61.33 | 20600 | | |
| -26.775 | 22.880 | -3.224 | -388.38 | -425.61 | -4.41 | 1 324.61 | 9.48 | 20600 | 3 | 69.17 | 20600 | | |
| -27.050 | 21.986 | -3.279 | -496.01 | -357.43 | -4.41 | 1 326.96 | 9.48 | 20600 | 3 | 77.72 | 20600 | | |
| -27.325 | 21.075 | -3.347 | -585.15 | -291.22 | -4.41 | 1 329.30 | 9.48 | 20600 | 3 | 88.19 | 20600 | | |
| -27.600 | 20.144 | -3.426 | -656.37 | -227.06 | -4.41 | 1 331.65 | 9.48 | 20600 | 3 | 97.33 | 20600 | | |
| -28.100 | 18.392 | -3.586 | -741.21 | -112.36 | -4.41 | 1 335.91 | 9.48 | 20600 | 3 | 102.60 | 20600 | | |
| -28.375 | 17.393 | -3.681 | -763.45 | -49.44 | -4.41 | 1 338.26 | 9.48 | 20600 | 3 | 105.18 | 20600 | | |
| -28.650 | 16.368 | -3.777 | -768.41 | 13.37 | -4.41 | 1 340.61 | 9.48 | 20600 | 3 | 108.01 | 20600 | | |
| -28.925 | 15.316 | -3.873 | -756.11 | 76.02 | -4.41 | 1 342.95 | 9.48 | 20600 | 3 | 111.08 | 20600 | | |
| -29.200 | 14.238 | -3.966 | -726.62 | 138.45 | -4.41 | 1 345.30 | 9.48 | 20600 | 3 | 114.36 | 20600 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | | kPa | kPa/m | kN |



FASE 8 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | -4.41 | 1 | 276.55 | 7.95 | 43800 | 3 | 164.35 | | | 43800 | | | | | | | | | | |
| -29.513 | 12.982 | -4.067 | -678.14 | 171.65 | -4.41 | 1 | 279.03 | 7.95 | 43800 | 3 | 169.89 | | | 43800 | | | | | | | | | | | |
| -29.825 | 11.697 | -4.159 | -619.44 | 203.86 | -4.41 | 1 | 281.52 | 7.95 | 43800 | 3 | 175.71 | | | 43800 | | | | | | | | | | | |
| -30.138 | 10.383 | -4.243 | -550.84 | 234.99 | -4.41 | 1 | 284.00 | 7.95 | 43800 | 3 | 181.77 | | | 43800 | | | | | | | | | | | |
| -30.450 | 9.046 | -4.316 | -472.69 | 264.96 | -4.41 | 1 | 286.49 | 7.95 | 43800 | 3 | 188.04 | | | 43800 | | | | | | | | | | | |
| -30.763 | 7.687 | -4.378 | -385.36 | 293.73 | -4.41 | 1 | 288.97 | 7.95 | 43800 | 3 | 194.48 | | | 43800 | | | | | | | | | | | |
| -31.075 | 6.311 | -4.426 | -289.24 | 321.24 | -4.41 | 1 | 291.46 | 7.95 | 43800 | 3 | 201.09 | | | 43800 | | | | | | | | | | | |
| -31.388 | 4.922 | -4.460 | -184.73 | 347.43 | -4.41 | 1 | 293.94 | 7.95 | 43800 | 3 | 207.82 | | | 43800 | | | | | | | | | | | |
| -31.700 | 3.526 | -4.478 | -71.54 | 378.95 | -4.41 | 1 | 296.43 | 7.95 | 43800 | 2 | 172.05 | | | 43800 | | | | | | | | | | | |
| | | | | | -4.41 | -1 | | | | 2 | 1063.95 | | | 300000 | | | | | | | | | | | |
| -32.200 | 1.285 | -4.481 | 12.35 | 12.58 | -4.41 | -1 | | | | 2 | 392.69 | | | 300000 | | | | | | | | | | | |
| -32.700 | -0.955 | -4.480 | 0.00 | 0.00 | -4.41 | 2 | 351.20 | 1.52 | 300000 | -1 | | | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | | kPa | | | kN | | | | | | | | | |

DESPLAZAMIENTO MÁX. = 41.85 mm

MOMENTO MÁXIMO =-3246.04 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 263.99 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.283 = (6690.94 kN/m)/(23665.21 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.413 = (1235.29 kN/m)/(2989.73 kN/m) SIN INTERÉS

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 6 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.95 |
| -0.825 | 0.00 | 2.92 |
| -1.100 | 0.00 | 5.01 |
| -1.375 | 0.00 | 7.23 |
| -1.650 | 0.00 | 9.57 |
| -1.925 | 0.00 | 12.04 |
| -2.200 | 0.00 | 14.63 |
| -2.250 | 0.00 | 15.12 |
| | -104.49 | 164.61 |
| -2.675 | -99.79 | 169.95 |
| -3.100 | -94.05 | 177.38 |
| -3.600 | -85.98 | 188.75 |
| -4.100 | -76.49 | 202.88 |
| -4.600 | -65.56 | 219.66 |
| -5.100 | -52.89 | 239.24 |
| -5.600 | -38.12 | 261.78 |
| -6.100 | -21.19 | 287.09 |
| -6.600 | -2.04 | 314.98 |
| -7.100 | 0.00 | 345.17 |
| -7.450 | 0.00 | 371.67 |
| -7.800 | 0.00 | 397.87 |
| -8.150 | 0.00 | 423.29 |
| -8.500 | 0.00 | 447.45 |
| -8.850 | 0.00 | 469.79 |
| -9.200 | -0.20 | 489.73 |
| -9.550 | -3.25 | 506.64 |
| -9.900 | -5.46 | 520.83 |
| | -740.54 | 103.37 |
| -10.200 | -729.04 | 114.87 |
| -10.500 | -719.87 | 124.04 |
| -10.762 | -711.48 | 110.87 |
| -11.025 | -702.73 | 95.39 |
| -11.288 | -693.63 | 79.74 |
| -11.550 | -684.18 | 71.43 |
| -11.812 | -674.38 | 84.17 |
| -12.075 | -664.23 | 97.45 |
| -12.338 | -653.73 | 111.18 |
| -12.600 | -642.88 | 125.25 |
| -12.700 | -637.61 | 131.41 |
| -13.115 | -614.58 | 157.81 |
| -13.530 | -589.44 | 185.58 |
| -13.945 | -562.18 | 214.20 |
| -14.360 | -532.80 | 243.87 |
| -14.775 | -501.31 | 275.36 |
| -15.190 | -467.71 | 308.97 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.09 |
| -0.825 | 0.00 | 0.62 |
| -1.100 | 0.00 | 1.70 |
| -1.375 | 0.00 | 3.38 |
| -1.650 | 0.00 | 5.69 |
| -1.925 | 0.00 | 8.66 |
| -2.200 | 0.00 | 12.32 |
| -2.250 | 0.00 | 13.07 |
| | 0.00 | 13.07 |
| -2.675 | -30.38 | 75.96 |
| -3.100 | -71.61 | 149.70 |
| -3.600 | -116.67 | 241.11 |
| -4.100 | -157.35 | 338.91 |
| -4.600 | -192.92 | 444.44 |
| -5.100 | -222.62 | 559.04 |
| -5.600 | -245.46 | 684.17 |
| -6.100 | -260.38 | 821.28 |
| -6.600 | -266.29 | 971.69 |
| -7.100 | -262.04 | 1136.64 |
| -7.450 | -253.83 | 1262.09 |
| -7.800 | -242.63 | 1396.78 |
| -8.150 | -228.23 | 1540.51 |
| -8.500 | -210.39 | 1692.93 |
| -8.850 | -188.87 | 1853.51 |
| -9.200 | -163.45 | 2021.50 |
| -9.550 | -133.89 | 2195.96 |
| -9.900 | -99.97 | 2375.83 |
| | -99.97 | 2375.83 |
| -10.200 | -67.25 | 2155.39 |
| -10.500 | -31.42 | 1938.04 |
| -10.762 | -0.50 | 1750.17 |
| -11.025 | 0.00 | 1564.54 |
| -11.288 | 0.00 | 1381.26 |
| -11.550 | 0.00 | 1200.42 |
| -11.812 | 0.00 | 1022.10 |
| -12.075 | -3.06 | 846.40 |
| -12.338 | -71.78 | 673.41 |
| -12.600 | -137.69 | 616.43 |
| -12.700 | -161.99 | 629.26 |
| -13.115 | -257.04 | 689.22 |
| -13.530 | -342.09 | 760.44 |
| -13.945 | -416.27 | 843.37 |
| -14.360 | -536.93 | 938.37 |
| -14.775 | -751.59 | 1046.04 |
| -15.190 | -952.73 | 1167.21 |



| | | | | | |
|---|---|---|---|---|---|
| -15.605 | -431.99 | 344.69 | -15.605 | -1139.49 | 1302.77 |
| -16.020 | -394.15 | 383.31 | -16.020 | -1310.98 | 1453.60 |
| | -913.01 | 3.09 | | -1310.98 | 1453.60 |
| -16.520 | -864.61 | 51.49 | -16.520 | -1496.09 | 1020.47 |
| -17.020 | -813.14 | 102.96 | -17.020 | -1656.22 | 633.02 |
| -17.520 | -758.60 | 123.76 | -17.520 | -1789.86 | 272.75 |
| -17.905 | -714.52 | 133.61 | -17.905 | -1873.73 | 14.88 |
| -18.290 | -668.61 | 139.89 | -18.290 | -1940.28 | 5.47 |
| -18.675 | -620.88 | 142.61 | -18.675 | -1988.80 | 0.99 |
| -19.060 | -571.33 | 141.75 | -19.060 | -2018.60 | 0.00 |
| -19.445 | -519.96 | 137.33 | -19.445 | -2028.97 | 0.00 |
| -19.830 | -466.77 | 131.38 | -19.830 | -2019.21 | 0.00 |
| -20.215 | -411.76 | 126.21 | -20.215 | -1988.63 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| -20.600 | -354.92 | 163.94 | -20.600 | -1936.51 | 3.99 |
| -20.903 | -312.62 | 206.24 | -20.903 | -1880.55 | 7.64 |
| -21.205 | -269.20 | 249.66 | -21.205 | -1811.62 | 9.61 |
| -21.508 | -224.65 | 294.20 | -21.508 | -1812.05 | 17.58 |
| -21.810 | -178.99 | 339.86 | -21.810 | -1873.13 | 36.89 |
| -22.113 | -132.22 | 386.64 | -22.113 | -1920.23 | 51.85 |
| -22.415 | -84.32 | 434.54 | -22.415 | -1953.01 | 62.75 |
| -22.718 | -35.31 | 483.55 | -22.718 | -1971.13 | 69.90 |
| -23.020 | -19.97 | 533.69 | -23.020 | -1974.25 | 73.57 |
| | -392.10 | 533.69 | | -1974.25 | 73.57 |
| -23.520 | -306.78 | 619.00 | -23.520 | -1945.64 | 72.79 |
| -24.020 | -218.41 | 707.38 | -24.020 | -1873.60 | 64.58 |
| -24.520 | -126.98 | 798.80 | -24.520 | -1895.57 | 50.13 |
| -24.550 | -121.40 | 804.39 | -24.550 | -1899.30 | 49.09 |
| | -491.09 | 237.44 | | -1899.30 | 49.09 |
| -24.975 | -410.82 | 268.55 | -24.975 | -1933.92 | 32.56 |
| -25.400 | -328.34 | 294.58 | -25.400 | -1933.95 | 13.13 |
| -25.675 | -283.44 | 308.72 | -25.675 | -1916.40 | 0.00 |
| -25.950 | -238.04 | 320.73 | -25.950 | -1886.87 | 0.00 |
| -26.225 | -192.39 | 330.61 | -26.225 | -1846.11 | 0.00 |
| -26.500 | -146.99 | 338.37 | -26.500 | -1794.78 | 0.00 |
| -26.775 | -103.00 | 344.00 | -26.775 | -1733.72 | 0.00 |
| -27.050 | -61.30 | 347.51 | -27.050 | -1663.91 | 0.00 |
| -27.325 | -43.87 | 348.89 | -27.325 | -1586.52 | 0.00 |
| -27.600 | -36.82 | 348.14 | -27.600 | -1502.99 | 0.00 |
| -28.100 | -19.47 | 342.57 | -28.100 | -1338.73 | 0.00 |
| -28.375 | -7.37 | 356.96 | -28.375 | -1242.55 | 0.00 |
| -28.650 | 0.00 | 371.41 | -28.650 | -1142.40 | 0.00 |
| -28.925 | 0.00 | 385.70 | -28.925 | -1038.29 | 0.00 |
| -29.200 | 0.00 | 399.59 | -29.200 | -930.30 | 0.00 |
| -29.513 | 0.00 | 392.70 | -29.513 | -806.47 | 0.00 |
| -29.825 | 0.00 | 384.30 | -29.825 | -685.02 | 0.00 |
| -30.138 | 0.00 | 374.13 | -30.138 | -566.47 | 0.00 |
| -30.450 | 0.00 | 361.95 | -30.450 | -451.40 | 0.00 |
| -30.763 | 0.00 | 347.58 | -30.763 | -340.48 | 25.96 |
| -31.075 | 0.00 | 330.84 | -31.075 | -234.41 | 45.81 |
| -31.388 | 0.00 | 316.34 | -31.388 | -133.47 | 60.28 |
| -31.700 | 0.00 | 315.21 | -31.700 | -35.30 | 74.32 |
| -32.200 | -123.85 | 10.57 | -32.200 | 0.00 | 44.15 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |





| m | kN/m | kN/m | m | kN.m/m | kN.m/m |
|---|---|---|---|---|---|





* CURVAS ENVOLVENTES DE FASE  7 A FASE  7 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 | -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.02 | -0.550 | 0.00 | 0.00 |
| -0.825 | 0.00 | 0.28 | -0.825 | 0.00 | 0.03 |
| -1.100 | 0.00 | 0.97 | -1.100 | 0.00 | 0.20 |
| -1.375 | 0.00 | 2.09 | -1.375 | 0.00 | 0.61 |
| -1.650 | 0.00 | 3.65 | -1.650 | 0.00 | 1.39 |
| -1.925 | 0.00 | 5.63 | -1.925 | 0.00 | 2.65 |
| -2.200 | 0.00 | 8.06 | -2.200 | 0.00 | 4.53 |
| -2.250 | 0.00 | 8.55 | -2.250 | 0.00 | 4.94 |
| | 0.00 | 165.62 | | 0.00 | 4.94 |
| -2.675 | 0.00 | 170.96 | -2.675 | 0.00 | 76.39 |
| -3.100 | 0.00 | 178.40 | -3.100 | 0.00 | 150.56 |
| -3.600 | 0.00 | 189.78 | -3.600 | 0.00 | 242.48 |
| -4.100 | 0.00 | 203.92 | -4.100 | 0.00 | 340.80 |
| -4.600 | 0.00 | 220.72 | -4.600 | 0.00 | 446.85 |
| -5.100 | 0.00 | 240.33 | -5.100 | 0.00 | 561.99 |
| -5.600 | 0.00 | 262.89 | -5.600 | 0.00 | 687.67 |
| -6.100 | 0.00 | 288.23 | -6.100 | 0.00 | 825.34 |
| -6.600 | 0.00 | 316.14 | -6.600 | 0.00 | 976.33 |
| -7.100 | 0.00 | 346.37 | -7.100 | 0.00 | 1141.87 |
| -7.450 | 0.00 | 372.92 | -7.450 | 0.00 | 1267.74 |
| -7.800 | 0.00 | 399.17 | -7.800 | 0.00 | 1402.88 |
| -8.150 | 0.00 | 424.64 | -8.150 | 0.00 | 1547.07 |
| -8.500 | 0.00 | 448.83 | -8.500 | 0.00 | 1699.97 |
| -8.850 | 0.00 | 471.20 | -8.850 | 0.00 | 1861.04 |
| -9.200 | 0.00 | 491.16 | -9.200 | 0.00 | 2029.53 |
| -9.550 | 0.00 | 508.07 | -9.550 | 0.00 | 2204.50 |
| -9.900 | 0.00 | 522.26 | -9.900 | 0.00 | 2384.87 |
| | -755.78 | 0.00 | | 0.00 | 2384.87 |
| -10.200 | -744.28 | 0.00 | -10.200 | 0.00 | 2159.84 |
| -10.500 | -735.11 | 0.00 | -10.500 | 0.00 | 1937.92 |
| -10.762 | -726.72 | 0.00 | -10.762 | 0.00 | 1746.05 |
| -11.025 | -717.97 | 0.00 | -11.025 | 0.00 | 1556.43 |
| -11.288 | -708.87 | 0.00 | -11.288 | 0.00 | 1369.15 |
| -11.550 | -699.42 | 0.00 | -11.550 | 0.00 | 1184.30 |
| -11.812 | -689.62 | 0.00 | -11.812 | 0.00 | 1001.98 |
| -12.075 | -679.47 | 0.00 | -12.075 | 0.00 | 822.28 |
| -12.338 | -668.97 | 0.00 | -12.338 | 0.00 | 645.29 |
| -12.600 | -658.12 | 0.00 | -12.600 | 0.00 | 471.10 |
| -12.700 | -652.85 | 0.00 | -12.700 | 0.00 | 405.55 |
| -13.115 | -629.82 | 0.00 | -13.115 | 0.00 | 139.32 |
| -13.530 | -604.68 | 0.00 | -13.530 | -116.91 | 0.00 |
| -13.945 | -577.42 | 0.00 | -13.945 | -362.27 | 0.00 |
| -14.360 | -548.01 | 0.00 | -14.360 | -595.87 | 0.00 |
| -14.775 | -516.40 | 0.00 | -14.775 | -816.81 | 0.00 |
| -15.190 | -482.54 | 0.00 | -15.190 | -1024.17 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| -15.605 | -446.39 | 0.00 | -15.605 | -1217.00 | 0.00 |
| -16.020 | -407.92 | 0.00 | -16.020 | -1394.35 | 0.00 |
| -16.520 | -358.42 | 0.00 | -16.520 | -1586.08 | 0.00 |
| -17.020 | -305.43 | 0.00 | -17.020 | -1752.19 | 0.00 |
| -17.520 | -248.85 | 0.00 | -17.520 | -1890.91 | 0.00 |
| -17.905 | -202.80 | 0.00 | -17.905 | -1977.93 | 0.00 |
| -18.290 | -154.52 | 0.00 | -18.290 | -2046.78 | 0.00 |
| -18.675 | -104.00 | 0.00 | -18.675 | -2096.62 | 0.00 |
| -19.060 | -51.17 | 0.00 | -19.060 | -2126.56 | 0.00 |
| -19.445 | 0.00 | 4.00 | -19.445 | -2135.72 | 0.00 |
| -19.830 | 0.00 | 61.55 | -19.830 | -2123.18 | 0.00 |
| -20.215 | 0.00 | 121.52 | -20.215 | -2088.02 | 0.00 |
| -20.600 | 0.00 | 183.96 | -20.600 | -2029.30 | 0.00 |
| -20.903 | 0.00 | 232.92 | -20.903 | -1966.29 | 0.00 |
| -21.205 | 0.00 | 283.59 | -21.205 | -1888.21 | 0.00 |
| -21.508 | 0.00 | 336.01 | -21.508 | -1794.54 | 0.00 |
| -21.810 | 0.00 | 390.17 | -21.810 | -1684.75 | 0.00 |
| -22.113 | 0.00 | 446.11 | -22.113 | -1558.30 | 0.00 |
| -22.415 | 0.00 | 503.83 | -22.415 | -1414.67 | 0.00 |
| -22.718 | 0.00 | 563.34 | -22.718 | -1253.30 | 0.00 |
| -23.020 | 0.00 | 624.63 | -23.020 | -1073.67 | 0.00 |
| -23.520 | 0.00 | 729.85 | -23.520 | -735.25 | 0.00 |
| -24.020 | 0.00 | 839.86 | -24.020 | -343.02 | 0.00 |
| -24.520 | 0.00 | 954.53 | -24.520 | 0.00 | 105.39 |
| -24.550 | 0.00 | 961.56 | -24.550 | 0.00 | 134.13 |
| | -448.44 | 0.00 | | 0.00 | 134.13 |
| -24.975 | -347.23 | 0.00 | -24.975 | -35.07 | 0.00 |
| -25.400 | -270.39 | 0.00 | -25.400 | -164.47 | 0.00 |
| -25.675 | -236.84 | 0.00 | -25.675 | -234.25 | 0.00 |
| -25.950 | -201.71 | 0.00 | -25.950 | -294.59 | 0.00 |
| -26.225 | -164.81 | 0.00 | -26.225 | -345.03 | 0.00 |
| -26.500 | -127.26 | 0.00 | -26.500 | -385.18 | 0.00 |
| -26.775 | -91.04 | 0.00 | -26.775 | -415.14 | 0.00 |
| -27.050 | -57.72 | 0.00 | -27.050 | -435.52 | 0.00 |
| -27.325 | -28.86 | 0.00 | -27.325 | -447.30 | 0.00 |
| -27.600 | -5.10 | 0.00 | -27.600 | -451.86 | 0.00 |
| -28.100 | 0.00 | 29.33 | -28.100 | -445.42 | 0.00 |
| -28.375 | 0.00 | 45.38 | -28.375 | -435.13 | 0.00 |
| -28.650 | 0.00 | 60.41 | -28.650 | -420.56 | 0.00 |
| -28.925 | 0.00 | 73.89 | -28.925 | -402.05 | 0.00 |
| -29.200 | 0.00 | 85.35 | -29.200 | -380.10 | 0.00 |
| -29.513 | 0.00 | 120.63 | -29.513 | -347.75 | 0.00 |
| -29.825 | 0.00 | 148.90 | -29.825 | -305.44 | 0.00 |
| -30.138 | 0.00 | 169.41 | -30.138 | -255.49 | 0.00 |
| -30.450 | 0.00 | 181.52 | -30.450 | -200.44 | 0.00 |
| -30.763 | 0.00 | 184.71 | -30.763 | -142.97 | 0.00 |
| -31.075 | 0.00 | 178.54 | -31.075 | -85.97 | 0.00 |
| -31.388 | 0.00 | 167.42 | -31.388 | -31.91 | 0.00 |
| -31.700 | 0.00 | 162.32 | -31.700 | 0.00 | 19.29 |
| -32.200 | -69.52 | 0.00 | -32.200 | 0.00 | 30.69 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |





*** DESPLAZAMIENTO MÁXIMO EN FASE N° 8 = 41.850 mm EN FASE FINAL N° 8 = 41.850 mm

*** MAXIMUM MOMENT IN PHASE Nb 8 = -3246.037 kN.m/m IN FINAL PHASE Nb 8 = -3246.037 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -2.25 | 2 | 0.00 | 7 | 157.06 | 8 | 156.27 |
| 2 | -9.90 | 3 | 0.00 | 8 | -1626.55 | 8 | -1626.55 |
| 3 | -16.02 | 4 | 0.00 | 4 | -1295.54 | 6 | QUITADO |
| 4 | -23.02 | 5 | 0.00 | 5 | -480.28 | 6 | QUITADO |
| 5 | -24.55 | 6 | 0.00 | 6 | -1295.48 | 7 | QUITADO |
| 6 | -24.55 | 7 | -1410.00 | 8 | -3009.83 | 8 | -3009.83 |
| 7 | -16.02 | 8 | 0.00 | 8 | -1707.03 | 8 | -1707.03 |
| m | | kN | | kN | | kN | |





* CURVAS ENVOLVENTES DE FASE 8 A FASE 8 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.34 | -0.275 | 0.00 | 0.03 |
| -0.550 | 0.00 | 1.40 | -0.550 | 0.00 | 0.25 |
| -0.825 | 0.00 | 3.23 | -0.825 | 0.00 | 0.87 |
| -1.100 | 0.00 | 5.82 | -1.100 | 0.00 | 2.10 |
| -1.375 | 0.00 | 9.17 | -1.375 | 0.00 | 4.14 |
| -1.650 | 0.00 | 13.28 | -1.650 | 0.00 | 7.21 |
| -1.925 | 0.00 | 18.16 | -1.925 | 0.00 | 11.52 |
| -2.200 | 0.00 | 23.79 | -2.200 | 0.00 | 17.27 |
| -2.250 | 0.00 | 24.90 | -2.250 | 0.00 | 18.49 |
| | 0.00 | 181.17 | | 0.00 | 18.49 |
| -2.675 | 0.00 | 191.60 | -2.675 | 0.00 | 97.64 |
| -3.100 | 0.00 | 203.84 | -3.100 | 0.00 | 181.60 |

| | | | | | |
|---|---|---|---|---|---|
| -3.600 | 0.00 | 220.58 | -3.600 | 0.00 | 287.60 |
| -4.100 | 0.00 | 239.84 | -4.100 | 0.00 | 402.60 |
| -4.600 | 0.00 | 261.62 | -4.600 | 0.00 | 527.86 |
| -5.100 | 0.00 | 285.92 | -5.100 | 0.00 | 664.64 |
| -5.600 | 0.00 | 312.74 | -5.600 | 0.00 | 814.20 |
| -6.100 | 0.00 | 342.07 | -6.100 | 0.00 | 977.80 |
| -6.600 | 0.00 | 373.93 | -6.600 | 0.00 | 1156.69 |
| -7.100 | 0.00 | 408.31 | -7.100 | 0.00 | 1352.15 |
| -7.450 | 0.00 | 437.43 | -7.450 | 0.00 | 1500.16 |
| -7.800 | 0.00 | 466.10 | -7.800 | 0.00 | 1658.30 |
| -8.150 | 0.00 | 493.79 | -8.150 | 0.00 | 1826.31 |
| -8.500 | 0.00 | 519.90 | -8.500 | 0.00 | 2003.76 |
| -8.850 | 0.00 | 545.07 | -8.850 | 0.00 | 2190.14 |
| -9.200 | 0.00 | 570.81 | -9.200 | 0.00 | 2385.38 |
| -9.550 | 0.00 | 597.74 | -9.550 | 0.00 | 2589.84 |
| -9.900 | 0.00 | 625.85 | -9.900 | 0.00 | 2803.94 |
| | -1000.71 | 0.00 | | 0.00 | 2803.94 |
| -10.200 | -975.67 | 0.00 | -10.200 | 0.00 | 2507.46 |
| -10.500 | -953.26 | 0.00 | -10.500 | 0.00 | 2218.09 |
| -10.762 | -932.97 | 0.00 | -10.762 | 0.00 | 1970.51 |
| -11.025 | -912.04 | 0.00 | -11.025 | 0.00 | 1728.34 |
| -11.288 | -890.47 | 0.00 | -11.288 | 0.00 | 1491.75 |
| -11.550 | -868.26 | 0.00 | -11.550 | 0.00 | 1260.90 |
| -11.812 | -845.42 | 0.00 | -11.812 | 0.00 | 1035.97 |
| -12.075 | -821.93 | 0.00 | -12.075 | 0.00 | 817.12 |
| -12.338 | -797.81 | 0.00 | -12.338 | 0.00 | 604.51 |
| -12.600 | -773.06 | 0.00 | -12.600 | 0.00 | 398.32 |
| -12.700 | -745.49 | 0.00 | -12.700 | 0.00 | 322.39 |
| -13.115 | -628.88 | 0.00 | -13.115 | 0.00 | 37.09 |
| -13.530 | -508.81 | 0.00 | -13.530 | -199.10 | 0.00 |
| -13.945 | -385.27 | 0.00 | -13.945 | -384.74 | 0.00 |
| -14.360 | -258.28 | 0.00 | -14.360 | -518.40 | 0.00 |
| -14.775 | -127.82 | 0.00 | -14.775 | -598.63 | 0.00 |
| -15.190 | 0.00 | 6.10 | -15.190 | -624.00 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -15.605 | 0.00 | 143.49 | -15.605 | -593.08 | 0.00 |
| -16.020 | 0.00 | 284.33 | -16.020 | -504.43 | 0.00 |
| | -1422.70 | 0.00 | | -504.43 | 0.00 |
| -16.520 | -1248.41 | 0.00 | -16.520 | -1172.42 | 0.00 |
| -17.020 | -1069.09 | 0.00 | -17.020 | -1752.00 | 0.00 |
| -17.520 | -884.74 | 0.00 | -17.520 | -2240.67 | 0.00 |
| -17.905 | -739.37 | 0.00 | -17.905 | -2553.41 | 0.00 |
| -18.290 | -591.02 | 0.00 | -18.290 | -2809.60 | 0.00 |
| -18.675 | -439.69 | 0.00 | -18.675 | -3008.11 | 0.00 |
| -19.060 | -285.39 | 0.00 | -19.060 | -3147.79 | 0.00 |
| -19.445 | -128.10 | 0.00 | -19.445 | -3227.48 | 0.00 |
| -19.830 | 0.00 | 32.17 | -19.830 | -3246.04 | 0.00 |
| -20.215 | 0.00 | 195.42 | -20.215 | -3202.32 | 0.00 |
| -20.600 | 0.00 | 361.65 | -20.600 | -3095.18 | 0.00 |
| -20.903 | 0.00 | 468.19 | -20.903 | -2969.71 | 0.00 |
| -21.205 | 0.00 | 576.41 | -21.205 | -2811.75 | 0.00 |
| -21.508 | 0.00 | 686.31 | -21.508 | -2620.81 | 0.00 |
| -21.810 | 0.00 | 797.88 | -21.810 | -2396.37 | 0.00 |
| -22.113 | 0.00 | 911.13 | -22.113 | -2137.92 | 0.00 |
| -22.415 | 0.00 | 1026.07 | -22.415 | -1844.96 | 0.00 |
| -22.718 | 0.00 | 1142.68 | -22.718 | -1516.98 | 0.00 |
| -23.020 | 0.00 | 1260.97 | -23.020 | -1153.48 | 0.00 |
| -23.520 | 0.00 | 1460.16 | -23.520 | -473.39 | 0.00 |
| -24.020 | 0.00 | 1663.95 | -24.020 | 0.00 | 307.45 |
| -24.520 | 0.00 | 1872.32 | -24.520 | 0.00 | 1191.33 |
| -24.550 | 0.00 | 1884.97 | -24.550 | 0.00 | 1247.68 |
| | -1124.86 | 0.00 | | 0.00 | 1247.68 |
| -24.975 | -943.91 | 0.00 | -24.975 | 0.00 | 807.95 |
| -25.400 | -787.06 | 0.00 | -25.400 | 0.00 | 441.95 |
| -25.675 | -712.51 | 0.00 | -25.675 | 0.00 | 235.77 |
| -25.950 | -639.00 | 0.00 | -25.950 | 0.00 | 49.97 |
| -26.225 | -566.61 | 0.00 | -26.225 | -115.78 | 0.00 |
| -26.500 | -495.40 | 0.00 | -26.500 | -261.78 | 0.00 |
| -26.775 | -425.61 | 0.00 | -26.775 | -388.38 | 0.00 |
| -27.050 | -357.43 | 0.00 | -27.050 | -496.01 | 0.00 |
| -27.325 | -291.22 | 0.00 | -27.325 | -585.15 | 0.00 |
| -27.600 | -227.06 | 0.00 | -27.600 | -656.37 | 0.00 |
| -28.100 | -112.36 | 0.00 | -28.100 | -741.21 | 0.00 |
| -28.375 | -49.44 | 0.00 | -28.375 | -763.45 | 0.00 |
| -28.650 | 0.00 | 13.37 | -28.650 | -768.41 | 0.00 |
| -28.925 | 0.00 | 76.02 | -28.925 | -756.11 | 0.00 |
| -29.200 | 0.00 | 138.45 | -29.200 | -726.62 | 0.00 |
| -29.513 | 0.00 | 171.65 | -29.513 | -678.14 | 0.00 |
| -29.825 | 0.00 | 203.86 | -29.825 | -619.44 | 0.00 |
| -30.138 | 0.00 | 234.99 | -30.138 | -550.84 | 0.00 |
| -30.450 | 0.00 | 264.96 | -30.450 | -472.69 | 0.00 |
| -30.763 | 0.00 | 293.73 | -30.763 | -385.36 | 0.00 |
| -31.075 | 0.00 | 321.24 | -31.075 | -289.24 | 0.00 |
| -31.388 | 0.00 | 347.43 | -31.388 | -184.73 | 0.00 |
| -31.700 | 0.00 | 378.95 | -31.700 | -71.54 | 0.00 |
| -32.200 | 0.00 | 12.58 | -32.200 | 0.00 | 12.35 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS ENVOLVENTES DE FASE  1 A FASE  8 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.34 | -0.275 | 0.00 | 0.03 |
| -0.550 | 0.00 | 1.40 | -0.550 | 0.00 | 0.25 |
| -0.825 | 0.00 | 3.23 | -0.825 | 0.00 | 0.87 |
| -1.100 | 0.00 | 5.82 | -1.100 | 0.00 | 2.10 |
| -1.375 | 0.00 | 9.17 | -1.375 | 0.00 | 4.14 |
| -1.650 | 0.00 | 13.28 | -1.650 | 0.00 | 7.21 |
| -1.925 | 0.00 | 18.16 | -1.925 | 0.00 | 11.52 |
| -2.200 | 0.00 | 23.79 | -2.200 | 0.00 | 17.27 |
| -2.250 | 0.00 | 24.90 | -2.250 | 0.00 | 18.49 |
| | -104.49 | 181.17 | | 0.00 | 18.49 |
| -2.675 | -99.79 | 191.60 | -2.675 | -30.38 | 97.64 |
| -3.100 | -94.05 | 203.84 | -3.100 | -71.61 | 181.60 |
| -3.600 | -85.98 | 220.58 | -3.600 | -116.67 | 287.60 |
| -4.100 | -76.49 | 239.84 | -4.100 | -157.35 | 402.60 |
| -4.600 | -65.56 | 261.62 | -4.600 | -192.92 | 527.86 |
| -5.100 | -52.89 | 285.92 | -5.100 | -222.62 | 664.64 |
| -5.600 | -38.12 | 312.74 | -5.600 | -245.46 | 814.20 |
| -6.100 | -21.19 | 342.07 | -6.100 | -260.38 | 977.80 |
| -6.600 | -2.04 | 373.93 | -6.600 | -266.29 | 1156.69 |
| -7.100 | 0.00 | 408.31 | -7.100 | -262.04 | 1352.15 |
| -7.450 | 0.00 | 437.43 | -7.450 | -253.83 | 1500.16 |
| -7.800 | 0.00 | 466.10 | -7.800 | -242.63 | 1658.30 |
| -8.150 | 0.00 | 493.79 | -8.150 | -228.23 | 1826.31 |
| -8.500 | 0.00 | 519.90 | -8.500 | -210.39 | 2003.76 |
| -8.850 | 0.00 | 545.07 | -8.850 | -188.87 | 2190.14 |
| -9.200 | -0.20 | 570.81 | -9.200 | -163.45 | 2385.38 |
| -9.550 | -3.25 | 597.74 | -9.550 | -133.89 | 2589.84 |
| -9.900 | -5.46 | 625.85 | -9.900 | -99.97 | 2803.94 |
| | -1000.71 | 103.37 | | -99.97 | 2803.94 |
| -10.200 | -975.67 | 114.87 | -10.200 | -67.25 | 2507.46 |
| -10.500 | -953.26 | 124.04 | -10.500 | -31.42 | 2218.09 |
| -10.762 | -932.97 | 110.87 | -10.762 | -0.50 | 1970.51 |
| -11.025 | -912.04 | 95.39 | -11.025 | 0.00 | 1728.34 |
| -11.288 | -890.47 | 79.74 | -11.288 | 0.00 | 1491.75 |
| -11.550 | -868.26 | 71.43 | -11.550 | 0.00 | 1260.90 |
| -11.812 | -845.42 | 84.17 | -11.812 | 0.00 | 1035.97 |
| -12.075 | -821.93 | 97.45 | -12.075 | -3.06 | 846.40 |
| -12.338 | -797.81 | 111.18 | -12.338 | -71.78 | 673.41 |
| -12.600 | -773.06 | 125.25 | -12.600 | -137.69 | 616.43 |
| -12.700 | -745.49 | 131.41 | -12.700 | -161.99 | 629.26 |
| -13.115 | -629.82 | 157.81 | -13.115 | -257.04 | 689.22 |
| -13.530 | -604.68 | 185.58 | -13.530 | -342.09 | 760.44 |
| -13.945 | -577.42 | 214.20 | -13.945 | -416.27 | 843.37 |
| -14.360 | -548.01 | 243.87 | -14.360 | -595.87 | 938.37 |
| -14.775 | -516.40 | 275.36 | -14.775 | -816.81 | 1046.04 |
| -15.190 | -482.54 | 308.97 | -15.190 | -1024.17 | 1167.21 |



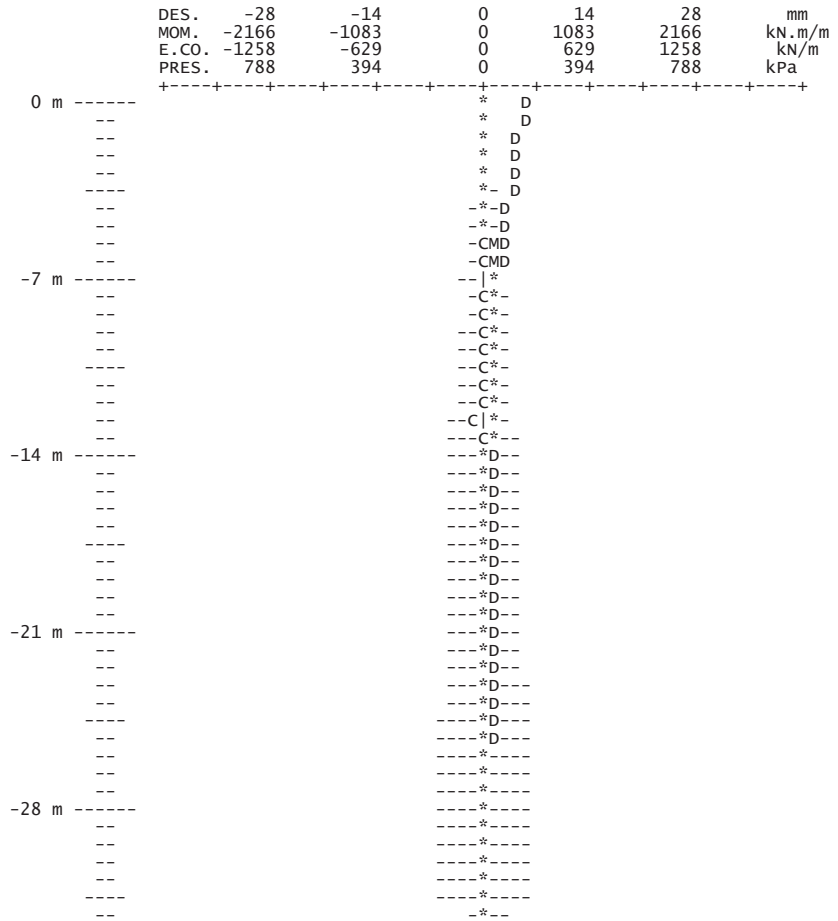


| | | | | | | |
|---|---|---|---|---|---|---|
| -15.605 | -446.39 | 344.69 | -15.605 | -1217.00 | 1302.77 |
| -16.020 | -407.92 | 383.31 | -16.020 | -1394.35 | 1453.60 |
| | -1422.70 | 3.09 | | -1394.35 | 1453.60 |
| -16.520 | -1248.41 | 51.49 | -16.520 | -1586.08 | 1020.47 |
| -17.020 | -1069.09 | 102.96 | -17.020 | -1752.19 | 633.02 |
| -17.520 | -884.74 | 123.76 | -17.520 | -2240.67 | 272.75 |
| -17.905 | -739.37 | 133.61 | -17.905 | -2553.41 | 14.88 |
| -18.290 | -668.61 | 139.89 | -18.290 | -2809.60 | 5.47 |
| -18.675 | -620.88 | 142.61 | -18.675 | -3008.11 | 0.99 |
| -19.060 | -571.33 | 141.75 | -19.060 | -3147.79 | 0.00 |
| -19.445 | -519.96 | 137.33 | -19.445 | -3227.48 | 0.00 |
| -19.830 | -466.77 | 131.38 | -19.830 | -3246.04 | 0.00 |
| -20.215 | -411.76 | 195.42 | -20.215 | -3202.32 | 0.00 |
| -20.600 | -354.92 | 361.65 | -20.600 | -3095.18 | 3.99 |
| -20.903 | -312.62 | 468.19 | -20.903 | -2969.71 | 7.64 |
| -21.205 | -269.20 | 576.41 | -21.205 | -2811.75 | 9.61 |
| -21.508 | -224.65 | 686.31 | -21.508 | -2620.81 | 17.58 |
| -21.810 | -178.99 | 797.88 | -21.810 | -2396.37 | 36.89 |
| -22.113 | -132.22 | 911.13 | -22.113 | -2137.92 | 51.85 |
| -22.415 | -84.32 | 1026.07 | -22.415 | -1953.01 | 62.75 |
| -22.718 | -35.31 | 1142.68 | -22.718 | -1971.13 | 69.90 |
| -23.020 | -19.97 | 1260.97 | -23.020 | -1974.25 | 73.57 |
| | -392.10 | 1260.97 | | -1974.25 | 73.57 |
| -23.520 | -306.78 | 1460.16 | -23.520 | -1945.64 | 72.79 |
| -24.020 | -218.41 | 1663.95 | -24.020 | -1873.60 | 307.45 |
| -24.520 | -126.98 | 1872.32 | -24.520 | -1895.57 | 1191.33 |
| -24.550 | -121.40 | 1884.97 | -24.550 | -1899.30 | 1247.68 |
| | -1124.86 | 237.44 | | -1899.30 | 1247.68 |
| -24.975 | -943.91 | 268.55 | -24.975 | -1933.92 | 807.95 |
| -25.400 | -787.06 | 294.58 | -25.400 | -1933.95 | 441.95 |
| -25.675 | -712.51 | 308.72 | -25.675 | -1916.40 | 235.77 |
| -25.950 | -639.00 | 320.73 | -25.950 | -1886.87 | 49.97 |
| -26.225 | -566.61 | 330.61 | -26.225 | -1846.11 | 0.00 |
| -26.500 | -495.40 | 338.37 | -26.500 | -1794.78 | 0.00 |
| -26.775 | -425.61 | 344.00 | -26.775 | -1733.72 | 0.00 |
| -27.050 | -357.43 | 347.51 | -27.050 | -1663.91 | 0.00 |
| -27.325 | -291.22 | 348.89 | -27.325 | -1586.52 | 0.00 |
| -27.600 | -227.06 | 348.14 | -27.600 | -1502.99 | 0.00 |
| -28.100 | -112.36 | 342.57 | -28.100 | -1338.73 | 0.00 |
| -28.375 | -49.44 | 356.96 | -28.375 | -1242.55 | 0.00 |
| -28.650 | 0.00 | 371.41 | -28.650 | -1142.40 | 0.00 |
| -28.925 | 0.00 | 385.70 | -28.925 | -1038.29 | 0.00 |
| -29.200 | 0.00 | 399.59 | -29.200 | -930.30 | 0.00 |
| -29.513 | 0.00 | 392.70 | -29.513 | -806.47 | 0.00 |
| -29.825 | 0.00 | 384.30 | -29.825 | -685.02 | 0.00 |
| -30.138 | 0.00 | 374.13 | -30.138 | -566.47 | 0.00 |
| -30.450 | 0.00 | 361.95 | -30.450 | -472.69 | 0.00 |
| -30.763 | 0.00 | 347.58 | -30.763 | -385.36 | 25.96 |
| -31.075 | 0.00 | 330.84 | -31.075 | -289.24 | 45.81 |
| -31.388 | 0.00 | 347.43 | -31.388 | -184.73 | 60.28 |
| -31.700 | 0.00 | 378.95 | -31.700 | -71.54 | 74.32 |
| -32.200 | -123.85 | 12.58 | -32.200 | 0.00 | 44.15 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |

| | m | kN/m | kN/m | | m | kN.m/m | kN.m/m |
|---|---|---|---|---|---|---|---|

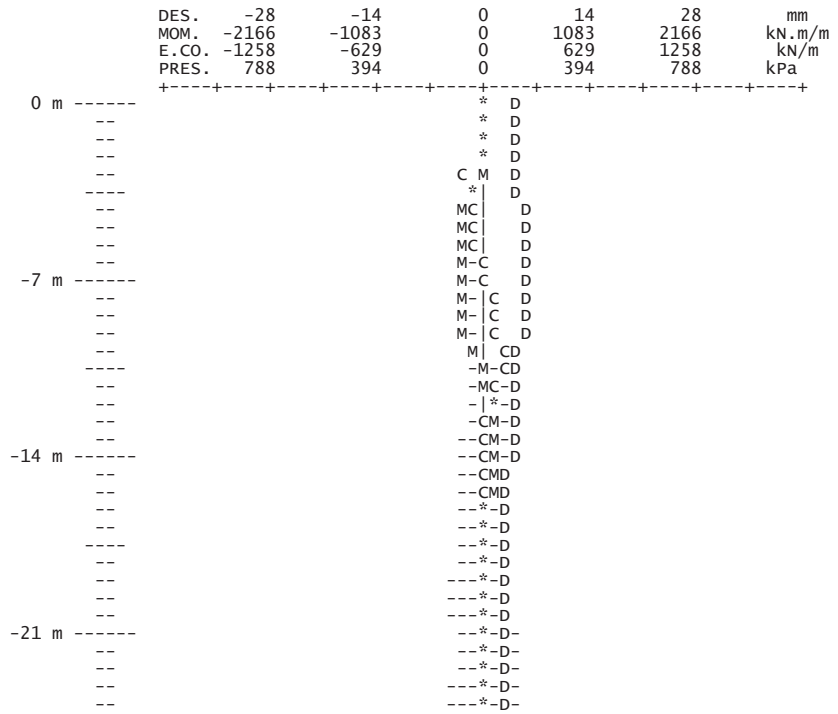


* CURVAS DE LA FASE  1 *





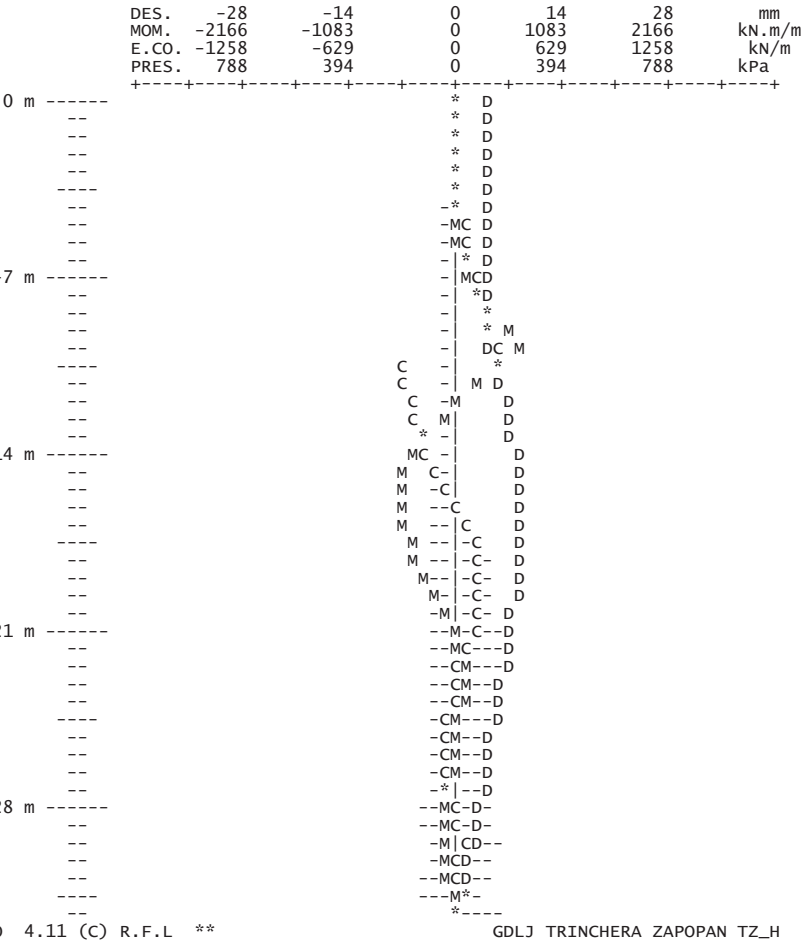

* CURVAS DE LA FASE  2 *





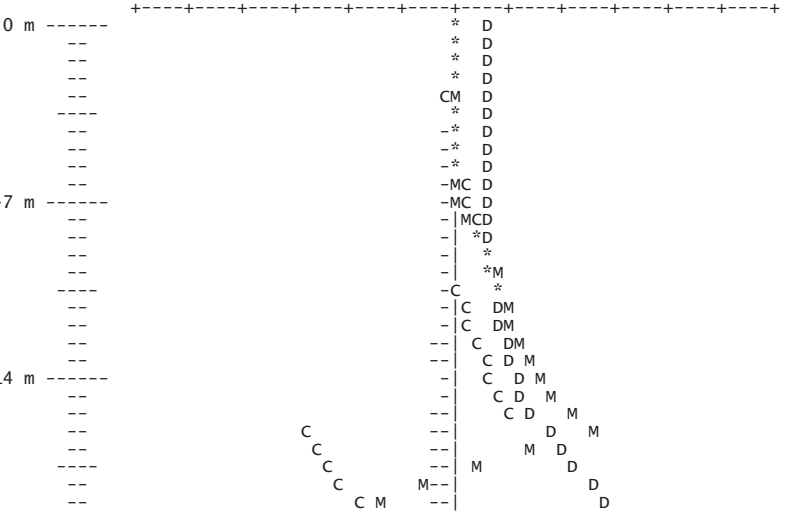


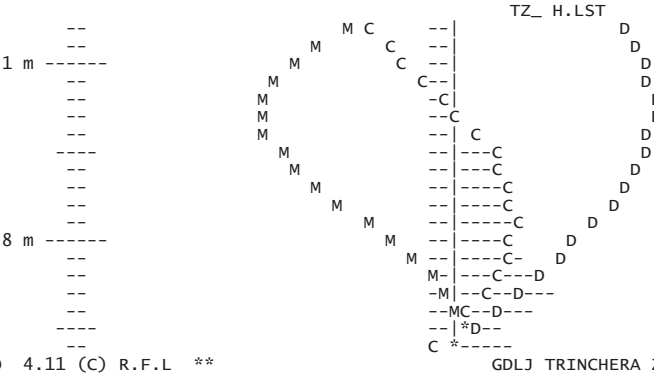
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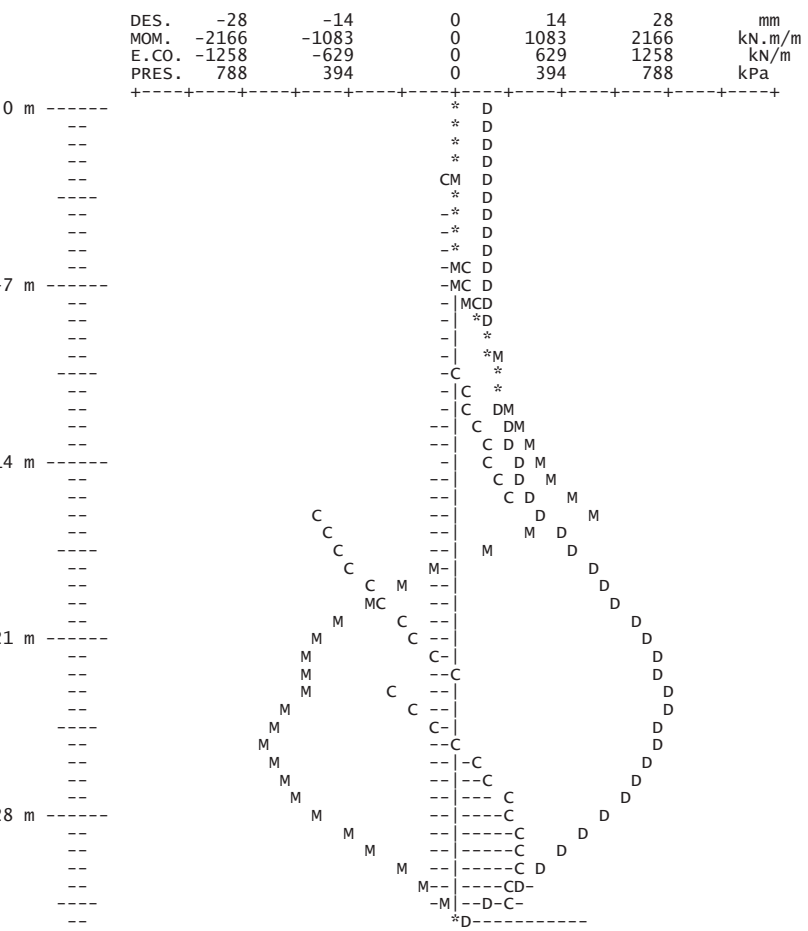

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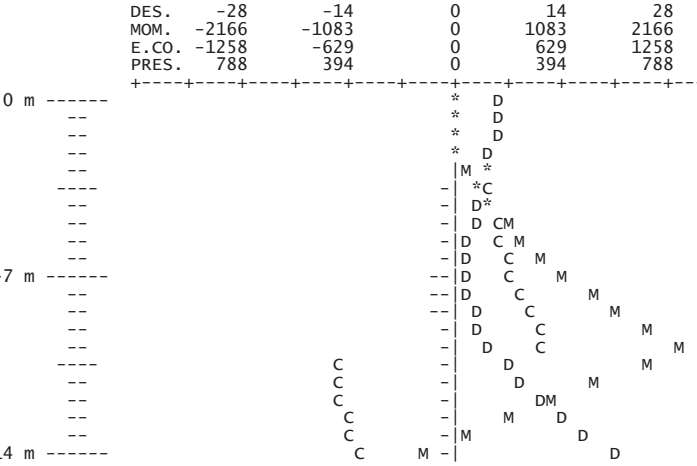


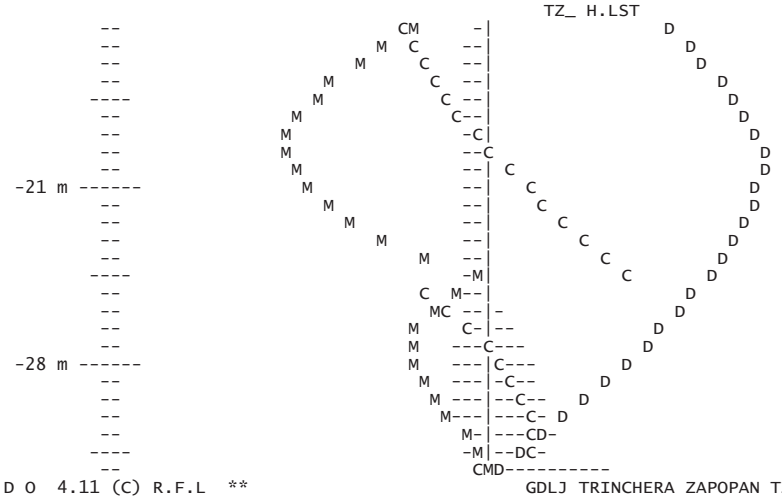
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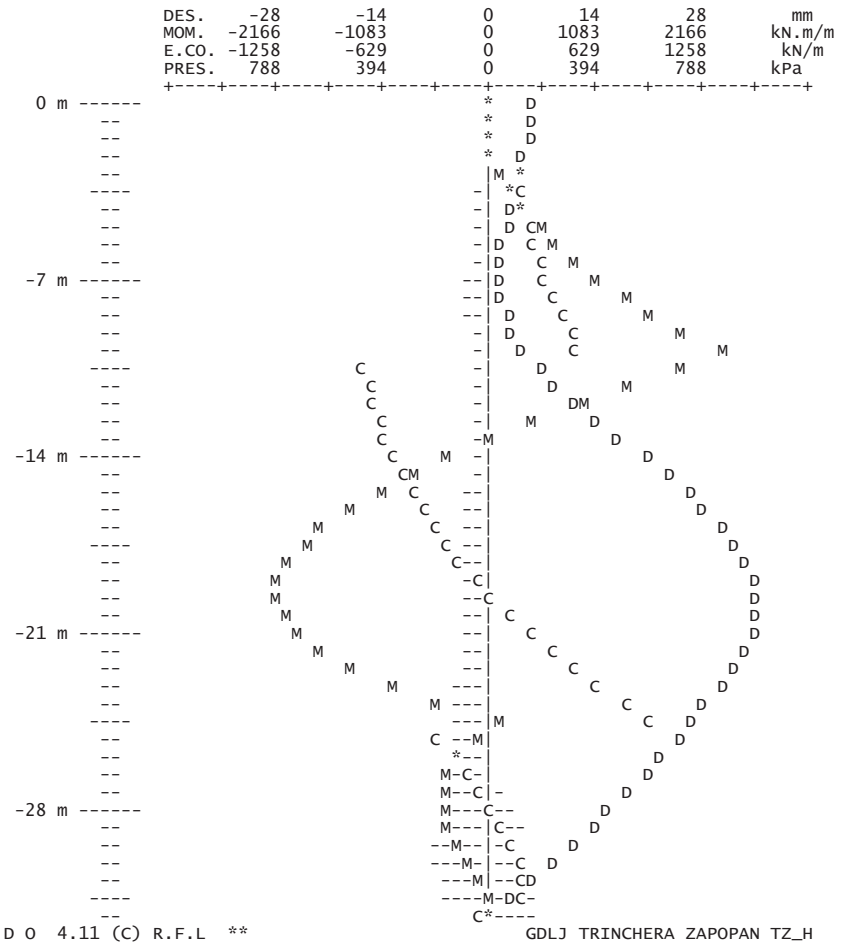

* CURVAS DE LA FASE  6 *





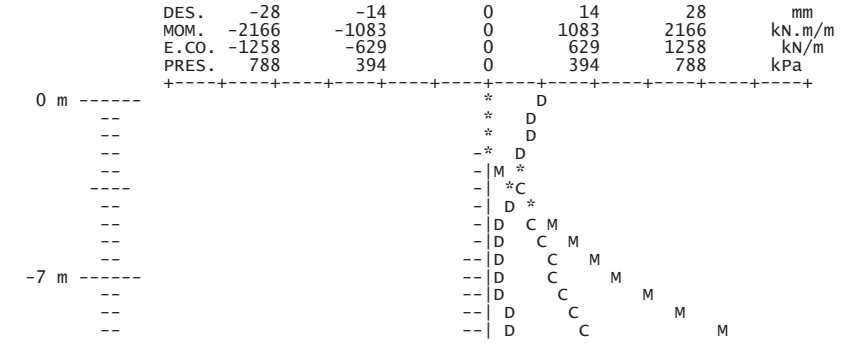


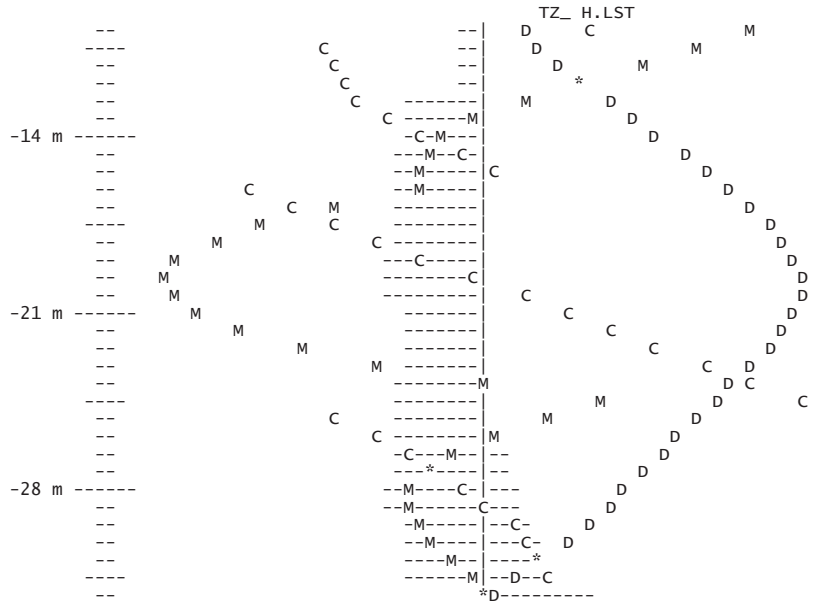

* CURVAS DE LA FASE  7 *






* CURVAS DE LA FASE  8 *




TZ_ H.LST
-14 m
-21 m
-28 m

```
***** NOMBRE DE FICHERO DE DATOS : TZ_ I.RIO

      GDLJ TRINCHERA ZAPOPAN TZ_I                      *60L  U:NN*
      : 0
 1 ...  0
      *PANTALLA DE 1.00 m
      : -32.70 2190000
 2 ...  -32.7 2190000
      : 0.00
 3 ...  0
      * R
      : -2.20 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 4 ...  -2.2 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1a
      : -7.10 18.00 8.00 0.317 0.515 2.882 5.00 29 0.333 0.000 4900
 5 ...  -7.1 18 8 0.317 0.515 2.882 5 29 0.333 0 4900
      * UG1b
      : -10.20 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 6 ...  -10.2 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -12.60 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 7 ...  -12.6 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG1b
      : -20.60 18.50 8.50 0.291 0.485 3.124 15.00 31 0.333 0.000 15100
 8 ...  -20.6 18.5 8.5 0.291 0.485 3.124 15 31 0.333 0 15100
      * UG1c
      : -29.20 19.00 9.00 0.268 0.455 3.392 20.00 33 0.333 0.000 20600
 9 ...  -29.2 19 9 0.268 0.455 3.392 20 33 0.333 0 20600
      * UG2
      : -31.70 20.00 10.00 0.246 0.426 3.69 30.00 35 0.333 0.000 43800
10 ...  -31.7 20 10 0.246 0.426 3.69 30 35 0.333 0 43800
      * UG3a
      : -47.30 23.00 13.00 0.075 0.152 12.162 246.00 58 0.333 0.000 300000
11 ...  -47.3 23 13 0.075 0.152 12.162 246 58 0.333 0 300000
      * NF
      : -12.7 0.50
12 ...  -12.7 0.5
      *Fase 1
      *Excavacion hasta cota inferior nivel cubierta
      : SUC(1) 10
13 ... SUC(1)  10
      : EXC(2) -3.10
14 ... EXC(2)  -3.1
      : CAL(2)
15 ... CAL(2)
      *Fase 2
      *Ejecucion del nivel cubierta
      *Excavacion hasta nivel rampa de autobuses.
      : STR(0) -2.25 1.00 0.00 0.00 5200000
16 ... STR(0)  -2.25 1 0 0 5200000
      : EXC(2) -10.15
17 ... EXC(2)  -10.15
      : CAL(2)
18 ... CAL(2)
      *Fase 3
      *Ejecucion del nivel de autobuses
      *Excavacion hasta nivel peatonal (acceso estación Normal)
      : STR(0) -9.45 1.00 0.00 0.00 3466667
19 ... STR(0)  -9.45 1 0 0 3466667
      : EXC(2) -14.30
20 ... EXC(2)  -14.3
      : WAT(2) -14.80
21 ... WAT(2)  -14.8
      : CAL(2)
22 ... CAL(2)
      *Fase 4
      *Ejecucion de losa peatonal acceso estación
      *Excavacion hasta nivel puntales provisionales
      : STR(0) -13.60 1.00 0.00 0.00 3466667
23 ... STR(0)  -13.6 1 0 0 3466667
      : EXC(2) -24.02
24 ... EXC(2)  -24.02
      : WAT(2) -24.52
25 ... WAT(2)  -24.52
      : CAL(2)
26 ... CAL(2)
      *Fase 5
      *Ejecucion del nivel de puntales provisionales
      *Excavacion hasta el nivel de losa de fondo
      : STR(0) -23.02 1.00 0.00 0.00 453000
27 ... STR(0)  -23.02 1 0 0 453000
      : EXC(2) -25.4 -27.6 2.47 4.67
28 ... EXC(2)  -25.4 -27.6 2.47 4.67
      : WAT(2) -28.1
29 ... WAT(2)  -28.1
      : CAL(2)
30 ... CAL(2)
      *Fase 6
      *Ejecucion de la losa de fondo y retirada de puntales provisionales
      : STR(0) -24.55 1.00 0.00 0.00 850000
31 ... STR(0)  -24.55 1 0 0 850000
      : STR(0,4)
32 ... STR(0,4)
      : CAL(2,1)
33 ... CAL(2,1)
      *Fase 7
      *Restitucion del nf y paso de la tuneladora
      : STR(0,5)
34 ... STR(0,5)
      : STR(0) -24.55 1.00 0.00 -163-398 430000
35 ... STR(0)  -24.55 1 0 -561 430000
      : WAT(2) -25.4 127.0
36 ... WAT(2)  -25.4 127
      : CAL(2,1)
37 ... CAL(2,1)
      *Fase 8
      *Restitucion del puntal provisional y Sismo
      : STR(0) -16.02 1.00 0.00 0.00 453000
38 ... STR(0)  -16.02 1 0 0 453000
      *SISMO_ R
      : PLA(1) 0.560 2.367 5.00 29 0.00 0.00
```

```
  39 ... PLA(1)  0.56 2.367 5 29 0 0
         *SISMO_ UG1a
         : PLA(2) 0.560 2.367 5.00 29 0.00 0.00
  40 ... PLA(2)  0.56 2.367 5 29 0 0
         *SISMO_ UG1b
         : PLA(3) 0.522 2.594 15.00 31 0.00 0.00
  41 ... PLA(3)  0.522 2.594 15 31 0 0
         *SISMO_ UG1c
         : PLA(4) 0.487 2.846 20.00 33 0.00 0.00
  42 ... PLA(4)  0.487 2.846 20 33 0 0
         *SISMO_ UG1b
         : PLA(5) 1.211 1.520 15.00 31 0.00 0.00
  43 ... PLA(5)  1.211 1.52 15 31 0 0
         *SISMO_ UG1c
         : PLA(6) 0.948 1.991 20.00 33 0.00 0.00
  44 ... PLA(6)  0.948 1.991 20 33 0 0
         *SISMO_ UG2
         : PLA(7) 0.795 2.402 30.00 35 0.00 0.00
  45 ... PLA(7)  0.795 2.402 30 35 0 0
         *SISMO_ UG3a
         : PLA(8) 0.302 10.398 246.00 58 0.00 0.00
  46 ... PLA(8)  0.302 10.398 246 58 0 0
         : CAL(2)
  47 ... CAL(2)
         : FIN
  48 ... FIN
         : GRF
  49 ... GRF
         : STA
  50 ... STA
         : EVP
  51 ... EVP
         : ASC
  52 ... ASC
         *XLS
         : STOP
  53 ... STOP
```



*PANTALLA DE 1.00 m

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** COMIENZO DE DATOS **

* LAS SOBRECARGAS DE BOUSSINESQ FUNCIÓN DEL ESTADO DE SUELO

*** DESCRIPCIÓN DE LA PARED :

| | PRODUCTO DE INERCIA EI | RIGIDEZ CILÍNDRICA |
|---|---|---|
| SECCIÓN N° 1 DE 0.000 m A -32.700 m : | 2190000. kN.m2/m | 0. kPa/m |

*** DESCRIPCIÓN DE SUELO :

* R

CAPA N° 1 DE 0.000 m A -2.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1a

CAPA N° 2 DE -2.200 m A -7.100 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.317 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.882 |
| COHESIÓN | C | = | 5.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

* UG1b



CAPA N° 3 DE -7.100 m A -10.200 m :

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.291 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 3.124 |
| COHESIÓN | C | = | 15.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.333 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |

MÓDULO DE BALASTO HORIZONTAL (A P=0) = 15100.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1c

CAPA N° 4 DE -10.200 m A -12.600 m :

PESO ESPECIFOCO HÚMEDO GH = 19.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.268
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.455
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.392
COHESIÓN C = 20.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 33.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 20600.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1b

CAPA N° 5 DE -12.600 m A -20.600 m :

PESO ESPECIFOCO HÚMEDO GH = 18.500 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 8.500 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.291
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.485
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.124
COHESIÓN C = 15.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 31.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 15100.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG1c



CAPA N° 6 DE -20.600 m A -29.200 m :

PESO ESPECIFOCO HÚMEDO GH = 19.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 9.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.268
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.455
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.392
COHESIÓN C = 20.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 33.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 20600.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG2

CAPA N° 7 DE -29.200 m A -31.700 m :

PESO ESPECIFOCO HÚMEDO GH = 20.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 10.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.246
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.426
COEFIC. DE EMPUJE PASIVO HOR. KP = 3.690
COHESIÓN C = 30.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 35.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 43800.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* UG3a

CAPA N° 8 DE -31.700 m A -47.300 m :

PESO ESPECIFOCO HÚMEDO GH = 23.000 kN/m3
PESO ESPECIFOCO SUMERGIDO GD = 13.000 kN/m3
COEFIC. DE EMPUJE ACTIVO HOR. KA = 0.075
COEFIC. DE EMPUJE EN REPOSO HOR. K0 = 0.152
COEFIC. DE EMPUJE PASIVO HOR. KP = 12.162
COHESIÓN C = 246.000 kPa
ANGULO DE ROZAMIENTO INTERNO PHI = 58.000 GRADOS
PARA PRESIÓN ACTIVA DELTA/PHI = 0.333
PARA PRESIÓN PASIVA DELTA/PHI = 0.000
MÓDULO DE BALASTO HORIZONTAL (A P=0) = 300000.000 kPa/m
MEJORA DE ESTE COEF. A LA PRESIÓN = 0.000 1/m

* NF



**  FASE No  1  **

*Fase 1
*Excavacion hasta cota inferior nivel cubierta

* SOBRECARGA DE CAQUOT SOBRE SUELO 1 = 10.000 kPa

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -3.100 m

FASE 1

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 10.00 kPa | | | | SOIL 2 EXCAVACIÓN: -3.10 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 0.00 kPa | | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PARED | | | | | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° | FUERZA |
| 0.000 | 5.375 | -0.492 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.275 | 5.240 | -0.492 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.550 | 5.105 | -0.492 | 0.00 | 0.02 | | 1 | 0.16 | 0.16 | 4900 | 0 | | | | | |
| -0.825 | 4.969 | -0.492 | 0.03 | 0.28 | | 1 | 1.73 | 1.73 | 4900 | 0 | | | | | |
| -1.100 | 4.834 | -0.492 | 0.20 | 0.97 | | 1 | 3.30 | 3.17 | 4900 | 0 | | | | | |
| -1.375 | 4.699 | -0.492 | 0.61 | 2.09 | | 1 | 4.87 | 3.17 | 4900 | 0 | | | | | |
| -1.650 | 4.563 | -0.492 | 1.39 | 3.65 | | 1 | 6.44 | 3.17 | 4900 | 0 | | | | | |
| -1.925 | 4.428 | -0.492 | 2.65 | 5.63 | | 1 | 8.00 | 3.17 | 4900 | 0 | | | | | |
| -2.200 | 4.293 | -0.491 | 4.53 | 8.05 | | 1 | 9.57 | 3.17 | 4900 | 0 | | | | | |
| -2.250 | 4.268 | -0.491 | 4.94 | 8.54 | | 1 | 9.86 | 3.17 | 4900 | 0 | | | | | |
| -2.675 | 4.060 | -0.490 | 9.53 | 13.24 | | 1 | 12.28 | 3.17 | 4900 | 0 | | | | | |
| -3.100 | 3.852 | -0.487 | 16.35 | 19.04 | | 2 | 15.01 | 3.47 | 4900 | 0 | | | | | |
| | | | | | | 2 | 15.01 | 3.47 | 4900 | 3 | 16.98 | | 4900 | | |
| -3.600 | 3.610 | -0.482 | 25.65 | 18.18 | | 2 | 20.83 | 5.15 | 4900 | 2 | 22.32 | | 4900 | | |
| -4.100 | 3.370 | -0.476 | 34.65 | 18.02 | | 2 | 26.64 | 5.15 | 4900 | 2 | 25.78 | | 4900 | | |
| -4.600 | 3.135 | -0.467 | 43.86 | 19.03 | | 2 | 32.43 | 5.15 | 4900 | 2 | 29.26 | | 4900 | | |
| -5.100 | 2.904 | -0.455 | 53.86 | 21.18 | | 2 | 38.20 | 5.15 | 4900 | 2 | 32.77 | | 4900 | | |
| -5.600 | 2.679 | -0.442 | 65.22 | 24.44 | | 2 | 43.93 | 5.15 | 4900 | 2 | 36.30 | | 4900 | | |
| -6.100 | 2.462 | -0.426 | 78.49 | 28.79 | | 2 | 49.63 | 5.15 | 4900 | 2 | 39.88 | | 4900 | | |
| -6.600 | 2.254 | -0.406 | 94.18 | 34.17 | | 2 | 55.29 | 5.15 | 4900 | 2 | 43.49 | | 4900 | | |
| -7.100 | 2.057 | -0.382 | 112.83 | 40.55 | | 2 | 60.89 | 5.15 | 4900 | 2 | 47.16 | | 4900 | | |
| | | | | | | 2 | 35.77 | 4.85 | 15100 | 2 | 65.98 | | 15100 | | |
| -7.394 | 1.947 | -0.366 | 123.48 | 32.17 | | 2 | 40.07 | 4.85 | 15100 | 2 | 66.96 | | 15100 | | |
| -7.688 | 1.842 | -0.349 | 131.82 | 24.73 | | 2 | 44.29 | 4.85 | 15100 | 2 | 68.01 | | 15100 | | |
| -7.981 | 1.742 | -0.331 | 138.10 | 18.21 | | 2 | 48.43 | 4.85 | 15100 | 2 | 69.13 | | 15100 | | |
| -8.275 | 1.648 | -0.312 | 142.60 | 12.55 | | 2 | 52.50 | 4.85 | 15100 | 2 | 70.34 | | 15100 | | |
| -8.569 | 1.559 | -0.293 | 145.56 | 7.70 | | 2 | 56.48 | 4.85 | 15100 | 2 | 71.63 | | 15100 | | |
| -8.862 | 1.475 | -0.273 | 147.20 | 3.62 | | 2 | 60.37 | 4.85 | 15100 | 2 | 73.01 | | 15100 | | |
| -9.156 | 1.398 | -0.254 | 147.75 | 0.25 | | 2 | 64.17 | 4.85 | 15100 | 2 | 74.48 | | 15100 | | |
| -9.450 | 1.326 | -0.234 | 147.41 | -2.46 | | 2 | 67.89 | 4.85 | 15100 | 2 | 76.04 | | 15100 | | |
| -9.800 | 1.249 | -0.210 | 146.10 | -4.90 | | 2 | 72.20 | 4.85 | 15100 | 2 | 78.00 | | 15100 | | |
| -10.150 | 1.179 | -0.187 | 144.07 | -6.57 | | 2 | 76.39 | 4.85 | 15100 | 2 | 80.09 | | 15100 | | |
| -10.200 | 1.170 | -0.184 | 143.74 | -6.74 | | 2 | 76.98 | 4.85 | 15100 | 2 | 80.40 | | 15100 | | |
| | | | | | | 2 | 64.69 | 4.55 | 20600 | 2 | 82.96 | | 20600 | | |
| -10.500 | 1.118 | -0.164 | 140.92 | -11.90 | | 2 | 68.36 | 4.55 | 20600 | 2 | 84.47 | | 20600 | | |
| -10.800 | 1.071 | -0.145 | 136.66 | -16.45 | | 2 | 71.91 | 4.55 | 20600 | 2 | 86.11 | | 20600 | | |
| -11.100 | 1.031 | -0.127 | 131.11 | -20.46 | | 2 | 75.34 | 4.55 | 20600 | 2 | 87.86 | | 20600 | | |
| -11.400 | 0.995 | -0.109 | 124.43 | -23.99 | | 2 | 78.67 | 4.55 | 20600 | 2 | 89.73 | | 20600 | | |
| -11.700 | 0.965 | -0.093 | 116.75 | -27.12 | | 2 | 81.89 | 4.55 | 20600 | 2 | 91.70 | | 20600 | | |
| -12.000 | 0.939 | -0.077 | 108.19 | -29.91 | | 2 | 85.00 | 4.55 | 20600 | 2 | 93.77 | | 20600 | | |
| -12.300 | 0.918 | -0.063 | 98.83 | -32.41 | | 2 | 88.03 | 4.55 | 20600 | 2 | 95.92 | | 20600 | | |
| -12.600 | 0.901 | -0.050 | 88.77 | -34.67 | | 2 | 90.98 | 4.55 | 20600 | 2 | 98.17 | | 20600 | | |
| | | | | | | 2 | 103.16 | 4.85 | 15100 | 2 | 98.46 | | 15100 | | |
| -12.700 | 0.896 | -0.046 | 85.32 | -34.19 | | 2 | 104.13 | 4.85 | 15100 | 2 | 99.28 | | 15100 | | |
| -13.150 | 0.879 | -0.030 | 70.44 | -31.90 | | 2 | 106.24 | 4.85 | 15100 | 2 | 100.88 | | 15100 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO | PR. | SOPRAC. | ELAST. | SOIL 2 ESTADO | PR. | SOPRAC. | ELAST. | PUNTALES/ ANCLAS N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.600 | 0.869 | -0.017 | 56.64 | -29.41 | | 2 | 108.26 | 4.85 | 15100 | 2 | 102.57 | | 15100 | | |
| -13.950 | 0.864 | -0.009 | 46.70 | -27.40 | | 2 | 109.77 | 4.85 | 15100 | 2 | 103.95 | | 15100 | | |
| -14.300 | 0.862 | -0.002 | 37.47 | -25.35 | | 2 | 111.24 | 4.85 | 15100 | 2 | 105.36 | | 15100 | | |
| -14.800 | 0.863 | 0.005 | 25.53 | -22.42 | | 2 | 113.29 | 4.85 | 15100 | 2 | 107.43 | | 15100 | | |
| -15.105 | 0.865 | 0.008 | 18.96 | -20.64 | | 2 | 114.52 | 4.85 | 15100 | 2 | 108.72 | | 15100 | | |
| -15.410 | 0.867 | 0.010 | 12.94 | -18.88 | | 2 | 115.74 | 4.85 | 15100 | 2 | 110.02 | | 15100 | | |
| -15.715 | 0.871 | 0.011 | 7.44 | -17.15 | | 2 | 116.94 | 4.85 | 15100 | 2 | 111.32 | | 15100 | | |
| -16.020 | 0.874 | 0.012 | 2.47 | -15.45 | | 2 | 118.15 | 4.85 | 15100 | 2 | 112.64 | | 15100 | | |
| -16.306 | 0.878 | 0.012 | -1.73 | -13.89 | | 2 | 119.27 | 4.85 | 15100 | 2 | 113.87 | | 15100 | | |
| -16.593 | 0.881 | 0.012 | -5.49 | -12.36 | | 2 | 120.40 | 4.85 | 15100 | 2 | 115.10 | | 15100 | | |
| -16.879 | 0.884 | 0.011 | -8.81 | -10.85 | | 2 | 121.53 | 4.85 | 15100 | 2 | 116.33 | | 15100 | | |
| -17.165 | 0.887 | 0.009 | -11.70 | -9.38 | | 2 | 122.67 | 4.85 | 15100 | 2 | 117.55 | | 15100 | | |
| -17.451 | 0.890 | 0.008 | -14.18 | -7.92 | | 2 | 123.81 | 4.85 | 15100 | 2 | 118.77 | | 15100 | | |
| -17.738 | 0.892 | 0.006 | -16.24 | -6.49 | | 2 | 124.96 | 4.85 | 15100 | 2 | 119.98 | | 15100 | | |
| -18.024 | 0.893 | 0.003 | -17.89 | -5.07 | | 2 | 126.12 | 4.85 | 15100 | 2 | 121.18 | | 15100 | | |
| -18.310 | 0.894 | 0.001 | -19.14 | -3.65 | | 2 | 127.29 | 4.85 | 15100 | 2 | 122.37 | | 15100 | | |
| -18.596 | 0.894 | -0.001 | -19.99 | -2.24 | | 2 | 128.48 | 4.85 | 15100 | 2 | 123.55 | | 15100 | | |
| -18.883 | 0.893 | -0.004 | -20.43 | -0.83 | | 2 | 129.67 | 4.85 | 15100 | 2 | 124.72 | | 15100 | | |
| -19.169 | 0.891 | -0.007 | -20.46 | 0.59 | | 2 | 130.87 | 4.85 | 15100 | 2 | 125.87 | | 15100 | | |
| -19.455 | 0.889 | -0.009 | -20.08 | 2.04 | | 2 | 132.09 | 4.85 | 15100 | 2 | 127.02 | | 15100 | | |
| -19.741 | 0.886 | -0.012 | -19.29 | 3.50 | | 2 | 133.31 | 4.85 | 15100 | 2 | 128.15 | | 15100 | | |
| -20.028 | 0.882 | -0.014 | -18.08 | 4.99 | | 2 | 134.55 | 4.85 | 15100 | 2 | 129.27 | | 15100 | | |
| -20.314 | 0.878 | -0.017 | -16.43 | 6.52 | | 2 | 135.80 | 4.85 | 15100 | 2 | 130.39 | | 15100 | | |
| -20.600 | 0.872 | -0.019 | -14.34 | 8.09 | | 2 | 137.06 | 4.85 | 15100 | 2 | 131.49 | | 15100 | | |
| | | | | | | 2 | 122.96 | 4.55 | 20600 | 2 | 128.97 | | 20600 | | |
| -20.903 | 0.866 | -0.021 | -12.16 | 6.32 | | 2 | 124.33 | 4.55 | 20600 | 2 | 130.08 | | 20600 | | |
| -21.205 | 0.860 | -0.022 | -10.51 | 4.61 | | 2 | 125.70 | 4.55 | 20600 | 2 | 131.19 | | 20600 | | |
| -21.508 | 0.853 | -0.024 | -9.36 | 3.00 | | 2 | 127.08 | 4.55 | 20600 | 2 | 132.29 | | 20600 | | |
| -21.810 | 0.846 | -0.025 | -8.69 | 1.47 | | 2 | 128.47 | 4.55 | 20600 | 2 | 133.37 | | 20600 | | |
| -22.113 | 0.838 | -0.026 | -8.46 | 0.03 | | 2 | 129.87 | 4.55 | 20600 | 2 | 134.46 | | 20600 | | |
| -22.415 | 0.830 | -0.027 | -8.66 | -1.31 | | 2 | 131.27 | 4.55 | 20600 | 2 | 135.53 | | 20600 | | |
| -22.718 | 0.822 | -0.028 | -9.25 | -2.55 | | 2 | 132.68 | 4.55 | 20600 | 2 | 136.60 | | 20600 | | |
| -23.020 | 0.813 | -0.030 | -10.19 | -3.68 | | 2 | 134.10 | 4.55 | 20600 | 2 | 137.65 | | 20600 | | |
| -23.520 | 0.797 | -0.032 | -12.45 | -5.29 | | 2 | 136.47 | 4.55 | 20600 | 2 | 139.38 | | 20600 | | |
| -24.020 | 0.781 | -0.035 | -15.43 | -6.58 | | 2 | 138.86 | 4.55 | 20600 | 2 | 141.08 | | 20600 | | |
| -24.520 | 0.762 | -0.039 | -18.96 | -7.49 | | 2 | 141.29 | 4.55 | 20600 | 2 | 142.74 | | 20600 | | |
| -24.550 | 0.761 | -0.040 | -19.19 | -7.54 | | 2 | 141.44 | 4.55 | 20600 | 2 | 142.84 | | 20600 | | |
| -24.975 | 0.743 | -0.044 | -22.49 | -7.98 | | 2 | 143.55 | 4.55 | 20600 | 2 | 144.22 | | 20600 | | |
| -25.400 | 0.723 | -0.048 | -25.92 | -8.09 | | 2 | 145.69 | 4.55 | 20600 | 2 | 145.56 | | 20600 | | |
| -25.675 | 0.710 | -0.052 | -28.13 | -7.98 | | 2 | 147.10 | 4.55 | 20600 | 2 | 146.40 | | 20600 | | |
| -25.950 | 0.695 | -0.055 | -30.29 | -7.70 | | 2 | 148.53 | 4.55 | 20600 | 2 | 147.22 | | 20600 | | |
| -26.225 | 0.679 | -0.059 | -32.35 | -7.26 | | 2 | 149.98 | 4.55 | 20600 | 2 | 148.02 | | 20600 | | |
| -26.500 | 0.662 | -0.064 | -34.27 | -6.62 | | 2 | 151.45 | 4.55 | 20600 | 2 | 148.80 | | 20600 | | |
| -26.775 | 0.644 | -0.068 | -35.98 | -5.79 | | 2 | 152.95 | 4.55 | 20600 | 2 | 149.56 | | 20600 | | |
| -27.050 | 0.625 | -0.073 | -37.43 | -4.75 | | 2 | 154.47 | 4.55 | 20600 | 2 | 150.28 | | 20600 | | |
| -27.325 | 0.604 | -0.077 | -38.57 | -3.48 | | 2 | 156.03 | 4.55 | 20600 | 2 | 150.99 | | 20600 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.600 | 0.582 | -0.082 | -39.32 | -1.97 | | 2 | 157.60 | 4.55 | 20600 | 2 | 151.66 | | 20600 | | |
| -28.100 | 0.539 | -0.091 | -39.49 | 1.45 | | 2 | 160.54 | 4.55 | 20600 | 2 | 152.81 | | 20600 | | |
| -28.375 | 0.513 | -0.096 | -38.79 | 3.72 | | 2 | 162.20 | 4.55 | 20600 | 2 | 153.41 | | 20600 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |



FASE 1 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -28.650 | 0.486 | -0.101 | -37.42 | 6.29 | | 2 | 163.89 | 4.55 | 20600 | 2 | 153.98 | | 20600 | | |
| -28.925 | 0.458 | -0.106 | -35.30 | 9.18 | | 2 | 165.60 | 4.55 | 20600 | 2 | 154.52 | | 20600 | | |
| -29.200 | 0.428 | -0.110 | -32.34 | 12.39 | | 2 | 167.33 | 4.55 | 20600 | 2 | 155.03 | | 20600 | | |
| | | | | | | 2 | 146.17 | 4.26 | 43800 | 2 | 155.65 | | 43800 | | |
| -29.513 | 0.393 | -0.114 | -28.88 | 9.91 | | 2 | 149.04 | 4.26 | 43800 | 2 | 155.45 | | 43800 | | |
| -29.825 | 0.357 | -0.118 | -26.04 | 8.41 | | 2 | 151.96 | 4.26 | 43800 | 2 | 155.19 | | 43800 | | |
| -30.138 | 0.319 | -0.122 | -23.52 | 7.91 | | 2 | 154.93 | 4.26 | 43800 | 2 | 154.88 | | 43800 | | |
| -30.450 | 0.281 | -0.125 | -20.99 | 8.45 | | 2 | 157.95 | 4.26 | 43800 | 2 | 154.52 | | 43800 | | |
| -30.763 | 0.241 | -0.128 | -18.13 | 10.06 | | 2 | 161.01 | 4.26 | 43800 | 2 | 154.13 | | 43800 | | |
| -31.075 | 0.201 | -0.130 | -14.59 | 12.76 | | 2 | 164.10 | 4.26 | 43800 | 2 | 153.70 | | 43800 | | |
| -31.388 | 0.160 | -0.132 | -10.03 | 16.57 | | 2 | 167.22 | 4.26 | 43800 | 2 | 153.24 | | 43800 | | |
| -31.700 | 0.119 | -0.133 | -4.11 | 21.51 | | 2 | 170.37 | 4.26 | 43800 | 2 | 152.76 | | 43800 | | |
| | | | | | | 2 | 26.96 | 1.52 | 300000 | 2 | 88.34 | | 300000 | | |
| -32.200 | 0.053 | -0.133 | 0.63 | 0.79 | | 2 | 47.88 | 1.52 | 300000 | 2 | 69.39 | | 300000 | | |
| -32.700 | -0.014 | -0.133 | 0.00 | 0.00 | | 2 | 68.80 | 1.52 | 300000 | 2 | 50.45 | | 300000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN |

DESPLAZAMIENTO MÁX. = 5.38 mm

MOMENTO MÁXIMO = 147.75 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 143.59 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.093 = (3180.33 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.118 = (3180.33 kN/m)/(26962.71 kN/m) SIN INTERÉS



** FASE No 2 **

*Fase 2
*Ejecucion del nivel cubierta
*Excavacion hasta nivel rampa de autobuses.

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 1
NIVEL = -2.250 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 5200000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -10.150 m



FASE 2

PARED

SOIL 1: EXCAVACIÓN: 0.00 m; NIVEL AGUA: -12.70 m; S. DE CAQUOT: 10.00 kPa

SOIL 2: EXCAVACIÓN: -10.15 m; NIVEL AGUA: -12.70 m; S. DE CAQUOT: 0.00 kPa

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 3.700 | 0.262 | 0.00 | 0.00 | | -1 | | | | 0 | | | |
| -0.275 | 3.772 | 0.262 | 0.00 | 0.00 | | -1 | | | | 0 | | | |
| -0.550 | 3.844 | 0.262 | 0.08 | 0.87 | | 2 | 6.34 | 5.15 | 4900 | 0 | | | |
| -0.825 | 3.916 | 0.262 | 0.57 | 2.69 | | 2 | 6.89 | 5.15 | 4900 | 0 | | | |
| -1.100 | 3.988 | 0.262 | 1.57 | 4.66 | | 2 | 7.44 | 5.15 | 4900 | 0 | | | |
| -1.375 | 4.060 | 0.262 | 3.14 | 6.78 | | 2 | 8.00 | 5.15 | 4900 | 0 | | | |
| -1.650 | 4.132 | 0.263 | 5.32 | 9.06 | | 2 | 8.55 | 5.15 | 4900 | 0 | | | |
| -1.925 | 4.204 | 0.264 | 8.14 | 11.48 | | 2 | 9.10 | 4.27 | 4900 | 0 | | | |
| -2.200 | 4.277 | 0.265 | 11.65 | 14.06 | | 2 | 9.65 | 3.25 | 4900 | 0 | | | |
| -2.250 | 4.290 | 0.265 | 12.36 | 14.55 | | 1 | 9.86 | 3.17 | 4900 | 0 | | | |
| | | | | -99.83 | | 1 | 9.86 | 3.17 | 4900 | 0 | | | 1 -114.38 |
| -2.675 | 4.403 | 0.263 | -29.10 | -95.13 | | 1 | 12.28 | 3.17 | 4900 | 0 | | | |
| -3.100 | 4.513 | 0.254 | -68.35 | -89.39 | | 1 | 14.71 | 3.17 | 4900 | 0 | | | |
| -3.600 | 4.635 | 0.233 | -111.09 | -81.32 | | 1 | 17.56 | 3.17 | 4900 | 0 | | | |
| -4.100 | 4.745 | 0.204 | -149.44 | -71.83 | | 1 | 20.41 | 3.17 | 4900 | 0 | | | |
| -4.600 | 4.838 | 0.165 | -182.65 | -60.71 | | 2 | 24.09 | 3.99 | 4900 | 0 | | | |
| -5.100 | 4.909 | 0.121 | -209.81 | -47.59 | | 2 | 28.37 | 5.15 | 4900 | 0 | | | |
| -5.600 | 4.957 | 0.070 | -229.88 | -32.30 | | 2 | 32.77 | 5.15 | 4900 | 0 | | | |
| -6.100 | 4.979 | 0.016 | -241.74 | -14.79 | | 2 | 37.30 | 5.15 | 4900 | 0 | | | |
| -6.600 | 4.973 | -0.039 | -244.28 | 5.03 | | 2 | 41.96 | 5.15 | 4900 | 0 | | | |
| -7.100 | 4.940 | -0.095 | -236.32 | 27.21 | | 2 | 46.76 | 5.15 | 4900 | 0 | | | |
| | | | | | | 1 | 22.45 | 2.91 | 15100 | 0 | | | |
| -7.394 | 4.907 | -0.126 | -227.33 | 34.04 | | 1 | 24.03 | 2.91 | 15100 | 0 | | | |
| -7.688 | 4.866 | -0.155 | -216.28 | 41.33 | | 1 | 25.61 | 2.91 | 15100 | 0 | | | |
| -7.981 | 4.816 | -0.184 | -203.01 | 49.08 | | 1 | 27.19 | 2.91 | 15100 | 0 | | | |
| -8.275 | 4.758 | -0.210 | -187.40 | 57.30 | | 1 | 28.77 | 2.91 | 15100 | 0 | | | |
| -8.569 | 4.693 | -0.234 | -169.30 | 65.98 | | 1 | 30.35 | 2.91 | 15100 | 0 | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -8.862 | 4.621 | -0.255 | -148.58 | 75.13 | 1 | 31.93 | 2.91 | 15100 | 0 | | | | | |
| -9.156 | 4.543 | -0.273 | -125.11 | 84.75 | 1 | 33.51 | 2.91 | 15100 | 0 | | | | | |
| -9.450 | 4.461 | -0.289 | -98.75 | 94.82 | 1 | 35.10 | 2.91 | 15100 | 0 | | | | | |
| -9.800 | 4.357 | -0.302 | -63.37 | 107.44 | 1 | 36.98 | 2.91 | 15100 | 0 | | | | | |
| -10.150 | 4.250 | -0.309 | -23.47 | 120.71 | 1 | 38.86 | 2.91 | 15100 | 0 | | | | | |
| | | | | | 1 | 38.86 | 2.91 | 15100 | 3 | 53.02 | | 15100 | | |
| -10.200 | 4.235 | -0.309 | -17.45 | 119.94 | 1 | 39.13 | 2.91 | 15100 | 3 | 55.91 | | 15100 | | |
| | | | | | 1 | 29.79 | 2.68 | 20600 | 3 | 76.81 | | 20600 | | |
| -10.500 | 4.142 | -0.309 | 16.26 | 104.33 | 1 | 31.32 | 2.68 | 20600 | 2 | 88.34 | | 20600 | | |
| -10.800 | 4.050 | -0.305 | 45.01 | 87.35 | 1 | 32.84 | 2.68 | 20600 | 2 | 89.04 | | 20600 | | |
| -11.100 | 3.960 | -0.297 | 68.69 | 70.61 | 1 | 34.37 | 2.68 | 20600 | 2 | 89.77 | | 20600 | | |
| -11.400 | 3.872 | -0.286 | 87.39 | 54.10 | 1 | 35.90 | 2.68 | 20600 | 2 | 90.56 | | 20600 | | |
| -11.700 | 3.788 | -0.273 | 101.17 | 37.80 | 1 | 37.43 | 2.68 | 20600 | 2 | 91.43 | | 20600 | | |
| -12.000 | 3.708 | -0.259 | 110.09 | 21.69 | 1 | 38.95 | 2.68 | 20600 | 2 | 92.38 | | 20600 | | |
| -12.300 | 3.633 | -0.243 | 114.20 | 5.73 | 1 | 40.48 | 2.68 | 20600 | 2 | 93.42 | | 20600 | | |
| -12.600 | 3.562 | -0.228 | 113.54 | -10.09 | 1 | 42.01 | 2.68 | 20600 | 2 | 94.56 | | 20600 | | |
| | | | | | 2 | 62.97 | 4.85 | 15100 | 2 | 76.36 | | 15100 | | |
| -12.700 | 3.540 | -0.222 | 112.47 | -11.40 | 2 | 64.21 | 4.85 | 15100 | 2 | 76.92 | | 15100 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN | |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.150 | 3.445 | -0.200 | 106.15 | -16.47 | | 2 67.50 | 4.85 | 15100 | 2 | 77.34 | 15100 | | |
| -13.600 | 3.360 | -0.179 | 97.83 | -20.32 | | 2 70.64 | 4.85 | 15100 | 2 | 77.91 | 15100 | | |
| -13.950 | 3.300 | -0.164 | 90.31 | -22.54 | | 2 72.99 | 4.85 | 15100 | 2 | 78.44 | 15100 | | |
| -14.300 | 3.245 | -0.150 | 82.12 | -24.16 | | 2 75.26 | 4.85 | 15100 | 2 | 79.06 | 15100 | | |
| -14.800 | 3.174 | -0.133 | 69.65 | -25.53 | | 2 78.39 | 4.85 | 15100 | 2 | 80.05 | 15100 | | |
| -15.105 | 3.135 | -0.124 | 61.81 | -25.86 | | 2 80.23 | 4.85 | 15100 | 2 | 80.72 | 15100 | | |
| -15.410 | 3.099 | -0.116 | 53.92 | -25.84 | | 2 82.04 | 4.85 | 15100 | 2 | 81.43 | 15100 | | |
| -15.715 | 3.065 | -0.109 | 46.08 | -25.49 | | 2 83.81 | 4.85 | 15100 | 2 | 82.17 | 15100 | | |
| -16.020 | 3.032 | -0.103 | 38.40 | -24.84 | | 2 85.56 | 4.85 | 15100 | 2 | 82.94 | 15100 | | |
| -16.306 | 3.004 | -0.098 | 31.41 | -23.97 | | 2 87.17 | 4.85 | 15100 | 2 | 83.68 | 15100 | | |
| -16.593 | 2.976 | -0.095 | 24.70 | -22.85 | | 2 88.77 | 4.85 | 15100 | 2 | 84.45 | 15100 | | |
| -16.879 | 2.950 | -0.092 | 18.35 | -21.50 | | 2 90.35 | 4.85 | 15100 | 2 | 85.23 | 15100 | | |
| -17.165 | 2.924 | -0.090 | 12.41 | -19.92 | | 2 91.92 | 4.85 | 15100 | 2 | 86.01 | 15100 | | |
| -17.451 | 2.898 | -0.088 | 6.96 | -18.12 | | 2 93.49 | 4.85 | 15100 | 2 | 86.81 | 15100 | | |
| -17.738 | 2.873 | -0.088 | 2.06 | -16.10 | | 2 95.05 | 4.85 | 15100 | 2 | 87.61 | 15100 | | |
| -18.024 | 2.848 | -0.088 | -2.23 | -13.86 | | 2 96.61 | 4.85 | 15100 | 2 | 88.41 | 15100 | | |
| -18.310 | 2.823 | -0.088 | -5.85 | -11.41 | | 2 98.17 | 4.85 | 15100 | 2 | 89.21 | 15100 | | |
| -18.596 | 2.797 | -0.089 | -8.74 | -8.73 | | 2 99.73 | 4.85 | 15100 | 2 | 90.01 | 15100 | | |
| -18.883 | 2.771 | -0.091 | -10.83 | -5.83 | | 2 101.30 | 4.85 | 15100 | 2 | 90.80 | 15100 | | |
| -19.169 | 2.745 | -0.092 | -12.06 | -2.71 | | 2 102.88 | 4.85 | 15100 | 2 | 91.58 | 15100 | | |
| -19.455 | 2.719 | -0.094 | -12.36 | 0.63 | | 2 104.46 | 4.85 | 15100 | 2 | 92.36 | 15100 | | |
| -19.741 | 2.691 | -0.095 | -11.68 | 4.21 | | 2 106.05 | 4.85 | 15100 | 2 | 93.13 | 15100 | | |
| -20.028 | 2.664 | -0.097 | -9.93 | 8.03 | | 2 107.64 | 4.85 | 15100 | 2 | 93.90 | 15100 | | |
| -20.314 | 2.636 | -0.098 | -7.06 | 12.09 | | 2 109.24 | 4.85 | 15100 | 2 | 94.65 | 15100 | | |
| -20.600 | 2.608 | -0.099 | -2.99 | 16.38 | | 2 110.85 | 4.85 | 15100 | 2 | 95.41 | 15100 | | |
| | | | | | | 2 87.21 | 4.55 | 20600 | 2 | 106.29 | 20600 | | |
| -20.903 | 2.578 | -0.099 | 1.11 | 10.80 | | 2 89.07 | 4.55 | 20600 | 2 | 106.91 | 20600 | | |
| -21.205 | 2.548 | -0.098 | 3.58 | 5.58 | | 2 90.92 | 4.55 | 20600 | 2 | 107.54 | 20600 | | |
| -21.508 | 2.519 | -0.098 | 4.53 | 0.74 | | 2 92.77 | 4.55 | 20600 | 2 | 108.16 | 20600 | | |
| -21.810 | 2.489 | -0.097 | 4.07 | -3.73 | | 2 94.61 | 4.55 | 20600 | 2 | 108.80 | 20600 | | |
| -22.113 | 2.460 | -0.097 | 2.31 | -7.84 | | 2 96.46 | 4.55 | 20600 | 2 | 109.43 | 20600 | | |
| -22.415 | 2.431 | -0.097 | -0.64 | -11.58 | | 2 98.30 | 4.55 | 20600 | 2 | 110.07 | 20600 | | |
| -22.718 | 2.401 | -0.097 | -4.66 | -14.96 | | 2 100.14 | 4.55 | 20600 | 2 | 110.70 | 20600 | | |
| -23.020 | 2.372 | -0.098 | -9.65 | -17.97 | | 2 101.98 | 4.55 | 20600 | 2 | 111.34 | 20600 | | |
| -23.520 | 2.322 | -0.101 | -19.72 | -22.14 | | 2 105.05 | 4.55 | 20600 | 2 | 112.36 | 20600 | | |
| -24.020 | 2.270 | -0.107 | -31.62 | -25.26 | | 2 108.17 | 4.55 | 20600 | 2 | 113.34 | 20600 | | |
| -24.520 | 2.215 | -0.116 | -44.79 | -27.27 | | 2 111.36 | 4.55 | 20600 | 2 | 114.24 | 20600 | | |
| -24.550 | 2.211 | -0.116 | -45.61 | -27.35 | | 2 111.56 | 4.55 | 20600 | 2 | 114.29 | 20600 | | |
| -24.975 | 2.160 | -0.126 | -57.42 | -28.06 | | 2 114.36 | 4.55 | 20600 | 2 | 114.97 | 20600 | | |
| -25.400 | 2.104 | -0.139 | -69.33 | -27.83 | | 2 117.26 | 4.55 | 20600 | 2 | 115.55 | 20600 | | |
| -25.675 | 2.064 | -0.148 | -76.90 | -27.14 | | 2 119.20 | 4.55 | 20600 | 2 | 115.87 | 20600 | | |
| -25.950 | 2.022 | -0.158 | -84.22 | -25.98 | | 2 121.19 | 4.55 | 20600 | 2 | 116.13 | 20600 | | |
| -26.225 | 1.977 | -0.169 | -91.15 | -24.34 | | 2 123.24 | 4.55 | 20600 | 2 | 116.33 | 20600 | | |
| -26.500 | 1.929 | -0.181 | -97.55 | -22.17 | | 2 125.36 | 4.55 | 20600 | 2 | 116.47 | 20600 | | |
| -26.775 | 1.878 | -0.193 | -103.29 | -19.43 | | 2 127.54 | 4.55 | 20600 | 2 | 116.53 | 20600 | | |
| -27.050 | 1.823 | -0.207 | -108.19 | -16.09 | | 2 129.80 | 4.55 | 20600 | 2 | 116.52 | 20600 | | |
| -27.325 | 1.764 | -0.221 | -112.08 | -12.11 | | 2 132.14 | 4.55 | 20600 | 2 | 116.44 | 20600 | | |
| -27.600 | 1.701 | -0.235 | -114.78 | -7.44 | | 2 134.55 | 4.55 | 20600 | 2 | 116.28 | 20600 | | |
| -28.100 | 1.577 | -0.261 | -116.00 | 2.98 | | 2 139.16 | 4.55 | 20600 | 2 | 115.77 | 20600 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN | |





FASE 2 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -28.375 | 1.504 | -0.276 | -114.26 | 9.83 | | 2 141.80 | 4.55 | 20600 | 2 | 115.37 | 20600 | | |
| -28.650 | 1.426 | -0.290 | -110.52 | 17.54 | | 2 144.53 | 4.55 | 20600 | 2 | 114.90 | 20600 | | |
| -28.925 | 1.344 | -0.303 | -104.53 | 26.15 | | 2 147.34 | 4.55 | 20600 | 2 | 114.34 | 20600 | | |
| -29.200 | 1.259 | -0.316 | -96.05 | 35.70 | | 2 150.22 | 4.55 | 20600 | 2 | 113.71 | 20600 | | |
| | | | | | | 2 109.78 | 4.26 | 43800 | 2 | 137.33 | 43800 | | |
| -29.513 | 1.158 | -0.329 | -86.09 | 28.48 | | 2 115.53 | 4.26 | 43800 | 2 | 134.24 | 43800 | | |
| -29.825 | 1.053 | -0.341 | -77.96 | 24.06 | | 2 121.45 | 4.26 | 43800 | 2 | 130.99 | 43800 | | |
| -30.138 | 0.945 | -0.351 | -70.75 | 22.56 | | 2 127.52 | 4.26 | 43800 | 2 | 127.58 | 43800 | | |
| -30.450 | 0.834 | -0.361 | -63.54 | 24.06 | | 2 133.72 | 4.26 | 43800 | 2 | 124.04 | 43800 | | |
| -30.763 | 0.720 | -0.369 | -55.39 | 28.65 | | 2 140.05 | 4.26 | 43800 | 2 | 120.37 | 43800 | | |
| -31.075 | 0.603 | -0.377 | -45.31 | 36.40 | | 2 146.49 | 4.26 | 43800 | 2 | 116.60 | 43800 | | |
| -31.388 | 0.485 | -0.382 | -32.30 | 47.36 | | 2 153.02 | 4.26 | 43800 | 2 | 112.73 | 43800 | | |
| -31.700 | 0.365 | -0.386 | -15.36 | 61.60 | | 2 159.61 | 4.26 | 43800 | 2 | 108.81 | 43800 | | |
| | | | | | | -1 | | | 2 | 142.51 | 300000 | | |
| -32.200 | 0.171 | -0.387 | 0.51 | 7.64 | | 2 12.23 | 1.52 | 300000 | 2 | 85.52 | 300000 | | |
| -32.700 | -0.022 | -0.387 | 0.00 | 0.00 | | 2 71.22 | 1.52 | 300000 | 2 | 28.50 | 300000 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | | kN | |

DESPLAZAMIENTO MÁX. = 4.98 mm

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA

| | MOMENTO MÁXIMO = -244.28 kN.m/m | DE SUELO : 2 = ELÁSTICO<br>3 = PRESIÓN PASSIVA | |
|---|---|---|---|

( 3 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 134.27 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.070 = (2381.74 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.155 = (2267.35 kN/m)/(14595.14 kN/m) SIN INTERÉS



** FASE No 3 **

*Fase 3
*Ejecucion del nivel de autobuses
*Excavacion hasta nivel peatonal (acceso estación Normal)

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 2
NIVEL = -9.450 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 3466667.250 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -14.300 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -14.800 m



FASE 3

| | PARED | | | | | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -12.70 m<br>S. DE CAQUOT: 10.00 kPa | | | | SOIL 2<br>EXCAVACIÓN: -14.30 m<br>NIVEL AGUA: -14.80 m<br>S. DE CAQUOT: 0.00 kPa | | | | PUNTALES/ ANCLAS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
| 0.000 | 4.060 | 0.098 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.275 | 4.087 | 0.098 | 0.00 | 0.00 | | -1 | | | | 0 | | | | | |
| -0.550 | 4.114 | 0.098 | 0.06 | 0.69 | | 2 | 5.01 | 5.01 | 4900 | 0 | | | | | |
| -0.825 | 4.141 | 0.098 | 0.45 | 2.17 | | 2 | 5.79 | 5.15 | 4900 | 0 | | | | | |
| -1.100 | 4.168 | 0.098 | 1.28 | 3.87 | | 2 | 6.56 | 5.15 | 4900 | 0 | | | | | |
| -1.375 | 4.195 | 0.098 | 2.60 | 5.78 | | 2 | 7.33 | 5.15 | 4900 | 0 | | | | | |
| -1.650 | 4.222 | 0.099 | 4.48 | 7.91 | | 2 | 8.11 | 4.84 | 4900 | 0 | | | | | |
| -1.925 | 4.249 | 0.099 | 6.97 | 10.24 | | 2 | 8.88 | 4.05 | 4900 | 0 | | | | | |
| -2.200 | 4.277 | 0.100 | 10.13 | 12.79 | | 2 | 9.65 | 3.25 | 4900 | 0 | | | | | |
| -2.250 | 4.282 | 0.101 | 10.78 | 13.28 | | 2 | 9.90 | 3.21 | 4900 | 0 | | | | | |
| | | | | -55.70 | | 2 | 9.90 | 3.21 | 4900 | 0 | | | | 1 | -68.98 |
| -2.675 | 4.325 | 0.101 | -11.91 | -50.90 | | 2 | 12.67 | 3.55 | 4900 | 0 | | | | | |
| -3.100 | 4.367 | 0.096 | -32.32 | -44.93 | | 2 | 15.43 | 3.89 | 4900 | 0 | | | | | |
| -3.600 | 4.412 | 0.086 | -52.72 | -36.41 | | 2 | 18.65 | 4.26 | 4900 | 0 | | | | | |
| -4.100 | 4.452 | 0.073 | -68.46 | -26.28 | | 2 | 21.85 | 4.60 | 4900 | 0 | | | | | |
| -4.600 | 4.484 | 0.056 | -78.70 | -14.37 | | 2 | 25.82 | 5.15 | 4900 | 0 | | | | | |
| -5.100 | 4.508 | 0.037 | -82.47 | -0.33 | | 2 | 30.34 | 5.15 | 4900 | 0 | | | | | |
| -5.600 | 4.522 | 0.019 | -78.65 | 15.98 | | 2 | 34.91 | 5.15 | 4900 | 0 | | | | | |
| -6.100 | 4.527 | 0.002 | -66.11 | 34.59 | | 2 | 39.52 | 5.15 | 4900 | 0 | | | | | |
| -6.600 | 4.524 | -0.011 | -43.68 | 55.51 | | 2 | 44.16 | 5.15 | 4900 | 0 | | | | | |
| -7.100 | 4.517 | -0.017 | -10.21 | 78.76 | | 2 | 48.84 | 5.15 | 4900 | 0 | | | | | |
| | | | | | | 2 | 28.83 | 4.85 | 15100 | 0 | | | | | |
| -7.394 | 4.512 | -0.017 | 14.19 | 87.40 | | 2 | 30.00 | 4.85 | 15100 | 0 | | | | | |
| -7.688 | 4.507 | -0.013 | 41.17 | 96.36 | | 2 | 31.03 | 4.85 | 15100 | 0 | | | | | |
| -7.981 | 4.504 | -0.006 | 70.83 | 105.61 | | 2 | 31.90 | 4.85 | 15100 | 0 | | | | | |
| -8.275 | 4.504 | 0.006 | 103.24 | 115.08 | | 2 | 32.61 | 4.85 | 15100 | 0 | | | | | |
| -8.569 | 4.508 | 0.022 | 138.46 | 124.74 | | 2 | 33.15 | 4.85 | 15100 | 0 | | | | | |
| -8.862 | 4.517 | 0.043 | 176.53 | 134.53 | | 2 | 33.50 | 4.48 | 15100 | 0 | | | | | |
| -9.156 | 4.534 | 0.069 | 217.50 | 144.39 | | 2 | 33.66 | 3.06 | 15100 | 0 | | | | | |
| -9.450 | 4.559 | 0.102 | 261.39 | 154.49 | | 1 | 35.10 | 2.91 | 15100 | 0 | | | | | |
| | | | | -184.84 | | 1 | 35.10 | 2.91 | 15100 | 0 | | | | 2 | -339.33 |
| -9.800 | 4.601 | 0.138 | 198.88 | -172.22 | | 1 | 36.98 | 2.91 | 15100 | 0 | | | | | |
| -10.150 | 4.654 | 0.165 | 140.91 | -158.95 | | 1 | 38.86 | 2.91 | 15100 | 0 | | | | | |
| -10.200 | 4.663 | 0.168 | 133.01 | -157.00 | | 1 | 39.13 | 2.91 | 15100 | 0 | | | | | |
| | | | | | | 1 | 29.79 | 2.68 | 20600 | 0 | | | | | |
| -10.500 | 4.716 | 0.184 | 87.27 | -147.84 | | 1 | 31.32 | 2.68 | 20600 | 0 | | | | | |
| -10.800 | 4.772 | 0.192 | 44.35 | -138.21 | | 1 | 32.84 | 2.68 | 20600 | 0 | | | | | |
| -11.100 | 4.831 | 0.196 | 4.39 | -128.13 | | 1 | 34.37 | 2.68 | 20600 | 0 | | | | | |
| -11.400 | 4.889 | 0.194 | -32.48 | -117.59 | | 1 | 35.90 | 2.68 | 20600 | 0 | | | | | |
| -11.700 | 4.946 | 0.187 | -66.12 | -106.59 | | 1 | 37.43 | 2.68 | 20600 | 0 | | | | | |
| -12.000 | 5.001 | 0.176 | -96.39 | -95.13 | | 1 | 38.95 | 2.68 | 20600 | 0 | | | | | |
| -12.300 | 5.052 | 0.161 | -123.15 | -83.22 | | 1 | 40.48 | 2.68 | 20600 | 0 | | | | | |
| -12.600 | 5.097 | 0.142 | -146.27 | -70.84 | | 1 | 42.01 | 2.68 | 20600 | 0 | | | | | |
| | | | | | | 1 | 52.40 | 2.91 | 15100 | 0 | | | | | |
| -12.700 | 5.111 | 0.135 | -153.09 | -65.58 | | 1 | 52.94 | 2.91 | 15100 | 0 | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | | kN | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | | ESTADO PR. | SOPRAC. | ELAST. | | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.150 | 5.164 | 0.101 | -177.06 | -40.51 | 4.41 | 1 | 54.05 | 2.91 | 15100 | 0 | | | | | |
| -13.600 | 5.202 | 0.064 | -189.18 | -12.95 | 8.83 | 1 | 55.17 | 2.91 | 15100 | 0 | | | | | |
| -13.950 | 5.219 | 0.033 | -189.70 | 10.20 | 12.26 | 1 | 56.03 | 2.91 | 15100 | 0 | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14.300 | 5.225 | 0.003 | -181.86 | 34.85 | 15.70 | 1 | 56.90 | 2.91 | 15100 | 0 | | | | | | | |
| | | | | | 15.70 | 1 | 56.90 | 2.91 | 15100 | 3 | 53.02 | | 15100 | | | | |
| -14.800 | 5.217 | -0.036 | -162.94 | 38.95 | 20.60 | 1 | 58.14 | 2.91 | 15100 | 3 | 81.92 | | 15100 | | | | |
| -15.105 | 5.202 | -0.058 | -151.23 | 37.73 | 20.60 | 1 | 58.89 | 2.91 | 15100 | 2 | 84.30 | | 15100 | | | | |
| -15.410 | 5.181 | -0.078 | -139.95 | 36.24 | 20.60 | 1 | 59.65 | 2.91 | 15100 | 2 | 85.24 | | 15100 | | | | |
| -15.715 | 5.155 | -0.097 | -129.13 | 34.70 | 20.60 | 1 | 60.40 | 2.91 | 15100 | 2 | 86.09 | | 15100 | | | | |
| -16.020 | 5.122 | -0.114 | -118.78 | 33.14 | 20.60 | 1 | 61.15 | 2.91 | 15100 | 2 | 86.86 | | 15100 | | | | |
| -16.306 | 5.088 | -0.129 | -109.51 | 31.69 | 20.60 | 1 | 61.86 | 2.91 | 15100 | 2 | 87.52 | | 15100 | | | | |
| -16.593 | 5.049 | -0.143 | -100.64 | 30.26 | 20.60 | 1 | 62.57 | 2.91 | 15100 | 2 | 88.11 | | 15100 | | | | |
| -16.879 | 5.006 | -0.155 | -92.18 | 28.87 | 20.60 | 1 | 63.28 | 2.91 | 15100 | 2 | 88.64 | | 15100 | | | | |
| -17.165 | 4.960 | -0.167 | -84.11 | 27.54 | 20.60 | 1 | 63.99 | 2.91 | 15100 | 2 | 89.13 | | 15100 | | | | |
| -17.451 | 4.910 | -0.177 | -76.40 | 26.28 | 20.60 | 1 | 64.69 | 2.91 | 15100 | 2 | 89.56 | | 15100 | | | | |
| -17.738 | 4.858 | -0.187 | -69.05 | 25.10 | 20.60 | 1 | 65.40 | 2.91 | 15100 | 2 | 89.95 | | 15100 | | | | |
| -18.024 | 4.803 | -0.196 | -62.01 | 24.16 | 20.60 | 2 | 67.08 | 3.88 | 15100 | 2 | 90.31 | | 15100 | | | | |
| -18.310 | 4.746 | -0.203 | -55.18 | 23.65 | 20.60 | 2 | 69.12 | 4.85 | 15100 | 2 | 90.63 | | 15100 | | | | |
| -18.596 | 4.687 | -0.210 | -48.42 | 23.65 | 20.60 | 2 | 71.19 | 4.85 | 15100 | 2 | 90.91 | | 15100 | | | | |
| -18.883 | 4.626 | -0.216 | -41.59 | 24.17 | 20.60 | 2 | 73.29 | 4.85 | 15100 | 2 | 91.17 | | 15100 | | | | |
| -19.169 | 4.564 | -0.221 | -34.53 | 25.22 | 20.60 | 2 | 75.42 | 4.85 | 15100 | 2 | 91.41 | | 15100 | | | | |
| -19.455 | 4.500 | -0.225 | -27.10 | 26.81 | 20.60 | 2 | 77.56 | 4.85 | 15100 | 2 | 91.62 | | 15100 | | | | |
| -19.741 | 4.435 | -0.228 | -19.13 | 28.96 | 20.60 | 2 | 79.72 | 4.85 | 15100 | 2 | 91.83 | | 15100 | | | | |
| -20.028 | 4.370 | -0.230 | -10.47 | 31.68 | 20.60 | 2 | 81.89 | 4.85 | 15100 | 2 | 92.02 | | 15100 | | | | |
| -20.314 | 4.304 | -0.231 | -0.94 | 34.96 | 20.60 | 2 | 84.06 | 4.85 | 15100 | 2 | 92.20 | | 15100 | | | | |
| -20.600 | 4.238 | -0.230 | 9.60 | 38.81 | 20.60 | 2 | 86.24 | 4.85 | 15100 | 2 | 92.39 | | 15100 | | | | |
| | | | | | 20.60 | 1 | 60.50 | 2.68 | 20600 | 2 | 113.94 | | 20600 | | | | |
| -20.903 | 4.168 | -0.228 | 19.85 | 29.02 | 20.60 | 1 | 61.23 | 2.68 | 20600 | 2 | 113.75 | | 20600 | | | | |
| -21.205 | 4.100 | -0.225 | 27.19 | 19.50 | 20.60 | 1 | 61.96 | 2.68 | 20600 | 2 | 113.58 | | 20600 | | | | |
| -21.508 | 4.033 | -0.221 | 31.68 | 10.25 | 20.60 | 1 | 62.69 | 2.68 | 20600 | 2 | 113.43 | | 20600 | | | | |
| -21.810 | 3.966 | -0.216 | 33.43 | 1.38 | 20.60 | 2 | 64.18 | 3.44 | 20600 | 2 | 113.30 | | 20600 | | | | |
| -22.113 | 3.902 | -0.211 | 32.58 | -6.85 | 20.60 | 2 | 66.75 | 4.55 | 20600 | 2 | 113.21 | | 20600 | | | | |
| -22.415 | 3.839 | -0.207 | 29.36 | -14.27 | 20.60 | 2 | 69.29 | 4.55 | 20600 | 2 | 113.15 | | 20600 | | | | |
| -22.718 | 3.776 | -0.203 | 24.02 | -20.92 | 20.60 | 2 | 71.81 | 4.55 | 20600 | 2 | 113.11 | | 20600 | | | | |
| -23.020 | 3.715 | -0.201 | 16.79 | -26.80 | 20.60 | 2 | 74.31 | 4.55 | 20600 | 2 | 113.09 | | 20600 | | | | |
| -23.520 | 3.616 | -0.198 | 1.29 | -34.86 | 20.60 | 2 | 78.41 | 4.55 | 20600 | 2 | 113.08 | | 20600 | | | | |
| -24.020 | 3.516 | -0.200 | -17.73 | -40.87 | 20.60 | 2 | 82.51 | 4.55 | 20600 | 2 | 113.08 | | 20600 | | | | |
| -24.520 | 3.415 | -0.207 | -39.24 | -44.81 | 20.60 | 2 | 86.65 | 4.55 | 20600 | 2 | 113.04 | | 20600 | | | | |
| -24.550 | 3.408 | -0.207 | -40.59 | -44.98 | 20.60 | 2 | 86.90 | 4.55 | 20600 | 2 | 113.03 | | 20600 | | | | |
| -24.975 | 3.318 | -0.217 | -60.09 | -46.55 | 20.60 | 2 | 90.49 | 4.55 | 20600 | 2 | 112.92 | | 20600 | | | | |
| -25.400 | 3.223 | -0.231 | -79.92 | -46.49 | 20.60 | 2 | 94.19 | 4.55 | 20600 | 2 | 112.70 | | 20600 | | | | |
| -25.675 | 3.159 | -0.241 | -92.59 | -45.55 | 20.60 | 2 | 96.65 | 4.55 | 20600 | 2 | 112.49 | | 20600 | | | | |
| -25.950 | 3.091 | -0.254 | -104.90 | -43.85 | 20.60 | 2 | 99.18 | 4.55 | 20600 | 2 | 112.21 | | 20600 | | | | |
| -26.225 | 3.019 | -0.268 | -116.64 | -41.36 | 20.60 | 2 | 101.78 | 4.55 | 20600 | 2 | 111.86 | | 20600 | | | | |
| -26.500 | 2.943 | -0.283 | -127.58 | -38.04 | 20.60 | 2 | 104.47 | 4.55 | 20600 | 2 | 111.43 | | 20600 | | | | |
| -26.775 | 2.863 | -0.300 | -137.48 | -33.84 | 20.60 | 2 | 107.25 | 4.55 | 20600 | 2 | 110.90 | | 20600 | | | | |
| -27.050 | 2.778 | -0.318 | -146.10 | -28.70 | 20.60 | 2 | 110.12 | 4.55 | 20600 | 2 | 110.28 | | 20600 | | | | |
| -27.325 | 2.688 | -0.336 | -153.17 | -22.57 | 20.60 | 2 | 113.10 | 4.55 | 20600 | 2 | 109.56 | | 20600 | | | | |
| -27.600 | 2.593 | -0.356 | -158.42 | -15.39 | 20.60 | 2 | 116.19 | 4.55 | 20600 | 2 | 108.72 | | 20600 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |



FASE 3 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -28.100 | 2.406 | -0.393 | -162.28 | 0.57 | 20.60 | 2 | 122.09 | 4.55 | 20600 | 2 | 106.91 | | 20600 |
| -28.375 | 2.295 | -0.413 | -160.71 | 11.04 | 20.60 | 2 | 125.50 | 4.55 | 20600 | 2 | 105.76 | | 20600 |
| -28.650 | 2.179 | -0.433 | -156.09 | 22.79 | 20.60 | 2 | 129.02 | 4.55 | 20600 | 2 | 104.49 | | 20600 |
| -28.925 | 2.057 | -0.452 | -148.05 | 35.89 | 20.60 | 2 | 132.65 | 4.55 | 20600 | 2 | 103.10 | | 20600 |
| -29.200 | 1.930 | -0.470 | -136.22 | 50.40 | 20.60 | 2 | 136.39 | 4.55 | 20600 | 2 | 101.62 | | 20600 |
| | | | | | 20.60 | 2 | 80.39 | 4.26 | 43800 | 2 | 142.45 | | 43800 |
| -29.513 | 1.780 | -0.488 | -122.28 | 39.50 | 20.60 | 2 | 88.28 | 4.26 | 43800 | 2 | 137.22 | | 43800 |
| -29.825 | 1.625 | -0.505 | -111.10 | 32.76 | 20.60 | 2 | 96.41 | 4.26 | 43800 | 2 | 131.75 | | 43800 |
| -30.138 | 1.465 | -0.520 | -101.35 | 30.35 | 20.60 | 2 | 104.76 | 4.26 | 43800 | 2 | 126.07 | | 43800 |
| -30.450 | 1.300 | -0.534 | -91.67 | 32.38 | 20.60 | 2 | 113.31 | 4.26 | 43800 | 2 | 120.18 | | 43800 |
| -30.763 | 1.131 | -0.546 | -80.63 | 38.98 | 20.60 | 2 | 122.03 | 4.26 | 43800 | 2 | 114.12 | | 43800 |
| -31.075 | 0.959 | -0.557 | -66.81 | 50.26 | 20.60 | 2 | 130.92 | 4.26 | 43800 | 2 | 107.90 | | 43800 |
| -31.388 | 0.783 | -0.565 | -48.73 | 66.29 | 20.60 | 2 | 139.93 | 4.26 | 43800 | 2 | 101.55 | | 43800 |
| -31.700 | 0.606 | -0.570 | -24.88 | 87.15 | 20.60 | 2 | 149.04 | 4.26 | 43800 | 2 | 95.10 | | 43800 |
| | | | | | 20.60 | -1 | | | | 2 | 206.24 | | 300000 |
| -32.200 | 0.320 | -0.573 | -0.98 | 15.53 | 20.60 | -1 | | | | 2 | 121.42 | | 300000 |
| -32.700 | 0.034 | -0.573 | 0.00 | 0.00 | 20.60 | 2 | 54.57 | 1.52 | 300000 | 2 | 36.49 | | 300000 |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |

DESPLAZAMIENTO MÁX. = 5.22 mm
MOMENTO MÁXIMO = 261.39 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 126.48 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.057 = (1946.21 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.196 = (1928.29 kN/m)/(9835.92 kN/m)



** FASE No 4 **

*Fase 4
*Ejecucion de losa peatonal acceso estación
*Excavacion hasta nivel puntales provisionales

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 3
NIVEL = -13.600 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN

* EXCAVACIÓN EN SUELO 2 PARA NIVEL = -24.020 m

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -24.520 m



FASE 4

| | PARED | SOIL 1 EXCAVACIÓN: 0.00 m NIVEL AGUA: -12.70 m S. DE CAQUOT: 10.00 kPa | SOIL 2 EXCAVACIÓN: -24.02 m NIVEL AGUA: -24.52 m S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 3.652 | 0.284 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 3.730 | 0.284 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 3.808 | 0.284 | 0.08 | 0.90 | | 2 | 6.51 | 5.15 4900 | 0 | | | | |
| -0.825 | 3.886 | 0.284 | 0.58 | 2.76 | | 2 | 7.03 | 5.15 4900 | 0 | | | | |
| -1.100 | 3.965 | 0.284 | 1.61 | 4.76 | | 2 | 7.56 | 5.15 4900 | 0 | | | | |
| -1.375 | 4.043 | 0.284 | 3.21 | 6.91 | | 2 | 8.08 | 5.15 4900 | 0 | | | | |
| -1.650 | 4.121 | 0.285 | 5.43 | 9.21 | | 2 | 8.60 | 5.15 4900 | 0 | | | | |
| -1.925 | 4.200 | 0.286 | 8.29 | 11.64 | | 2 | 9.12 | 4.29 4900 | 0 | | | | |
| -2.200 | 4.278 | 0.287 | 11.84 | 14.23 | | 2 | 9.65 | 3.24 4900 | 0 | | | | |
| -2.250 | 4.293 | 0.287 | 12.57 | 14.71 | | 1 | 9.86 | 3.17 4900 | 0 | | | | |
| | | | | -111.40 | | 1 | 9.86 | 3.17 4900 | 0 | | | 1 | -126.12 |
| -2.675 | 4.415 | 0.285 | -33.81 | -106.70 | | 1 | 12.28 | 3.17 4900 | 0 | | | | |
| -3.100 | 4.534 | 0.274 | -77.98 | -100.96 | | 1 | 14.71 | 3.17 4900 | 0 | | | | |
| -3.600 | 4.666 | 0.251 | -126.50 | -92.89 | | 1 | 17.56 | 3.17 4900 | 0 | | | | |
| -4.100 | 4.783 | 0.217 | -170.64 | -83.40 | | 1 | 20.41 | 3.17 4900 | 0 | | | | |
| -4.600 | 4.881 | 0.173 | -209.64 | -72.33 | | 2 | 23.88 | 3.78 4900 | 0 | | | | |
| -5.100 | 4.955 | 0.122 | -242.64 | -59.32 | | 2 | 28.15 | 5.15 4900 | 0 | | | | |
| -5.600 | 5.001 | 0.063 | -268.60 | -44.15 | | 2 | 32.55 | 5.15 4900 | 0 | | | | |
| -6.100 | 5.017 | 0.000 | -286.41 | -26.73 | | 2 | 37.11 | 5.15 4900 | 0 | | | | |
| -6.600 | 5.001 | -0.067 | -294.94 | -6.99 | | 2 | 41.83 | 5.15 4900 | 0 | | | | |
| -7.100 | 4.950 | -0.134 | -293.01 | 15.14 | | 2 | 46.71 | 5.15 4900 | 0 | | | | |
| | | | | | | 1 | 22.45 | 2.91 15100 | 0 | | | | |
| -7.394 | 4.905 | -0.173 | -287.57 | 21.97 | | 2 | 24.06 | 2.94 15100 | 0 | | | | |
| -7.688 | 4.849 | -0.211 | -280.05 | 29.30 | | 2 | 25.87 | 3.17 15100 | 0 | | | | |
| -7.981 | 4.781 | -0.248 | -270.30 | 37.17 | | 2 | 27.72 | 3.44 15100 | 0 | | | | |
| -8.275 | 4.703 | -0.284 | -258.16 | 45.59 | | 2 | 29.61 | 3.75 15100 | 0 | | | | |
| -8.569 | 4.615 | -0.317 | -243.46 | 54.57 | | 2 | 31.54 | 4.09 15100 | 0 | | | | |
| -8.862 | 4.517 | -0.349 | -226.04 | 64.13 | | 2 | 33.51 | 4.49 15100 | 0 | | | | |
| -9.156 | 4.410 | -0.378 | -205.73 | 74.27 | | 2 | 35.53 | 4.85 15100 | 0 | | | | |
| -9.450 | 4.295 | -0.404 | -182.33 | 85.23 | | 2 | 39.08 | 4.85 15100 | 0 | | | | |
| | | | | 660.32 | | 2 | 39.08 | 4.85 15100 | 0 | | | 2 | 575.10 |
| -9.800 | 4.151 | -0.414 | 51.27 | 674.82 | | 2 | 43.78 | 4.85 15100 | 0 | | | | |
| -10.150 | 4.009 | -0.387 | 290.24 | 690.99 | | 2 | 48.61 | 4.85 15100 | 0 | | | | |
| -10.200 | 3.990 | -0.380 | 324.85 | 693.44 | | 2 | 49.29 | 4.85 15100 | 0 | | | | |
| | | | | | | 2 | 43.65 | 4.55 20600 | 0 | | | | |
| -10.500 | 3.884 | -0.321 | 534.92 | 707.25 | | 2 | 48.45 | 4.55 20600 | 0 | | | | |
| -10.800 | 3.800 | -0.234 | 749.34 | 722.45 | | 2 | 52.87 | 4.55 20600 | 0 | | | | |
| -11.100 | 3.747 | -0.116 | 968.51 | 738.89 | | 2 | 56.70 | 4.55 20600 | 0 | | | | |
| -11.400 | 3.734 | 0.032 | 1192.78 | 756.35 | | 2 | 59.71 | 4.55 20600 | 0 | | | | |
| -11.700 | 3.769 | 0.211 | 1422.40 | 774.55 | | 2 | 61.68 | 4.55 20600 | 0 | | | | |
| -12.000 | 3.863 | 0.422 | 1657.55 | 793.16 | | 2 | 62.39 | 4.55 20600 | 0 | | | | |
| -12.300 | 4.026 | 0.666 | 1898.29 | 811.76 | | 2 | 61.61 | 4.55 20600 | 0 | | | | |
| -12.600 | 4.266 | 0.942 | 2144.56 | 829.87 | | 2 | 59.13 | 4.55 20600 | 0 | | | | |
| | | | | | | 2 | 64.95 | 4.85 15100 | 0 | | | | |
| -12.700 | 4.365 | 1.042 | 2227.87 | 836.33 | | 2 | 64.20 | 4.85 15100 | 0 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.150 | 4.943 | 1.539 | 2610.64 | 864.69 | 4.41 | 2 | 57.40 | 4.85 15100 | 0 | | | | |
| -13.600 | 5.762 | 2.116 | 3006.08 | 892.99 | 8.83 | 1 | 55.17 | 2.91 15100 | 0 | | | | |
| | | | | -1050.94 | 8.83 | 1 | 55.17 | 2.91 15100 | 0 | | | 3 | -1943.94 |
| -13.950 | 6.584 | 2.567 | 2642.26 | -1027.79 | 12.26 | 1 | 56.03 | 2.91 15100 | 0 | | | | |
| -14.300 | 7.553 | 2.961 | 2286.80 | -1003.14 | 15.70 | 1 | 56.90 | 2.91 15100 | 0 | | | | |
| -14.800 | 9.154 | 3.426 | 1794.56 | -965.30 | 20.60 | 1 | 58.14 | 2.91 15100 | 0 | | | | |
| -15.105 | 10.235 | 3.656 | 1503.87 | -940.72 | 23.59 | 1 | 58.89 | 2.91 15100 | 0 | | | | |
| -15.410 | 11.380 | 3.846 | 1220.84 | -914.99 | 26.59 | 1 | 59.65 | 2.91 15100 | 0 | | | | |
| -15.715 | 12.577 | 3.996 | 945.84 | -888.12 | 29.58 | 1 | 60.40 | 2.91 15100 | 0 | | | | |
| -16.020 | 13.814 | 4.110 | 679.21 | -860.10 | 32.57 | 1 | 61.15 | 2.91 15100 | 0 | | | | |
| -16.306 | 15.002 | 4.182 | 436.89 | -832.77 | 35.38 | 1 | 61.86 | 2.91 15100 | 0 | | | | |
| -16.593 | 16.206 | 4.224 | 202.54 | -804.43 | 38.19 | 1 | 62.57 | 2.91 15100 | 0 | | | | |
| -16.879 | 17.417 | 4.236 | -23.55 | -775.09 | 40.99 | 1 | 63.28 | 2.91 15100 | 0 | | | | |
| -17.165 | 18.628 | 4.218 | -241.10 | -744.74 | 43.80 | 1 | 63.99 | 2.91 15100 | 0 | | | | |
| -17.451 | 19.830 | 4.173 | -449.82 | -713.38 | 46.61 | 1 | 64.69 | 2.91 15100 | 0 | | | | |
| -17.738 | 21.015 | 4.101 | -649.42 | -681.02 | 49.42 | 1 | 65.40 | 2.91 15100 | 0 | | | | |
| -18.024 | 22.175 | 4.004 | -839.60 | -647.65 | 52.23 | 1 | 66.11 | 2.91 15100 | 0 | | | | |
| -18.310 | 23.304 | 3.882 | -1020.10 | -613.27 | 55.03 | 1 | 66.82 | 2.91 15100 | 0 | | | | |
| -18.596 | 24.395 | 3.737 | -1190.61 | -577.88 | 57.84 | 1 | 67.53 | 2.91 15100 | 0 | | | | |
| -18.883 | 25.442 | 3.571 | -1350.84 | -541.50 | 60.65 | 1 | 68.23 | 2.91 15100 | 0 | | | | |
| -19.169 | 26.438 | 3.385 | -1500.51 | -504.10 | 63.46 | 1 | 68.94 | 2.91 15100 | 0 | | | | |
| -19.455 | 27.378 | 3.179 | -1639.34 | -465.70 | 66.27 | 1 | 69.65 | 2.91 15100 | 0 | | | | |
| -19.741 | 28.257 | 2.957 | -1767.03 | -426.29 | 69.07 | 1 | 70.36 | 2.91 15100 | 0 | | | | |
| -20.028 | 29.069 | 2.718 | -1883.29 | -385.87 | 71.88 | 1 | 71.07 | 2.91 15100 | 0 | | | | |
| -20.314 | 29.811 | 2.465 | -1987.84 | -344.45 | 74.69 | 1 | 71.77 | 2.91 15100 | 0 | | | | |
| -20.600 | 30.479 | 2.199 | -2080.39 | -302.02 | 77.50 | 1 | 72.48 | 2.91 15100 | 0 | | | | |
| | | | | | 77.50 | 1 | 60.50 | 2.68 20600 | 0 | | | | |
| -20.903 | 31.100 | 1.906 | -2165.38 | -259.71 | 80.47 | 1 | 61.23 | 2.68 20600 | 0 | | | | |
| -21.205 | 31.631 | 1.601 | -2237.41 | -216.29 | 83.43 | 1 | 61.96 | 2.68 20600 | 0 | | | | |
| -21.508 | 32.068 | 1.288 | -2296.13 | -171.75 | 86.40 | 1 | 62.69 | 2.68 20600 | 0 | | | | |
| -21.810 | 32.409 | 0.968 | -2341.20 | -126.09 | 89.37 | 1 | 63.42 | 2.68 20600 | 0 | | | | |
| -22.113 | 32.653 | 0.642 | -2372.30 | -79.31 | 92.34 | 1 | 64.15 | 2.68 20600 | 0 | | | | |
| -22.415 | 32.797 | 0.313 | -2389.08 | -31.42 | 95.30 | 1 | 64.88 | 2.68 20600 | 0 | | | | |
| -22.718 | 32.842 | -0.017 | -2391.19 | 17.60 | 98.27 | 1 | 65.61 | 2.68 20600 | 0 | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -23.020 | 32.787 | -0.347 | -2378.32 | 67.73 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | | | | | |
| -23.520 | 32.479 | -0.884 | -2323.25 | 153.05 | 106.14 | 1 | 67.54 | 2.68 | 20600 | 0 | | | | | | |
| -24.020 | 31.905 | -1.405 | -2224.76 | 241.42 | 111.05 | 1 | 68.75 | 2.68 | 20600 | 0 | | | | | | |
| | | | | | 111.05 | 1 | 68.75 | 2.68 | 20600 | 3 | 73.67 | | | 20600 | | |
| -24.520 | 31.079 | -1.898 | -2091.87 | 287.96 | 115.95 | 1 | 69.96 | 2.68 | 20600 | 3 | 105.89 | | | 20600 | | |
| -24.550 | 31.021 | -1.926 | -2083.20 | 290.34 | 115.95 | 1 | 70.03 | 2.68 | 20600 | 3 | 106.81 | | | 20600 | | |
| -24.975 | 30.118 | -2.318 | -1953.01 | 321.45 | 115.95 | 1 | 71.05 | 2.68 | 20600 | 3 | 119.79 | | | 20600 | | |
| -25.400 | 29.055 | -2.684 | -1810.68 | 347.48 | 115.95 | 1 | 72.08 | 2.68 | 20600 | 3 | 132.76 | | | 20600 | | |
| -25.675 | 28.286 | -2.905 | -1713.13 | 361.62 | 115.95 | 1 | 72.74 | 2.68 | 20600 | 3 | 141.15 | | | 20600 | | |
| -25.950 | 27.458 | -3.114 | -1611.98 | 373.63 | 115.95 | 1 | 73.41 | 2.68 | 20600 | 3 | 149.55 | | | 20600 | | |
| -26.225 | 26.575 | -3.310 | -1507.82 | 383.52 | 115.95 | 1 | 74.07 | 2.68 | 20600 | 3 | 157.95 | | | 20600 | | |
| -26.500 | 25.639 | -3.492 | -1401.24 | 391.28 | 115.95 | 1 | 74.73 | 2.68 | 20600 | 3 | 166.34 | | | 20600 | | |
| -26.775 | 24.655 | -3.661 | -1292.82 | 396.91 | 115.95 | 1 | 75.40 | 2.68 | 20600 | 3 | 174.74 | | | 20600 | | |
| -27.050 | 23.627 | -3.817 | -1183.14 | 400.41 | 115.95 | 1 | 76.06 | 2.68 | 20600 | 3 | 183.13 | | | 20600 | | |
| -27.325 | 22.557 | -3.958 | -1072.78 | 401.79 | 115.95 | 1 | 76.72 | 2.68 | 20600 | 3 | 191.53 | | | 20600 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |



FASE 4 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.600 | 21.451 | -4.086 | -962.35 | 401.05 | 115.95 | 1 | 77.39 | 2.68 | 20600 | 3 | 199.92 | | |
| -28.100 | 19.356 | -4.283 | -763.23 | 394.24 | 115.95 | 1 | 78.59 | 2.68 | 20600 | 3 | 215.19 | | |
| -28.375 | 18.166 | -4.372 | -655.69 | 387.50 | 115.95 | 1 | 79.26 | 2.68 | 20600 | 3 | 223.58 | | |
| -28.650 | 16.953 | -4.448 | -550.30 | 378.64 | 115.95 | 1 | 79.92 | 2.68 | 20600 | 3 | 231.98 | | |
| -28.925 | 15.721 | -4.511 | -447.63 | 367.65 | 115.95 | 1 | 80.58 | 2.68 | 20600 | 3 | 240.37 | | |
| -29.200 | 14.473 | -4.560 | -348.29 | 354.53 | 115.95 | 1 | 81.25 | 2.68 | 20600 | 3 | 248.77 | | |
| | | | | | 115.95 | 1 | 62.97 | 2.46 | 43800 | 3 | 305.74 | | |
| -29.513 | 13.041 | -4.603 | -243.86 | 313.22 | 115.95 | 1 | 63.74 | 2.46 | 43800 | 3 | 317.27 | | |
| -29.825 | 11.598 | -4.631 | -152.88 | 268.55 | 115.95 | 1 | 64.51 | 2.46 | 43800 | 3 | 328.80 | | |
| -30.138 | 10.148 | -4.647 | -76.37 | 220.51 | 115.95 | 1 | 65.28 | 2.46 | 43800 | 3 | 340.33 | | |
| -30.450 | 8.695 | -4.653 | -15.41 | 169.11 | 115.95 | 1 | 66.05 | 2.46 | 43800 | 3 | 351.86 | | |
| -30.763 | 7.241 | -4.652 | 29.26 | 117.10 | 115.95 | 1 | 66.81 | 2.46 | 43800 | 2 | 345.79 | | |
| -31.075 | 5.788 | -4.646 | 58.91 | 76.01 | 115.95 | 1 | 67.58 | 2.46 | 43800 | 2 | 283.48 | | |
| -31.388 | 4.338 | -4.636 | 78.81 | 54.61 | 115.95 | 1 | 68.35 | 2.46 | 43800 | 2 | 221.29 | | |
| -31.700 | 2.891 | -4.623 | 95.09 | 52.87 | 115.95 | 1 | 69.12 | 2.46 | 43800 | 2 | 159.26 | | |
| | | | | | 115.95 | -1 | | | | 2 | 878.87 | | 300000 |
| -32.200 | 0.584 | -4.604 | 54.95 | -155.86 | 115.95 | -1 | | | | 2 | 187.92 | | 300000 |
| -32.700 | -1.716 | -4.599 | 0.00 | 0.00 | 115.95 | 2 | 579.44 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 32.84 mm
MOMENTO MÁXIMO = 3006.08 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 5 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 106.91 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.053 = (1806.30 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.434 = (1945.14 kN/m)/(4481.17 kN/m) SIN INTERÉS



** FASE No 5 **

*Fase 5
*Ejecucion del nivel de puntales provisionales
*Excavacion hasta el nivel de losa de fondo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 4
NIVEL = -23.020 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

* EXCAVACIÓN EN SUELO 2
PARA NIVEL = -25.400 m
CON BERMA EN NIVEL = -27.600 m A = 2.470 m B = 4.670 m
SIMULACIÓN CON LAS SOBRECARGAS DE BOUSSINESQ

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2 PARA NIVEL = -28.100 m



FASE 5

| | PARED | SOIL 1 | SOIL 2 | |
|---|---|---|---|---|
| | | EXCAVACIÓN: 0.00 m | EXCAVACIÓN: -25.40 m | PUNTALES/ |
| | | NIVEL AGUA: -12.70 m | NIVEL AGUA: -28.10 m | ANCLAS |
| | | S. DE CAQUOT: 10.00 kPa | S. DE CAQUOT: 0.00 kPa | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 3.662 | 0.279 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 3.739 | 0.279 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 3.816 | 0.279 | 0.08 | 0.89 | | 2 | 6.47 | 5.15 | 4900 | 0 | | | |
| -0.825 | 3.893 | 0.279 | 0.58 | 2.74 | | 2 | 7.00 | 5.15 | 4900 | 0 | | | |
| -1.100 | 3.970 | 0.280 | 1.60 | 4.74 | | 2 | 7.53 | 5.15 | 4900 | 0 | | | |
| -1.375 | 4.046 | 0.280 | 3.20 | 6.89 | | 2 | 8.06 | 5.15 | 4900 | 0 | | | |
| -1.650 | 4.124 | 0.280 | 5.40 | 9.17 | | 2 | 8.59 | 5.15 | 4900 | 0 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -1.925 | 4.201 | 0.281 | 8.26 | 11.61 | | 2 | 9.12 | 4.28 | 4900 | 0 | | | | | | | |
| -2.200 | 4.278 | 0.282 | 11.80 | 14.19 | | 2 | 9.65 | 3.24 | 4900 | 0 | | | | | | | |
| -2.250 | 4.292 | 0.283 | 12.52 | 14.68 | | 2 | 9.86 | 3.17 | 4900 | 0 | | | | | | | |
| | | | | -110.00 | | 2 | 9.86 | 3.17 | 4900 | 0 | | | | | | 1 | -124.67 |
| -2.675 | 4.412 | 0.281 | -33.26 | -105.29 | | 1 | 12.28 | 3.17 | 4900 | 0 | | | | | | | |
| -3.100 | 4.530 | 0.270 | -76.83 | -99.55 | | 1 | 14.71 | 3.17 | 4900 | 0 | | | | | | | |
| -3.600 | 4.659 | 0.247 | -124.65 | -91.49 | | 1 | 17.56 | 3.17 | 4900 | 0 | | | | | | | |
| -4.100 | 4.775 | 0.213 | -168.08 | -81.99 | | 1 | 20.41 | 3.17 | 4900 | 0 | | | | | | | |
| -4.600 | 4.871 | 0.171 | -206.37 | -70.91 | | 2 | 23.92 | 3.83 | 4900 | 0 | | | | | | | |
| -5.100 | 4.944 | 0.120 | -238.66 | -57.88 | | 2 | 28.20 | 5.15 | 4900 | 0 | | | | | | | |
| -5.600 | 4.990 | 0.062 | -263.89 | -42.67 | | 2 | 32.61 | 5.15 | 4900 | 0 | | | | | | | |
| -6.100 | 5.005 | 0.000 | -280.96 | -25.23 | | 2 | 37.17 | 5.15 | 4900 | 0 | | | | | | | |
| -6.600 | 4.989 | -0.065 | -288.73 | -5.46 | | 2 | 41.89 | 5.15 | 4900 | 0 | | | | | | | |
| -7.100 | 4.940 | -0.131 | -286.03 | 16.70 | | 2 | 46.76 | 5.15 | 4900 | 0 | | | | | | | |
| | | | | | | 2 | 22.60 | 3.07 | 15100 | 0 | | | | | | | |
| -7.394 | 4.896 | -0.169 | -280.12 | 23.57 | | 2 | 24.20 | 3.08 | 15100 | 0 | | | | | | | |
| -7.688 | 4.840 | -0.206 | -272.13 | 30.94 | | 2 | 25.99 | 3.29 | 15100 | 0 | | | | | | | |
| -7.981 | 4.775 | -0.242 | -261.89 | 38.85 | | 2 | 27.82 | 3.54 | 15100 | 0 | | | | | | | |
| -8.275 | 4.698 | -0.277 | -249.25 | 47.29 | | 2 | 29.68 | 3.81 | 15100 | 0 | | | | | | | |
| -8.569 | 4.612 | -0.309 | -234.05 | 56.29 | | 2 | 31.57 | 4.13 | 15100 | 0 | | | | | | | |
| -8.862 | 4.517 | -0.339 | -216.13 | 65.85 | | 2 | 33.51 | 4.48 | 15100 | 0 | | | | | | | |
| -9.156 | 4.413 | -0.367 | -195.31 | 75.98 | | 2 | 35.48 | 4.85 | 15100 | 0 | | | | | | | |
| -9.450 | 4.302 | -0.391 | -171.41 | 86.91 | | 2 | 38.98 | 4.85 | 15100 | 0 | | | | | | | |
| | | | | 638.22 | | 2 | 38.98 | 4.85 | 15100 | 0 | | | | | | 2 | 551.30 |
| -9.800 | 4.162 | -0.401 | 54.44 | 652.67 | | 2 | 43.61 | 4.85 | 15100 | 0 | | | | | | | |
| -10.150 | 4.025 | -0.374 | 285.65 | 668.76 | | 2 | 48.36 | 4.85 | 15100 | 0 | | | | | | | |
| -10.200 | 4.007 | -0.367 | 319.14 | 671.20 | | 2 | 49.04 | 4.85 | 15100 | 0 | | | | | | | |
| | | | | | | 2 | 43.30 | 4.55 | 20600 | 0 | | | | | | | |
| -10.500 | 3.905 | -0.309 | 522.52 | 684.90 | | 2 | 48.02 | 4.55 | 20600 | 0 | | | | | | | |
| -10.800 | 3.824 | -0.223 | 730.22 | 699.95 | | 2 | 52.37 | 4.55 | 20600 | 0 | | | | | | | |
| -11.100 | 3.774 | -0.109 | 942.62 | 716.23 | | 2 | 56.15 | 4.55 | 20600 | 0 | | | | | | | |
| -11.400 | 3.762 | 0.035 | 1160.06 | 733.52 | | 2 | 59.12 | 4.55 | 20600 | 0 | | | | | | | |
| -11.700 | 3.798 | 0.209 | 1382.80 | 751.55 | | 2 | 61.09 | 4.55 | 20600 | 0 | | | | | | | |
| -12.000 | 3.890 | 0.414 | 1611.03 | 769.99 | | 2 | 61.83 | 4.55 | 20600 | 0 | | | | | | | |
| -12.300 | 4.049 | 0.651 | 1844.80 | 788.44 | | 2 | 61.13 | 4.55 | 20600 | 0 | | | | | | | |
| -12.600 | 4.284 | 0.920 | 2084.05 | 806.42 | | 2 | 58.76 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | | | 2 | 64.68 | 4.85 | 15100 | 0 | | | | | | | |
| -12.700 | 4.381 | 1.017 | 2165.01 | 812.85 | | 2 | 63.97 | 4.85 | 15100 | 0 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | | kPa | kPa/m | | | kN | |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.150 | 4.944 | 1.500 | 2537.20 | 841.15 | 4.41 | 2 | 57.38 | 4.85 | 15100 | 0 | | | |
| -13.600 | 5.742 | 2.060 | 2922.06 | 869.52 | 8.83 | 2 | 55.47 | 3.22 | 15100 | 0 | | | |
| | | | | -1004.30 | 8.83 | 2 | 55.47 | 3.22 | 15100 | 0 | | 3 | -1873.82 |
| -13.950 | 6.542 | 2.499 | 2574.59 | -980.99 | 12.26 | 2 | 56.67 | 3.54 | 15100 | 0 | | | |
| -14.300 | 7.485 | 2.884 | 2235.56 | -956.04 | 15.70 | 2 | 57.92 | 3.93 | 15100 | 0 | | | |
| -14.800 | 9.046 | 3.340 | 1767.02 | -917.55 | 20.60 | 2 | 59.77 | 4.55 | 15100 | 0 | | | |
| -15.105 | 10.100 | 3.567 | 1490.97 | -892.40 | 23.59 | 2 | 60.93 | 4.85 | 15100 | 0 | | | |
| -15.410 | 11.218 | 3.756 | 1222.79 | -865.98 | 26.59 | 2 | 62.10 | 4.85 | 15100 | 0 | | | |
| -15.715 | 12.388 | 3.908 | 962.85 | -838.30 | 29.58 | 2 | 63.26 | 4.85 | 15100 | 0 | | | |
| -16.020 | 13.598 | 4.025 | 711.55 | -809.35 | 32.57 | 2 | 64.42 | 4.85 | 15100 | 0 | | | |
| -16.306 | 14.762 | 4.103 | 483.90 | -781.04 | 35.38 | 2 | 65.48 | 4.85 | 15100 | 0 | | | |
| -16.593 | 15.944 | 4.151 | 264.51 | -751.61 | 38.19 | 2 | 66.52 | 4.85 | 15100 | 0 | | | |
| -16.879 | 17.136 | 4.172 | 53.71 | -721.09 | 40.99 | 2 | 67.53 | 4.85 | 15100 | 0 | | | |
| -17.165 | 18.330 | 4.166 | -148.21 | -689.49 | 43.80 | 2 | 68.49 | 4.85 | 15100 | 0 | | | |
| -17.451 | 19.518 | 4.134 | -340.93 | -656.82 | 46.61 | 2 | 69.39 | 4.85 | 15100 | 0 | | | |
| -17.738 | 20.694 | 4.077 | -524.14 | -623.09 | 49.42 | 2 | 70.24 | 4.85 | 15100 | 0 | | | |
| -18.024 | 21.850 | 3.997 | -697.54 | -588.32 | 52.23 | 2 | 71.01 | 4.85 | 15100 | 0 | | | |
| -18.310 | 22.980 | 3.895 | -860.86 | -552.55 | 55.03 | 2 | 71.71 | 4.85 | 15100 | 0 | | | |
| -18.596 | 24.078 | 3.773 | -1013.78 | -515.78 | 57.84 | 2 | 72.31 | 4.85 | 15100 | 0 | | | |
| -18.883 | 25.138 | 3.631 | -1156.05 | -478.05 | 60.65 | 2 | 72.82 | 4.85 | 15100 | 0 | | | |
| -19.169 | 26.155 | 3.471 | -1287.37 | -439.38 | 63.46 | 2 | 73.21 | 4.85 | 15100 | 0 | | | |
| -19.455 | 27.124 | 3.295 | -1407.51 | -399.82 | 66.27 | 2 | 73.49 | 4.85 | 15100 | 0 | | | |
| -19.741 | 28.040 | 3.103 | -1516.19 | -359.39 | 69.07 | 2 | 73.63 | 4.85 | 15100 | 0 | | | |
| -20.028 | 28.899 | 2.899 | -1613.18 | -318.14 | 71.88 | 2 | 73.63 | 4.85 | 15100 | 0 | | | |
| -20.314 | 29.698 | 2.682 | -1698.25 | -276.11 | 74.69 | 2 | 73.48 | 4.62 | 15100 | 0 | | | |
| -20.600 | 30.434 | 2.455 | -1771.18 | -233.33 | 77.50 | 2 | 73.17 | 3.59 | 15100 | 0 | | | |
| | | | | | 77.50 | 2 | 61.43 | 3.61 | 20600 | 0 | | | |
| -20.903 | 31.139 | 2.206 | -1835.36 | -190.89 | 80.47 | 1 | 61.23 | 2.68 | 20600 | 0 | | | |
| -21.205 | 31.768 | 1.949 | -1886.57 | -147.47 | 83.43 | 1 | 61.96 | 2.68 | 20600 | 0 | | | |
| -21.508 | 32.318 | 1.686 | -1924.47 | -102.92 | 86.40 | 1 | 62.69 | 2.68 | 20600 | 0 | | | |
| -21.810 | 32.787 | 1.418 | -1948.72 | -57.27 | 89.37 | 1 | 63.42 | 2.68 | 20600 | 0 | | | |
| -22.113 | 33.175 | 1.148 | -1959.00 | -10.49 | 92.34 | 1 | 64.15 | 2.68 | 20600 | 0 | | | |
| -22.415 | 33.481 | 0.877 | -1954.96 | 37.41 | 95.30 | 1 | 64.88 | 2.68 | 20600 | 0 | | | |
| -22.718 | 33.706 | 0.608 | -1936.25 | 86.42 | 98.27 | 1 | 65.61 | 2.68 | 20600 | 0 | | | |
| -23.020 | 33.850 | 0.343 | -1902.56 | 136.56 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | | |
| | | | | -344.90 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | 4 | -481.46 |
| -23.520 | 33.910 | -0.109 | -2053.80 | -259.58 | 106.14 | 1 | 67.54 | 2.68 | 20600 | 0 | | | |
| -24.020 | 33.736 | -0.591 | -2161.63 | -171.21 | 111.05 | 1 | 68.75 | 2.68 | 20600 | 0 | | | |
| -24.520 | 33.315 | -1.093 | -2224.51 | -79.78 | 115.95 | 1 | 69.96 | 2.68 | 20600 | 0 | | | |
| -24.550 | 33.282 | -1.123 | -2226.81 | -74.20 | 116.25 | 1 | 70.03 | 2.68 | 20600 | 0 | | | |
| -24.975 | 32.712 | -1.558 | -2241.37 | 6.07 | 120.42 | 1 | 71.05 | 2.68 | 20600 | 0 | | | |
| -25.400 | 31.958 | -1.991 | -2221.34 | 88.55 | 124.59 | 1 | 72.08 | 2.68 | 20600 | 0 | | | |
| | | | | | 124.59 | 1 | 72.08 | 2.68 | 20600 | 3 | 31.37 | 20600 | |
| -25.675 | 31.372 | -2.268 | -2190.81 | 133.18 | 127.28 | 1 | 72.74 | 2.68 | 20600 | 3 | 40.77 | 20600 | |
| -25.950 | 30.711 | -2.541 | -2148.31 | 175.43 | 129.98 | 1 | 73.41 | 2.68 | 20600 | 3 | 55.37 | 20600 | |
| -26.225 | 29.975 | -2.807 | -2094.57 | 215.07 | 132.68 | 1 | 74.07 | 2.68 | 20600 | 3 | 66.44 | 20600 | |
| -26.500 | 29.168 | -3.066 | -2030.26 | 252.10 | 135.38 | 1 | 74.73 | 2.68 | 20600 | 3 | 81.16 | 20600 | |
| -26.775 | 28.290 | -3.317 | -1956.22 | 285.78 | 138.08 | 1 | 75.40 | 2.68 | 20600 | 3 | 97.44 | 20600 | |
| -27.050 | 27.344 | -3.557 | -1873.43 | 315.66 | 140.77 | 1 | 76.06 | 2.68 | 20600 | 3 | 115.58 | 20600 | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | | kPa | kPa/m | | | kN | |



FASE 5 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.325 | 26.334 | -3.787 | -1783.06 | 340.62 | 143.47 | 1 | 76.72 | 2.68 | 20600 | 3 | 139.88 | 20600 | |
| -27.600 | 25.262 | -4.005 | -1686.54 | 360.58 | 146.17 | 1 | 77.39 | 2.68 | 20600 | 3 | 158.75 | 20600 | |

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -28.100 | 23.167 | -4.369 | -1498.69 | 389.77 | 151.07 | 1 | 78.59 | 2.68 | 20600 | 3 | 177.70 | | 20600 | |
| -28.375 | 21.941 | -4.550 | -1389.53 | 404.16 | 151.07 | 1 | 79.26 | 2.68 | 20600 | 3 | 177.67 | | 20600 | |
| -28.650 | 20.666 | -4.718 | -1276.40 | 418.61 | 151.07 | 1 | 79.92 | 2.68 | 20600 | 3 | 178.53 | | 20600 | |
| -28.925 | 19.347 | -4.871 | -1159.31 | 432.89 | 151.07 | 1 | 80.58 | 2.68 | 20600 | 3 | 180.23 | | 20600 | |
| -29.200 | 17.988 | -5.009 | -1038.34 | 446.79 | 151.07 | 1 | 81.25 | 2.68 | 20600 | 3 | 182.72 | | 20600 | |
| | | | | | 151.07 | 1 | 62.97 | 2.46 | 43800 | 3 | 233.88 | | 43800 | |
| -29.513 | 16.401 | -5.147 | -899.76 | 439.90 | 151.07 | 1 | 63.74 | 2.46 | 43800 | 3 | 239.05 | | 43800 | |
| -29.825 | 14.774 | -5.265 | -763.56 | 431.50 | 151.07 | 1 | 64.51 | 2.46 | 43800 | 3 | 245.10 | | 43800 | |
| -30.138 | 13.112 | -5.365 | -630.26 | 421.33 | 151.07 | 1 | 65.28 | 2.46 | 43800 | 3 | 251.94 | | 43800 | |
| -30.450 | 11.423 | -5.446 | -500.44 | 409.15 | 151.07 | 1 | 66.05 | 2.46 | 43800 | 3 | 259.45 | | 43800 | |
| -30.763 | 9.711 | -5.508 | -374.77 | 394.78 | 151.07 | 1 | 66.81 | 2.46 | 43800 | 3 | 267.55 | | 43800 | |
| -31.075 | 7.982 | -5.553 | -253.95 | 378.04 | 151.07 | 1 | 67.58 | 2.46 | 43800 | 3 | 276.14 | | 43800 | |
| -31.388 | 6.242 | -5.581 | -138.75 | 358.79 | 151.07 | 1 | 68.35 | 2.46 | 43800 | 3 | 285.16 | | 43800 | |
| -31.700 | 4.496 | -5.593 | -28.73 | 348.92 | 151.07 | 1 | 69.12 | 2.46 | 43800 | 2 | 217.61 | | 43800 | |
| | | | | | 151.07 | -1 | | | | 2 | 1356.11 | | 300000 | |
| -32.200 | 1.700 | -5.589 | 30.01 | -44.13 | 151.07 | -1 | | | | 2 | 518.24 | | 300000 | |
| -32.700 | -1.093 | -5.586 | 0.00 | 0.00 | 151.07 | 2 | 392.62 | 1.52 | 300000 | -1 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 33.91 mm

MOMENTO MÁXIMO = 2922.06 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
- -1 = SEPARACIÓN
- 0 = EXCAVACIÓN
- 1 = PRESIÓN ACTIVA
- 2 = ELÁSTICO
- 3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 119.38 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.052 = (1780.66 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.488 = (1710.22 kN/m)/(3501.03 kN/m) SIN INTERÉS



** FASE No 6 **

*Fase 6
*Ejecucion de la losa de fondo y retirada de puntales provisionales

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 5
NIVEL = -24.550 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 850000.000 kN/m
CONEXIÓN BILATERAL

* RETIRO DE LA LÍNEA DE PUNTALES N° 4



FASE 6

| | P A R E D | | | | | S O I L 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -12.70 m<br>S. DE CAQUOT: 10.00 kPa | | | | S O I L 2<br>EXCAVACIÓN: -25.40 m<br>NIVEL AGUA: -28.10 m<br>S. DE CAQUOT: 0.00 kPa | | | | PUNTALES/ ANCLAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO | PR. | SOPRAC. | ELAST. | ESTADO | PR. | SOPRAC. | ELAST. | N° FUERZA |
| 0.000 | 3.641 | 0.289 | 0.00 | 0.00 | | -1 | | | | 0 | | | | |
| -0.275 | 3.720 | 0.289 | 0.00 | 0.00 | | -1 | | | | 0 | | | | |
| -0.550 | 3.800 | 0.289 | 0.08 | 0.90 | | 2 | 6.55 | 5.15 | 4900 | 0 | | | | |
| -0.825 | 3.879 | 0.289 | 0.58 | 2.77 | | 2 | 7.07 | 5.15 | 4900 | 0 | | | | |
| -1.100 | 3.959 | 0.289 | 1.62 | 4.79 | | 2 | 7.58 | 5.15 | 4900 | 0 | | | | |
| -1.375 | 4.039 | 0.290 | 3.23 | 6.94 | | 2 | 8.10 | 5.15 | 4900 | 0 | | | | |
| -1.650 | 4.118 | 0.290 | 5.45 | 9.24 | | 2 | 8.62 | 5.15 | 4900 | 0 | | | | |
| -1.925 | 4.198 | 0.291 | 8.33 | 11.68 | | 2 | 9.13 | 4.30 | 4900 | 0 | | | | |
| -2.200 | 4.278 | 0.292 | 11.89 | 14.26 | | 2 | 9.64 | 3.24 | 4900 | 0 | | | | |
| -2.250 | 4.293 | 0.293 | 12.62 | 14.75 | | 1 | 9.86 | 3.17 | 4900 | 0 | | | | |
| | | | | -112.95 | | 1 | 9.86 | 3.17 | 4900 | 0 | | | | 1 -127.70 |
| -2.675 | 4.417 | 0.290 | -34.42 | -108.24 | | 1 | 12.28 | 3.17 | 4900 | 0 | | | | |
| -3.100 | 4.538 | 0.279 | -79.24 | -102.51 | | 1 | 14.71 | 3.17 | 4900 | 0 | | | | |
| -3.600 | 4.673 | 0.255 | -128.54 | -94.44 | | 1 | 17.56 | 3.17 | 4900 | 0 | | | | |
| -4.100 | 4.792 | 0.221 | -173.45 | -84.95 | | 1 | 20.41 | 3.17 | 4900 | 0 | | | | |
| -4.600 | 4.892 | 0.177 | -213.23 | -73.89 | | 2 | 23.82 | 3.72 | 4900 | 0 | | | | |
| -5.100 | 4.967 | 0.124 | -247.01 | -60.91 | | 2 | 28.09 | 5.14 | 4900 | 0 | | | | |
| -5.600 | 5.015 | 0.064 | -273.78 | -45.77 | | 2 | 32.49 | 5.15 | 4900 | 0 | | | | |
| -6.100 | 5.031 | 0.000 | -292.41 | -28.38 | | 2 | 37.05 | 5.15 | 4900 | 0 | | | | |
| -6.600 | 5.014 | -0.068 | -301.77 | -8.68 | | 2 | 41.76 | 5.15 | 4900 | 0 | | | | |
| -7.100 | 4.962 | -0.137 | -300.69 | 13.42 | | 2 | 46.65 | 5.15 | 4900 | 0 | | | | |
| | | | | | | 1 | 22.45 | 2.91 | 15100 | 0 | | | | |
| -7.394 | 4.916 | -0.177 | -295.75 | 20.25 | | 1 | 24.03 | 2.91 | 15100 | 0 | | | | |
| -7.688 | 4.858 | -0.217 | -288.74 | 27.56 | | 2 | 25.72 | 3.02 | 15100 | 0 | | | | |
| -7.981 | 4.789 | -0.255 | -279.51 | 35.39 | | 2 | 27.60 | 3.32 | 15100 | 0 | | | | |
| -8.275 | 4.709 | -0.292 | -267.90 | 43.78 | | 2 | 29.52 | 3.66 | 15100 | 0 | | | | |
| -8.569 | 4.618 | -0.327 | -253.74 | 52.74 | | 2 | 31.49 | 4.04 | 15100 | 0 | | | | |
| -8.862 | 4.517 | -0.359 | -236.86 | 62.28 | | 2 | 33.50 | 4.48 | 15100 | 0 | | | | |
| -9.156 | 4.407 | -0.390 | -217.09 | 72.43 | | 2 | 35.57 | 4.85 | 15100 | 0 | | | | |
| -9.450 | 4.288 | -0.418 | -194.23 | 83.41 | | 2 | 39.18 | 4.85 | 15100 | 0 | | | | |
| | | | | 681.32 | | 2 | 39.18 | 4.85 | 15100 | 0 | | | | 2 597.91 |
| -9.800 | 4.139 | -0.429 | 46.73 | 695.86 | | 2 | 43.96 | 4.85 | 15100 | 0 | | | | |
| -10.150 | 3.992 | -0.402 | 293.07 | 712.11 | | 2 | 48.86 | 4.85 | 15100 | 0 | | | | |
| -10.200 | 3.972 | -0.395 | 328.74 | 714.57 | | 2 | 49.56 | 4.85 | 15100 | 0 | | | | |
| | | | | | | 2 | 44.01 | 4.55 | 20600 | 0 | | | | |
| -10.500 | 3.862 | -0.335 | 545.16 | 728.51 | | 2 | 48.90 | 4.55 | 20600 | 0 | | | | |
| -10.800 | 3.774 | -0.246 | 765.98 | 743.85 | | 2 | 53.40 | 4.55 | 20600 | 0 | | | | |
| -11.100 | 3.718 | -0.125 | 991.60 | 760.46 | | 2 | 57.30 | 4.55 | 20600 | 0 | | | | |
| -11.400 | 3.702 | 0.026 | 1222.36 | 778.10 | | 2 | 60.35 | 4.55 | 20600 | 0 | | | | |
| -11.700 | 3.737 | 0.210 | 1458.54 | 796.51 | | 2 | 62.35 | 4.55 | 20600 | 0 | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -12.000 | 3.831 | 0.426 | 1700.31 | 815.32 | | 2 | 63.05 | 4.55 | 20600 | 0 | | | | | | | |
| -12.300 | 3.996 | 0.676 | 1947.73 | 834.11 | | 2 | 62.23 | 4.55 | 20600 | 0 | | | | | | | |
| -12.600 | 4.240 | 0.960 | 2200.73 | 852.40 | | 2 | 59.66 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | | | 2 | 65.34 | 4.85 | 15100 | 0 | | | | | | | |
| -12.700 | 4.341 | 1.062 | 2286.29 | 858.89 | | 2 | 64.57 | 4.85 | 15100 | 0 | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | |





FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.150 | 4.931 | 1.572 | 2679.24 | 887.37 | 4.41 | 2 | 57.58 | 4.85 | 15100 | 0 | | |
| -13.600 | 5.769 | 2.164 | 3084.90 | 915.72 | 8.83 | 1 | 55.17 | 2.91 | 15100 | 0 | | |
| | | | | -1049.95 | 8.83 | 1 | 55.17 | 2.91 | 15100 | 0 | | 3-1965.67 |
| -13.950 | 6.609 | 2.628 | 2721.43 | -1026.80 | 12.26 | 1 | 56.03 | 2.91 | 15100 | 0 | | |
| -14.300 | 7.602 | 3.035 | 2366.32 | -1002.14 | 15.70 | 1 | 56.90 | 2.91 | 15100 | 0 | | |
| -14.800 | 9.245 | 3.518 | 1874.58 | -964.31 | 20.60 | 1 | 58.14 | 2.91 | 15100 | 0 | | |
| -15.105 | 10.356 | 3.759 | 1584.19 | -939.72 | 23.59 | 1 | 58.89 | 2.91 | 15100 | 0 | | |
| -15.410 | 11.534 | 3.960 | 1301.46 | -913.99 | 26.59 | 1 | 59.65 | 2.91 | 15100 | 0 | | |
| -15.715 | 12.767 | 4.122 | 1026.77 | -887.12 | 29.58 | 1 | 60.40 | 2.91 | 15100 | 0 | | |
| -16.020 | 14.044 | 4.246 | 760.44 | -859.11 | 32.57 | 1 | 61.15 | 2.91 | 15100 | 0 | | |
| -16.306 | 15.273 | 4.330 | 518.40 | -831.78 | 35.38 | 1 | 61.86 | 2.91 | 15100 | 0 | | |
| -16.593 | 16.520 | 4.382 | 284.34 | -803.44 | 38.19 | 1 | 62.57 | 2.91 | 15100 | 0 | | |
| -16.879 | 17.779 | 4.405 | 58.53 | -774.09 | 40.99 | 1 | 63.28 | 2.91 | 15100 | 0 | | |
| -17.165 | 19.039 | 4.398 | -158.73 | -743.74 | 43.80 | 1 | 63.99 | 2.91 | 15100 | 0 | | |
| -17.451 | 20.294 | 4.363 | -367.17 | -712.39 | 46.61 | 1 | 64.69 | 2.91 | 15100 | 0 | | |
| -17.738 | 21.535 | 4.302 | -566.48 | -680.02 | 49.42 | 1 | 65.40 | 2.91 | 15100 | 0 | | |
| -18.024 | 22.754 | 4.216 | -756.38 | -646.65 | 52.23 | 1 | 66.11 | 2.91 | 15100 | 0 | | |
| -18.310 | 23.946 | 4.105 | -936.59 | -612.27 | 55.03 | 1 | 66.82 | 2.91 | 15100 | 0 | | |
| -18.596 | 25.102 | 3.971 | -1106.81 | -576.89 | 57.84 | 1 | 67.53 | 2.91 | 15100 | 0 | | |
| -18.883 | 26.217 | 3.816 | -1266.77 | -540.50 | 60.65 | 1 | 68.23 | 2.91 | 15100 | 0 | | |
| -19.169 | 27.285 | 3.641 | -1416.15 | -503.10 | 63.46 | 1 | 68.94 | 2.91 | 15100 | 0 | | |
| -19.455 | 28.300 | 3.446 | -1554.70 | -464.70 | 66.27 | 1 | 69.65 | 2.91 | 15100 | 0 | | |
| -19.741 | 29.257 | 3.235 | -1682.10 | -425.29 | 69.07 | 1 | 70.36 | 2.91 | 15100 | 0 | | |
| -20.028 | 30.150 | 3.007 | -1798.08 | -384.88 | 71.88 | 1 | 71.07 | 2.91 | 15100 | 0 | | |
| -20.314 | 30.977 | 2.765 | -1902.35 | -343.45 | 74.69 | 1 | 71.77 | 2.91 | 15100 | 0 | | |
| -20.600 | 31.732 | 2.510 | -1994.61 | -301.02 | 77.50 | 1 | 72.48 | 2.91 | 15100 | 0 | | |
| | | | | | 77.50 | 1 | 60.50 | 2.68 | 20600 | 0 | | |
| -20.903 | 32.449 | 2.229 | -2079.30 | -258.72 | 80.47 | 1 | 61.23 | 2.68 | 20600 | 0 | | |
| -21.205 | 33.080 | 1.937 | -2151.02 | -215.30 | 83.43 | 1 | 61.96 | 2.68 | 20600 | 0 | | |
| -21.508 | 33.620 | 1.635 | -2209.44 | -170.76 | 86.40 | 1 | 62.69 | 2.68 | 20600 | 0 | | |
| -21.810 | 34.068 | 1.327 | -2254.22 | -125.10 | 89.37 | 1 | 63.42 | 2.68 | 20600 | 0 | | |
| -22.113 | 34.422 | 1.013 | -2285.01 | -78.32 | 92.34 | 1 | 64.15 | 2.68 | 20600 | 0 | | |
| -22.415 | 34.681 | 0.696 | -2301.49 | -30.42 | 95.30 | 1 | 64.88 | 2.68 | 20600 | 0 | | |
| -22.718 | 34.843 | 0.378 | -2303.31 | 18.59 | 98.27 | 1 | 65.61 | 2.68 | 20600 | 0 | | |
| -23.020 | 34.910 | 0.061 | -2290.13 | 68.73 | 101.24 | 1 | 66.34 | 2.68 | 20600 | 0 | | |
| -23.520 | 34.810 | -0.457 | -2234.56 | 154.04 | 106.14 | 1 | 67.54 | 2.68 | 20600 | 0 | | |
| -24.020 | 34.456 | -0.956 | -2135.57 | 242.41 | 111.05 | 1 | 68.75 | 2.68 | 20600 | 0 | | |
| -24.520 | 33.858 | -1.428 | -1991.64 | 333.84 | 115.95 | 1 | 69.96 | 2.68 | 20600 | 0 | | |
| -24.550 | 33.815 | -1.456 | -1981.54 | 339.43 | 116.25 | 1 | 70.03 | 2.68 | 20600 | 0 | | |
| | | | | -113.88 | 116.25 | 1 | 70.03 | 2.68 | 20600 | 0 | | 5 -453.30 |
| -24.975 | 33.114 | -1.844 | -2012.96 | -33.61 | 120.42 | 1 | 71.05 | 2.68 | 20600 | 0 | | |
| -25.400 | 32.248 | -2.235 | -2009.79 | 48.87 | 124.59 | 1 | 72.08 | 2.68 | 20600 | 0 | | |
| | | | | | 124.59 | 1 | 72.08 | 2.68 | 20600 | 3 | 31.51 | 20600 |
| -25.675 | 31.598 | -2.486 | -1990.18 | 93.46 | 127.28 | 1 | 72.74 | 2.68 | 20600 | 3 | 40.93 | 20600 |
| -25.950 | 30.881 | -2.734 | -1958.61 | 135.66 | 129.98 | 1 | 73.41 | 2.68 | 20600 | 3 | 55.56 | 20600 |
| -26.225 | 30.095 | -2.977 | -1915.81 | 175.25 | 132.68 | 1 | 74.07 | 2.68 | 20600 | 3 | 66.63 | 20600 |
| -26.500 | 29.244 | -3.215 | -1862.46 | 212.22 | 135.38 | 1 | 74.73 | 2.68 | 20600 | 3 | 81.34 | 20600 |
| -26.775 | 28.328 | -3.445 | -1799.39 | 245.86 | 138.08 | 1 | 75.40 | 2.68 | 20600 | 3 | 97.61 | 20600 |
| -27.050 | 27.350 | -3.666 | -1727.59 | 275.70 | 140.77 | 1 | 76.06 | 2.68 | 20600 | 2 | 115.70 | 20600 |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | |





FASE 6 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.325 | 26.312 | -3.878 | -1648.19 | 300.77 | 143.47 | 2 | 77.17 | 3.13 | 20600 | 2 | 139.43 | 20600 |
| -27.600 | 25.218 | -4.080 | -1562.60 | 321.10 | 146.17 | 2 | 78.31 | 3.60 | 20600 | 2 | 157.83 | 20600 |
| -28.100 | 23.092 | -4.418 | -1394.20 | 351.53 | 151.07 | 2 | 80.15 | 4.23 | 20600 | 2 | 176.15 | 20600 |
| -28.375 | 21.853 | -4.587 | -1295.43 | 366.83 | 151.07 | 2 | 81.05 | 4.47 | 20600 | 2 | 175.87 | 20600 |
| -28.650 | 20.570 | -4.743 | -1192.42 | 382.32 | 151.07 | 2 | 81.89 | 4.55 | 20600 | 2 | 176.56 | 20600 |
| -28.925 | 19.246 | -4.886 | -1085.16 | 397.72 | 151.07 | 2 | 82.67 | 4.55 | 20600 | 2 | 178.15 | 20600 |
| -29.200 | 17.884 | -5.015 | -973.71 | 412.78 | 151.07 | 2 | 83.39 | 4.55 | 20600 | 2 | 180.57 | 20600 |
| | | | | | 151.07 | 2 | 67.53 | 4.26 | 43800 | 2 | 229.32 | 43800 |
| -29.513 | 16.296 | -5.145 | -845.31 | 408.75 | 151.07 | 2 | 68.33 | 4.26 | 43800 | 2 | 234.46 | 43800 |
| -29.825 | 14.671 | -5.257 | -718.39 | 403.20 | 151.07 | 2 | 69.02 | 4.26 | 43800 | 2 | 240.59 | 43800 |
| -30.138 | 13.013 | -5.350 | -593.50 | 395.80 | 151.07 | 2 | 69.63 | 4.26 | 43800 | 2 | 247.59 | 43800 |
| -30.450 | 11.329 | -5.426 | -471.24 | 386.27 | 151.07 | 2 | 70.16 | 4.26 | 43800 | 2 | 255.33 | 43800 |
| -30.763 | 9.623 | -5.485 | -352.33 | 374.38 | 151.07 | 2 | 70.64 | 4.26 | 43800 | 2 | 263.72 | 43800 |
| -31.075 | 7.902 | -5.527 | -237.52 | 359.92 | 151.07 | 2 | 71.07 | 4.26 | 43800 | 2 | 272.65 | 43800 |
| -31.388 | 6.171 | -5.553 | -127.66 | 342.73 | 151.07 | 2 | 71.47 | 4.26 | 43800 | 2 | 282.04 | 43800 |
| -31.700 | 4.433 | -5.563 | -22.36 | 334.69 | 151.07 | 2 | 71.85 | 4.26 | 43800 | 2 | 214.88 | 43800 |
| | | | | | 151.07 | -1 | | | | 2 | 1337.43 | 300000 |
| -32.200 | 1.652 | -5.559 | 31.41 | -50.13 | 151.07 | -1 | | | | 2 | 504.00 | 300000 |
| -32.700 | -1.126 | -5.556 | 0.00 | 0.00 | 151.07 | 2 | 402.36 | 1.52 | 300000 | -1 | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 34.91 mm

MOMENTO MÁXIMO = 3084.90 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 114.11 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

**  FASE No 7  **

*Fase 7
*Restitucion del nf y paso de la tuneladora

* RETIRO DE LA LÍNEA DE PUNTALES N° 5

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 6
NIVEL = -24.550 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = -561.000 kN
RIGIDEZ = 430000.000 kN/m
CONEXIÓN BILATERAL

* DESPLAZAMIENTO DE MESA DE AGUAS SUBTERRÁNEAS EN SUELO 2  PARA NIVEL = -25.400 m
PRESIÓN DEL AGUA EN SUELO 2  PARA NIVEL = -25.400 m  PR. = 0.000 kPa
PR. = 127.000 kPa



FASE 7

| | PARED | SOIL 1<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -12.70 m<br>S. DE CAQUOT: 10.00 kPa | SOIL 2<br>EXCAVACIÓN: -25.40 m<br>NIVEL AGUA: -25.40 m<br>S. DE CAQUOT: 0.00 kPa | PUNTALES/ ANCLAS |
|---|---|---|---|---|

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| 0.000 | 3.647 | 0.286 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 3.726 | 0.286 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.550 | 3.805 | 0.286 | 0.08 | 0.90 | | 2 | 6.53 | 5.15 4900 | 0 | | | | |
| -0.825 | 3.883 | 0.286 | 0.58 | 2.76 | | 2 | 7.05 | 5.15 4900 | 0 | | | | |
| -1.100 | 3.962 | 0.286 | 1.62 | 4.77 | | 2 | 7.57 | 5.15 4900 | 0 | | | | |
| -1.375 | 4.041 | 0.287 | 3.22 | 6.93 | | 2 | 8.09 | 5.15 4900 | 0 | | | | |
| -1.650 | 4.120 | 0.287 | 5.44 | 9.22 | | 2 | 8.61 | 5.15 4900 | 0 | | | | |
| -1.925 | 4.199 | 0.288 | 8.31 | 11.66 | | 2 | 9.13 | 4.29 4900 | 0 | | | | |
| -2.200 | 4.278 | 0.289 | 11.87 | 14.24 | | 2 | 9.65 | 3.24 4900 | 0 | | | | |
| -2.250 | 4.293 | 0.290 | 12.59 | 14.73 | | 2 | 9.86 | 3.17 4900 | 0 | | | | |
| | | | | -112.09 | | 2 | 9.86 | 3.17 4900 | 0 | | | 1 | -126.82 |
| -2.675 | 4.416 | 0.287 | -34.08 | -107.38 | | 1 | 12.28 | 3.17 4900 | 0 | | | | |
| -3.100 | 4.536 | 0.277 | -78.54 | -101.65 | | 1 | 14.71 | 3.17 4900 | 0 | | | | |
| -3.600 | 4.669 | 0.253 | -127.41 | -93.58 | | 1 | 17.56 | 3.17 4900 | 0 | | | | |
| -4.100 | 4.787 | 0.219 | -171.88 | -84.08 | | 1 | 20.41 | 3.17 4900 | 0 | | | | |
| -4.600 | 4.886 | 0.175 | -211.23 | -73.02 | | 2 | 23.85 | 3.75 4900 | 0 | | | | |
| -5.100 | 4.960 | 0.123 | -244.58 | -60.02 | | 2 | 28.12 | 5.15 4900 | 0 | | | | |
| -5.600 | 5.007 | 0.064 | -270.89 | -44.86 | | 2 | 32.53 | 5.15 4900 | 0 | | | | |
| -6.100 | 5.023 | 0.000 | -289.07 | -27.46 | | 2 | 37.08 | 5.15 4900 | 0 | | | | |
| -6.600 | 5.006 | -0.068 | -297.97 | -7.74 | | 2 | 41.80 | 5.15 4900 | 0 | | | | |
| -7.100 | 4.955 | -0.136 | -296.41 | 14.38 | | 2 | 46.69 | 5.15 4900 | 0 | | | | |
| | | | | | | 2 | 22.55 | 3.02 15100 | 0 | | | | |
| -7.394 | 4.910 | -0.175 | -291.19 | 21.24 | | 2 | 24.12 | 3.01 15100 | 0 | | | | |
| -7.688 | 4.853 | -0.214 | -283.88 | 28.57 | | 2 | 25.81 | 3.11 15100 | 0 | | | | |
| -7.981 | 4.784 | -0.251 | -274.35 | 36.42 | | 2 | 27.67 | 3.39 15100 | 0 | | | | |
| -8.275 | 4.705 | -0.287 | -262.43 | 44.83 | | 2 | 29.57 | 3.71 15100 | 0 | | | | |
| -8.569 | 4.616 | -0.321 | -247.96 | 53.80 | | 2 | 31.52 | 4.08 15100 | 0 | | | | |
| -8.862 | 4.517 | -0.354 | -230.76 | 63.35 | | 2 | 33.51 | 4.49 15100 | 0 | | | | |
| -9.156 | 4.408 | -0.383 | -210.68 | 73.50 | | 2 | 35.55 | 4.85 15100 | 0 | | | | |
| -9.450 | 4.292 | -0.410 | -187.50 | 84.47 | | 2 | 39.13 | 4.85 15100 | 0 | | | | |
| | | | | 670.46 | | 2 | 39.13 | 4.85 15100 | 0 | | | 2 | 585.99 |
| -9.800 | 4.145 | -0.421 | 49.65 | 684.98 | | 2 | 43.86 | 4.85 15100 | 0 | | | | |
| -10.150 | 4.002 | -0.394 | 292.18 | 701.18 | | 2 | 48.72 | 4.85 15100 | 0 | | | | |
| -10.200 | 3.982 | -0.387 | 327.30 | 703.64 | | 2 | 49.41 | 4.85 15100 | 0 | | | | |
| | | | | | | 2 | 43.81 | 4.55 20600 | 0 | | | | |
| -10.500 | 3.874 | -0.327 | 540.44 | 717.51 | | 2 | 48.65 | 4.55 20600 | 0 | | | | |
| -10.800 | 3.789 | -0.238 | 757.94 | 732.77 | | 2 | 53.11 | 4.55 20600 | 0 | | | | |
| -11.100 | 3.734 | -0.119 | 980.22 | 749.28 | | 2 | 56.96 | 4.55 20600 | 0 | | | | |
| -11.400 | 3.720 | 0.030 | 1207.62 | 766.82 | | 2 | 59.99 | 4.55 20600 | 0 | | | | |
| -11.700 | 3.755 | 0.212 | 1440.39 | 785.12 | | 2 | 61.96 | 4.55 20600 | 0 | | | | |
| -12.000 | 3.850 | 0.425 | 1678.73 | 803.81 | | 2 | 62.66 | 4.55 20600 | 0 | | | | |
| -12.300 | 4.014 | 0.672 | 1922.68 | 822.49 | | 2 | 61.86 | 4.55 20600 | 0 | | | | |
| -12.600 | 4.257 | 0.952 | 2172.17 | 840.66 | | 2 | 59.32 | 4.55 20600 | 0 | | | | |
| | | | | | | 2 | 65.09 | 4.85 15100 | 0 | | | | |
| -12.700 | 4.357 | 1.053 | 2256.56 | 847.14 | | 2 | 64.33 | 4.85 15100 | 0 | | | | |
| | | | | | | | | | | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| -13.150 | 4.941 | 1.557 | 2644.20 | 875.52 | 4.41 | 2 | 57.43 | 4.85 15100 | 0 | | | | |
| -13.600 | 5.770 | 2.141 | 3044.52 | 903.84 | 8.83 | 1 | 55.17 | 2.91 15100 | 0 | | | | |
| | | | | -1066.23 | 8.83 | 1 | 55.17 | 2.91 15100 | 0 | | | 3 | -1970.07 |
| -13.950 | 6.601 | 2.598 | 2675.35 | -1043.06 | 12.26 | 2 | 56.16 | 3.03 15100 | 0 | | | | |
| -14.300 | 7.582 | 2.996 | 2314.56 | -1018.33 | 15.70 | 2 | 57.20 | 3.21 15100 | 0 | | | | |
| -14.800 | 9.202 | 3.467 | 1814.78 | -980.26 | 20.60 | 2 | 58.78 | 3.55 15100 | 0 | | | | |
| -15.105 | 10.296 | 3.700 | 1519.55 | -955.44 | 23.59 | 2 | 59.78 | 3.80 15100 | 0 | | | | |
| -15.410 | 11.455 | 3.891 | 1232.09 | -929.39 | 26.59 | 2 | 60.83 | 4.10 15100 | 0 | | | | |
| -15.715 | 12.666 | 4.043 | 952.75 | -902.11 | 29.58 | 2 | 61.93 | 4.44 15100 | 0 | | | | |
| -16.020 | 13.917 | 4.157 | 681.93 | -873.57 | 32.57 | 2 | 63.07 | 4.83 15100 | 0 | | | | |
| -16.306 | 15.118 | 4.230 | 435.84 | -845.63 | 35.38 | 2 | 64.19 | 4.85 15100 | 0 | | | | |
| -16.593 | 16.336 | 4.271 | 197.92 | -816.56 | 38.19 | 2 | 65.35 | 4.85 15100 | 0 | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -16.879 | 17.561 | 4.282 | -31.53 | -786.34 | 40.99 | 2 | 66.57 | 4.85 | 15100 | 0 | | | | | | | |
| -17.165 | 18.784 | 4.263 | -252.15 | -754.97 | 43.80 | 2 | 67.83 | 4.85 | 15100 | 0 | | | | | | | |
| -17.451 | 19.999 | 4.216 | -463.64 | -722.43 | 46.61 | 2 | 69.15 | 4.85 | 15100 | 0 | | | | | | | |
| -17.738 | 21.196 | 4.142 | -665.63 | -688.69 | 49.42 | 2 | 70.52 | 4.85 | 15100 | 0 | | | | | | | |
| -18.024 | 22.368 | 4.043 | -857.80 | -653.75 | 52.23 | 2 | 71.95 | 4.85 | 15100 | 0 | | | | | | | |
| -18.310 | 23.508 | 3.919 | -1039.79 | -617.59 | 55.03 | 2 | 73.43 | 4.85 | 15100 | 0 | | | | | | | |
| -18.596 | 24.609 | 3.771 | -1211.25 | -580.20 | 57.84 | 2 | 74.97 | 4.85 | 15100 | 0 | | | | | | | |
| -18.883 | 25.665 | 3.603 | -1371.83 | -541.55 | 60.65 | 2 | 76.58 | 4.85 | 15100 | 0 | | | | | | | |
| -19.169 | 26.670 | 3.413 | -1521.17 | -501.63 | 63.46 | 2 | 78.24 | 4.85 | 15100 | 0 | | | | | | | |
| -19.455 | 27.617 | 3.205 | -1658.89 | -460.42 | 66.27 | 2 | 79.96 | 4.85 | 15100 | 0 | | | | | | | |
| -19.741 | 28.503 | 2.980 | -1784.63 | -417.91 | 69.07 | 2 | 81.74 | 4.85 | 15100 | 0 | | | | | | | |
| -20.028 | 29.322 | 2.739 | -1898.01 | -374.07 | 71.88 | 2 | 83.57 | 4.85 | 15100 | 0 | | | | | | | |
| -20.314 | 30.070 | 2.485 | -1998.66 | -328.90 | 74.69 | 2 | 85.47 | 4.85 | 15100 | 0 | | | | | | | |
| -20.600 | 30.743 | 2.217 | -2086.18 | -282.37 | 77.50 | 2 | 87.42 | 4.85 | 15100 | 0 | | | | | | | |
| | | | | | 77.50 | 2 | 80.87 | 4.55 | 20600 | 0 | | | | | | | |
| -20.903 | 31.370 | 1.924 | -2164.27 | -233.62 | 80.47 | 2 | 83.47 | 4.55 | 20600 | 0 | | | | | | | |
| -21.205 | 31.906 | 1.620 | -2227.35 | -183.18 | 83.43 | 2 | 86.13 | 4.55 | 20600 | 0 | | | | | | | |
| -21.508 | 32.349 | 1.309 | -2274.92 | -131.02 | 86.40 | 2 | 88.87 | 4.55 | 20600 | 0 | | | | | | | |
| -21.810 | 32.698 | 0.993 | -2306.45 | -77.14 | 89.37 | 2 | 91.66 | 4.55 | 20600 | 0 | | | | | | | |
| -22.113 | 32.950 | 0.673 | -2321.41 | -21.50 | 92.34 | 2 | 94.49 | 4.55 | 20600 | 0 | | | | | | | |
| -22.415 | 33.105 | 0.352 | -2319.28 | 35.90 | 95.30 | 2 | 97.35 | 4.55 | 20600 | 0 | | | | | | | |
| -22.718 | 33.163 | 0.033 | -2299.51 | 95.06 | 98.27 | 2 | 100.23 | 4.55 | 20600 | 0 | | | | | | | |
| -23.020 | 33.125 | -0.282 | -2261.59 | 155.99 | 101.24 | 2 | 103.11 | 4.55 | 20600 | 0 | | | | | | | |
| -23.520 | 32.856 | -0.788 | -2157.65 | 260.56 | 106.14 | 2 | 107.80 | 4.55 | 20600 | 0 | | | | | | | |
| -24.020 | 32.342 | -1.264 | -2000.23 | 369.89 | 111.05 | 2 | 112.30 | 4.55 | 20600 | 0 | | | | | | | |
| -24.520 | 31.600 | -1.697 | -1786.99 | 483.83 | 115.95 | 2 | 116.49 | 4.55 | 20600 | 0 | | | | | | | |
| -24.550 | 31.548 | -1.721 | -1772.37 | 490.82 | 116.25 | 2 | 116.72 | 4.55 | 20600 | 0 | | | | | | | |
| | | | | -70.18 | 116.25 | 2 | 116.72 | 4.55 | 20600 | 0 | | | | | | 6 | -561.00 |
| -24.975 | 30.744 | -2.067 | -1780.94 | 30.39 | 120.42 | 2 | 119.89 | 4.55 | 20600 | 0 | | | | | | | |
| -25.400 | 29.792 | -2.410 | -1749.93 | 107.01 | -2.41 | 2 | 122.66 | 4.55 | 20600 | 0 | | | | | | | |
| -25.675 | 29.099 | -2.628 | -1715.94 | 140.29 | -2.41 | 2 | 124.23 | 4.55 | 20600 | -1 | | | | | | | |
| -25.950 | 28.347 | -2.841 | -1672.75 | 173.82 | -2.41 | 2 | 125.59 | 4.55 | 20600 | 2 | 1.16 | | 20600 | | | | |
| -26.225 | 27.538 | -3.047 | -1620.45 | 206.16 | -2.41 | 2 | 126.76 | 4.55 | 20600 | 2 | 11.14 | | 20600 | | | | |
| -26.500 | 26.672 | -3.247 | -1559.63 | 235.55 | -2.41 | 2 | 127.71 | 4.55 | 20600 | 2 | 24.79 | | 20600 | | | | |
| -26.775 | 25.752 | -3.439 | -1491.24 | 261.16 | -2.41 | 2 | 128.45 | 4.55 | 20600 | 2 | 40.28 | | 20600 | | | | |
| -27.050 | 24.781 | -3.621 | -1416.40 | 282.39 | -2.41 | 2 | 128.97 | 4.55 | 20600 | 2 | 57.89 | | 20600 | | | | |
| -27.325 | 23.762 | -3.794 | -1336.43 | 298.18 | -2.41 | 2 | 129.72 | 4.55 | 20600 | 2 | 81.10 | | 20600 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa | kPa/m | kPa | | kPa | kPa/m | kN | | | |





FASE 7 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° | FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.600 | 22.696 | -3.957 | -1252.91 | 308.39 | -2.41 | 2 130.26 | 4.55 | 20600 | 2 99.87 | | 20600 | | |
| -28.100 | 20.649 | -4.225 | -1095.99 | 317.78 | -2.41 | 2 130.48 | 4.55 | 20600 | 2 118.48 | | 20600 | | |
| -28.375 | 19.468 | -4.357 | -1008.26 | 320.17 | -2.41 | 2 130.18 | 4.55 | 20600 | 2 119.99 | | 20600 | | |
| -28.650 | 18.253 | -4.478 | -919.96 | 321.87 | -2.41 | 2 129.62 | 4.55 | 20600 | 2 122.61 | | 20600 | | |
| -28.925 | 17.006 | -4.588 | -831.33 | 322.52 | -2.41 | 2 128.81 | 4.55 | 20600 | 2 126.26 | | 20600 | | |
| -29.200 | 15.731 | -4.687 | -742.70 | 321.78 | -2.41 | 2 127.76 | 4.55 | 20600 | 2 130.88 | | 20600 | | |
| | | | | | -2.41 | 2 161.86 | 4.26 | 43800 | 2 130.00 | | 43800 | | |
| -29.513 | 14.250 | -4.786 | -640.94 | 328.77 | -2.41 | 2 157.95 | 4.26 | 43800 | 2 140.23 | | 43800 | | |
| -29.825 | 12.741 | -4.870 | -537.71 | 331.06 | -2.41 | 2 153.54 | 4.26 | 43800 | 2 151.80 | | 43800 | | |
| -30.138 | 11.208 | -4.939 | -434.57 | 328.10 | -2.41 | 2 148.68 | 4.26 | 43800 | 2 164.55 | | 43800 | | |
| -30.450 | 9.656 | -4.994 | -333.24 | 319.41 | -2.41 | 2 143.44 | 4.26 | 43800 | 2 178.31 | | 43800 | | |
| -30.763 | 8.088 | -5.035 | -235.58 | 304.61 | -2.41 | 2 137.88 | 4.26 | 43800 | 2 192.95 | | 43800 | | |
| -31.075 | 6.510 | -5.061 | -143.54 | 283.33 | -2.41 | 2 132.04 | 4.26 | 43800 | 2 208.33 | | 43800 | | |
| -31.388 | 4.926 | -5.076 | -59.20 | 255.29 | -2.41 | 2 125.99 | 4.26 | 43800 | 2 224.32 | | 43800 | | |
| -31.700 | 3.339 | -5.079 | 16.54 | 232.28 | -2.41 | 2 119.78 | 4.26 | 43800 | 2 163.88 | | 43800 | | |
| | | | | | -2.41 | -1 | | | 2 1008.03 | | 300000 | | |
| -32.200 | 0.802 | -5.070 | 38.05 | -82.88 | -2.41 | -1 | | | 2 247.78 | | 300000 | | |
| -32.700 | -1.732 | -5.066 | 0.00 | 0.00 | -2.41 | 2 584.12 | 1.52 | 300000 | -1 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | kPa | | kPa/m | kPa | | kPa/m | kN | |

DESPLAZAMIENTO MÁX. = 33.16 mm

MOMENTO MÁXIMO = 3044.52 kN.m/m

CODIFICACIÓN DE ESTADO : -1 = SEPARACIÓN, 0 = EXCAVACIÓN, 1 = PRESIÓN ACTIVA
CODIFICACIÓN DE SUELO : 2 = ELÁSTICO, 3 = PRESIÓN PASSIVA

( 2 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 138.17 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.070 = (2404.63 kN/m)/(34256.59 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.329 = (1079.26 kN/m)/(3281.20 kN/m) SIN INTERÉS





** FASE No 8 **

*Fase 8
*Restitucion del puntal provisional y Sismo

* INSTALACIÓN DE LA LÍNEA DE PUNTALES N° 7
NIVEL = -16.020 m
ESPACIADO = 1.000 m
INCLINACIÓN = 0.000 GRADOS
PRECARGA = 0.000 kN
RIGIDEZ = 453000.000 kN/m
CONEXIÓN BILATERAL

*SISMO_ R

* NUEVOS PARÁMETROS PARA CAPA No. 1 HASTA NIVEL -2.200 m

PESO ESPECIFOCO HÚMEDO GH = 18.000 kN/m3

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 | |
| COHESIÓN | C | = | 5.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG1a

* NUEVOS PARÁMETROS PARA CAPA No. 2 HASTA NIVEL -7.100 m

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.560 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.515 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.367 | |
| COHESIÓN | C | = | 5.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 29.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 4900.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG1b



* NUEVOS PARÁMETROS PARA CAPA No. 3 HASTA NIVEL -10.200 m

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.522 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.594 | |
| COHESIÓN | C | = | 15.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG1c

* NUEVOS PARÁMETROS PARA CAPA No. 4 HASTA NIVEL -12.600 m

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.487 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.846 | |
| COHESIÓN | C | = | 20.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG1b

* NUEVOS PARÁMETROS PARA CAPA No. 5 HASTA NIVEL -20.600 m

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 18.500 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 8.500 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 1.211 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.485 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.520 | |
| COHESIÓN | C | = | 15.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 31.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 15100.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG1c



* NUEVOS PARÁMETROS PARA CAPA No. 6 HASTA NIVEL -29.200 m

| | | | | |
|---|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 19.000 | kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 9.000 | kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.948 | |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.455 | |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 1.991 | |
| COHESIÓN | C | = | 20.000 | kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 33.000 | GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 | |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 | |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 20600.000 | kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 | 1/m |

*SISMO_ UG2

* NUEVOS PARÁMETROS PARA CAPA No. 7 HASTA NIVEL -31.700 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 20.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 10.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.795 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.426 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 2.402 |
| COHESIÓN | C | = | 30.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 35.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 43800.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |

*SISMO_ UG3a

* NUEVOS PARÁMETROS PARA CAPA No. 8 HASTA NIVEL -47.300 m

| | | | |
|---|---|---|---|
| PESO ESPECIFOCO HÚMEDO | GH | = | 23.000 kN/m3 |
| PESO ESPECIFOCO SUMERGIDO | GD | = | 13.000 kN/m3 |
| COEFIC. DE EMPUJE ACTIVO HOR. | KA | = | 0.302 |
| COEFIC. DE EMPUJE EN REPOSO HOR. | K0 | = | 0.152 |
| COEFIC. DE EMPUJE PASIVO HOR. | KP | = | 10.398 |
| COHESIÓN | C | = | 246.000 kPa |
| ANGULO DE ROZAMIENTO INTERNO | PHI | = | 58.000 GRADOS |
| PARA PRESIÓN ACTIVA DELTA/PHI | | = | 0.000 |
| PARA PRESIÓN PASIVA DELTA/PHI | | = | 0.000 |
| MÓDULO DE BALASTO HORIZONTAL (A P=0) | | = | 300000.000 kPa/m |
| MEJORA DE ESTE COEF. A LA PRESIÓN | | = | 0.000 1/m |



FASE 8

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO PR. | SOIL 1 SOPRAC. | SOIL 1 ELAST. | SOIL 2 ESTADO PR. | SOIL 2 SOPRAC. | SOIL 2 ELAST. | PUNTALES/ ANCLAS N° | PUNTALES/ ANCLAS FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | PARED<br>EXCAVACIÓN: 0.00 m<br>NIVEL AGUA: -12.70 m<br>S. DE CAQUOT: 10.00 kPa | | | SOIL 1<br>EXCAVACIÓN: -25.40 m<br>NIVEL AGUA: -25.40 m<br>S. DE CAQUOT: 0.00 kPa | | | | |
| 0.000 | 3.316 | 0.441 | 0.00 | 0.00 | | -1 | | | 0 | | | | |
| -0.275 | 3.437 | 0.441 | 0.03 | 0.34 | | 1 | 2.48 | 2.48 4900 | 0 | | | | |
| -0.550 | 3.558 | 0.441 | 0.29 | 1.75 | | 2 | 7.74 | 5.15 4900 | 0 | | | | |
| -0.825 | 3.679 | 0.441 | 1.06 | 3.91 | | 1 | 8.03 | 5.13 4900 | 0 | | | | |
| -1.100 | 3.800 | 0.441 | 2.48 | 6.50 | | 1 | 10.80 | 5.60 4900 | 0 | | | | |
| -1.375 | 3.922 | 0.441 | 4.71 | 9.85 | | 1 | 13.57 | 5.60 4900 | 0 | | | | |
| -1.650 | 4.043 | 0.442 | 7.96 | 13.96 | | 1 | 16.34 | 5.60 4900 | 0 | | | | |
| -1.925 | 4.165 | 0.443 | 12.46 | 18.84 | | 1 | 19.11 | 5.60 4900 | 0 | | | | |
| -2.200 | 4.287 | 0.445 | 18.40 | 24.48 | | 1 | 21.89 | 5.60 4900 | 0 | | | | |
| -2.250 | 4.309 | 0.446 | 19.65 | 25.58 | | 1 | 22.39 | 5.60 4900 | 0 | | | | |
| | | | | -188.12 | | 1 | 22.39 | 5.60 4900 | 0 | | | 1 | -213.70 |
| -2.675 | 4.499 | 0.442 | -58.15 | -177.69 | | 1 | 26.67 | 5.60 4900 | 0 | | | | |
| -3.100 | 4.683 | 0.424 | -131.13 | -165.45 | | 1 | 30.96 | 5.60 4900 | 0 | | | | |
| -3.600 | 4.886 | 0.384 | -209.78 | -148.71 | | 1 | 36.00 | 5.60 4900 | 0 | | | | |
| -4.100 | 5.065 | 0.328 | -279.42 | -129.45 | | 1 | 41.04 | 5.60 4900 | 0 | | | | |
| -4.600 | 5.212 | 0.258 | -338.80 | -107.67 | | 1 | 46.08 | 5.60 4900 | 0 | | | | |
| -5.100 | 5.320 | 0.175 | -386.67 | -83.37 | | 1 | 51.12 | 5.60 4900 | 0 | | | | |
| -5.600 | 5.385 | 0.082 | -421.75 | -56.55 | | 1 | 56.16 | 5.60 4900 | 0 | | | | |
| -6.100 | 5.401 | -0.017 | -442.80 | -27.21 | | 1 | 61.20 | 5.60 4900 | 0 | | | | |
| -6.600 | 5.367 | -0.119 | -448.55 | 4.65 | | 1 | 66.24 | 5.60 4900 | 0 | | | | |
| -7.100 | 5.283 | -0.220 | -437.73 | 39.02 | | 1 | 71.28 | 5.60 4900 | 0 | | | | |
| | | | | | | 1 | 54.96 | 5.22 15100 | 0 | | | | |
| -7.394 | 5.209 | -0.278 | -423.86 | 55.59 | | 1 | 57.80 | 5.22 15100 | 0 | | | | |
| -7.688 | 5.119 | -0.334 | -405.00 | 72.98 | | 1 | 60.63 | 5.22 15100 | 0 | | | | |
| -7.981 | 5.013 | -0.387 | -380.90 | 91.21 | | 1 | 63.47 | 5.22 15100 | 0 | | | | |
| -8.275 | 4.892 | -0.436 | -351.33 | 110.27 | | 1 | 66.31 | 5.22 15100 | 0 | | | | |
| -8.569 | 4.758 | -0.481 | -316.04 | 130.16 | | 1 | 69.14 | 5.22 15100 | 0 | | | | |
| -8.862 | 4.610 | -0.520 | -274.78 | 150.89 | | 1 | 71.98 | 5.22 15100 | 0 | | | | |
| -9.156 | 4.453 | -0.554 | -227.31 | 172.45 | | 1 | 74.82 | 5.22 15100 | 0 | | | | |
| -9.450 | 4.286 | -0.581 | -173.38 | 194.84 | | 1 | 77.65 | 5.22 15100 | 0 | | | | |
| | | | | 802.26 | | 1 | 77.65 | 5.22 15100 | 0 | | | 2 | 607.42 |
| -9.800 | 4.080 | -0.586 | 112.23 | 830.03 | | 1 | 81.03 | 5.22 15100 | 0 | | | | |
| -10.150 | 3.881 | -0.545 | 407.77 | 858.98 | | 1 | 84.41 | 5.22 15100 | 0 | | | | |
| -10.200 | 3.854 | -0.535 | 450.83 | 863.22 | | 1 | 84.90 | 5.22 15100 | 0 | | | | |
| | | | | | | 1 | 73.32 | 4.87 20600 | 0 | | | | |
| -10.500 | 3.704 | -0.455 | 713.14 | 885.63 | | 1 | 76.10 | 4.87 20600 | 0 | | | | |
| -10.800 | 3.584 | -0.339 | 982.29 | 908.87 | | 1 | 78.87 | 4.87 20600 | 0 | | | | |
| -11.100 | 3.505 | -0.186 | 1258.54 | 932.95 | | 1 | 81.65 | 4.87 20600 | 0 | | | | |
| -11.400 | 3.477 | 0.006 | 1542.14 | 957.86 | | 1 | 84.42 | 4.87 20600 | 0 | | | | |
| -11.700 | 3.512 | 0.237 | 1833.34 | 983.61 | | 1 | 87.20 | 4.87 20600 | 0 | | | | |
| -12.000 | 3.623 | 0.509 | 2132.39 | 1010.18 | | 1 | 89.98 | 4.87 20600 | 0 | | | | |
| -12.300 | 3.821 | 0.822 | 2439.54 | 1037.59 | | 1 | 92.75 | 4.87 20600 | 0 | | | | |
| -12.600 | 4.120 | 1.177 | 2755.03 | 1065.83 | | 1 | 95.53 | 4.87 20600 | 0 | | | | |
| | | | | | | 1 | 274.58 | 12.11 15100 | 0 | | | | |
| -12.700 | 4.244 | 1.306 | 2862.99 | 1093.40 | | 1 | 276.82 | 12.11 15100 | 0 | | | | |
| m | mm | /1000 | kN.m/m | kN/m | kPa | | kPa | kPa kPa/m | | kPa | kPa kPa/m | | kN |



FASE 8 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | SOIL 1 ESTADO PR. | SOIL 1 SOPRAC. | SOIL 1 ELAST. | SOIL 2 ESTADO PR. | SOIL 2 SOPRAC. | SOIL 2 ELAST. | PUNTALES/ ANCLAS N° | PUNTALES/ ANCLAS FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -13.150 | 4.972 | 1.946 | 3383.35 | 1220.00 | 4.41 | 1 | 281.45 | 12.11 15100 | 0 | | | | |
| -13.600 | 6.013 | 2.700 | 3961.60 | 1350.68 | 8.83 | 1 | 286.08 | 12.11 15100 | 0 | | | | |
| | | | | -1461.81 | 8.83 | 1 | 286.08 | 12.11 15100 | 0 | | | 3 | -2812.49 |
| -13.950 | 7.064 | 3.293 | 3468.18 | -1357.36 | 12.26 | 1 | 289.68 | 12.11 15100 | 0 | | | | |
| -14.300 | 8.309 | 3.811 | 3011.74 | -1250.45 | 15.70 | 1 | 293.29 | 12.11 15100 | 0 | | | | |
| -14.800 | 10.375 | 4.430 | 2425.55 | -1093.45 | 20.60 | 1 | 298.43 | 12.11 15100 | 0 | | | | |
| -15.105 | 11.775 | 4.745 | 2106.98 | -995.21 | 23.59 | 1 | 301.57 | 12.11 15100 | 0 | | | | |
| -15.410 | 13.265 | 5.018 | 1818.66 | -895.10 | 26.59 | 1 | 304.71 | 12.11 15100 | 0 | | | | |
| -15.715 | 14.832 | 5.253 | 1561.16 | -793.12 | 29.58 | 1 | 307.85 | 12.11 15100 | 0 | | | | |
| -16.020 | 16.466 | 5.454 | 1335.05 | -689.27 | 32.57 | 1 | 310.99 | 12.11 15100 | 0 | | | | |
| | | | | -1843.83 | 32.57 | 1 | 310.99 | 12.11 15100 | 0 | | | 7 | -1154.56 |
| -16.306 | 18.049 | 5.595 | 821.41 | -1744.66 | 35.38 | 1 | 313.94 | 12.11 15100 | 0 | | | | |
| -16.593 | 19.663 | 5.670 | 336.39 | -1643.84 | 38.19 | 1 | 316.88 | 12.11 15100 | 0 | | | | |
| -16.879 | 21.289 | 5.684 | -119.53 | -1541.38 | 40.99 | 1 | 319.83 | 12.11 15100 | 0 | | | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -17.165 | 22.912 | 5.640 | -545.89 | -1437.27 | 43.80 | 1 | 322.78 | 12.11 | 15100 | 0 | | | | | | | | | |
| -17.451 | 24.513 | 5.543 | -942.22 | -1331.52 | 46.61 | 1 | 325.72 | 12.11 | 15100 | 0 | | | | | | | | | |
| -17.738 | 26.080 | 5.395 | -1308.03 | -1224.11 | 49.42 | 1 | 328.67 | 12.11 | 15100 | 0 | | | | | | | | | |
| -18.024 | 27.598 | 5.202 | -1642.86 | -1115.06 | 52.23 | 1 | 331.62 | 12.11 | 15100 | 0 | | | | | | | | | |
| -18.310 | 29.054 | 4.967 | -1946.24 | -1004.36 | 55.03 | 1 | 334.56 | 12.11 | 15100 | 0 | | | | | | | | | |
| -18.596 | 30.438 | 4.695 | -2217.70 | -892.02 | 57.84 | 1 | 337.51 | 12.11 | 15100 | 0 | | | | | | | | | |
| -18.883 | 31.739 | 4.389 | -2456.77 | -778.02 | 60.65 | 1 | 340.45 | 12.11 | 15100 | 0 | | | | | | | | | |
| -19.169 | 32.948 | 4.054 | -2662.96 | -662.38 | 63.46 | 1 | 343.40 | 12.11 | 15100 | 0 | | | | | | | | | |
| -19.455 | 34.057 | 3.694 | -2835.82 | -545.10 | 66.27 | 1 | 346.35 | 12.11 | 15100 | 0 | | | | | | | | | |
| -19.741 | 35.061 | 3.314 | -2974.87 | -426.16 | 69.07 | 1 | 349.29 | 12.11 | 15100 | 0 | | | | | | | | | |
| -20.028 | 35.953 | 2.918 | -3079.64 | -305.58 | 71.88 | 1 | 352.24 | 12.11 | 15100 | 0 | | | | | | | | | |
| -20.314 | 36.730 | 2.511 | -3149.66 | -183.35 | 74.69 | 1 | 355.19 | 12.11 | 15100 | 0 | | | | | | | | | |
| -20.600 | 37.390 | 2.096 | -3184.46 | -59.48 | 77.50 | 1 | 358.13 | 12.11 | 15100 | 0 | | | | | | | | | |
| | | | | | 77.50 | 1 | 271.92 | 9.48 | 20600 | 0 | | | | | | | | | |
| -20.903 | 37.957 | 1.656 | -3186.37 | 47.06 | 80.47 | 1 | 274.51 | 9.48 | 20600 | 0 | | | | | | | | | |
| -21.205 | 38.392 | 1.217 | -3155.81 | 155.28 | 83.43 | 1 | 277.09 | 9.48 | 20600 | 0 | | | | | | | | | |
| -21.508 | 38.694 | 0.786 | -3092.26 | 265.18 | 86.40 | 1 | 279.67 | 9.48 | 20600 | 0 | | | | | | | | | |
| -21.810 | 38.868 | 0.365 | -2995.21 | 376.75 | 89.37 | 1 | 282.25 | 9.48 | 20600 | 0 | | | | | | | | | |
| -22.113 | 38.917 | -0.040 | -2864.15 | 490.01 | 92.34 | 1 | 284.83 | 9.48 | 20600 | 0 | | | | | | | | | |
| -22.415 | 38.846 | -0.425 | -2698.58 | 604.94 | 95.30 | 1 | 287.41 | 9.48 | 20600 | 0 | | | | | | | | | |
| -22.718 | 38.662 | -0.784 | -2498.00 | 721.55 | 98.27 | 1 | 289.99 | 9.48 | 20600 | 0 | | | | | | | | | |
| -23.020 | 38.374 | -1.113 | -2261.88 | 839.84 | 101.24 | 1 | 292.57 | 9.48 | 20600 | 0 | | | | | | | | | |
| -23.520 | 37.697 | -1.578 | -1792.35 | 1039.04 | 106.14 | 1 | 296.84 | 9.48 | 20600 | 0 | | | | | | | | | |
| -24.020 | 36.816 | -1.924 | -1222.08 | 1242.82 | 111.05 | 1 | 301.10 | 9.48 | 20600 | 0 | | | | | | | | | |
| -24.520 | 35.797 | -2.128 | -548.76 | 1451.19 | 115.95 | 1 | 305.37 | 9.48 | 20600 | 0 | | | | | | | | | |
| -24.550 | 35.733 | -2.135 | -505.04 | 1463.84 | 116.25 | 1 | 305.63 | 9.48 | 20600 | 0 | | | | | | | | | |
| | | | | -896.32 | 116.25 | 1 | 305.63 | 9.48 | 20600 | 0 | | | | | | | | 6-2360.16 | |
| -24.975 | 34.799 | -2.268 | -847.64 | -715.37 | 120.42 | 1 | 309.25 | 9.48 | 20600 | 0 | | | | | | | | | |
| -25.400 | 33.796 | -2.460 | -1116.45 | -558.09 | -2.41 | 1 | 312.88 | 9.48 | 20600 | 0 | | | | | | | | | |
| | | | | | -2.41 | 1 | 312.88 | 9.48 | 20600 | 3 | 35.97 | | 20600 | | | | | | |
| -25.675 | 33.100 | -2.609 | -1259.59 | -482.99 | -2.41 | 1 | 315.22 | 9.48 | 20600 | 3 | 41.18 | | 20600 | | | | | | |
| -25.950 | 32.360 | -2.775 | -1382.20 | -408.93 | -2.41 | 1 | 317.57 | 9.48 | 20600 | 3 | 48.13 | | 20600 | | | | | | |
| -26.225 | 31.572 | -2.955 | -1484.60 | -335.99 | -2.41 | 1 | 319.92 | 9.48 | 20600 | 3 | 54.10 | | 20600 | | | | | | |
| -26.500 | 30.733 | -3.147 | -1567.10 | -264.23 | -2.41 | 1 | 322.26 | 9.48 | 20600 | 3 | 61.33 | | 20600 | | | | | | |
| -26.775 | 29.841 | -3.348 | -1630.06 | -193.89 | -2.41 | 1 | 324.61 | 9.48 | 20600 | 3 | 69.17 | | 20600 | | | | | | |
| m | mm | /1000 | kN.m/m | | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN | | | | | | |



FASE 8 (CONTINUACIÓN)

| NIVEL | DESPLAZ. | ROTACIÓN | MOMENTO | ESF.CO. | C. REP. | ESTADO PR. | SOPRAC. | ELAST. | ESTADO PR. | SOPRAC. | ELAST. | N° FUERZA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -27.050 | 28.891 | -3.556 | -1673.89 | -125.16 | -2.41 | 1 326.96 | 9.48 | 20600 | 3 | 77.72 | 20600 | |
| -27.325 | 27.884 | -3.768 | -1699.08 | -58.40 | -2.41 | 1 329.30 | 9.48 | 20600 | 3 | 88.19 | 20600 | |
| -27.600 | 26.819 | -3.982 | -1706.20 | 6.30 | -2.41 | 1 331.65 | 9.48 | 20600 | 3 | 97.33 | 20600 | |
| -28.100 | 24.731 | -4.369 | -1674.10 | 122.01 | -2.41 | 1 335.91 | 9.48 | 20600 | 3 | 102.60 | 20600 | |
| -28.375 | 23.501 | -4.576 | -1631.82 | 185.48 | -2.41 | 1 338.26 | 9.48 | 20600 | 3 | 105.18 | 20600 | |
| -28.650 | 22.215 | -4.778 | -1572.10 | 248.84 | -2.41 | 1 340.61 | 9.48 | 20600 | 3 | 108.01 | 20600 | |
| -28.925 | 20.874 | -4.970 | -1494.97 | 312.04 | -2.41 | 1 342.95 | 9.48 | 20600 | 3 | 111.08 | 20600 | |
| -29.200 | 19.482 | -5.152 | -1400.49 | 375.02 | -2.41 | 1 345.30 | 9.48 | 20600 | 3 | 114.36 | 20600 | |
| | | | | | -2.41 | 1 276.55 | 7.95 | 43800 | 3 | 164.35 | 43800 | |
| -29.513 | 17.841 | -5.344 | -1277.99 | 408.85 | -2.41 | 1 279.03 | 7.95 | 43800 | 3 | 169.89 | 43800 | |
| -29.825 | 16.144 | -5.517 | -1145.07 | 441.68 | -2.41 | 1 281.52 | 7.95 | 43800 | 3 | 175.71 | 43800 | |
| -30.138 | 14.396 | -5.670 | -1002.06 | 473.43 | -2.41 | 1 284.00 | 7.95 | 43800 | 3 | 181.77 | 43800 | |
| -30.450 | 12.602 | -5.802 | -849.30 | 504.03 | -2.41 | 1 286.49 | 7.95 | 43800 | 3 | 188.04 | 43800 | |
| -30.763 | 10.772 | -5.912 | -687.16 | 533.42 | -2.41 | 1 288.97 | 7.95 | 43800 | 3 | 194.48 | 43800 | |
| -31.075 | 8.910 | -5.998 | -516.04 | 561.55 | -2.41 | 1 291.46 | 7.95 | 43800 | 3 | 201.09 | 43800 | |
| -31.388 | 7.025 | -6.059 | -336.33 | 588.38 | -2.41 | 1 293.94 | 7.95 | 43800 | 3 | 207.82 | 43800 | |
| -31.700 | 5.126 | -6.093 | -148.44 | 613.86 | -2.41 | 1 296.43 | 7.95 | 43800 | 3 | 214.66 | 43800 | |
| | | | | | -2.41 | -1 | | | 2 | 1544.08 | 300000 | |
| -32.200 | 2.075 | -6.105 | 3.27 | 69.20 | -2.41 | -1 | | | 2 | 629.72 | 300000 | |
| -32.700 | -0.977 | -6.104 | 0.00 | 0.00 | -2.41 | 2 357.75 | 1.52 | 300000 | -1 | | | |
| m | mm | /1000 | kN.m/m | | kN/m | kPa | kPa | kPa | kPa/m | kPa | kPa | kPa/m | kN |

DESPLAZAMIENTO MÁX. = 38.92 mm

MOMENTO MÁXIMO = 3961.60 kN.m/m

CODIFICACIÓN DE ESTADO DE SUELO :
-1 = SEPARACIÓN
0 = EXCAVACIÓN
1 = PRESIÓN ACTIVA
2 = ELÁSTICO
3 = PRESIÓN PASSIVA

( 4 IT.)

EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 1 = 264.41 kN/m
EFECTO HORIZONTAL INTEGRADO DE SOBRECARGAS SOBRE EL SUELO 2 = 0.00 kN/m

PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 1 = 0.282 = (6667.46 kN/m)/(23665.20 kN/m) SIN INTERÉS
PROPORCIÓN (PRESIÓN MOVILIZADA)/(PRESIÓN PASIVA) PARA SUELO N° 2 = 0.495 = (1480.50 kN/m)/(2989.73 kN/m) SIN INTERÉS

*** FINAL DE CÁLCULO



* CURVAS ENVOLVENTES DE FASE 1 A FASE 6 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.90 |
| -0.825 | 0.00 | 2.77 |
| -1.100 | 0.00 | 4.79 |
| -1.375 | 0.00 | 6.94 |
| -1.650 | 0.00 | 9.24 |
| -1.925 | 0.00 | 11.68 |
| -2.200 | 0.00 | 14.26 |
| -2.250 | 0.00 | 14.75 |
| | -112.95 | 8.54 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.08 |
| -0.825 | 0.00 | 0.58 |
| -1.100 | 0.00 | 1.62 |
| -1.375 | 0.00 | 3.23 |
| -1.650 | 0.00 | 5.45 |
| -1.925 | 0.00 | 8.33 |
| -2.200 | 0.00 | 11.89 |
| -2.250 | 0.00 | 12.62 |
| | 0.00 | 12.62 |

| | | | | | |
|---|---|---|---|---|---|
| -2.675 | -108.24 | 13.24 | -2.675 | -34.42 | 9.53 |
| -3.100 | -102.51 | 19.04 | -3.100 | -79.24 | 16.35 |
| -3.600 | -94.44 | 18.18 | -3.600 | -128.54 | 25.65 |
| -4.100 | -84.95 | 18.02 | -4.100 | -173.45 | 34.65 |
| -4.600 | -73.89 | 19.03 | -4.600 | -213.23 | 43.86 |
| -5.100 | -60.91 | 21.18 | -5.100 | -247.01 | 53.86 |
| -5.600 | -45.77 | 24.44 | -5.600 | -273.78 | 65.22 |
| -6.100 | -28.38 | 34.59 | -6.100 | -292.41 | 78.49 |
| -6.600 | -8.68 | 55.51 | -6.600 | -301.77 | 94.18 |
| -7.100 | 0.00 | 78.76 | -7.100 | -300.69 | 112.83 |
| -7.394 | 0.00 | 87.40 | -7.394 | -295.75 | 123.48 |
| -7.688 | 0.00 | 96.36 | -7.688 | -288.74 | 131.82 |
| -7.981 | 0.00 | 105.61 | -7.981 | -279.51 | 138.10 |
| -8.275 | 0.00 | 115.08 | -8.275 | -267.90 | 142.60 |
| -8.569 | 0.00 | 124.74 | -8.569 | -253.74 | 145.56 |
| -8.862 | 0.00 | 134.53 | -8.862 | -236.86 | 176.53 |
| -9.156 | 0.00 | 144.39 | -9.156 | -217.09 | 217.50 |
| -9.450 | -2.46 | 154.49 | -9.450 | -194.23 | 261.39 |
| | -184.84 | 681.32 | | -194.23 | 261.39 |
| -9.800 | -172.22 | 695.86 | -9.800 | -63.37 | 198.88 |
| -10.150 | -158.95 | 712.11 | -10.150 | -23.47 | 293.07 |
| -10.200 | -157.00 | 714.57 | -10.200 | -17.45 | 328.74 |
| -10.500 | -147.84 | 728.51 | -10.500 | 0.00 | 545.16 |
| -10.800 | -138.21 | 743.85 | -10.800 | 0.00 | 765.98 |
| -11.100 | -128.13 | 760.46 | -11.100 | 0.00 | 991.60 |
| -11.400 | -117.59 | 778.10 | -11.400 | -32.48 | 1222.36 |
| -11.700 | -106.59 | 796.51 | -11.700 | -66.12 | 1458.54 |
| -12.000 | -95.13 | 815.32 | -12.000 | -96.39 | 1700.31 |
| -12.300 | -83.22 | 834.11 | -12.300 | -123.15 | 1947.73 |
| -12.600 | -70.84 | 852.40 | -12.600 | -146.27 | 2200.73 |
| -12.700 | -65.58 | 858.89 | -12.700 | -153.09 | 2286.29 |
| -13.150 | -40.51 | 887.37 | -13.150 | -177.06 | 2679.24 |
| -13.600 | -29.41 | 915.72 | -13.600 | -189.18 | 3084.90 |
| | -1050.94 | 0.00 | | -189.18 | 3084.90 |
| -13.950 | -1027.79 | 10.20 | -13.950 | -189.70 | 2721.43 |
| -14.300 | -1003.14 | 34.85 | -14.300 | -181.86 | 2366.32 |





| | | | | | |
|---|---|---|---|---|---|
| -14.800 | -965.30 | 38.95 | -14.800 | -162.94 | 1874.58 |
| -15.105 | -940.72 | 37.73 | -15.105 | -151.23 | 1584.19 |
| -15.410 | -914.99 | 36.24 | -15.410 | -139.95 | 1301.46 |
| -15.715 | -888.12 | 34.70 | -15.715 | -129.13 | 1026.77 |
| -16.020 | -860.10 | 33.14 | -16.020 | -118.78 | 760.44 |
| -16.306 | -832.77 | 31.69 | -16.306 | -109.51 | 518.40 |
| -16.593 | -804.43 | 30.26 | -16.593 | -100.64 | 284.34 |
| -16.879 | -775.09 | 28.87 | -16.879 | -92.18 | 58.53 |
| -17.165 | -744.74 | 27.54 | -17.165 | -241.10 | 12.41 |
| -17.451 | -713.38 | 26.28 | -17.451 | -449.82 | 6.96 |
| -17.738 | -681.02 | 25.10 | -17.738 | -649.42 | 2.06 |
| -18.024 | -647.65 | 24.16 | -18.024 | -839.60 | 0.00 |
| -18.310 | -613.27 | 23.65 | -18.310 | -1020.10 | 0.00 |
| -18.596 | -577.88 | 23.65 | -18.596 | -1190.61 | 0.00 |
| -18.883 | -541.50 | 24.17 | -18.883 | -1350.84 | 0.00 |
| -19.169 | -504.10 | 25.22 | -19.169 | -1500.51 | 0.00 |
| -19.455 | -465.70 | 26.81 | -19.455 | -1639.34 | 0.00 |
| -19.741 | -426.29 | 28.96 | -19.741 | -1767.03 | 0.00 |
| -20.028 | -385.87 | 31.68 | -20.028 | -1883.29 | 0.00 |
| -20.314 | -344.45 | 34.96 | -20.314 | -1987.84 | 0.00 |
| -20.600 | -302.02 | 38.81 | -20.600 | -2080.39 | 9.60 |
| -20.903 | -259.71 | 29.02 | -20.903 | -2165.38 | 19.85 |
| -21.205 | -216.29 | 19.50 | -21.205 | -2237.41 | 27.19 |
| -21.508 | -171.75 | 10.25 | -21.508 | -2296.13 | 31.68 |
| -21.810 | -126.09 | 1.47 | -21.810 | -2341.20 | 33.43 |
| -22.113 | -79.31 | 0.03 | -22.113 | -2372.30 | 32.58 |
| -22.415 | -31.42 | 37.41 | -22.415 | -2389.08 | 29.36 |
| -22.718 | -20.92 | 86.42 | -22.718 | -2391.19 | 24.02 |
| -23.020 | -26.80 | 136.56 | -23.020 | -2378.32 | 16.79 |
| | -344.90 | 68.73 | | -2378.32 | 16.79 |
| -23.520 | -259.58 | 154.04 | -23.520 | -2323.25 | 1.29 |
| -24.020 | -171.21 | 242.41 | -24.020 | -2224.76 | 0.00 |
| -24.520 | -79.78 | 333.84 | -24.520 | -2224.51 | 0.00 |
| -24.550 | -74.20 | 339.43 | -24.550 | -2226.81 | 0.00 |
| | -113.88 | 290.34 | | -2226.81 | 0.00 |
| -24.975 | -46.55 | 321.45 | -24.975 | -2241.37 | 0.00 |
| -25.400 | -46.49 | 347.48 | -25.400 | -2221.34 | 0.00 |
| -25.675 | -45.55 | 361.62 | -25.675 | -2190.81 | 0.00 |
| -25.950 | -43.85 | 373.63 | -25.950 | -2148.31 | 0.00 |
| -26.225 | -41.36 | 383.52 | -26.225 | -2094.57 | 0.00 |
| -26.500 | -38.04 | 391.28 | -26.500 | -2030.26 | 0.00 |
| -26.775 | -33.84 | 396.91 | -26.775 | -1956.22 | 0.00 |
| -27.050 | -28.70 | 400.41 | -27.050 | -1873.43 | 0.00 |
| -27.325 | -22.57 | 401.79 | -27.325 | -1783.06 | 0.00 |
| -27.600 | -15.39 | 401.05 | -27.600 | -1686.54 | 0.00 |
| -28.100 | 0.00 | 394.24 | -28.100 | -1498.69 | 0.00 |
| -28.375 | 0.00 | 404.16 | -28.375 | -1389.53 | 0.00 |
| -28.650 | 0.00 | 418.61 | -28.650 | -1276.40 | 0.00 |
| -28.925 | 0.00 | 432.89 | -28.925 | -1159.31 | 0.00 |
| -29.200 | 0.00 | 446.79 | -29.200 | -1038.34 | 0.00 |
| -29.513 | 0.00 | 439.90 | -29.513 | -899.76 | 0.00 |
| -29.825 | 0.00 | 431.50 | -29.825 | -763.56 | 0.00 |
| -30.138 | 0.00 | 421.33 | -30.138 | -630.26 | 0.00 |
| -30.450 | 0.00 | 409.15 | -30.450 | -500.44 | 0.00 |
| -30.763 | 0.00 | 394.78 | -30.763 | -374.77 | 29.26 |





| | | | | | |
|---|---|---|---|---|---|
| -31.075 | 0.00 | 378.04 | -31.075 | -253.95 | 58.91 |
| -31.388 | 0.00 | 358.79 | -31.388 | -138.75 | 78.81 |
| -31.700 | 0.00 | 348.92 | -31.700 | -28.73 | 95.09 |
| -32.200 | -155.86 | 15.53 | -32.200 | -0.98 | 54.95 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |
| | | | | | |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |

** S E N E R SPAIN **

** 19/09/13 **

* CURVAS ENVOLVENTES DE FASE 7 A FASE 7 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.90 |
| -0.825 | 0.00 | 2.76 |
| -1.100 | 0.00 | 4.77 |
| -1.375 | 0.00 | 6.93 |
| -1.650 | 0.00 | 9.22 |
| -1.925 | 0.00 | 11.66 |
| -2.200 | 0.00 | 14.24 |
| -2.250 | 0.00 | 14.73 |
| | -112.09 | 0.00 |
| -2.675 | -107.38 | 0.00 |
| -3.100 | -101.65 | 0.00 |
| -3.600 | -93.58 | 0.00 |
| -4.100 | -84.08 | 0.00 |
| -4.600 | -73.02 | 0.00 |
| -5.100 | -60.02 | 0.00 |
| -5.600 | -44.86 | 0.00 |
| -6.100 | -27.46 | 0.00 |
| -6.600 | -7.74 | 0.00 |
| -7.100 | 0.00 | 14.38 |
| -7.394 | 0.00 | 21.24 |
| -7.688 | 0.00 | 28.57 |
| -7.981 | 0.00 | 36.42 |
| -8.275 | 0.00 | 44.83 |
| -8.569 | 0.00 | 53.80 |
| -8.862 | 0.00 | 63.35 |
| -9.156 | 0.00 | 73.50 |
| -9.450 | 0.00 | 84.47 |
| | 0.00 | 670.46 |
| -9.800 | 0.00 | 684.98 |
| -10.150 | 0.00 | 701.18 |
| -10.200 | 0.00 | 703.64 |
| -10.500 | 0.00 | 717.51 |
| -10.800 | 0.00 | 732.77 |
| -11.100 | 0.00 | 749.28 |
| -11.400 | 0.00 | 766.82 |
| -11.700 | 0.00 | 785.12 |
| -12.000 | 0.00 | 803.81 |
| -12.300 | 0.00 | 822.49 |
| -12.600 | 0.00 | 840.66 |
| -12.700 | 0.00 | 847.14 |
| -13.150 | 0.00 | 875.52 |
| -13.600 | 0.00 | 903.84 |
| | -1066.23 | 0.00 |
| -13.950 | -1043.06 | 0.00 |
| -14.300 | -1018.33 | 0.00 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.00 |
| -0.550 | 0.00 | 0.08 |
| -0.825 | 0.00 | 0.58 |
| -1.100 | 0.00 | 1.62 |
| -1.375 | 0.00 | 3.22 |
| -1.650 | 0.00 | 5.44 |
| -1.925 | 0.00 | 8.31 |
| -2.200 | 0.00 | 11.87 |
| -2.250 | 0.00 | 12.59 |
| | 0.00 | 12.59 |
| -2.675 | -34.08 | 0.00 |
| -3.100 | -78.54 | 0.00 |
| -3.600 | -127.41 | 0.00 |
| -4.100 | -171.88 | 0.00 |
| -4.600 | -211.23 | 0.00 |
| -5.100 | -244.58 | 0.00 |
| -5.600 | -270.89 | 0.00 |
| -6.100 | -289.07 | 0.00 |
| -6.600 | -297.97 | 0.00 |
| -7.100 | -296.41 | 0.00 |
| -7.394 | -291.19 | 0.00 |
| -7.688 | -283.88 | 0.00 |
| -7.981 | -274.35 | 0.00 |
| -8.275 | -262.43 | 0.00 |
| -8.569 | -247.96 | 0.00 |
| -8.862 | -230.76 | 0.00 |
| -9.156 | -210.68 | 0.00 |
| -9.450 | -187.50 | 0.00 |
| | -187.50 | 0.00 |
| -9.800 | 0.00 | 49.65 |
| -10.150 | 0.00 | 292.18 |
| -10.200 | 0.00 | 327.30 |
| -10.500 | 0.00 | 540.44 |
| -10.800 | 0.00 | 757.94 |
| -11.100 | 0.00 | 980.22 |
| -11.400 | 0.00 | 1207.62 |
| -11.700 | 0.00 | 1440.39 |
| -12.000 | 0.00 | 1678.73 |
| -12.300 | 0.00 | 1922.68 |
| -12.600 | 0.00 | 2172.17 |
| -12.700 | 0.00 | 2256.56 |
| -13.150 | 0.00 | 2644.20 |
| -13.600 | 0.00 | 3044.52 |
| | 0.00 | 3044.52 |
| -13.950 | 0.00 | 2675.35 |
| -14.300 | 0.00 | 2314.56 |



** S E N E R SPAIN **

** 19/09/13 **

| | | |
|---|---|---|
| -14.800 | -980.26 | 0.00 |
| -15.105 | -955.44 | 0.00 |
| -15.410 | -929.39 | 0.00 |
| -15.715 | -902.11 | 0.00 |
| -16.020 | -873.57 | 0.00 |
| -16.306 | -845.63 | 0.00 |
| -16.593 | -816.56 | 0.00 |
| -16.879 | -786.34 | 0.00 |
| -17.165 | -754.97 | 0.00 |
| -17.451 | -722.43 | 0.00 |
| -17.738 | -688.69 | 0.00 |
| -18.024 | -653.75 | 0.00 |
| -18.310 | -617.59 | 0.00 |
| -18.596 | -580.20 | 0.00 |
| -18.883 | -541.55 | 0.00 |
| -19.169 | -501.63 | 0.00 |
| -19.455 | -460.42 | 0.00 |
| -19.741 | -417.91 | 0.00 |
| -20.028 | -374.07 | 0.00 |
| -20.314 | -328.90 | 0.00 |
| -20.600 | -282.37 | 0.00 |
| -20.903 | -233.62 | 0.00 |
| -21.205 | -183.18 | 0.00 |
| -21.508 | -131.02 | 0.00 |
| -21.810 | -77.14 | 0.00 |
| -22.113 | -21.50 | 0.00 |
| -22.415 | 0.00 | 35.90 |
| -22.718 | 0.00 | 95.06 |
| -23.020 | 0.00 | 155.99 |
| -23.520 | 0.00 | 260.56 |
| -24.020 | 0.00 | 369.89 |
| -24.520 | 0.00 | 483.83 |
| -24.550 | 0.00 | 490.82 |
| | -70.18 | 0.00 |
| -24.975 | 0.00 | 30.39 |
| -25.400 | 0.00 | 107.01 |
| -25.675 | 0.00 | 140.29 |
| -25.950 | 0.00 | 173.82 |
| -26.225 | 0.00 | 206.16 |
| -26.500 | 0.00 | 235.55 |
| -26.775 | 0.00 | 261.16 |
| -27.050 | 0.00 | 282.39 |
| -27.325 | 0.00 | 298.18 |
| -27.600 | 0.00 | 308.39 |
| -28.100 | 0.00 | 317.78 |
| -28.375 | 0.00 | 320.17 |
| -28.650 | 0.00 | 321.87 |

| | | |
|---|---|---|
| -14.800 | 0.00 | 1814.78 |
| -15.105 | 0.00 | 1519.55 |
| -15.410 | 0.00 | 1232.09 |
| -15.715 | 0.00 | 952.75 |
| -16.020 | 0.00 | 681.93 |
| -16.306 | 0.00 | 435.84 |
| -16.593 | 0.00 | 197.92 |
| -16.879 | -31.53 | 0.00 |
| -17.165 | -252.15 | 0.00 |
| -17.451 | -463.64 | 0.00 |
| -17.738 | -665.63 | 0.00 |
| -18.024 | -857.80 | 0.00 |
| -18.310 | -1039.79 | 0.00 |
| -18.596 | -1211.25 | 0.00 |
| -18.883 | -1371.83 | 0.00 |
| -19.169 | -1521.17 | 0.00 |
| -19.455 | -1658.89 | 0.00 |
| -19.741 | -1784.63 | 0.00 |
| -20.028 | -1898.01 | 0.00 |
| -20.314 | -1998.66 | 0.00 |
| -20.600 | -2086.18 | 0.00 |
| -20.903 | -2164.27 | 0.00 |
| -21.205 | -2227.35 | 0.00 |
| -21.508 | -2274.92 | 0.00 |
| -21.810 | -2306.45 | 0.00 |
| -22.113 | -2321.41 | 0.00 |
| -22.415 | -2319.28 | 0.00 |
| -22.718 | -2299.51 | 0.00 |
| -23.020 | -2261.59 | 0.00 |
| -23.520 | -2157.65 | 0.00 |
| -24.020 | -2000.23 | 0.00 |
| -24.520 | -1786.99 | 0.00 |
| -24.550 | -1772.37 | 0.00 |
| | -1772.37 | 0.00 |
| -24.975 | -1780.94 | 0.00 |
| -25.400 | -1749.93 | 0.00 |
| -25.675 | -1715.94 | 0.00 |
| -25.950 | -1672.75 | 0.00 |
| -26.225 | -1620.45 | 0.00 |
| -26.500 | -1559.63 | 0.00 |
| -26.775 | -1491.24 | 0.00 |
| -27.050 | -1416.40 | 0.00 |
| -27.325 | -1336.43 | 0.00 |
| -27.600 | -1252.91 | 0.00 |
| -28.100 | -1095.99 | 0.00 |
| -28.375 | -1008.26 | 0.00 |
| -28.650 | -919.96 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| -28.925 | 0.00 | 322.52 | -28.925 | -831.33 | 0.00 |
| -29.200 | 0.00 | 321.78 | -29.200 | -742.70 | 0.00 |
| -29.513 | 0.00 | 328.77 | -29.513 | -640.94 | 0.00 |
| -29.825 | 0.00 | 331.06 | -29.825 | -537.71 | 0.00 |
| -30.138 | 0.00 | 328.10 | -30.138 | -434.57 | 0.00 |
| -30.450 | 0.00 | 319.41 | -30.450 | -333.24 | 0.00 |
| -30.763 | 0.00 | 304.61 | -30.763 | -235.58 | 0.00 |
| -31.075 | 0.00 | 283.33 | -31.075 | -143.54 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -31.388 | 0.00 | 255.29 | -31.388 | -59.20 | 0.00 |
| -31.700 | 0.00 | 232.28 | -31.700 | 0.00 | 16.54 |
| -32.200 | -82.88 | 0.00 | -32.200 | 0.00 | 38.05 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



*** DESPLAZAMIENTO MÁXIMO EN FASE N° 8 = 38.917 mm EN FASE FINAL N° 8 = 38.917 mm

*** MAXIMUM MOMENT IN PHASE Nb 8 = 3961.605 kN.m/m IN FINAL PHASE Nb 8 = 3961.605 kN.m/m

| PUNTAL/ANCLA | | PRECARGA | | MÁXIMO | | ESTADO FINAL | |
|---|---|---|---|---|---|---|---|
| NÚMERO | NIVEL | FASE | FUERZA | FASE | FUERZA | FASE | FUERZA |
| 1 | -2.25 | 2 | 0.00 | 8 | -213.70 | 8 | -213.70 |
| 2 | -9.45 | 3 | 0.00 | 8 | 607.42 | 8 | 607.42 |
| 3 | -13.60 | 4 | 0.00 | 8 | -2812.49 | 8 | -2812.49 |
| 4 | -23.02 | 5 | 0.00 | 5 | -481.46 | 6 | QUITADO |
| 5 | -24.55 | 6 | 0.00 | 6 | -453.30 | 7 | QUITADO |
| 6 | -24.55 | 7 | -561.00 | 8 | -2360.16 | 8 | -2360.16 |
| 7 | -16.02 | 8 | 0.00 | 8 | -1154.56 | 8 | -1154.56 |
| m | | kN | | kN | | kN | |



* CURVAS ENVOLVENTES DE FASE 8 A FASE 8 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.34 |
| -0.550 | 0.00 | 1.75 |
| -0.825 | 0.00 | 3.91 |
| -1.100 | 0.00 | 6.50 |
| -1.375 | 0.00 | 9.85 |
| -1.650 | 0.00 | 13.96 |
| -1.925 | 0.00 | 18.84 |
| -2.200 | 0.00 | 24.48 |
| -2.250 | 0.00 | 25.58 |
| | -188.12 | 0.00 |
| -2.675 | -177.69 | 0.00 |
| -3.100 | -165.45 | 0.00 |
| -3.600 | -148.71 | 0.00 |
| -4.100 | -129.45 | 0.00 |
| -4.600 | -107.67 | 0.00 |
| -5.100 | -83.37 | 0.00 |
| -5.600 | -56.55 | 0.00 |
| -6.100 | -27.21 | 0.00 |
| -6.600 | 0.00 | 4.65 |
| -7.100 | 0.00 | 39.02 |
| -7.394 | 0.00 | 55.59 |
| -7.688 | 0.00 | 72.98 |
| -7.981 | 0.00 | 91.21 |
| -8.275 | 0.00 | 110.27 |
| -8.569 | 0.00 | 130.16 |
| -8.862 | 0.00 | 150.89 |
| -9.156 | 0.00 | 172.45 |
| -9.450 | 0.00 | 194.84 |
| | 0.00 | 802.26 |
| -9.800 | 0.00 | 830.03 |
| -10.150 | 0.00 | 858.98 |
| -10.200 | 0.00 | 863.22 |
| -10.500 | 0.00 | 885.63 |
| -10.800 | 0.00 | 908.87 |
| -11.100 | 0.00 | 932.95 |
| -11.400 | 0.00 | 957.86 |
| -11.700 | 0.00 | 983.61 |
| -12.000 | 0.00 | 1010.18 |
| -12.300 | 0.00 | 1037.59 |
| -12.600 | 0.00 | 1065.83 |
| -12.700 | 0.00 | 1093.40 |
| -13.150 | 0.00 | 1220.00 |
| -13.600 | 0.00 | 1350.68 |
| | -1461.81 | 0.00 |
| -13.950 | -1357.36 | 0.00 |
| -14.300 | -1250.45 | 0.00 |

| NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|
| 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.03 |
| -0.550 | 0.00 | 0.29 |
| -0.825 | 0.00 | 1.06 |
| -1.100 | 0.00 | 2.48 |
| -1.375 | 0.00 | 4.71 |
| -1.650 | 0.00 | 7.96 |
| -1.925 | 0.00 | 12.46 |
| -2.200 | 0.00 | 18.40 |
| -2.250 | 0.00 | 19.65 |
| | 0.00 | 19.65 |
| -2.675 | -58.15 | 0.00 |
| -3.100 | -131.13 | 0.00 |
| -3.600 | -209.78 | 0.00 |
| -4.100 | -279.42 | 0.00 |
| -4.600 | -338.80 | 0.00 |
| -5.100 | -386.67 | 0.00 |
| -5.600 | -421.75 | 0.00 |
| -6.100 | -442.80 | 0.00 |
| -6.600 | -448.55 | 0.00 |
| -7.100 | -437.73 | 0.00 |
| -7.394 | -423.86 | 0.00 |
| -7.688 | -405.00 | 0.00 |
| -7.981 | -380.90 | 0.00 |
| -8.275 | -351.33 | 0.00 |
| -8.569 | -316.04 | 0.00 |
| -8.862 | -274.78 | 0.00 |
| -9.156 | -227.31 | 0.00 |
| -9.450 | -173.38 | 0.00 |
| | -173.38 | 0.00 |
| -9.800 | 0.00 | 112.23 |
| -10.150 | 0.00 | 407.77 |
| -10.200 | 0.00 | 450.83 |
| -10.500 | 0.00 | 713.14 |
| -10.800 | 0.00 | 982.29 |
| -11.100 | 0.00 | 1258.54 |
| -11.400 | 0.00 | 1542.14 |
| -11.700 | 0.00 | 1833.34 |
| -12.000 | 0.00 | 2132.39 |
| -12.300 | 0.00 | 2439.54 |
| -12.600 | 0.00 | 2755.03 |
| -12.700 | 0.00 | 2862.99 |
| -13.150 | 0.00 | 3383.35 |
| -13.600 | 0.00 | 3961.60 |
| | 0.00 | 3961.60 |
| -13.950 | 0.00 | 3468.18 |
| -14.300 | 0.00 | 3011.74 |

| | | | | | | |
|---|---|---|---|---|---|---|
| -14.800 | -1093.45 | 0.00 | -14.800 | 0.00 | 2425.55 |
| -15.105 | -995.21 | 0.00 | -15.105 | 0.00 | 2106.98 |
| -15.410 | -895.10 | 0.00 | -15.410 | 0.00 | 1818.66 |
| -15.715 | -793.12 | 0.00 | -15.715 | 0.00 | 1561.16 |
| -16.020 | -689.27 | 0.00 | -16.020 | 0.00 | 1335.05 |
| | -1843.83 | 0.00 | | 0.00 | 1335.05 |
| -16.306 | -1744.66 | 0.00 | -16.306 | 0.00 | 821.41 |
| -16.593 | -1643.84 | 0.00 | -16.593 | 0.00 | 336.39 |
| -16.879 | -1541.38 | 0.00 | -16.879 | -119.53 | 0.00 |
| -17.165 | -1437.27 | 0.00 | -17.165 | -545.89 | 0.00 |
| -17.451 | -1331.52 | 0.00 | -17.451 | -942.22 | 0.00 |
| -17.738 | -1224.11 | 0.00 | -17.738 | -1308.03 | 0.00 |
| -18.024 | -1115.06 | 0.00 | -18.024 | -1642.86 | 0.00 |
| -18.310 | -1004.36 | 0.00 | -18.310 | -1946.24 | 0.00 |
| -18.596 | -892.02 | 0.00 | -18.596 | -2217.70 | 0.00 |
| -18.883 | -778.02 | 0.00 | -18.883 | -2456.77 | 0.00 |
| -19.169 | -662.38 | 0.00 | -19.169 | -2662.96 | 0.00 |
| -19.455 | -545.10 | 0.00 | -19.455 | -2835.82 | 0.00 |
| -19.741 | -426.16 | 0.00 | -19.741 | -2974.87 | 0.00 |
| -20.028 | -305.58 | 0.00 | -20.028 | -3079.64 | 0.00 |
| -20.314 | -183.35 | 0.00 | -20.314 | -3149.66 | 0.00 |
| -20.600 | -59.48 | 0.00 | -20.600 | -3184.46 | 0.00 |
| -20.903 | 0.00 | 47.06 | -20.903 | -3186.37 | 0.00 |
| -21.205 | 0.00 | 155.28 | -21.205 | -3155.81 | 0.00 |
| -21.508 | 0.00 | 265.18 | -21.508 | -3092.26 | 0.00 |
| -21.810 | 0.00 | 376.75 | -21.810 | -2995.21 | 0.00 |
| -22.113 | 0.00 | 490.01 | -22.113 | -2864.15 | 0.00 |
| -22.415 | 0.00 | 604.94 | -22.415 | -2698.58 | 0.00 |
| -22.718 | 0.00 | 721.55 | -22.718 | -2498.00 | 0.00 |
| -23.020 | 0.00 | 839.84 | -23.020 | -2261.88 | 0.00 |
| -23.520 | 0.00 | 1039.04 | -23.520 | -1792.35 | 0.00 |
| -24.020 | 0.00 | 1242.82 | -24.020 | -1222.08 | 0.00 |
| -24.520 | 0.00 | 1451.19 | -24.520 | -548.76 | 0.00 |
| -24.550 | 0.00 | 1463.84 | -24.550 | -505.04 | 0.00 |
| | -896.32 | 0.00 | | -505.04 | 0.00 |
| -24.975 | -715.37 | 0.00 | -24.975 | -847.64 | 0.00 |
| -25.400 | -558.09 | 0.00 | -25.400 | -1116.45 | 0.00 |
| -25.675 | -482.99 | 0.00 | -25.675 | -1259.59 | 0.00 |
| -25.950 | -408.93 | 0.00 | -25.950 | -1382.20 | 0.00 |
| -26.225 | -335.99 | 0.00 | -26.225 | -1484.60 | 0.00 |
| -26.500 | -264.23 | 0.00 | -26.500 | -1567.10 | 0.00 |
| -26.775 | -193.89 | 0.00 | -26.775 | -1630.06 | 0.00 |
| -27.050 | -125.16 | 0.00 | -27.050 | -1673.89 | 0.00 |
| -27.325 | -58.40 | 0.00 | -27.325 | -1699.08 | 0.00 |
| -27.600 | 0.00 | 6.30 | -27.600 | -1706.20 | 0.00 |
| -28.100 | 0.00 | 122.01 | -28.100 | -1674.10 | 0.00 |
| -28.375 | 0.00 | 185.48 | -28.375 | -1631.82 | 0.00 |
| -28.650 | 0.00 | 248.84 | -28.650 | -1572.10 | 0.00 |
| -28.925 | 0.00 | 312.04 | -28.925 | -1494.97 | 0.00 |
| -29.200 | 0.00 | 375.02 | -29.200 | -1400.49 | 0.00 |
| -29.513 | 0.00 | 408.85 | -29.513 | -1277.99 | 0.00 |
| -29.825 | 0.00 | 441.68 | -29.825 | -1145.07 | 0.00 |
| -30.138 | 0.00 | 473.43 | -30.138 | -1002.06 | 0.00 |
| -30.450 | 0.00 | 504.03 | -30.450 | -849.30 | 0.00 |
| -30.763 | 0.00 | 533.42 | -30.763 | -687.16 | 0.00 |



| | | | | | |
|---|---|---|---|---|---|
| -31.075 | 0.00 | 561.55 | -31.075 | -516.04 | 0.00 |
| -31.388 | 0.00 | 588.38 | -31.388 | -336.33 | 0.00 |
| -31.700 | 0.00 | 613.86 | -31.700 | -148.44 | 0.00 |
| -32.200 | 0.00 | 69.20 | -32.200 | 0.00 | 3.27 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



* CURVAS ENVOLVENTES DE FASE 1 A FASE 8 *

| NIVEL | ESF.CO. MIN | ESF.CO. MÁX | NIVEL | MOMENTO MIN | MOMENTO MÁX |
|---|---|---|---|---|---|
| 0.000 | 0.00 | 0.00 | 0.000 | 0.00 | 0.00 |
| -0.275 | 0.00 | 0.34 | -0.275 | 0.00 | 0.03 |
| -0.550 | 0.00 | 1.75 | -0.550 | 0.00 | 0.29 |
| -0.825 | 0.00 | 3.91 | -0.825 | 0.00 | 1.06 |
| -1.100 | 0.00 | 6.50 | -1.100 | 0.00 | 2.48 |
| -1.375 | 0.00 | 9.85 | -1.375 | 0.00 | 4.71 |
| -1.650 | 0.00 | 13.96 | -1.650 | 0.00 | 7.96 |
| -1.925 | 0.00 | 18.84 | -1.925 | 0.00 | 12.46 |
| -2.200 | 0.00 | 24.48 | -2.200 | 0.00 | 18.40 |
| -2.250 | 0.00 | 25.58 | -2.250 | 0.00 | 19.65 |
| | -188.12 | 8.54 | | 0.00 | 19.65 |
| -2.675 | -177.69 | 13.24 | -2.675 | -58.15 | 9.53 |
| -3.100 | -165.45 | 19.04 | -3.100 | -131.13 | 16.35 |
| -3.600 | -148.71 | 18.18 | -3.600 | -209.78 | 25.65 |
| -4.100 | -129.45 | 18.02 | -4.100 | -279.42 | 34.65 |
| -4.600 | -107.67 | 19.03 | -4.600 | -338.80 | 43.86 |
| -5.100 | -83.37 | 21.18 | -5.100 | -386.67 | 53.86 |
| -5.600 | -56.55 | 24.44 | -5.600 | -421.75 | 65.22 |
| -6.100 | -28.38 | 34.59 | -6.100 | -442.80 | 78.49 |
| -6.600 | -8.68 | 55.51 | -6.600 | -448.55 | 94.18 |
| -7.100 | 0.00 | 78.76 | -7.100 | -437.73 | 112.83 |
| -7.394 | 0.00 | 87.40 | -7.394 | -423.86 | 123.48 |
| -7.688 | 0.00 | 96.36 | -7.688 | -405.00 | 131.82 |
| -7.981 | 0.00 | 105.61 | -7.981 | -380.90 | 138.10 |
| -8.275 | 0.00 | 115.08 | -8.275 | -351.33 | 142.60 |
| -8.569 | 0.00 | 130.16 | -8.569 | -316.04 | 145.56 |
| -8.862 | 0.00 | 150.89 | -8.862 | -274.78 | 176.53 |

| | | | | | |
|---|---|---|---|---|---|
| -9.156 | 0.00 | 172.45 | -9.156 | -227.31 | 217.50 |
| -9.450 | -2.46 | 194.84 | -9.450 | -194.23 | 261.39 |
| | -184.84 | 802.26 | | -194.23 | 261.39 |
| -9.800 | -172.22 | 830.03 | -9.800 | -63.37 | 198.88 |
| -10.150 | -158.95 | 858.98 | -10.150 | -23.47 | 407.77 |
| -10.200 | -157.00 | 863.22 | -10.200 | -17.45 | 450.83 |
| -10.500 | -147.84 | 885.63 | -10.500 | 0.00 | 713.14 |
| -10.800 | -138.21 | 908.87 | -10.800 | 0.00 | 982.29 |
| -11.100 | -128.13 | 932.95 | -11.100 | 0.00 | 1258.54 |
| -11.400 | -117.59 | 957.86 | -11.400 | -32.48 | 1542.14 |
| -11.700 | -106.59 | 983.61 | -11.700 | -66.12 | 1833.34 |
| -12.000 | -95.13 | 1010.18 | -12.000 | -96.39 | 2132.39 |
| -12.300 | -83.22 | 1037.59 | -12.300 | -123.15 | 2439.54 |
| -12.600 | -70.84 | 1065.83 | -12.600 | -146.27 | 2755.03 |
| -12.700 | -65.58 | 1093.40 | -12.700 | -153.09 | 2862.99 |
| -13.150 | -40.51 | 1220.00 | -13.150 | -177.06 | 3383.35 |
| -13.600 | -29.41 | 1350.68 | -13.600 | -189.18 | 3961.60 |
| | -1461.81 | 0.00 | | -189.18 | 3961.60 |
| -13.950 | -1357.36 | 10.20 | -13.950 | -189.70 | 3468.18 |
| -14.300 | -1250.45 | 34.85 | -14.300 | -181.86 | 3011.74 |



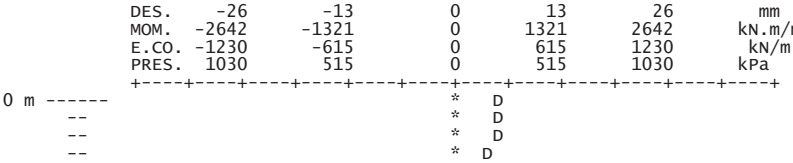
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| -15.105 | -995.21 | 37.73 | -15.105 | -151.23 | 2106.98 |
| -15.410 | -929.39 | 36.24 | -15.410 | -139.95 | 1818.66 |
| -15.715 | -902.11 | 34.70 | -15.715 | -129.13 | 1561.16 |
| -16.020 | -873.57 | 33.14 | -16.020 | -118.78 | 1335.05 |
| | -1843.83 | 33.14 | | -118.78 | 1335.05 |
| -16.306 | -1744.66 | 31.69 | -16.306 | -109.51 | 821.41 |
| -16.593 | -1643.84 | 30.26 | -16.593 | -100.64 | 336.39 |
| -16.879 | -1541.38 | 28.87 | -16.879 | -119.53 | 58.53 |
| -17.165 | -1437.27 | 27.54 | -17.165 | -545.89 | 12.41 |
| -17.451 | -1331.52 | 26.28 | -17.451 | -942.22 | 6.96 |
| -17.738 | -1224.11 | 25.10 | -17.738 | -1308.03 | 2.06 |
| -18.024 | -1115.06 | 24.16 | -18.024 | -1642.86 | 0.00 |
| -18.310 | -1004.36 | 23.65 | -18.310 | -1946.24 | 0.00 |
| -18.596 | -892.02 | 23.65 | -18.596 | -2217.70 | 0.00 |
| -18.883 | -778.02 | 24.17 | -18.883 | -2456.77 | 0.00 |
| -19.169 | -662.38 | 25.22 | -19.169 | -2662.96 | 0.00 |
| -19.455 | -545.10 | 26.81 | -19.455 | -2835.82 | 0.00 |
| -19.741 | -426.29 | 28.96 | -19.741 | -2974.87 | 0.00 |
| -20.028 | -385.87 | 31.68 | -20.028 | -3079.64 | 0.00 |
| -20.314 | -344.45 | 34.96 | -20.314 | -3149.66 | 0.00 |
| -20.600 | -302.02 | 38.81 | -20.600 | -3184.46 | 9.60 |
| -20.903 | -259.71 | 47.06 | -20.903 | -3186.37 | 19.85 |
| -21.205 | -216.29 | 155.28 | -21.205 | -3155.81 | 27.19 |
| -21.508 | -171.75 | 265.18 | -21.508 | -3092.26 | 31.68 |
| -21.810 | -126.09 | 376.75 | -21.810 | -2995.21 | 33.43 |
| -22.113 | -79.31 | 490.01 | -22.113 | -2864.15 | 32.58 |
| -22.415 | -31.42 | 604.94 | -22.415 | -2698.58 | 29.36 |
| -22.718 | -20.92 | 721.55 | -22.718 | -2498.00 | 24.02 |
| -23.020 | -26.80 | 839.84 | -23.020 | -2378.32 | 16.79 |
| | -344.90 | 839.84 | | -2378.32 | 16.79 |
| -23.520 | -259.58 | 1039.04 | -23.520 | -2323.25 | 1.29 |
| -24.020 | -171.21 | 1242.82 | -24.020 | -2224.76 | 0.00 |
| -24.520 | -79.78 | 1451.19 | -24.520 | -2224.51 | 0.00 |
| -24.550 | -74.20 | 1463.84 | -24.550 | -2226.81 | 0.00 |
| | -896.32 | 290.34 | | -2226.81 | 0.00 |
| -24.975 | -715.37 | 321.45 | -24.975 | -2241.37 | 0.00 |
| -25.400 | -558.09 | 347.48 | -25.400 | -2221.34 | 0.00 |
| -25.675 | -482.99 | 361.62 | -25.675 | -2190.81 | 0.00 |
| -25.950 | -408.93 | 373.63 | -25.950 | -2148.31 | 0.00 |
| -26.225 | -335.99 | 383.52 | -26.225 | -2094.57 | 0.00 |
| -26.500 | -264.23 | 391.28 | -26.500 | -2030.26 | 0.00 |
| -26.775 | -193.89 | 396.91 | -26.775 | -1956.22 | 0.00 |
| -27.050 | -125.16 | 400.41 | -27.050 | -1873.43 | 0.00 |
| -27.325 | -58.40 | 401.79 | -27.325 | -1783.06 | 0.00 |
| -27.600 | -15.39 | 401.05 | -27.600 | -1706.20 | 0.00 |
| -28.100 | 0.00 | 394.24 | -28.100 | -1674.10 | 0.00 |
| -28.375 | 0.00 | 404.16 | -28.375 | -1631.82 | 0.00 |
| -28.650 | 0.00 | 418.61 | -28.650 | -1572.10 | 0.00 |
| -28.925 | 0.00 | 432.89 | -28.925 | -1494.97 | 0.00 |
| -29.200 | 0.00 | 446.79 | -29.200 | -1400.49 | 0.00 |
| -29.513 | 0.00 | 439.90 | -29.513 | -1277.99 | 0.00 |
| -29.825 | 0.00 | 441.68 | -29.825 | -1145.07 | 0.00 |
| -30.138 | 0.00 | 473.43 | -30.138 | -1002.06 | 0.00 |
| -30.450 | 0.00 | 504.03 | -30.450 | -849.30 | 0.00 |

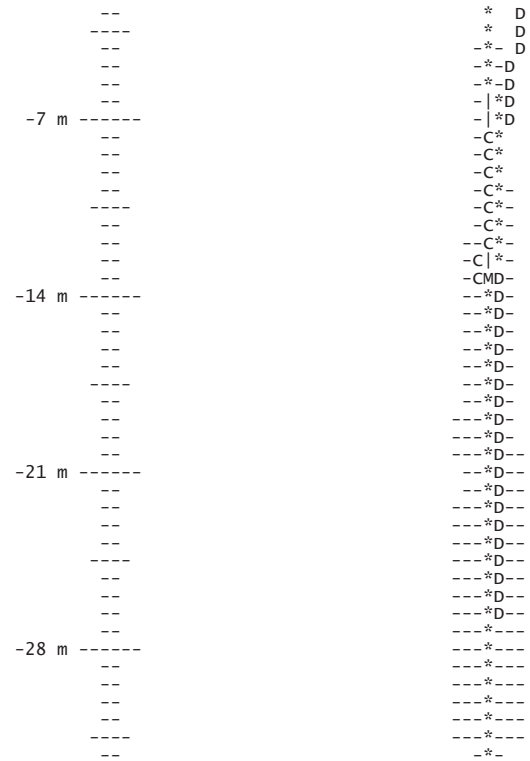


| | | | | | |
|---|---|---|---|---|---|
| -30.763 | 0.00 | 533.42 | -30.763 | -687.16 | 29.26 |
| -31.075 | 0.00 | 561.55 | -31.075 | -516.04 | 58.91 |
| -31.388 | 0.00 | 588.38 | -31.388 | -336.33 | 78.81 |
| -31.700 | 0.00 | 613.86 | -31.700 | -148.44 | 95.09 |
| -32.200 | -155.86 | 69.20 | -32.200 | -0.98 | 54.95 |
| -32.700 | 0.00 | 0.00 | -32.700 | 0.00 | 0.00 |
| m | kN/m | kN/m | m | kN.m/m | kN.m/m |



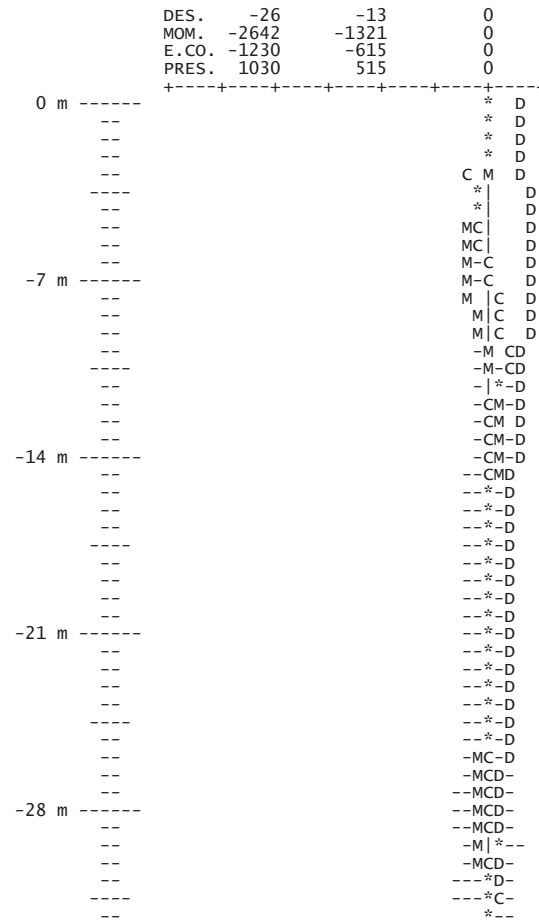
* CURVAS DE LA FASE  1 *





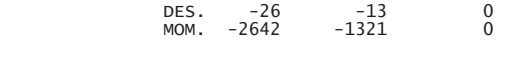


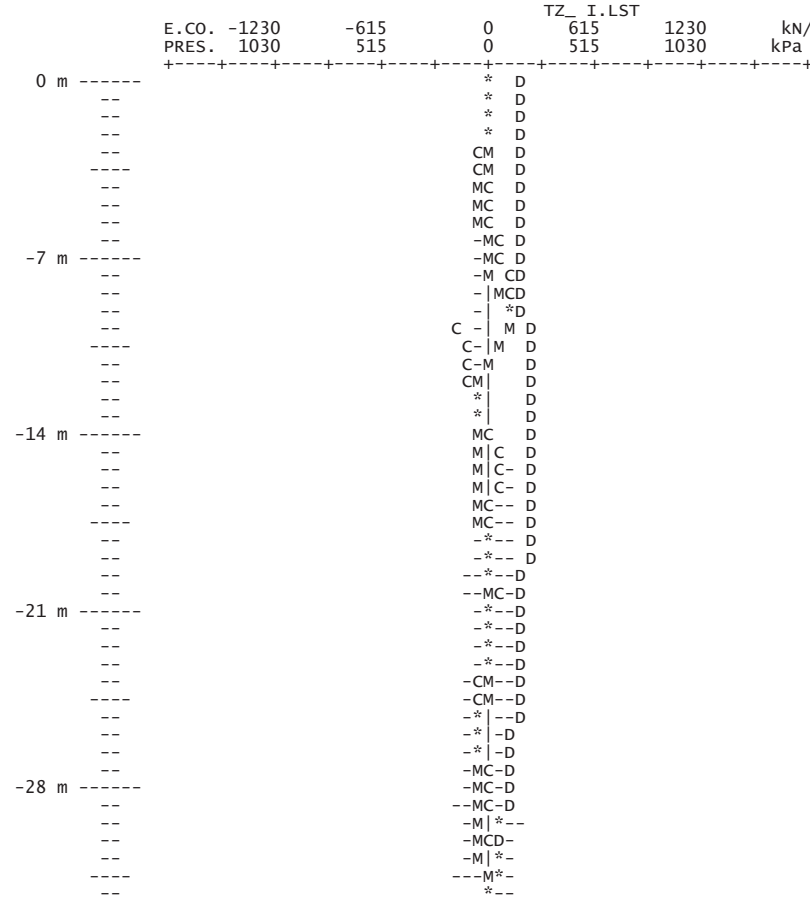

* CURVAS DE LA FASE  2 *






* CURVAS DE LA FASE  3 *

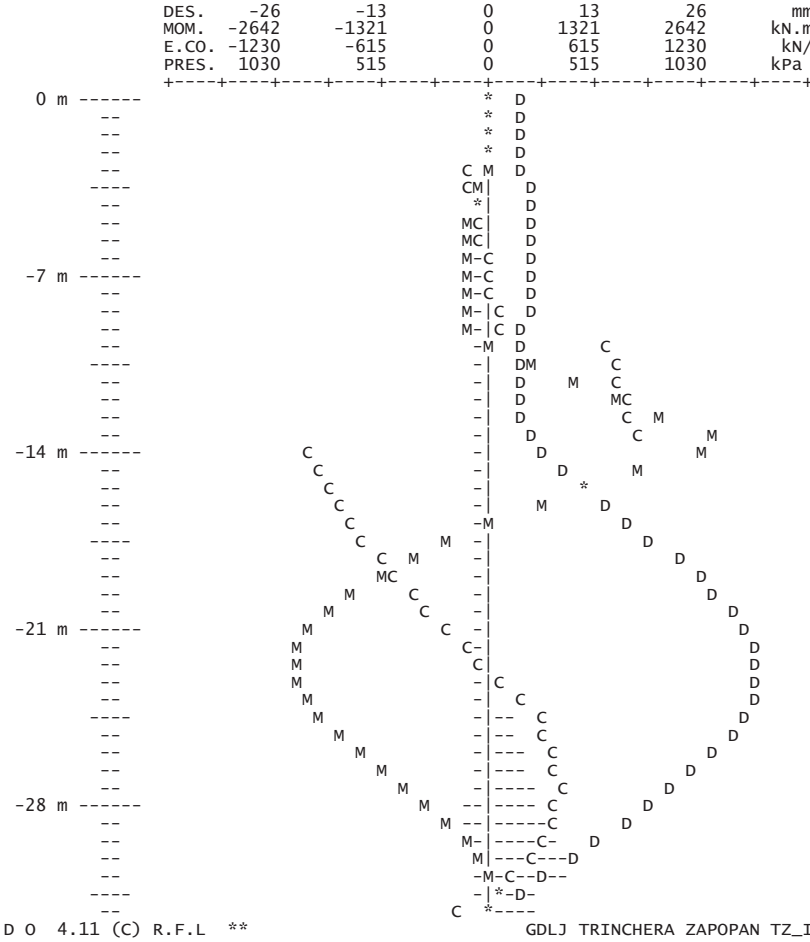




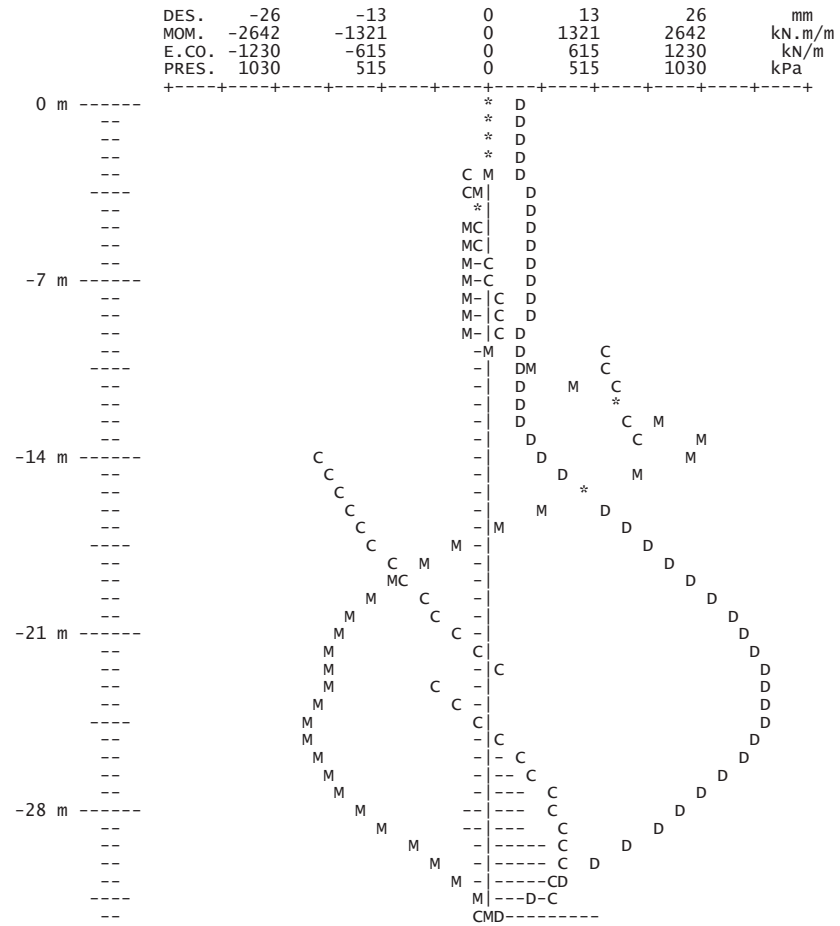





* CURVAS DE LA FASE  4 *



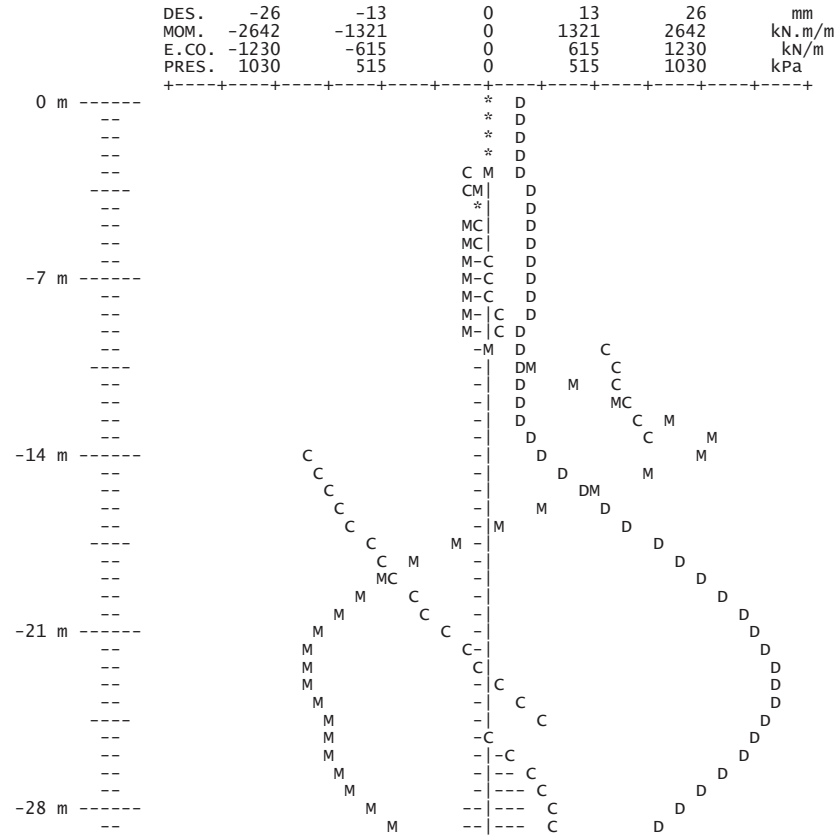
* CURVAS DE LA FASE 5 *



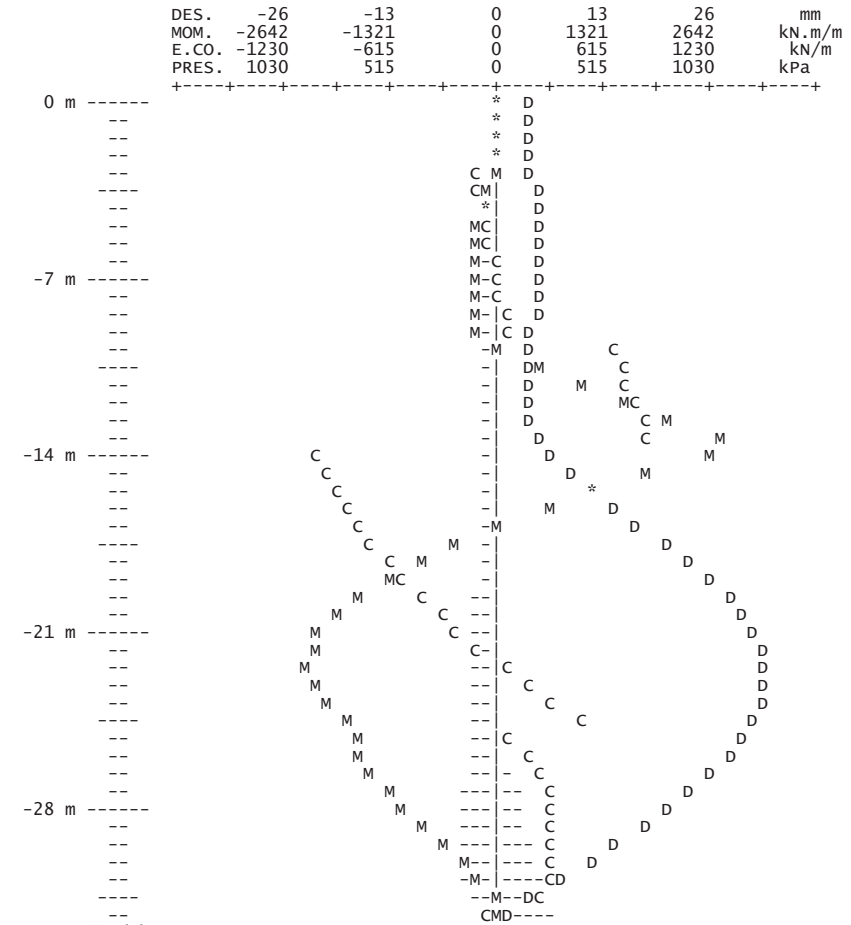





* CURVAS DE LA FASE 6 *

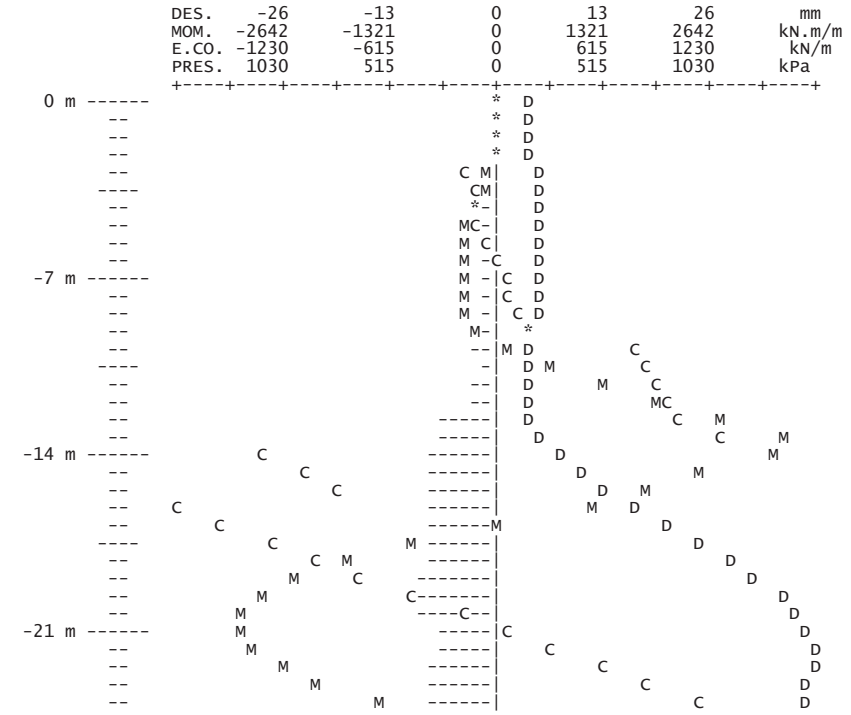


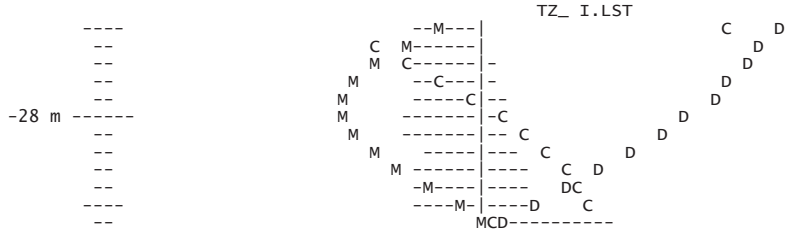
* CURVAS DE LA FASE  7 *






* CURVAS DE LA FASE  8 *




-28 m