



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | Wn/LL |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | |
| L6P1 | 5 | S | 4.45 | 2545.84 | 55.1 | 89 | 24 | 65 | 0.619 |
| L6P1 | 9 | S | 8.25 | 2542.04 | 77.9 | 110 | 29 | 81 | 0.708 |
| L6P1 | 13 | S | 11.90 | 2538.39 | 77.7 | 111 | 30 | 81 | 0.700 |
| L6P1 | 15 | S | 13.65 | 2536.64 | 42.8 | 72 | 23 | 49 | 0.594 |
| L6P1 | 16 | S | 15.15 | 2535.14 | 32.8 | 47 | 19 | 28 | 0.698 |
| L6P1 | 20 | S | 19.15 | 2531.14 | 60.3 | 72 | 24 | 48 | 0.838 |
| L6P1 | 24 | S | 23.15 | 2527.14 | 35.8 | 27 | 22 | 5 | 1.326 |
| L6P1 | 25 | S | 24.65 | 2525.64 | 32 | 53 | 20 | 33 | 0.604 |
| L6P1 | 28 | S | 29.15 | 2521.14 | 97 | 126 | 57 | 69 | 0.770 |
| L6P1 | 34 | S | 34.65 | 2515.64 | 46.1 | 83 | 29 | 54 | 0.555 |
| L6P1 | 37 | S | 38.15 | 2512.14 | 51.4 | 94 | 33 | 61 | 0.547 |
| L6P1 | 41 | S | 44.15 | 2506.14 | 35 | 46 | 20 | 26 | 0.761 |
| L6P1 | 43 | S | 47.15 | 2503.14 | 26.3 | 52 | 20 | 32 | 0.506 |
| L7P1A | 1 | U | 0.25 | 2550.99 | 36.3 | 75 | 30 | 45 | 0.484 |
| L7P1A | 3 | U | 3.25 | 2547.74 | 55.5 | 85 | 30 | 55 | 0.653 |
| L7P1A | 5 | U | 6.25 | 2544.74 | 67 | 81 | 30 | 51 | 0.827 |
| L7P1A | 7 | U | 9.25 | 2541.74 | 94.1 | 127 | 49 | 78 | 0.741 |
| L7P1A | 8 | U | 10.75 | 2540.24 | 57.5 | 117 | 45 | 72 | 0.491 |
| L7P1A | 14 | U | 19.75 | 2531.24 | 53.2 | 115 | 29 | 86 | 0.463 |



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|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Indice de plasticidad (%) | |
| L8P1 | 3 | S | 1.30 | 2551.90 | 39.30 | 82 | 24.00 | 58 | 0.479 |
| L8P1 | 4 | U | 3.25 | 2549.95 | 49.80 | 94 | 29.00 | 65 | 0.530 |
| L8P1 | 5 | S | 4.75 | 2548.45 | 76.60 | 109 | 34.00 | 75 | 0.703 |
| L8P1 | 8 | S | 8.25 | 2544.95 | 86.60 | 123 | 33.00 | 90 | 0.704 |
| L8P1 | 14 | S | 15.25 | 2537.95 | 51.70 | 74 | 22 | 52 | 0.699 |
| L8P1 | 16 | S | 17.25 | 2535.95 | 62.00 | 122 | 31 | 91 | 0.508 |
| L8P1 | 19 | S | 22.25 | 2530.95 | 34.90 | 31 | 15 | 16 | 1.126 |
| L8P1 | 20 | S | 23.75 | 2529.45 | 139.20 | 205 | 121 | 84 | 0.679 |
| L8P1 | 21 | S | 25.25 | 2527.95 | 106.50 | 145 | 72 | 73 | 0.734 |
| L8P1 | 22 | S | 26.75 | 2526.45 | 74.00 | 79 | 40 | 39 | 0.937 |
| L8P1 | 23 | S | 28.25 | 2524.95 | 28.80 | 40 | 18 | 22 | 0.720 |
| L8P1 | 24 | S | 29.75 | 2523.45 | 42.10 | 90 | 25 | 65 | 0.468 |
| L8P1 | 25 | S | 31.25 | 2521.95 | 33.10 | 52 | 17 | 35 | 0.637 |
| L8P1 | 27 | S | 33.75 | 2519.45 | 50.90 | 90 | 38 | 52 | 0.566 |
| L8P1 | 29 | S | 36.75 | 2516.45 | 25.00 | 51 | 18 | 33 | 0.490 |
| L8P1 | 31 | S | 39.75 | 2513.45 | 37.60 | 86 | 34.00 | 52 | 0.437 |
| L8P1 | 33 | S | 42.75 | 2510.45 | 42.80 | 76 | 39.00 | 37 | 0.563 |
| L8P1 | 34 | S | 44.25 | 2508.95 | 33.80 | 59 | 34.00 | 25 | 0.573 |
| L8P1 | 35 | S | 45.75 | 2507.45 | 28.30 | 56 | 28.00 | 28 | 0.505 |
| L8P1 | 36 | S | 47.25 | 2505.95 | 48.50 | 62 | 36.00 | 26 | 0.782 |
| L8P1 | 37 | S | 48.75 | 2504.45 | 39.40 | 71 | 43.00 | 28 | 0.555 |



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|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Indice de plasticidad (%) | |
| L9P2 | 1 | U | 0.75 | 2554.49 | 35.9 | 84 | 25 | 59 | 0.427 |
| L9P2 | 3 | U | 3.75 | 2551.49 | 71.8 | 101 | 31 | 70 | 0.711 |
| L9P2 | 5 | U | 7.75 | 2547.49 | 86 | 119 | 31 | 88 | 0.723 |
| L9P2 | 6 | U | 9.25 | 2545.99 | 65.9 | 98 | 27 | 71 | 0.672 |
| L9P2 | 7 | U | 10.75 | 2544.49 | 62 | 98 | 26 | 72 | 0.633 |
| L9P2 | 9 | U | 13.75 | 2541.49 | 55.7 | 111 | 24 | 87 | 0.502 |
| L9P2 | 10 | U | 15.25 | 2539.99 | 54.7 | 127 | 31 | 96 | 0.431 |
| L9P2 | 15 | S | 22.75 | 2532.49 | 31.2 | 44 | 23 | 21 | 0.709 |
| L9P2 | 17 | S | 25.75 | 2529.49 | 34.7 | 45 | 20 | 25 | 0.771 |
| L9P2 | 19 | S | 28.75 | 2526.49 | 35.7 | 44 | 21 | 23 | 0.811 |
| L9P2 | 21 | S | 31.75 | 2523.49 | 30.2 | 52 | 22 | 30 | 0.581 |
| L9P3 | 2 | S | 1.75 | 2549.50 | 27.9 | 46 | 20 | 26 | 0.607 |
| L9P3 | 6 | U | 7.75 | 2543.50 | 50.2 | 72 | 23 | 49 | 0.697 |
| L9P3 | 8 | U | 10.75 | 2540.50 | 46.5 | 77 | 28 | 49 | 0.604 |
| L9P3 | 9 | U | 12.25 | 2539.00 | 60.6 | 99 | 28 | 71 | 0.612 |
| L9P3 | 10 | U | 13.75 | 2537.50 | 70.5 | 114 | 27 | 87 | 0.618 |
| L9P3 | 11 | S | 15.25 | 2536.00 | 50.8 | 74 | 26 | 48 | 0.686 |
| L9P3 | 13 | U | 18.25 | 2533.00 | 56.5 | 94 | 28 | 66 | 0.601 |
| L9P3 | 20 | S | 28.75 | 2522.50 | 180.1 | 184 | 112 | 72 | 0.979 |
| L9P3 | 24 | S | 34.75 | 2516.50 | 40.5 | 79 | 26 | 53 | 0.513 |
| L9P3 | 30 | S | 43.75 | 2507.50 | 30.9 | 43 | 16 | 27 | 0.719 |



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|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | |
| L9P3 | 34 | S | 49.75 | 2501.50 | 44.6 | 90 | 31 | 59 | 0.496 |
| L10 P1 | 1 | S | 0.25 | 2542.93 | 22.2 | 49 | 20 | 29 | 0.453 |
| L10 P1 | 5 | U | 6.25 | 2536.68 | 104 | 124 | 39 | 85 | 0.839 |
| L10 P1 | 6 | U | 7.75 | 2535.18 | 95.3 | 138 | 51 | 87 | 0.691 |
| L10 P1 | 7 | U | 9.25 | 2533.68 | 66.1 | 131 | 24 | 97 | 0.505 |
| L10 P1 | 9 | U | 12.25 | 2530.68 | 35.1 | 49 | 19 | 30 | 0.716 |
| L10 P1 | 11 | S | 15.25 | 2527.68 | 52.8 | 90 | 27 | 63 | 0.587 |
| L10 P1 | 13 | U | 18.25 | 2524.68 | 65 | 100 | 31 | 69 | 0.650 |
| L10 P1 | 15 | U | 21.25 | 2521.68 | 43.7 | 40 | 16 | 24 | 1.093 |
| L10 P1 | 17 | S | 24.25 | 2518.68 | 203.5 | 300 | 171 | 129 | 0.678 |
| L11P1 | 1 | U | 0.75 | 2556.96 | 30.3 | 68 | 22 | 46 | 0.446 |
| L11P1 | 2 | U | 2.75 | 2554.96 | 56.9 | 97 | 33 | 64 | 0.587 |
| L11P1 | 3 | U | 4.75 | 2552.96 | 44.8 | 72 | 25 | 47 | 0.622 |
| L11P1 | 4 | U | 6.75 | 2550.96 | 71.7 | 107 | 30 | 77 | 0.670 |
| L11P1 | 6 | S | 10.25 | 2547.46 | 58.3 | 95 | 26 | 69 | 0.614 |
| L11P1 | 7 | U | 12.25 | 2545.46 | 61.6 | 112 | 30 | 82 | 0.550 |
| L11P1 | 8 | S | 13.25 | 2544.46 | 46.3 | 90 | 34 | 56 | 0.514 |
| L11P1 | 11 | S | 17.75 | 2539.96 | 74.6 | 118 | 49 | 69 | 0.632 |
| L11P1 | 13 | S | 20.75 | 2536.96 | 70.2 | 95 | 35 | 60 | 0.739 |
| L11P1 | 15 | U | 23.75 | 2533.96 | 69.1 | 88 | 35 | 53 | 0.785 |



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| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Indice de plasticidad (%) | |
| L11P1 | 16 | S | 25.25 | 2532.46 | 35.2 | 66 | 22 | 44 | 0.533 |
| L11P1 | 20 | S | 31.25 | 2526.46 | 50.3 | 89 | 30 | 59 | 0.565 |
| L11P2 | 1 | U | 0.25 | 2552.79 | 26.9 | 40 | 18 | 22 | 0.673 |
| L11P2 | 3 | U | 3.25 | 2549.54 | 49.1 | 92 | 33 | 59 | 0.534 |
| L11P2 | 6 | U | 7.75 | 2545.04 | 64.9 | 74 | 25 | 49 | 0.877 |
| L11P2 | 9 | S | 12.25 | 2540.54 | 98.8 | 142 | 42 | 100 | 0.696 |
| L11P2 | 12 | U | 16.75 | 2536.04 | 31.5 | 66 | 21 | 45 | 0.477 |
| L11P2 | 14 | U | 19.75 | 2533.04 | 70.7 | 81 | 26 | 55 | 0.873 |
| L11P2 | 15 | U | 21.25 | 2531.54 | 38.2 | 54 | 20 | 34 | 0.707 |
| L11P2 | 19 | U | 27.25 | 2525.54 | 43.7 | 97 | 27 | 70 | 0.451 |
| L11P2 | 20 | U | 28.75 | 2524.04 | 22.7 | 40 | 17 | 23 | 0.568 |



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|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 1 | 2 | U | 1.43 | 2550.07 | 31.2 | 79 | 32 | 47 | 0.395 |
| 1 | 5 | U | 4.88 | 2546.62 | 65.5 | 100 | 37 | 63 | 0.655 |
| 1 | 7 | U | 7.18 | 2544.32 | 77.7 | 115 | 39 | 76 | 0.676 |
| 1 | 8 | U | 8.33 | 2543.17 | 75 | 119 | 36 | 83 | 0.630 |
| 1 | 9 | U | 9.48 | 2542.02 | 60.8 | 98 | 34 | 64 | 0.620 |
| 1 | 10 | U | 10.63 | 2540.87 | 62.2 | 96 | 29 | 67 | 0.648 |
| 1 | 17 | U | 18.65 | 2532.84 | 70.9 | 93 | 32 | 61 | 0.762 |
| 1 | 22 | U | 24.35 | 2527.14 | 38.8 | 45 | 25 | 20 | 0.862 |
| 1 | 27 | U | 29.18 | 2522.32 | 80.7 | 140 | 69 | 71 | 0.576 |
| 2 | 3 | U | 2.28 | 2549.47 | 42.6 | 81 | 24 | 57 | 0.526 |
| 2 | 6 | U | 5.28 | 2546.47 | 51.1 | 74 | 24 | 50 | 0.691 |
| 2 | 7 | U | 6.28 | 2545.47 | 61.1 | 84 | 28 | 56 | 0.727 |
| 2 | 8 | U | 7.28 | 2544.47 | 47 | 81 | 30 | 51 | 0.580 |
| 2 | 10 | U | 9.28 | 2542.47 | 95.4 | 118 | 35 | 83 | 0.808 |
| 2 | 11 | U | 10.28 | 2541.47 | 70 | 99 | 33 | 66 | 0.707 |
| 2 | 12 | U | 11.28 | 2540.47 | 58.6 | 100 | 27 | 73 | 0.586 |
| 2 | 13 | U | 12.28 | 2539.47 | 56.6 | 90 | 29 | 61 | 0.629 |
| 2 | 16 | U | 15.28 | 2536.47 | 65.4 | 46 | 19 | 27 | 1.422 |
| 2 | 20 | U | 19.28 | 2532.47 | 52 | 73 | 30 | 43 | 0.712 |
| 2 | 22 | U | 21.28 | 2530.47 | 59.6 | 84 | 25 | 59 | 0.710 |
| 2 | 25 | U | 24.28 | 2527.47 | 41.4 | 66 | 27 | 39 | 0.627 |
| 2 | 27 | U | 26.28 | 2525.47 | 58 | 78 | 30 | 48 | 0.744 |
| 2 | 29 | U | 28.28 | 2523.47 | 143.8 | 160 | 99 | 61 | 0.899 |
| 2 | 31 | U | 29.78 | 2521.97 | 140.2 | 148 | 74 | 74 | 0.947 |



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| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 3 | 2 | U | 1.78 | 2550.57 | 45 | 92 | 27 | 65 | 0.489 |
| 3 | 3 | U | 3.28 | 2549.07 | 51.2 | 78 | 29 | 49 | 0.656 |
| 3 | 6 | U | 7.78 | 2544.57 | 101 | 107 | 34 | 73 | 0.944 |
| 3 | 7 | U | 9.28 | 2543.07 | 74.2 | 107 | 36 | 71 | 0.693 |
| 3 | 9 | U | 12.28 | 2540.07 | 65.2 | 82 | 28 | 54 | 0.795 |
| 3 | 12 | U | 16.78 | 2535.57 | 51.9 | 91 | 24 | 67 | 0.570 |
| 3 | 14 | U | 19.75 | 2532.59 | 61.7 | 90 | 30 | 60 | 0.686 |
| 4 | 3 | U | 2.50 | 2550.61 | 39.9 | 81 | 24 | 57 | 0.493 |
| 4 | 6 | U | 5.98 | 2547.14 | 62.2 | 101 | 33 | 68 | 0.616 |
| 4 | 7 | U | 7.18 | 2545.94 | 77.9 | 106 | 33 | 73 | 0.735 |
| 4 | 9 | U | 9.48 | 2543.64 | 83 | 120 | 37 | 83 | 0.692 |
| 4 | 12 | U | 12.93 | 2540.19 | 70.7 | 91 | 29 | 62 | 0.777 |
| 4 | 14 | U | 15.25 | 2537.86 | 38.9 | 62 | 25 | 37 | 0.627 |
| 4 | 22 | U | 24.28 | 2528.84 | 148.1 | 254 | 160 | 94 | 0.583 |
| 4 | 24 | U | 26.28 | 2526.84 | 180.2 | 192 | 111 | 81 | 0.939 |
| 4 | 28 | U | 29.73 | 2523.39 | 23.2 | 37 | 17 | 20 | 0.627 |
| 5 | 2 | U | 1.28 | 2551.84 | 38.4 | 82 | 25 | 57 | 0.468 |
| 5 | 3 | U | 2.28 | 2550.84 | 66.7 | 85 | 30 | 55 | 0.785 |
| 5 | 4 | U | 3.28 | 2549.84 | 70.5 | 99 | 35 | 64 | 0.712 |
| 5 | 5 | U | 4.28 | 2548.84 | 68.7 | 90 | 33 | 57 | 0.763 |
| 5 | 6 | U | 5.28 | 2547.84 | 56.5 | 85 | 31 | 54 | 0.665 |
| 5 | 8 | U | 7.28 | 2545.84 | 90.2 | 115 | 35 | 80 | 0.784 |
| 5 | 10 | U | 9.28 | 2543.84 | 67.6 | 89 | 31 | 58 | 0.760 |
| 5 | 13 | U | 12.28 | 2540.84 | 94.1 | 124 | 31 | 93 | 0.759 |
| 5 | 15 | U | 14.28 | 2538.84 | 30.7 | 36 | 15 | 21 | 0.853 |



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| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 5 | 20 | U | 19.28 | 2533.84 | 60.8 | 90 | 27 | 63 | 0.676 |
| 5 | 24 | U | 23.28 | 2529.84 | 94.7 | 114 | 44 | 70 | 0.831 |
| 5 | 26 | U | 25.23 | 2527.89 | 36.4 | 45 | 25 | 20 | 0.809 |
| 5 | 28 | U | 27.28 | 2525.84 | 186.1 | 251 | 131 | 120 | 0.741 |
| 5 | 30 | U | 29.28 | 2523.84 | 120.2 | 124 | 100 | 24 | 0.969 |
| 7 | 1 | U | 0.28 | 2552.65 | 40.7 | 94 | 30 | 64 | 0.433 |
| 7 | 4 | U | 3.73 | 2549.20 | 72.5 | 80 | 25 | 55 | 0.906 |
| 7 | 7 | U | 7.20 | 2545.72 | 82.6 | 110 | 28 | 82 | 0.751 |
| 7 | 8 | U | 8.33 | 2544.60 | 72.8 | 111 | 29 | 82 | 0.656 |
| 7 | 11 | U | 11.78 | 2541.15 | 57.4 | 88 | 29 | 59 | 0.652 |
| 7 | 14 | U | 15.23 | 2537.70 | 60.4 | 95 | 30 | 65 | 0.636 |
| 7 | 15 | U | 16.38 | 2536.55 | 58.1 | 85 | 30 | 55 | 0.684 |
| 7 | 22 | U | 24.53 | 2528.40 | 63.1 | 145 | 72 | 73 | 0.435 |
| 7 | 23 | U | 25.53 | 2527.40 | 100.9 | 163 | 74 | 89 | 0.619 |
| 7 | 25 | U | 27.53 | 2525.40 | 79.9 | 145 | 105 | 40 | 0.551 |
| 7 | 27 | U | 29.73 | 2523.20 | 39.2 | 89 | 29 | 60 | 0.440 |
| 8 | 4 | U | 3.83 | 2547.63 | 60.8 | 85 | 28 | 57 | 0.715 |
| 8 | 5 | U | 4.98 | 2546.48 | 51.4 | 83 | 22 | 61 | 0.619 |
| 8 | 6 | U | 6.13 | 2545.33 | 59.6 | 95 | 32 | 63 | 0.627 |
| 8 | 9 | U | 9.58 | 2541.88 | 84.6 | 125 | 37 | 88 | 0.677 |
| 8 | 11 | U | 11.83 | 2539.63 | 60.2 | 95 | 33 | 62 | 0.634 |
| 8 | 12 | U | 12.93 | 2538.53 | 57.9 | 115 | 31 | 84 | 0.503 |
| 8 | 16 | U | 17.23 | 2534.23 | 42.4 | 70 | 25 | 45 | 0.606 |
| 8 | 20 | U | 21.83 | 2529.63 | 39.8 | 70 | 25 | 45 | 0.569 |
| 8 | 22 | U | 23.98 | 2527.48 | 55.3 | 72 | 25 | 47 | 0.768 |



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| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 8 | 29 | U | 31.25 | 2520.20 | 77.5 | 87 | 49 | 38 | 0.891 |
| 8 | 31 | U | 33.33 | 2518.13 | 117.2 | 252 | 150 | 102 | 0.465 |
| 8 | 32 | U | 34.33 | 2517.13 | 117.3 | 127 | 61 | 66 | 0.924 |
| 8 | 35 | U | 37.33 | 2514.13 | 42.2 | 75 | 30 | 45 | 0.563 |
| 8 | 38 | U | 40.33 | 2511.13 | 39 | 78 | 30 | 48 | 0.500 |
| 8 | 41 | U | 43.33 | 2508.13 | 42.6 | 94 | 39 | 55 | 0.453 |
| 8 | 42 | S | 44.28 | 2507.18 | 23.8 | 43 | 18 | 25 | 0.553 |
| 9 | 3 | U | 3.28 | 2548.35 | 40.3 | 82 | 20 | 62 | 0.491 |
| 9 | 5 | U | 6.28 | 2545.35 | 67.9 | 84 | 23 | 61 | 0.808 |
| 9 | 6 | U | 7.78 | 2543.85 | 82.8 | 114 | 40 | 74 | 0.726 |
| 9 | 8 | U | 10.78 | 2540.85 | 69.7 | 100 | 29 | 71 | 0.697 |
| 9 | 10 | U | 13.78 | 2537.85 | 62.1 | 82 | 23 | 59 | 0.757 |
| 9 | 12 | U | 16.78 | 2534.85 | 52.6 | 70 | 29 | 41 | 0.751 |
| 9 | 15 | U | 21.28 | 2530.35 | 53.7 | 105 | 33 | 72 | 0.511 |
| 9 | 19 | U | 27.28 | 2524.35 | 34.7 | 42 | 27 | 15 | 0.826 |
| 9 | 20 | U | 28.75 | 2522.87 | 125.9 | 217 | 116 | 101 | 0.580 |
| 9 | 22 | U | 31.78 | 2519.85 | 107.5 | 164 | 92 | 72 | 0.655 |
| 10 | 3 | U | 2.68 | 2548.57 | 35.8 | 87 | 24 | 63 | 0.411 |
| 10 | 4 | U | 3.83 | 2547.42 | 52.9 | 75.6 | 25.6 | 50 | 0.700 |
| 10 | 5 | U | 4.98 | 2546.27 | 74.9 | 106 | 37 | 69 | 0.707 |
| 10 | 6 | U | 6.13 | 2545.12 | 60.7 | 73 | 26 | 47 | 0.832 |
| 10 | 7 | U | 7.28 | 2543.97 | 55.8 | 95 | 30 | 65 | 0.587 |
| 10 | 8 | U | 8.43 | 2542.82 | 55.6 | 85 | 33 | 52 | 0.654 |
| 10 | 9 | U | 9.58 | 2541.67 | 86.6 | 126 | 38 | 88 | 0.687 |
| 10 | 10 | U | 10.58 | 2540.67 | 79.7 | 110 | 34 | 76 | 0.725 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 10 | 12 | U | 12.58 | 2538.67 | 92.4 | 119 | 32 | 87 | 0.776 |
| 10 | 15 | U | 16.28 | 2534.97 | 49.1 | 75 | 25 | 50 | 0.655 |
| 10 | 17 | U | 18.28 | 2532.97 | 66.4 | 89 | 30 | 59 | 0.746 |
| 10 | 18 | U | 19.28 | 2531.97 | 73.8 | 134 | 35 | 99 | 0.551 |
| 10 | 21 | U | 22.28 | 2528.97 | 34.8 | 64 | 19 | 45 | 0.544 |
| 10 | 24 | U | 25.28 | 2525.97 | 39.9 | 49 | 21 | 28 | 0.814 |
| 10 | 26 | U | 27.03 | 2524.22 | 29.8 | 44 | 22 | 22 | 0.677 |
| 10 | 31 | U | 31.28 | 2519.97 | 69.6 | 105 | 58 | 47 | 0.663 |
| 10 | 33 | U | 33.28 | 2517.97 | 43.8 | 70 | 32 | 38 | 0.626 |
| 10 | 36 | U | 36.28 | 2514.97 | 45.9 | 78 | 30 | 48 | 0.588 |
| 10 | 39 | U | 39.15 | 2512.09 | 26.6 | 48 | 23 | 25 | 0.554 |
| 10 | 42 | U | 41.10 | 2510.14 | 32 | 50 | 22 | 28 | 0.640 |
| 10 | 45 | U | 43.28 | 2507.97 | 24.3 | 39 | 19 | 20 | 0.623 |
| 10 | 48 | S | 46.23 | 2505.02 | 27.7 | 64 | 26 | 38 | 0.433 |
| 10 | 51 | S | 49.23 | 2502.02 | 32.6 | 74 | 29 | 45 | 0.441 |
| 11 | 2 | U | 1.78 | 2550.46 | 35.7 | 83 | 25 | 58 | 0.430 |
| 11 | 3 | U | 3.28 | 2548.96 | 47.2 | 81 | 28 | 53 | 0.583 |
| 11 | 6 | U | 7.78 | 2544.46 | 92.2 | 114 | 36 | 78 | 0.809 |
| 11 | 8 | U | 10.78 | 2541.46 | 60 | 91 | 29 | 62 | 0.659 |
| 11 | 11 | U | 15.28 | 2536.96 | 29.4 | 45 | 20 | 25 | 0.653 |
| 11 | 15 | U | 21.28 | 2530.96 | 49 | 72 | 27 | 45 | 0.681 |
| 11 | 18 | U | 25.78 | 2526.46 | 124.8 | 172 | 100 | 72 | 0.726 |
| 11 | 20 | U | 28.78 | 2523.46 | 78.1 | 92 | 45 | 47 | 0.849 |
| 11 | 23 | U | 33.28 | 2518.96 | 44.4 | 77 | 29 | 48 | 0.577 |
| 11 | 24 | U | 34.78 | 2517.46 | 59.9 | 81 | 36 | 45 | 0.740 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 11 | 27 | U | 39.28 | 2512.96 | 34.4 | 65 | 24 | 41 | 0.529 |
| 11 | 28 | U | 40.78 | 2511.46 | 31.2 | 50 | 18 | 32 | 0.624 |
| 11 | 35 | S | 51.23 | 2501.01 | 20.8 | 51 | 25 | 26 | 0.408 |
| 11 | 39 | U | 57.75 | 2494.48 | 22.6 | 39 | 20 | 19 | 0.579 |
| 12 | 3 | U | 2.68 | 2549.56 | 56.4 | 98 | 26 | 72 | 0.576 |
| 12 | 4 | U | 3.83 | 2548.41 | 79.4 | 124 | 30 | 94 | 0.640 |
| 12 | 5 | U | 4.98 | 2547.26 | 88.8 | 124 | 29 | 95 | 0.716 |
| 12 | 6 | U | 6.13 | 2546.11 | 70.6 | 127 | 32 | 95 | 0.556 |
| 12 | 7 | U | 7.28 | 2544.96 | 97.6 | 127 | 30 | 97 | 0.769 |
| 12 | 8 | U | 8.43 | 2543.81 | 88.3 | 135 | 33 | 102 | 0.654 |
| 12 | 10 | U | 10.73 | 2541.51 | 63.6 | 98 | 26 | 72 | 0.649 |
| 12 | 12 | U | 13.03 | 2539.21 | 83.5 | 119 | 34 | 85 | 0.702 |
| 12 | 17 | U | 18.78 | 2533.46 | 45 | 103 | 37 | 66 | 0.437 |
| 12 | 19 | U | 21.08 | 2531.16 | 50.4 | 66 | 32 | 34 | 0.764 |
| 12 | 21 | U | 23.38 | 2528.86 | 33.3 | 68 | 25 | 43 | 0.490 |
| 12 | 22 | U | 24.53 | 2527.71 | 163 | 190 | 89 | 101 | 0.858 |
| 12 | 24 | U | 26.68 | 2525.56 | 88 | 134 | 96 | 38 | 0.657 |
| 12 | 26 | U | 28.68 | 2523.56 | 72.4 | 86 | 44 | 42 | 0.842 |
| 12 | 28 | U | 30.68 | 2521.56 | 23.6 | 51 | 17 | 34 | 0.463 |
| 12 | 29 | S | 31.73 | 2520.51 | 21.9 | 46 | 21 | 25 | 0.476 |
| 12 | 33 | S | 34.63 | 2517.61 | 17.3 | 24 | 13 | 11 | 0.721 |
| 12 | 39 | S | 40.63 | 2511.61 | 38.3 | 56 | 29 | 27 | 0.684 |
| 12 | 46 | S | 47.93 | 2504.31 | 34.9 | 54 | 32 | 22 | 0.646 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 13 | 1 | U | 0.28 | 2552.63 | 29.8 | 44 | 23 | 21 | 0.677 |
| 13 | 3 | U | 3.28 | 2549.63 | 60.5 | 99 | 30 | 69 | 0.611 |
| 13 | 4 | U | 4.78 | 2548.13 | 49.3 | 141 | 42 | 99 | 0.350 |
| 13 | 6 | U | 7.78 | 2545.13 | 84.8 | 112 | 36 | 76 | 0.757 |
| 13 | 7 | U | 9.28 | 2543.63 | 72.1 | 89 | 31 | 58 | 0.810 |
| 13 | 9 | U | 12.28 | 2540.63 | 64.9 | 96 | 28 | 68 | 0.676 |
| 13 | 11 | U | 15.28 | 2537.63 | 47.2 | 69 | 25 | 44 | 0.684 |
| 13 | 12 | U | 16.78 | 2536.13 | 63.5 | 92 | 31 | 61 | 0.690 |
| 13 | 13 | U | 18.28 | 2534.63 | 26.9 | 67 | 23 | 44 | 0.401 |
| 13 | 17 | U | 24.28 | 2528.63 | 99 | 120 | 48 | 72 | 0.825 |
| 13 | 18 | U | 25.78 | 2527.13 | 101.7 | 153 | 98 | 55 | 0.665 |
| 13 | 23 | S | 33.23 | 2519.68 | 22.1 | 23 | 17 | 6 | 0.961 |
| 13 | 26 | S | 37.73 | 2515.18 | 27.4 | 47 | 22 | 25 | 0.583 |
| 13 | 28 | S | 39.78 | 2513.13 | 31.6 | 35 | 19 | 16 | 0.903 |
| 14 | 4 | U | 3.83 | 2550.01 | 63.1 | 92 | 33 | 59 | 0.686 |
| 14 | 5 | U | 4.98 | 2548.86 | 76 | 110 | 35 | 75 | 0.691 |
| 14 | 6 | U | 6.13 | 2547.71 | 78.5 | 107 | 35 | 72 | 0.734 |
| 14 | 7 | U | 7.28 | 2546.56 | 83.3 | 115 | 33 | 82 | 0.724 |
| 14 | 9 | U | 9.68 | 2544.16 | 58.6 | 100 | 31 | 69 | 0.586 |
| 14 | 11 | U | 12.03 | 2541.81 | 64.3 | 97 | 32 | 65 | 0.663 |
| 14 | 13 | U | 14.33 | 2539.51 | 24.7 | 73 | 26 | 47 | 0.338 |
| 14 | 16 | U | 17.65 | 2536.18 | 54 | 80 | 24 | 56 | 0.675 |
| 14 | 23 | U | 23.43 | 2530.41 | 111.6 | 213 | 125 | 88 | 0.524 |
| 14 | 25 | U | 25.73 | 2528.11 | 86.7 | 132 | 52 | 80 | 0.657 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 14 | 27 | U | 28.03 | 2525.81 | 51.70 | 90 | 29 | 61 | 0.574 |
| 14 | 29 | U | 30.33 | 2523.51 | 36.2 | 41 | 26 | 15 | 0.883 |
| 14 | 31 | U | 32.60 | 2521.23 | 21.2 | 30 | 16 | 14 | 0.707 |
| 14 | 34 | U | 34.98 | 2518.86 | 54.3 | 65 | 21 | 44 | 0.835 |
| 14 | 35 | U | 35.98 | 2517.86 | 30.8 | 51 | 19 | 32 | 0.604 |
| 14 | 36 | U | 36.95 | 2516.88 | 22.9 | 50 | 20 | 30 | 0.458 |
| 14 | 42 | U | 43.30 | 2510.53 | 25.5 | 37 | 30 | 7 | 0.689 |
| 14 | 44 | S | 45.03 | 2508.81 | 33 | 63 | 37 | 26 | 0.524 |
| 14 | 46 | U | 47.70 | 2506.13 | 33.5 | 52 | 31 | 21 | 0.644 |
| 14 | 48 | U | 49.65 | 2504.18 | 36 | 60 | 38 | 22 | 0.600 |
| 15 | 1 | U | 0.28 | 2553.13 | 26.1 | 76 | 34 | 42 | 0.343 |
| 15 | 3 | U | 3.28 | 2550.13 | 63 | 89 | 32 | 57 | 0.708 |
| 15 | 4 | U | 4.78 | 2548.63 | 78.7 | 103 | 39 | 64 | 0.764 |
| 15 | 7 | U | 9.28 | 2544.13 | 75 | 93 | 30 | 63 | 0.806 |
| 15 | 8 | U | 10.78 | 2542.63 | 61.4 | 84 | 30 | 54 | 0.731 |
| 15 | 9 | U | 12.28 | 2541.13 | 44.7 | 63 | 24 | 39 | 0.710 |
| 15 | 10 | U | 13.78 | 2539.63 | 50 | 78 | 31 | 47 | 0.641 |
| 15 | 11 | U | 15.28 | 2538.13 | 53.7 | 83 | 32 | 51 | 0.647 |
| 15 | 15 | U | 21.28 | 2532.13 | 114.6 | 183 | 118 | 65 | 0.626 |
| 15 | 18 | U | 25.78 | 2527.63 | 40.3 | 71 | 26 | 45 | 0.568 |
| 15 | 20 | U | 28.73 | 2524.68 | 46.2 | 53 | 26 | 27 | 0.872 |
| 15 | 23 | S | 33.23 | 2520.18 | 35.7 | 91 | 32 | 59 | 0.392 |
| 15 | 26 | U | 38.25 | 2515.15 | 39.1 | 69 | 38 | 31 | 0.567 |
| 15 | 27 | S | 39.23 | 2514.18 | 36.3 | 71 | 33 | 38 | 0.511 |
| 15 | 28 | S | 39.78 | 2513.63 | 25 | 44 | 22 | 22 | 0.568 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 16 | 4 | U | 3.28 | 2550.98 | 53.8 | 80 | 26 | 54 | 0.673 |
| 16 | 5 | U | 4.28 | 2549.98 | 70.6 | 104 | 35 | 69 | 0.679 |
| 16 | 6 | U | 5.28 | 2548.98 | 72.2 | 102 | 35 | 67 | 0.708 |
| 16 | 7 | U | 6.28 | 2547.98 | 81.1 | 107 | 39 | 68 | 0.758 |
| 16 | 8 | U | 7.28 | 2546.98 | 78.6 | 110 | 33 | 77 | 0.715 |
| 16 | 9 | U | 8.28 | 2545.98 | 96 | 115 | 35 | 80 | 0.835 |
| 16 | 10 | U | 9.28 | 2544.98 | 63.9 | 94 | 29 | 65 | 0.680 |
| 16 | 12 | U | 11.28 | 2542.98 | 63 | 96 | 31 | 65 | 0.656 |
| 16 | 16 | U | 14.28 | 2539.98 | 51.1 | 85 | 28 | 57 | 0.601 |
| 16 | 23 | U | 21.28 | 2532.98 | 133.5 | 297 | 201 | 96 | 0.449 |
| 16 | 25 | U | 23.28 | 2530.98 | 45.8 | 67 | 29 | 38 | 0.684 |
| 16 | 29 | U | 27.28 | 2526.98 | 40.4 | 68 | 27 | 41 | 0.594 |
| 16 | 38 | S | 35.23 | 2519.03 | 40.4 | 70 | 38 | 32 | 0.577 |
| 16 | 42 | S | 39.23 | 2515.03 | 35 | 72 | 34 | 38 | 0.486 |
| 16 | 44 | S | 41.23 | 2513.03 | 33.4 | 73 | 34 | 39 | 0.458 |
| 16 | 46 | S | 43.23 | 2511.03 | 31.2 | 54 | 29 | 25 | 0.578 |
| 16 | 48 | S | 45.23 | 2509.03 | 37.8 | 61 | 31 | 30 | 0.620 |
| 16 | 50 | S | 47.23 | 2507.03 | 35 | 65 | 33 | 32 | 0.538 |
| 16 | 52 | S | 49.23 | 2505.03 | 49.3 | 76 | 38 | 38 | 0.649 |
| 18 | 3 | U | 2.28 | 2549.51 | 57.3 | 88 | 33 | 55 | 0.651 |
| 18 | 4 | U | 3.28 | 2548.51 | 60.8 | 79 | 28 | 51 | 0.770 |
| 18 | 6 | U | 5.28 | 2546.51 | 56.2 | 93 | 28 | 65 | 0.604 |
| 18 | 7 | U | 6.28 | 2545.51 | 87.2 | 126 | 38 | 88 | 0.692 |
| 18 | 9 | U | 8.28 | 2543.51 | 83 | 121 | 35 | 86 | 0.686 |
| 18 | 14 | U | 13.28 | 2538.51 | 76.1 | 94 | 26 | 68 | 0.810 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 18 | 16 | U | 15.28 | 2536.51 | 58.1 | 92 | 27 | 65 | 0.632 |
| 18 | 24 | U | 24.28 | 2527.51 | 28.3 | 40 | 20 | 20 | 0.708 |
| 18 | 27 | U | 27.28 | 2524.51 | 78.6 | 106 | 50 | 56 | 0.742 |
| 18 | 29 | U | 29.28 | 2522.51 | 130.4 | 183 | 87 | 96 | 0.713 |
| 19 | 3 | U | 2.68 | 2550.15 | 53.3 | 72 | 25 | 47 | 0.740 |
| 19 | 5 | U | 4.98 | 2547.85 | 76.3 | 120 | 40 | 80 | 0.636 |
| 19 | 10 | U | 10.73 | 2542.10 | 80 | 105 | 30 | 75 | 0.762 |
| 19 | 11 | U | 11.88 | 2540.95 | 78.8 | 104 | 32 | 72 | 0.758 |
| 19 | 13 | U | 14.18 | 2538.65 | 45.1 | 68 | 24 | 44 | 0.663 |
| 19 | 16 | U | 17.63 | 2535.20 | 60.8 | 99 | 31 | 68 | 0.614 |
| 19 | 24 | U | 26.53 | 2526.30 | 99.4 | 156 | 64 | 92 | 0.637 |
| 19 | 25 | U | 27.53 | 2525.30 | 55.3 | 87 | 50 | 37 | 0.636 |
| 20 | 3 | U | 3.28 | 2549.83 | 70 | 100 | 31 | 69 | 0.700 |
| 20 | 4 | U | 4.78 | 2548.33 | 75.7 | 117 | 37 | 80 | 0.647 |
| 20 | 8 | U | 10.78 | 2542.33 | 67.9 | 99 | 27 | 72 | 0.686 |
| 20 | 11 | U | 14.73 | 2538.38 | 53.2 | 82 | 25 | 57 | 0.649 |
| 21 | 1 | U | 0.28 | 2552.02 | 39.6 | 78 | 28 | 50 | 0.508 |
| 21 | 2 | U | 1.28 | 2551.02 | 38.9 | 76 | 27 | 49 | 0.512 |
| 21 | 7 | U | 6.28 | 2546.02 | 55.8 | 81 | 30 | 51 | 0.689 |
| 21 | 10 | U | 9.28 | 2543.02 | 72 | 91 | 31 | 60 | 0.791 |
| 21 | 12 | U | 11.28 | 2541.02 | 56 | 98 | 32 | 66 | 0.571 |
| 21 | 16 | U | 15.28 | 2537.02 | 50.7 | 65 | 26 | 39 | 0.780 |
| 21 | 18 | U | 17.28 | 2535.02 | 65.8 | 89 | 33 | 56 | 0.739 |
| 21 | 20 | U | 19.28 | 2533.02 | 40 | 58 | 20 | 38 | 0.690 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 21 | 24 | U | 23.28 | 2529.02 | 49 | 81 | 41 | 40 | 0.605 |
| 21 | 27 | U | 25.28 | 2527.02 | 165.2 | 181 | 77 | 104 | 0.913 |
| 21 | 28 | U | 26.28 | 2526.02 | 93.1 | 168 | 97 | 71 | 0.554 |
| 21 | 29 | U | 27.28 | 2525.02 | 77.4 | 145 | 72 | 73 | 0.534 |
| 21 | 31 | U | 29.28 | 2523.02 | 69.9 | 85 | 39 | 46 | 0.822 |
| 21 | 32 | U | 30.28 | 2522.02 | 51.7 | 100 | 35 | 65 | 0.517 |
| 21 | 34 | U | 32.28 | 2520.02 | 38.7 | 73 | 25 | 48 | 0.530 |
| 21 | 36 | U | 34.28 | 2518.02 | 25.9 | 32 | 16 | 16 | 0.809 |
| 21 | 38 | U | 36.08 | 2516.22 | 55.8 | 46 | 18 | 28 | 1.213 |
| 21 | 44 | S | 41.23 | 2511.07 | 17.4 | 39 | 18 | 21 | 0.446 |
| 21 | 48 | S | 45.23 | 2507.07 | 42 | 88 | 38 | 50 | 0.477 |
| 22 | 2 | U | 1.53 | 2551.22 | 47.8 | 98 | 26 | 72 | 0.488 |
| 22 | 4 | U | 3.83 | 2548.92 | 76.2 | 112 | 34 | 78 | 0.680 |
| 22 | 6 | U | 6.13 | 2546.62 | 56.1 | 101 | 26 | 75 | 0.555 |
| 22 | 9 | U | 9.58 | 2543.17 | 59.9 | 88 | 29 | 59 | 0.681 |
| 22 | 14 | U | 15.31 | 2537.43 | 44.2 | 70 | 22 | 48 | 0.631 |
| 22 | 23 | U | 25.48 | 2527.27 | 104.6 | 236 | 125 | 111 | 0.443 |
| 22 | 28 | U | 30.48 | 2522.27 | 44.2 | 74 | 24 | 50 | 0.597 |
| 22 | 32 | U | 34.48 | 2518.27 | 40.1 | 74 | 21 | 53 | 0.542 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS



REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 23 | 2 | U | 1.53 | 2551.76 | 32.8 | 66 | 24 | 42 | 0.497 |
| 23 | 4 | U | 3.83 | 2549.46 | 64 | 95 | 31 | 64 | 0.674 |
| 23 | 12 | U | 13.03 | 2540.26 | 44.6 | 58 | 21 | 37 | 0.769 |
| 23 | 14 | U | 15.33 | 2537.96 | 55 | 97 | 31 | 66 | 0.567 |
| 23 | 15 | U | 16.48 | 2536.81 | 63.5 | 108 | 36 | 72 | 0.588 |
| 23 | 17 | U | 18.78 | 2534.51 | 40.3 | 57 | 20 | 37 | 0.707 |
| 23 | 18 | U | 19.93 | 2533.36 | 32.6 | 68 | 35 | 33 | 0.479 |
| 23 | 22 | U | 24.08 | 2529.21 | 145.8 | 181 | 100 | 81 | 0.806 |
| 23 | 24 | U | 26.08 | 2527.21 | 157.8 | 244 | 136 | 108 | 0.647 |
| 23 | 26 | U | 28.08 | 2525.21 | 22.4 | 42 | 17 | 25 | 0.533 |
| 24 | 3 | U | 2.68 | 2551.27 | 49.1 | 72 | 26 | 46 | 0.682 |
| 24 | 7 | U | 7.28 | 2546.67 | 91.3 | 119 | 36 | 83 | 0.767 |
| 24 | 12 | U | 13.03 | 2540.92 | 26.2 | 30 | 16 | 14 | 0.873 |
| 24 | 16 | U | 17.63 | 2536.32 | 35.9 | 52 | 20 | 32 | 0.690 |
| 24 | 18 | U | 19.93 | 2534.02 | 30.2 | 47 | 19 | 28 | 0.643 |
| 24 | 22 | U | 24.53 | 2529.42 | 84 | 97 | 42 | 55 | 0.866 |
| 24 | 25 | U | 27.53 | 2526.42 | 32.8 | 47 | 24 | 23 | 0.698 |
| 24 | 29 | S | 31.48 | 2522.47 | 28.2 | 40 | 20 | 20 | 0.705 |
| 24 | 41 | U | 42.75 | 2511.19 | 32.2 | 41 | 24 | 17 | 0.785 |
| 24 | 47 | S | 48.73 | 2505.22 | 31.1 | 41 | 21 | 20 | 0.759 |
| 25 | 2 | U | 1.78 | 2552.22 | 33.8 | 84 | 24 | 60 | 0.402 |
| 25 | 4 | U | 4.78 | 2549.22 | 68.6 | 115 | 33 | 82 | 0.597 |
| 25 | 8 | U | 10.78 | 2543.22 | 64.7 | 100 | 31 | 69 | 0.647 |
| 25 | 10 | U | 13.78 | 2540.22 | 37.8 | 67 | 31 | 36 | 0.564 |

| | | |
|--|--|-------------------|
|   | EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS | Revisión: 1 |
| | REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA | Elaboró: LFEV |
| | | Fecha: Enero 2016 |

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 26 | 3 | U | 2.58 | 2553.47 | 47.9 | 79 | 22 | 57 | 0.606 |
| 26 | 4 | U | 3.73 | 2552.32 | 55.8 | 101 | 30 | 71 | 0.552 |
| 26 | 5 | U | 4.88 | 2551.17 | 67 | 118 | 45 | 73 | 0.568 |
| 26 | 6 | U | 6.03 | 2550.02 | 56.1 | 78 | 20 | 58 | 0.719 |
| 26 | 8 | U | 8.33 | 2547.72 | 86.9 | 130 | 33 | 97 | 0.668 |
| 26 | 12 | U | 12.93 | 2543.12 | 43.1 | 56 | 22 | 34 | 0.770 |
| 26 | 14 | U | 14.73 | 2541.32 | 51.6 | 99 | 27 | 72 | 0.521 |
| 27 | 2 | U | 1.78 | 2553.69 | 35.4 | 91 | 27 | 64 | 0.389 |
| 27 | 4 | U | 4.78 | 2550.69 | 63.9 | 113 | 35 | 78 | 0.565 |
| 27 | 6 | U | 7.78 | 2547.69 | 87.9 | 129 | 31 | 98 | 0.681 |
| 27 | 8 | U | 10.78 | 2544.69 | 74.3 | 97 | 33 | 64 | 0.766 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 28 | 2 | U | 1.28 | 2550.37 | 29.6 | 54 | 25 | 29 | 0.548 |
| 28 | 4 | U | 3.28 | 2548.37 | 49.7 | 84 | 27 | 57 | 0.592 |
| 28 | 5 | U | 4.28 | 2547.37 | 64.3 | 88 | 30 | 58 | 0.731 |
| 28 | 7 | U | 6.28 | 2545.37 | 71.1 | 100 | 31 | 69 | 0.711 |
| 28 | 8 | U | 7.28 | 2544.37 | 72.9 | 78 | 27 | 51 | 0.935 |
| 28 | 10 | U | 9.28 | 2542.37 | 87.2 | 124 | 33 | 91 | 0.703 |
| 28 | 12 | U | 11.28 | 2540.37 | 55.5 | 70 | 21 | 49 | 0.793 |
| 28 | 16 | U | 14.78 | 2536.87 | 60.8 | 125 | 36 | 89 | 0.486 |
| 29 | 2 | U | 1.78 | 2550.34 | 45.9 | 81 | 24 | 57 | 0.567 |
| 29 | 3 | U | 3.28 | 2548.84 | 70.2 | 97 | 28 | 69 | 0.724 |
| 29 | 4 | U | 4.78 | 2547.34 | 66.5 | 96 | 30 | 66 | 0.693 |
| 29 | 5 | U | 6.28 | 2545.84 | 51 | 75 | 35 | 40 | 0.680 |
| 29 | 6 | U | 7.78 | 2544.34 | 69.4 | 119 | 37 | 82 | 0.583 |
| 29 | 7 | U | 9.28 | 2542.84 | 55.6 | 119 | 34 | 85 | 0.467 |
| 29 | 8 | U | 10.78 | 2541.34 | 55.4 | 96 | 25 | 71 | 0.577 |
| 29 | 10 | U | 13.78 | 2538.34 | 60.5 | 119 | 26 | 93 | 0.508 |
| 30 | 2 | U | 1.78 | 2550.11 | 43.4 | 80 | 25 | 55 | 0.543 |
| 30 | 3 | U | 3.28 | 2548.61 | 80.7 | 81 | 24 | 57 | 0.996 |
| 30 | 4 | U | 4.78 | 2547.11 | 67 | 94 | 26 | 68 | 0.713 |
| 30 | 6 | U | 7.78 | 2544.11 | 77.2 | 116 | 33 | 83 | 0.666 |
| 30 | 7 | U | 9.28 | 2542.61 | 81.5 | 96 | 30 | 66 | 0.849 |
| 30 | 10 | U | 13.78 | 2538.11 | 55.2 | 98 | 31 | 67 | 0.563 |
| 30 | 11 | U | 14.73 | 2537.16 | 63.2 | 96 | 25 | 71 | 0.658 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 31 | 2 | U | 1.78 | 2549.71 | 40.4 | 79 | 24 | 55 | 0.511 |
| 31 | 4 | U | 4.78 | 2546.71 | 51.4 | 82 | 29 | 53 | 0.627 |
| 31 | 6 | U | 7.78 | 2543.71 | 54.3 | 117 | 30 | 87 | 0.464 |
| 31 | 9 | U | 12.28 | 2539.21 | 79.9 | 86 | 25 | 71 | 0.929 |
| 31 | 10 | U | 13.78 | 2537.71 | 44.5 | 70 | 24 | 46 | 0.636 |
| 31 | 11 | U | 14.73 | 2536.76 | 47.9 | 80 | 26 | 54 | 0.599 |
| 32 | 2 | U | 1.78 | 2550.23 | 29.6 | 63 | 24 | 39 | 0.470 |
| 32 | 3 | U | 3.28 | 2548.73 | 53.8 | 78 | 25 | 53 | 0.690 |
| 32 | 4 | U | 4.78 | 2547.23 | 77.6 | 92 | 32 | 60 | 0.843 |
| 32 | 5 | U | 6.28 | 2545.73 | 67 | 85 | 27 | 58 | 0.788 |
| 32 | 7 | U | 9.28 | 2542.73 | 90.9 | 133 | 33 | 100 | 0.683 |
| 32 | 8 | U | 10.78 | 2541.23 | 44.3 | 66 | 19 | 47 | 0.671 |
| 32 | 9 | U | 12.28 | 2539.73 | 83.9 | 135 | 31 | 104 | 0.621 |
| 32 | 11 | U | 14.73 | 2537.28 | 65 | 93 | 37 | 56 | 0.699 |
| 33 | 2 | U | 1.78 | 2550.19 | 32.7 | 84 | 27 | 57 | 0.389 |
| 33 | 3 | U | 3.28 | 2548.69 | 48 | 78 | 28 | 50 | 0.615 |
| 33 | 4 | U | 4.78 | 2547.19 | 63 | 104 | 38 | 66 | 0.606 |
| 33 | 5 | U | 6.28 | 2545.69 | 77.6 | 129 | 48 | 81 | 0.602 |
| 33 | 7 | U | 9.28 | 2542.69 | 90.4 | 137 | 39 | 98 | 0.660 |
| 33 | 11 | U | 14.73 | 2537.24 | 63.5 | 109 | 38 | 71 | 0.583 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 34 | 3 | U | 2.28 | 2549.50 | 42.7 | 71 | 27 | 44 | 0.601 |
| 34 | 4 | U | 3.28 | 2548.50 | 57.1 | 85 | 31 | 54 | 0.672 |
| 34 | 5 | U | 4.28 | 2547.50 | 41.2 | 84 | 31 | 53 | 0.490 |
| 34 | 7 | U | 6.28 | 2545.50 | 45.3 | 73 | 28 | 45 | 0.621 |
| 34 | 9 | U | 8.28 | 2543.50 | 41 | 111 | 33 | 78 | 0.369 |
| 34 | 12 | U | 11.28 | 2540.50 | 66.4 | 98 | 32 | 66 | 0.678 |
| 34 | 13 | U | 12.28 | 2539.50 | 47.2 | 88 | 29 | 59 | 0.536 |
| 34 | 16 | U | 14.78 | 2537.00 | 22.5 | 31 | 18 | 13 | 0.726 |
| 35 | 2 | U | 1.78 | 2552.03 | 55.8 | 78 | 30 | 48 | 0.715 |
| 35 | 3 | U | 3.28 | 2550.53 | 64.9 | 91 | 34 | 57 | 0.713 |
| 35 | 4 | U | 4.78 | 2549.03 | 76.8 | 89 | 31 | 58 | 0.863 |
| 35 | 7 | U | 9.28 | 2544.53 | 74.3 | 95 | 29 | 66 | 0.782 |
| 35 | 10 | U | 13.78 | 2540.03 | 30 | 63 | 20 | 43 | 0.476 |
| 36 | 2 | U | 1.53 | 2552.06 | 41.8 | 78 | 30 | 48 | 0.536 |
| 36 | 4 | U | 3.83 | 2549.76 | 68 | 104 | 36 | 68 | 0.654 |
| 36 | 6 | U | 6.13 | 2547.46 | 78.9 | 108 | 30 | 78 | 0.731 |
| 36 | 9 | U | 9.58 | 2544.01 | 73.3 | 104 | 34 | 70 | 0.705 |
| 36 | 12 | U | 13.03 | 2540.56 | 77 | 113 | 35 | 78 | 0.681 |
| 36 | 14 | U | 14.73 | 2538.86 | 61.9 | 92 | 29 | 63 | 0.673 |
| 37 | 4 | U | 4.88 | 2547.30 | 43.7 | 75 | 24 | 51 | 0.583 |
| 37 | 5 | U | 6.38 | 2545.80 | 80.8 | 131 | 41 | 90 | 0.617 |
| 37 | 6 | U | 7.88 | 2544.30 | 74.7 | 129 | 34 | 95 | 0.579 |
| 37 | 8 | U | 10.88 | 2541.30 | 62.5 | 96 | 28 | 68 | 0.651 |
| 37 | 9 | U | 12.38 | 2539.80 | 46.1 | 96 | 28 | 68 | 0.480 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 38 | 2 | U | 1.78 | 2551.75 | 33.5 | 74 | 33 | 41 | 0.453 |
| 38 | 4 | U | 4.78 | 2548.75 | 60.5 | 77 | 31 | 46 | 0.786 |
| 38 | 5 | U | 6.28 | 2547.25 | 90.7 | 113 | 37 | 76 | 0.803 |
| 38 | 7 | U | 9.28 | 2544.25 | 73.2 | 113 | 38 | 75 | 0.648 |
| 38 | 9 | U | 12.28 | 2541.25 | 37.4 | 78 | 32 | 46 | 0.479 |
| 38 | 11 | U | 14.73 | 2538.80 | 59.9 | 90 | 32 | 58 | 0.666 |
| 39 | 2 | U | 1.78 | 2553.74 | 34.4 | 75 | 27 | 48 | 0.459 |
| 39 | 3 | U | 3.28 | 2552.24 | 57.5 | 95 | 35 | 60 | 0.605 |
| 39 | 6 | U | 7.78 | 2547.74 | 88.3 | 101 | 34 | 67 | 0.874 |
| 39 | 8 | U | 10.78 | 2544.74 | 66.6 | 96 | 36 | 60 | 0.694 |
| 39 | 9 | U | 12.28 | 2543.24 | 65.5 | 100 | 33 | 67 | 0.655 |
| 39 | 10 | U | 13.78 | 2541.74 | 32.3 | 47 | 23 | 24 | 0.687 |
| 40 | 1 | U | 0.28 | 2556.02 | 39.6 | 74 | 31 | 43 | 0.535 |
| 40 | 2 | U | 1.78 | 2554.52 | 37.1 | 77 | 26 | 51 | 0.482 |
| 40 | 5 | U | 6.28 | 2550.02 | 55 | 87 | 27 | 60 | 0.632 |
| 40 | 7 | U | 9.23 | 2547.07 | 75.4 | 115 | 42 | 73 | 0.656 |
| 40 | 8 | U | 10.58 | 2545.72 | 52.2 | 88 | 24 | 64 | 0.593 |
| 40 | 9 | U | 12.28 | 2544.02 | 55.3 | 77 | 25 | 52 | 0.718 |
| 40 | 11 | U | 14.73 | 2541.57 | 67.9 | 80 | 32 | 48 | 0.849 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | Nº Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 41 | 2 | U | 1.30 | 2556.96 | 23.4 | 47 | 25 | 22 | 0.498 |
| 41 | 3 | U | 2.58 | 2555.69 | 24.3 | 58 | 24 | 34 | 0.419 |
| 41 | 6 | U | 6.03 | 2552.24 | 67.5 | 84 | 32 | 52 | 0.804 |
| 41 | 7 | U | 7.18 | 2551.09 | 52.2 | 84 | 31 | 53 | 0.621 |
| 41 | 8 | U | 8.25 | 2550.01 | 45.6 | 78 | 30 | 48 | 0.585 |
| 41 | 12 | U | 12.78 | 2545.49 | 65.9 | 86 | 35 | 51 | 0.766 |
| 42 | 2 | U | 1.78 | 2551.01 | 69.4 | 72 | 26 | 46 | 0.964 |
| 42 | 3 | U | 3.28 | 2549.51 | 61.6 | 102 | 30 | 72 | 0.604 |
| 42 | 5 | U | 6.28 | 2546.51 | 54.1 | 83 | 28 | 55 | 0.652 |
| 42 | 7 | U | 9.28 | 2543.51 | 77.4 | 119 | 35 | 84 | 0.650 |
| 42 | 8 | U | 10.78 | 2542.01 | 63 | 95 | 29 | 66 | 0.663 |
| 42 | 11 | U | 14.73 | 2538.06 | 34.1 | 51 | 20 | 31 | 0.669 |
| 43 | 7 | U | 7.18 | 2546.83 | 64.8 | 100 | 37 | 63 | 0.648 |
| 43 | 8 | U | 8.33 | 2545.68 | 53.6 | 102 | 31 | 71 | 0.525 |
| 43 | 11 | U | 11.78 | 2542.23 | 64 | 117 | 35 | 82 | 0.547 |
| 43 | 13 | U | 14.08 | 2539.93 | 24.7 | 64 | 25 | 39 | 0.386 |
| 43 | 14 | U | 14.73 | 2539.28 | 49.6 | 80 | 24 | 56 | 0.620 |
| 44 | 1 | S | 0.23 | 2554.22 | 7.4 | 26 | 16 | 10 | 0.285 |
| 44 | 3 | U | 3.28 | 2551.17 | 58.3 | 109 | 34 | 75 | 0.535 |
| 44 | 4 | U | 4.78 | 2549.67 | 57.6 | 109 | 34 | 75 | 0.528 |
| 44 | 6 | U | 7.78 | 2546.67 | 79.5 | 119 | 39 | 80 | 0.668 |
| 44 | 9 | U | 12.28 | 2542.17 | 46 | 57 | 20 | 37 | 0.807 |
| 44 | 11 | U | 14.73 | 2539.72 | 65.2 | 124 | 34 | 90 | 0.526 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 45 | 2 | U | 1.43 | 2553.39 | 34.5 | 84 | 26 | 58 | 0.411 |
| 45 | 4 | U | 3.73 | 2551.09 | 66.9 | 98 | 29 | 69 | 0.683 |
| 45 | 5 | U | 4.88 | 2549.94 | 69.3 | 107 | 31 | 76 | 0.648 |
| 45 | 6 | U | 6.03 | 2548.79 | 50.2 | 77 | 28 | 49 | 0.652 |
| 45 | 10 | U | 10.63 | 2544.19 | 45.2 | 90 | 28 | 62 | 0.502 |
| 45 | 13 | U | 13.78 | 2541.04 | 38.8 | 84 | 31 | 53 | 0.462 |
| 46 | 2 | U | 1.78 | 2551.86 | 34.8 | 79 | 24 | 55 | 0.441 |
| 46 | 3 | U | 3.28 | 2550.36 | 58.6 | 84 | 29 | 55 | 0.698 |
| 46 | 9 | U | 12.28 | 2541.36 | 70.9 | 96 | 29 | 67 | 0.739 |
| 46 | 10 | U | 13.78 | 2539.86 | 55.3 | 79 | 27 | 52 | 0.700 |
| 47 | 1 | U | 0.28 | 2549.74 | 27.7 | 54 | 22 | 32 | 0.513 |
| 47 | 2 | U | 1.08 | 2548.94 | 28.4 | 45 | 33 | 12 | 0.631 |
| 47 | 5 | S | 3.23 | 2546.79 | 47.7 | 88 | 34 | 54 | 0.542 |
| 47 | 6 | U | 4.28 | 2545.74 | 63.4 | 77 | 28 | 49 | 0.823 |
| 47 | 8 | U | 6.28 | 2543.74 | 70.7 | 81 | 28 | 53 | 0.873 |
| 47 | 14 | U | 12.28 | 2537.74 | 86.5 | 117 | 35 | 82 | 0.739 |
| 47 | 16 | U | 14.28 | 2535.74 | 81.6 | 133 | 36 | 97 | 0.614 |
| 47 | 17 | U | 14.78 | 2535.24 | 72.9 | 125 | 38 | 87 | 0.583 |
| 48 | 2 | U | 1.78 | 2549.33 | 47.9 | 83 | 30 | 53 | 0.577 |
| 48 | 6 | U | 7.78 | 2543.33 | 36.6 | 66 | 25 | 41 | 0.555 |
| 48 | 9 | U | 12.28 | 2538.83 | 80.1 | 96 | 34 | 62 | 0.834 |
| 48 | 11 | U | 14.73 | 2536.38 | 36.5 | 72 | 25 | 47 | 0.507 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

Revisión: 1

REALIZAR EL DISEÑO A NIVEL DE INGENIERÍA DE DETALLE DE LA PLANTA DE TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Elaboró: LFEV

Fecha: Enero 2016

| Identificación de la muestra | | | Profundidad Media (m) | Cota promedio (m.s.n.m) | Propiedades Índice | | | | |
|------------------------------|------------|------|-----------------------|-------------------------|------------------------|-------------------|---------------------|---------------------------|-------|
| Perforación | N° Muestra | Tipo | | | Humedad natural wn (%) | Límite Líquido(%) | Límite Plástico (%) | Índice de plasticidad (%) | Wn/LL |
| 49 | 2 | U | 1.43 | 2546.21 | 58.4 | 99 | 38 | 61 | 0.590 |
| 49 | 3 | U | 2.58 | 2545.06 | 44.5 | 108 | 42 | 66 | 0.412 |
| 49 | 4 | U | 3.73 | 2543.91 | 48.2 | 85 | 23 | 62 | 0.567 |
| 49 | 6 | U | 6.03 | 2541.61 | 83.7 | 131 | 38 | 93 | 0.639 |
| 49 | 8 | U | 8.33 | 2539.31 | 63.3 | 99 | 30 | 69 | 0.639 |
| 49 | 11 | U | 11.78 | 2535.86 | 91.7 | 176 | 53 | 123 | 0.521 |
| 49 | 13 | U | 14.08 | 2533.56 | 84.3 | 133 | 40 | 93 | 0.634 |
| 50 | 3 | U | 3.90 | 2535.26 | 22.5 | 39 | 20 | 19 | 0.577 |
| 50 | 5 | S | 6.83 | 2532.34 | 98 | 129 | 33 | 96 | 0.760 |
| 50 | 8 | U | 11.30 | 2527.86 | 56 | 72 | 27 | 45 | 0.778 |
| 50 | 9 | U | 12.80 | 2526.36 | 36.9 | 95 | 30 | 65 | 0.388 |
| 50 | 11 | U | 14.80 | 2524.36 | 46.5 | 82 | 31 | 51 | 0.567 |
| 52 | 2 | U | 1.78 | 2549.43 | 29.7 | 86 | 25 | 61 | 0.345 |
| 52 | 3 | U | 3.28 | 2547.93 | 52.2 | 80 | 28 | 52 | 0.653 |
| 52 | 4 | U | 4.78 | 2546.43 | 44.6 | 89 | 32 | 57 | 0.501 |
| 52 | 6 | U | 7.78 | 2543.43 | 58.3 | 100 | 31 | 69 | 0.583 |
| 52 | 7 | U | 9.28 | 2541.93 | 89 | 133 | 39 | 94 | 0.669 |
| 52 | 8 | U | 9.78 | 2541.43 | 96.2 | 119 | 37 | 82 | 0.808 |
| 53 | 2 | U | 1.78 | 2547.63 | 34.7 | 81 | 36 | 45 | 0.428 |
| 53 | 3 | U | 3.28 | 2546.13 | 52 | 92 | 35 | 57 | 0.565 |
| 53 | 4 | U | 4.78 | 2544.63 | 61 | 60 | 23 | 37 | 1.017 |
| 53 | 5 | U | 6.28 | 2543.13 | 80.7 | 103 | 24 | 79 | 0.783 |
| 53 | 7 | U | 9.28 | 2540.13 | 68.5 | 133 | 24 | 109 | 0.515 |



EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS

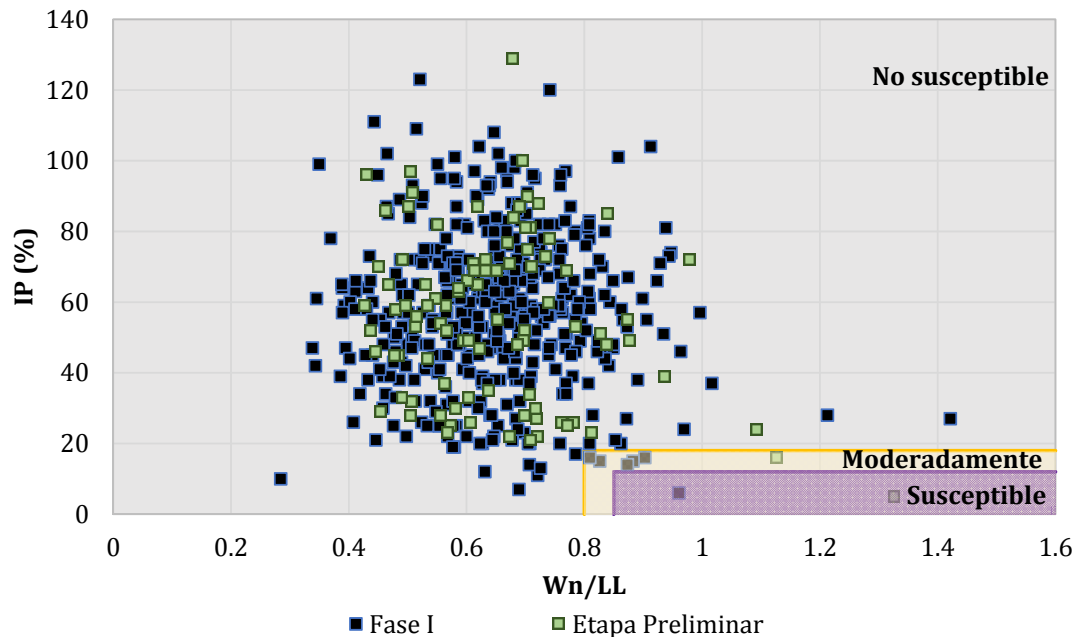
TRATAMIENTO DE AGUAS RESIDUALES DE "CANOAS" EN LOS COMPONENTES ASOCIADOS AL SISTEMA DE TRATAMIENTO PRIMARIO CON ASISTENCIA QUÍMICA

Revisión: 1

Elaboró: LFEV

Fecha: Enero 2016

**EVALUACIÓN DE SUSCEPTIBILIDAD A LA PÉRDIDA DE RESISTENCIA POR ABLANDAMIENTO CÍCLICO EN SUELOS FINOS
BRAY ET AL. (2004) - FASE I DE LA PTAR CANOAS**



Criterio de susceptibilidad por ablandamiento cíclico:
*Si $IP \leq 12$ Y $W_n/LL > 0.85$ el material es susceptible a la pérdida de resistencia por ablandamiento cíclico.
*Si $W_n/LL > 0.8$ y $12 < IP \leq 18$ el material es moderadamente susceptible a la pérdida de resistencia por ablandamiento cíclico.
*Si el material no cumple con ninguno de estos criterios no es susceptible a presentar pérdida de resistencia por ablandamiento cíclico.