

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------|---------------------------------|----------------------------|-------------|-------------|-----------------------------|----------------------------|--------------------|--------------------------|---------------------------|-----------------------------|------------------------|-----------|--|-------|----|------------------|----------|------------------|----------|------------------|----------|----------------|-------|------------------|-------------------------|------------------|-------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | INFORME DE ENSAYO DE EXPANSIÓN METODO LAMBE. |                           | PROCEDIMIENTO<br>PT 13          |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |                           | FECHA DE REVISION<br>2024-02-15 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | NORMA TECNICA DE REFERENCIA: INV E 120/13    |                           | REVISION No:<br>2               |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <b>PROYECTO:</b> VIAS LOCALIDAD DE USAQUEN<br><b>CLIENTE:</b> INCOLTA INTERVENTORIA Y CONSULTORIA SAS<br><b>Fecha recepción:</b> 2026-03-12 <b>Fecha ensayo:</b> 2026-03-17<br><b>Orden No.:</b> 612 <b>Informe de ensayo:</b> 2026-03-17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <b>CIV</b> 1004836 <b>MUESTRA:</b> 1 <b>PROFUNDIDAD:</b> N/D m<br><b>DESCRIPCIÓN:</b> ARCILLA DE BAJA PLASTICIDAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <table style="width: 100%; font-size: small;"> <tr> <td>Anillo A</td> <td>f = 7,00 cm</td> <td>h = 1,87 cm</td> <td>Área: 38,48 cm<sup>2</sup></td> <td>Vol: 71,97 cm<sup>3</sup></td> </tr> <tr> <td>W anillo 166,71 gr</td> <td>W anillo + m.i. 298,9 gr</td> <td>W<sub>t</sub> = 132,2 gr</td> <td>Lectura anillo 27 (0,0000")</td> <td>Lectura carga 153,37 N</td> </tr> </table> <div style="display: flex; justify-content: space-between;"> <table border="1" style="width: 30%; font-size: x-small;"> <tr><td colspan="2" style="text-align: center;">% Humedad</td></tr> <tr><td>RECIP</td><td>25</td></tr> <tr><td>P<sub>1</sub> =</td><td>30,25 gr</td></tr> <tr><td>P<sub>2</sub> =</td><td>27,15 gr</td></tr> <tr><td>P<sub>3</sub> =</td><td>12,36 gr</td></tr> <tr><td>W<sub>0</sub></td><td>21,0%</td></tr> </table> <table border="1" style="width: 30%; font-size: x-small;"> <tr><td>g<sub>t</sub> =</td><td>1,837 g/cm<sup>3</sup></td></tr> <tr><td>g<sub>d</sub> =</td><td>1,519 g/cm<sup>3</sup></td></tr> </table> <div style="width: 35%;"> <p>Humedad de compactación</p> <p>Indice de Hinchamiento (MPa)</p> <p><b>Cambio de Volumen Potencial</b></p> </div> </div> <div style="display: flex; justify-content: flex-end; align-items: center; margin-top: 10px;"> <div style="border-bottom: 1px solid black; width: 100px;"></div> <div style="font-weight: bold; font-size: x-small;">Limite plástico</div> </div> <div style="display: flex; justify-content: flex-end; align-items: center; margin-top: 5px;"> <div style="border-bottom: 1px solid black; width: 100px;"></div> <div style="font-weight: bold; font-size: x-small;">0,040</div> </div> <div style="display: flex; justify-content: flex-end; align-items: center; margin-top: 5px;"> <div style="border-bottom: 1px solid black; width: 100px;"></div> <div style="font-weight: bold; font-size: x-small;">CRITICO</div> </div> |                                              |                           |                                 | Anillo A                   | f = 7,00 cm | h = 1,87 cm | Área: 38,48 cm <sup>2</sup> | Vol: 71,97 cm <sup>3</sup> | W anillo 166,71 gr | W anillo + m.i. 298,9 gr | W <sub>t</sub> = 132,2 gr | Lectura anillo 27 (0,0000") | Lectura carga 153,37 N | % Humedad |  | RECIP | 25 | P <sub>1</sub> = | 30,25 gr | P <sub>2</sub> = | 27,15 gr | P <sub>3</sub> = | 12,36 gr | W <sub>0</sub> | 21,0% | g <sub>t</sub> = | 1,837 g/cm <sup>3</sup> | g <sub>d</sub> = | 1,519 g/cm <sup>3</sup> |
| Anillo A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | f = 7,00 cm                                  | h = 1,87 cm               | Área: 38,48 cm <sup>2</sup>     | Vol: 71,97 cm <sup>3</sup> |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| W anillo 166,71 gr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | W anillo + m.i. 298,9 gr                     | W <sub>t</sub> = 132,2 gr | Lectura anillo 27 (0,0000")     | Lectura carga 153,37 N     |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| % Humedad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| RECIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 25                                           |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>1</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 30,25 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>2</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 27,15 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>3</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 12,36 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| W <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 21,0%                                        |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| g <sub>t</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,837 g/cm <sup>3</sup>                      |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| g <sub>d</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,519 g/cm <sup>3</sup>                      |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <b>CIV</b> 1005246 <b>MUESTRA:</b> 2 <b>PROFUNDIDAD:</b> N/D m<br><b>DESCRIPCIÓN:</b> ARCILLA DE BAJA PLASTICIDAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
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| Anillo A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | f = 7,00 cm                                  | h = 1,87 cm               | Área: 38,48 cm <sup>2</sup>     | Vol: 71,97 cm <sup>3</sup> |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| W anillo 166,71 gr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | W anillo + m.i. 301,2 gr                     | W <sub>t</sub> = 134,5 gr | Lectura anillo 30 (0,0000")     | Lectura carga 165,84 N     |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| % Humedad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| RECIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12                                           |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>1</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 223,3 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>2</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 185,2 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>3</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 16,36 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| W <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 22,5%                                        |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| g <sub>t</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,869 g/cm <sup>3</sup>                      |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| g <sub>d</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,525 g/cm <sup>3</sup>                      |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <b>CIV</b> 1005663 <b>MUESTRA:</b> 3 <b>PROFUNDIDAD:</b> N/D m<br><b>DESCRIPCIÓN:</b> ARCILLA DE BAJA PLASTICIDAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <table style="width: 100%; font-size: small;"> <tr> <td>Anillo A</td> <td>f = 7,00 cm</td> <td>h = 1,87 cm</td> <td>Área: 38,48 cm<sup>2</sup></td> <td>Vol: 71,97 cm<sup>3</sup></td> </tr> <tr> <td>W anillo 166,71 gr</td> <td>W anillo + m.i. 303,6 gr</td> <td>W<sub>t</sub> = 136,9 gr</td> <td>Lectura anillo 34 (0,0000")</td> <td>Lectura carga 184,42 N</td> </tr> </table> <div style="display: flex; justify-content: space-between;"> <table border="1" style="width: 30%; font-size: x-small;"> <tr><td colspan="2" style="text-align: center;">% Humedad</td></tr> <tr><td>RECIP</td><td>42</td></tr> <tr><td>P<sub>1</sub> =</td><td>226,6 gr</td></tr> <tr><td>P<sub>2</sub> =</td><td>183,2 gr</td></tr> <tr><td>P<sub>3</sub> =</td><td>15,23 gr</td></tr> <tr><td>W<sub>0</sub></td><td>25,8%</td></tr> </table> <table border="1" style="width: 30%; font-size: x-small;"> <tr><td>g<sub>t</sub> =</td><td>1,902 g/cm<sup>3</sup></td></tr> <tr><td>g<sub>d</sub> =</td><td>1,512 g/cm<sup>3</sup></td></tr> </table> <div style="width: 35%;"> <p>Humedad de compactación</p> <p>Indice de Hinchamiento (Mpa)</p> <p><b>Cambio de Volumen Potencial</b></p> </div> </div> <div style="display: flex; justify-content: flex-end; align-items: center; margin-top: 10px;"> <div style="border-bottom: 1px solid black; width: 100px;"></div> <div style="font-weight: bold; font-size: x-small;">Limite plástico</div> </div> <div style="display: flex; justify-content: flex-end; align-items: center; margin-top: 5px;"> <div style="border-bottom: 1px solid black; width: 100px;"></div> <div style="font-weight: bold; font-size: x-small;">0,048</div> </div> <div style="display: flex; justify-content: flex-end; align-items: center; margin-top: 5px;"> <div style="border-bottom: 1px solid black; width: 100px;"></div> <div style="font-weight: bold; font-size: x-small;">CRITICO</div> </div> |                                              |                           |                                 | Anillo A                   | f = 7,00 cm | h = 1,87 cm | Área: 38,48 cm <sup>2</sup> | Vol: 71,97 cm <sup>3</sup> | W anillo 166,71 gr | W anillo + m.i. 303,6 gr | W <sub>t</sub> = 136,9 gr | Lectura anillo 34 (0,0000") | Lectura carga 184,42 N | % Humedad |  | RECIP | 42 | P <sub>1</sub> = | 226,6 gr | P <sub>2</sub> = | 183,2 gr | P <sub>3</sub> = | 15,23 gr | W <sub>0</sub> | 25,8% | g <sub>t</sub> = | 1,902 g/cm <sup>3</sup> | g <sub>d</sub> = | 1,512 g/cm <sup>3</sup> |
| Anillo A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | f = 7,00 cm                                  | h = 1,87 cm               | Área: 38,48 cm <sup>2</sup>     | Vol: 71,97 cm <sup>3</sup> |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| W anillo 166,71 gr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | W anillo + m.i. 303,6 gr                     | W <sub>t</sub> = 136,9 gr | Lectura anillo 34 (0,0000")     | Lectura carga 184,42 N     |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| % Humedad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| RECIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 42                                           |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>1</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 226,6 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>2</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 183,2 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| P <sub>3</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 15,23 gr                                     |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| W <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 25,8%                                        |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| g <sub>t</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,902 g/cm <sup>3</sup>                      |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| g <sub>d</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,512 g/cm <sup>3</sup>                      |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;"> REVISÓ Y APROBÓ: </div> <div style="width: 50%; text-align: right;"> <br/> Luis Alirio Awazacko Reyes<br/> Gerente Técnico </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |
| LOS RESULTADOS PRESENTADOS EN ESTE INFORME CORRESPONDEN ÚNICAMENTE A LAS MUESTRAS ENSAYADAS.<br>PROHIBIDA LA REPRODUCCIÓN PARCIAL DEL PRESENTE INFORME SIN AUTORIZACION DE DAPCIL SAS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                           |                                 |                            |             |             |                             |                            |                    |                          |                           |                             |                        |           |  |       |    |                  |          |                  |          |                  |          |                |       |                  |                         |                  |                         |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------|---------------------------------|-----------|--|-------|-----|------------------|-----------|------------------|-----------|------------------|----------|----------------|-------|------------------|-------------------------|------------------|-------------------------|-------------------------|--|-----------------|------------------------------|--|--------------|-----------------------------|--|----------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | INFORME DE ENSAYO DE EXPANSIÓN METODO LAMBE. |                                      | PROCEDIMIENTO<br>PT 13          |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      | FECHA DE REVISION<br>2024-02-15 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | NORMA TECNICA DE REFERENCIA: INV E 120/13    |                                      | REVISION No:<br>2               |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>PROYECTO:</b> VIAS LOCALIDAD DE USAQUEN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>CLIENTE:</b> INCOLTA INTERVENTORIA Y CONSULTORIA SAS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>Fecha recepción:</b> 2026-03-12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                              | <b>Fecha ensayo:</b> 2026-03-17      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>Orden No.:</b> 612                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                              | <b>Informe de ensayo:</b> 2026-03-17 |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>CIV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1005704</b>                               | <b>MUESTRA:</b> 4                    | <b>PROFUNDIDAD:</b> N/D m       |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>DESCRIPCIÓN:</b> ARCILLA DE BAJA PLASTICIDAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <div style="display: flex; justify-content: space-between; font-size: small;"> <span>Anillo <u>A</u> f = <u>7,00</u> cm h = <u>1,87</u> cm Área: <u>38,48</u> cm<sup>2</sup> Vol: <u>71,97</u> cm<sup>3</sup></span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>W anillo <u>166,71</u> gr W anillo + m.i. <u>302,2</u> gr W<sub>t</sub> = <u>135,5</u> gr</span> <span>Lectura anillo <u>32</u> (0,0000")<br/>Lectura carga <u>176,05</u> N</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%; border: 1px solid black; padding: 5px; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">% Humedad</td></tr> <tr><td style="text-align: center;">RECIP</td><td style="text-align: center;">63</td></tr> <tr><td style="text-align: center;">P<sub>1</sub> =</td><td style="text-align: center;">256,25 gr</td></tr> <tr><td style="text-align: center;">P<sub>2</sub> =</td><td style="text-align: center;">208,23 gr</td></tr> <tr><td style="text-align: center;">P<sub>3</sub> =</td><td style="text-align: center;">16,89 gr</td></tr> <tr><td style="text-align: center;">W<sub>0</sub></td><td style="text-align: center;">25,1%</td></tr> </table> </div> <div style="width: 30%; border: 1px solid black; padding: 5px; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">g<sub>t</sub> =</td><td style="text-align: center;">1,883 g/cm<sup>3</sup></td></tr> <tr><td style="text-align: center;">g<sub>d</sub> =</td><td style="text-align: center;">1,505 g/cm<sup>3</sup></td></tr> </table> </div> <div style="width: 35%; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2">Humedad de compactación</td><td style="text-align: right;">Limite plástico</td></tr> <tr><td colspan="2">Indice de Hinchamiento (MPa)</td><td style="text-align: right;"><u>0,046</u></td></tr> <tr><td colspan="2">Cambio de Volumen Potencial</td><td style="text-align: right;"><u>CRITICO</u></td></tr> </table> </div> </div> |                                              |                                      |                                 | % Humedad |  | RECIP | 63  | P <sub>1</sub> = | 256,25 gr | P <sub>2</sub> = | 208,23 gr | P <sub>3</sub> = | 16,89 gr | W <sub>0</sub> | 25,1% | g <sub>t</sub> = | 1,883 g/cm <sup>3</sup> | g <sub>d</sub> = | 1,505 g/cm <sup>3</sup> | Humedad de compactación |  | Limite plástico | Indice de Hinchamiento (MPa) |  | <u>0,046</u> | Cambio de Volumen Potencial |  | <u>CRITICO</u> |
| % Humedad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| RECIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 63                                           |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>1</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 256,25 gr                                    |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>2</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 208,23 gr                                    |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>3</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 16,89 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| W <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 25,1%                                        |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| g <sub>t</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1,883 g/cm <sup>3</sup>                      |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| g <sub>d</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1,505 g/cm <sup>3</sup>                      |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Humedad de compactación                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              | Limite plástico                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Indice de Hinchamiento (MPa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              | <u>0,046</u>                         |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Cambio de Volumen Potencial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              | <u>CRITICO</u>                       |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>CIV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1005491</b>                               | <b>MUESTRA:</b> 5                    | <b>PROFUNDIDAD:</b> N/D m       |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>DESCRIPCIÓN:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <div style="display: flex; justify-content: space-between; font-size: small;"> <span>Anillo <u>A</u> f = <u>7,00</u> cm h = <u>1,87</u> cm Área: <u>38,48</u> cm<sup>2</sup> Vol: <u>71,97</u> cm<sup>3</sup></span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>W anillo <u>166,71</u> gr W anillo + m.i. <u>302,1</u> gr W<sub>t</sub> = <u>135,4</u> gr</span> <span>Lectura anillo <u>27</u> (0,0000")<br/>Lectura carga <u>155,13</u> N</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%; border: 1px solid black; padding: 5px; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">% Humedad</td></tr> <tr><td style="text-align: center;">RECIP</td><td style="text-align: center;">102</td></tr> <tr><td style="text-align: center;">P<sub>1</sub> =</td><td style="text-align: center;">286,9 gr</td></tr> <tr><td style="text-align: center;">P<sub>2</sub> =</td><td style="text-align: center;">245,3 gr</td></tr> <tr><td style="text-align: center;">P<sub>3</sub> =</td><td style="text-align: center;">19,21 gr</td></tr> <tr><td style="text-align: center;">W<sub>0</sub></td><td style="text-align: center;">18,4%</td></tr> </table> </div> <div style="width: 30%; border: 1px solid black; padding: 5px; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">g<sub>t</sub> =</td><td style="text-align: center;">1,881 g/cm<sup>3</sup></td></tr> <tr><td style="text-align: center;">g<sub>d</sub> =</td><td style="text-align: center;">1,589 g/cm<sup>3</sup></td></tr> </table> </div> <div style="width: 35%; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2">Humedad de compactación</td><td style="text-align: right;">Limite plástico</td></tr> <tr><td colspan="2">Indice de Hinchamiento (Mpa)</td><td style="text-align: right;"><u>0,040</u></td></tr> <tr><td colspan="2">Cambio de Volumen Potencial</td><td style="text-align: right;"><u>CRITICO</u></td></tr> </table> </div> </div>  |                                              |                                      |                                 | % Humedad |  | RECIP | 102 | P <sub>1</sub> = | 286,9 gr  | P <sub>2</sub> = | 245,3 gr  | P <sub>3</sub> = | 19,21 gr | W <sub>0</sub> | 18,4% | g <sub>t</sub> = | 1,881 g/cm <sup>3</sup> | g <sub>d</sub> = | 1,589 g/cm <sup>3</sup> | Humedad de compactación |  | Limite plástico | Indice de Hinchamiento (Mpa) |  | <u>0,040</u> | Cambio de Volumen Potencial |  | <u>CRITICO</u> |
| % Humedad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| RECIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 102                                          |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>1</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 286,9 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>2</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 245,3 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>3</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 19,21 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| W <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18,4%                                        |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| g <sub>t</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1,881 g/cm <sup>3</sup>                      |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| g <sub>d</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1,589 g/cm <sup>3</sup>                      |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Humedad de compactación                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              | Limite plástico                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Indice de Hinchamiento (Mpa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              | <u>0,040</u>                         |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Cambio de Volumen Potencial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              | <u>CRITICO</u>                       |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>CIV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1005808</b>                               | <b>MUESTRA:</b>                      | <b>PROFUNDIDAD:</b> N/D m       |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <b>DESCRIPCIÓN:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <div style="display: flex; justify-content: space-between; font-size: small;"> <span>Anillo <u>A</u> f = <u>7,00</u> cm h = <u>1,87</u> cm Área: <u>38,48</u> cm<sup>2</sup> Vol: <u>71,97</u> cm<sup>3</sup></span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>W anillo <u>166,71</u> gr W anillo + m.i. <u>302,2</u> gr W<sub>t</sub> = <u>135,5</u> gr</span> <span>Lectura anillo <u>21</u> (0,0000")<br/>Lectura carga <u>130,02</u> N</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%; border: 1px solid black; padding: 5px; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">% Humedad</td></tr> <tr><td style="text-align: center;">RECIP</td><td style="text-align: center;">27</td></tr> <tr><td style="text-align: center;">P<sub>1</sub> =</td><td style="text-align: center;">268,7 gr</td></tr> <tr><td style="text-align: center;">P<sub>2</sub> =</td><td style="text-align: center;">224,7 gr</td></tr> <tr><td style="text-align: center;">P<sub>3</sub> =</td><td style="text-align: center;">16,67 gr</td></tr> <tr><td style="text-align: center;">W<sub>0</sub></td><td style="text-align: center;">21,2%</td></tr> </table> </div> <div style="width: 30%; border: 1px solid black; padding: 5px; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">g<sub>t</sub> =</td><td style="text-align: center;">1,883 g/cm<sup>3</sup></td></tr> <tr><td style="text-align: center;">g<sub>d</sub> =</td><td style="text-align: center;">1,554 g/cm<sup>3</sup></td></tr> </table> </div> <div style="width: 35%; font-size: x-small;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2">Humedad de compactación</td><td style="text-align: right;">Limite plástico</td></tr> <tr><td colspan="2">Indice de Hinchamiento (Mpa)</td><td style="text-align: right;"><u>0,034</u></td></tr> <tr><td colspan="2">Cambio de Volumen Potencial</td><td style="text-align: right;"><u>CRITICO</u></td></tr> </table> </div> </div>   |                                              |                                      |                                 | % Humedad |  | RECIP | 27  | P <sub>1</sub> = | 268,7 gr  | P <sub>2</sub> = | 224,7 gr  | P <sub>3</sub> = | 16,67 gr | W <sub>0</sub> | 21,2% | g <sub>t</sub> = | 1,883 g/cm <sup>3</sup> | g <sub>d</sub> = | 1,554 g/cm <sup>3</sup> | Humedad de compactación |  | Limite plástico | Indice de Hinchamiento (Mpa) |  | <u>0,034</u> | Cambio de Volumen Potencial |  | <u>CRITICO</u> |
| % Humedad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| RECIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 27                                           |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>1</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 268,7 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>2</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 224,7 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| P <sub>3</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 16,67 gr                                     |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| W <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 21,2%                                        |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| g <sub>t</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1,883 g/cm <sup>3</sup>                      |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| g <sub>d</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1,554 g/cm <sup>3</sup>                      |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Humedad de compactación                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              | Limite plástico                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Indice de Hinchamiento (Mpa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              | <u>0,034</u>                         |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| Cambio de Volumen Potencial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              | <u>CRITICO</u>                       |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| <div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 40%;">             REVISÓ Y APROBÓ:           </div> <div style="width: 55%; text-align: right;">  <br/>Luis Alirio Awazacko Reyes<br/>Gerente Técnico           </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |
| LOS RESULTADOS PRESENTADOS EN ESTE INFORME CORRESPONDEN ÚNICAMENTE A LAS MUESTRAS ENSAYADAS.<br>PROHIBIDA LA REPRODUCCIÓN PARCIAL DEL PRESENTE INFORME SIN AUTORIZACION DE DAPCIL SAS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                              |                                      |                                 |           |  |       |     |                  |           |                  |           |                  |          |                |       |                  |                         |                  |                         |                         |  |                 |                              |  |              |                             |  |                |